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CONTRIBUTIONS

TO THE STUDY OF THE

ENTOMOSTRACA,

BY GEORGE STEWARDSON BRADY, C.M.Z.S.

VII.—A LIST OF THE

NON-PARASITIC MARINE COPEPODA

OF THE

NORTH-EAST COAST OF ENGLAND.

PLATES XVII.—XXI.

THE following list, though embracing all the species at present known to me as inhabiting our district, must be taken only as an instalment of what an exhaustive survey would no doubt reveal. The examination of these little creatures is exceedingly tedious and laborious, the points of difference being often indistinguishable except with tolerably high microscopic powers. Thus a very small gathering, if it contain any great variety of species, will often occupy many hours in its examination.

By far the greater number of species here noted, or described by foreign authors, are free-swimming animals; some have a special predilection for the fronds of fuci, and others for muddy localities or the bed of the sea, but little is yet known of the ground-inhabiting forms, and among them there remains doubtless a rich harvest for future collectors.

Two of the species described in Baird's "British Entomotraca," it seems impossible to identify—*Canthocampus Stromii* and *C. minuticornis*. The former name probably applies to some member of the genus *Thalestris*, the latter perhaps to a *Laophonte*. Neither species is included in the following list.

FAM. CALANIDÆ, Dana.

SUB-FAM. CALANINÆ, Dana.

GENUS CALANUS, Leach.

(*CETOCHILUS*, R. de Vauzème, fide Boeck).

1. CALANUS FINMARCHICUS, (Gunner.)

Monoculus finmarchicus, Gunner, Act. Hafn. (1765), X., 175, f. 20-23.

Cetochilus septentrionalis, Goodsir, Edin. New Phil. Journ., XXXV., 339, Pl. VI., figs. 1-11. Baird, Nat. Hist. Brit. Entom. (1850), p. 335, T. XXX., figs. 1a-g.

Cetochilus helgolandicus, Claus, Die frei leb. Copep. (1863), p. 171, T. XXVI., figs. 2-9.

According to M. Boeck the species described first by Gunner as *Monoculus finmarchicus* is identical with the *Cetochilus helgolandicus* of Claus, and not at all with the species called by Baird *Temora finmarchica*. Leach's genus *Calanus* was, however, constituted to receive Gunner's species, and is synonymous with the more recent name *Cetochilus*, applied by Roussel de Vauzème to the same animal. Not having the opportunity of reference to the original memoirs of Gunner and Leach, I must accept as substantially correct M. Boeck's careful account of this synonymy. The generic name *Cetochilus* will therefore give way to *Calanus*.

The present species, *C. finmarchicus*, is generally distributed all around our coast, being met with in equal abundance both between tide marks and in the open sea. It is said to constitute an important part of the food of the whale.

GENUS CLAUSIA, *Boeck.*1. CLAUSIA ELONGATA, *Boeck.*

Clausia elongata, Boeck, Oversigt Norges Copep. (1864), p. 10.

Clausia Clausii, Brady, Nat. Hist. Trans. N. & D. (1865), Vol. I., p. 33, Pl. I., figs. 1-11, 13.

Often taken in abundance, by the surface net, in the open sea, and in tide-pools, all along our coast.

Boeck's *C. elongata* is undoubtedly the same species as that described by myself (possibly a little later, though I am not perfectly sure as to the actual date of publication of Boeck's monograph) under the name *Calanus Clausii*. The differences between this and the genus *Paracalanus*, Boeck (*Calanus*, Claus) lie chiefly in the one-jointed inner branch of the first foot, and in the very small or entirely wanting fifth foot of the female. It is, I think, open to doubt whether these ought to be considered of generic importance, but the separation having been made, it seems best to adhere to it.

GENUS DIAS, *Lilljeborg.*1. DIAS LONGIREMIS, *Lilljeborg.*

Abundant all round the British Islands, both in the open sea and between tide marks: frequent also in brackish water.

GENUS TEMORA, *Baird.*1. TEMORA LONGICORNIS, (*Müller.*)

Cyclops longicornis, Müller, Entomostraca (1785), p. 115, T. XIX., figs. 7-9.

Temora finmarchica, Baird, Brit. Entom. (1850), p. 228, T. XXVIII., figs. 1a-g. Claus, Die frei leb. Copep., p. 195, T. XXXIV., figs. 1-11. Brady, Nat. Hist. Trans. N. & D., Vol. I., p. 36, Pl. I., fig. 15; and Pl. II., figs. 1-10.

Temora longicornis, Boeck, loc. cit., p. 15.

Diaptomus longicaudatus, Lubbock.

(Not *Monoculus finmarchicus*, Gunner).

Common in the open sea; and between tide marks perhaps the most abundant of all British species.

2. *TEMORA VELOX*, Lilljeborg.

In autumn when the brackish pools of salt-marshes have become thoroughly warmed by the sun, this species occurs in such situations in immense profusion. I have only on one or two occasions met with a stray specimen amongst the weeds on the sea-shore.

GENUS ISIAS, Boeck.

1. *ISIAS CLAVIPES*, Boeck.

Isias clavipes, Boeck, loc. cit., p. 18.

Superior antennæ twenty-five-jointed, about equal in length to the cephalothorax, joints short and broad at the base, and gradually increasing in length to the nineteenth, which is about four times as long as broad; first fifteen joints of the male antennæ bearing each a single club-shaped, ciliated, auditory seta: hinge joint of the twenty-one-jointed right male antenna situated between the eighteenth and nineteenth joints; eighteenth joint formed by the coalescence of the normal eighteenth and nineteenth, nineteenth by the twentieth and twenty-first, twentieth by the twenty-second, twenty-third, and twenty-fourth. Mouth organs and swimming feet as in *Centropages typicus*. Fifth pair of feet two-branched, in the *female* having the inner branch of one joint with two terminal setæ, the outer branch of three broad laminar joints, the second of which is produced on the inner margin into a broad spinous process: in the *male* the feet are somewhat similar, but the central joint is destitute of the spinous process, and the terminal joint of the outer branch of one side is expanded into a very broad lamina, which is terminated by a broad ciliated seta. Abdomen of the female, four—of the male, five-jointed. Length, exclusive of tail setæ, $\frac{1}{10}$ th of an inch.

