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Spawning Behaviour Independent of Egg Maturity in a Cuttlefish (*Sepia officinalis* Linnaeus)

BY

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(1 Plate)

ASPECTS OF EGG LAYING in *Sepia officinalis* Linnaeus, 1758 have been reported and discussed by several authors (GRIMPE, 1926; JECKLIN, 1934; BOTT, 1938; TINBERGEN, 1939; RICHARD, 1971; BOLETZKY, 1972). Virtually nothing is known, however, of the timing system that coordinates the different processes involved in spawning: expulsion of a ripe egg, embedded in oviducal jelly, by the oviduct, production of a band of nidamental jelly subsequently coloured by pigment from the ink sac, and wrapping of the egg with this nidamental jelly. All these processes occur within the mantle cavity prior to fertilization (TINBERGEN, 1939). It would seem rather likely that production of egg-case material strongly depends on the presence of ripe eggs, and that, in any instance of timing failure, no normal egg-cases would be produced (MESSENGER, 1968).

The observations reported here show, however, that:

a) certain stimuli may induce production of egg-cases and normal spawning behaviour despite absence of ripe eggs,

b) the empty egg-cases then produced may be perfectly normal in size and structure.

An adult female *Sepia officinalis* (mantle-length ca. 22 cm) was captured by bottom trawling in the area of Banyuls-sur-Mer (western Mediterranean), on the 29th of October, *i. e.*, between normal spawning seasons (MANGOLD-WIRZ, 1963). The animal was badly damaged by the net, but it survived for a few weeks in a tank with running sea water. A plastic tube was placed vertically in the tank; mature females readily attach eggs to such objects.

Twenty days after capture, the animal attached about 90 normal egg-cases to this tube, in the usual manner (TINBERGEN, 1939). Examination of several of these egg-cases revealed the absence of eggs. When the animal died a few days later, dissection showed that the largest ovarian eggs were still immature.

Formation of egg-cases and spawning behaviour may have been induced by the unnatural light conditions in the laboratory (exclusively artificial light), but certainly not by the water temperature (13 to 14° C) that corresponded to open sea temperature. The physical condition of the animal resulting from injury may also have been influential.

In the days following deposit, the egg-cases showed the typical shrinking, the outer coils of the nidamental jelly becoming rather tough (in normal eggs, this shrinking is later on counteracted by the strong increase of the perivitelline fluid within the egg chorion). Some egg-cases thus became very small. In a few others gas production by bacteria caused strong swelling (Figure *1*). The spiral winding of the nidamental jelly was identical to the arrangement observed in egg-cases containing eggs. In the egg-cases that were of normal size (*i. e.*, those not completely shrunken), the space in which the egg would normally lie was filled with the soft inner coils of the nidamental jelly bands (Figures *2* and *3*).

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Explanation of Figures *1* to *3*

Figure *1*: Empty egg-cases of *Sepia officinalis,* two months after deposit by immature female. The large egg-cases in the upper right are gas filled (see text)
Figure *2*: Empty egg-case (normal size), cut open three months after deposit. Note the tough coat formed by the outer coils of the nidamental jelly surrounding the "egg-chamber" filled with the soft inner coils of the jelly band
Figure *3*: Detail of Figure *2*

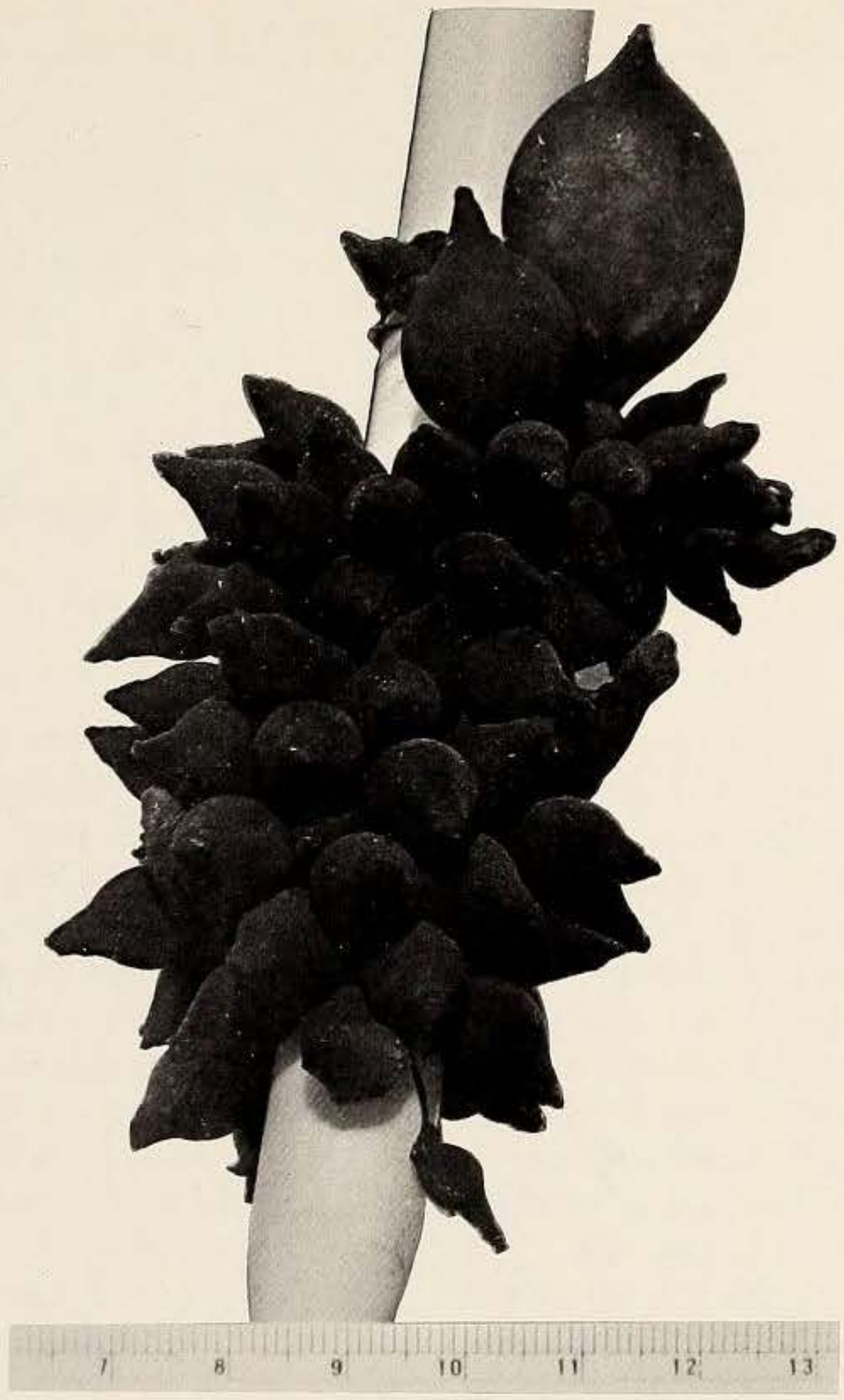

Figure *1*

Figure *2*

Figure *3*