

On the taxonomic status of the Indian kiddi prawn *Parapenaeopsis stylifera* (H Milne Edwards, 1837)

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Extensive analysis of *Parapenaeopsis stylifera* based on material collected near the type locality (north west coast of India) has shown that both *P. coromandelica*/*P. stylifera coromandelica* (from east coast of India) and *P. stylifera cochinensis* (from south west coast of India) should be treated merely as its junior synonyms. All the remaining species of genus *Parapenaeopsis* differ from this genotype in several respects, thereby warranting an independent generic or subgeneric status for themselves.

The kiddi prawn *Parapenaeopsis stylifera* (H. Milne Edwards, 1837) which is fished heavily amongst all the Indian penaeids¹, is taxonomically one of the most confusing members since its specific characters are not properly understood or determined and most of the identification keys are based on features which are not very easy to observe and decipher²⁻¹⁵. Moreover, there is considerable confusion regarding its east coast and west coast populations with reference to the number of telson spines, the presence of which makes *P. stylifera* stand apart from all the remaining species of *Parapenaeopsis* (Alcock, 1901). In order to understand these problems in their proper perspectives and to provide tangible solutions, detailed taxonomic investigation was carried out on *P. stylifera* based on material collected in and around Ratnagiri and at Alibag, both of which are quite near to its type locality.

Material examined were about — i) 2517 males (32.5 to 97.5 mm) and 2832 females (91.5 to 118.0 mm) collected at Mirkarwada and Sakhartar fish landing centres and Ratnagiri fish market from April 1989 to December 1991, ii) 6 males (60.0 to 84.0 mm) and 3 females (96.0 to 105.5 mm) collected at Alibag fish market on 26 February 1991.

Parapenaeopsis stylifera (H. Milne Edwards, 1837)
(Figs. 1 and 2)

Penaeus styliferus H. Milne Edwards, 1837 : 418 { Type locality : Around Mumbai (=Bombay), Maharashtra State, India}; *Penaeopsis styliferus* - Bate, 1881 : 183; *Parapenaeopsis styliferus* - Nobili, 1903 : 4; *Parapeneopsis stylifera* - Alcock, 1906 : 36; *Parapeneopsis stylifera* var *coromandelica* - Alcock, 1906 : 37; Hansen, 1956 : 346 (key); *Parapenaeopsis stylifera* - De Man, 1911 : 9; Nataraj, 1942 : 468; Anderson & Lindner, 1945 : 313 (key); Menon, 1953 : 153; 1956 : 346 (key); Ahmed, 1957 : 12; Dall, 1957 : 214 (key); Tirmizi, 1968 : 193; 1969 : 762; George, 1969 : 34; 1979 : 300; 1980 : 42; Rao, 1970 : 1575; Muthu, 1971 : 154; Starobogatov, 1972 : 395 (key); Recek, 1973 : 161 (key); Johnson, 1976 : 14; Holthuis, 1980 : 33; Ramamurthy, 1981 : 161; Burukovskii, 1974 (1982) : 34 (key); Miquel, 1984 : PEN Para 12; Thomas, 1986 : 353; Dall *et al.*, 1990 : 85 (key); *Parapenaeopsis coromandelica* - Hall, 1962 : 27; De Bruin, 1965 : 99; Holthuis, 1980 : 30; Miquel, 1984 : PEN Para 5; *Parapenaeopsis stylifera stylifera* - Recek & Dall, 1965 : 98; Ravindranath, 1989 : 258; *Parapenaeopsis stylifera coromandelica* - Recek & Dall, 1965 : 98; Ravindranath, 1989 : 259; ? *Parapenaeopsis stylifera* var. *cochinensis* - George, 1973 : 420; 1980 : 43; *Parapenaeopsis mumbayensis* - Aravindakshan, 1996 : 32.

Description — Rostrum sigmoid with distinctly upturned tip, extending beyond antennal scale and unarmed in distal half. Carapace with antennal and hepatic carinae well developed; longitudinal suture short, being restricted only to anterior 3/4th of carapace. Antennular flagella subequal; stylocerite extending up to middle and prosarthema up to tip of basal segment. Third maxilliped barely reaching up to proximal 1/4 th of antennal scale. Fingers of first and second chelipeds longer than palm while

