

Like the organs without pigment coat, these are probably incited to action in groups and not singly, although there may be more individuality in their performance than in that of the less highly differentiated organs without pigment coat.

The function of the pigment coat is probably to shade the light at the sides, and to concentrate it in one direction, which, of course, would be of advantage to the fish. Possibly the pigment is only to be considered as a residue of the chemical reactions which go on in the organ.

e. *Development.*

I do not doubt that these organs have been developed from the simple phosphorescent organs without pigment coat, and that they in this way represent the second stage in the development of the ocellar phosphorescent organs of fishes. Not only does their structure indicate a much greater differentiation, but also their distribution over the surface of the fish is more sharply defined and not so irregular as in the case of the former organs.

3. Composite, ocellar, regular phosphorescent organs, without reflector.

a. *Distribution.*

Organs of this kind have been found by me in *Opostomias micripnus*, *Echiostoma barbatum*, *Astronesthes niger*, and *Pachystomias microdon*.

These organs invariably appear in two rows on each side of the body, one lateral and one ventral. The rows extend forwards on the lower side of the head, a row on the projecting crest of a fold below the operculum being especially conspicuous.

Ussow¹ has described the distribution of these organs over the body very carefully. The organs in one row are from 2.5 to 5 mm. apart according to the size of the species. Large specimens possess a much greater number of them than small ones.

The organs which Ussow calls "augenähnliche Organe" in *Astronesthes martensii*,² *Stomias barbatus*,³ and *Chauliodus sloani*,⁴ belong to this group.

Some of Leydig's "augenähnliche Organe," which he found in *Ichthyococcus ovatus*⁵ and in *Ichthyococcus palmeriæ*,⁶ likewise belong to this group.

In all the fishes in which these organs have been found, they are distributed over the surface of the body in the same way, always occupying four lines.

In this respect the composite organs differ much from the two preceding kinds, which are scattered much more irregularly over the surface and which never occur in distinct rows.

¹ M. Ussow, *loc. cit.*, pp. 108, 109.

³ M. Ussow, *loc. cit.*, p. 91, pl. ii. fig. 10.

⁶ F. Leydig, *Die augenähnlichen Organe der Fische*, p. 22, pl. vi. fig. 33.

² M. Ussow, *loc. cit.*, p. 89, pl. ii. fig. 9.

⁴ M. Ussow, *loc. cit.*, p. 93, pl. ii. figs. 6, 7.

⁵ F. Leydig, *loc. cit.*, p. 25.