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STUDIES ON THE GROWTH OF OLIVE RIDLEY *LEPIDOCHELYS OLIVACEA* IN CAPTIVITY

M. RAJAGOPALAN

ABSTRACT

The growth of olive ridley *Lepidochelys olivacea* in captivity has been studied from emergence to 47 months. The carapace length increased from 37 mm at the time of emergence to 528 mm in 47 month old turtle and the weight increased from 16.3 gm to 19.5 kg. The growth recorded here is higher than those reported by previous authors. Sex could not be differentiated externally even in 47 month old olive ridley.

INTRODUCTION

The growth of olive ridley *Lepidochelys olivacea* in captivity has been reported by Deraniyagala (1939) from emergence to a period of six months and by Whitaker (1979) for 22 months. The present paper embodies growth data of olive ridley reared in captivity, in two groups, for 32 and 44 months from emergence.

I am thankful to Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin for his constant encouragement and help during the course of this study. My thanks are due to Sri R. Thiagarajan, Dr. E. Vivekanandan and Sri M. Vijayakumaran, Scientists of CMFRI for their help in preparation of the manuscript. I wish to express my sincere thanks to the Chief Wildlife Warden, Forest Department, Government of Tamil Nadu for permission given to the Institute to collect olive ridley eggs for studies relating to recovery programme of the species.

MATERIAL AND METHODS

Hatchlings of *L. olivacea* belonging to 1980 and 1981 seasons were reared in the Kovalam Field Laboratory of Central Marine Fisheries Research Institute, Madras, and in two pens (area : 7.5 × 2.5 m ; depth of water : 0.7 to 2.5 m) at the Mariculture Farm of Central Marine Fisheries Research Institute, Muttukadu, Madras. The number of individuals, conditions in which they were reared, food offered and other environmental parameters during the growth period are presented in Table 1. While in the laboratory the animals were

TABLE 1. *Rearing condition, food offered and environmental parameters during growth period of olive ridley* Lepidochelys olivacea

Group	Number of individuals	Rearing condition	Food offered	Total growth observation	Temperature (°C)	Salinity (‰)
1980	15	a. Group rearing from emergence to 15 months in polythene liner tank at Kovalam Field Laboratory	clam & fish		25.7-28.3	21.6-37.2
		b. Individual rearing during subsequent 12 months in plastic containers at Kovalam Field Laboratory	fish	44 months	25.9-29.5	27.7-34.8
		c. Group rearing thereafter for 17 months in pen at Mariculture Farm, Muttukadu	fish		27.6-32.3	21.2-47.9
1981	19	a. Individual rearing from emergence to 14 months in plastic containers at Kovalam Field Laboratory	clam & fish	32 months	25.9-30.0	27.7-35.6
		b. Group rearing thereafter for 18 months in pen at Mariculture Farm, Muttukadu.	fish		27.6-32.3	21.2-47.9

* Present address : Madras Research Centre of Central Marine Fisheries Research Institute, 29, Commander-in-Chief Road, Madras-600 105.

reared in plastic containers as well as in 4' diameter polythene liner tank. Food was offered for about 12 hours daily and sea water was changed completely after removing the feed remains. Water was changed again before the next feeding. Growth characters such as carapace length, carapace width, plastron length and plastron width (all curved measurements) and total weight of the animal were recorded at periodic intervals.

Results

(a) Relationship among growth characters:

The relationships between carapace length and width, carapace length and plastron length, carapace length and plastron width and carapace length and total weight of turtles of 1981 season reared in captivity are plotted in Figs. 1 to 4. A simple regression $Y = a + bX$ has been fitted to understand the relationship between variables. The a, b and r values of the different relationships are presented in Table 2. All these characters exhibited a linear relationship.

Table 2. *Values of a, b and r for different growth characters of* Lepidochelys olivacea *(N = 19 individuals)*

Characters	*a*	*b*	*r*
1. Carapace length & Carapace width	—15.9856	1.0216	0.998
2. Carapace length & Plastron length	2.9151	0.8567	0.999
3. Carapace length & Plastron width	—27.9218	0.8557	0.984
4. Carapace length (log) & Total Weight (log)	— 3.1552	2.7875	0.999

(b) (i) *Growth studies in* 1981 *group :*

The increase in growth in carapace length and width, plastron length and width of 1981 group (reared for 32 months) are plotted in Figs. 5 and 6. The a, b and r values for the relationship between the growth characters and the age are presented in Table 3.

