

to which they appear to me to bear no resemblance; and in the opinion which I here express Mr. G. S. Brady now entirely coincides. I propose therefore to restore to the recent form, which has been found on this coast, and in the Norwegian and Arctic seas, the name *C. Bradii*, which I had previously proposed for it. Judging from the figures and description in the *Monograph of the Tertiary Entomostraca of England*, *C. Bradii* (Norman), would seem to approach very closely to *C. pinguis*, Jones, and is chiefly distinguishable from that species by the absence of angulation of the dorsal margin. It was *C. pinguis* which I had in my thoughts when I inserted *C. Bradii*—without a name—in the dredging report of 1862, as a *Cythere* “new to science, if it be not identical with a Tertiary Fossil species.”

Report on the Pelagic Entomostraca, by George S. Brady.

During the dredging expeditions of 1863 and 1864 the sea was mostly too rough to allow of the towing-net being used successfully. In 1862, owing to the generally smoother sea, it was worked to more advantage; but as the dredges occupied almost the entire attention of the party, the captures which we have to record must be looked upon as embracing only the commoner species of our free-swimming Oceanic Entomostraca. The gatherings of 1862 were made at a distance of fifty to one hundred miles from shore nearly due east of Tynemouth. Those of the following year were taken in the Holy Island district, and on the Durham coast, three or four miles off Ryhope. The total number of species taken was eleven, five of which are new to the British Fauna, and two others have been hitherto only very imperfectly recognized and described. Two out of the eleven belong to the order *Cladocera*, the remaining nine to the *Copepoda*. The two *Cladocera* belong to the family *Polyphemidæ*, the nine *Copepoda* are distributed amongst the families *Harpacticidæ* (one), *Peltididæ* (one), *Calanidæ* (six), *Pontellidæ* (one).

I have described and figured in this report all the new or imperfectly known species excepting *Thalestris longimana* and

Alteutha bopyroides. Both of these belong to families which occur chiefly between tide-marks, and of which there remain several British species yet requiring notice. I therefore here content myself with the simple record of their capture in the open sea, leaving the more elaborate description of them until their congeners also can have due attention. One structural character in the Calanidæ and allied families seems scarcely to have attracted the attention it deserves as a specific mark, namely, the form of the terminal spine of the outer branch of the swimming feet; and more especially, the arrangement of the supplementary spines at its base. These will be found, in some cases at least, to afford diagnostic marks quite sufficient for the determination of a species, and I have therefore figured side by side, in plate I, the spines from the feet of all the British species. The figures are, in each case, taken from the fourth swimming foot.

	1862.	1863.	1863.
	50-100 miles east of Tynemouth.	Northumber- land coast, (Holy Island.)	Durham coast, (off Ryhope.)
CLADOCERA.			
<i>Evadne Nordmanni</i> , <i>Lovén</i>	common . . . .	.....	common.
<i>Pleopsis polyphemoides</i> , <i>Leuckart</i>	scarce . . . . .	.....	common.
COPEPODA.			
<i>Thalestris longimana</i> , <i>Claus</i> . . . .	.....	.....	rare.
<i>Alteutha bopyroides</i> , <i>Claus</i> . . . .	.....	.....	rare.
<i>Cetochilus septentrionalis</i> , <i>Goods.</i>	scarce	common	common.
<i>Calanus Clausii</i> , <i>G. S. Brady</i>	common	scarce	common.
<i>Dias longiremis</i> , <i>Lilljeborg</i>	common	common	common.
<i>Temora Finmarchica</i> , <i>Gunner</i>	common	scarce	common.
<i>Ichthyophorba hamata</i> , <i>Lillj.</i>	common	common	common.
<i>denticornis</i> , <i>Claus</i>			
<i>Anomalocera Patersonii</i> , <i>Templet.</i>	frequent	frequent	rare.

ORDER. CLADOCERA.

FAM. POLYPHEMIDÆ.

