

tail-like part of the body, where it would form an axis around which the muscles were placed. This would account for the change in the general shape, in the disposition of the alimentary canal, and in the relations of the notochord. The other changes which probably took place in the primitive Tunicata were the enlargement of the anterior part of the nervous system to form a vesicle in which sense organs (optic and auditory) were developed; the degeneration and abortion of the nephridia, with the possible exception of those underlying the nervous system in the præoral lobe which later on may have become modified to form the subneural gland of the Ascidian, the homologue of the hypophysis cerebri of vertebrates; and the enlargement of the anterior portion of the alimentary canal to form a respiratory tract—the primitive branchial sac.

Most of the Appendiculariidae of the present day (see Fig. 14) represent such an ancestral form with comparatively little change. They have the branchial sac or

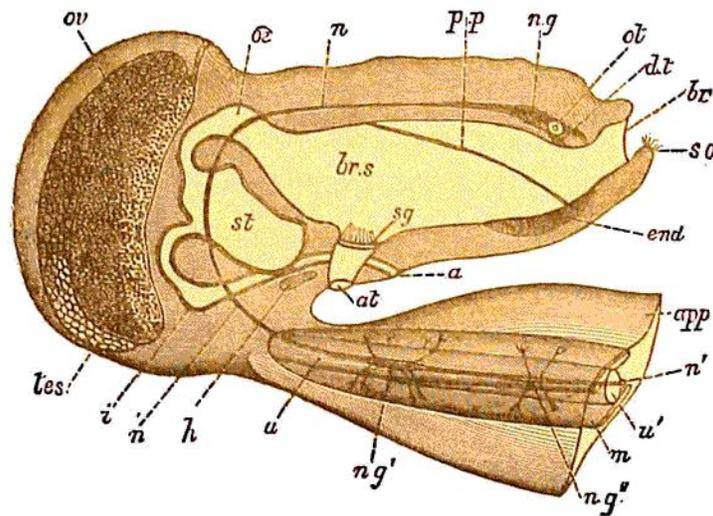


FIG. 14.—Diagram of *Appendicularia* from the right side. (From the *Encyclopædia Britannica*, 9th ed.)

a. anus; app. tail; at. one of the atrial apertures; br. branchial aperture; br.s. branchial sac; dt. dorsal tubercle; end. endostyle; h. heart; i. intestine; m. muscle band of tail; n. nerve cord in body; n. nerve cord in tail; n.g. large anterior (cerebral) ganglion; n.g. caudal ganglion; n.g. enlargement of nerve cord in tail; a. oesophagus; ot. otocyst; ov. ovary; p.p. peripharyngeal band; sg. one of the stigmata; s.o. oral sense organs; st. stomach; tes. testis; u. urochord; u. its cut end.

pharynx opening to the exterior by a single pair of stigmata or gill slits which correspond to the primary or first formed stigmata of the young *Ascidia*, and may represent the ancestral condition. In some few of the Appendiculariidae, however, considerable degeneration has taken place (e.g. *Kowalevskia*); and in one form described as new, but not named, by Dr. Moss in 1871,¹ the branchial sac has a number of stigmata, and is in a condition which recalls the arrangement found in the Doliolidæ. This species, which may be called *Appendicularia mossi*, is perhaps the nearest form known to the ancestral Tunicates from which the two great lines of degeneration diverged (see table, p. 120), the one leading to the Doliolidæ and the Salpidæ, and the other to the Simple and the Compound Ascidiæ.

¹ *Trans. Linn. Soc. Lond.*, vol. xxvii. p. 299.