

## III. DISCUSSION OF THE DIFFERENT SUBDIVISIONS.

The Monaxonida thus comprise two fairly natural suborders, the Halichondrina and the Clavulina. But whether these two suborders are sufficiently closely related to one another and sufficiently distinct from other suborders to admit of their being united in one natural order, the Monaxonida, as opposed to the Tetractinellida, is very doubtful. In the classification of Dr. Vosmaer the order Monaxonida finds no place, and we are inclined to agree with this authority, who accepts the suborders Halichondrina and Clavulina as themselves natural, but refuses to allow a special order for the reception of these two groups to the exclusion of others. There is much evidence in favour of this view. The mere possession by the Tetractinellida of tetraxonid spicules is no safe guide. Imperfectly developed "grapnel spicules," which in a more highly developed condition are so characteristic of Tetractinellid sponges, are now known to occur in the Suberitidæ (*Proteleia*), and polyaxonid megasclera are occasionally met with in Desmacidonidæ and Axinellidæ (*Acarinus* and *Thrinacophora*). Again, the test whether a sponge is corticate or not breaks down utterly in this case, for the Clavulina, like some of the Tetractinellida, are nearly all corticate and have mostly a radially disposed skeleton. We even find a cortex, associated with a radially disposed skeleton, in one genus of Desmacidonidæ (*Phelloderma*). It is quite certain that there exists no sharp line of division between the Monaxonida and the Tetractinellida, for the Suberitidæ, Spirastrellidæ and Tethyadæ supply us with abundant connecting links.

That either the Tetractinellida have been derived from the Monaxonida, or *vice versa*, is now a generally accepted fact, but which is the parent group is a matter of much controversy, and there is much to be said on both sides. We have already<sup>1</sup> advanced strong reasons for supposing the Tetractinellida to be derived from the Monaxonida, whilst Vosmaer upholds the contrary hypothesis. The time has as yet scarcely arrived when a satisfactory discussion of the question is practicable. We must wait for more evidence, and the evidence chiefly to be desired is of an embryological character. In any case it appears to us that the Clavulina and Tetractinellida are at any rate as intimately connected with one another as are the Clavulina and Halichondrina.

That the Keratosa are most closely connected with the Halichondrina is also now a generally accepted fact, which finds its expression in recent classifications. They are probably Halichondrine sponges, which, living in warm seas, have developed a large amount of spongin, and suffered a correspondingly great reduction in the proportion of spicules present in the skeleton. We can trace this development of spongin through all intermediate stages; through the Renierinæ to the Chalininæ, and thence to aspiculous forms. But this is not the only path by which the same results may have been arrived at. The Challenger dredgings teach us that a horny skeleton may be developed in the

<sup>1</sup> *Ann. and Mag. Nat. Hist.*, ser. 5, vol. xviii. p. 152, *et seq.*