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Taxonomy and systematics

A new species of *Pangaeus* (Hemiptera: Heteroptera: Cydnidae: Cydninae), with new records of the genus for Mexico

Especie nueva de Pangaeus *(Hemiptera: Heteroptera: Cydnidae: Cydninae), con nuevos registros del género para México*

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Abstract

A new species of *Pangaeus* Stål (Hemiptera: Cydnidae) from Chiapas: *P.* (*Pangaeus*) *cervantesi* sp. nov., is described and illustrated. New records for Mexico for the following species are also provided: *P.* (*Pangaeus*) *docilis* (Walker), *P.* (*Pangaeus*) *moestus* (Stal), *Pangaeus* (*Homaloporus*) *punctilinea* (Froeschner), and *P.* (*Pangaeus*) *quinquespinosus* (Froeschner). A list of the species of *Pangaeus* that have been recorded for Mexico is provided. A key to the Mexican species of *Pangaeus* is also given.
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Keywords: Burrowing bugs; Biodiversity; Dicotomic key; Chiapas

Resumen

Se describe e ilustra una nueva especie de *Pangaeus* Stål. (Hemiptera: Heteroptera) de Chiapas: *P.* (*Pangaeus*) *cervantesi* sp. nov. Se incluyen nuevos registros para México de las especies *P.* (*Pangaeus*) *docilis* (Walker) *P.* (*Pangaeus*) *moestus* Stål, *P.* (*Homaloporus*) *punctilinea* Froeschner y *P.* (*Pangaeus*) *quinquespinosus* Froeschner. Se proporciona una lista de las especies de *Pangaeus* que se han registrado en México y se presenta también una clave para la identificación de las mismas.
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Palabras clave: Insectos enterradores; Biodiversidad; Clave dicotómica; Chiapas

Introduction

The genus *Pangaeus* Stål was described by Stål (1862) based on one described species from Mexico, *P. piceatus*. In his revision of the genus, Froeschner (1960) recognized 23 species distributed from southern Canada to Argentina, and divided them into 2 subgenera: *Homaloporus* and *Pangaeus*. This genus can be distinguished from other members of the subfamily Cydninae by the presence of an impressed subapical line, which extends from side to side on the anterior margin of the pronotum (Froeschner, 1960).

The subgenus *Homaloporus* contains 6 species and occurs from Guatemala to Canada. Species of this subgenus have the mesopleural evaporatorium limited and separated from the posterolateral angle, and the posterior margin of the sclerite with a polished area (Froeschner, 1960). The subgenus *Pangaeus*, on the other hand, has 17 recognized species, and is distributed from Northern Mexico to Guatemala. Members of this subgenus are characterized by having the mesopleural evaporatorium extending and uninterrumped along the posterior margin of the sclerite into a posterolateral angle (Froeschner, 1960).

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Eight species have so far been recorded for the Mexican territory (Froeschner, 1960): *P.* (*Homaloporus*) *bilineatus* (Say), *P.* (*Homaloporus*) *congruus* (Uhler), *P.* (*Homaloporus*) *rugiceps* Horvath, *P.* (*Pangaeus*) *setosus* Froeschner, *P.* (*Pangaeus*) *tuberculipes* Froeschner, *P.* (*Pangaeus*) *impressus* Froeschner, *P.* (*Pangaeus*) *piceatus* Stål, *P.* (*Pangaeus*) *serripes* (Westwood). More recently, Mayorga (2002) only reported the presence of 7 species because she was not able to examine specimens of *P. congruous.*

The 2 studies mentioned above are the only taxonomic works that have been carried out for Mexican species of *Pangaeus*, and therefore, its actual number of species is expected to be higher for this country. In this work, we describe and illustrate a new species of *Pangaeus*, *P.* (*P.*) *cervantesi*, from Chiapas. We also report 5 new records for Mexico for the following species: *P.* (*H.*) *punctilinea*, *P.* (*P.*) *docilis*, *P.* (*P.*) *moestus*, and *P.* (*P.*) *quinquespinosus.*

