

shape;—round, fusiform, and stellate or branched shapes are the most common (Pl. XI. fig. 1, and many other figures). They comparatively rarely become modified into bladder cells or show much pigmentation. Bladder cells, if present, are usually in the outer layers of the test, and are of rather small size compared with those of Simple Ascidiæ.

A coloured test may be due to either of two causes—(1) the presence of numerous vessels containing coloured blood-corpuscles, (2) pigment cells in the test. The vessels are usually most abundant at the edges of the colony and close to the surface, while the pigment cells may be scattered evenly all through the test, or aggregated in one part, as in the case of *Colella murrayi* (see p. 117). In some cases (e.g., many Didemnidæ, Pl. XLI. figs. 2, 5) calcareous spicules<sup>1</sup> are formed in the test, and these may become

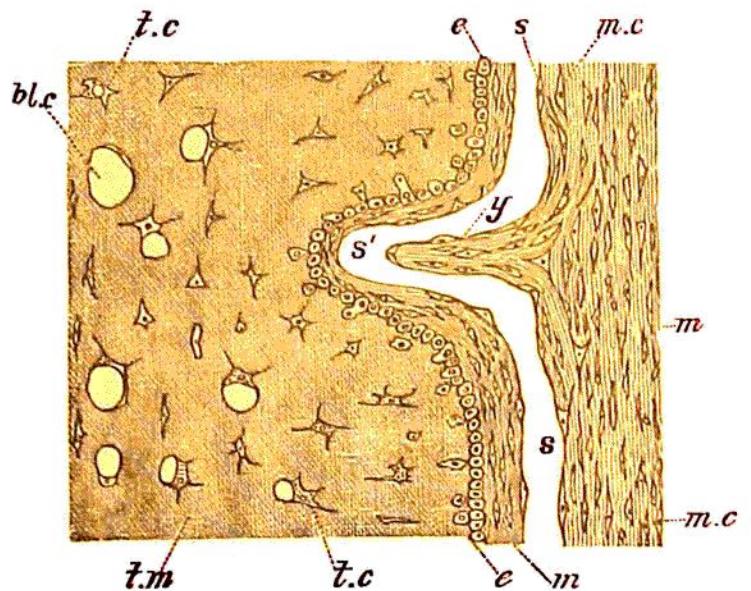


FIG. 2.—A diagrammatic section through part of the mantle and test, showing their relations and the mode of formation of a "vessel."

*bl.c.*, a bladder cell in the test; *e*, the ectoderm; *m*, the mantle; *m.c.*, a connective tissue cell in the mantle; *t.c.*, test cells; *t.m.*, the matrix of the test; *s*, a blood sinus in the mantle; *s'*, its continuation into the test to form a "vessel"; *y*, the septum of the young vessel formed by a continuation of the connective tissue of the mantle.

so numerous as to entirely change the character of the tissue, rendering it hard and brittle, and usually giving it an opaque white colour (see Pl. XXXV. fig. 1).

As in the case of the Ascidiæ Simplicis, the test is sometimes penetrated by "vessels" in the form of prolongations from the mantle covered by a layer of ectoderm and containing a blood sinus (see fig. 2). These vessels may be very numerous, and have large terminal knobs or bulbs placed in the superficial layers of the test (as in some Botryllidæ), or they may be only very slightly developed (as in some Polyclinidæ). In some cases they contain powerful bands of muscle-fibres continuous with those of the mantle, and then seem to have changed their function (which was probably respiratory at first<sup>2</sup>) and to

<sup>1</sup> The relation of these spicules to the rest of the test is discussed further at p. 270.

<sup>2</sup> See Herdman, On a New Organ of Respiration in the Tunicata, *Proc. Lit. and Phil. Soc. Liverpool*, 1884-85, p. 39.