DETERMINATION OF THE AXIS OF THE ECHINOIDEA.

Of the attempts to define from the position of the antero-posterior axis of the Echinids the relative position of the different zones, by far the most ingenious is that of Lovén.[1] Adopting the position of the antero-posterior axis of Echinids first defined by Desor, and subsequently fully elaborated by Cotteau,[2] he has proposed a most admirable notation to denote the several ambulacral and interambulacral areas, which simplifies to a remarkable degree the comparison of the various types, by making it possible to number conveniently the plates of which these areas are composed, and thus readily to call attention to any modifications they may undergo. While, however, we shall adopt generally the nomenclature of Lovén, we wish also to be understood as not agreeing with his conclusions regarding the mode of ascertaining the position of the theoretical axis which he has adopted.

It will be necessary to give a short résumé of his method of comparison of the corresponding ambulacral and interambulacral areas. If we place any recent Spatangoid with the actinal opening upwards and the odd ambulacrum in the line dividing the petaloid ambulacra symmetrically, and call the left posterior ambulacrum I.; the left of the anterior pair II., the odd ambulacrum III., the right anterior IV., and the right posterior V.,—if we then call the first plates of these ambulacra respectively a, b, in the order of their sequence from right to left, we shall, according to him, have the following formula to denote the order of identical ambulacral plates; the larger plates composed of two primary plates, the sutures of which have disappeared, with two ambulacral pores, are I.a, II.a, III.b, IV.a, V.b, while the corresponding plates of the ambulacra belonging to the formula I.b, II.b, III.a, IV.b, V.a, are smaller and only perforated for a single pore (tentacle).

By going through the whole group of Echinids, exclusive of the Perischoechinidæ, Lovén finds that by placing the test in the position indicated, the above formula will always hold good; that is by placing the test in such a way that the madreporic body is on the right of the odd ambulacrum, when placed with the actinostome downward. Calling, again, the interambulacral spaces corresponding to them 1, 2, 3, 4, 5, he finds that the large and small interambulacral plates in the Echinoidea (exclusive of the Clypeastroids and Petalosticha) are arranged round the actinal opening according to the formula, 1a, 2a, 3b, 4a, 5a for the small plates, and 1b, 2b, 3a, 4b, 5b for the large plates. Now, Lovén gives us to understand that this denotes some special quality in the areas I. to V. and 1 to 5, as he has numbered them. But this it seems to me is not the fact, as we get an identical formula whether we number each of the five ambulacra and interambulacra in succession I. to V. or 1 to 5. The result will always be the same, as will easily be seen

[1] S. Lovén, Études sur les Echinoïdées, Kongl. Svensk. Vetensk. Akad. Handl., xi., No. 7, 1874.
[2] G. Cotteau, Note sur la famille des Salénides, Bull. Soc. Géol. de France, tom. xviii. p. 614, 1861.