

help of a tegmen, such as occurs in the Actinocrinidæ. The proximal ends of these tunnels would open into the closed peristomial space beneath the pyramid of apical dome plates or orals. In fact, *Carpocrinus* appears to me to be in the condition of a *Hyocrinus*, with an oral pyramid composed of somewhat smaller plates, but permanently closed, like the ambulacra of the disk. While therefore I am in complete-accordance with Wachsmuth respecting the closure of the peristome and calyx-ambulacra in the Cyathocrinidæ, Platycrinidæ, and Actinocrinidæ, I cannot altogether agree with him in denying all homology between the solid vault of a Palæocrinoid and the soft disk of a recent form. For I believe that both in the Cyathocrinidæ and in the Platycrinidæ the plates which form the vault are unusually massive representatives of the ambulacral, anambulacral, and interradial plates which are developed in the perisome of a *Pentacrinus* or *Comatula*.

The Ichthyocrinidæ and some of the doubtful Silurian forms, such as *Reteocrinus* and *Xenocrinus*, appear to me to occupy an intermediate position between the heavily vaulted Platycrinidæ and the more thinly plated recent forms. Some of the Mesozoic species, such as *Extracrinus*, *Apiocrinus*, *Guettardicrinus*, and *Marsupites*, which have comparatively thick plates on the sides and surface of the disk, also help to fill up the gap.

The only genus of Ichthyocrinidæ in which the summit is known at all satisfactorily is *Onychocrinus*. Wachsmuth and Springer describe it as follows: <sup>1</sup>—"Interradials three to twenty, perhaps more in some species; the first one large, resting between the first and second radials; the succeeding ones smaller, rapidly decreasing in size and thickness upward, and having an inward curvature. They are followed by very minute, irregular polygonal plates, which form the interradial portion of the vault. The radial summit areas consist of two rows of somewhat larger plates, alternately arranged, which extend to the ventral covering of the free rays, and probably throughout their full length. In the median portion of the vault there are six rather thin but large apical dome plates." I understand, however, from Mr. Wachsmuth that he is now less inclined to believe in the presence of apical dome plates in the Ichthyocrinidæ; and I will not therefore take their presence as established. If they exist I should call them oral plates, and compare the vault to the disk of a *Hyocrinus* with a closed oral pyramid. But in their absence the vault appears to me so closely to resemble the disk of *Pentacrinus* and *Comatula*, that I cannot question the identity of the two for the merely *a priori* reason of the Ichthyocrinidæ being Palæocrinoids.

The two rows of alternating plates which radiate outwards over the "squamous integument," and extend on to the free rays (*i.e.*, distichal and palmar series), are surely nothing more than the covering plates of the ambulacra, which were perhaps permanently closed as in the Platycrinidæ, or only temporarily so, as in the Neocrinoids; while the small irregular plates which form the interradial portion of the vault, correspond to the

<sup>1</sup> Revision, part i. pp. 53, 54.