Table 3. *Values of a, b and r for different growth characters against age of* Lepidochelys olivacea *(N = 19 individuals)*

Characters	*a*	*b*	*r*
Age & Carapace length	22.6195	0.4414	0.992
Age & Carapace width	6.6509	0.4521	0.993
Age & Plastron length	21.8967	0.3792	0.994
Age & Plastron width	— 7.8813	0.3759	0.972

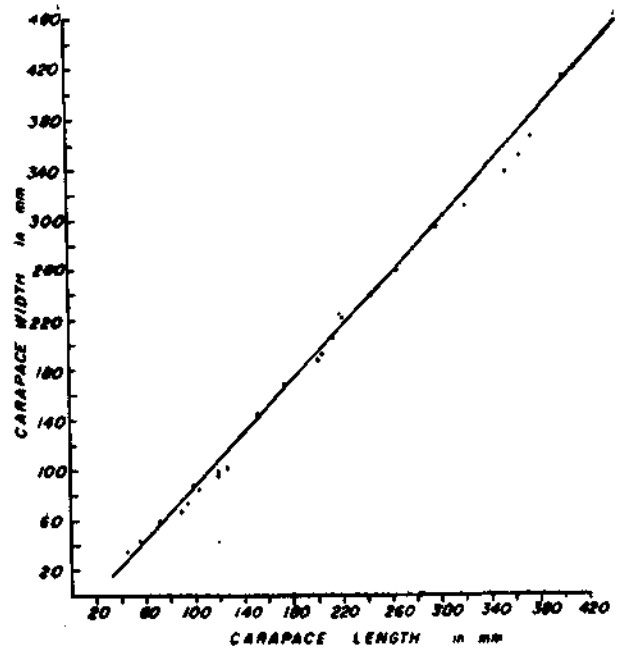

Fig. 1. Relationship between carapace length and carapace width of olive ridley *Lepidochelys olivacea*. The values are mean of 19 individuals.

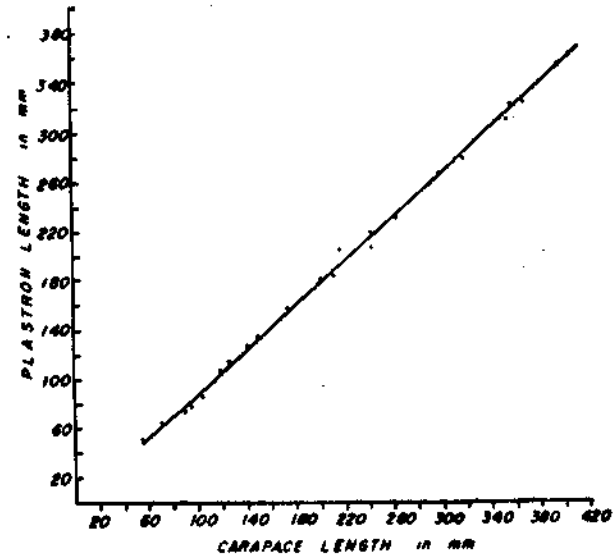

Fig. 2. Relationship between carapace length and plastron length of olive ridley *Lepidochelys olivacea*. The values are mean of 19 individuals.

The mean carapace length of newly emerged hatchlings of olive ridley was 37.8 mm. At the end of 12 months the carapace length increased to 192 mm and further increased to 342 mm at the end of 24 months and reached 420 mm in 32 months; the corresponding values for carapace width were 28.2, 174, 333 and 414 mm respectively. The plastron length increased from 31.8 mm in hatchlings to 171, 318 and 396 mm and

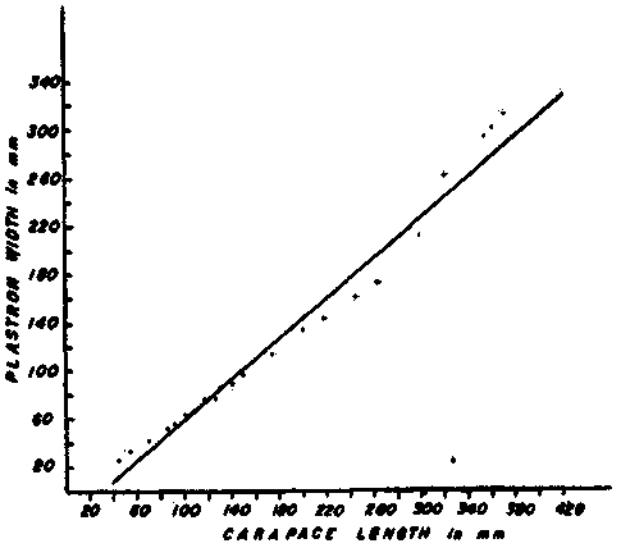

Fig 3. Relationship between carapace length and plastron width of olive ridley *Lepidochelys olivacea*. The values are mean of 19 individuals.

the plastron width from 25.6 mm to 129, 264 and 333 mm in 12, 24 and 32 month old animals respectively.

