

which they are well marked in the extended parts. In the recent Crinoids the alternate plates are represented by the 'Saumplättchen,' which, however, instead of forming a part of a solid vault, are movable, and line the lateral margins of the tentacle furrows."

Now these "Saumplättchen" or covering plates of recent Crinoids are imbedded in the ventral perisome, and Wachsmuth admits that this is represented in the Actinocrinidæ by the interpalmar areas on the upper surface of his internal casts, and in the calcareous network which lines the interior of the vault. He describes how the ambulacra pass outwards from the peristome within the body, and communicate directly with the arm-grooves.

I believe myself that the tubular skeleton beneath the vault, which has thus far been observed only in the Actinocrinidæ,¹ represents the covering of the disk-ambulacra of the recent Crinoids, passing at the arm-openings directly into the ambulacral skeleton of the arms. The following passage² seems to imply that Wachsmuth is of the same opinion:—"It is now generally conceded that the tubular canals beneath the vault contain the same organs which in modern Crinoids are exposed on the ventral disk, and like them embrace the food passages and certain other vessels connected with the ambulacral system." If then the tubular skeleton beneath the vault correspond to the covering plates of the disk in recent Crinoids, how can these last be represented by the alternating plates in the dome of the Actinocrinidæ, which, as Wachsmuth himself admits, are not readily distinguishable?

Another difficulty also presents itself in connection with Wachsmuth's views respecting these alternating plates of the ambulacra. Those on the calyx he considers as vault pieces; those on the arms as representing the covering plates of recent Crinoids. But in another place he tries to prove that they are rudimentary pinnules, a question which has been already discussed.³

Now it is obvious that the plates covering one end of an ambulacrum cannot be vault pieces, while those at the other end are covering plates or rudimentary pinnules—they cannot be both. It appears to me tolerably certain that the whole series of *regular* alternating plates, calicular and brachial, represent the covering plates on the disk and arms of recent Crinoids; but I will not venture to assert that they were invariably movable on the vault and free rays, so as to expose the food-grooves to the exterior.

The condition of *Gissocrinus* seems to me to confirm this view very strongly, and also to emphasise the difference between *Cyathocrinus* and *Coccocrinus*, to which I have alluded above.

The composition of the calyx in *Gissocrinus* is the same as in *Cyathocrinus*, but the lowest arm-joints instead of resting on the outer edges of the radials, lie upon their ventral surface, and extend downwards towards the peristome over the sutures between

¹ Mr Wachsmuth tells me that he has lately found "tubular canals beneath the vault" both in *Platycrinus* and in some of the *Rhodocrinidæ* (August, 1884).

² Revision, part ii. p. 29.

³ *Ante*, pp. 61-66.