Hab.—Bridlington Bay, several specimens taken in the towing net by Mr. E. C. Davison. On weeds in Roundstone and Clifden Bays, Ireland (*G. S. B.*).

The most distinguishing characters of this fine species are the auditory setæ, with which the upper antennæ are on their basal portions thickly clothed, and the broadly laminar construction of the fifth pair of feet, more especially in the male sex.

GENUS CENTROPAGES, *Kroyer*.

(*ICHTHYOPHORBA*, *Lilljeborg*; *CALANOPIA*, *Dana*;
CATOPIA (?), *Dana*).

1. *CENTROPAGES TYPICUS*, *Kroyer*.

C. typicus, *Kroyer* (1849), *Nat. Tidsskr. Anden. Række andet Bind*. Side 288. *Boeck* (1864), *Oversigt over de ved Norges Kyster iagttagne Copepoder*, p. 19.

Ichthyophorba denticornis, *Claus* (1863), *Die frei lebenden Copepoden*, p. 199, Pl. XXXV., figs. 1, 3-9. *Brady*, *Nat. Hist. Trans. N. & D.*, Vol. I., p. 40, Pl. IV., figs. 1-6.

This species occurs not uncommonly in surface net gatherings from the open sea, but never in very great numbers so far as my observation extends. I accept *Boeck's* identification of the species with *C. typicus* of *Kroyer*, but without the opportunity of myself referring for verification to the original description.

2. *CENTROPAGES HAMATUS*, (*Lilljeborg*.)

Ichthyophorba hamata, *Lilljeborg* (1853), *De crustaceis, &c.*, p. 185, T. XXI., figs. 1-5, 7-9, and T. XXII., figs. 9-12; *Brady*, *Nat. Hist. Trans. N. & D.* (1865), Vol. I., p. 39, Pl. IV., figs. 7-10.

I. angustata, *Claus* (1863), *Die frei lebenden Copepoden*, p. 199, T. XXXV., figs. 2, 10-12.

Diaptomus Bateanus, *Lubbock* (1857), *Ann. and Mag. Nat. Hist.* (2nd ser.), Vol. XX., p. 404, Pl. XI., figs. 1-3.

Centropages hamatus, Boeck (1864), Oversigt, &c., p. 20.

Of very frequent occurrence in surface net gatherings from the North Sea. I have also once taken it sparingly amongst fuci near low water-mark, between Sunderland and Ryhope.

SUB-FAM. PONTELLINÆ.

GENUS ANOMALOCERA, *Templeton*.

1. ANOMALOCERA PATERSONII, *Temp.*

Anomalocera Patersonii, Temp., Trans. Ent. Soc. (1837).

Baird, Brit. Entom. (1850); Boeck, loc. cit. (1864).

Irenæus Patersonii, Claus, Die frei leb. Copep. (1863).

Of common occurrence in the open sea all round the British Islands.

GENUS PONTELLA, *Dana*.

1. PONTELLA BREVICORNIS, *Lubbock*.

Pontella brevicornis, Lubbock, Ann. and Mag. Nat. Hist., 2nd Ser., Vol. XX. (1857), Pl. XI., figs. 4-8.

In surface-net off Grimsby, and in Bridlington Bay. Amongst weeds in tide pools near Ryhope, August, 1871. Shetland (*Mr. Norman*).

In a gathering made by Mr. E. C. Davison in Bridlington Bay, this species occurred in great abundance, the contents of the net, which quite filled a six-ounce bottle, consisting of about equal numbers of *P. brevicornis*, *Anomalocera Patersonii*, and larval forms of the higher decapods.

FAM. CYCLOPIDÆ.

GENUS CYCLOPS, *O. F. Müller*.

1. CYCLOPS LUBBOCKII, *Brady*.

C. Lubbockii, Brady, Nat. Hist. Trans. N. and D., Vol. IV., p. 127, Pl. IV., figs. 1-8.

In pools of brackish water, Hartlepool, June, 1866.

2. *CYCLOPS ÆQUOREUS*, *Fischer*.

C. aquoreus, Fischer, Abhandl. der Akad. der Wissenschaft, München (1860), Band VIII., p. 654. Brady, Nat. Hist. Trans. N. and D., Vol. IV., p. 128, Pl. IV., figs. 9-16.

In brackish pools at Seaton Sluice, Northumberland.

3. *CYCLOPS LITTORALIS*, *nov. sp.* Plate XVII., figs. 9-14.

Superior antennæ twenty-two-jointed, clothed with long setæ, more particularly towards the base, joints all very short, the two terminal ones, which are the longest, not being much longer than broad, the twelfth and sixteenth much produced, and bearing a long seta at the external margin. Inferior antennæ without a secondary branch, four-jointed. Fifth pair of feet composed of a single three-jointed branch. Caudal segments about four times as long as broad; setæ four, the two central ones being alike in length and equal to the three preceding segments.

Hab.—Amongst weeds in tidal pools, near Whitley and Ryhope: scarce.

4. *CYCLOPS OVALIS*, *nov. sp.* Plate XVIII., figs. 1, 2.

Superior antennæ twenty-four jointed, as long as cephalothorax, slender and nearly equal in width throughout, joints about equal in length and breadth at the base, gradually increasing in length towards the apex, the terminal joint being about thrice as long as broad; each joint bearing a single short, delicate hair on the external margin, the twenty-second and twenty-third one on each margin, the last having four or five apical setæ. Caudal segments about four times as long as broad, setæ not much longer than the caudal segments.

Hab.—One specimen only taken off Sunderland in the surface net.

GENUS OITHONA, *Baird*.1. *OITHONA HELGOLANDICA*, *Claus*.

Oithona helgolandica, Claus (1863), Die frei lebenden Copepoden, p. 105, Taf. XI., figs. 10-12.

