

1, 2, 5, 12) and *Asthenosoma* show but the slightest possible trace of the lapping of the edge of the plates of the ambulacral and interambulacral areas.

It is only in somewhat older stages (Pl. XII.<sup>a</sup> figs. 4, 5; Pls. XVIII., XVIII.<sup>c</sup> figs. 3, 6, 7) that the lapping of the sutures becomes apparent, or that the interstices between the plates are formed; unfortunately there are not among the Challenger specimens enough small specimens to enable me to open a sufficient number of stages to examine the changes in the imbrication of the plates due to growth.

There are, however, among the Echinids of the last "Blake" expedition a large number of young stages both of *Phormosoma* and *Asthenosoma*, and I hope to return to this subject in my final report on the "Blake" Echinoidea.

On the abactinal surface the arrangement of the tubercles characteristic of the adult seems to be developed at a comparatively early stage (see young of *Asthenosoma pellucidum*, Pl. XVIII. of *Phormosoma tenue*, and *Phormosoma luculentum*, Pl. XVIII.<sup>c</sup>), and the same is the case with the characteristic features in the great development of the primary tubercles of the actinal surface (see Pl. XVIII. figs. 1, 4, 8, and Pl. XVIII.<sup>c</sup> figs. 4, 7).

The irregularity of the course of the poriferous zone on the actinal surface is not characteristic of the adult alone. In the earliest stages of *Phormosoma*, which I have thus far examined (Pl. XVIII.<sup>c</sup> figs. 4, 7; Pl. XII.<sup>a</sup> figs. 3, 6, 8), the same irregularity already exists, the poriferous zone extending in a straggling line of pores from the ambitus to the actinal membrane. The poriferous zone of the abactinal surface in the young stages is also narrower than in the adult and is confined mainly to the outer edge of the ambulacral area, extending in a more or less irregular undulating zigzag line of pairs of pores from the ambitus to the abactinal system (Pl. XII.<sup>a</sup> figs. 4, 5, 9; Pl. XVIII.<sup>c</sup> fig. 6), and the pores attain only in later stages the characteristic arrangement of the adult.

In the young *Phormosoma* the small intercalated plate of the poriferous zone is not placed as it is in the adult about halfway between the outer edge of the ambulacral zone and the median line, but is found close to the outer edge, gradually passing with increasing age and size towards its more central position (Pls. XVII. and XVIII.).

Although in one of the species (*Phormosoma luculentum*, Pl. XVIII.<sup>c</sup> fig. 3) the definite arrangement of the pores characteristic of that species was already perceptible in a specimen measuring not more than 36 mm. in diameter, the alternate arrangement of the poriferous zone seems to be attained earlier in *Phormosoma* than in *Asthenosoma* (see Pl. XVIII.); though in a young *Asthenosoma* (*A. gracile?*), measuring 30 mm. in diameter, the poriferous zone was already separated into its two components much as in the adult.

In all the young Echinothuridæ in which the imbricating membrane of the actinal surface was partly developed, the gills are already present, though in the early stages they appear as simple diminutive forks, and soon increase in size to form somewhat more fan-shaped appendages, with three to four short digits (Pl. XII.<sup>a</sup> fig. 6, Pl. XVIII.<sup>c</sup> fig. 4, 7); but in the young as in the old, even when highly developed, as in *Asthenosoma tessellatum*,