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XXVI.—On some points in the structure of a species of the “Willemoesia group of Crustacea”

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AND

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[FIFTH SERIES.]

No. 28. APRIL 1880.

XXVI.—*On some Points in the Structure of a Species of the "Willemoesia Group of Crustacea."* By S. I. SMITH, Prof. Comp. Anat., Yale Coll.

AMONG the interesting collections of marine animals made during the past two years by the fishermen of Gloucester, Massachusetts, and presented to the United-States Fish Commission for the National Museum at Washington, there are two species of Podophthalmous Crustacea of peculiar interest. One of these is a remarkable hermit-crab (*Parapagurus pilosimanus*), which I have already described*; the other is the subject of this note, and belongs to the "*Willemoesia* group of Crustacea," which has recently been discussed by Messrs. Bate and Norman in the 'Annals.' Of the latter species I have seen a single male only, which was taken in 250 fathoms, off the coast of Nova Scotia, north latitude $43^{\circ} 10'$, west longitude $61^{\circ} 20'$, by Capt. Thomas Olsen, of the schooner 'Epes Tarr.' This specimen is not in very good condition, having been dried (probably after having been taken from the stomach of some fish, though there is very little evidence of digestion having begun) and the internal organs consequently destroyed; but it is still sufficient to throw considerable light upon the structural peculiarities of the group to which it belongs.

* "The Stalk-eyed Crustaceans of the Atlantic Coast of North America north of Cape Cod," Trans. Connecticut Acad. v. pp. 27-138 (1879).

Of the three genera into which Bate has separated the forms of the "*Willemoesia* group," our species should be referred to *Pentacheles*; but, on account of the at present uncertain tenure of these genera, I have referred it provisionally to Heller's *Polycheles*. It is apparently very distinct from any of the Atlantic species described by Heller, Willemoes-Suhm, or Bate; but, judging from the very short descriptions given by the last author, it appears to be closely allied to his *Pentacheles auriculatus*, obtained by the 'Challenger' expedition off the Fijis. Our specimen is a male, 92 millims. long. It is described in detail in the 'Proceedings of the National Museum, Washington,' for 1879, as *Polycheles sculptus*; and I wish here to call attention to a few points in its structure only.

The anterior margin of the carapax, as seen from above, is concave in outline, so that the lateral angles are much in advance of the rostrum. About a third of the space between the median line and the lateral angle on each side is occupied by a very deep orbital sinus completely filled by a large ophthalmic lobe (fig. 1). Just behind the orbital sinus there is a smooth and evenly curved depression in the surface of the carapax, exposing a small area on the posterior part of the ophthalmic lobe.

The ventral region of the carapax on each side is divided longitudinally into three approximately equal parts by two carinæ: the outer (marking the pleuro-tergal suture?) extends from the anterior margin at the base of the antenna toward the postero-lateral margin; the inner extends along the branchial region from near the base of the first pereopod to the postero-lateral angle of the carapax.

The outer of the three longitudinal

regions thus marked out is divided transversely by the cervical suture; and the anterior portion (subhepatic region) is divided transversely into an anterior and a posterior lobe by a groove nearly or quite as conspicuous as the cervical. In the frontal margin of this anterior lobe and near its inner side there is a deep sinus corresponding to the orbital sinus of the dorsal surface, but not quite as wide, and open nearly to the dorsal surface, except where it is crossed by a protuberance from the ophthalmic lobe (fig. 2).

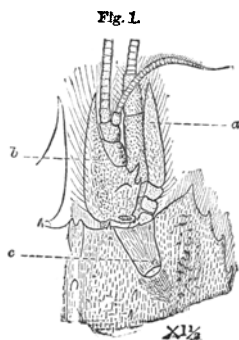
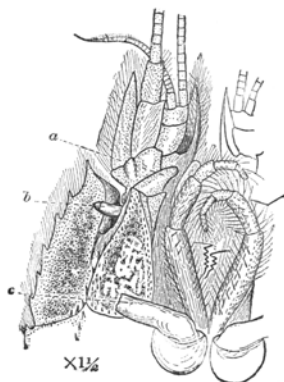


Fig. 1.
Dorsal view of the anterior portion of the right side of the carapax: a, antennal scale; b, proximal segment of antenna; c, ophthalmic lobe.

The dorsal surface of the ophthalmic lobe is smooth, calcareous, and opaque, and on a level with the adjacent surface of the carapax, except posteriorly, where a small oval area of the extremity of the lobe is exposed by the depression in the carapax. This oval area is thin, semitranslucent, and not calcareous, and has every appearance of being a true corneal area, although I am unable to detect any evidence of facets. The carapax along the margins of the sinus is in close contact with the ophthalmic lobe, but is not really connected with it. From the lower portion of each ophthalmic lobe there is an elongated, cylindrical and somewhat conical, but obtuse and pointed, protuberance, of which the base rests in a transverse groove in the base of the antenna, while the terminal portion extends well across the open ventral side of the orbital sinus. Upon the obtuse extremity of this protuberance there is a nearly circular area, similar to the cornea-like area at the posterior extremity of the dorsal part of the lobe.

