



Article

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Rediscovery, hosts and systematics of *Holothuriophilus trapeziformis* Nauck, 1880 (Crustacea, Brachyura, Pinnotheridae)

ERNESTO CAMPOS^{1,4}, VÍCTOR ARTURO PELÁEZ-ZÁRATE² & FRANCISCO A. SOLÍS-MARÍN³

¹Facultad de Ciencias, Universidad Autónoma de Baja California, Apartado Postal 296, Ensenada, 22800 Baja California, México (Email: ecampos@uabc.edu.mx)

²Facultad de Ciencias del Mar, Universidad Autónoma de Sinaloa, Paseo Claussen S/N. C.P. 82000. Mazatlán, Sinaloa, México (Email: arthurpelaez@live.com.mx)

³Laboratorio de Sistemática y Ecología de Equinodermos, Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México. Apdo. Post. 70–305, México, D.F. 04510 (Email: fasolis@emar.unam.mx)

⁴Corresponding author

Abstract

The type species of *Holothuriophilus* Nauck, 1880, *H. trapeziformis* Nauck, 1880 is rediscovered in the type locality, Mazatlán, Sinaloa, Mexico and in a new locality, Zihuatanejo Bay, Guerrero, Mexico. The generic diagnostic features include a smooth, transversally elongated carapace, that is broader than long, widest portion anterior to middle portion and with a cristate anterolateral margin; basal antennal article lacking a conical protuberance; third maxilliped with fused ischium and merus, spoon-shaped dactyl larger than subtrapezoidal propodus which is subequal in length to the carpus; abdomen with six somites and free telson. Hosts recorded for *H. trapeziformis* include the holothurids *Holothuria inornata* Semper, 1868, *H. lubrica* Selenka, 1867 and *H. kefersteini* Selenka, 1867 (= *Paraholothuria riojai* Caso, 1964), however, only the former is herein confirmed. *Holothuriophilus trapeziformis* can be separated from its eastern Pacific congener *H. pacificus* (Poepfig, 1836) because the fingers of the chela meet when closed instead of leaving a gape as in the latter species.

Resumen

La especie tipo de *Holothuriophilus* Nauck, 1880, *H. trapeziformis* Nauck, 1880, fue redescubierta en la localidad tipo, Mazatlán, Sinaloa y en una nueva localidad, Zihuatanejo, Guerrero, México. Las características diagnósticas incluyen: caparazón transversalmente alargado, más ancho que largo, su mayor amplitud anterior a la parte media, liso, y con el margen anterolateral cristado; artejo basal de la antena carece de una protuberancia cónica; tercer maxilipedio con el isquio y mero fusionado, dactilo de forma acucharado, más largo que el subtrapezoidal propodio el cual es subigual en longitud al carpo, y el abdomen de seis somitos y telson libre. Los huéspedes registrados para esta especie incluyen a *Holothuria inornata* Semper, 1868, *H. lubrica* Selenka, 1867 y *H. kefersteini* Selenka, 1867 (= *Paraholothuria riojai* Caso, 1964), pero sólo la primer especie es aquí confirmada. *Holothuriophilus trapeziformis* puede ser separado de su congénere del Pacífico oriental, *H. pacificus* (Poepfig, 1836), debido a que los dedos de la quela se juntan al cerrarse en vez de dejar una abertura como en la última especie.

Key words: Decapoda, Crustacea, Brachyura, Pinnotheridae, *Holothuriophilus*, taxonomy, hosts, distribution

Introduction

Ongoing studies on the systematics of holothurid-dwelling pinnotherid crabs in the tropical Mexican Pacific prompted us to examine the species of *Holothuria* Linnaeus, 1758 deposited in the Colección Nacional de Equinodermos of the Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México. The holothurid species studied included *H. kefersteini* Selenka, 1867 (= *Paraholothuria riojai* Caso, 1964), *H. inornata* Semper, 1868 and *H. lubrica* Selenka, 1867. Taxonomy of the holothurid species has been based on Solís-Marín *et*

al. (2009). The study produced only one species of pinnotherid crab, which concurred well with *Holothuriophilus trapeziformis* Nauck, 1880 (see Ahyong & Ng 2007). In this paper the diagnosis provided by Ahyong & Ng (2007) for this species is revised and its geographic distribution and host are updated.

