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**A NOTE ON THE FIRST PHYLLOSOMA OF  
*PANULIRUS BURGERI* (de HAAN)**

**BY**

**R. RAGHU PRASAD, F.A.SC. AND P. R. S. TAMPI**

## A NOTE ON THE FIRST PHYLLOSOMA OF *PANULIRUS BURGERI* (de HAAN)\*

BY R. RAGHU PRASAD, F.A.SC. AND P. R. S. TAMPPI  
(Central Marine Fisheries Research Station, Mandapam Camp)

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### INTRODUCTION

THE authors started a few years back a survey of the Phyllosoma larvæ of the Indian waters (Prasad and Tampi, 1957). A thorough knowledge of these larvæ and the biology of the lobsters has now become essential because in recent years a fishery of considerable magnitude for lobsters has been established along the southernmost part of the west coast of India. The fishery is dependent on more than one species but at present off Vizhingam ( $76^{\circ} 59' 15''$  E;  $08^{\circ} 22' 30''$  N), which is one of the important fishing centres, the dominant species constituting the fishery is *Panulirus burgeri*, popularly known as Burger's crayfish. It has been possible to obtain a berried specimen of this and the following account deals with the first Phyllosoma thus adding to the list of Phyllosomas of the Indian waters whose identity has been definitely established.

### DESCRIPTION OF THE LARVA

The berried specimen of *P. burgeri* was kept in a non-circulating seawater tank where the eggs hatched out. Although all the larvæ died in the course of two or three days, it has been possible to obtain and study the stages during hatching until the first Phyllosoma swims about freely. Gilchrist (1913) described for the first time a naupliosoma for the South African form of *Jasus lalandii*. The larva was an active swimming form with large biramous antennæ possessing long setæ. This moults after a few hours into the normal Phyllosoma. Feliciano (1956), who later described a pre-naupliosoma stage in the development of *P. argus* remarked that further investigation is necessary to decide whether the prenaupliosoma and the naupliosoma stages occur within the egg or hatch as such. In the previous account (1957) the authors were not certain about the existence of a naupliosoma in *P. ornatus*. It may now be said with certainty that at least in *P. burgeri* neither a free living prenaupliosoma nor a naupliosoma, as described by some of the earlier workers in other forms, is present. However,

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the present authors have not studied the changes in the form of the developing embryos. It may be pointed out that the liberation of the Phyllosoma from the egg is more or less comparable to the process of hatching of the larvæ noticed in some of the other decapods (Prasad and Tampi, 1953). The larva that just emerges from the egg-capsule is unable to swim about as it remains completely rolled up inside another extremely thin and transparent membrane. At this stage the larva is soft bodied, the eyes droop laterally, the whole body as well as the appendages are curved ventrally and the setæ on the legs are only partly extruded so as to accommodate the larva within the delicate membrane. But the form of this larva is similar in all respects to that of the Phyllosoma except that it is not fully expanded. The larva sheds this membrane soon after the body and the appendages assume their turgidity. When once out of this covering the natatory setæ are fully extruded and the larva begins to swim about in the water. In view of these a separate name for this early soft-bodied larva does not seem warranted.

The first Phyllosoma of *P. burgeri* (Fig. 1 A) closely resembles the corresponding larva of *P. ornatus*, the only Phyllosoma of *Panulirus* of the Indian coast so far definitely correlated with its adult (Prasad and Tampi, 1957). It has been found that the differences in the first stage of Phyllosoma in these two species are only minor making specific distinction between them rather difficult. Nevertheless, it is possible to distinguish them on a detailed study and therefore the salient features of the larva of *P. burgeri* are compared with those of *P. ornatus* in order to help in differentiating them.

The Phyllosoma of both *P. ornatus* and *P. burgeri*, soon after hatching possess more or less the same type of orange-red chromatophores, particularly on the coxal segments of the pereopods and between the base of the first and second antennæ, while those of the mandibular region and on the other segments of the appendages as observed in *ornatus* are wanting in *burgeri*. As these chromatophores seem to be mostly an early character and further as these contract or easily disappear on preservation, their significance in the systematics can only be very little.

