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A new epigean species of ricinuleid of the genus *Pseudocellus* (Arachnida: Ricinulei: Ricinoididae) from a tropical sub-deciduous forest in Oaxaca, Mexico

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Abstract. A new species of epigean ricinuleid of the genus *Pseudocellus* Platnick, 1980 is described from a tropical sub-deciduous forest in Oaxaca, Mexico. The species is described based on adult males and females, protonymphs, deutonymphs and tritonymphs: *Pseudocellus valerdii* sp. nov. This is the second species described from the state of Oaxaca. The total number of described species of *Pseudocellus* from Mexico increases to 20, having the highest species diversity of known ricinuleids worldwide.

Keywords: Taxonomy, morphology, diversity, southern Mexico

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The arachnid order Ricinulei comprises 91 species worldwide, including the new species herein described, and 22 fossil species. The group comprises the suborders Palaeoricinulei Selden, 1992 and Neoricinulei Selden, 1992, each including extinct and living taxa respectively (Selden 1992; Harvey 2003). Wunderlich (2012, 2015) modified the classification and proposed that all previously known species be placed in the suborder Posteriorricinulei Wunderlich, 2015, while a newly discovered fossil, *Primoricinuleus pugio* Wunderlich, 2015, was assigned to the suborder Primoricinulei Wunderlich, 2015. Recently, Wunderlich (2017) proposed two new families of extinct ricinuleids that were included in the Primoricinulei: Hirsutisomidae Wunderlich, 2017 and Monooculricinuleidae Wunderlich, 2017.

Currently, three genera comprise the superfamily Ricinoidoidea Ewing, 1929 (the sole member of the suborder Neoricinulei): *Cryptocellus* Westwood, 1874, *Pseudocellus* Platnick, 1980 and *Ricinoides* Ewing, 1929, with 42, 36 and 11 described species respectively. *Cryptocellus* and *Pseudocellus* are distributed in the New World, whereas *Ricinoides* is restricted only to western and central African rainforest ecosystems (Tuxen 1974; Naskrecki 2008; Penney et al. 2009). *Pseudocellus* is distributed in North and Central America as far south as Panama, including some species described from Cuba, an island in the Caribbean; whereas *Cryptocellus* is predominantly South American, with some species occurring as far north as Nicaragua (Harvey 2003; Tourinho & Azevedo 2007; Botero-Trujillo & Pérez 2008, 2009; Teruel & Armas 2008; Tourinho & Saturnino 2010; Tourinho et al. 2010, 2014; Valdez-Mondragón & Francke 2011, 2013; Pinto-da-Rocha & Andrade 2012; Botero-Trujillo 2014; Armas & Agreda 2016; Botero-Trujillo & Valdez-Mondragón 2016; Armas 2017; Botero-Trujillo & Flórez 2017; Valdez-Mondragón et al. 2018; Teruel 2018).

Of the 35 previously named species of *Pseudocellus*, the majority are from Mexico (19 species) and Cuba (11 species), with Mexico having the highest known ricinuleid diversity of any country in the world. Species of *Pseudocellus* from Mexico are typically found in the soil of lowland tropical rainforests, including the leaf litter, underlying layers of the ground, under big rocks as well as under rotten logs (Platnick 2002; Harvey 2003; Valdez-Mondragón et al. 2018).

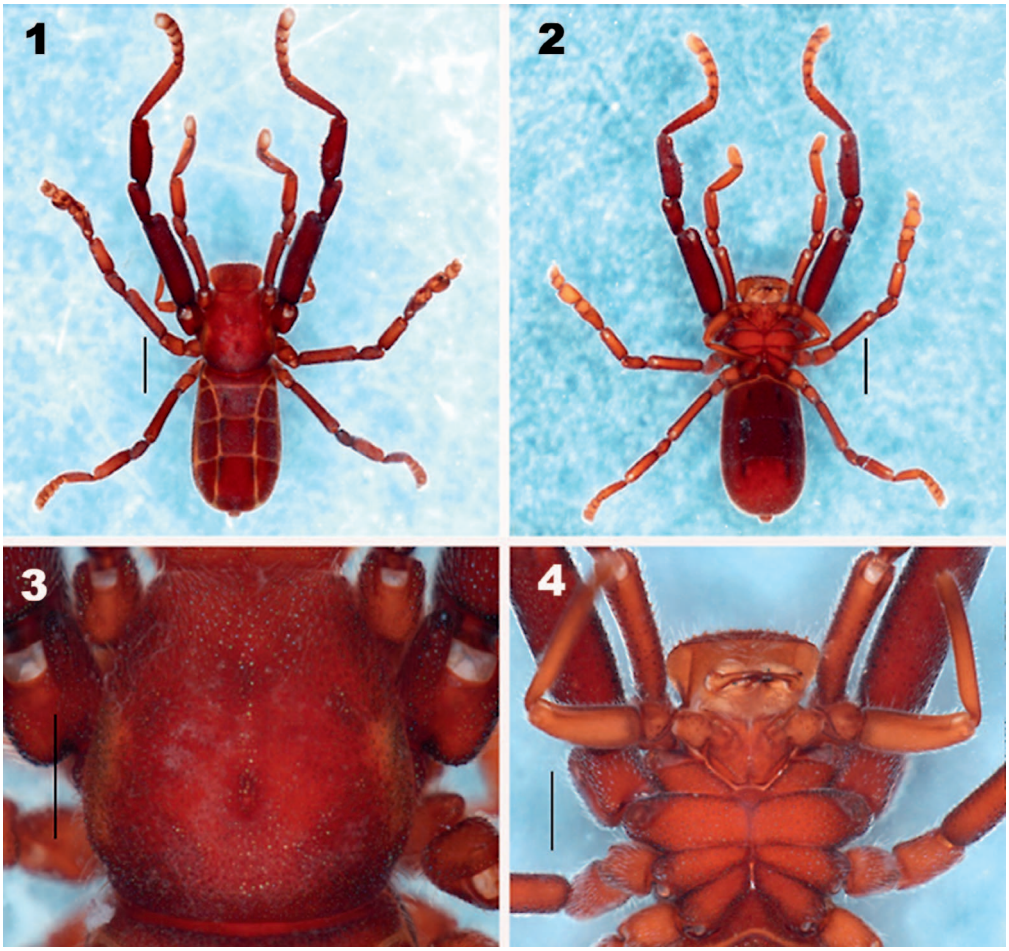
Most of the species found in Mexico are epigean, although some species occur in caves, representing true troglobites with distinct troglomorphisms. Among the species recently discovered from Mexico, six epigean and three troglobitic species have been described by Valdez-Mondragón & Francke (2011, 2013), and Valdez-Mondragón et al. (2018, 2020).

