

2. ALIMENTARY CANAL AND ITS APPENDAGES.

The Tubinares as a group agree very closely together in the form of stomach and intestines possessed by them, which have peculiarities not occurring in any other groups of birds, and it is only in the variations in form and structure of the tongue, in the nature of the armature of the mucous membrane of the mouth, and in the presence or absence of cæca that the various forms differ in any important degree from each other.

The mucous membrane of the palate usually presents, in the Tubinares, several series of longitudinal rows of pointed, retroverted papillæ, which no doubt serve in the capture and retention of the prey by these birds. The most ordinary arrangement of these may be understood from Plate II. fig. 21, where the palate of *Æstrelata lessoni* is represented.

The palate is cleft for about half its length by a narrow median fissure, fringed on each side by a row of small spines, which dilates behind into the opening of the posterior nares, which is similarly fringed. Behind this, separated by a small interval, is the linear median aperture of the Eustachian tubes. From the anterior extremity of the median fissure runs forwards, to near the end of the beak, a sharp median ridge, with four or five strong, conical spines developed on it posteriorly. This ridge is separated by a deep groove on each side from the margins of the beak. Along a line corresponding to that of the palatine bones, and extending for an extent equal to that of the median fissure, there is developed on each side a second longitudinal row of retroverted and pointed spines, much longer and stronger than the more median series. In front of the posterior-narial aperture there runs between the two longitudinal series an oblique series of smaller spines, whilst behind the Eustachian aperture is a second transverse series, concave anteriorly.

In all the species of the genera *Æstrelata*, *Bulweria*, and *Majaqueus* examined by me the same condition obtains, the larger species, however, as that figured, frequently developing one or two rows of smaller spines lying parallel to the external longitudinal row, one outside, and the other between it and the median fissure. *Puffinus* is similar, but the anterior median keel is smooth, and almost without spines, and the palate to the sides of the Eustachian aperture becomes covered with small spines.

In *Cymochorea* and *Procellaria*, as in *Halocyptena*, the palate is much as in *Æstrelata*, but with all the spines smaller and feebler, particularly those on the palatal ridge. In the first genus at least the pre-narial ridge is nearly smooth, and between the palatine row of spines—only developed posteriorly—and the median a stronger row is developed, so that there are here altogether three pairs of longitudinal spines above.

In the Oceanitidæ the palate is much the same, but the palatine row becomes very weak and nearly obsolete, whilst the intermediate row is the strongest, considerably, of all.