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OBSERVATIONTS ON MOULTING OF CRAB *PORTUNUS PELAGICUS* LINNAEUS REARED IN THE LABORATORY

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ABSTRACT

Young crabs of *Portunus pelagicus* of the size group between 11 and 44 mm in carapace width were collected from the inshore waters off Mandapam and were reared. Crabs measuring between 11 and 25 mm in carapace width attained marketable size of 140—145 mm at the twelfth moult after a period of fourteen months. Moulting occurred frequently in the young crabs measuring between 11 and 75 mm and thereafter, the interval between the two successive moults increased. The weight of the reared crabs at different sizes was comparable to that of freshly caught from the sea.

Regeneration of chelipeds and legs was studied in *P. pelagicus* by removing a single appendage at one time. After about 4 to 7 days rudiment appendage was found to develop from the basis and it completely regenerated to normal size at the next moult.

INTRODUCTION

IN COMMON with other members of crustacea, the crabs periodically cast away their exoskeleton inorder to grow. The moulting is observed throughout their life and the periodicity of moulting depend upon a number of factors such as availability of food, temperature, size of the crabs and influence by hormones. Changes in these factors may alter the moulting process. There are four stages in the moulting cycle *viz.* premoult, moulting, postmoulting and intermoult. The early development and moulting of crab have been described by Chopra (1939). Prasad and Tampi (1953) described the eggs and the developmental stages upto the second post-larval instar of *Portunus pelagicus*. Naidu (1955) also described the early development of *Scylla serrata* and *Portunus sanguinolentus*. These accounts include a brief description on the process of moulting, but did not provide any illustrations. The present account gives some of the interesting informations on the moulting based on the observations made from the laboratory-reared crabs of *Portunus pelagicus* Linnaeus.

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MATERIAL AND METHODS

While catching prawns by special type of drag nets (*Suppivalai* and *thallu valai*) from the inshore waters around Mandapam area, juvenile crabs of *Portunus pelagicus* have also been caught by these nets in large quantities. Young crabs of the size group between 11 and 44 mm in carapace width were transported alive to the aquarium where they were reared in running sea water in large tanks. The experimental crabs (11 mm to 25 mm) were kept singly in sea water and sand filled in rectangular plastic troughs ($60 \times 33 \times 25$ cm) and in glass aquaria (diameter: 32 cm; depth: 20 cm). These rearing chambers were flushed with fresh sea water daily and an aerator was also provided to each chamber. Each crab was fed with ten pieces of clam meat once daily. The unused pieces of meat particles were removed in the evening. Seven experiments were conducted to study the growth pattern in

Portunus pelagicus. The periodic moulting in the crab was followed by constant observations. The crab was weighed and measured after each moult and the data was recorded for the growth studies.

Moulting and Growth

The crab ceases feeding for about two to three days prior to its moult. This indicates that the crab may moult at any time. The old exoskeleton breaks along the posterolateral margin of the dorsal side, anterolateral border of the ventral side (Pl. I A, B) and posterior border of the arm of the chelipeds and legs (Pl. II A). A new pre-exuvial soft layer is formed below the old carapace (Pl. I A). At this stage the crab comes out from the old case leaving the skeleton almost intact on the sand surface (Pl. II A). The whole process of moulting takes place only at night, is completed within 12 to 15 minutes. The newly moulted crab is seen to bury itself in the sand. It is less active and did not eat clam meat for one or two days. The body is very soft and depressible on the first day, 30% hardened on the second day, 50% hardened on the third day, 75% hardened on the fourth day, 90% harddened on the fifth day and the crab became completely hardened (100%) on the sixth day of its moult. Now the crab is normal in all activities and the process of moulting is repeated again when it is ready for a further increase in size. The moulting occurs at short intervals in the young crabs measuring between 11 and 75 mm and thereafter, the interval between the two successive moults increased.

The mean valves of time interval and size and weight increase between moults are given in Table 1. From the data it is evident that there is a steady increase of about 5 mm in size after moulting in the case of crabs measuring between 10 mm and 25 mm in carapace width, 10 to 11 mm increase in size in the cases of crabs of the size group between 25 and 36 mm, 12 to 13 mm increase in the size group between 36 and 86 mm, 18 mm increase in the size group between 86 and 104 mm, 10 mm increase in the size group between 104 and 124 mm and 21 mm increase in size in the cases of individuals measuring between 124 and 145 mm. The crabs measured between 11 and 25 mm at capture attained the marketable size of 140—145 mm after a period of 14 months by completing twelve successive moults. It is interesting to note that the weight of the reared crabs at different sizes is comparable to that of freshly caught from the sea.

