points more or less anteriorly. It shows distinct traces of meta­meric segmentation, having its muscle bands broken up into myo­tomes, while the nerve cord presents a series of enlargements from which distributary nerves are given off (fig. 12, *ng").* Near the base of the tail there is a distinct elongated ganglion (fig. 12, *ng').* The anterior (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. The branchial aperture or mouth leads into the branchial sac or pharynx. There are no tentacles. The endostyle is short. There is no dorsal lamina, and the peripharyngeal bands run dorsally and posteriorly. The wall of the branchial sac has only two ciliated apertures. They are homologous with the }>rimary stigmata of the typical Ascidians and the gill clefts of Vertebrates. They are placed far back on the ven­tral surface, one on each side of the middle line, and lead into short funnel-shaped tubes which open on the surface of the body behind the anus (fig. 12, *at).* These tubes corre­spond to the right and left atrial involutions which, in an ordinary Ascidian, fuse to form the peribranchial cavity. The heart, according to Lankester, is formed of two cells, which are placed at the opposite ends and connected by delicate con­tractile protoplasmic fibrils. The large ovary and testis are placed at the posterior end of the body. The remainder of the structural details can be made out from fig. 12.

The family *Appendiculariidæ* comprises the genera,—*Oikopleura* (Mertens), and *Appendicularia* (Cham.), in both which the body is short and compact and the tail relatively long, while the endostyle is straight ; *Fritillaria* (Q. and G.), in which the body is long and composed of anterior and posterior regions, the tail relatively short, the endostyle recurved, and an ectodermal hood is formed over the front of the body ; and *Kowalevskia* (Fol), a remarkable form de­scribed by Fol (*14),* in which the heart, endostyle, and intestine are said to be absent, while the branchial sac is provided with four rows of ciliated tooth-like processes.

Order II.—THALIACEA.

Free-swimming pelagic forms which may be either simple or compound, and the adult of which is never provided with a tail or a notochord. The test is permanent and may be either well developed or very slight. The musculature of the mantle is in the form of more or less complete circular bands, by the contraction of which locomotion is effected. The branchial sac has either two large or many small apertures, leading to a single peribranchial cavity, into which the anus opens. Alternation of generations occurs in the life- history, and may be complicated by polymorphism. The *Thaliacea* comprises two groups, *Cyclomyaria* and *Hemimyaria.*

Sub-order 1.—Cyclomyaria.

Free-swimming pelagic forms which exhibit alternation of genera­tions in their life-history but never form permanent colonies. The body is cask-shaped, with the branchial and atrial apertures at the opposite ends. The test is more or less well developed. The mantle has its musculature in the form of circular bands surrounding the body. The branchial sac is fairly large, occupying the anterior half or more of the body. Stigmata are usually present in its posterior part only. The peribranchial cavity is mainly posterior to the branchial sac. The alimentary canal is placed ventrally close to the posterior end of the branchial sac. Hermaphrodite reproductive organs are placed ventrally near the intestine.

This group forms one family, the Doliolidæ, including two genera, *Doliohum* (Quoy and Gaimard) and *Anchinia* (C. Vogt).

