SOME OBSERVATIONS ON THE FISHERY OF *Chorinemus Lysan* FORSKÅL OF THE RAMESHWARAM ISLAND WITH NOTES ON ITS BIOLOGY

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Introduction

Several species of carangids are known to occur in the Palk Bay and Gulf of Mannar in the vicinity of Mandapam of which *Selaroides leptolepis, Selar kalla, Caranx sexfasciatus, C. carangus C. ignobilis, Carangoides armatus, Atropus atropus, Megalaspis cordyla* and *Chorinemus lysan* are the most common species and important from the fishery point of view. Krishnamurthi (1957) estimated that the first three species mentioned above, usually caught in the shore seines, contributed to 2.72% and 1.66% of the total catch of fish on the Rameswaram Island in the years 1952-53 and 1953-54 respectively. The occurrence of other species of carangids has been stated to be sporadic and hence considered commercially unimportant by him.

It is well known that for various reasons the species contributing to a fishery at any particular locality are subject to change with time in variety as well as abundance. Species which have been abundant for some years may show a decline and the reverse may also be true. Changes in regional fisheries are also necessitated by shifting of the fishing grounds associated with changes in the gear employed. During the course of a general fishery survey and biological observations on the field in the years 1961 and 1962, the author had the opportunity to examine the drift net catches at Rameswaram and Thangachimadam (Palk Bay) and Pamban (Gulf of Mannar). While the general composition of the drift net catches does not appear to have substantially changed from what was known a decade ago, the percentage composition of *Chorinemus lysan* (known as Katta in Tamil language) in these catches seems to have altered markedly, the species now exclusively supporting a seasonal fishery of considerable importance on the Rameswaram Island of which there is no record hitherto. Other species of *Chorinemus* are of stray occurrence in the area and do not contribute to the fishery. Therefore, some observations made by the author on this fishery together with notes on the biology of the species and the characteristic structure and disposition of its gonads are presented in this paper. Although preliminary, these observations are the first to be made on this important commercial fishery and thus provide the necessary basic information.

Fishery

Fishing season, methods and grounds.—The season for the fishery on the Island extends from about February to July with peak catches in March and April.

C. lysan is commonly caught in drift nets called *Vali vaini* operated from Tuticorin type of boats. Each piece of the net is about 75 metres long and 12 metres broad with a mesh size of 9 cm. knot to knot. A thick rope runs along one side of the net to which floats are attached. The other side is free, to which sinkers are attached. Usually 15 such pieces are attached end to end to constitute the net operated by 5 persons. The nets are set in the sea by about 6 P.M. and operated at depths varying between 8-10 fathoms. Usually two hauls are made by day break and the catches are landed by about 10 A.M. The species is also caught occasionally in bottom set gill nets called *Pachu valai* operated from mechanised boats but the major catches come from drift nets.

Good fishing grounds for the species are reported to exist at *Kachchtivu* (79° 31′E, 9° 23′N) and *Neduntivu* (79° 43′E, 9° 34′N) off the Rameswaram coast (Palk Bay). The species is also caught off Thangachimadam (Palk Bay) and Pamban (Gulf of Mannar) with comparable results as at Rameswaram. Elsewhere along the coasts of Palk Bay and Gulf of Mannar only stray specimens have been observed by the author.

Size composition and sex ratio.—Samples of fish have been examined at random on certain days, the particulars of which are given in Table I. All length measurements given in this paper refer to total length from tip of snout to tip of upper lobe of caudal fin.

Table I

Particulars of size composition, sex ratio and maturity of C. lysan.

