

MORPHOLOGICAL MEASUREMENTS, GONADAL DEVELOPMENT
AND ESTIMATED AGE OF ADULT MILKFISH, CHANOS CHANOS
CAPTURED IN PANDAN BAY FROM 10 MAY - 16 JUNE, 1975*

by

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Abstract

From 10 May to 16 June, 1975, 106 adult milkfish were captured in an otoshi-ami 500 meters offshore. Of the 106 specimens, 37 were females in various stages of gonadal development or spent and 69 were males of which 41 were sexually mature. The age of these fishes were estimated to be between 3 and 5 years.

Introduction

From 10 to May 16 June, 1975, the SEAFDEC study team which was stationed in Pandan, Antique Province, Philippines (Kumagai et al., 1976) obtained 106 adult milkfish, Chanos chanos from the otoshi-ami adjacent to the laboratory site at Mag-aba, Pandan. Information on the length, weight, gonadal development, gonado-somatic indices of the captured milkfish together with records on salinity and temperature of water at the otoshi-ami have been detailed in this report. Attempts have also been made to determine age of these sabalo by study of their scales.

Materials and Methods

The daily routine of the commercial fishermen working on the otoshi-ami at Mag-aba included lifting the bag of the net and collecting the fish catch at about 0400, 1200 and 1600 hours. Members of the study team accompanied the fishermen daily and obtained water samples from depths of 5, 15 and 30 meters during the 1200 hour fishing operation. Water temperatures were recorded immediately and the salinity of each sample was determined at the laboratory. Whenever adult milkfish (sabalo) were caught in any of the three daily catches

*This work has been partially supported through a grant to SEAFDEC by the International Development Research Centre under project No. 3-P-74-0146.

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they were usually killed at the otoshi-ami and transported to the laboratory within one hour of removal from the net. Prior to arrival of the study team at Mag-aba on 13 May, the commercial fishermen captured 19 sabalo on 10 May. These specimens were immediately placed in a holding pen constructed of 2-inch (5 cm) stretch mesh knotted nylon net 12 m x 13 m x 15 m deep adjacent to the otoshi-ami. On 14 May these fish were killed and designated as sample Nos. 1-19 by the study team. Fourteen of the sabalo captured on 18 May were also placed in the holding pen and 2 of these (Nos. 64 and 66) were killed on 24 May while the remaining 12 (Nos. 76-87) were killed on 27 May. All specimens which were held in the holding pen sustained multiple injuries and had opaque adipose eyelids at the time of sampling.

After recording the length and weight of each sample at the laboratory, gonads were weighed and preserved in 10% seawater formalin. Similarly, the anterior spiral portion of the oesophagus was preserved in 10% seawater formalin for qualitative analysis of its contents as reported by Villaluz et al. (1976).

Two specimens of female sabalo containing almost sexually mature ovaries were captured in a fish corral located at Hamtik, Antique, 100 km south of Pandan on 8 April and 8 May. Fecundity of these samples and of Mag-aba sample No. 62 was determined gravimetrically (FAO 1958).

Five scales were removed from each of the following four regions of each sabalo sampled: (1) midway between the lateral line and the dorsal fin; (2) immediately posterior to the ventral fin; (3) directly above the pelvic fin; and, (4) around the anus. The scales were air-dried and approximately two months later were cleaned in warm water to remove attached mucus and re-dried. The cleaned and flattened scales were examined at a magnification of 400 times and the age of each fish estimated by the method followed by Chiu (1965). This method, developed for age study of silver carp, consists of counting the number of sets of discontinuous lines as illustrated in Fig. 1. Scales collected from above the pelvic fin did not contain clear sets of continuous lines and were discarded. Scales from the other three regions on each fish contained the same line patterns and were used for estimating the age.

Results and Discussion

The total daily catch of adult milkfish from the Mag-aba otoshi-ami between 10 May and 16 June, 1975, together with those obtained from the operator of the otoshi-ami during January to 4 June, 1974 and from January to 9 May, 1976 were recorded and data analyzed.

