



Research article

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**A new genus of Theraphosid spider from Mexico,  
with a particular palpal bulb structure  
(Araneae, Theraphosidae, Theraphosinae)**

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**Abstract.** *Magnacarina* gen. nov. from Mexico is described. *Hapalopus aldanus* West, 2000 from Nayarit, is transferred to the new genus with an emended diagnosis creating the new combination *Magnacarina aldana* comb. nov. Three new species are described: *Magnacarina moderata* Locht, Mendoza & Medina sp. nov. from Nayarit and Sinaloa; *Magnacarina primaverensis* Mendoza & Locht sp. nov. and *Magnacarina cancer* Mendoza & Locht sp. nov., both from Jalisco. *Magnacarina* gen. nov. is characterized by an unusual bifid palpal bulb, and has a primary projection located in the central area of the palpal bulb and directed retrolaterally; this projection possesses the prolateral superior and retrolateral keels. Next to the primary projection is a secondary projection, which may be short or long, ending in the prolateral inferior and apical keel surrounding the sperm pore. This secondary projection may have prolateral accessory keels and is diagnosed by possessing a nodule of inwardly curled megaspines, located in the basal ventro-retrolateral region of metatarsi I in adult males. Additionally, male tibiae I possess three apophyses. Females of *Magnacarina* gen. nov. have a single reduced and strongly sclerotized spermatheca, with an apical lobe projecting ventrally, and with a uterus externus that is longer and wider than the spermatheca.

**Key words.** Tarantula, taxonomy, bulb morphology, tibial apophyses, new species.

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## Introduction

Mexico has the second highest number of formally described tarantula species worldwide, with 84 species (World Spider Catalog 2016). Despite this, Mexican theraphosid spiders have been poorly studied and it is common to find undescribed species and novel genera (Vol 1999, 2000, 2001; Locht *et al.* 2005; Locht, 2008; Locht & Medina 2008; Mendoza 2012a, 2012b, 2014a, 2014b; Schmidt 2012; Estrada-Alvarez 2014; Ortiz & Francke 2014).

West (2000) described *Hapalopus aldanus*, a small theraphosid from Nayarit state in Mexico, which did not resemble any known theraphosid species. Due to the general shape of the male palpal bulb and female spermatheca, he placed that new species in the genus *Hapalopus* Ausserer, 1875. Unfortunately, he did not mention which characters linked the new species with *Hapalopus*. Locht (2008) investigated *Hapalopus aldanus* West, 2000 and determined the species did not belong to *Hapalopus* or any other known theraphosid genus. However, it was determined that this species belonged in the Theraphosinae due to the presence of urticating setae of the type III, the oval unipartite spermatheca, and the multiple keels on the male palpal bulb, which are the diagnostic features of this subfamily. Locht also indicated it might represent an undescribed genus because of the very distinctive shape of male palpal bulb.

After examining spider collections in the American Museum of Natural History (AMNH), the Colección Nacional de Arácnidos (CNAN) and the Laboratorio de Acarología Anita Hoffman (LAAH), we noticed more specimens with the same male palpal bulb morphology as in *H. aldanus*. Following confirmation that these specimens possessed the three tibial apophyses and cluster of megaspines in the basoretrolateral area of metatarsi I, as indicated by Locht (2008), it was determined that these specimens belonged to a new genus of subfamily Theraphosinae. Herein, we describe *Magnacarina* gen. nov. and three additional new species, transferring *H. aldanus* to represent the type species. Additionally, we propose new nomenclature for the unique features in the male palpal bulb morphology.

## Material and methods

All measurements are in millimeters; smaller structures were measured using an ocular micrometer on a stereo microscope Nikon SMZ645, larger structures with a digital caliper General UltraTech (error of 0.1 mm). Leg and palp measurements were taken along the dorsal central axis of the left side. Description of tarsal scopulae follows Pérez-Miles (1994). Male palpal bulb keel terminology follows Bertani (2000). For comparative purposes, it is necessary to properly position the bulb, with the subtegulum pointing upwards as when extended for mating (Goloboff 1995; Bertani 2000). The primary projection is a structure located in the central area of the palpal bulb and is directed retrolaterally; this projection is apparently formed by the extension of prolateral superior and retrolateral keels (Figs 2, 6, 9, 14). Next to this projection is the secondary projection that ends with the prolateral inferior and apical keels surrounding the sperm pore (Figs 2E, 6E, 9E, 14E). The secondary projection may also have prolateral accessory keels, better observed in prolateral or frontal view (Figs 9D, 14D). Position of the keels were compared with other related theraphosids: *Bonnetina* Vol, 2000; *Cardiopelma* Vol, 1999; *Cyriocosmus* Simon, 1903; *Davus* O. Pickard-Cambridge, 1892; *Hapalopus* Ausserer, 1875 and *Schizopelma* F.O. Pickard-Cambridge, 1897.

Spination description follows Mendoza (2014a). Terminology of tibial apophyses follows the general usage for Theraphosidae (Bertani 2001). The term “accessory apophysis”, recently proposed by Ortiz & Francke (2014) for *Bonnetina*, is also used. In species historical references, we follow the World Spider Catalog (2016): D = Described. Photographs (Figs 1–3, 5–11, 13–15) were taken with a Nikon Coolpix S10 VR digital camera coupled to a stereomicroscope. The following photographs were provided as follows: Fig. 4 by Rick C. West; Fig. 12C–D by G. Vila. Photographs of Fig. 12A–B were taken with a digital camera Canon G12 in laboratory and field respectively.

### Abbreviations

Morphological abbreviations are as follows:

- Aap = accessory apophysis
- AK = apical keel
- ALE = anterior lateral eyes
- AME = anterior median eyes
- d = dorsal
- Nm = retrolateral nodule of megaspines
- p = prolateral
- PAc = prolateral accessory keels
- Pap = prolateral tibial apophysis
- PI = prolateral inferior keel
- PLE = posterior lateral eyes
- PLS = posterior lateral spinnerets
- PME = posterior median eyes
- PMS = posterior median spinnerets
- Ppr = primary projection
- PS = prolateral superior keel
- r = retrolateral
- RK = retrolateral keel
- Rap = retrolateral tibial apophysis
- Rp = male palpal tibia retrolateral process
- Spr = secondary projection
- TA = tegular apophysis
- v = ventral

Examined specimens are deposited in the following institutions:

- AMNH = American Museum of Natural History, New York
- CNAN = Colección Nacional de Arácnidos, México City
- LAAH = Laboratorio de Acarología Anita Hoffman; México City
- NHM = Natural History Museum, London (formerly BMNH)
- UNAM = Universidad Nacional Autónoma de México, Mexico City

### Material examined for comparisons

#### *Bonnetina aviae* Estrada-Alvarez & Locht, 2011

MEXICO: 2 ♂♂, Veracruz, Perote, Totalco, 15 Jun. 2015, coll. P. Berea (CNAN-Ar003708); 1 ♀, Veracruz, Perote, cerca de San Antonio Limón, 19 Dec. 2010, colls J. Mendoza, E. Hijmensen, E. Goyer and S. Longhorn (CNAN-Ar003534B).

#### *Bonnetina papalutlensis* Mendoza, 2012

MEXICO: 1 ♂, 1 ♀, Guerrero, Eduardo Neri, 1 km N of Milpillas, 22 Sep. 2012, colls D. Ortiz, J. Mendoza, J. Cruz and G. Contreras (CNAN-Ar003723A, CNAN-Ar003723D).

***Cardiopelma mascatum* Vol, 1999**

MEXICO: 2 ♂♂, 1 ♀, Oaxaca, Santa Maria Tule, El Potrero, 1 Dec. 2010, colls J. Mendoza, S. Longhorn, E. Hijmensen and E. Goyer (CNAN 4092).

***Cyriocosmus elegans* (Simon, 1889)**

VENEZUELA: 1 ♂ donated by J. Mendoza (CNAN-Ar003298).

***Davus pentaloris* (Simon, 1888)**

MEXICO: 1 ♂, Veracruz, Copital, Medellin, El Mangal, 14 Dec. 2010, colls J. Mendoza, S. Longhorn, E. Hijmensen and E. Goyer (CNAN-Ar003634); 1 ♀, Veracruz, Copital, Medellin, El Mangal, 14 Dec. 2010, coll. G. Monter (CNAN-Ar003523).

***Hapalopus formosus* Ausserer, 1875**

COLOMBIA: 3 ♂♂, Valledupar, Dept. Cesar, 22–24 May 1968, coll. Borys Malkin (AMHN).

***Schizopelma bicarinatum* F.O. Pickard-Cambridge, 1897**

MEXICO: 1 ♂ (holotype), 1 ♀ (paratype), Guerrero, Xantipa (currently Chautipan) (BMNH 1898.12.24.57.-60); 1 ♂, Guerrero, Chilpancingo de los Bravo, Acahuizotla, 19 Nov. 1969, without collector data (CNAN-Ar003511).

***Schizopelma* sp.**

MEXICO: 1 ♂, Guerrero, Acapulco, 1km NE of Dos Arroyos, 20 Sep. 2012, colls J. Mendoza, J. Cruz, G. Contreras and D. Ortiz (CNAN-Ar010328).

## Results

Phyllum Arthropoda Latreille, 1829  
Class Arachnida Lamarck, 1801  
Order Araneae Clerck, 1757  
Infraorder Mygalomorphae Pocock, 1892  
Family Theraphosidae Thorell, 1869  
Subfamily Theraphosinae Thorell, 1870

***Magnacarina* gen. nov.**

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Figs 1–16

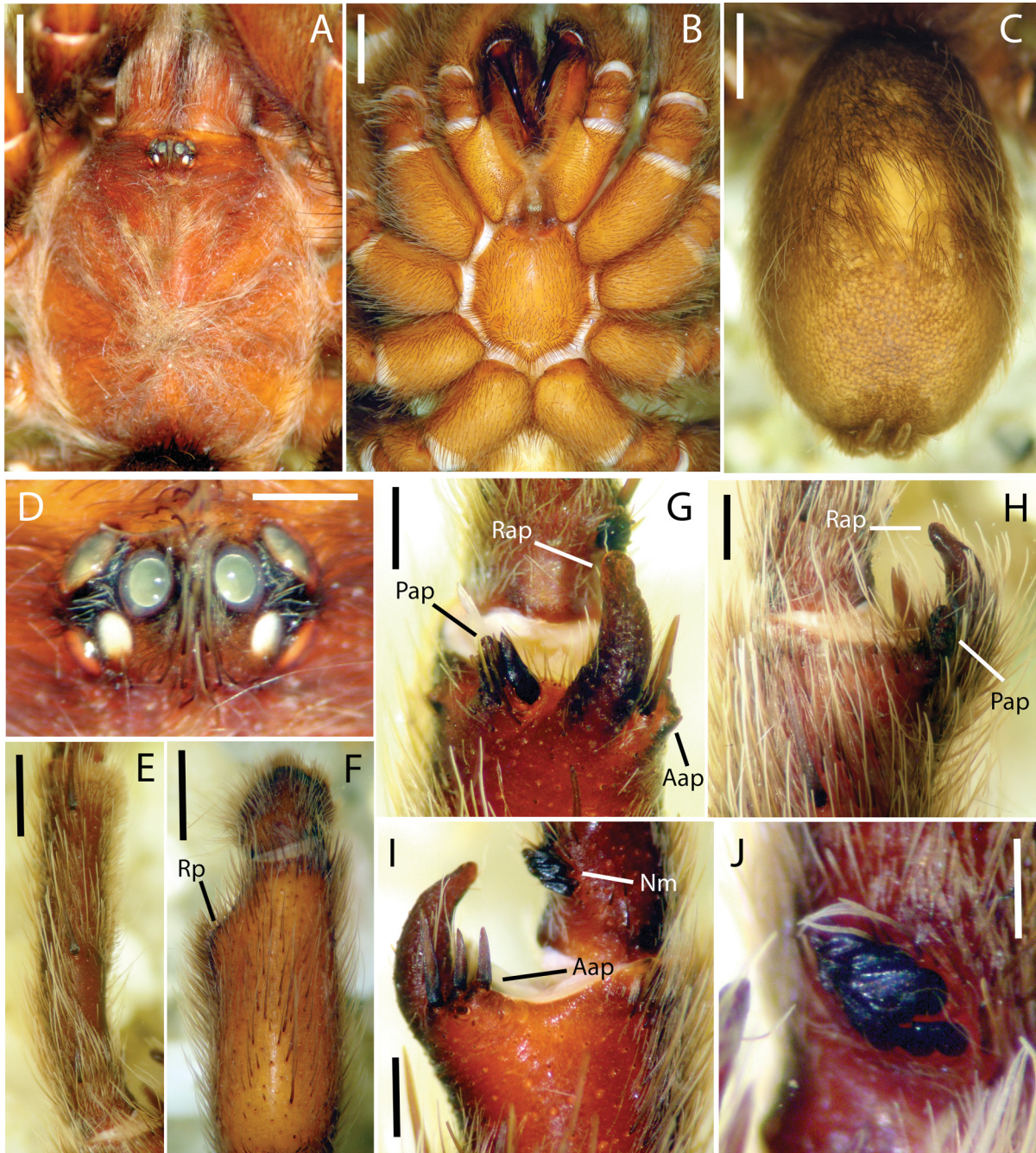
## Type species

*Magnacarina aldana* (West, 2000) comb. nov.

