XI

Larval development — Specific identity of penaeid postlarvae found in brackishwater areas

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Chromatophore pattern on the tail fan has been found to be a reliable and easily observed criterion for the identification of postlarval penaeids found in the brackishwater regions. The distinguishing characters of the postlarvae of *Penaeus indicus*, *P. meguiensis*, *P. semisulcatus*, *P. monodon*, *P japonicus*, *Metapenaeus dobsoni*, *M. monoceros*, and *M.affinis* are given and illustrated.

The possibility of using the postlarval abundance in brackishwater areas to predict the subsequent abundance of adult prawns in the sea has been discussed by Baxter (1963, *Proc. Gulf. Caribb. Fish. Instt;* 15: 79-87[1]), Christmas *et.al.* 1966, *Gulf Res. Rep.* 2 (2): 177-212[2].), George (1967, *Indian. J. Fish.* 10 (A): 135-139[3]), Berry and Baxter (1969, *FAO Fish. Rep.* 57 (3): 775-798[4]), and Rao (1972, *Indian. J. Fish.* 19: 86-96[5]). For work of this nature the specific identity of the postlarvae is essential, especially in a multispecies fishery. This is also necessary for selective stocking in prawn culture operations.

Various criteria have been used by previous workers for the identification of the postlarval penaeids. Williams (1959, *Bull. Mar. Sci. Gulf. Caribb;* 9 (3): 281-290.[6]) found that the postlarvae of *Penaeus setiferus*, *P. duorarum* and *P. aztecus* could be distinguished on the basis of (a) the shape of A1 scale and (b) the extent of the rostrum and the extent of the pereopods in relation to the eye. Ringo and Zamoro (1968, *Bull. mar. Sci.*, 18: 471-476[7]) found that the presence of minute spines on the dorsal carina of the 6th abdominal segment in the postlarvae of *P. aztecus* and *P. duorarum* is a taxonomic character which could be used to separate them from the postlarvae of *P. setiferus* which lack these spines. Mohamed *et. al.* (1968, *FAO Fish, Rep.*, 57 (2): 487-503[8]) have described the first postlarval stage of *P. indicus*, *M. monoceros*, *M. affinis* and *Parapenaeopsis stylifera* and used the number of telsonic spine, number of rostral spines, presence or absence of long setae on the distal lateral aspect of the 6th abdominal segment, the presence or absence of posteromedian dorsal spine on the 5th and 6th abdominal segments and the general body colour as criteria for identifying them. Sub-

rahmanyam and Rao (1970, *Proc. Indo Pacific Fish. Coun*, 13th sess. Sec. II: 113-127[9]) used the number of chromatophores on the ventral side of the body (especially on the 6th abdominal segment) and on the antennular peduncle to identify the postlarvae of *P. indicus*, *P. monodon*, and *P. semisulcatus*. Prawirodihardjo *et. al.* (1975, *Bull. Shrimp cult. Res. Cent.* 1 (1): 19-26[10]) have used the pigmentation of the uropod and telson to distinguish between the postlarva of *P. monodon* and *P. semisulcatus*.

In trying to identify the postlarvae found in the brackishwaters around Madras, it was found that the chromatophore pattern on the tail fan provided a very reliable criterion for identifying the early postlarval stages. The chromatophores were visible even in material fixed in formalin for 15-20 days if the specimens were kept in dark place away from light. The pattern is more important than the colour or number of chromatophores. On the basis of the chromatophore pattern on the tail fan the eight species of postlarval penaeids viz. *Penaeus indicus, P. merguiensis, P. semisulcatus, P. monodon, P. japonicus, Metapenaeus dobsoni, M. monoceros* and *M. affinis* could be sorted out with ease, speed and certainty. A key for their identification based on the chromatophore pattern of the tail fan is given below. It is applicable to the early postlarval stages i, e., postlarvae with 4-6 dorsal rostral spines in the case of *Penaeus* species and postlarvae with 3 rostral spines in case of *Metapenaeus* species. In later stage postlarvae more chromatophores develop and may obscure the primary chromatophore pattern described here. In the present collection the early postlarvae belonging to the genus *Penaeus* were large in size being 7-13 mm in total length while those belonging to the genus *Metapenaeus* were 3-4 mm in length.

