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XXIX.—*Contributions to British Carcinology.*—I. *Characters of undescribed Podophthalmia and Entomostraca.* By the Rev. ALFRED MERLE NORMAN, M.A.

[Plates XIII. & XIV.]

UNDER the above title I propose to publish, from time to time, notes upon our rarer Crustacea, together with descriptions of such new species as may come into my hands. I regret to learn from Mr. Van Voorst that there is no prospect at present of a new edition or supplement to Bell's 'History of British Crustacea' being published; may I be allowed, however, through this channel, to express a hope that Dr. Baird may be induced to prepare a Supplement to his admirable 'Monograph of British Entomostraca.' Ample material is in existence; and such portion of it as is in my own collection would be most gladly placed in his abler hands for description, if such a supplement were undertaken.

Subclass PODOPHTHALMIA.

Fam. Paguridæ.

Pagurus ferrugineus, n. sp. Pl. XIII. figs. 1–3.

Pedes chelati ciliati, læves, neque spiniferi neque granulati (præter quod margo carpi interior spinosulus est); margo brachii dextri interior setarum scopas gerens. *Manus dextra* ovata; *sinistra* minor, angustior, lateribus subparallelis, supra haud angulata. *Oculorum pedunculi* elongati. Longitudo 1 unc.

The carapace in this species is somewhat depressed anteriorly, with the margin not rostrate and scarcely flexuous. The long and slender eye-stalks reach to the middle of the last basal joint of the external antennæ, and to about one-third the length of the last joint of the peduncle of the interior antennæ. The first pair of feet, which are very unequal, are clothed with fine silky hairs.

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The right leg is furnished with a conspicuous brush of hair on the lower edge of the inner margin of the third joint; the wrist has spinose tubercles on the inner margin; the hand elongate-ovate, about equal to the wrist in length, not sculptured (neither spinose nor granular), clothed with scattered hair; fingers half the total length of the hand. Left hand very much smaller, with nearly parallel sides, and not angulated on the centre of the upper surface; fingers elongated, not toothed. Second and third legs slightly hairy, their upper margins not spinose. Colour reddish brown, uniform all over. Total length 1 inch.

The hairiness of the fore legs distinguishes this species from all its British congeners except *cuanensis* and *Thompsoni*; and from these, as well as, I believe, from *all* our species, it may be at once known by the smoothness of the hands, which have neither surface nor margins spinose or granular. The form of the fore legs in *P. laevis* approaches closely to that of *P. ferrugineus*; but the surface of the former is minutely granular, and never hairy, the wrist and fore-arm are also more spiny on the inner edge, and the hand is always pale in colour, with a bright crimson central stain, which bifurcates and extends up the fingers.

In July 1859, when dredging in Moulin Huet Bay, Guernsey, I procured two small individuals of the new species now characterized, which were at once laid aside for description. This summer, while dredging with my friend Mr. Jeffreys in the Shetland Isles, two larger specimens were taken in Dourie Voe; and while drawing up this description, and looking through my collection of Hermit Crabs, I found a fifth example, mixed with the young of *P. Thompsoni*, which was taken, in February 1853, in Lamblash Bay.

Fam. Palæmonidæ.

Subfam. ALPHÆINÆ (Dana).

Genus HIPPOLYTE (Leach).

Rostrum sat longum, plus minusve ensiforme, non mobile. *Abdominis segmentum tertium* pone productum. *Oculi* salientes. *Antennæ* internæ plerumque spina, externæ semper squama basali ornatae; internæ duobus flagellis confectæ. *Maxillipedum articulus ultimus* compressus, pectinatus. *Pedes primi* maxillipedibus breviores, manibusque brevibus instructi; *secundi* multo longiores, carpum annulati.

Rostrum long, more or less sword-shaped, not articulated at the base. Third segment of abdomen produced behind, and the abdomen thence suddenly bent downwards. Eyes prominent. Internal antennæ generally with a spine externally at their base,

ending in two filaments; external antennæ always furnished with a scale. Pedipalps with their last joint flattened and toothed on the edge like a comb. First pair of legs shorter than the foot-jaws, and having small hands; second pair longer, their wrists many-jointed, and hands smaller than those of the first pair.

I have drawn up fresh characters of this well-known genus, for comparison with those hereafter to be described.

