Pycnogonida from Costa Rica collected by Scuba Diving

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Received 27-VI-2011 Corrected 8-VIII-2011 Accepted 19-VIII-2011

ABSTRACT

The knowledge of the pycnogonid fauna of Costa Rica is poor. This is the first report on Pycnogonida collected by scuba diving from both oceans of Costa Rica. Nine species from the Caribbean side and one from the Pacific coast are reported. We add eight species to the Caribbean fauna and one to the Pacific fauna of Costa Rica. No species new to science were encountered.

KEY WORDS

Pycnogonida, Costa Rica, scuba collecting, Caribbean, Pacific.

RESUMEN

Se sabe poco de los picnogónidos de Costa Rica. Este es el primer informe sobre especímenes de Pycnogonida recolectados por buceo, en ambos océanos de Costa Rica. Se encontraron nueve especies de la zona del Caribe y uno de la costa del Pacífico. Se añaden ocho especies a la fauna del Caribe y una a la fauna del Pacífico de Costa Rica. Ninguna de las especies encontradas es nueva para la ciencia.

PALABRAS CLAVE

Pycnogonida, Costa Rica, recolección por buceo, Caribe, Pacífico.

The knowledge of the pycnogonid fauna of Costa Rica is poor. Bamber (2009) is the first paper dedicated to this country. It brings a species list, incorporating also the few single records published in papers on a wider area, mainly the Caribbean.

METHODOLOGY

This note is on seven vials containing Pycnogonida, all handpicked by scuba divers, all but one from the Caribbean coast of Costa Rica near Manzanillo, except locality (E) from Bahia de Coronado (National Park Ballena Marino) on the Pacific coast. The diver in most cases was A. Berrocal, except in locality E, where M. Calderon collected the specimens.

Localities

A. Manzanillo (01/04/2000), 09°38'25,9" N, 82°39'50,0" W, 25m deep.

B. Sixaola, Manzanillo, 1500m north of cemetery (12/10/2000), 09°39'10,8" N -82°38'56,7" W, 15-20m deep.

C. Manzanillo, Punta Mona (7/4/2000), 09°37'53,6" N, 82°37'13,1" W, 6m deep.

D. Manzanillo, Punta Mona (7/4/2000), 09°37'53,6" N, 82°37'13,1" W, 6m deep.

E. Bahia de Coronado (National Park Ballena Marino), Pacific coast, 09°08'57,4" N -83°46'00,2" W, surf zone, under stones.

F. Manzanillo, near petrolero Manzanillo, 09°38'21,6" N -82°39'22,6" W, collected during ascension, about 5-7 m

G. Manzanillo (1/4/2000), 09°38'25,9" N -82°37'54,7" W, 25 m, between algae.

As a rule we give here with most species heading only the original citation and some recent ones in order to orientate interested researchers. Citations of papers not found in the references section may be traced in Müller & Krapp (2009). All specimens are housed in the collections of the Museo de Zoología, Escuela de Biología, Universidad de Costa Rica under their UCR numbers given.

RESULTS

Systematics

Locality A: Manzanillo, 25 m

Nymphopsis duodorsospinosa Hilton, 1942

Literature: Hilton 1942: 303-305, pl. 45. Child 1982: 363 (previous literature). Müller & Krapp 2009: 38-39 (text), 36-37 (figs. 15A-D, 16 A-C).

Material: 1 male, very strongly encrusted and covered with detritus. UCR 17-01.

Remarks: A widely distributed species, from the southern US states and the Caribbean Sea. Hilton, 1942: 303. Child 1979: 29 (literature). Child 1982: 363. Stock 1986: 401. Müller & Krapp 2009: 38-39, figs. 15-16.

Locality B: Sixaola, Manzanillo, 15-20 m deep, between green algae

Nymphopsis duodorsospinosa Hilton, 1942

Material: 1 ovigerous male, 2 females. UCR 19-01.

Literature: See locality A.

Pallenoides spinulosa Stock, 1955

Literature: Stock 1955: 227-230, figs. 6-7. Müller & Krapp 2009: 76-77, figs. 41A-J (literature and 5 previous records).

Material: 1 female. UCR 19-02.

Remarks: The only female present has been tentatively allocated to this species. It differs from Stock's description of his single male holotype in the following character: there are no appreciable middorsal tubercles on the anterior two segments. As far as we know this is the sixth record of this species.

Anoplodactylus cf. *virescens* (Hodge, 1864)

Literature: The literature on this species is too vast to bring it here, cf. author and year of description.

Material: 1 female. UCR 19-03.

