BIOLOGICAL STUDIES

ON

RHONCISCUS STRIATUS (FAM. POMADASYIDAE) FROM THE GULF OF SUEZ

By

Th. S. Shenouda
M. Sc.
Research Assistant

Dr. A.F.A. Latif
Research Professor

Oceanography and Fisheries
Institute.

I. INTRODUCTION

The Gulf of Suez is one of the important participants of the water wealth resources in A.R.E., yet its fisheries is considered to be still virgin. Trawling and purse-seining are two principal methods of fishing in the Gulf, and the former yields about 50% of its total annual production. About 600 fishermen and sailors with 55 trawlers were operating by this method during 1963 to 1966. The nets used for trawling are the typical Italian Otter-trawls with some modifications in the mesh size of the cod-end (Nassif and Zaki, 1960). Fam. *Pomadasyidae* is one of the most important economic families-and its members are mainly caught by trawlers (about 99%)-and of a good taste and cheep price. However, as far as I know, no study has been previously undertaken for the fisheries of this family in A.R.E. This study was therfore undertaken and we hope that it will focus some light on this important family and may contribute to some extent in managing the total fisheries of the Gulf.

II. FAMILY POMADASYIDAE

Fishes of Fam. *Pomadasyidae* are small sized with bright colours, and laterally compressed. They usually live in shallow waters of warm seas. This family is represented in the Gulf of Suez by two genera, viz: *Pomadasys* and *Rhonciscus*. Members belonging to the former are coral living fishes and have therefore a negligible economic value. On the other hand, genus *Rhonciscus* includes demersal fishes (Smith 1953) which are widely caught by trawlers. It constituted a mean production of about 16% of the trawling catch of the Gulf during the period from 1963 to 1966. Genus *Rhonciscus* is represented in the Suez Gulf by three species which are *R. striatus* (Gilchrist and Thomson), *R. anas* (Val.) and *R. stridens* (Forsk.). Of these, the first species is predominant and constitutes more than 95% of the production of members of this genus. The present study is therefore focused on *Rhonciscus striatus*, and entails the study of its various biological aspects in a hope that it helps in managing the trawling fisheries of the Gulf.

III. MATERIAL AND METHODS

The study of *Rhonciscus striatus* from the Gulf of Suez is based on the determination of age and growth and the calculation of the growth histories of 2100 specimens collected from March, 1963 to December, 1964. Samples were randomly taken from the landed commercial catch and sometimes on board trawlers. Samples were not available in July and August whence fishing is prohibited. Data collected are; standard length (to the nearest 0.1 cm), and stomach-content, weights (to the nearest 0.1 and 0.01 gm. respectively). Scale samples were usually taken from the left side in the area between the insertion of the dorsal and pectoral fins. They were cleaned by 10% ammonia solution. 1520 key scales were mounted between two glass slides on which the serial number of the specimen besides the date of sampling were written. The length frequency curve is based on 4734 specimens taken from the commercial catch. Statistical data were available from the statistical department of Alexandria Institute of Oceanography and Fisheries.

the macroscopic study of gonads, the maturity stages are sorted according Ijort's description (1910) as follows:

e *I* Gonads transparent, thread like, ovaries or testes cannot be differentiated externally.

e *II* Gonads slightly swollen, eggs minute, first visible in the ovaries, testes can be recognized externally.

e *III* Gonads filling half the body cavity, ovaries reddish in colour, testes reddish white.

e *IV* Gonads filling two-thirds of the body cavity, ovaries reddish white with eggs larger in size than in stage II, testes white in colour.

e *V* Gonads filling all the body cavity, ovaries yellowish testes almost white in colour.

IV. COMMERCIAL FISHERIES
A. ANNUAL CATCH

The Gulf of Suez is considered as one of the main fishing areas of A.R.E., yields nearly about 22% of the total catch. In general, the total production ne Gulf is however decreasing as its production is about 23,000 and 11.000 tons 963 and 1966 respectively, with a decrease of about 52% (Table 1, fig. 1)

Following the same manner, the percentage of the annual catch of the Gulf ne total production of A.R.E. declined gradually being about 26, 21 19and 18 cent in the years of 1963, 1964, 1965 and 1966 respectively (Table 2, fig 2). analysing the total annual catch of the gulf, it was found that, the ottertrawl tributed a mean percentage of about 54% during the period from 1963 to 1966. percentage of the trawling catch fluctuate from one year to another being high certain year and low in the next (Table 1 Fig. 3). Fam. *Pomadasyidae* ticipates by a mean of about 16% of the trawling catch (from 1963 to 1966). ce *Rhonciscus striatus* constitute more than 95% of Fam. *Pomadasyidae* duction, so, the preceding percentage of the family could by considered to ect the fluctuation of this species alone.

ABLE 1.—ANNUAL PRODUCTION AND PERCENTAGES DURING 1963 TO 1966

Production / ar	A.R.E. landings	Gulf of Suez	Trawling	Percentage of: Gulf of Suez to total	Percentage of: Trawling to Gulf of Suez	Rhonciscus to Trawling
3	89289	22929	3962	25.63	60.89	12.26
4	79233	16648	1899	21.02	47.45	21.88
5	70372	13411	8211	19.06	61.23	15.39
6	60120	10894	5188	18.13	47.62	16.31

B. SIZE AT CAPTURE

The length frequency study of *Rhonciscus striatus* in the Gulf of Suez is based on 4734 specimens collected during 1963 and 1964. The length frequency curve is typically of the unimodal type. The modal lengths lie within the range of 90 to 100 mm. in body length as shown in Tables (2) & (3) and fig. (4). It is clear that fishes of the modal lengths are more frequent in 1963 than in the next year. This may be attributed to the smaller mesh-size of the cod end of the otter-trawling nets used in 1964. It was also noticed that the mean length of samples collected during the 1963 is relatively higher (being 110.9 mm) than that of 1964 (being 102.4 mm.). On this account the commercial catch not only decreased in 1964, but this is also accompanied by a diminution in the standard length of the fish stock.

V. BIOLOGY OF *RHONCISCUS STRIATUS*

A. FOOD AND FEEDING HABITS

Rhonciscus striatus is a plankton feeder, However, small bivalved molluscs are also ingested and they are frequently found mixed with sandy or muddy particles of the sea bottom. This diet agrees reasonably well with the small mouth with its feeble teeth. In general, seasonal change in the type of diet does not take place.

B. LENGTH-WEIGHT RELATION

A knowledge of the length at which the fish increases most rapidly in weight is of great value in determining the size at which fish may be most profitably harvested. Therefore, the relation between length and weight in fish is commonly examined. For many species, it has been found that weight increases as the cube of length, but for others, the weight increases at a greater or less rate (Le Cren, 1951; Hile 1953,...etc.). The general equation $W = cL^n$ (where W = weight of fish in grams, L = length in cms., c & n are constants) has been satisfactorily applied to many species. It is here applied to the present studied species viz : *Rhonciscus striatus*. The data adopted were collected from the commercial catch landed by the trawlers operating in the Gulf of Suez through 1963 and 1964. They were separately and collectively grouped and investigated without regard to sex, state of maturity or time of capture. Groups with an interval of 0.5 cm. in length or 2.0 gm. in weight were here adopted and the average for each group is calculated. The mean or average length or weight for each group do not differ significantly. The length - weight equation determined by fitting a straight line to the logarithms of the standard length and weight of 881 specimens captured during 1963 and 1964 is:

$$\log W = -4.0642 + 2.6899 \log L$$

The data available for the different samples collected are given in table 4. The few fishes of standard lengths shorter than 75 mm. or longer than 130 mm. were not included otherwise the mean weights would be unreliable. From the above equation it is clear that the increase in weight of fish does not follow the cube of length. This relation was represented by figure 5. In few cases only there are full agreement between the calculated and empirical weights.

TABLE 2.—LENGTH FREQUENCY DISTRIBUTION OF *Rhonciscus striatus* FROM THE GULF OF SUEZ IN DIFFERENT MONTHS OF 1963.

Length interval (mm.)	Jan.	Feb.	Mar.	April	May	June	Sept.	Oct.	Nov.	Dec.	Total	Percentage
50 — 59.9	4										4	0.2
60 —	3	3							4	2	12	0.5
70 —	9	5			1	9	1	3	28	6	62	2.3
80 —	23	42	12		15	26	48	46	42	21	275	10.1
90 —	34	76	110	47	74	48	140	176	85	89	878	32.3
100 —	16	55	105	142	104	35	74	136	103	63	833	30.6
110 —	10	17	101	56	77	34	33	31	48	17	424	15.6
120 —	5	3	62	19	19	25	3	22	15	1	174	6.4
130 —		1	20	1	8	5	1	6	5	2	49	1.8
140 —					2						2	0.2
Total	104	202	410	265	300	182	300	420	330	200	2713	—
Average length	93	97	108	107	106	103	98	100	99	97	101	—

TABLE 3.—LENGTH FREQUENCY DISTRIBUTION OF *Rhonciscus striatus* FROM THE GULF OF SUEZ IN DIFFERENT MONTHS OF 1964.

