

the cladi of a protriæne, while the deuterocladi are almost invariably tangential in position.

The anatriænes present a difficulty which is not readily overcome: this is the recurvature of the cladi. In the very young spicule they are extended from the tylus at right angles to the rhabdome, that is in an exactly tangential direction, but with growth they begin to curve backwards till they may become almost parallel to the rhabdome. Hitherto we have not been careful to distinguish between a line of least resistance due to direction of growth and one due to tension, for either would in most cases serve our purpose equally well, but they are evidently of different character, for a line of growth is to be represented by a vector, while a tension if represented vectorially must be drawn as two equal and opposite vectors; it is possible that this distinction may be of service to us here, for if the anatriæne be compared with the other forms of this triæne, it will be found that it is generally, I think always, distinguished by a longer and thinner rhabdome; this points to a relatively quicker growth in a radial direction, and owing to this the cladome of the spicule will encounter resistance as it is pushed forwards, if so the cladi, which from their inception point outwards at right angles to the rhabdome, will grow in backwards, as this is the direction of least resistance. Of course, there are difficulties in the way of this explanation, but a complete theory of spicules is not evolved all at once. One difficulty is involved in the often excessive length of the rhabdome, a character we have employed in our explanation, for it might fairly be argued from the line of reasoning here followed that this excessive length is itself a result of tension, and just what we should expect from the function of this spicule, which is partly to resist the pull of currents on the sponge when it lives anchored by these spicules in the ooze of the sea floor.

If therefore the rhabdome is produced by a *vis à fronté* acting at the cladal end, how can a *vis à tergo* be called in to account for the backward direction of the cladi?

As an interesting example of the influence of tension on spicules, we may refer to the appearance of accessory cladi, which now and then make their appearance in triæne spicules; thus beneath the cortex of some sponges are found large, somewhat spherical, cavities, which have already been alluded to as subcortical crypts, and it sometimes happens that spicules passing by the sides of the crypts develop a lateral spur, such as is shown in Pl. XLIII. fig. 19 at α . This is clearly due to the tension exerted by the membrane of the roof of the crypt on the adjacent tissue, a tension which was not sufficient to divert the rhabdome from its course, but was sufficient to elicit an accessory cladus, and this has just that direction it should have according to theory.

A curious point of detail represented in the figure just referred to may be noticed in passing; it is the total disconnection of the axial fibre of the accessory cladus and that of the rest of the spicule. I have observed one or two other instances of this, but they are not common.