NATURAL HISTORY

TRANSACTIONS

OF

NORTHUMBERLAND AND DURHAM.

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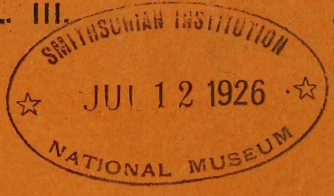

WILLIAMS AND NORGATE,
14, HENRIETTA STREET, COVENT GARDEN, LONDON;
AND
20, SOUTH FREDERICK STREET, EDINBURGH.
F. & W. DODSWORTH, NEWCASTLE-UPON-TYNE.

1869.

NATURAL HISTORY TRANSACTIONS

OF

NORTHUMBERLAND AND DURHAM;

BEING PAPERS READ AT THE

MEETINGS OF THE NATURAL HISTORY SOCIETY

OF

NORTHUMBERLAND, DURHAM, AND NEWCASTLE-UPON-TYNE,

AND THE

TYNESIDE NATURALISTS' FIELD CLUB,

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Fig. 4. Section of the upper portion of the tooth of *Polypterus*, from Agassiz, showing the cap of enamel, *a*.

Fig. 5 Section of portion of maxilla of *Rhizodopsis*, much enlarged, exhibiting the bony pillars supporting the teeth; *a a*, bony pillars; *b b*. teeth in an abraded condition, the enamel having all disappeared, and, in some instances, portions of the dentine.

V.—*On the Crustacean Fauna of the Salt-Marshes of Northumberland and Durham.* By GEORGE S. BRADY, C.M.Z.S., &c. (Plates IV., V.)

AT the Newcastle Meeting of the British Association, in 1863, I read a short paper "On the Zoology of Hylton Dene,"* in which was recorded the occurrence of various Entomostraca, Foraminifera, and other Invertebrata, in slightly brackish water in the neighbourhood of Sunderland. The subject appeared to me to be one of very great interest, not only as exhibiting the manner and degree in which the various denizens of fresh and salt water are able to accommodate themselves to altered conditions, as in the case of the common shrimp and stickleback, but also as affording an opportunity for the study of a group of animals which seem to be inhabitants exclusively of brackish water, and which may be supposed to be modifications of species originally dwelling in the sea, or perhaps in purely fresh water. Furthermore, the investigation of the inhabitants of our salt-marshes might be expected to throw some light on the real character of those Carboniferous and post-tertiary deposits which are supposed to have been formed in estuaries, or lagoons of brackish water. I have, therefore, during the last three or four years, taken advantage of every opportunity that has come in my way to collect microzoa—especially Entromostraca and Foraminifera—from the salt-marshes of our district; and I do not know of any such locality in Northumberland or Durham which I have not more or less thoroughly examined. The marshes which I have visited are the following:—Cowpen Marsh at the mouth of the Tees, Hartlepool Slake, Hylton Dene and Claxheugh on the

* See "Transactions of Tyneside Naturalists' Field Club," Vol. VI., p. 95.

Wear, Jarrow Slake, Seaton Sluice, the mouths of the Wansbeck, Coquet and Aln, as well as Burgh Marsh on the Solway: besides these I have received some scanty gatherings from the Blyth and Tweed; and the Rev. A. M. Norman and Mr. David Robertson have kindly supplied me with notes of species taken in similar situations in Scotland and the Channel Islands.

My attention has been chiefly confined to the Crustacean Fauna, and it is that alone which I have examined minutely, though, for the sake of more general interest, I have always noted such other animals as presented themselves to my attention.

There seems to be very little variety amongst the Mollusca inhabiting these marshes. *Rissoa ulvæ* is the only gasteropod (excepting Nudibranchs) which I have found alive in strictly brackish water, where it occurs often in great abundance; but pools further removed from the saline influence, and above the highest limit of spring tides, where, to the taste, the water is quite fresh, are frequently inhabited by a peculiar mixed Crustacean Fauna, seeming to indicate some slightly saline character. In such situations we meet with *Limnea peregra* and *Pisidium pulchellum*, which are quite fresh-water species. The only marsh in which I have taken any Nudibranchiate species is Hylton Dene, where *Alderia modesta* occurred in great abundance, in company with a smaller species, *Limapontia depressa*, which was first found there by Mr. Albany Hancock. These two species have also been found in company at Loughor Marsh, near Swansea, by Mr. C. Spence Bate and Mr. Muggridge. In the "debateable ground," between fresh and brackish water, I have also met with the beautiful polyzoon *Plumatella repens*; but in this case the general vegetation and animal life of the pool was decidedly that of fresh water, differing only in the presence of several species of stalk-eyed crustacea, which usually inhabit brackish water.* For further particulars of this interesting locality I must refer the reader to my paper on the Zoology of Hylton Dene.