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Key to the identification of early postlarval stages found in the brackishwaters.

1 a. Telson bears 8 pairs of spines on sides and distal margin..... 2

b. Telson bears 7 pairs of spines on sides and distal margin..... 6

2 a. Telson with chromatophores in distal half only..... .....*Penaeus indicus*

b. Telson with chromatophores from base to distal end 3

3 a. Outer rami of uropods without chromatophores 4

b. Outer and inner rami of uropods with chromatophores 5

4 a. Inner rami of uropods with a single chromatophore near base on medial aspect (usually hidden by telson)..... ..... *Penaeus japonicus*

b. Inner rami of uropods with 3-4 chromatophore in the middle region on medial aspect *Penaeus merguiensis*

5 a. Distal half of inner and outer rami of uropods with numerous chromatophores .....*Penaeus semisulcatus*

b. Inner and outer rami of uropods with a row of chromatophores along the medial margin .....*Penaeus monodon*

6 a. Chromatophores present on outerand inner rami of uropods..... 7

b. Chromatophores present on inner rami of uropods, outer rami colourless..... *Metapenaeus monoceros*

7 a. A single chromatophores at tip of each uropod ramus .... *Metapenaeus affinis*

b. A prominent chromatophore in the middle of each uropod ramus .....*Metapenaeus dobsoni*

More details regarding the chromatophore pattern and other characters useful for the identification of the postlarvae are given in Table I. The diagnostic characters are illustrated in Fig. 1 and 2. The rostrum of the postlarva is drawn to indicate the stage of the postlarvae illustrated. The identification of the postlarvae studied was confirmed by rearing them in the

TABLE 1 Distinguishing characters

	P. indicus (Fig. 1, a-d)	*P.merguiensis* (Fig.1,e-h)	*P. monodon* (Fig.1, i-l)
1. Chromatophores			
i Telson	present in distal half only	present from base to distal end	present from base to distal end
ii Inner uropod ramus	*may have a minute one, but usually absent	3 to 4 on median aspect	a row of chromatophores along median aspect
iii. Outer uropod ramus	*absent	absent	3 to 5 in the middle on median aspect
iv. 6th abdominal segment			
a. Anterolateral chromatophore.	present	present	absent
b. Ventral chromatophores	6	5 to 6 more prominent than in *P. indicus*	13 to 18
c. Dorsal chromatophores	absent	absent	absent
2. Colour of chromatophores in live specimens.	red	red	maroon
3. Posteromedian dorsal spines on 5th abdominal segment	absent after two rostral spine stage	present up to 5 rostral spine stage	absent after two rostral spine stage
4. Rostrum	reaches end of eye	reaches end of eye	reaches end of eye
5. Spinules on dorsal carina of 6th abdominal segment.	absent	absent	absent
6. Antennal spine on carapace	absent	absent	absent

of the postlarval penaeids

P. semisulcatus (Fig.2,a-d)	*P. Japonicus* (Fig.2,e-h)	*M. dobsoni* (Fig.2i-l)	*M. monoceros* (Fig.2'm-p)	*M. affinis* (Fig.1,m-p)
present from base to distal end	present from base to distal end	two prominent ones in the middle	present from base to distal end	present from base to distal end
numerous, on distal half only	one near base on median aspect	one prominent in the middle	2-3 present	one present at distal end
numerous on distal half only	absent	one prominent in the middle	absent	one present at distal end
present	absent	absent	present	present
9 to 10	10 to 11	single	4 to 5	2
absent	absent	usually absent	single	single
brown	crimson	brown	reddish brown	brown
present up to 4 rostral spine stage.	present up to 4 rostral spine stage	absent	absent	absent
long, surpasses end of eye	short, reaching only half length of eye	very short, blunt	very short, pointed	very short, pointed
absent	present all along length of carina	2 to 3 may be present near posterior end	1 to 2 may be present near posterior end	1 to 2 may be present near posterior end
absent	prominent	present	present	present

* The inner and outer uropods of the earlier postlarvae of *P. indicus* in the sea (up to 3 rostral spine stage) have chromatophores in the distal half. These chromatophores disappear in the postlarvae with 4 rostral spines i. e. the stage at which they normally enter the brackishwater regions.

laboratory to the juvenile stage when they could be positively identified. It may be mentioned here that the chromatophore patterns illustrated in this paper for *Metapenaeus dobsoni*, *M. affinis* and *M. monoceros* are also valid for the mysis stage of the respective species.