## Diagnosis

*Magnacarina* gen. nov. differs from all other known theraphosine genera, except *Bonnetina*, in having three apophyses on male tibia I and a retrolateral nodule on metatarsus I. Males differ from *Bonnetina* in having a bifid palpal bulb that possesses a primary and secondary projections. Additionally, *Magnacarina* gen. nov. differs in possessing a retrolateral nodule of metatarsus I with megaspines, whereas *Bonnetina* has a granular one. Females differ in possessing a very low semicircular spermatheca with a uterus externus that is longer and wider than the *Bonnetina* triangular, domiform or digitiform spermatheca. *Magnacarina* gen. nov. has the following character combination: bifid shape of male palpal bulb with one sperm pore. It has a primary projection, located in the central area of palpal bulb and directed retrolaterally. This projection possesses the prolateral superior and retrolateral keels. The prolateral superior keel is large, extending posteriorly to palpal bulb back face. Posterior extension of the prolateral superior keel

may extend to the palpal bulb back face (as in *M. aldana* comb. nov.), close to border of back face (as in *M. primaveraensis* Mendoza & Locht sp. nov.), or extend only until the middle portion of the palpal bulb prolateral face (as in *M. cancer* Mendoza & Locht sp. nov. and *M. moderata* Locht, Mendoza & Medina sp. nov.). Following the primary projection is a secondary projection (long or short), ending with the prolateral inferior and apical keels surrounding the sperm pore. The prolateral inferior keel is

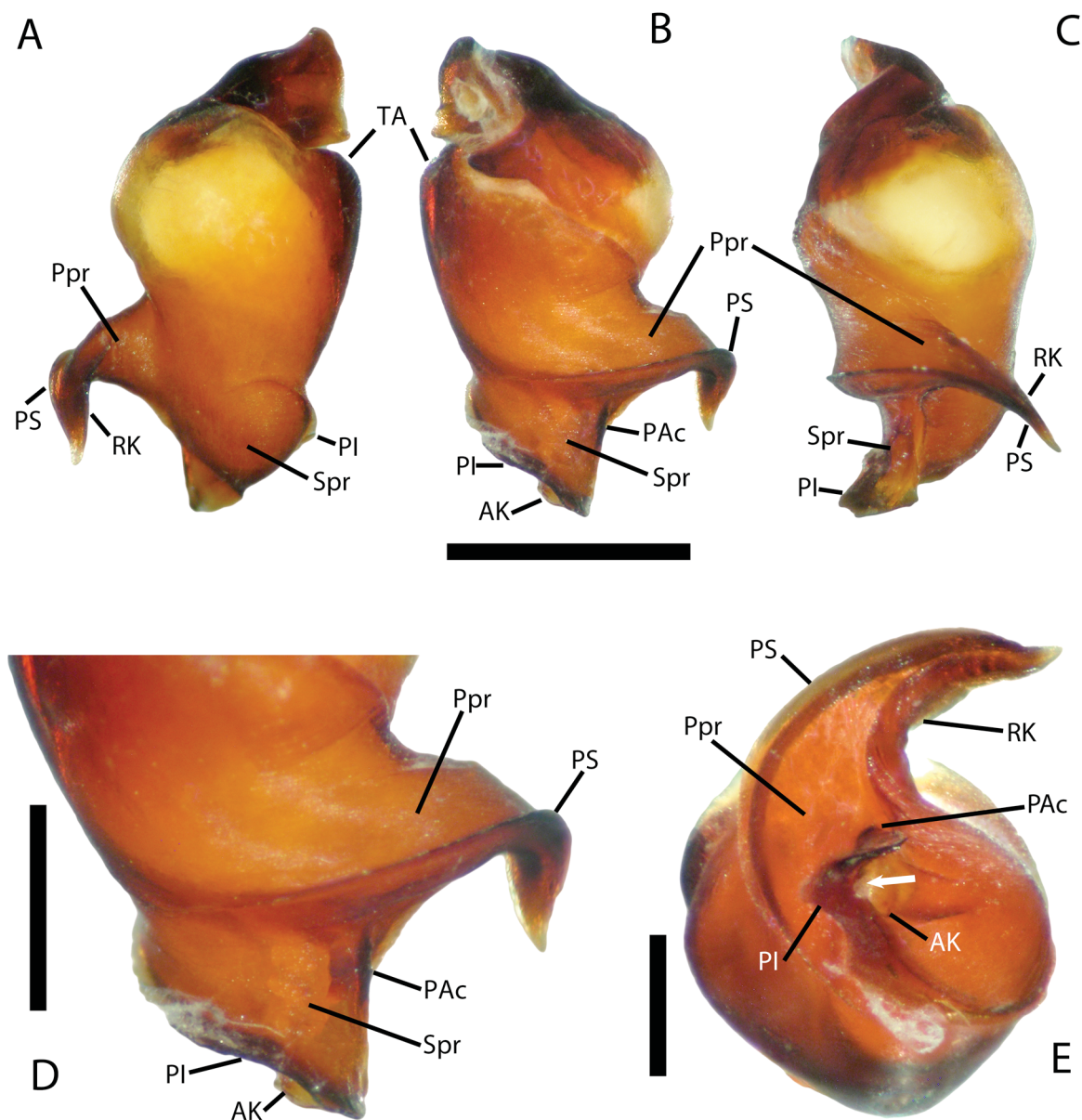


**Fig. 1.** *Magnacarina aldana* (West, 2000), ♂, paratype (LAAH). A. Carapace, dorsal view. B. Prosoma, ventral view. C. Opisthosoma, dorsal view. D. Ocular tubercle, dorsal view. E–J. Left side. E. Metatarsus I, Prolateral view. F. Palp tibia, dorsal view. G. Tibial apophyses, ventral view. H. Tibial apophyses, prolateral view. I. Tibial apophyses, retrolateral view. J. Retrolateral nodule with megaspines, retrolateral view. Scale bars: A–C = 2 mm; E, F = 1 mm; D, G–I = 0.5 mm.

always the widest distally. The secondary projection may have prolateral accessory keels that are variable in size and number. Males have a nodule of prolaterally curled megaspines, located at the basal ventro-retrolateral region of metatarsi I (except for *M. moderata* sp. nov.). Male tibiae I with three apophyses. The accessory apophysis well to slightly developed, with apical spines variable in size and number. Urticating setae of the type III arranged in one dorsomedian patch. Females with very low spermatheca and single semicircular receptacle. Uterus externus always longer and wider than spermatheca.

### Remarks

Adult males of *Magnacarina* gen. nov. have a retrolateral nodule of megaspines, located in the retrolatero-basal region of metatarsus I (except *M. moderata* sp. nov.). This nodule is considered homologous to the granular one found in *Bonnetina*, so it is possible that these genera are closely related.



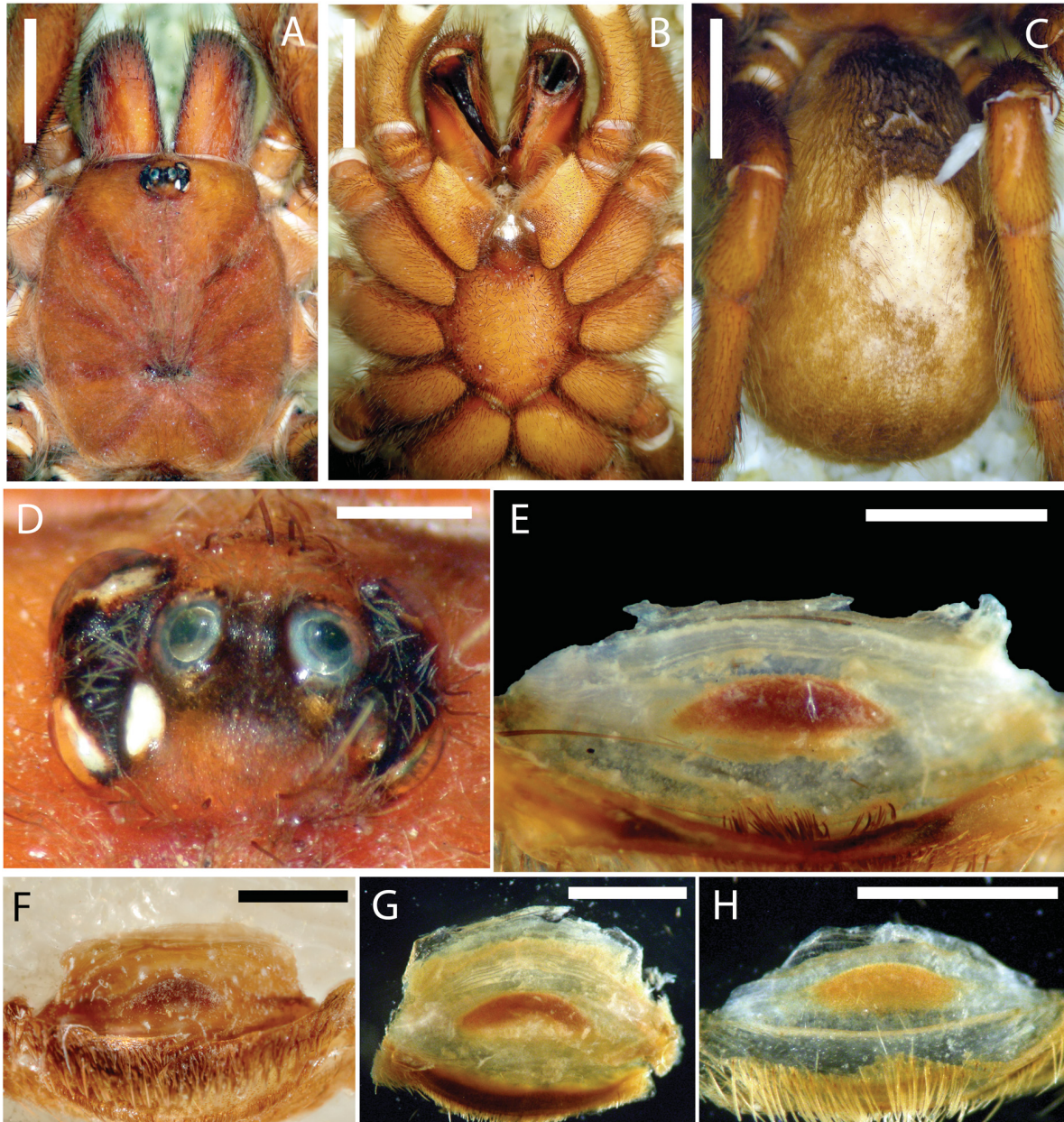
**Fig. 2.** *Magnacarina aldana* (West, 2000), ♂, paratype (LAAH). Left palpal bulb. **A.** Retrolateral view. **B.** Prolateral view. **C.** Dorsal view. **D.** Apex, prolateral view. **E.** Apex, apical view. White arrow indicates sperm pore. Scale bars: A–C = 1 mm; D, E = 0.5 mm.

### Etymology

The genus gender is feminine, comprising *magnus*, a Latin adjective meaning “very large” or “great”, and the Latin word *carina*, which means “keel”. Generic name refers to the very large primary projection in the male palpal bulb (Figs 2D, 6D, 9D, 14D).

### Distribution

*Magnacarina* gen. nov. is endemic to Mexico and only known from the states of Sinaloa, Nayarit and Jalisco. The genus inhabits the deciduous forest along the Pacific coast to the foothills of the Sierra



**Fig. 3.** *Magnacarina aldana* (West, 2000). A–E. ♀, paratype (LAAH). A. Carapace, dorsal view. B. Prosoma, ventral view. C. Opisthosoma, dorsal view. D. Ocular tubercle, dorsal view. E. Spermatheca, ventral view. F–H. Spermatheca ventral view. F. ♀, paratype (AMNH). G. ♀, paratype (LAAH). H. ♀ (CNAN-Ar010276). Scale bars: A–C = 4 mm; E–H = 1 mm; D = 0.5 mm.

Madre Occidental. Specimens collected during fieldwork were found under rocks, in shallow burrows or superficial scrapes covered with silk.

*Magnacarina aldana* (West, 2000) comb. nov.

Figs 1–4

*Hapalopus aldanus* West, 2000: 299, fig. 1 A–D (D ♂♀).

*Hapalopus aldanus* – Schmidt 2003: 168, figs 386–389 (♂♀).

**Emended diagnosis**

*Magnacarina aldana* comb. nov. males differ from *M. cancer* sp. nov. in possessing a thinner prolateral inferior keel that is distally rounded and oriented to the apex, and the retrolateral apophysis is thinner apically; females differ in possessing a wider spermatheca. *Magnacarina aldana* comb. nov. differs from *M. primaveraensis* sp. nov. in possessing a highly developed accessory apophysis and a lower number of prolateral accessory keels as well as in the thinner prolateral inferior keel and the coloration of the carapace and legs in both sexes. *Magnacarina aldana* comb. nov. differs from *M. moderata* sp. nov. in that males have a retrolateral nodule of megaspines and females a medially longer spermatheca.

*Magnacarina aldana* comb. nov. is characterized by the following character combination: male palpal bulb with a prominent primary projection that is strongly curved retrolaterally (Fig. 2A); retrolateral and prolateral superior keels thin and well developed, posterior extension of prolateral superior keel ends



**Fig. 4.** *Magnacarina aldana* (West, 2000), habitus; ♀, in habitat (Nayarit) Photo: R.C. West.



**Table 1.** *Magnacarina aldana* (West, 2000) and *Magnacarina cancer* Mendoza & Locht sp. nov. Variations of some quantitative characters in the specimens of the type series. Measurements in mm. Hyphens represent the interval between the lowest and highest value of each character. When left and right side values were taken, it was indicated as (left/right).

Specimens measurements	<i>Magnacarina aldana</i> sp. nov.		<i>Magnacarina cancer</i> sp. nov.	
	Males (2)	Females (4)	Males (3)	Females (1)
Total length	20.26, 20.31	16.81–31.00	10.15–16.47	13.7
Carapace length	7.92, 8.17	6.32–10.33	5.33–7.45	5.2
Carapace width	6.33, 7.42	5.70–9.17	4.0–7.18	4.5
Sternum length	3.20, 3.50	2.73–4.38	2.80–3.17	2.45
Sternum width	3.00, 3.25	2.73–3.81	2.78–3.16	2.4
Labium length	0.90, 0.94	0.87–1.25	0.83–1.0	1.0
Labium width	1.20, 1.25	1.20–1.50	1.20–1.30	1.11
Cheliceral teeth (left/right)	9/10	9/10	11/10–12	8/8
Labial cuspules	52, 84	52–73	26–29	60
Maxillary cuspules (left/right)	145–157/132–159	112–179/91–201	66–109/68–110	97/100
Spermatheca length medially	–	0.23–0.41	–	0.17
Spermatheca base width	–	0.77–1.06	–	0.8
Accesorial apophysis spines (left side)	4	–	3–5	–
Number of megaspines in nodule (left side)	10	–	12–14	–

on the back face (Fig. 2D–E); secondary projection possesses two prolateral accessory keels (Fig. 2B, D). Prolateral inferior keel wide and increasing from posterior to apical (Fig. 2C–E). Apical keel well developed, covering the sperm pore that opens towards prolateral (Fig. 2D–E). Prolateral apophysis conical with one inner spine longer than its length (Fig. 1G–H); retrolateral apophysis strongly curved to dorsal (Fig. 1H–I); accessory apophysis slightly developed (Fig. 1G, I). Male palpal tibia retrolateral process short subconical, slightly developed on distal third (Fig. 1F). Spermatheca reduced and low, with one single semicircular, strongly sclerotized receptacle. Uterus externus is three times wider, and longer than the spermatheca (Fig. 3E–H). Variations summarized in Table 1.