The length of the first Phyllosoma of *burgeri* in these aquarium-hatched and preserved ones ranges from 1.35–1.40 mm., whereas that of *ornatus* averages 1.42 mm. A most noticeable difference between the two larvæ lies in the form and shape of the fore-body. Whereas in *burgeri* the length, maximum width and the length/width relation of the fore-body are of the order of 0.671 mm., 0.658 mm. and 1.02 the corresponding measurements in *ornatus* are 0.733 mm., 0.700 mm. and 1.05. Thus, in *burgeri*, the fore-body is comparatively smaller than that of *ornatus* but broader rela-

ve to their respective lengths. The change in the proportion is further accentuated by a distinct narrowing of the carapace just below the insertion of the second antennæ. Similarly, the proportion between the width of the fore-body and the hind-body is also slightly different in the two species; the hind-body/fore-body is  $\frac{3}{5}$  in the Phyllosoma of *burgeri* while it is  $\frac{2}{3}$  in *ornatus*, the hind-body being relatively narrower in the former.

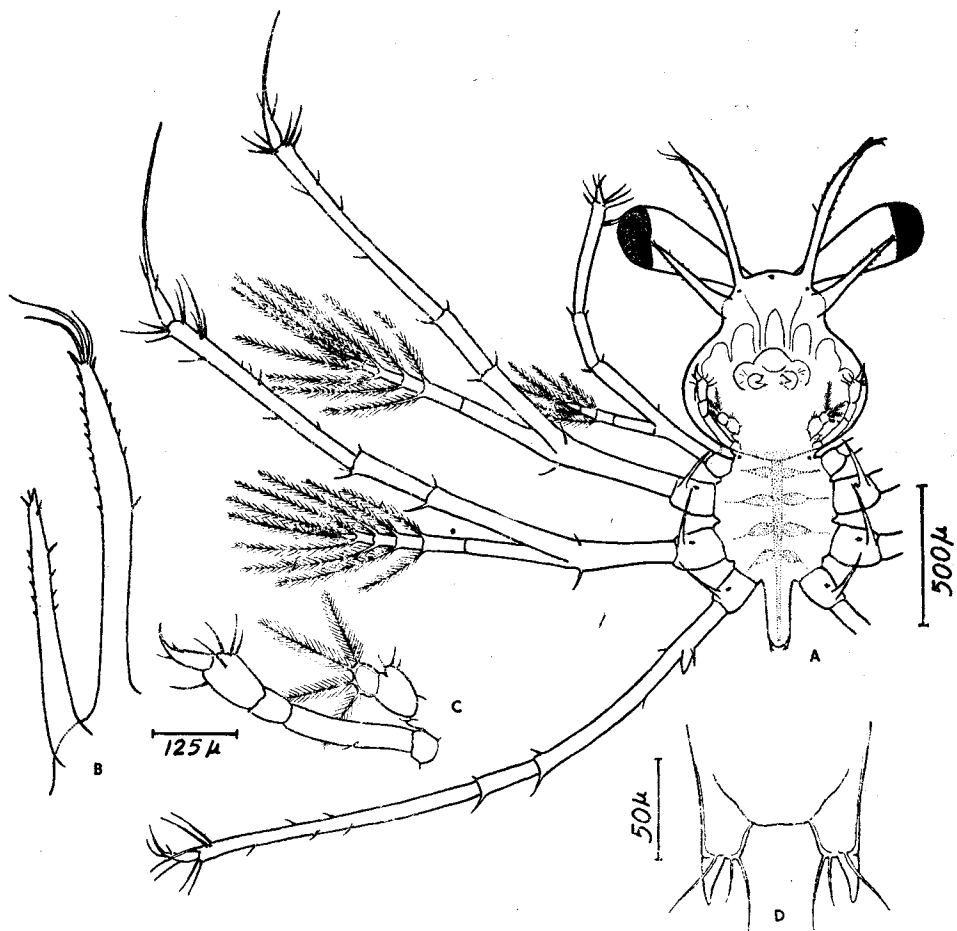


FIG. 1. A. The first Phyllosoma of *Panulirus burgeri*. B. The first and second antennæ. C. The second maxilla and the second maxillipede. D. The abdomen.