The weight increment with advancing age of the olive ridley is plotted in a semi-logarithmic graph in Fig. 7. The mean live body weight of freshly emerged hatchling was 16.3 gm. The body weight increased to 1,125, 9,925 and 14,500 gm at the end of 12, 24 and 32 months respectively.

(ii) *Growth studies in* 1980 *group :*

The 1980 group of hatchlings (mean weight : 17.5 gm) weighed 460, 4,375, 13,400 and 19,000 gm at the end of 12, 24, 36 and 44 months respectively (Fig. 7). The carapace length (mean values) increased from 37.8 to 497 mm in 44 months.

Discussion

The growth increment observed in two batches in the present study is variable, compared to the previous observations on growth of *L. olivacea*. Deraniyagala (1939) gave the linear measurements of carapace length for one animal at about 6 months as 74 mm and its weight as 76 gm. Whitaker (1979) recorded the carapace length at 6 months growth as varying from 83 to 95 mm with the mean at 89 mm and the weight varying from 100 to 175 gm. For a similar period of six months in the present study the carapace length (curved measurements) varied from 102.4 to 119.2 mm and the mean weight was 280 gm (1981 group). Similarly the 22 month old olive ridley in the present study registered a growth (mean weight : 3,300 gm in 1980 group and 7,800 in 1981 group) as compared to 2,100 gm (mean) recorded by Whitaker (1979).

It is apparent from Fig. 7 that after one year the 1981 group olive ridley has exhibited substantial growth (the weight increased from 1,125 gm to 9,100 gm at the end of second year). This may be because the animals were transferred from the plastic containers at Kovalam Field Laboratory to spacious pens in the Mariculture Farm, Muttukadu. A similar spurt in growth was seen in the 1980 group once it was introduced into the pen after 27 months.

The 1981 group grew faster throughout the rearing period than the 1980 group (Fig. 7). The obvious reason is that until transferring into pen the 1981 group was reared individually whereas the 1980 group was reared in one 4′ diameter polythene liner tank for the first 15 months (Table 1). Vijayakumaran *et al.* (1984) too observed that group rearing of hatchlings of olive ridley retarded the growth rate considerably. They suggested that group rearing invokes a social hierarchy which is evident in the present study also. The growth among 1981 group turtles when reared individually (mean weight of 220 day old turtles : 460 gm ; range 380-580 gm) did not vary much whereas when group rearing was resorted to, the variation in growth among individuals was enormous (mean weight of 830 day old turtle : 9,500 gm ; range—5,800-13,500 gm).

At the end of 32 and 44 months the 1981 and 1980 groups of olive ridley attained 14.7 kg and 19.0 kg respectively. The olive ridley may continue to grow at this fast rate for a few more months, as evidenced by the measurements and weight taken at the end of 47 months on 22nd Feb. 1984(Table 4).

Table 4. *Carapace length, carapace width and total body weight of* 47 *and* 35 *month old olive ridley* L. olivacea

	47 month olive ridley (1980 group) N = 11	35 month olive ridley (1981 group) N = 17
(a) *Curved measurements*		
Carapace length (mm)	490 – 551 (528)	445 – 510 (467)
Carapace width (mm)	510 – 585 (549)	470 – 520 (498)
Weight (kg)	15.5 – 23.0 (19.5)	13.0 – 19.0 (15.8)
(b) *Straight line measurements*		
Carapace length (mm)	445 – 535 (484)	410 – 495 (447)
Carapace width (mm)	425 – 501 (468)	375 – 455 (415)

