

to distinguish Simple from Compound Ascidiæ. Reproduction by gemmation and the formation of colonies in the latter group will not hold, since it is possible to pass from *Ciona*—a typical Simple Ascidian—to *Distoma* and the very centre of the Compound Ascidiæ through the following series of forms which show a perfect gradation of these characters:—*Ciona*, *Rhopalæa*, *Ecteinascidia*, *Clavelina*, *Diazona*, *Chondrostachys*, *Oxycorynia*, *Distoma*.

The formation of common cloacal cavities, canals, and apertures cannot be considered as a diagnostic feature of the Compound Ascidiæ. Although recent investigations by Giard and others upon living material have demonstrated their presence in some genera in which they were previously unknown, yet there are some forms considered by all authorities as Synascidiæ, such as *Chondrostachys*, *Diazona*, *Distoma*, and others, in which the atrial apertures of the Ascidiozooids open independently on the surface of the colony, and no common cloaca is formed.

Lastly, we come to characters taken from the condition of the test, but these break down like the others. In the first place, in passing along the series of forms mentioned above as connecting *Ciona* and *Distoma*, we encounter all stages between a distinct test or tunic for each individual and a common mass in which a number of Ascidiozooids are imbedded. And, secondly, the remarkable group of Polystyelidæ, which were briefly characterised by Giard in 1874, present many of the characters of highly differentiated Simple Ascidiæ (the Cynthiidæ) along with the supposed Synascidian feature of a colony composed of many Ascidiozooids completely buried in a common test.

Thus all the diagnostic features usually employed fail utterly, and we find that, as our knowledge of the two groups extends, it becomes more and more difficult to distinguish even in an artificial and arbitrary manner between Simple and Compound Ascidiæ. The condition of the test is probably the best distinguishing feature to employ, but it must be remembered that, as I have just shown, it will not hold good in all cases. As a general rule, however, in the Ascidiæ Compositæ the Ascidiozooids forming the colony have not separate tests, but are imbedded in a common investing mass, while in the Ascidiæ Simplicis, when colonies are formed, the Ascidiozooids remain partially distinct from one another and each retains its own test.

The mutual relation of the different families of the Ascidiæ Compositæ is a very difficult matter to determine on account of the peculiarity of their evolution. They seem to form, when expressed diagrammatically, a network rather than a tree-like figure, and this is due, I believe, to the group being formed of several distinct branches which have arisen at different times from different groups of the Simple Ascidiæ and have become modified so as to form, in some cases, divergent and in others convergent lines. This will be discussed more fully further on in the Report in considering the phylogeny of the group, and the arrangement of the various families according to their natural affinities may be postponed till then (see Summary and General Remarks).