GENUS. PLEOPIS,* *Dana*.

General form very like *Polyphemus*. *Head* moveable, separated above by a deep impression from the thorax, below thick and

* As defined by G. O. Sars.

rounded. *Carapace* in adult female having a large round oviferous sac over the thorax. *Abdomen* small, having a little process above bearing two very short pellucid setæ, and terminating in two stiliform nails bending backwards. *First antennæ* rudimentary and alike in both sexes. *Second antennæ* having one branch 3, the other 4-jointed, all the joints—except the very small basal joint of the 4-jointed branch—bearing ciliated but not jointed setæ. *Lip* short and thick, forming a rounded lobe which has its inferior margin sparingly furnished with short spine-like setæ. *Mandibles* moderately large, upper part indistinctly defined, lower strongly bent inwards, forming with the upper part a nearly right angle, attenuated towards the extremity, and ending in two teeth. No *maxillæ*. *Feet* four pairs, all prehensile, and scarcely branchial, basal joint furnished with a small setiferous appendage; first pair longer than the others and more slender, 4-jointed; two last joints small, and bearing long curved setæ; these joints in the male are a little dilated; last joint armed with a small curved nail; second and third pair alike, 4-jointed; basal joint having an appendage on the inner side furnished with terminal spines, and may be compared to the coxal or maxillary (coxali vel maxillari) process in other Cladocera; the setæ of the other joints shorter and more nail-like than in the legs of first pair. Last legs much shorter than the others, and not distinctly articulated. *Eye* very large, entirely filling the fore part of the head, having very numerous and very long crystalline lenses. On the hinder portion of the back of the head there is a distinct *organ of attachment*. *Intestine* simple and nearly straight, and terminates before the caudal stiliform appendages.

1. PLEOPIS POLYPHEMOIDES, *Leuckart*. Pl. IV, fig. 14.

Evadne polyphemoides, *Leuckart*, *Weigmann's Archiv*. 1859, p. 262, and *Ann. & Mag. Nat. Hist.*, 3rd Series, vol. V, p. 445.

This species occurs mostly at some little distance from land, associated often with *Evadne Nordmanni*, from which it is readily distinguished by the form of the carapace which is rounded below and deeply constricted at the neck. The front of the head is

almost filled by an immense eye. The abdomen projects anteriorly and is terminated by two strong spines directed downwards, thus giving the lower part of the animal an appearance not unlike that of *Daphnia mucronata*.

ORDER. COPEPODA.

FAM. HARPACTIDÆ.

GENUS. THALESTRIS, *Claus*.

1. THALESTRIS LONGIMANA, *Claus*.

Claus; Die frei lebenden Copepoden, p. 130, T. XVIII, figs. 1-11.

A single specimen was taken in the towing net off Seaham Harbour.

FAM. PELTIDIDÆ.

GENUS. ALTEUTHA, *Baird*.

1. ALTEUTHA BOPYROIDES, *Claus*.

Claus; Die frei lebenden Copepoden, p. 143, T. XXII, figs. 10-17.

Several examples of this species occurred in a gathering taken three miles off Ryhope, on the Durham coast.

FAM. CALANIDÆ.

GENUS. CETOCHILUS, *R. de Vauzème*.

1. CETOCHILUS SEPTENTRIONALIS, *Goodsir*. Pl. I, fig. 12; and Pl. IV, figs. 11, 12.

Cetochilus septentrionalis, *Goodsir*; Edin. New Phil. Jour. XXXV, 339, Pl. VI, figs. 1-11.

„ „ *Baird*; Nat. Hist. Brit. Entom., p. 335, T. XXX, figs. 1, a-g.

Cetochilus Helgolandicus, *Claus*; Die frei lebenden Copepoden, p. 171, T. XXVI, figs. 2-9.