Values in parentheses indicate mean

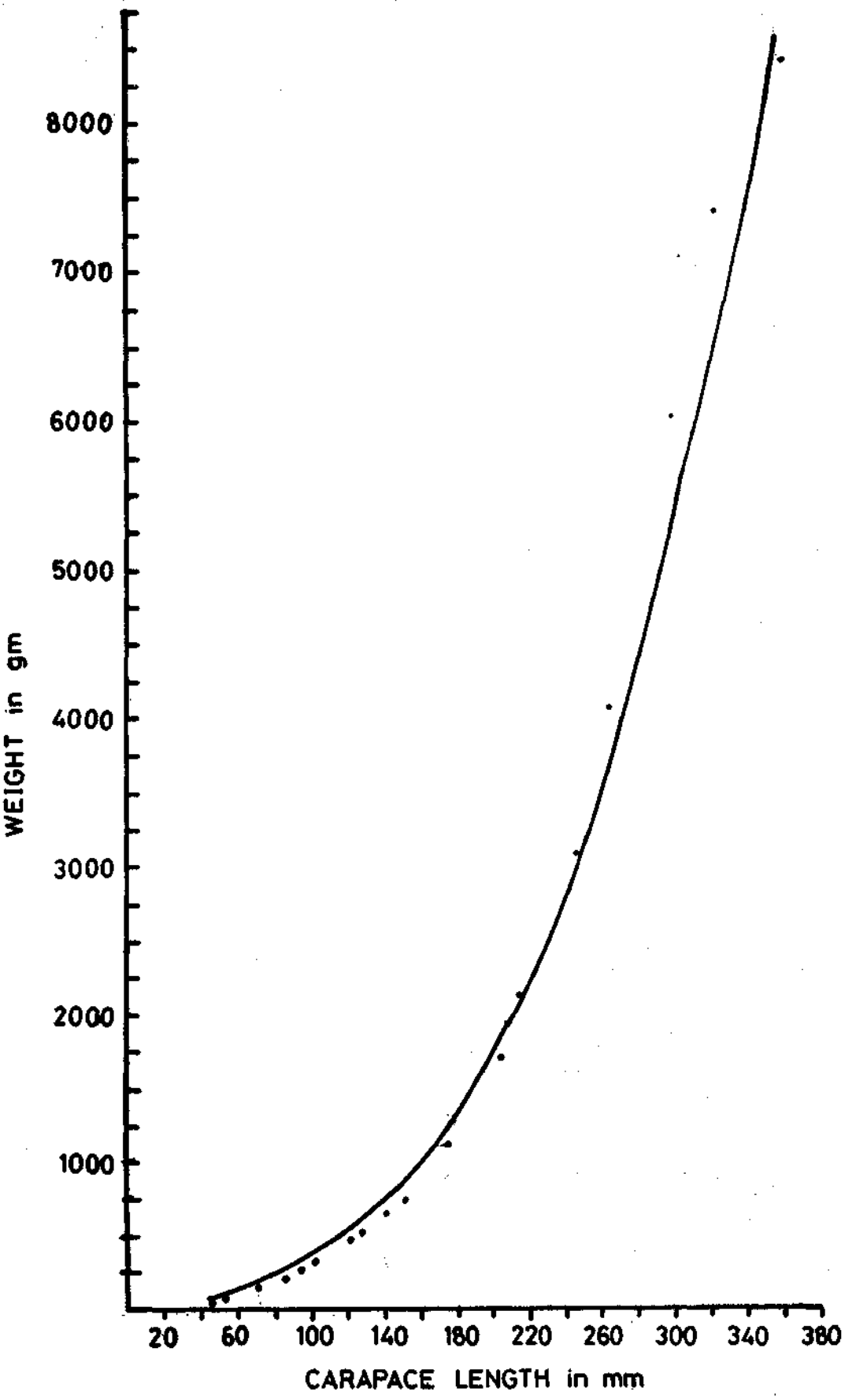

Fig. 4. Relationship between carapace length and total live weight of olive ridley *Lepidochelys olivacea*. The values are mean of 19 individuals.

