

as of independent origin. Nothing in the characters of the spicules of *Placina* seems at first sight to suggest for them a simpler origin, yet a general consideration of the subject leads me to suspect that they also may be traced back to a sigmaspire, but not through a genuine spiraster. Bowerbank represents as the spicules of an undescribed sponge several forms of sigma with one or more rudimentary actines proceeding from the centre; these spicules, which Bowerbank¹ terms exter-umbonate, inter-umbonate, and bi-umbonate bihamates, we may incorporate into our system of nomenclature as contractinate sigmas. The particular form, which is of interest as bearing on the present enquiry, is that in which the actine is directed outwardly from the convex side of the sigma, and to this alone we shall refer in using the term contractinate sigma in the following remarks. The first point of interest is that such spicules are by no means confined to the Sponges, but occur also in the Echinodermata, and in the Nudibranch Molluscs, and that not at all uncommonly. Next in both these groups, the contractinate sigma passes into a contractinate form in which the actine is of considerable size in relation to the rest of the sigma; so large is it that the spicule presents a close resemblance to a triod, into which form indeed it passes by the straightening of the two arms of the sigma, one on each side of the actine; finally, by the appearance of an additional actine the triod passes into a microcalthrops. There is thus suggested for our consideration the possibility of a similar origin in the case of the microcalthrops of *Placina*. In this sponge microtriodes and microxeas are almost as plentiful as microcalthrops, and they are always distinguished either by a curved inflexion at the centre (Pl. XLIII. figs. 14, 14a), or by two of the actines forming together a regular arciform curve. Thus, what little evidence we can adduce is in favour of at least a double origin for the aster, and we may suppose that in some cases it has been developed from the sigmaspire through the spiraster, and in the others from the same spicule through the sigma and its contractinate modification.

In both *Placina* and most species of *Thenia* the mesoderm is not largely developed, and it is possible that this is connected with the comparatively few actines which the asters in these sponges possess; with a larger development of mesoderm or perhaps from other causes the aster acquires additional actines; with increase of size, and sometimes without, the aster becomes reduced and furnishes the microrabd or even a microstyle, and indeed in some sponges a globule, so that this last-named spicule may arise in two ways either as a primitive form or as a reduced aster. The megarabd or rhabdus is in all probability an overgrown microrabd. The style may have been derived from a microstyle, but transitions from the rhabdus to the style are of such frequent occurrence that it may with equal and perhaps greater probability have descended from the rhabdus. The same is true of the tylostyle, and the shortening of the rhabdus may proceed so far as to produce the sphere. These modifications of the

¹ Bowerbank, Mon. Brit. Spong., vol. i. figs. 115-117.