

OBSERVATION ON THE CULTURE AND BIOLOGY OF THE SQUID *SEPIA SP.*

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There are two species of squids of economic importance that are found along the shore of Naawan, Misamis Oriental and its adjacent waters. They are the broad-finned squid, *Sepioteuthis lessoniana*, locally called *nocos*, and the squid or cuttlefish, *Sepia sp.*, locally known as *kubotan* which are often netted by fishermen.

Although the squid is a potential source of protein, very few studies has been done on this group of mollusks. Most of these studies were taxonomic, which include those of Berry (1932), Rehder (1945) and Voss (1963). The Bureau of Fisheries reported in 1970, that fifteen (15%) per cent of the total fish catch in the Philippines represent squid fisheries of different species. Our recent knowledge on studies of Philippine squids include those of Flores (1975), where he determined the concentration of squids in Luzon waters by echo sounding. The difficulty of studying the squids, as Clarke (1966) pointed out, is due mainly to sampling problem. So far no studies on the biology and ecology of Philippine squid has been done. The first attempt on biological studies was made by the MSU-IFRD in 1974.

The present paper is a report on the observations made on the squids, *Sepia sp.*, in the hatchery laboratory of MSU-Institute of Fisheries Research and Development at Naawan, Misamis Oriental, Philippines.

Materials and Methods

The observations were based on a cluster of eggs attached to a coral stone, about 150 meters from the shoreline of Naawan, Misamis Oriental, and collected on April 6, 1978 by native fishermen. They

were transported to the MSU-IFRD hatchery laboratory and placed in a 0.5 ton wooden tank filled with filtered sea water and aerated. The cluster numbers about 80 eggs.

As soon as the eggs started to hatch, the squid embryos were transferred to another 0.5 ton wooden tank, also filled with filtered sea water and aerated moderately. The level of water in this tank was maintained from 30 to 40 cm and was changed daily, once in the morning and once again in the afternoon.

The young squids were fed two times daily. The feeds consisted of live mysis and postlarvae fry of the white shrimp (*Penaeus indicus*), live fish larvae of gobies (*Glossogobius sp.*), Bangos, *Chanos chanos*, of the species *Megalops cyprinoides* and *Therapon jarbura*, and other unidentified fish larvae caught along the shore of Naawan and Simanoc Creek by means of cast nets. To sustain the culture, a number of live fishes and shrimps were collected during early morning and late afternoon, especially during low tide. All fishes collected were placed in a 0.5 ton wooden tank beside the culture tank, containing the squid embryos.

After ninety (90) days, the squid were transferred to a 16-ton concrete tank inside the hatchery laboratory. Measurement on the growth was done every three days from May to July 1968.

Since the present work is the first for this species, analysis of temperature, salinity and oxygen requirements was made. Salinity was determined by standard silver nitrate titration. Oxygen concentration was also determined by Winkler's method and the measurement of temperature was made in both the 0.5 ton wooden tank and 16-ton concrete tank.

Observations

Eggs collected from the sea were attached to the coral stone (See Figure 1). Each was surrounded by a gelatinous substance and was so isolated from the others. This state of the eggs appears to be similar to that of the eggs of the oegopsid squid collected, described and reported by Shojima (1972) in East China Sea. The average total length of the eggs is 15 mm. When collected from the sea, most of the eggs were clear white, some were cloudy white. However, these colors changed to light

brown before the hatching.

The *Sepia* egg differs from that of the *Sepioteuthis* by being isolated from the other eggs. The eggs of the *Sepioteuthis*, as reported (MSU-IFRD Annual Report, 1975) and on actual observation and collection, are long, cylindrical tamarind-shaped. They are arranged in three to six segments, each segment bearing a squid embryo.

The egg capsule started to hatch on April 11, 1978 at about 4:30 p.m. Other eggs hatched three to seven days later. The average total length of the newly hatched embryo was 90 mm. There were about 50 squid embryos that were hatched from this cluster. Since our knowledge on the biological requirement and behaviour of this squid is limited, only 13 of the total hatched eggs survived to 5 months. Mortality of squid embryo was also attributed to mechanical defects in the aeration system of the tank.

