4. *On Variability in Development.* *By* Professor A. Milnes Marshall, *F.R.S.*, *and* E. J. Bles.

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5. *On Secreting Cells.*[1] *By* Professor G. Gilson.

During some years past the author has been engaged in studying the structure and mode of action of secreting cells. For, with respect to the question of secretion, it seems to him that, though an immense number of works have been published on the subject, there remains still much that is unknown.

A complete and adequate summary of these still unfinished researches is not given, the author confining himself to a very short account of the principal results obtained by describing in a few words several of the most interesting objects which he has met with in different groups of beings.

(1) *The silk-producing cells of the Lepidoptera.*—The author made a short communication on the secretion of these cells last year, at the Newcastle meeting. On that occasion he pointed out that these cells are perfectly closed elements, their inner surface being covered with a thin but very strong and finely striated membrane.

The silk substance, produced within the protoplasm, passes from it into the cavity of the organ, not by forcing its way violently through this membrane, but by filtering through it slowly and regularly.

(2) *The epithelial cells with a striated plate.*—These cells are well known to biological students; but many are not aware of the degree of development to which this striated plate may attain in several inferior animals, especially in the arthropods.

There exist two kinds of striated plates, which shall be distinguished as the *open* and the *closed*.

The former is composed of tiny rods only, very regularly disposed on the inner surface of the cell, and entirely separated from each other. The cells bearing this plate resemble so closely ciliated cells that one is apt to mistake one for the other; but in the striated plate the tiny rods never move, and so in spite of their likeness and morphological homology they are not real cilia.

These motionless rods are ordinarily glued together by a sticky matter, which conceals them more or less from sight. But often, as happens particularly during digestion, they are entirely free from this matter, and then they appear exactly like cilia. It is thus scarcely necessary to say that there is no question of tubes piercing the plate, and that therefore Professor Leydig's denomination, 'Porenkanälen,' is by no means to be retained with respect to the striæ.

Very striking instances of this kind of plate are found in the intestine and Malpighian tubes of insects, myriapods, and crustaceans. In vertebrates this plate is well known in the digestive organs. It exists also in the kidney, for the so-called 'Heidenhain's rods' are nothing else than the rods of an open striated plate covering certain cells of the urinary tubes.

In the closed plate, on the contrary, the rods or cilia are united to each other by transverse fibres, and its external surface seems to be closed with an extremely thin and apparently structureless membrane. Its structure does not differ from that of many other cellular membranes.

Certain parts of the intestine of insects and crustaceans are covered with these *closed* plates; but in certain species, for instance in the Oniscus, the digestive tube does not contain a single open plate.

(3) *The silk-producing cells of Tenthredo.*—The silk-producing gland of this species differs notably from that of the silkworm. It consists of an epithelial tube with many large appendicular cells. These are the producing elements. They are packed with silk spherules that fuse together into a more considerable mass, which glides directly into the tube through a yawning aperture. In this case the secreted substance does not filter through a membrane.

[1] This work when published *in extenso* will contain a summary and a criticism of the literature of the subject.

(4) *The bursting cells.*—Many well-known epithelial cells are not essentially different from the silk-producing cells of Tenthredo. For example, the so-called 'caliciform cells' and other elements of the same kind.

These cells are ordinarily furnished either with real vibrating cilia, or with a striated plate.

They work in the same way as the cells with a striated plate during the first part of their life; but the secreted product soon accumulates within their protoplasm in the form of one or more small masses. These increase gradually in size, and finally cause the cell membrane to burst. Their substance begins then to glide more or less rapidly into the cavity of the organ.

The author has observed in certain cases, but not very often, for instance in the *Triton cristatus*, that this gliding mass was divided from the protoplasm, not by a thin and apparently structureless membrane, but by a striated zone entirely similar to the plate, of which it was the continuation. In this case he is inclined to think that the wall of the small cavity, as well as the striated plate itself, continues to allow the permeation of the secreted fluid.

The intestinal villosities of certain coleoptera, for instance, the *Cephalotes*, contain in their middle part a series of transparent cells entirely different from the other epithelial cells. The nearer they lie to the digestive cavity, the larger they are. The last and largest one is often found in a state of destruction, which indicates that it has burst and given forth its contents.

Another kind of cell which does not exactly burst is found in the intestine of many insects and myriapods. In these elements the secretion accumulates at the extremity of the cell until it forms there a considerable protuberance. These protuberances become pediculated, and finally they fall off into the tube. Of course, they themselves are destroyed later, bursting and setting free their contents.

These facts and many others which have not been mentioned induce the author to adopt the following view on secretion:—

All the cases of cellular secretion are reduced to two general processes: the *regular filtration* and the *direct pouring* out.

In the first process the substance permeates more or less rapidly through a filtering membrane. A thin and apparently structureless membrane is found ordinarily when the secretion is active and perfectly liquid, as, for instance, the secretion of the bile. A striated plate is often connected with the slower production of a more or less viscous substance. A viscous substance may certainly filter through the striated plate, and this plate, perhaps, plays then the part of an accumulating apparatus, out of which the substance may be cast quickly when a large supply is wanted.

In the second process the substance does not pass through a filtering membrane, but is cast out directly. The excess of production over elimination causes the substance at first to accumulate in a perceptible manner within the protoplasm, and produces subsequently the opening or bursting of the cell. The first process seems to be the primitive one, the most regular, and, in a certain sense, might be called the most physiological process of cellular secretion.

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6. *On the Regeneration of Lost Parts in Polyzoa.*

By SIDNEY F. HARMER, *M.A., B.Sc.*

It has long been known that, in the great majority of *Polyzoa*, a remarkable process takes place, by which, in each individual unit of the colony, the polypide degenerates from time to time, and becomes a 'brown body.' A new polypide is then formed as an internal bud from some part of the old zoœcium, and soon becomes the functional digestive system of the latter.

In *Crisia*, one of the *Cyclostomata*, not only are the polypides periodically renewed, but the zoœcia themselves, or even whole branches of the colony, may be regenerated. This regeneration of parts other than the polypides is a subject which has hitherto attracted comparatively little attention.

In the early spring, submerged stones from suitable localities may be found to be covered by the discoloured stumps of colonies of *Crisia* which grew in the