Length interval (mm.)	Jan.	Feb.	Mar.	April	May	June	Sept.	Oct.	Nov.	Dec.	Total	Percentage
50 — 59.9	1								14	14	29	1.4
60 —	7	5	3	3					15	26	59	2.9
70 —	18	30	15	12	2	7	9	3	25	58	179	8 9
80 —	24	89	36	51	4	30	34	37	67	2	374	18.5
90 —	43	111	57	58	24	40	93	100	55		581	28.7
100 —	76	56	56	58	84	51	51	46	19		497	24.6
110 —	29	5	31	22	72	46	9	13	3		231	11.4
120 —	2	1	4	2	18	19	4	1	2		53	2.6
130 —			1		5	7					13	0.6
140 —		3		1	1						5	0.2
Total	200	300	204	207	210	200	200	200	200	100	2021	—
Average length	96	92	92	95	109	102	93	96	85	68	93	—

Length range (mm.)	Mean Length (mm.)	Fish No.	Actual Weight (gm.)	Calcu. Weight (gm.)	Logarithms of			K
					Length	Actual Weight	Calculated Weight	
75—7[illegible]	77.5	7	10.10	10.42	1.8893	1.0043	1.0178	1.31
80	82.5	45	12.16	12.33	1.9165	1.0849	1.0910	1.39
85—	87.5	69	14.93	14.44	1.9420	1.1741	1.1596	1.48
90—	92.5	157	17.15	16.77	1.9661	1.2342	1.2244	1.54
95—	97.5	142	19.73	19.32	1.9890	1.2952	1.2860	1.60
100—	102.5	202	22.40	22.10	2.0107	1.3502	1.3444	1.66
105—	107.5	107	25.25	25.14	2.0315	1.4023	1.4003	1.17
110—	112.5	96	27.38	28.38	2.0511	1.4375	1.4530	1.75
115—	117.5	24	30 84	31.93	2.0701	1.4892	1.5042	1.18
120—	122.5	22	36.63	35.70	2.0881	1.5639	1.5526	1.87
125—	127.5	10	39.62	39.76	2.1055	1.5979	1.5994	1.91
		881						

Data for the condition factor which is considered as direct and quantitative measures of form or relative robustness of the body were derived from sampling records. The formula applied for the calculation of this factor is of the form

$$k = \frac{W \times 10^3}{L^n}$$ (where k is the condition factor, W = mean actual weight in grams, L = mean actual length in cms., n = constant derived on dealing with length weight relation. The number 10^3 was introduced to eliminate decimals.

The mean values of the condition coeficient for the standard lengths between 75 and 130 mm. ranged between 1.31. and 1.91 (Table 4).

C. AGE AND GROWTH

a. Age

1. *Scale characteristics and definition of the annulus.*

Scales of *Rhonciscus striatus* are typically of the ctenoid type, oval to egg shaped. Scales are small, thin and deeply embedded in the skin and so they are relatively inconspicuous. They are dislodged with difficulty and consequently few are regenerated. Squamation of the body is complete. Concentric ridges or circuli are arranged about the focus, roughen the surface of the scale. The focus may be central or slightly anterior or posterior to the center of the scale. Scales have repeatedly widely and closely spaced circuli radiating from the focus. The different spacing of circuli indicates the periods of fast and slow growth. The wider spacing is found typical at the beginning of each new band of growth and indicates the summer fast growth. The closely spaced circuli are laid down at the end of the growing season and represent the slow winter growth. Sometime, the closely spaced circuli give the appearance of incomplete bands on the scales

2. *Time of annulus formation.*

New growth is first seen on *Rhonciscus striatus* scales as a narrow, clear band outside a darker band of the closely spaced circuli of the winter growth. At the beginning of the growing season, new growth is narrow and distinguished with difficulty from the winter circuli. It was noticed that the percentage of *Rhonciscus* scales having new growth increases slowly from November onwards, and reaches its maximum of about 75% by the second half of February. Such a long period may be due to the fact that new growth on the scales of different individuals in the sample begin and become complete at different times, as the specimens examined cover a wide range whereby they may live different environmental conditions. Owing to this season the percentage of the scales having new growth does not exceed 75% by the second half of February as was said before. A higher percentage may prevail of the fishes react similarly to the surrounding conditions. Temperature, was considered as the principal factor in the formation of annual rings as it affects food supply (Thompson 1901). Whereas, Culter (1918) believed that the water temperature affects the spacing between the circuli while the food supply determines their number. It is noticed, in the present study, that temperature may influence the time of annulus formation which takes place during the months of the minimal water temperature.

. Validity of the annulus as a year mark.

Scales of *Rhonciscus striatus* are found reliable for age studies and conse-quently for calculating the length at different growth years. That the annulus s valid as a year mark and considered as a winter ring was concluded from the ollowing :—

1. Scale samples collected in October showed no marginal annulus.
2. Scales had an annulus short distance within the edge in the period from November through February. The frequency of scales with this annulus increases progressively from one month to that follows.
3. Scale samples collected during March showed no annulus on the edge.
4. The available scale samples collected from March through October showed variation in the position of the annulus within the scale margin The farthest position was revealed in July.

Moreover, additional evidence in the validity of annulus as a year mark may e obtained from the calculated length which agree to a great extent with the ctual length of fish at any age-group.

. Body-Scale Relation.

The validity of growth calculations from scale measurements requires the stablishment of the relationship between the growth of scale and that of the ody. Scales adopted are from the area between the anterior insersion of the orsal and pectoral fins. The body-scale relation of *Rhonciscus striatus* from he Gulf of Suez was determined for 2100 specimens ranging-in standard length rom 75 to 120 mm. and collected during the different months of 1963 and 1964 'able 5, fig. 6. Scale radii were recorded only from the key scales used in age etermination study. Graphical representation of the body-scale data for the ombined sexes indicated that the scale radii grow in direct propertion to that f the standard length. A test of the relation between both variables is found to e linear. The regression line $L = 1.91 + 0.47\ S$ was fitted by the least squares where L = standard length in mm., S = magnified anterior scale radius$\times 14$). 'his empirically derived equation was the base for the calculation of growth from he scale measurements.

. Age determintation.

The validity of age determination by counting the number of annuli was learly established by Van Oosten (1919). In the present studied species. Hav-ng established the characteristics of the annulus and its validity as a year mark, he selected scales from fishes of different lenghts were examined for determining he age and marking the position of the focus, scale margin and the annuli for ter use in growth calculations. Regenerated scales were frequently met with nd they were easily detected in spite of the small size of these scales. The ength of fish within any age-group is variable and overlaps with that of lower nd higher age-groups.

TABLE 5.—BODY LENGTH (CM.) SCALE RADIUS (x14) RELATION OF *Rhonciscus Striatus*.

No.	Length of fish (L)	Scale radius (SR)	$(SR)^2$	L×S	Calc. SR
1	7.25	11.86	140.66	85.98	11.36
2	7.75	12.91	166.67	100.05	12.42
3	8.25	13.39	179.29	110.47	13.49
4	8.75	13.97	195.16	122.24	14.55
5	9.25	15.17	230.13	140.32	15.62
6	9.75	16.52	272.91	161.07	16.68
7	10.25	17.75	315.06	181.94	17.74
8	10.75	18.86	355.70	202.74	18.81
9	11.25	19 98	399.20	224.77	19.87
10	11.75	21.15	447.32	248.51	20.94
Total	95.00	161.56	2702.10	1578.09	

6. *Age — Composition*

The age – composition of *Rhonciscus striatus* was investigated from representative samples of the commercial catch of 1963 and 1964 and the percentage of fishes of each age group was examined. The available are shown in figures (7,8) and Tables (6,7). Age—group II is dominant and contributed for about 51.15% and 43.70% in the catch of 1963 and 1964 respectively. Age—group 0 is the least represented, contributed with about 0.55 percent in 1963 and about 1.10 percent in 1964 and distinguished in 3 and 4 months of 1963 and 1964 respectively. Frequency of fishes of age — group IV is very low and is about 3.65% in 1963 and about 1.0% in 1964. Age—groups I and III have an intermediate position. The former contribute for about 11.70% and 23.70%, whereas the latter has nearly about 32.95% and 30.60%, in the commercial catch of 1963 and 1964 respectively.

TABLE 6.—PERCENTAGE OF AGE — GROUPS (1963).

Months / Age groups	Jan.	Feb.	Mar.	April	May	Jun.	Sept.	Oct.	Nov.	Dec.	Total
0	5.8	1.3							1.1	0.9	0.55
I	26.5	20.9	2.6	—	5.0	16.8	14.6	10.3	20.0	12.6	11.70
II	51.2	60.0	36.6	6.5	44.3	39.7	67.5	66.0	50.7	72.0	51.15
III	15.7	17.3	50.9	89.4	46.1	37.8	17.6	20.8	26.2	15.6	32.95
IV	0.8	0.5	9.9	4.1	4.6	5.7	0.3	2.9	2.0	0.9	3.65

TABLE 7.—PERCENTAGE OF AGE — GROUPS (1964)

Months / Age groups	Jan.	Feb.	Mar.	April	May	Jun.	Sep.	Oct.	Nov.	Dec.	Total
0	0.4								5.8	14.0	1.1
I	18.7	32.3	20.6	24.1	2.2	14.2	16.4	14.8	44.2	86.0	23.7
II	38.9	51.3	43.5	42.0	28.8	38.5	59.3	62.6	40.1	—	43.7
III	40.8	16.1	35.5	29.9	66.1	46.9	24.3	22.2	9.9	—	30.6
IV	1.2	0.3	0.4	4.0	2.9	0.4	—	0.4	—	—	1.0

Growth in Length

a. *Length at capture*

By means of the relation which is deduced before between the body and the anterior scale radii, the calculation of lengths were computed from the actual lengths of fish at the time of capture. The growth rate of the different age-groups - discriminated by the number of annuli on scales was determined by computing the means of the actual and the calculated lengths in the different years of life. Table 8 shows that there is a wide range in standard lengths of fishes within each age-group. This range varies from 22 mm. for age-group I to 35 mm. for age group III. This results in the overlapping between the standard lengths of the successive age-groups. This mean actual lengths for the various age-groups indicated a progressive increase. Thus the means of body lengths for age-groups I, II, III and IV are 77.8, 103.2, 125.9 and 138.1 mm. respectively.

