

SPAWNING CONCENTRATIONS OF THE SARDINE, *SARDINELLA GIBBOSA* (BLEEKER), OFF THE NORTH ANDHRA COAST IN MARCH - APRIL 1969

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ABSTRACT

Adult *Sardinella gibbosa* in pre-spawning and spawning stages were observed in March 1969 in Waltair - Kakinada region from catches made 15-20 km from shore. Plankton collections made during this period off Kakinada contained eggs which have been assigned to *S. gibbosa* based on circumstantial evidence and resemblances. Most of the stomachs of *S. gibbosa* examined during the period were either empty or contained very little food. These indicate that there was extensive spawning of the species off the North Andhra coast in March-April 1969.

Although *Sardinella gibbosa* (Blkr) is known to spawn off the east coast during February - April (Sekharan, 1955; Ganapati and Rao, 1957), locations of the actual spawning concentrations have not so far been reported. The observations made by the authors in this regard in the Waltair-Kakinada area in March-April 1969 are presented here.

Sardine in the pre-spawning and spawning stages (V and VI) were first recorded at Waltair on the morning of 1st March '69 and at Kakinada on the morning of the 11th. At Waltair, they were landed by surface gill nets which had been operated the previous night; at Kakinada, surface gill nets were not operated during this period, but the sardine were caught in trawls operated by mechanised boats. At both the centres, the catches were made in grounds 15-20 km from shore. Specimens only in advanced stages of maturity continued to be common at both centres up to the end of March, but were rare in April. The ova diameter frequency of fish (length range 163 - 173 mm) of stages V - VII collected at Waltair and Kakinada in March - April are given in Fig. 1. At each place 6 fish were examined, 3 in stage V - VI and 3 in stage VII. From each ovary about 300 ova were measured. The similarity of the two figures may be noted. The ova of the most advanced batch

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were in different stages of transparency. (The difference in the modal size of this group of ova at Kakinada and Waltair was partly due to the difference in the magnifications used and the grouping of the measurements.)

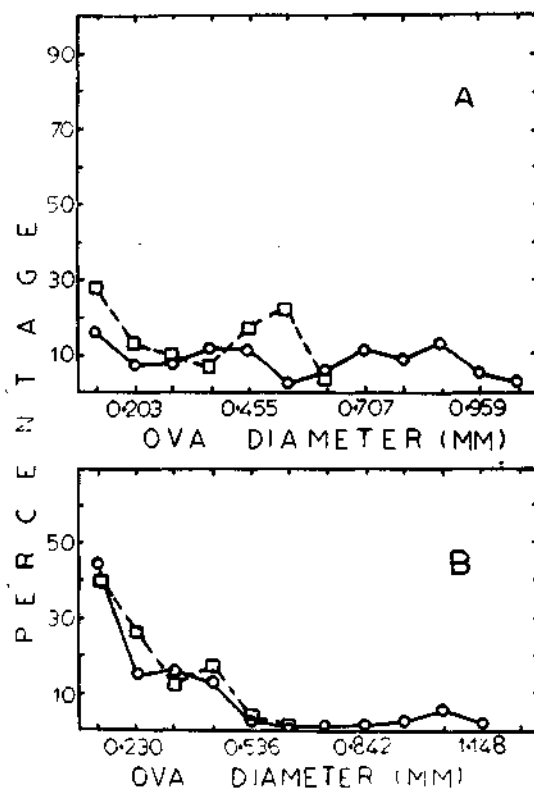


FIG. 1. Ova diameter frequency of mature *S. gibbosa* at Waltair (A) and Kakinada (B), o—o stages V-VI based on 3 specimens each in March, □—□ partly spent stage at Waltair (A) based on 3 specimens in April and spent stage at Kakinada (B) based on 3 specimens in March. Ova less than 0.07 mm not measured.

Observing the large catch of specimens in advanced maturity stages at Kakinada on 11th March, one of us (G.S.R.) made, on the morning of 12th, three 10-minute surface plankton hauls off Kakinada in grounds 20-25 km from shore. Two hauls contained only a few sardine eggs each, but the third one contained a large number of them, based on which the number per m³ of water filtered was estimated at 450,000. The table below gives the frequency distribution of the diameter of the planktonic eggs.

<u>Diameter of ova in mm</u> (mid-points of classes)	<u>Frequency</u>
1.40	4
1.45	9
1.50	25
1.55	28
1.60	23
1.65	7
1.70	4
	<u>100</u>

The diameter of the yolk varied from 0.75 to 0.87 mm (mode 0.78 mm) and that of the oil globule from 0.10 to 0.17 mm (mode 0.13 mm). That these were most probably the eggs of *S. gibbosa* could be made out from the following (see also Fig. 2):

1. These are eggs of the *Sardinella* type (see Bapat, 1955; Nair, 1959).
2. *Sardinella gibbosa* was the only species of *Sardinella* in the running condition observed at Kakinada on the preceding and succeeding days. In fact, other species of *Sardinella* were only rarely recorded in the catches in March-April both at Waltair and Kakinada.
3. The size of the planktonic eggs, 1.4 - 1.7 mm, compares well with the size of the translucent intraovarian eggs of *S. gibbosa* (0.7 - 1.2 mm).
4. The eggs resemble those assigned to *S. fimbriata* by Bapat (1955), but the latter, as described by him, have diameter of only about 1.33 mm. Further, *S. fimbriata* was not recorded in the catches either at Waltair or Kakinada during the second week of March. Hence the present eggs cannot be assigned to *S. fimbriata*.

