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# *On Ilyopsyllus coriaceus and other Crustacea taken at Alnmouth, Northumberland, in 1899.*

By George Stewardson Brady, M.D., LL.D., D.Sc., F.R.S., C.M.Z.S. (Plates XI.—XIII.)

The remarkable little Crustacean which forms the principal subject of this paper was first described from specimens taken by the late Dr. David Robertson and myself in 1872. These specimens were found in black peaty mud about the roots of fuci near the head of Roundstone Bay, Ireland, and not far from high water mark. The mud was collected for the sake of any shells of Foraminifera and Ostracoda which it might contain, and was simply bagged and dried for examination at home. Copepoda of ordinary constitution would have been so shrivelled by this treatment as to be practically useless and indeed almost unrecognisable, but this species possesses an integument so dense as to undergo comparatively little change in drying, while its usually vivid red colour, which seems to withstand not only desiccation but most chemical reagents, renders it easy of detection amongst its native mud. Nevertheless I was unable from the dried material to make out satisfactorily the more minute details of its structure, and from that time up to the autumn of the present year (1899) no further material has been available. About ten years ago I found a single specimen amongst a gathering of mud-loving brackish water species from Lymington, Hants; and I have had sent to me—I think by Dr. Chevreux, though I have no written memoranda—two or three specimens found in oyster-ooze from Arcachon, France. And only this morning Dr. Norman writes to me as follows:—"I have lately found *Ilyopsyllus* in a gathering made in 1874 in Birtirbuy Bay; and after all these years in spirits the brilliant red colour remains." I am not aware that the species has been seen by any other observer, except Mr. T. Scott, who has taken a single specimen at the mouth of the River Alness on the Cromarty Firth.

During a recent visit to Alnmouth, however, I was fortunate enough to meet with *Ilyopsyllus* in the mud of the salt-marshes near the mouth of the Aln. It is not confined to one bit of the river but may be found I think almost anywhere on the surface of the tidal mud, though probably restricted pretty much to the belt just below high water mark. Most of my specimens were obtained in the extensive backwater on the south side of the river, in a patch of reeds growing at the extreme edge. The little creature is by no means abundant and one has to collect a good deal to secure a very few examples. In the very first gathering which I made there I noticed, on examining my captures with a powerful hand-lens, a minute moving speck of a brilliant red colour, so brilliant that one must resort to the terms of the jeweller adequately to describe it; ruby is indeed pale by comparison. I at once recognized that I had chanced, for the third time upon *Ilyopsyllus*, and a few more visits to the place enabled me to secure specimens, few indeed, but sufficient for further investigation of its structure. The creature is very small and its extremely tough exo-skeleton makes its dissection a matter of difficulty: moreover it is extremely opaque, and I found it impossible to get rid of the colour. I tried steeping specimens in solution of Potash and in Sulphurous Acid, but without effect. Perhaps a more prolonged immersion in some such medium might give better results. Still, I have succeeded, I think, in making out most if not all of the structural details, which are in many respects of great interest. It may be noted that Mr. T. Scott has described in a paper on the Entomostraca of the Gulf of Guinea,* a very closely allied (perhaps really the same) species—*Ilyopsyllus affinis*—which was taken amongst Confervæ in a lagoon at São Thomé Island. The very minute mouth organs of this species are illustrated in detail, but do not seem altogether to agree with those which I have been able to observe in *I. coriaceus*. Unfortunately no further specimens of *I. affinis* are available for comparison and the original dis-

* Report on Entomostraca from the Gulf of Guinea by Thomas Scott, F.L.S., Naturalist to the Fishery Board for Scotland (Trans. Linn. Soc., Lond.. 2nd series, Zoology, Vol. vi., Part 1, 1894).

sections (in the British Museum) have now, as I am informed by Professor T. Jeffrey Bell, deteriorated so as to be useless. For a revision, therefore, of my original description I have had to depend entirely on the new material obtained at Alnmouth. My chief difficulty has been with the mouth-organs, in the examination of which I have sacrificed all my specimens. The result, though not entirely satisfactory, is such as to render a new description of the animal desirable. This will be found on a succeeding page.

The following list comprises all the Crustacea noticed by me during my visit to Alnmouth—29th August to 12th September. My collecting was confined to the littoral zone: I did neither dredging nor tow-netting. The greater part were obtained in weedy pools among the rocks near low-water mark, others on the muddy river bank or in brackish pools subject to tidal overflow: the estuarine forms are marked in the list with an asterisk. Some of the species are new to our district; a few are apparently new to science: of these I give here brief descriptions. For the determination of the Amphipoda and Isopoda I am indebted to the Rev. Canon Norman who kindly examined my specimens. Amongst this group Dr. Norman considers the following as additions to our local fauna; *Paratylus uncinatus* (G. O. Sars), *Apherusa borealis* (G. O. Sars). Amongst the Schizopoda, *Siriella norvegica* and *S. armata* are hitherto unrecorded. The more interesting species of Entomostraca are considered in detail further on.

