REARING OF EARLY JUVENILES OF SPINY LOBSTER *PANULIRUS VERSICOLOR* (LATREILLE) WITH NOTES ON LOBSTER FISHERY IN VIZHINJAM AREA

M. D. K. KUTHALINGAM, G. LUTHER AND S. LAZARUS
Central Marine Fisheries Research Institute Centre, Vizhinjam.

ABSTRACT

Juveinles of the spiny lobster *Panulirus versicolor* measuring in carapace length from 9 mm to 21 mm, collected from the crevices of rocks inside the breakwater area in theVizhinjam Bay at a depth of about 6 meters were reared in the laboratory glass tanks. The results revealed an increment of growth of 1.82 mm to 3.58 mm in carapace length with an average at 2.84 mm per month. The lobster fishery at Vizhinjam area together with price index is outlined.

INTRODUCTION

Prasad and Tampi (1968) included the seas around India as part of distributional range of the spiny lobster, *Panulirus versicolor* (Latreille). George (1973) reported this species to constitute to a certain extent the lobster fishery south of Trivandrum. And Chhapghar and Deshmukh (1971) reported the occurrence of this species along the Maharashtra coast. Detailed biological studies on this species, however, are lacking. The present paper reports on the occurrence of early juveniles of *P. versicolor* at Vizhinjam together with observations on the rearing of this species in the laboratory. The lobster fishery at Vizhinjam is also briefly described.

METHODS OF COLLECTION AND REARING OF LOBSTERS IN THE LABORATORY

On 6-4-1976, while we were engaged in supplying food for the fish that were being reared in cages in the Vizhinjam Bay, young stages of spiny lobsters, *P. versicolor* were observed in the crevices of the rocks inside the breakwater area in the Vizhinjam Bay at about 6m depth. Thirty-two of them ranging between 9 and 21 mm carapace length together with 5 numbers of *P. homarus* ranging between 19 and 32 mm in carapace length were hand-picked by skin diving and they were immediately transferred into large polythene troughs containing sea water and were later released into glass tanks (100 x 50 x 40 cm size) in the laboratory. Three pieces of flat bottomed rocks were placed in each tank, one upon two, to provide hiding place for each lobster. The lobsters spent

most of the day time inside this shelter but came out and moved about freely inside the tank at night. Six specimens of *P. versicolor* with carapace lengths at 9 mm, 10 mm, 15 mm, 16 mm, 20 mm and 21 mm were selected and each individual was kept separately in a tank to study their growth rate (Table 1). The specimens were fed with enough quantity of minced flesh of the brown mussel (*Perna* sp.) both in the morning and in the evening. The rearing tanks were constantly kept aerated. Sea water in the experimental tanks were changed twice a day. Information regarding the lobster landings and price for the seasons from 1972-73 to 1975-76 was obtained from lobster agents of the Vizhinjam area.

TABLE 1. *Increment in growth of* P. versicolor *in six laboratory tanks*

Carapace Length (mm)	*Date of collection*	*Date of successive moulting and carapace length* (mm) *Moult I*	*Moult II*	*Moult III*	*Moult IV*	*increment per month* (mm)	*Remarks*
9	6-4-1976	10-4-76 9	22-4-76 10	9-5-76 11	——	1.82	Died on 10-5-76
10	6-4-1976	8-4-76 10	3-5-76 11	——	——	2.57	Died on 11-5-76 at 13 mm length
15	6-4-1976	11-4-76 15	5-5-76 17	29-5-76 18	14-6-76 21	2.61	———
16	6-4-1976	20-4-76 16	6-5-76 19	22-5-76 21	——	3.53	Died on 13-6-76 at 24 mm length
20	6-4-1976	8-4-76 20	4-5-76 21	18-5-76 22	11-6-76 25	2.27	———
21	6-4-1976	18-4-76 21	10-5-76 22	29-5-76 26	12-6-76 29	3.58	———

OBSERVATIONS

When food was placed in the tank, the lobster was found to come out and carry away the food into the hiding place. It does so almost immediately when food was placed after a longer interval of time. The first moulting in captivity was observed after an initial period of 2-14 days, and the inferval of time for the next moulting varied between 12 and 26 days. The lobster was found to moult mostly at night after which it was seen to hide in the shelter for 2-3 days.