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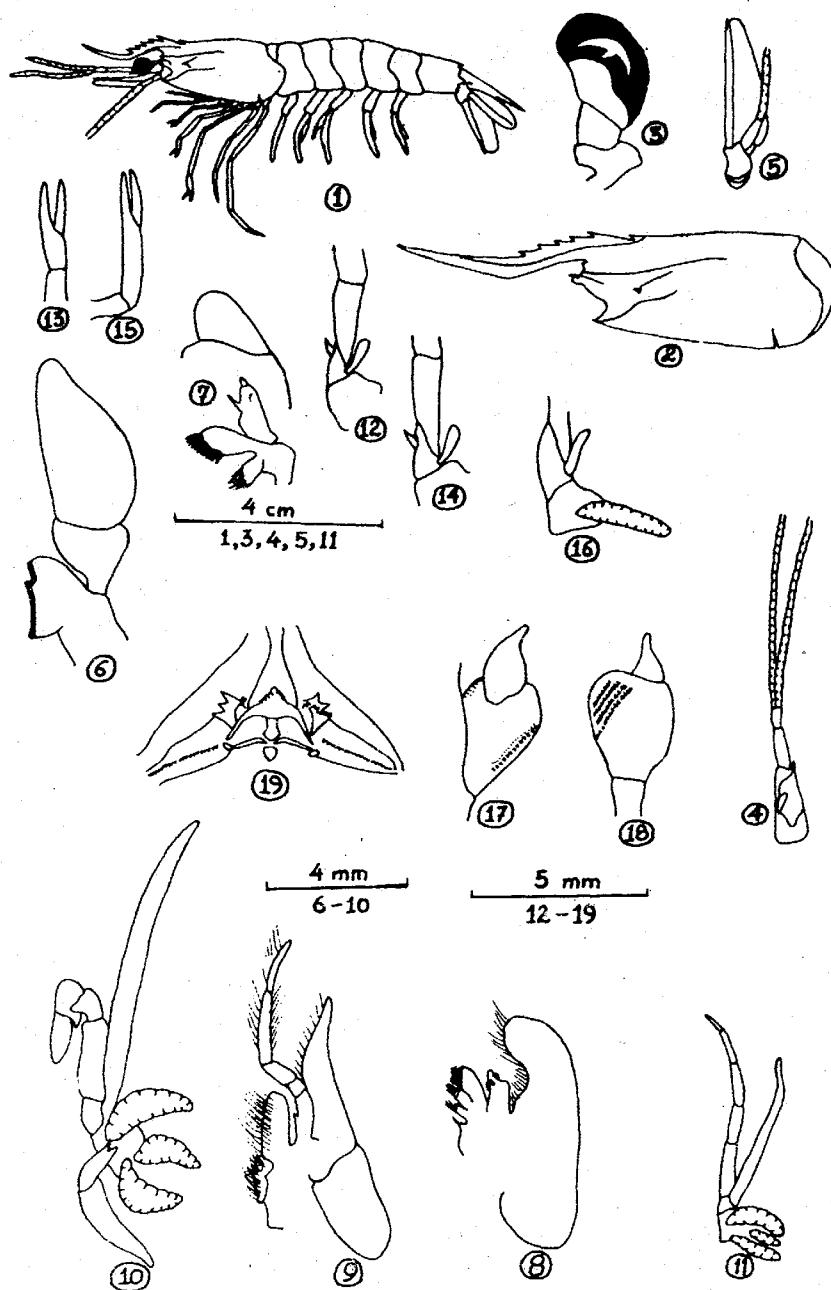


Fig. 1—Body parts of *Parapenaeopsis stylifera* (H. Milne Edwards, 1837)—1) entire female; 2) carapace; 3) eye; 4) antennule; 5) antennal scale; 6) mandible; 7) first maxilla; 8) second maxilla; 9) first maxilliped; 10) second maxilliped; 11) third maxilliped; 12) basal portion of first cheliped; 13) palm and finger of first cheliped; 14) basal portion of second cheliped; 15) palm and finger of third cheliped; 16) basal portion of fourth pereopod; 17) appendix masculina - dorsal view; 18) appendix masculina - ventral view; 19) gastric mill.

