

Taxonomy and Systematics

A new fouling species of *Nymphon* (Arthropoda: Pycnogonida) from Bahía de La Paz, Gulf of California, Mexico

Una especie incrustante nueva de Nymphon (Arthropoda: Pycnogonida) de la bahía de La Paz, golfo de California, México

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Abstract

A new species of pycnogonid belonging to the genus *Nymphon* is described and illustrated from specimens collected at Bahía de La Paz (Gulf of California), where it is part of the dock fouling community. The new species is morphologically similar to *Nymphon littus*, both species can be separated based on the dentition of the oviger terminal claw, strigilis formula, the relative size of palp segments and chela ornamentation. An identification key for the species reported from the Eastern Pacific is included.

Keywords: Pycnogonid; Nymphonidae; *Nymphon childi*; Sea of Cortés; Sea spider; Fouling

Resumen

Se describe e ilustra una especie nueva de picnogónido perteneciente al género *Nymphon* a partir de especímenes recolectados en la bahía de La Paz (golfo de California), donde forma parte de la comunidad de incrustantes en andadores de muelles náuticos. La especie nueva es morfológicamente similar a *Nymphon littus*; ambas especies pueden distinguirse según la dentición de la uña terminal del ovígero, la fórmula de la strigilis, el tamaño relativo de los segmentos del palpo y la ornamentación de la quela. Se incluye una clave de identificación para las especies reportadas en el Pacífico oriental.

Palabras clave: Picnogónido; Nymphonidae; *Nymphon childi*; Mar de Cortés; Araña marina; Incrustantes

Introduction

Nymphon Fabricius, 1794 is the most diverse genus of the class Pycnogonida. Currently the genus includes 269 accepted species (Bamber et al., 2026) but a large number of species are poorly described, making difficult its study (Bamber, 1982; Takahashi et al., 2012). Four species of *Nymphon* have been recorded, so far, in Mexico (Munilla-León, 2002; de León-Espinosa et al., 2021; Ramírez-Tello et al., 2022): *N. apheles* Child, 1979, described from Panama City, reported also in Bahía de La Paz, Gulf of California (de León-Espinosa et al., 2021), *N. floridanum* Hedgpeth, 1948 described from Florida and reported in the Yucatán Channel (Stock, 1986); *N. lituus* Child, 1979 described from the northeastern Gulf of California, with records in the Pacific coast of Panama (Child, 1979), Ojo de Liebre Lagoon on the western coast of Baja California Peninsula (de León-Espinosa & de León-González, 2015), as well as Bahía Banderas, Nayarit (Villatoro-Ortiz & Salazar-Silva, 2022); and *N. pixellae* Scott, 1912 described from Vancouver, Canada and reported in the Gulf of California by Child (1979).

During a sampling effort carried out at public and private nautical marinas along the west coast of the Gulf of California, specimens of a new species of the genus *Nymphon* were collected inhabiting with the algae *Padina caulescens* Thivy, 1945, and the barnacles *Tetracita stalactifera* (Lamarck, 1818) fixed to floating docks not deeper than 0.50 m. Type material was deposited in the Colección Carcinológica de la Facultad de Ciencias Biológicas, Universidad Autónoma de Nuevo León (UANL-FCB-PYCNO).

Materials and methods

Samples of *Nymphon* were collected from 3 marine docks located in Bahía de La Paz, Baja California Sur, Mexico (La Paz, Palmira and Cantamar) (Fig. 1). Each encrusting faunal sample was obtained by scraping an area of 400 cm² (20 × 20 cm) located immediately below the sea surface from the edges of the platform and floating docks. The scraping of encrusted fauna was done with a carpenter's chisel or a spatula following a standard technique (Pech et al., 2023). The encrusted fauna detached from the dock were deposited in plastic bags (Ziploc®) labeled with the date, time and geographic location information for each collection site. The biological samples were later placed in a cooler with seawater obtained from the collection site to transfer to the processing site. At the processing site, specimens from each biological sample were identified and sorted in situ into large taxonomic groups. The pycnogonid