After hatching, the squid embryo settled at the bottom of the tank. Unlike the *Sepioteuthis*, where the embryo moved freely in the tank, the *Sepia* embryo only moved on the surface when feeding or attempting to catch live feeds. They started to feed a day after hatching. In the entire duration of the observation, the squid never attempted to feed on dead fish given to them.

Figure 2 shows the average growth rate of the squid in the tank from April 11 to July 31, 1978. The average growth increment (total length) per month was 50 mm.

Ninety days after hatching, all the squids were transferred to the concrete tank inside the hatchery laboratory. On August 20, 1978 (134 days after hatching), eggs were seen to have been laid at the bottom of the concrete tank and on the PVC pipe placed in the tank (See Fig. 3). These eggs were collected and transferred to a 0.5 ton wooden tank. All the eggs were clear white. This observation suggests that the clear white eggs collected from the sea were at the early stage of development. The observation also indicates that this species of mollusk mature in four (4) to five (5) months.

The water temperature in both tanks in the entire duration of the observation was between 27.3°C to 29.7°C. The salinity readings was between 29.84 to 35.27 par per thousand and the oxygen readings was

between 5.18 to 6.7 for the same period of observation.

The data gathered from these observations, although limited, suggest the potential of the culture and propagation of squid which will eventually led us to squid farming in this region. Our works so far on two species of squids need refinement which we hope will eventually led us to the development of appropriate technology. It is however known that to fully control any aquatic animals, an intensive biological study has to be done. This we are undertaking at present.

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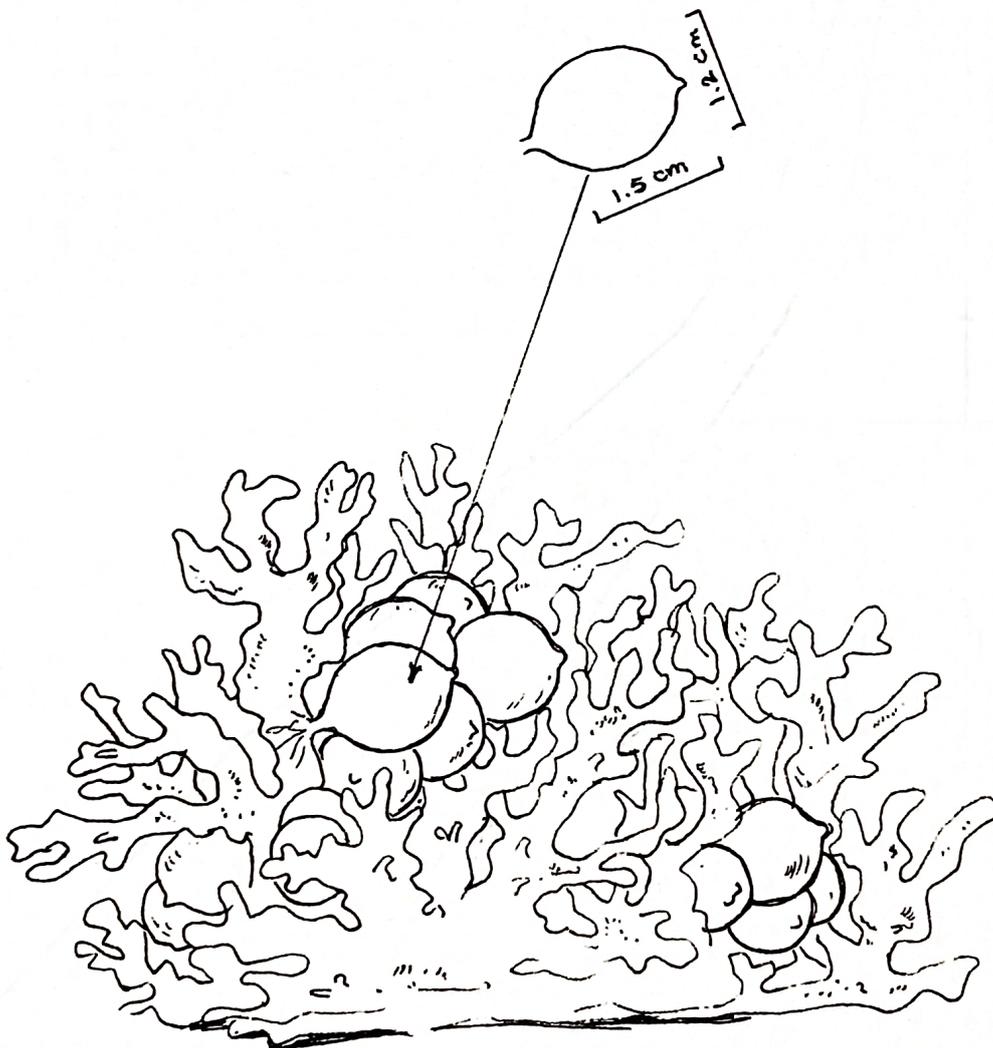