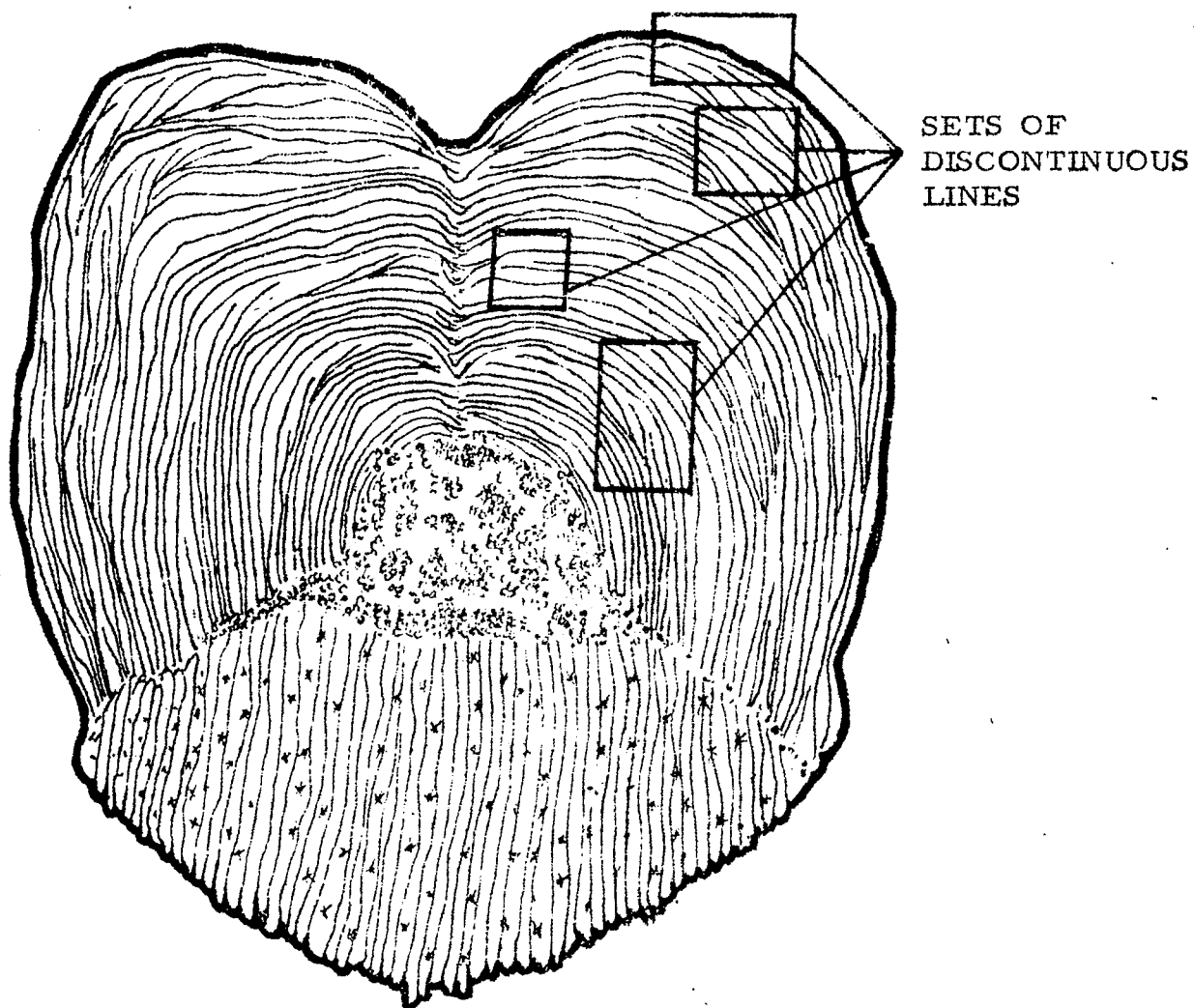


Fig. 1. Diagram of a typical dorsal scale from a Sabalo with an estimated age of four years.

The temperature and salinity data obtained from the operator of the net and also collected by the study team is presented in Table 1.

Although the otoshi-ami was in operation from December to late June during the 1973/74 and 1974/75 fishing seasons, no sabalo was caught prior to late April 1974 or early March 1975. Of the 106 specimens obtained by the study team during 1975 (Tables 2 and 3) 37 were female in varying stages of gonadal development or spent, and 69 were males of which 41 were either sexually mature, or partially spent with freely flowing milt. Five or more scales from each of the 81 of the 106 sabalo obtained from the Mag-aba otoshi-ami contained distinct sets of discontinuous lines. The age of these 81 fish were estimated to be between 3 and 5 years. From preliminary observations, Tampi (1957) suggested that the age of female milkfish at first maturity may be between 4 and 5 years and Liao (1971) estimated the age of 9 adult milkfish caught in the colder waters of Taiwan, to be between 5 and 7 years.