Material and methods

Specimens examined were obtained from the following collections: Colección Nacional de Insectos, Universidad Nacional Autónoma de Mexico, Mexico City (CNIN); Colección Entomológica, Instituto de Ecología, A.C., Xalapa, Veracruz (IEXA), and Colección de Insectos asociados a plantas cultivadas en la Frontera Sur (ECOTAPE). More than 98 specimens were revised. Illustrations were made using a drawing tube device for a microscope Zeiss SV8. Measurements are given in millimeters ± SD and the number of individuals (*n*) is specified for each sex. The description of the new species is first presented followed by the new Mexican records of species from the genus organized alphabetically by subgenus.

Description

Pangaeus cervantesi sp. nov.

Material examined: holotype. Male. México, Chiapas, Unión de Juarez, Chiquihuite; 26-29-X-2007; J. García, D Chamé; Cloud forest (CNIN). Paratypes. Same data as holotype, 2♂, 3♀ (CNIN, ECOTAPE).

Diagnosis. This species is mainly distinguished by having the anterior third of the corial margin emarginated and slightly elevated (not present in the remaining species of *Pangaeus* recorded for Mexico). *Pangaeus cervantesi* sp. nov., also has the head with the apical third expanded and the middle basal area convex (semicircular, triangular and flat in the remaining species). The new species is morphologically similar to *P. bilineatus* and *P. rugiceps*. These 3 species have similar anterolateral margins of pronotum. However, *P cervantesi* sp. nov. has the margin of the anterior third emarginated slightly elevated and the hind tibiae without sub-basal angulation (as it could be observed as well in *P. rugiceps* and *P. bilineatus*).

Body oval, dorsally less convex than ventrally. Coloration: head, pronotum, pro-, meso-, and metapleura, scutellum, femora of all legs, meso- and metatibiae, abdomen, antennal segments I, II, and basal half of III dark brown; apical half of antennal segment III, IV, and V, rostral segments I–IV, protibiae, and hemelytra pale brown. Head wider than long; tylus as long as juga; eyes large and slightly elongate; ocelli small; 5 antennal segments, first one the shortest and V the longest; buccula as high as rostral segment II; rostrum reaching middle of mesocoxae. Thorax: pronotum. Anterior margin concave; dorsally less convex than ventrally; transverse impression just apparent; anterior lobe without punctures; posterior lobe flat and smooth, anterolateral margins with a fine carina and with margin entire. Propleura shiny; mesopleura with evaporatorium reaching anterolateral margin of pleura; metapleura with evaporatorium extended through all pleura; but not reaching lateral margin; osteolar peritreme elongate with apex abruptly terminated. Legs: fore tibiae flat with 9 spines on dorsal margin, hind tibia without sub-basal angulation, and with 5 spines on postero-ventral margin. Scutellum longer than wide, with fine punctures distributed uniformly. Hemelytra with anterior third of margin emarginate and slightly elevated; costa with 2 setigerous punctures; corial surface with scattered punctures; clavus without punctures; hemelytral membrane hyaline, reaching apex of abdomen. Abdomen: ventrally convex, and smooth (Fig. 1).