*Schizopoda.* Macromysis flexuosus. (Müller). (Very abundant in the river and in tide-pools).
Siriella armata, G. O. Sars.
,, norvegica, G. O. Sars.

*Amphipoda.* Apherusa bispinosa, Sp. Bate.
,, jurinei, M. Edwards.
,, borealis. G. O. Sars.
Calliopius Rathkei, Zaddach.
Paratylus uncinatus, G. O. Sars.
Gammarus locusta, Linn.
Amphithoe rubricata, Mont.

*Isopoda.* Idotea granulata, Rathke.
Jœra marina, Linn.

*Copepoda.* *Eurytemora clausii (Hoek).
*Acartia clausii, Giesbrecht.
Parapontella brevicornis (Lubbock).
Cyclops salinus, sp. n.
Cyclopina littoralis, G. S. Brady.
Ectinosoma melaniceps, Boeck.
*Delavalia palustris, G. S. Brady.
*Platychelipus littoralis, G. S. Brady.
Stenhelia limicola, sp. n.
Dactylopus longirostris? Claus.
Thalestris mysis, Claus.
,, peltata (Boeck).
Idya furcata (Baird).
Harpacticus chelifer (Müller).
Zaus spinosus, Goodsir.
Laophonte similis (Claus).
*Ilyopsyllus coriaceus, B. & R.
Echinocheres violaceus, Claus.
Cyclopicera berniciensis, sp. n.
Artotrogus boeckii, G. S. Brady.

## COPEPODA.

### Series 1. Gnathostomata.

*Cyclops salinus.* sp. n. (Plate XII., figs. 11—15).

Anterior antennæ ten-jointed (fig. 11), the first three joints very imperfectly separated; lengths of the joints as in the following formula—

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 3 | 3 | 2 | 2 | 10 | 4 | $2\frac{1}{2}$ | $2\frac{1}{2}$ | 3 |

bearing a few short hairs towards the apex; posterior antennæ simple, three-jointed, without any lateral branch (fig. 12). Swimming feet very short and stout, all the branches three-jointed (figs. 13, 14), the terminal joints much dilated, not much longer than broad. Abdomen (fig. 15) slender, elongated,

joints of the furca quite four times as long as broad, distinctly constricted in front of the middle, each bearing two terminal setæ.

*Hab.*—Among Fuci in pools near low-water mark. Only one example of this Cyclops was seen, and it was not in quite perfect condition, but the genus is so little known as inhabiting salt water that it seems desirable to make a record of this species which is undoubtedly distinct from those hitherto described. The marine species already recorded are *Cyclops magnoctavus*, Cragin, found by Mr. I. C. Thompson in "low-water marine pools at Lytham," but which is also a fresh-water species; *C. marinus*, Thompson, dredged in 20 fathoms in the Irish Sea, and *C. Ewarti*, G. S. Brady, which was first found in the Firth of Forth, but has since been noticed by I. C. Thompson in a 20 fathom dredging from the Isle of Man, and by myself in tow-net gatherings from New Zealand. There have also been described two Scandinavian species, *C. magniceps*, Lilljeborg, and *C. christianensis*, Boeck.

*Ectinosoma melaniceps*, Boeck.

This pretty little species,—easily recognized by the dark grey patch upon its head—is generally distributed round the British shores, though nowhere very common. Several specimens occurred in gatherings from among Algæ in tide pools. This is the first record of its appearance in our district, but I have lately found it abundantly in a gathering from Cullercoats.

*Platychelipus littoralis*, G. S. Brady.

This interesting species is tolerably abundant in the mud of the River Aln and in the tidal pools of the adjacent marshes. *Delavalia palustris* occurs as usual in company with it, and with these species one almost always finds associated *Cythere castanea* and *Loxoconcha viridis*.

*Stenhelia limicola*, sp. n. (Plate XII., figs. 1–7.)

In general appearance like *Canthocamptus*, slender, and with very short antennæ and limbs (fig. 1). Anterior antennæ extremely short, scarcely longer than the rostrum (fig. 2) eight-jointed, the peduncle much stouter than the distal portion.

Mandible stout and well-developed (fig. 3), with a large 3 (or 4) lobed palp: swimming feet having both branches three-jointed (figs. 4, 5), laminæ of the fifth pair of feet small, nearly equal in length (fig. 6) and not nearly covering the much elongated ovisac, which, when fully formed, extends almost to the extremity of the abdomen but contains only a small number of very large ova; caudal segments very short, about half as long as broad (fig. 7), the outermost of the terminal setæ very short and bulbously dilated at the base. Length ·66 mm.

Two or three specimens were taken near the old oyster-hatchery at the side of the Aln. I have also specimens of this species which were taken about three years ago on the muddy shores of the River Glen, at Carrick, Co. Donegal.