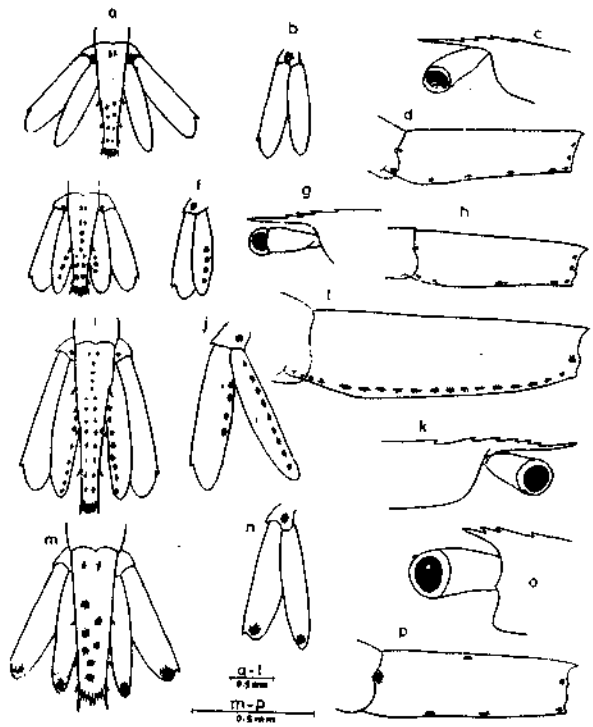

Fig. 1 a - d; *Penaeus indicus* (C. L. 1.70 mm); e - h, *Penaeus merguiensis* (C. L. 1.77 mm); i - l, *Penaeus monodon* (C. L. 2.73 mm ; m - p, *Metapenaeus affinis* (C. L. 1.0 mm); (a, e, i, m) tail fan; (b, f, j, n) left uropod; (c, g, k, o) anterior end of carapace; (d, h, l, p) 6th abdominal segment.

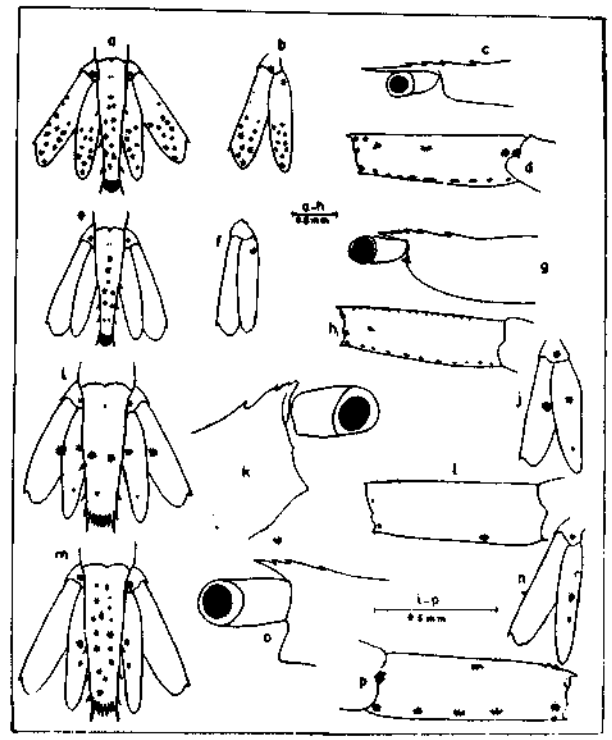

Fig. 2 a - d, *Penaeus semisulcatus* (C. L. 1.90 mm), e - h, *Penaeus japonicus* (C. L. 1.87 mm); i - l; *Metapenaeus dobsoni* (C. L. 0.89 mm); m - p, *Metapenaeus monoceros* (C. L. 1.01 mm); (a, e, i, m) tail fan; (b, f, j, n) left uropod; (c, g, k, o) anterior end of carapace; (d, h, l, p) 6th abdominal segment.