In this contribution, we describe a new epigean species of the genus *Pseudocellus* from a tropical sub-deciduous forest of the El Cedral, Municipality Acatlán de Pérez Figueroa, in the state of Oaxaca, south of Mexico.

METHODS

All the specimens were collected and deposited in 80% ethanol, labeled with complete field data. The type material is deposited with their collection codes in the Colección Nacional de Arácnidos (CNAN) (Curator: Dr. Oscar F. Francke), Institute of Biology, Universidad Nacional Autónoma de México (IBUNAM), Tlaxcala City.

The descriptions and observations of the specimens were performed using a Zeiss Discovery V8 stereomicroscope. A Zeiss Axiocam 506 color camera attached to a Zeiss AXIO Zoom V16 stereomicroscope was used to photograph the



Figures 1–4.—*Pseudocellus valerdii* sp. nov., male holotype: 1, 2. Habitus, dorsal and ventral views; 3. Carapace, dorsal view; 4. Prosoma, ventral view showing coxosternal region. Scale bars: 1 mm (Figs. 1, 2), 0.5 mm (Figs. 3, 4).

different structures of specimens. Photography was conducted with specimens and structures submerged in commercial-grade gel alcohol (to hold them in the appropriate position), and the preparation completely covered with 80% ethanol. Spermathecae were stained using a drop of chlorazol (1%) for a few seconds followed by rinsing with 80% ethanol. Digital images were edited in Adobe Photoshop CS6. The distribution map was produced using SimpleMappr (Shorthouse 2010).

Terminology used for referring to leg segments follows Gertsch (1971), whereas for the copulatory structures, we follow Pittard & Mitchell (1972) and Valdez-Mondragón et al. (2018). The length/diameter (l/d) ratio of femur II of males was calculated in prolateral view.

RESULTS

Order Ricinulei Thorell, 1876
Suborder Neoricinulei Selden, 1992
Superfamily Ricinoidoidea Ewing, 1929
Family Ricinoididae Ewing, 1929
Genus *Pseudocellus* Platnick, 1980

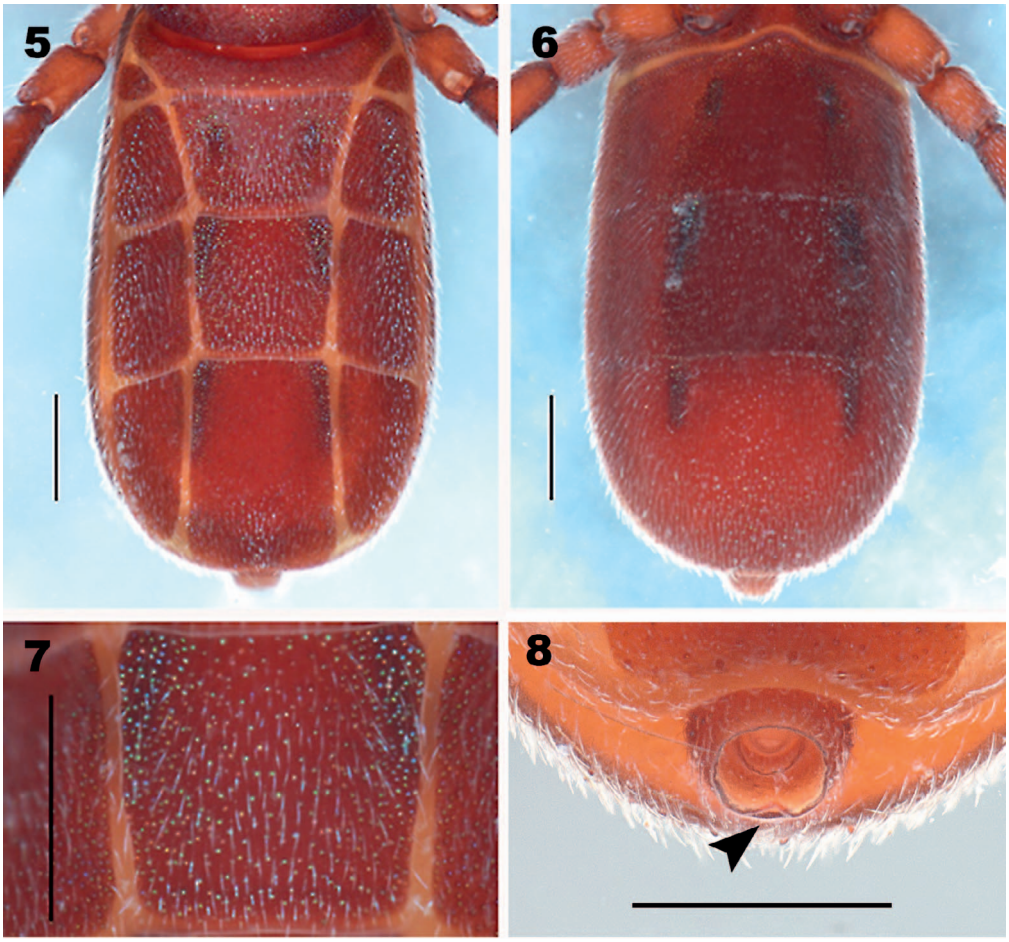
Type species.—*Cryptocellus dorotheae* Gertsch & Mulaik, 1939, by original designation.

Pseudocellus valerdii sp. nov.
ZooBank Registration: urn:lsid:zoobank.org:act:DF600662-E605-47F9-AB7B-29CB6B264B56
Figs. 1–36

Type material.—*Holotype male:* MEXICO: *Oaxaca:* from outside of Cueva del Cedral, 2.6 km SE of the community El Cedral, Municipality Acatlán de Pérez Figueroa (18.38669°N, 96.47409°W, 85 m), subtropical forest, 22 March 2018, A. Valdez, M. Cortez, A. Juárez, J. Valerdi, A. Cabrera (CNAN-T01368).