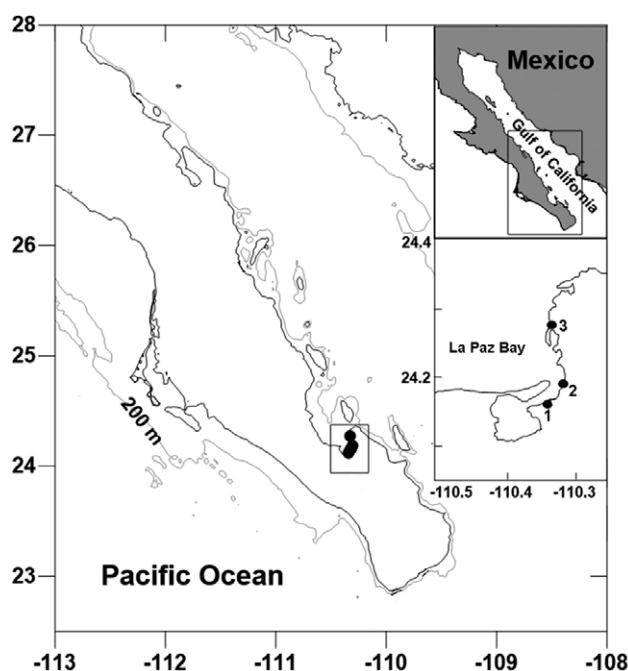


Figure 1. Area of study showing the marine docks located Bahía de La Paz, Gulf of California, Mexico: 1 = La Paz; 2 = Palmyra; 3 = Cantamar.

specimens, sorted from the encrusted fauna, were fixed with a 10% formaldehyde solution in 2 mL cryovials. The pycnogonids were then washed a week later with distilled water to remove the excess formalin and salt and then preserved in 70% non-denatured ethanol.

Morphological observations were conducted using a stereomicroscope Olympus SZ, and an Olympus BX51 microscope with differential interference contrast (DIC). The figure backgrounds were cleaned and lightened as necessary, and final figures were assembled on a plate using Paint Shop Pro7. Description of the species is based on the morphology of the holotype.

Description

Class Pycnogonida Latreille, 1810
 Order Pantopoda Gerstäcker, 1863
 Family Nymphonidae Wilson, 1878
 Genus *Nymphon* Fabricius, 1794

Type species: Nymphon grossipes (O. Fabricius, 1780)

Diagnosis. Trunk usually segmented and elongate. Lateral processes in general are well separated. Ocular tubercle is inserted at the posterior end of the cephalic segment. Abdomen is usually short. Proboscis variable in shape, cylindrical. Cheliphore robust, the scape formed by 1 segment, chelae complete and functional, fingers

are long and have teeth of various shape and size. Palps 5-segmented, first one always short; the second one usually longest. The 10-segmented ovigers are present in both sexes, with a strigilis formed by the last 4 segments. They have denticulate spines and usually a toothed terminal claw. Propodus is heelless, main claw usually has auxiliary claws of various sizes. Cement glands, when present, are only present in males and open on the ventral side of the femur.

Remarks

Nymphon the most diverse genus within Pycnogonida, early descriptions are very brief, and type materials are unavailable, making its study very difficult. Traditionally, its species have been placed in artificial groups; however, most species have not been able to be placed in such groups for study.

Nymphon childi sp. nov.

(Fig. 2)

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Description. Male holotype (UANL-FCB-PYCNO-0055), trunk slender, fully segmented, neck in front of oviger bases, half the width of trunk, 4.5 times longer than its width, cylindrical, widening in the form of a calyx, with pair of conical, short anterior projections (Fig. 2A, B); lateral processes between first and second pairs separated by 2 times their own diameters, second and third pairs separated by 2.5 times their own diameters, third and fourth pairs separated by their own diameters (Fig. 2A). Ocular tubercle as high as basal width, inserted between first pair of lateral processes and bases of ovigers, cone-shaped, with 2 small papilliform projections, with 2 pigmented pairs of eyes (Fig. 2A, B).

Proboscis cylindrical, longer than wide, horizontal to body (Fig. 2A, B), with 3 smooth lips.

Chelifore scape over-reaching proboscis, chela fingers curved inwards, crossing at tips, 20-21 needle-like teeth of uniform size on each finger, slender, longer than basal part, which is inflated and rectangular, with 5 median ventral spines and 3 large dorsal setae in a row at distal end, next to articulation with movable finger (Fig. 2C).

Abdomen narrowing distally, length over 2 times greatest width, as long as lateral processes of fourth pair of legs, elevated from body at an angle of about 30° (Fig. 2B).

