

The branchial sac is shown by its relations and development to be a pharynx greatly enlarged and modified to serve as a respiratory organ. The water, when the muscular mantle is relaxed, enters the sac by the branchial siphon and streams through the stigmata into the peribranchial space, bathing in its passage all the thin-walled vessels and aerating their contained blood. The current of water is directed by the lashing of the cilia bounding the stigmata. In nearly every specimen examined one or two small Copepod Crustaceans were found living in the branchial cavity as commensals.

*Endostyle*.—The endostyle runs along the ventral edge of the branchial sac (Pl. V. fig. 13 *en.*). It begins anteriorly at the base of the branchial siphon immediately behind the peripharyngeal band and runs backwards to the base of the sac, ending at the ventral edge of the œsophageal aperture. The ends are bluntly conical (Pl. VI. fig. 4), otherwise it is of the same breadth throughout. Its course is far from being a straight one. In its longitudinal and lateral plane (from side to side) it forms a series of minute undulations, which are sometimes especially marked in its anterior part (Pl. VI. fig. 3, *en.*), while in its longitudinal dorso-ventral plane (Pl. V. fig. 13) it describes two large curves of nearly equal size with the convexity outwards (ventrally) and separated by a deep depression; these form the B-shaped ventral edge of the branchial sac.

The endostyle is a groove with greatly thickened sides formed of columnar epithelium, while the base is covered with squamous epithelium. The summits of the edges are continued up as lip-like folds, which sometimes arch over so as to form what seems to be a canal. A tract along each side and the base are richly ciliated. Seen from the dorsal or ventral aspects, the endostyle shows a pair of thick brown semi-opaque bands separated by a more translucent area (Pl. VII. fig. 2). The opaque bands are caused by the thickened sides, separated by the less massive floor of the groove.

*Dorsal Lamina*.—This is probably the best designation for the very variously named organ which runs along the dorsal edge of the branchial sac opposite to the endostyle. It varies greatly in the details of its structure in different Ascidians, but two chief modifications are generally recognised—(1) where it occurs as a lamina or membrane, and (2) as a series of tongue-like processes or languets. These two conditions of the organ look very different, but are really merely the extreme modifications of intermediate stages which are also found. Beginning with the lamina or simple broad membrane, we find that this may be traversed by horizontal equidistant ribs or thickenings more or less strongly marked. The next stage is when these ribs, extending to the free edge of the membrane, form thereon, when seen in profile, a series of slight tubercles. These marginal tubercles are found in every degree of development, from the merest points up to large teeth and finally long conical languets. As a rule the breadth of the membrane seems to be in inverse ratio to the development of the marginal tubercles. In working through a series of dorsal laminæ, as the tubercles increase in size the membrane