

## PYCNOGONIDS (ARTHROPODA: PYCNOGONIDA) FROM PAKISTAN WATERS (NORTH ARABIAN SEA)

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### ABSTRACT

Fourteen described pycnogonid species are recorded from Pakistan waters for the first time. These records increase the known species to sixteen. The pycnogonid fauna in the region is poorly studied and little understood with only two species, *Pycnogonum tessellatum* Stock, 1968 and *Pigrogromitus timsanus* Calman, 1927 previously recorded. The species now known belong to nine genera in five families. *Callipallene brevirostris* (Johnston, 1837) is recorded from the Indian Ocean for the first time and may have been introduced to the region as part of the fouling community on the hulls of ships. No new species are reported.

**Key words:** Pycnogonida, Arthropoda, Pakistan, North Arabian Sea, Indian Ocean, records.

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### INTRODUCTION

The Pycnogonids, commonly known as sea spiders, are marine Arthropods of uncertain taxonomic status, comprising more than 1300 described species world wide (Arango and Wheeler, 2007). These are small, cryptic animals with a low level of dispersion however there are records of their passive transport as part of the planktonic fauna and fouling communities on ship's hulls (Bamber and Costa, 2009). The study adds fourteen new records, raising the number of pycnogonid species of Pakistan to sixteen.

### MATERIALS AND METHODS

Specimens were collected from brown and green algae on the rocky intertidal. Rocks covered with algae were brought to the laboratory, bathed in water and algae removed. Washings were then sieved, and sorted under a stereomicroscope. Several preserved specimens were made available from the collections of the second author.

The sampling sites were Pasni (25.262N-63.479E), Bulleji (24.850N-66.747E), Hawks Bay (24.860N-66.852E), Sandspit (24.827N-66.929E), Manora (24.792N-66.976E), Clifton (24.803N-67.027E) and Ibrahim Haideri (24.783N-67.142E) along the Pakistan coast.

The specimens are preserved in 70% alcohol. Drawings were made using a Camera Lucida. Specimens will be deposited in the Marine Reference Collection and Resource Centre, University of Karachi.

### RESULTS

Family Ammotheidae Dohrn, 1881

Genus *Ammothella* Verrill, 1900

*Ammothella appendiculata* (Dohrn, 1881) (**Fig. 1**)

**Material examined:** Bulleji, December 2006, 1 ♂; Manora, February 2009, 3 ♂, 5 ♀; January 2012, 1 ♂ with eggs. All specimens from algal sortings.

**Remarks:** The present material is in close agreement with the description by Child (1992). In this material the first chelifore scape is two-third's the length of the second and without a clubbed spine.

**Distribution:** Western and Eastern Atlantic, Panama in the Pacific, Mediterranean, Red Sea and Oman.

Genus *Achelia* Hodge, 1864

*Achelia echinata* Hodge, 1864

**Material examined:** Manora, March, 2005, 4 ♂, from algal sortings.

**Remarks:** The present specimens agree in different features with the figures by Hodge (1864: 115, plate XII, figs. 7-10) and also those by Bouvier (1923: fig. 55) and Stock (1992: fig. 6a-b).

**Distribution:** Red Sea and Gulf of Aden in the Indian Ocean by Calman (1938), Mediterranean, North East Atlantic and North West Pacific.

*Achelia sawayai* Marcus, 1940

**Material examined:** Manora, April, 2005, 3 ♂, from algal sortings.

**Remarks:** The present material substantially agrees the descriptions of the species by Child (1992) and, Krapp and Kraeuter (1976). These specimens are somewhat more slender in appearance with first two inter segmental lines present and tuberculated lateral processes.

**Distribution:** Madagascar in the Western Indian Ocean, Indonesia, Southern Brazil to Northern Caribbean and Gulf of Mexico in the Western Atlantic, East Atlantic; Society Islands, Fiji Islands and New Guinea in the South Pacific.

*Achelia* cf. *boschi* Stock, 1992 (**Fig. 2**)

**Material examined:** Pasni, 2006, 4 ♂, 7 ♀, attached to the base of unidentified hydroids.

**Remarks:** The authors are a little hesitant assigning the present material to this species because of having weaker tuberculation of the femora and tibiae.

