

**NOTES ON THE MATURITY AND SPAWNING OF *OPISTHOPTERUS TARDOORE*
(CUVIER)**

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The present study on the biology of *Opisthopterus tardoore* (Cuvier) was initiated in 1955 as part of the comprehensive investigation of the biology of the common clupeoids of North Kanara. Little is known about the fishes belonging to the genus *Opisthopterus*, excepting the post larval stages of *Opisthopterus tardoore* which have been described by John (1951). In view of this, a detailed study of various aspects of the biology of this species was undertaken, and the present paper relates to notes on maturity and spawning of *Opisthopterus tardoore*, and incorporates the results of investigations carried out in the inshore regions at Karwar.

MINIMUM SIZE AT MATURITY :

To determine the size at which *Opisthopterus tardoore* first matures, the condition of the gonads of 830 specimens was studied. Table I shows the distribution of these specimens of different size groups according to the condition of the gonads. It can be seen from Table I that about 17.24% of the specimens of 140-149 mm were mature; 48.43% of 150-159 mm; 77.21% of 160-169 mm size groups and 100% of 170-179 mm and above. Since about 50 to 78% were mature between 150-169 mm groups, it can be concluded that the first maturity is attained when the fish grows to a length of 150-169 mm. The occurrence of spent gonads at this size confirms the onset of maturity.

TABLE No. I

The number of mature females and the percentages in each 10 mm length

Size groups (mm)	Total fish observed	Number of mature individuals	Percentage of mature fish
60-69	22	..	..
70-79	30	..	..
80-89	30	..	..
90-99	102	..	..
100-109	98	..	..
110-119	52	..	..
120-129	54	..	..
130-139	58	..	..
140-149	58	10	17.24
150-159	64	31	48.43
160-169	79	61	77.21
170-179	73	73	100.00
180-189	52	52	100.00
190-199	35	35	100.00
200-209	23	23	100.00

SEX RATIO : A knowledge of the sex composition of catches is of help in understanding whether any differential fishing exists and if so, what possible bearing it has on the fish stocks.

Sexes of this fish could not be determined externally. In specimens below 100 mm in total length, a microscopic examination of the gonad was found necessary to distinguish the sex. The data analysed reveal that the two sexes were not occurring in about the same proportion. In many samples the females were found to be more numerous than the males—their proportion ranging from 70-80%. Sex distribution in the monthly samples of *Opisthopterus tardoore* obtained during 1960 is shown in Table II. It can be seen from the Table that from February to July, many samples consisted entirely of females and that in all the months the females dominated the catches. The outnumbering of females over males may probably be due to sexual segregation, selective migration, differential fishing or perhaps genetic. More data are required before any positive conclusion is put forward.

TABLE No. II

Sex distribution in the monthly totals of samples of Opisthopterus tardoore examined during 1960. All figures mentioned in brackets are percentages

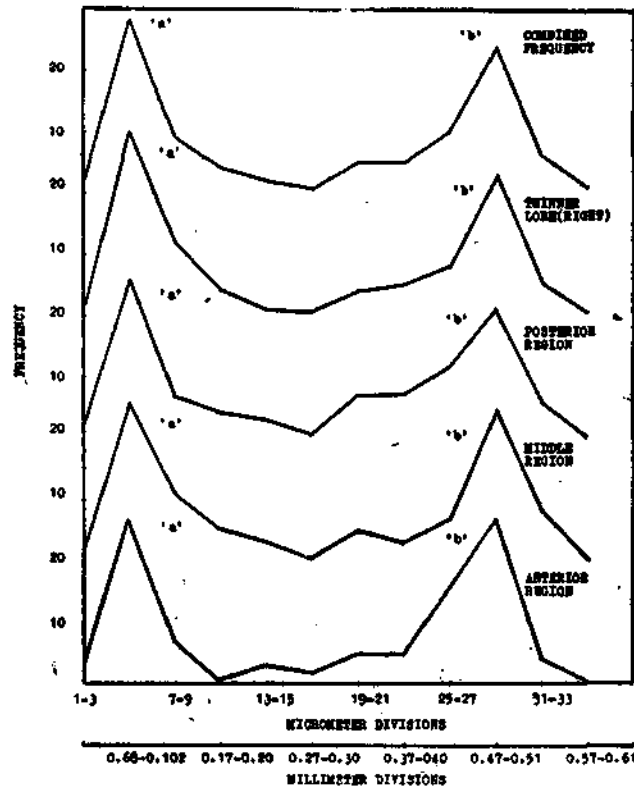
Months*	Female	Male
February	96(96.9)	3(3.00)
March	120(100.0)	..
April	125(81.5)	16(18.5)
May	98(75.4)	32(24.6)
June	102(92.7)	8(7.3)
July	95(79.2)	25(20.8)
August	52(61.1)	33(28.8)

