Further records of Penaeoidea from the East coast of South Africa

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Fifty-four specimens of ten penaeoid species were identified. Of particular interest was the finding of pelagic juveniles of two species, *Funchalia (Funchalia) villosa* and *Penaeus marginatus*.

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Vier-en-vyftig eksemplare van tien Penaeoidea-spesies is geïdentifiseer. Die voorkoms van onvolwasse individue van die twee spesies *Funchalia (Funchalia) villosa* en *Penaeus marginatus* was van besondere belang.

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Apart from commercial operations, Penaeoidea have been described and collected from South African waters since the beginning of this century (Stebbing 1914; Calman 1925; Barnard 1947, 1950; Joubert & Davies 1966; Kensley 1968, 1969, 1977; Champion 1973; Ivanov & Hassan 1976b). The aim of the present work is to record new localities for a clearer knowledge of distribution, especially for recently recorded species such as *Aristeus virilis* and *Funchalia (Funchalia) villosa* (Kensley 1977), and to contribute to juvenile pelagic penaeoid ecology, of which very little is known. The specimens are lodged in the South African Museum, Cape Town.

Methods

A number of penaeoids were collected between 1967 and 1973, mainly by trawlers operating off Durban, at depths between 92 and 700 m with mesh diameters of 2,5 (exploratory) to 12,5 (commercial) cm. Fifty-four specimens of 10 penaeoid species were identified. The classification system used was that established by Pérez Farfante (1977a) where previous subfamilies are elevated to families of the superfamily Penaeoidea.

Results

A list of the species together with depths and localities is given in Table 1. The measurements given in the descriptive section which follows refer to carapace length.

Family Aristeidae

Aristeomorpha foliacea (Risso, 1826)

Material

4 ♂♂ (36,3 – 39,8 mm) with 5 – 10 dorsal rostral teeth, and 4 ♀♀ (46,3 – 48,8 mm) with 7 – 11 dorsal rostral teeth.

Previous records

This is a well-known species from the Mediterranean, N.E. Atlantic, Indo-Pacific and S.E. Africa. Previous records for South Africa have come from Stebbing (1914), Calman (1925), Barnard (1950), Kensley (1977) and de Freitas (1979).

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Table 1 List of penaeoid species collected in Southern African waters, with locality data

	♂♂	♀♀	Juv.	Total	Depth m	Locality
Natantia						
Superfamily Penaeoidea						
Family Aristeidae						
Aristeomorpha foliacea (Risso)	4	4	–	8	610	30 km off Durban
Aristeus virilis (Bate)	1	–	–	1	425	off Bazaruto, Mozambique
Plesiopenaeus edwardsianus (Johnson)	1	–	–	1	700	off Bluff, Durban
Plesiopenaeus nitidus (Barnard)	1	3	–	4	700	off Bluff, Durban
Family Penaeidae						
Funchalia (Funchalia) villosa (Bouvier)	4	8	(12)	12	surface	50 km off Durban, at night
Parapenaeus fissurus (Bate)	–	1	–	1	410	off Bluff, Durban
Penaeopsis balssi Ivanov & Hassan	–	1	–	1	400	off Durban
Penaeus marginatus (Randall)	–	–	14		surface	100 km off Durban, at night
Penaeus marginatus (Randall)	–	3	–		425	off Southern Mozambique
Penaeus marginatus (Randall)	–	2	–	20	92	off Schoenmakerskop, Port Elizabeth
Penaeus marginatus (Randall)	–	1	–		90	Algoa Bay
Family Solenoceridae						
Solenocera algoensis (Barnard)	1	4	–		277	off Umhlanga Rocks, Natal
Solenocera algoensis (Barnard)	–	1	–	5	107	off Bird Island, Algoa Bay
Cryptopenaeus catherinae De Freitas	–	1	–	1	406	off Bluff, Durban

Aristeus virilis (Bate, 1888)

Material

1 ♂ (44,4 mm)

Remarks

The specimen agrees with the description of Ramadan (1938) and the relative leg length measurements differ only slightly (Table 2). Kubo (1949) compared the merus, carpus and chela lengths to the carapace lengths as a ratio. Similar ratios were found in this specimen (Table 2).

