

that they are really rudimentary stolons, which are, however, not capable of producing buds, and are only made use of as adhering organs.¹

In most of the other members of the family Ascidiidæ, these rudimentary stolons either become lost altogether or they acquire a new function, that of aiding in respiration, and become converted into an important system of blood-vessels ramifying through the test and terminating in numerous enlarged bulbs in its superficial layer (Fig. 25).

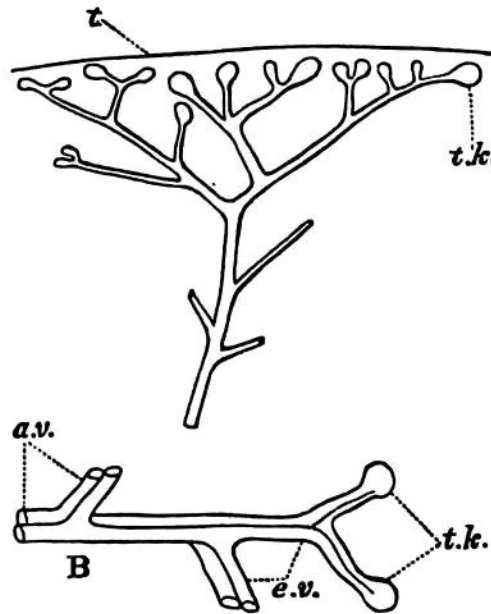


FIG. 25.—Diagram of the vessels in the test of *Ascidia mammillata*.

B. a small part of the system more highly magnified; *a.v.* afferent vessels; *e.v.* efferent vessels; *t.k.* terminal knobs; *t.* surface of the test.

This is a well-marked instance of the evolution of a system of organs performing an important function from a structure having originally an entirely different function. The process has, I believe, been as follows:—The bud-producing stolons of the Clavelinidæ lost their power of gemmation in the primitive Ascidiidæ, and the stolons became rudimentary. In *Ciona* and some other Simple Ascidiidæ they were made use of as adhering organs, until they gradually came to function slightly as respiratory organs by aiding in the oxygenation of the blood circulating in the test, and were then seized upon by natural selection as useful organs, and evolved into the system of vessels seen in *Ascidia mammillata* and other species. It would be possible to form a series of preparations showing all the transition forms between the bud-producing stolons of *Clavelina* (Fig. 19, p. 129), and the respiratory system of vessels in the test of *Ascidia* (Fig. 25); and *Ciona* (Fig. 24) may be regarded as the nearest form known to the point occupied by the ancestors in which the change of function took place.

¹ See Prelim. Report on Ohall. Tun., Part II., *Proc. Roy. Soc. Edin.*, vol. x. p. 719, 1880; and On the Evolution of the Blood-vessels of the Test in the Tunicata, *Nature*, vol. xxxi. p. 247, 1885.