Hippolyte producta, n. sp. Pl. XIII. fig. 5.

Forma gracilis atque attenuata. *Scutum* dorsale cylindricum, neque gibbosum neque crassitudine abdomen excedens. *Rostrum* horizontale, prælongum, acuminatæque cultrellatum, squamam antennarum elongatam multo superans: dens marginis superioris unus prope basin supra oculos positus; marginis inferioris dentes quatuor omnes ultra dentem superiorem positi. *Margo scuti* anterior duobus aculeorum paribus munita, unum ad rostri basin (sicut in *varians*), alterum prope basin antennarum exteriorum situm. *Telson* aculeorum unum par gerens. *Oculi* approximati sub rostro positi, quod, quum, ut oculos desuper videamus, conamur, hos celat. Long. 1 unc.

This is by far the most slender member of the genus with which I am acquainted; every part is elongated, the body and all its members. The carapace is cylindrical; it does not present the slightest gibbosity on the back, nor at all exceed in size the first segment of the abdomen; the lateral margins are bent inwards below or wrapped round the body, instead of being produced downwards, as is usually the case. The rostrum is remarkably long, extending beyond the apices of the narrow antennal scales, which are themselves much produced; above, there is a single tooth near the base and over the eyes; below, there are four teeth, of which the last is the smallest, and is situated close to the apex. There is a tooth on the carapace on either side of the base of the rostrum, and another behind the origin of the external antennæ; the front margin of the carapace is also produced into two very minute spine-like expansions immediately below the eyes. The telson has one pair of minute teeth. The eyes, which are remarkable for their small size, are placed side by side, close together, and directly under the rostrum, so that, if looked at from above, they are almost entirely concealed.

From the above description it will be at once evident that, with respect to the armature of the rostrum, *H. producta* approaches both *H. varians* (Leach) and *H. viridis* (Otto)*. From

* This species is the *H. Whitei* and *H. Mitchellii* of Mr. William Thompson (Ann. Nat. Hist. ser. 2. vol. xii. p. 110, pl. 6). Mr. Adam White, in
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the former it may be known by the larger number of teeth on the under side of the rostrum, from the latter by the presence of the tooth near the base of the rostrum above; from both by the single pair of spines on the telson. The remarkable elongation and slenderness of this species is, however, its most marked characteristic. It is quite a *Mysis* in form, and indeed, when I first took the species, I was under the impression that it belonged to that genus. The dredge came up one day in Lamlash Bay, Arran, full of *Laminariæ*, among which were hopping numerous *Hippolytæ*: (*varians*, *Cranchii*, *pandaliformis*, &c.) and *Pandalia* (*annulicornis* and *Thompsoni*): from these I at once singled out what I took to be a *Mysis* I had never seen before; the specimen was accordingly bottled, when, on reaching home, examination proved it to be the *Hippolyte* now described.

The colour, when alive, was a deep green (not so vivid as in *H. viridis*), with a black line down the back of the abdomen.

The species measures 1 inch from the extremity of the rostrum to the end of the telson; length of carapace $\frac{2}{10}$ inch, of rostrum $\frac{3}{10}$ inch; greatest depth of carapace $\frac{1}{10}$ inch.

Genus DORYPHORUS*, n. g.

Rostrum, oculi antennæque eadem quæ in Hippolyte. Abdominis segmentum tertium pone non productum. Spina antennarum interiorum magna. Maxillipedum articulus ultimus cylindricus, ciliatus, spinulis (non in pectinis formam dispositis) paucis ad apicem instructus. Pedes primi secundique inter se maxillipedibusque fere pares, manibus elongatis instructi; secundi carpum annulati.