Material and Methods

Preserved specimens of *Holothuria* spp., deposited in the Colección Nacional de Equinodermos, U.N.A.M., were radiographed to reveal the presence of crabs. Those infested were dissected and crabs were extracted from different parts of the inner organs: cloaca, anterior parts of the respiratory trees and the posterior part of the digestive tract. The second author kept alive in aquaria, several specimens of *H. (?) lubrica* Selenka, 1867, from the rocky intertidal of Mazatlán, Sinaloa, Mexico. Some crabs left the living host and were collected crawling on the external surface of the holothuroid. This material was fixed in formaldehyde 10%, preserved in ethanol 80% and voucher specimens deposited in the Laboratorio de Sistemática de Invertebrados at the Universidad Autónoma de Baja California. Photos were taken with a stereoscopic microscope Leica MZ-12. equipped with a digital camera Leica DC200 and drawings were made with the aid of a camera lucida. Editing of photos and drawings was performed using Adobe Illustrator CS and Adobe Photoshop CS. The description follows the terminology of Ahyong & Ng (2007). Abbreviations used: lc, length of carapace; wc, width of carapace.

Systematics

Order Decapoda Latreille, 1802

Infraorder Brachyura Linnaeus, 1758

Section Eubrachyura de Saint Laurent, 1980

Family Pinnotheridae De Haan, 1833

Genus *Holothuriophilus* Nauck, 1880

Holothuriophilus trapeziformis Nauck, 1880

(Figs. 1A, B, 2A–D)

Holothuriophilus trapeziformis Nauck 1880: 24, 66; De Man 1887: 721–722; Takeda & Masahito 2000: 103; Ng & Manning 2003: 903, 916–918, fig. 7C–F (lectotype); Ahyong & Ng 2007: 213–214 (lectotype); Ng *et al.* 2008: 249 (list).

Pinnixa banharti—Caso 1958: 329; 1964: 379 (not *P. banharti* Rathbun 1918); Campos *et al.* 1998: 337.

Holothuriophilus sp.—Campos *et al.* 1998: 337.

Pinnotheres trapeziformis—Bürger 1895: 380–381, pl. 9: fig. 26, pl. 10, fig. 25; Adensamer 1897: 107; Tesch 1918: 285 (list); Garth 1948: 55; Silas & Alagarswami 1967: 1211, 1216, 1221 (list); Balss 1956: 1417; Schmitt *et al.* 1973: 5, 13, 89.

Diagnosis. Female: Carapace transversally elongated, widest anterior to middle portion, broader than long, thin but firm exoskeleton, almost smooth, anterolateral margin cristate; front below postfrontal ridge, deflexed, emarginated, its margin scarcely visible in dorsal view. Third maxilliped with ischium merus indistinguishably fused, palp 3-segmented; carpus subequal in length to subtrapezoidal propodus, spoon-shaped dactylus articulated on medial ventral third of propodus; tip of dactylus slightly overreaching tip of propodus; exopod with one-segment flagellum. Cheliped merus, carpus densely setose; propodus setose on inner distal margin; propodus, dactylus almost meeting when closed. Walking legs robust, similar in shape, segments compressed, carpi, propodi subequal; dactili shorter than preceding articles, similar and subequal, last pair shorter than preceding. Abdomen with 6 somites plus free telson.

Male. Unknown.