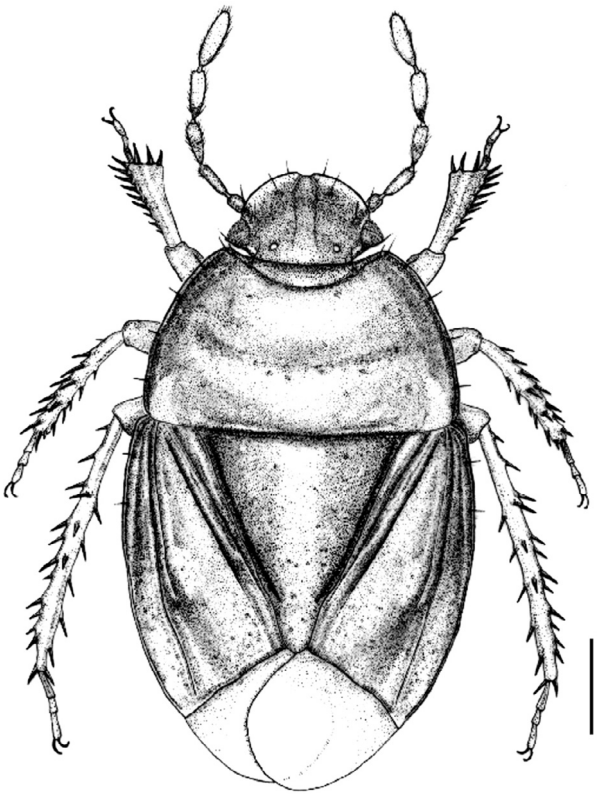

Figure 1. Holotype of *Pangaeus* (*Pangaeus*) *cervantesi* sp. n. (scale = 1 mm).

Male genitalia: parameres short, with dorsal and ventral margins entire (Fig. 2), apical margin slightly bifurcate, with numerous setigerous punctures (Fig. 2).

Male: measurements (*n* = 3). Body length 6.28 ± 0.1; head length 0.9 ± 0.07; width across eyes 1.5 ± 0.08; interocular distance 1.0 ± 0.08; interocellar distance 0.5 ± 0.04; antennal segments: I 0.3, II 0.38, III 0.43 ± 0.08, IV 0.62 ± 0.04; V 0.76; rostral segments: I 0.73 ± 0.04, II 0.78 ± 0.08, III 0.75 ± 0.07,

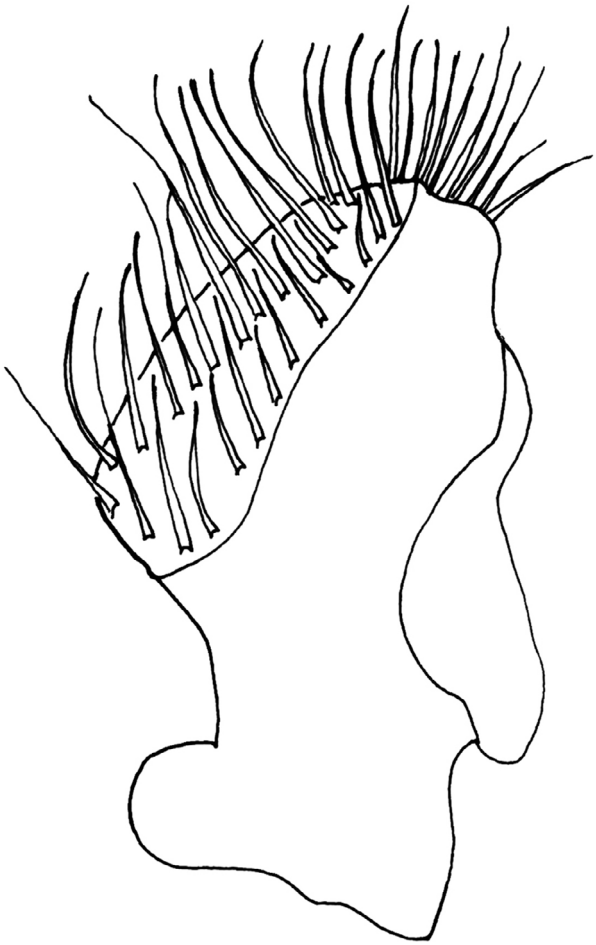

Figure 2. Paramere of *Pangaeus* (*Pangaeus*) *cervantesi* sp. nov., lateral view.

IV 0.47 ± 0.04; pronotum: length 1.69 ± 0.08, width across frontal margin 1.64 ± 0.04, width across humeral angles 3.1 ± 0.3; scutellum: length 2.25 ± 0.04, width 1.94 ± 0.04; hind leg: femur length 2.02 ± 0.1, tibia length 2.63 ± 0.35, length of tarsal segments: I 0.3, II 0.15, III 0.34.

