BULLETIN OF THE
NATIONAL MUSEUM SINGAPORE

No. 33 JUNE 21, 1965 Part 4

Notes on the Biology of the Anchovy, *Stolephorus pseudoheterolobus* Hardenberg

By Tham Ah Kow

Fisheries Biology Unit, University of Singapore

(Received, May 1965)

INTRODUCTION

The members of the genus *Stolephorus* Lacepede are small fishes known locally in Malaysia as *Ikan Bilis*. They are the Malayan counterparts of the anchovies in other countries. In Java they are known as *Ikan Teri*. They are very popular among the indigenous people who have many ways of cooking them. In Malaysia the larger species such as *Stolephorus indicus* are usually sold in the fresh state, whilst the smaller ones such as *S. pseudoheterolobus*, *S. heterolobus* and *S. insularis*, are usually cooked in brine as soon as they are caught, and sold as cooked fish. Along the east coast of Malaya they are sometimes salted and then sundried, especially when they are caught in very large quantities. In Singapore they are caught mainly by fixed traps known as kelongs or by beach seines. Along the east coast of Malaya they are also caught by lighted purse seines.

According to Hardenberg (1934) there are nine species of *Stolephorus*. They may be divided into two main groups from the point of view of their distribution: —

I. Those with widespread distribution:
   (*a*) *S. tri* (Bleeker). Philippines to Bombay.
   (*b*) *S. indicus* (van Hasselt). India to Japan and Tahiti.
   (*c*) *S. commersoni* Lacepede. Philippines to Madagascar.
   (*d*) *S. heterolobus* Ruppell. Red Sea to Australia.

II. Those with limited distribution:
   (*a*) *S. baganensis* Hardenberg. Java, Sumatra, Borneo.
   (*b*) *S. insularis* Hardenberg. Java, Sumatra, Borneo, Celebes, Singapore.
   (*c*) *S. pseudoheterolobus* Hardenberg. Java, Sumatra, Celebes, Singapore.
   (*d*) *S. zollingeri* (Bleeker). Celebes, Java (south coast only).
   (*e*) *S. celebicus* Hardenberg. Celebes only.

In the Singapore Straits four species, viz. *S. indicus*, *S. insularis*, *S. heterolobus* and *S. pseudoheterolobus* are recorded (Tham, 1953). The last species is by far the most abundant, especially from February to June and from August to November. During the period of maximum abundance a large *Kelong* could catch as much as $1\frac{1}{4}$ tons per night.

TAXONOMY

The genus *Stolephorus* belongs to the sub-family Engraulinae of the family Clupeidae. The genera of the sub-family Engraulinae are characterised by the presence of keeled abdominal scutes, a large mouth with a prominent snout and a maxillary with two supplemental bones. Members of the genus *Stolephorus* are distinguished from the other genera of the sub-family Engraulinae by the possession of a forked caudal fin which is not united with the anal fin, as well as by the presence of scutes on the ventral surface only between the pectoral fins and the ventral fins. Also the silvery hue on the body is only limited to a lateral band.

The species *S. pseudoheterolobus* may be characterised as follows: — dorsal 14–15; anal 16–18; pectoral 13–14; ventral 7. Lateral line 38. Snout rather pointed. Head 3.8–4.2 in standard length; eye 3.5–4.0 in head. Maxillary reaches to somewhat behind mandibulary joint. The ventral edge of maxillary is lined with a series of hooks with 3 to 4 large ones near the posterior end. The dorsal fin is situated a little behind the half-way point between the tip of the snout and the first rays of the caudal fin, with the anal fin somewhat behind along the ventral edge. The ventral fins are inserted in front of the vertical through the origin of the dorsal. There are 4 to 6 abdominal, needle-like scutes in front of the ventral fins. The scales are very deciduous and fall off as soon as the fish is caught in the net.

This species is differentiated from the other species of *Stolephorus* by the possession of all the following characteristics: —

(*a*) The maxillary extends to somewhat behind the mandibulary joint.

(*b*) The end of the maxillary is somewhat pointed.

(*c*) The origin of the anal is behind the dorsal.

(*d*) The height of the adult fish is 5.6 to 6.2 in standard length.