Carapace lengths of the lobster at each moulting or at death noted for individual lobsters reared in separate tanks are given in Table 1. A sample of

the lobsters reared in the laboratory tanks is shown in fig. 2. It may be seen from the table that the lobster, 9 mm length, in tank 1 grew to 11 mm in 33 days, moulting thrice during the period. This gives a monthly growth rate of 1.82 mm. The 10 m long lobster in tank 2 grew to 13 mm in 35 days, showing a monthly growth rate of 2.57 mm. Specimen in tank 3 grew from 15 mm to 21 mm in 69 days, showing an increment of 3.53 mm per month. Similarly the specimen in tank 5 grew from 20 mm to 25 mm in 66 days and that in tank 6 from 21 mm to 29 mm in 67 days registering growth increments of 2.27 mm and 3.58 mm permonth respectively. Thus the growth rate of young lobsters in 9-21 mm carapace length range varied from 1.82 mm to 3.58 mm with an average at 2.84 mm per month of 30 days.

FISHERY

Five species of spiny lobsters, namely, *Panulirus homarus*, *P. ornatus*, *P. polyphagus*, *P. penicillatus* and *P. versicolor* were found to contribute to the lobster fishery in Vizhinjam area, extending from Mulloor to Kovalam, a distance of about 3 km. The first species formed the major bulk forming about 95% of the lobster landings in the area. The composition of the other 4 species was in the order of about 2.0%, 1.5%, 1.0% and 0.5% respectively. Thus *P. versicolor* is a rare species of lobster in the Vizhinjam area. The carapace size ranges of the different species of lobsters in the fishery were 30-80 mm for *P. homarus*, 35-125 mm for *P. ornatus*, 20-65 mm for *P. polyphagus*, 25-60 mm for *P. penicillatus* and 9-70 mm for *P. versicolor*.

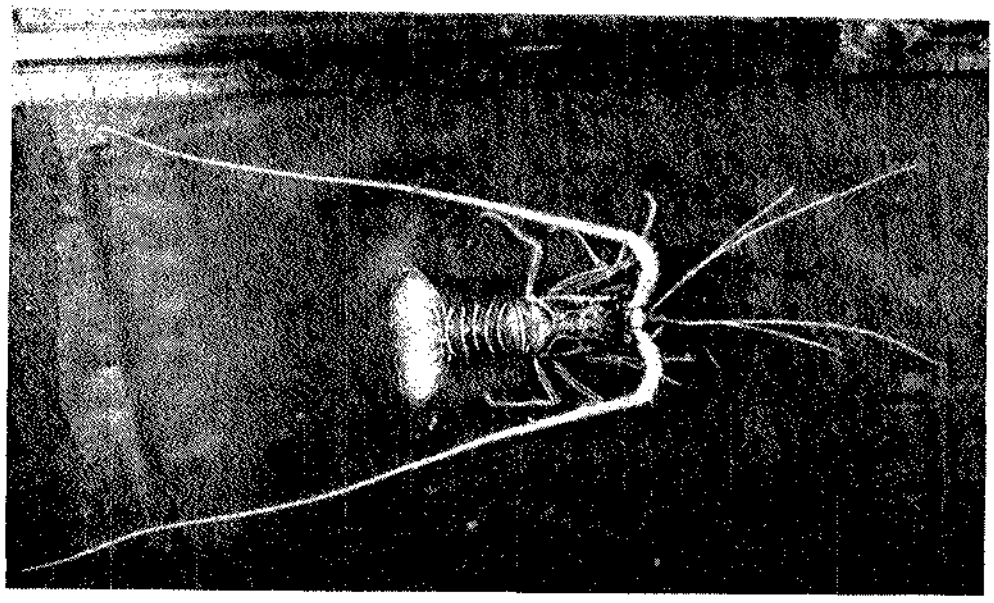

FIG. 1. Dorsal view of *P. versicolor* showing the colour pattern

Basket-trap made of strips of fibres of palm-leaf stalk with mussel as bait is the main gear employed in the Vizhinjam area for the lobster fishery. Occasionally, however, lobsters are caught in bottom-set gill nets as well as by hooks tied to one end of a bamboo pole of about a metre length operated mostly at night.

The lobster catch at Vizhinjam ranged between 3725 and 3872 kg and between 30613 and 32444 in number in each season during the period 1972-73 to 1975-76 with an average at 3794 kg and 31725 nos. The amount realised in each annual fishing season ranged between Rs. 134,485 and Rs. 173,960 during the same period. Table 2 and 3 give the monthly lobster landings at Vizhinjam for eight seasons 1968-69 to 1975-76 and the price index for four seasons 1972-73 to 1975-76.

Fishing season extends from October to April with peak period during December-January. On an average about 200 lobsters were caught daily during November-Frebruary period and about 100 lobsters per day during the rest of the period during 1972-73 to 1975-76 seasons, when they were sold at a rate varying between Rs. 4.51 and Rs. 7.10 per adult depending on the size of the lobster.

