calcite, which, unlike silica, is not known to originate from a colloidal state, recourse must be had to a different mode of explanation, and the following may be suggested.

"In some sponges—*e.g.*, *Thenea wallichii*—the walls of the canals in the living state are formed by a considerable thickness of gelatinous connective tissue, from which the body spicules are absent, these occurring immediately about the exterior of the gelatinous tissue. If such a sponge should soon after death become covered up by fine calcareous mud, it is quite conceivable that the entrance of solid particles of foreign material might be prevented for a time by the presence of an investing skin and other soft tissues; on the other hand, this would not prevent the entrance of mineral solutions, which, penetrating the interior, might deposit in the vacant canals calcite or silica, as the case might be. Subsequently the organic matter would be dissipated by decomposition, and the fine calcareous mud, no longer excluded, would be able to insinuate itself into every space thus left vacant, and so fill up the cavity which would intervene between the thread of calcite or other mineral which had already been deposited, and the walls of the surrounding skeleton. Thus the problematical threads of our fossil sponge may be regarded as representing the original cavities of the canals; while the consolidated mud, or empty space, as the case may be, *has taken the place of once-existing gelatinous connective tissue*. How far this, which is the only explanation I can suggest, is the true one, it is hard to say. One difficulty on the face of it is the rapidity which it seems to require in the rate of deposition of the minerals now forming the axial threads; but till we know more about the durability of certain organic tissues, and the rapidity with which mineral deposition takes place in shallow warm seas, this objection cannot be regarded as a fatal one."

As the structure assumed in the foregoing explanation has now been observed to exist, the explanation itself becomes much strengthened, and that mineral deposition proceeds under certain circumstances with a greater celerity than has hitherto been suspected appears probable. The parallelism between the structure of the canal-wall in this species of *Theonella* and in some species of *Thenea*, *e.g.*, *Thenea muricata*, and more particularly in the position of the spicules or desmas of the general skeleton, is suggestive enough to merit notice.

The mesoderm also contains numerous fibrous strands, consisting of fusiform cells arranged longitudinally side by side with overlapping ends (Pl. XXX. figs. 13, 17). Occasionally one of these cells is met with prolonged into two processes at one end, and at intervals cells of quite a different character occur; these are larger, oval, and densely granular (two instances not very well represented are shown in fig. 13). They are prolonged at one or both ends into a slender thread-like process, and take a comparatively deep stain with reagents. The fibrous strands sometimes run more or less parallel to the wall of one of the water-canals, but this is not always the case, and frequently it is quite impossible to correlate their direction with that of any other structure in the sponge. In