Previous records

A. virilis is known from the eastern Indian Ocean, while in western Indian Ocean waters it has been recorded off Zanzibar by Ramadan (1938), off Natal by Kensley (1977) and in Madagascan waters by Crosnier (1978).

Plesiopenaeus edwardsianus (Johnson, 1867)

Material

1 ♂ (22,0 mm)

Previous records

This species is widely distributed from the mid-Atlantic and Caribbean to the Indian Ocean. *P. edwardsianus* has been recorded in South African waters by Barnard (1950), Champion (1973) and Kensley (1977).

Plesiopenaeus nitidus (Barnard, 1947)

Material

1 ♂ (20,6 mm) and 3 ♀♀ (19,4 – 38,2 mm).

Previous records

Barnard (1950) described this species from 6 specimens

Table 2 *Aristeus virilis*. Relative length of merus, carpus and chela of first three pereiopods and the ratio of these lengths to the carapace lengths

	Lengths			Length/Carapace length		
	Merus mm	Carpus mm	Chela mm	Merus mm	Carpus mm	Chela mm
Pereiopod 1	15(14)[a]	13(12)[a]	17(16)[a]	0,34(0,34)[b]	0,29(0,25)[b]	0,38(0,34)[b]
Pereiopod 2	16(15)[a]	16(16)[a]	18(17)[a]	0,36(0,35)[b]	0,36(0,35)[b]	0,405(0,38)[b]
Pereiopod 3	17(15)[a]	20(20)[a]	17(18)[a]	0,38(0,40)[b]	0,45(0,46)[b]	0,38(0,41)[b]

[a]After Ramadan (1938)
[b]After Kubo (1949).

from off Cape Point. Kensley (1968) recorded a further 6 specimens from off Cape Point. However, the *Meiring Naudé* cruises yielded 92 specimens from Natal waters (Kensley 1977).

Family Penaeidae

Funchalia (Funchalia) villosa (Bouvier, 1905)

Material

4 ♂♂ (5,0 – 8,0 mm); 8 ♀♀ (6,0 – 9,0 mm).

Remarks

These specimens were netted on the surface at night from the whaler *C.G. Hovelmaier W29* on whale-marking cruises off Durban during February of 1971, 1972 and 1973.

From the description given by previous authors, the following differences are noted:

Dall's (1957) specimens, although bigger, have fewer rostral teeth: $\frac{5-6}{0}$ as opposed to $\frac{6-7}{0}$. In all the specimens the rostrum reaches to, or just beyond, the anterior margin of the cornea, and the smaller the animal, the more the rostrum extends beyond the cornea.

The hepatic spine is obvious in seven specimens, only just discernable in three and indistinguishable from the pubescence in two animals (Table 3). The spine appears to be resorbed at a carapace length of 8 – 9 mm (33 – 36 mm total length). This differs from Burkenroad's (1936) '5 – 7 rostral teeth series' specimens where the size of spine disappearance is 46 mm total length. In all Dall's specimens (CL > 12,5 mm) the hepatic spine was absent.

Table 3 *Funchalia (Funchalia) villosa.* Measurements to illustrate the disappearance of the hepatic spine in juveniles

Sex	Carapace length mm	Total length mm	Hepatic spine
M	5,0	17,0	present
M	6,0	26,0	present
F	6,0	23,0	present
F	6,5	26,0	present
F	6,5	26,0	present
F	7,2	28,0	present
F	8,0	32,0	present
M	8,0	29,0	just discernable
F	8,8	33,0	absent
F	9,0	35,0	just discernable
M	9,0	36,0	just discernable
F	9,0	36,0	absent

The mesial flagellum of the antennule is not nearly as long as the carapace plus rostrum, ranging from just shorter than the carapace alone to just longer than the carapace, reaching a quarter way along the rostrum at the most. The lateral flagellum is not $\frac{3}{5}$ of the length of the mesial one but almost as long in most cases. There are also slight differences in thoracic appendages. Pereiopod four reaches to $\frac{2}{3}$ of the carpocerite and pereiopod five reaches to the base of the carpocerite only, whereas the reverse is found in Dall's specimens. These minor differences are probably intraspecific ones.