**Distribution:** Oman in the Arabian Sea.

Genus *Nymphopsis* Haswell, 1885

*Nymphopsis acinacispinatus bathursti* Williams, 1940

**Material examined:** Manora, April 1999, 3 ♀, from bushy, intertidal bryozoa.

**Remarks:** On the bases of Child (1975) and Bamber (2005) the present specimens are placed under *Nymphopsis acinacispinatus bathursti* Williams, 1940. The given female specimens however have been found more close to Oman material described by Stock (1992) with a new rank (as *Nymphopsis bathursti*) and have long spiniferous tubercles all over the tibia 1.

**Distribution:** Western Australia, Oman.

Genus *Tanystylum* Miers, 1879

*Tanystylum bredini* Child, 1970

**Material examined:** Manora, February 2009, 2 ♀, from algal sortings.

**Remarks:** The present specimens are closely aligned to the material described by Muller (1989; 1990) and differ from Child (1970) in the absence of trunk and coxae tubercles and by having no fold or suture between the ocular tubercle and base of the abdomen.

**Distribution:** Indo-Pacific, recorded from French Polynesia, Yemen, Oman, Seychelles, Kenya, Sri Lanka, Malaysia and Indonesia.

Family Nymphonidae Wilson, 1878

Genus *Nymphon* Fabricius, 1794

*Nymphon setimanus* Barnard, 1946 (**Fig. 3**)

**Material examined:** Hawks Bay, February 2008, 1 ♂, 2 ♀ (1 fragmentary), from algal sortings.

**Remarks:** The present material agrees with Stock (1965) in all respects including the pigmentation which is still evident.

**Distribution:** South Africa, Madagascar, Gulf of Aden, and Socotra Archipelago, Yemen. Two specimens from Andaman Islands reported by Calman (1938: 51) have also been included by Stock (1965) as probably the same species.

*Nymphon enteonum* Child, 2002

**Material examined:** Ibrahim Haideri, March 1996, 2♀, attached to an unidentified species of *Alcyonium*.

**Remarks:** These specimens are similar to the description by Child (2002). However, in this material the second palp segment is longest on contrary to Child's figure of palp (Fig. 4E) where third is longest but almost in the same length ratio.

**Distribution:** Eastern (Hasa) district of Saudi Arabia.

Family Callipallenidae (Hilton, 1942)

Genus *Propallene* Schimkewitsch, 1909

*Propallene socotrana* Bartolino and Krapp, 2007 (Fig. 4)

**Material examined:** Pasni, January 2007, 1 ♂ (with juveniles attached to ovigers), 3 ♀, from algal sortings.

**Remarks:** The present specimens differ in minor respects from the description by Bartolino and Krapp (2007). The maximum number of oviger compound spines: 11: 9: 9: 10, femoral cement gland tubes: 7-11 and chela teeth: 6-8 on each finger.

**Distribution:** Socotra Archipelago, Yemen.

Genus *Callipallene* Flynn, 1929

*Callipallene brevirostris* (Johnston, 1837) (Fig. 5)

**Material examined:** Bulleji, January 2007, 1 ♂, 1 ♀, from algal sortings.

**Remarks:** The present specimens have been compared with the figures of various species given by Stock (1952). This material is more slender in appearance, with longer cephalon neck and considerably longer second coxae. Legs are armed with some setae. Femur in females is swollen at the ventral margin. The specimens differ from *Callipallene longicoxa* Stock, 1955 mainly in having low, rounded ocular tubercle.

**Distribution:** North Atlantic, West Africa, Mediterranean and Black Sea. This is the first record from the Indian Ocean. Its presence in the Pakistan waters, North Arabian Sea is unexpected and it may have been introduced by way of fouling on ship hulls.

*Callipallene dubiosa* Hedgpeth, 1949 (Fig. 6)

**Material examined:** Pasni, November 1993, 5 ♂, 11 ♀; Bulleji, March 2007, 1 ♂, 3 ♀; Sandspit, March 2005, 3 ♂, Manora, October 2006, 6 ♂, 2 juveniles. All specimens from algal sortings.

