separated off from the Cynthinæ, since the latter group became distinct from the Styelinæ through the development of compound tentacles. Next comes the modification of the branchial sac, a change consisting in the suppression of the interstigmatic vessels, which appears to have taken place in the Styelinæ and the Bolteninæ independently, and resulting in the evolution of two forms (E. and E′. in the scheme), which were the ancestors of *Bathyoncus* on the one hand and of *Culeolus* and *Fungulus* on the other.

The above is what seems to me the simplest and most natural method of accounting for the structural relations of the present genera, the only difficulty being the independent origin of the modified branchial sac in two distinct groups. And the difficulty is increased, since it is not evident what is the advantage of the structure seen in *Culeolus*, or what is the reason of the modification. The idea that that structure is possibly better suited to certain conditions consequent upon living at great depths is probably not correct, since we find other Simple Ascidians, from as great or greater depths, having the normal structure of branchial sac, such as *Abyssascidia wyvillii*, *Corynascidia suhmi*, *Styela squamosa*, and *Styela bythia*, although it is true these forms are, according to my phylogenetic scheme (page 286), all less highly developed than at least *Culeolus* and *Fungulus*, and probably than *Bathyoncus* also.

A very notable feature in *Culeolus* is the condition of the blood-vessels in the test in some of the species (*e.g.*, *Culeolus murrayi*). This structure, when I first saw it in section (Pl. VIII. fig. 2), at once suggested to my mind the idea that it was an accessory respiratory apparatus, and I still incline to that view. It is not difficult to imagine how the blood-vessels in the test might, especially if the supply was not abundant, become branched in the superficial layers of the organs, and swollen in their end twigs, in order that the blood circulating in the test might thus receive a little additional aeration, and in this way the large blood-vesicles and hollow papillæ of *Culeolus murrayi* could be explained. Possibly the enlarged terminations of the vessels seen in the tests of so many other Ascidians may not only be the same structure in a less developed condition, but may also perform the same function in a slighter degree. A glance at the diagram of the circulation in a Simple Ascidian (page 280), will show that when the heart contracts ventro-dorsally the test receives almost pure blood, but that when, on the other hand, it contracts dorso-ventrally the blood carried to the test is impure blood, which has been returned from the viscera, and is on its way to the branchial sac. From a consideration of this arrangement, it is obvious how advantageous it would be for the Ascidian if the test could act, even to a slight degree, as an accessory respiratory organ, and could allow the blood circulating in its superficial layers to be brought into such close relation with the external medium as to render possible a certain amount of oxydation.

In those forms where the terminal twigs of the blood-vessels are prolonged into delicate processes of the test, these hair-like structures have generally acquired a second function—that of attaching to their surfaces sand grains, small stones, shell fragments, and