Remarks: One female is (as the rule in this genus) not exactly identifiable without accompanying male. If the species identification is correct it is within the range of this widely distributed and frequently collected species of amphi-Atlantic and Mediterranean distribution.

Pallenopsis (P.) schmitti Hedgpeth, 1943:

Literature: Hedgpeth 1943: 303-305, pl. 45. Stock 1975: 1028-1030: figs. 30c-d (literature, type of typical "subgenus" or rather genus, as *Bathypallenopsis* is now mostly regarded a distinct genus). Müller & Krapp 2009: 122 (distribution, depth range)

Material: 1 female. UCR 13-01.

Locality C: Manzanillo, Punta Mona, 6 m

Endeis mollis (Carpenter, 1904)

Literature: Carpenter 1904: 182-183; pl. 5, figs. 1-7. Stock 1965: 31 (literature, synonymy). Stock 1994: 18 (list), 68 (literature, distribution). Müller & Krapp 2009. 117-119, figs. 62A-E.

Material: 1 female. UCR 18-02.

Remarks: Circumtropical in distribution. Stock (1986) compiled all collection areas then known from the western reaches of the Atlantic Ocean.

Ascorhynchus aff. *latipes* (Cole, 1906)

Literature: Cole 1906: 217-222, pls. 1-2. Child 1979: 15-16 (previous literature). Child 1982: 359 (literature). Child 1992: 20-21, figs. 7a-c (literature in part). Müller & Krapp 2009: 5961, figs. 29A-I.

Material: 1 male specimen. UCR 18-03.

Remarks: This specimen belongs to the "less typical" or "Veracruz form" of Child (1992): it conforms to that description in some "negative" characters, i. e., many characters present in "typical" latipes are absent, so the "horn" at the anterior margin of the cephalon, as well as a distinct postocular prominence, the tubercles on the lateral processes are lacking, cheliphores having longish scapes with a distinct bend at midlength, no prominent swellings (tubercles in Child's words) at the origin of the ovigera, has an additional (= fourth) low bump at the root of the abdomen, which is also bent ventrally. Child (1992) refrained from describing a new species and considered these differing characters to variability only. As we have a single specimen at hand we can only pronounce our doubts about this interpretation. But a description of a new species should be based on more material.

Locality D: Manzanillo, Punta Mona, 6 m

Ammothella appendiculata (Dohrn, 1881)

Literature: Dohrn 1881: 152-155, pl. VII, figs. 1-5. Stock 1992: 81 (in list), 82 (literature, distribution). Müller & Krapp 2009: 21-24, figs. 6A-J (synonymy with *Ammothella rugulosa* confirmed).

Material: 1 male. UCR 18-04.

Remarks: A widely distributed species in the Atlantic and Mediterranean.

Anoplodactylus simulator Stock, 1975

Literature: Stock 1975: 1066-1067, figs. 50a-i. Stock 1986: 440, fig. 15c.

Material: 1 female. UCR 15-01.

Remarks: This is the third record of that species only as well as of the second known female. This specimen enlarges the known distribution considerably, as all previous localities were in the Florida Straits (Stock 1975, 1986). The depth range is also greater, as Stock's specimens came from depths between 176-183 m.

Nymphopsis duodorsospinosa Hilton, 1942

Literature: See under the species at locality A.

Material: 1 chelate immature. UCR 18-01.

Remarks: The ovigera are still lacking, the cheliphores bear still functional chelae with widely gaping „ice tongs". Besides its juvenile aspect the animal conforms to the diagnosis of the species; other localities in the vicinity yielded more specimens.

Locality E: Bahia de Coronado (National Park Ballena Marino), Pacific coast

Anoplodactylus californicus Hall, 1912

Literature: Hall 1012: 91-93, figs. 49, 52 D, F, I, J. Child 1987: 554-555 (literature, synomymy). Child 1992a: 43-44; figs. 19A+B. Child 1992b: 37 (distribution, first record from Ecuador). Child 1995: 123-124. Child 2004: 155. Bamber & Takahashi 2005: 4+7. Arango & Maxmen 2006: 51-64. Müller & Krapp 2009: 90-93, figs. 48A-H. Bamber 2009: 238 (from Costa Rica). Child 2009: 819.

Material: 1 female. UCR 13-01.

