luminous epithelium is a transparent lens-like structure consisting of two lateral halves filling the rest of the bulb, leaving only a narrow slit for the passage of the fæces.

4. The wall of the rectal bulb, which elsewhere is thick and pigmented, has a very thin and completely transparent window where it is attached to the bladder-like organ of the ventral sole. Dorsally the inner surface of this 'bladder' has a silky brilliance.

Evidently the function of the organ in the sole of *Opisthoproctus* is to serve as a reflector for the rectal light-organ. The light is transmitted through the lens and window of the bulb to the crystal-clear tissue of the reflector organ. From the shining ventral wall of the latter the light is reflected downwards and dispersed over the whole ventral surface of the fish. The flat sole is covered with large thin scales which are transparent at the base but pigmented with increasing density towards the distal edge. A shortening of the sole will thus screen the light.

Probably the main biological significance of this complicated organ is that it enables the fish to be recognized by others of its kind which have sensitive, upwardly directed, tubular eyes. Possibly a very low light intensity is sufficient for this purpose. This would greatly reduce the risk of being detected by predators, and furthermore the downwardly directed light from the flat sole will be difficult to observe by fish with normal horizontally directed eyes.

Somewhat similar types of light-organs with open glands connected more or less directly with the intestine, and emitting light indirectly through transparent parts of the body, have been found in some Percomorphi from shallow water : *Acropomona japonicum*, *Leiognathus equula*, *Gazza minuta* and *Apogon marginatus*[2–5].

A more detailed report on the rectal light-organ of *Opisthoproctus* and related genera is under preparation and will appear in the "*Dana* Reports".

E. Bertelsen

Dana Oceanographical Collections,
Charlottenlund.
Jan. 6.

[1] Trewavas, E., *Proc. Zool. Soc. Lond.*, 601 (1933).
[2] Haneda, Y., *Palao Trop. Biol. Sta.*, **2**, 29 (1940); *Pacif. Sci.*, **4**, 214 (1950).
[3] Harms, J. W., *Z. Wiss. Zool.*, **131**, 157 (1928).
[4] Kato, K., *Zool. Mag. Tokyo*, **57**, 195 (1947).
[5] Yasahi, Y., and Haneda, Y., *Proc. Imp. Acad. Jap.*, **12** (2), 55 (1935).

Effect on Earthworm and Diptera Populations of BHC Dust applied to Soil

It is well known that BHC affects earthworms and soil insects. A review of these problems has been given by Satchell[1].

In May 1956, 12 per cent γ-BHC dust was applied at surface concentrations of 10·08, 20·16, 28·8 and 57·6 gm./100 m.² to ploughed plots and was thoroughly mixed with soil to a depth of 4 in. In 1956 and 1957 the plots were sown with sugar beet and potato. In October 1957 (18 months after treatment with BHC) the earthworms and other fauna were extracted from the experimental plots.

A significant increase in the earthworm population occurred in all the plots treated with BHC (Table 1). This may be partly explained by 'food mobilization' in soil treated with BHC[2].

A statistical examination has shown that there is a curvilinear correlation (parabolic) between BHC concentration and the number of earthworms. The optimal γ-BHC concentration is 31·03 gm./100 m.². This gives the highest number of earthworms.

Table 1. Effect of BHC on Numbers of Earthworms in Potato Plots

gm./100 m.² of γ-BHC	No. of earthworms per m.²
Untreated	10·0
10·08	21·6
20·16	25·8
28·8	26·1
57·6	14·6

Table 2. Effect of BHC on Populations of Wireworm and Diptera in Sugar Beet Plots

gm./100 m.² of γ-BHC	No. per m.²	
	Wireworm	Diptera
Untreated	1·1	3·6
10·08	0·2	4·3
20·16	0·2	6·0
28·8	—	7·1
57·6	—	6·6

It was observed (Table 2) that on all treated sugar beet plots the number of wireworm was reduced and the population of Diptera (*Pegomyia hyoscyami* and others) was increased. It is suggested that the significant increase in the number of Diptera in all plots treated with BHC was due to a reduction in predators, the numbers of wireworm. Similar results were obtained by Stone[3] with the wireworms *Limonius californicus* and *Hylemyia ciliclura*.

Jerzy J. Lipa

Laboratory of Agricultural Entomology,
Institute of Plant Protection,
Puławy, Poland.
Dec. 18.

[1] Satchell, J. E., *Soils and Fert.*, **18**, 279 (1955).
[2] Persin, S. A., *Dokl. Akad. Sel'sk. Nauk*, No. 4, 29 (1954).
[3] Stone, M. W., *J. Econ. Ent.*, **46**, 1100 (1954).

Thermocline off the Coast of Tropical West Africa

Recently, Salzen[1] has shown that there is a marked difference with depth in the species composition of the demersal fish fauna off Tema in Ghana. He found that there was a distinct change from euryhaline and eurythermal species in the shallow inshore water, to red and brown marine species below 10 fathoms. As the same change in species had been observed by Postel[2] working off French Guinea, Salzen suggested that the results for Tema might be typical of a great deal of the West African shelf in the dry season. The results (unpublished) of an extensive, though not detailed, hydrographic survey of the region, from Dakar to the Cameroons, made during 1952, tend to support such a generalization, and pose the question as to whether the thermocline might be partly responsible for determining the distribution of the inshore fish fauna.

During the course of the hydrographic survey, a number of bathythermograph recordings were made at stations distributed in transects at various intervals along the West African shelf. Salinity samples were also taken using a Nansen Peterssen insulated water-bottle. The results of the survey were in close agreement with the observations of Defant[3] made during the *Meteor* Expedition of 1925–27. It was found that the deeper water on the shelf was separated