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Bioluminescence of a bathypelagic fish, *Argyropelecus hemigymnus* **Cocco** (1 figure).

About one hundred fifty *Argyropelecus hemigymnus* were either fished in the straight of Messina, or collected on nearby beaches. The causes which induce these bathypelagic fishes to be brought up toward the Sea surface have been recently discussed by GENOVESE *et al.* (1971).

Four to six photophores have been dissected from each of the six fishes studied. Each photophore was laid on small extracellular platinum electrodes, and it was put into a humid chamber at 12 °C where they could be stimulated by square electrical pulses. The light emitted by the organ was monitored by a photomultiplier (IP21) and the signal was displayed on a storage oscilloscope. A single stimulus not longer than 4 msec evoked one flash of light, with a latency of 2 to 3 msec, a rise time of 0.6 msec,

followed by an exponential decay lasting about 7 msec (Fig. 1A). A single stimulus longer than 4 msec (up to 16 msec) evoked 3 to 4 similar flashes, with a certain degree of summation. A train of stimulus (12.5/sec) induced a train of flashes, which however fatigue rapidly (Fig. 1B); at a frequency of 25/sec, the organ emitted one flash at the first stimulus, and no response afterwards. The intensity of the light production was very variable : from 6×10^7 to 6×10^9 quanta/sec. A continuous emission of light was never observed on fresh photophores; five hours after dissection some photophores showed a spontaneous light emission, the intensity of which was continuous and oxygen-dependent; a single stimulus increased the level of this light-production during the period of stimulation; after the stimulus, the light production returned within a few seconds to its previous level.

Enzymic measurements of eight perchloric acid extracts of the ventral photophores showed a low level of ATP (< 0.4 μmole/g), and fair amount of ADP (0.4 to 1.0 μmole/g) and of AMP (0.2 to 0.4 μmole/g).

Luminous bacteria were found in the viscers of *Argyropelecus*. Their light emission was continuous, oxygen dependent and had a peak maximum at 480 mμ. These bacteria grow well in an agar-peptone medium with 3 % NaCl. Their luminescence was irreversibly destroyed by a 20 minutes heating at 34 °C. Epipelagic Fishes collected simultaneously with *Argyropelecus* specimens did

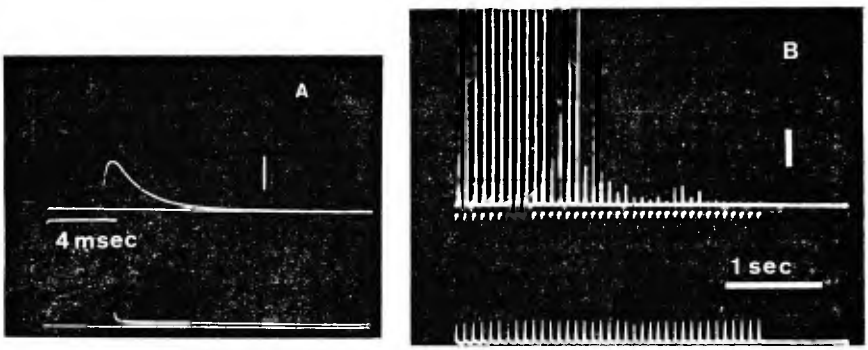

FIG. 1. *Original record of light produced by a photophore isolated from* Argyropelecus *and stimulated by electrical current.*

A : response to a single stimulus (square wave, 4 msec duration, 25 volts).

B : response to a train of stimulus (same duration, same voltage as A) given at a frequency of 12.5/sec.

Vertical deflection line : 2.4×10^8 quanta/sec.

not harbour any luminous bacteria. It is thus probable that luminous bacteria live in symbiosis within the viscers of *Argyropelecus;* the light which they produce is absorbed by a dense hypodermic layer of melanin and therefore not visible as longer as the fish is not dissected. The physiological role of these bacteria in respect with the photophores remains to be elucidated.

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REFERENCE

GENOVESE, S., BERDAR, A. & GUGLIELMO, L. (1971) *Atti Soc. Peloritana* **17** 331-370.