

reduced and partially resorbed condition.<sup>1</sup> In *Rhizocrinus*, *Hyocrinus*, *Holopus*, and *Thaumatocrinus* they persist through life, and in each case present a different stage of development.

The orals of *Holopus* retain their embryonic position, and are scarcely separated at all from the first radials, coming into close relation with the inner faces of these plates, while the arms are altogether above and outside them (Pl. III. fig. 2). But in *Hyocrinus* (Pl. Vc. fig. 6, O; Pl. VI. figs. 1-4) and also in *Thaumatocrinus* (Pl. LVI. fig. 5), though still relatively large, they are separated from the edges of the radials by a marginal zone of perisome which is paved with closely-set plates, and occupies about one-fifth of the total diameter of the disk.

The orals appear to be unequally developed in the two living species of *Rhizocrinus*. In *Rhizocrinus lofotensis* they would seem either to undergo some amount of resorption, or else to remain in a comparatively undeveloped condition. For they are figured and described by Sars<sup>2</sup> as minute valvule-like plates which occupy the central ends of the triangular interpalmar fields on the disk; so that there is a comparatively large amount of perisome between their bases and the edge of the disk, just as there is in many young Comatulæ after separation from the stem. In *Rhizocrinus rawsoni*, however, they are relatively larger, and their bases approach more closely to the lower brachials, from which they are only separated by a narrow band of perisome (Pl. X. figs. 7, 20).

Under these circumstances, therefore, it is hardly to be expected that the orals should be preserved in the fossil species of *Rhizocrinus*; for as they are only united to the calyx by membrane, they would naturally become separated from it when the soft parts were destroyed. In all the recent Comatulæ, with the exception of the archaic type *Thaumatocrinus* (Pl. LVI. fig. 5), they are resorbed before maturity is reached; and if this was not the case in the fossil species, they probably persisted in somewhat the same form as in *Rhizocrinus*. Even in *Holopus* there is no very close connection between the orals and the tubular cup (Pl. III. figs. 1, 2); and the type is so rare in the fossil state, that specimens with the orals preserved are not likely to be found.

In the Palæocrinoids, however, the orals reached a greater development than in the later Neocrinoids, resembling rather the solid plates of *Holopus* and *Hyocrinus* (Pl. III. fig. 2; Pl. Vc. fig. 6; Pl. VI. figs. 1-5) than the mere films of delicate limestone network which represent them in *Rhizocrinus* and in the Comatulæ. It will, however, be more advantageous to postpone the discussion of the nature and position of the oral plates in the Palæocrinoids until the chapter which deals with the relation of these older forms to the Neocrinoids.

<sup>1</sup> Fra den norske Nordhavs-Expedition, Echinodermer, *Nyt Mag. f. Naturvid.*, Bd. xxiii. p. 9.

<sup>2</sup> Crinoides vivants, p. 17, figs. 40, 41, 85, 86, 89-91—o.