Material examined and host. Three females, Punta Tiburón, Mazatlán, Sinaloa, Mexico, rocky intertidal, June 29, 2010, in *Holothuria lubrica* Selenka, 1867; 3 females, same locality, in *H. inornata* Semper, 1868; 1 female, Ixtapa, Zihuatanejo Bay, Guerrero, Mexico, January 7, 1968 in *H. kefersteini* Selenka, 1867 (= *Paraholothuria riojai* Caso, 1964); 1 female, same locality, March, 1982, in *H. inornata* Semper, 1868.

The names of the hosts herein recorded were transcribed from each sample's label. Because the taxonomic confusion of the species *Holothuria* in the Mexican Pacific (see, Solís-Marín *et al.* 2009) the identities of the hosts need to be confirmed. *Holothuria inornata* is the only host confirmed by us.

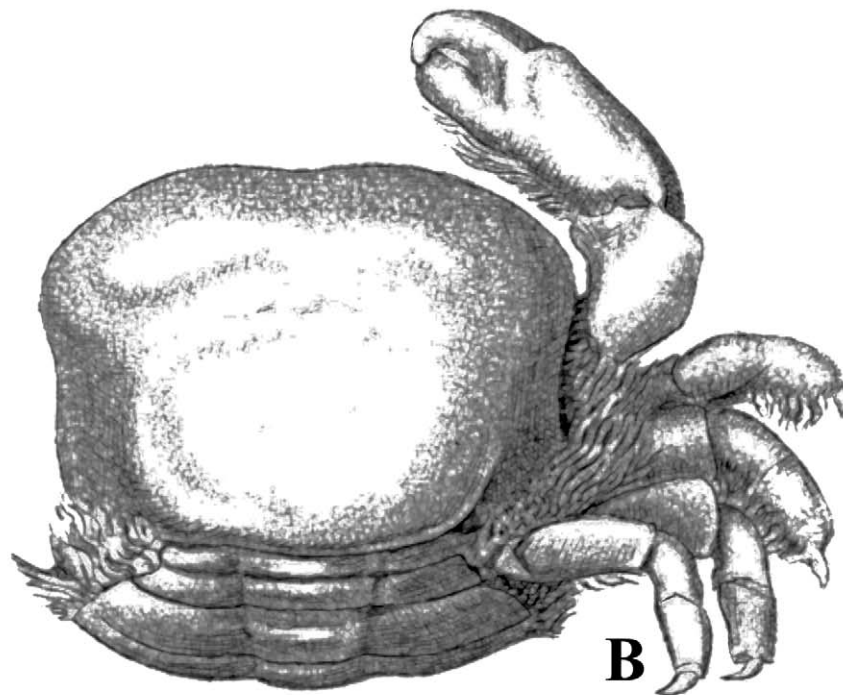
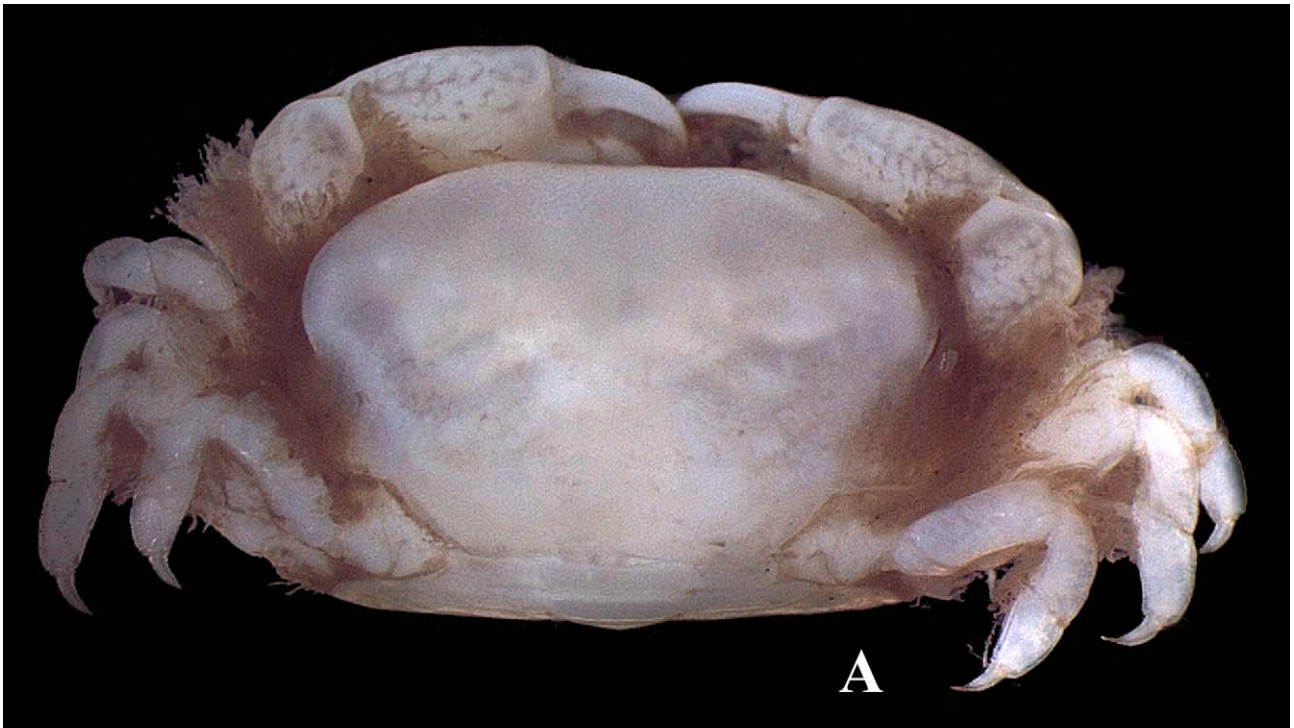