### Type material examined

#### Holotype

MEXICO: ♂, Nayarit, Mpio. Santa Rosa, 8 km W of Compostela, highway 200, 10 Jan. 1996, coll. N.M. Palomera (AMNH).

#### Allotype

MEXICO: ♀, same data as the holotype (AMNH).

#### Paratypes

MEXICO: 2 ♀♀, same data as the holotype (LAAH); 1 ♂, Nayarit, Santa Rosa, 8 km W of Compostela, highway 200, 11 Jan. 1996, coll. N.M. Palomera (LAAH).

### Other material examined

MEXICO: 1 ♀, Nayarit, 8 km S. of Compostela, Jul. 1996, coll. N. Palomera and R.C. West (CNAN-Ar010267).

### Distribution and natural history

Only known from the type locality. West (2000) mentioned that all specimens were collected in tropical deciduous forest while clearing land near cattle pastures. Males were found wandering during the daytime and females were found in shaded areas residing in scrapes under large rocks or fallen logs. He also indicated that the species is sympatric with *Aphonopelma nayaritum* (Chamberlin, 1940).

*Magnacarina cancer* Mendoza & Locht sp. nov.

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Figs 5–7, 16

### Diagnosis

*Magnacarina cancer* sp. nov. differs from all other *Magnacarina* species in the general shape of the male palpal bulb, with a prolateral inferior keel pointing to primary projection - resembling a crab claw. Secondary projection lacking prolateral accessory keels. Also *M. cancer* sp. nov. differs from other species in possessing a more developed accessory apophysis. Females differ in having a very reduced spermatheca.

*Magnacarina cancer* sp. nov. possesses the following character combination: male palpal bulb with a short primary projection, with distal half twisted to apical (Fig. 6A–C); retrolateral keel slightly developed; prolateral superior keel wide and well developed, posterior extension ends at the middle of prolateral face (Fig. 6D–E). Secondary projection short, lacking prolateral accessory keels (Fig. 6D). Prolateral inferior keel short and broader distally, apex acute and directed to Ppr - resembling a crab claw (Fig. 6A–B, E). Apical keel wide and covering the sperm pore (Fig. 6E). Accessory apophysis pointed dome shape and well developed (Fig. 5H). The retrolateral apophysis is thicker on distal half. The retrolateral nodule of megaspines very short and wide (Fig. 5F, I–J). Spermatheca very reduced, only a small rounded receptacle, as long as wide. Uterus externus is five times wider, and three times longer than the spermatheca (Fig. 7D).

### Etymology

The specific epithet is in reference to the Latin word *cancer* (crab), describing the shape and orientation of the primary projection and apical keel that resembles a crab claw.

### Type material

#### Holotype

MEXICO: ♂, Jalisco, Tomatlán, Estación de Biología Chamela, 7 Mar. 1990, coll. S. Guzmán (CNAN-T0991).

#### Paratypes

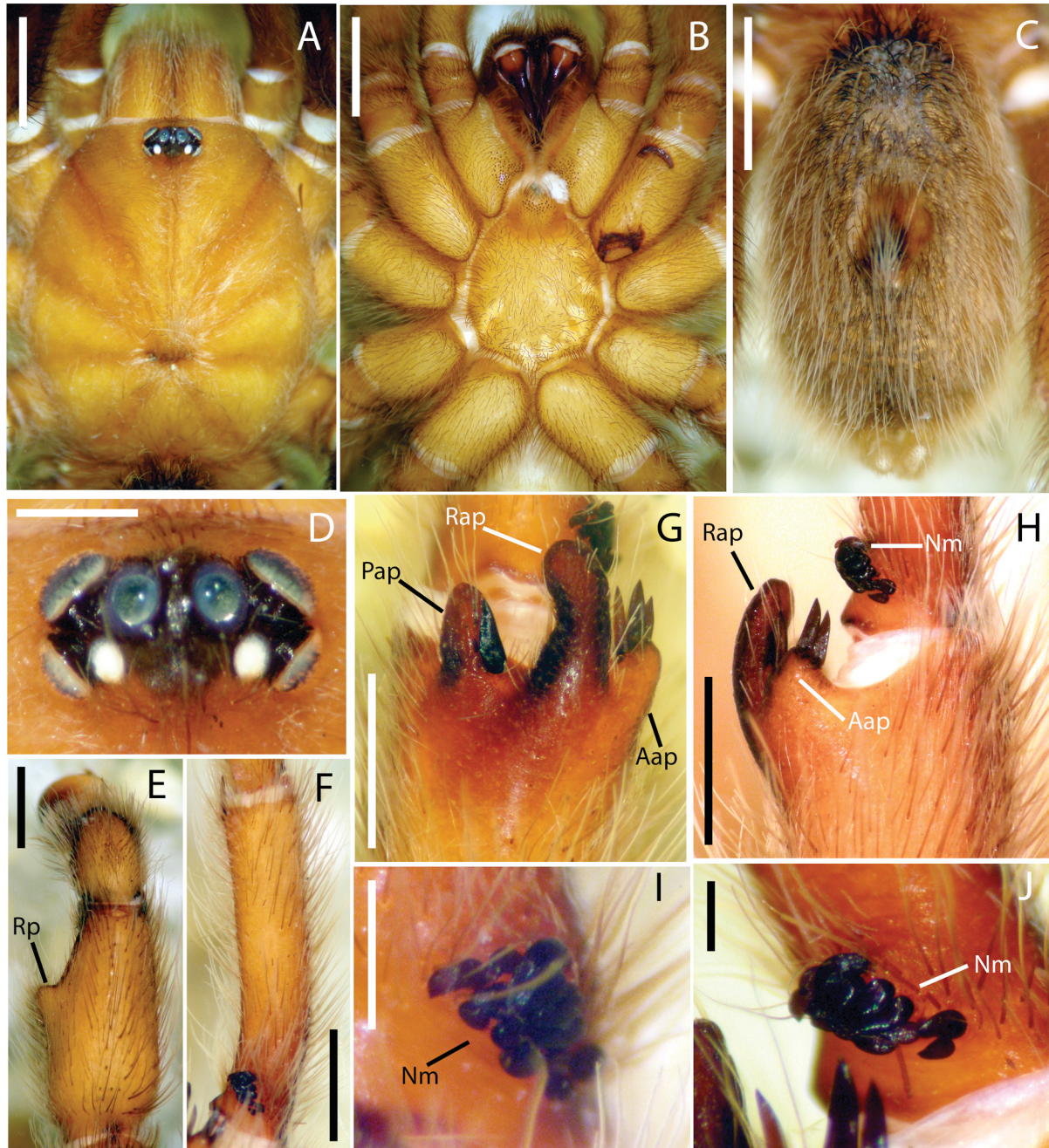
MEXICO: 1 ♀, Jalisco, Tomatlán, Estación de Biología Chamela, 10 Jan. 1990, coll. S. Guzmán (CNAN-T0992); 1 ♂, same locality, 6 Feb. 1990, coll. S. Guzmán (CNAN-T0993); 1 ♂, same locality, 19 Feb. 1990, coll. S. Guzmán (CNAN-T0994); 1 ♂, same locality, 4 Mar. 1987, coll. S.H. Bullock (LAAH).

### Description

#### Holotype male CNAN-T0991 (Figs 5–6)

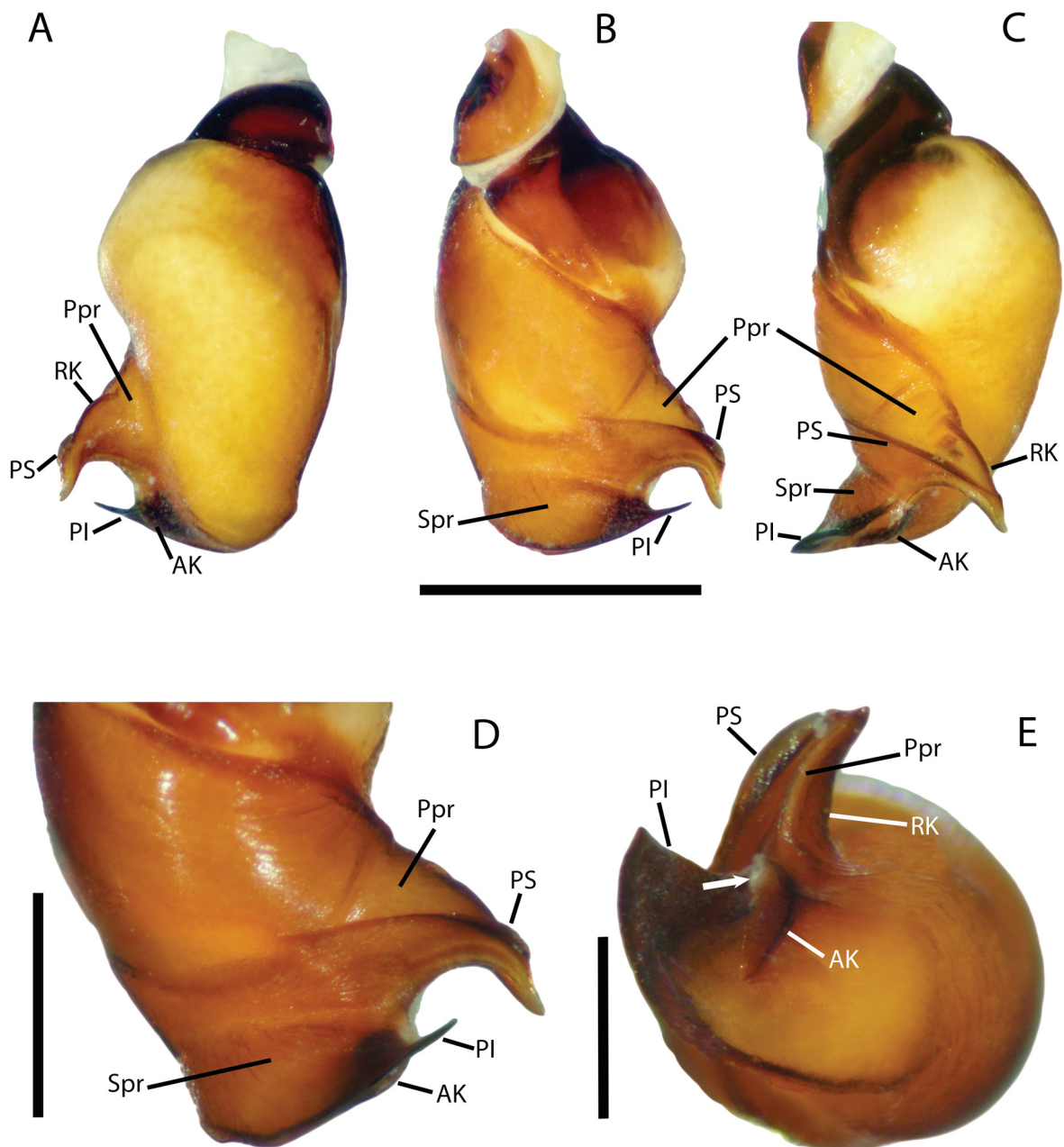
Body length (not including chelicerae and spinnerets) 10.15, carapace: 5.33 long, 4.0 wide. Caput not markedly elevated; fovea procurved, 0.95 wide. Carapace without dark cephalic area (Fig. 5A). Eyes: anterior eye row procurved, posterior eye row recurved. Eyes sizes and interocular distances: AME 0.26; ALE 0.36; PME 0.16; PLE 0.32; AME–AME 0.10; AME–ALE 0.04; PME–PME 0.42; PME–PLE 0.03; ALE–PLE 0.04. Ocular tubercle, width 1.16; length 0.88; clypeus lacking (Fig. 5D). Labium: length

0.90; width 1.20; with 26 cuspules. Maxilla inner corner with approximately 66-68 (left-right). Cheliceral promargin with 11-11 teeth (left-right). Sternum length 2.80. Sigilla oval, first to third hardly visible; posterior sigilla one and half times its length from the margin (Fig. 5B). Leg formula: IV > I > II > III. Length of legs and palpal segments (femur, patella, tibia, metatarsus, tarsus, total): I: 5.72, 3.54, 4.49,



**Fig. 5.** *Magnacarina cancer* Mendoza & Locht sp. nov., ♂, holotype (CNAN-T0991). **A.** Carapace, dorsal view. **B.** Prosoma, ventral view. **C.** Opisthosoma, dorsal view. **D.** Ocular tubercle, dorsal view. **E–J.** Left side. **E.** Palp tibia, dorsal view. **F.** Metatarsus I, retrolateral view. **G.** Tibial apophyses, ventral view. **H.** Tibial apophyses, retrolateral view. **I.** Retrolateral nodule with megaspines, ventral view. **J.** Retrolateral nodule with megaspines, retrolateral view. Scale bars: A–C = 2 mm; E–H = 1 mm; D, I–J = 0.5 mm.

