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On the histological structure of the digestive tube of *Holothuira tubulosa*

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larvæ which become quickly transformed, larvæ of delayed fixation, in which the dissepiments become sketched out even while the vermiform stage persists. The most curious character of these larvæ consists in the structure of their integuments. No sclerites are as yet formed, but the ectoderm has become differentiated after the fashion of the *Clavulariæ*. The cells have pushed forth muscular processes. At the base of the pseudomesoderm a fibrous layer corresponds to an annular muscular band. Very numerous primitive mesenteric folds have been formed; and the whole endoderm is associated with a layer of longitudinal muscular fibres. The transverse section of these larvæ is almost identical with that of an Actinia.—*Comptes Rendus*, September 25, 1882, p. 562.

On the Histological Structure of the Digestive Tube of Holothuria tubulosa. By M. E. JOURDAN.

Throughout its length the intestinal tube consists essentially of three distinct fundamental layers—an external or peritoneal cellular covering, a fibro-muscular coat, and an inner epithelial layer.

Outer or Peritoneal Epithelial Layer.—The cells forming this are of two kinds. There are simple endothelial cells arranged in a single layer; in their frequently cylindrical form and the presence of vibratile cilia they differ widely from the endothelial elements of the Vertebrata. Their aspect also varies with the region examined and state of contraction or extension of the intestine. The other elements, which are much scarcer, are of the type described by Semper as *mucous cells*.

Muscular Layer.—This is represented by circular and by longitudinal fibres. The former constitute a continuous and regular muscular layer; the latter are much more numerous in the anterior region of the intestine. In the œsophageal region they are internal to the circular fibres; at the commencement of the middle intestine and throughout the rest of the tube they are placed immediately above the peritoneal layer of cells; that is to say, they are external to the circular fibres.

Conjunctive Layer.—In this there is an external zone, in which the fibres are intercrossed in all directions and form a close lamina, and an internal zone, in which they are much looser. In this part of the fibrous coat there are many vacuities; and in it the vessels circulate; it displays numerous nuclei, and some yellow granular bodies, like those of the liquid of the general cavity.

Inner Epithelial Layer.—This layer presents remarkable differences in the different regions. It is composed of epithelial cells and of glandular elements belonging to two distinct types.

The epithelial cells in the anterior and middle regions are excessively long, like slender fibrils, and terminate at their free extremities in a thick plate. At the beginning of the terminal intestine they become true cylindrical cells.

Of the glandular cells, some have finely granular contents, the others a protoplasm like that of the mucous cells so common in the

Holothuriæ. The cells with granular contents are always ovoid or spherical; they exist in the anterior intestine and in the anterior part of the middle intestine, and then entirely disappear. The cells with contents resembling those of the mucous cells of the peritoneal cavity are much more general; but they vary in form, distribution, and number in the different regions of the digestive tube. Thus they are ovoid and large at the commencement of the middle intestine, but soon become club-shaped and so numerous in the greater part of that region, that the epithelial cells seem to have entirely disappeared. In the terminal part of the middle intestine and in the posterior intestine they form spherical cells, and then resemble the mucus-cells of Vertebrata.—*Comptes Rendus*, September 25, 1882, p. 565.

On Animal Polymorphism. By E. B. WILSON.

This paper gave a brief discussion of the nature of polymorphism in animal colonies, with especial reference to the so-called polymorphism of the Pennatulacea. In studying the development of the colony in *Renilla* it was found that the peculiar and characteristic mode of budding shown by the sexual polyps is characteristic also of the rudimentary polyps or "zooids." There is a manifest relation between this mode of budding in the sexual polyps and the environment of the organism; and in view of the structure of other Pennatulacea, we seem to be justified in the conclusion, in accordance with the prevailing views of symmetry, that the mode of budding in the sexual polyps is directly dependent on the relation of the organism to its environment. If this conclusion is well founded, then it follows with considerable probability that the rudimentary zooids cannot have acquired their present mode of budding in their present position; for they agree with the sexual polyps in the law of budding, but differ widely from them in their relation to the environment. And, furthermore, it is impossible to conceive how the zooids can ever have occupied such a position as to agree with the sexual polyps in this relation.

From these considerations it seems probable that the zooids are not degenerated polyps, but are new formations which have inherited certain peculiarities from the sexual polyps. It is immaterial whether we call them organs which simulate individuals or individuals in a state of arrested development; in either case the various members of the colony are not of morphological equivalence; that is, they are not the *direct* descendants of like individuals. This suggests that in such organisms as the Siphonophora a similar condition may exist, some of the members being the direct descendants phylogenetically of fully developed buds, while others have arisen *de novo*, and are to be regarded morphologically as organs or as imperfectly developed buds. This view would harmonize the conflicting theories of Leuckart, Hæckel, Gegenbaur, and others on the one side, and of Huxley and Metschnikoff on the other.—*Johns Hopkins University Circulars*, May 1882, p. 203.