The higher orders of Crustacea are almost always represented in salt-marsh pools by *Carcinus mænas*, *Palæmon varians*,

* *Palæmon varians*, *Mysis vulgaris*, and *Corophium longicorne* occur in such a situation in Hylton Dene.

Crangon vulgaris, *Mysis vulgaris*, *Gammarus locusta*, *Corophium longicorne*, and *Sphæroma rugicauda*: in Hylton Dene I met also with *Orchestia littorea*, and at Seaton Sluice with *Oniscus asellus*. These usually occur in considerable numbers, though very often a pool will be found tenanted entirely by one species to the exclusion of the rest, while a neighbouring pool will contain a mixture, or perhaps a single different species. In Hartlepool Slake I have seen the water so swarming with *Mysis vulgaris* that a net could not have been dipped in the spaces between the floating balks of timber without capturing scores or perhaps hundreds of them.

The Entomostracan inhabitants of salt-marshes seem to be confined to the two orders, Ostracoda and Copepoda. In pools which are subject to the overflow of ordinary spring-tides the Ostracoda met with are *Cythere castanea*, *Cytheridea littoralis*, and *Loxoconcha elliptica*, the last named until recently an undescribed, and apparently a rather uncommon species; the other two are of very frequent occurrence, *C. littoralis* often existing in astonishing abundance. But in the sub-brackish pools slightly above tidal influence, which have been already referred to, we find two Cypridæ which seem to have a particular liking for these situations, though both are occasionally found in quite fresh water; these are *Cypris salina* and *Cypridopsis aculeata*. The only locality in which I have found the two species in company is a hot-water pond at Monkwearmouth Colliery, the water of which, though of course not at all marine in character, is, nevertheless, owing to its rapid evaporation, constantly saturated with salts of lime, &c., which it deposits copiously in a sort of crust upon the vegetation (*Potamogeton*, *Callitriche*, &c.) which it contains. Besides this locality *C. salina* has been found only twice by Dr. Baird and myself, and in both cases in pools just above high water. The Monkwearmouth pond seems also to afford the only instance of the occurrence of *C. aculeata* apart from salt water, unless, indeed, one of the Suffolk "broads," where it was taken by Mr. E. C. Davison, be an instance of fresh-water habitat. I believe, however, that even this may probably be rightly called a sub-brackish habitat.

The Copepoda which I have found in brackish water are as follows:—*Dias longiremis*, Lilljeborg, *Temora velox*, Lilljeborg, *Cyclops æquoreus*, Fischer, *C. Lubbockii*, n. sp., *Dactylopus tisboides*, Claus, *Delavalia palustris*, n. gen., *Tachidius brevicornis*, Lilljeborg, and two species of *Cleta*, which I have not yet been able to work out satisfactorily.

Temora velox appears to be the most abundant of these species, occurring in great profusion in almost all brackish pools on our coast, more especially in the autumn months. I have only once met with it in the open sea.

At Seaton Sluice a little mite, *Halacarus rhodostigma*, Gosse, occurred pretty plentifully. I did not notice it while alive, and can therefore give no account of its habits. The pools at Seaton Sluice have afforded me a decidedly greater variety of Entomostraca than any other similar locality, and I am disposed to attribute this, in part, to the greater abundance of algæ which they contain. *Vaucheria velutina* and *Conferva linum* form the principal vegetation, and certainly harbour a great number of these microzoa, but many species are found very abundantly where there is scarcely any vegetation, as for instance *Temora velox* and the three species of Ostracoda previously mentioned. *Cytheridea littoralis* and the Foraminifera seem to haunt the mud exclusively, and are not to be taken in any quantity, merely by sweeping the weeds, and I am disposed to think that the genus *Cleta* has the same habit.

I am at a loss to account for the constant existence in salt-marshes, of their characteristic pools. They are quite unlike any other pools, being mostly shallow (about six or eight inches in depth), the bottoms perfectly flat, and the sides perpendicular, as if cleanly punched out of the ground, never shelving or saucer-shaped. Wherever a salt-marsh exists pools of this kind are sure to be found, but the mode of their formation is to me a mystery.

