

fused hexacts with blind processes lying side by side, he was led altogether to deny the accuracy of Marshall's group of Synauloidæ. He also threw doubt on the correctness of Marshall's representation of *Eurete*, Semper, as a Monacid. On this account Zittel divides all the Hexactinellida into two main divisions,—Lyssacina, in which "the skeletal spicules generally remain isolated, and only united by protoplasm" and Dictyonina, in which "the skeletal spicules are fused in a regular way, and form a connected lattice-work with cubical or polyhedral meshes." The soldering of the spicules into a compact connected framework, as occurs in some Lyssacina such as *Euplectella aspergillum*, cannot be identified in mode or nature of union with the regular fusion of a distinct dictyonal skeleton. The irregularity of arrangement, and the inhibition of further development of the spicules as the consequence of this external union, demonstrate the secondary importance of the former case.

For the further classification of the Lyssacina, Zittel emphasises, like Marshall, the degree of differentiation exhibited by the loose spicules, and forms three families:—(1) Monacidæ (Zittel), with only a single form with loose skeletal elements, including also the few known fossil Lyssacina (like *Astræospongia*, Röm, and *Stauractinella*, Zittel); (2) Pleionacidæ, Marshall, in which the main mass of the skeleton consists of regular hexacts, in association with broom-forks and rosettes (*Asconema*, S. Kent, and *Lanuginella*, O. Schmidt); and (3) Pollacidæ, Marshall, in which the form of the skeletal and loose spicules is very manifold, especially in the dermal skeleton and in the lining of the enteric cavities, while the base usually bears a root-tuft of long siliceous spicules (numerous living and some fossil forms). The Dictyonina, on the other hand, are divided by Zittel into a large number of families with complicated characteristics.

In an essay by Marshall and Meyer¹ on some new or slightly known Philippine Hexactinellids, Marshall withdraws his opinion as to the continuity of the axial canal system in the framework of *Sclerothamnus*, and thus abandons the group of synauloid Hexactinellids.

In 1880,² O. Schmidt discusses these systematic questions in detail. He says (p. 41) that "the conception which one is apt to associate with the division of the Hexactinellids into Dictyonina and Lyssacina, namely, that each group for itself has originated from one or several common ancestral forms, and that all the Dictyonina, and especially the recent forms, are more closely related to one another than to the Lyssacina, is certainly not in accordance with the facts. The relation between these two divisions appears indeed to be much closer; the phylogenetic branches have probably repeatedly crossed, and are interlaced by connecting twigs. In one of the new genera, *Hertwigia*, this inseparable relationship is expressed in the most convincing way, since this sponge at the branched base is distinctly dictyonal, but forms further up, where it consists of irregular tubes and plates, a transitional type, and finally, still further up and towards the exterior,

¹ *Mitth. a. d. k. zoolog. Mus. Dresden*, 1877.

² *Spongien des Meerbusens von Mexico*.