

On the Structure of the Ocelli of Lithobius.

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The study of the ocelli of *Lithobius forficatus* has been the object of researches by Graber and Grenacher; but the descriptions given by these two authors differ in all their details, so much so that they seem, as Grenacher himself remarks, to have examined different animals.

Graber* states in effect that the visual organs of the Myriapods have an organization so similar to that of the eyes of Arachnids that he deems it useless to give a special description of them. Now, according to this author, the ocellum of an Arachnid comprises two layers of cellular elements, separated by a delicate lamellar membrane:—a *complete* layer of cells clothing the internal face of the corneal lens and representing a vitreous body, and, in the second place, a retina formed of elements *directed parallel to the axis of the eye*. Each of these retinal elements must be considered as constituted by a basal ganglion-cell, the terminal prolongation of which, or rod, is *capped by a uni- or sometimes binuclear cell*.

According to Grenacher† there is found beneath the cornea a circlet of large pigmented prismatic cells, forming around the axis of the eye a hollow cylinder, the cavity of which is occupied by *transversely directed* cilia converging from the internal margin of the cells (*Haarzellen*) towards the axis of the visual organ. The posterior part of the ocellum is occupied by a hemispherical group of *unicellular* pigmented retinal elements, each one of which is terminated on the inner side by a rod, the structure of which is extraordinarily difficult to elucidate. Lastly, behind the lens we may observe a *limited* number of little cellular nuclei.

A third observer, Sograff‡, gives a vague and very summary description of *Lithobius*, which does not accord with either of the foregoing.

In spite of the numerous difficulties which this study presents, I have succeeded in obtaining satisfactory sections of this organ, and have found that their structure corresponds, at any rate broadly, with the description given by Grenacher.

Each of the ocelli has the form of an elongated cylinder, bounded externally by the cornea, and surrounded by a connective membrane which is traversed by the optic nerve; in the furrows which separate the corneal facets from one another this membrane is thickened and encloses a number of little pigment-cells.

* "Ueber das unicorneale Tracheaten- und speciell das Arachnoiden- und Myriopoden-Auge," Archiv für mikroskopische Anatomie, 17^{ter} Band, 1880.

† "Ueber die Augen einiger Myriopoden," *ibid.* 18^{ter} Band, 1880.

‡ "Anatomie de *Lithobius forficatus*," Moscow, 1880, p. 26 (in Russian).

The cavity of the ocellus is occupied by cells belonging to two different types, besides a few little cellular elements applied against the cornea, even in the centre of its inner face.

The first, the *Haarzellen* of Grenacher, which are elongated and of relatively little thickness and pigmented, form, by attaching themselves by their large faces, a hollow cylinder, which separates the cornea from the true retina. They terminate on the inner side in delicate cilia, which, in my sections, do not appear with the regularity which Grenacher's figures ascribe to them, but are found adhering together in irregular pencils. May these ciliated elements be "giant" recipient cells similar to those which Patten has described in the larva of *Acilius*, and of which the altered rods would no longer be represented, in the preparations of Grenacher and myself, except by fibrillæ running at right angles to the direction of the retinidium? I cannot admit this explanation, for the way in which these ciliated cells and the true retinal cells respectively behave towards fixing reagents forces me to conclude that these two kinds of elements have not the same morphological significance.

The bottom of the optic cup is occupied by some twenty retinal cells, which Grenacher says he has been unable to observe in their entirety except in exceptional cases. Each of these cells presents a basal portion enclosing the nucleus, some pigment-granules, and, in connexion with a nerve-fibre and a terminal segment, Grenacher's rod, which is clearly transversely striated. In certain favourable sections I have determined the presence, between the striated segments of the adjoining cells, of elongated elements, presenting the same appearance as the lateral rods of the retinal cells of the larvæ of *Acilius*. Sometimes, in transverse sections, I have observed in the centre of the meshes of the plexus formed by the section of the external segments, a corpuscle of special refractile power, which I could only regard as the section of the axial nerve-fibre of each cell. Do the transverse striations of the terminal segment correspond to the fibrillæ of a retinidium, similar to that which Patten describes generally in the terminal segments of the retinophores? This is a problem which the extreme minuteness of the elements observed does not permit me to solve.

The pigment-granules of the ciliated and rod-cells occupy a more or less extended zone, according as the ocelli have been fixed in sunlight or in shade.

I would observe in conclusion that the appearance of certain of my preparations resembling Graber's figure explains to me the error of interpretation perpetrated by this observer, due to a rapid examination, with a preconceived idea, of sections which were not sufficiently thin.—*Comptes Rendus*, tome cxiii. no. 1 (6 juillet, 1891), pp. 43-45.



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