

doch ist das sonst so verbreitete Haarpolster hier nicht nachweisbar. Neben der Öffnung sitzt ein dünnes, halbkreisförmiges Anhangsgebilde auf, welches vielleicht dem sonst fehlenden Innenaste entspricht und ein Drittel der Länge des Außenastes beträgt.

Das einzige ♂ stammt aus der Gegend von Coimbra.

14) *Glomeris connexa* C. Koch. Die Copulationsorgane stimmen mit denen der Mitteleuropäer überein.

Von Gerez liegen vor ein ♂ von 6 und ein ♀ von 8 mm.

Alle Flecken sind gelbbraun, die Thiere gehören zur var. *alpina* Latzel. Die Flecken der beiden inneren Reihen sind nicht größer als die der äußeren, rundlich und nach dem Hinterrande der Segmente sich in einen nach innen gerichteten Strichanhang verlängernd. Flecken der äußeren Reihen nach innen und vorn ausgebuchtet. Analschildflecken weit getrennt.

Das ♂ besitzt am Halsschildhinterrande zwei gelbliche Flecken, dem ♀ fehlen sie.

Brustschild mit zwei durchlaufenden Furchen, dahinter mit zwei stufig abgekürzten, außerdem noch eine abgekürzte zwischen den beiden durchlaufenden Linien.

Eine Punctierung ist auf den Segmenten kaum wahrnehmbar.

Wollen wir auf die bisher bekannt gewordenen *Juliden* noch einen Rückblick thun, so muß es auffallen, daß nur zwei derselben ein Flagellum besitzen.

Bonn a./Rh., den 27. März 1893.

2. The development of the dorsal organ, genital rachis and genital organs in *Asterina gibbosa*.

By E. W. MacBride, B.A., Demonstrator of Comparative Anatomy in the University of Cambridge.

eingeg. 27. März 1893.

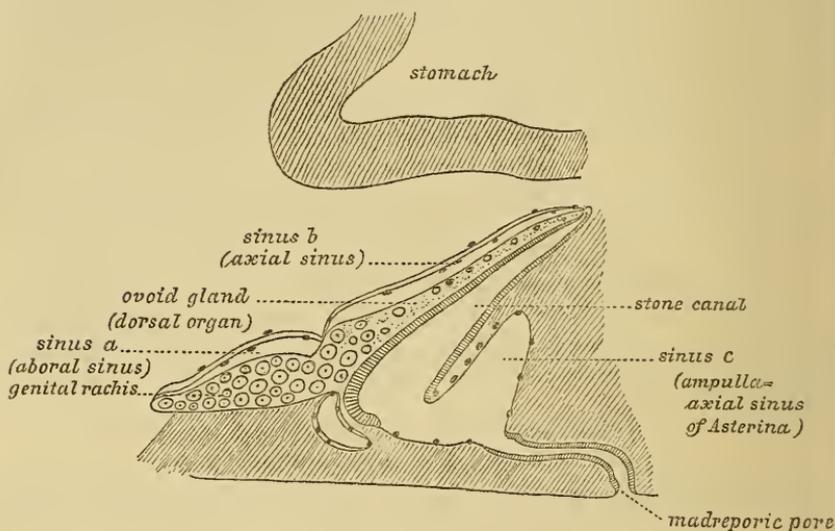
In No. 394 of this journal I published a note on the development of the genital organs in *Amphiura squamata*¹. Since then I have been engaged in examining the origin of the genital cells in *Asterina gibbosa*. As this, like my preceding communication is only intended to be the preliminary notice of a fuller paper on the subject, I shall only notice the publications of other workers, in so far as they agree with my results.

¹ The Development of the Genital Organs, Pseudo-heart (Ovoid gland) Axial and Aboral Sinuses in *Amphiura squamata*. By E. W. MacBride, B.A. (Cantab.) B.Sc. London.

My material consisted in a large number of the larval and post-larval stages of *Asterina gibbosa* forming a fairly complete series from larvae in which the larval appendage was still fairly large, up to young starfishes the greater radius of which measured about 2 mm.

