

appeared singly in a periodical called the 'Home Friend,' and commences with an account of the author's outward voyage and of his journey up the Alabama River to his destination, in the course of which he found opportunities of making numerous observations on the natural history of the country traversed, which are described, as usual with Mr. Gosse, in a pleasant, lively style. Mr. Gosse then gives us a short account of the nature of his scholastic duties, and afterwards a history of his proceedings in the out-of-the-way locality where he took up his abode for seven or eight months, which includes a great many interesting observations on the natural history of the district, and especially on its entomology, described in an agreeable, gossiping manner. Interspersed with these, we find numerous characteristic remarks on the mode of life of the rough-and-ready southern planters amongst whom our author found himself located, their field sports, and their dexterity with the rifle. The *institution* also comes in for its share of notice, and, as may be expected, is not mentioned with any favour. The little work is illustrated with several nicely executed woodcuts, and is altogether a pleasing contribution to the stock of popular Natural History literature.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

Dec. 15, 1859.—Sir Benjamin C. Brodie, Bart., President, in the Chair.

“Note respecting the Circulation of Gasteropodous Mollusca and the supposed Aquiferous Apparatus of the Lamellibranchiata.” By M. H. Lacaze Duthiers.

A memoir upon the aquiferous system and the oviducts of Lamellibranchiate Mollusks by Messrs. Rolleston and Robertson, was read before the Royal Society at the Meeting on the 3rd of February, 1859. The abstract of this memoir, contained in the 'Annals and Magazine of Natural History,' reached me in the month of July; and I was not a little surprised to find that a structure which I had so elaborately studied in the course of my various journeys to the sea-shore, and which I had carefully described in a number of species, was something quite different from what I had imagined it to be. Without entering into minute anatomical details, which would not tend to elucidate the question, I find that Messrs. Rolleston and Robertson consider that the organs, the ducts, and the orifices supposed to be the ovaries or their excretory ducts, are, in fact, nothing but an aquiferous apparatus, and that the openings placed on each side of the foot are the excretory orifices of this system. They discover elsewhere the ducts whose office is to convey away the products of the genital glands. The enunciation of an opinion so opposed to what I, in common with many other authors, had maintained, seemed to require a recurrence to direct observation. But on repeating my examination of

Cardium edule, *Tellina solidula*, *Macra stultorum*, and *Donax anatina*, I have precisely verified my previous conclusions.

On throwing injections into the genital orifices, the sexual glands have become turgid; and on examining fragments of such injected genital glands microscopically, the injected substance was seen mixed with the ova or spermatozoa. These facts may be observed with especial ease in *Cardium edule*.

In addition to this, I have seen ova actually laid by living females of *Modiolæ* and *Mytili*, one of the valves of whose shell was removed, on irritation of the genital orifice; and in others the ova or the spermatic fluid may be made to pass out of their orifices, at the breeding season, by pressing gently upon the foot.

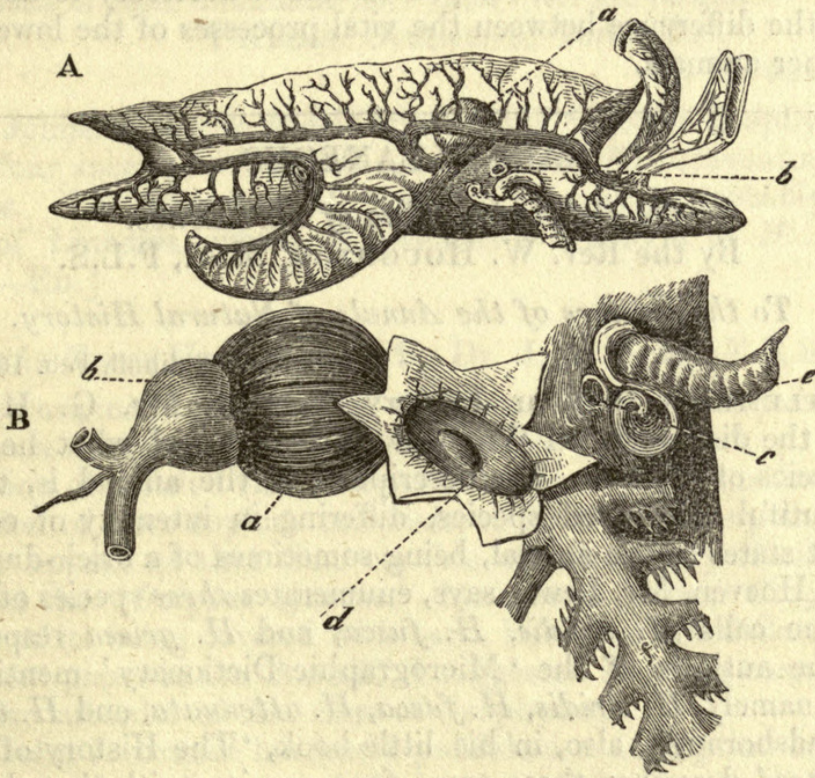
In *Spondylus gæderopus* the genital orifice is situated in the sac of Bojanus, and I had great difficulty in finding it when investigating this subject. It was, in fact, only by chance that I opened the sac of Bojanus and observed a little rose-coloured cylinder issuing from an orifice in its interior. This cylinder, like a thread of vermicelli in aspect, was composed of reddish ova mixed with mucus, and agglomerated. I might multiply examples; but it seems to be useless to do so, for I should simply reproduce the facts which I have brought forward in the memoir which I published in the 'Annales des Sciences Naturelles,' on my return from a long stay in the Balearic isles.