*During other months of the year, only stray catches were netted in the inshore catches and these have not been taken into account.

SPAWNING PERIODICITY :

To find out whether there was any apparent difference in the distribution of eggs either in different regions (anterior, middle and posterior) of the same lobe or in the two lobes of the ovary of the same fish, measurements of ova were taken from the ovaries of a fish measuring 174 mm. in total length. These have been illustrated in Text Figure 1. I. It is seen from the figure, that there is no significant difference in the relative numbers of the ova of different size groups in various regions of the ovary. However, to obviate any possibility of error, samples were taken from different regions of both the ovaries.

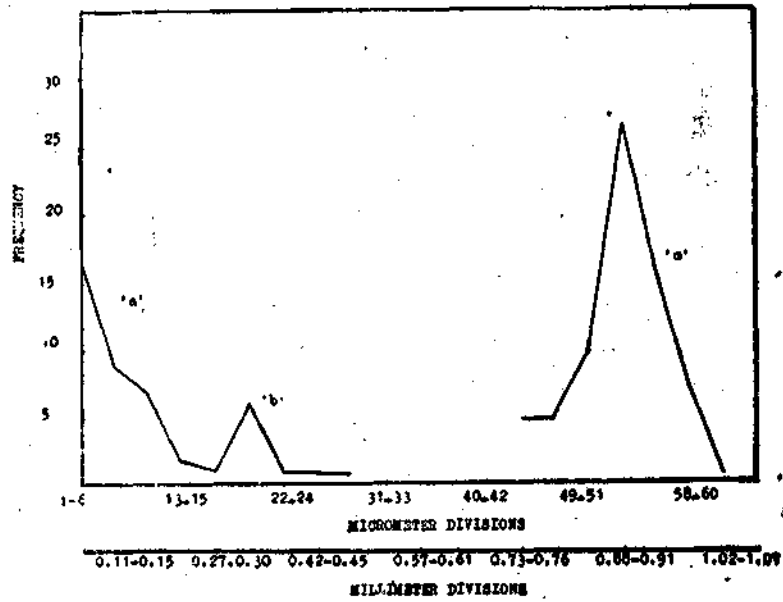
Text figure 2 shows the ova size frequencies in the ovaries of a ripe female measuring 185 mm obtained at Karwar in March 1960. In this curve, there is a preponderance of small immature eggs upto 0.221 mm. At 0.323 mm to 0.357 mm there is a peak (b) of maturing