*Dactylopus longirostris?* Claus. (Plate XIII., figs. 9–12).

*? Dactylopus longirostris.* Claus. Die frei lebenden Copepoden, p. 127, Plate xvii., figs. 4–6.

One imperfect specimen which probably belongs to this species occurred in a gathering from pools near low-water mark. The female only is described by Dr. Claus: my specimen was a male, but the general characters so nearly approach those of the type that I do not much doubt the propriety of the reference. The antenna and some of the limbs are shown in Plate XIII.

*Thalestris mysis*, Claus.

*Thalestris peltata*, (Boeck).

Taken in tide-pools among Algæ. Neither species has before been noticed in our district.

Series 3. Leptostomata,* Series nov.

* λεπτὸς, slender, στόμα a mouth.

Genus *Ilyopsyllus*, B. & R., 1874 (=*Abacola*, Edwards*).

*Ilyopsyllus coriaceus*, Brady and Robertson. (Plate XI., Plate XII., fig. 8).

1873. *Ilyopsyllus coriaceus*, B. & R., Ann. & Mag. Nat. Hist, Ser. 4, vol. XII., page 132. Pl. IX., figs. 1–5.

,, ,, Brady, Monog., Brit. Copep., vol. II., p. 143, pl. LXXXII. figs. 1–10.

* Edwards, C. L. Beschreibung einiger neuen Copepoden, etc., Berlin, 1891.

Outline as seen from above somewhat lozenge-shaped, greatest width behind the middle and equal to about half the length: seen from the side the ventral margin is almost straight, the dorsal forming a very bold and almost semicircular arch (fig. 1) colour deep red, the edges of the abdominal segments uncoloured: rostrum (fig. 3) short, broad and blunt, slightly emarginate at each side where there is attached a short hair; abdominal segments slightly spinous at the lateral angles, caudal segments short and stout, about as broad as long, principal tail setæ as long as the body of the animal, lateral setæ only about one-sixth as long; those of the male are of the usual width (fig. 1), those of the female (plate XII., fig. 8) dilated and spatulate proximally. Anterior antennæ of the *female* (figs. 3, 4) five-jointed, the first joint very large and stout and produced into a hood-like process which overhangs the second joint, second joint much smaller than the first, but stouter than the remaining three; in the *male* the antennæ are swollen and geniculated, with a clawed apex (fig. 5). Posterior antennæ scarcely shorter than the anterior and quite as stout, destitute of any secondary branch but bearing at the apex four stout claw-like setæ, the penultimate joint also bearing similar setæ. Mandible (fig. 8) extremely small, almost obsolete, and provided with a small bisetose, two-jointed palp: the remaining mouth-organs consist of a series of minute filamentous appendages (fig. 7) arranged on each side of what appears to be a suctorial, protrusile mouth. Outer branch of the first pair of feet three-jointed, each joint bearing a stout, curved marginal spine, the apical joint having in addition three long terminal setæ (figs. 9, 10); outer branch two-jointed, bearing two apical setæ, which in the *female* are simply curved, but in the *male* are shorter and stouter, divergent and bulbously dilated at the bases: the second, third, and fourth pairs of feet have both branches three-jointed (figs. 11, 12) and bear very long and delicately plumose setæ, fifth pair (Plate XII., fig. 16) very minute, each foot consisting of a subquadrate lamina tapered and furcate at the distal end. The feathering of the setæ as represented in fig. 11. is much too coarse and is in fact scarcely perceptible except with higher

microscopic powers. Between the bases of the fourth pair of feet in the *male* is a complex lobose organ very similar in general aspect to the copulating apparatus of some Ostracoda (figs. 12, 13). The spermatophores (fig. 14) are very large in proportion to the size of the animal extending when *in situ* over nearly one-third of the length of the body. Length ·55 mm.

*Hab.*—On the surface of mud near high-water mark on the margin of the River Aln.

The structure figured and described in the Monograph of British Copepoda, as a fifth pair of feet seems to be only a part of tho peculiar organ found at the basis of the fourth pair in the male but non-existent in the female. The situation of the organ would rather lead to the supposition that it may be in some way connected with the reproductive function, but of this I can say nothing certainly.

The movements of the animal in a living condition are very interesting. I was unable with the imperfect appliances available at Alnmouth, to isolate a specimen under the microscope, but with a hand-lens its habits could be fairly well watched, the brilliant colour of the animal making it conspicuous. So far as I have seen it never attempts to swim, but glides very actively and with a sort of serpentine or eel-like motion among the particles of mud or debris. How the motion is produced I could not ascertain, but my impression is that it is by the action of the tail rather than the feet,—a motion rather of the "pulsellum" than the "tractellum" kind. The flexible abdomen and long tail, with the massive, immobile character of the anterior part of the body seem to support this view.

