

that the two parts enclose an angle of  $80^{\circ}$ . One portion lies tangentially and occupies the space just below the gray sphincter membrane, and the other extends downwards into the interior of the orbital fossa. The whole organ lies loose in a cavity surrounded by a light-reflecting membrane backed by the usual pigment layer. The wall of this sac or cavity is perforated in one place only—where the nerve and the bloodvessels enter the organ.

The organ itself consists of two distinct structures; firstly, meandriform gland-tubes surrounded and divided from each other by fibrous tissue containing nerves and bloodvessels, of which the whole of the inverted and the central portion of the tangential lobe are composed; secondly, a high cylinder-epithelium on the surface of the tangential lobe. The gland-tubes contain a coating of ordinary gland-cells and their lumen is partly filled with similar cells and partly with a slimy secretion, but they present no striking peculiarity. The cylinder-epithelium on the other hand is a most complex and interesting structure.

Of all the Challenger fish examined by me, this one is the best preserved, so well in fact that the most minute detail in the structure of this organ could be studied in very fine longitudinal sections (Pl. LXXII. figs. 40, 41).

The superficial part of the tangential lobe rests on the ordinary fibrous tissue covering the central gland-tubes (Pl. LXXII. fig. 41, *b*), and the nerves contained in this tissue extend upwards into it. It consists of two layers. Below, attached to the floor, we find a layer of ganglion cells (Pl. LXXII. fig. 41, *c*), which are irregularly roundish, highly granular, non-transparent, and measure 0.006 mm. in diameter, their nuclei being spherical, highly stainable and conspicuous. From their upper surface the ganglion cells send forth stout processes, which are in direct connection with club-shaped typical phosphorescent cells found in the upper layer (Pl. LXXII. fig. 41, *d*).

The upper layer is structurally very similar to the tissue described above from the cup-shaped portion of the composite phosphorescent organs in *Scopelus*.

It is chiefly composed of slender, vertical, indifferent, transparent, spindle-shaped cells with small nuclei, and between them, rising directly from the ganglion cells below, the typical phosphorescent clavate-cells are situated. These are shorter and stouter than in *Scopelus* and *Xenodermichthys*, and are scattered somewhat irregularly, resembling in this respect the corresponding structure in *Xenodermichthys*. They are 0.01 to 0.02 mm. high, the club-shaped end is 0.002 mm. thick.

The light-refracting vesicle is always single, forming an oval body with a vertical longitudinal axis. It is situated in the club-shaped end of the cell, 0.0024 mm. long and about half as broad. The protoplasm is highly stainable, but singularly enough I did not observe nuclei in these cells. Neither have I observed any pavement epithelium on the surface as in other similar organs.