Female: measurements ($n = 2$). Body length 6.38 ± 0.21; head length 0.83; width across eyes 1.5 ± 0.04; interocular distance 1.02 ± 0.05; interocellar distance 0.49 ± 0.05; antennal segments: I 0.3, II 0.38, III 0.45, IV 0.562 ± 0.04; V 0.76; rostral segments: I 0.72 ± 0.05, II 0.76 ± 0.1, III 0.76, IV 0.49 ± 0.05; pronotum: length 1.6 ± 0.02, width across frontal margin 1.66 ± 0.1, width across humeral angles 3.19 ± 0.2; scutellum: length 2.31 ± 0.04, width 1.82 ± 0.11; hind leg: femur length 1.86 ± 0.05, tibia length 2.39 ± 0.15, length of tarsal segments: I 0.38, II 0.15, III 0.34 ± 0.08.

Etymology: the name *cervantesi* is in honor to the late Dr. Luis Cervantes Peredo, a passionate Mexican researcher involved in the study of Hemiptera-Heteroptera.

Distribution: this species is only known from Chiapas, Mexico (Table 1).

Pangaeus (Homaloporus) punctilinea

Material examined: Mexico: Baja California Sur, 1 ♂ 1♀, La Paz, San Bartolo 360 m asl, 07-X-2010, 23°44′09″ N, 109°50′36″ W, matorral xerófilo, C. Mayorga, L. Cervantes, cols. (Table 1).

Comments: this species was previously reported for Texas, USA. This species represents a new record for Mexico, and was collected in a single locality in Baja California Sur at 360 m., where it was sympatric with *P.* (*H.*) *bilineatus* in the soil, under herbaceous vegetation.

Pangaeus (Pangaeus)docilis

Material examined: Mexico: Campeche, 1 ♂, Grutas X Tacumbilxuna'an, 20-VI-1989, A. Cadena L. Cervantes, cols.; Chiapas, Nahá. 980 m asl, 16.96345°N 91.59341W, 9-VI-2008, Proyecto LLAMA, col.; Chiapas, 1♂, Sierra Morena. 1360 m asl, 16.15.950°N, 93.60530°W, 12-VI-2008, Proyecto LLAMA, col.; Chiapas, 1♂, Playon de la Gloria 167.15919°N, 90.90178°, 1600 m asl, 24-VI-2008, Proyecto LLAMA, col.; Chiapas, 2 ♂ 2♀, Ixta-Comitán Rio Blanco, 10-12-1985, F. Arias, L. Cervantes, R. Barba, cols.; Chiapas, 2 ♂ Comitán 6-IV-1979, E. Barrera, col.; Chiapas, 1♀, Pueblo Nuevo Soluchistan, 1772 m asl, 25-VI-2007, 17°11′50″ N, 92°55′27″ W, bosque pino –encino, G. Ortega, L. Cervantes, C. Mayorga, cols.; Chiapas, 1♀, 8 Km. Salto de Oaxaca 17.5124° N, 92.29442° W, 14-VI-2008, Proyecto LLAMA, col.; Chiapas, 1 ♀, Tuxtla Gutiérrez, el Chorreadero, 13-III-1995, G. Ortega, E. Barrera, cols.; Chiapas, 1 ♂, El Vergel 200 m asl, XI-1939, D. Pelaez, col.; Oaxaca, 1 ♂, San Mateo Yetla, 27-V-1990, E. Barrera, A. Cadena, cols.; Oaxaca, 1♀, Sta Rosa, 22-IV-1983, M. García, col.; Puebla, 1♂ 2 ♀, Km. 10 Carr. Xicotepec Patla, 2-VII-1994, G. Ortega, E. Barrera, col.; Veracruz, 1♂ Estación de Biología Tropical los Tuxtlas, 16-IX- 1989, H. Rojas, J. L. Colín, cols.; Veracruz, 1♂ 1♀, Estación de Biología Tropical, Los Tuxtlas, 14-X-1989, H. Rojas, col.; Veracruz, 1♂, Estación de Biología Tropical Los Tuxtlas, 2-XI-1989, H. Rojas, J. Colin, cols.; Veracruz, 1 ♂, Estación de Biología Tropical Los Tuxtlas, 14-IX-1989, J. L. Colín, H. Rojas, cols.; Veracruz, 1♀, Estación de Biología Tropical los Tuxtlas, 4-III-1985, A. Ibarra, col.; Veracruz, 4 ♂ 1 ♀, Estación de Biología Tropical, los Tuxtlas, Laguna el Zacatal, 16-VI-1990, J. L. Colin, col.; Veracruz, 1 ♂, Estación de Biología Tropical Los Tuxtlas, 10-XII-1989, J. L Colin, H. Rojas, col.; Veracruz, 1♀, Xalapa Ferrer Guardia I-2004, L. Cervantes, col.; Veracruz, 8 ♂ 5 ♀, Estación de Biología Tropical Los Tuxtlas, 11-X-1989, J. L. Colin, H. Rojas, col. (Table 1).