The genus *Abacola* proposed by C. L. Edwards (*loc. cit.*) is undoubtedly identical with *Ilyopsyllus*, the latter name having the claim of priority. *Abacola holothuriæ*, however, appears to be parasitic either in or on a sea-cucumber, and is probably distinct from the British species.

The mouth organs are totally different from those of any other Copepoda known to me. The almost obsolete mandibles, and the reduction of all the other mouth apparatus—maxillæ and maxillipeds—to a few very minute filaments or setæ, preclude its

coming into line with any one of the three divisions established by Thorell. I therefore propose for the reception of *Ilyopsyllus* a new section under the name Leptostomata. The divisions of Copepoda based upon the structure of the mouth organs would then stand as follows.

*Series 1.* Gnathostomata

Os mandibulis duabus libens tribusque paribus maxillarum instructum, siphone nullo.

*Series 2.* Pœcilostomata

Os mandibulis et siphone carens, maxillarum paribus 3—1 (—0) instructum.

*Series 3.* Leptostomata

Os mandibulis duabus perparvis et maxillarum paribus (?3) tenuissimis instructum, siphone nullo.

*Series 4.* Siphonostomata

Os in siphonem, mandibulis 2 plerumque includentem productum et maxillarum paribus 3—0 instructum.

According to the view taken in this arrangement, the differences which separate Series 1 from 2, 3, and 4 are analogous to those which divide mandibulate from haustellate insects, the chief distinction between Siphonostomata and the two intermediate groups, Pœcilostomata and Leptostomata, being the presence of a siphon or suctorial tube in which certain of the mouth-organs are enclosed. There may, of course, be transitional forms difficult of reference to any group, but this is a disadvantage common to all systems of classification.

Series 4. Siphonostomata.

Echinocheres violaceus, Claus. (Plate XII., figs. 9, 10).

1889. *Echinocheres violaceus*, Claus, Über neue oder wenig bekannte halbparasitische Copepoden, p. 30, Plate VI., figs. 1—10.

A single specimen which agrees closely with Dr. Claus' figures and description was found in a gathering taken among Algæ in tide-pools. I give a drawing of the entire animal and an enlarged figure of the anterior antenna. My specimen, however, was a little defective as to setæ, which had doubtless been

broken and injured accidentally. Dr. Claus says respecting it "this pretty violet, black-pigmented Ascomyzontid" was first found amongst Algæ along with other Copepoda, but that later he had discovered it to be parasitic upon *Strongylocentrotus lividus* "with the colouring of which it remarkably harmonizes," and he adds that Dr. Græffe had found specimens of that sea-urchin infested with hundreds of *Echinocheres* both male and female.

Cyclopicera berniciensis, sp. n. Plate XIII., figs. 1—8.

*Male.* Anterior antennæ seventeen-jointed, with a small inner branch (fig. 2): swimming feet with both branches three-jointed (fig. 5) but the outer branch of the fourth pair is short, the last two joints being rudimentary and without spines, the terminal joint spine-like and subulate. In other respects *C. berniciensis* presents the usual characters of the genus. Of this species only one example was found: it occurred in the same gathering as the *Echinocheres* and, like it, was a good deal damaged.

Artotrogus boeckii, G. S. Brady.

This species I have not previously seen except from the West coast of Ireland. A single specimen was found at Alnmouth among Algæ near low-water mark.

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Among other interesting specimens taken at Alnmouth were the following:—In brackish water by the side of the river were found several specimens of *Acartia clausii*, all of which were infested with what is probably an immature Trematode parasite. This in its most advanced condition forms a large club-shaped projection on the dorsal surface of the cephalothorax. I secured only about half-a-dozen specimens of the *Acartia*, and from these have not been able to trace completely the development of the parasite, and a later visit to the locality in the hope of obtaining more material was unsuccessful. In Plate XIII. will be found drawings of some of its stages. The ova of the fluke are probably swallowed by the *Acartia* and begin their development in its alimentary canal, eating or boring their way through the tissues until they appear externally. The earliest stage which I have seen is shown in fig. 14,—a rounded, finely cre-

nated prominence of the cephalothoracic integument; further developments are seen in figs. 13 and 14, and in fig. 16 is shown what is probably the final stage of the intermediate life history. At the distal extremity in figs. 13 and 16 may be noticed small sucking discs (?), and in fig. 16 a structure, which Prof. G. O. Sars has called in a similar organism, the byssus thread*. The probability seems to be that the parasite represents the larval stage of a fluke of which the *Acartia* is the intermediate host. Where the final steps of the fluke may be attained it is impossible at present to say; probably, I think, in the intestine or on the outer surface of some fish. The dab, being very abundant in the river Aln, may perhaps be the final host, but I cannot hear of any fluke having as yet been found in or on it.

