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Cladistic analysis of the family Nomoclastidae with descriptions of a new genus and eight new species (Opiliones, Laniatores)

Ricardo Pinto-da-Rocha[A,C] *and Cibele Bragagnolo*[B]

[A]Departamento de Zoologia, Instituto de Biociências, Universidade de São Paulo, Caixa Postal: 11.461, 05422-970, São Paulo, SP, Brazil.
[B]Departamento de Biologia Evolutiva, Instituto de Ciências Ambientais, Químicas e Farmacêuticas, