centrally placed common cloacal cavity. The test became penetrated by a well-developed system of blood-vessels with enlarged terminal bulbs in the superficial layer of the colony, forming in all probability an accessory organ of respiration. This system is evidently the same as that found in the test of some of the Ascidiidæ, and it has been inherited by the Botryllidæ from their ancestors amongst the Ascidiæ Simplices. The Simple Ascidians in their turn inherited the blood-vessels of the test from their ancestors the primitive Clavelinidæ (see fig. 11, p. 388), in which these structures were limited to the posterior end of the body and the stolons. This system in the Clavelinidæ was originally a bud-producing apparatus, and when the property of gemmation was lost (in the Ascidiidæ) it became useful as an accessory organ of respiration,[1] and was seized upon and evolved by the action of natural selection into the complicated system of vessels and bulbs found in some Ascidiidæ and Botryllidæ. It is interesting to find that in the Botryllidæ, where the property of gemmation has been acquired, the vessels in the test have in some cases (*e.g.*, *Sarcobotrylloides wyvillii*, see p. 59) returned to their original function of producing buds in their terminal enlargements.

The branchial sac in the Botryllidæ is well developed, and agrees with that of the Simple Ascidians from the point B. (fig. 11, p. 388) onwards in having well developed internal longitudinal bars. The reproductive organs are found in a condition which suggests the close relationship with the ancestral Cynthiidæ, which is shown in the diagram (fig. 11, p. 388).

The genus *Symplegma*, as I have already pointed out (p. 144), unites the characters of the families Distomidæ and Botryllidæ. In the systematic part of this Report I placed *Symplegma* with some hesitation in the Distomidæ, but I am rather inclined now to regard it, on account of the structure of its branchial sac and dorsal lamina, as being more closely related to the Botryllidæ than to the Distomidæ, and therefore I have placed it provisionally in the phylogenetic table (fig. 11, p. 388) on the termination of a side branch from the ancestral Botryllidæ.

For the different conditions of colony, systems, and Ascidiozooids found in the four genera of the Botryllidæ I may refer to the systematic part of this Report (see p. 37), where they are described and their probable relations discussed. The ancestral Botryllidæ, with moderately thick colonies, probably divided into two series; one—with regular stellate systems and ovate Ascidiozooids—leading to (1) *Botryllus*, in which the colony became thin and incrusting, and (2) *Polycyclus*, in which the colony became thick and massive; and the other—with elongated irregular systems and cylindrical Ascidiozooids—giving rise (1) to *Botrylloides* with thin colonies, and (2) to *Sarcobotrylloides* with thickened colonies (see fig. 15, p. 398). The manner in which the systems probably became complicated, and in which the Ascidiozooids may have changed their form as a result of the modification of the systems, has already been described (see p. 40).

[1] See Herdman, On the Evolution of the Blood-Vessels in the Test of the Tunicata, *Nature*, vol. xxxi. p. 247.