

Three new Peruvian species of *Protimesius* (Opiliones: Laniatores: Stygnidae)

José A. Ochoa^{1,2} and Ricardo Pinto-da-Rocha¹: ¹Departamento de Zoologia, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, travessa 14, 101, São Paulo, SP, 05508-900, Brazil. E-mail: jaochoa2000@yahoo.com; ²Frankfurt Zoological Society - Peru, Residencial Huancaro, Los Cipreses H-21, Santiago, Cusco, Peru

Abstract. Three new species of the harvestmen genus *Protimesius* Roewer 1913 are described from the Amazonian region of Peru. *Protimesius amigos* n. sp. from Madre de Dios Department may be distinguished by the absence of an anterior prominence on the prosoma and the presence of five pairs of basal large setae on the penis. *Protimesius machiguenga* n. sp. and *P. kakinte* n. sp. are described from the Lower Urubamba region of Cusco Department; *P. machiguenga* n. sp. is similar to *P. cirio* Villarreal-Manzanilla & Pinto-da-Rocha 2006 and can be distinguished from it by the presence of a conspicuous dorsal prolateral row of tubercles on the male tibia IV; *P. kakinte* n. sp. is similar to *P. amphichelis* Roewer 1931 and *P. boibumba* Villarreal-Manzanilla & Pinto-da-Rocha 2006, but can be separated from these by the development of tubercles on the femur and tibia IV, and by the number of retrolateral tubercles on male femur IV. New records of *P. albilineatus* (Roewer 1957) from Loreto department in northern Peru are also reported.

Keywords: Amazonia, Opiliones, Peru, *Protimesius*, Stygninae

The harvestman family Stygnidae is distributed throughout the central-northern portion of South America and Lesser Antilles and consists of 98 species (Pinto-da-Rocha 2000; Villarreal-Manzanilla & Pinto-da-Rocha 2006; Pinto-da-Rocha 2007; Hara & Pinto-da-Rocha 2008; Kury & Pinto-da-Rocha 2008; Kury 2009; Pinto-da-Rocha & Carvalho 2009; Pinto-da-Rocha & Tourinho 2012; Bragagnolo 2013). The family is divided into three subfamilies: Nomoclastinae, Heterostygninae, and Stygninae (Pinto-da-Rocha 2007).

The Neotropical genus *Protimesius* Roewer 1913 includes moderate to large-bodied stygnine harvestmen, easily diagnosed by the elongated coxa to patella of the pedipalp. The two synapomorphic characters of the genus (Pinto-da-Rocha & Villarreal-Manzanilla 2009) are the bifid tibial anterior sockets of the pedipalps (see Pinto-da-Rocha 1997, Figs. 584 & 585) and the scopula of tarsi III–IV with long hairs having thin apices (see Pinto-da-Rocha 1997, Fig. 595). The relationships within the genus are unclear, according to Pinto-da-Rocha & Villarreal-Manzanilla (2009). *Protimesius gracilis* Roewer 1913 has been recognized as the sister species of two other clades of species, one consisting of *P. laevis* Soerensen 1932 and *P. cirio* Villarreal-Manzanilla & Pinto-da-Rocha 2006 and the other including six species (*P. trocaraincola* Pinto-da-Rocha 1997, *P. bahiensis* Pinto-da-Rocha & Villarreal-Manzanilla 2009, *P. amphichelis* Roewer 1931, *P. evelinae* (Soares & Soares 1978), *P. foliadereis* Villarreal-Manzanilla & Pinto-da-Rocha 2006 and *P. boibumba* Villarreal-Manzanilla & Pinto-da-Rocha 2006). Seven other previously known species of the genus form a polytomy with these two clades (Pinto-da-Rocha & Villarreal-Manzanilla 2009).

A new phylogenetic hypothesis of the species of *Protimesius* was recently proposed with several changes of the relationships within the genus; however, most clades are supported by only one synapomorphy, and the main characters used to separate species are very homoplastic (Bragagnolo 2013). A reanalysis of *Protimesius* phylogeny, including more characters, is necessary to resolve this controversy.

Protimesius, currently consisting of 20 species, is restricted to Brazil, Ecuador, and Peru (Pinto-da-Rocha & Villarreal-Manzanilla 2009; Bragagnolo 2013). Species of this genus inhabit

the northern Atlantic rainforest, Amazonian lowland, and Andean rainforests. *Protimesius* has been previously reported from Peru represented by a single species, *P. albilineatus* (Roewer 1957) from the Ucayali and Madre de Dios departments (Roewer 1957; Pinto-da-Rocha 1997; Kury 2003). During the last 10 years, we have conducted several field expeditions in Peru, including the rainforests of the Amazonian region. In the present contribution, we describe three new Peruvian species of *Protimesius* and report new records for *P. albilineatus*. The description of these three new species increases the number of named species in the genus to 23, with four occurring in Peru.

