

regarded as sigmaspires reduced to arcs, a view which is supported by the occasional occurrence of S-shaped forms as apparently accidental variations of the normal C-shaped sigma. I have myself no doubt as to the derivation of the Desmacidine chela from the sigma, but as my views on this point are at variance with those of my colleague, Mr. Dendy, and as this form does not occur in the Tetractinellida, I shall not now discuss the question.

The spiraster, which we shall next consider, is the crux of sclerological studies. It may be conceived as originating in two different ways, which, however, are not mutually exclusive. It may arise as a spiral extension of the centrum of a euaster, or by the development of spines about a sigmaspire; the former view appears to have been generally accepted, I fancy rather as a tacit assumption than as a result of investigation.

In the Theneidæ there is good reason to believe, at least so it seems to me, that the spiraster originates from a sigmaspire or polyspire, for in its smallest forms, which are probably the least removed from the ancestral, it always presents a well-marked spire of about two turns, with comparatively small spines, which are produced at intervals in a radiate direction from the outer side of the spire. The spire is in this case the most conspicuous part of the spicule, and since we have already found the sigmaspire becoming spined in the Tetillidæ, which are amongst the simplest sponges of the Tetractinellida, we are fairly led to conclude, in the absence of evidence to the contrary, that the sigmaspire is the parent of the spiraster.

Further, in the Theneidæ the euaster would appear to proceed from the spiraster and not the spiraster from the euaster; thus as the spiraster increases in size the spire becomes reduced, and the spines increased in length, till the various forms of metastar result; the increase in size continuing, the spire sinks into insignificance, and the spines acquire comparatively colossal proportions; the plesiaster, which can thus be traced through a continuous series of transitions from the spiraster, is scarcely distinguishable from the euaster. In the lower forms of the genus *Thenea* the course of development proceeds no further, but in others the plesiaster is absent and its place taken by a euaster, which only differs from the plesiaster in the fact that its actines all proceed from a common centre.

While the spiraster can thus be traced through a perfect gradational series into the aster, the converse is not true, and I know of no instance but one (*Placqspongia*) in which sponges characterized by euasters (Stellettidæ, Geodiidæ) present any indications of a tendency for these to revert to the spirastral form; the modifications of the aster are of a completely different kind, being chiefly in the direction of a reduction in the number of the actines.

While some asters thus originate from spirasters, and these again from sigmaspires, it is quite possible that there are other asters possessing a different history; thus in *Placina*, the simplest of all Tetractinellida, microcalthrops occur which, unless this sponge is to be regarded as a reduced Theneid, not a very likely supposition, must be regarded