

apertures which was seen obscurely in *Ecteinascidia* is very well marked: they have eight lobes around the branchial aperture and six around the atrial. In *Chelyosoma*, however, the branchial aperture is six-lobed, and in *Abyssascidia* the number has become greatly increased. In *Abyssascidia wyvillii* there are twelve or fourteen branchial and nine atrial. The Botryllidæ, like most other Compound Ascidiæ, have six-lobed branchial apertures. The ancestral Simple Ascidiæ in the neighbourhood of the point M. (table, p. 150) probably acquired four-lobed or cross slit apertures, since it is the general rule both in the Styelinæ and the Cynthinæ that both branchial and atrial apertures should have four lobes. The Polystyelidæ, like the Styelinæ from which they are derived, have both apertures four-lobed or quadrangular.

In both the side branches which arose from the ancestral Cynthinæ modification has taken place. In the Molgulidæ the branchial aperture has become six-lobed while the atrial has remained unchanged (*i.e.* has four lobes). In the Bolteninæ, finally, *Boltenia* has both apertures four-lobed, while *Culcolus* and *Fungulus* have the branchial aperture triangular and the atrial bilabiate.

From the distinctness of the lobes and the constancy of their number in most groups, there can be no doubt that the number of lobes around the apertures is of some importance to the Ascidian, and yet it is not easy to say what difference it makes whether there are six lobes or eight around the branchial aperture; and although it may possibly be an instance of correlation,—the lobes varying in accordance with the condition of some other part of the body,—still there is no known organ in the Ascidian which will account for all the variations. I have sometimes thought that the structure of the branchial sac might be the cause of the number of lobes in some cases; for example, in the Styelinæ, where the branchial and atrial apertures are always four-lobed, the branchial sac has always four folds upon each side; then, again, in the Botryllidæ, where there are six lobes around the branchial aperture, there are always three well-marked internal longitudinal bars upon each side of the branchial sac. But, on the other hand, in many cases there appears to be no connection between the structure of the branchial sac and the number of folds. Perhaps the most unaccountable case is that of the genera of Polyclinidæ derived from the ancestral form occupying the point H. (table, p. 150). In this little group, most closely related genera such as *Sidnyum*, *Fragarium*, *Morchellium*, and *Morchellioides* are found, some with six-lobed branchial apertures and others with eight lobes, while their branchial sacs and most of the other organs of the body are almost indistinguishable from one another.

Uljanin in his sketch of the phylogeny of the Tunicata<sup>1</sup> shows the Appendiculariidæ giving rise to the Simple Ascidiæ, from which three lines then diverge, one to *Salpa*, the second to *Doliolum* through *Anchinia*, and the third to the Compound Ascidiæ,

<sup>1</sup> Fauna und Flora des Golfes von Neapel., Monogr. x. Doliolum, p. 128, 1884.