Burkenroad (1940) maintained that a specimen of 9-mm CL should have a pereiopod three chela length of 3 mm. This was substantiated by a specimen of similar length (8,8 mm-CL) which had a pereiopod three chela of 3 mm.

Previous records

F. villosa has been recorded from the North and South Atlantic (Burkenroad 1936), the South Atlantic off Tristan da Cunha (Lenz & Strunck 1914), the Caribbean (Burkenroad 1936), the Gulf of Mexico (Springer & Bullis 1956), the Indo-Pacific off Lord Howe Islands (Dall 1957), East Central Atlantic near the Canary Islands (Lenz & Strunck 1914; Foxton 1970) and the Indian Ocean off Natal (Kensley 1977). Paulinose (1974) recorded eight specimens of juvenile *F. woodwardi* and *F. balboae* from the Indian Ocean, but not juvenile *F. villosa*.

Ecological notes

These specimens were collected on the surface at night from colonies of *Pyrosoma* sp. Each prawn was situated in the central cavity facing outwards with its antennae streaming outside the colony (pers. comm. G. Ross 1979, who collected the material). On one particular night in which most of the specimens were collected there were large numbers of *Pyrosoma* on the surface. Twenty-six prawns were counted from a sample of 50 *Pyrosoma*. While bringing the *Pyrosoma* on board, some were inadvertantly tipped, spilling their contents. If it were not for this, the percentage occupancy of *Pyrosoma* by juvenile *F. villosa* would have been more representative. Dall (1957) was therefore close when he stated; 'Whether *F. villosa* is predatory, as the large hemispherical corneas seem to indicate, or merely attaches to some relatively passive organism has yet to be discovered'.

Lenz & Strunck (1914) caught 75 – 83-mm *F. villosa* in shallow water (10 m) and suggested that they are only near the surface at night and usually live at greater depths. Foxton (1970) verified this suggestion by demonstrating that *F. villosa* migrates diurnally from 450 – 600 m during the day up to 50 m and to the surface during the night, with similar day and night modes of 13 – 15-mm CL.

This information tends to suggest that the juveniles seek protection in the *Pyrosoma* and perhaps make short foraging excursions away from the colonies. They may use the *Pyrosoma* only at night utilizing the colony's phosphorescence to feed. As they become larger they could then detach from the colony and freely migrate with the diurnal cycle as shown by Foxton's larger specimens. Foxton recorded very few *F. villosa* (seven out of 242) of less than 9,0 mm during day and night hauls.

The association between juvenile *F. villosa* and *Pyrosoma* may only be found in Southern African waters, but this seems unlikely as both have a wide distribution.

Parapenaeus fissurus (Bate, 1888)

Material

1 ♀ (24,5 mm).

Previous records

P. fissurus is Indo-Pacific in distribution. Existing South African records have come from off the Tugela River mouth and Port St Johns (Stebbing 1914; Barnard 1950) and off the Natal coast (Kensley 1969).

Penaeopsis balssi Ivanov & Hassan, 1976b

Material

1 ♀ (35,3 mm).

Remarks

The material fits the description of Ramadan (*Penaeopsis serratus* (Bate) 1938), Ivanov & Hassan (1976b) and de Freitas (1980). As with Ivanov & Hassan's (1976b) description, the hepatic spine is lower than the antennal and is well developed. The rostrum is arcuate with 11 teeth dorsally and the epigastric spine is present. The rostral tip extends beyond the eye to the end of the second peduncular segment. The antero-inferior angle is rounded. The thelycum is similar to that of Ramadan (1938) and identical to that of Ivanov & Hassan (1976b) and de Freitas (1980). The anterior median plate has a pointed apex while the posterior lateral plates are hairy with bracket-shaped external sides.

