On Some Points in the Anatomy of the Platydesmidæ.

By

F. G. Sinclair, F.L.S.

With Plate 29.

In 1901 I received a small amount of material which enabled me to make out a little of the anatomy of the species of Platydesmus, which I described in my paper on the Myriapods of the Skeat Expedition as Platydesmus kelantanicus.

The material was not enough to enable me to make out many points, and so was laid aside till 1903 when Dr. H. Gadow brought me back a quantity of P. mexicanus from Mexico, sufficient to allow me to proceed with my investigations. I am glad to have this opportunity of thanking him for his kindness.

The general appearance of P. mexicanus is given in Humbert and Saussure's work, "Études sur les Myriapodes," and of P. kelantanicus in my own paper, so it will not be necessary to describe them again here.

The first point that strikes one in examining this animal is the extreme smallness of the head in comparison with the rest of the body. It is almost concealed beneath the tergal plate of the neck. In the next place the similarity of the individual segments attract one's notice; there does not seem to be the same amount of specialisation of regions in the neighbourhood of the thorax that one finds in most Myriapods. This appearance is, however, to a great extent, deceptive, as closer

examination shows that the legs of the thoracic region are single pairs as in other Myriapods.

The external appearance of the head of the two species that I have worked at differs considerably owing to the presence in P. mexicanus of a peculiar sense-organ mentioned by Humbert and Saussure in their description, in which they mention their resemblance to visual organs. "Les deux points stematiform leur sont specieux et quoique nous n'ayons pas réussis a en distinguer nettement la nature, ils nous semblent cependant former des organes visuels, car ils sont révêtus d'une cornée tres distinct."

On a first examination one can hardly help coming to the opinion that the organ in question is visual in function. Seen from the outside (figs. 8, 16) one sees that the external chitin is thickened so as to form a projecting boss, and further that the chitin of which this boss is formed is clear and transparent, so that the whole has a white appearance. One can also make out that the pigment layer that lines the internal side of the hypodermis is thickened just below the boss, and its colour is much darker, so that it forms a sort of iris. It is not, however, an eye, for there is no division into separate eye spots, and the external surface of the boss is not smooth, but when viewed under magnification is beset with fine hairs. The internal features of this organ will be described later in connection with the brain.

P. mexicanus has two small light-coloured patches in the frontal region, one on either side of the middle line. These small patches correspond with two depressions on the frontal region of the brain, but I have been unable to discover their function.

The mouth parts consist of the upper lip, the hypostoma, and the mandibles. The first two of these have been described by Silvestri for P. polydesmoides (Classis Diplopoda, Portici, 1903), and my species offer no considerable variation. With the mandibles, however, it is different, as in both the species I have examined the mandible shows a considerable divergence from that of P. polydesmoides, as figured by

Silvestri. Here I must take the opportunity of correcting an error in my paper on the Skeat collection. The figure that I gave there as the mandible of P. kelantanicus is imperfect. The delicate chitin which forms a great part of the mandible has been torn away leaving only a part of the structure.

Fig. 14 shows the mandible of mexicanus. As will be seen in addition to the teeth and the small comb of bristle shown in Silvestri's figure the clump of bristles marked Z in his figure are, in my species, much enlarged, and the bristles are arranged in a concave space in a definite order (figs. 14, 15). It is possible that the curves may be exaggerated by the shrinkage of the chitin, but I have examined a great number under the microscope and think that the arrangement shown in my figure is correct.

Fig. 15 shows the two mandibles in situ on the hypostoma, and we can see that the effect of the configuration of the concave region in which the bristles are arranged is to form a sort of atrium set with bristles through which all food must pass before it reaches the gullet. In correspondence with this structure the muscles of the mandible are comparatively feeble, and only allow of a small amount of movement of the appendage.

There is another point in the composition of the exoskeleton which deserves attention. The suture passing along the back has been mentioned by Humbert and Saussure as only occuring in the Platydesmidæ and in Craspedosomidæ.

