

Probable Direct Development in Some New Zealand Ophiuroids.

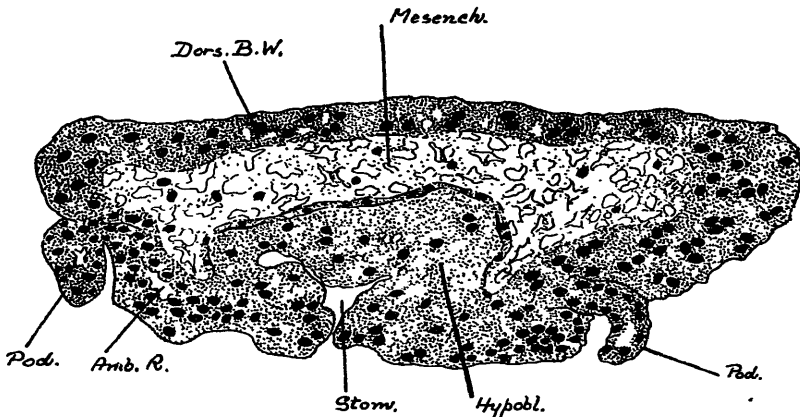
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Ophiomyxa brevirima is a viviparous Ophiuroid occurring fairly commonly in the littoral zone of the New Zealand coast. Shortly before leaving New Zealand last year I obtained three adult specimens, two of them males and the third a female. The latter proved on examination to be carrying in the bursae some fifty young Ophiuroids, all at the same stage of development, or approximately so. The young, measuring about 0.7 mm. across the disc, were at that stage at which the outline of the body resembles in general form that of the starfish *Asterina*, having the arms as yet unsegmented. The opaque, buff colour of these indicates that the egg must be very yolky, so much so that the yolk still colours the greater part of the tissues in the "Asterina" stage. This conclusion is borne out by microscopic examination of sections of these stages, which indicates the presence of large numbers of yolk granules thickly distributed throughout, and staining with basiphilic dyes, but not masking the nuclei.

Vertical sections show that the coelom is represented by a remarkably extensive and clearly marked zone of typical mesenchyme. The cells are loosely aggregated, with protoplasmic extensions enclosing spaces. No coelomic cavity can be distinguished. From the evidence already provided by *Amphiura squamata* and by Kirk's Ophiuroid (referred to below) it seems fairly certain that this species



Vertical section through embryo of *Ophiomyxa brevirima*, showing mesenchyme mass occupying the position of the future coelom.

Dors. B.W., dorsal body-wall; Mesench., mesenchyme; Pod., podium; Hypobl., hypoblast; Stom., stomach; Amb. R., ambulacral ring.

must have a direct, or partially direct development. In all probability the coelom will be found to arise as splits in the mesenchyme mass referred to above, and shown in the accompanying figure. In the type of Ophiuroid development having a larval stage (hitherto regarded as the usual type of development for the group) the coelom is clearly differentiated from enteric pouches long before the radial form is assumed. *Ophiomyxa brevirima* should provide interesting material for research where sufficient specimens can be obtained.

In a preliminary paper in the *Transactions of the New Zealand Institute*, Professor H. B. Kirk (1916) recorded his discovery of the eggs of an Ophiuroid having a very abbreviated development. Subsequent work has shown that the egg, which is heavily yolked, divides to form a blastula with only a small and excentric blastocoel. Invagination is largely replaced by epiboly and the archenteron is only a transient feature, giving rise to no lasting structures. There is no larval stage, nor any vestige thereof. The coelom arises late in development as a series of splits in a mass of mesenchyme, and the stomach by a hollowing out of a mass of hypoblast. A young Ophiuroid at the "disc" stage leaves the egg. A general account of the development of this species is at present in the press, and will be published in England (Fell, 1940). None of the young of this species has as yet been reared to a stage sufficiently advanced for identification, nor have the parents of the eggs been discovered. Hence we are unable to refer to this interesting species by any scientific name. The writer till recently has been engaged upon research on the influence of yolk and viviparity on development in Ophiuroids, and the preliminary results to hand indicate that the type of development occurring in this New Zealand form is likely to prove by no means unique. It will therefore be necessary to have some convenient term by which this species may be referred to, since it is a "type" for this kind of development. There is as yet no justification for giving a new scientific name to the species on the assumption that it is a new form. On the other hand, it has been shown that the eggs cannot belong to any of the species commonly occurring in the area where they are found (Island Bay). Therefore, until the problem of their identity is finally cleared up, I suggest that the species be referred to as "Kirk's Ophiuroid," after the discoverer of the unusual type of development that it has.

Pectinura cylindrica and *P. gracilis* have both been shown to be viviparous and hermaphrodite, a condition closely approaching that found in *Amphiura squamata*. As the latter species has a partially direct development, we may expect that the two New Zealand species of *Pectinura* mentioned will be found to have a modified development also. *Pectinura maculata* is a larger form which is neither viviparous nor hermaphrodite. The eggs, however, are very heavily yolked, and therefore we can expect a modified development in this species, too. Here is abundant material for research by New Zealand workers.

REFERENCES.

- KIRK, H. B., 1916. On the Much-abbreviated Development of a Sand-star (*Ophionereis schayeri*?)—Preliminary Note, *Trans. N.Z. Inst.*, vol. 48.
 FELL, H. B., 1940. The Direct Development of a New Zealand Ophiuroid, *Quart. Journ. Mic. Sc.* (in the press).