3.53, 3.05, 20.33; II: 4.76, 2.96, 3.61, 3.64, 2.96, 17.93; III: 4.32, 2.26, 3.49, 4.18, 2.90, 17.15; IV: 6.11, 2.42, 4.93, 5.59, 3.39, 22.44. Palp: 3.61, 2.25, 3.27, -, 1.62, 10.75. Spinnerets: PMS, 0.77 long, 0.30 apart; PLS, 1.10 basal, 0.70 middle, 1.06 distal. Tarsi I–IV scopulate, I to III divided by narrow band of setae, IV divided by strong band of setae. Metatarsi I scopulate on distal third; II scopulate on distal third, III slightly scopulate on distal third, and IV slightly scopulate on distal fourth. Tibia I with three apophyses. Prolateral apophysis conical with smaller internal spine. Retrolateral apophysis wide through its length, thick and slightly curved to dorsal position at apex (Fig. 5G–H). Accessory apophyses pointed dome shape and well developed, bearing three megaspines at the apex (Fig. 5H). Metatarsus I curved (Fig. 5F),



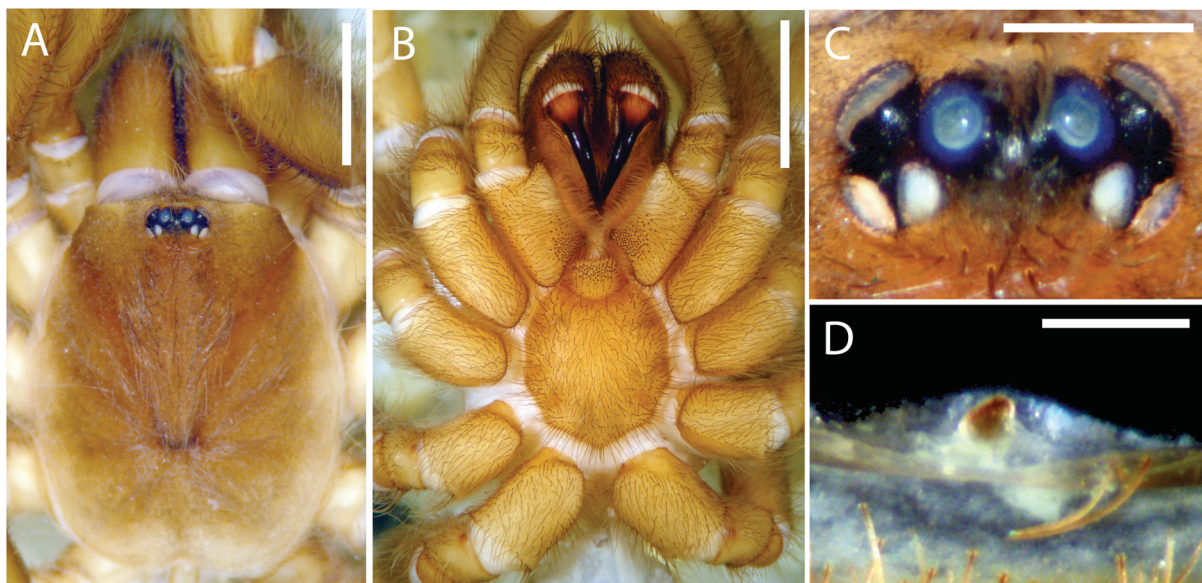
**Fig. 6.** *Magnacarina cancer* Mendoza & Locht sp. nov., ♂, holotype (CNAN-T0991), left palpal bulb. **A.** Retrolateral view. **B.** Prolateral view. **C.** Dorsal view. **D.** Apex, prolateral view. **E.** Apex, apical view. White arrow indicates sperm pore. Scale bars: A–C = 1 mm; D–E = 0.5 mm.

with retrolateral megaspines nodule well developed, having 12 very short and wide spines (Fig. 5I–J). Retrolateral face of palpal tibiae with a prominent conical process in the middle, covered by short setae (Fig. 5E). Chaetotaxy (left side): femora I 1p; II 1p; III 1r; IV 1r; palp 1p; patellae none; tibiae I 2p, 4v; II 2p, 6v; III 2p, 5v, 2r; IV 5v, 2r; palp none; metatarsi: I 1v; II 2p, 6v; III 4p, 6v, 2r; IV 2p, 7v, 2r. Palpal bulb with short and wide primary projection, strongly curved retrolaterally and its distal half twisted to apical. Retrolateral keel thin and slightly developed. Prolateral superior keel wide and well developed, posterior extension ends in the middle of prolateral face (Fig. 6A–D). Secondary projection short lacking, prolateral accessory keels (Fig. D). Prolateral inferior keel short and broader distally, apex acute and directed to primary projection (Fig. 6D–E), shape similar to the crab claw (Fig. 6A–B). Apical keel wide covering the sperm pore, which opens towards prolateral face (Fig. 6E). Lacking tegular apophysis. Urticating setae type III arranged in one oval dorsomedian patch, with copper metallic iridescence, intermixed with long yellowish setae (Fig. 5C). Variations summarized in Table 1.

Color pattern: damaged by preservation in ethanol, carapace tegument looks yellowish; ventral coxae, labium, maxillae and sternum brown; abdomen dorsally brown with whitish setae, ventrally brown. Legs and palps yellowish.

**Paratype female CNAN-T0992 (Fig. 7A–D)**

Body length (not including chelicerae and spinnerets) 13.70, carapace: 5.20 long, 4.50 wide. Caput not markedly elevated; fovea recurved, 0.70 wide. Carapace without dark cephalic area (Fig. 7A). Eyes: anterior eye row procurved, posterior eye row recurved. Eyes sizes and interocular distances: AME: 0.23; ALE: 0.28; PME: 0.12; PLE: 0.22; AME–AME: 0.10; AME–ALE: 0.05; PME–PME: 0.38; PME–PLE: 0.02; ALE–PLE: 0.06. Ocular tubercle, width 0.98; length 3.50; clypeus 0.06 (Fig. 7C). Labium: length 1.10; width 1.11; with 60 cuspules. Maxilla inner corner with approximately 97–100 (left–right). Cheliceral promargin with 8–8 (left–right) teeth. Sternum length 2.45. Sigilla oval, first to third pairs hardly visible; posterior sigilla once its length from the margin (Fig. 7B). Leg formula: IV > I > II > III. Length of legs and palpal segments (femur, patella, tibia, metatarsus, tarsus, total): I: 3.79, 2.54, 2.92, 2.11, 1.69, 13.05; II: 3.47, 2.32, 2.54, 2.01, 2.05, 12.39; III: 2.92, 1.69, 2.17, 2.12, 1.62, 10.52; IV: 4.10, 2.07, 3.20, 3.36,



**Fig. 7.** *Magnacarina cancer* Mendoza & Locht sp. nov., ♀, paratype (CNAN-T0992). **A.** Carapace dorsal view. **B.** Prosoma, ventral view. **C.** Ocular tubercle, dorsal view. **D.** Spermatheca, ventral view. Scale bars: A–B = 2 mm; D = 1 mm; C = 0.5 mm.

2.23, 14.96. Palp: 3.19, 1.84, 2.09, -, 1.94, 9.06. Spinnerets: PMS, 0.825 long, 0.30 apart; PLS, 1.375 basal, 0.95 middle, 1.15 distal. Tarsi I–IV scopulate, I to III divided by narrow band of setae, IV divided by strong band of setae. Metatarsi I scopulate on distal half; II scopulate on distal half, III scopulate on distal third, and IV scopulate on distal fourth. Chaetotaxy (left side): femora I 1p; II 1p; palp 1p; patellae none; tibiae III 1p, 3v, 1r; IV 2v, 1r; metatarsi I 2v; II 2v; III 4p, 5v, 2r; IV 2p, 7v, 3r. Spermatheca very reduced, only a rounded receptacle as long as wide. Strongly sclerotized with the top oriented ventrally. Uterus externus is five times wider and three times longer than the spermatheca (Fig. 7D). Urticating setae of type III arranged in one dorsomedian patch, with copper metallic iridescence. Variations summarized in Table 1.

Color pattern: damaged by preservation in ethanol, carapace tegument looks yellowish; ventral coxae, labium, maxillae and sternum brown; abdomen dorsally brown with whitish setae, ventrally brown. Legs and palps: yellowish.

### Distribution

The species is known only from the type locality in the Natural Protected Area of Chamela in Jalisco (Fig. 16). Specimens were collected in scrapes under medium size rocks and the males wandering during daytime. Nothing is known about its life cycle or natural history. We know, however, that the same area is inhabited by *Brachypelma klaasi* (Schmidt & Krause, 1994), *Bonnetina cyaneifemur* Vol, 2000, and *Aphonopelma* sp., so it is possible there exists competition or even predation of *M. cancer* sp. nov. by these larger species.

*Magnacarina primaverensis* Mendoza & Locht sp. nov.

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Figs 8–12, 16

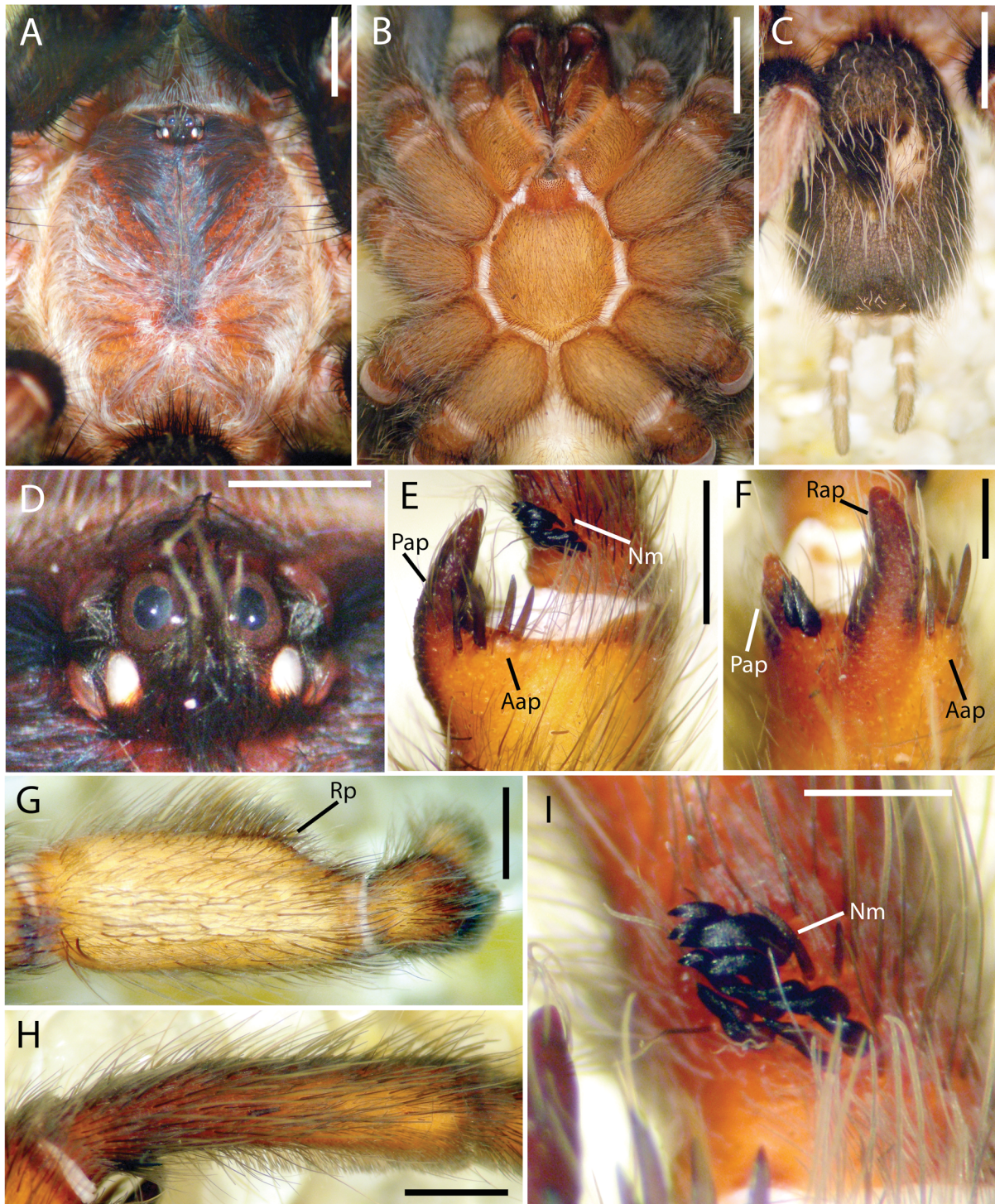
### Diagnosis

*Magnacarina primaverensis* sp. nov. differs from *M. cancer* sp. nov. in the general shape of the male palpal bulb, with prolateral inferior keel distally thinner and rounded, as well as in possessing prolateral accessory keels, and retrolateral apophysis slendering towards apex. Females differ in possessing a wider and longer spermatheca. *M. primaverensis* sp. nov. differs from *M. aldana* comb. nov. in possessing a slightly developed accessory apophysis; in a higher number of prolateral accessory keels, wider prolateral inferior keel and an inconspicuous male palpal tibia retrolateral process. Females differ in the endites posteriorly wider and rounded. Both sexes differ in a slightly orange carapace, with black cephalic area. *M. primaverensis* sp. nov. differs from *M. moderata* sp. nov. in having retrolateral nodule of megaspines, a male bulb with secondary projection shorter and thinner, with more prolateral accessory keels, and an inconspicuous male palpal tibia retrolateral process. Females differ in having a carapace as long as wide.

*Magnacarina primaverensis* sp. nov. has the following character combination: male palpal bulb with a prominent primary projection strongly curved retrolaterally; retroaleteral keel thin and well developed; prolateral superior keel well developed, posterior extension ends almost on the back face of palpal bulb (Fig. 9A–C); secondary projection with prolateral accessory keels, increasing in size from proximal to distal (Fig. 9C–D). Prolateral inferior keel wide, increasing from back to front and distal end slightly oriented to apical (Fig. 9A, C–D). Apical keel well developed, wider in the middle (Fig. 9D–E). Accessory apophysis barely developed, bearing large megaspines apically (Fig. 8E). Retrolateral nodule of megaspines with large spines, stout at base and slendering apically (Fig. 8I). Spermatheca reduced, low, with one single receptacle variable in shape, and strongly sclerotized. Uterus externus that is wider, and four to five times longer than the spermatheca (Fig. 11A–D).

### Etymology

The specific epithet is a combination of the noun referring to the area that the species inhabits, “Bosque de la Primavera”, and the Latin suffix *-ensis*, which means “of or from a place”.



**Fig. 8.** *Magnacarina primaverensis* Mendoza & Locht sp. nov., ♂, holotype (CNAN-T0995). A. Carapace, dorsal view. B. Prosoma, ventral view. C. Opisthosoma, dorsal view. D. Ocular tubercle, dorsal view. E–I. Left side. E. Tibial apophyses, retrolateral view. F. Tibial apophyses, ventral view. G. Palpal tibia, dorsal view. H. Metatarsus I, prolateral view. I. Retrolateral nodule with megaspines, retrolateral view. Scale bars: A–C = 2 mm; E, G–H = 1 mm; D, F, I = 0.5 mm.