TABLE 8.—RANGES AND MEANS OF ACTUAL LENGTHS AND WEIGHTS OF *Rhonciscus straitus* BY AGE-GROUPS AT CAPTURE

Age groups	Length (mm.)		Weight (gm.)	
	Range	Mean	Range	Mean
I	65.0 — 87.0	77.8	8.0 — 18.0	10.23
II	79.0 — 109.0	103.2	10.0 — 26.0	21.41
III	100.0 — 135 0	125 9	16.0 — 46.0	36.18
IV	122.0 — 150.0	138 1	35.0 — 62.0	49.76

b. *Calculated lengths*

Depending in the linear relationship between the standard length of fish and the length of the anterior scale radius, "Dahl - Lea" methods for the calculat-ion of growth histories of this fish was adopted. The formula applied for this purpose is as follows:

$$Ln = (L - a) \frac{Vn}{V} + a$$

Where ln = the calculated length at the end of n*th* year, L = Standard length capture, Vn = anterior scale radius, corresponding of n*th* year, V = anterior scale radius at time of capture. While (a) is the correction factor.

The mean calculated lengths for the successive age-groups were shown in table (9). Fig. (9) represents the growth in length on applying the actual and the calculated standard lengths. The upper lines represent the mean lengths for the successive age-groups, while the lower lines represent the annual increments between them. From this figure it is clear that the calculated lengths go nearly parallel but slightly lower than actual lengths. A close fitting of the two lines was hardly to be expected due to the large investigated area and the possible difference in the environmental conditions. The most rapid growth prevails in the first year of life (76.4 mm.), after which the rate of growth slowly and progressively decreased. Thus the increments between age-groups I-II, II-III and III and IV are 25 7, 21.4 and 16.9 mm. respectively. Thus, the highest increment in length was attained between the first and second age-group.

TABLE 9.— CALCULATED STANDARD LENGTHS OF THE DIFFERENT YEARS OF LIFE IN *Rhonciscus straitus* AND NUMBER OF INDIVIDUALS COMPRISING EACH YEAR

Age-groups	Calculated length at the end of each year of life (cm.)			
	1	2	3	4
I	8.27			
II	7.85	10.74		
III	7.34	10.12	12.48	
IV	7.12	9.76	12.23	14.04
Mean	7.64	10.21	12.35	14.04
Increment . . .	2.57	2.14	1.69	

Growth in Weight

(a) *Weight at Capture*

The actual weight for the sampled fishes exhibits nearly the same picture as does the length. Thus there is a wide range in weight within each age-group. Also there is a great deal of overlapping between the successive age-groups. The mean actual weights for the different age groups are shown in table (8), which reveals that these weights gradually increases. Therefore the mean weight for age-groups I, II, III and IV are 10 23, 21.41, 36.18 and 49.76 gms. respectively. Thus, it is clear that the increase in weights between age-groups I - II, II - III and III - IV is 11.18, 14.77 & 13.58 gms. respectively. Therefore the highest increase was attained between the second and third age-groups.

(b) *Calculated Weights*

By application of the length-weight relationship to the mean calculated lengths shown in table (9). the calculated weights for the different age-groups were computed. They were shown in table (10) and represented graphically by figure (10). It can clearly seen that the lowest growth in weight was attained in the first year of life after which the annual increment gradually and progressively increased, varying from 11.21 gm. in the second year to 14.97 gm. in the fourth year of life. This reveals that the highest increment in weight is attained between the third and fourth age-groups, However, the increment between these age-groups and that between the second and third age-groups are nearly camparable and the difference between these increments is small.

TABLE 10.– CALCULATED WEIGHTS OF DIFFERENT YEARS OF LIFE OF *Rhonciscus striatus*. (WEIGHTS CALCULATED BY LENGTH-WEIGHT EQUATION

Age-groups	Calculated weight at the end of each year of life			
	I	II	III	IV
I	12.42			
II	10.78	25.07		
III	8.97	21.34	37.53	
IV	8.29	19.36	35 54	51.50
Mean	10.11	21.92	36.53	51.50
Increment . . .	11.81	14.61	14 97	

D. MATURITY STAGES OF GONADS

One of the fundamental biological aspects is to identify the spawning perio of the species concerned. This can be clarified by microscopic and macroscopi examination of the gonads. Although the first method is more accurate yet the second is easier and more applicable and can be accomplished even on boar ships. In the present study, the five maturity stages described by Hjort (191 were found satisfactorily applicable to define the state of gonads for *Rhoncisc striatus*. It is worth-mentioning that the gonads (either testes or ovaries) w not available through July and August whence trawling is prohibited. The fore, we preferred to consider a fishing year starting from September to Ju The frequency of different maturity stages are shown in table (11) and repre ted by figures (11, 12).

TABLE 11.—PERCENTAGE OF MATURITY STAGES FOR *Rhonciscus striatus* FROM THE GULF OF SUEZ (Sept. 1963 to June 1964)

Maturity Stage / Month	Fish No.		I		II		III		IV		V	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
September 1963	116	132	94	100	6							
October	136	104	91	96	9	4						
November	100	114	82	88	14	12	4					
December	100	95	64	40	20	48	16	12				
January 1964	100	106	40	16	34	24	26	52	—	8		
February	143	118	10	7	28	20	42	53	20	20		
March	130	156	—	—	2	3	6	23	34	47	58	27
April	118	120	—	—	—	—	3	6	20	40	77	54
May	158	168	—	—	22	11	33	28	27	42	18	19
June	132	128	13	22	55	56	27	12	5	10		

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	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
September 1963	116	132	94	100	6							
October	136	104	91	96	9	4						
November	100	114	82	88	14	12	4					
December	100	95	64	40	20	48	16	12				
January 1964	100	106	40	16	34	24	26	52	—	8		
February	143	118	10	7	28	20	42	53	20	20		
March	130	156	—	—	2	3	6	23	34	47	58	27
April	118	120	—	—	—	—	3	6	20	40	77	54
May	158	168	—	—	22	11	33	28	27	42	18	19
June	132	128	13	22	55	56	27	12	5	10		

In males, about 94% of testes belong to stage I during September. This percentage decreases progressively in the following months and reachs about 10% in February. Stage II increased progressively in representation from September to January, but decreasing afterwards during February and March and lacking in April. Males having this stage comprise 22 and 55% of these examined in May and June respectively. Stage III increases from November to February, decreases during March and April and reincreases in May but decreases progressively in frequency from this month till February. Stage IV appeared in the collected samples from February to June reaching a maximum percentage during March. On the other hand, all the ovaries belonged to stage I in September. Ovaries of stage II increase in abundance from September till January and decreasing after wards till March. Stages III and IV were first started appearing in December and January respectively and were most represented in February and March respectively. In both males and females stage I was lacking during March and May whereas stage II was lacking as well in April, while stage V was dectectable from March to May.

On considering gonads of stages I or II as immature, of stage III as intermediate and of stages IV and V as mature, we shall examine the magnitude of different conditions of different gonads in different months. Thus, as shown in Fig. 13, in males, the testes are exclusively immature in September and October. The frequency of testes showing this condition decreases progressively afterwards till March. These testes are completely lacking in April put reappear in May and to a much greater extent in June. Testes of intermediate maturation increase in abundance from November till February, but decrease in March and April but reincrease in May and June. Mature testes were detected only in February through June. These comprise more than 90% of the gonads examined in March and April but form only about half of the of gonads in May but they are least represented in June.

Concerning the ovaries, they are exclusively immature in September and October Gonads of this condition decrease in frequency progressively till March are wanting in April but reappear in May and to a greater extend in June. Ovaries of intermediate maturity condition comprise more than 50% of the gonads examined in January and February and are the least in April. Mature ovaries appear from January to June and increase in frequency till April and decrease afterwards. The percentage of ovaries showing this condition is 74,94 and 61% in March, April and May respectively.

It may therefore be concluded that *Rhonciscus striatus* has, in the Gulf of Suez, a long spawning season which extends for about three months extending from March to May.

VI. SUMMARY

1. The landed annual catch of the Gulf of Suez declined from about 23 thousan tons to about 11 thousand tons in 1963 and 1966 respectively.

2. Trawling is one of the important fishing methods adopted in the gulf, con tributing for a mean of about 54% of the landings during the period fro 1963 to 1966.

3. Fam. *Pomadasyidae* constitute about 16% of the annual trawling production. Its members belong to two genera viz; *Pomadasys* and *Rhonciscus* in the Gulf of Suez. *Rhonciscus striatus* is the most important species and comprise more than 95% of production of this family.

4. The mean body length of *Rhonciscus striatus* decreased from about 110 mm. in 1963 to about 102 mm in 1964.

5. This species feeds mainly on plankton and small bivalved molluscs were frequently met with in the stomach.

6. The application of the length weight relationship for the combined data of 1963 and 1964 revealed that the value of (n) is 2.6899.

7 The condition coefficient ranged between 1.31-1.91 for the samples collected during 1963 and 1964.

8 Characteristics of scales, besides the time of annulus formation and its validity as a year mark have been discussed.

9 The linear relationship between the body length and the anterior radius of scale has been established. The correction factor is 1.91 cms.

