them some vermiform families which have resisted the planetary influence, excepting only in certain parts around the mouth. Their next most general character is derived from the tentacular tubes which the animals push out from pores drilled in rows between the vertical segments of the thick integument of the body, and withdraw again in part at pleasure : but the character becomes abnormal in some Holothuridæ, which have these suckers pullulating irregu­larly from the surface; and it fails us altogether in Sipunculus and its allies. The organs in question much resemble the tentacula of the snail, but they are really very dissimilar both in the use and mechanism of their movements : they may be compared to the glass of a thermometer, for they are closed tubes, with a vesicular bulb placed within the body, and they are protruded by forcing the fluid, with which the bulb is filled, up the cylindrical portion. It is not through them, as Lamarck imagined, that the circum­fluent water gains access within the body, although it is very true that almost all the Echinodermata contain a large but variable quantity of it, partly flowing through a special apparatus, and partly effused, if we may so speak, into the visceral cavity, bathing the surface of every viscus which may be said to float in it; and since the quantity of this water can be increased or lessened at pleasure, so we find that the contour of all the flexible species is liable to alter­ation of figure, according to circumstances. When

Batt'ning in ease, and slumb,ring life away, the skin is rotund and swollen, and the organs are distended and displayed ; but if alarmed or removed from their sites, the fluid escapes from them, and collapsion and retraction follows. Other purposes which this water must serve, are its aid in rendering the crude nutritive fluids of digestion fit for assimilation, and its purifying influence over the blood ; for we learn from Delle Chiaje, that in all the Echinodermata there is a blood of a yellowish or orange colour, composed of a large proportion of lymph, and a certain number of globules endowed with a self-rotatory motion.@@1 In what course this blood circulates, has not been determined. Tiedemann, who may be regarded as our best authority on such a point, says that it “ moves in a circle, but which is confined to the alimentary sac and ovaria alone. In the Asterias, numerous thin-coated veins, coming from the stomach, the coecal appendages, and ovaries, unite into a single trunk. This produces a dilatation analogous to a heart, and then ramifies like an artery. In sea-hedgehogs are found, on both sides of the circumvolutions of the intes­tinal canal, two vascular trunks, the external of which seems to be a vein, and the internal an artery. These two trunks communicate by a dilatation similar to a heart, or by their minutest ramifications. The intestinal canal of Holothuria likewise exhibits an arterial and venous trunk, connected with each other by their smallest ramifications, as well as by a large vascular net-work spread over one branch of the respiratory organ.”@@2 Delle Chiaje’s description of the same system differs considerably ;@@3 and it is difficult to define the limits between it and the system of vessels for conveying currents of water through the body. Blainville, of distin­guished excellence as a comparative anatomist, felt this dif­ficulty. He has concluded that there is no real circulation, and that the sanguineous system of the Asterias, and per­haps even of the Echinides, is nothing else than a system of ramose aqueducts, like the tracheæ of insects ; and in­deed it appears certain that these vessels communicate with the exterior by orifices more or less conspicuous. But, he

adds, it is difficult to say as much of the vessels which we find in the Holothuridæ, for no anatomist has suspected their direct communication either with the arbuscular ten­tacula, or with the real aquiferous vessels, or with the desi- droidal branchiæ ; so that in these animals there may be an oscillatory movement of the blood in its special system, but certainly no circulation of it, returning and going to and from a font of pulsion.@@4

The aquiferous system alluded to must not be confounded with the aquiferous cutaneous tubes that jut out from be­tween the tubercles on the dorsal surface of the star-fishes, but is an internal ramose set of vessels for leading water from the general cavity of the viscera, more especially into the locomotive organs of the animal, and its buccal tenta­cula. “ It is composed of vessels,” says Tiedemann, “ which commence from a canal placed around the mouth, and spread in rays over the internal surface of the skin, as in Holothuria, or proceed to the chalky covering, as in sea­hedgehogs and asterias. These vessels open in the hollow tentacula,@@5 and their vesicular dilatations. They contain a limpid fluid, which is shed over the tentacula during the animal’s motions, and causes their increase or shrinking. When the animal draws in his tentacula, the contraction of their muscular coats forces the liquid again into the ves­sels. The fluid contained in this vascular system is not therefore agitated by a circular movement, but only flows outwards from within, and *vice versa.* This liquid, which is probably derived from the blood, seems at the same time to serve for the nutrition of the skin, of the chalky cover­ing, and the locomotive organs.”@@6

With this system, that of respiration is most intimately associated ; nor indeed are there any separated branchiæ, either in the star-fish or sea-eggs, whose fluids are aerated by a flow of pure water over their surfaces, and around and within their viscera, driven over them in currents deter­mined by the regulated action of vibratile cilia, which clothe them almost everywhere, as the researches of Dr Sharpey have more especially proved.@@7 In the Holothuridæ, anato­mists have generally considered as pulmonic certain organs which lie between the long curves of the intestine, and closely connected with it. They are very much branched in *a* dendroidal fashion in some species, their branches re­uniting successively backwards, until they form at last two trunks, or one only, that opens with the intestine into the cloacum ; but it seems to shew how readily their presumed function can be transferred to the general cavities, when we find other species of the family in which these organs are slightly sketched, and some in which their existence is not to be demonstrated.

With Lamarck, we shall further pursue the history of this class under its three sections or orders, which are named and defined as follows.

I. Fistulides. Body elongate, cylindraceous; the skin leathery, soft, and irritable ; intestine with an oral and anal orifice, the former encircled with retractile tentacula.

II. Echinides. Body more or less rotund or angular, covered with a shell of immoveable testaceous pieces without projecting arms ; anus distinct from the mouth.

III. Stellerides. Body depressed, circular or angulated, and divided into arms or rays; the skin creto-coria- ceous, tubercular ; intestine in some families only, with an orifice distinct from the mouth.

@@@1 Blainville’s *Man. d'Actinologie,* p. 65.

*@@@2 Treat, on Comp. Physiology,* trans, i. p. 160.

@@@’ The differences are fully pointed out by Dr Sharpey in his excellent article “ Echinodermata,” in the *Cyclop, of Anat. and Physiology,* it p. 41.

*@@@4 Man. d'Actinologie,* p. 86.

@@@4 The feet or suckers are here meant.

*@@@0 Comp. Physiology,* trans, vol. i. p. 161. Dr Sharpey doubts their being nutritious vessels, as is here asserted, for their liquid is not san- gu neous, or even a secretion, “ but agrees almost entirely in composition with sea-water.” *Cyclop, of Anat. and Phys.* ii. p. 41.

*@@@, Cyclop, of Anat. and Phys.* art. "Cilia,” i. p. 615.