PARAPENAEOPSIS INDICA, SP. NOV. (DECAPODA, PENAEIDAE) FROM THE INDIAN WATERS

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ABSTRACT

Parapenaeopsis indica, a species new to science, is described based on material collected from Kakinada along the east coast of India. The features that distinguish *P. indica* from the closely related species are discussed.

In August 1968, some specimens of what appeared to be young *Parapenaeopsis sculptilis* were collected from the Kakinada fish market. Subsequently similar specimens were collected from the Kakinada canal, Kakinada Bay and from the near-shore waters at Godavary Point. On closer examination they were found to differ from all known species of *Parapenaeopsis* and hence they are described here in detail as a species new to science.

Parapenaeopsis indica SP. NOV.

Material— Kakinada, east coast of India, August 1968. 44 males, 27.5 to 66.5 mm (carapace 6.5 to 15.8 mm) and 43 females, 48 to 85 mm (carapace 10.5 to 21.0 mm), collected from Kakinada Bay (Lat. 16° 56.5' N, Long. 82° 16.5' E), Kakinada canal (Lat. 16° 56.5' N, Long. 82° 14.5' E) and from the sea off Godavary Point (Lat. 16° 58.3' N, Long. 82° 21'E) in 1 - 4 m depth of water.

Holotype—	Female, 85 mm (21 mm carapace), collected from Kakinada Bay, 3-8-1968.
Allotype—	Male, 63 mm (14.8 mm carapace), collected from Kakinada Bay, 3-8-1968.
Paratypes—	Two females 79 mm and 62 mm (19.0 mm and 14.5 mm carapace). Two males 55.5 mm and 50.5 mm (12.5 mm and 12.0 mm carapace).

The type specimens are deposited in the reference collections of the Central Marine Fisheries Research Institute (Reg. No. AR 277 A).

Description— Body sparsely pubescent and carapace finely punctate. In mature males the pubescence and punctae are greatly reduced in the carapacial region

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dorsal to the longitudinal sutures. Dense hair-like pubescence present in the hepatic fossa, cervical sulcus, orbito-antennal sulcus, post-orbital region and along the rostrum above the lateral carina.

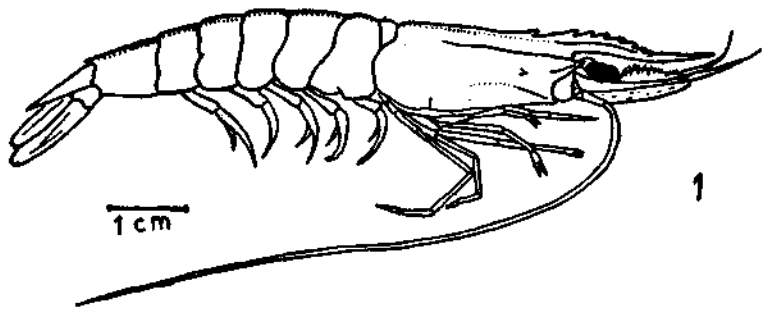


FIG. 1. *Parapenaeopsis indica* sp. nov. female 85 mm (21.0 mm. carapace)

Rostrum sigmoid with edentate tip in females and immature males but the styliform distal end is lost in mature males with the result considerable variation in the extent of the rostrum in relation to the antennular peduncle is noticed. The upper margin of the rostrum provided with 4-7 teeth (generally 6) excluding the epigastric.

The post-rostral carina extends almost to posterior end of carapace and has a barely perceptible sulcus which widens just behind epigastric tooth and again at posterior quarter of carapace. In adult males the post-rostral carina is flat-topped and glazed. Longitudinal suture extends to 3/4 carapace almost reaching level of vertical suture above base of third leg. Post-ocular sulcus present. The hepatic and cervical sulci well defined. The branchiocardiac and orbito-antennal sulci barely defined. Cervical and antennal carina not sharply defined. Anterior end of hepatic carina sharply defined and stops far short of pterygostomian angle. Adrostral carina does not reach epigastric tooth. Antennal spine prominent, hepatic larger than epigastric and placed a little posterior to the latter. Supraorbital spine distinct, pterygostomian angle without spine but sharply angular in females and blunt in males.

