

HISTOLOGY.

The tissues of the sponges are now generally regarded as derived from two simple epithelial layers, which I first compared with the two primitive germ layers of the other Metazoa, exoderm (or ectoderm) and entoderm (or endoderm), in my Monograph of the *Calcispongiæ* (1872). From this comparison, and from the deduced homology of the Gastrula form in all Metazoa, arose my *Gastræa* theory. At that time I was of the opinion that in all sponges these two primitive cell-layers were metamorphosed in a similar manner, the inner (entoderm) lining as a simple permanent epithelium the cavities of the gastral canal-system, and producing the sexual cells, whilst the blending cells of the outer layer (exoderm) melt together and form a syncytium, or a contractile protoplasmic ground-mass (sarcodine), in which the scattered nuclei of the cells are propagating; in this syncytium, too, the skeleton is formed.

Three years later (in 1875) this conception was corrected by the accurate observations of Franz Eilhard Schulze, the excellent spongiologist, who has advanced in so many important directions the knowledge of this class of Cœlenterata. Employing new methods of histological examination, he discovered on the surface of many sponges a delicate external pavement-epithelium not before observed, and deduced from this observation the following important conclusions:—

The body of the sponges is originally composed not of two, but of three primitive cell-layers, corresponding to those which in the higher organised Metazoa are called exoderm, mesoderm, and entoderm. The exoderm (or outer layer covering the external faces) and the entoderm (or inner layer lining the canal-system internally) are two simple epithelial plates, and between them is enclosed the mesoderm (or the middle layer); this latter is a kind of connective tissue, and produces not only the skeleton, but also the sexual cells (eggs and sperm).

The conception of the sponge-tissues given by F. E. Schulze is now generally accepted, and it is very probable that it has general value, though it was not possible to demonstrate clearly in all sponges the delicate exodermal epithelium. The histological examination of our Deep-sea Keratosa has given no remarkable and positive results in this respect, owing to their insufficient state of preservation. I will not, therefore, further discuss their finer histological structure, but only add a few remarks on the three above-mentioned layers.

Exoderm (Surface-Epithelium).—The delicate simple epithelium, composed of thin pavement-cells, which F. E. Schulze discovered on the surface of many sponges, is now usually regarded as an independent cell-layer, and often compared with the epidermis of the higher Metazoa. This conception may be combated even when we assume its general presence in all sponges (which is not proved). In my opinion this outer exodermal epithelium does not possess the same primary importance and independence as