The eggs hatched out in the laboratory but the larvae could not be reared beyond the second day.

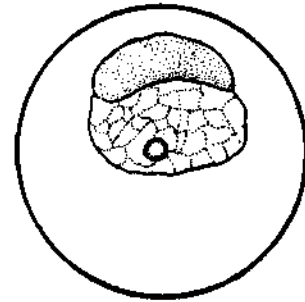


FIG. 2. The planktonic egg (apparently of *Sardinella gibbosa*).

0.33 mm

Chacko (1950) states that the planktonic eggs of *S. gibbosa* have a diameter range of 0.68-0.84 mm. But since the intraovarian eggs of this species themselves are larger, the eggs described by him cannot apparently be assigned to *S. gibbosa* unless there are seasonal or geographic variations in egg size.

On two subsequent days, two of us (M.S.M. and G.S.R.) again made plankton collections off Kakinada, but did not obtain sardine eggs. However, during these trips on board mechanised vessels, large mature *S. gibbosa* were recorded in the catches of the trawls operated in grounds more than 15 km from shore confirming the observations already made regarding the area of congregation of the sardine.

Another indication of spawning having occurred was provided by the examination of the stomach contents of the fish. More than 75% of the number of stomachs examined at Waltair on 1-3-1969 were empty. At Kakinada, no stomach could be examined on 11-3-1969 but those examined on 13-3-1969 contained only small quantities of food. Subsequent samples of stomach both at Waltair and Kakinada contained more quantities of food (copepods, crustacean larvae, mysids, cumaceans and diatoms).

As stated already, the fishery was very poor after April. The estimated catch and catch per unit of effort of the sardine at Waltair and Kakinada are given below (catch and catch per unit of effort in kg; within brackets are given the percentage of *S. gibbosa* in the catch of all fishes).

At Waltair

	Shore seine			Boat seine			Gill net		
	March	April	Total	March	April	Total	March	April	Total
No of units operated	170	115	285	270	290	560	2830	2225	5055
Catch of <i>S. gibbosa</i>	191	10	201	—	—	—	89336	63935	153271
	(5.8%)	(0.2%)	(2.5%)				(86%)	(75%)	(81%)
Catch per unit per day	1.1	0.1	0.7	—	—	—	316	287	303

At Kakinada

	Trawlers (30-60 HP)		
	March	April	Total
Hours of fishing	3714	4287	8001
Catch of <i>S. gibbosa</i>	10541	733	11274
	(5.5%)	(0.4%)	(2.9%)
Catch per hour	2.8	0.2	1.4

Reports showed that heavy catches of large mature sardine were landed not only in the Waltair-Kakinada region, but along the entire North Andhra coast from Machilipatnam to Palasa during March-April. About 53 m. tons of large mature sardine were landed in gill nets in the three villages, Pentakota, Bangarammapeta and Patha Amalapuram near Kakinada on 9-4-69. On the preceding and succeeding

days, however, the sardine catch at these centres was poor. In all centres from where reports were received, sardine catch was very poor in the shore-seines, but good in gill nets, indicating that the sardine were congregated quite some distance from the shore. From the reports of heavy catches, it also appeared that the shoals were moving in a southerly direction.

The size ranges (R) and modal sizes (M) of *S. gibbosa* recorded at Waltair and Kakinada during March-April are given below (Total length):

	R	M
Waltair (gill net)	120-184 mm	130-134 and 160-164 mm
Kakinada (trawl net)	125-184 mm	155-159 mm

The fish were apparently more than one year old (Sekharan, 1955). There were more females than males in the Waltair sample of 1st March, but more males in the April samples both at Waltair and Kakinada. There was no fish in maturity stage lower than IV; the dominant stage was V.

The data presented here indicate that there was extensive spawning of *S. gibbosa* off the North Andhra coast in March-April 1969 in grounds more than 15 km from shore. But only a fringe of this spawning population appears to have been touched by the fishery since the boats (both powered and non-powered) could not proceed beyond a distance of about 25 km from shore. The fishing centres also appear not to have been alerted promptly to the presence of shoals in the grounds capable of being reached even by the non-powered boats. There is therefore the necessity to organise a system in the fishing centres for the quick passing of intelligence about the appearance of shoaling fishes in this region. Further work towards an appraisal of the magnitude of this resource is also necessary.

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