METHODS

The specimens examined for this study are deposited in the collections of Museo de Historia Natural, Universidad Nacional de San Antonio Abad del Cusco, Cusco, Peru (MHNC) and Museu de Zoologia da Universidade de São Paulo, Brazil (MZSP). Specimens were collected on vegetation at night by ultraviolet (UV) light detection. The integument, mainly of the tergites, sternites, and articular membranes of legs, is slightly fluorescent under ultraviolet light. Morphological terminology follows Pinto-da-Rocha (1997). All measurements are given in millimeters and were obtained following the methodology of Acosta et al. (2006). We recorded measurements and produced illustrations using a Leica MZ-APO stereomicroscope fitted with an ocular micrometer and a camera lucida. Distribution maps were generated using DIVA-GIS Version 5.4 (<http://www.diva-gis.org/>) by superimposing geo-referenced point locality records on a digital elevation dataset from the CGIAR Consortium for Spatial Information (CGIAR-CSI) available at <http://srtm.csi.cgiar.org>.

TAXONOMY

Family Stygnidae Simon 1879

Protimesius Roewer 1913

Protimesius Roewer 1913:439.

Type species.—*Protimesius gracilis* Roewer 1913 by monotypy.

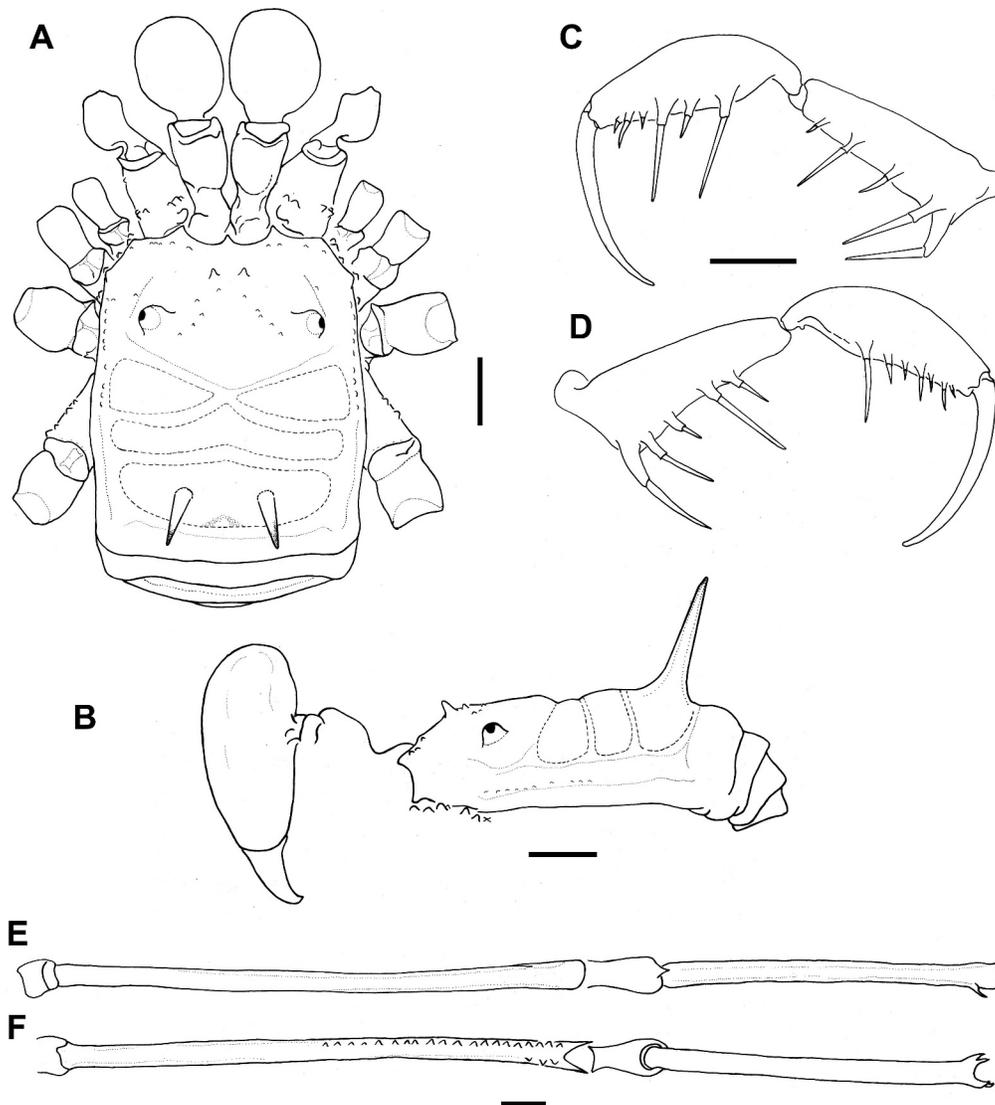


Figure 1.—*Protimesius amigoi* new species: Paratype male (MHNC). A, B. Habitus: A. Dorsal view; B. Lateral view. C, D. Right pedipalp: C. Mesal view; D. Ectal view. E, F. Leg IV: E. Dorsal view; F. Ventral view. Scale bars: 1 mm.