**Remarks:** With the exception of number of propodal heel spines (six, placed in two rows (1+2+2+1)) the present specimens agree with the description by Hedgpeth (1949).

**Distribution:** Indo-West Pacific. From Socotra Archipelago, Yemen (as *Callipallene* aff. *dubiosa*).

Family Phoxichilidiidae Sars, 1891

Genus *Anoplodactylus* Wilson, 1878

*Anoplodactylus turbidus* Stock, 1975.



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 6



Fig. 7

- Fig. 1, *Ammothella appendiculata* (Dohrn, 1881). Female, dorsal view.  
 Fig. 2, *Achelia* cf. *boschi* Stock, 1992. Male, dorsal view  
 Fig. 3, *Nymphon setimanus* Barnard, 1946. Female, dorsal view  
 Fig. 4, *Propallene socotrana* Bartolino and Krapp, 2007. Male, dorsal view  
 Fig. 6, *Callipallene dubiosa* Hedgpeth, 1949. Male, dorsal view  
 Fig. 7, *Endeis meridionalis* (Böhm, 1879). Male, dorsal view.

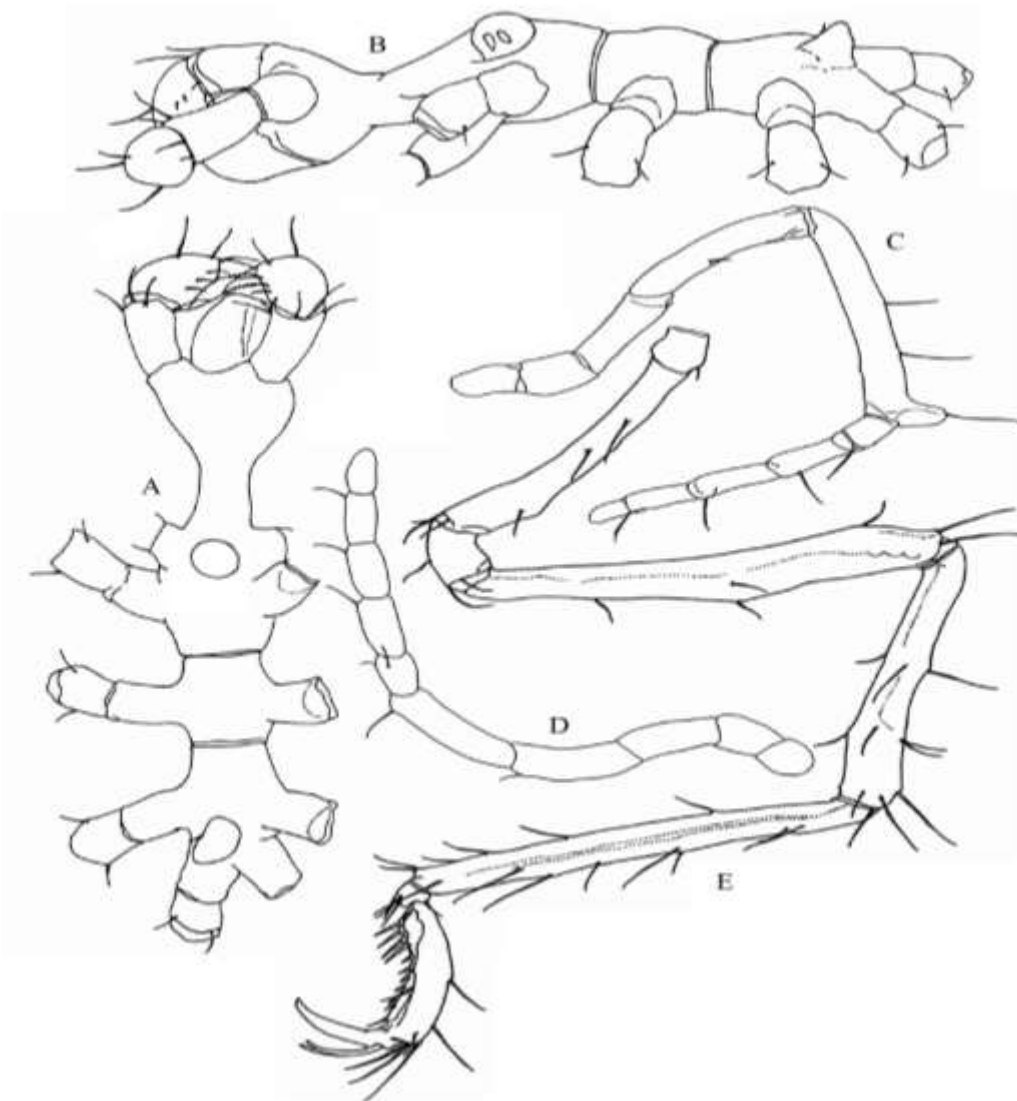


Fig.5, *Callipallene brevisrostris* (Johnston, 1837). Male, (A) Trunk, dorsal view (B) Trunk, lateral view (C) Oviger, male (D) Oviger, female (E) Fourth leg.

**Material examined:** Bulleji, January 2007, 4 ♂; Pasni, February 2007, 2 ♂. All specimens from algal sortings.

**Remarks:** The specimens are in good agreement with the description by Stock (1975).

**Distribution:** South Red Sea, Eastern (Hasa) District of Saudi Arabia, Socotra Archipelago, Yemen and from Ethiopia, Tanzania and Madagascar in the Western Indian Ocean.

*Anoplodactylus angulatus* (Dohrn, 1881)

**Material examined:** Manora, January 2007, 2 ♂, 1 ♀; Pasni February 2008, 2 ♀. All specimens from algal sortings.

**Remarks:** The specimens agree with *Anoplodactylus angulatus* particularly the proboscis shape as figured by Krapp (1973, fig. 6). The proboscis has an angular anterior margin and raised distal corners. Each propodus has two strong heel spines and 7-8 curved sole spines in males and upto 13 in females.

**Distribution:** Mediterranean Sea, Oman, Northwest Atlantic from North Ireland to Canary.

*Anoplodactylus* sp.