Date	Total No. of fish examined	Males			Females		
		No.	Size range (cm.)	Stage of maturity	No.	Size range (cm.)	Stage of maturity
10-4-62 .	26	12	77.5-96.0	III	14	74.5-128.0	III & IV
17-4-62 .	18	7	90.-102.2	III	11	84.5-102.5	III & IV
24-4-62 .	17	11	77.0-96.0	II & III	6	90.0-92.0	II & III
27-4-62 .	15	8	44.0-114.0	I, II & IV	7	72.0-109.4	I, III & IV
11-6-62 .	12	8	69.0-98.0	I & III	4	75.5-98.5	II & III
18-6-62 .	9	3	71.5-79.0	II	6	57.5-92.0	II & III

The total size range varies between 44.0-128.0 cm. but the commercial size ranges between 70.0-110.0 cm. Maturing (Stage II) and mature (Stages III & IV) fish contribute to the fishery. Juveniles and immature fish are landed only occasionally which may partly be due to the selectivity of the gear. Sexes appear to be equally distributed in the commercial catches, the ratio for the total period being 49:48 males to females (Table I).

Catch particulars.—Particulars of catch of *C. lysan* in a few boats examined at random on certain days together with the total catch are given in Table II. Catch particulars from the Tuticorin type of boats and mechanised boats are shown separately. It may be seen that *C. lysan* contributes to a greater portion of the catches in the season from both the types of boats.

Curing and disposal of catch.—The major quantity of the catch is pit cured with salt. In this process, the back of the fish is slit without removing any of the parts and large amounts of salt are pushed inside the body cavity and gill openings. The salted fish are arranged in layers with alternating layers of salt in pits along the beach. The pits filled with salted fish are covered by palmyra leaf mats and then by sand. The fish are left in this condition usually for a day after which they are removed, washed and packed with fresh salt and transported to marketing places. The fresh fish after removal of the head with gills, fins and the visera including the gonads are cut into several pieces, washed in sea water, packed in ice and sent to interior places. Fresh fish are also packed whole in ice and transported to marketing centres.

The market price of fresh fish is 60 paise per kg. and that of cured fish 62 paise per kg.

Notes on Biology

Maturity and spawning.—The fish have been classified into the various stages of maturity depending on the relative space the gonads occupy in the body cavity and the microscopic structure of ova.

During the fishing season both males and females were found to be in stages II, III and IV (gonads occupying from 1/3, 1/2 and 2/3 space of body cavity respectively). Fish with ripe gonads or in the spawning stage have not been encountered. The ova diameter frequency polygon of a mature ovary (Stage IV) indicates that apart from the immature group of eggs (which have not been measured) there are two more groups representing the maturing and mature stock of eggs (Fig. 1). The maturing group of eggs range in size from 0.18 to 0.42 mm and the mature group from 0.42 to 0.67 mm. Since the maturing group is clearly demarketed and situated about half way between the immature and mature groups of eggs, it is likely that individuals spawn at least twice during the spawning season. Spent fishes have been recorded in April and September. One juvenile of

TABLE II

Particulars of catch of C. lysan *at Rameswaram*

Date	Tuticorin type of boat/drift net					Mechanised boat/drift net				
	Total no. of boats operated	Total no. of boats observed	Total catch (kg.)	Catch of *C. lysan* (kg.)	Percentage composition of *C. lysan*	Total no. of boats operated	Total no. of boats observed	Total catch (kg.)	Catch of *C. lysan* (kg.)	Percentage composition of *C. lysan*
3-4-62	88	18	1449.70	303.46	20.9	4	4	402.80	301.65	74.8
6-4-62	27	7	481.27	82.10	17.1	4	4	717.14	676.31	94.3
10-4-62	154	16	1378.49	101.60	7.3	4	4	354.26	67.13	18.9
13-4-62	132	13	888.15	226.80	25.5	4	4	861.38	567.45	65.8
17-4-62	62	12	976.15	229.52	23.5	4	4	356.99	164.66	46.1
24-4-62	63	12	732.57	75.76	10.3	4	4	227.25	75.30	33.1
27-4-62	127	13	913.55	136.99	14.9	1	1	187.79	58.79	31.4
28-4-62	12	6	246.30	Nil	..	3	3	131.99	76.21	57.7
4-6-62	4	4	667.24	10.43	1.5	1	1	18.59	Nil	..
11-6-62	12	6	305.72	35.38	11.5	3	3	189.16	154.67	81.7
18-6-62	12	6	464.03	12.25	2.6	2	2	83.92	54.43	64.8
25-6-62	24	6	610.54	Nil	..	3	3	158.30	112.47	71.0
2-7-62	36	9	657.72	29.94	4.5	3	3	58.06	5.90	10.1
16-7-62	41	10	1009.26	131.54	13.0	..	..	..	..	..
30-7-62	34	8	310.72	4.54	1.4	..	..	..	..	..