When one cuts a section through the dorsal region one sees the appearance shown in figs. 11, 12, 13. The longitudinal division between the two parts of the body-ring is complete, and not only that but there is a narrow longitudinal plate intercalated between the two parts. A comparison between the two species of Platydesmus and Craspedosoma shows that the conditions are nearly similar. In both cases the intercalated plate does not extend the whole length of the segment, but is only present in its anterior part and has the shape of a long narrow wedge.

It is not easy to account for these facts. Newport (3), in his monograph on the Chilopoda, 1844, held that the dorsal arch in the Chilopoda is composed of four pieces of which the two median ones are the last to be united, these two median pieces form the scutum and the two lateral ones the episcutum. Bode (1), in 1877, said that the body-ring of Polyxenus belongs to the pentazonal type, and describes the dorsal portion of the zonite as consisting of two large pleuræ and a relatively small tergum.

It would be natural to suppose that in the case of Platydesmus, the conditions of Polyxenus had been carried a little further, and that the tergum had been reduced to the thin median intercatated plate. It is possible that this may be the case. On the other hand it is possible that the intercalated plate may be a completely new structure, and that the two side plates may represent a single tergal plate that has been divided and jointed in the middle longitudinal line.

The difficulty in the way of accepting the first of these explanations, is that the keels which should be a prolongation of the sides of the terga, judging by the analogy of the keels of Polydesmidæ, would in this case be an extension of the pleuræ. I thought at first that the foramina repugnatoria might throw some light on the subject. Humbert and Saussure describe them as beginning in the fifth segment. Careful dissection and examination by means of sections failed to show me any trace of these glands, and I thought that as these glands are typically organs of the terga their absence was evidence that the two side divisions were not terga but pleura. This, however, is contradicted by Craspedosoma, which shows, as I have already said, the same formation of the zonite but has well-marked repugnatorial glands and foramina. Of course, it is not impossible that the keels and repugnatorial glands should have been formed in the pleuræ instead of in the terga, still their occurrence is a difficulty to my mind.

The second possibility that I have mentioned would seem the most probable to me if there were anything in the way of

are much more separate, and lie almost on the same horizontal plane, the antennal lobe being anterior to the frontal. It is worth noting that, assuming St. Remy's view of the primitive situation of the ganglia that make up the brain of Myriapods to be correct, this arrangement would be almost exactly the primitive one. There is also a consideration of interest in the disposition of the parts of the brain. If it is true that the arthropod brain has been derived from the development of an eliptical ring of nervous tissue, and that this condition is represented by the widely-separated nerve cords of Peripatus joined at the ganglia by commissures, then the structure of the brain of S. evansi strongly recalls this condition, inasmuch as the ganglia on each side of the head are widely separate, and are joined by transverse commissures.[1]

The brain of S. modigliani (fig. 2), on the other hand, shows a concentration and compression that removes it from Class 3 altogether, and places it in the same class as that of the Julidæ. There is no separate commissure uniting the antennal lobe, but the two sides of the brain are united above the œsophagus by a broad tract of nervous tissue. This striking fact is not alone, for in the Craspedosomidæ we find a complicated brain of the same type as of that Glomeris. The Craspedosomidæ are classed by Silvestri in the third of the five suborders in which he divides the Helminthomorpha (I. Diplopodi), and yet its brain is of the complex type of the third class (fig. 1), with the two commissures uniting the frontal and antennal lobes of the two sides. The species which I dissected is Craspedosoma polydesmoides. Polydesmus has a simple brain of the first class. Blanjulus guttulatus has a simple brain of the type of the Polydesmoidea.

The brain of Platydesmus mexicanus occupies a large part of the head when we take into consideration the small size of the latter. It belongs to the first of my three classes,

[1] It is right to state that I had only a small amount of material of *S. evansi.*