**Material examined:** Sandspit, March 2005, 2 ♀, from algal sortings.

**Remarks:** These female specimens appear close to *Anoplodactylus tarsalis* Stock, 1968 but it is difficult to identify females in absence of male.

Family Endeididae Norman, 1908

Genus *Endeis* Philippi, 1843

*Endeis mollis* (Carpenter, 1904)

**Material examined:** Clifton, May 1996, 2 ♂, from plankton collection.

**Remarks:** The material is similar to the figures given by Calman (1923, fig. 16). The femora are straight and without swellings.

**Distribution:** Arabia, Indian coast, Somalia, Madagascar, Zululand in the Western Indian Ocean and Izu Peninsula, Japan; Great Barrier Reef, Australia and Columbia in the Pacific.

*Endeis meridionalis* (Böhm, 1879) (**Fig. 7**)

**Material examined:** Clifton, May 1996, 1 ♂, 1 fragmentary ♀, from plankton collection.

**Remarks:** The specimens are similar to the figures by Calman (1923, fig. 15). The femora have lateral swellings with strong spine. However, on contrary to Calman, 1923 each femur is also provided by a dorsodistal spine bearing process.

**Distribution:** Indian coast, Madagascar in the Western Indian Ocean, Singapore and Tor in the Gulf of Suez, and Christmas Islands.

## DISCUSSION

Pycnogonids are unique in having characteristic proboscis, the specific appendages or ovigers used for carrying eggs by males and a reduced abdomen (Arango and Wheeler, 2007). These arthropods are less studied; the reasons may be their small size, cryptic nature, occurrence in low densities and no economic significance (Arango, 2003).

The pycnogonid fauna of Pakistan waters is greatly neglected and only three papers have been noticed suggesting just two records of sea spiders from this region. These previously recorded species are: *Pigrogromitus timsanus* Calman, 1927 and *Pycnogonum tessellatum* Stock, 1968 documented by Moazzam (1987) and Stock (1968) respectively. The present study results in fourteen pycnogonids new to Pakistan and an unexpected occurrence of *Callipallene breviostris* (Johnston, 1837). The number of pycnogonid species has been increased to sixteen.

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