

fasciculi which radiate from the sides of the thoracic ganglion, where they are attached by short tendons. Their arrangement is such, that, according as either one or the other set of fibres act, they will draw the nervous mass either forwards or backwards, horizontally, or in the vertical direction. I am not aware that this voluntary power of moving the nervous centres exists in any of the other Articulata.

Organs of Sense.—With the exception of that of vision, the precise location of the other organs of sense in *Phalangium* rests, for the most part, as in insects, upon conjecture. A very delicate touch no doubt resides in the extremities of the palpi, and the slender terminations of the anterior and two hindermost pairs of legs, while the second pair, longer than the rest, and which the harvest-spider keeps raised, chiefly in resting, from the surface, may serve to convey the vibratory impulses of the atmosphere, and thus apprise it of any coming danger. The form of the chelicerae, the usually regarded analogues of the antennae, would seem to ill adapt them for the auditory function. The eyes are four in number, as stated in the commencement of this paper, two being situated in the centre of the cephalo-thoracic shield, and the other pair near to its anterior angles. In the first of these, the large size, prominence, and elevated position of which, appear to supply their deficiency in number as contrasted with the median ocelli of the Araneida, I have succeeded in tracing out similar structures to those described by Müller and others as composing the eye of the scorpion; namely, first of all a layer of black pigment, retained doubtless in place by a choroid coat, which is thicker laterally than above and below, and which must support upon its inner surface the nervous expansion of the retina; secondly, a vitreous humour, seen as a convex transparent spot imbedded in the centre of the pigmentary layer; and lastly, a minute, round and compressed crystalline lens formed of concentric laminae, and apparent in the living animal through the cornea, which is simply a smooth transparent portion of the general integument of the body. At fig. 32. *om* are represented a pair of muscles, passing upon each side beneath the middle pair of eyes, which are united laterally to each other. Their use must surely be to effect some change of position in the internal humours of the eye beneath their immoveable cornea, and so accommodate them to the movements of the thoracic ganglion, and through it the cephalic and optic nerves, when acted upon by its powerful muscles. One fact is deserving of notice, as tending to throw some light upon this opinion,—that in every specimen of *P. Opilio* from which I have removed the cephalo-thoracic plate, the layer of pigment with the vitreous humour has invariably remained attached to the extremity of the optic nerve, leaving the crystalline

lens behind the cornea, and thus indicating their great freedom of connexion, if indeed any exist. The lateral pair of eyes are not nearly so distinct and prominent as the above, and would appear to be wanting altogether in certain species, as in a specimen of *P. quadridentatum*, I have been unable to perceive the slightest traces of their existence.

Respiratory System.—The respiratory organs of the *Phalangia* consist of two large tracheal trunks (Pl. V. fig. 33.), situated upon either side of the cephalo-thoracic cavity. They commence from two stigmata, which open externally between the posterior coxæ and under surface of the abdomen, and from thence they pass inwards, forwards and slightly upwards, converging towards each other at their anterior termination. In their course are several slight dilatations, where large branches are given off. From the oblique position of the posterior coxæ, these trunks have to curve somewhat abruptly round their convexity, and owing to the narrow space in which the spiracle lies, are compressed and smaller in calibre at that particular point. Their different relations from behind forwards are as follows:—As they emerge from beneath the posterior coxæ they pass over a part of the ovarium, which has been said on a former occasion to dip deeply down there upon either side, and are then situated for the remainder of their course upon the inner extremities of the coxal joints resting partly upon the muscles passing into these open cavities, while near to their anterior extremities, they overlies the sides and crural branches of the thoracic ganglion. These trunks are somewhat remarkable for their large size and short course, and are readily distinguished from other organs in dissection by their additional pearly lustre. The best mode of displaying them is to commence from the dorsal surface of the animal by removing the heart and all the digestive viscera, and in the female the ovarium and ovisac.

Further than their principal trunks, Straus-Durckheim*, in his recent able work, states, “Je n’ai jamais pu m’assurer de la forme et de la disposition des trachées dans les Holètes.” Treviranus, however, long since described and figured the respiratory tubes and their branches, but as this excellent observer has done so in a very general manner, it enables me, after much patient re-investigation, to enter into more minute details. The primary branches, also of considerable size, which proceed from each of the main trunks, are about fourteen in number, the majority of which ramify among the viscera of the thorax, while three only upon either side are distributed to the abdomen. The first of these abdominal air-tubes (*at*) is given off from the internal side

* *Traité d’Anat. Comp.*, Paris 1842.



Leuckart, Rudolf. 1863. "On the Acanthocephali." *The Annals and magazine of natural history; zoology, botany, and geology* 12, 326–327.

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