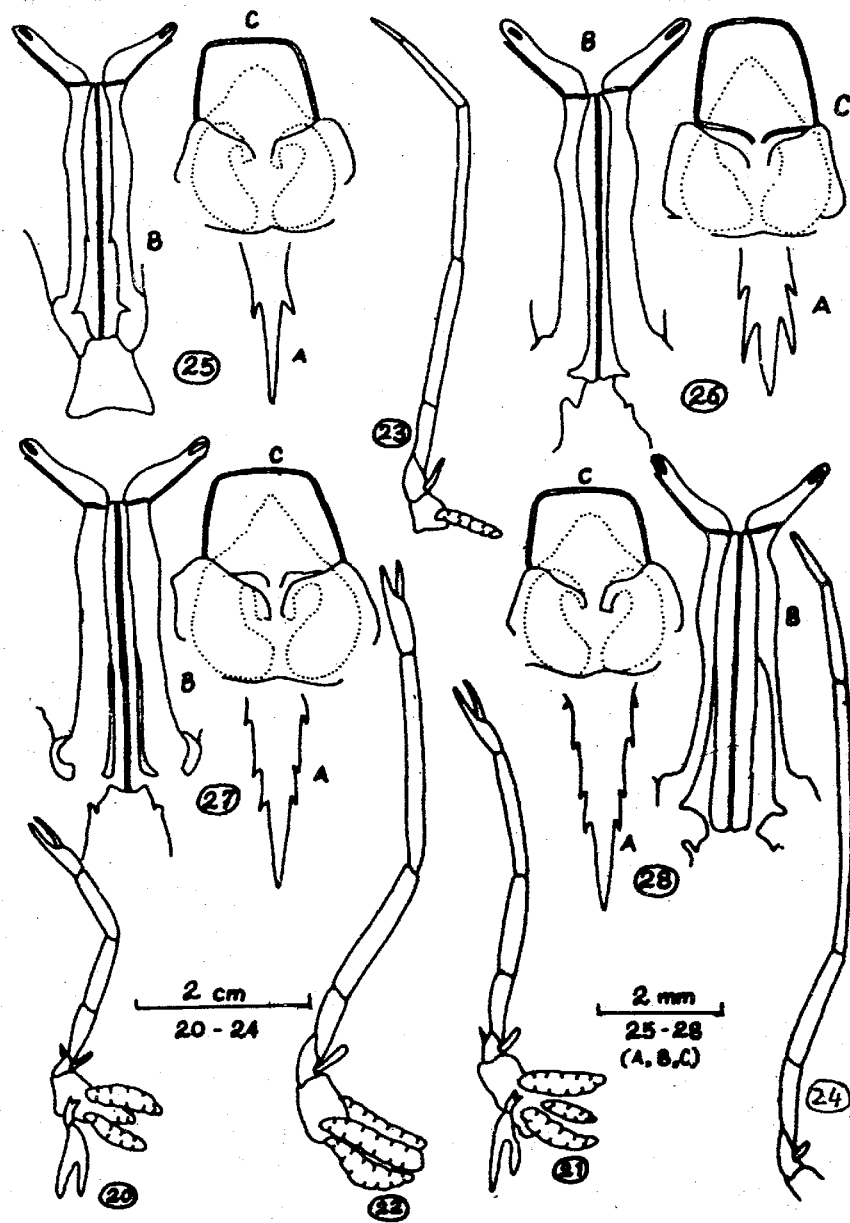


Fig. 2—Body parts of *Parapenaeopsis stylifera* (H. Milne Edwards, 1837)—20) first cheliped; 21) second cheliped; 22) third cheliped; 23) fourth pereopod; 24) fifth pereopod; 25) telson with one pair of fixed spines; 26) telson with two pairs of fixed spines; 27) telson with three pairs of fixed spines; 28) telson with three pairs of fixed spines and one pair of movable spines — (A) telson (B) petasma (C) thelycum.

those of third distinctly shorter than palm. First 4 pereopods not extending beyond middle of antennal scale while fifth subequal to it. Zygocardiac ossicle with 3 large teeth. Thelycum with only 2 plates. Distolateral projections of petasma quite long, wing-like and directed laterally. Appendix masculina with leaf-like projections apically. Telson shorter than uropods and armed with 1 to 3 pairs of larger (lateral) fixed spines and sometimes with 1 or 2 pairs of smaller proximal pairs of movable spines.

Out of the 18 morphometric ratios, males and females differ from each other in only 4 ratios viz. Sr. nos. 3, 13, 14 and 16 (Table 1). The two sexes differ from each other in the number of non -

aesthetasc bearing segments on upper antennular flagella (Table 2). The species also exhibits distinct sexual dimorphism both in size and colouration — males always smaller than females (see material examined), bright reddish in colour and with dark reddish appendages, while females greyish pink with dark reddish uropod tips and with pale reddish appendages.

Parapenaeopsis stylifera distinctly stands apart from all the remaining species assigned to the genus *Parapenaeopsis* in possessing fixed spines on telson^{2-8,10} however, it is the number of these very spines which has created a lot of confusion, resulting in number of controversies.