In my paper on *Amphiura squamata* I described, three sinuses, associated with the stone-canal, and the adjoining dorsal organ (ovoid gland). Of these *c* (Fig. 1 a), is situated, ventrally, and mesially (i. e. nearer the mouth), with respect to the stone canal, which opens into it, as does also the pore canal leading to the single madreporic pore; *b* on the other hand is situated peripherally and dorsally with respect

Fig. 1 a.

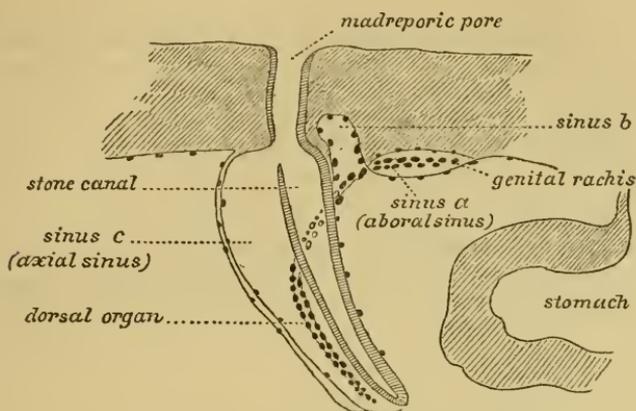


to the ovoid gland, and partially enwraps it laterally, whilst *a* is a portion of the aboral sinus, whose undulating course dorsal in the radii and ventral in the interradii, has been so well described by Ludwig². Of these sinuses I showed that *a*, and *b*, originated as involutions of the coelom, whereas *c*, which communicates with the stone-canal, was present in the youngest stages examined by me. I also showed that the ovoid gland itself is derived from a layer of peritoneal cells, and that the genital rachis which is contained in the aboral sinus, originates as an outgrowth from the ovoid gland, so that the sexual cells are primarily peritoneal.

² »Neue Beiträge zur Anatomie der Ophiuriden. Zeitschrift f. wiss. Zoologie. 34. Bd. 1880.

I have arrived at completely similar results from my study of *Asterina gibbosa*. The existence of a sinus surrounding the stone-canal throughout its whole course from the ringcanal to the madreporic

Fig. 1 b.

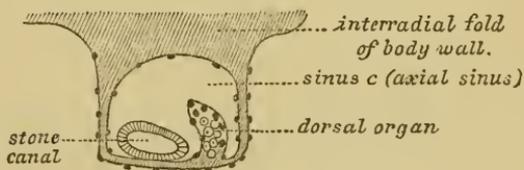


plate, is well known, as is also the fact that besides the stone canal, a glandular organ, the so-called heart, is likewise contained in it.

If we make two sections of the sinus and its contained organs in a young *Asterina* about 1 mm, in diameter, one about the middle of its course and the other, in the region of the madreporic plate, we get the appearances represented in Figs. 2 a and 2 b respectively.

In figure 2 a we see that the dorsal organ consists of an inwardly directed fold, covered on

Fig. 2 a.

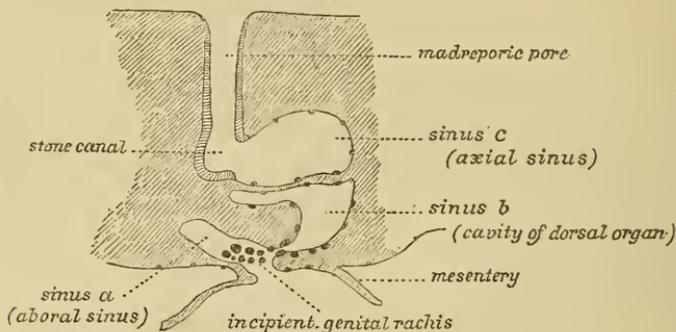


the outside by the epithelium which lines the axial sinus (called sinus c for reasons which will immediately appear). In the interior of this fold, we have a mass of rounded cells staining brown with osmic acid. In order to avoid too many figures, in 2 b I have represented appearances in the same section, which are usually only seen in successive sections through the madreporite. We see now that the stone-canal communicates with the axial sinus, and that the dorsal organ is represented at this level by a tube lined with a well defined epithelium. This tube we shall call sinus b. Further down towards the mouth its lumen becomes virtual and it is represented by a solid cord of cells. Further we see that from the one corner of this tube, there

is an evagination of large cells, obviously of the same character as the epithelium lining it. This is the commencement of the genital rachis, and the space into which it is growing, which is seen to be a diverticulum of the coelom, is the rudiment of the aboral sinus.