Dr. Claus, in his recent monograph of the Copepoda, describes three species closely allied to the *C. septentrionalis* of *Goodsir*,

two of these being from Messina, the other from the North Sea. There can, I think, be no reasonable doubt, that the latter is the species referred to by Goodsir, and I therefore here retain the original name as having the claim of priority. The chief characters by which Dr. Claus distinguishes his northern species, *C. Helgolandicus*, from the southern *C. longiremis*, are the distribution of setæ on the apical joints of the upper antennæ (fig. 11) and the presence, in the former species, of a serrated inner border to the basal joints of the fifth pair of feet (fig. 12). In these particulars the species here recorded agrees with *C. Helgolandicus*. It is one of the commonest forms on our coast, occurring abundantly both in pelagic and littoral situations.

GENUS. CALANUS, *Leach*.

Fifth thoracic segment indistinct, united with the fourth. *Superior antennæ* 25-jointed, sometimes (two of the joints being soldered together) 24-jointed; those of the male thickened but not hinged. *Inferior antennæ* and *maxillary* organs like those of *Cetochilus*. *Fifth feet* consisting of one branch; those of the male nearly alike; sometimes altogether absent in the female. *Abdomen* of the male composed of five; of the female, of four (or three) segments. *Eyes* simple, small.

1. CALANUS CLAUSII, n. sp. Pl. I, figs. 1-11, 13.

Body elongated, about one-twentieth of an inch long (without the tail setæ), colourless and fragile. *Superior antennæ* 24-jointed, (the eighth and ninth of the twenty-five joints being fused together,) a little longer than the cephalothorax; the two terminal articulations contracted at the base and somewhat swollen at the distal extremities: the upper or outer edge is beset with short hairs, and the joints in the male are irregularly swollen, the third to the sixth or seventh having each a stronger and longer hair than the rest. *Inferior antennæ* two-branched, the secondary branch with four short median articulations. *Cephalothorax* oval in outline, rounded above, the last segment conspicuously indented or umbilicate at its junction with the abdomen. *Swimming feet* slender, the inner branch two, the outer three-jointed, except the first pair, the inner branch of which has only one (?) joint. *Fifth*

pair of feet, in the male long and slender, pointed; the left consisting of three cylindrical tapering joints, of which the middle is the longest; the right composed of five joints, of which the first three are nearly equal, the fourth shorter, and the fifth very small and sharp. The fifth pair in the female is obsolete. First abdominal segment, in the female, very tumid in front. Terminal abdominal segments very short. Caudal setæ short; about half the length of the abdomen.

This species was doubtfully referred, in a previous report, (Trans. Tyneside Nat. Field Club, vol. VI, p. 188,) to *Phæenna spinifera*, Claus; but Dr. Claus has kindly examined specimens which I forwarded to him, and pronounced them to belong to a hitherto undescribed species, referable to the genus *Calanus*, from which it differs, however, in the absence of the fifth pair of feet in the female. To meet this peculiarity I have slightly modified the definition of the genus here given. The species is peculiarly difficult to examine satisfactorily on account of its extreme fragility, it being scarcely possible, in any of my gatherings, to find an un-mutilated specimen. By far the greater number are females devoid of the rudimentary feet, but some rare specimens showed these organs in a peculiar form (plate I, fig. 11), which I at one time supposed to belong to the female. Dr. Claus has, however, pointed out to me that these are in reality the fifth feet of the immature male, and that where they occur there are always corresponding marks of immaturity in the development of the abdominal segments.

C. Clausii is an abundant and widely-spread species, occurring both in tidal pools and in the open sea. I have specimens from Shetland and the Channel Islands, and from many localities, both littoral and pelagic, in the Northumberland and Durham districts.

I have much pleasure in dedicating this interesting species to Dr. Claus, and I regret that the imperfect state of my specimens has prevented my figuring it as fully and accurately as I could have wished.

GENUS. DIAS, *Lilljeborg*.

