

In the Ascidiidæ and the Clavelinidæ, there are no large folds in the branchial sac, like those characteristic of the Cynthiidæ and the Molgulidæ, but in many species of the genus *Ascidia*, the interstigmatic vessels are inserted into the large transverse vessels in an undulating, in place of a straight line (see fig. 7, and compare with fig. 5), so that the stigmatic part of the branchial sac, the region between the large transverse vessels, is thrown into a series of slight projections and hollows, which gives the sac a peculiar and complicated appearance, especially from the exterior (Pl. XXVIII. figs. 3 and 4, and Pl. XXXIII. fig. 3), where it is not obscured by the presence of the internal longitudinal bars. This "minute plication" may be further complicated by the transverse vessels being of different sizes, and the slighter ones being involved in the undulations, while the larger ones are not.

In most of the Ascidiidæ the internal longitudinal bars are provided on their inner surfaces with papillæ or knob-like projections (figs. 4 and 7, *p.*) placed at the points of intersection with the transverse vessels, and immediately opposite the connecting ducts; and the broad membranes which hang from the front of the transverse vessels (figs. 5 and 7, *h.m.*) are attached to the side of these papillæ and stretch between them like horizontal shelves. In some species of *Ciona* and *Ascidia* one or two apertures of communication with the peribranchial cavity, in addition to the ordinary stigmata, have been found. They are comparatively long slits, in the posterior dorsal region, usually one on each side of the dorsal lamina near its posterior end, and are bordered by cilia much finer than those of the ordinary stigmata.

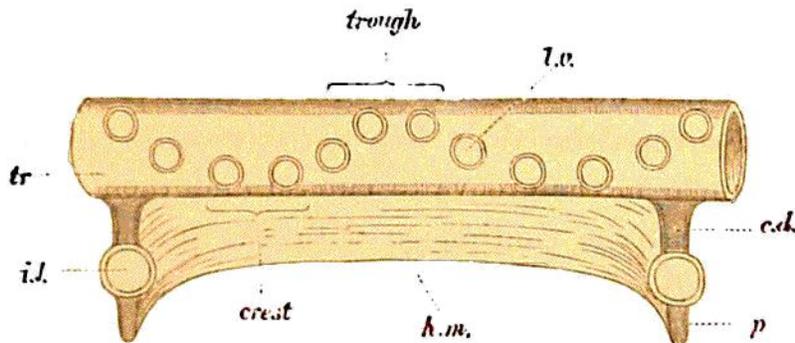


FIG. 7.—Diagrammatic horizontal section through a Mesh of the Branchial Sac of *Ascidia*, showing the arrangement of the fine longitudinal vessels which causes "minute plication."

*tr.*, transverse vessel; *l.v.*, fine longitudinal vessel; *i.l.*, internal longitudinal bar; *c.d.*, connecting duct; *p.*, papilla; *h.m.*, horizontal membrane. "Crest" indicates the highest, and "trough" the lowest part of the undulation.

In the Clavelinidæ, the branchial sac is neither folded nor plicated, and there are no papillæ on the internal surface. In the genus *Clavelina* the entire system of internal longitudinal bars is absent.

In the Ascidiæ Compositæ the branchial sac is always simple in structure, differing little in most forms (*e.g.*, *Botryllus*) from the arrangement found in *Clavelina*. In some cases, however, internal longitudinal bars are found, and occasionally these bear slight papillæ (*Distoma*, *Diazona*).