Sets of discontinuous lines were absent from the scales obtained from several six to eight months old pond-reared milkfish. However, two sets of discontinuous lines were present in the scales of two 2-year-old female fish obtained from the Bureau of Fisheries fishpond at Naujan, Mindoro. These two fish weighed 1.2 and 1.5 kg with fork lengths 43 and 45 cm and total lengths 53 and 57 cm respectively. Histological examination of the ovaries from these two fish showed the beginning of ova development which is in agreement with the findings of Tampi (1957).

Ovaries with developing ova were light yellow or pale orange in color while the ovaries from spawned fish were dark reddish-brown. The total number and diameters of ovarian eggs from Mag-aba Sample 62 and the 2 samples from Hamtik are presented in Table 4 together with data from other investigators.

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Table 1. Range and mean monthly water temperature ($^{\circ}\text{C}$) and salinities ($^{\circ}/\text{oo}$) at depths of 5, 15 and 30 meters during the 1974-75 fishing season at the otoshi-ami located at Mag-aba, Pandan, Antique.

	Dec. '74	Jan. '75	Feb. '75	Mar. '75	Apr. '75	May '75	June '75
Depth							
Temperature							
($^{\circ}\text{C}$)							
5	26.0-27.8 (26.5)	24.5-26.9 (25.8)	23.5-27.0 (25.5)	26.0-28.0 (26.8)	26.0-28.5 (27.5)	28.0-30.1 (29.5)	28.5-30.4 (29.1)
15	26.0-28.0 (26.5)	24.9-26.8 (25.9)	23.5-27.0 (25.5)	26.0-28.0 (26.8)	26.0-28.5 (27.5)	27.7-29.8 (29.5)	27.3-29.5 (28.7)
30	26.0-28.0 (26.5)	25.0-26.9 (25.9)	23.5-27.0 (25.5)	26.0-27.0 (26.8)	26.0-28.5 (27.6)	27.7-29.6 (29.0)	27.0-28.8 (28.2)
Salinity							
($^{\circ}/\text{oo}$)							
5						May 15-30	June 1-17
						33.4-35.0 (34.2)	31.9-34.4 (33.3)
15						33.2-35.2 (34.6)	32.6-34.4 (33.4)
30						34.0-36.4 (35.0)	32.9-35.4 (34.2)

Table 2. Fork Length, body weight, ovary weight and estimated age of adult female milkfish

Date of Catch & Fish No.	Fork Length (cm)	Fork Weight (kg)	Ovary Weight (gm)	Gonadal Development	Gonado-somatic Index	Estimated Age
May 10/75						
1	87.5	7.70	50	Spent	0.65	-
2	76.0	5.32	40	"	0.75	3
4	75.0	5.20	25	"	0.48	3
7	79.0	6.50	60	"	0.92	-
8	83.5	6.10	20	"	1.31	-
9	75.0	6.45	20	"	0.31	-
12	85.5	7.00	80	"	1.14	4
13	72.5	5.60	70	"	1.25	3
14	76.0	5.90	75	"	1.27	4
15	89.4	6.15	95	"	1.54	-
16	81.6	6.80	90	"	1.32	4
18	81.6	7.27	70	Developing	9.32	4
19	77.0	5.75	95	Spent	1.65	3
	(85.5)	(6.28)				
May 18/75						
24	84.5	6.37	190	Spent	2.98	5
64	77.3	6.25	60	"	0.16	3
76	78.5	5.80	66	"	1.14	4
78	76.7	5.80	59	"	1.02	4
80	81.0	6.65	119	Developing	1.79	4
83	74.5	5.15	48	Spent	0.93	4
86	72.8	5.13	136	"	2.65	-
87	76.1	6.54	50	"	0.76	4
	(77.7)	(5.96)				

Figures in parentheses represent mean length and body weight of fish caught on the same day.

