

*First record of deep-sea gigantic pycnogonid
Colossendeis colossea Wilson, 1881 from
the Western Indian Ocean*

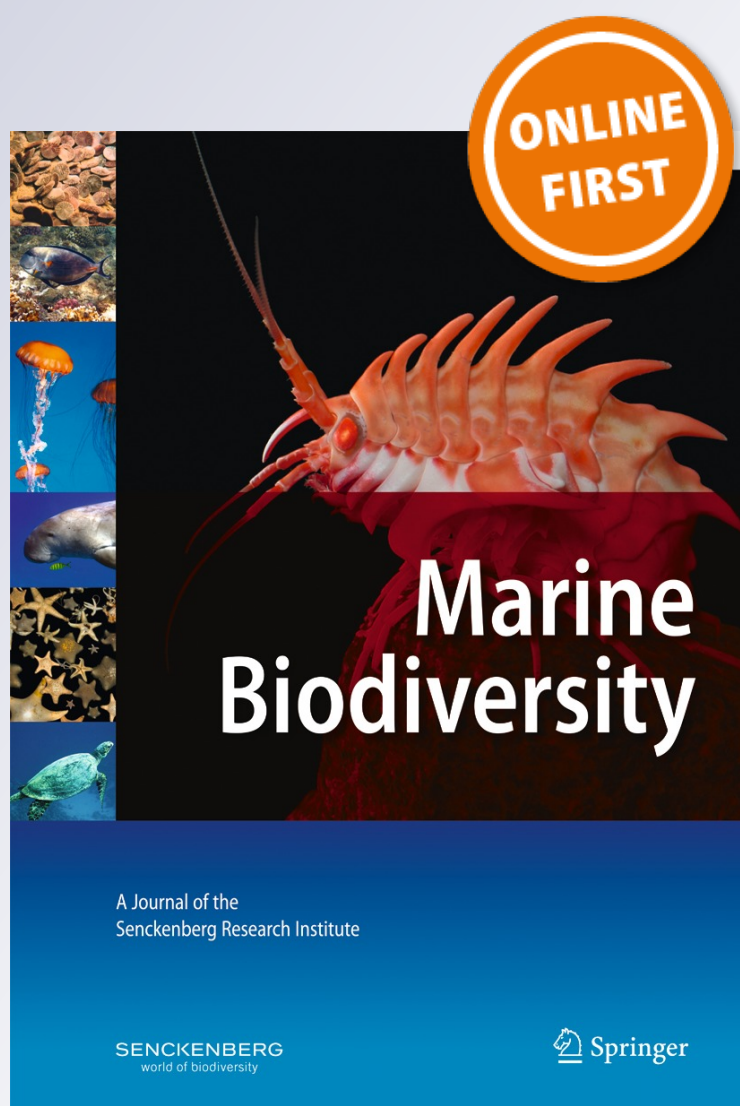
**Jacob Vinu, M. P. Rajeesh Kumar,
K. S. Sumod, K. P. Deepa, M. Hashim,
V. N. Sanjeevan & M. Sudhakar**

Marine Biodiversity

ISSN 1867-1616

Mar Biodiv

DOI 10.1007/s12526-015-0373-1



Your article is protected by copyright and all rights are held exclusively by Senckenberg Gesellschaft für Naturforschung and Springer-Verlag Berlin Heidelberg. This e-offprint is for personal use only and shall not be self-archived in electronic repositories. If you wish to self-archive your article, please use the accepted manuscript version for posting on your own website. You may further deposit the accepted manuscript version in any repository, provided it is only made publicly available 12 months after official publication or later and provided acknowledgement is given to the original source of publication and a link is inserted to the published article on Springer's website. The link must be accompanied by the following text: "The final publication is available at link.springer.com".

First record of deep-sea gigantic pycnogonid *Colossendeis colossea* Wilson, 1881 from the Western Indian Ocean

Jacob Vinu¹ · M. P. Rajeesh Kumar¹ · K. S. Sumod¹ · K. P. Deepa¹ · M. Hashim¹ · V. N. Sanjeevan¹ · M. Sudhakar¹

Received: 30 March 2015 / Revised: 23 July 2015 / Accepted: 27 July 2015

© Senckenberg Gesellschaft für Naturforschung and Springer-Verlag Berlin Heidelberg 2015

Abstract The gigantic pycnogonid, *Colossendeis colossea* Wilson, 1881 is reported for the first time in the Western Indian Ocean. Two male specimens of this species were collected from a bottom trawl operated at bathyal depths (>1000 m) off the Southwest coast of India.