In the following notes on the species of Entomostraca I have not thought it desirable to give descriptions or figures of any except entirely new species, or species new to the British Fauna. The rest have been sufficiently described elsewhere.

Class. CRUSTACEA.

Division. ENTOMOSTRACA.

Order. OSTRACODA.

Family. CYPRIDÆ.

Genus. CYPRIS, *Müller*.

Cypris salina, *Brady*.

Cypris salina, Brady. Monograph of recent British Ostracoda, p. 368, Plate XXVI., figs. 8–13.

Cypris strigata, Baird. British Entomostraca, p. 157. Brady, Intellectual Observer, Vol. I. (1862), p. 452, Woodcut, fig. 6.

This species I at one time supposed, with Dr. Baird, to be perhaps referable to Müller's *C. strigata*, the peculiar surface markings agreeing very well with his description; but the shape and proportions of the carapace are so widely different that I now consider it quite distinct, and I am confirmed in this opinion by the fact that another species more nearly approaching the original *strigata* has been noticed by some continental authors. The only localities in which *C. salina* has yet been found are Monkwearmouth Colliery pond, a pool about high-water mark at Warkworth (G. S. B.), and "pool on sea shore a little above high-water mark, at Thornton Loch, East Lothian, June, 1835" (Dr. Baird).

Genus. CYPRIDOPSIS, *Brady*.

Cypridopsis aculeata (*Lilljeborg*).

Cypris aculeata, Norman. Trans. Tyneside Nat. Field Club, Vol. V., p. 147, Plate III., figs. 7–10.

Cypridopsis aculeata, Brady. Monograph of recent British Ostracoda, p. 376, Plate XXIV., figs. 16–20; and Plate XXXVI., fig. 10.

The genus *Cypridopsis* differs from *Cypris* in the post-abdominal rami being quite rudimentary. *C. aculeata* has been found

in this country in the following localities :—Brackish ditches at Gravesend (Professor T. Rupert Jones), Sutton Decoy, Suffolk (Mr. E. C. Davison), Cowpen Marsh, near Stockton (Rev. A. M. Norman), Hylton Dene and Monkwearmouth Colliery pond (G. S. B.).

Family. CYTHERIDÆ.

Genus. CYTHERE, *Müller.*

Cythere castanea, *G. O. Sars.*

Cythere castanea, G. O. Sars. Oversigt af Norges Marine Ostracoder, p. 32. Brady, Monograph of recent British Ostracoda, p. 398, Plate XXVIII., fig. 27; and Plate XXXVIII., fig. 6.

Occurs pretty plentifully in most of our salt-marshes. I have found it at Hylton Dene, Jarrow Slake, and at the mouths of the Seaton Burn, Wansbeck, Aln, and Tweed.

Genus. CYTHERIDEA, *Bosquet.*

Cytheridea littoralis, (*Brady*).

Cyprideis torosa. Brady, Trans. Tyneside Nat. Field Club, Vol. VI., p. 108, Plate III., figs. 11–23. G. O. Sars, Oversigt af Norges marine Ostracoder, p. 51.

Cytheridea torosa, Brady. Monograph of the recent British Ostracoda, p. 425, Plate XXVIII., figs. 7–12; and Plate XXXIX., fig. 5.

There seems to be no valid distinction between the genus *Cyprideis*, proposed by Prof. T. Rupert Jones, and the previously established genus *Cytheridea*, Bosquet. *C. littoralis* occurs often in very great abundance, and almost always in brackish water. The following are the localities where I have taken it :—Jarrow Slake, Seaton Sluice, mouths of the Wansbeck and Coquet; and

I have also seen specimens collected by the Rev. A. M. Norman from Hartlepool, the coast of Somersetshire, and Guernsey. Mr. Norman has also taken it in fresh water near Sedgefield, and Professor T. Rupert Jones in brackish water ditches at Gravesend, and in shell-sand on the Devonshire coast. I have found it abundantly in mud from the Sea of Azoff, and sparingly in gatherings from various places in the Levant.