Table 3.. Fork length, body weight, testes weight and estimated age of adult male milkfish

Date of Catch & Fish No.	Fork Length (cm)	Body Weight (kg)	Testes Weight (gm)	Gonadal Development	Gonado-somatic Index	Estimated Age
May 10/75						
3	77.0	5.47	20	Spent	0.36	3
5	78.0	4.50	10	"	0.22	3
6	85.0	4.57	10	"	0.22	-
10	75.0	5.35	20	"	0.37	-
11	80.5	5.90	40	"	0.68	-
17	76.0	6.20	50	"	0.81	4
	(78.6)	(5.33)				
May 17/75						
20	83.0	6.35	80	Spent	1.26	-
May 18/75						
21	77.0	6.22	265	Mature	4.26	3
22	76.5	6.52	315	Mature	4.83	4
23	74.0	4.95	105	Mature	2.12	4
66	72.2	4.95	80	Spent	1.62	-
77	80.5	6.00	20	Spent	0.33	4
79	74.6	4.85	14	Spent	0.29	4
81	74.7	5.55	20	Spent	0.36	4
82	70.5	4.10	8	Spent	0.19	-
84	73.9	5.55	19	Spent	0.34	4
85	75.9	5.70	21	Spent	0.37	4
	(75.0)	(5.44)				
May 19/75						
25	85.0	7.15	230	Mature	3.21	-
26	73.5	6.15	99	Spent	1.61	4
30	76.5	6.25	250	Mature	4.00	3
31	77.5	5.75	60	Spent	1.04	4
	(78.1)	(6.33)				

Figures in parentheses represent mean length and body weight of fish caught on the same day.

Table 3. (cont'd.)

Date of Catch & Fish No.	Fork Length (cm)	Body Weight (kg)	Testes Weight (gm)	Gonadal Development	Gonado-somatic Index	Estimated Age
May 24/75						
63	71.1	5.70	210	Mature	3.68	3
65	74.8	6.70	410	Mature	6.12	3
	(73.0)	(6.20)				
Mat 25/75						
69	73.3	6.81	345	Mature	5.07	4
70	74.2	6.75	180	"	2.67	4
71	72.5	5.50	130	"	2.36	4
72	68.7	4.70	174	"	3.70	4
73	74.2	5.85	237	"	4.05	5
74	76.2	6.34	123	"	1.94	4
	(73.2)	(5.99)				
May 26/75						
75	77.0	7.40	365	Mature	4.93	4
May 28/75						
88	79.1	6.65	100	Spent	1.50	4
89	72.1	5.65	300	Mature	5.30	4
90	74.9	5.40	110	"	2.04	4
92	75.6	6.23	230	"	3.70	4
93	71.2	5.30	100	Spent	1.80	4
94	78.0	6.60	110	Mature	1.66	5
	(75.2)	(5.97)				
May 29/75						
95	71.4	5.10	127	Mature	2.49	4
96	73.2	5.80	224	"	3.86	4
97	75.4	5.93	290	"	4.89	-
98	75.0	5.80	200	"	3.45	4
99	77.0	5.40	18	Spent	0.33	4
	(74.4)	(5.60)				

Table 3. (cont'd.)

Date of Catch & Fish No.	Fork Length (cm)	Body Weight (kg)	Testes Weight (gm)	Gonadal Develop- ment	Gonado- somatic Index	Esti- mated Age
June 15/75						
103	72.1	5.85	326	Mature	5.57	4
June 16/75						
104	77.5	6.60	280	Mature	4.24	3
105	67.4	4.60	150	"	3.76	3
106	78.0 (74.3)	5.30 (5.50)	460	"	8.68	3

Table 4: Fecundity and size of milkfish eggs.

Reference	Sample Number	Gonado-somatic Index	Number of Eggs	Egg Diameter (mm)
1. Ovarian eggs in late stages of maturation:				
Sunier 1922			5,700	
Reijntjes 1923 ²			4,200	
Herre 1929 ²			3,060	
Adams et al 1932 ¹			3,000	
Tampi 1957	1	6.9	2,118	0.5 - 0.8
	2	8.6	3,433	0.5 - 0.7
	3	10.3	4,896	0.5 - 0.8
Liao 1971	2	11.6	3,180	0.9 x 1.0 1.3 x 1.5
	5	3.3	1,319	0.5 x 0.6
	8	24.9	3,288	1.1 x 1.2
Present study	62	7.7	2,113	0.7
Hamtik	8/4	4.2	3,717	0.6
	8/5	11.5	3,968	0.8
2. Eggs undergoing resorption:				
Tampi 1957				0.2
Present study	68			1.5
3. Fertilized eggs				
Delsman 1929				1.2

¹ Cited by Tampi 1957

² Cited by Schuster 1960