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I.—*Description of some peculiar Fish's Ova.*

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PLATE XLV.

MORE than thirteen years ago, when dredging in Lamlash Bay, Arran, in the month of August or September, I brought up from a depth of thirty or forty fathoms a fragment of a Bivalve Shell, on the internal surface of which I noticed some minute bodies, whose appearance under a hand-magnifier was so unusual as considerably to perplex me. On submitting them to a higher magnifying power, it at once became obvious that they were the Ova of a Fish; for some of them contained embryos in a state of advanced development, whilst from others the mature embryos were in the very act of escaping, others, again, being entirely empty. Further examination disclosed some very curious features in these Ova, which I should have described long since (as Prof. Kölliker, to whom I showed them at the time, urged me to do), if I had been able to find any clue to their parentage. But having neither again met with them, nor been able to obtain any information from the Lamlash fishermen that could help me to determine this point, I deem it better to put on record the results of my observations, in the hope that some other Naturalist may be able to complete them by the discovery of the Fish by which these ova are produced, and by the study of the earlier stages of the development both of the ovum itself and of the embryo which its fecundation generates.

The peculiarities which I have to describe have reference (1) to the Shape of the Ova; (2) to the mode of their Attachment to the surface of the Shell; (3) to the position and remarkable distinctness of the Micropyle.

1. So far as I am aware, the Ova of Fish (save those of the Plagiostome family) have been hitherto described as either spherical or ellipsoidal. These ova, on the other hand, are nearly *hemi-ellipsoidal*; having one surface plane and the other convex (Plate XLV., Figs. 1, 2). The plane surface is an ellipse, the longitudinal diameter

of which averages about 1-20th inch, and the transverse about 1-25th inch; the proportion of the former to the latter being thus as 5 to 4. But this proportion is liable to variation; some ova being more elongated (Fig. 1), and others more nearly hemispherical, than ordinary.

2. The Ova of Fishes, if attached at all, are usually made to adhere, either to each other or to solid surfaces on which they are deposited, by an albuminous secretion formed around them during their passage outwards from the ovary, just as in the well-known case of the spawn of the Frog. In some instances, however, the connection of the ova with each other is formed by villous appendages, which may either spring from the whole surface of the shell-membrane, as in the *Perch*, or may be limited to one portion of it, as in the *Stickleback*. Such villous filaments are here found proceeding from the under or flat side of the shell-membrane; and whilst those arising from the central portion of the area are very short, those developed from its peripheral portion are of considerable length, forming a fringe which extends itself far from the margin of the ovum (Fig. 2); and these tie down the ovum to the subjacent surface by their firm adhesion to it. The Shell-membrane itself appears to me a simple horny pellicle of great transparence, possessing no structure whatever. I have searched in vain for the fine tubulation detected by Prof. Müller in the shell-membrane of the egg of the *Perch*,\* and by Prof. Allen Thomson in that of the *Salmon* and *Trout*.† And the villous filaments proceeding from it seem mere extensions of the same structureless substance, springing from little papillary elevations of its surface. In Fig. 3 is shown, under a power of 150 diameters, a portion of this villous shell-membrane from near the centre of the flat surface; and in Fig. 4 a marginal portion with its fringe of elongated fibres. I feel confident that these filaments are not tubular, and that they have no epithelial investment; they cannot, therefore, be in any way likened to the villi of the Mammalian chorion; and it is obvious that their function is simply mechanical.

3. The Micropyle, or aperture in the investment of the ovum through which the *spermatozoa* penetrate to its interior, was first discovered in the ovum of the *Stickleback* (*Gasterosteus*) by Dr. Ransome in 1854,‡ but independently and almost contemporaneously in the ova of two species of *Salmo* by Professor Bruch, of Basle.§ Since that date it has been recognized in the many other ova, both Vertebrate and Invertebrate. I doubt, however, if it has ever been so distinctly seen as it can be in the ovum now

\* 'Müller's Archiv,' for 1854, p. 186.

† Art. "Ovum," in 'Cyclopædia of Anat. and Phys.,' vol. v., p. 100.

‡ See Dr. Ransome, "On the Impregnation of the Ovum of the *Stickleback*," in 'Proceedings of Royal Society,' vol. vii. (1854), pp. 168-172.

§ 'Zeitschrift für Wissensch. Zool.' Bd. vii., pp. 172-175.

under description (Fig. 5), in which its position is most peculiar,—the centre of the flat or attached side (Fig. 2). Here we find a perforation in the ordinary shell-membrane, having a diameter of 1-1800th inch, and surrounded by an area of about 1-300th inch in diameter, which has somewhat of the funnel-like character described by Dr. Ransome in the ovum of the Stickleback, and by Professor Allen Thomson in that of the *Salmonidæ*. I have not been fortunate enough to obtain such a side view of this depression as is represented by the latter author;\* but from the slightness of the focal difference between its marginal and its central portion, I should infer that the depression of the latter is much less in this ovum than in that figured by Professor A. Thomson. Not improbably, however, the form of this part may have undergone some change during the process of embryonic development.

Looking to the position of the Micropyle, and the closeness of adhesion between the flat side of the Ovum and the subjacent surface, I think it can scarcely be doubted that the fertilization of the ovum by the entrance of the spermatozoa must have taken place previously to its attachment to that surface.

\* *Op. cit.*, fig. 68, B.

#### EXPLANATION OF PLATE XLV.

- FIG. 1.—Upper or convex aspect of hemi-ellipsoidal Fish's Ovum, with contained embryo. Magnified 40 diameters.  
 .. 2.—Lower or flattened aspect of similar Ovum, from which the embryo had escaped; showing the Micropyle in its centre, and its entire surface covered with filaments, which are longest at its margin. Magnified 40 diameters.  
 .. 3.—Portion of this surface near the Micropyle; and Fig. 4, marginal portion of the same surface, showing the relative length of the filamentous processes in the two situations. Magnified 150 diameters.  
 .. 5.—Micropyle, lying at the bottom of a shallow funnel-shaped depression. Magnified 150 diameters.  
 .. 6.—Section of a portion of the shell of *Fusulina*, showing the large perforations in its chamber-wall. Magnified 100 diameters.