The confused synonymy of this species requires a few words of explanation. The specific name *torosa* was originally applied by Professor T. Rupert Jones to certain fossil carapaces found at Grays, in Essex, which we now know to be identical with the more recently described *Cythere lacustris* of G. O. Sars. But after preparing his first description, Professor Jones found, in ditches of brackish water at Gravesend, living specimens which he supposed to belong to the same species as his *torosa*. These were referred to in his "Monograph of the Tertiary Entomostraca," published in 1856, as *Cyprideis torosa*. In a short paper published by myself (*loc. cit.*) in 1864, I adopted this view, describing the recent salt-marsh species under the name *Cyprideis torosa*. But in the preparation of my recently published "Monograph of the Recent British Ostracoda," having had the advantage of reference to the original type specimens of *C. torosa*, I found that they (the specimens from Grays) were specifically distinct from the recent brackish water species, and at the same time I became aware that G. O. Sars, not having access to Professor Jones's "Monograph," had described the original *C. torosa* from living specimens, under the name *Cythere lacustris*, and had also followed me in referring the smoother littoral species to *C. torosa*, Jones. Under these circumstances, wishing to avoid the needless introduction of fresh specific names, I proposed in my "Monograph" to retain the name *torosa* for the species which had already been recognised under that term by G. O. Sars and myself, as also in part by Professor Jones, allowing Sars's name *lacustris* to stand for the fresh-water torose form. I was not then aware, as I now learn from Mr. Jones, that his description of the carapace was made wholly from the fossil specimens (from Grays), and the reference to the recent form (Gravesend) was

made on the ground of similarity of valves to the smoother individuals of *C. torosa*. Subsequently the limbs of the Gravesend specimens were examined and misplaced to the fossil valves (the fossil valves of Grays and the recent carapaces of Gravesend being regarded as belonging to the same species). It seems, therefore, unavoidable, that the term *torosa* must in future be applied exclusively to the fresh-water species (*lacustris*, Sars), and that the smooth brackish water species (*torosa*, Sars and Brady) must take an entirely new name: with this view, the specific name *littoralis* is here proposed.

Genus. LOXOCONCHA. *G. O. Sars.*

Loxoconcha elliptica, *Brady.*

Loxoconcha elliptica, Brady. Monograph of recent British Ostracoda, p. 435, Plate XXVII., figs. 38, 39, 45–48; and Plate XL., fig. 3.

I first found this species in May, 1865, in pools near the mouth of the Wansbeck; and in May and July, 1867, more abundantly at Seaton Sluice. Mr. Norman has also taken it in Arnold's pool, Guernsey. Still more recently I have found it in various localities in Ireland, and have seen it in a gathering from the estuary of the Thames.

Order. COPEPODA.

Family. CYCLOPIDÆ.

Genus. CYCLOPS, *Müller.*

Cyclops Lubbockii, n. sp. (Plate IV., figs. 1–8.)

Superior antennæ of the female fourteen-jointed, the eighth joint being incompletely divided, the last two joints the largest, seventh, ninth, eleventh, and thirteenth joints each armed with a single long apical seta, the last joint with six. Penultimate

joint of the inferior antennæ bearing on the upper margin a row of eight curved setæ, gradually increasing in length from the first to the last. Mandibles broad at the base. Second pair of foot-jaws feeble and sparingly setose. Fifth pair of feet bi-articulate, cylindrical, first joint short, bearing one long seta, the last joint bearing one long and one short terminal seta. First abdominal segment bearing a small laminar appendage or rudimentary foot, which has four unequal terminal spinous setæ. Caudal segments very long and narrow, nearly four times longer than the preceding abdominal segment, and above half the length of the longest apical seta. Length, $\frac{1}{27}$th of an inch.*

Hab.—In pools of brackish water, near the edge of the Slake at Hartlepool, June, 1866.

This species is very closely allied to *Cyclops insignis*, Claus; but the setose armature of the upper antennæ, and the conformation of the rudimentary feet, are both strikingly different. The foot-jaws also seem to be much weaker, and less robustly spined. The form and proportions of the joints of the tail and upper antennæ of *C. insignis*, as figured by Claus (*Weigmann's Archiv.*, 1857) are, however, precisely similar to those of the present species. The only Entomostraca which occurred in company with it were *Temora velox* and *Tachidius brevicornis*, both purely brackish water species. I have pleasure in inscribing this species to Sir John Lubbock, an author who has contributed largely to our knowledge of this order.

Cyclops æquoreus, *Fischer*. (Plate IV., figs. 9–16).

Cyclops æquoreus, Fischer. Abhandl. der Akad. der Wissenschaft, München (1860), Band 8, p. 654, T. XX., figs. 26–29.