Anterior antennæ composed of 19–21 joints, beset with long

setæ; that of the male having, on the right side, a hinge joint. *Posterior antennæ* with a short, simple secondary branch. *Labrum* large, three lobed. *Anterior foot-jaws* strong, with ciliated, unci-form setæ; *posterior foot-jaws* slender, armed with setæ at the base; *swimming feet* elongated, inner branch two-jointed. *Fifth pair* of feet having one branch, the *right* of the male formed for prehension. Abdomen of the male 5, of the female 3-jointed.

1. DIAS LONGIREMIS, *Lillj.* Pl. I, fig. 14; and Pl. II, figs. 11-18.

Dias longiremis, Lilljeborg; De Crustaceis ex ordinibus tribus (1853), p. 181, T. XXIV, figs. 1-13.

„ „ Claus; Die frei lebenden Copepoden (1863), p. 193, T. XXXIII, figs. 6-14.

Calanus Euchæta, Lubbock; Ann. & Mag. Nat. Hist., 2nd Series. Vol. XX (1857), p. 401. Pl. X, figs. 1-6.

Body elongated, slender. Head obtusely rounded. Antennæ about as long as the cephalothorax, the right of the male having 19, the left 21 joints. First segment of the body nearly as long as the remaining four segments. Caudal segments short, about once and a half or twice as long as broad. Tail setæ equal in length to the abdomen, the second from the inner side being the longest. Length $\frac{1}{6}$ th of an inch. This species may at once be recognized by the peculiarity of the larger antennæ which are irregularly swollen at the articulations so as to give them a gnarled or knotted appearance (figs. 11-13). About one half of the antennal setæ are much larger than the rest, being distributed at irregular intervals, but most profusely near the apex of the antennæ. The lower antenna (fig. 4) is two branched, the larger branch three-jointed, and having on the basal joint a series of eight hairs which increase regularly in length from the first to the fifth or sixth. The cephalothorax has often a few minute spines on the posterior border of the last segment. These are variable in number: most of my specimens possess two or three, but some have none. The fifth feet of the male consist each of a single four or five-jointed branch, forming a pair of strong prehensile claws (fig. 18). The fifth foot in the female (fig. 17)

is much smaller and is made up of a short basal portion, from which springs a long, gradually attenuated apical joint. From the basal joint there is given off on one side a long seta. The terminal spines of the swimming feet (plate I, fig. 14) are peculiar; for instead of having one or more small supplementary spines at the base connected with the first joint of the foot by a moveable joint, as is usually the case, the spine is in this species formed by a mere arched and pointed prolongation of the outer edge of the foot.

D. longiremis seems to be one of the commonest and most widely distributed of our native Calanidæ. It occurs abundantly in a gathering taken off the Durham coast; also at the Fern Islands, and in the open sea one hundred miles off Tynemouth. Mr. Norman has taken it at Rothesay, Mr. Lubbock at Weymouth, and I have myself found it amongst the Channel Islands, in the Isle of Man, in tidal pools on the Durham coast, and in pools of brackish water on Burgh Marsh, near Carlisle. The specimens taken in the last-named locality are, however, stunted and ill-developed, being only about $\frac{1}{3}$ th of an inch in length, the result, I suppose, of an uncongenial habitat.

GENUS. TEMORA, *Baird.*

Superior antennæ 24-jointed, the right in the male having a hinge joint. Branches of the inferior antennæ subequal: the secondary branch with four short median joints. Inner branch of the first pair of feet one-jointed; of the second, third, and fourth pairs two-jointed. Fifth feet consisting of one branch; in the female short and rudimentary; in the male prehensile, and, on the right side, subcheliform. Abdomen of the male 5, of the female 3-jointed.

1. TEMORA FINMARCHICA, *Gunner.* Pl. I, fig. 15; and Pl. II, figs. 1-10.

Monoculus Finmarchicus, *Gunner*; Act. Hafn. X 175, f. 20-23. 1765.

Temora Finmarchica, *Baird*; Nat. Hist. Brit. Entom., p. 228, T. XXVIII, figs. 1, 1 a-g.