10. Age determination and growth studies were based on 2100 specimens.

11. Age composition studies revealed that age-groups I to IV are represented in the catch age groups II predominated in the catch over other age groups and constituted about 51% and 44% for 1963 and 1964 respectively.

12. Mean calculated body lengths for the successive age-groups from I to IV are 77.8, 103.2, 125.9 and 138.1 mm. respectively. Highest increment were found between age-groups I and II.

13. Mean calculated weights are 10.23, 21.47, 36.18and 49.76 gm. for age-groups I, II, III and IV respectively. The highest increment takes place between age-group III and IV.

14. Maturity stages of gonads are examined according to Hjort scale (1910). Spawning season is long and apparently extends from March to May.

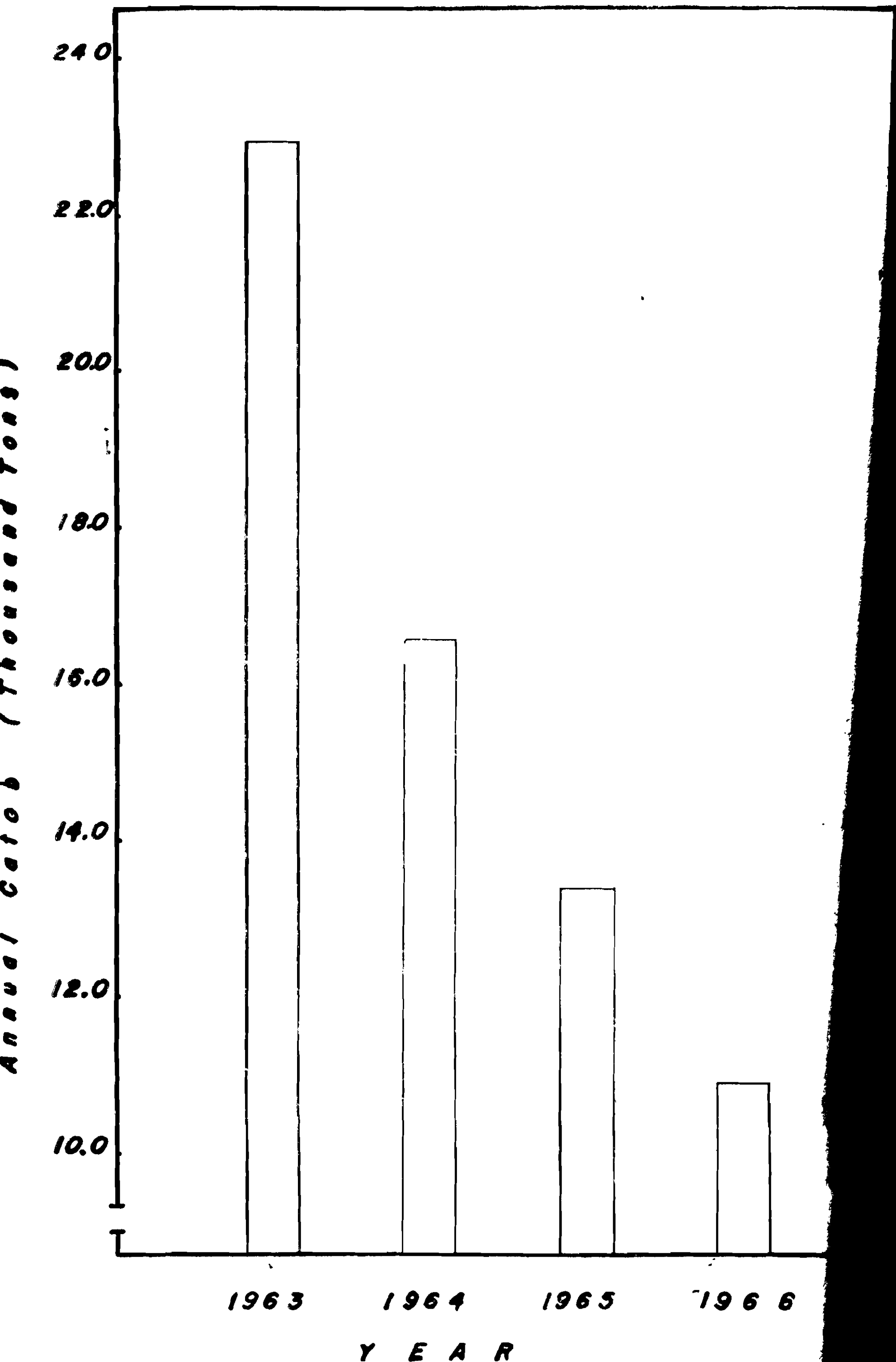


FIG. 1.—Annual Calch of the Gulf of Suez.

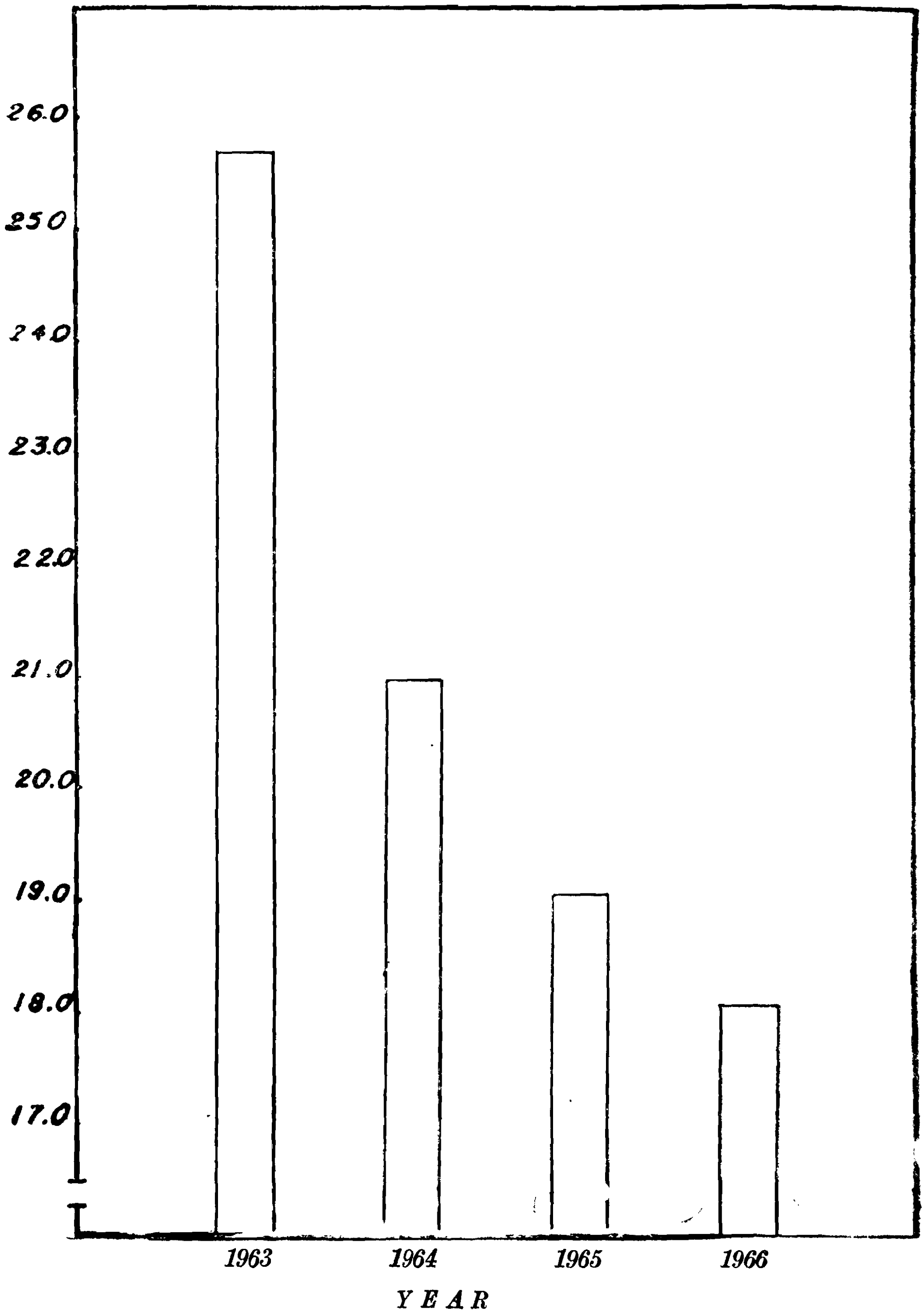


FIG. 2.—Percentage of annual catch of the Suez gulf to the total production of A.R.E.