FIGURE 1. *Holothuriophilus trapeziformis* (Nauck, 1880). A, ovigerous female, dorsal view, from Mazatlán, Sinaloa, Mexico in *Holothuria inornata* Semper, 1868; B, Female, unknown type locality, presumably from Mazatlán, Mexico. B after Bürger (1895:pl. 9, fig. 26).

Measurements of the type material in millimeters (wc x lc). Female on which the original description was based (lost), 13.8 x 10.5 (after De Mann 1887); 14 x 10 (after Bürger 1895). We consider that both of these authors described the same female and that the minor differences in size is the result of the accuracy of the measurements. Male specimen from Mazatlán measure 8.5 x 5.0 (after Bürger 1895). The female lectotype, SMF-ZMG 170 (Go565a), selected by Ng & Manning, 2003, measuring 7.7 x 4.8, is probably Bürger's specimen, erroneously identified as a male by him (see below).

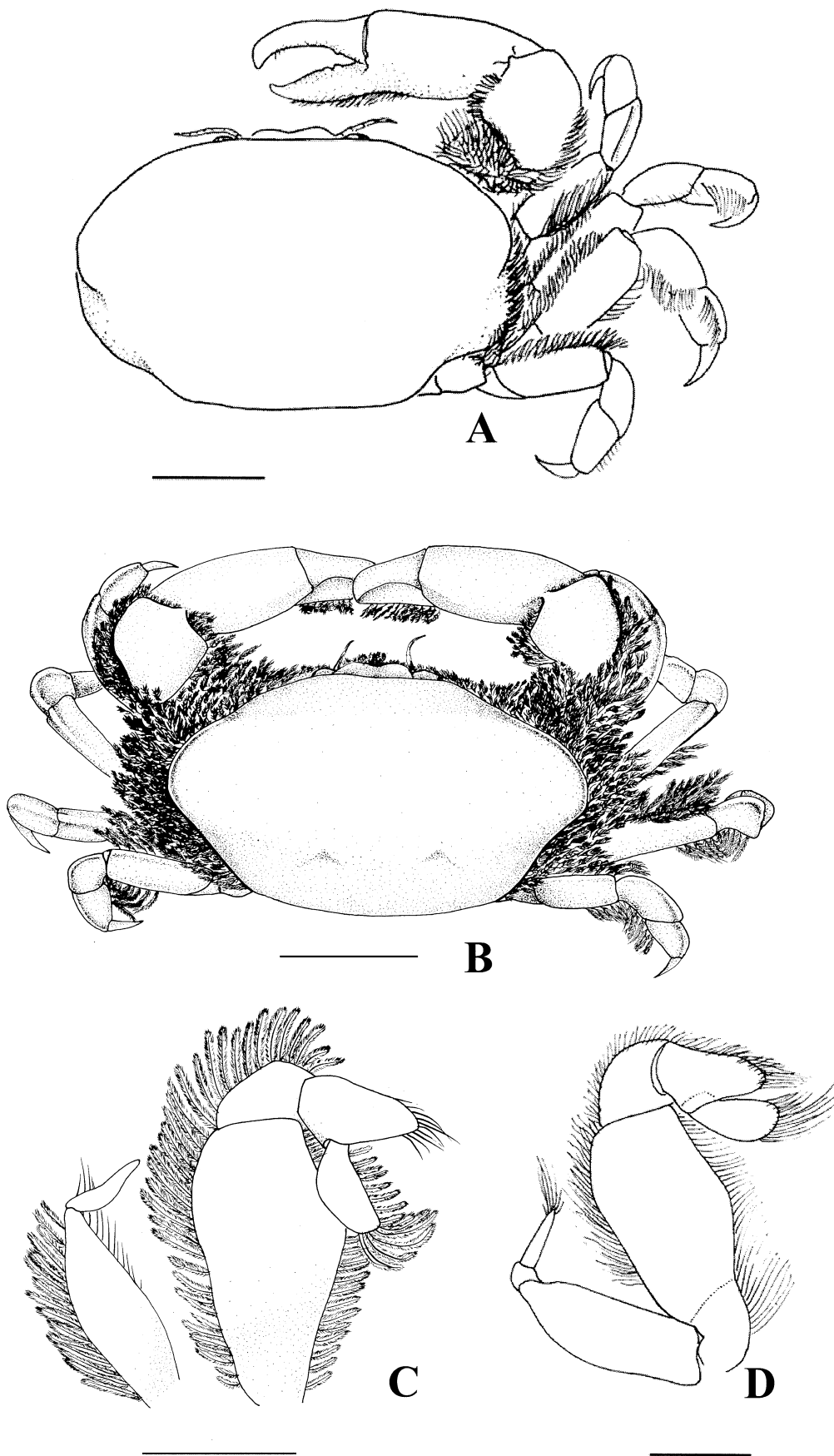


FIGURE 2 *Holothurioplus trapeziformis* (Nauck, 1880. A, D, SMF-ZMG 170, female lectotype, dorsal view (7.7 × 4.8 mm) and third maxilliped, Mazatlán, Sinaloa, Mexico; B–C, female, dorsal view, Zihuatanejo Bay, Guerrero. A, D after Ahyong & Ng (2007, Fig 20). Scale bars: A= 2.0 mm; B= 3.0 mm; C= 1 mm; D= 0.5 mm.

Type locality and host. Unknown in *Holothuria maxima* Semper (after Nauck 1880); Mazatlán, Sinaloa, Mexico, from the cloaca of a *H. inornata* Semper (after Bürger 1885).