Table 1—Various morphometric ratios in *Parapenaeopsis stylifera* (H. Milne Edwards, 1837)

Sl. no	Ratios	Males	Females
1	Rostrum length/Carapace length	0.63 to 0.77 (0.6986 ± 0.06248)	0.69 to 0.82 (0.7682 ± 0.06042)
2	Distance between rostrum tip & last tooth/Distance between last tooth & penultimate tooth	3.35 to 8.0 (5.6043 ± 1.1484)	4.18 to 10.30 (8.027 ± 0.027)
*3	Length of eyestalk/Length of cornea	1.03 to 1.13 (1.0794 ± 0.05097)	1.13 to 1.26 (1.1766 ± 0.05197)
4	Length of second segment of antennular peduncle/Length of basal segment of antennular peduncle	0.74 to 0.76 (0.7558 ± 0.01494)	0.66 to 0.78 (0.7266 ± 0.04949)
5	Length of third segment of antennular peduncle/Length of basal segment of antennular peduncle	0.30 to 0.35 (0.338 ± 0.01778)	0.30 to 0.36 (0.3324 ± 0.02805)
6	Length of upper antennular flagellum/Length of lower antennular flagellum	1.02 to 1.04 (1.0258 ± 0.00965)	1.01 to 1.13 (1.044 ± 0.05026)
7	Length of longer antennular flagellum/Length of carapace	1.04 to 1.17 (1.0982 ± 0.05806)	0.96 to 1.10 (1.053 ± 0.05316)
8	Length of antennal scale/Breadth of antennal scale	2.96 to 3.25 (3.149 ± 0.1095)	2.91 to 3.03 (2.9432 ± 0.04983)
9	Length of dactylus of third maxilliped/Length of propods of third maxilliped	0.611 to 0.70 (0.6562 ± 0.04778)	0.65 to 0.75 (0.6898 ± 0.03838)
10	Length of finger of first cheliped /Length of palm of first cheliped	1.20 to 1.50 (1.422 ± 0.1252)	1.36 to 1.50 (1.464 ± 0.07930)
11	Length of finger of second cheliped/Length of palm of second cheliped	1.09 to 1.30 (1.188 ± 0.07512)	1.15 to 1.45 (1.328 ± 0.1093)
12	Length of finger of third cheliped/length of palm of third cheliped	0.81 to 0.92 (0.8646 ± 0.04163)	0.75 to 0.90 (0.8514 ± 0.06968)
*13	Length of fifth pereopod/Length of carapace	1.88 to 2.01 (1.9356 ± 0.04753)	1.50 to 1.75 (1.641 ± 0.08982)
*14	Length of abdomen/Length of carapace	1.42 to 1.50 (1.4686 ± 0.03094)	1.29 to 1.40 (1.3682 ± 0.04707)
15	Length of 6th abdominal segment /Length of 5th abdominal segment	1.70 to 1.80 (1.76 ± 0.05477)	1.63 to 1.80 (1.7526 ± 0.07244)
*16	Length of telson/Length of 6th abdominal segment	1.33 to 1.50 (1.4438 ± 0.06503)	1.50 to 1.72 (1.5936 ± 0.0824)
17	Length of telson/Breadth of telson	3.13 to 3.40 (3.3133 ± 0.1524)	3.11 to 3.34 (3.2448 ± 0.09216)
18	Length of uropod exopod/Length of telson	1.24 to 1.37 (1.3308 ± 0.05312)	1.22 to 1.27 (1.2543 ± 0.02146)

*Indicates non - overlapping ratios

The crux of the problem is whether the variety *P. stylifera coromandelica* of Alcock, supposedly an inhabitant of Bay of Bengal (along Coromandel coast) and east of it and characterised by at the most 2 (mostly only 1) pairs of telson spine is :

A synonym of *P. stylifera* ? ^{4,5,24} OR

A subspecies of *P. stylifera* ? ^{25,28} OR

A distinct separate species ? ^{3,7,16,27}

Examination of an extensive series of material in the present study has clearly shown that the geographical isolation of the two forms, with their so called hybridization zone situated somewhere along the Kerala coast (south west coast of India)²⁶ is not agreeable since the entire range of telson spines (i.e. 1 to 4) is represented in the present material collected near the type locality, as under:

Number of telson spines (pairs)	Percentage frequency
1	12%
2	23%
3	61%
4	04%

The number of telson spines, therefore, cannot be treated as a valid character for separating the two forms. Further, it has been stated that *P. stylifera coromandelica* possibly also differs

from the 'n nominate subspecies' in possessing less number of rostral teeth i.e. 4 to 6 + 1 (epigastric). However, even this appears to be rather improbable since the rostral formula in the Ratnagiri specimens is quite variable, being 3 to 6 + 1 (epigastric)²⁵.