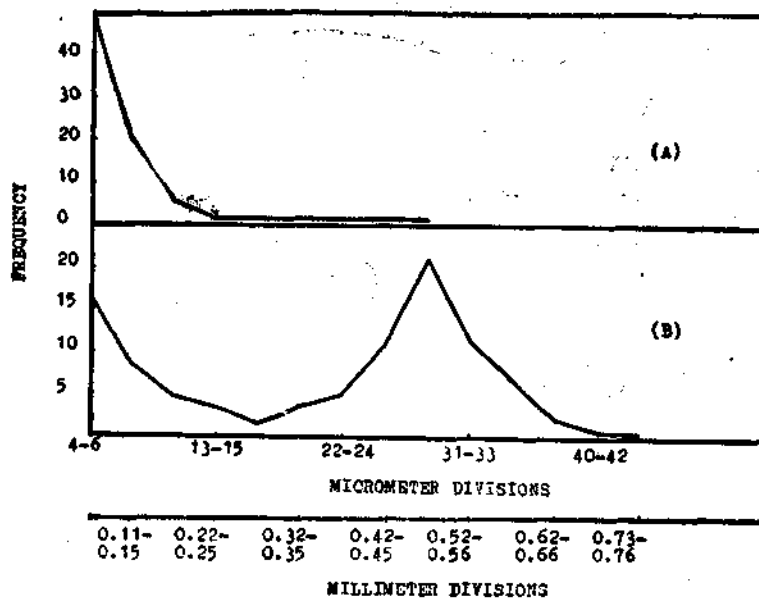
Text Fig. 1—Frequency polygons of the diameters of ova measured from a mature log finned herring, 174 mm. in total length taken on 31-3-1960 at Katwar.

group. This is followed by a gap in the curve and another distinct group (c) of larger eggs whose diameters vary from 0.731 mm to 1.020 mm. The last group represents those eggs which are reaching peak maturity. These will be liberated during the forthcoming spawning season. The ova of mode 'b' are very small, as compared to those of mode 'c'. The presence of the maturing ova in mode 'b' suggests that this batch of eggs forms the stock of later years. Since these eggs only measure 0.510 mm in diameter, it seems unlikely that these will attain the size of 1.020 mm shown by the fully ripe ova of mode 'c'. Therefore, the ova at mode 'b' in all probability form brood of subsequent years. During the coming breeding season, only those belonging to mode 'c' will be spawned. This makes it quite clear that each individual of this species spawns only once a year.

The frequencies of ova 'A' and 'B' in Text figure 3 have been based on eleven spent individuals and thirty four mature individuals respectively. It is clear from the Text figure that in spent fishes there is a single group of immature ova. This may be sometimes accompanied by some residual eggs of the earlier batch. Since in spent ovaries, a clear egg stock measuring more than 0.510 mm is not found, it indicates that all the ova measuring 0.510 mm and above are shed during the spawning season.



Text Fig. 2. Size distribution of ova from an individual measuring 185 mm, (Stage IV of maturity) in *Opisthopterus tardoore* (Cuvier)



Text Fig. 3. Frequencies of ova in eleven spent ovaries and thirty four mature ovaries in *Opisthopterus tardoore* (Cuvier)

SPAWNING SEASON :

The time of appearance of the smaller fishes (0-year group) and the occurrence of spent individuals seem to indicate that the spawning season of this species lasts from February or March to July and August. Mature individuals are noticed in the commercial catches during February and March, which indicates that the spawning season is approaching. Fishes in stage VI could not be obtained in large numbers during the period of investigation, despite the fact that sampling was done continuously. However, some stray specimens were obtained in March. Spent and recovered spents (Stages VII and II) were abundantly recorded from March to August. This shows that spawning had already taken place. For the first time during the season the entry of young individuals into the fishery was noticed during May. These observations clearly indicate that the spawning season of this species commences in late February or early March and extends upto July or August.

SUMMARY

The account presented embodied the results of the investigations on the maturity and spawning of *Opisthopterus tardoore* at Karwar. It is concluded that the fish matures for the first time when it grows to a length of 150-169 mm. Sex distribution of the monthly totals revealed that the females were more numerous than the males. Ova diameter studies indicate that *O. tardoore* spawns only once a year and the entire stock of ova measuring 0.510 mm and above are shed during spawning. The spawning season of this species lasts from late February or early March to July and August.

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