Protimesius amigoi new species
Figs. 1A–F, 4E & F, 5

Type material.—PERU: *Madre de Dios Department*, Manu Province, Manu District: Holotype male (MHNC), CICRA, Los Amigos Biological Station, confluence between Los Amigos and Madre de Dios rivers, 12°34'07"S, 70°05'57"W, 270 m, 12 December 2005, J.A. Ochoa, collected at night with UV light. Paratypes: 1 male, 1 female, collected with holotype (MHNC); 1 male, 1 female, collected with holotype (MZSP 36823).

Etymology.—The specific name in a noun in apposition taken from the Spanish word *amigos*, meaning “friends,” and refers the type locality, Los Amigos River.

Diagnosis.—*Protimesius amigoi* is most similar to *P. albilineatus*, based on the similar ornamentation on male leg IV (Fig. 1E, F), two ventral rows of small tubercles on the distal half of femur IV, tibia IV smooth or without

conspicuous rows of tubercles, and the ventral plate of the penis with lateral margins concave (Figs. 4E, F). *Protimesius amigoi* may be separated from this species by the absence of an anterior prominence on the prosoma, which is well developed in *P. albilineatus*. The penis in *Protimesius amigoi* possesses five pairs of basal large setae and with a concave distal margin of the ventral plate, compared to *P. albilineatus*, with four pairs of basal setae and a straight distal margin of ventral plate.

Description.—*Male (holotype)*: *Measurements*: Dorsal scutum length 4.86; prosoma length 2.50; dorsal scutum width 3.86; prosoma width 3.71; interocular distance 2.50; chelicera: II 3.29, III 1.79; pedipalp 19.0; leg I 20.5, II 38.0, III 29.0, IV 38.0.

Dorsum (Fig. 1A, B): Anterior margin of carapace with some small granules. Prosoma without anterior prominence, two tubercles anteriorly, and several sparse small granules medially. Eye mounds smooth. Interocular region with several

