as to form vertical series. But the cilia or fringes are far larger than any vibratile cilia ever described, and their motion shows distinctly that they are under the voluntary control of the animal; for their movements are neither incessant nor constantly equal. They are at times accelerated or retarded, or entirely stopped, and resumed at shorter or longer intervals; so that the evidence of their voluntary movement is as full as can be, and, indeed, the structure which determines the movements is the same as in all cases of voluntary motion.

Fully to understand the character of the vertical rows of locomotive flappers, it should be borne in mind that they are connected for their whole length with vascular tubes following the same course, and which arise from the central chymiferous cavity. This intimate connection leads naturally to the supposition, that, besides their functions as locomotive organs, the vertical rows of flappers are in some way connected with respiratory functions, and that there is between these two systems the same natural physiological connection which exists in Echinoderms between the inner branchiæ and the ambulacral tubes, or in Worms between the respiratory vesicles and the locomotive bristles.

The circulation of fluids, and the respiratory movements connected with this circulation, are, almost throughout the animal kingdom, in direct relation to locomotion, even in the higher animals. Among Polypi, the dilatations and contractions of the body renew constantly the water which fills their cavity, and provide them with a fresh supply of aerated water. The same is the case among Medusæ. For, even where there is no distinct, individualized system of respiratory organs, it is obvious that a constant renewal of the surrounding medium, by means of which oxygenation takes place, is an essential condition for the maintenance of life; and where there are no special organs adapted to this purpose, the main movements of the body supply the deficiency. The water-pores in Echinoderms, through which their main cavity is constantly filled with fresh sea-water, undoubtedly perform a similar office. Again, among Mollusca, respiration and locomotion are still more intimately connected; but in a manner which differs decidedly from what we observe in higher animals. For here, by the dilatation and contraction of the respiratory cavities, and the circulation of the blood through the respiratory organs, the body is amply supplied. But, unless Acephala open their valves, unless they expand and contract alternately the whole body, the supply of fresh aerated water must be much less; and I doubt whether oysters and clams could be kept alive if their valves were shut constantly by pressure, and muscular motion, the contraction and expansion of the large bundles which preside chiefly over locomotion, were prevented from coming into play in aid of the vibratory cilia of the mantle and gills. The manner in which the respiratory cavity is shut in so many Gasteropods, unless the fleshy parts are fully expanded, shows plainly that here again there