

to open to the exterior (Fig. 13, *a*) in the middle ventral line in front of the pair of atrial apertures. This independent opening of the intestine upon the surface of the body is just what might be expected from the incomplete and embryonic condition of the peribranchial cavity. The heart is placed in the middle line of the body ventrally to the stomach and near the posterior end of the branchial cavity. According to Lankester, it is formed of two cells which are placed at the opposite ends, and are connected by delicate contractile protoplasmic fibrils.

The nervous system consists of a large (cerebral) ganglion, which is placed near the anterior end of the body on the dorsal edge of the branchial sac (see Fig. 13, *n.g.*). This corresponds to the single ganglion of ordinary Ascidians. From this cerebral ganglion a nerve cord runs backwards along the dorsal edge of the branchial sac, and then curves ventrally and passes the alimentary viscera to reach the tail, along which it runs on the left side of the urochord. Near the base of the tail there is a distinct elongated caudal ganglion (Fig. 13, *n.g.*') on the nerve cord, and farther on there are the slight enlargements already referred to. All these are connected with distributory nerves, and Langerhans<sup>1</sup> has described both motor and sensory nerves in the tail.

There are various sense organs in the body. The cerebral ganglion has connected with it an otocyst, a pigment spot, and a tubular process opening into the branchial sac, and representing the dorsal tubercle and associated parts of an ordinary Ascidian. On the ventral edge of the branchial aperture are placed some groups of modified ectodermal cells, which are possibly tactile organs (Fig. 13, *s.o.*), and there may be others of the same nature on other parts of the body.

The reproductive organs are placed at the posterior end of the body. They consist of either single or paired large sac-like ovaries and testes, the latter communicating with the dorsal surface of the body by means of a delicate duct, while the ova are only set free by rupture of the body-wall. The testis arrives at maturity before the ovary, so that although hermaphrodite, the Appendiculariidæ are not self-fertilizing. This is a case of protandry, while in most other Tunicata which I have examined protogyny appears to be the rule.

Very little is known as yet in regard to the development. There is no reproduction by gemmation, and therefore no alternation of generations in the life-histories of this group.

The family contains about two dozen species, which may be grouped in the following four genera:—

<sup>1</sup> *Zeitschr. f. wiss. Zool.*, Bd. xxxiv. p. 144.