Palps 5-segmented, first segment very short. Second segment longest, with 1 medio-dorsal seta and a large dorso-distal 1. Third segment about 2/3 length of segment 2 with line of 3 ventral setae and latero-distal one; with medio-dorsal small seta. Fourth segment 4.5 times as long as segment 1, with ventral row of 7 setae. Fifth segment

1.1 times as long as fourth segment, with 9 long ventral setae, medio-dorsal small seta, terminal end with cluster of 4 setae (Fig. 2D).

Oviger 10-segmented, inserted in distal half of first lateral processes (Fig. 2B). First 3 segments short, first segment half size of second one, second and third segments subequal. Fourth segment with dorsal seta and ventrodistal one. Fifth segment 1.6 times longer than fourth, with ventral row of 11 setae, dorsal surface bare. Sixth segment as long as first and second segments together, with ventral row of 14 setae. Last 4 segments compose the strigilis, armed with compound ovigerous leg spines, each with the following formula: 12: 7: 5: 8. Compound spines with 3-6 pairs of lateral teeth depending upon the size of the spine. Terminal claw long, curved, with 6 teeth (Fig. 2G). First segment of strigilis with transverse row of 4 distal setae, second one with 2 dorsal isolated setae and distal row with 4 setae, in both dorsal setae longest; third segment with 3 dorsal setae and group of 4 dorso-distal setae; fourth strigilis segment with row of 8 dorsal setae (Fig. 2F, G).

Third leg (Fig. 2E), coxa 1 short, without setae. Coxa 2, 3.3 times longer than coxa 1, with 3 ventral setae. Coxa 3 slightly longer than coxa 1, with row of 6 small ventral setae. Femur long, with 10 scattered ventral setae. Tibia 1 with row of 6 long median-dorsal chaetae and distal spine, ventral row of 10 smaller setae. Tibia 2, 1.3 longer than tibia 1, with row of 17 dorsal setae and 3 median and distal spines, 24 small ventral setae and 1 distal spine. Tarsus with dorsal row of 4 setae, and 7 ventral setae and distal spine. Propodus 2.2 times longer than tarsus, slightly curved, with dorsal row of 13 spines and setae, and row of 22 ventral setae. Main claw short, less than 1/4 length of propodus, auxiliary claws nearly as long as main claw.

Measurements of holotype (mm). Trunk length (frontal margin of cephalic segment to tip of fourth lateral process), 2.31; cephalon length, 1.04; width across 2nd lateral processes, 0.93; proboscis length, 0.53; proboscis greatest diameter, 0.22; abdomen length (lateral), 0.22. Palp: seg. 1, 0.05; seg. 2, 0.55; seg. 3, 0.44; seg. 4, 0.24; seg. 5, 0.25. Oviger: seg. 1, 0.13; seg. 2, 0.28; seg. 3, 0.28; seg. 4, 0.8; seg. 5, 1.3; seg. 6, 0.41; seg. 7, 0.3; seg. 8, 0.22; seg. 9, 0.13; seg. 10, 0.17; claw, 0.09. Third leg: coxa 1, 0.28; coxa 2, 0.87; coxa 3, 0.33; femur, 1.99; tibia 1, 2.5; tibia 2, 3.26; tarsus, 0.41; propodus, 0.81; claw, 0.25.

Female paratype (UANL-FCB-PYCNO-0056). Gonopores oval-shaped, present on ventrodistal end of coxa 2 in all leg pairs.

Taxonomic summary

Etymology. This species is named in honor of Dr. C. Allan Child (Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution,