Previous records

This species has been recorded off central Mozambique (Ivanov & Hassan 1976b; de Freitas 1979, 1980). Kensley (1968, 1977) recorded *P. rectacuta* (*sensu* Hall 1962) off Mozambique and Zululand but Ivanov & Hassan assigned Hall's (and therefore Kensley's) material to *P. balssi*. If this is correct, then this specimen constitutes another locality record after Kensley's specimens. Kensley (1972) only gives a diagrammatic representation of '*P. rectacuta*', so his material probably has been correctly assigned to *P. balssi*. However, Pérez Farfante (1977b, 1979) has described two close relatives of *P. rectacuta, P. jerryi* and *P. eduardoi*, as new species occurring in the Indian Ocean in Mozambican and Madagascan waters and the Indo-West Pacific respectively so that Kensley's material needs to be re-examined to firmly establish its identity. De Freitas (1979) has already stated, however, that *P. balssi* is found off the coast of Natal.

Penaeus marginatus (Randall, 1840)

Material

14 juveniles (8,0 – 10,4 mm) with a rostral formula of $\frac{7-10}{0-2}$ and 6 adult ♀♀ (42,2 – 58,0 mm) with a rostral formula of $\frac{9-10}{1-2}$.

Remarks

The specimens agree with the revised description of Champion (1973). The juveniles were bright blue when alive but the colour was lost during preservation (pers. comm. A.D. Connell who collected the material). Rathbun (1906) also noted that young specimens were 'said to be French blue'.

Previous records

This species is Indo-Pacific in distribution. Previous Southern African records have all come from Natal waters so that the three specimens from the Cape represent a new southern distribution limit while the three Mozambique specimens constitute a northern locality record. In Hawaiian waters Rathbun (1906) recorded juvenile *P. marginatus* occurring at the surface, while Gopalakrishnan (1976) showed that juveniles are found inshore. This appears to be the first record of juveniles in South African waters, but as juveniles have only been caught far offshore, never inshore, despite extensive bait-prawn netting, it would appear that their life-cycle could be different for this area.

Family Solenoceridae

Solenocera algoensis (Barnard, 1947)

Material

1 ♂ (23,0 mm) with a rostral formula of 6/0 and 4 ♀♀ (22,0 – 31,1 mm) with a rostral formula of $\frac{5-7}{0}$.

Remarks

These specimens agree with the descriptions of Barnard (1947), Ivanov & Hassan (*Solenocera ramadani* sp. nov.: 1976a), Crosnier (1978) and de Freitas (1980). The rostra have 5 – 7 dorsal teeth with the number of teeth on the carapace varying from 3 to 4. Ivanov & Hassan (1976a) did not include their material with *S. algoensis* as their specimens 'have seven instead of six rostral teeth and the 4th pereiopod does not reach the end of the antennular penduncle as in *S. algoensis*'. These points are trivial as rostral teeth for example are known to be subject to individual variation.

Previous records

Since Barnard's (1947) specimens, there was no further material until Ivanov & Hassan's (1976a) record off the Zululand coast (29°31'S/34°42'E). However, the finding of this species in Madagascan (Crosnier 1978) and Mozambican (de Freitas 1980) waters has shown that this species is fairly well distributed in S.E. African waters.

Cryptopenaeus catherinae de Freitas, 1979

Material

1 ♀ (49,7 mm).

Remarks

The rostral formula is 7/0. This specimen agrees with the description of de Freitas (1979).

Previous records

All previous records (4 ♀♀, 1 ♀) have come from southern Mozambique (de Freitas 1979). De Freitas does, however, note the following: 'Although *Cryptopenaeus catherinae* has so far been found only in the type locality, it seems feasible to expect that, as its associate species *Haliporoides triarthrus, Aristeomorpha foliacea* and

Penaeopsis balssi are found off the coast of Natal, the distribution of *C. catherinae* could possibly extend southward as well'. This specimen is the second known female of this genus and species.

