

by Wachsmuth and Springer on account of its resemblance to *Eupachyrcrinus*. No such vault has been found in this type, but only a small "ventral tube" which rests on a series of three anal plates and has been traced to the height of the fourth or fifth arm-plate, where it is composed of small, very delicate, hexagonal plates. But these anal plates are absent in *Erisocrinus* as in *Encrinus*, and since a ventral tube or sac like that of *Cyathocrinus* is always found associated with a system of anal plates, the lowest of which is intercalated between two radials, it seems rash to postulate its presence in the symmetrical *Erisocrinus*.

It should be remembered too that the Liassic *Extracrinus* has a symmetrical calyx with a dicyclic base, *i.e.*, of the same composition as that of *Encrinus* and *Erisocrinus*; while its summit or ventral side was in no way different from that of a recent *Pentacrinus*. I have a strong suspicion that this is also true of many Palæocrinoids, and do not therefore believe that *Erisocrinus* must have had a closed vault because it was a Palæocrinoid. Together with *Encrinus*, *Philocrinus*, and *Stemmatocrinus* it certainly affords the best transition yet known between the Neocrinoids and Palæocrinoids. For the only point of difference about which we are entitled to speak with certainty is the absence of a second radial in the three older forms, and the constancy of its presence in *Encrinus*, as in most other Neocrinoids. The occurrence of *Encrinus*-like forms in the Carboniferous strata of India, America, Russia, and also Spain (according to C. Barrois) is therefore very interesting.

Some species of *Taxocrinus* and *Heterocrinus* have been thought to bear a superficial resemblance to *Pentacrinus*, owing to the freedom of their rays. But both genera have an asymmetrical calyx with a well marked anal side, and also a variable number of radials, peculiarities which, when occurring together, are very characteristic of the Palæocrinoidea.

Wachsmuth and Springer<sup>1</sup> have pointed out that "another very characteristic distinction between ancient and recent Crinoids is to be found in the comparatively large size and massive body plates in the fossil, contrasted with the diminutive body and very long and highly developed arms of recent types; and the same is even more strikingly true as to Blastoids and Cystideans."

But it is a mistake to suppose, as they do, that while the arms are in progress of growth in the Palæocrinoids, those of the Pentacrinidæ are fully developed; for it is among the Comatulæ that the greatest development of the arms is to be found. Very few Pentacrinidæ, except *Extracrinus*, *Pentacrinus asterius*, and three or four species of *Metacrinus* have more than fifty arms, a number which is never reached by *Apiocrinus* and *Bourgueticrinus*. In certain species of *Actinometra*, however, the rays may branch six or eight times, and the number of arms exceed one hundred; while in many species both of *Antedon* and *Actinometra*, the number of joints in a single arm is over two hundred, and in rare cases reaches three hundred. Nearly all of these bear functional pinnules, the last of which are sometimes longer than their predecessors.

<sup>1</sup> Revision, part i. p. 6.