Paratypes: MEXICO: *Oaxaca:* 1 ♀, same data as holotype (CNAN-T01369); 3 ♀, 1 tritonymph, 5 deutonymphs, 2 protonymphs, same data as holotype (CNAN-T01370).

Diagnosis.—*Pseudocellus valerdii* most closely resembles *P. cruzlopezi* Valdez-Mondragón & Francke 2013 from which it differs as follows: the opisthosoma of the male of *P. valerdii* is longer and slightly square-shaped (Fig. 1), whereas that of *P. cruzlopezi* is shorter and more oval (Valdez-Mondragón & Francke 2013: fig. 1). Males of the new species have femur II longer than *P. cruzlopezi*, with proportions of 3.8 and 2.8 times longer than wide, respectively (Figs. 1, 2; Valdez-Mondragón & Francke 2013: fig. 1). Males of *P. valerdii* and *P. cruzlopezi* have similar shape of tibia II; however, the spines



Figures 5–8.—*Pseudocellus valerdii* sp. nov., male holotype: 5, 6. Opisthosoma, dorsal and ventral view; 7. Tergites; 8. Pygidium, posterior view (notch indicated by arrow). Scale bars: 0.5 mm.

in the two ventral rows of the new species are smaller in *P. cruzlopezi*; also, tibiae II are longer in the new species than *P. cruzlopezi*, 3.4 and 2.8 longer than wide, respectively (Figs. 11, 12; Valdez-Mondragón & Francke 2013: figs. 4, 5). The tarsal process (*tP*) of male leg III of *P. valerdii* is slightly wider than in *P. cruzlopezi*, ending in a wide and sharp tip, whereas in *P. cruzlopezi* the tip of the tP is longer, thin, and sharp (Figs. 18, 19, 21–23; Valdez-Mondragón & Francke 2013: figs. 10–12). The metatarsal process (*mP*) of males of *P. valerdii* is thinner distally than in *P. cruzlopezi* (Figs. 18, 19; Valdez-Mondragón & Francke 2013: figs. 8, 10, 13). The accessory piece (*ac*) of the male copulatory apparatus is considerably wider in *P. valerdii* than in *P. cruzlopezi* (Figs. 18–20, 21, 23; Valdez-Mondragón & Francke 2013: figs. 10, 11, 13). The spermathecae (*st*) of the female of *P. valerdii* have two oval lobules on each side, one slightly longer than the other (Figs. 26–29), whereas in *P. cruzlopezi* the spermathecae are the long, curved, horn-shaped, ending in a small rounded tip (Valdez-Mondragón & Francke 2013: figs. 6, 7).

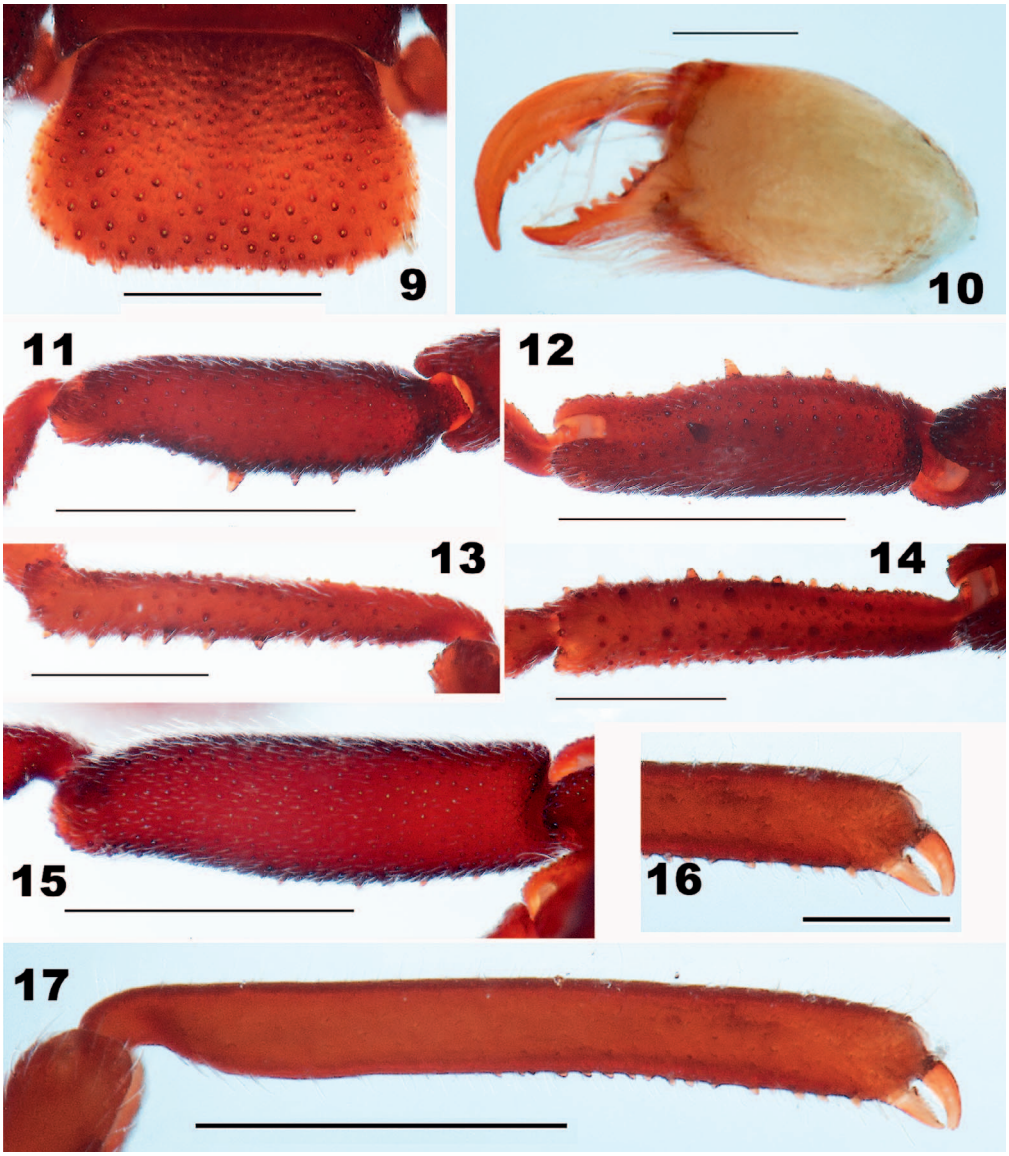
Description (male holotype).—*Coloration*. Cucullus, carapace and sternal region dark reddish (Figs. 1–4). Legs I, III and IV lighter dark reddish than legs II; tarsomeres paler reddish than other segments. Opisthosoma reddish dorsally, slightly darker ventrally (Figs. 5, 6).