Fig. 1. Eggs of squid attached to a reef coral.

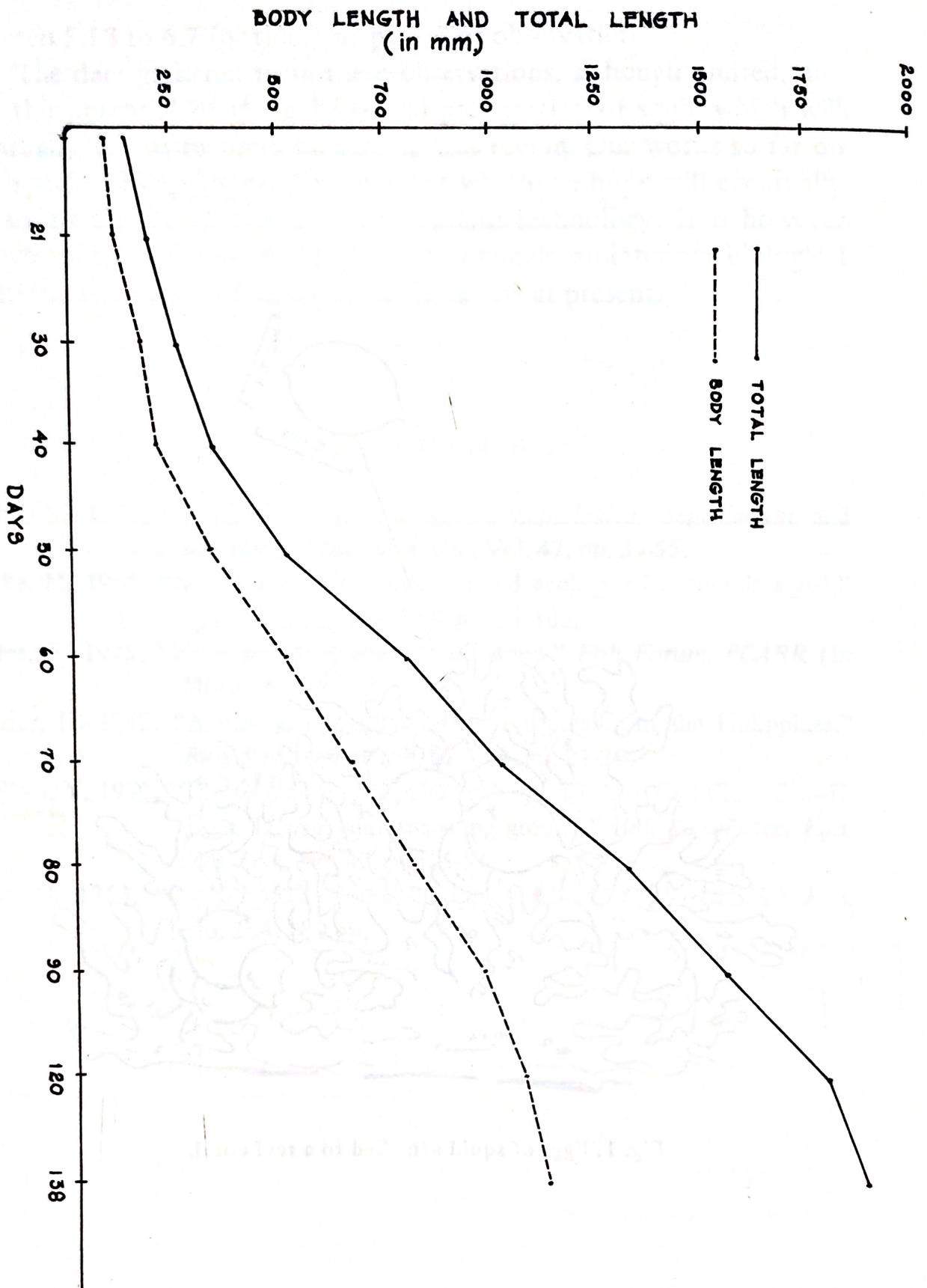


Fig. 2. Average growth of Squid, *Sepia Sp.*, in the 0.5-ton wooden tank and 16-ton concrete tank, April 11-July 31, 1978.



Fig. 3

