

and it is only later that the differences in the depth and width of the petals becomes apparent, as I have shown in the figures of *Hemiaster* on plate iv. of the "Hassler" Echini.¹

"The figures given on plate iv. figs. 4-8, are all natural size, and show the changes the lateral ambulacra undergo as they pass from fig. 8 to fig. 7, and from fig. 6 to fig. 4. When the specimens reach the size of fig. 7, the change from comparatively shallow lateral ambulacra to the deep ambulacra of fig. 6 takes place without a great increase in the size of the test. The anterior ambulacra, eventually the most concave (fig. 4), are the first to show marked signs of depressions, and in slightly older specimens than figs. 7 or 6 they are already deeply sunken, while the posterior lateral ambulacra are comparatively shallow. In most of the specimens examined I have found large globular, short-stemmed pedicellariæ situated in the sunken ambulacral petals, usually the anterior pair, as mentioned by Philippi. Owing to the comparatively long spines of the edge of the petals, the sunken ambulacra are completely hidden by a screen of spines. The changes of outline of the test are very limited after the specimens have attained the size figured on plate iv. fig. 8. The outline of the test is somewhat more angular and gibbous, seen from above, and perhaps less conical and somewhat more flattened at the apical system. The number of genital pores is variable, as we find two or three quite indifferently; the posterior pair of genital openings is always present, if a third exists it is the right anterior one usually, but sometimes the left. In the youngest specimen figured the outline of the peripetalous fasciole is nearly the same as in the oldest specimen examined (fig. 4), though its breadth becomes greater with advancing age. The odd anterior ambulacrum increases but little in depth and breadth with increasing size."

In the magnified views of the apical system of a male (Pl. XX.^a fig. 21) and of a female (Pl. XX.^a fig. 22), the difference between the size of the genital openings is very striking, as well as the sudden sinking of the floor of the apical extremity of the paired ambulacra in the female to form the marsupial pouches. The genital openings are developed comparatively late, there is no trace of them until they attain the size figured on Plate XX.^a fig. 15. In one female (Pl. XX.^a fig. 19) there were only two genital openings, and it was the left anterior which disappeared next, leaving the two posterior genital openings.

Professor A. E. Verrill has carefully described the differences existing between the males and females of specimens collected at Kerguelen Island by Dr J. H. Kidder (Bull. U. S. Nat. Museum, No. 3). These specimens he described under the name of *Hemiaster cordatus* (Bull. U. S. Nat. Mus., 1876, No. 3, p. 69), as he, not having a sufficient series of the South American species (*Hemiaster cavernosus* and *Hemiaster australis*) for comparison, preferred to regard it for the present as distinct. The specimens he sent me at the time for comparison I could not distinguish from the South American species. The Challenger series is so extensive, and shows such a range of variation

¹ A. Agassiz, 1874, Zool. Results of the "Hassler" Expedition, Ill. Cat. Mus. Comp. Zool., No. 8.