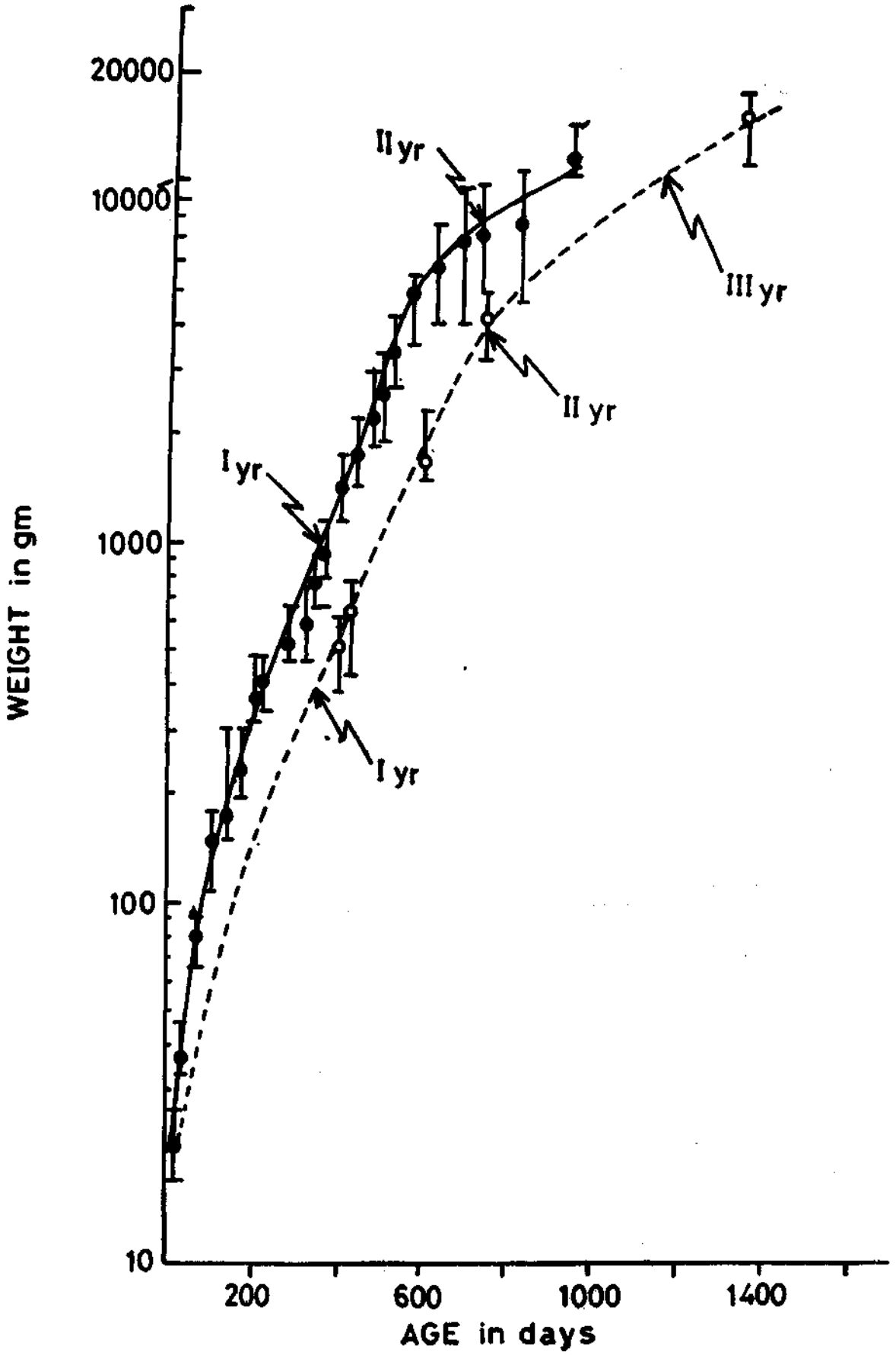

Fig. 7. Increase in live body weight of 1981 (●—●) and 1980 (O- - -O) groups of olive ridley *Lepidochelys olivacea* with advancing age. The values are mean of 15-19 individuals ; the vertical line represents the range.