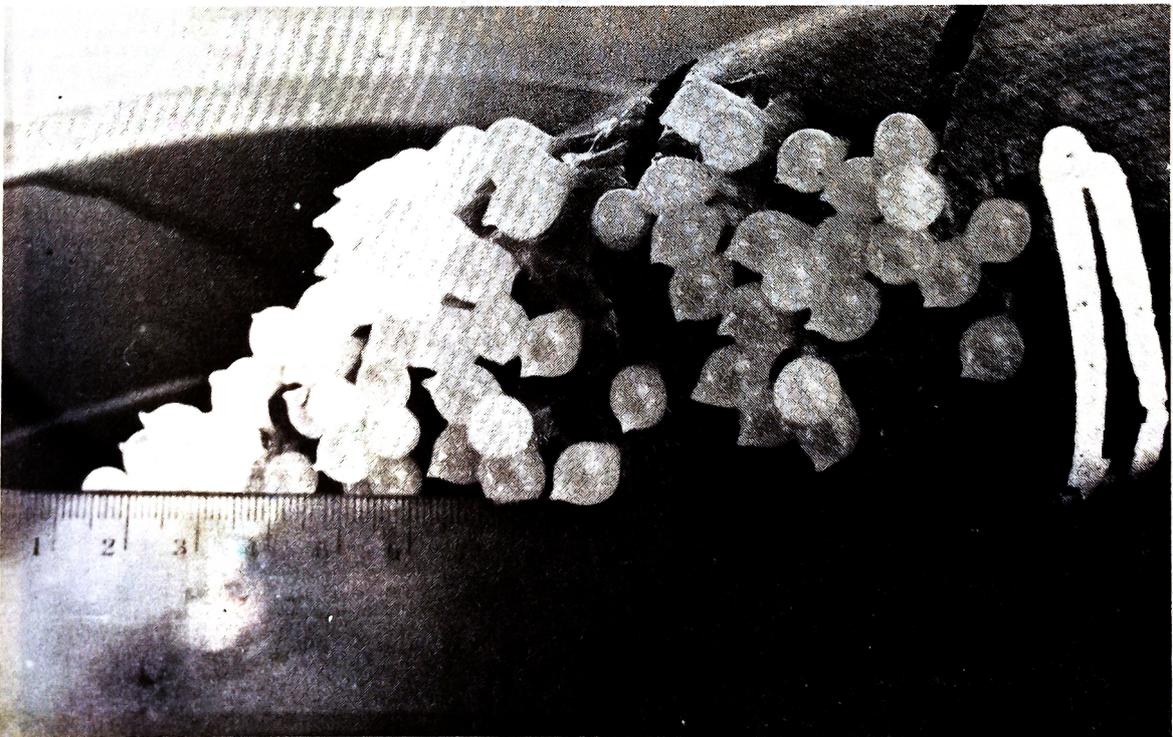


Figure 4.

Fig. 3-4. Eggs laid in concrete tanks, August 20, 1978, attached to PVC pipes.



Figure 5A.

Fig. 5 A-C. Adult squid 134 days after hatching.



Figure 5B.



Figure 5C