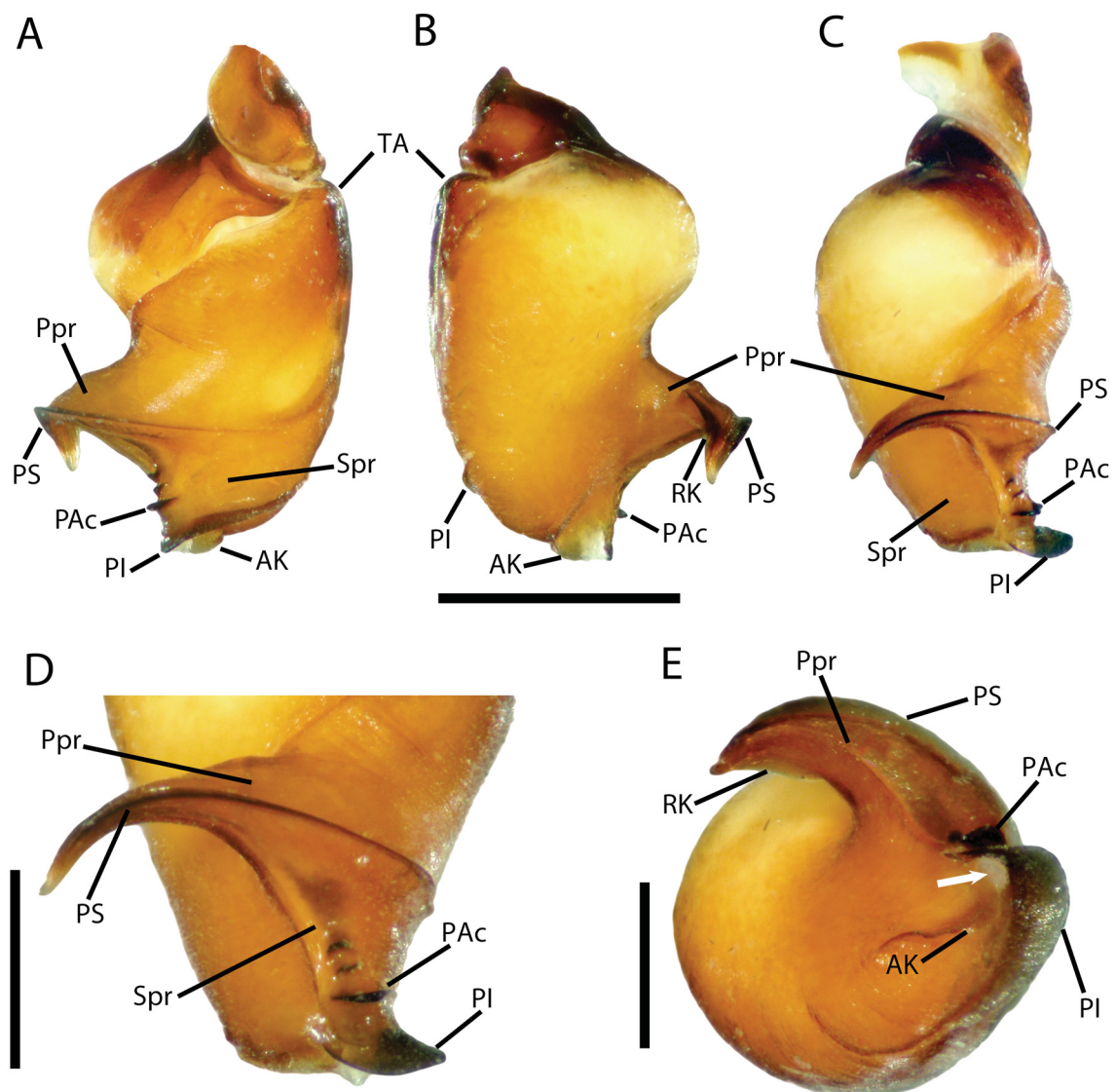
**Type material**

**Holotype**

MEXICO: ♂, Jalisco, Zapopan, Bosque de la Primavera, 10 Oct. 2012, coll. R. Orozco (CNAN-T0995).

**Paratypes**

MEXICO: 4 ♀♀, 1 ♂, Jalisco, Zapopan, Bosque de la Primavera, 20 Aug. 2010, coll. J. Mendoza (females: CNAN-T0996, CNAN-T0999, CNAN-T1000 and CNAN-T1001; male: CNAN-T0998); 1 ♂, Jalisco, Zapopan, Carr. A Colotlán, casi llegando a Huaxtla, Oct. 2013, coll. G. Vila. (CNAN-T0997); 1 ♂, Jalisco, Zapopan, Bosque de la Primavera, 21 Sep. 2013, coll. J. Mendoza (NHM).



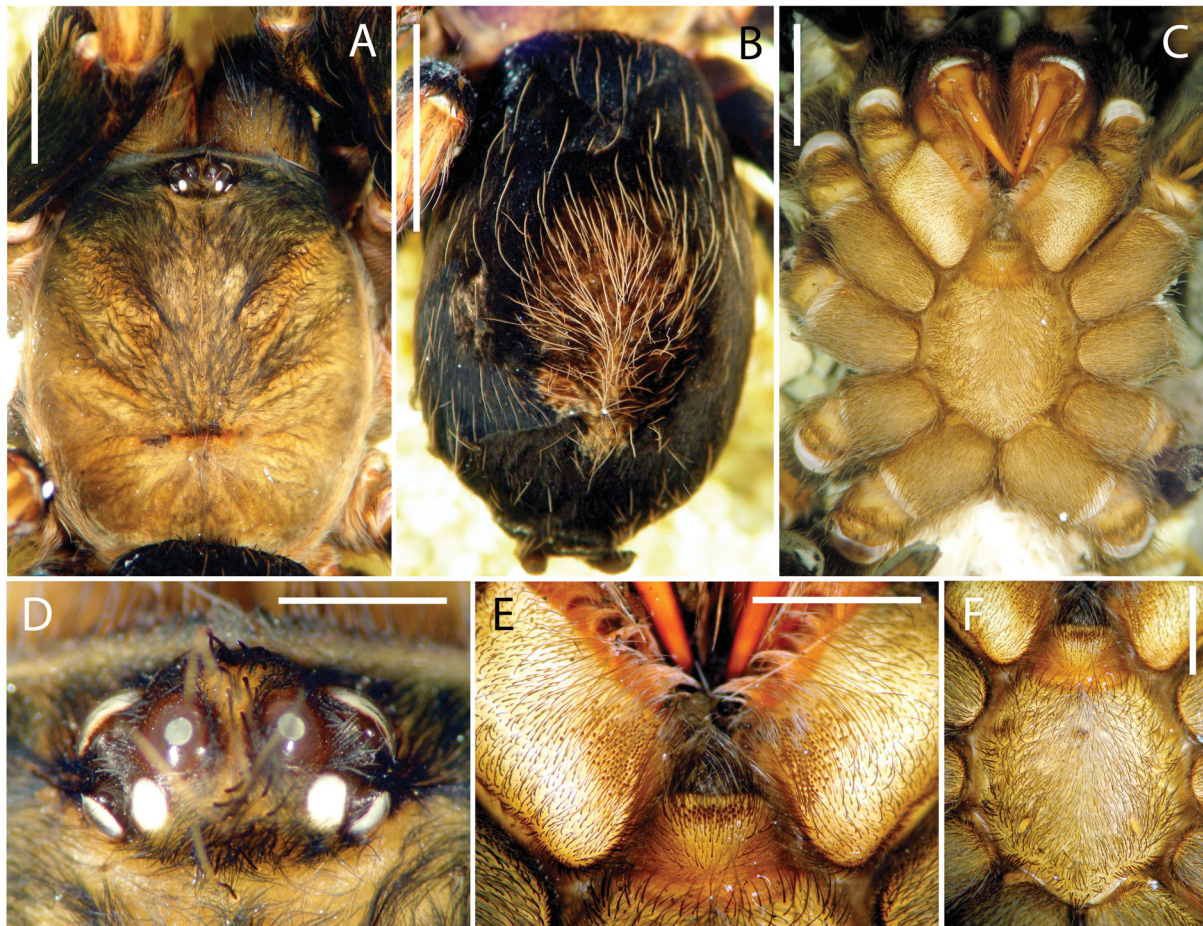
**Fig. 9.** *Magnacarina primaverensis* Mendoza & Locht sp. nov., ♂, holotype (CNAN-T0995), right palpal bulb. **A.** Prolatateral view. **B.** Retrolateral view. **C.** Dorsal view. **D.** Apex, dorsal view. **E.** Apex, apical view. White arrow indicates sperm pore. Scale bars: A–C = 1 mm; D–E = 0.5 mm.



## Description

### Holotype male CNAN-T0995 (Figs 8–9, 12A)

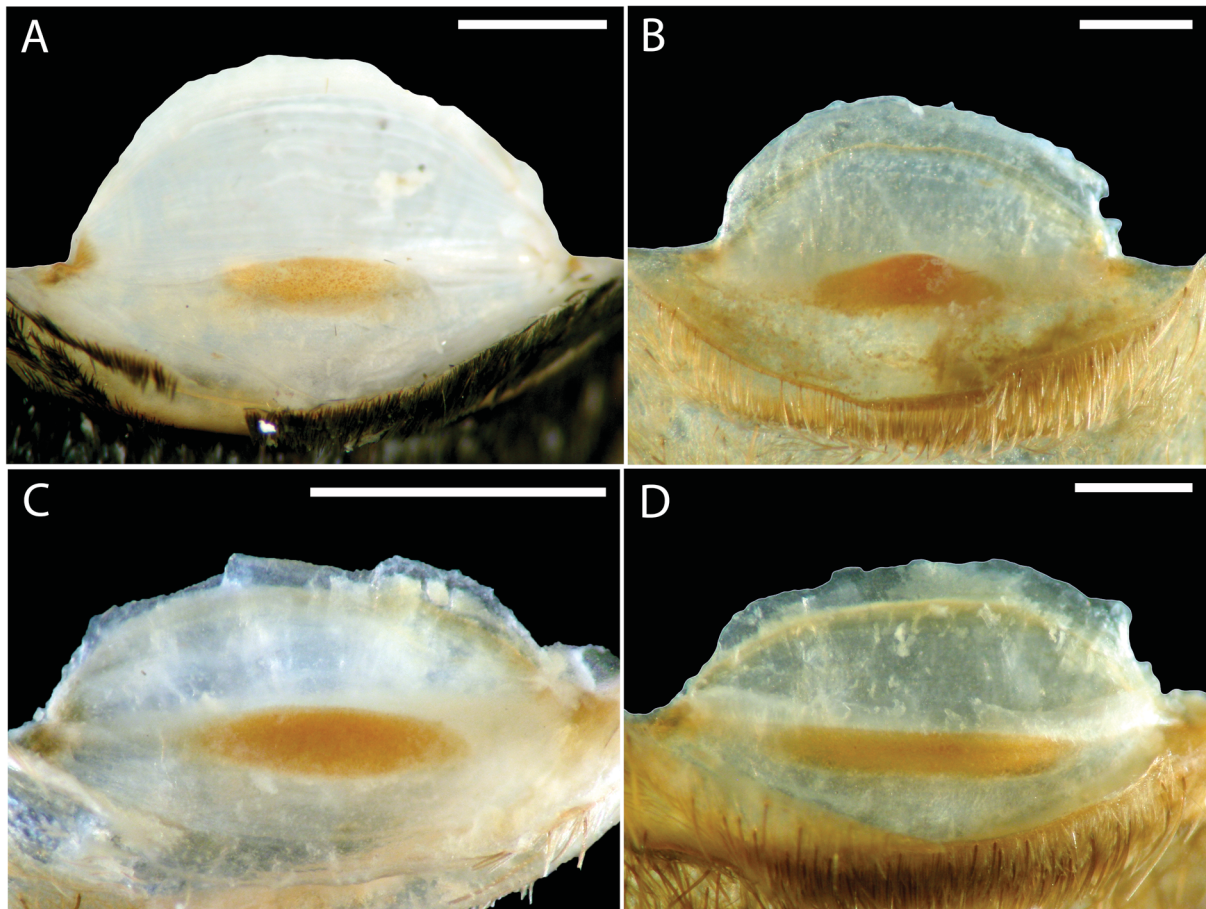
Body length (not including chelicerae and spinnerets) 16.39, carapace: 7.48 long, 6.44 wide. Caput not markedly elevated; fovea straight, 1.00 wide. Carapace with orange sheen setae and dark cephalic area (Fig. 8A). Eyes: anterior eye row procurved, posterior eye row, recurved. Eyes sizes and interocular distances: AME 0.325; ALE 0.275; PME 0.20; PLE 0.25; AME–AME 0.15; AME–ALE 0.05; PME–PME 0.50; PME–PLE 0.025; ALE–PLE 0.075. Ocular tubercle, width 1.05; length 0.875; clypeus 0.075 (Fig. 8D). Labium: length 0.5; width 1.30; with 72 cuspules. Maxilla inner corner with approximately 136–133 (left–right). Cheliceral promargin with 8–8 (left–right) teeth. Sternum length 3.35. Sigilla circular, only third pair hardly visible; posterior sigilla one and half times its length from the margin (Fig. 8B). Leg formula: IV > I > III > II. Length of legs and palpal segments (femur, patella, tibia, metatarsus, tarsus, total): I: 6.69, 3.46, 4.58, 4.71, 3.61, 23.05; II: 5.48, 3.25, 3.66, 4.37, 3.34, 20.1; III: 4.87, 3.09, 3.67, 4.97, 3.55, 20.15; IV: 6.40, 3.13, 5.47, 7.34, 4.28, 26.62. Palp: 4.25, 2.97, 3.75, -, 2.05, 13.02. Spinnerets: PMS, 1.03 long, 0.43 apart; PLS, 1.60 basal, 1.00 middle, 1.27 distal. Tarsi I–IV scopulate, II and III divided by narrow band of setae, IV divided by strong band of setae. Metatarsi I densely scopulate; II scopulate on distal two thirds, III scopulate on distal half and IV scopulate on distal third. Tibia I with three apophyses. Prolateral apophysis with one short and stout inner spine shorter than its length (Fig. 8F).



**Fig. 10.** *Magnacarina primaverensis* Mendoza & Locht sp. nov., ♀, paratype (CNAN-T0996). **A.** Carapace, dorsal view. **B.** Opisthosoma, dorsal view. **C.** Prosoma, ventral view. **D.** Ocular tubercle, dorsal view. **E.** Labial and maxillary cuspules, ventral view. **F.** Sternum, ventral view. Scale bars: A–C = 4 mm; E–F = 2 mm; D = 1 mm.

