

very complicated, highly differentiated spicules (discohexasters, floricoles, &c.) occur, and so many species incline towards fusion of the large spicules and formation of a connected framework, that one cannot regard these forms at least as primitive.

A very simple structure is exhibited by certain tubular or saccular Rossellidæ, as for instance, *Bathydorus fimbriatus*, from the great depths. On the other hand, there are species, like *Aulocalyx irregularis*, which, both in the formation of a connected supporting framework, and in the complicated structure of the isolated spicules, occupy a decidedly higher grade. Such are the members of the entire division of Crateromorphinæ, in which a more or less firm long stalk is formed, and the chamber-layer exhibits a complicated folding. The Asconematidæ exhibit a remarkable affinity with the otherwise indisputably far-removed Hyalonematidæ, in the possession of autodermal pinuli. Here there can hardly be any direct inheritance, either of one family from the other, or of both from a common ancestor. I am rather of opinion that the tendency to form lateral teeth is very generally distributed among Hexactinellid spicules, and is expressed in development whenever such would be physiologically advantageous or specially useful for the preservation and strengthening of the organism, as for instance in the formation of weapons of capture or defence on the autodermalia projecting from the skin. I believe that the tendency may be expressed in far-removed Hexactinellids, without there being any transmission by inheritance. And this opinion is supported by the fact that, among the typical Scopularia, there are isolated cases in the various genera and species, e.g., in *Aphrocallistes* and again in *Chonelasma dæderleinii* (but not in *Chonelasma lamella*), in which the distal radial ray of the hypodermalia, projecting more or less beyond the skin, exhibits exactly similar teeth, and thus most distinctly evidences the formation of a pinule.

In the following sketch of a genealogical tree, including those Hexactinellids which I have investigated, the opinions above expressed are graphically represented.

When an attempt is made to collate the results of the investigation of living Hexactinellids with what is known of fossil forms, an array of difficulties beset the task. Above all it is unfortunate that of the great majority of fossil forms only the dictyonal framework is known, so that there is no possibility of induction as to the configuration of the soft parts, nor as to the form, number and disposition of the isolated skeletal elements which are so pre-eminently characteristic, and so extremely important, in spite of Zittel's opinion, in determination of relationship. Again, the blanks in the geological record are here even more serious than in most of the other groups. From entire geological formations either no Hexactinellids are known, or only slight traces. Zittel indicates an obvious explanation in the following sentences:<sup>1</sup>—"Our knowledge of the fossil Hexactinellids is limited to isolated remains of a developmental series, widely separated (both in time and space) the links of which perhaps lie buried in the deposits now sunk

<sup>1</sup> Palæontologie, i. pp. 199, 200.