Rostrum, eyes, and antennæ as in the genus *Hippolyte*; the spine at the base of the internal antennæ large. Last joint of pedipalps cylindrical, ciliated, ending in a few spines, which, however, are not disposed in the form of a comb. First pair of feet much longer than in *Hippolyte*, about equal to the pedipalps and second pair of feet; third, fourth, and fifth pairs of feet long and slender, exceeding the first two pairs. Wrist of

his 'Popular History of British Crustacea,' quotes a note of mine, in which I stated my opinion that *H. Mitchellii* was a variety of *H. varians*. That opinion I now retract. I had then only seen two small specimens of "*Mitchellii*;" but having since taken that form as well as "*Whitei*" in considerable numbers at Jersey, Guernsey, and Bantry Bay, I am now satisfied that Mr. Thompson's *Hippolytes* are varieties of one species, which may always be known from *varians* by the absence of teeth on the upper side of the rostrum, as well as by its more produced form and larger size. The species would seem to be identical with *Hippolyte viridis* (Otto) (*Alpheus viridis*, Otto, Mém. de l'Acad. des Cur. de la Nat. de Bonne, lxiv. pl. 20. f. 4; *Hippolyte viridis*, Milne-Edwards, vol. ii. p. 372).

* Δορυφόρος, a spear-bearer, lancer.

the second pair not simple. Third segment of the abdomen not produced behind, nor differing from the other segments.

Doryphorus Gordoni (Spence Bate). Pl. XIII. figs. 6 & 7.

Hippolyte Gordoni, Spence Bate, Nat. Hist. Review, vol. v. p. 51 and woodcut.

Scutum antice carinatum atque dentatum. *Rostrum* horizontale, ad apicem aliquantum resimum, longitudine oculos bis superans, squamam antennarum exteriorum quarta parte æquare deficiens. *Dentes* marginis superioris septem (rarius octo) ejusdem magnitudinis eodemque intervallo inter se separati, horum unus (rarius duo) in carina scuti positus: marginis inferioris unus prope apicem positus. *Margo scuti* anterior uno aculeorum pare armata infra oculos posito. *Telson* duo minuta aculeorum paria gerens. *Antennæ* internæ apicem squamæ exteriorum longe superantes. *Pedes primi* præter apicem squamæ antennarum multo extendentes, antennarumque interiorum longitudinem assequentes; dactyli pedum primi atque secundi parium elongati. *Carpus* secundi paris biarticulatus. Long. $\frac{3}{4}$ unc.

Rostrum moderately long, and very elegant from the fact of its being doubly bent; in the middle it inclines slightly downwards, and at the apex it again bends upwards. There are seven or eight equidistant and equal-sized teeth above, of which not more than two are situated posteriorly to the orbit; the apex is simple and bent upwards; the single tooth below is placed near the apex of the rostrum and opposite to the last tooth of the upper side. On either side of the carapace, below the orbit, is a single tooth. The interior antennæ are long, and considerably exceed the antennal scales in length. Two pairs of spines on the telson. The first feet are long, and, when directed forwards, project beyond the antennal scale by the length of the fingers, which in both the first and second pairs of feet are much larger than in the genus *Hippolyte*, elongated and curved. Colour reddish. Length, from the apex of the antennal scales to the end of the telson, $\frac{3}{4}$ inch.

I took two specimens of *Doryphorus Gordoni* in Lamash Bay in 1853, and afterwards found it among some Crustacea sent to me from the Moray Firth by Mr. Edward—the same locality from whence Mr. Spence Bate subsequently described the species. The absence of any prolongation in the third segment of the abdomen, the large size of the first pair of feet, the elongated hands of the first two pairs, and the greater length of the first, third, fourth, and fifth pairs, as compared with the second, seem to afford ample grounds for raising this interesting species to generic rank; and I had already drawn up the characters of the genus in MS. when Mr. Spence Bate's description appeared in the 'Natural History Review.'

Genus DENNISIA, n. g.

Rostrum, abdomen oculique eadem quæ in Hippolyte. Antennæ et externæ et internæ squama basali ornatæ; internæ tribus flagellis confectæ. Maxillipedum articulus ultimus cylindricus, ciliatus. Pedes primi maxillipedibus longiores, manibus elongatis instructi.

Rostrum, abdomen, external antennæ, and eyes as in the genus *Hippolyte*; the internal antennæ have the basal joint compressed and flattened out into a scale similar in form to that attached to the external antennæ, but smaller; their filaments are similar to those of the genus *Athanas*, the thicker of the two ordinary filaments being divided and sending out a slender branch near its termination. The last joint of the pedipalps is cylindrical and ciliated, not spinose. The first feet are longer than the pedipalps, and have lengthened hands, as in the genus *Palæmon*. The second feet in my specimens are injured, and I am consequently unable to draw characters from them. The palp of the mandibles appears to consist of a single joint.