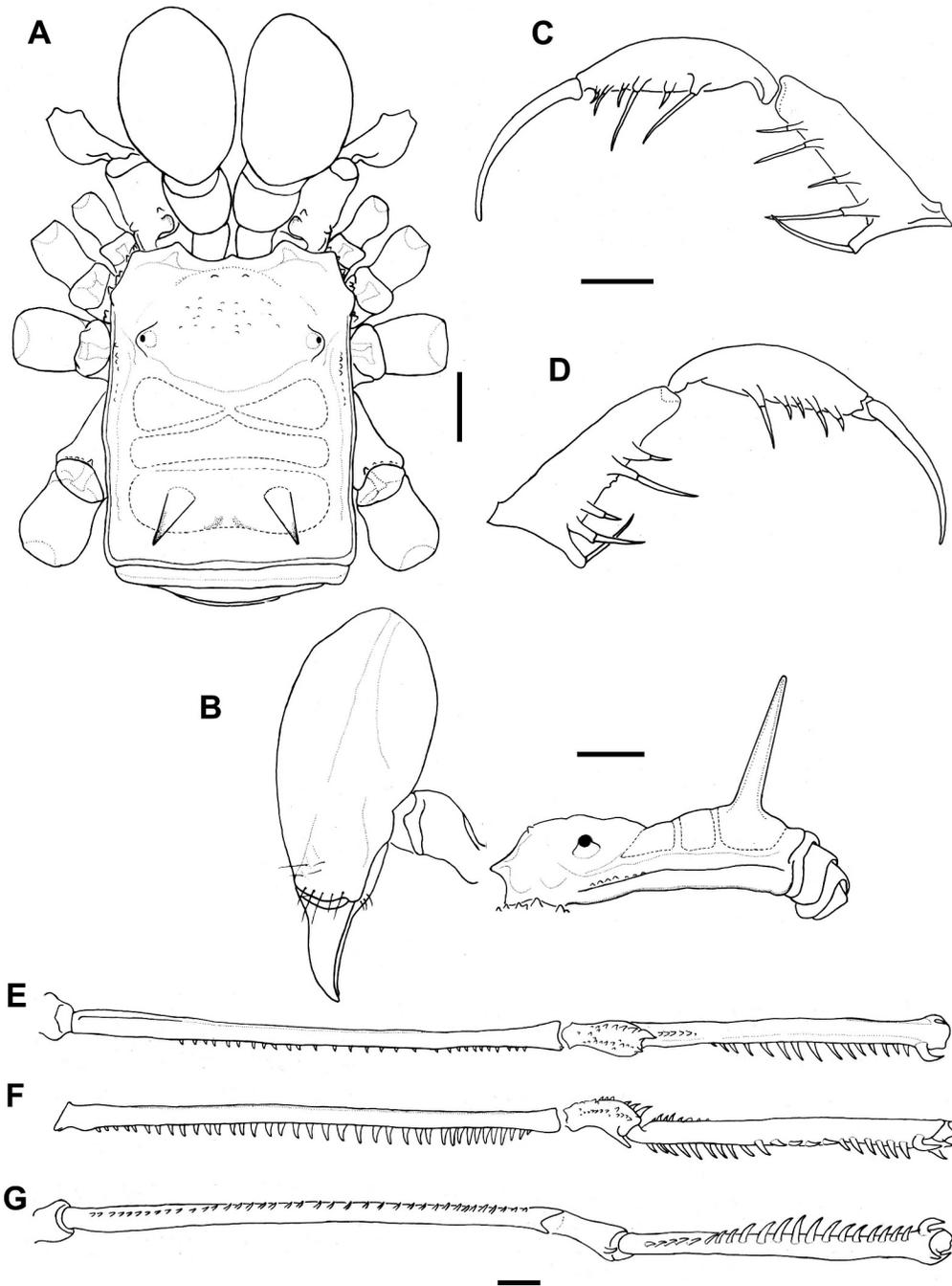


Figure 2.—*Protimesius machiguenga* new species: Holotype male (MHNC). A, B. Habitus: A. Dorsal view; B. Lateral view. C, D. Right pedipalp: C. Mesal view; D. Ectal view. E–G. Leg IV: E. Dorsal view; F. Retrolateral view; G. Ventral view. Scale bars: 1 mm.

granules. Lateral margins with 7-7 tubercles from coxa III to coxa IV (one paratype possesses 9-10, Fig. 1A). Area I-III without tubercles; I divided, III with two large spines, divergent slightly toward posterior. Posterior margin and free tergites smooth.

Venter: Coxa I with a medial row of 7-7 tubercles, two small anterior, 4-3 small posterior, three apical (anterior largest); II with medial row of 11-10 tubercles, three small anterior, 7-6 small posterior, three apical; III with a weak row of 9-10 small tubercles, 7-6 small posterior scattered tubercles, and four

apical tubercles; IV with scattered small tubercles. Genital operculum with 8 granules. Free sternites smooth.

Chelicerae: Swollen. Segment I smooth; II with one basal elongated, three small teeth, with several setae near the base of finger; III with one elongated median and two small subdistal teeth.

Pedipalp: Coxa with one large dorsobasal, 5-6 dorsosubbasal, and four ventral tubercles. Trochanter with four ventral tubercles, one basal, one medial (the largest), and two small distal. Femur with one ventrobasal tubercle; patella smooth; tibia, mesal IiIi; ectal IiIi; tarsus, mesal IiIiii; ectal IiIiiii.