Carapace (Fig. 3). Slightly longer than wide, trapezoidal, widest at posterior margin near coxae II and III. Tegument covered with abundant, fine translucent setae. Anterior margin straight, lateral margins not parallel, narrowing anteriorly; posterior margin procurved. Translucent areas present at level of trochanters II and III. Carapace with six depressions: one median and two laterals depressions at level of coxae II, a similar triad at level of coxae III.

Cucullus (Fig. 9). Wider than long, widest distally; anterior margin straight, lateral margins rounded at anterior corners. Tegument covered with abundant translucent setae and granules similar to those on carapace; granules become larger and more conspicuous distally; depressions and cuticular pits absent. Distal margin with long, translucent setae.

Chelicerae (Fig. 10). Movable finger with six teeth, basal larger than others, which are equal in size. Fixed finger with six teeth, subequal in size. Both fingers with long translucent setae basally.

Sternal region (Fig. 4). Coxae covered with translucent setae and granules similar to those on carapace. Coxae I rhomboidal, II sub-rectangular, III and IV conical. Coxae II considerably larger and wider than others; coxae IV smallest. Coxae I and II meeting tritosternum; coxae II meeting tritosternum along 1/3 of its length. Coxae II anterior and

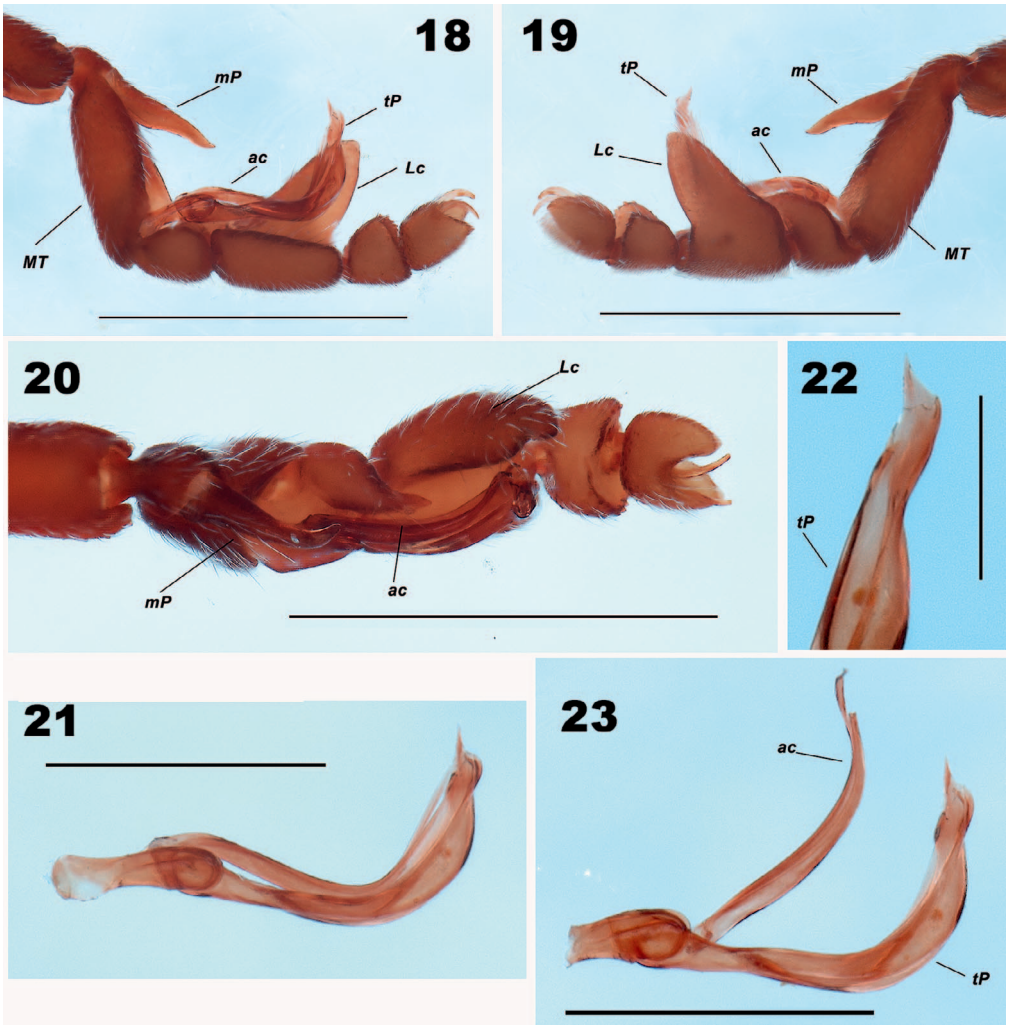


Figures 9–17.—*Pseudocellus valerdii* sp. nov., male holotype. 9. Cucullus, dorsal view; 10. Right chelicera, dorsal view; 11, 12. Right tibia II, prolateral and retroventral view; 13, 14. Right metatarsus II, prolateral and retroventral view; 15. Right femur II, prolateral view; 16. Detail of movable and fixed claws of right palp, retrolateral view; 17. Right palpal tibia, retrolateral view. Scale bars: 0.5 mm (Figs. 9, 13, 14, 17), 1 mm (Figs. 11, 12, 15), 0.2 mm (Fig. 10).

posterior margins perpendicular to median axis of prosoma; coxae III slightly oblique, their posterior margins forming an obtuse angle (>90°) with each other; coxae IV oblique, their posterior margins forming an acute angle (<90°) with each other.

Opisthosoma (Figs. 5, 6). Longer than wide, widest at level of tergite XII and XIII. Tegument covered with abundant setae and granules similar to those on carapace; cuticular pits absent. Median plates of tergites XI–XIII with paired longitudinal depressions, those of tergite XI are the smallest. Tergite X widest and shortest. Median tergite XI trapezoidal, wider than long; XII sub-square, slightly longer than wide; median tergite XIII markedly longer than wide, with posterior corners curved. Lateral tergites in oblique position; X smallest, XI and XIII largest. Lateral tergites XI trapezoidal, XII trapezoidal, XII square and XIII triangular. Sternites XI–XIII with paired depressions. Sternites XI and XII dark medially, XII paler reddish. Pygidium segments with posterior-ventral notch (arrow, Fig. 8).