Cuénot³ has made the statement, that the genital rachis is an outgrowth of the dorsal organ. This however he did not observe; he only inferred it from the fact, that the dorsal organ exists before the genital rachis, and that the cells in both are similar. Hamann⁴ has described the relation of the genital organs to the rachis, and I can only confirm his results. As it passes each interradial fold of the body wall it gives off two branches which run down the sides of the fold, and end in slight enlargements. These in later stages increase very much in size, pushing before them, as they project into the body-cavity a por-

Fig. 2 b.



tion of the aboral sinus. Later as described by Cuénot in the paper referred to above, a constriction appears, tending to interrupt the continuity of the portion of the aboral sinus surrounding the young genital organ with the portion surrounding the branch of the rachis.

Thus far we have traced the genital cells back to the epithelium lining the canal, which represents the most aboral portion of the dorsal organ. Whence however comes the dorsal organ?

If we make sections of a very young *Asterina* which still retains a considerable rudiment of its larval appendage, we see that the cavity of the dorsal organ is in communication with the coelom, and hence its epithelium is peritoneal epithelium.

³ Cuénot, »Contribution a l'étude anatomique des Astérides«. Archives de Zoologie Expérimentale. Tome V^{bis} supplementaire.

⁴ Hamann, »Die wandernden Urkeimzellen und ihre Reifungsstätte bei den Echinodermen.« Zeitschr. f. wiss. Zool. 46. Bd. 1887.

Therefore in *Asterina gibbosa*, as I have shewn it to be the case in *Amphiura squamata*, the genital cells are ultimately derived from the peritoneum. *Asterina gibbosa* thus shews the same origin for its sexual cells as Vertebrata, Annelida, and in fact all Coelomata.

We are now in a position to compare the corresponding structures found in *Amphiura squamata* with those just described.

The axial sinus of *Asterina gibbosa*, into which the stone canal opens, is obviously homologous to the »ampulla« of *Amphiura squamata*, which has the same relation though relatively less developed. I have called it sinus *c* therefore in Fig. 1 *b*. In both animals the peculiar cells of the dorsal organ are derived from the peritoneal epithelium, but subsequently by a process of invagination become shut off from it. Hence, the so-called axial sinus (sinus *b*) of *Amphiura squamata* corresponds to the canal in the dorsal portion of the »heart« of *Asterina gibbosa*. Finally the aboral sinus is homologous in the two, and originates in the same way: the undulating course which it pursues in *Amphiura squamata* is evidently conditioned by the curious way in which the abactinal surface has grown in between the actinal radii, in Ophiurids; the madreporite and stone canal being thus forced round to the ventral side, whilst the aboral sinus is pulled out into 5 interradiial ventral loops.

One word on Ludwig's »haemal« system in *Asterina gibbosa*. The radial haemal strands penetrate only for a very short distance into the septum dividing the radial perihæmal canal. In the septum separating the inner and outer oral perihæmal rings, there is a strand of cells continuous with and similar in character to, the inner cells of the dorsal organ. These therefore are peritoneal in origin. Well preserved specimens shew at once that we have to deal with a strand of cells and not with a vessel.

The axial sinus (*c*) exists already in the metamorphosing larva. Of its origin and significance, as well as of the development of the whole perihæmal system I hope to be able to give an account in my complete paper.

In conclusion I have to express my warm thanks, to Cav. Salvatore Lo Bianco who spared no pains in obtaining for me the rare and valuable postlarval stages on which my work has been principally based.

The Morphological Laboratory Cambridge, March 24 1893.

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