Upper antennæ of the female six-jointed, short and stout, rather densely setose along the upper margin; fourth joint the longest, third and fifth both very short, the sixth nearly as long as the fourth, and terminating in four setæ. Lower antennæ

* This is in all cases exclusive of the tail setæ.

small, three-jointed, the basal joint bearing one short apical seta, the second none, the last six curved apical setæ, and a tuft of three or four—one long, the rest short—from the middle of the upper margin. Upper foot-jaw stout and powerfully clawed; lower, weak, slender, bearing three long terminal setæ and several shorter marginal ones. Mandibles small, and slenderly toothed. First four pairs of feet alike; branches short, and nearly equal, the joints very broad; marginal spines of the inner branch ovate-lanceolate, divaricate. First abdominal segment produced at each side into a slender projecting angle from which springs a short bi-articulate seta, representing the fifth foot. To the second abdominal segment is attached at each side a conspicuous triangular lamina, the external margin of which bears four spines, the first and fourth (counting from above) being nearly equal, the second shorter, the third much longer and setiform: margins of the appendage finely ciliated. The lower angles of the abdominal segments are produced downwards, appearing like slender appressed spines. Terminal or caudal segments short, bearing one short seta in the middle, and four terminal setæ, the longest of which considerably exceeds the length of the abdomen. Ovisacs two.

Hab.—Brackish pools at Seaton Sluice, Northumberland.

My specimens agree so closely in many respects with the figures and description of *Cyclops æquoreus*, given by Fischer, that I cannot entertain much doubt as to their identity. The lower antennæ are, however, considerably stouter than those figured by Fischer, and are, as far as I can make out, only three-jointed; the spinous armature of the triangular abdominal appendage of Fischer's specimens also slightly differs from that of mine. It appears to me that the small bi-articulate cylindrical appendage, attached just above the triangular plates, is the true homologue of the fifth foot, and that these plates correspond with the very similar appendages which are found in *C. Lubbockii* (fig. 6 *a*) attached to the segment below the last pair of feet. Fischer's specimens were taken in "sea-water" at Madeira. Mr. Norman has specimens from a marsh in the West of Scotland.

Family. HARPACTIDÆ.

Genus. TACHIDIUS, *Lilljeborg.*

Superior antennæ short, having no flagellum; in the male bearing a vesiculiform appendage, and hooked at the extremity, in the female stout, and densely setose. Lower antennæ small, two-branched; secondary branch small. First four pairs of swimming feet alike, two-branched; each branch tri-articulate; fifth pair rudimentary, and composed of a single setose lamina. One eye. Ovisac single.

Tachidius brevicornis (*Müller*). (Plate V., figs. 1–9.)

Cyclops brevicornis, Müller. Entomostraca, p. 118.

Tachidius brevicornis, Lilljeborg. De Crust. ex Ord. trib., p. 196, Tab. XXII., figs. 12–16; Tab. XXIII., figs. 1, 2, 9; and Tab. XXIV., figs. 17, 18.

Body gradually tapering from the head downwards; lower edge of each segment distinctly pectinated; head beaked. First segment of the cephalothorax equal in length to the following three. Superior antennæ of the female (fig. 4) swollen at the base, the last five joints suddenly narrower, last joint excessively small, penultimate longer than any of the three preceding; the whole antenna densely clothed with long setæ on its upper margin, some of the setæ being strongly plumose, or even almost spinous. Superior antenna of the male (fig. 3) bearing, towards the apex, a large vesiculiform sac from the upper margin of which spring a strong curved spine and three long setæ; the apex of the antenna forming a strong claw or hook. Lower antennæ (fig. 5) two-jointed, the basal joint bearing a small, slender, secondary branch. Third foot-jaw (fig. 6) tri-articulate, slender, chelate. Four pairs of swimming feet (fig. 7), all alike, two-branched, each branch three-jointed. Fifth pair (fig. 9) squamous, bordered with long spiniform setæ. Terminal joints of the abdomen very short (fig. 8); internal (longer) setæ of the tail about half the length of the body, external setæ half the

length of the internal, beset along nearly their whole length with short cilia. Length, $\frac{1}{40}$th of an inch.

Hab.—Brackish pools at Hartlepool, and in Hylton Dene, near Sunderland, county of Durham; and at Seaton Sluice, Northumberland.

From the close agreement of my specimens, in most respects, with the figures and descriptions given by Lilljeborg, I have no doubt that they are referable to *Tachidius brevicornis*, though I have not been able to make out precisely the structure of some of the appendages of the mouth. A species closely allied to the present, *T. minutus*, has recently been described by Prof. Claus.*

Genus. DACTYLOPUS, *Claus.*

General conformation of the body as in *Canthocamptus*. Superior antennæ mostly eight-jointed, armed with a flagellum; secondary branch of the lower antennæ three-jointed. Lower foot-jaws large, subchelate. Both joints of the first pair of feet tri-articulate, armed with digitiform terminal setæ, internal branch prehensile, its first joint much elongated, apical joint very short.