O. spinifrons? Boeck (1864), Oversigt Norges Copep., p. 25.

Taken occasionally in the surface-net. Plentifully off Sunderland, August, 1871. Frith of Forth, Whitby, and Bridlington, in gatherings made by Mr. E. C. Davison.

Boeck's description of *O. spinifrons* seems to me not to indicate any essential difference between it and *O. helgolandica*, Claus, the chief point being the presence of a minute rostrum in the Norwegian specimens, which is not noted in Claus's definition. This, however, might be easily overlooked. I have seen it in some of my examples, but have not succeeded in bringing it into view in others, and should, in fact, have probably missed it altogether, had it not been for M. Boeck's description.

GENUS BOECKIA, *nov. gen.*

Like *Cyclopina* in general appearance. Superior antennæ very short, six-jointed, much shorter than cephalothorax. (Mouth organs totally different from those of any of the allied genera). Swimming feet like those of *Cyclops*, but very short and broad. Fifth pair of feet one-jointed, laminar, spinous. Abdomen much elongated; tail setæ short, ovisacs two.

1. BOECKIA ARENICOLA, *nov. sp.*

Second joint of superior antennæ the longest, three times as long as broad; fourth and fifth joints of equal length, two-thirds as long as the second; sixth joint scarcely as long as the preceding, third the shortest of all, about one-fourth as long as the second. Inferior antennæ short and thick, three-jointed, without any secondary branch, densely beset with rather short and stout setæ. Swimming feet having the marginal angles of the inner branch much produced; margins densely and finely ciliated; lateral spines of the outer branch lanceolate, laminar; the basal joint fringed with a row of somewhat similar, but much smaller spines in pectinate series. Feet of fifth pair consisting of a single slightly curved, club-shaped joint, having on its outer margin one long spiniform seta with two minute ones near its

base; at the truncate extremity two similar large setæ with an intermediate smaller one; on the middle of the inner margin six sub-equal curved setæ of moderate size, and at the extreme angle three of a similar kind but smaller. Abdomen elongated, swollen at the base; caudal segments rather more than twice as long as broad; tail setæ shorter than the abdomen. Length, $\frac{1}{2}$ th of an inch.

One specimen dredged on a sandy bottom, at a depth of four fathoms, off Seaton Carew, September, 1871.

The mouth organs of this animal are of very remarkable structure, but I defer attempting any description or giving any drawings in the hope of being able to illustrate it completely from a better series of specimens.

GENUS PSEUDOCYCLOPS, *nov. gen.*

In general conformation resembling *Cyclops*. Right superior antennæ of male without a hinge joint, but much swollen in the middle. Inferior antennæ two-branched, secondary branch nearly equal in size to the primary. Lower footjaw like that of *Cyclops*. Swimming feet having both branches three-jointed. Fifth pair of feet in the male very complex in structure,—the external branch of one side produced into a powerful sickle-shaped clasping joint, the whole resembling very closely the male copulative organs of some ostracoda.

1. PSEUDOCYCLOPS CRASSIREMIS, *nov. sp.* Plate XVII., figs. 1-8.

Left superior antenna of male seventeen-jointed, basal joint large and stout, those next following very short and broad, gradually decreasing in breadth to the fifteenth, which is about as long as broad; last two joints more slender, about twice as long as broad, the whole limb densely beset on the outer margin, especially towards the base, with long setæ; antenna of right side ten-jointed, the central joints much enlarged, last two suddenly contracted and similar to those of the left side, antepenultimate joint armed with a strong lateral subfalciform process. Both branches of inferior antennæ bearing numerous long, curved

terminal setæ, first joint of the lower branch enlarged and truncate at the distal end. Maxillæ composed of four digitate lobes, each bearing four long terminal setæ. Lower footjaw stout, with almost entire margins. Joints of swimming feet very broad, subtriangular, much produced at the external distal angle. Abdomen slender, four jointed, tail setæ slender, finely plumose, the longest equal to about twice the length of the abdomen. Length of animal, $\frac{3}{8}$ th of an inch.

Hab.—Off Seaham Harbour, dredged in a depth of twenty to thirty fathoms. One specimen only taken.

The characters of this genus are very remarkable and strongly pronounced, especially as regards the fifth pair of feet of the male, which are more complex than anything of the kind hitherto known amongst the Copepoda. Another species referable to the same genus (*P. obtusatus*, Brady M.S.) was taken abundantly in the surface-net by Mr. D. Robertson and myself in Roundstone Bay, Ireland, on a calm moonlight night in June of last year.

GENUS THORELLIA, Boeck.

1. THORELLIA BRUNNEA, Boeck.

T. brunnea, Boeck (1864), Oversigt over de ved Norges Kyster iagt. Copep., p. 26.

Cyclops nigricauda, Norman (1868), Last Shetland Dredging Report, p. 295.

One specimen of this species occurred to me amongst fuci, in pools near low-water mark between Ryhope and Sunderland, in the autumn of 1871. Mr. Norman takes it abundantly amongst Laminariæ in Shetland, and at Tobermory in Mull.

The genus differs from *Cyclops* chiefly in the conformation of the lower footjaw, which is transformed into a four-jointed clawed foot. M. Boeck describes also in the same place another closely allied genus, *Misophria*, in which the maxillæ are formed as in the Harpacticidæ, but with a strongly developed palp; the lower footjaws as in *Calanus*.

GENUS CYCLOPICERA, *nov. gen.*

Superior antennæ about as long as the cephalothorax, many jointed, bearing (as in the Harpacticidæ) a sword-shaped appendage near the distal extremity. Inferior antennæ three-jointed, having a minute secondary branch. Upper footjaw chelate, three-jointed, the last joint forming a doubly-curved very long claw; lower footjaw four-jointed, last two joints forming a long claw, each joint of which bears a spine on its inner margin. Swimming feet as in *Cyclops*. Fifth pair of feet small, one-jointed.