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References

BARNARD, K.H. 1947. Descriptions of new species of South African decapod Crustacea, with notes on synonymy and new records. *Ann. Mag. nat. Hist.* (11)13: 361 – 392.

BARNARD, K.H. 1950. Descriptive catalogue of South African decapod Crustacea. *Ann. S. Afr. Mus.* 38: 1 – 837.

BATE, C.S. 1888. Report on the Crustacea dredged by HMS Challenger during the years 1873 – 1876. *Rep. Voy. Challenger, 1873 – 1876.* 24: 1 – 942.

BOUVIER, E.L. 1905. Sur les Pénéides et les Sténopides receueillis par les expeditions francaises et monegasques dans l'Atlantique oriental. *C.R. Acad. Sci. Paris*, 140: 980 – 983.

BURKENROAD, M.D. 1936. The Aristaeinae, Solenocerinae, and pelagic Penaeinae of the Bingham Oceanographic Collection. *Bull. Bingham oceanogr. Coll.* 5(2): 1 – 151.

BURKENROAD, M.D. 1940. Preliminary descriptions of twenty-one new species of pelagic Penaeidae (Crustacea Decapoda) from the Danish oceanographical expeditions. *Ann. Mag. nat. Hist.* (11) 6: 35 – 54.

CALMAN, W.T. 1925. On macrurous decapod Crustacea collected in South African waters by *S.S. Pickle. Rep. Fish. mar. biol. Surv. Un. S. Afr.* 4 (Spec. Rep. 3): 1 – 26.

CHAMPION, H.F.B. 1973. New records of penaeid prawns from the east coast of Southern Africa with notes on *Penaeus marginatus* Randall and a new species of *Metapenaeopsis. Crustaceana* 25: 181 – 203.

CROSNIER, A. 1978. Crustacés décapodes Aristeidea. *Faune Madag.* 46: 130 – 138.

DALL, W. 1957. A revision of the Australian species of Penaeinae (Crustacea Decapoda: Penaeidae). *Aust. J. mar. Freshwat. Res.* 8: 136 – 231.

DE FREITAS, A.J. 1979. A new genus and species of the penaeoid family Solenoceridae (Crustacea, Decapoda) from South-East African waters. *Ann. S. Afr. Mus.* 77: 123 – 131.

DE FREITAS, A.J. 1980. The Penaeoidea of South Eastern Africa, Ph.D. thesis, University of the Witwatersrand.

FOXTON, P. 1970. The vertical distribution of pelagic decapods (Crustacea: Natantia) collected on the Sond Cruise 1965. II. The Penaeidae and general discussion. *J. mar. biol. Ass. U.K.* 50: 961 – 1000.

GOPALAKRISHNAN, K. 1976. Larval rearing of red shrimp, *Penaeus marginatus* (Crustacea). *Aquaculture* 9: 145 – 154.

HALL, D.N.F. 1962. Observations on the taxonomy and biology of some Indo-West Pacific Penaeidae (Crustacea, Decapoda). *Fishery Publs colon. Off.* 17: 1 – 229.

IVANOV, B.G. & HASSAN, A.M. 1976a. Penaeid shrimp (Decapoda, Penaeidae) collected off East Africa by the fishing vessel '*Van Gogh*', 1. *Solenocera ramadani* sp. nov., and commercial species of the genera *Penaeus* and *Metapenaeus. Crustaceana* 30: 241 – 251.

IVANOV, B.G. & HASSAN, A.M. 1976b. Penaeid shrimps (Decapoda, Penaeidae) collected off East Africa by the fishing vessel '*Van Gogh*', 2. Deep-water shrimps of the genera *Penaeopsis* and *Parapenaeus* with description of *Penaeopsis balssi* sp. nov. *Crustaceana* 31: 1 – 10.