Dactylopus tisboides, *Claus.*

Dactylopus tisboides, Claus. Die frei lebenden Copepoden, p. 127, Taf. XVI., figs. 24–28; and Die Copepoden-Fauna von Nizza, p. 27, Taf. III., figs. 1–7. (*Not* of Brady, Intellectual Observer, Vol. VII., p. 22.)

Body rather broad and massive, often marked with reddish-brown blotches. Head produced into a short, conical beak. Upper antennæ of the female short and densely setose along their whole length, nine-jointed (eight-jointed, *Claus*), tapering gradually from the base, the penultimate and ante-penultimate joints very short. In the male the joints are twisted, and constricted at the sutures; no vesculiform swelling. The secondary branch of the lower antenna is armed with four setæ along its upper margin, and three terminal setæ. Last joint of the lower

* Die Copepoden-Fauna von Nizza, p. 24.

foot-jaw having its margins nearly equally arched, lower margin bearing in the middle a long seta, with several minute ones in front of it; claw long and slender. First pair of feet strong, outer margins of the two branches densely setose and spinous; outer branch very much shorter than the inner; the long branch bearing on its inner margin a single long plumose seta, which never reaches much beyond the base of the terminal spines. Fifth pair of feet somewhat larger, and less angular in the female than the male, bearing several long apical setæ. Abdomen broad, its last segment short; caudal segments also very short, inner tail-setæ fully two-thirds the length of the body, outer seta about half their length. Length, $\frac{1}{45}$th of an inch.

Hab.—In rock pools at Roker, county of Durham; and the Great Isle of Aran, Galway Bay. Also in pools of brackish water at Seaton Sluice, Northumberland.

This species is less common than that which I at one time supposed to be referable to *D. tisboides*, and which I published under that name in the "Intellectual Observer" (*loc. cit.*). The form of *D. tisboides* found in brackish water differs remarkably from the marine form in the strength of the spinous and plumose armature of the limbs. I do not know that this variation is produced by difference of habitat, my observation of the species not having been extensive enough to assure me that a similar variety may not be found in truly marine situations. The following remarks of Dr. Claus on a similar variation in one of a nearly allied genus, will, however, be read with interest:—"The stronger, and, on the average, the larger form of *Harpacticus nicæensis* has a heavy, strong body, ill-bred apparently, inactive, and wanting in mobility; the antennæ clumsy, with their third and fourth joints short and thick, the second joint very long; the second foot-jaw ends in a strong, massive, clasping hand; the first pair of feet are armed with doubly curved claws; the feet, especially the last pair, are strong and clumsy, all the setæ showing a tendency to become plumose. The smaller and slenderer breed has larger antennæ, the third and fourth joints of which are much elongated; the prehensile apparatus of the foot-jaws and first pair of feet more slender; and there is also a much slimmer,

slenderer form of the limbs. In general structure and conformation of body, in the peculiar arrangement of setæ, the serration of the abdominal segments, in short, in those points where distinct species mostly diverge, there is here a striking agreement. * * After diligent enquiry, these differences remained unexplained; and I was inclined to consider them as mere individual variations. But further investigation of all parts of the body convinced me that two distinct forms, with qualities diversely useful, had originated two separate races, one slender, swift, and agile, the other clumsy in figure, but robust and powerfully armed. The two races are so far separate that intermediate individuals, partaking of the characters of both, are not met with. The upper antennæ, however, in each case, show a tendency to similar variations: at the same time these variations are not so profound that they might not have been acquired singly, or in combination. The differences in the relative size of the claws and prehensile organs may be traced back to the youngest stages of growth. * * * Many species may, no doubt, have been founded on characters no more distinct than these, and on mere deviation of character in the joints, which a critical investigation would prove to be worthless."* It may be noticed that many of the peculiarities here pointed out by Dr. Claus—especially the strong, doubly-curved claws of the first feet in the stronger, and the very slender, simply-curved claws in the weaker, form—have their exact counterparts in the two varieties of *D. tisboides* here referred to.

Genus. DELAVALIA,† nov. gen.