Upper and lower antennal flagella more or less equal, about 1/2 carapace length in females and 2/3 carapace in males, as long as peduncle without the distal segment in both sexes. Lower flagellum densely setose throughout length in females and immature males but most of the setae in the distal 1/3 lost in adult males. Peduncle just falls short of distal end of scaphocerite in females and immature males but exceeds scaphocerite by 1/3 distal segment in adult males. Prosartema barely reaches end of eye stalk. Stylocerite reaches posterior 1/3 of cornea. Basicerite with blunt outer spine. Eye 1/4 carapace in males and 1/5 carapace in females.

Mandibular palp with the outer margin more tapering in the distal 2/3. Palp of first maxilla unsegmented, 3 marginal setae below the sharp spine on the distomedian angle.

Third maxilliped reaching just behind tip of carpocerite to beyond carpocerite by dactylus and is sexually dimorphic; in adult males the median surface of the merus (and to a lesser extent the carpus) develops an elongated spiny cushion.

First leg does not quite reach base of carpocerite, reaching pterygostomian angle to beyond angle by half finger. Second leg reaching base to posterior 1/3 of carpocerite. Third leg reaching just behind carpocerite to beyond carpocerite by finger; in females always reaching end of carpocerite or beyond. Fourth leg reaching base to 1/2 carpocerite. Fifth leg reaching end of carpocerite to beyond carpocerite by 1/2 propodus. Mastigobranchs on first and second legs. Basal spine on first leg in both sexes. A much smaller basal spine on second leg in females only; this may be minute in smaller females.

Cardiac plate of gastric mill with 40—45 minute spinules. Zygocardiac ossicle with 3 prominent outer teeth and numerous other smaller ones. Prepyloric ossicle with 7 - 9 teeth on either side.

Abdomen carinate from middle of second segment. The first two segments have very shallow mid-dorsal canaliculation which is absent in mature males. Carina on the third segment is flat-topped; that on the three posterior segments well developed with rounded edge; one on the sixth segment ending in a sharp spine. No posteriomedian spine on the fourth and fifth segments. Last abdominal segment 1.4 to 1.6 as long as high measured at posterior end and is 0.45 in carapace. Telson slightly longer than sixth segment being 0.5 in carapace. Telson devoid of lateral spines and well exceeded by the inner rami of uropods.

Petasma (Figs. 2-4) with short fang-like distolateral projections and auriculate proximal expansions. The distomedian projections small, directed anteriorly, and open medially; the ventral lips distinctly swollen in mature males. In immature males (Fig. 4) the petasma has anteriorly tapering sides with the distolateral projections less reflected laterally and the ventral lip of the distomedian projection not swollen.

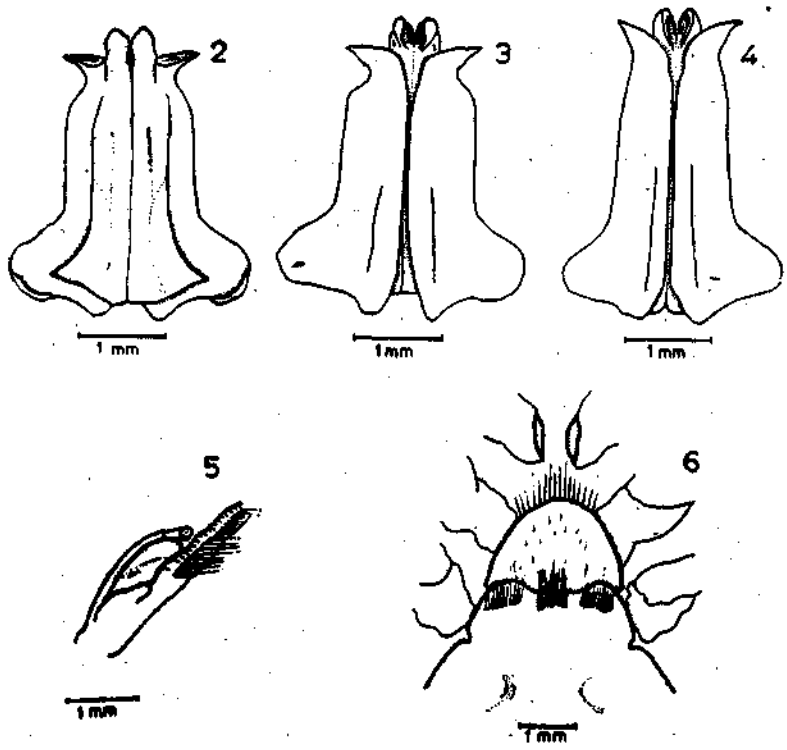
Proximal piece of appendix masculina (Fig. 5) thickened along median border in adult males. Distal piece more than twice as long as wide measured near proximal end, generally widened distally and concave on distal surface.