(5)

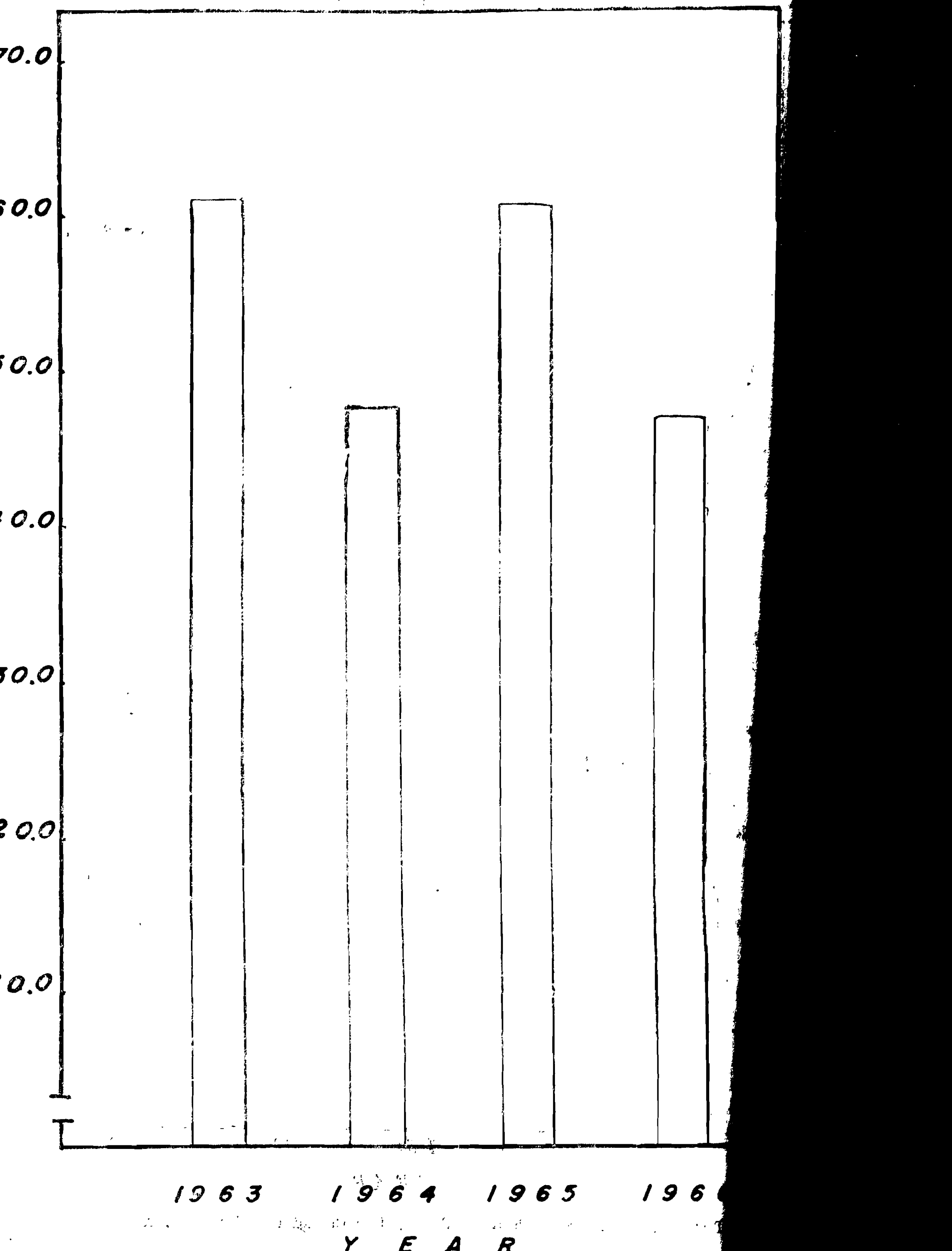


FIG. 3.—The fluctuation percentage of the trawling catch (1963–1966).

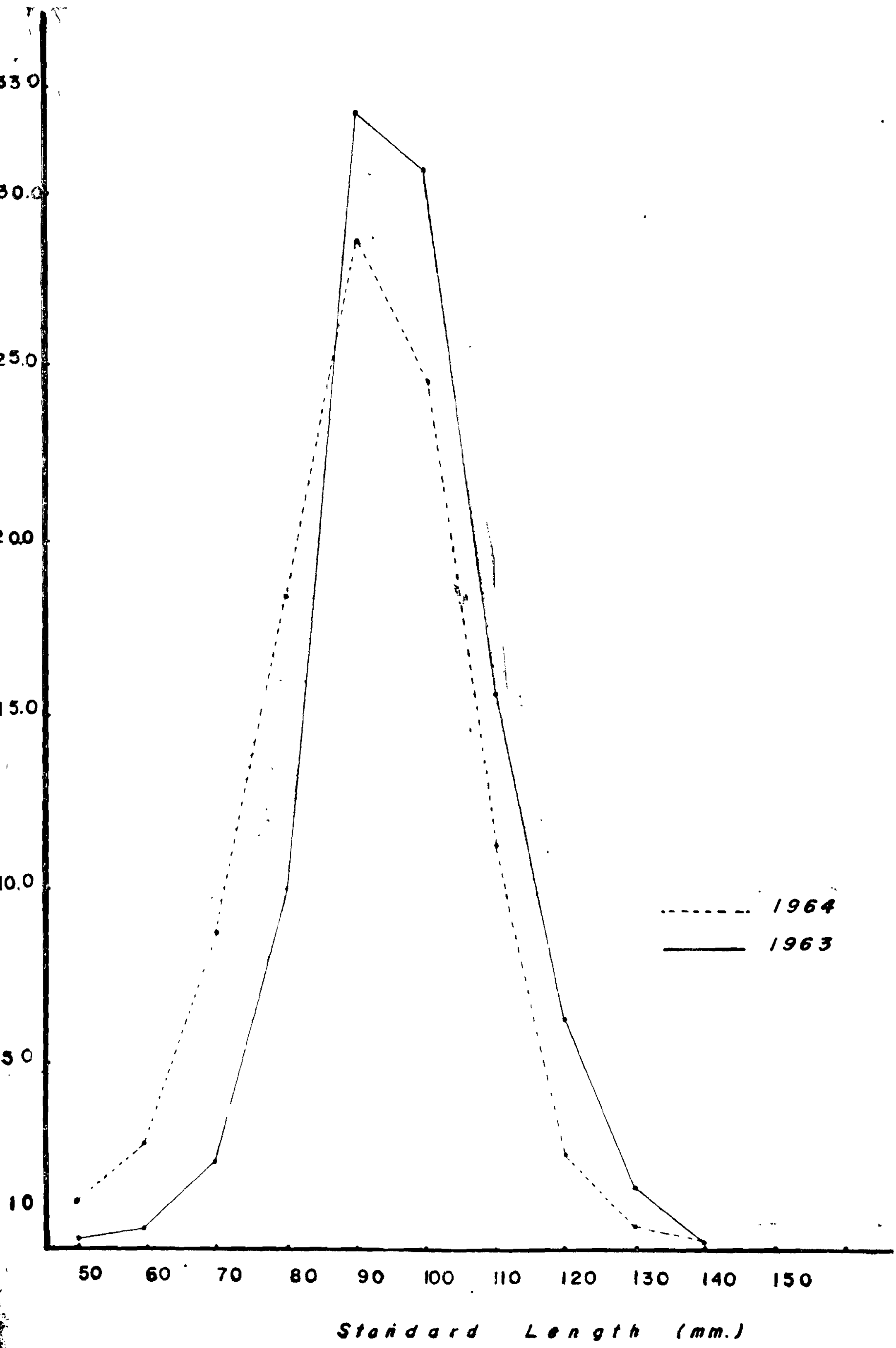
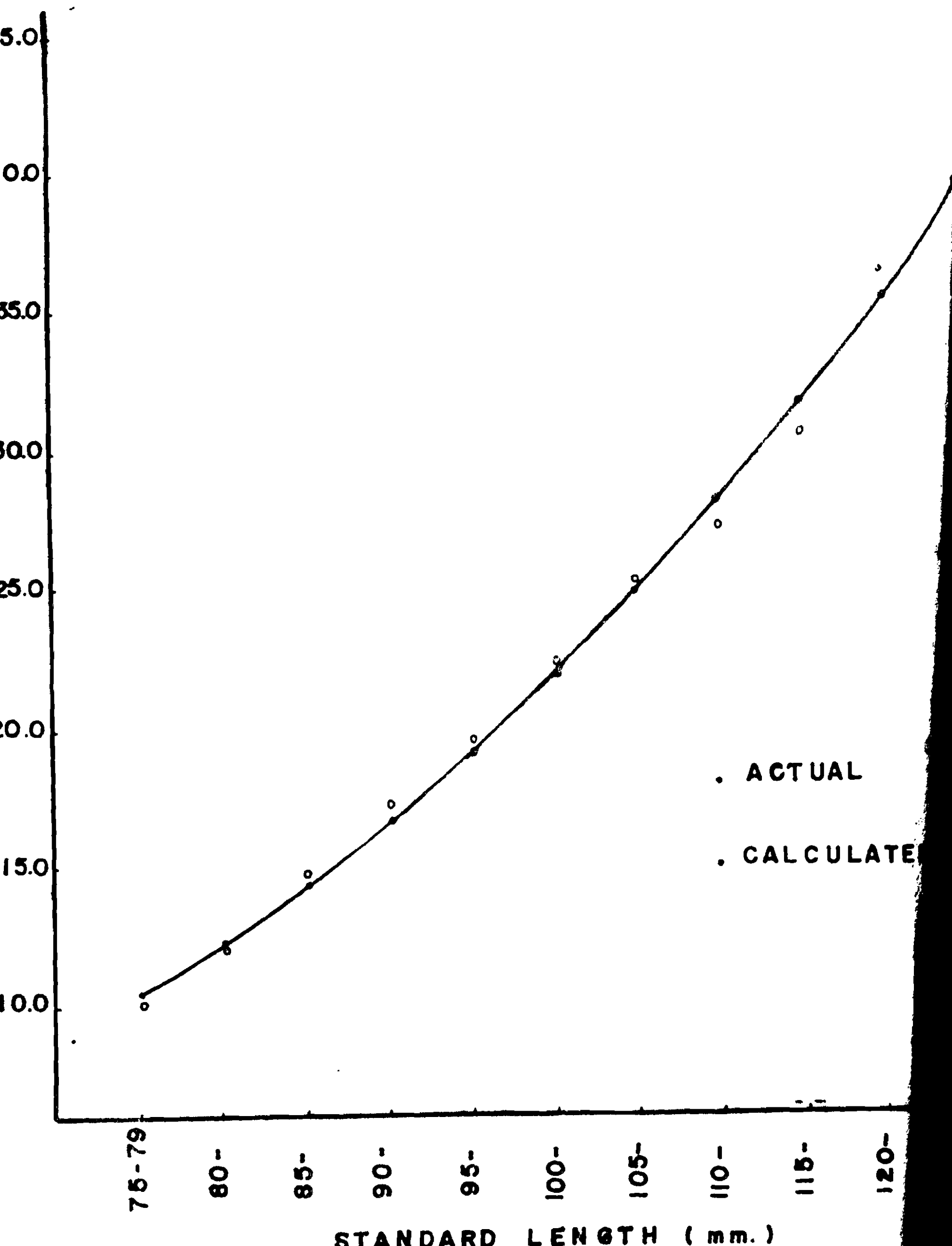


FIG. 4.—Length fuquency distibution of *Rhonciseus* from the Gulf of Suez (1963 & 1964)



IG. 5—Length-weight relationship of *Rhonciscus striatus* from the Gulf of Suez.

