nuclei which are much flattened. The retina is composed of nerve fibres and a single cell layer embracing two kinds of cells: viz. (*a*) pigment cells and (*b*) sensory cells. In sections along the chief axis of the eye the retina presents three concentric zones; the innermost, of a pale yellowish color, is composed of the so-called cones; the middle is the pigment zone and exhibits higher radial bands alternating with broader masses of more opaque appearance; the outer zone, which is destitute of pigment contains, nuclei of two kinds: large, pale, circular ones, and smaller, elongated, deeply staining ones. The branches of the optic nerve constitute the outermost portion of this clear zone next to the sclerotic.

These three zones are really made up of a single layer of cells, the retinal cells, of which there are two kinds: the unpigmented, or sensory, and the pigmented. The pigment cells are club-shaped and contain granules of dark brown pigment. Their central ends all terminate at nearly the same level and rather abruptly. Their basal ends run out into long fibres which are often branched. The lighter radial bands of the middle zone are produced by the sensory cells. These extend nearer to the center of the eye than the pigment cells, each ending in a club-shaped portion that is rounded at its free extremity. This club-shaped prolongation is surrounded by a thick mantle of substance having a radially fibrous structure. These prolongations with their mantles constitute the 'cones.' The unpigmented, or sensory, cell itself shows throughout its whole course a longitudinally fibrous structure, contains no pigment and terminates at its deep end in a large number of fibrous branches.

The sensory and pigment cells are definitely grouped into sets. Each set, or ommatidium, comprises a single central sensory cell and a small number (5–7) of pigment cells surrounding it.

In front of the pigment cells of the antero-ventral margin of the chief eye its sclerotic capsule is somewhat enlarged so as to include a hitherto undescribed structure, which reproduces on a smaller scale almost exactly the conditions found in the chief eye. In one respect only does it differ from the chief eye; the cells corresponding to the pigment cells of the retina *contain no pigment granules*. In other respects it presents the same histological conditions and a similar arrangement of the histological elements. The innervation of this accessory retina is effected by nerve fibres from the optic nerve, which accompany those distributed to the antero-ventral portion of the chief eye. The cells composing the accessory eye are separated from the pigment cells of the adjacent parts of the chief eye by elongated cells with small oval nuclei. At the angle formed by the juxtaposition of the two retinas are seen several very large nuclei. Some of these are probably the nuclei of sensory cells, but there are others which are much larger than the nuclei of the sensory cells and do not seem to be connected with cells terminating in fibrous cones; they have a striking resemblance to the large ganglionic cells of the central nervous system. These are the largest nuclei found within the eye capsule.

The Optic Lobes of the Bee's Brain. F. C. KENYON.

In the optic lobes of the bee's brain there are, as in other hexapods, three masses of fibrillar substance surrounded more or less completely by masses of cells. The middle and inner masses or bodies may in section be recognized as composed of a pair of lenticular, densely and finely fibrillar bodies or capsules, fitted one within the other and with their convex surfaces directed outward, their concave surfaces inward. The capsules in each body are separated from one

another by a loose mass of fibres running parallel to the surfaces of the capsules.

In the middle body this middle layer of fibres is gathered into a bundle at the anterior margin of the body and passes out towards the central portion of the brain. Almost immediately the bundle divides. One division goes to the calices of the mushroom bodies, forming thus the antero-superior optic tract; the other to the lower posterior portion of the brain, forming the antero-posterior optic tract.

From the middle loose layer of fibres of the inner body several bundles arise, all penetrating the hinder portion of the brain. One bundle forms an upper, another a lower commissure between the two optic lobes.

The fibrillar elements from the retina terminate in five branches and thus help to form the outer mass of fibrillar substance. From cell bodies between the basement membrane of the retina and this mass fibres pass inward, give off short, fine fibrils connecting with the terminating fibrils just noted, and then go further inward, forming, with their fellows, the outer chiasma and terminate in a bunch of fibrils in the outer capsule of the middle body. These form neural elements 1. From cell bodies between the outer chiasma and the middle body fibres penetrate the outer capsule of the latter, giving off a bunch of lateral fibrils connecting with the terminals of elements No. 1. The main fibre then crosses the body to the inner capsule, gives off in it a group of short fibrils, then leaves the body, and after forming, with their fellows, the inner chiasma, finally terminate in the outer capsule of the inner body of the lobe.

From cell bodies between the margins of the two bodies neural elements No. 3 arise, that bear the same relations to the inner body and its capsules as do elements No. 2 to the middle body. Passing out of the concave surface of the inner body some of the elements are gathered into a bundle that passes forward, forming the anterior optic tract and terminate in the optic body, a small oval mass of fibrillar substance above the antennal lobe. Others go upward as a bundle of fibres to the calices of the mushroom bodies, forming thus the postero-superior optic tract.

The branching terminals of the fibres forming the antero-superior optic tract seem to connect with the lateral fibrils of element No. 2 in the inner capsule of the middle body, and the terminals of the fibres forming the posterior optic tracts connect similarly with the inner lateral fibrils of elements No. 3.

A stimulus to a retinal element may reach the central portion of the brain by passing over three or four neural elements and may reach either the mushroom bodies, the optic body or several portions of the posterior part of the brain, or passing over more elements it may reach all these regions, and even be transferred over the two optic commissures to the opposite lobe, and thus indirectly reach the mushroom bodies, the optic body or the posterior portion of the brain on the other side.

The earliest differentiation in the central nervous system of Vertebrates. A. Schaper.

The speaker presented briefly some of the results of his recent investigations on the histogenesis of the central nervous system which are to be published in extenso in the 'Archiv für Entwicklungsmechanik.' The essential points of this paper were the following:

1. The so-called '*Keimzellen*' of *His*, lying near the central cavity of the neural tube, along the membrana limitans interna, are not at all to be considered as a special type of cells in contrast to the main epithelial part of the medullary wall. They are nothing else than *epithelial cells in process of continuous proliferation* and serve in the earliest stage of develop-