Temora Finmarchica, Claus; Die frei lebenden Copepoden, p. 195, T. XXXIV, figs. 1-11.

Diaptomus longicaudatus, Lubbock; Ann. & Mag. Nat. Hist., 2nd Series. Vol. XX (1857), p. 405. Pl. X, figs. 11, 12; and Pl. XI, figs. 12, 13.

Body broad in proportion to its length; posterior margin of cephalothorax very much arched. Anterior antennæ rather longer than the cephalothorax. Anterior angle of the last thoracic segment rounded. Fifth feet short, composed of a single branch; in the male subchelate. Caudal segments very long and slender, about nine times as long as broad and nearly equal in length to the abdomen. Terminal setæ shorter than the caudal segments. Colour brown. Length $\frac{1}{20}$ th of an inch.

The exceedingly long and slender caudal segments (fig. 7), which bear a slender spine on their outer margin at about one fourth of their length from the apex, the strongly arched dorsal outline, and the absence of spines on the inferior angles of the cephalothorax, sufficiently distinguish this from every other species. The fifth foot of the female (fig. 10) is very short, composed of three cylindrical joints, the last of which is armed with four short spines, two at the apex and two at the sides. That of the male (figs. 8, 9) is also short, and consists of one four-jointed branch, the antepenultimate being produced into a strong spine which, when in apposition with the apical joint, forms a prehensile claw. This is developed much more fully on the left than on the right side. The antero-inferior angle of the last cephalothoracic segment is well rounded off; the posterior angle is directed downwards and forms an obtuse angle.

This is, I think, the most abundant, and the most widely distributed of all the British species. It occurs often in immense numbers in tidal pools, as well as in the open sea. The following are the localities from which I have obtained specimens:—The Channel Islands, Northumberland and Durham coasts, Rothesay, and Shetland. For specimens from the two last-mentioned places I am indebted to the Rev. A. M. Norman.

2. *TEMORA VELOX*, *Lilljeborg*. Pl. I, fig. 16; and Pl. III, figs. 1-11.

Lillj.; De Crust. ex ordinibus tribus Clad., Ostrac., et Copep., p. 177, T. XX, figs. 1-9; and T. XIX, figs. 9, 10.

Cephalothorax strongly arched dorsally. First segment about equal in length to the following three. Superior antennæ as long as the cephalothorax, very stout, and of nearly equal thickness throughout. Inferior angle of the body produced into a spine. Fifth pair of feet, in the male, very large and strong. Caudal segments of moderate length. Tail setæ about half the length of the abdomen. Length $\frac{1}{7}$ th of an inch.

This fine species does not, strictly speaking, come within the limits of a dredging report, seeing that we have found it only in brackish water and never in the open sea. But as it has not yet been noticed by any British author (except casually by myself in the Report of the British Association for 1863) it seems desirable to describe it here as being nearly related to the other subjects of this paper. The upper antennæ are remarkably stout, thickened at the base, and beset along the upper margin with numerous short hairs. That of the male, on the right side (fig. 2), has two long terminal joints, at the base of which the "hinge" is placed. The two joints above, and one below the hinge are armed with serrated plates. The 11th, 12th, 13th, and 14th joints have each usually a distinct but short spine; the 15th and 19th are also armed in the same way, but their spines are much longer. These are not shown with sufficient clearness in the plate. The fifth feet in the female (fig. 9) are four-jointed, the apical joint rounded, small, and having two stout setæ, one large and one small; the penultimate joint has one or two setæ, and is produced at the inferior angle into a strong spine, which is sometimes serrated on the lower border. The second joint bears also a slender bristle. The fifth feet of the male (fig. 10) are very large and powerful, and are provided on their opposing edges with several spines—mostly one in the middle of each joint. The last abdominal and the caudal segments (fig. 11) are beset with irregularly scattered short hairs or prickles. The caudal

segments are four times as long as broad, and about equal in length to the terminal setæ.