1. CYCLOPICERA LATA, *nov. sp.* Plate XVIII., figs. 3-8.

Superior antennæ twenty-jointed, basal joint large, next eight very short and broad, the following six about as long as broad, sixteenth and seventeenth about twice as long as broad, last three shorter and more slender: seventeenth joint bearing a long laminated ensiform seta. Inferior antennæ tri-articulate, the first joint bearing a minute bi-ciliated, one-jointed branch, second joint of about equal length with the first, third very short, and terminating in a slender claw. Maxillæ two-branched (?), each branch terminating in three long, slender setæ. Fifth pair of feet very small, laminar, with one basal and two apical setæ. First joint of abdomen very short and broad, finely ciliated in the middle of each lateral margin. Caudal joints about twice as long as broad; setæ equal in length to the abdomen.

One specimen only taken amongst weeds in rock-pools at Roker.

FAM. CORYCÆIDÆ.

GENUS MACROCHEIRON, *nov. gen.*

Superior antennæ (6-7 ?) jointed, inferior four-jointed, unciniate. Lower footjaw very large and powerfully chelate. First three pairs of swimming feet alike, each branch being three-jointed, fourth pair with the inner branch small and two-jointed, rudimentary. Fifth joint of cephalothorax long and greatly swollen below. Abdomen five-jointed, all the joints short.

1. *MACROCHEIRON FUCICOLUM*, *nov. sp.* Pl. XVIII., figs. 9-18.

Rostrum short but distinctly angulated. First cephalothoracic segment very large, following three small, fifth constricted at the base, but much swollen and elongated below, equal in length to the preceding three segments: abdominal joints short, none of them longer than broad, the first the shortest. Superior antennæ in the male seven (?), in the female six-jointed. Last joint of lower antenna very short, bearing several long setæ and a long curved claw which is serrated on its inner margin. Terminal claw of the lower footjaw very long and strong, suddenly curved at the extremity. First three pairs of swimming feet short, springing from a large base, the joints short and broad: fourth pair having the outer branch elongated, the inner short, bi-articulate, its second joint bearing two apical setæ. Fifth pair of feet rudimentary, slightly different in the two sexes. Caudal segments about thrice as long as broad, setæ short, ciliated, jointed in the middle. Length, $\frac{1}{3}$ th of an inch. Colour dark brown.

Hab.—Amongst fuci near low water mark, between Ryhope and Sunderland: two or three specimens.

This approaches very closely the genera *Oncaea*, Philippi, and *Antaria*, Dana, but does not seem strictly referable to either of them. Probably, indeed, the two are synonymous. One of my specimens differed in some minor points from the others, whence I supposed it to be of different sex, and have so described it here. The species, however, requires further examination.

FAM. HARPACTIDÆ.

GENUS LONGIPEDIA, *Claus.*1. *LONGIPEDIA CORONATA*, *Claus.*

This beautiful species occurred abundantly on a sandy bottom off Seaton Carew, in a depth of four fathoms, also off Seaham Harbour (twenty to thirty fathoms), and among weeds near the Bell Rock Lighthouse. Mr. Norman finds it in Shetland, and I have myself taken it on the West Coast of Ireland.

GENUS ECTINOSOMA, *Boeck*.1. ECTINOSOMA MELANICEPS, *Boeck*. Pl. XX., figs. 1-12.

Off Seaton Carew and Seaham Harbour in company with the foregoing species, but less abundantly.

The characters of this remarkable species are so distinct that I cannot doubt its identity with that described by Boeck, though I have not noticed anything in my specimens which warrants the term *melaniceps*. Moreover the fifth foot consists of two branches, and not of one only as stated by that author, unless indeed, the Norwegian animal be a different but closely allied member of the same genus.

GENUS TACHIDIUS, *Lilljeborg*.1. TACHIDIUS BREVICORNIS (*Müller*).

Cyclops brevicornis, Müller, Entomotraca, p. 118.

Tachidius brevicornis, Lillj., De crustaceis. Brady, Nat. Hist. Trans. N. and D., Vol. IV., p. 130, Pl. V., figs. 1-9.

In pools of brackish water at Hartlepool, Hylton Dene, and Seaton Sluice.

GENUS IDYA, *Philippi*.1. IDYA FURCATA (*Baird*).

Canthocamptus furcatus, Baird, Brit. Entom. (1850).

Tisbe furcata, Lilljeborg, De crustaceis (1853).

Tisbe ensifer, Fischer, Beitr. zur Kennt. der. Entom. (1860).

Iyda barbiger (?) Phil., Weigmann's Archiv. (1843).

Very common amongst weeds in tide pools.

GENUS WESTWOODIA, *Dana*.1. WESTWOODIA NOBILIS (*Baird*).

Harpacticus nobilis, Baird, Brit. Entom.

One specimen on *Laminaria saccharina* at Roker (1871). Berwick Bay (*Dr. Baird*).

GENUS DELAVALIA, *Brady*.1. DELAVALIA PALUSTRIS, *Brady*.

D. palustris, Brady, Nat. Hist. Trans. N. and D., Vol. IV.,
p. 134, Pl. V., figs. 10-15.

In pools of brackish water at the side of the Seaton Burn,
above Seaton Sluice.

GENUS CANTHOCAMPTUS, *Westwood*.1. CANTHOCAMPTUS IMUS, *nov. sp.* Pl. XIX., figs. 1-5.

Animal slender, sublinear. Superior antennæ of the *female* eight-jointed, the fourth, seventh, and eighth joints bearing several long setæ, the second and third each three of moderate length, the last joint having also five or six smaller marginal setæ arranged in a pectinate series; rostrum long and slender, curvate. Lower foot-jaw simple, chelate, inner margin of hand bearing in the middle one seta of moderate length. First joint of inner branch of first swimming foot equal in length to the entire outer branch, second joint very short, third about half as long as first, bearing three terminal setæ, the middle one being very long and minutely pectinate at the extremity. Outer branch of fifth pair oblong, having two long apical setæ, three shorter ones on outer and one on inner margin; inner branch ciliate on outer, and armed with five long setæ, the last of which is excessively slender, on inner margin. Ovisac single, curvate, containing but few (six to nine) ova, ranged in a single plane, and very large in proportion to the size of the animal. Length, $\frac{1}{3}$ th of an inch.