Regeneration of Chelipeds and Legs

Results obtained from experiments on the regeneration of chelipeds and legs in *Portunus*

Table 1. *Data (mean values) on* Portunus pelagicus *used in experiments on growth (moulting)*

Carapace width (& weight in g) before moulting (mm)	Carapace width (& weight in g) after moulting (mm)	Time interval in moulting (days)	Size increase after moulting (mm)	Weight increase after moulting (g)
11.7 (-)	15.5 (0.2)	5	3.8	–
15.1 (0.2)	20.0 (0.46)	7	4.9	0.26
20.0 (0.46)	25.1 (0.8)	11	5.1	0.46
25.1 (0.8)	36.0 (2.8)	33	10.9	2.00
36.0 (2.8)	44.0 (5.9)	17	8.0	3.10
44.0 (5.9)	59.0 (11.7)	22	15.0	5.80
59.0 (11.7)	75.0 (22.0)	32	16.0	10.30
75.0 (22.0)	86.0 (33.1)	57	11.0	11.10
86.0 (33.1)	104.0 (57.2)	58	18.0	24.10
104.0 (57.2)	115.0 (76.7)	86	11.0	19.50
115.0 (76.7)	124.0 (102.5)	48	9.0	25.80
124.0 (102.5)	145.0 (155.3))	47	21.0	52.80

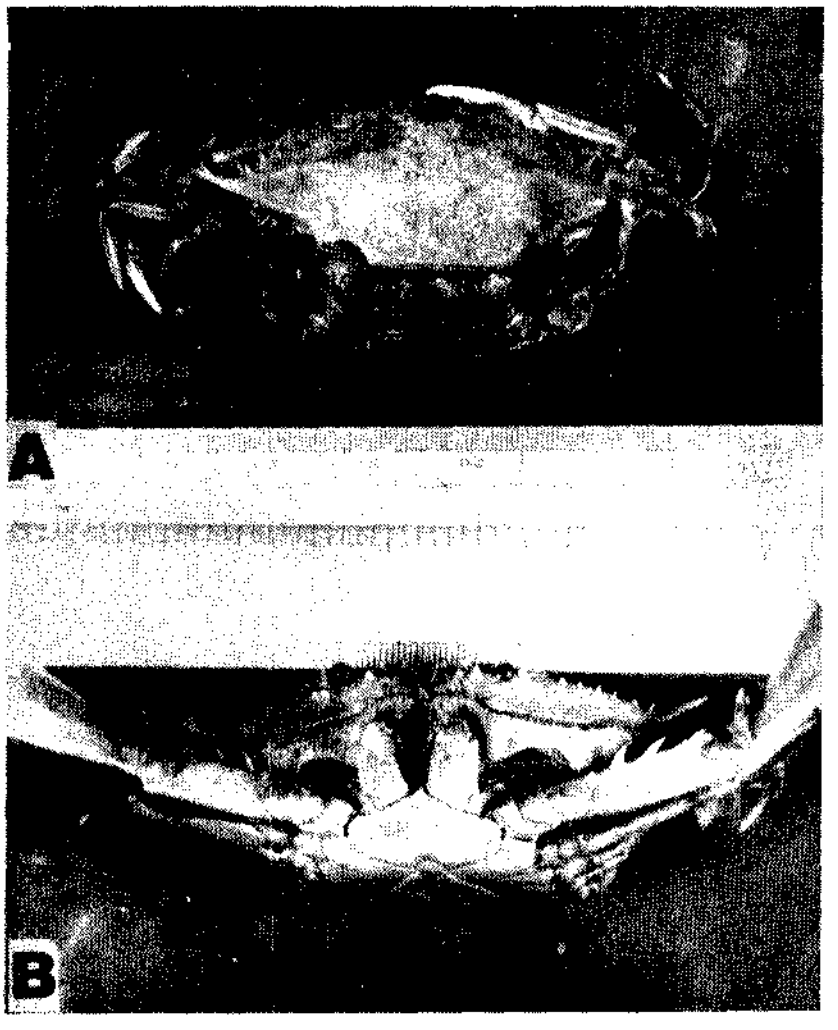

PLATE I. A. Splitting of old exoskeleton along the posterolateral margin (dorsal view) and B. anterolateral border (ventral view) during the process of moulting.