(..) = No fishing.

this species measuring 78 mm from a shore seine (*Ola valai*) at Vedalai (Gulf of Mannar) on 23-4-62 and another 85 mm from shore seine (*Kara valai*) at Panaikulam (Palk Bay) on 9-3-65 have been collected. The occurrence of mature

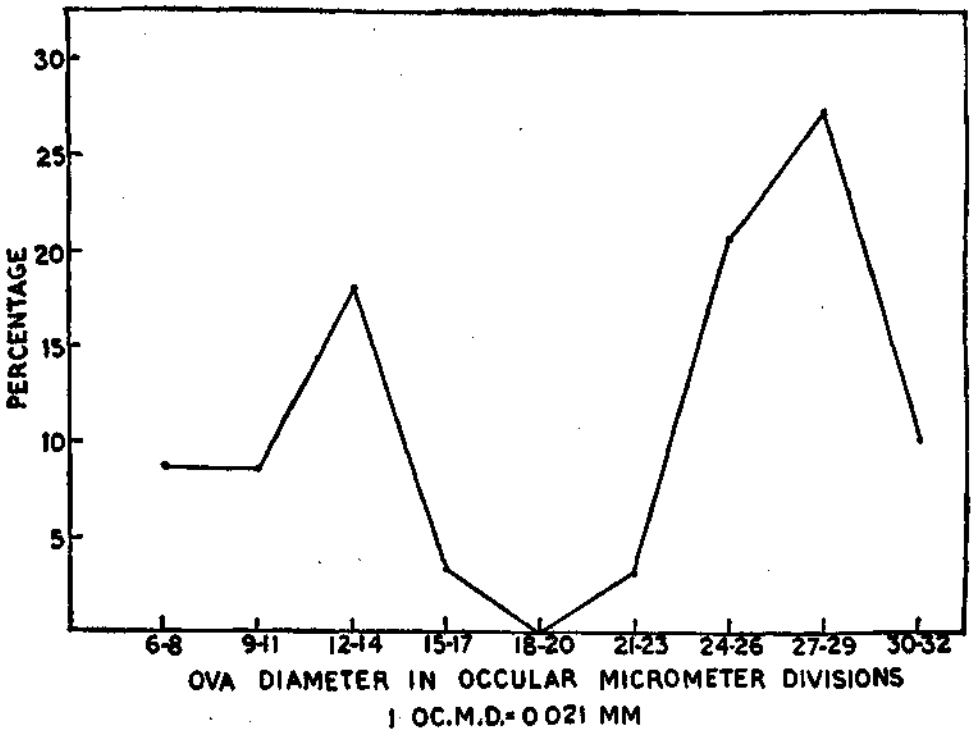

FIG. 1. Ova diameter frequency polygon of a mature ovary (Stage IV) of *C. lysan*.

fish from April to June and spent fish in April and September and juveniles only once a year during March-April indicates that the species probably spawns from about April to August. Two young ones 122 and 136 mm have been collected from trawl net on 16-9-65 operated at a depth of 6 fathoms off Mandapam in the Palk Bay. Young ones of this species, locally called *Kora* ranging in size between 28.0 to 40.0 cm have been noticed in the drift net catches at Rameswaram on 27-8-62. The rarity of the juveniles measuring less than 10.0 cm may either be due to the selectivity of the gear employed or the spawning of the species outside the inshore fishing grounds.