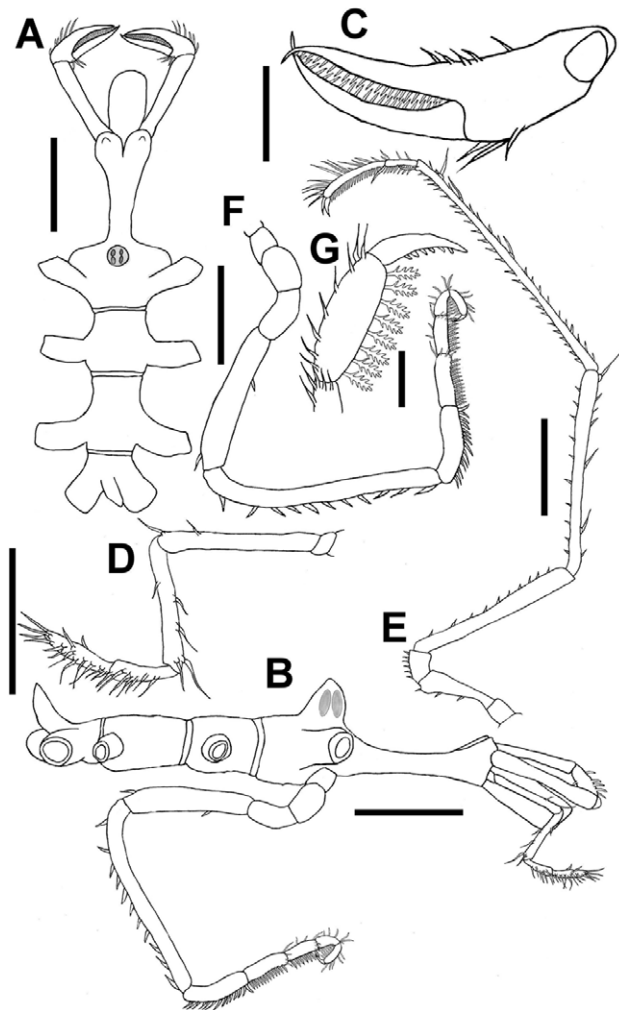


Figure 2. *Nymphon childi* sp. nov. Holotype. A) Trunk, dorsal view; B) trunk, lateral view; C) chela, lateral view; D) palp, lateral view; E) third leg, lateral view; F) oviger, lateral view; G) oviger, terminal end, lateral view. Scale bars: A, B, D, F = 0.5 mm; C, G = 0.1 mm; E = 1 mm

Washington) in recognition of his life dedicated to the study of Pycnogonida. The species-group name is a noun in the genitive case (ICZN 1999, Art. 31.1.2).

Type material. Holotype (1 male), (UANL-FCB-PYCNO-0055), paratypes (1 male and 4 females), (UANL-FCB-PYCNO-0056), Marina La Paz, La Paz, Baja California Sur, Mexico, 24°07'29.3" N, 110°20'47.3" W, 3 September 2013.

Additional material. One specimen (female), (UANL-FCB-PYCNO-0059), Marina La Paz, La Paz, Baja California Sur, Mexico, 24°07'29.3" N, 110°20'47.3" W, 14 August 2011. One specimen (male), (UANL-FCB-PYCNO-0057), Marina Palmira, La Paz, Baja California

Sur, Mexico, 24°11'05.3" N, 110°18'12.7" W, 3 April 2011; 10 specimens (male), (UANL-FCB-PYCNO-0058), same locality, 15 August 2011. Two specimens (1 male and 1 female), (UANL-FCB-PYCNO-0060), Marina Cantamar, La Paz, Baja California Sur, Mexico, 24°16'44" N, 110°19'49" W, 26 June 2017.

Remarks

From the current *Nymphon* species known in the world, 21 have been reported from both coasts of America, 10 of these from the Eastern Pacific: *N. aculeatum* Child, 1994 (California, Oregon); *N. apheles* Child, 1979 (Panama); *N. duospinum* (Hilton, 1942) (Alaska); *N. heterodenticulatum* Hedgpeth, 1941 (Santa Catalina Island, California); *N. hirsutum* Child, 1995 (Bering Sea); *N. lituus* Child, 1979 (Gulf of California and Panama); *N. longicollum* Hoek, 1881 (Chile); *N. pixellae* Scott, 1912 (Vancouver, Oregon, Gulf of California); *P. simulare* Child, 1992 (Ecuador) and *N. stipulum* Child, 1990 (California).

Nymphon childi sp. nov. is morphologically similar to *N. lituus* Child, 1979 and *N. simulare* Child, 1992, all have a slender body, the third metamere of the body is longer than wide, the neck is 4 or more times longer than wide, and the tarsus is less than 50% of the length of the propodus. *Nymphon childi* sp. nov. differ from these species in the following characteristics: 1) the anterior tubercle over insertion of chelifores, conical in *N. childi* sp. nov., and as low anteriorly curved tubercle in *N. lituus*, *N. simulare* does not present anterior tubercles; 2) strigilis formula, of 12: 7: 5: 8 in *N. childi* sp. nov., 15: 10: 10: 11 in *N. littus*, and 11:10:10:10 in *N. simulare*; 3) second segment of the palp is shorter than third and fourth together in *N. childi* sp. nov. and *N. simulare*, and slightly longer in *N. littus*; 4) third segment of the palp is 1.5 times longer than the fifth in *N. childi* sp. nov. and *N. simulare* and subequal to the fifth 1 in *N. littus* sp. nov.; 5) chela fingers, with 23 teeth in both chelae in *N. childi* sp. nov, immovable finger has 29 teeth, movable finger with 33 teeth in *N. littus*, and 27-28 teeth in *N. simulare*.

