

Sometimes both horns are coiled inwards towards each other, sometimes outwards, and in other cases they curve in opposite directions. The resulting forms seem almost endless, and although the dorsal tubercle affords in some cases characters of value in classification, still it cannot be relied upon, and in many species (e.g., *Ascidia virginea* and *Styela grossularia*) exhibits a considerable amount of individual variation.<sup>1</sup>

In a few cases the dorsal tubercle is still further complicated, apparently by the development of lateral branches from the original slit as in *Boltenia pachydermatina* (Pl. VII. fig. 8), while in *Cynthia irregularis* (Pl. XVI. fig. 12) the primitive aperture has evidently become subdivided into a number of openings, each bounded by prominent lips.

In those cases where the organ is complicated, and has a pair of closely coiled spiral horns, the raised lips of the aperture make a considerable projection, and give the appearance of a tubercle with a curiously sculptured surface (as in *Ascopera gigantea*, Pl. III. fig. 5). For a long time this was considered from its appearance, its proximity to the nerve ganglion, and its position at the entrance to the branchial sac, as a sense organ, and was hence called the olfactory tubercle. Ussow and Julin have, however, definitely established (1), that the tubercle is not sensory, and has no nervous connection with the ganglion; and (2), that it is simply the aperture by which the duct of the neural gland communicates with the branchial sac.

The slit forming the aperture leads into a funnel-shaped cavity (fig. 11, *d.t.*), the commencement of the duct, and this is lined by an epithelium of columnar cells provided with very long cilia. This is replaced by cubical non-ciliated cells on the lips of the aperture, and that graduates into the squamous epithelium covering the surface of the præbranchial zone. Under the epithelium is a layer of connective tissue continuous with that of the mantle.

### *The Alimentary Canal.*

The first portion of the alimentary canal, consisting of the mouth and pharynx, has already been fully described as the branchial aperture, the siphon, and the branchial sac. The next portion, or alimentary canal proper, consisting of the œsophagus, stomach, and intestine, commences with the œsophageal aperture, placed near the posterior extremity of the dorsal lamina, and terminates in the anus, which opens into the dorsal part of the peribranchial or atrial cavity—the large space surrounding the branchial sac.

The stomach and intestine almost invariably lie at one side of the branchial sac, usually the left, and may either be comparatively free or attached along the whole extent to the inner surface of the mantle, and covered by the layer of squamous epithelium lining

<sup>1</sup> See Herdman, On the Olfactory Tubercle as a Specific Character in Simple Ascidiæ, Proc. Roy. Phys. Soc. Edin., vol. vi. p. 254, 1881.