Fecundity.—Ovaries of four fish ranging in size between 90.0 and 113.5 cm which were in Stages III and IV have been collected for a study of the fecundity. The ovaries were preserved in 5% formalin and after removing excessive moisture, the weight of the ovaries was determined. One piece was taken from ovary, weighed separately and the number of mature eggs in each sample was

determined and from this the total number in the ovaries was estimated. Total number of eggs ranged from 8 to 35 lakhs (Table III).

TABLE III

Particulars of number of mature eggs in C. lysan

S.No.	Date of collection	Length of fish (cm.)	Stage of maturity	Maximum length of ovary (cm.)	Weight of ovary (gm.)	Total No. mature eggs in the ovaries
1	10-4-62	113.5	IV	35.0	361.0	34,45,143
2	10-4-62	90.0	III	24.0	215.6	15,49,948
3	17-4-62	91.5	III	16.8	79.7	8,98,105
4	17-4-62	111.5	IV	32.0	412.9	33,12,834

Stomach contents.—Examination of stomach contents of 50 specimens ranging in size between 77.5 to 114.0 cm revealed that none of them had the stomachs full during the season indicating a probable partial cessation of feeding prior to and during spawning. Those that had stomach contents were only ¼ full, rest of the space being occupied by fluid. The stomach contents include partly digested remains and in certain cases complete specimens of *Hilsa toli* and *H. kanagurta.* Incidentally it may be mentioned here that mature *H. kanagurta* (common size 14 cm fork length) are frequently caught in drift nets and shore seines in this area during the period February to April. Specimens of *H. toli* (common size 10 cm fork length) have also been recorded in the drift net catches. Empty stomachs were quite common. This feature and the presence of fluid may be due to the fish being held within the net for several hours in the sea.

The stomach contents of two young specimens measuring 122 and 136 mm collected on 16-9-65 from a trawl net operated at 6 fathoms depth in the Palk Bay off Mandapam included fish scales and *Lucifer* remains and fish scales and a juvenile of *Leiognathus* sp. respectively.

Parasites.—A number of bladders (young stages of cestodes) were found attached to the mesenterial folds and the surface of the ovaries. The peritoneal membrane of the body cavity was also highly infested by them. However, no adult worms have been noticed.

The structure and disposition of Gonads.—The gonads in most teleostean fishes are paired, tubular or saccular structures with smooth contours. In some cases the right and left gonads are fused, partly fused or lie closely adherent. They

may be symmetrical or asymmetrical (with one of the lobes larger than the other). Several authors have described the structure and peculiarities of gonads in teleostean fishes (Sedgwick, 1905, Goodrich, 1930; Bridge, 1932; Kamalaveni, 1961; Thomas and Raju, 1962; Bensam, 1964 and others) but during the course of the present observations the author noticed that the gonads of *C. lysan* are very characteristic in their shape as well as disposition, of which there has been no account hitherto. Therefore, a detailed description of the gonads of this species is given below.

The gonads are paired organs suspended in the body cavity which is confined to about the anterior one-third length of fish. Consequently, the genital aperture is situated anteriorly. Beyond the regular body cavity, one pocket on either side (Fig. 2) which is a direct continuation of the body cavity to accommodate the posterior part of air bladder and the enlarged gonad of that side during breeding season, extends up to the 9th haemal spine (externally opposite the 12th ray of second dorsal and 10th ray of anal). Unlike the body cavity proper, the posterior extensions are lined only by muscles.