Comments: this species was previously reported for Guatemala, Panama, Colombia, Venezuela, Brazil, Ecuador and Peru. In Mexico, this is a new record for the country in the Mexican states of Campeche, Chiapas, Oaxaca, Puebla, and Veracruz (Table 1). This is a tropical species, mainly restricted to the Neotropical parts of Mexico in elevations that range from 9 to 2265 m.

Pangaeus (Pangaeus) moestus

Material examined: Mexico: Campeche, 1♂ Ruinas hormiguero, 7-V-1997 A. Contreras, col.; Veracruz 1 ♂, Xalapa VII-1985, J. Peña, col. (Table 1).

Table 1
List of distribution of *Pangaeus* species in Mexico. BC = Baja California, BCS = Baja California Sur, CPCH = Campeche, CHIS = Chiapas, COA = Coahuila, COL. = Colima, DF = Distrito Federal, DGO = Durango, GTO = Guanajuato, GRO = Guerrero, HGO = Hidalgo, EM = Estado de México, MICH = Michoacán, MOR = Morelos, NAY = Nayarit, NL = Nuevo León, OAX = Oaxaca, PUE = Puebla, QRTO = Querétaro, QRO = Quintana Roo, SLP = San Luis Potosí, SNLA = Sinaloa, SON = Sonora, TAB = Tabasco, TAMPS = Tamaulipas, VER = Veracruz, YU = Yucatán, ZCA = Zacatecas. New records with*. New species in bold.

Species	Distribution in Mexico	Distribution out of Mexico
Pangaeus (*Homaloporus*) *bilineatus* (Say)	BC, BCS, CPCH, CHIS, COA, COL., DF, DGO, GTO, GRO, HGO, EM, MICH, MOR, NAY, NL, OAX, PUE, QRTO, QRO, SLP, SNLA, SON, TAB, TAMPS, VER, YU, ZCA	Bermudas, Guatemala, USA, Canada
Pangaeus (*Homaloporus*) *congruus* (Uhler)	DF, EM, MICH	USA
Pangaeus (*Homaloporus*) *punctilinea* Froeschner	BCS*	USA
Pangaeus (*Homaloporus*) *rugiceps* Horvath	CPCH, CHIS, COL., GRO, HGO, JAL, EM, MICH, MOR, NAY, NL, OAX, SLP, SNLA, SON, TAMPS, VER	Guatemala
Pangaeus (*Homaloporus*) *setosus* Froeschner	CHIH y SLP	USA
Pangaeus (*Homaloporus*) *tuberculipes* Froeschner	CHIS, DF, HGO, EM, MICH y MOR	USA
***Pangaeus* (*Pangaeus*) *cervantesi* nov. sp.**	CHIS*	
Pangaeus (*Pangaeus*) *docilis* (Walker)	CPCH*, CHIS*, OAX*, PUE*, VER*	Brazil, Colombia, Ecuador, Guatemala, Panama, Peru, Venezuela
Pangaeus (*Pangaeus*) *impressus* Froeschner	EM, NAY	
Pangaeus (*Pangaeus*) *moestus* (Stål)	CPCH*y VER*	Brazil, Guatemala
Pangaeus (*Pangaeus*) *piceatus* Stål	CHIS, OAX, PUE y VER	Brazil, Colmbia, Costa Rica, Guatemala, Peru, Puerto Rico
Pangaeus (*Pangaeus*) *quinquespinosus* Froeschner	CPCH*,CHIS*,OAX*, y VER*	Panama, Costa Rica.
Pangaeus (*Pangaeus*) *serripes* (Westwood)	CPCH, CHIS, COL., GRO, HGO, JAL, EM, MICH, MOR, NAY, OAX, PUE, QRTO, QRO, SLP, TAB, TAMPS, VER, YU	Argentina, Bolivia, Brazil, Brithish Guiana, Colombia, Ecuador, French Guiana, Guatemala, Grenada, Honduras, Nicaragua, Panama, Paraguay, Peru, Trinidad, Uruguay, Venezuela