Pedipalps (Figs. 4, 16, 17). Coxae with fine translucent setae and rounded granules. Trochanters 1 rounded, with sparse fine translucent setae and granules restricted to ventrodistal half; trochanters 2 conical, ventrally with basal setae and granules (similar to those on 1st). Femora curved and wider proximally, with deep prolateral concavity distally close to the tibial joint; tegument with abundant translucent setae, which are thinner and longer on the prolateral surface. Tibiae almost straight, with numerous thin translucent setae of the same size throughout the segment. Tibiae with prolateral granules becoming larger and more conspicuous on distal half.



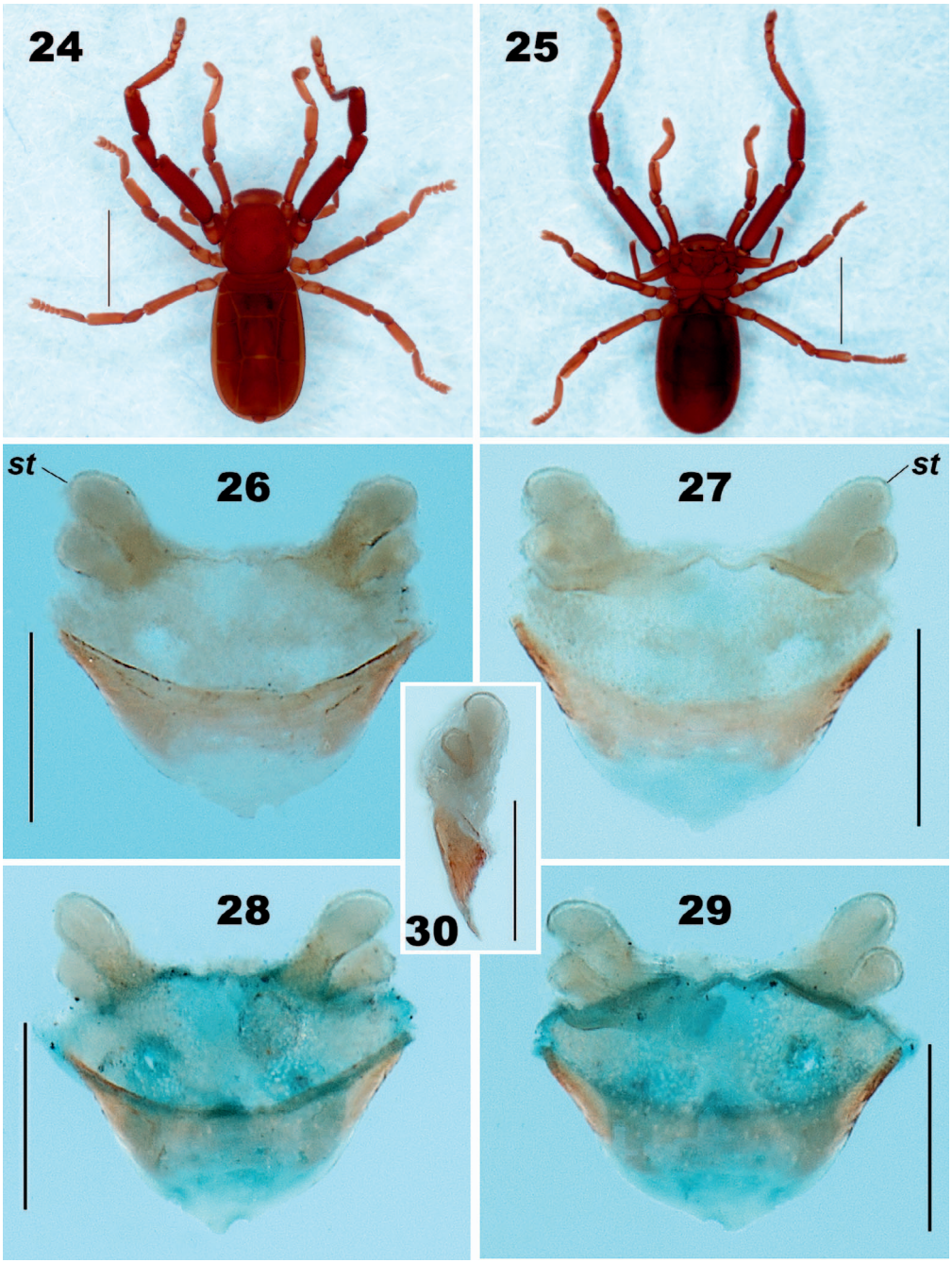
Figures 18–23.—*Pseudocellus valerdii* sp. nov., male holotype: 18–20. Left leg III (copulatory apparatus), prolateral, retrolateral and dorsal views; 21, 23. Copulatory apparatus, prolateral view; 22. Tarsal process, distal half, prolateral view. Scale bars: 1 mm (Figs.18–20), 0.2 mm (Fig. 22), 0.5 mm (Figs. 21, 23). Abbreviations: *ac*, accessory piece of the male copulatory apparatus; *Lc*, lamina cyathiformis; *MT*, metatarsus of leg III; *mP*, metatarsal process; *tP*, tarsal process.

Movable claws curved and longer than fixed claws, which are conical.

Legs. Without cuticular pits but with translucent setae and rounded granules on all segments (Figs. 1, 2). Legs II noticeably longer and wider (Figs. 1, 2). Femora II almost straight, slightly curved on prolateral-distal part, wider and longer than the others; femora II ventrally with few scattered sharp-tipped granules (Fig. 15). Tibiae II ventrally with two ventral rows of spines, the spines on median part largest (Figs. 11, 12). Metatarsus II with scattered sharp-tipped granules, not forming rows, ventral ones longer and more conspicuous than dorsal (Figs. 13, 14). Tarsomeres of leg II dorsally with sharp-tipped granules, tarsomeres 4 and 5 with fewer granules. Femora I, III and IV ventrally with few sharp-tipped granules. Patellae I, III and IV with normal granules. Tibiae I, III and IV ventrally with few sharp-tipped granules distally. All metatarsi dorsally with V-shaped invaginations distally; metatarsi I ventrally with numerous and small sharp-tipped granules, metatarsi III and IV without granules ventrally, only few slightly sharp-tipped granules dorso-distally on metatarsi IV. Tarsomeres of leg I with few granules dorso-distally, tarsomeres of legs III and IV with few granules apically.