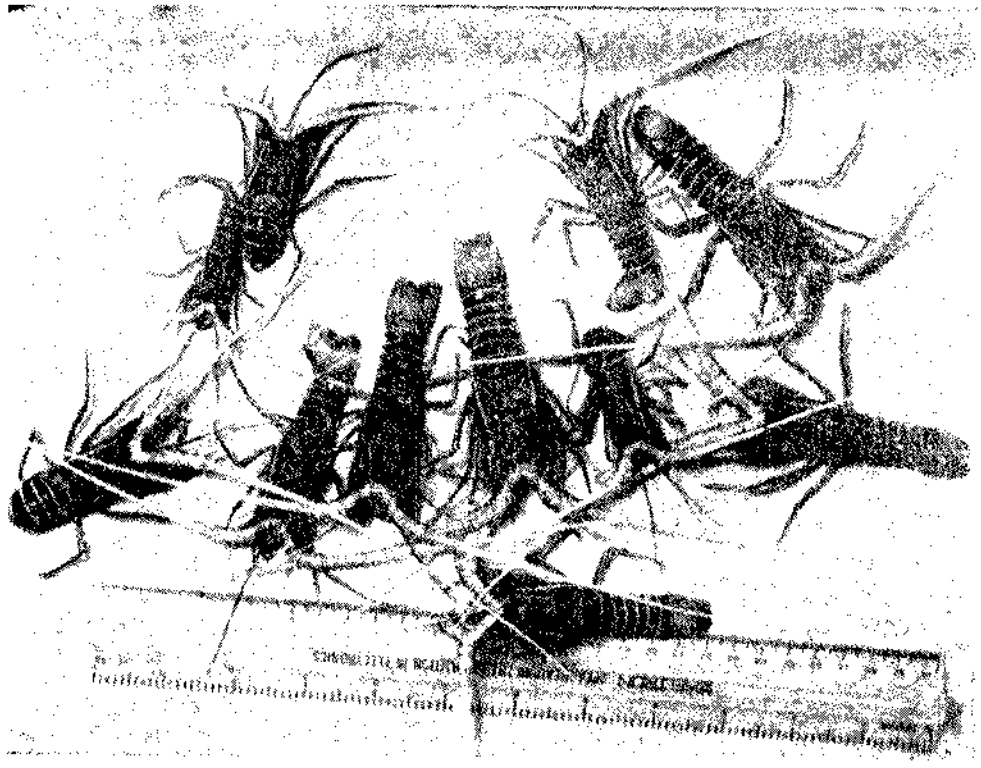

FIG. 2. A sample of *P. versicolor* reared in the laboratory.

TABLE 2. *Monthly lobster landings in numbers during* 1968-69 *to* 71-72 *in Vizhinjam area.**

	68-69	69-70	70-71	71-72
October	1882	——	372	——
November	6236	1185	750	——
December	8490	1485	1098	1687
January	7920	1143	1027	912
February	5012	1560	581	322
March	3570	315	——	225
April	270	——	——	——

* Data presented have been obtained from the administrative reports of Fisheries Department, Kerala. Particulars relating to weight and amount realised were not available.

REMARKS

Lobster fishery off the southwest coast of India was reported by Miyamoto and Shariff (1962) as being constituted mainly by *P. homanrus P. burgeri.* They have also mentioned record of single specimen of *P. pencillatus* and *P. polyphagus* along this coast. In his account on the crustacean fishery resources of India, Jones (1967) however reported that 4 species of lobsters, namely, *Panulirus polyphagus, P. ornatus, P. homarus* and *Puerulus sewelli* constitute the lobster fishery in India. Of the 4 species, according to him, *P. homarus* contributes to a fairly good fishery supporting a lucrative freezing industry on the southwest coast of India mostly in the area south of Trivandum during the months of December-April. Observations of George (1967) also have revealed that *P. homarus* is the most common species of lobster occurring along the southwest coast of India. The present observations also indicate that *P. homarus* is the chief support of lobster fishery at Vizhinjam. Nair et al. (1973) have reported that *P. versicolor* forms about 6.97% of the lobster catch in the Gulf of Mannar. But Jonklaas (1967) found this species to form about 23% of the lobster catch in the Maldive Islands.