Alcyonidium hirsutum. This beautiful Polyzoon seems to grow abundantly on the reef of rocks immediately to the north of Alnmouth. I could always find it among the heaps of washed-up seaweed there, but, excepting a few very small young specimens I did not succeed in finding it growing. Probably it lives chiefly a little beyond low-water line. I mention it here on account of the minute Algæ which live on and in it in great abundance,—so abundantly indeed that the creature itself is often quite masked by its deep red investment. This at first deceived me into the belief that I had got an actual red Alga. I am indebted to E A. Batters, Esq., for examining and naming these parasites, and for kindly allowing me to print the following list of them.

*Endozoic species.*

Chantransia endozoica, Darbishire.

Epicladia flustræ, Rke.

var. Phillipsü, Batt.

* The description here referred to will be found in Prof. G. O. Sars' report on the Schizopoda of the "Challenger" expedition, p. 221, plate 38. Respecting the byssus Sars says "the most peculiar feature is the mode in which the parasite is affixed within the body cavity of the Schizopod. For this is not effected by any of the sucking discs, but with the aid of a kind of byssus excreted from the posterior end of the animal and dispersed within a peculiar sac-like body lying transversely within the posterior part of the body cavity of the Schizopod and at least with one of its extremities firmly connected with the outer skin." A structure very similar to this is seen at fig. 19, Plate XIII.: the byssus thread is marked *b*.

*Epizoic species.*

Chantransia Daviesü, Thur.
Erythrotrichia carnea, J. Ag.
Ceramium rubrum, Ag.
Polysiphonia urceolata, Grev.
Rhodochorton membranaceum, Mag.
Spermothamnion Turneri, Aresch.
var. repens. Le Jol.
Pylaiella littoralis, Kjellm.
? Rhodymenia palmata, Grev.

Hardly more than ·5 mm. high.

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## EXPLANATION OF PLATES.

### Plate XI.

Ilyopsyllus coriaceus.

Fig. 1. Female seen from right side × 140.
2. Abdomen of male seen from above × 240.
3. Anterior antenna of female, with rostrum × 240.
4. The same seen obliquely × 240.
5. Anterior antenna of male × 280.
6. Posterior antenna × 280.
7. Mouth and mouth-organs × 550.
8. Mandible and palp × 280.
9. Foot of first pair, female × 240.
10. ,, ,, male × 240.
11. Foot of second pair, male × 240.
12. ,, fourth ,, ,, × 240.
13. Appendages of fourth pair of male × 240.
14. A spermatophore × 240.

### Plate XII.

Stenhelia limicola ♀

Fig. 1. Female seen from left side × 100.
2. Anterior antenna × 440.
3. Mandible and palp × 440.
4. Foot of first pair × 240.
5. ,, third pair × 240.
6. ,, fifth pair × 240.
7. Furca × 240.

ILYOPSYLLUS CORIACEUS.

8. Tail of female × 240.
16. Fifth pair of feet of male × 440.

ECHINOCHERES VIOLACEUS ♂

9. Male seen from below × 100.
10. Anterior antenna × 250.

CYCLOPS SALINUS ♀

11. Anterior antenna × 300.
12. Posterior antenna × 300.
13. Foot of first pair × 300.
14. ,, third pair × 300.
15. Tail × 250.

## PLATE XIII.

CYCLOPICERA BERNICIENSIS ♂

Fig. 1. Anterior antenna × 240.
2. Posterior antenna (imperfect) × 240.
3. Mandible × 240.
4. Footjaw × 240.
5. Foot of third pair × 240.
6. ,, fourth pair × 240.
7. ,, fifth pair × 240.
8. Abdomen and tail × 150.

DACTYLOPUS LONGIROSTRIS ♂

9. Anterior antenna × 250.
10. Foot of first pair (imperfect) × 250.
11. ,, second pair × 250.
12. ,, fifth pair × 250.

TREMATODE PARASITE OF ACARTIA CLAUSII.

13. Acartia, with parasite *in situ* × 66.
14. Early external stage of parasite × 66.
15. Later stage of parasite × 66.
16. Final ,, ,, × 66.
17. Portion of cuticle of the same × 240.

*An Afternoon's Dredging off Cullercoats.* By Professor G. S. Brady, M.D., F.R.S., &c.

The President of the Northumberland Coast Club (Alderman Dent) having kindly lent his steamer "Livingstone" for the purpose, a party of some thirty or forty members of the Club set out for a short dredging excursion from Cullercoats on the afternoon of the 24th of July last. The weather was delightfully fine and the sea smooth, and the results of the afternoon's work were, if not very wonderful, at any rate interesting enough to deserve record. The ground dredged over was not of the best or most productive character, the most conspicuous contents of the net being generally a few of the commoner Echinoderms with masses of Dead Man's Finger (*Alcyonium digitatum*). But in the washings from the débris were afterwards found a considerable number of interesting Crustacea, lists of which are here given. I have to thank our old friend the Rev. Canon Norman for having kindly examined and named the Cumacea, and the Rev. T. R. R. Stebbing for a similar service as regards the Amphipoda. All the specimens were taken in a depth of about twenty fathoms.