Keywords Gigantic pycnogonid · *Colossendeis colossea* · Western Indian Ocean

Introduction

Pycnogonids are commonly known as sea spiders, representing exclusive marine inhabitants of the phylum Arthropoda. The genus *Colossendeis* belongs to the family Colossendeidae, with 71 valid species (Bamber 2014). As the name implies, the genus *Colossendeis* comprises ‘colossal’ sized giant pycnogonids. Members of the genus *Colossendeis* prefer a cold freezing environment in the ocean. An extraordinary diversity and richness of *Colossendeis* species is present in the Antarctic and sub-Antarctic seas: at least 27 species are endemic to the Southern Ocean (Munilla and Soler 2009). The species *Colossendeis colossea* Wilson, 1881 is the largest pycnogonid species known to science, with a leg span of up to 70 cm.

Communicated by P. Martinez Arbizu

✉ Jacob Vinu
vinujacob01@gmail.com

¹ Centre for Marine Living Resources & Ecology (CMLRE), Ministry of Earth Sciences (MoES), Govt. of India, C-Block, 6th Floor, Kendriya Bhavan, CEPZ (PO), Kochi-37, India

The first description of *Colossendeis colossea* was based on ten specimens collected during survey of *U. S. Coast Survey Steamer “Blake”* along the East coast of United States. *C. colossea* has a cosmopolitan distribution, inhabiting the continental slope region of all major oceans with depth ranging between 420 m and 5200 m (Bamber 2010). Only two species of *Colossendeis* have been so far reported from Indian EEZ and *C. macerrima* Wilson, 1881 from the Arabian Sea, Laccadive Sea, and Andaman Sea; *C. colossea* from the Andaman Sea (Daniel and Sen 1975; Veena et al. 2010). However, gigantic pycnogonid, *C. colossea* has so far not been reported from the Arabian Sea. The present report extends the distributional range of *C. colossea* to the deep-sea of the Northwestern Indian Ocean.

Materials and methods

Two male specimens of *Colossendeis colossea* were collected during the deep-sea exploratory fishery surveys of *FORV Sagar Sampada* (FORV SS) conducted by the Centre for Marine Living Resources and Ecology (CMLRE) along the Southwest coast of India. The specimens were collected by a High Speed Demersal Trawl-Crustacean Version (HSDT-CV) operated at a speed of 2.5 knots. One specimen was collected during cruise 319 of FORV SS, station No. 09 (8°17'N, 76°01'E) on 10 September 2013 from a depth of 1262 m. The second specimen was collected during the FORV SS cruise 321, station No. 18 (8°25'N, 75°55'E) on 11 December 2013 from a depth of 1241 m. Specimens were preserved in 5 % buffered formaldehyde solution and deposited in the CMLRE Referral Centre (CMLRE R. C. No. 3190908, 3211820). The specimens were identified as *Colossendeis colossea* following the original description and illustrations (Wilson 1881) and taxonomic keys (Child 1995a,

Table 1 Morphometric measurements of *Colossendeis colossea* Wilson, 1881 (♂) collected off Southwest coast of India

Morphometric measurements (cm)	CMLRE RC No. 3190908 (♂)	CMLRE RC No. 3211820 (♂)
Length of body including proboscis and abdomen	7.0	6.9
Length of proboscis	4.1	4.2
Diameter of proboscis at base	0.3	0.3
Diameter of proboscis at widest part	0.5	0.5
Diameter of proboscis at tip	0.4	0.4
Length of trunk	2.5	2.6
Length of palp	6.0	5.5
Oviger	10.0	11.0
Length of 1st leg	24.8	23.5
Length of 2nd leg	27.5	27.0
Length of 3rd leg	27.3	25.7
Length of 4th leg	25.0	24.8
Abdomen	0.5	0.5

b, c). Morphometric data taken from the preserved specimens shown in Table 1 and terminology used in the description follow Wilson 1881 and Child 1995a, b, c.

