

branches of the water-vessels are therefore either absent altogether as in the Blastoids and in some of the arms in many *Actinometræ*; or they supply delicate papillate tubules, the tentacles, the chief functions of which are probably those of respiration and sensation. Ludwig's researches have demonstrated that the primary water-pore of the *Antedon*-larva is homologous with the commencing madreporite of an Echinozoon. But in no Starfish or Urchin is the communication between the water-vascular system and the exterior effected through the intervention of the body-cavity as it is in the adult forms of recent Crinoids, whatever be the condition of the larva. There is good reason to believe that the hydrospires of the Blastoids and Cystids were neither connected with the water-vascular ring nor with the body-cavity, so that the absence of a continuous madreporic canal may be regarded as eminently characteristic of the Pelmatozoa, though it occurs in some Holothurians and possibly also in certain Ophiurids.

The limitation of the functions of the water-vascular system in the Pelmatozoa, although a natural consequence of the presence of the stem, is in no way connected with this organ morphologically. With the blood-vascular and nervous systems, however, the case is different.

There can be little doubt that the remarkable neuro-vascular axis which occupies the central canal of the stem of a Neocrinoid, occupied a similar position in the Palæocrinoids. Even in the case of sessile forms like *Edriocrinus* there must have been a chambered organ, from the fibrillar envelope of which were derived the axial cords of the rays and arms, just as in the recent *Holopus*. The Blastoids all have basal and radial plates, and, with the exception of the Astrocrinidæ, a perforated stem, so that one can hardly be going too far in assuming that its central canal lodged a neuro-vascular axis, as in recent Crinoids. The same is probably true of the pedunculate Cystids; though I much doubt whether the Agelacrinidæ had a chambered organ. This peculiar structure, which is so important a part both of the blood-vascular and of the nervous systems, is essentially anti-ambulacral, being developed in the right larval antimer. With its connections it is as important a part of the organisation of a Pelmatozoon as the cerebro-spinal axis is in a vertebrate animal; and there is in many respects a striking analogy between the two.

Although in such intimate relation with the basal and radial plates, the chambered organ cannot be correlated with their presence; for true homologues of these plates occur in the Echinozoa, in none of which have any traces of an aboral neuro-vascular centre yet been discovered.

There are two characters, however, by which some or all of the Pelmatozoa are especially distinguished, viz., (1) the presence of a stem, and (2) the development of arms upon the primary radials, with muscular articulations between their component joints. The majority of the Pelmatozoa have both stem and arms, but the Astrocrinidæ seem to have had neither, though possibly stalked when young; while the remaining Blastoids