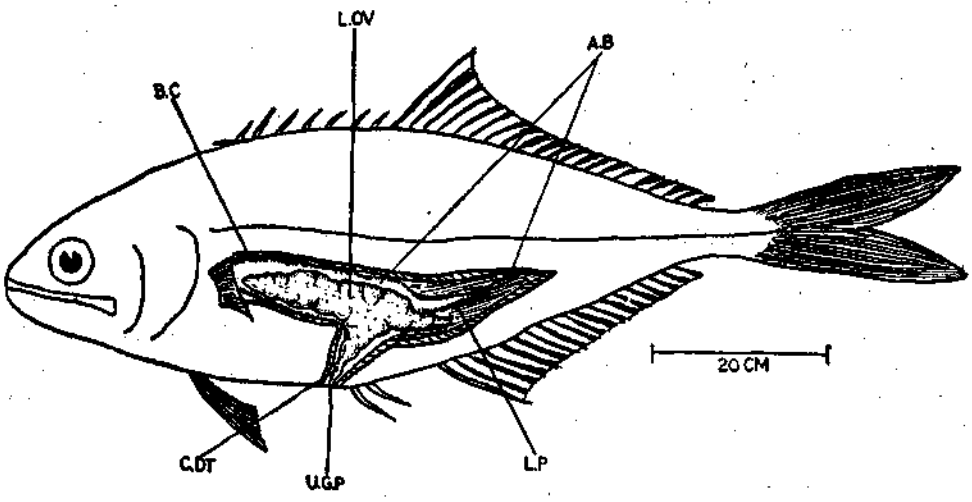

FIG. 2. Lateral view of a dissected specimen of *C. lysan* showing the internal disposition of gonads and air bladder in the body cavity and its extensions. A.B: Air bladder ; B.C. Body cavity ; B.V: Blood vessels ; C. DT: common duct ; L.OV: Left ovary; L.P: Lateral pocket ; U.G.P: Urino-genital pore.

Each ovary is typically 'Y' shaped (Fig. 3A) with one arm and stem of 'Y' running along the middorsal line of the body cavity. The ventral arm of each oary joins the fellow of the opposite side to open at the genital pore. The right ovary is distinctly larger than the left, with its posterior end elongated into a tapering lobe. The posterior ends of mature ovaries (the stem of 'Y' in each case) lie in pockets of space referred to above beyond the regular body cavity (extra peritoneal) and are intervened by the haemal spines and muscles. When cut open from a side, the posterior portion of the ovary of

that side only is visible because these portions lie beyond the regular body cavity in the caudal region of the fish. Since the posterior free end of the right ovary is longer than the left, it extends for a greater distance into the pocket than the other. The outer surface of the ovaries is convex with faint grooves along the margins whereas the inner surface is flat.