Legs III and copulatory apparatus. Metatarsi almost square-shaped in prolateral view, with numerous long translucent setae; metatarsal processes (*mP*) long and slightly sigmoidal in pro and retrolateral views (Figs. 18, 19), curved in dorsal view (Fig. 20). Lamina cyathiformis (*Lc*) of tarsomeres 2 leaf shaped, with a small notch basally on retrolateral view (Fig. 19), with long translucent setae throughout. All tarsomeres ventrally with long translucent setae, which are more numerous and longer on tarsomere 4. Tarsomeres 4 with two curved claws (Figs. 18–20).

Measurements (in mm). Total length (carapace + opisthosoma including pygidium) 4.25. Carapace 1.35 long, 1.29 wide (widest part). Cucullus 0.53 long, 0.83 wide. Opisthosoma 2.5 long (not including pygidium), 1.65 wide (widest part). Femur II length/diameter (l/d): 3.11. Legs tarsal formula (leg I to IV): 1-5-4-5. Leg lengths; I: coxa 0.44/ trochanter 1 0.33/ trochanter 2 -/ femur 0.77/ patella 0.39/ tibia 0.66/ metatarsus 0.66/ tarsus 0.38/ total 3.63; II: 0.48/ 0.31/ -/ 1.08/ 0.39/ 0.74/



Figures 24–30.—*Pseudocellus valerdii* sp. nov., female paratype: 24, 25. Habitus, dorsal and ventral views; 26–29. Spermathecae, anterior, lateral and posterior views, respectively; 30. Spermathecae lateral view. Scale bars: 2 mm (Figs. 24–25), 0.2 (Figs. 26–30). Abbreviation: *st*, spermathecae.

0.72/ 0.90/ 4.62; III: 0.36/ 0.24/ 0.22/ 0.66/ 0.30/ 0.39/ 0.32/ 0.66/ 3.15; IV: 0.49/ 0.33/ 0.33/ 0.99/ 0.38/ 0.66/ 0.60/ 0.82/ 4.60. Leg length formula: 2-4-1-3.

Female (paratype) (CNAN-T01369).—Differs from male as follows: Carapace paler reddish, median longitudinal depression shallower than on male. Femora II slightly less robust than those on male. Tibiae II with curved spines smaller than in males. Metatarsi II with the scattered sharp-tipped granules smaller than those on male. Opisthosoma wider, higher and larger than in male, paler reddish (Figs. 24, 25). Median tergites XI and XII wider than those on male (Fig. 24). Spermathecae with widespread tiny pores throughout (Figs. 26–30). *Measurements:* Total length (carapace + opisthosoma including pygidium) 4.75. Carapace 1.65 long, 1.57 wide. Cucullus 0.53 long, 0.83 wide. Opisthosoma 1.65 long (not including pygidium), 2.50 wide (widest part). Femur II length/ diameter (l/d): 3.74. Legs tarsal formula (leg I to IV): 1-5-4-5. Leg lengths; I: coxa 0.40/ trochanter 1 0.36/ trochanter 2 -/ femur 1.80/ patella 0.42/ tibia 0.75/ metatarsus 0.48/ tarsus 0.24/ total 4.45; II: 0.54/ 0.30/ -/ 1.10/ 0.42/ 0.78/ 0.72/ 0.84/

Figures 31–34.—*Pseudocellus valerdii* sp. nov. Protonymph: 31, 32. Habitus, dorsal and ventral views. Deutonymph: 33, 34. Habitus, dorsal and ventral views. Scale bars: 2 mm.

4.70; III: 0.42/ 0.24/ 0.21/ 0.72/ 0.25/ 0.48/ 0.45/ 0.48/ 3.25; IV: 0.36/ 0.27/ 0.24/ 0.74/ 0.26/ 0.50/ 0.44/ 0.48/ 3.29. Leg length formula: 2-4-3-1.

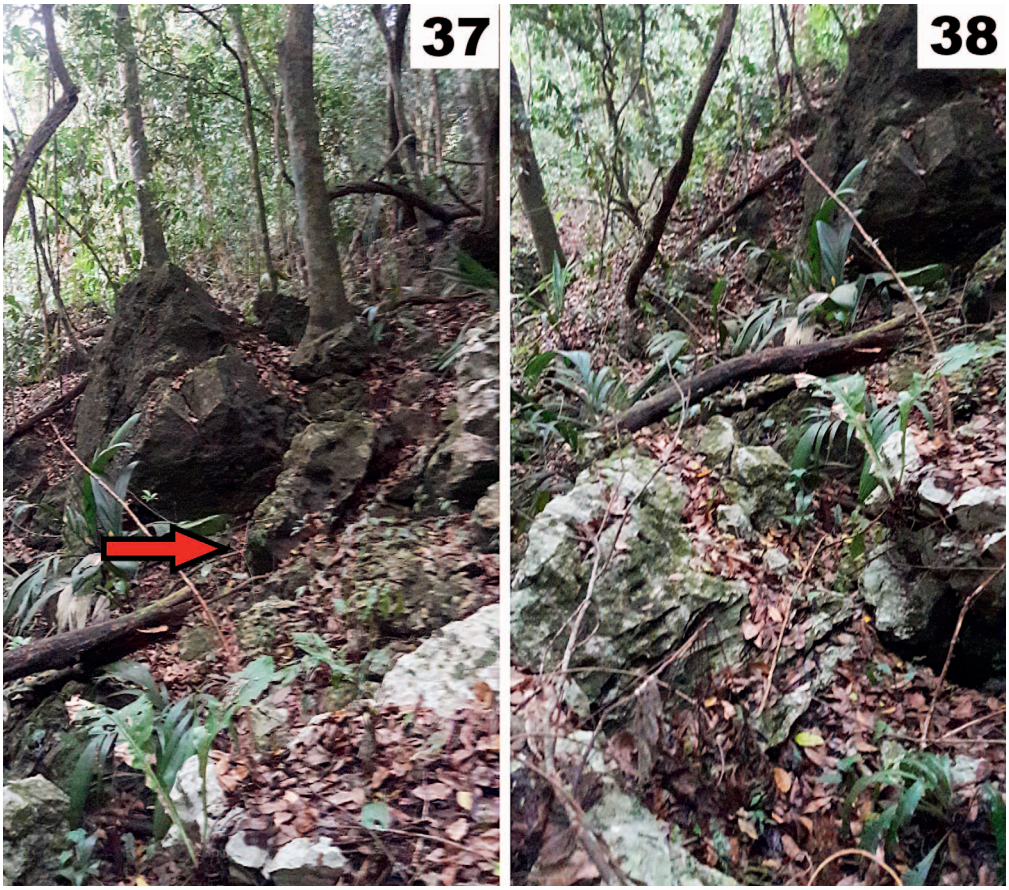
Protonymph (Figs. 31–32).—Appendages and body coloration pale orange. Palp tibia dark orange in distal half. Carapace dark orange, wider than long, trapezoidal, with rounded corners in posterior part, with numerous rounded granules throughout. Cucullus dark yellow, wider than long, oval shaped, distal margin with long translucent setae, with numerous rounded granules throughout. Sternal region, legs and opisthosoma covered with abundant, fine translucent setae and rounded granules, except tibiae of the pedipalps where granules are absent. Opisthosoma wider than long, widest at the level of tergite XII, median tergites X–XII wider than long, tergite XIII as long as wide. Lateral tergite X smallest, lateral tergites XI, XII and XIII largest, X and XI trapezoidal; XII square and XIII triangular. Sternites X–XII as long as wide, distinct and not fused. Pygidium segments without notch. *Measurements:* Total length 2.25. Carapace 0.46 long, 0.49 wide (widest part). Cucullus 0.18 long, 0.3 wide. Opisthosoma 1.45 long, 1.25 wide. Legs tarsal formula (leg I to IV): 1-4-3-2.