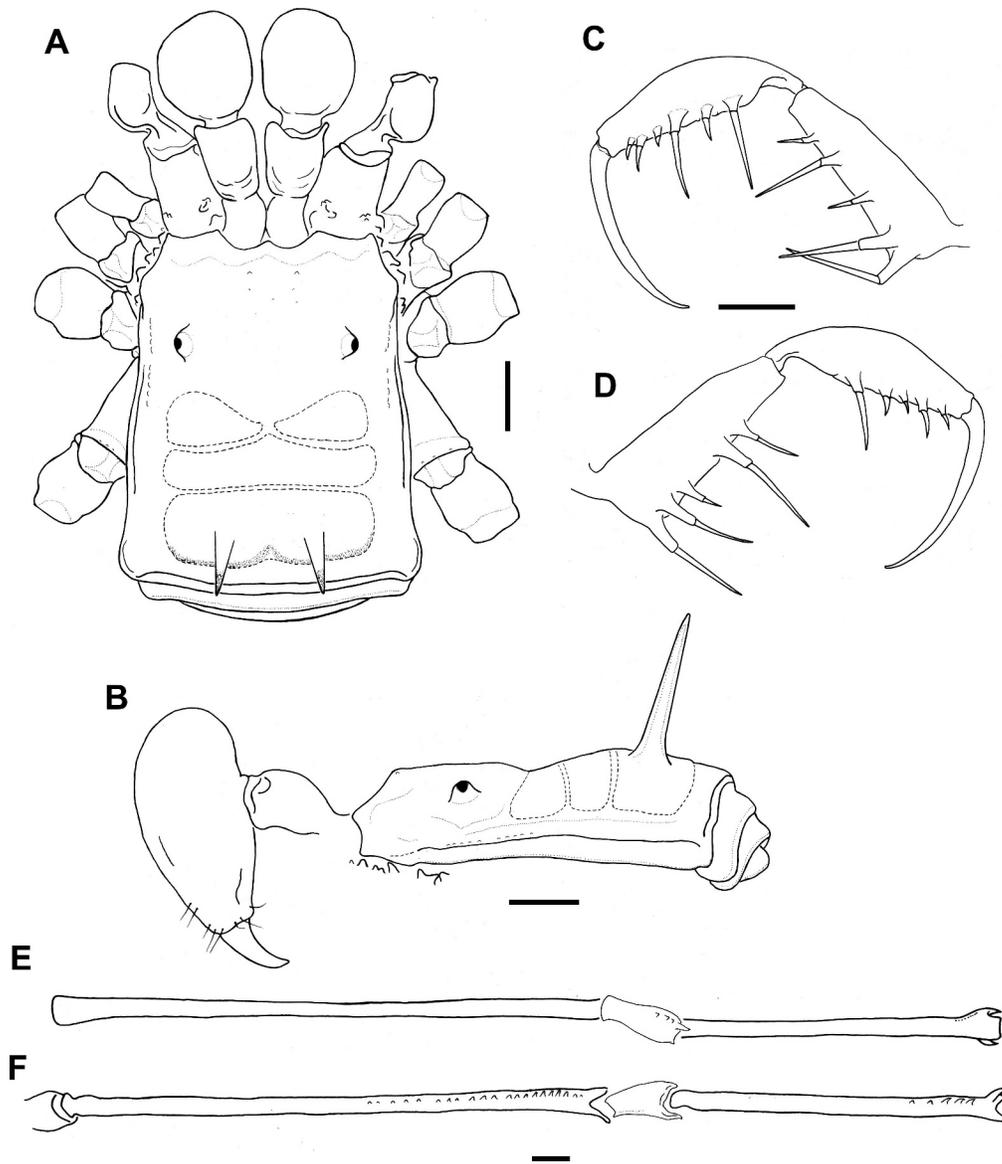


Figure 3.—*Protimesius kakinte* new species: Holotype male (MHNC). A, B. Habitus: A. Dorsal view; B. Lateral view. C, D. Right pedipalp: C. Mesal view; D. Ectal view. E, F. Leg IV: E, Dorsal view; F, Ventral view. Scale bars: 1 mm.

Legs: Coxa I with three dorsal tubercles, the anterior smaller, the posterior bifid; II with three dorsal, the posterior fused with coxa III; III with one tubercle, IV with five dorsal small granules distally and some tubercles laterally. Trochanters I–IV with three ventral tubercles, antero-distal smaller in I–II or vestigial in III and IV. Femur IV (Fig. 1E, F) with two ventral rows of small tubercles on distal half, prolateral row with three tubercles, retrolateral with 21, progressively increasing in size distally, except the last one, which is smaller. Patella IV (Fig. 1E, F), ventral side smooth, dorsal side with a conspicuous distal tubercle. Tibia IV smooth without tubercles, prolaterodorsal and retrolateral distal spines moderate developed. Tarsal segmentation: 7, 13, 6, 7.

Penis (Figs. 4E, F): Truncus with five pairs of basal large setae; ventral plate lateral and distal sides concave; with three pairs of distal large setae and without intermediary setae.

Glans with dorsal process well developed, lower than stylus; stylus apex swollen and without small subapical setae.

Color: Yellowish brown; chelicerae, prosoma, coxa of pedipalps and legs, and scutum slightly darker; with well developed reticulate pigmentation especially in antero-lateral parts of prosoma, lateral borders of scutum and area III; free tergites and sternites reddish brown with dark reticulate pigmentation; legs with brown reticulate pigmentation. Membrane between posterior margin and free tergite I white.

Female (paratype, MHNC): Measurements: Dorsal scutum length 4.36; prosoma length 1.86; dorsal scutum width 3.79; prosoma width 3.64; interocular distance 2.36; chelicera: II 2.21, III 1.50; pedipalp 20.86; leg I 22.0, II 40.5, III 31.0, IV 41.0.

Somatic morphology: Similar to male, differs in the following features: reticulate pigmentation more evident than male, especially in prosoma and free tergites and sternites.

