Radiolaria also present spicular forms like those of Sponges, and there is also much in the character of the reticulation of their test which is of interest in our present enquiry. In the Echinodermata the forms of sponge spicules are frequently repeated, and not merely of calcareous spicules but of siliceous ones as well; thus sigmas and sigmaspires are far from uncommon, and the former are sometimes centrotylote, and sometimes centractinate, the centractinate variety passing into a triod with curved or straight actines; various forms of rhabdi, both smooth and spined, triods and dichotriods, calthrops, pentactine triaxons, and various irregular forms almost precisely similar to Lithistid desmas are of common occurrence.[1] In the Nudibranchiate Mollusca sigmas occur, which are sometimes centractinate and then pass into triods, which again give rise to oxeas; asters, strongyles, and tylotes are also met with. Rhabdi and spherasters, amongst other spicules, occur in the Tunicata; and some of the spicules of the Alcyonaria also are remarkably similar to some forms of sponge spicules.

Since it is clear that spicules of similar form occur in very different groups of organisms, and in both crystalline and colloidal material, it follows that an explanation of these forms must be independent of special peculiarities of the organism and of the crystalline or non-crystalline structure of the material; in the skeletal structures of the higher animals it would appear that pressure and tension are chiefly concerned in determining the particular form which each sclere or bone assumes, and were it possible to connect the special forms of spicules with the action of these forces, an explanation would be reached which would fulfil the conditions with which we started, *i.e.*, one independent of the nature of the material, and capable of being applied to all the organisms in which spicular forms are developed. Such an explanation is, I am firmly convinced, not only possible, but capable of being worked out in mathematical detail by any one who possesses the requisite mathematical power, but as I cannot pretend to this I can only hope in very meagre outline to suggest the nature of the explanation which I believe to be the true one. The principle of this is that all spicular structures tend to grow along lines of least resistance; if we can determine the law or laws which govern the distribution of these, we shall have furnished ourselves with the key which will unlock all the difficulties of the problem; at present we cannot hope to do more than offer approximations, other investigators no doubt will succeed in correcting and perfecting them.

The simplest form of spicule is a minute granule, generally more or less spherical; it is an indifferent form, which we need not stay to discuss; from it probably arises the sigmaspire, this forms a spiral line around the exterior of a scleroblast, having the form of a spheroid, sometimes prolate, but usually more or less oblate, especially when it lies near an epithelial surface of the sponge.

Finding a difficulty in explaining the origin of the sigmaspire on the lines laid down

[1] C. Stewart, *Trans. Linn. Soc. Lond.*, vol. xxv. pls. xlix., l. Hjalmar Théel, Zool. Chall. Exp., Holothurioidea, part xiii., 1882. R. Semon, *Mitth. a. d. Zool. Station Neapel*, Bd. vii. pls. ix., x.