Comments: this species was previously reported for Guatemala and Brazil. This is the first record for Mexico in the states of Campeche and Veracruz. This species can be found at around 1486 m.

Pangaeus (*Pangaeus*) *quinquespinosus*

Material examined: Mexico: Campeche, 2 ♂, 30 km. Al Sur Xpujil, 20-III-1982, M. Garcia. A. Ibarra, cols.; Campeche, 2 ♂ 1 ♀, Ruinas Hormiguero, 6-V-1997 A. Contreras, col.; Campeche, 1♂, 30-IV-1997, A. Contreras, col.; Campeche 6 ♂ 3♀, Ruinas Hormiguero 7-V-1997, A. Contreras, col.; Chiapas, 1♂, Bonampak, 25-V-1980, E. Barrera, col.; Chiapas, 1 ♂ 1♀, Frontera Chiapas, 400 m asl, 6-IV-1979, H. Brailovsky, col.; Chiapas, 1 ♂, Km.9 Carr. Palenque Ocozingo, 5-V-1982, A. Ibarra, col.; Chiapas, 1♂, Bonampak, 20-V-1984, M. García, col.; Chiapas, 1♀, Bonampak, 23-25-V-1984, A. Ibarra, col.; Chiapas, 1♀, Chajul, 8-IX-1986, J. Galván, col.; Chiapas, 1♀, Ocosingo Chajul, Reserva Montes Azules 28-IV-5-V-1986, F. Arias, R. Barba, L. Cervantes, cols.; Oaxaca, 1♂, Km. 116 Carr. Tuxtepec Palomares 22-XI-1990, A. Cadena, E. Barrera, cols.; Oaxaca, 1♀, Portillo del Rayo, 31-XI-1987, E. Barrera, col.; Oaxaca, 1♀, Santa Rosa, 22-IV-1983, A. Ibarra, col.; Oaxaca, 1♀, Monte Alban, 18-X-1978, E. Barrera, col.; Oaxaca, 1♀, Santo Domingo Peteapa, Arroyo Las Palmas 330 m asl, 20-III-1990, E. Barrera A. Cadena, cols.; Oaxaca, 1♀, 2 Km. Desviación a Pluma Hidalgo- Carr. San Jose Pacifico Pochutla, 8-VI-2004, E. Barrera, R. Mariño, cols.; Oaxaca, 2♀, Km. 2 Desviación a pluma Hidalgo Carr. Oaxaca- Puerto Angel 8-VI-2004, E. Barrera, R. Mariño, cols.; Oaxaca, 1♀, Pluma Hidalgo, 2-II-1988, A. Cadena E. Ramírez, cols.; Oaxaca, 1♀ 10 km. Al Sur de Valle Nacional, 4-IX-1982, J. Bueno, col.; Veracruz, 3 ♂, Tlapacoyan, 2-VII-1985, J. Bueno, col.; Veracruz, 1 ♂, El Ocotal Chico, Mpio. Soteapa Tuxtla Vercruz, 13-VIII-1980, S. Zaragoza, col.; Veracruz, 1♂, Estación de Biología Tropical Los Tuxtlas, 3-15-XII-1988, E. Mejorada, col.; Veracruz, 1 ♀, Estación de Biología Tropical Los Tuxtlas 30-VII-1989 S. Zaragoza; Veracruz, 2♀, Estación de Biología Tropical Los Tuxtlas, 20-26-II-1985, A. Ibarra, col.; Veracruz, 1♀, Estación de Biología Tropical Los Tuxtlas, 10-VIII-1989, J. l. Colin, H. Rojas, cols.; Veracruz, 1 ♀, Xalapa 24-VIII-1985, J. Peña, col.; Veracruz, 3 ♀, Jalapa, 1-8-IX-1985, J. Peña, col.; Veracruz, 1♀, Salto Eyipantla, 20-II-1984, H. Delfin, col.