Thelycum (Fig. 6) with concave anterior plate wider than long with an evenly rounded anterior margin beset with long setae. Posterior sternal plate between the fifth legs with the rounded conical anterolatral lobes overlapping the posterolateral region of the median plate. There are three groups of long setae, one each on the anterolateral lobes and a median clump.

Colour of fresh specimens— In large females the general body colour reddish or purplish brown with darker transverse bands on the hind margin of carapace and 1—5 abdominal segments. Sides of the abdomen and carapace washed with olive

green. Rostrum dark brown. Antennular peduncle and lower flagella fully dark brown, upper flagella proximally dark brown and distally reddish. Antennal flagella brown. Scaphocerite dark brown medially and distally. All the appendages from mandibular palps to the last pleopods reddish. Outer aspect of basis of pleopods with a vertical yellow streak on posterior border. Uropods reddish, touched with bright yellow distomedially in the case of the endopods and distally and posterolaterally in the exopods.

The colour of young females and the males differs from the above description in the following respects: Olive green and brown predominate as the general body colour, the pereopods are pale, the uropods are bright red with the characteristic yellow patches and the lower antennular flagella are colourless distally. In males the sides of the carapace, abdomen and the base of the pereopods and pleopods are washed with yellow, the yellow patches on the uropods are tinged with green. In mature males with short rostrum the antennular flagella are fully colourless and the rostrum is also pale.



FIGS.2-6. *Parapenaeopsis indica* sp. nov. 2-3. Dorsal and ventral views of petasma of mature male. 50.5 mm (11.3 mm carapace). 4. Ventral view of petasma of immature male, 57.5 mm (13.0 mm carapace). 5. Appendix masculina of mature male. 6. Thelycum of mature female, 82. 0 mm (20:0 mm carapace).

Distribution—At present known only from Kakinada, east coast of India. It appears to prefer very shallow inshore waters and enters the backwater creeks and estuaries.

Discussion

Parapenaeopsis indica sp. nov. is closely related to *P. sculptilis* (Heller), *P. hardwickii* (Miers) and *P. uncta* Alcock. In these four species the appendix masculina is of the same type (O_6 of Kubo, 1949) and the petasma has short, sharply pointed fang-like distolateral projections and, with the exception of *P. uncta*, well-developed distomedian projections. The thelycum is also closely similar in all the four species, in the absence of posterior tongue-like extensions of the median plate and in the possession of three clumps of long setae in the anterior region of the posterior sternal plate between the fifth pair of legs. The lateral clumps of setae are not shown by Hall (1962, Fig. 104b) for *P. hardwickii* but can be seen in Pl. 13, Fig. 4 of Racek and Dall (1965). The presence of the 3 clumps of setae in *P. hardwickii* and *P. uncta* is also confirmed by an examination of the specimens in the present collection.

The features that distinguish *P. indica* from the closely related species are set out in Table 1.

The adult males of these four species have a cultrate rostrum. Although Racek and Dall (1965) state that the cultrate condition is the result of damage sustained during mating, Burkenroad (1934) is of the view that the cultrate rostrum is a characteristic of the "adult instar ultimately attained by all the males". The present observations show that in *P. hardwickii* and *P. indica* the cultrate shape of the rostrum can be made out even inside the sigmoid rostrum of the males which are about to moult into the mature form.