In general form like *Dactylopus*. Superior antennæ eight-jointed, having no flagellum. Inferior antennæ bearing a bi-articulated secondary branch. First pair of feet two-branched,

* "Die Copepoden-Fauna von Nizza. Ein Beitrag zur Charakteristik der Formen und deren Abänderungen. 'im sinne Darwin's'" von Dr. C. Claus. Marburg und Leipzig, 1866. See also an Abstract of Dr. Claus's Memoir, by the present author, in the "Intellectual Observer, Vol. X., p. 327.

† From Seaton Delaval, near which place the genus was first found.

the external branch three-jointed, the internal two-jointed, not prehensile; both branches of the three following pairs tri-articulate; fifth pair rudimentary, foliaceous. Two ovisacs.

This genus differs from *Dactylopus* and *Thalestris* chiefly in the structure of the first pair of feet, one or both branches of which are, in those genera, prehensile. The absence of a flagellum in the upper antenna, and the presence of two ovisacs constitute further distinctive characters.

DELAVALIA PALUSTRIS, n. sp.

Body of the female robust, the segments not pectinated on their lower margins. Upper antennæ short, densely setose on the superior margin, gradually tapering to the apex, last joint slender, longer than any of the preceding. Superior margin of the apical joint of the lower antennæ pectinately setose; the last three setæ longer than the rest, and almost spinous; apex bearing five or six long curved setæ; secondary branch slender, bi-articulate. The two branches of the first pair of feet nearly equal in length; the inner bi-articulate, its apical joint narrow, and much longer than the basal, terminating in two long subequal spinous setæ; external branch composed of three nearly equal joints, the last terminating in two setæ, like those of the inner branch. Both branches of the second, third, and fourth pairs tri-articulate, the outer nearly twice as long as the inner. Fifth pair of feet small, subovate, lower margin bearing about five setæ. Ovisacs two, divergent. Length, $\frac{1}{32}$nd of an inch.

Hab.—In brackish pools at Seaton Sluice, Northumberland.

FAMILY. CALANIDÆ.

GENUS. TEMORA, *Baird.*

TEMORA VELOX, *Lilljeborg.*

Temora velox, Brady. Nat. Hist. Trans. North. and Durham, Vol. I., p. 38, Plate I., fig. 16, and Plate III., figs. 1–11.

This is the most abundant of all the brackish-water Copepoda.

I have taken it in great numbers at Hylton Dene; also at Hartlepool, Seaton Sluice, Alnmouth, and Burgh Marsh, near Carlisle. Mr. Norman finds it in a similar situation in the Isle of Cumbrae. I have only once noticed it in the open sea, and then only one or two specimens were taken; this was on the coast near Sunderland Docks.

Genus. DIAS, *Lilljeborg*.

Dias longiremis, *Lilljeborg*.

Dias longiremis, Brady. Nat. Hist. Trans. North. and Durham, Vol. I., p. 35, Plate I., fig. 14; and Plate II., figs. 11–18.

D. longiremis has occurred in brackish water at Alnmouth, and at Burgh Marsh Cumberland; but is more abundant and of much finer growth in the open sea.

EXPLANATION OF THE PLATES.

PLATE IV.

Cyclops Lubbockii.

Fig. 1. Upper antenna of female, × 210.
Fig. 2. ,, ,, male, × 210
Fig. 3. Lower antenna, × 210.
Fig. 4. Upper foot-jaw, × 210.
Fig. 5. Lower foot-jaw, 400.
Fig. 6. Fifth foot of male, × 400.
Fig. 6*a*. Appendage of first abdominal segment, × 400.
Fig. 7. Upper abdominal segments of male, × 210.
Fig. 8. Tail, × 210.

Cyclops æquoreus.

Fig. 9. Upper antenna of female, × 210.
Fig. 10. Lower antenna, × 210.
Fig. 11. Mandible, × 210.

Fig. 12. Lower foot-jaw, × 210.
Fig. 13. Upper foot-jaw, × 210.
Fig. 14. Foot of first pair, × 210.
Fig. 15. Abdomen and lower segments of cephalothorax, × 120.
Fig. 16. Foot of fifth pair, × 210.

PLATE V.

Tachidius brevicornis.