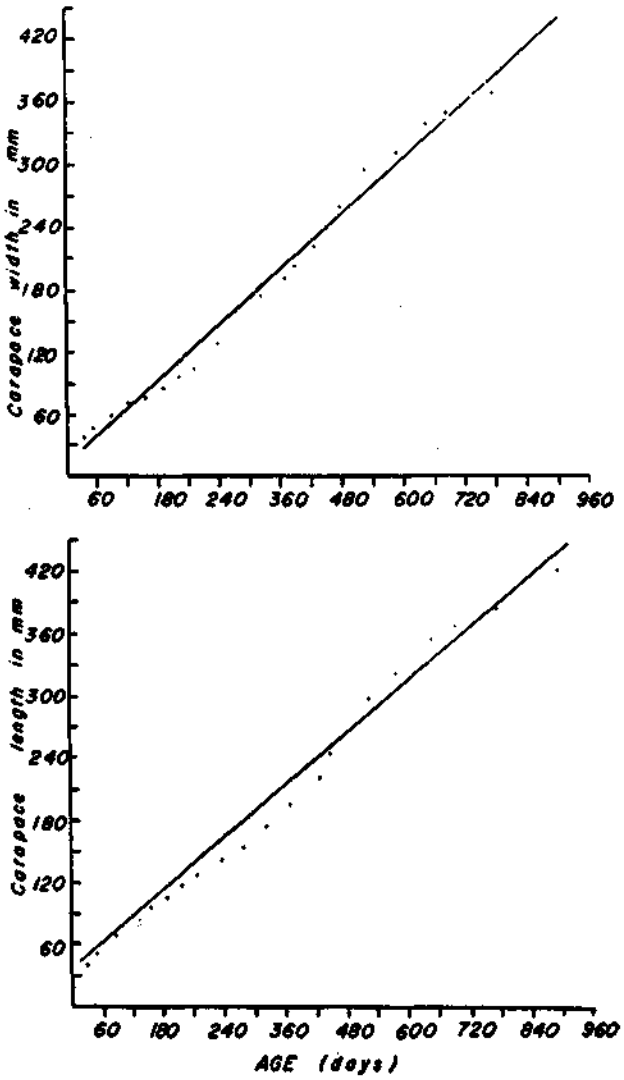

Fig. 5. Increase in carapace length and width of olive ridley *Lepidochelys (olivacea* 1981 group) with advancing age. Each value represents the mean of 19 individuals.

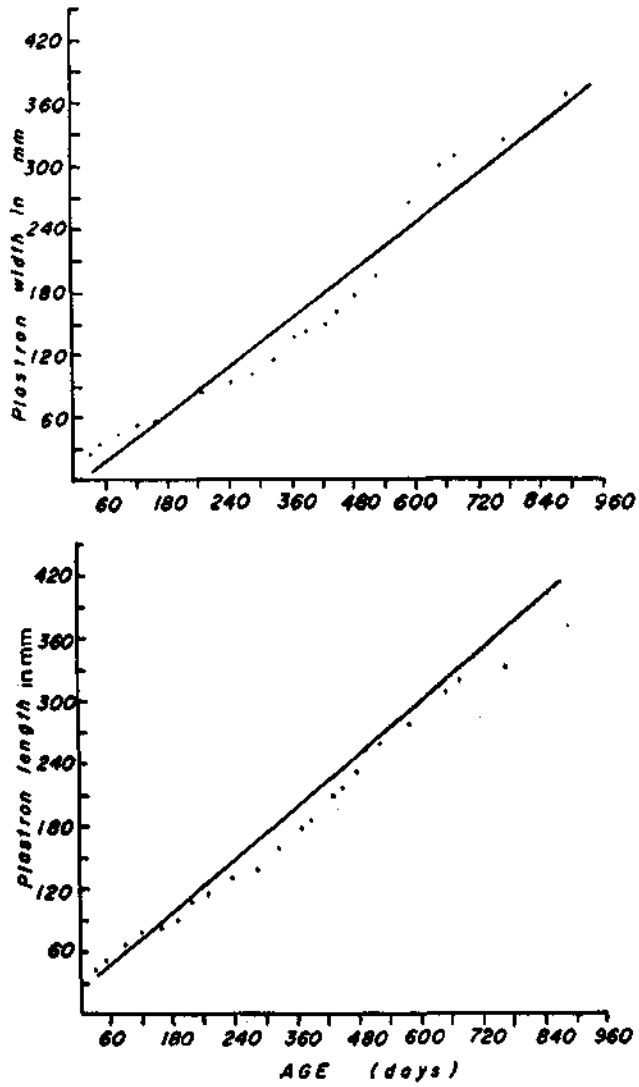

Fig. 6. Increase in plastron length and width of olive ridley *Lepidochelys olivacea* (1981 group) with advancing age. Each value represents the average of 19 individuals.

Even after 47 months it has not been possible to externally identify the sexes of olive ridley. Further rearing will provide information on the first appearance of secondary sexual characters. Rearing these turtles is continued in the pens at Muttukadu to collect information on aspects such as growth, appearance of secondary sexual characters and age at first maturity.

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