

FROM  
TRANSACTIONS  
OF THE  
NEW ZEALAND INSTITUTE,  
VOLUME XLVIII, 1915.

On the Much-abbreviated Development of a Sand-star  
(*Ophionereis schayeri?*).

Preliminary Note.

By H. B. KIRK, M.A.

ISSUED 16TH OCTOBER, 1916

WELLINGTON, N.Z.:  
MARCUS F. MARKS, GOVERNMENT PRINTER.

1916.



Z.S.P. 80

Z.S.P. 80

ART. XXXVI.—*On the Much-abbreviated Development of a Sand-star*  
(*Ophionereis schayeri*?).—*Preliminary Note.*

By H. B. KIRK, M.A., Professor of Biology, Victoria College, Wellington.

[Read before the Wellington Philosophical Society, 27th October, 1915.]

Plates XXVII, XXVIII.

I OBSERVED at Island Bay in August of this year several clusters of small round eggs attached to the underside of stones. Some of these were brought in on the 24th August, and observed from time to time to determine, if possible, to what animal they belonged. Only slight attention was paid to them, but they were probably not left unobserved for more than two days together. To my great surprise, there began to emerge from the eggs of one group small Echinoderms having the general appearance of Asteroids with a perfectly formed disc that had the barest suggestion of arms. Each had the primary tube-feet developed beyond the extremity of the radial groove. The tube-feet had somewhat club-shaped extremities, without suckers, but with a number of stiff, bristle-like processes. Each of the five points of the disc consisted of a single, grooved terminal plate like that of *Ophionereis schayeri* Müller and Troschel. There could be no doubt that the young animals were Ophiuroids. *O. schayeri* is very common in the neighbourhood. I have often examined the bursae, and have never found them to contain embryos.

I carefully observed the remaining capsules, and obtained others from the same locality; but the time for the very early stages had gone by. From these later observations, and from the earlier but less thorough observations, I am able to give the following preliminary account of this very extraordinary instance of Echinoderm development.

The eggs are spherical, 0.5 mm. in diameter, each with a perfectly transparent, thin, but extremely tough chitinous envelope. They are deposited in irregular clusters of from 10 to 100 or more. The embryo does not occupy the whole of the space within the envelope, but is surrounded by colourless, apparently mucilaginous, matter. The envelope was so tough that I could not tear it away satisfactorily, the embryo getting crushed in the process. The embryo is of a buff or pinkish-brown colour, and is so opaque that no internal structure is to be observed. The pigment is very refractory to all the ordinary solvents. For knowledge of internal structure sectioning is likely to be the only process, and for this I shall have to obtain fresh material next year.

The earliest embryos observed were apparently late gastrulae, in which the blastopore had closed or become indistinguishable. No movement was at any time observed until the disc and tube-feet were formed. I do not think that any external cilia were ever developed, or that there was any stage that could be recognized as corresponding at all closely to a typical larval stage of any Echinoderm. My present view is that development is absolutely direct, but I cannot yet speak with certainty.

The first movement observed was that of the tube-feet. At the time these appear the disc is concave on the ventral surface, the tube-feet

showing as rounded structures where they project beyond the margin of the cup. As the disc flattens somewhat, pressing the egg-envelope with its incipient rays, the envelope is drawn flatter dorsally and ventrally. Against the ventral portion of the envelope the tube-feet are worked with a stamping or pushing movement, much as an infant works with its hands at the mother's breast. Presently the envelope gives way, and the young animal struggles out. The disc soon completes its ventral flattening. Locomotion is effected by the animal raising itself upon its almost-rigid tube-feet and toddling, as it were, occasionally falling forward. The movements suggest those of a fat puppy making its first real attempt to walk. From under the grooved terminal plate of each arm there extends a blunt, rigid tentacle, capable of being retracted.

As there is yet no marine laboratory here, and I wished to keep these young animals alive as long as possible, I placed a number in a specially contrived glass cage, which I sank in a rock-pool, concealing it by means of stones. When I visited the pool three weeks later I found that the stones had been lifted out and the cage taken away.

In the laboratory I was able to keep some alive and under observation for thirty days. The mortality was, however, great, and only two specimens reached the stage at which a second pair of tube-feet developed.

For the photo-micrographs that illustrate this note I am greatly indebted to the kindness of Mr. P. G. Harwood, of Auckland.