As already suggested²⁵, apart from the above two features, i.e. number of telson spines and rostral formula, which as per the present study merely represent intraspecific variations, the two forms cannot be segregated based on any other morphological characters including even the structure of petasma and thelycum (Fig. 2, nos. 25-28, a, b, c). This observation is in complete agreement with that of George^{4,5,28} who was indeed right in synonymising Alcock's form from the Coromandel coast with *P. stylifera* (H. Milne Edwards, 1837).

While George²⁴ was able to settle the issue of Alcock's variety, he created his own new variety viz *P. stylifera cochinensis* based solely on 15 males from inshore waters of Cochin (Kerala State). However, the size of specimens as mentioned by him i. e. a total length of merely 7.2 to 9.0 mm, appears to be indeed quite strange. In all probability, this might be the result of a typographical error since it is almost impossible to conceive such small individuals even with traces of petasma or appendix masculina. Nevertheless, the figures of petasma and appendix masculina as given by George²⁴ (ref. 24, Fig. 1, b, d, on page number 422) completely tally with those of early developmental stages (approximately 45 mm size) of *P. stylifera* proper described by Tirmizi²⁹ (ref. 29, Fig. 2, A-C on page number 195). This proves that George's Cochin specimens are merely young ones of *P. stylifera* as already pointed out by Ravindranath²⁶.

Similarly, originating from the type locality Mumbai and not really differing from the present species in any character, the recent new species of Arvindakshan³⁰ viz. *P. mumbayensis* certainly belongs to *P. stylifera* only.

Another important aspect which is already mentioned earlier and, which needs to be particularly stressed is that *P. stylifera* distinctly differs from all other known species assigned to the genus *Parapenaeopsis* in possessing well developed fixed spines on telson which are quite discernible even to naked eyes. In the present

Table 2—Various meristic counts in *Parapenaeopsis stylifera* (H. Milne Edwards, 1837)

Sl. no.	Characters	Counts
1	Rostral formula	
	a) Range	3 to 6/0
	b) Mostly	5/0
2	Postorbital teeth	
	a) Range	1
	b) Mostly	1
3	Non- aesthetasc bearing segments of upper antennular flagella	3 to 5
	a) Males	10 to 16
	b) Females	
4	Abdominal cicatrices	
	a) Fourth segment	—
	b) Fifth segment	—
	c) Sixth segment	2
5	Telson	
	a) Fixed spines	1 to 3 pairs
	b) Movable spines	0 to 2
6	Gastric Mill	
	a) Cardiac plate	24 to 42
	b) Zygocardiac plate	3 + 30 to 34
	c) Prepyloric ossicle teeth	1 + 8 to 12

Table 3—Comparison of *Parapenaeopsis stylifera* (H. Milne Edwards, 1837) with the remaining 4 species of '*Parapenaeopsis*' collected along the Ratnagiri coast

Sl. no.	Characters	<i>P. stylifera</i>	Remaining species of <i>Parapenaeopsis</i> off Ratnagiri.
1	Colour in fresh condition		
	a) Transverse bands	Absent	Present
	b) Sexual dimorphism	Present	Absent
2	Fixed spines on telson	Present	Absent
3	Distal unarmed portion of rostrum	Present in both sexes	Absent in both sexes or present only in females
4	Fingers of chelipeds		
	a) First & second chelipeds	Shorter, being less than 1.5 (1.0 to 1.5-times) palm.	Longer, being more than 1.5 to 2.2 - times palm.
	b) Third cheliped	Shorter than (0.8 to 0.9 - times) palm.	Longer than (1.0 to 1.6 - times) palm.
5	Distolateral projection of petasma	Longer than distomedian projection and directed laterally	Generally shorter than distomedian projection & if longer directed inwards but not laterally { as in <i>P. (?) cornuta</i> }
6	A well developed leaf-like apical process on appendix masculina	Present	Absent.

study, the species is found to stand out, in at least 8 important features, from the remaining 4 local species viz *P. acclivirostris* Alcock, 1905, *P. cornuta* (Kishinouye, 1900), *P. sculptilis* (Heller, 1862) and *P. hardwickii* (Miers, 1878) (Table 3). However, these characters could not be confirmed in the other known species of the genus for want of published information.

All the same, these differences, strongly indicate that at present :

(1) *P. stylifera* alone can be assigned to *Parapenaeopsis* (Alcock, 1901) being the genotype and oldest known member of the genus.

(2) The remaining species need to be assigned a separate generic status (further studies are under progress).

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