

principal vault pieces or interradians, as they were also called by Meek and Worthen.¹ The grooves which converge upon it are not like those of *Coccoerinus* "which have no floor,"² but they are formed at the sutures of the interradians, *i.e.*, the apposed edges of these plates are bevelled away so as to form a groove with the suture in the middle of its floor.

According to Wachsmuth and Springer,³ the central space "in perfect specimens is completely covered by the apical dome plates. The food-groove and ambulacral canal are also arched over solidly by two rows of alternate plates which connect with the movable covering of the arm furrow." The existence of these marginal alternating plates has yet to be proved in *Coccoerinus*, and until this has been done, the resemblance between this type and *Cyathocrinus* does not seem to me to be very "close," for while the arm-grooves of *Cyathocrinus* are continued towards the peristome over the united edges of the interradians, this is by no means the case in *Coccoerinus*; and there is no groove on the ventral disk at all, any more than there is in *Holopus*, or in any young Crinoid before the separation of the orals and radials by the expansion of the equatorial zone. The fact that the principal vault pieces of *Coccoerinus* are not united laterally, as is the case in *Cyathocrinus*, seems to me to be one of very considerable morphological importance. It must of course be remembered, as Wachsmuth has pointed out in other cases, that the absence of a covering to the central space and its radial clefts in the fossil *Coccoerinus* is no proof that it was not present during life as in *Cyathocrinus*. But the two genera are not in the same morphological condition, and all that we *know* about *Coccoerinus* goes to indicate its resemblance to *Holopus* with open slits between the orals and an uncovered mouth. Wachsmuth,⁴ however, states that he has "yet to discover a single palæozoic genus in which a special oral aperture has been identified, or in which the existence of a solid vault has been disproved, or cannot be traced by analogy." I believe, on the contrary, that the special oral aperture is to be found in *Coccoerinus* as in *Holopus*, and that it is pushing analogy too far to assert the existence of an as yet undiscovered vault in this genus.

If then, as I believe, there was an unobstructed mouth in *Coccoerinus* as in *Holopus*, I cannot agree with Zittel's association of this type with *Haplocrinus*, which had a closed oral pyramid.

Wachsmuth and Springer⁵ place *Coccoerinus* near *Platycrinus*. "The two genera are identical in the construction of the calyx, and the summit really forms the only distinction between them." To this point I shall return. *Coccoerinus*, like the recent *Holopus*, seems to me to be permanently in the condition of a Crinoid larva in which the orals have not yet moved away from the radials, though separated from one another.

Haplocrinus and *Symbathocrinus* are permanently in the condition of an unopened

¹ Palæontology of Illinois, vol. v. pl. ix. fig. 13.

² Revision, part i. p. 84.

⁴ Amer. Journ. Sci. and Arts, vol. xiv. p. 190.

³ Revision, part ii. p. 58.

⁵ Revision, part ii. p. 58.