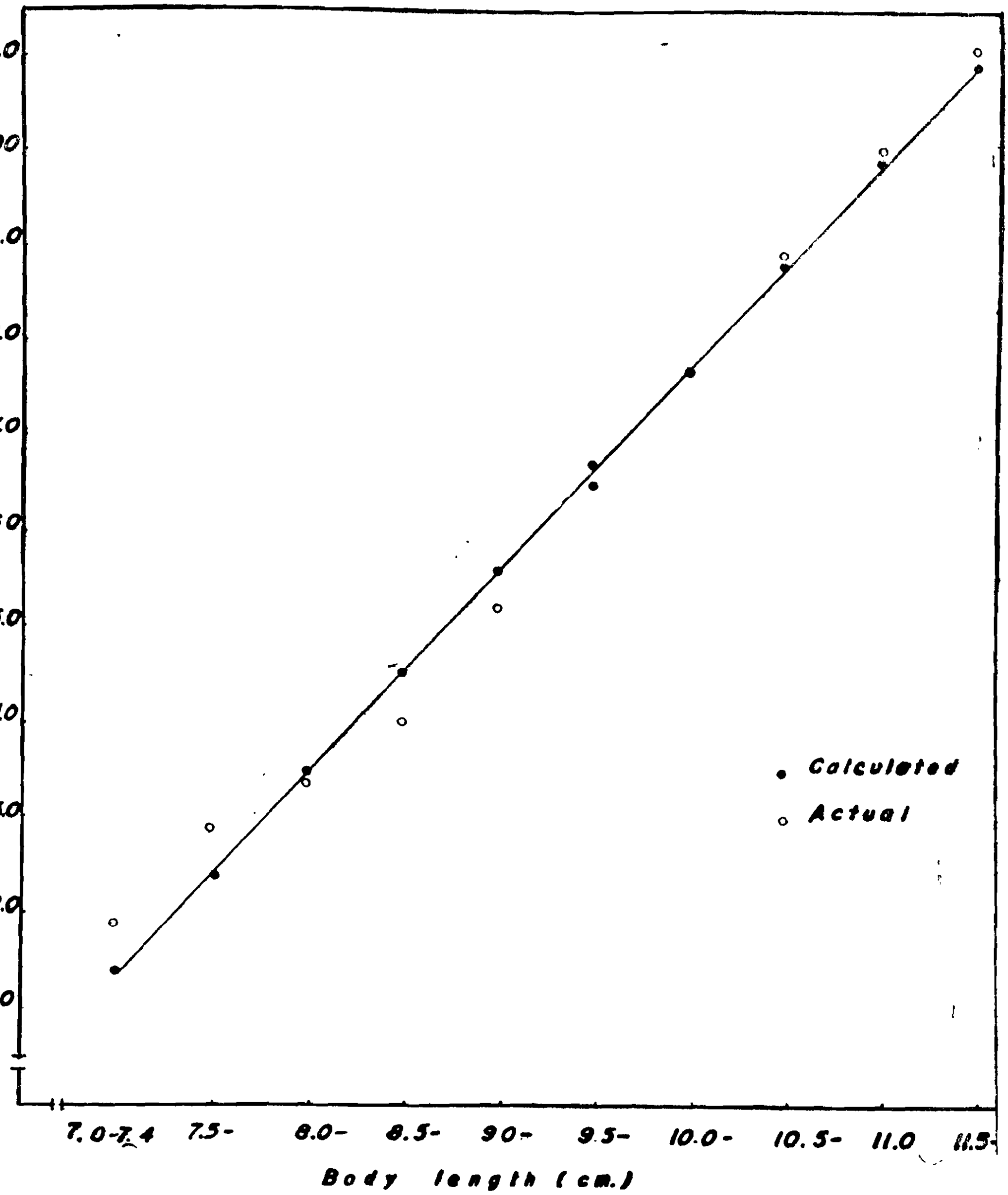


FIG. 6.—Bogy length (Cm.)-Scale radius (x 14) of *Rhonciscus* from the gulf of Suez.