Unfortunately the specimen is not in sufficiently good condition to enable me to determine positively in regard to the structure of these cornea-like areas; but that they are connected with the optic nerves and are sensitive to light, there is, I think, no chance for reasonable doubt. While it seems probable that all four of these areas are really faceted like the eyes of ordinary *Podophthalmia*, it is possible that they may be large, simple or nearly simple eyes, like the eyes of some *Amphipoda* and *Cumacea*. The division of the ophthalmic lobe on each side into two or more "eyes" has not, I think, before been noticed among the *Decapoda*, and is certainly an interesting fact in morphology; but it is apparently not a character of much systematic or phylogenetic value. Among the *Schizopoda*, the lamellar expansion of the ophthalmic lobes in *Amblyops*, and their broad expansion and partial union in *Pseudomma*, are quite as remarkable and apparently somewhat similar modifications; and *Ampelisca* and *Biblys*, among the *Amphipoda*, are cases in which there are two simple eyes on each side,

Fig. 2.



Ventral view of the anterior portion of the right side of the carapax: *a*, tubular process containing the canal from the green gland; *b*, process of the ophthalmic lobe; *c*, base of the first pereopod.

while in the closely allied *Haploopsis* the number apparently varies in the different species.

The openings of the green glands are arranged very differently from what they are in any other group of Crustaceans known to me. Willemoes-Suhm says, of *Willemoesia leptodactyla*, that "there is no distinct opening for the so-called green glands;" but he probably overlooked it from its being in an unusual position: it is, with very little doubt, situated in a similar manner in all the allied species. The proximal segment of the antenna, in our specimen, is loosely articulated with the sternum of the antennal segment, so as to be freely movable upon it. It is very short upon the outside, but expands somewhat on the inner side, which terminates distally in a thin tubular process arising from the oral side of the segment and directed upward to a level with the dorsal side, so that, in the ordinary position of the appendages, its orifice is closed by contact with the proximal segment of the antennula. This tubular process (*a*, fig. 2) readily admits a large bristle, which can be pushed through it, round into the cavity of the segment itself. A similar process is apparently shown in one of Bate's figures of *Pentacheles enthria* ('Annals,' vol. ii. pl. xiii. fig. 2, 1878), though I find no reference to it in the accompanying text. Bate subsequently, however, appears to allude to this same process as "the olfactory tubercle of the second or outer antennæ," though I cannot find that he anywhere alludes to Willemoes-Suhm's inability to discover the openings of the green glands.

The branchiostegites extend forward quite over the sternum of the antennary somite; and their anterior extremities are applied to the basal segments of the antennæ. The epistome is short, not extending at all in front of the bases of the antennæ, is nearly on a level with the dorsal wall of the efferent branchial passages, and on a plane above the bases of the antennæ; so that the efferent passages terminate in the space between the upturned edges of the squamiform processes of the inner sides of the basal segments of the antennulæ and just beneath the short two-spined rostrum. The anterior part of the endostome is on a plane somewhat above the plane of the epistome; but the space below is filled by the soft and fleshy labrum, which projects considerably below the raised posterior edge of the epistome, and does not differ essentially from the labrum in *Astacidae* or *Scyllaridae*. The other oral appendages are nearly as figured by Willemoes-Suhm for *Willemoesia leptodactyla*; one of the lobes of the first maxillipeds, however, appears to assume a function not before noticed. The inner, or endognathal, lobes of these appendages

are small and rudimentary; but there is a very large and terminally bilobed lamella, apparently representing the exognath, which extends forward considerably in front of the epistome, where its terminal lobes are somewhat upturned and serve as the lower wall of a tube from the efferent branchial opening. This lamella is continuous posteriorly with the very large epignath, which extends far back into the branchial chamber.

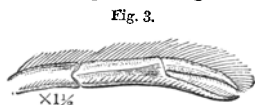


Fig. 3.
Terminal portion of the second pereopod of the right side.

The fifth, or last, pair of pereopods are considerably shorter and more slender than the fourth, and subchelate (fig. 4).

The first pleopods have an imperfect articulation about a third of the way from the base to the tip; the basal portion is somewhat triquetral; and the terminal portion expands into a smooth, naked, and thin



Fig. 4.
Terminal portion of the fifth pereopod of the left side.

lanceolate lamella slightly concave posteriorly. The second pleopods are similar to the succeeding pairs, not greatly modified as in *Astacus* and its near allies. The lamellæ are narrow, lanceolate, and nearly equal in size; and the inner lamella bears the two small styliform processes usually characteristic of males among *Macrura*. The three succeeding pairs of pleopods are similar to those of the second pair; but, as usual, they all want the outer of the two styliform processes on the inner margin of the inner lamellæ.

New Haven, Conn., U. S. A.,
Feb. 11, 1880.

XXVII.—On the Geological Distribution of the *Rhabdophora*.

By CHARLES LAPWORTH, F.G.S. &c.

Part III. RESULTS.

[Continued from p. 62.]

(A) GEOLOGICAL.—The conclusions which may be drawn from the data now before us, as detailed in the preceding pages, arrange themselves very naturally under two distinct heads. In the first place, we shall consider the various forms of *Rhabdophora* there enumerated from the geological or stratigraphical point of view, treating of the several groups and individuals as possible indices of the systematic place of their