In this memoir, besides, I have not merely drawn attention to the circumstance that after oviposition the aspect of the gland changes completely, which might lead an observer to mistake the apparatus of reproduction for something quite different, but I have given figures of this condition of *Pecten varius*, &c. In fine, I believe that the structure of the male and female organs of the Lamellibranchiate Mollusca is such as it was described to be before the observations of Messrs. Rolleston and Robertson.

But does the system of aquiferous vessels, whose occurrence in the Mollusca has been sometimes admitted, sometimes denied, really exist in the Acephala? In the abstract to which I refer, those citations, which doubtless existed in the memoir, have not, and probably could not have appeared. It is well known that the belief in this supposed aquiferous system has been gradually becoming weaker. The necessity of explaining the extreme dilatation and contraction of the bodies of molluscous animals led anatomists to seek for and describe such a system; but at present the explanation of these facts is found in the direct mixture of water with the blood, or the ejection of the latter liquid. MM. Leuckart and Gegenbaur have made observations tending to prove the occurrence of this process in the Pteropods; M. Langer of Vienna has published a special memoir on the circulation of *Anodon*, and the great point he makes out is the passage of water into the blood by the intermediation of the organ of Bojanus. I believe that I have demonstrated in *Dentalium* the orifices by which the direct communication of the circulatory apparatus with the exterior of the body takes place; and lastly, I have found a Gasteropod,

and one which assuredly occupies a very high place in that group, which presents the same arrangement.

I hope to be able before long to bring out a complete Monograph of the anatomy of *Pleurobranchus aurantiacus*, in which the existence of an external orifice of the circulatory apparatus shall be put beyond doubt. As the figure which accompanies this Note shows, a very small orifice (*b*, fig. A, and *c*, fig. B) with a raised rim is visible above the external genital organs and in front of the principal branchial vein. This orifice, hidden by the contractions of the body, is very conspicuous in the dead animal. On injecting milk or any other liquid by it, the fluid is seen always to enter the heart; and on slitting up the branchial vein, there is seen within it an aperture (*d*, fig. B) leading into a little canal which is connected with the external aperture, and is the channel whereby the fluid injected enters the heart. I have varied the method of injection in every possible way, and always with the same result. I cannot conceive that there is any rupture of the parts or any extravasation of the



EXPLANATION OF THE FIGURES.

- A. *Pleurobranchus aurantiacus*, seen in a side view.
 - a*. Heart.
 - b*. External orifice of the sanguiferous system, placed before the branchiæ and above the genital organ.
- B. Enlarged view of the heart, branchial vein, &c.
 - a*. Auricle.
 - b*. Ventricle.
 - c*. External opening through which fluid may be injected into the heart.
 - d*. Branchial vein laid open at this part to show the internal opening of the canal which leads from the external orifice *c*.
 - e*. Penis.
 - f*. Part of the branchial vein, unopened.

injection, so that I believe (as may be verified in spirit specimens) that in the *Pleurobranchus* the circulatory apparatus communicates directly with the exterior.

The demonstration of a direct communication between the exterior and the circulatory apparatus, renders the assumed existence of an aquiferous system *a priori* less necessary, in order to explain the great changes of volume of the body of Mollusks. But I believe that, in addition, microscopic examination will show the direct continuity of the genital glands with the lateral orifices placed at the base of the foot in the Lamellibranchiata.

This communication of the vascular apparatus with the external water, has a very important bearing on the history of the nutritive processes. The physiological conceptions derived from the study of the higher animals are singularly affected by finding creatures which can at will throw out a portion of their blood, or, on the contrary, dilute with water that which is, *par excellence*, the nutritious element.

This would be sufficient to prove, were it necessary to do so, how wide is the difference between the vital processes of the lower and of the higher animals.

MISCELLANEOUS.

On the Hydra rubra of Mr. Lewes.

By the Rev. W. HOUGHTON, M.A., F.L.S.

To the Editors of the Annals of Natural History.

Solihull, Feb. 10, 1860.

GENTLEMEN,—In your January Number, Mr. G. H. Lewes records the discovery, on Wimbledon Common, of what he terms a new species of *Hydra*. His description of the animal is, that it is “a beautiful bright-red species, differing in intensity of colour in different states of the animal, being sometimes of a brick-dust hue.” Van der Hoeven, Mr. Lewes says, enumerates *three* species of *Hydra*, which he calls *H. viridis*, *H. fusca*, and *H. grisea* respectively. Now, the authors of the ‘Micrographic Dictionary’ mention *four* species, namely, *H. viridis*, *H. fusca*, *H. attenuata*, and *H. vulgaris*. Dr. Landsborough, also, in his little book, ‘The History of British Zoophytes,’ describes these same four species, with the addition of *Hydra oligactis* (Baker). The description Dr. Landsborough gives of *H. vulgaris* (for it is to this species I wish to direct attention) is that it is about the same size as *H. viridis*, but that it differs from it in colour, “being of an orange-colour, or sometimes of a brown, or even *red tint*.” Under the word “Hydra,” in the ‘Micrographic Dictionary,’ I read the following description of *H. vulgaris*: “Body orange-brown, yellowish, or *red*.” How does this differ from Mr. Lewes’s so-called new species?

Why this animal has ever been designated as *H. vulgaris* I am at a loss to conceive. I have searched pools and ditches innumerable for *Hydræ*; and my experience tends to show that this species



1860. "Proceedings of Learned Societies." *The Annals and magazine of natural history; zoology, botany, and geology* 5, 225–228.

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