Retrolateral apophysis normally developed, slender and slightly curved to dorsal (Fig. 8E). Accessory apophysis barely developed, bearing five large megaspines at its apex (Fig. 8E). Metatarsus I curved (Fig. 8H), with retrolateral megaspines nodule with 14 large spines, stout at base and tapering apically (Fig. 8I). Retrolateral face of palpal tibiae with a short process, poorly developed on distal third (Fig. 8G). Chaetotaxy (left side): femora I 1p; II 1p; III 1p, 1r; IV 1r; palp 1p; patellae none; tibiae I 1p, 4v; II 2p, 5v; III 2p, 5v, 2r; IV 5v, 2r; palp none; metatarsi: I 1v; II 1p, 7v; III 4p, 7v, 2r; IV 3p, 7v, 2r. Palpal bulb with a prominent primary projection strongly curved retrolaterally with distal half twisted to apical. Retrolateral keel thin and well developed. Prolateral superior keel well developed, posterior extension ends almost on the back face of palpal bulb (Fig. 9A–B, E). Secondary projection short and wide, with three to six prolateral accessory keels well developed increasing in size from proximal to distal (Fig. 9C–D). Prolateral inferior keel wide, increasing from back to front, distal end slightly oriented to apical (Fig. 9A, C–D). Apical keel well developed, wider in the middle, covering the sperm pore which opens towards prolateral face (Fig. 9E). Tegular apophysis slightly developed (Fig. 9A–B). Urticating setae of type III arranged in one dorsomedian patch, with copper metallic iridescence (Fig. 8C, 12A). Variations summarized in Table 2.

Color pattern: In live specimens, carapace slightly orange with black cephalic area; ventral coxae, labium, maxillae and sternum dark brown; abdomen dorsally black with reddish setae and dorsomedian patch of copper-colored urticating setae, ventrally black. Legs and palps: femur with dark blue iridescence, patellae orange, tibiae, metatarsi and tarsi black (Fig. 12A).



**Fig. 11.** *Magnacarina primaverensis* Mendoza & Locht sp. nov., spermatheca, ventral view. **A.** ♀, paratype (CNAN-T0996). **B.** ♀, paratype (CNAN-T0999). **C.** ♀, paratype (CNAN-T1001). **D.** ♀, paratype (CNAN-T1000). Scale bars = 1 mm.

**Table 2.** *Magnacarina primaverensis* Mendoza & Locht sp. nov. and *Magnacarina moderata* Locht, Mendoza & Medina sp. nov. Variations of some quantitative characters in the specimens of the type series. Measurements in mm. Hyphens represents the interval between the lowest and highest value of each character. When left and right side values were taken, it was indicated as (left/right).

Specimens measurements	<i>Magnacarina primaverensis</i> sp. nov.		<i>Magnacarina moderata</i> sp. nov.	
	Males (3)	Females (4)	Male (1)	Females (2)
Total length	13.79–16.39	18.92–26.67	15.19	14.5–18.18
Carapace length	6.64–7.84	7.78–11.82	7.31	6.82–6.85
Carapace width	6.32–6.47	5.99–10.16	5.42	5.21–5.60
Sternum length	2.93–3.6	3.37–5.20	3.07	2.70–3.10
Sternum width	2.7–2.9	3.27–5.0		2.80–3.0
Labium length	0.5–0.93	1.60–2.15	0.90	0.93
Labium width	1.10–1.33	0.93–1.30	1.175	1.30–1.50
Cheliceral teeth (left/right)	7–8/8–10	8–10/7–10	9	8–9/9
Labial cuspules	48–72	35–56	58	62–75
Maxillary cuspules (left/right)	106–136/85–133	93–206/104–200	115/119	134–164/123–163
Spermatheca length medially	–	0.20–0.34	–	0.16–0.20
Spermatheca base width	–	0.86–1.40	–	0.60–0.66
Accessorial apophysis spines (left side)	3–5	–	4	–
Number of megaspines in nodule (left side)	12–14	–	–	–

**Paratype female CNAN-T0996** (Figs 10, 11A, 12B)

Body length (not including chelicerae and spinnerets) 26.67, carapace: 11.82 long, 10.16 wide. Caput not markedly elevated; fovea straight, 2.10 wide. Carapace with orange sheen setae and dark cephalic area (Fig. 10A). Eyes: anterior eye row procurved, posterior eye row recurved. Eyes sizes and interocular distances: AME: 0.325; ALE: 0.525; PME: 0.325; PLE: 0.325; AME–AME: 0.30; AME–ALE: 0.15; PME–PME: 0.825; PME–PLE: 0.075; ALE–PLE: 0.225. Ocular tubercle, width 1.85; length 1.30; clypeus 0.2 (Fig. 10D). Labium: length 1.3; width 2.15; with 35 cuspules. Maxilla inner corner with approximately 162–152 (left–right) (Fig. 10E). Cheliceral promargin with 10–10 (left–right) teeth. Sternum length 5.20. Sigilla oval, first to third pairs hardly visible; posterior sigilla one and half times its length from the margin (Fig. 10C, F). Leg formula: IV > I > II > III. Length of legs and palpal segments (femur, patella, tibia, metatarsus, tarsus, total): I: 8.03, 5.13, 5.62, 4.60, 3.46, 26.84; II: 6.98, 4.50, 4.83, 4.59, 3.16, 24.06; III: 6.38, 3.81, 4.48, 5.42, 3.58, 23.67; IV: 8.26, 4.26, 5.66, 7.83, 4.63, 30.64. Palp: 6.17, 3.67, 3.90, –, 3.51, 17.25. Spinnerets: PMS, 1.07 long, 0.33 apart; PLS, 2.27 basal, 1.40 middle, 2.3 distal. Tarsi I–IV scopulate, II and III divided by narrow band of setae, IV divided by strong band of setae. Metatarsi I densely scopulate; II scopulate on distal two thirds, III scopulate on distal half, and IV scopulate on distal third. Chaetotaxy (left side): femora II 1p; III 1p, 1r; palp 1p; patellae none; tibiae II 1p, 2v; III 2p, 4v, 2r; IV 4v, 2r; palp 5v; metatarsi I 1v; II 5v; III 4p, 6v, 2r; IV 3p, 8v, 2r.

Spermatheca reduced, low with one single semicircular receptacle, strongly sclerotized. Uterus externus is twice wider, and five times longer than the spermatheca (Fig. 11A). Variation: spermatheca medially longer. Also can be lower but twice wider than normally seen (Fig. 11B–D). Urticating setae of type III, arranged in one dorsomedian patch, with copper metallic iridescence (Fig. 10B, 12B). Variations summarized in Table 2.

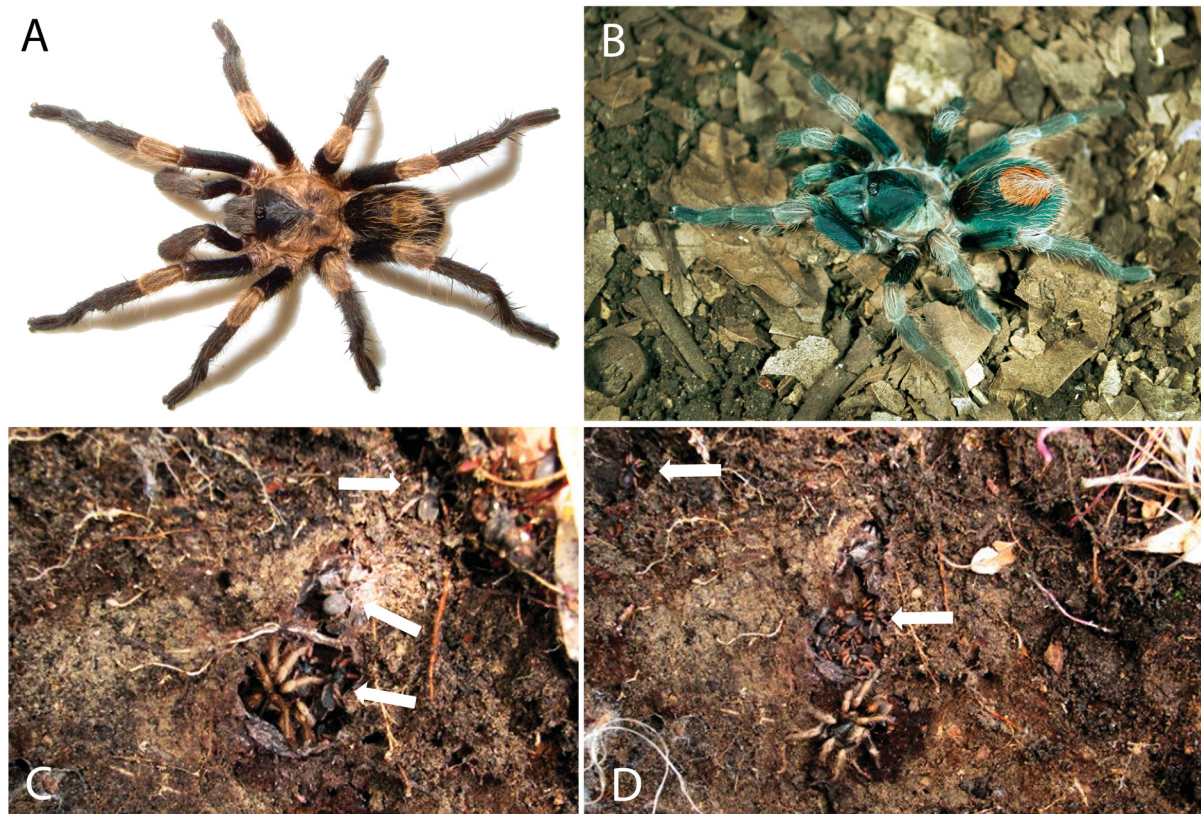
Color pattern: In live specimens, carapace slightly orange with black cephalic area; ventral coxae, labium, maxillae and sternum dark brown; abdomen dorsally black with reddish setae and dorsomedian patch of copper-colored urticating hairs, ventrally black. Legs and palps: femur with dark blue iridescence, patellae orange, tibiae, metatarsi and tarsi black (Fig. 12B).

### Color pattern

Color pattern of these spiders changes during their development. Spiderlings of *M. primaverensis* sp. nov. have a black carapace; the abdomen dorsum is dark with a central patch of urticating hairs. All the femora are black; patellae, tibia, metatarsi and tarsi are orange in color (2<sup>nd</sup> to 6<sup>th</sup> instar). In larger stadia, the carapace is dark brown with larger black cephalic area; the rest of the body remains as spiderling color (7<sup>th</sup> to 8<sup>th</sup> instar). As the individuals grow, the carapace becomes orange with black cephalic area; the abdomen dorsum develops a few red setae; palps and legs show dark blue iridescent color on femora, patellae becomes orange in color; and tibiae, metatarsi and tarsi become black (9<sup>th</sup> instar onwards). This last coloration is stronger in adults, especially in males. Recently molted specimens have more vivid colors as observed in other theraphosids. In pre-molting individuals, colors are more opaque.

### Distribution and natural history

Known only from the Natural Protected Area “Bosque de la Primavera”, near Jalisco, México (Fig. 16). All the spiders were found during daytime in a primary forest protected area. They live under rocks in shallow scrapes. The spiders are more difficult to find during the dry season. One of the females was found with a group of 25 spiderlings, with a legspan of 2.5 cm, suggesting that the spiderlings remain with the mother for a few months (Fig. 12C–D). Since there were no systematic collecting efforts to estimate the size of the population, the density of the distribution cannot be ascertained. The area is under increasing pressure from human activities of the nearby city of Guadalajara, and it is possible that the only existing population is in the protected area of “Bosque de la Primavera”.



**Fig. 12.** *Magnacarina primaverensis* Mendoza & Locht sp. nov., habitus. **A.** ♂, holotype (CNAN-T0995). **B.** ♀, paratype (CNAN-T0996). **C–D.** Habitat burrow, white arrows indicates location of spiderlings. Photos: J. Mendoza (A, B); G. Vila (C, D).

*Magnacarina moderata* Locht, Mendoza & Medina sp. nov.  
[urn:lsid:zoobank.org:act:74AF9502-86F8-4A92-B782-1A50555D8BD4](https://zoobank.org/act:74AF9502-86F8-4A92-B782-1A50555D8BD4)

Figs 13–16

### Diagnosis

*Magnacarina moderata* sp. nov. differs from all other *Magnacarina* species in lacking retrolateral nodule of megaspines and having only one prolateral accessory keel well developed. *Magnacarina moderata* sp. nov. also differs in possessing a secondary projection that is thinner and larger than that of the other species, with a short and apically directed prolateral inferior keel. Females differ in carapace distinctly larger than wide.

*Magnacarina moderata* sp. nov. possesses the following character combination: male palpal bulb with a prominent primary projection strongly curved retrolaterally, with distal half slightly apically directed (Fig. A–C); retrolateral keel thin and slightly developed. Prolateral superior keel wide along its entire length, posterior extension ends almost in the middle of prolateral face (Fig. 14D–E); secondary projection is elongated and directed to apical, with one prolateral accessory keel well developed (Fig. 14C–D). Prolateral inferior keel wide, divided in two sections, increasing from back to front and distal end oriented to apical (Fig. 14A–B, D). Apical keel well developed, wider distally. Sperm pore is located between prolateral inferior and apical keels (Fig. 14D–E). Accessory apophysis slightly developed, bearing large megaspines at the apex (Fig. 13G–H). Metatarsus I lacking retrolateral nodule of megaspines (Fig. 13H). Spermatheca reduced, low, with one single receptacle oval in shape, strongly sclerotized. Uterus externus is three times wider, and four to five times longer than the spermatheca (Fig. 15E–F).

### Etymology

The specific epithet is the latinized version of “moderate”, *moderatus* fem. *moderata*, referring to the shape of the secondary projection in the male palpal bulb which is moderately elongated and thinner than in other species.

### Type material

#### Holotype

MEXICO: ♂, Nayarit, Acaponeta, 14 Nov. 1939, coll. C.M. Bogert and H.E. Vokes (CNAN-T1003).