Considerable similarity between the larvæ of the two species is also evident in the shape of the eyes and their size in relation to the first antennæ, as well as the structure of the antennæ and other appendages. Figure 1 B shows the first and second antennæ of *P. burgeri*. Any difference in the

number of setæ or in their position seems to be insignificant, not to be too well relied upon as specific distinguishing characters. As in the Phyllosoma of *P. ornatus* the second maxilla has the last segment with the four setæ and also the three spines along the margin of the penultimate segment (Fig. 1 C). The first maxillipede is a very tiny, rudimentary bud (not figured in the earlier account by the authors), the second maxillipede is without an exopoditic segment while the third maxillipede is biramous bearing a setose exopodite characteristic of Palinurid Phyllosomas. The ventral coxal spines on the pereopods are also very long and prominent, and similarly the pereopods possess a spine at the distal end of their basipodite on the dorsal side adjacent to the beginning of the exopodites. The exopod of the third pereopod, however, is only rudimentary as in *ornatus*. Johnson (1956) has described a spine in a corresponding position on the pereopod in the larva of *P. gracilis* while it is said to be absent in the Phyllosoma of *P. interruptus*, thereby being able to distinguish the Phyllosomas of the two common species of spiny lobsters of the Californian coast. However, the presence of these spines seems to be a common characteristic of the larvæ of both *ornatus* and *burgeri*. It may further be added that the other spines on the legs do not seem to be very dependable as distinguishing characters. In trying to separate the two larvæ, the dactylus of the pereopods seems to be more helpful in the present instance. While the general characteristics of the dactylus resemble in the two species the length and its proportion in relation to the propus (penultimate segment) show differences in the two species. The mean values are in Table I. The dactylus of the last pereopod is much the same in the two larvæ. It is very much shorter than that in the first two pereopods and is curved like a claw.

TABLE I

	<i>P. ornatus</i>	<i>P. burgeri</i>
Dactylus of first pereopod ..	0.585 mm.	0.522 mm.
Dactylus/Propus ..	1.50	1.43
Dactylus of second pereopod ..	0.872 mm.	0.736 mm.
Dactylus/Propus ..	1.11	1.21

The abdomen in both the species is narrow with parallel sides ending in two pointed tips each bearing three simple setæ (Fig. 1 D).

Small numbers of the early Phyllosoma of *P. burgeri* have been obtained in November, 1958 in the inshore plankton hauls taken off Vizhingam. In view of the wider distribution of this species their larvæ will undoubtedly be found in other regions. Descriptions of the later stages in the larval history of this form as well as other Phyllosomas of the Indian waters on which work is in progress will be published in due course.

#### ACKNOWLEDGEMENTS

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#### REFERENCES

- Feliciano, C. .. "A prenaupliosoma stage in the larval development of the spiny lobster, *Panulirus argus* (Latreille), from Puerto Rico," *Bull. Mar. Sci. Gulf and Carib.*, 1956, 6, 341-45.
- Gilchrist, J. D. F. .. "A free-swimming nauplioid stage in *Palinurus*," *J. Linn. Soc., London*, 1913, 32, 225.
- Johnson, M. W. .. "The larval development of the California spiny lobster, *Panulirus interruptus* (Randall), with a note on *Panulirus gracilis* Streets," *Proc. California Acad. Sci., Ser. 4*, 1956, 29, 1-19.
- Prasad, R. R. and Tampi, P. R. S. "A contribution to the biology of the Blue Swimming Crab, *Neptunus pelagicus* (Linn.) with a note on the zœa of *Thalassidroma crenata* Latreille," *Journ. Bombay Nat. Hist. Soc.*, 1953, 51, 674-89.
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- .. "On the Phyllosoma of Mandapam," *Proc. Nat. Inst. Sci., India*, 1957, 23 B, 48-67.