Remarks: In that special case the identification of a single female specimen is relatively easy. The most salient feature is the wing-shaped "necktie" at the base of the proboscis which shows six indentations on each lateral extremity and a one-articled palp rudiment. This specimen presents an astonishing look (cf. Child 1978): as it is a female, it lacks ovigera, but shows high genital prominences on all normally developed walking legs (the first leg on the right side and the second leg on the left one are apparently regenerated and shorter than they should be in comparison with the other six). These genital papillae are highest in the third pair of walking legs (normally the fourth!), the papillae on second right and first left legs are only moderately high. Child (1978) described such a gynandromorph state in a "male" of the same *Anoplodactylus species* (cited there as its synonym *A. portus*). Child & Nakamura (1982) reported the same anomaly in an *Anoplodactylus gestiens* from Japan. Therefore such cases seem to be not too rare in this genus.

Stock (1979) tabulated all species of *Anoplodactylus* with females showing ventral excrescences on their proboscides. Arnaud & Maxmen (2006) studied the entire group called by them *californicus-digitatus* group and supplied even a species key to their identification. Of these, *arnaudae* Stock, *brevicollis* Loman, *insignis* Hoek, *evansi* Clark, *polignaci* Bouvier, *unilobus* Stock and *versluysi* Loman may be at once excluded, as their ventral proboscis excrescences are differently shaped. Besides, *californicus* Hall (and its synonyms *carvalhoi* Marcus, *portus* Calman and *investigatoris* Calman) only *jungersi* Fage, *digitatus* Böhm and *stictus* Marcus show a similar configuration of these female characters. *Anoplodactylus jungersi* Fage, 1949 shares the lack of lateral indentations on the "necktie", whereas our specimen shows the typical undulated lateral margins (about 6-7 irregular crenulations on each side) of *A. californicus* females and lacks the anterior "échancrure" ascribed to *jungersi* (that species has been only briefly described and partly figured, moreover it was found twice on the African Atlantic coast only). It differs from the only published figure of the ventral aspect of the proboscis, as there is such an obtuse angle formed on the caudal aspect of the "necktie".

Ascorhynchus spec.

Very similar to *A. castellioides*, but deviating by a biarticled scape of cheliphores). No UCR number available.

Locality F: Manzanillo, near the petrolero Manzanillo, about 5-7 m

Pentapycnon geayi Bouvier, 1911

Literature: Bouvier 1911: 491-494. Stock 1975: 1084, fig. 58c, 1088 (references). Munilla 1993: 543, 545, 551 (in lists, first European record). Bamber 2009: on p. 309, fig. 25.1 shows an "unidentified species of *Pentapycnon* from Costa Rica".

Material: 1 male collected between algae during ascending, about 5-7 m depth. UCR 16-01.

Remarks: Considering Bamber's figure (2009) this is the second record from Costa Rica.

Locality G: Manzanillo, 25 m, between algae

Nymphopsis duodorsospinosa Hilton, 1942

Literature: See at same species from locality A.

Material: 1 male. UCR 20-01.

DISCUSSION

According to Bamber (2009) 12 species of Pycnogonida were known from the Caribbean coast and two from the Pacific (see table 1). In this paper we add 8 more species from the Caribbean and confirm the presence of one more species on the Caribbean coast of Costa Rica, namely *Pentapycnon geayi* Bouvier, 1911, which was only figured as *Pentapycnon* spec. in Bamber (2009). The only species common to this collection and all previous reports is *Anoplodactylus californicus* Hall, 1912, which we found only on the Pacific coast, where it is widely distributed, but not in this collection from the Caribbean.

Therefore at least 21 species are now currently known from Caribbean waters of Costa Rica and three only from its Pacific coast, apparently due to lack of more collecting activity. It should be noted that there are no previous reports from Costa Rica proper, all the species collated by Bamber (2009) were collected by expedition ships sammpling a wider geographic range, but mostly in the Caribbean.

To these we may add the Pycnogonida photographed by Ingo Wehrtmann and published in Bamber (2009) showing *Pentapycnon* spec. (most probably *P. geayi* Bouvier, 1911) from the Caribbean and an unidentified species of *Anoplodactylus* from the Pacific.