Results and discussion

SYSTEMATICS

Class PYCNOGONIDA

Order PANTOPODA

Family COLOSSENDEIDAE

Genus *Colossendeis* Jarzynsky, 1870

Colossendeis colossea Wilson, 1881
figure 1a, b

Diagnosis

Proboscis much longer than trunk, with great median and distal swelling. Lateral processes well separated and not touching; legs very long; ocular tubercle low and unpigmented; distal 3 palp segments straight and sub equal; oviger terminus not sub-chelate.

Description (♂)

Size extremely large, leg span about 7.9 times that of the trunk and proboscis length combined. Lateral processes very short and swollen separated by very small intervals, the last pair separated by a somewhat greater interval. Ocular tubercle very short, terminating in a low conical tip, two rudimentary ocelli widely separated without pigment. The proboscis is of great size, its length being about 1.6 times that of the trunk. At the base it is of slightly less diameter than that of the trunk and continues of the same size for about one third of its length; it then expands its diameter and then gradually tapers towards the tip. Abdomen very small, slender pyriform shape, obtusely conical towards extremity, 0.19 times that of the trunk.

Palp 1.4 of the proboscis, third segment is largest, 6.9 times the fourth, distal three segments are short and sub-equal. Oviger of great length, 2.5 times the proboscis. Sixth segment is the largest at 3.6 times the fifth. Seventh to tenth segments, short, curved, bearing the peculiar spines on its inner margin; terminal joint claw like and coalescent with preceding. Legs enormously long, more than 5.8 times that of the proboscis, Coxae 1, 2 and 3 are very short; femur very long and slender, 1.9 times that of the proboscis; tibia 1 nearly equal to femur; tibia 2 more than 0.8 of the femur; tarsus more than 0.1 of the femur; propodus a little more than 0.5 of the tarsus; claw, less than one half the propodus, very slightly curved, acute.

Entire surface is finely tuberculose with stout appressed hairs, which show a distinctly linear arrangement, at considerable intervals but intervals gets shorter over the legs.

Fig. 1 *Colossendeis colossea* Wilson, 1881 (♂) from the Southwest coast of India. a. entire organism, b. enlarged view of body

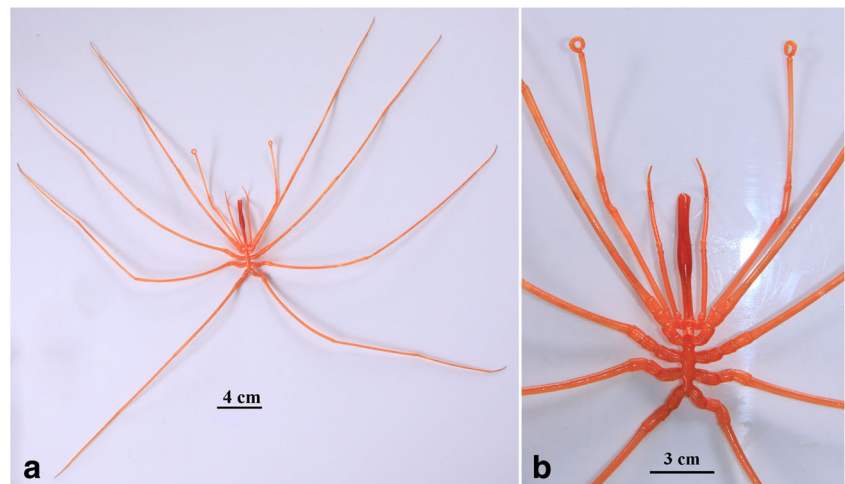
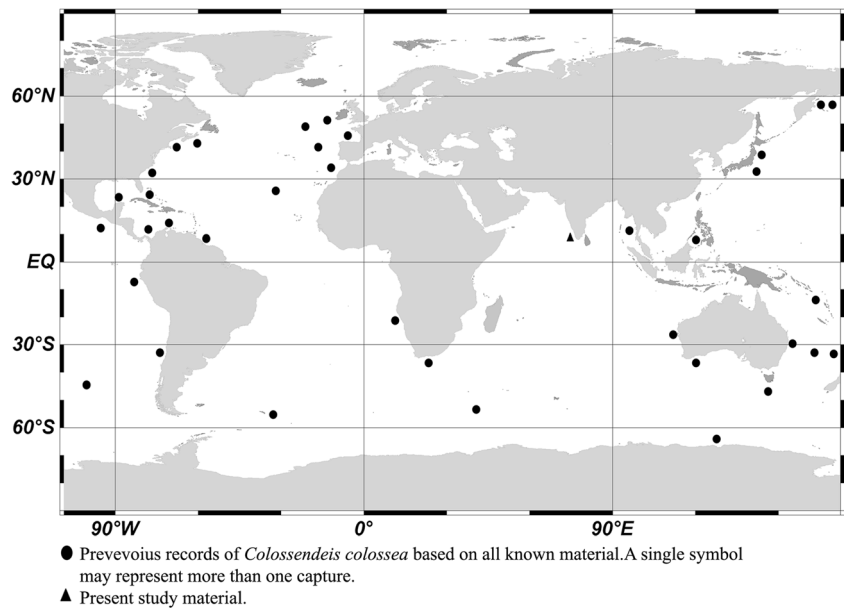