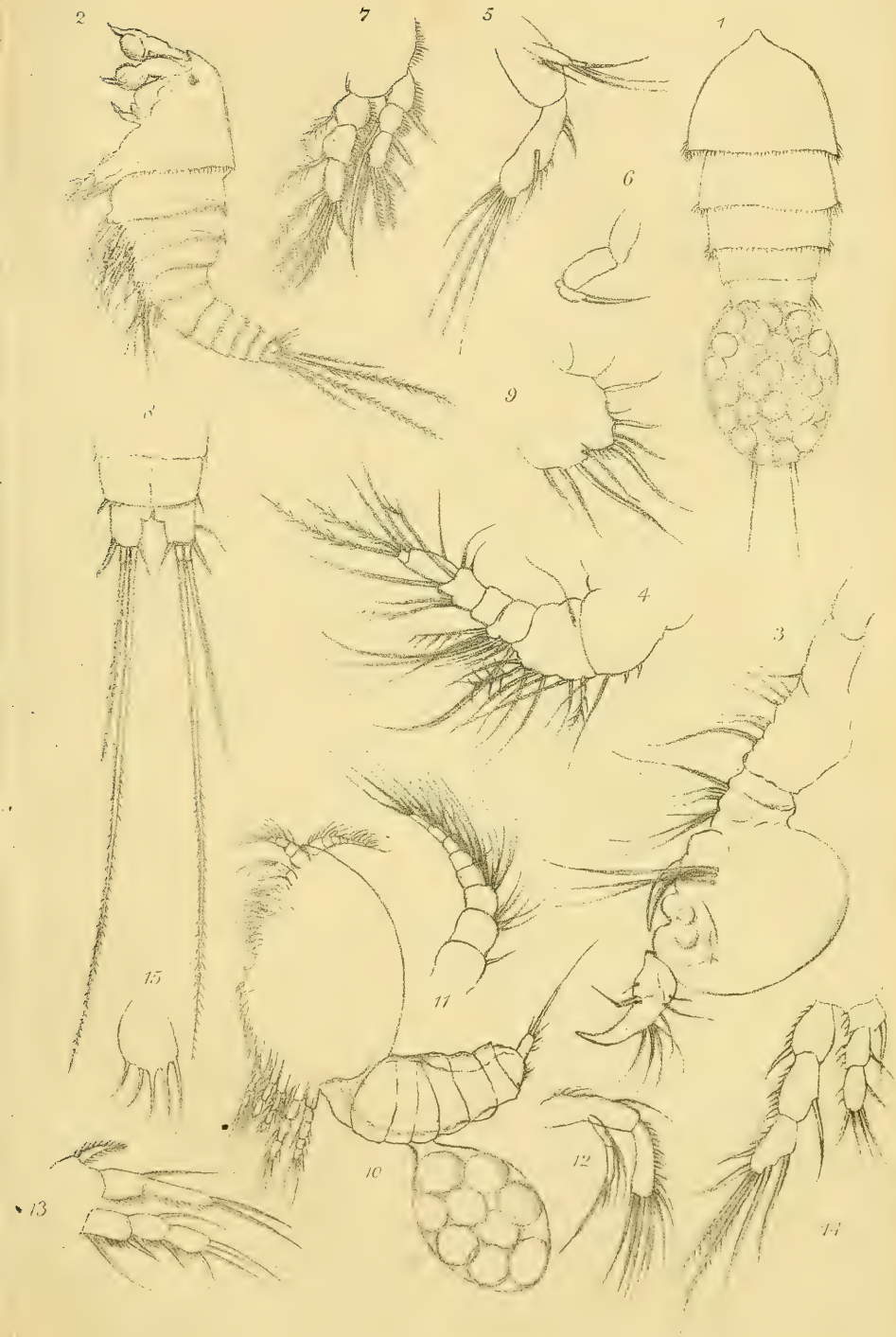
Fig. 1. Female seen from below, × 85.
Fig. 2. Male seen from side, × 85.
Fig. 3. Superior antenna of male, × 400.
Fig. 4. ,, ,, female, × 400.
Fig. 5. Inferior antenna, × 400.
Fig. 6. Third foot-jaw, × 210.
Fig. 7. Foot of second pair, × 210.
Fig. 8. Extremity of abdomen, × 210.
Fig. 9. Fifth foot of female, × 210.

Delavalia palustris.

Fig. 10. Female seen from side, × 85.
Fig. 11. Superior antenna of female, × 210.
Fig. 12. Inferior antenna, × 210.
Fig. 13. Foot of first pair, × 210.
Fig. 14. ,, fourth pair, × 210.
Fig. 15. ,, fifth pair, × 210.

G. S. Brady, delt.

W. West, imp.



G. S. Brady delt.

W. West, imp.