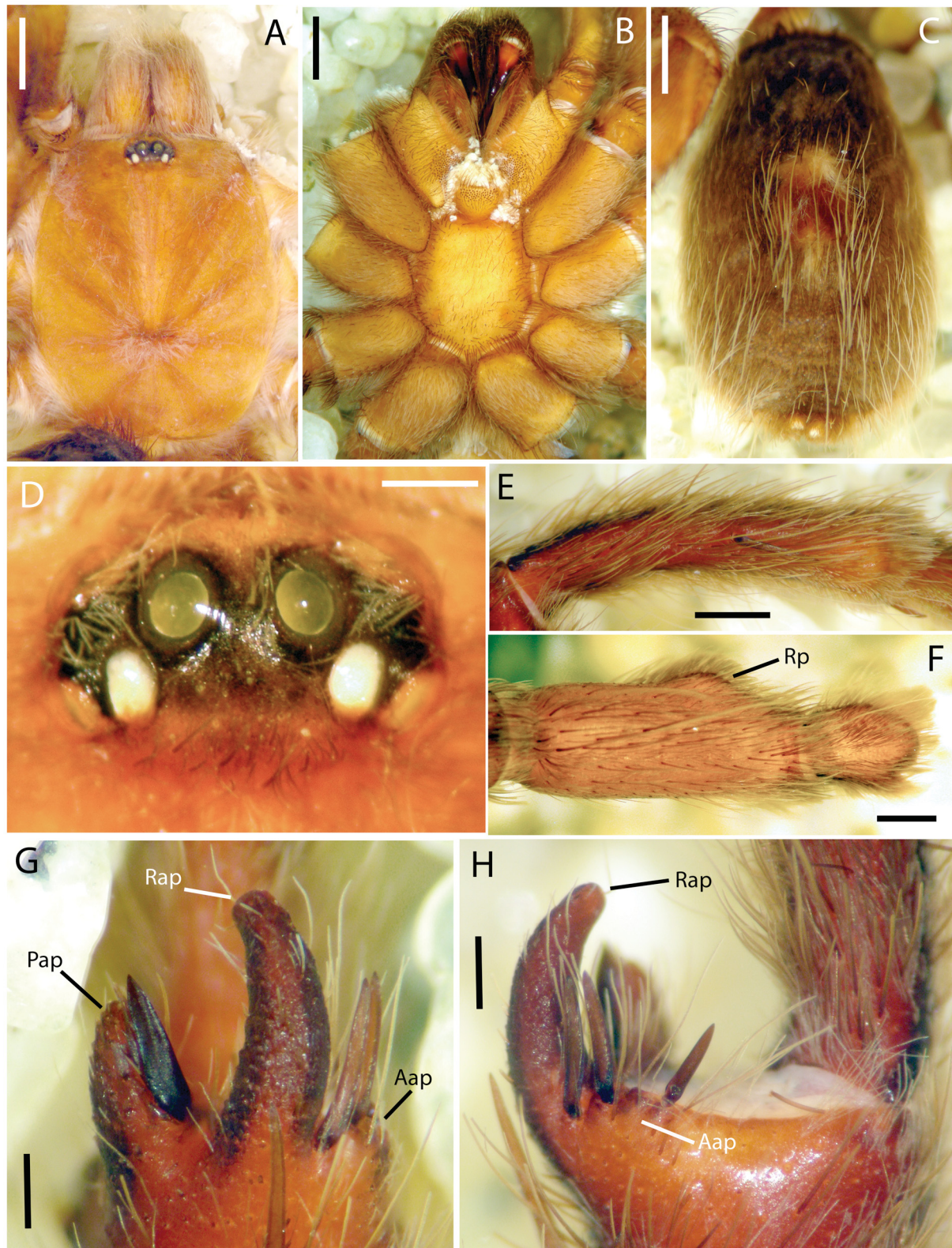
#### Paratypes

MEXICO: 2 ♀♀, Sinaloa, 70 mi South of Mazatlan, 24 Jul. 1954, coll. W.J. Gertsch (CNAN-T1004 and AMNH).

### Description

#### Holotype male CNAN-T1003 (Figs 13–14)

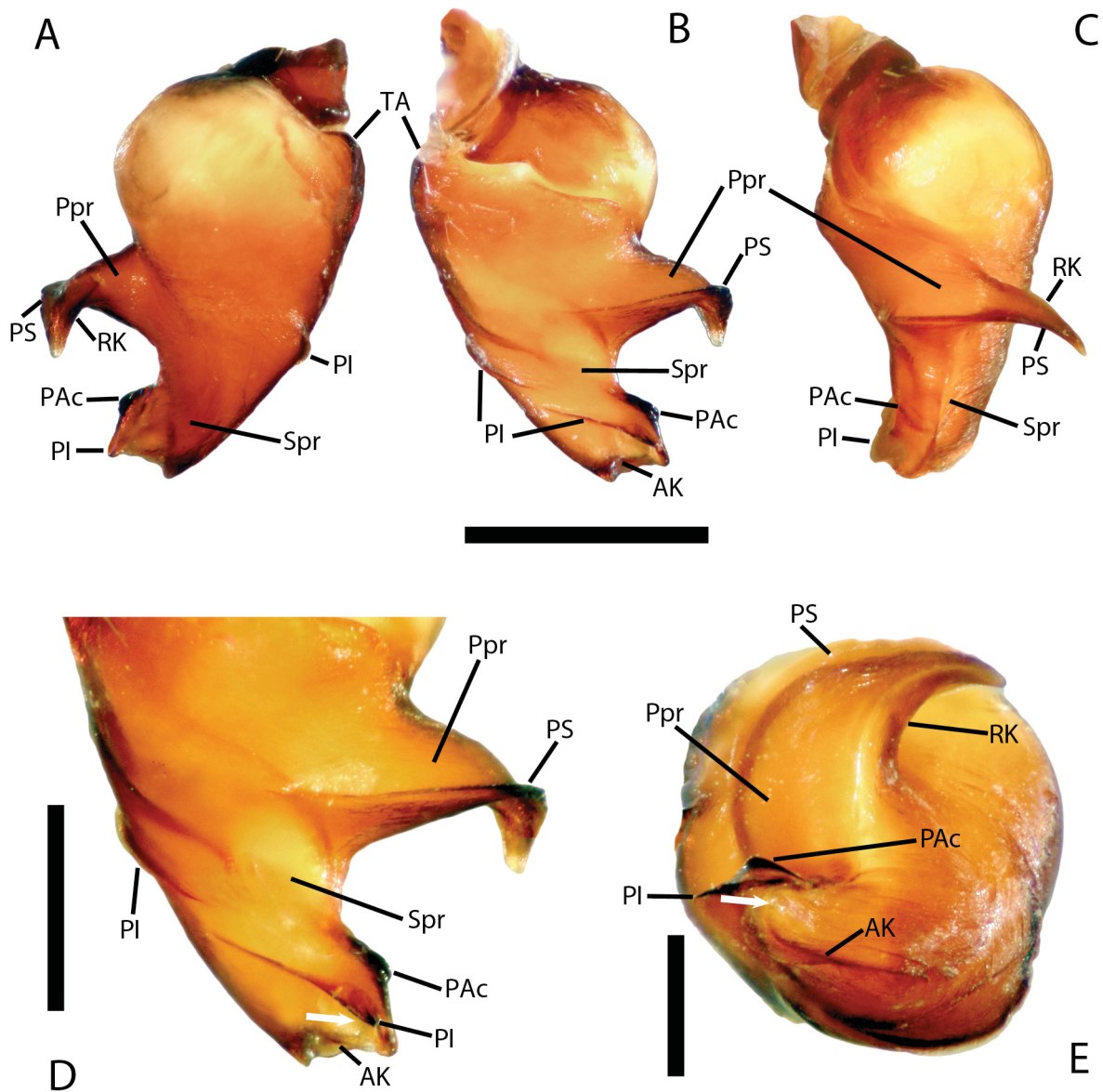
Body length (not including chelicerae and spinnerets) 15.19, carapace: 7.31 long, 5.42 wide. Caput not markedly elevated; fovea procurved, 1.33 wide. Carapace with orange sheen setae (Fig. 13A). Eyes: anterior eye row procurved, posterior eye row, recurved. Eyes sizes and interocular distances: AME 0.24; ALE 0.32; PME 0.18; PLE 0.22; AME–AME 0.12; AME–ALE 0.08; PME–PME 0.46; PME–PLE 0.02; ALE–PLE 0.16. Ocular tubercle, width 1.18; length 0.84; clypeus 0.12 (Fig. 13D). Labium: length 0.90; width 1.175; with 58 cuspules. Maxilla inner corner with approximately 115–119 (left–right). Cheliceral promargin with 9–9 (left–right) teeth. Sternum length 3.07. Sigilla circular, second and third pairs hardly visible; posterior sigilla half its length from the margin (Fig. 13B). Leg formula: IV > I > III > II. Length of legs and palpal segments (femur, patella, tibia, metatarsus, tarsus, total): I: 5.29, 3.29, 3.41, 4.25, 2.26, 18.50; II: 4.71, 3.08, 3.33, 3.30, 2.64, 17.06; III: 4.18, 2.66, 3.03, 3.44, 2.55, 15.86; IV: 5.78, 3.13, 4.43, 4.95, 3.10, 21.39. Palp: 3.96, 2.82, 3.26, -, 1.29, 11.33. Spinnerets: PMS, 0.53 long,



**Fig. 13.** *Magnacarina moderata* Locht, Mendoza & Medina sp. nov., ♂, holotype (CNAN-T1003). **A.** Carapace, dorsal view. **B.** Prosoma, ventral view. **C.** Opisthosoma, dorsal view. **D.** Ocular tubercle, dorsal view. Left side: **E.** Metatarsus I. Prolateral view. **F.** Palpal tibia, dorsal view. **G.** Tibial apophyses, ventral view. **H.** Tibial apophyses, retrolateral view. Scale bars: A–C = 2 mm; E–F = 1 mm; D, G–H = 0.5 mm.

0.20 apart; PLS, 0.97 basal, 0.63 middle, 1.10 distal. Tarsi I–IV scopulate, I and II divided by narrow band of setae, III and IV divided by strong band of setae. Metatarsi I scopulate on distal two thirds; II scopulate on distal half, III scopulate on distal half, and IV scopulate on distal fourth.

Tibia I with three apophyses, prolateral apophysis with one inner larger spine (Fig. 13G). Retrolateral apophysis slightly curved to dorsal (Fig. 13G, H). Accessory apophysis slightly developed, bearing four large megaspines at its apex (Fig. 13H). Metatarsus I curved (Fig. 13E), lacking retrolateral megaspines nodule (Fig. 13H). Retrolateral face of palpal tibiae with a short process, slightly developed on distal half (Fig. 13F). Chaetotaxy (left side): femora I 1p; II 1p; III 1r; IV 2r; palp none; patellae none; tibiae I



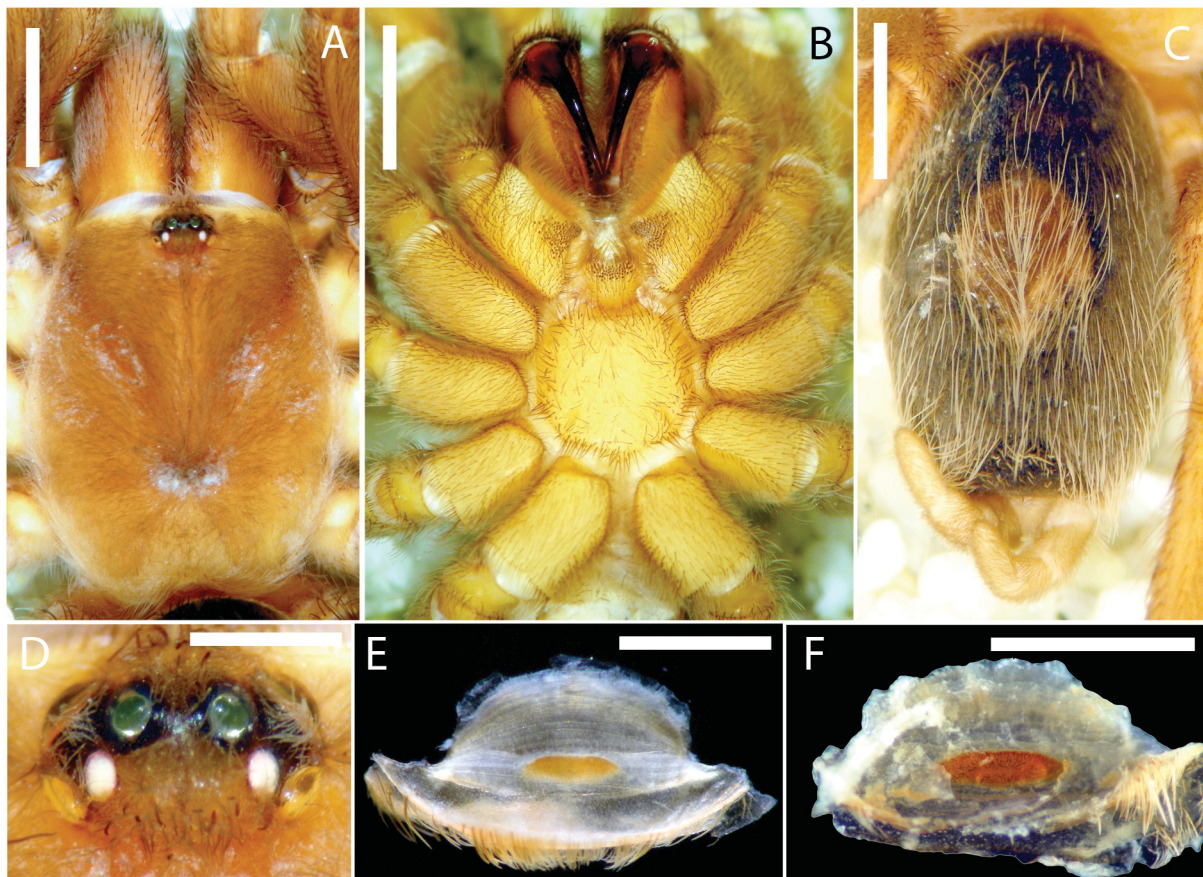
**Fig. 14.** *Magnacarina moderata* Locht, Mendoza & Medina sp. nov., ♂, holotype (CNAN-T1003), left palpal bulb. **A.** Prolateral view. **B.** Retrolateral view. **C.** Dorsal view. **D.** Apex, dorsal view. **E.** Apex, apical view. White arrow indicates sperm pore. Scale bars: A–C = 1 mm; D–E = 0.5 mm.

3p, 4v; II 3p, 8v; III 2p, 7v, 3r; IV 9v, 4r; palp none; metatarsi: I 1p, 2v; II 3p, 8v; III 3p, 8v, 2r; IV 2p, 8v, 2r. Palpal bulb with a prominent primary projection strongly curved retrolaterally, with distal half slightly twisted to apical (Fig. A–C). Retrolateral keel thin and slightly developed. Prolateral superior keel wide along its entire length, posterior extension ends almost in the middle of prolateral face (Fig. 14D–E). Secondary projection elongated with one prolateral accessory keel well developed (Fig. 14B, D). Prolateral inferior keel wide, divided in two sections, increasing from back to front, distal end oriented to apical (Fig. 14A–B, D). Apical keel well developed, wider distally. Sperm pore is located between prolateral inferior and apical keels, and opens towards prolateral face (Fig. 14D–E). Tegular apophysis slightly developed (Fig. 14A–B). Urticating setae of type III arranged in one dorsomedian patch, with copper metallic iridescence (Fig. 13C). Variations summarized in Table 2.