The present study gives a rate of growth of 1.82 mm to 3.58 mm in carapace length with an average at 2.84 mm per month for the lobster *P. versicolor.* George (1967a, b) has reported an average annual growth rate of about 30 mm in total length for *P. homarus.* From the details of growth on *P. homarus*

TABLE 3. *Monthly lobster landings (number and weight) and price index during 72-73 to 75-76 in Vizhinjam area (Figures in brackets in columns 1-3 represent the average number of lobsters caught per day, number of lobsters per kg, price/kg, respectively).*

Months	1972-73 No. of lobsters caught	1972-73 Lobster catch (kg)	1972-73 Amount realised per kg (Rs.)	1973-74 No. of lobsters caught	1973-74 Lobster catch (kg)	1973-74 Amount realised per kg (Rs.)	1974-75 No. of lobsters caught	1974-75 Lobster catch (kg)	1974-75 Amount realised per kg (Rs.)
Oct.	——	——	——	——	——	——	——	——	——
Nov.	6400	675	35.00	5041	605	38.00	6501	780	40.00
	(213)	(8)	(4.18)	(170)	(8)	(4.56)	(220)	(8)	(4.80)
Dec.	5900	700	35.00	6477	775	38.00	7212	865	45.00
	(197)	(8)	(4.15)	(216)	(8)	(4.56)	(240)	(8)	(5.40)
Jan.	7215	865	38.00	8400	1006	38.00	6200	650	46.00
	(240)	(8)	(4.56)	(280)	(8)	(4.56)	(206)	(10)	(4.82)
Feb.	6110	730	38.00	6205	745	38.00	4500	580	48.00
	(203)	(8)	(4.54)	(207)	(8)	(4.56)	(150)	(8)	(6.19)
Mar.	3700	440	33.00	4115	494	38.00	4200	600	50.00
	(123)	(8)	(4.16)	(134)	(8)	(4.56)	(140)	(7)	(7.14)
Apr.	2500	300	35.00	2206	245	32.00	2000	250	46.00
	(83)	(8)	(4.20)	(74)	(9)	(3.56)	(67)	(8)	(5.75)

given by Thomas (1972) it may be inferred that it has a monthly growth rate varying between 1.56 mm and 5.32 mm with an average at 2.39 mm in total length, The present result on growth rate cannot be compared with the previous ones since the former were based on total length. However, it would appear that *P. versicolor* exhibits good growth rate in captivity. Rearing of lobsters in marine tanks could therefore be an additional source of lobster tails for marine products export industry.

ACKNOWLEDGEMENTS

We express our sincere thanks to Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin, for his encouragement. We express our deep appreciation for the utmost care and attention bestowed by Shri. V. Viswanathan in maintaining the experimental marine tanks.

REFERENCES

ANONYMOUS. Administration Reports of the Fisheries Department, Government of Kerala, for the years 1968-1971.

CHHAPGHAR, B. F. AND S. DESHMUKH. 1971. Lobster fishery of Maharshtra, *J. Indian Fish. Assoc.*, 1(1): 74-83.

GEORGE, M. J. 1967a. The Indian spiny lobster. *Souvenier, 20th Anniversary. Central Marine Fisheries Research Institute*, 1967, 81-86.

GEORGE, M. J. 1967b. Observations on the biology and fishery of the spiny lobster *Panulirus homarus* (Linn.). *Proc. Symp. Crust.* (Marine Biological Association of India): Pt. IV, pp. 1308-1316.

GEORGE, M. J. 1973. The lobster fishery resources of India. *Proc. Symposium on the Living Resources of the seas and around India.* p. 570-580.

JONES, S. 1967. The crustacean fisheries resources of India. *Proc. Symp. Crust.* (Marine Biological Association of India), Pt. IV, pp. 1328-1340.

JONKLAAS, R. 1967. A preliminary investigation of the spiny lobster resources of the Maldive Islands. *Ibid.*, pp. 1341-1347.

MIYAMOTO, H. AND A. T. SHARIFF. 1962. Lobster fishery off the south-west coast of India. *Indian J. Fish.*, 8(1): 254-268.

NAIR, R. V., R. SOUNDRARAJAN AND K. DORAIRAJ. 1973. On the occurrence of *Panulirus longipes longipes, P. pencillatus* and *P. polyphagus* in the Gulf of Mannar with notes on the lobster fishery around Mandapam. *Indian J. Fish.*, 20(2): 333-350.

PRASAD, R. R. AND P. R. S. THAMPIS 1968. On the distribution of palinurid and scyllarid lobsters in the Indian Ocean. *J. mar. biol. Ass. India*, 1968. 18(1): 78-87.

THOMAS, M. M. 1972. Growth of the spiny lobster, *Panulirus homarus* (Linnaeus), in captivity. *Indian J. Fish.*, 19: 125-129.