It is very closely related to *S. heterolobus* but differs from it in having a higher ratio of standard length to body height and in having a more pointed snout. The eggs of *S. pseudoheterolobus* have no oil globule, whilst in those of *S. heterolobus* an oil globule is present.

BIOLOGY

Delsman (1931), who studied the eggs and larvae of the members of the genus *Stolephorus*, came to the conclusion that the egg of *S. pseudoheterolobus* differs from those of the other species in that it has no oil globule and no knob. Like the eggs of the other species of *Stolephorus* it is elongated and has a segmented yolk (fig. 1*a*). Spawning occurs at night and by the next morning the germinal disc is formed and the larva hatches out in the evening of the same day (fig. 1*b*). By the following morning part of the yolk sac has been absorbed (fig. 1*c*). The yolk sac will be totally absorbed by the evening of the second day (fig. 1*d*). The characteristic feature of this larva is that unlike the larvae of other members of the genus, the terminal part of the gut does not extend to the border of the unpaired fin fold and the vent is situated either on the left or the right side beneath the inferior border of the myotomes. As the larva grows, there is a forward movement of the anus over a distance of about 6 myotomes.

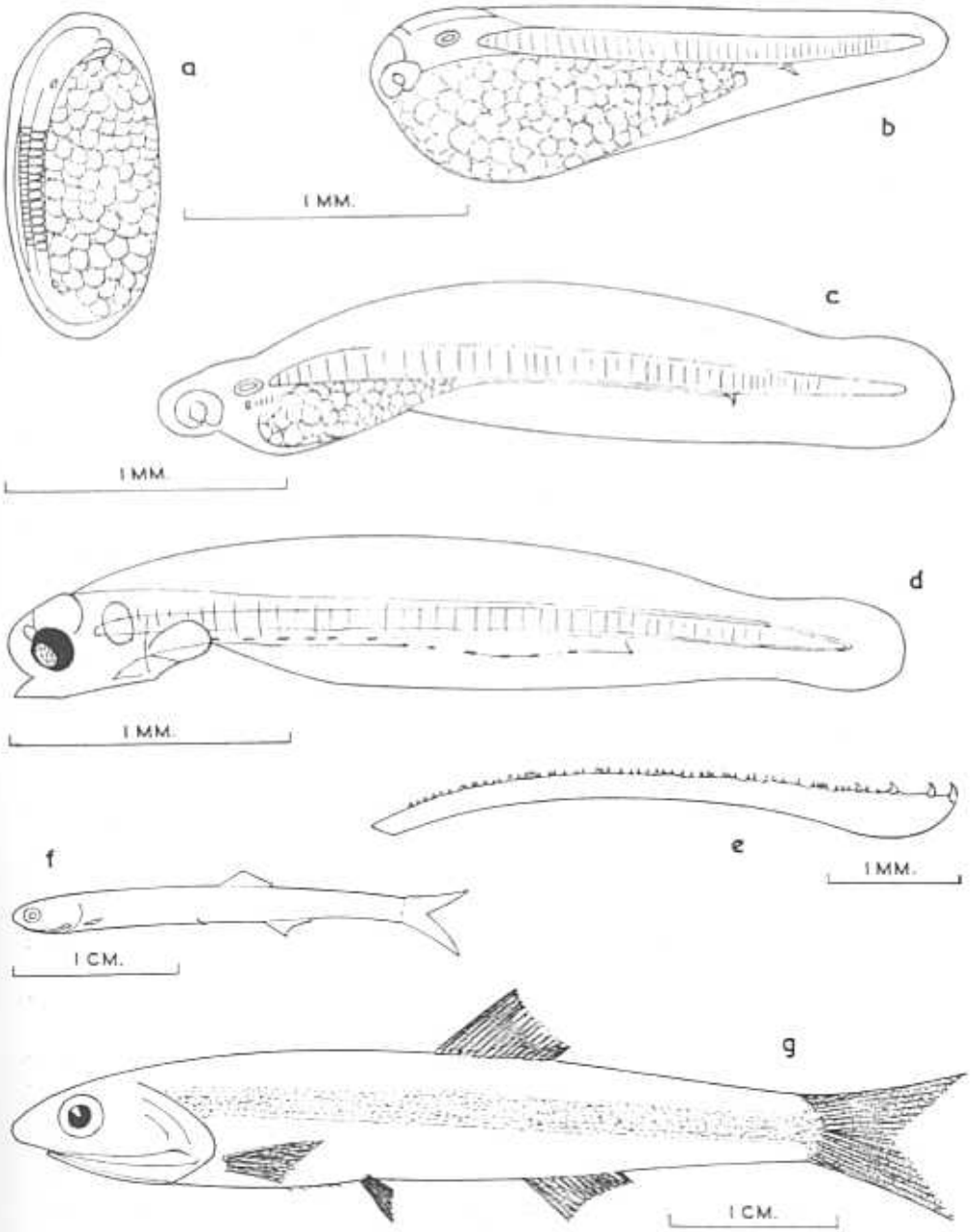

Figure 1. *Stolephorus pseudoheterolobus* Hardenberg. (*a*) Developing egg (After Delsman). (*b*) Newly hatched larva (After Delsman). (*c*) Larva, 12 hours after hatching (After Delsman). (*d*) Larva, 24 hours after hatching (After Delsman). (*e*) Maxillary of juvenile. (*f*) Juvenile stage. (*g*) Mature stage.

The work of Delsman only covered the larval stages and no work had been done on the juvenile stages of the species. Using Hardenberg's key, specimens of over 40 mm. standard length could be identified with certainty. For specimens of 30 to 40 mm. standard length however the identification was doubtful. For specimens of less than 30 mm. standard length it was not possible to identify them with the key. During 1948 and 1949 the author was able to collect small stolephorids ranging from 15 mm. to 60 mm. in length in large numbers. An attempt was therefore made to find some means of identification which could be used with certainty even with specimens of 15 mm. standard length. It has been found that *S. pseudoheterolobus* has a very characteristic maxillary. Whilst the maxillary of all the species of *Stolephorus* which occur in the Singapore Straits has a number of serrations along the ventral edge, that of *S. pseudoheterolobus* is distinct from the other species in having the last 3 or 4 serrations enlarged and curved (fig. 1*e*). This characteristic has been used to identify the juveniles of this species (fig. 1*f*). Below 30 mm. standard length, specimens of *S. pseudoheterolobus*, *S. indicus* and *S. heterolobus* look very much alike.

In the Singapore Straits *S. pseudoheterolobus* matures at about 50 mm. standard length (fig. 1*g*). The gonads begin to be visible to the naked eye at a standard length of between 35 mm. and 40 mm. Although mature specimens are caught in the Singapore Straits at intervals throughout the year, the eggs are rare in the plankton. The juvenile stages however appear during the north east monsoon, when the currents of the South China Sea flow through the Straits. This suggests that the spawning takes place in more saline water in the South China Sea.

The juvenile stages of up to 40 mm. feed mainly on phytoplankton and small copepods. From 40 mm. onwards they begin to feed on the larger Calanids, *Leptochela*, small Polychaetes, Mysids, *Squilla* larvae, *Lucifer* and Brachyuran and other decapod larvae. Sometimes small larval Stolephorids are found in the stomachs of the large specimens.

Predatory fish such as *Scomberomorus* spp., *Chirocentrus dorab* and *Trichiurius* spp. have been observed to feed very heavily on *S. pseudoheterolobus* when it is abundant in the Singapore Straits.

REFERENCES

DELSMAN, H. C., 1931. Fish eggs and larvae from the Java Sea. 17. The genus *Stolephorus*. *Treubia*, **13** (2): 217–243, figs. 1–60.

HARDENBERG, J. D. F., 1934. Some remarks on the genus *Stolephorus* Lacepede in the Indo-Australian Archipelago. *Treubia*, **14** (3): 313–375, figs. 1–11.

THAM, A. K., 1953. A preliminary study of the physical, chemical and biological characteristics of Singapore Straits. *Colonial Office Fish. Publ.*, **1** (4): 1–65, figs. 1–19. London: H.M.S.O.

Edited by Eric R. Alfred, M.SC., Curator of Zoology, National Museum

—

Printed by the Government Printing Office, Singapore

—

Sold at the National Museum, Stamford Road, Singapore, 6

—

Price: Fifty Cents (Malaysian)

0838—500—6/65