*Doliolum,* of which several species are known from various seas, has a cask-shaped body, usually from 1 to 2 cm. in length. The terminal branchial and atrial apertures (fig. 13) are lobed, and the lobes are provided with sense organs. The test is very slightly developed and contains no cells. The mantle has eight or nine circular muscle bands surrounding the body. The most anterior and posterior of these form the branchial and atrial sphincters. The wide branchial and atrial apertures lead into large branchial and peribranchial cavities, separated by the pos­terior wall of the branchial sac, which is pierced by stigmata ; con­sequently there is a free passage for the water through the body along its long axis, and the animal swims by contracting its ring­like muscle-bands, so as to force out the contained water posteriorly. Stigmata may also be found on the lateral walls of the branchial sac, and in that case there are corresponding anteriorly directed diverticula of the peribranchial cavity. There is a distinct endo­style on the ventral edge of the branchial sac and a peripharyngeal band surrounding its anterior end, but there is no representative of the dorsal lamina on its dorsal edge. The oesophagus com­mences rather on the ventral edge of the posterior end of the branchial sac, and runs backwards to open into the stomach, which is followed by a curved intestine opening into the peribranchial cavity. The alimentary canal as a whole is to the right of the middle line. The hermaphrodite reproductive organs are to the left of the middle line alongside the alimentary canal. They open into the peribranchial cavity. The ovary is nearly spherical, while the testis is elongated, and may be continued anteriorly for a long distance. The heart is placed in the middle line ventrally, be­tween the posterior end of the endostyle and the oesophageal aperture. The nerve ganglion lies about the middle of the dorsal edge of the body, and gives off many nerves. Under it is placed the subneural gland, the duct of which runs forward and opens into the anterior end of the branchial sac by a simple aperture, surrounded by the spirally twisted dorsal end of the peripharyngeal band (fig. 13, *dt).*

The ova of the sexual generation produce tailed larvæ ; these develop into forms known as “ nurses ” (blastozooids), which are asexual, and are characterized by the possession of nine muscle bands, an auditory sac on the left side of the body, a ventrally- placed stolon near the heart, upon which buds are produced, and a dorsal outgrowth near the posterior end of the body. The buds give rise eventually to the sexual generation, which is polymor­phous, having three distinct forms, in two of which the reproduc­tive organs remain undeveloped. The buds while still very young migrate from their place of origin on the stolon, divide by fission, and become attached to the dorsal outgrowth of the body of the nurse, where they develop. The three forms produced are as follows. (1) Nutritive forms (trophozooids), which remain permanently at­tached to the nurse and serve to provide it with food ; they have the body elongated dorso-ventrally, and the musculature is very slightly developed. (2) Foster forms (phorozooids), which, like the preceding, do not become sexually mature, but, unlike them, are set free as cask-shaped bodies with eight muscle bands and a ventral outgrowth, which is formed of the stalk by which the body was formerly united to the nurse. On this outgrowth the (3) forms (gonozooids) which become sexually mature are attached while still young buds, and after the foster forms are set free these reproductive forms gradually attain their complete development, and are event­ually set free and lose all trace of their connexion with the foster forms. They resemble the foster forms in having a cask-shaped body with eight muscle bands, but differ in having no outgrowth or process, and in having the reproductive organs fully developed.@@1

*Anchinia,* of which only one species is known, *A. rubra,* from the Mediterranean, has the sexual forms permanently attached to portions of the dorsal outgrowth from the body of the unknown nurse. The body is elongated dorso-ventrally. The test is well developed and contains branched cells. The musculature is not so well developed as in *Doliolum.* There are two circular bands at the anterior end and two at the posterior, and two on the middle of the body. The stigmata are confined to the obliquely placed posterior end of the branchial sac. The alimentary canal forms a U-shaped curve. The reproductive organs are placed on the right side of the body. The life-history is still imperfectly known. As in the case of *Doliolum* the sexual generation is polymorphous, and has three forms, two of which remain in a rudimentary condition so far as the reproductive organs are con­cerned. In *Anchinia,* however, the three forms do not occur to­gether on one stolon or outgrowth, but are produced successively, the reproductive forms of the sexual generation being independent of the “foster forms” (see Barrois, *27).*

Sub order 2.—Hemimyaria.

Free-swimming pelagic forms which exhibit alternation of genera­tions in their life-history and in the sexual condition form colonies. The body is more or less fusiform, with the long axis antero-posterior, and the branchial and atrial apertures nearly terminal. The test is well developed. The musculature of the mantle is in the form of a series of transversely-running bands, which do not form com­plete independent rings as in the *Cyclomyaria.* The branchial and

@@@1 For further details see Uljanin *OS).*