

NOTE BY PROFESSOR E. W. MACBRIDE ON MR. HIROSHI OHSHIMA'S PAPER ON 'THE OCCURRENCE OF SITUS INVERSUS AMONG ARTIFICIALLY-REARED ECHINOID LARVAE'.

The most interesting paper by my friend and pupil Dr. Ohshima, which appears in this number of the 'Quarterly Journal of Microscopical Science', calls for some comment from me. Dr. Ohshima refers to a paper published by me in the 'Proceedings of the Royal Society' in which I described a method for inducing the formation of a second (right) hydrocoele in Echinoid larvae by stimulating the larva at a critical period of its growth by exposure to hypertonic sea-water.

Dr. Ohshima states that an attempt which he made to repeat this experiment in my laboratory in 1920 resulted in failure. Nevertheless certain larvae with two hydrocoeles turned up, and he gives a different explanation of the cause for their appearance. I am convinced that the explanation which Dr. Ohshima gives is the right one to account for the phenomena which he observed in 1920; but I wish to emphasize the fact that his and my explanations agree in one most important particular, viz. we both feel convinced that the right anterior coelom of an Echinoid larva has the innate constitutional power of developing a right hydrocoele. This power I account for on the hypothesis that Echinoderms are derived from a free-swimming ancestor provided with sets of tentacles on the right and left sides of the body. Dr. Ohshima's explanation is that it is a case of 'homoeosis', but to use this term of Dr. Bateson seems to me to be merely restating the difficulty in other language without offering any explanation at all.

The fact that when the right hydrocoele does appear it appears in similar form to that exhibited by the left, and not in the condition in which the original right hydrocoele must have been when it was functional, is in my judgement to be accounted for by the assumption that the modifications which the left hydrocoele subsequently underwent have been pushed backwards in development according to the principle of tachygenesis till they now affect the earliest differentiated

organ-forming substance out of which the hydrocoele arises—and that this organ-forming substance gives rise to both hydrocoeles.

The results which I obtained in 1917 I was able to obtain under precisely similar conditions in 1919. Dr. Ohshima's failure to obtain them in 1920 may, I think, be attributed to several causes. I stated that for success several conditions were necessary, one of which was a vigorous culture of the diatom *Nitzschia*. For some unknown reason this was excessively difficult to obtain in 1920. Again and again our cultures died off and the larvae were checked in their development. Dr. Ohshima obtained a few 'doubles' both in the control and the 'treated' culture which were started in May, and a few more doubles in the control culture started in June. But the May cultures were not obtained from satisfactory females: they were obtained from masses of eggs in which only a small proportion developed, and they could not be described as vigorous cultures or likely to show a proper reaction to stimulation. The June cultures were vigorous, but, owing to the failure of the *Nitzschia* culture, the 'treated' culture died off completely, and the 'control' culture was for weeks in a condition of checked and stunted growth and only recovered later when the *Nitzschia* finally re-established itself. In a word Dr. Ohshima obtained his specimens with a right hydrocoele through the checking of the growth of the normal left one by starvation, whilst I obtained mine in 1917 and 1919 by stimulating the larvae in their early growth by the action of hypertonic seawater.

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