Another closer species to *Nymphon childi* sp. nov. is *N. heterodenticulatum*, both have the same structural body plan, proboscis horizontal to body, with a long cylindrical neck longer than wide ending in a structure with calyx shape, similar lateral processes separation, and abdomen shape. However, *N. heterodenticulatum* presents the ocular tubercle sharply pointed, ending in a cone shaped structure, chelifores with slender chela, fixed finger with 17 teeth, movable finger with 19 teeth; oviger with strigilis with a formula of 9: 9: 7: 7.

This species is currently known only from the type locality: Bahía de La Paz, Baja California Sur, Mexico, attached to dock fouling not deeper than 0.5 m.

Key to *Nymphon* species from Eastern Pacific

- 1 Tarsus longer than propodus..... 2
- Tarsus shorter than propodus 4
- 2 Ocular tubercle well developed; auxiliary claw present; fourth and fifth segment of palp equal in size..... 3
- Ocular tubercle and eyes lacking; auxiliary claws absent; fourth segment of palp shorter than the fifth one
..... *N. aculeatum* Child, 1994 (California)
- 3 Auxiliary claws less than half the length of the main claw; strigilis of oviger as follow 20:9:14:12; terminal claw of oviger with 15-17 teeth; movable finger of chela with 35 thin teeth; immovable finger with 20 teeth
..... *N. pixellae* Scott, 1912 (Vancouver, Canada)
- Auxiliary claws slightly longer than the main claw; strigilis of oviger as follow 10: 9: 8: 10; terminal claw of oviger with 8 teeth; movable finger of chela with 19 teeth; immovable finger with 17 teeth
..... *N. heterodenticulatum* Hedgepeth, 1941 (Santa Catalina Island, California)
- 4 Short neck, less than twice own width..... 5
- Long neck, more than twice own width 7
- 5 Auxiliary claws less than half the length of the main claw; cheliphore with long and thin scape 6
- Auxiliary claws longer than half the length of the main claw; cheliphore with short and robust scape
..... *N. apheles* Child, 1979 (Panama)
- 6 Palp with third segment longer than second one, with a group of long distal chaetae; tarsus longer than half the size of the propodus..... *N. stipulum* Child, 1990 (California)
- Palp with third segment shorter than second one, with short chaetae along surface; tarsus shorter than half the size of the propodus..... *N. duospinum* (Hilton, 1942) (Alaska)
- 7 Auxiliary claws thin and small, less than ¼ the size of the main claw; chelae with few teeth on both fingers, movable finger with 8 teeth, immovable finger with 5 teeth..... *N. longicollum* Hoek, 1881 (Chile)
- Auxiliary claws equal to, or longer than half the size of the terminal claw 8
- 8 Fingers of the chelae shorter than palm, movable finger with 34 teeth, immovable finger with 26 teeth; oviger with strigilis as follow 11: 6: 6: 6; oviger claw with 20 teeth..... *N. hirsutum* Child, 1995 (Bering Sea)
- Fingers of the chelae longer than palm..... 9
- 9 Oviger with strigilis as follow 12: 7: 5: 8; movable finger of chelae with 20 teeth, immovable finger with 20-21 teeth..... *N. childi* sp. nov. (Bahía de La Paz, Gulf of California)
- Last 3 segments of the strigilis with 10 or more compound spines; chelae fingers with more than 20 teeth each ... 10
- 10 Third segment of the palp similar in size of the second one; distal end of neck without distal tubercles.....
..... *N. simulare* Child, 1992. (El Viejo Island, Ecuador)
- Third segment of the palp ½ the size of the second one; distal end of neck with anteriorly curved low tubercle over insertion of chelifores..... *N. lituus* Child, 1979 (Puerto Peñasco, Gulf of California)

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