The tow-net captures were also of great interest. Those which call for special notice here were *Actinotrocha*, and the small flagellate Infusorian, *Ceratium tripos*, which was extremely abundant,—also a few specimens of *Cyphonautes*, the free-swimming larva of a Polyzoon, *Membranipora pilosa*. *Actinotrocha*, the larval form of *Phoronis*, a beautiful tubicolous "worm" of uncertain affinity has not been previously noticed in our district: it has indeed been recorded from only a very small number of localities on the British coasts. It may be interesting to note that whereas both Mr. Meek and myself had tow-nets overboard, Mr. Meek captured only one *Actinotrocha*, whilst I had a very large number, the reason, probably, being that my net was sunk to the depth of a few fathoms, whereas Mr. Meek's was worked close to the surface.

Crustacea.

*Amphipoda.* Melphidipella macra, Norman.
Erichthonius abditus, Templ.

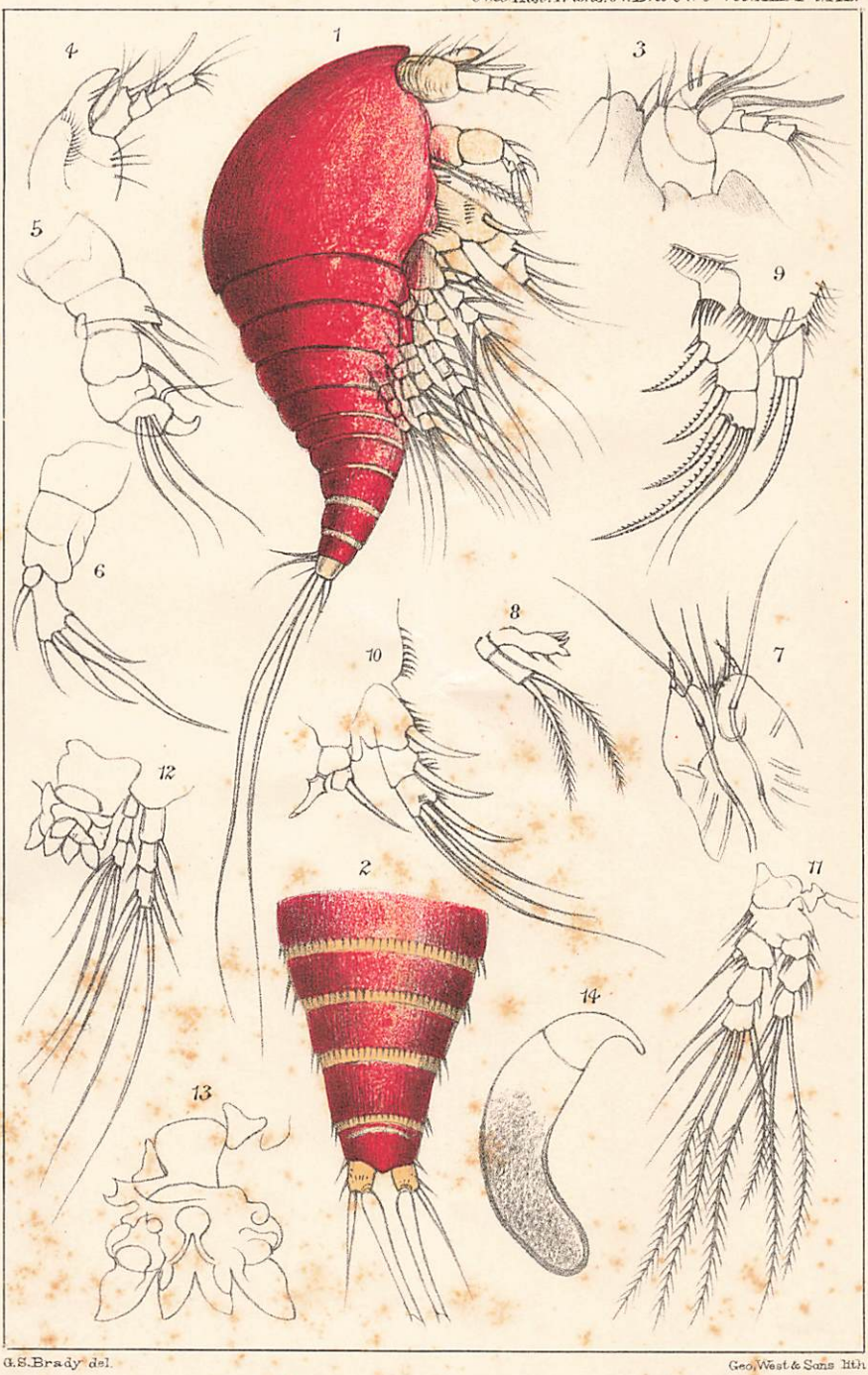
Paratylus vedlomensis, Sp. Bate.
Cressa dubia, Sp. Bate.
Gitanopsis inermis, G. O. Sars.
Ampelisca brevicornis, Costa = A lævigata, Lillj.
Ampelisca spinipes, Boeck.
Haploöps tubicola, Lillj.
Guernea coalita, Norman.
Protella phasma, Montagu.