Fig. 2 Known localities of *Colossendeis colossea* Wilson, 1881 in the world oceans, including the sampling location



Colour Body uniformly orange-red color in a fresh specimen, clear straw yellow in a preserved specimen. A narrow dark stripe runs along both sides of the appendages representing a thickening of chitin.

Distribution *Colossendeis colossea* exhibits a semi-cosmopolitan (Fig. 2) distribution at bathyal depths in major zones of the world oceans namely, western north Atlantic; eastern north and south Atlantic; western north and south Pacific; eastern north and south Pacific; western and eastern Indian Ocean, and the Antarctic and sub-Antarctic zones. Bibliography of the depth distribution of *C. colossea* across major regions of the world oceans is listed in Table 2.

Remarks

The present specimens exactly match the original description and morphometric measurements of Wilson 1881. The trunk length (including proboscis and abdomen), and the proboscis length of the present two specimens (7.0; 6.9 and 4.1; 4.2 cm respectively) are larger than those in Wilson's (1881) specimen (5 and 3 cm, respectively). The distribution record of *Colossendeis colossea* from the Southwest coast of India extends the distribution of this species to tropical waters of the Western Indian Ocean. Sea spiders are generally predators on cnidarians, sponges, polychaetes and bryozoans or scavengers; with their long proboscis they suck food from cnidarians. Preferred prey animals, such as solitary corals and deep-sea

Table 2 Bibliography of the depth distribution of *Colossendeis colossea* Wilson, 1881 across major regions of the world's oceans

Region	References	Depth
Northwest Atlantic	Wilson 1881; Stock 1986; Child 2009; Mueller and Krapp 2009	950-1480
Southwest Atlantic	-	-
Northeast Atlantic	Stock 1987; Bamber 2010; Soler and Munila 2015	420-5200
Southeast Atlantic	Stock 1981	
Antarctic and sub-Antarctic	Child 1995a; Cano and López-González 2007; Munila and Soler 2015	425–4140
Northwest Indian	Present study	1240-1262
Southwest Indian	-	-
Northeast Indian	Daniel and Sen 1975	-
Southeast Indian	Staples 2007	760-770
Northwest Pacific	Nakamura and Child 1991; Child 1995b	350-3239
Southwest Pacific	Staples 2007; Bamber 2013	776-856
Northeast Pacific	Child 1994	740-4100
Southeast Pacific	Child 1992	950-1480

anemones, were also observed in bottom trawl catches along with *C. colossea*. Near bottom (1000 m depth) mean temperature, mean salinity and mean dissolved oxygen from two sampling location were 6.79 °C, 34.97 and 0.86 ml/L, respectively.

Acknowledgments We would like to express our gratitude to all scientific participants of *FORV Sagar Sampada* Cruises no. 319 and 321. We thank all our colleagues and friends in CMLRE for the constant support and encouragement. We also thank the anonymous reviewers whose suggestions helped to improve our manuscript.