I first recognized this species from specimens taken by the Rev. A. M. Norman in the Isle of Cumbrae, in a pool above ordinary high-water mark, and into which the sea found access only at spring tides. Since that time I have myself taken it in immense numbers in brackish pools at Hylton Dene near Sunderland, and at Burgh Marsh near Carlisle, and I have also seen a few examples collected by Mr. Norman in brackish water at Hartlepool. When living the animal is of a pale brown tint, but on immersion in spirit, assumes a peculiar vinous red or purple.

GENUS. ICHTHYOPHORBA, *Lilljeborg*.

Head more or less distinct from the thorax. Superior antennæ 24-jointed, the right of the male having a hinge joint. All the feet two-branched; branches three-jointed. Fifth pair of feet in the male prehensile, the inner branch formed for swimming. Abdomen of the male 4 or 5, of the female 3-jointed; much more slender than the body.

1. ICHTHYOPHORBA HAMATA, *Lilljeborg*.

Ichthyophorba hamata, Lillj. ; De Crust. ex ordinibus tribus (1853), p. 185, T. XXI, figs. 1-5, and 7-9; and T. XXII, figs. 9-12.

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

Diaptomus Bateanus, Lubbock; Ann. & Mag. Nat. Hist. 2nd Series, vol. XX (1857), p. 404. Pl. XI, figs. 1-3.

Body slender. Superior antennæ slender, as long as the whole body, destitute of spines. Right antenna of the male slightly swollen in the middle. Inferior angle of the last cephalothoracic segment produced into a hook-shaped spine. Fifth pair of feet two-branched; the external branch of the right foot in the male terminating in two slender curved claws, the outer of which is the longest, and is armed with two or three short, sharp spines. Outer branch of the left foot two-jointed. Outer branch of the fifth foot, in the female, armed with a long and strong spine projecting inwards from the second joint. Tail segments of moderate

length, about once and a half as long as the last abdominal ring. Colour brown. Length $\frac{1}{3}$ th of an inch.

I. hamata is pretty widely distributed, at any rate, on our eastern shores; where it occurs both in tidal pools and in the open sea. It is, however, not very commonly taken between tide marks; neither in the open sea is it so abundant as many other species. The following are the localities in which it has been taken:—Shetland, Northumberland and Durham (both littoral and pelagic), Channel Islands; Weymouth (Mr. Lubbock).

2. *ICHTHYOPHORBA DENTICORNIS*, *Claus*.

Claus; Die frei lebenden Copepoden, p. 199, T. XXXV, figs. 1, 3–9.

Superior antennæ as long as the body, bearing a strong pointed tooth on the upper border of the 1st, 2nd, and 5th joints. Right antenna of the male much swollen in the middle, armed with a strong spine on the joint next above the uppermost serrated plate, and with three or four smaller teeth on the preceding joints. Lower anterior angle of the cephalothorax produced into a strong tooth. First segment of the female abdomen bearing on the right side two long, slender spines connected with the papilla for the attachment of spermatophores. Fifth pair of feet similar to those of *I. hamata*, but the inner claw of the right foot possesses at its extremity, a row of blunt serrations, and the outer branch of the left foot is 3-jointed.

The genus *Ichthyophorba* was established by Lilljeborg in his work (published in 1853), “De Crustaceis ex ordinibus tribus Cladocericis, Ostracodis et Copepodis in Scaniâ occurrentibus.” In this work one species only, *I. hamata*, was described. Dr. Claus in his recent work on the Copepoda has described an additional species, *I. denticornis*, substituting at the same time for Prof. Lilljeborg’s specific name *hamata*, that of *angustata*, under the impression that the species referred to by Lilljeborg might not be identical with the new “*angustata*.” There seems, however, little room to doubt that the species described by the two authors are one and the same, and I have therefore here adopted the older name. In our seas, *I. hamata* is much the commoner form.