Further, it appears that this shortening of the rostrum in adult males of the four species is accompanied by far-reaching morphological changes. The epigastric spine becomes reduced in size and the rostral spines become blunt and less conspicuous. The minute pits on the carapace dorsal to the longitudinal sutures become considerably reduced in number and this area becomes smooth and glazed except in *P. sculptilis*, where the pitting is retained. The post-rostral carina becomes flat-topped and glazed in *P. indica* and *P. hardwickii;* in *P. uncta* only the posterior half of the carina becomes flat and glazed, while in *P. sculptilis* the carina retains the sulcus. The distal 1/3 of the lower antennular flagella lose the dense setation in *P. indica* and *P. sculptilis*. The antennular peduncle projects beyond the scaphocerite by 1/3 to 1/2 the distal segment, except in *P. uncta*. The spiny area on the median surface of the merus of the third maxilliped is transformed into an oblong brush with close-set spines in all the four species. The mid-dorsal canaliculations on the first two abdominal segments in *P. indica* and *P. sculptilis* disappear. The outer border of the exopodites of the uropod becomes thickened in *P. hardwickii* and *P. uncta*. The lateral lobes

TABLE 1. *Features that distinguish* P. indica *from closely related species*

	Characters	*P. indica*	*P. sculptilis*	*P. hardwickii*	*P. uncta*
1.	No. of rostral teeth	1+4-7	1+7-8	1+7-8	1+9
2.	Length of antennular flagella	shorter than peduncle	shorter than peduncle	longer than peduncle	as long as peduncle
3.	extent of carpocerite	hardly reaches distal end of cornea	well exceeds distal end of cornea	hardly reaches distal end of cornea	reaches distal end of cornea
4.	Basal spine on 2nd leg	absent in males	present in males	present in males	present in males
5.	4th leg in adult males	—	sharply bent at junction of propodus with carpus	posterior edge of merus expanded basally	—
6.	Dorsal surface of first two abdominal segments	faint canaliculation present	faint canaliculation present	smoothly rounded	smoothly rounded
7.	Movable lateral spines on telson	absent	absent	present	absent
8.	Outer edge of exopodite of uropods in adult males	not thickened	not thickened	thickened in the middle	thickened in the middle
9.	Petasma	distomedian projections small and parallel, directed anteriorly	distomedian projections large and flare out laterally	distomedian projections hemispherical with rugose surface	distomedian projections absent, dorsal hook-like lobe at base of each distolateral projection
10.	Thelycum	rounded anterolateral corners of posterior sternal plate overlap the anterior thelycal plate	bluntly angular anterolateral corners of posterior sternal plate separated from the anterior thelycal plate by a short intervening space	bluntly dentate anterolateral lobes of the posterior sternal plate overlap the anterior sternal plate	angular anterolateral corners of posterior sternal plate do not overlap but juxtaposed to the posterior margin of anterior thelycal plate

of the petasma become thickened laterally and the distolateral projections become more flexed laterally (Figs. 2 - 4). In *P. indica* the ventral lips of the distomedian lobes become swollen (Fig. 3 - 4); in *P. sculptilis* they flare out laterally and in *P. hardwickii* they become rugose along the distal margin (Kubo, 1949; Fig. 29 A, C). The median border of the proximal piece of the appendix masculina becomes distinctly thickened in all the four species.

These transformations appear to occur abruptly in the course of a single moult which may be called the nuptial moult. In other species of the genus, which do not possess a cultrate rostrum, however, these changes do not take place in the adult males.

The ambiguity regarding the identity of *P. cultrirostris* Kubo expressed by Racek and Dall (1965) is resolved by the present observations on the morphological changes accompanying the cultrate condition of the males. The figures and descriptions of *P. cultrirostris* given by Kubo (1949) clearly reveal that it is only the adult instar of *P. hardwickii*.

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