Hab.—About ten miles off Seaham Harbour, in a depth of thirty fathoms on a muddy bottom: a few specimens only taken.

GENUS LAOPHONTE, *Philippi*.1. LAOPHONTE SIMILIS? (*Claus*).

Cleta similis, Cls., Die Copepoden Fauna von Nizza, p. 23, Pl. V., figs. 13-16.

Amongst weeds in tide pools at Whitley, Cullercoats, and Sunderland, and in brackish water at Seaton Sluice.

My specimens do not entirely agree with the figures and descriptions given by Claus, but I am unwilling, without a more extended examination, to describe them as belonging to a distinct species.

2. LAOPHONTE LAMELLIFERA (Claus).

Cleta lamellifera, Cls., Die frei lebend. Copep., p. 123, Pl. XV., figs. 21-24.

One specimen on frond of *Laminaria saccharina* at Roker.

3. LAOPHONTE HODGII, *nov. sp.* Pl. XXI., figs. 1-9.

Upper antennæ six or seven-jointed, those of the male (?) shorter and thicker than of the female, rather densely setose. Lower footjaw of moderate size, with a very long and slender, slightly curved claw. Outer branch of first foot three-jointed, short. Fifth pair of feet foliaceous, larger in the male, the outer branch elongated, having four or six long setæ on the apex and outer margin, the inner wider, and bearing internally four or five marginal setæ, those situated near the apex being very long. Caudal segments in the female at least four times as long as broad.

Hab.—Off Seaham, dredged in twenty to thirty fathoms. Several specimens were taken. I have a mournful pleasure in naming this species after my late friend, Mr. George Hodge, it having been taken during one of the last dredging excursions in which I had the pleasure of his company.

GENUS CLETODES, *nov. gen.*

Animal resembling *Laophonte* in general appearance. Upper antennæ six-jointed. All the four pairs of swimming feet alike, and having the outer branch three, the inner two-jointed. Lower footjaw chelate. Lower antennæ without a secondary branch.

1. CLETODES LIMICOLA, *nov. sp.* Pl. XXI. figs. 10-17.

Animal, when seen from above, elongated, distinctly indented at each ring of the body. First segment of cephalothorax short, about equal in length to the two following; second and third abdominal segments produced into spinous processes at the lower lateral angles. Upper antennæ in the *female* much shorter than the first cephalothoracic segment; first three joints short, and nearly equal, fourth about half as long as the third, fifth as long as the third, but much more slender; in the *male* forming at the third joint a large vesiculiform swelling, last joint elongated and unciniate. Swimming feet elongated, slender; the outer branch ciliated on the margins, bearing at the apex of each joint, on the external margin, a long slender spine, terminal spines long and slender; the middle joint has also a long apical seta at the inner margin: inner branch two-jointed, the first joint very small, the second long, almost filiform, and dividing at the extremity into one short and two very long lash-like branches. Fifth foot in the *female* foliaceous, the outer branch rather the longer, bearing one long seta at the apex and three shorter ones on the outer margin, inner branch with two long apical setæ; in the *male* the two branches are of nearly equal length, very narrow, simple, one branch bearing one, the other two long setæ at the apex. The caudal segments short, but longer in the *male* than in the *female*, setæ one on each segment, scarcely longer than the segment itself. Length, $\frac{1}{3}$ rd of an inch.

Hab.—Off Seaham Harbour in a depth of twenty to thirty fathoms, on a soft muddy bottom. Two specimens only taken. On account of the peculiar structure of the swimming feet, which were identical in both examples, I think I am justified in referring these to the male and female of the same species. The genus approaches *Lilljeborgia* of Claus, but the characters given by that author, "*Pedum sequentium* (2, 3, 4), *rami interni rudimentarii*, *rami externi triarticulati*, *uncinati*," do not apply here.

GENUS HARPACTICUS, *M. Edwards.*1. HARPACTICUS CHELIFER (*O. F. Müller.*)

Cyclops chelifer, Müller, Entomostraca (1798).

Harpacticus chelifer, Claus, Die frei lebend. Copep. (1863).

Harpacticus chelifer, Boeck, Oversigt Norges. Copep. (1864).

(Not *H. chelifer* of Lilljeborg).

Not uncommon amongst weeds between tide marks. Roker, Whitley, &c. In the open sea off Seaton Carew.

2. *HARPACTICUS GRACILIS*, Claus.

H. gracilis, Cls., Die frei lebend. Copep. (1863)

H. elongatus, Boeck, Oversigt Norges. Copep. (1864).

This occurs in the same situations, though not so frequently as the foregoing species. M. Boeck doubts the identity of his *H. elongatus* with Claus's *gracilis* on account of a difference in the lengths of the antennal joints. This character, however, seems to me to be often subject to considerable variation, and I should not, without some divergence in other respects, be disposed to separate the two forms. Indeed, both approach so closely to *H. chelifer* that it seems questionable whether they might not be more fitly regarded as varieties of that species.

3. *HARPACTICUS FULVUS*, Fischer.

H. fulvus, Fisch., Beitrag. zur Kenntniss der Entom. (1860);
G. O. Sars, Som. 1862, Zool. Reise.

H. curticornis, Boeck, loc. cit., p. 38 (1864).

H. chelifer, Lilljeborg, De crustaceis ex. ord. trib.

Tigriopus Lilljeborgii, Norman, Last Shetland Dredging Report, p. 296.

In pools at or above high water mark; Bambo', Cullercoats, Marsden. Boeck and Sars both describe this species as inhabiting chiefly pools at or above high water mark, which are liable to get warmed by the sun. In such situations it is often extremely abundant in our district.

4. *HARPACTICUS NICEËNSIS*? Claus.

Harpacticus niceensis, Claus, Die Copep.-fauna von Nizza, p. 31, Pl. II., figs. 12-14.