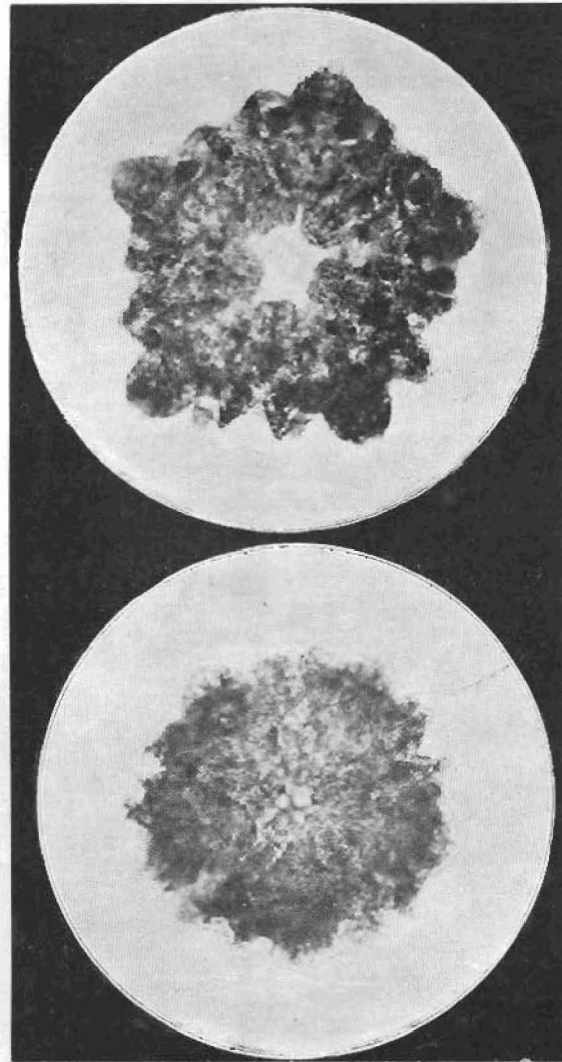


FIG. 1.—Just after emerging from egg.

FIG. 2.—Age seven days.

OPHIONEBRIS SCHAYERI.

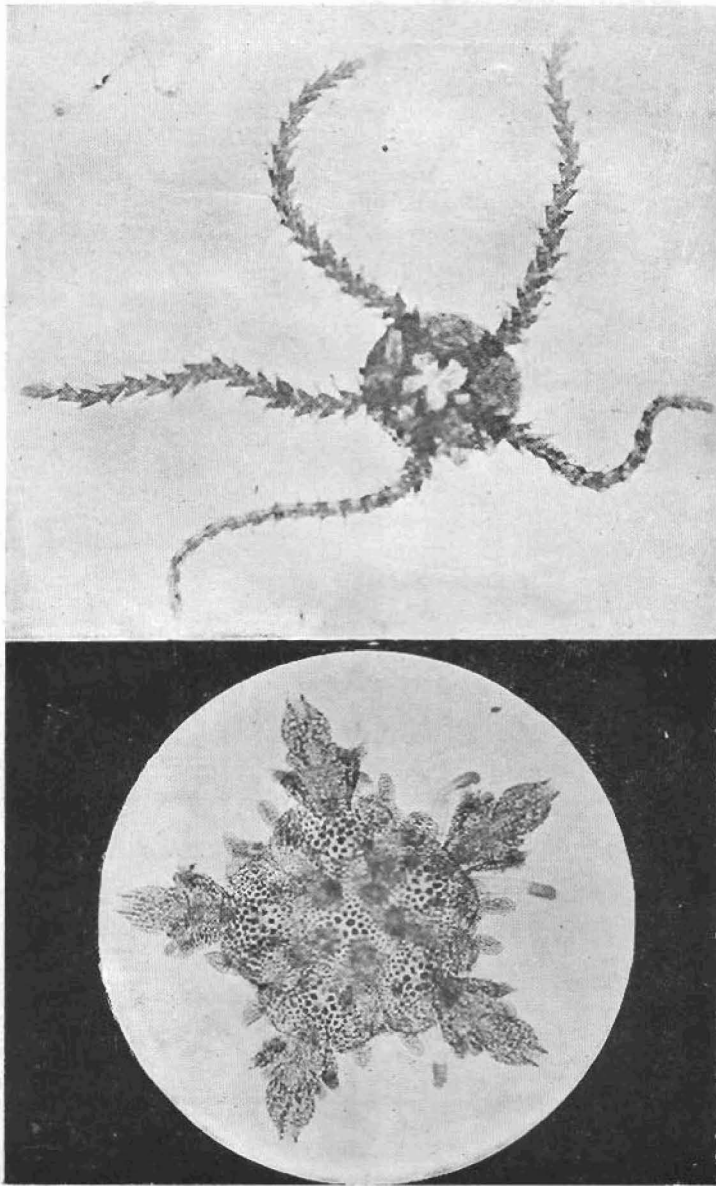


FIG. 2.—Age not known. This is one of the numerous young specimens found in rock-pools in October.

*OPHIONEREIS SCHAYERI.*

FIG. 1.—Age twenty-six days.