

long as the circulatory system is relaxed, the ambulacral tubes are very much contracted, and their diameter is much less than under other circumstances, and by no means equals the width of the vertical rows of locomotive flappers; but when turgescient and full, they swell beyond their width. The force which acts in propelling the liquid through the system is not the same throughout. The alternate contractions of the two sides result from the regularly alternating muscular contractions of the two sides of the body; but the main cavity in its central part is entirely lined with vibratory cilia, so that even when the body is perfectly at rest, the fluid is maintained in a constant rotatory motion through their agency. I have repeatedly and distinctly seen these cilia playing round the abactinal opening of the digestive cavity, and upon the walls of the central chymiferous cavity, as well as upon the walls of its main horizontal stems, upon the walls of the coeliac tubes, and upon the walls of the two forks of the funnel. I have been unable, however, to discover similar cilia within the secondary horizontal tubes and the vertical ambulacral tubes; though recently I have noticed them in the vertical tubes of the tentacular apparatus, where I had failed to discover them before. However, the contractions of the spherosome are so powerful that the vibratory cilia can do but little, of themselves, to keep the fluid in motion in some of these tubes. I should also add, that even the walls of the central chymiferous cavity, where they are most distinctly lined with vibratory cilia, are nevertheless distinctly contractile; and that the capacity of the cavity is not only increased and reduced in a passive manner by the accumulation of fluid or its expulsion, but also actively by the contraction and dilatation of the walls themselves. How the contents of this circular system are diffused into the substance of the body for nourishment is not very plain, as there are no capillaries, but everywhere broad tubes. From the cellular structure of the whole mass, however, we may infer that assimilation takes place by a process of endosmosis and exosmosis. If this view is correct, we should consider the two coeliac tubes upon the middle of the main walls of the digestive cavity as the nourishing vessels of the stomach; the two horizontal trunks as two respiratory vessels, branching into eight branchial vessels, which are the main trunks of the eight ambulacral vessels; and the vertical funnel as a vascular cloaca, discharging its contents through two distinct apertures, the coeliac apertures, on the sides of the circumscribed area near the abactinal centre.

The vertical tubes of the tentacular apparatus seem to have a peculiar function, and to be directly connected with the movements of the tentacles, and these movements again to be connected with the alternate contraction of the two halves of the body, as there are no parts which undergo so extensive changes in their size, and in their state of contraction and dilatation, as these sacs. But their structure is so complicated as to require a minute description. The two tentacles with their