A few specimens which I doubtfully refer to this species have occurred to me on the fronds of *Laminaria saccharina* and other fuci at Sunderland and Ryhope.

GENUS ZAUS, *Goodsir*.

1. ZAUS SPINOSUS, *Goodsir*.

Z. spinosus, Goodsir, Edinbro' New Phil. Journ. (1842);
Claus, die frei lebend. Copep. (1863). Boeck, Oversigt
Norges Copep. (1864).

Common on fuci, and especially on the fronds of *Laminariæ*, in tidal pools and beyond low water mark. Roker, Ryhope, Sunderland, Cullercoats, &c. Shetland (*Rev. A. M. Norman*).

GENUS THALESTRIS, *Claus*.

1. THALESTRIS LONGIMANA, *Claus*.

Frequent on the smaller weeds and on *Laminariæ* in tidal pools; Roker, Sunderland, Ryhope, &c. Also in the open sea, but more rarely.

2. THALESTRIS HELGOLANDICA? *Claus*.

On *Laminariæ* in tide pools at Roker. Not common.

3. THALESTRIS HARPACTOIDES, *Claus*.

In the surface-net off Grimsby and Teesmouth.

4. THALESTRIS CLAUSII, *Norman*.

T. Clausii, Norman, Last Shetland Dredging Report.

Frequent on *Laminaria saccharina* and other weeds in tide pools. Ryhope, Sunderland, Roker, Whitley, &c.

GENUS DACTYLOPUS, *Claus*.

1. DACTYLOPUS TISBOIDES, *Claus*.

On *Laminaria saccharina* at Roker and Ryhope; scarce. Abundant in brackish pools at Seaton Sluice.

2. DACTYLOPUS SIMILIS, *Claus.*

One specimen dredged in a depth of four fathoms off Seaton Carew.

3. DACTYLOPUS BREVICORNIS, *Claus.*

On *Laminaria saccharina*, at Roker; not common.

4. DACTYLOPUS NORMANI, *nov. sp.* Pl. XX., figs. 13-17.

Closely approaching *D. tisboides*, from which it differs, however, in the following particulars:—The superior antennæ are eight-jointed, and not so densely setose, the proportionate lengths of the various joints being as follows:— $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$, $\frac{5}{5}$, $\frac{6}{5}$, $\frac{7}{5}$, $\frac{8}{5}$. The secondary branch of the lower antennæ bi-articulate, each joint bearing two moderately long setæ. Lower footjaw (gnathopod) simply chelate, the inner margin of the hand fringed with short setæ. Longer branch of the first foot slender, bearing almost at the extremity of the outer margin a short ciliated seta. Fifth pair of feet large, outer branch subovate, bearing three long setæ, one at the apex, one on each lateral margin, and three shorter ones on the outer margin between the apical and lateral setæ; inner branch very much smaller, subquadrate, extending only half the length of the outer, bearing four primary setæ, two of them long and two of moderate length, the interspaces being densely ciliated.

Hab.—Roker, on *Laminaria saccharina*; rare.

GENUS SCUTELLIDIUM, *Claus.*1. SCUTELLIDIUM TISBOIDES, *Claus.* Pl. XIX., figs. 6-10.

One specimen on the frond of *Laminaria saccharina* at Roker.

GENUS ALTEUTHA, *Baird.*1. ALTEUTHA BOPYROIDES, *Claus.*

Often taken abundantly in the surface-net, all round the British Islands.

2. ALTEUTHA PURPUCINCTA, *Norman.*

A. purpurocincta, Norman, Last Shetland Dredging Report.

Peltidium purpureum, White, Pop. Hist. Brit. Crust.

On *Laminaria saccharina* at Roker and Cullercoats; frequent. Shetland (*Rev. A. M. Norman*).

3. ALTEUTHA DEPRESSA, *Baird*.

This species, described by Dr. Baird in his "Natural History of the British Entomostraca," is unknown to me, and appears not to have been recognized by any other author. It was taken by Dr. Baird in Berwick Bay.

GENUS ASPIDISCUS, *Norman*.

1. ASPIDISCUS FASCIATUS, *Norman*, Last Shetland Dredging Report, p. 298.

Abundant on the fronds of *Laminaria saccharina* at Roker, Sunderland, and Cullercoats. Shetland (*Rev. A. M. Norman*).

EXPLANATION OF PLATES.

PLATE XVII.

PSEUDOCYCLOPS CRASSIREMIS (male).

- Fig. 1. Animal, seen from right side, $\times 84$.
 Fig. 2. Superior antenna of right side, $\times 210$.
 Fig. 3. " " of left side, $\times 210$.
 Fig. 4. Inferior antenna, $\times 210$.
 Fig. 5. Maxilla, $\times 210$.
 Fig. 6. Lower footjaw, $\times 210$.
 Fig. 7. Fifth pair of feet, $\times 120$.
 Fig. 8. Last abdominal segments and tail, $\times 84$.

CYCLOPS LITTORALIS.

- Fig. 9. Superior antenna, $\times 210$.
 Fig. 10. Inferior antenna, $\times 210$.
 Fig. 11. Mandible, $\times 210$.
 Fig. 12. Upper footjaw (?), $\times 210$.
 Fig. 13. Lower footjaw, $\times 210$.
 Fig. 14. Abdomen and tail: (a) foot of fifth pair, $\times 210$.

PLATE XVIII.

CYCLOPS OVALIS

- Fig. 1. Superior antenna, $\times 120$.
Fig. 2. Abdomen and tail, $\times 120$.

CYCLOPICERA LATA.

- Fig. 3. Superior antenna, $\times 210$.
Fig. 4. Inferior antenna, $\times 210$.
Fig. 5. Maxilla, $\times 210$.
Fig. 6. Upper footjaw, $\times 210$.
Fig. 7. Lower footjaw, $\times 210$.
Fig. 8. Abdomen and tail: (a) foot of fifth pair, $\times 120$.

MACROCHEIRON FUCICOLUM.