*Cumacea.* Diastylis rugosa, Sars.
Diastylis lævis, Norman.
Cuma scorpioides, Mont.
Pseudocuma cercaria, Van Beneden.

*Cladocera.* Evadne nordmanni, Lovèn.
Podon polyphemoides, Leuckart.

*Copepoda.* Calanus finmarchicus, Gunner.
Pseudocalanus elongatus, Boeck.
Acartia longiremis (Lillj).
Oithona spinifrons, Boeck.
Anomalocera patersonii, Templ.
Temora longicornis, Müller.
Longipedia coronata, Claus.
Ectinosoma sarsi, Boeck = E. spinipes, Brady, Monog. Brit. Copepoda.
Stenhelia ima, Brady.
Thalestris northumbrica, Brady, M.S.
Diosaccus tenuicornis (Claus)
(on Laminaria near low-water mark).
Peltidium interruptum (Goodsir).
Zaus goodsiri, G. S. Brady.
Lichomolgus fucicolus, G. S. Brady.
Dermatomyzon nigripes (B. & R.)
Cyclopicera, sp.

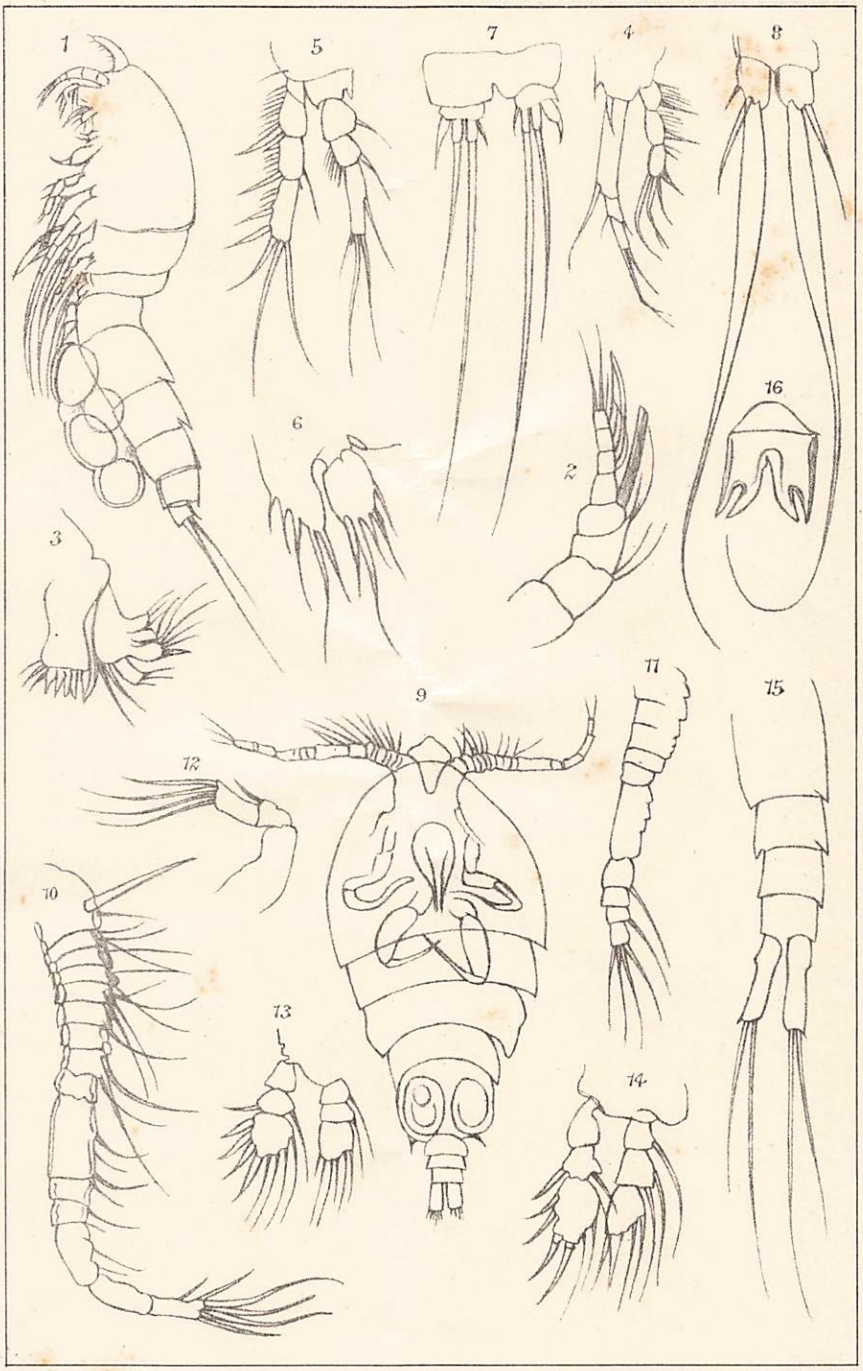
In the wash of the dredge there were found also a few specimens of an *Echinorhynchus*—unknown except as internal parasites of fishes, etc. The free condition we must assume to be accidental.