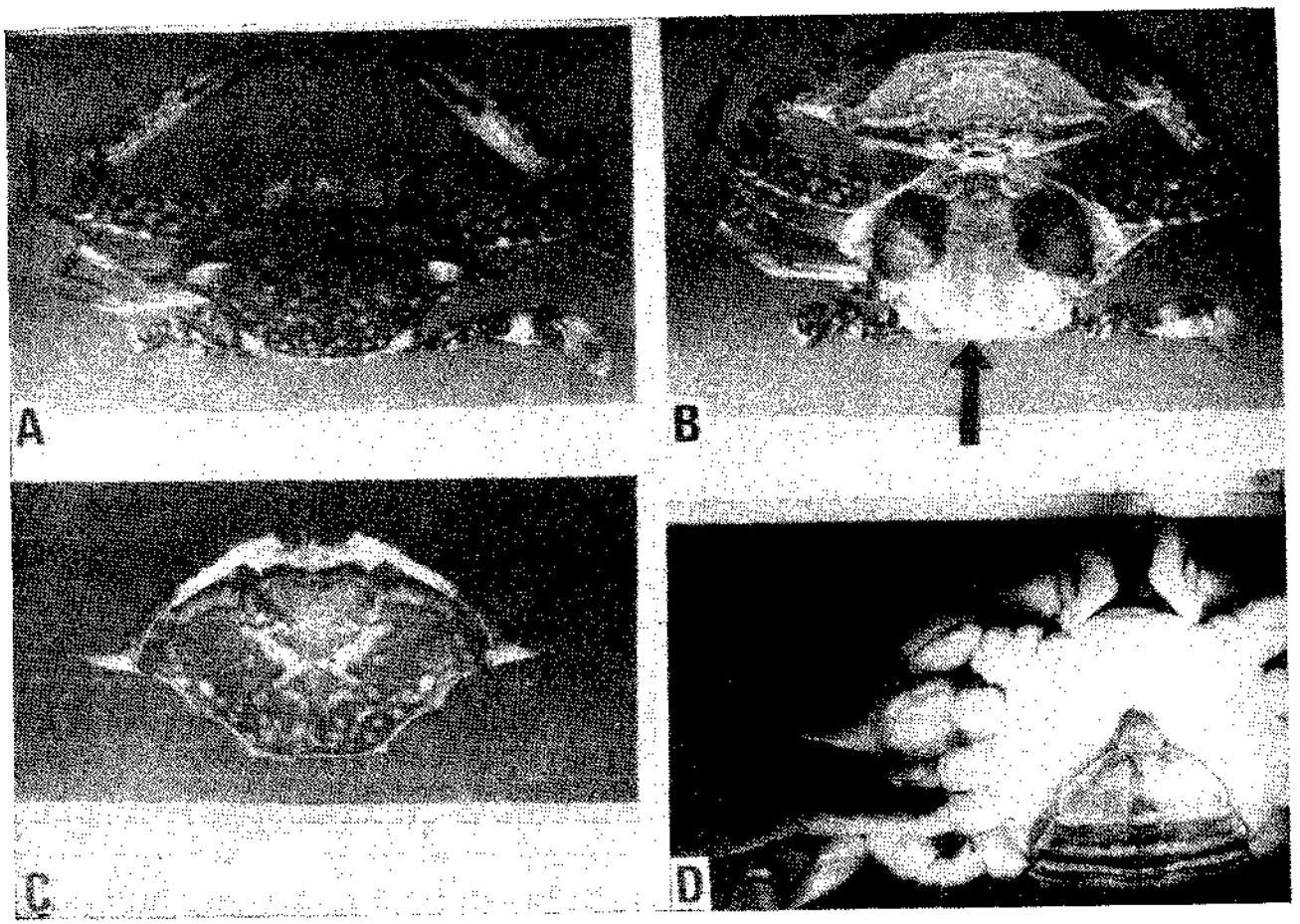

PLATE II. A. Moulted skeleton of a male crab of *Portunus pelagicus*; B. Usual splitting on the margins of posterolateral, anterolateral and posterior border of the arm of the chelipeds and legs, arrow points out the posterolateral border which lies above the first abdominal segment; C. Inside view of carapace shows splitting on the anterior border; and D. Rudiment appendages of right cheliped, 1st and 2nd walking legs; the appendage is four segmented, slightly darkened and pigmented

pelagicus are presented in Table 2. In this study, cheliped or leg of freshly moulted crab was carefully cut down at the end of ischium leaving the basis segment with the appendage. size and was segmented (four segments) after another 6 days. It increased further in size and became slightly darkened and pigmented after another 4 days. Dactyl and thumb were

TABLE 2. *Data on* Portunus pelagicus *Used in experiments on regeneration of chelipeds and legs*

Sex	Carapace Width (mm)	Weight (g)	Days of observation	Days of Moulting	Remarks
Female	14.7	0.2	21.2.72		Left swimming leg removed
	17.9	0.45	12.12.72		
	18.0	—	19.12.72		
	24.0	—		19.12.72	Left swimming leg regenerated
Female	39.1	4.0	22.12.72		Right 3rd walking leg removed
	39.5	4.25	29.12.72		Rudiment appendage developed
	50.9	7.9		12.1.73	Right 3rd walking leg regenerated
Female	48.0		2.3.73		Left 1st walking leg removed
	"		6.3.73		Rudiment appendage developed
	61.0			17.3.73	Left 1st walking leg regenerated
Female	43.0	5.2	3.11.73		Right cheliped removed
	"	"	7.11.73		Rudiment appendage developed
	53.0	—		14.11.73	Right cheliped regenerated
Male	57.0	10.2	3.11.73		Right cheliped and left 3rd walking leg removed
	"	"	7.11.73		Rudiment appendage of cheliped and 3rd walking leg developed
	68.0	18.2		15.11.73	Right cheliped and 3rd walking leg regenerated
Male	68.0	19.4	29.8.74		Left cheliped removed
	83.0	33.2		18.9.74	Left cheliped regenerated
	83.0	34.6	1.10.74		Right cheliped removed
	94.0	46.8		11.11.74	Right cheliped regenerated

In most cases a single appendage was removed at one time in each crab. After about 4 to 7 days rudiment appendage was found to develop from the basis as a minute, transparent fleshy structure. This fleshy rudiment increased in seen at the tip of the folded rudiment of the cheliped (Pl. II D). The crab moulted at this stage and the rudiment appendage was completely regenerated to normal size.

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