- Fig. 9. Male (?), seen from right side, $\times 100$.
Fig. 10. Upper antenna of male, $\times 220$.
Fig. 11. „ „ of female, $\times 220$.
Fig. 12. Lower antenna, $\times 220$.
Fig. 13. Mandible, $\times 220$.
Fig. 14. Lower footjaw, $\times 220$.
Fig. 15. Foot of fourth pair, $\times 220$.
Fig. 16. „ fifth pair (male), $\times 220$.
Fig. 17. „ „ (female), $\times 220$.
Fig. 18. Caudal segment and setæ, $\times 220$.

PLATE XIX.

CANTHOCAMPTUS IMUS (female).

- Fig. 1. Animal, seen from left side, $\times 100$.
Fig. 2. Superior antenna, $\times 250$.
Fig. 3. Lower footjaw, $\times 250$.
Fig. 4. Foot of first pair, $\times 250$.
Fig. 5. Foot of fifth pair, $\times 250$.

SCUTELLIDIUM TISBOIDES (female).

- Fig. 6. Upper antenna, $\times 210$.
Fig. 7. Mandible and maxilla, $\times 210$.
Fig. 8. Foot of first pair, $\times 210$.
Fig. 9. Lower footjaw, $\times 210$.
Fig. 10. Foot of fifth pair, $\times 210$.

PLATE XX.

ECTINOSOMA MELANICEPS.

- Fig. 1. Female (?), seen from right side, $\times 84$.
 Fig. 2. Superior antenna, $\times 210$.
 Fig. 3. Lower antenna, $\times 210$.
 Fig. 4. Mandible: (a) origin of palp, $\times 300$.
 Fig. 5. Mandible-palp, $\times 300$.
 Fig. 6. Maxilla, $\times 300$.
 Fig. 7. Upper footjaw, $\times 300$.
 Fig. 8. Lower footjaw, $\times 300$.
 Fig. 9. Foot of first pair, $\times 210$.
 Fig. 10. Posterior abdominal segments and setæ, $\times 120$.
 Fig. 11. Foot of fifth pair, $\times 210$.
 Fig. 12. Maxillary appendage (?).

DACTYLOPUS NORMANI.

- Fig. 13. Superior antenna, $\times 210$.
 Fig. 14. Lower footjaw, $\times 210$.
 Fig. 15. Foot of first pair, $\times 210$.
 Fig. 16. Secondary branch of lower antenna, $\times 210$.
 Fig. 17. Fifth pair of feet, $\times 210$.

PLATE XXI.

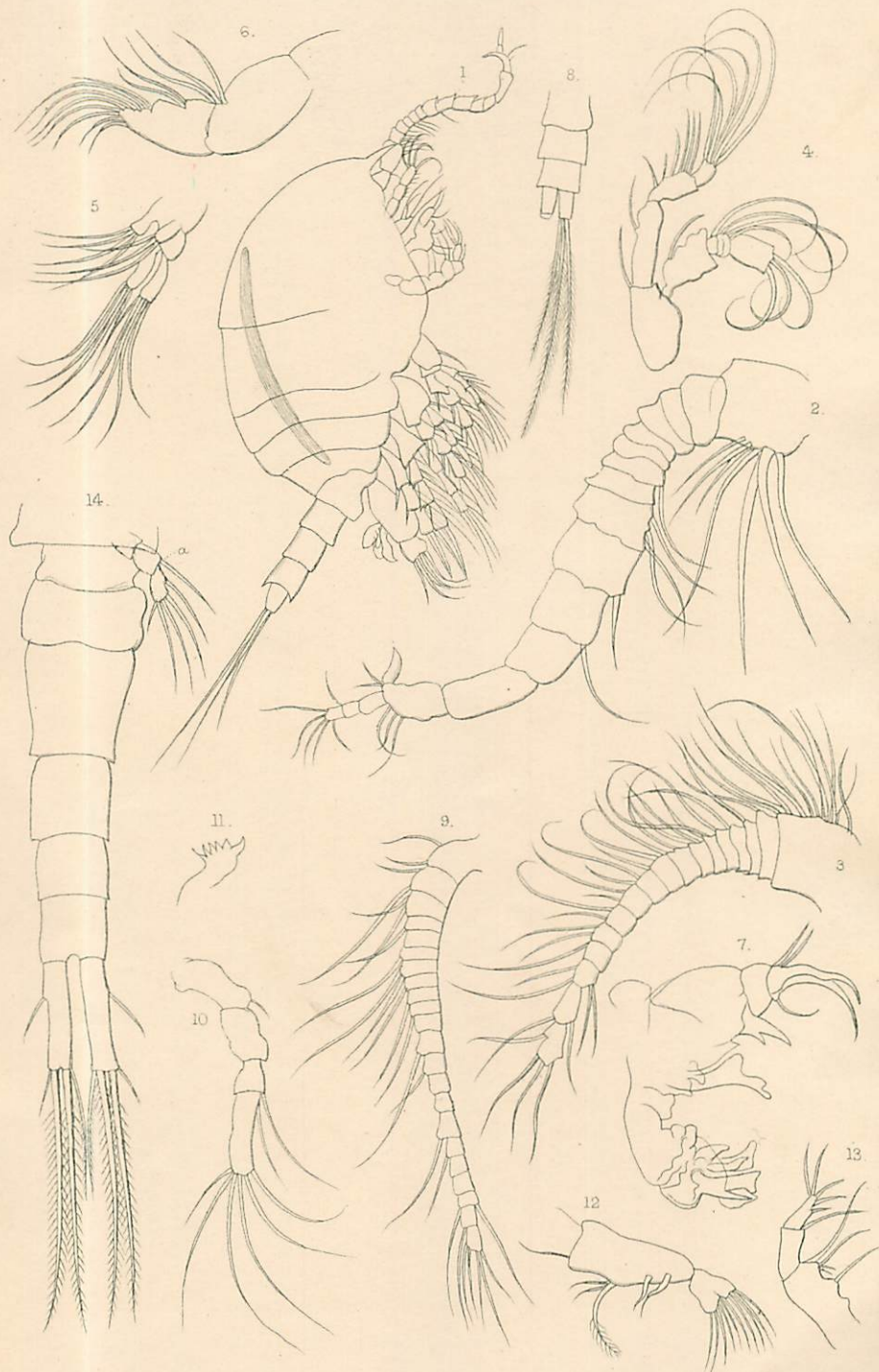
LAOPHONTE HODGII.