Remarks. According with Nauck (1880) the ovigerous female on which the original description was based (Fig. 1B, lost) was collected in an unknown locality in *Holothuria maxima*. Bürger (1985) redescribed this female and pointed out that a second specimen, not yet described, is much smaller than the ovigerous female and is a male (not a female as pointed out by Ng & Manning 2003: 917), collected by Semper in Mazatlan (Sinaloa, Mexico), in *H. inornata*. Regarding the host recorded by Nauck (1880) for this species, *H. maxima* Semper, it is important to point out that Semper did not describe *H. maxima* Delle Chiaje, 1823, which actually is a junior synonym of *H. tubulosa* Gmelin, 1791, a species that is found in the northwest Atlantic (Hansson 2001). Because the identity of the *H. maxima*, erroneously allocated to Semper by Nauck, cannot be established, all the geographical and ecological information for the described crab female is uncertain. Even so, in the absence of additional data, we are assuming that this lost female, along with the female lectotype selected by Ah Yong & Ng (2003), were collected in *H. inornata* in Mazatlán, Sinaloa.

Taxonomic and host records for *Holothuriophilus trapeziformis*. Nauck (1880: 24, 66) described *H. trapeziformis* very briefly and did not state the location or sex, only stating that it was a “parasite in *Holothuria maxima* Semper”. De Man (1887: 721–722) who re-examined Nauck’s material, commented on the affinities of the species and noted he had one female specimen measuring 13.8 x 10.5 mm. He also did not indicate where it was collected. Bürger (1895) was the first to describe and to figure this female in more detail and for the first time he recorded a second specimen assigned to this species from “Mazatlan” collected in *Holothuria inornata*. He also commented that this second specimen was a male which was not yet described (“*Ein zweites, noch nicht beschriebenes Exemplar ist viel kleiner als das vorige und ein ♂*”) and measuring 8.5 x 5.0 mm (Bürger 1895: 381). Assuming Nauck’s material included several specimens, it is clear that he did not select a holotype, and as such, all the presumed material he examined when he named the species (1880) would be syntypes (Article 72.1.1 of the 1999 ICZN Code). Ng & Manning (2003) checked on the possible depositories of Nauck’s material and indicated it was in the Senckenberg Museum (SMF) (where the bulk of the Göttingen University collections, where Nauck originally gave his specimens, are currently deposited), Zoologisches Museum, Museum für Naturkunde, Humboldt Universität, Berlin, and the U.S. National Museum of Natural History (USNM). In the case of *Holothuriophilus trapeziformis*, there is only one Nauck specimen that still is extant. Ng & Manning (2003) observed this and selected this female specimen as the lectotype of *Holothuriophilus trapeziformis* Nauck, 1880 (see also Ah Yong & Ng 2007). In this context, the “male” specimen (8.5 x 5.0 mm) mentioned by Bürger (1895) is likely to be the same specimen as the lectotype female (7.7 x 4.8 mm) designated by Ng & Manning (2003). The two sets of measurements are very close and can easily be accounted by the poor current state of the soft lectotype female specimen, which looks to have suffered from shrinkage. Bürger (1895) indication that this was a male is probably a lapsus. Two species are currently included in *Holothuriophilus* in the eastern Pacific, its type species, *H. trapeziformis* and *H. pacificus* (Poepfig, 1836) (= *Pinnotheres silvestri* Nobili, 1901= *Pinnaxodes meinerti* Rathbun, 1904) (Nauck 1880; Garth 1958; Manning 1993). Females of both species are morphologically very similar sharing transversally elongated carapace (Fig. 1A–B) that is broader than long, widest anterior to the middle portion, smooth; a spoon-shaped third maxilliped dactyl (Fig. 2C–D) that is larger than the propodus; and a large carpus more robust than the propodus (Fig., 1 and 2). They can be separated because the fingers of the chela of *H. trapeziformis* meet when closed, instead of leaving a gape in *H. pacificus* (Rathbun 1918: 178). Two other species have also been included in the genus, *H. mutuensis* (Sakai, 1939), from Amori Bay, northern Japan, and *H. tomentosus* (Ortmann, 1894), from the West Atlantic, (Takeda & Masahito 2000; de Melo 2004). The taxonomy and systematics of these species is currently being studied by the first author and will be published elsewhere.

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