

THE EGG POTENTIAL IN TWO SPECIES OF EUPHAUSIACEA (CRUSTACEA) OF THE SOUTHEASTERN ARABIAN SEA

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ABSTRACT

The egg potential in two species of euphausiids has been studied and it showed that in the mature ovary of *Thysanopoda tricuspidata* ova of four distinct phases of development were present. A little increase in size of the mature eggs was noticed with increase in body length. The number of ripe eggs in the ovary of different specimens examined ranged between 36 and 60 while the total number of the ova in the ovary ranged between 328 and 414. The ovaries showed two batches of maturing ova and one batch of fully mature ova which indicated that more than one spawning takes place in *T. tricuspidata* during one season. In the second species namely *Stylocheiron indicum*, 2-3 eggs which were not exactly spherical were found attached to the thoracic legs of some females.

INTRODUCTION

THE FECUNDITY of very few species of euphausiids has been investigated. It is easy to estimate the brood size of those genera such as *Pseud euphausia*, *Nyctiphanes*, *Nematoscelis* and *Stylocheiron* in which the eggs after laying are carried by the females. For those species which lay their eggs freely into the water more than one method have been under use to estimate the brood size, they being (1) by counting the ova in the ovary (Bargman, 1937; Zelikman, 1958; Ponomareva, 1959; Naumov, 1962) and (2) by estimating the volume of the ova in the ovary, and from that estimating the number of eggs (Mauchline, 1966, 1968, 1980; Mauchline and Fisher, 1969). The present paper embodies the results of the studies made on the egg potential in two species of euphausiids namely *Thysanopoda tricuspidata*

and *Stylocheiron indicum* by adopting the former method.

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MATERIAL AND METHODS

The adult egg bearing females used for the present study were obtained from the oceanic region beyond the continental shelf area of the southwest coast of India including the Lakshadweep Sea. The brood size of *T. tricuspidata* was estimated by counting the number of ova in the ovary while in *S. indicum* by noting the number of eggs carried by the females. In the former species ovaries of five

fully mature specimens were dissected out and all the ova in them (fully developed as well as developing) were carefully separated from one another, counted and measured.

Thysanopoda tricuspidata

In *T. tricuspidata* the ova are pentagonal or hexagonal in shape and are compactly packed in the ovary. The lengths of the ova were measured along an axis which was neither maximum nor minimum.

ova of 4 distinct phases of development morphologically comparable to *M. norvegica* were found in the mature ovary (Table 1).

Stylocheiron indicum

In *S. indicum* out of the total 136 specimens examined 65 were females. Among the females six were found to carry the eggs. The number of eggs with each specimen varied from 2 in two specimens to 3 each in the rest.

TABLE 1. *The egg potential in T. tricuspidata (Actual number of ova in each stage is given in brackets)*

Total length of specimens (mm)	Total No. of eggs in ovary	Size range of ova (mm)			
		Stage-I	Stage-II	Stage-III	Stage-IV
22.0 ..	328	0.04-0.10 (153)	0.11-0.30 (83)	0.31-0.50 (56)	0.51-0.59 (36)
24.0 ..	342	0.03-0.10 (171)	0.11-0.30 (64)	0.31-0.50 (58)	0.51-0.62 (49)
25.0 ..	398	0.03-0.10 (177)	0.11-0.30 (86)	0.31-0.55 (77)	0.56-0.70 (58)
26.0 ..	414	0.04-0.10 (186)	0.11-0.35 (94)	0.36-0.50 (79)	0.51-0.73 (55)
27.0 ..	408	0.04-0.10 (159)	0.11-0.40 (106)	0.41-0.60 (83)	0.61-0.71 (60)

Eventhough the growth of ova in the ovary of euphausiids is a continuous process, they may be divided into several phases which are recognisable by the general appearance of the ova, condition of the nucleus and yolk granulation (Ponomareva, 1956; Zelikman, 1958; Mauchline, 1968; Mauchline and Fisher, 1969). Thus ova of 4 different phases have been recognised in *Meganyctiphanes norvegica* (Mauchline, 1968). In *T. tricuspidata* also

DISCUSSION

It has been found that the brood size of a species increases with increasing body size (Mauchline and Fisher, 1969). Nemoto *et al.* (1972) found that the size of females and the number as well as weight of ova in the ovary are directly proportional, in that, the larger females do not only produce larger number of ova per brood, but that the ova themselves are

also larger. But several other authors could see no difference in the sizes of the ova produced by females of different sizes; for example in *Thysanoessa inermis* and *T. raschi* (Zelikman, 1958); in *Euphausia superba* (Naumov, 1962); in *Pseudeuphausia sinica* (Wang, 1965) and *M. norvegica* and *T. raschi* (Mauchline, 1968). However, during the present studies a little increase in the sizes of the mature ova was noticed in *T. tricuspidata* with increase in the body length (Table 1).