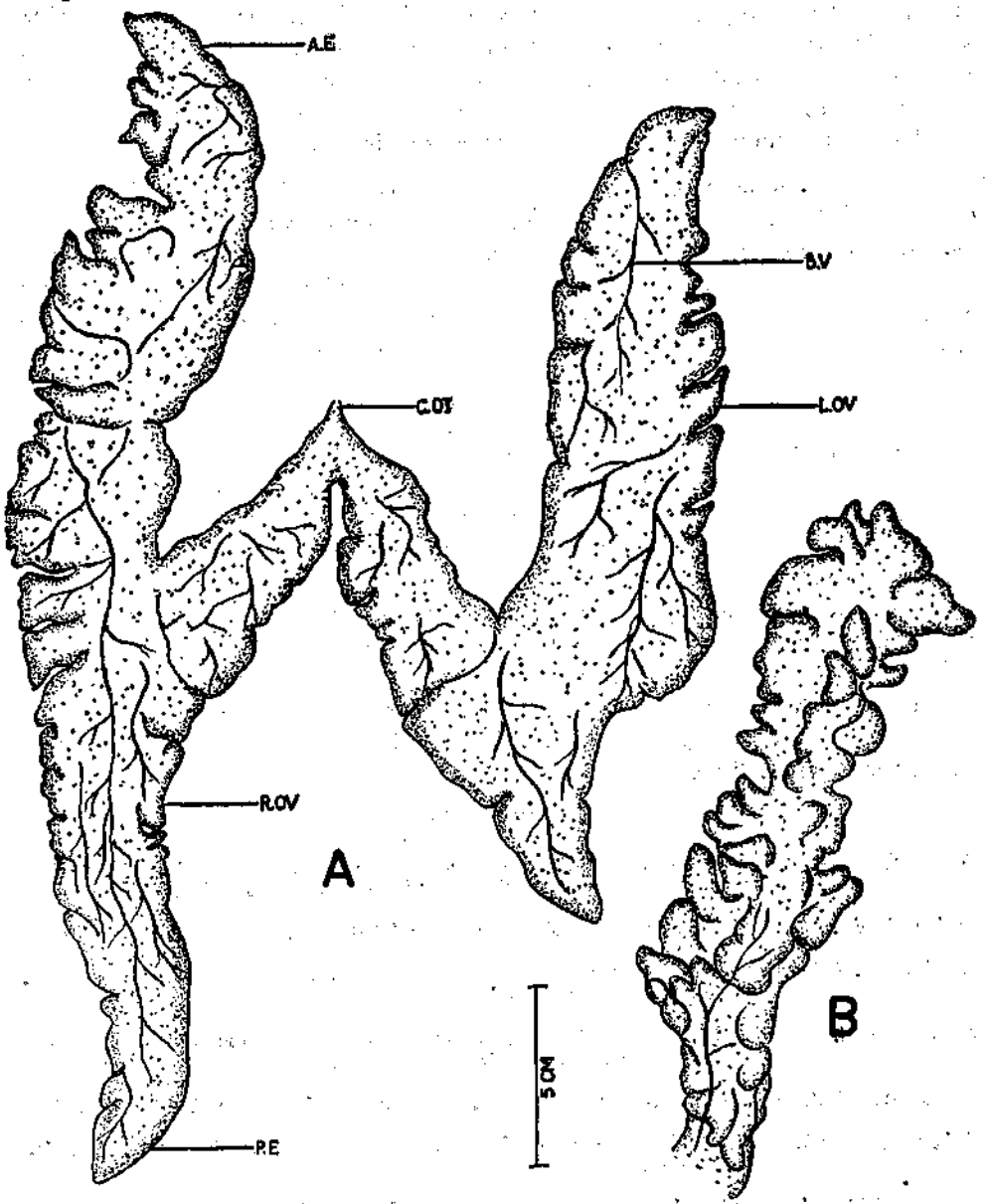

FIG. 3A. The ovaries of *C. lysan*. A.E: Anterior end ; B.V: Blood vessel; C.DT: Commso duct; L.OV: Left ovary ; R.OV: Right ovary; P.E: Posterior end. B. A portion of testn to indicate their highly lobulated nature.

Like the ovaries, the testes are also 'Y'—shaped with the inner surface flat and the external surface highly lobulated (Fig. 3 B). The free limbs of 'Y' are longer and the basal united portion shorter in the testes than in the ovaries.

In the advanced stages of maturity (Stages III and IV) the posterior ends of the ovaries (especially of the right ovary) extend as far as the 6th haemal spine whereas in the immature or spent condition they hardly extend into the pockets. The testes also extend into the pockets in the advanced stages of maturity. The mature ovaries are bright yellow and the testes creamy white in colour with the blood vessels prominent both on the external and internal surfaces.

Incidently, it may be of interest to note that the air bladder of *C. lysan* (Fig. 2) consists of an anterior, median, broad chamber which divides into two narrow blind diverticula at the level of the first haemal spine and extend to the tip of the pocket on either side. The anterior chamber lies in the body cavity and extends up to the auditory region in front. During the breeding season the enlarged gonads extend into the lateral pockets ventral to the air bladder.

SUMMARY

Some observations on the fishery and biology of *C. lysan* of the Rameswaram island are presented to indicate the importance of the fishery. The fishery is seasonal from about February to July with peak catches in March and April constituted by mature fish. Spawning season appears to extend from April to August, individuals spawning at least twice in the season. The rarity of fish in the spawning condition indicates that the spawning grounds are outside the fishing areas. Sexes are equally distributed and adults seem to feed mainly on larger fishes whereas young ones subsist on smaller fishes and crustaceans. Though consumed fresh, majority of the catch is salt cured. The characteristic structure and disposition of the gonads and air-bladder in this species are described in detail for the first time.

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