

the ambulacral area, could, of course, not be traced satisfactorily. But enough could be seen of the shape of the embryo mass to render it highly probable that the development was very similar to that of other viviparous Echinoderms (Star-fish and Ophiurans), in which the young are carried about by the parents till they are well advanced Star-fishes (Sars, Müller, Agassiz), or hatched from the main cavity as well-developed Ophiuridæ (Quatrefages, Schultze, Lyman, Agassiz), and where the plutean development is passed through in a very imperfect manner, owing to the rudimentary development of the arms, which take such an extreme degree of growth in the pelagic pluteus of Echinids and Ophiurans, traces only of these arms being found in the younger stages of growth of these viviparous Echinoderms.

“The specimens I have had the opportunity of examining were collected at Kerguelen Island by Dr J. H. Kidder, the naturalist attached to the Transit of Venus expedition, and were sent to me for examination by Professor Verrill. He has described the species as new, under the name of *Hemiaster cordatus*; but I cannot distinguish it from *Hemiaster cavernosus* and *Hemiaster australis*, which I was led to consider (from analogy with *Hemiaster philippii*) to be identical species. It is remarkable that, in the young stages of both these species, all the ambulacra are but little sunken, and it is only when they have attained a considerable size that the posterior ones begin to deepen. Philippi considered that this might be a sexual feature. We have not sufficient data to decide the question, but can only say that up to a certain size, at any rate, there is no difference in the depth of the ambulacra of males and females. (See pl. iv. figs. 4-8, Echini of “Hassler” Expedition, Ill. Cat. Mus. Comp. Zool., No. 8). I have examined a large number of a common Spatangoid from our southern coasts (*Moiria atropos*), with ambulacra still more deeply sunken than in *Hemiaster*, in hopes of finding the young, but thus far without success; from the eggs of *Schizaster canaliferus* from the Mediterranean, in which some of the ambulacra are also deeply sunken, a pelagic pluteus is known to be developed; so that in many of the genera with sunken ambulacral petals the sunken area does not shelter the young in their earliest stages of development.”

Among the large number of specimens of this species collected by the Challenger there were a few small specimens intermediate between the younger stages which I described in the Proceedings of the Am. Acad. from specimens collected by Dr J. H. Kidder, U.S.N., and those which were figured on plate iv. of the “Hassler” Echini in Mem. of Museum Comp. Zoology. These figures I have reproduced (Pl. XX.^a figs. 13-17), although they do not quite fill the gap existing between the stage of Plate XX.^a fig. 9 and Pl. XX.^a fig. 18, which were known before, still they leave but little to trace in the history of the development of the petals, and of the gradual passage of the anal system from the abactinal surface to the posterior edge of the test, and they also show the passage of the peripetalous fasciole from that figured in stage 13 until it has assumed approximately the shape of the adult (Pl. XX.^a fig. 18). The development of the males and females is identical to that point,