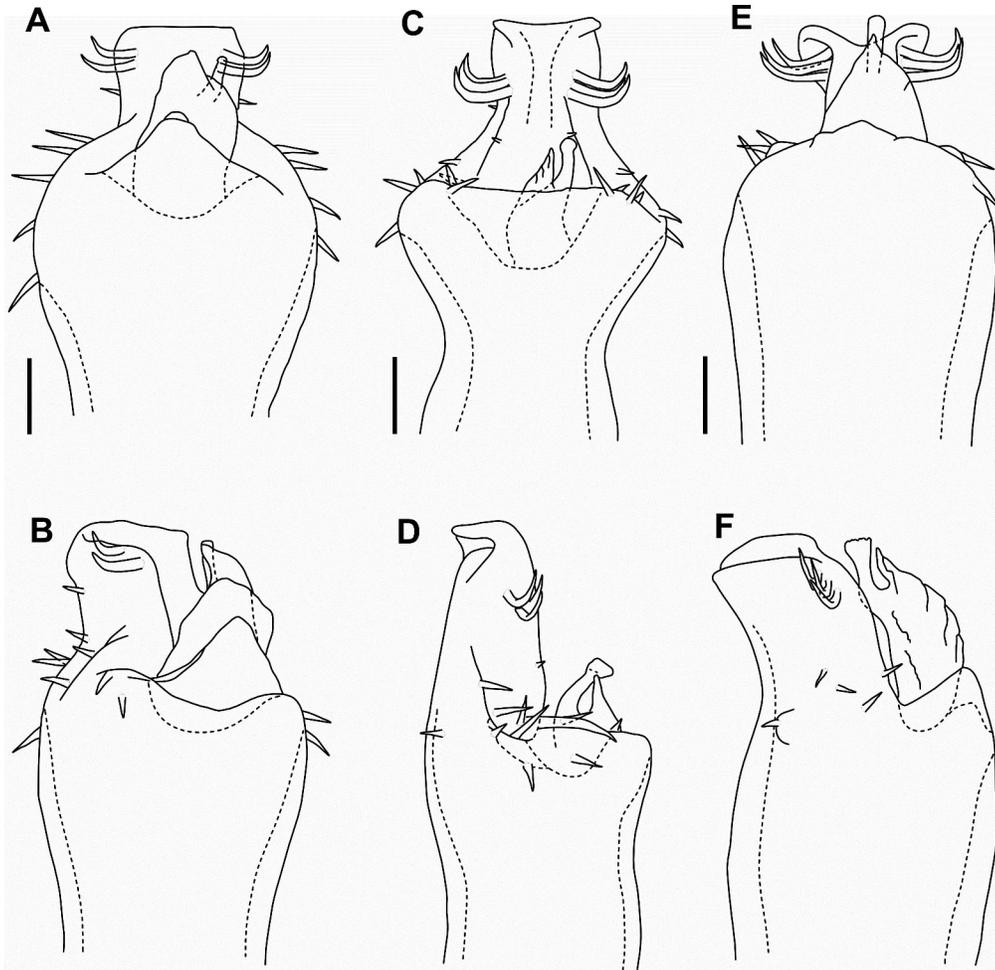


Figure 4.—Distal portion of penis of Peruvian *Protimesius* spp.: A, B. *P. kakinte* new species. A, dorsal view; B, lateral view. C, D. *P. machiguenga* new species. C, dorsal view; D, lateral view. E, F. *P. amigos* new species. E, dorsal view; F, lateral view. Scale bars: 0.1 mm.

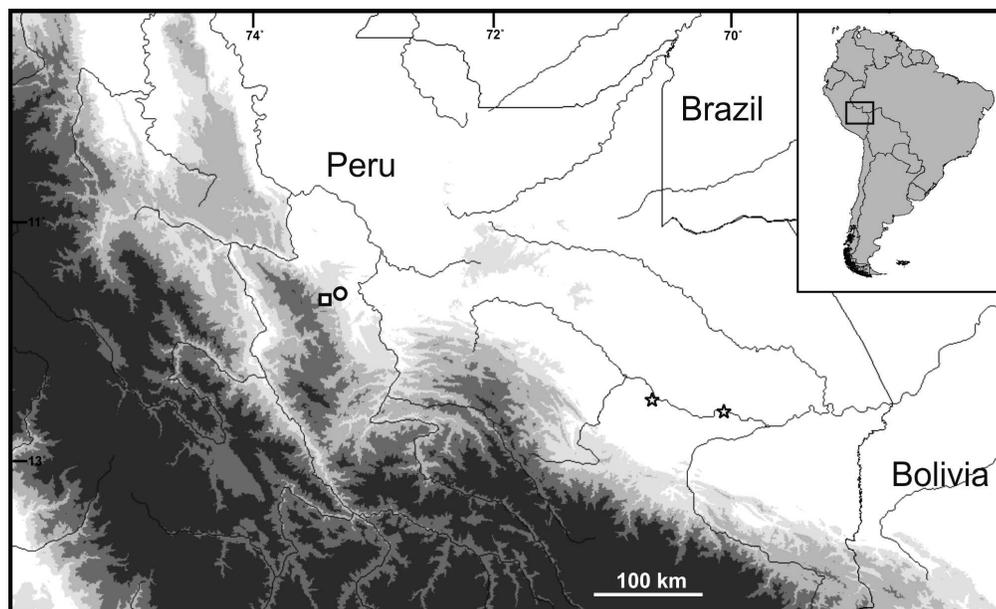


Figure 5.—Map of the known locality records of *Protimesius* spp. in southeastern Peru. *P. amigos* new species (stars), *P. machiguenga* new species (square), *P. kakinte* new species (circle).

Chelicerae slightly less swollen; prosoma less granular than male; leg IV: femur, patella and tibia smooth, without tubercles. Tarsal segmentation: 7, 14, 6, 7. Pedipalpal tarsal formula; mesal IiIiii, ectal IiIiii.

Distribution.—Peru: Madre de Dios.

Protimesius machiguenga new species

Figs. 2A–G, 4C & D, 5

Type material.—PERU: *Cusco Department*, La Convención Province, Echarati District: Holotype male (MHNC), Kiñanaroni, Reserva Comunal Machiguenga, between Taini and Kitepampani, near the confluence between Ayeni and Yari Rivers, 11°36'44"S, 73°23'18"W, 497 m, 18 October 2006, J.A. Ochoa, collected at night with UV light. Paratypes: 1 female, collected with holotype (MHNC), 1 male, 1 female, collected with holotype (MZSP 36821).

Etymology.—The specific name is a noun in apposition and refers to the Reserva Comunal Machiguenga, an area protected by the Peruvian government, located on the eastern slopes of the Vilcabamba mountain range in Cusco Department, where this species occurs.

