

The Challenger having collected a number of large specimens (Pl. V. fig. 1) fully equalling in size the original specimen of Michelin, I am now able to clear up many points left doubtful, and to describe at length this interesting Sea-urchin.

On the actinal side the spines are of two kinds both in the ambulacral and interambulacral areas. First, small, slender, more or less cylindrical, pointed, finely serrated, secondary spines (Pl. VI. figs 20c and 21c) surmount the secondary tubercles intervening between the primary rows, especially on the edge of the interambulacral plates adjoining the poriferous zone; secondly, the primary spines which, near the apical system are scarcely larger than the secondary spines, but are readily distinguished by their triangular or flattened shape, though the ornamentation of the smaller primary radioles is similar to that of the secondaries. As they become large the base of the shaft becomes more finely granular, and the extremity of the spines fluted, with serrated edges; this fluting and serration exists only in the largest primary radioles, and is limited to the part of the shaft included between the milled ring and the shoe. The spines increase very rapidly in size, so that before reaching the ambitus there are in the ambulacral area from four to five, more or less curved, varying in length from nearly the diameter of the test to fully three times as much (Pl. V. fig. 1, Pl. VI. figs. 19a, b, c, 22a, b, c), and two to three of like size on the ambulacral plates near the ambitus. Abnormal as these radioles seem at first glance, the relationship of the genus to the Arbaciadæ gives a very simple explanation of the enormous growth of some of the primary spines. The shaft of the larger primary radioles is composed of two very distinct parts, the basal part, the extension of the shaft beyond the collar, which is triangular, passing into an hexagonally fluted or angular shaft (Pl. VI. fig. 22a', c'), finely striated and more or less distinctly covered with minute serrations on the edge of the fluting [which in the shorter primary spines extends to the very tip or near its extremity (Pl. VI. fig. 19c)] surmounted by the smooth polished portion of the shaft (Pl. VI. figs. 19a, 22a, c), which is rarely straight, and often very considerably curved, and which sometimes is twice as long as the diameter of the test, and sometimes forms a mere tip to the coloured angular base (Pl. VI. figs. 19d, 22d). This tip is angular or triangular in younger specimens. As the primary spines pass towards the ambitus they rapidly become shorter, flatter, more slender (Pl. VI. figs. 19d, 22d), straighter, and immediately around the actinal membrane are reduced again to slender spines, not more powerful than the secondary ones (Pl. VI. figs. 20c, 21c).

It is the identity of the smaller flattened tipped spines (Pl. VI. figs. 20b, 21b) around the actinostome with those of other Arbaciadæ which shows plainly that the principal part of the shaft of the radioles of this genus consists of an exaggerated growth of the cap at the tip of the spine so characteristic of the Arbaciadæ and to which Desmoulins (Actes Soc. Lin. de Bordeaux, 1870) first called attention. This cap, however, in the other species of the family is found only on the spines of the actinal surface, and I inferred from the peculiar mode of locomotion of the common