Color pattern: damaged by preservation in ethanol, carapace tegument looks yellowish; ventral coxae, labium, maxillae and sternum brown; abdomen dorsally brown with yellowish setae, ventrally brown. Urticating setae with copper metallic iridescence. Legs and palps: brownish.

**Paratype female CNAN-T1004** (Fig. 15A–E)

Body length (not including chelicerae and spinnerets) 14.50, carapace: 6.85 long, 5.60 wide. Caput not markedly elevated; fovea procurved, 1.17 wide. Carapace with orange sheen setae (Fig. 15A). Eyes: anterior eye row procurved, posterior eye row, recurved. Eyes sizes and interocular distances: AME 0.225;



**Fig. 15.** *Magnacarina moderata* Locht, Mendoza & Medina sp. nov. A–E. ♀, paratype (CNAN-T1004). A. Carapace, dorsal view. B. Prosoma, ventral view. C. Opisthosoma, dorsal view. D. Ocular tubercle, dorsal view. E. Spermatheca, ventral view. F. ♀, paratype (AMNH), spermatheca, ventral view. Scale bars: A–C = 2 mm; E–F = 1 mm; D = 0.5 mm.

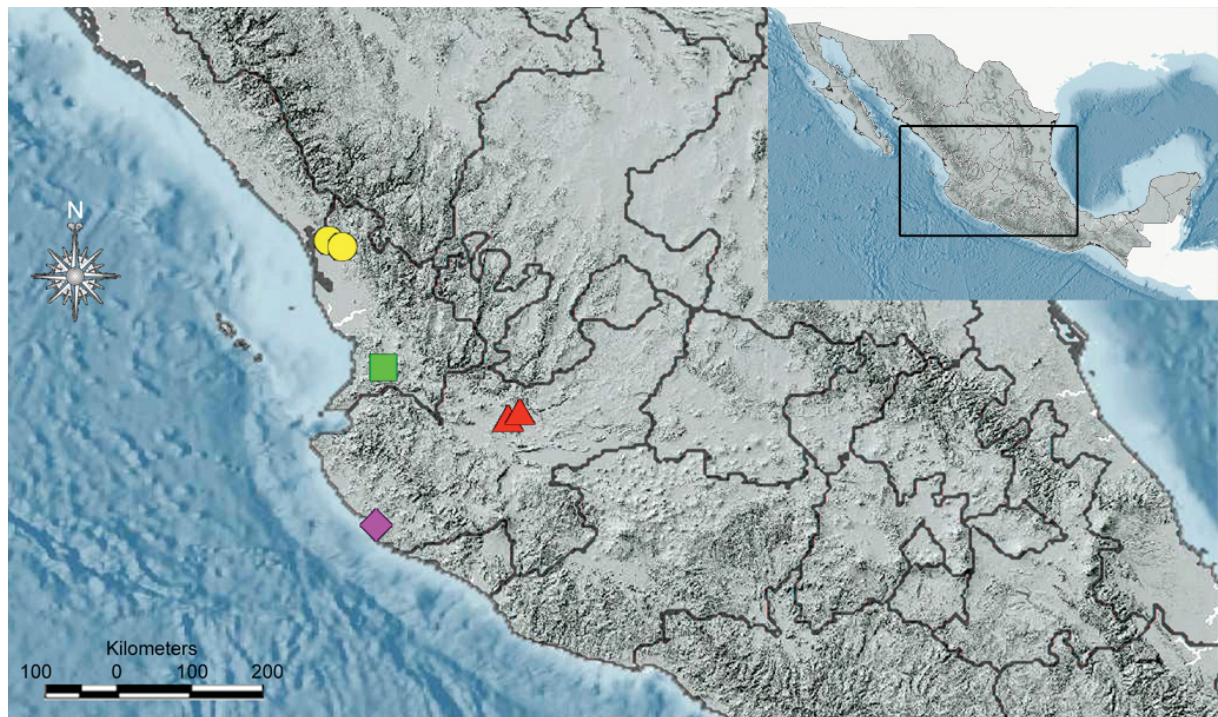


ALE 0.35; PME: 0.125; PLE: 0.275; AME–AME: 0.175; AME–ALE: 0.075; PME–PME: 0.55; PME–PLE: 0.025; ALE–PLE: 0.10. Ocular tubercle, width 1.225; length 0.95; clypeus lacking (Fig. 15D). Labium: length 0.93; width 1.50; with 62 cuspules. Maxilla inner corner with approximately 134–123 (left–right). Cheliceral promargin with 9–9 (left–right) teeth. Sternum circular, length 3.10. Sigilla oval, second and third pair hardly visible; posterior sigilla once its length from the margin (Fig. 15B). Leg formula: IV > I > II > III. Length of legs and palpal segments (femur, patella, tibia, metatarsus, tarsus, total): I: 4.75, 3.17, 3.44, 2.53, 2.28, 16.17; II: 4.11, 2.93, 2.55, 2.39, 2.36, 14.34; III: 3.46, 2.43, 2.45, 2.90, 2.24, 13.48; IV: 4.99, 2.82, 3.85, 4.16, 3.05, 18.87. Palp: 3.43, 2.43, 2.29, -, 2.79, 10.94. Spinnerets: PMS, 0.87 long, 0.43 apart; PLS, 1.63 basal, 0.90 middle, 1.03 distal. Tarsi I–IV densely scopulate, I and II divided by narrow band of setae, III and IV divided by strong band of setae. Metatarsi I densely scopulate; II scopulate on distal two thirds, III scopulate on distal half, and IV scopulate on distal fourth. Chaetotaxy (left side): femora I 1p; II 1p; III 1p, 1r; IV 1r; palp 1p; patellae none; tibiae II 1v; III 2p, 4v, 2r; IV 5v, 2r; palp 3v; metatarsi I 2v; II 4v; III 3p, 7v, 2r; IV 3p, 9v, 2r. Spermatheca fused, low with one single receptacle oval in shape, strongly sclerotized. Uterus externus is three times wider, and four to five times longer than the spermatheca (Fig. 15E–F). Urticating setae of type III, arranged in one dorsomedian patch, with copper metallic iridescence (Fig. 15C). Variations summarized in Table 2.

Color pattern: damaged by preservation in ethanol, carapace tegument looks yellowish; ventral coxae, labium, maxillae and sternum brown; abdomen dorsally brown with yellowish setae, ventrally brown. Urticating setae with copper metallic iridescence. Legs and palps: brownish.

### Distribution

Known only from the border area between the states of Nayarit and Sinaloa (Fig. 16), this species inhabits scrapes under rocks in deciduous forest.



**Fig. 16.** Distribution map identifying known records of *Magnacarina* gen. nov. species in Mexico: Jalisco, Nayarit and Sinaloa states. ■ = *M. aldana* (West, 2000); ▲ = *M. primaveraensis* Mendoza & Locht sp. nov.; ◆ = *M. cancer* Mendoza & Locht sp. nov.; ● = *M. moderata* Locht, Mendoza & Medina sp. nov.

## Discussion

West (2000) described *Hapalopus aldanus* and placed it in the genus, based on the shape of the male palpal bulb, the presence of a basoventral tubercle on metatarsus I, and the shape of the monolobed spermatheca. Unfortunately, he based his comparison with the male type of *Hapalopus formosus* (Ausserer, 1875) only on the illustrations by Gerschman & Schiapelli (1973) and suggested a continued study of male *Hapalopus* congeners. We have reviewed the material of all other known Mexican theraphosids with the type III urticating setae (i.e., *Bonnetina*, *Cardiopelma*, *Davus* and *Schizopelma*), and also the South American genera *Cyriocosmus* and *Hapalopus* for better comparison of morphological features. One of the most important challenges of this study was determining the homology of male palpal bulb keels and projections. The bulb of *Magnacarina* gen. nov. is characterized by two unique projections: a primary projection with PS and RK keels, and a secondary projection with PI and AK keels. As the PS and PI keel generally occur on the embolus only (Bertani 2000), it is considered that this new taxon has a bifid embolus.

Although the position of the keels and their designation in bulbs of *Bonnetina*, *Schizopelma*, *Davus* and *Cardiopelma* seem to be clear and straightforward, in order to fit *Magnacarina* gen. nov. into this taxonomic scheme we must accept that the Ppr is an embolar projection formed by the fusion of PS and RK keels. Consequently, the Spr is extremely short, and a wide embolus carrying PI keel, AK keel and PAc keels in some cases. The male palpal bulb morphology in *Bonnetina*, *Schizopelma*, *Davus* and *Cardiopelma* is relatively congruent with this interpretation; additionally, the PI keel bears teeth (*Bonnetina*) or a developed subapical tooth (*Schizopelma*, *Davus*, *Cardiopelma*). A “ring-shaped” structure of PI and AK keels was observed in *Cardiopelma*, with the sperm pore between PI and AK keels, similar to that of *Hapalopus*; this corresponds with the position of the sperm pore in *Magnacarina* species, located between PI and A keels. Based on the morphological evidence, we consider our proposed homologies for keels is correct. Additionally, the naming of the new structures Ppr and Spr is necessary as nothing similar to these structures has been previously described.

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## References

- Bertani R. 2000. Male palpal bulbs and homologous features in Theraphosinae (Araneae, Theraphosidae). *Journal of Arachnology* 28 (1): 29–42.
- Bertani R. 2001. Revision, cladistic analysis, and zoogeography of *Vitalius*, *Nhandu*, and *Proshapalopus*; with notes on other theraphosine genera (Araneae, Theraphosidae). *Arquivos de Zoologia* 36 (3): 265–356.

- Estrada-Alvarez J.C. 2014. New data from mygalomorph spiders (Araneae: Mygalomorphae) of Estado de Mexico, with taxonomic comments about the genus *Davus* O. Pickard-Cambridge, 1892. *Dugesiana* 21: 55–66.
- Gerschman B.S. & Schiapelli R.D. 1973. La subfamilia Ischnocolinae (Araneae, Theraphosidae). *Revista del museo Argentino de ciencias naturales 'Bernardino Rivadavia'* 4: 42–77.
- Goloboff P.A. 1995. *A revision of the South American spiders of the family Nemesiidae (Araneae, Mygalomorphae)*. Part I. *Species from Peru, Chile, Argentina, and Uruguay*. Bulletin of the American Museum of Natural History 224, American Museum of Natural History, New York.
- Locht A., Medina F., Rojo R. & Vázquez I. 2005. Una nueva especie de tarántula del género *Aphonopelma* Pocock 1901 (Araneae, Theraphosidae, Theraphosinae) de México con notas sobre el género *Brachypelma* Simon 1891. *Boletín de la Sociedad Entomológica Aragonesa* 37: 105–108.
- Locht A. 2008. *Estudio sobre la sistemática y distribución de la familia Theraphosidae (Arachnida, Araneae) en México*. Master thesis, Facultad de Ciencias, Universidad Nacional Autónoma de México, México City.
- Locht A. & Medina F. 2008. Una nueva especie de tarántula del género *Bonnetina* Vol, 2000 (Araneae, Theraphosidae, Theraphosinae), de México. *Boletín de la Sociedad Entomológica Aragonesa* 43: 45–48.
- Mendoza J.I. 2012a. *Bonnetina papalutlensis* a new species of tarantula from Guerrero, Mexico, with notes on reproduction (Araneae, Theraphosidae, Theraphosinae). *Revista Ibérica de Aracnología* 20: 57–62.
- Mendoza J.I. 2012b. *Cotztetlana omiltemi*, a new genus and species of tarantula from Guerrero, México (Araneae, Theraphosidae, Theraphosinae). *Arthropoda Scientia* 2: 2–7.
- Mendoza J.I. 2014a. Taxonomic revision of *Hemirrhagus* Simon, 1903 (Araneae: Theraphosidae, Theraphosinae), with description of five new species from Mexico. *Zoological Journal of the Linnean Society* 170 (4): 634–689. <http://dx.doi.org/10.1111/zoj.12112>
- Mendoza J.I. 2014b. *Psalmopoeus victori*, the first arboreal theraphosid spider described for Mexico (Araneae: Theraphosidae: Aviculariinae). *Revista Mexicana de Biodiversidad* 85 (3): 728–735. <http://dx.doi.org/10.7550/rmb.44597>
- Ortíz D. & Francke O. 2014. Two new species of *Bonnetina* tarantulas (Theraphosidae: Theraphosinae) from Mexico: contributions to morphological nomenclature and molecular characterization of types. *Journal of Natural History* 49 (11–12): 685–707. <http://dx.doi.org/10.1080/00222933.2014.924770>
- Pérez-Miles F. 1994. Tarsal scopula division in Theraphosinae (Araneae, Theraphosidae): Its systematic significance. *Journal of Arachnology* 22: 46–53.
- Schmidt G. 2003. *Die Vogelspinnen: Eine weltweite Übersicht*. Neue Brehm-Bücherei 641, Westarp-Wissenschaften, Hohenwarsleben.
- Schmidt G. 2012. *Bonnetina (Pachythecha) tanzeri* subgen. et sp. n., eine bisher unbeschriebene Vogelspinnenart aus Mexiko (Araneae: Theraphosidae: Theraphosinae). *Arthropoda Scientia* 2: 21–28.
- Vol F. 1999. À propos d'une spermathèque inhabituelle. *Arachnides* 42: 1–13.
- Vol F. 2000. Description de *Bonnetina cyaneifemur*, gen. n. & sp. n. (Araneae, Theraphosidae, Theraphosinae) du Mexique. *Arachnides* 44: 2–9.
- Vol F. 2001. Description d'une deuxième espèce de *Bonnetina* Vol, 2000 du Mexique, *B. rudloffii* sp. n. (Araneae, Theraphosidae, Theraphosinae) et comparaison avec *B. cyaneifemur*. *Arachnides*. 48: 7–16.

West R.C. 2000. Some new theraphosids from western Mexico (Araneae, Mygalomorphae). *The Southwestern Naturalist* 45 (3): 299–305. <http://dx.doi.org/10.2307/3672832>

World Spider Catalog. 2016. Natural History Museum Bern. Available online at <http://wsc.nmbe.ch>, version 17.0 [accessed 20 Feb. 2016].

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