

complex in nature than that of *Reteocrinus* and *Xenocrinus*. But a transition between the two appears to be presented by some forms of *Dendrocrinus*, *Heterocrinus*, and *Iocrinus*. A little specimen figured by Meek, and referred to the aberrant type *Dendrocrinus casei*, shows the anal side very well.¹ Meek's description runs as follows:—"Anal series with the first piece resting directly upon the upper truncated side of the heptagonal posterior subradial (i.e., basal) hexagonal in form, and bearing in direct succession above a series of hexagonal pieces gradually diminishing in size; while alternating with these similar small hexagonal pieces can be seen on each side of the mesial series, for some distance above the body between the free rays, and connecting with those of the ventral part." His figure is a curious one, and does not quite agree with his description; for there seems to be a single large and pentagonal anal plate which separates two radials and rests in the angle formed by the upper edges of two basals (subradials, Meek). Upon this plate rests a series of seven gradually diminishing hexagonal pieces which stand out prominently from the smaller plates at their sides, just like the middle row of plates in the anal area of *Reteocrinus nealli* with which they seem to be comparable. If they supported a ventral sac like that of the typical *Dendrocrinus*, it was relatively much larger than that of *Reteocrinus nealli*, so that the vertical series of plates would end much farther from its summit than in that species.

Thus then in *Onychocrinus*, *Taxocrinus*, *Reteocrinus*, *Xenocrinus*, and even in *Dendrocrinus casei* the anal side shows this regular vertical series of plates which rests on a basal below and gradually diminishes in size. The only essential difference between it and the anal appendage of *Thaumatocrinus* is that it forms part of the body, being bound in with the rays by minute interradianal plates which are not present in the simpler *Thaumatocrinus*. But this is often the fate of the lower pinnules in the Neocrinoids; and it would assuredly also be the fate of an anal appendage in a Crinoid with the same calyx-characters as *Thaumatocrinus*, but standing in the same relation to it as an extensively plated and multiradiate *Comatula* does to the naked and ten-armed *Antedon rosacea*.

In the Cyathocrinoid genus *Heterocrinus* there appears to have been an anal appendage like that of *Onychocrinus* and *Reteocrinus*; but it rested on the upper sloping sides of two adjacent radials instead of on a basal.

In this type, as in the Cyathocrinidæ generally, the capacity of the cup is comparatively small, and the visceral cavity within the disk is almost entirely limited to its anal interradius, which is enormously enlarged, and forms the structure known as the "ventral sac." In *Cyathocrinus* itself this is a heavily plated tube, that commences at the upper edge of the "special anal" plate, above which its characteristic porous structure appears at once. But in *Heterocrinus* the ventral sac appears to be less robust, while the anal

¹ Palæontology of Ohio, vol. i. pl. iii. bis. fig. 2c, p. 29.