TABLE 1
Pycnogonida species present in Costa Rican waters

Caribbean, in Bamber (2009)	Pacific, in Bamber (2009)	Caribbean (this report)	Pacific (this report)
Ascorhynchus paxillum Child, 1992	*Anoplodactylus batangensis* (Helfer, 1938)	*Ascorhynchus* aff. *latipes* (Cole, 1906)	—
Ammothella symbius Child, 1979	*Anoplodactylus insigniformis* Stock, 1974	*Nymphopsis duodorsospinosa* Hilton,1942	—
Tanystylum isthmiacum Stock, 1955	—	*Ammothella appendiculata* (Dohrn, 1881)	—
Anoropallene palpida (Hilton, 1939)	—	*Pallenopsis schmitti* Hedgpeth, 1943	—
Callipallene californiensis (Hall, 1913)	—	*Pallenoides spinulosa* Stock, 1955	—
Anoplodactylus californicus Hall, 1912	—	*Anoplodactylus* aff. *virescens* (Hodge, 1864)	*Anoplodactylus californicus* Hall, 1912
Anoplodactylus erectus Cole, 1904	—	*Anoplodactylus simulator* Stock, 1975	—
Anoplodactylus reimerae Child, 1979	—	*Endeis mollis* (Carpenter, 1904)	—
Anoplodactylus typhlops Sars, 1888	—	*Pentapycnon geayi* Bouvier, 1911	—
Heteronymphon abyssale (Stock, 1968)	—	—	—

ACKOWLEDGEMENTS

We are most thankful to Ingo Wehrtmann who accepted the specimens for the Museo de Zoología, Universidad de Costa Rica and commented on an earlier version of this paper.

REFERENCES

NOTE: The references to older papers mentioned in the text and especially under the individual species headings lacking in this list may be found in the bibliographies of Child (1992) or Müller & Krapp (2009).

Arango, C.P. 2000. Three species of sea spiders (Pycnogonida) from Santa Marta, Colombian Caribbean. Boletín de Investigación Marina y Costera 29: 59-66.

Arango, C.P., Maxmen, A. 2006. Proboscis ornamentation as a diagnostic character for the *Anoplodactylus californicus-digitatus* complex (Arthropoda: Pycnogonida) with an example from the *Anoplodactylus* eroticus female. Zootaxa 1311: 51–64.

Bamber, R. N. 2009. Part 25 Sea-Spiders. Marine Biodiversity of Costa Rica, Central America. *In:* I. S. Wehrtmann, Cortés, J. (eds.). Dordrecht, Netherlands, Springer Science and Business Media B. V.: 307-311.

Bamber, R. N., Takahashi, Y. 2005. Some littoral sea spiders (Arthropoda: Pycnogonida) from Ecuador, with a new species of *Anoplodactylus* Wilson, 1878 (Phoxichilidiidae). Zootaxa 815: 1-8.

Child, C. A. 1978. Gynandromorphs of the pycnogonid *Anoplodactylus portus*. Zoological Journal of the Linnean Society London 63: 133-144.

Child, C. A. 1979. Shallow-water Pycnogonida of the Isthmus of Panama and the coasts of Middle America. Smithsonian Contributions to Zoology 293: V + 86.

Child, C. A. 1992. Shallow-water Pycnogonida of the Gulf of Mexico. Memoirs of the Hourglass Cruises 9: 1-86.

Child, C. A. 2009. Pycnogonida and Xiphosura (Cheliceriformes) of the Gulf of Mexico. Gulf of Mexico: origin, waters, and biota. D. L. Felder, Camp, David K., (eds.). Texas A & M University Press. 1, Biodiversity: 815-820.

Child, C. A., Nakamura, K. 1982. A gynandromorph of the Japanese pycnogonid *Anoplodactylus gestiens* (Ortmann). Proceedings of the biological Society Washington 95(2): 292-296.

Müller, H.-G., 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.

Stock, J. H. 1955. Papers from Dr. Th. Mortensen's Pacific Expedition 1914-1916. LXXVIII. Pycnogonida from the West Indies, Central America, and the Pacific coast of North America. Videnskabelige Meddelelser fra Dansk naturhistorisk Foreningen 117: 209-266.

Stock, J. H. 1965. Pycnogonida from the southwestern Indian Ocean. Beaufortia 13: 13-33.

Stock, J. H. 1968. Pycnogonida collected by the Galathea and Anton Bruun in the Indian and Pacific Oceans. Videnskabelige Meddelelser fra dansk naturhistorisk Forening 137: 7-65.

Stock, J. H. 1975. Biological results of the University of Miami Deep-sea Expeditions. 108. Pycnogonida from the continental shelf, slope, and deep sea of the tropical Atlantic and east Pacific. Bulletin of marine Science 24: 957-1092.

Stock, J. H. 1979. *Anoplodactylus ophiurophilus* n. sp., a sea spider associated with brittle stars in the Seychelles. Bijdragen tot de Dierkunde 48(2): 156-160.

Stock, J. H. 1986. Pycnogonida from the Caribbean and the Straits of Florida. Bulletin of marine Science 38: 399-441.