Comments: this species was previously reported for Panama and Costa Rica. This is the first report for Mexico in the states of Campeche, Chiapas, Oaxaca and Veracruz (Table 1), in localities with an altitude of about 1965 m.

Key of Mexican species of the genus Pangaeus

1. Mesopleural evaporatorium extending, uninterrupted, along posterior margin of sclerite into posterolateral angle . . . . . subgenus *Pangaeus* 7
1a. Mesopleural evaporatorium limited, separated from posterolateral angle and posterior margin of sclerite by polished area . . . . . subgenus *Homaloporus* 2
2. Ventral surface of posterior femur with numerous scattered, small tubercles; posterior tibia of male distinctly angulate ventrally near base 3
2a. Posterior femur not tuberculate ventrally; posterior tibia of male simple, not angled ventrally near base 4
3. Submargin of head with a double set of setigerous punctures, those on anterior third or half giving rise to short pegs on posterior part giving rise to long hairs . . . *setosus* Froeschner
3a. Submargin of head with 4–5 setigerous punctures giving rise to long slender hairs but without pegs . . . . . *tuberculipes* Froeschner
4. Juga and tylus with a complete submarginal row of pegs . . . . . *congruus* (Uhler)
4a. Juga and tylus without a row of pegs 5
5. Juga with 3 or more setigerous punctures submarginally; surface of head neither strongly convex nor strongly rugose 6
5a. Jugum with one submarginal setigerous puncture immediately anterior to eye; dorsum of head strongly convex, usually with strong transverse rugae . . . . . *rugiceps* Horvath
6. Subapical impressed line of pronotum with a row of punctures; corium not alutaceous . . . . . *punctilinea* Froeschner
6a. Subapical impressed line of pronotum impunctate; corium distinctly alutaceous . . . . . bilineatus (Say)
7. Posterior tibia ventrally with a distinct, subbasal angulation, with a one to 3 spines on postero-ventral margin before apex 8
7a. Posterior tibia ventrally without a subbasal angulation, postero-ventral margin with 4 or more spines before apex 10
8. Apex of genital capsule with a broad, deep, U-shaped emargination . . . . . *serripes* (Westwood)
8a. Apex of genital capsule not emarginate, sometimes gently sinuate 9
9. Costa with 2 setigerous punctures; larger, length of body 5.84-6.60 . . . . . *impressus* Froeschner
9a. Costa with one setigerous puncture; smaller, length of body 4.21-5.56 . . . . . docilis (Walker)
10. Costa with one setigerous puncture 11
10a. Costa with 2 setigerous punctures 12
11. Posterior tibia with 4 strong spines on posterolateral margin before apex . . . . . *piceatus* Stål
11a. Posterior tibia with 5 strong spines on posterolateral margin before apex . . . . . *quinquespinosus* Froeschner
12. Posterior tibia male with 4 strong spines on posterolateral margin before apex . . . . . *moestus* (Stål)
12a. Posterior tibia of male with 5 strong spines on posterolateral margin before apex . . . . . *cervantesi* sp. n.

Discussion

Most of the species of *Pangaeus* recorded for the Mexican territory occur in the states of Chiapas, Oaxaca and Veracruz in low deciduous and low evergreen forests, as well as in xerophile scrubs areas. However, this could be due to the bias of collecting effort in other Mexican states. We therefore expect to register additional new species of *Pangaeus* in other Mexican states, since to date only 9 of the 32 Mexican states have records of *Pangaeus* species (Table 1).

Acknowledgements

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