Roger (1976) found that the number of ripe ova in stage-IV ovary of *T. tricuspidata* (length range: 15-22 mm) to range between 20 and 82 with a mean number of 40. During the present studies a direct count of the eggs in the ovary of this species (length range: 22-27 mm) showed that the number of ripe eggs ranged between 36 and 60 (Table 1).

at once or within a short period of few days. There are then only very small ova left in the ovary and a period of, several weeks would be required for their development to a ripe state. An examination of the ovaries of *T. tricuspidata* collected from the tropical Indian seas (the present material) indicated that the fully mature ovaries may have developing ova belonging to more than one mode. The ovaries examined showed two batches of maturing ova and another batch of fully mature ova (Fig. 1). Thus there is an indication of more than one spawning among *T. tricuspidata* during a breeding season. But the interval involved between two successive spawnings needs further studies and confirmation.

All the ova produced in the ovary are not grown to the ripe stage and laid. Many of them would be reabsorbed. Hence a sequential

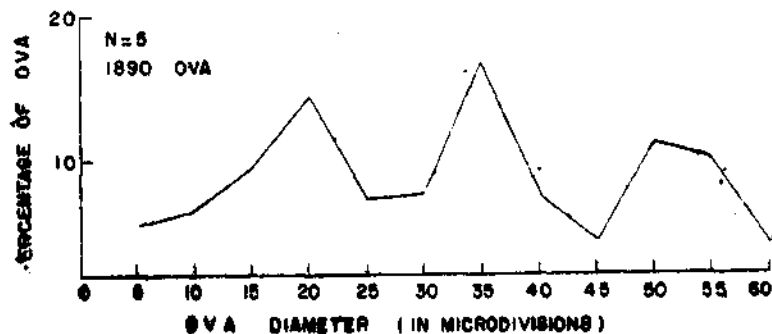


FIG. 1. Ova diameter-frequency diagram for *Thysanopoda tricuspidata*. The number of ovaries examined and the ova measured are indicated.

There is still little further information available than what has been mentioned by Mauchline and Fisher (1969) about the number of successive broods that an euphausiid can produce (Mauchline, 1980). The tropical euphausiids do not release eggs continuously from an individual ovary (Mauchline and Fisher, 1969; Roger, 1976). According to Roger (1976) the females release all ripe eggs

reduction in the number of eggs of different developmental stages from immature to the mature could be noticed in the ovary. Thus in five specimens of *T. tricuspidata* it was found that while an average of 169 stage-I ova were present, 87 ova of 2nd stage, 71 of the 3rd stage and only 52 of the last stage were present in the ovary. According to Mauchline (1968) all the stage-IV eggs are also not laid,

The brood size in some species of *Stylocheiron* has been estimated. In *S. suhmi* Lebour (1962) estimated eight eggs per brood but according to Mauchline and Fisher (1969) the brood size of this species is three eggs. In *S. carinatum* Sars (1885) estimated 10 eggs while the estimate by Mauchline and Fisher (1969) was 8 eggs. Whatever be the differences in the estimates by various authors it is found that of all the species of euphausiids in which the fecundity has been studied the species of *Stylocheiron* have been found to produce the minimum number of eggs per brood.

The eggs carried externally by the female euphausiids are generally described as spherical (Wang, 1965; Komaki, 1967). However, Nemoto *et al.* (1972) found that the eggs carried by *Nematoscelis difficilis* were not exactly spherical in shape. The measurements made for the eggs in *S. indicum* during the present studies indicated that the eggs were not spherical

TABLE 2. The number and size of eggs in *S. indicum*

Length of specimen (mm)	No. of eggs with each female	Egg diameter (mm)	
		Major axis	Minor axis
13.00	2	0.983	0.775
		1.007	0.756
13.75	2	0.983	0.662
		0.983	0.662
12.50	3	0.756	0.662
		0.756	0.567
		0.869	0.756
12.75	3	1.143	0.775
		1.040	0.869
		1.115	0.756
13.00	3	0.983	0.756
		1.096	0.662
		0.945	0.624
13.50	3	1.040	0.813
		0.869	0.794
		0.605	0.321

in shape. Table 2 gives the diameter of eggs measured along the major and minor axes.

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