GROWTH OF THE SPINY LOBSTER, *PANULIRUS HOMARUS* (LINNAEUS), IN CAPTIVITY

M. M. THOMAS[1]

Central Marine Fisheries Research Institute; Regional Centre, Mandapam Camp

ABSTRACT

The growth of *Panulirus homarus* (Linnaeus) in captivity is traced in relation to moulting. The growth per moult of 4 to 9 mm carapace length and annual rate of growth of 30 mm in male and 17 mm in female are found to be in agreement with those of its congeners. Instances of moulting without growth and death during exuviation are also reported.

INTRODUCTION

Investigations on the growth of spiny lobsters have been undertaken by various workers. Moulting and subsequent increase in length and weight were traced by Kinoshita (1933) and Nakamura (1940) in *Panulirus japonicus* (Von Siebold). Lindberg (1955) calculated the increase in length of tagged animals, and Bakus (1960) estimated the yearly growth of females and males of *Panulirus interruptus* (Randall). Growth studies were undertaken by Simpson (1961) in *Homarus vulgaris* (Milne Edwards), Marshall (1948) and Dawson and Idyll (1951) in *Panulirus argus* (Latreille). Travis (1954) made a detailed study of the moulting and consequent increase in size and weight in *P. argus*. The growth of the Indian spiny lobster, *P. homarus* has been estimated from the length frequency distribution by George (1967) while Mohamed and George (1971) have reported the actual increase in length observed during the mark-recovery experiments on the same species.

MATERIAL AND METHODS

Specimens of *Panulirus homarus* ranging in carapace length from 33 to 51 mm (total length 90 to 145 mm) were collected from the shore-seine landings from the Gulf of Mannar near Mandapam Camp and kept in glass aquaria with running sea water and provided with den-like shelters made of rocks and asbestos pieces. They were daily fed on clams and pieces of small fishes.

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1. Present address: Central Marine Fisheries Research Institute, Cochin-11.

The length of each individual was carefully measured by means of calipers to the nearest millimetre. Carapace length was made use of during the studies as total length was subject to errors due to the distortion of the abdomen. Carapace length was measured from the posterior margin of the carapace to the anterior margin of the base of postorbital spines, along the mid-dorsal line.

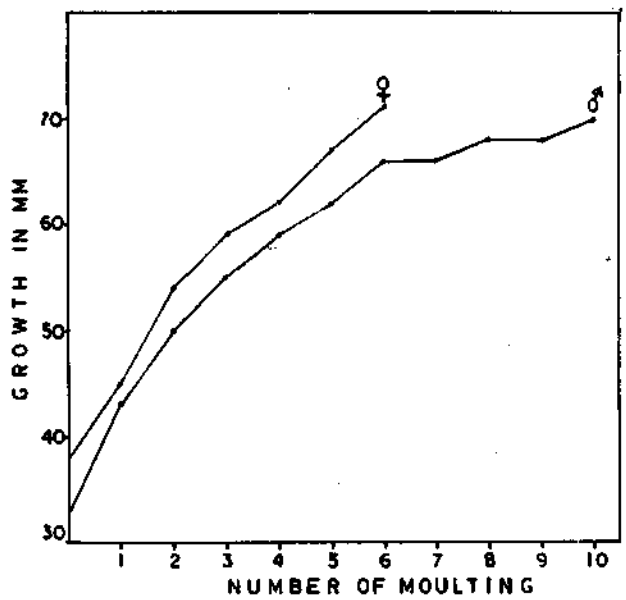

Fig. 1. Growth curve of *Panulirus homarus*.

Ten specimens of carapace length ranging from 33 to 51 mm were kept under observation for a period from 32 to 633 days. Two specimens, one male and one female survived for 569 and 633 days, undergoing 10 and 6 moults respectively (Table 1). The secondary sexual characters were developed at 50 mm carapace length in male and 54 mm in female.

Results and Discussion

The growth rate in the younger specimens was higher than in older ones (Fig. 1), as observed by studies of mark-recovery experiments in the same species by Mohamed and George (1971). Travis (1954) in *P. argus*, Simpson (1961) in *P. vulgaris* and Fielder (1964) in *Jasus lalandii* obtained similar results. Heydorn (1969) however, did not find such differences in growth rate between small and large specimens. The average increase in carapace length per moult

TABLE 1. *Details of moulting and growth of* Panulirus homarus *(Linnaeus)*

Sl No.	Initial length (mm)	Final length (mm)	Increase in length (mm)	No. of days	No. of moults	Sex	Remarks
1	33	44	11	62	1	Undeveloped	Died during moulting Died due to fouling of water supply with *Trichodesmium* bloom
2	43	43	nil	40	nil	-do-	
3	49	49	nil	40	nil	-do-	
4	28	54	26	338	3	-do-	
5	37	71	33	633	6	Female	
6	33	33	nil	32	nil	Undeveloped	Died before moulting
7	35	42	7	120	1	-od-	
8	33	70	37	569	10	Male	
9	50	61	11	191	2	Male	
10	51	62	11	156	1	Male	Died just before second moult

ranged from 4 to 9 mm which is in agreement with the observations of Travis (1954) in *P. argus* and Lindberg (1955) in *P. interruptus*. The estimated average annual increment of carapace length was 30 mm in male and 17 mm in female which is faster than the estimates based on length frequency studies in the same species by George (1967) and conforms with the results obtained by Smith (1948, 1951) and Dawson and Idyll (1951) in *P. argus*. But, the growth rates reported by Von Bonde and Merchand (1935), Bradstock (1950) and Fielder (1964) in *Jasus lalandii* are lesser than that observed in the present studies as well as by previous workers on species of the genus *Panulirus* from different localities.

The frequency of moulting was higher in the present material in comparison with that in *Jasus lalandii* in South Australian and South African waters (Fielder, 1964, Heydorn, 1969), although it is comparable to the results obtained in species of *Panulirus* by various authors. Moulting without increase in length was noticed in the male specimen at 66 mm and 68 mm of carapance length (Fig. 1) as already reported in *P. argus* (Marshall, 1948; Dawson and Idyll, 1951; Travis, 1954) and in *P. interruptus* (Lindberg, 1955). While observing similar instances of moulting without increase in length, Fielder (1964) reported marked increase in size during the subsequent moultings as was the case in the present investigations on *P. homarus* also. The time for first moulting in capacity was longer in the male and female specimens, probably due to the inhibitions caused by captivity. It was found that the frequency of moulting in *P. homarus* was greater in males than in females.

One of the specimens measuring 44 mm in carapace length died during moulting. The carapace and abdomen were already withdrawn from the old

exoskeleton while the pereopods were caught in the skeleton by the swelling before they were freed. Similar phenomenon has been reported by Lindberg (1955) in *P. interruptus* and Fielder (1964) in *Jasus lalandii*.

Ecdysis, in all cases, was during night. Close examination of the exuviae and the animals which died during exuviation showed that the process was the same as described by Travis in *P. argus*, although, the actual moulting could not be observed.

Temperature which considerably affects the frequency of moulting in crustaceans (Drach, 1939; Travis, 1954) is reported to have direct influence on moulting cycle of palinurid lobsters. Travis (1954) found that most of the moults in *P. argus* occurred in the warmer months of the year, thus limiting it to seven months. But, such striking correlation between the temperature and moulting was not noticed by Fielder (1964) during his investigations on the South Australian spiny lobster, *Jasus lalandii*. In the present studies on *P. homarus* also no correlation between temperature and frequency of moulting could be established as found for *P. argus* (Travis, 1954), probably due to the narrow range in temperature (27 to 30°C) in the aquaria.

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