- Fig. 1. Upper antenna of female, $\times 210$.
 Fig. 2. „ „ male, $\times 210$.
 Fig. 3. Lower footjaw, $\times 210$.
 Fig. 4. Foot of first pair, $\times 210$.
 Fig. 5. „ fourth pair, $\times 210$.
 Fig. 6. Fifth foot of female, $\times 250$.
 Fig. 7. „ male, $\times 250$.
 Fig. 8. Caudal segment of female, $\times 250$.
 Fig. 9. „ „ male, $\times 210$.

CLETODES LIMICOLA.

- Fig. 10. Female, seen from above, $\times 100$.
 Fig. 11. Upper antenna of female, $\times 250$.
 Fig. 12. „ „ male, $\times 250$.
 Fig. 13. Lower footjaw, $\times 250$.

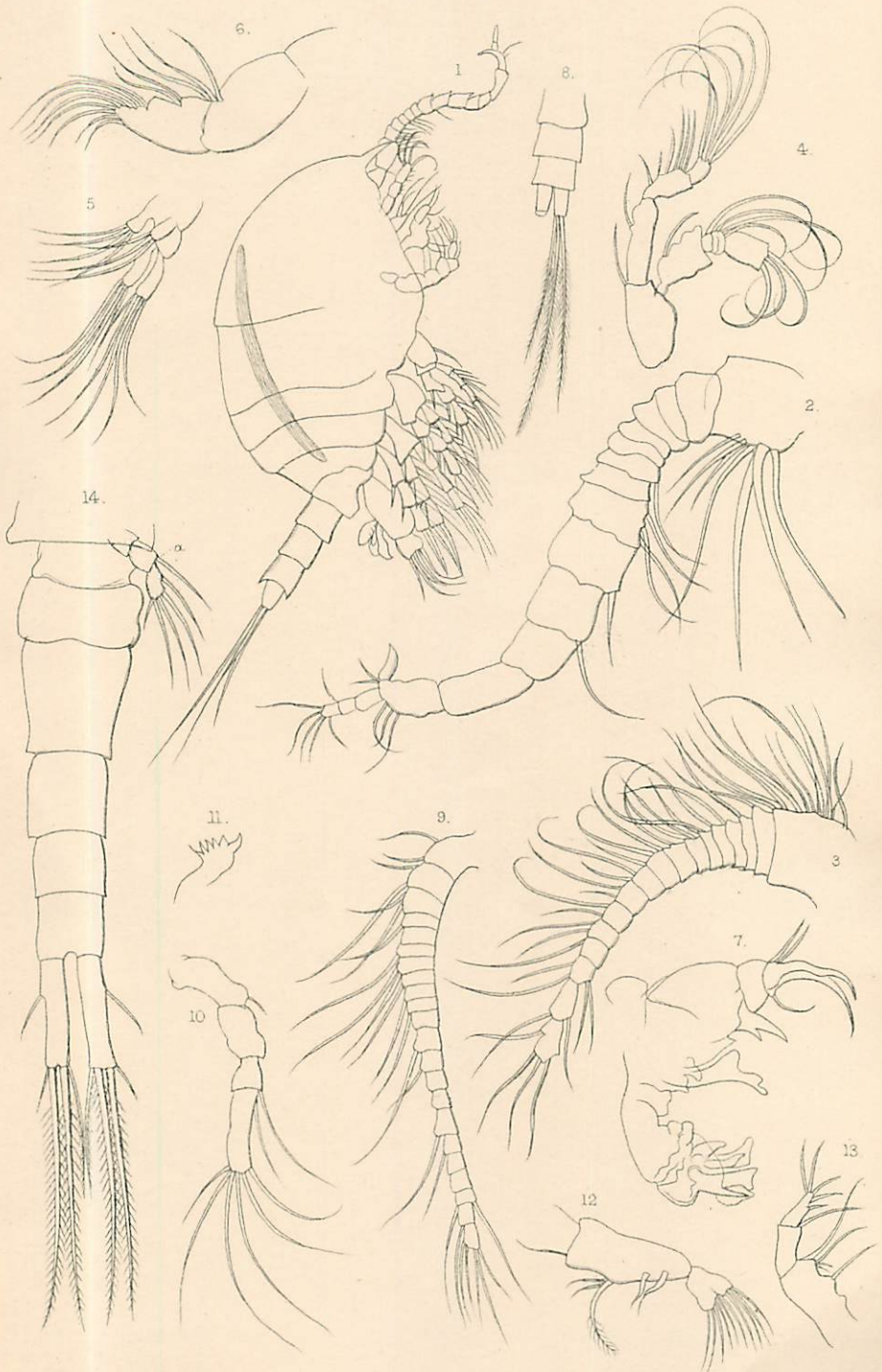
- Fig. 14. Foot of first pair, $\times 250$.
Fig. 15. ,, fifth pair, female, $\times 250$.
Fig. 16. ,, ,, male, $\times 250$.
Fig. 17. Caudal segment of female, $\times 250$.



G.S. Brady del. T. West sc.

W. West & Co. imp.

1-8. PSEUDOCYCLOPS CRASSIREMIS.
9-14. CYCLOPS LITTORALIS.



G. S. Brady del. T. West sc.

W. West & C. S. Turp.

1-8. PSEUDOCYCLOPS CRASSIREMIS.
9-14. CYCLOPS LITTORALIS.





G.S. Brady del. T. West sc.

W. West & Co. imp.

1-12. *ECTINOSOMA MELANICEPS*
13-17. *DACTYLOPUS NORMANI*.



C. S. Hayward, West. ex.

1-9 LAOPHONTE HODGII
10-17. CLETODES LIMICOIA.

W. V. Balch & Co. Imp.