Dennisia sagittifera, n. sp. Pl. XIII. figs. 8-13.

Scutum antice dentatum atque carinatum. *Rostrum* horizontale, cultrellatum, squamam antennarum exteriorum paulo superans: *dentes* marginis superioris octo, quorum duo in scuti carina positi; *dentes* inferioris tres; *dentes* ciliati. *Margo scuti* anterior duo aculeorum paria infra oculos posita gerens. *Telson* duobus aculeorum paribus ornatum.

The fore part of the carapace keeled. Rostrum nearly straight, a little longer than the scale of the exterior antennæ, and deep in proportion to its length; of the eight teeth which are on the upper edge, two are on the carapace and six on the rostrum itself; below there are three teeth: all the teeth are ciliated. There is a spine at the origin of the external antennæ, and a second spine on the carapace behind and a little below the first. Third segment of the abdomen gibbous and produced behind, as in the genera *Hippolyte* and *Pandalus*. There are two pairs of spines on the telson.

The colours of this species were very vivid and extremely beautiful when alive. The carapace was pale green, delicately spotted and mottled with brown; the abdomen very pale lilac, elegantly painted on the third segment with a chevron of a bright lilac (from this mark the specific name is derived), and before this were two oval brown spots. The legs were prettily banded with violet.

Among many rare Crustacea which were dredged by the Rev. R. N. Dennis and myself at Jersey, in 1859, was the present species. It was found among *Zostera* from about 4 fathoms water in St. Catherine's Bay. I have named the genus after

my friend and brother carcinologist, in remembrance of the happy hours which we have spent together, and as a tribute to an excellent field naturalist.

Subfam. II. PANDALINÆ (Dana).

Genus PANDALUS, Leach.

Pandalus Thompsoni, Bell. Pl. XIV. figs. 3-9.

Hippolyte Thompsoni, Bell, Brit. Crust. p. 290; White, Popular Hist. Brit. Crust. p. 123.

Pandalus Jeffreysii, Spence Bate, Fauna of Swansea; and Nat. Hist. Review, vol. vi. p. 100, with woodcuts.

Bell has described a *Hippolyte*, but figured a *Pandalus*, for this species. Any one looking at the woodcut in the 'History of British Crustacea' will see that the first feet are rightly drawn with "the terminal joint styliform and simple," which is the chief character of the genus *Pandalus*. *Hippolyte Thompsoni* is thus undoubtedly synonymous with Mr. Spence Bate's *Pandalus Jeffreysii*. Mr. Gosse was near discovering the truth. In his "Notes on some new and little-known Marine Animals" (Ann. Nat. Hist. ser. 2. vol. xii. p. 155), he remarked that the rostral spines of *Hippolyte Thompsoni* are not simple serratures, but "triangular spines articulated to the edge," as in *Pandalus annulicornis*; but there his observations appear to have ceased, and he failed to notice that the shrimp which he was examining was in all respects a true *Pandalus*.

Subfam. III. PALÆMONINÆ (Dana).

Genus PALÆMON, Fabr.

Palæmon minans, n. sp. Pl. XIV. figs. 1 & 2.

Scutum dorsale vix carinatum. *Rostrum* haud longe ab origine subito resimum; squamam antennarum non superans. *Dens* unus in scuti tergo positus. *Rostris dentes*, marginis superioris nulli, inferioris tres, ciliati.

This *Palæmon* may be known at a glance from the other British species by the remarkable form of the rostrum, which, instead of being horizontal or nearly so, is suddenly bent upwards at a short distance from its base. There is a single tooth on the back of the carapace, but none on the upper margin of the rostrum. The under side of the rostrum is furnished with three large teeth, which are fringed with fine hairs.

Palæmon minans was taken at Guernsey in 1857. The specific name has reference to the "threatening" aspect of the rostrum—upraised, as it were, to strike.

Subclass ENTOMOSTRACA.

Fam. Cypridinidæ.

Genus CYPRIDINA, Milne-Edwards.

Cypridina teres, n. sp. Pl. XIV. fig. 10.

Ovata, infra medium vix latior, lævis, alba; oris incisura stricta, descendens, recurvata. Animal incognitum. Long. $\frac{1}{15}$ unc.