JOHNSON, J.Y. 1867. Descriptions of a new genus and a new species of macrurous decapod crustaceans belonging to the Penaeidae, discovered at Madeira. *Proc. zool. Soc. Lond. 1867*: 895 – 901.

JOUBERT, LEONI S. & DAVIES, D.H. 1966. The penaeid prawns of the St Lucia Lake System. *Investl Rep. Oceanogr. Res. Inst. Durban* 13: 1 – 40.

KENSLEY, B.F. 1968. Deep sea decapod Crustacea from west of Cape Point, South Africa. *Ann. S. Afr. Mus.* 50: 283 – 323.

KENSLEY, B.F. 1969. Decapod Crustacea from the South-West Indian Ocean. *Ann. S. Afr. Mus.* 52: 149 – 181.

KENSLEY, B.F. 1972. Shrimps and prawns of South Africa. 1st ed. Cape Town: Trustees of the South African Museum.

KENSLEY, B.F. 1977. The South African Museum's *Meiring Naudé* cruises. V. Crustacea. Decapoda, Reptantia and Natantia. *Ann. S. Afr. Mus.* 74: 13 – 44.

KUBO, I. 1949. Studies on the Penaeids of Japanese and its adjacent waters. *J. Tokyo Coll. Fish.* 36: 1 – 467.

LENZ, M. & STRUNCK, K. 1914. Die Decapoden der Deutschen Südpolar-Expedition 1901 – 1903. I. Brachyuren und Macruren mit Ausschluss der Sergestiden. *Dt. Südpol. Exped.* 15 (Zool. 7), 3(6): 257 – 345.

PAULINOSE, V.T. 1974. Decapod Crustacea from the International Indian Ocean Expedition: The species of *Funchalia* (Penaeidae) and their post-larvae. *J. nat. Hist.* 8: 433 – 443.

RANDALL, J.W. 1840. Catalogue of the Crustacea brought by Thomas Nuttall and J.K. Townsend, from the West Coast of North America and the Sandwich Islands, with descriptions of such species as are apparently new, among which are included several species of different localities, previously existing in the collection of the Academy. *Journ. Acad. nat. Sci. Philadelphia* 8: 106 – 147.

RATHBUN, MARY J. 1906. The Brachyura and Macrura of the Hawaiian Islands. *Bull. U.S. Fish Commn* 23: 827 – 930.

RISSO, A. 1826. Histoire naturelle de l'Europe méridionale, vol. 5. Paris, France.

SPRINGER, S. & BULLIS, H.R. 1956. Collections by the *Oregon* in the Gulf of Mexico. *Spec. scient. Rep. U.S. Fish Wildl. Serv. (Fisheries)* 196: 1 – 134.

STEBBING, T.R.R. 1914. South African Crustacea. *Ann. S. Afr. Mus.* 15: 1 – 55.

PÉREZ FARFANTE, ISOBEL. 1977a. American solenocerid shrimps of the genera *Hymenopenaeus, Haliporoides, Pleoticus, Hadropenaeus* new genus, and *Mesopenaeus* new genus. *Fish. Bull. U.S. Nat. mar. fish. serv.* 75: 261 – 346.

PÉREZ FARFANTE, ISOBEL. 1977b. *Penaeopsis eduardoi*, a new species of shrimp (Crustacea: Penaeoidea) from the Indo-West Pacific. *Proc. biol. Soc. Wash.* 92: 172 – 182.

PÉREZ FARFANTE, ISOBEL. 1979. *Penaeopsis jerryi*, new species from the Indian Ocean (Crustacea: Penaeoidea). *Proc. biol. Soc. Wash.* 92: 208 – 215.

RAMADAN, M.M. 1938. Crustacea Penaeidae. *Scient. Rep. John Murray Exped. 1933 – 34* 5(3): 1 – 76.

Added in proof:

PÉREZ FARFANTE, ISOBEL, 1980. Revision of the penaeid shrimp genus *Penaeopsis* (Crustacea: Decapoda). *Fish. Bull.* 77: 721 – 763.