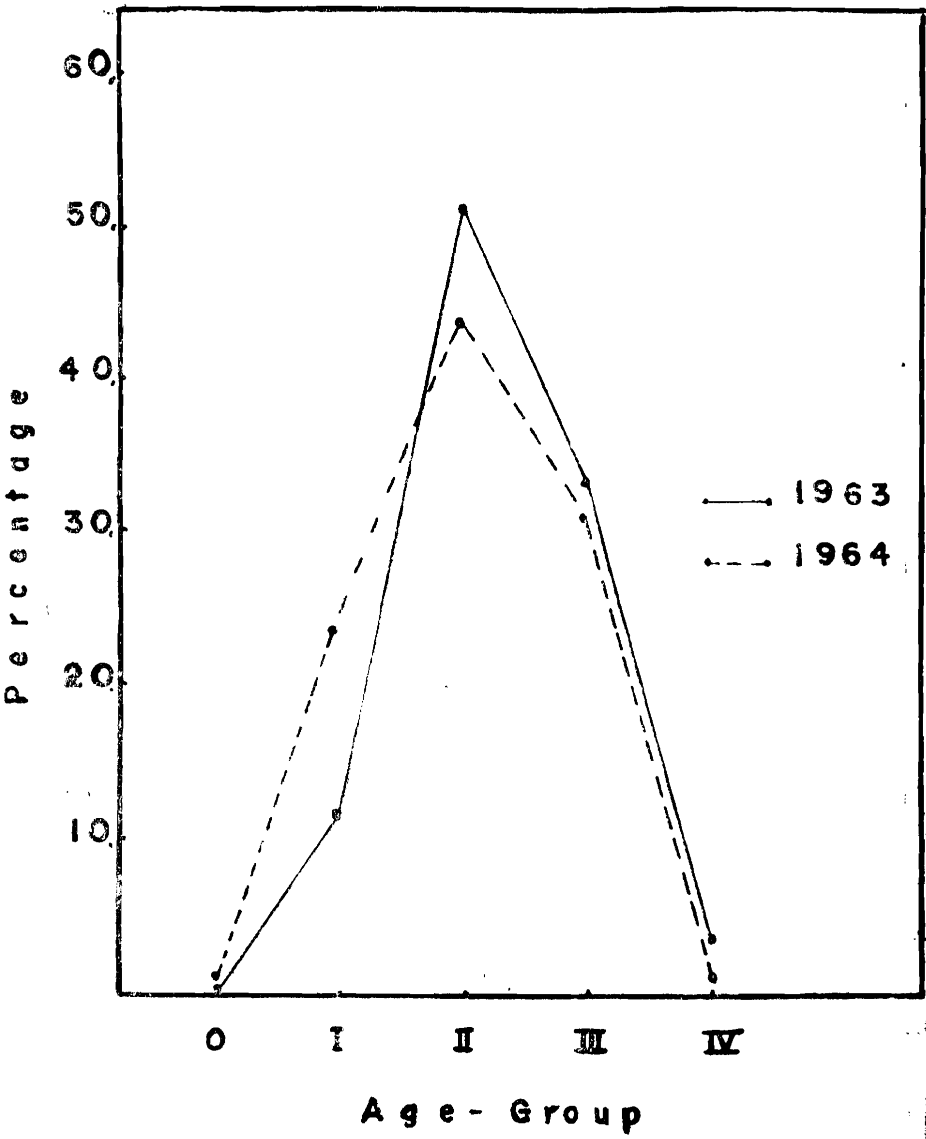


FIG. 7.—Age-composition of *Rhonciseus* during 1963 & 1964

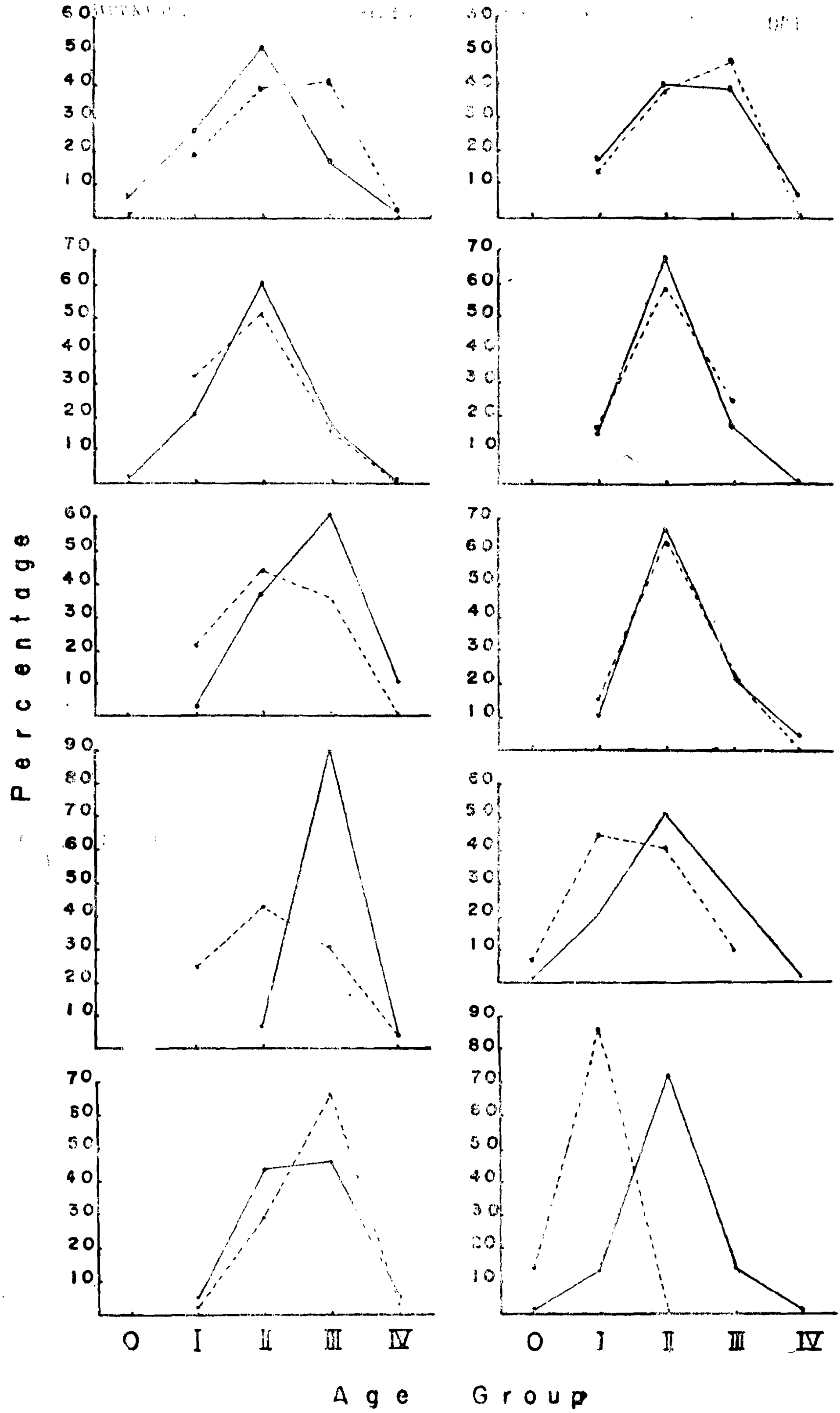


Fig. 8.—Monthly age-composition of Rhonciscus stratus (1963 and 1964)

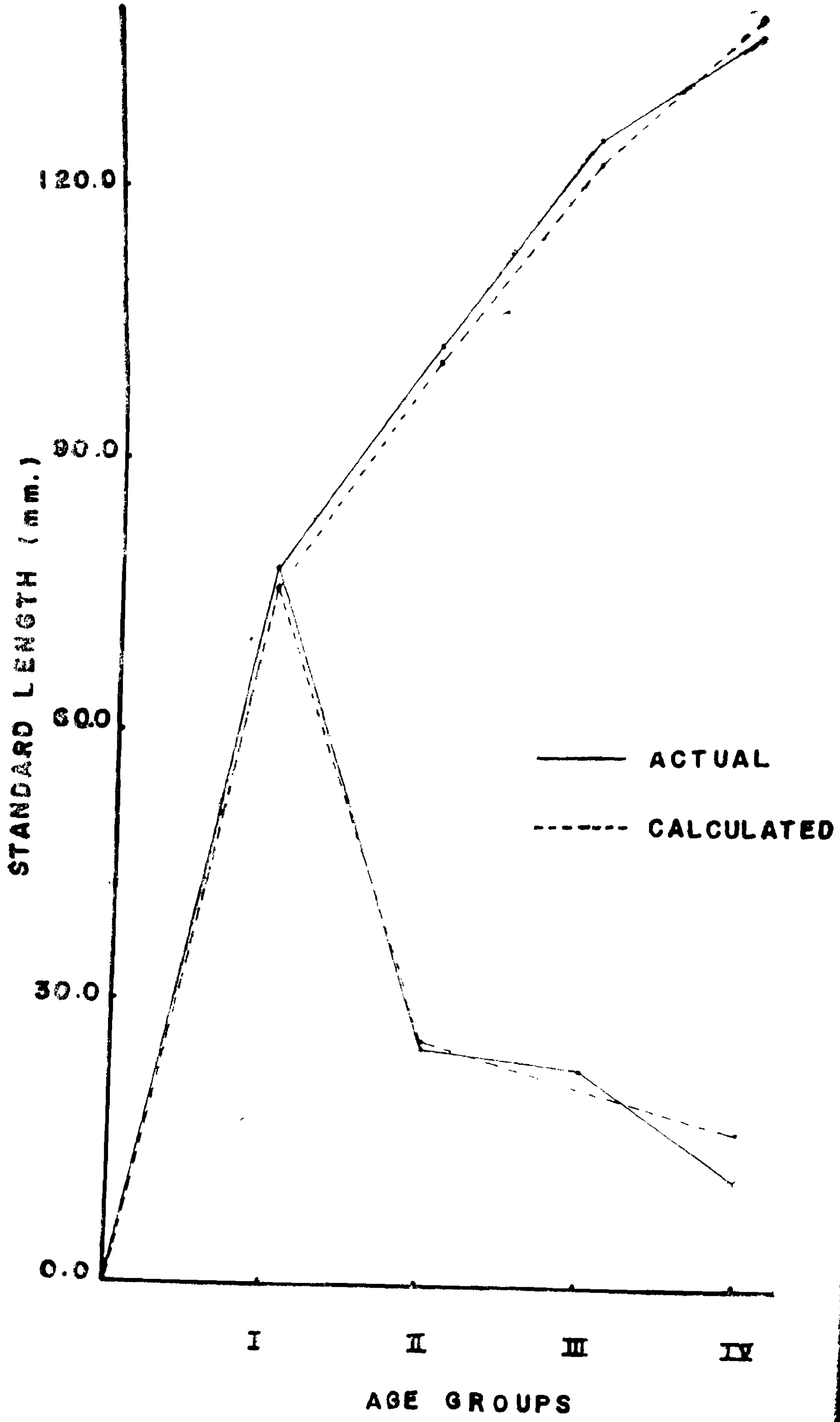


FIG. 9.—Actual and calculated growth in length for *Rhonciscus striatus*.

