Zoology Part X: Report on the PYCNOGONIDA. By P. P. C. Hoek. Bound in Volume 3,1881.

of the inner surface of the skin. Now, this inner surface of the integument both of the body and the legs, especially in species of the genus *Colossendeis*, is richly furnished with ganglia, which spread all over it, and are connected with nerves. They are so very numerous as to form a continuous network of ganglia and nerves, their function being, I believe, to innervate the cavities of the integument, for which I have suggested a respiratory function. There can therefore be no difficulty in supposing that the ganglia of my ganglionic bundles are derived from originally integumentary ganglia, and that their high development is to be attributed to the changed functions of the parts which surround the mouth.

While these same ganglionic bundles, in a more or less developed state, are found in all species and genera of Pycnogonida, it is very probable, I believe, that in the other classes of the Arthropoda their homologues[1] will be sought for in vain. The shape of the terminal ganglia, of which the dorsal one is the largest, is best seen from the drawing (Pl. XVIII. fig. 8). Of the nerves which arise from it, two run in an oblique direction (one to each side), these enter again (at least in *Nymphon*) a small ganglion, from which nerves are given off to the tactile organs placed in the so-called lips of the proboscis. Of these small ganglia, those two, which are placed on both sides of one of the lines of union of the three proboscideal parts, are again connected by means of a nerve string. The tactile organs consist of a small tuft of hairs placed just at the end of the chitinous list which marks the place of union of two of the proboscideal parts meeting there laterally. Perhaps the nerve fibres of the small nerve bundles, which enter the secondary ganglia and innervate these tactile hair-tufts, take their origin in the three original proboscideal nerves.

Besides the three original nerves and the three ganglionic bundles, two thinner nerves enter the proboscis dorsally. These I observed only in *Nymphon* arising from the supra-œsophageal ganglion. The two thin nerves which in *Colossendeis* run alongside and quite near to the main proboscideal nerve must be considered as branches of this main nerve, and no doubt there are still other longitudinal nerves, which run through the proboscis, and which must also be considered as branches of one of the three main nerves.

What I observed in regard to the remaining part of the nervous system is the following:—The shape of the four thoracic ganglia may be seen from the figures on Plate XVII. The length of the commissures uniting these ganglia is different in different genera, and even in the different species of one genus. In *Nymphon robustum*,

[1] It seems to me that an analogous case is that of the visceral or stomatogastric nerves of the Crayfish, studied by different authors, and investigated recently more accurately by Prof. Huxley (Anatomy of Invertebrated Animals, London, 1877, p. 330), a complex nervous apparatus, serving chiefly for the innervation of the muscles of the mandibles, and for that part of the intestine which has been called by Huxley the gastric mill. This gastric mill of the Decapod Crustacea is placed behind the œsophageal commissures; the analogous apparatus of the Pycnogonids is found in front of the same commissures.

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