G.S.Brady del.

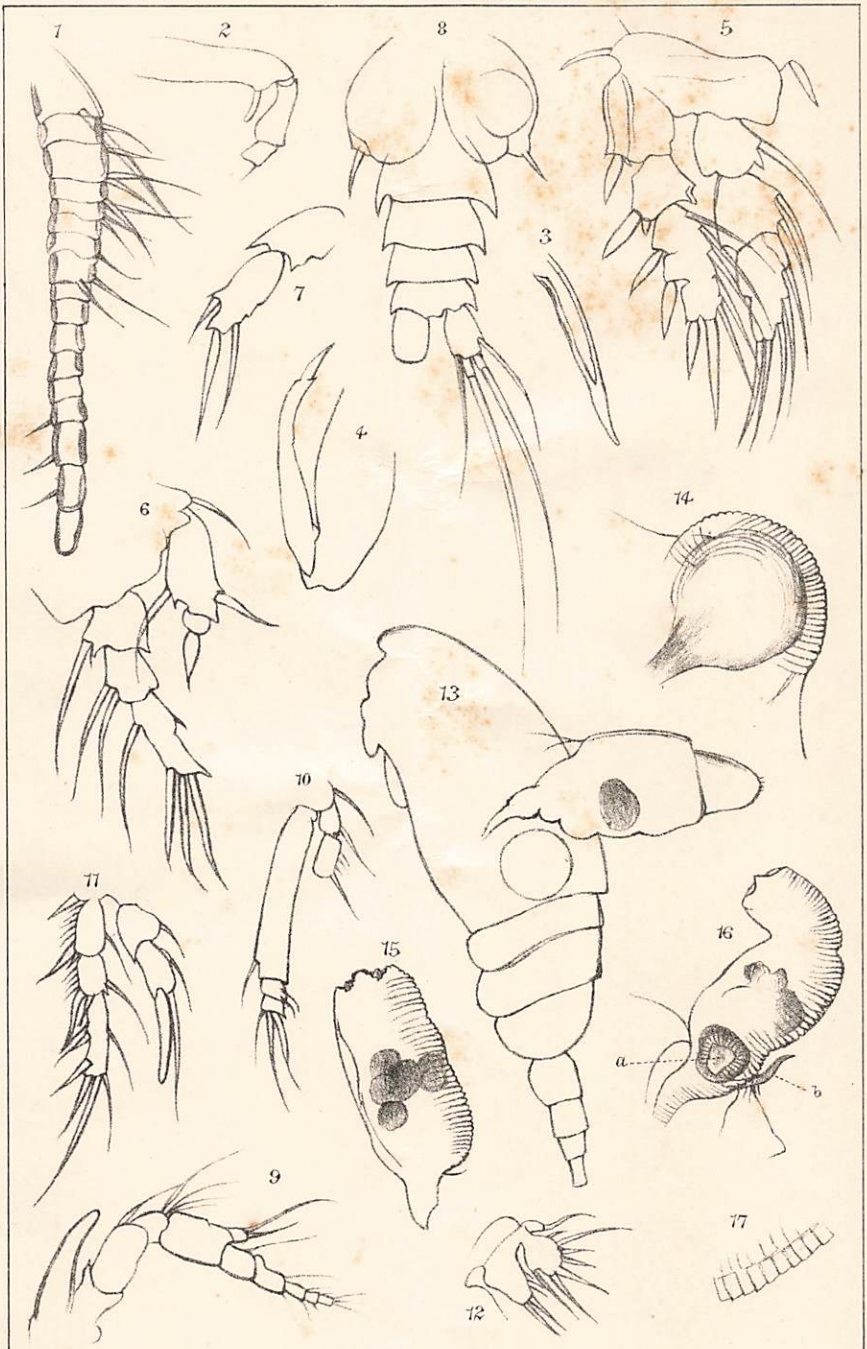
Geo. West & Sons lith.

ILYOPSYLLUS CORIACEUS.




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

1 – 7 STENHELIA LIMICOLA
8, 16 ILYOPSYLLUS CORIACEUS
9, 10 ECHINOCHERES VIOLACEUS
11 – 15 CYCLOPS SALINUS.




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

1 – 8 CYCLOPICERA BERNICIENSIS
9 – 12 DACTYLOPUS LONGIROSTRIS
13 – 17 PARASITE OF ACARTIA.