Diagnosis.—*Protimesius machiguenga* appears to be closely related to *P. cirio* and *P. boibumba*, based on the presence of ventral row of tubercles on male femur IV. *Protimesius machiguenga* may be separated from one another by the number of tubercles on femur IV; it consists of 37–38 tubercles (Fig. 2E) in *P. machiguenga*, 24 in *P. cirio*, 46 in *P. boibumba*; additionally tibia IV in *P. machiguenga* possesses a conspicuous dorsal prolateral row of tubercles and one retrolateral row of small tubercles, whereas in *P. cirio* the tibia IV is smooth, and *P. boibumba* has only a ventral row of tubercles. The shape of the penis of *Protimesius machiguenga* (Fig. 4C, D) differs from that of *P. cirio* by the presence of three pairs of distal setae (also present in *P. boibumba*) and dorsal process well developed, compared with 4–5 pairs of distal setae and absence of dorsal process in *P. cirio*.

Description.—*Male (holotype): Measurements:* Dorsal scutum length 5.14; prosoma length 2.43; dorsal scutum width 4.36; prosoma width 4.14; interocular distance 2.79; chelicera: II 5.07, III 2.43; pedipalp 24.2; leg I 28.0, II 54.5, III 39.0, IV 50.5.

Dorsum (Fig. 2A, B): Anterior margin of carapace smooth. Prosoma without anterior prominence, two moderate tubercles anteriorly, and several sparse, small granules medially. Eye mounds smooth. Interocular region smooth. Lateral margins with 7–8 small tubercles from coxa III to anterior margin of coxa IV. Area I–III without tubercles; I divided; III with two large spines, divergent slightly toward posterior. Posterior margin and free tergites finely granulated.

Venter: Coxa I with a medial row of 7–5 tubercles, two anterior, three apical (anterior largest); II with medial row of 7–8 small tubercles, two apical; III with a weak row of small tubercles, and two apical tubercles; IV smooth. Genital operculum with five granules, three anterior largest. Free sternites smooth.

Chelicerae: Strongly swollen. Segment I smooth; II with one basal elongated and three medial small teeth, with several setae near the base of finger; III with one elongated median and two small subdistal teeth.

Pedipalp: Coxa with one large dorsobasal, two dorsosub-basal, and three ventral tubercles, distal largest. Trochanter

with four ventral tubercles, one basal, one medial (the larger), and two distal. Femur with one ventrobasal tubercle, patella smooth. Tibia: mesal IiIi, ectal IiIi. Tarsus: mesal IiIiii, ectal IiIi.

Legs: Coxa I with three dorsal tubercles, the anterior smaller, the posterior bifid; II with 2–3 dorsal (a small additional granule could be present), the posterior bifid and fused with coxa III; III with one tubercle; IV with one prominent and three small granules distally. Trochanters I–IV with three ventral tubercles, antero-distal smaller in I–III or vestigial in IV. Femur IV (Fig. 2E–G) with a ventral row of 37–38 tubercles, progressively increasing in size distally, except the last three, which are smaller. Patella IV (Fig. 2E–G): dorsal side with one dorsoprolateral row of seven tubercles, progressively increasing in size distally; one retrolateral row of small tubercles; and four dorsal small granules; ventral side with a conspicuous distal tubercle. Tibia IV (Fig. 2E–G) with one dorsal row of seven proximal small tubercles; one ventral row of 20–23 conspicuous tubercles, medial tubercles slightly tortuous retrolaterally and much larger than basal and distal one; prolaterodorsal and retrolateral distal spines well developed. Tarsal segmentation: 8, 19, 6, 7.

Penis (Figs. 4C, D): Truncus with 10 pairs of large basal setae; ventral plate pentagonal, distal margin straight; with three pairs of distal large setae and one pair of intermediary setae smaller than others and placed more dorsally than distal one. Glans with dorsal process well-developed, lower stylus; stylus apex swollen and with small subapical setae.

Color: Prosoma, pedipalps and legs I–III, yellowish brown with slight reticulate pigmentation; antero-lateral parts of prosoma, lateral borders of scutum and area III with dark reticulate pigmentation; free tergites and sternites brown; chelicerae brown with reticulate pigmentation; leg IV reddish brown.

Female (paratype, MHNC): Measurements: Dorsal scutum length 5.0; prosoma length 2.14; Dorsal scutum width 4.29; prosoma width 3.71; interocular distance 2.29; chelicera: II 2.14, III 1.50; pedipalp 23.4; leg I 26.0, II 51.5, III 38.0, IV 51.5.

Somatic morphology: Similar to male, differs in the following features: chelicerae and prosoma slightly darker, especially in borders; free tergites and sternites with well developed brown pigmentation. Chelicerae short, not swollen; prosoma less granular than male. Leg IV: femur, patella and tibia smooth, without tubercles. Tarsal segmentation: 7, 18, 6, 7.

Distribution.—Known only from the type locality.

Protimesius kakinte new species

Figs. 3A–F, 4A & B, 5

Type material.—PERU: *Cusco Department*, La Convención Province, Echarati District: Holotype male (MHNC), Sariteto, Kitepampani, Ayeni River near the Reserva Comunal Machiguenga, 11°35'10"S, 73°20'32"W, 447 m, 17 October 2006, J.A. Ochoa, collected at night with UV light.

Etymology.—The specific name, a noun in apposition, refers to the geographic distribution of this species in Kitepampani, a Kakinte Native Community. Kakinte is a small Amazonian tribal group of southeastern Peru. The Kakinte language belongs to the Arawak language family and is related with the Machiguenga group.