Shell ovate, not produced, very slightly widening just below the middle, quite smooth, pure white, moderately and regularly convex. Oral slit narrow and somewhat semicircular in form. Length $\frac{1}{15}$ inch.

The nearest ally to this species is perhaps *Cypridina Mariae* (Baird); but the form of the latter is more produced, narrower in proportion to its length, of more equal breadth throughout, and much more tumid.

Cypridina teres was kindly added to my collection by the Rev. R. N. Dennis, who found it among shell-sand which had been dredged at Oban.

Genus PHILOMEDES, Lilljeborg.

The genus *Philomedes* is distinguished from *Cypridina* by the antennæ, which are furnished with a remarkable, long seta.

Philomedes longicornis, Lilljeborg. Pl. XIV. fig. 11.

Philomedes longicornis, Lilljeborg, Cladocera, Ostracoda, ock Copepoda i Skane, t. 26. figs. 4, 5 (1853).

Shell subquadrangular-ovate, slightly convex. Anterior margin generally retuse, but sometimes rounded; dorsal and ventral margins moderately arched; posterior margin obliquely truncate, the ventral angle being the lower. A short spine is frequently, but not always, present at the dorsal angle of the posterior extremity. Oral aperture wide, gaping, triangular. The surface of the shell seems to be always more or less excavated with large irregularly disposed circular or subcircular pits, which in aged examples are often confluent and form large scars. Length $\frac{1}{20}$ inch.

I met with this species, now first added to the British fauna, in some numbers among dredged stuff sent to me by W. Webster, Esq., from Plymouth Sound, on account of its containing *Chemitzia fenestrata* and *Odostomia acuta* in great abundance. I am indebted to Dr. Baird for pointing out to me the identity of the Plymouth Entomostracan with Lilljeborg's species.

In concluding these descriptions, I must return my best thanks to my friend Mr. Hodge for the valuable assistance he has given me in illustrating the paper.

EXPLANATION OF THE PLATES.

PLATE XIII.

- Fig. 1. *Pagurus ferrugineus* (Norman), slightly enlarged.
 Fig. 2. Right arm, side view.
 Fig. 3. Right hand, front view.
 Fig. 4. *Pagurus lavis* (Thompson); right arm.
 Fig. 5. *Hippolyte producta* (Norman); rostrum.
 Fig. 6. *Doryphorus Gordoni* (Spence Bate, sp.); rostrum.
 Fig. 7. Telson of the same.
 Fig. 8. *Dennisia sagittifera* (Norman), twice the natural size.
 Fig. 9. Rostrum of the same.
 Fig. 10. Carapace viewed from above, showing the structure of the antennal scales and filaments.
 Fig. 11. Pedipalp.
 Fig. 12. Leg of first pair.
 Fig. 13. Telson.

PLATE XIV.

- Fig. 1. *Palaemon minans* (Norman), slightly enlarged.
 Fig. 2. Side view of carapace of the same.
 Figs. 3 & 4. *Pandalus Thompsoni* (Bell); two forms of the rostrum.
 Fig. 5. Internal antennæ of the same.
 Fig. 6. Pedipalp.
 Fig. 7. Leg of the first pair.
 Fig. 8. Right leg of the second pair.
 Fig. 9. Left leg of the second pair.
 Fig. 10. *Cypridina teres* (Norman), magnified 50 diameters.
 Fig. 11. *Philomedes longicornis* (Lilljeborg), magnified 50 diameters: the spine *a* is often absent.

Sedgefield, county Durham,
 August 15, 1861.

XXX.—*Notes and Corrections on the Organization of Infusoria, &c.*
 By H. J. CARTER, Esq., F.R.S.

As time progresses, we make new observations and detect errors in preceding inquiries; and he who would still pursue truth will publish both indiscriminately, wishing to record the results of his labours for the benefit of those who may come after him, and thus make some little return for the pleasure he himself has derived from the investigations of others.

Spherical Cells.

In my "Notes on the Organization of the Freshwater Infusoria" (Ann. Nat. Hist. vol. xviii., 1856), I have mentioned "spherical cells or biliary organs (?)" in the list of their contents. This was a mistake, so far as the Infusoria are concerned; for I have since ascertained that the bodies to which I have referred, instead of being homologous with the ciliated cells lining the stomach of the *Planariæ* and Rotatoria respectively,