References

- Bamber RN (2010) Sea-Spiders (Pycnogonida) of the north-east Atlantic. In: Crothers JH, Hayward PJ (eds) Synopses of the British Fauna (New Series), 2nd edn, vol 5. Field Studies Council, Linnean Society of London, London, p 249
- Bamber RN (2013) Deep-water Pycnogonida from recent cruises to Papua New Guinea and Melanesia, with an appendix of new records from Polynesia and descriptions of five new species. *Zoosystema* 35(2):195–214
- Bamber RN (2014) *Colossendeis* Jarzynsky, 1870 In: Bamber RN, El Nagar A (Eds) (2014). Pycnobase: World Pycnogonida Database. World Register of Marine Species <http://www.marinespecies.org/aphia.php?p=taxdetails&id=134586>
- Cano E, López-González PJ (2007) *Colossendeis* species (Pycnogonida: Colossendeidae) collected during the Italica XIX cruise to Victoria Land (Antarctica), with remarks on some taxonomic characters of the ovigers. *Sci Mar* 71(4):661–681
- Child CA (1992) Pycnogonida of the southeast Pacific biological oceanographic project (SEPBOP). *Smithsonian Contributions to Zoology* 526:1–43
- Child CA (1994) Deep-sea Pycnogonida from the temperate west coast of the United States. *Smithson Contrib Zool* 556:23
- Child CA (1995a) Antarctic and Subantarctic Pycnogonida IV. The families Colossendeidae and Rhynchothoracidae. *Antarct Res Ser* 69: 69–111
- Child AC (1995b) Antarctic and Subantarctic Pycnogonida IV. The families Colossendeidae and Rhynchothoracidae. In: Cairns S (ed) Antarctic and Subantarctic Pycnogonida: Nymphonidae, Colossendeidae, Rhynchothoracidae, Pycnogonidae, Endeidae, and Callipallenidae. Am Geophys Union, Washington, DC, pp 69–111
- Child CA (1995c) Pycnogonida of the Western Pacific Islands, XI: collections from the Aleutians and other Bering Sea Islands, Alaska. *Smithson Contrib Zool* 569:1–30
- Child CA (2009) Pycnogonida and Xiphosura (Cheliceriformes) of the Gulf of Mexico. In: Felder DL, Camp DK (eds) Gulf of Mexico—Origins, Waters, and Biota. Biodiversity. Texas A&M University Press, College Station, pp 815–820
- Daniel A, Sen J (1975) Studies on the Pycnogonids from the Collections of the Zoological Survey of India, Calcutta, together with Notes on their Distribution in the Indian Ocean. *J Mar Biol Assoc India* Cochin 17(2):160–167
- Mueller HG, Krapp F (2009) The pycnogonid fauna (Pycnogonida, Arthropoda) of the Tayrona National Park and adjoining areas on the Caribbean coast of Colombia. *Zootaxa* 2319:1–138
- Munilla T, Soler Membrives A (2009) Check-list of the pycnogonids from Antarctic and sub-Antarctic waters: zoogeographic implications. *Antarct Sci* 21(02):99–111
- Munilla T, Soler-Membrives A (2015) Pycnogonida from the Bellingshausen and Amundsen seas: taxonomy and biodiversity. *Polar Biol* 38(3):413–430
- Nakamura K, Child CA (1991) Pycnogonida from waters adjacent to Japan. *Smithson Contrib Zool* 512:1–74
- Soler-Membrives A, Munilla T (2015) PYCNOIB: Biodiversity and Biogeography of Iberian Pycnogonids. *PLoS One* 10(3), e0120818
- Staples DA (2007) A new species of *Colossendeis* (Pycnogonida: Colossendeidae) together with records from Australian and New Zealand waters. *Mem Mus Victoria* 64:79–94
- Stock JH (1981) Abyssal Pycnogonida from the Walvis Basin, Southern Atlantic. *Cah Biol Mar* 22:453–471
- Stock JH (1986) Pycnogonida from the Caribbean and the Straits of Florida. *Bull Mar Sci* 38(3):399–441
- Stock JH (1987) Faunistic transit between the Atlantic and the Mediterranean: the deep water Pycnogonida. *Cah Biol Mar* 28: 505–519
- Veena S, Kaladharan P, Rohit P (2010) Pycnogonids, the sea spiders their role in marine ecology. *Fish Chimes* 30(9):41–46
- Wilson EB (1881) Report on the Pycnogonidae. Reports on the Results of Dredging, under the supervision of Alexander Agassiz, along the east coast of the United States during the summer of 1880, by the U. S. Coast Survey Steamer “Blake”, Commander JR Bartlett, U. S. N., Commanding. *Bull Mus Comp Zool* 8:239–256