Deutonymph (Figs. 33–34).—Appendages and body coloration pale orange. Tibiae of the pedipalps and chelicerae dark orange. Carapace as wide as long, trapezoidal, with fifteen pits dorsally: three on each side medially, three on each side posteriorly and three centrally. Cucullus as wide as long, oval. Cucullus, carapace, sternal region, legs and opistosoma covered with abundant, fine translucent setae and rounded granules, except pedipalps. Opisthosoma longer than wide, widest at level of tergite XII, median tergites X–XIII wider than long. Lateral tergite X smallest, XII and XIII largest. Lateral tergites: X triangular, XII trapezoidal, XII rectangular, XIII triangular. All tergites widely separated from each

Figures 35–36.—*Pseudocellus valerdii* sp. nov. Tritonymph: Habitus, dorsal and ventral views. Scale bars: 2 mm.

other in comparison to adults. Sternites X–XIII distinct and not fused in comparison to adults. Pygidium segments without notch. *Measurements:* Total length (carapace + opisthosoma including pygidium) 2.85. Carapace 0.97 long, 1 wide (widest part). Cucullus 0.24 long, 0.42 wide. Opisthosoma 1.9 long, 1.5 wide. Legs tarsal formula (leg I to IV): 1-5-4-4.

Tritonymph (Figs. 35–36).—Appendages and body coloration pale orange. Tibiae of the pedipalps dark orange in distal half. Carapace dark orange, as wide as long, trapezoidal, with rounded corners posteriorly, with numerous rounded granules throughout. Cucullus dark orange, wider than oval shaped, distal margin with long translucent setae, with numerous rounded granules throughout. Sternal region, legs and opisthosoma covered with abundant, fine translucent setae and rounded granules, except tibiae of the pedipalps where granules are absent. Opisthosoma longer than wide, widest at the level of tergite XIII, median tergites X–XII wider than long, tergite XIII as long as wide. Lateral tergite X smallest,



Figures 37–38.—Habitat of *Pseudocellus valerdii* sp. nov.: tropical sub-deciduous forest at 85 m elevation at the type locality, arrow indicates the microhabitat where the specimens were collected.

Figure 39.—Type localities of the two species of *Pseudocellus* recorded from the state of Oaxaca, Mexico. *Pseudocellus valerdii* sp. nov. (red circle) and *Pseudocellus cruzlopezi* Valdez-Mondragón & Francke, 2013 (green circle).

lateral tergites XI, XII and XIII largest, X and XI trapezoidal; XII square, and XIII triangular. Sternites X–XIII widely separated from each other like in deutonymph. Sternites X–XIII distinct like deutonymph, not fused in comparison to adults. Pygidium segments without notch. *Measurements:* Total length (carapace + opisthosoma including pygidium) 3.4. Carapace 0.72 long, 0.72 wide (widest part). Cucullus 0.31 long, 0.5 wide. Opisthosoma 2.2 long, 1.64 wide. Legs tarsal formula (leg I to IV): 1-5-4-5.

Natural history.—Specimens of *P. valerdii* were collected outside of Cueva del Cedral, where they were found under boulders around 30–80 cm in diameter. The specimens were collected in a tropical sub-deciduous forest at 85 m elevation, in a karstic zone with many caves; however, the specimens were never found inside caves, only under boulders on the ground thus representing an epigean species (Figs. 37, 38).

Distribution.—The species is known only from the type locality (Fig. 39).

Etymology.—The species is dedicated to former student José Cruz Valerdi Tlachi, who was the first person to collect this species in the type locality, and to his memory because he passed away on April 26, 2019.

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LITERATURE CITED

Armas, L.F. 2017. Cuatro especies nuevas de *Pseudocellus* de Cuba (Arachnida: Ricinulei). Revista Ibérica de Aracnología 30:87–99.

Armas, L.F. & E.O. Agreda. 2016. Una nueva especie de *Pseudocellus* (Ricinulei: Ricinoididae) del Suroeste de Guatemala. Revista Ibérica de Aracnología 28:79–83.

Botero-Trujillo, R. 2014. A new Colombian species of *Cryptocellus* (Arachnida, Ricinulei), with notes on the taxonomy of the genus. Zootaxa 3814:121–132.