Diagnosis.—*Protimesius kakinte* appears to be most similar to *P. amplichelis* and *P. boibumba*, based on the presence of

ventral retrolateral row of tubercles on the male femur IV, and ventral retrolateral row on the apex of tibia IV (Fig. 3E–F). *Protimesius boibumba* differs from *P. kakinte* by its well-developed large tubercles on the femur and tibia IV, which are present on the distal two thirds of femur IV and entirely on tibia IV, whereas in *P. kakinte* the tubercles are present on the distal half of femur IV, restricted to five small tubercles distally. *P. kakinte* may be separated from *P. amplichelis* by the number of retrolateral tubercles on femur IV: *P. kakinte* possess 21 tubercles compared to *P. amplichelis* with 9 tubercles; additionally, *P. amplichelis* present a low anterior eminence on the prosoma, which is absent in *P. kakinte*.

Description.—*Male (holotype): Measurements:* Dorsal scutum length 4.79; prosoma length 2.14; Dorsal scutum width 4.0; prosoma width 3.71; interocular distance 2.29; chelicera: II 3.29, III 1.86; pedipalp 22.4; leg I 24.0, II 46.5, III 36.5, IV 47.0.

Dorsum (Figs. 3A, B): Anterior margin of carapace smooth. Prosoma without anterior prominence, two small tubercles anteriorly, and few sparse small granules medially. Eye mounds smooth. Interocular region smooth. Lateral margins with 10–10 small tubercles from coxa III to anterior margin of coxa IV. Area I–III without tubercles; I divided; III with two large spines, divergent slightly towards posteriorly. Posterior margin and free tergites smooth.

Venter: Coxa I with a medial row of 6–6 tubercles, one small anterior, 3–4 small posterior, three apical; II with a weak medial row of 6–5 small tubercles, three apical; III with some small scattered granules and two apical tubercles (anterior vestigial); IV with one apical tubercle. Genital operculum with two weak granules. Free sternites smooth.

Chelicerae: Swollen. Segment I smooth; II with one basal elongated, three small teeth, with some setae near the base of finger; III with one elongated median and two small subdistal teeth.

Pedipalp: Coxa with one large dorsobasal and 4–6 dorsosubbasal tubercles, ventral side with a row of three ventral tubercles (the distal largest) and one posterior small tubercle. Trochanter with one small dorsal and four ventral tubercles, one basal, one medial (the largest), and two small distal. Femur with one ventrobasal tubercle. Patella smooth. Tibia: mesal IIIIi, ectal IIiIi. Tarsus: mesal IiIiii, ectal Iiii.

Legs: Coxa I with three dorsal tubercles, the anterior smaller, the posterior bifid; II with two dorsal, the posterior bifid and fused with coxa III; III with one tubercle; IV with three dorsal small granules distally. Trochanters I–IV with three ventral tubercles, antero-distal smaller in I–II, vestigial in III–IV. Femur IV (Fig. 3E, F) with a ventral retrolateral row of 21 small tubercles on distal half, progressively increasing in size distally, except the last two, which are smaller. Patella IV (Fig. 3E, F) with a dorsal row of four small tubercles progressively increasing in size distally. Tibia IV (Fig. 3E, F) with a ventral row of five small tubercles distally; prolaterodorsal and retrolateral distal spines moderate developed. Tarsal segmentation: III, 6, IV, 7 (I and II incomplete).

Penis (Figs. 4A, B): Truncus with eight pairs of basal large setae; ventral plate rectangular, distal margin straight; with two pairs of distal large setae and 1 pair of intermediary setae smaller than others and placed more ventrally than distal one. Glans with dorsal process well developed, same height as stylus; stylus cylindrical and without small setae.

Color: Chelicerae, prosoma, Areas I–III, and leg IV, reddish brown; pedipalps and legs I–III yellowish brown; free tergites and sternites brown. Slight reticulate pigmentation on chelicerae, antero-lateral parts of prosoma, lateral borders of scutum and area III; patella, tibia and tarsus of pedipalps and legs I–III with dark reticulate pigmentation.

Female: unknown.

Distribution.—Known only from the type locality.

Protimesius albilineatus (Roewer 1957)

Obidosus albilineatus Roewer 1957:82, Fig. 18.

Protimesius albilineatus: Pinto-da-Rocha 1997: 276, 277, Figs. 357–361, 539, 540, 603; Kury 2003: 230, 268, 282, 285, 286; Pinto-da-Rocha & Villarreal-Manzanilla 2009:55. Fig. 12, table 3; Bragagnolo 2013: 286, Fig. 1.

New material examined.—PERU, Loreto Department, *Maynas, Fernando Lores Province:* Comunidad El Chino, Tahuayo River, 04°18'19"S, 73°13'22"W, 101 m, 25 February 2008, C. Gil and J.A. Ochoa, rainforest, collected at night with UV light, 1 male, 5 females (MHNC), 1 male, 7 females (MZSP 36824), 1 male, 4 females (MZSP 36822).

Distribution.—Brazil: Amazonas; Ecuador: Napo; Peru: Madre de Dios, Ucayali and Loreto.

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