

has twelve (ten) arms, instead of five, as in *Hyocrinus*. These arms are composed of short, stiff joints in which no syzygial unions occur; while they bear short pinnules, all of which, except the first four, consist merely of one elongated joint. Zittel further says,<sup>1</sup> "Aus dem Vorhergesagten geht hervor, dass *Hyocrinus* in Bezug auf den Bau der Arme einen differenzirteren Typus darstellt als *Plicatocrinus*. Immerhin aber stimmen beide Gattungen hinsichtlich ihres Kelchbaues besser mit einander überein, als mit irgend einer anderen bis jetzt bekannten Crinoideen-Genus und durften darum wohl derselben Familie zugetheilt bleiben." It appears to me, however, that this supposed resemblance between *Hyocrinus* and *Plicatocrinus* is really very superficial; and that it consists essentially in the condition of the thin and somewhat flattened calyx-plates. This is also the case with the radials of *Bathocrinus*, while the calyces of young Pentacrinidæ have a very considerable similarity to that of *Plicatocrinus*. On the other hand, and apart from the question of basals, the arms of *Plicatocrinus*, as discovered and described by Zittel himself, are utterly and entirely different from those of *Hyocrinus*; and although de Loriol says, "Les analogies tendrent à montrer que les deux genres sont de la même famille,"<sup>2</sup> he concludes as follows, "il faudra peut-être établir une famille pour chacun de ces genres." This I propose to do in the case of *Hyocrinus*, the definition of the family Hyocrinidæ being for the present the same as that given above for the genus.

While resembling *Apiocrinus* and also many Palæocrinoids in the nature of the stem-joints, *Hyocrinus* differs in several respects from the other Neocrinoids. In the first place the apparent presence of only three basals and the small size of the articular facets as compared with the great breadth of the radials, give it a strong resemblance to some of the Palæocrinoids, and more especially to the Platycrinidæ. Although *Hyocrinus* resembles *Platycrinus* in having a symmetrical, tripartite base, the position of the dorsal axis<sup>3</sup> which divides the base symmetrically is not the same in the two genera. If a *Platycrinus* be "orientirt" with the anal interradius posterior, the dorsal axis runs from the right anterior interradius to the left posterior radius; whereas that of *Hyocrinus* (in the only specimen examined) runs from the left anterior radius to the right posterior interradius. But the general form of the calyx, as seen from the side (Pl. VI. fig. 3), is very like that of the Carboniferous *Dichocrinus intermedius*, figured by de Koninck.<sup>4</sup> Its composition, however, is different, as *Dichocrinus* only has two symmetrical basals.

The persistence of the large oral plates is a noteworthy feature of *Hyocrinus*, but it finds a parallel in the Comatulid genus *Thaumatocrinus* (Pl. LVI. fig. 5), and also to a certain extent in *Rhizocrinus*.

<sup>1</sup> Ueber Plicatocrinus, *Sitzungsb. d. II. Cl. k. baier. Akad. d. Wiss.*, 1882, Bd. i. p. 112.

<sup>2</sup> *Paléont. Franç., loc. cit.*, p. 63.

<sup>3</sup> See Beyrich, Ueber die Basis der Crinoidea brachiata, *Monatsber. d. k. preuss. Akad. d. Wiss. Berlin*, 1871, p. 42.

<sup>4</sup> *Recherches sur les Crinoïdes du terrain Carbonifère de la Belgique*, Bruxelles, 1854, pl. iv. fig. 9.