Botero-Trujillo, R. & D.E. Flórez. 2017. Two new ricinuleid species from Ecuador and Colombia belonging to the *peckorum* species-group of *Cryptocellus* Westwood (Arachnida, Ricinulei). Zootaxa 4286:483–498.

Botero-Trujillo, R. & G.A. Pérez. 2008. A new species of *Cryptocellus* (Arachnida, Ricinulei) from northwestern Colombia. Journal of Arachnology 36:468–471.

Botero-Trujillo, R. & G.A. Pérez. 2009. A new species of *Cryptocellus* (Arachnida, Ricinulei) from the Kófan Territory in southwestern Colombia. Zootaxa 2050:56–64.

Botero-Trujillo, R. & A. Valdez-Mondragón. 2016. A remarkable new species of the *magnus* species-group of *Cryptocellus* (Arachnida, Ricinulei) from Ecuador, with observations on the taxonomy of the New World genera. Zootaxa 4107:321–337.

Gertsch, W.J. 1971. Three new ricinuleids from Mexican caves (Arachnida, Ricinulei). Bulletin of the Association for Mexican Cave Studies 4:127–135.

Harvey, M.S. 2003. Catalogue of the Smaller Arachnid Orders of the World. CSIRO Publishing, Collinwood, Victoria, Australia.

Naskrecki, P. 2008. A new ricinuleid of the genus *Ricinoides* Ewing (Arachnida, Ricinulei) from Ghana. Zootaxa 1698:57–64.

Penney, D., Y. Marusik, C.P. Wheater & A.M. Langan. 2009. First Gambian Ricinulei (Arachnida: Ricinoididae): northernmost African record for the order. Zootaxa 2021:66–68.

Pinto-da-Rocha, R. & R. Andrade. 2012. A new *Cryptocellus* (Arachnida: Ricinulei) from Eastern Amazonia. Zoologia 29:474–478.

Pittard, K. & R.W. Mitchell. 1972. Comparative morphology of the life stages of *Cryptocellus pelaezi* (Arachnida, Ricinulei). Graduate Studies Texas Tech University 1:1–77.

Platnick, N.I. 2002. Ricinulei. Amazonian Arachnida and Myriapoda. Pp. 381–386. (J. Adis, org.). Pensoft Publishes, Sofia, Moscow.

Selden, P.A. 1992. Revision of the fossil ricinuleids. Transactions of the Royal Society of Edinburgh: Earth Sciences 83:595–634.

Shorthouse, D.P. 2010. SimpleMappr, an online tool to produce publication-quality point maps. Online at http://www.simplemappr.net

Teruel, R. 2018. Two remarkable new species of *Pseudocellus* Platnick, 1980 (Ricinulei: Ricinoididae) from eastern Cuba. *Ecologica Montenegrina* 19:73–88.

Teruel, R. & L.F. Armas. 2008. Nuevo *Pseudocellus* Platnick 1980 de Cuba oriental y nuevos registros de *Pseudocellus paradoxus* (Cooke 1972) (Ricinulei: Ricinoididae). Boletín de la Sociedad Entomológica Aragonesa 43:29–33.

Tourinho, A.L. & C.S. Azevedo. 2007. A new Amazonian *Cryptocellus* Westwood (Arachnida, Ricinulei). Zootaxa 1540:55–60.

Tourinho, A.L. & R. Saturnino. 2010. On the *Cryptocellus peckorum* and *Cryptocellus adisi* groups, and description of a new species of *Cryptocellus* from Brazil (Arachnida: Ricinulei). Journal of Arachnology 38:425–432.

Tourinho, A.L., N.F. Lo Man-Hung & A.B. Bonaldo. 2010. A new species of Ricinulei of the genus *Cryptocellus* Westwood (Arachnida) from northern Brazil. Zootaxa 2684:63–68.

Tourinho, A.L., N.F. Lo Man-Hung & L. Salvatierra. 2014. A new Amazonian species of *Cryptocellus* (Arachnida, Ricinulei), with descriptions of its integumental structures and all free-living life stages. Zootaxa 3814:81–95.

Tuxen, S.L. 1974. The African genus *Ricinoides* (Arachnida, Ricinulei*)*. Journal of Arachnology 1:85–106.

Valdez-Mondragón, A. & O.F. Francke. 2011. Four new species of the genus *Pseudocellus* (Arachnida: Ricinulei: Ricinoididae) from Mexico. Journal of Arachnology 39:365–377.

Valdez-Mondragón, A. & O.F. Francke. 2013. Two new species of ricinuleids of the genus *Pseudocellus* (Arachnida: Ricinulei: Ricinoididae) from southern Mexico. Zootaxa 3635:545–556.

Valdez-Mondragón, A., Cortez-Roldán, M. R. & E. F. Campuzano-Granados. 2020. On the Mexican ricinuleids: a new species of the genus *Pseudocellus* (Arachnida: Ricinulei: Ricinoididae) from the cloud forest of Chiapas, Mexico. Revista Mexicana de Biodiversidad 91:1–12.

Valdez-Mondragón, A., O.F. Francke & R. Botero-Trujillo. 2018. New morphological data for the order Ricinulei with the description of two new species of *Pseudocellus* (Arachnida: Ricinulei: Ricinoididae) from Mexico. Journal of Arachnology 46:114–132.

Wunderlich, J. 2012. Description of the first fossil Ricinulei in amber from Burma (Myanmar), the first report of this arachnid order from the Mesozoic and from Asia, with notes on the related extinct order Trigonotarbida. Pp. 233–244. *In* Beiträge zur Araneologie 7: Fifteen papers on extant and fossil spiders (Araneae). (J. Wunderlich (ed.)), Joerg Wunderlich, Hirschberg, Germany.

Wunderlich, J. 2015. New and rare fossil Arachnida in Cretaceous Burmese amber (Amblypygi, Ricinulei and Uropygi: Thelephonida). Pp. 409–436. *In* Beiträge zur Araneologie 9: Spinnen des erdmittelalters. (J. Wunderlich (ed.)). Joerg Wunderlich, Hirschberg, Germany.

Wunderlich, J. 2017. New extinct taxa of the arachnid order Ricinulei, based on new fossils preserved in Mid Cretaceous Burmese amber. Pp. 48–71. *In* Beiträge zur Araneologie 10: Spinnen des Erdmittelalters. (J. Wunderlich ed.). Joerg Wunderlich, Hirschberg, Germany.

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