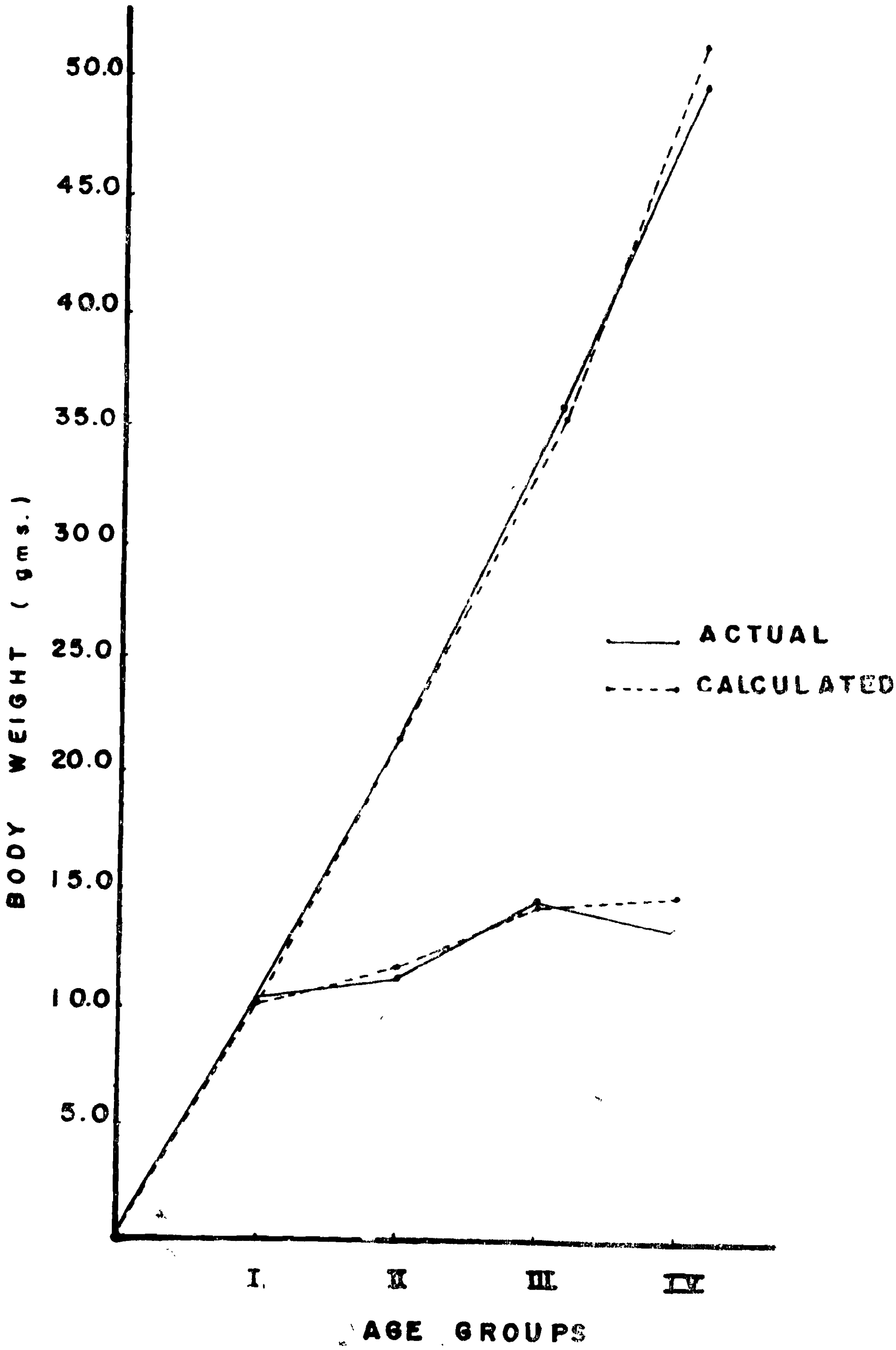


FIG. 10.—Actual and calculated growth in weight of *Rhorciscus Striatus.*

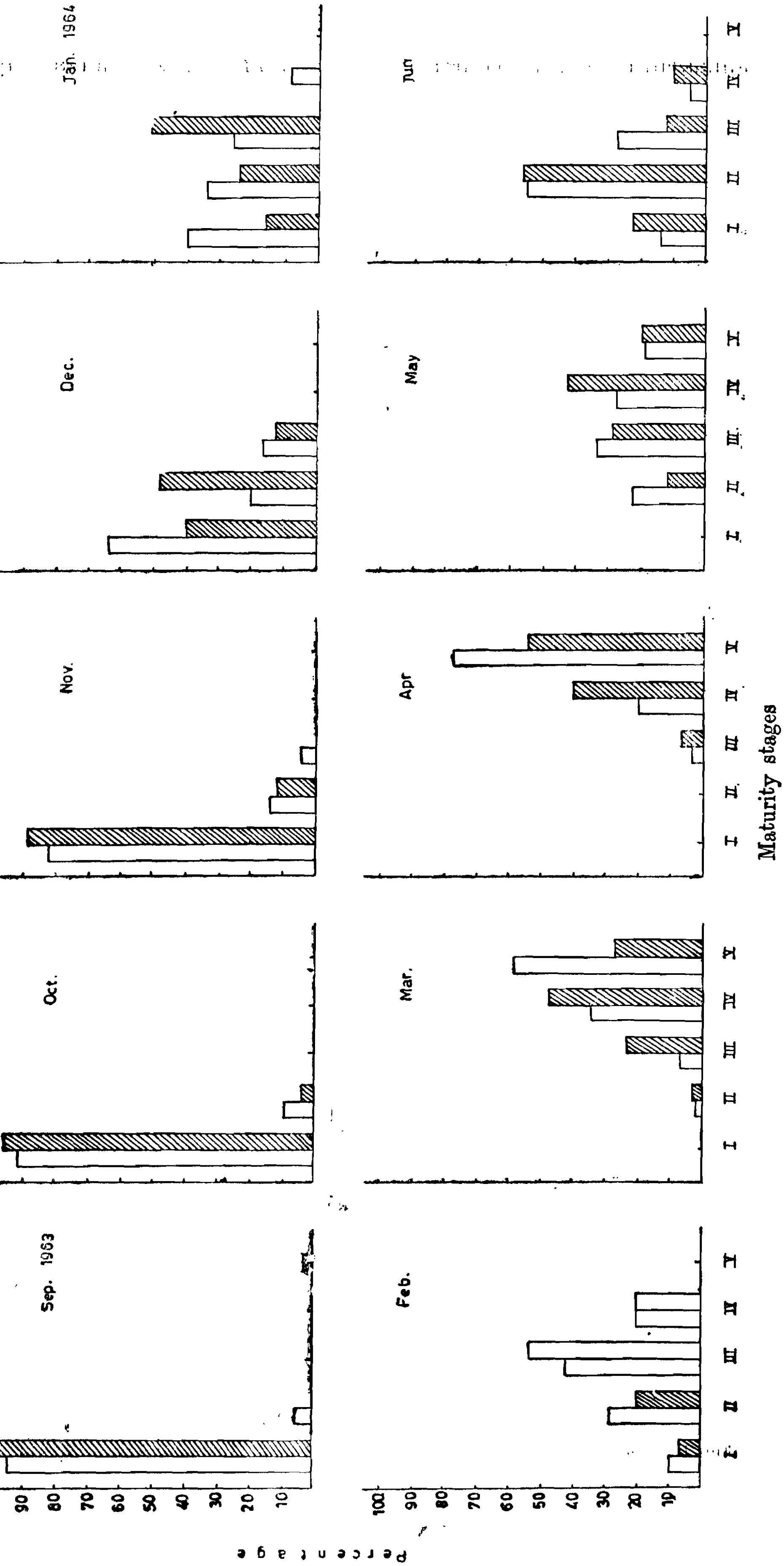
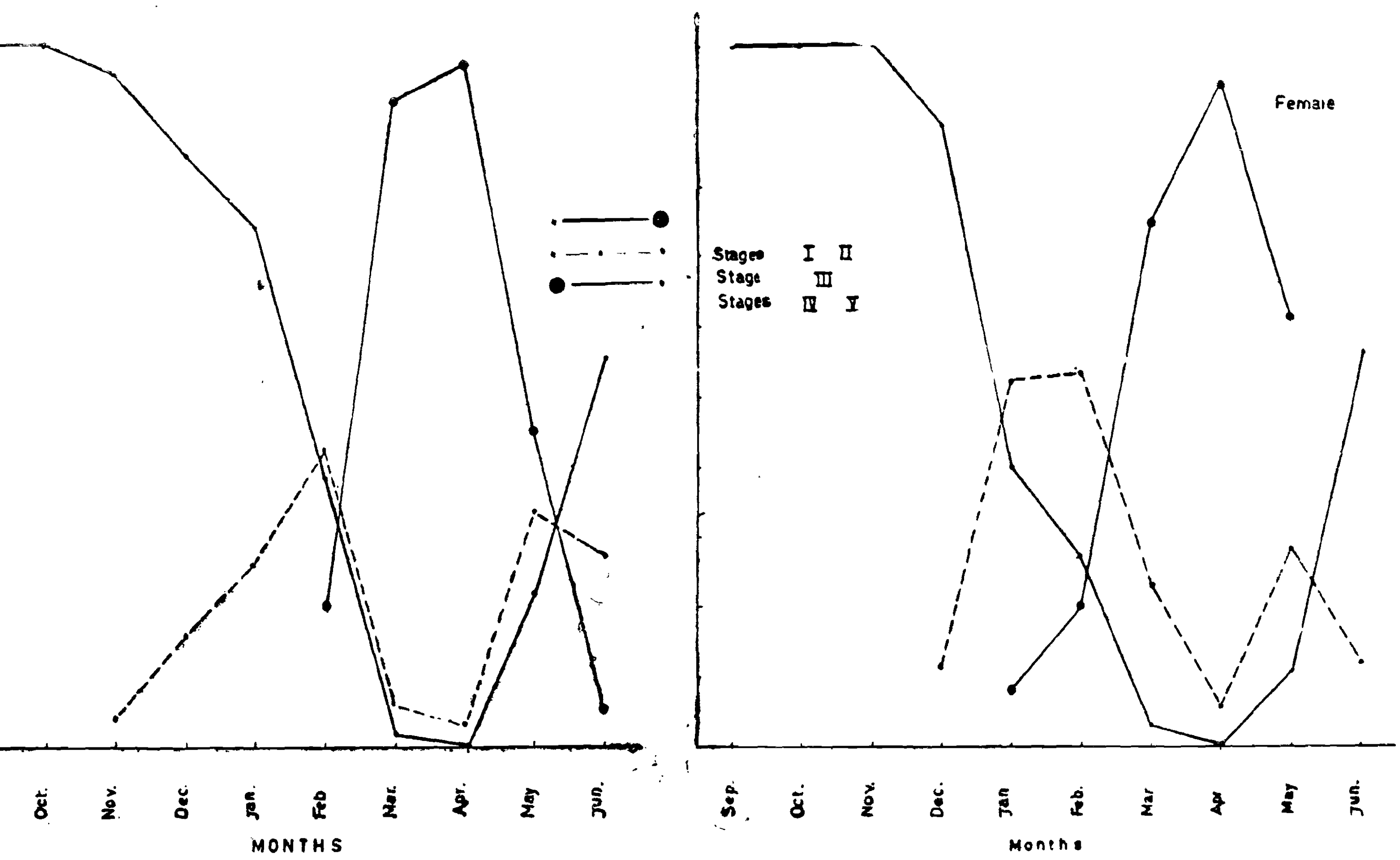


FIG. 11.—Frequency of Maturity stages of *Rhonciscus* from the Gulf of Suez.



Stages I II
Stage III
Stages IV V
Female
Oct.
Nov.
Dec.
Jan.
Feb
Mar.
Apr.
May
Jun.
MONTHS
Sep.
Oct.
Nov.
Dec.
Jan
Feb.
Mar
Apr
May
Jun.
Months

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