

Its general course was parallel to the slightly spiral lines of irregular spots on the surface of the tube, ascending on the one side, and descending on the other; each of the opposite currents occupying one-half of the circumference of the cylindric cavity. At the knots, or contracted parts of the tube, slight eddies were noticed in the currents; and at each end of the tube the particles were seen to turn round, and pass over to the other side. In various species of *Sertulariæ* the stream does not flow in the same constant direction; but, after a time, its velocity is retarded, and it then either stops, or exhibits irregular eddies, previous to its return in an opposite course; and so on alternately, like the ebb and flow of the tide. If the currents be designedly obstructed in any part of the stem, those in the branches go on without interruption, and independently of the rest. The most remarkable circumstance attending these streams of fluid is that they appear to traverse the cavity of the stomach itself, flowing from the axis of the stem into that organ, and returning into the stem without any visible cause determining these movements. Similar phenomena were observed by Mr. Lister in *Campanulariæ* and *Plumulariæ*.

In some of the minuter species of Crustacea the fluids have been seen, by the aid of the microscope, moving within the cavities of the body, as if by a spontaneous impulse, without the aid of a propelling organ, and apparently without being confined in membranous channels, or tubes of any sort. This kind of diffused circulation is also seen in the embryos of various animals, at the earliest periods of their development, and before any vessels are formed.

### § 2. *Vascular Circulation.*

THE next step in the gradation of structures consists in the presence of vessels, within which the fluids are confined, and by which their course and their velocity are regulated;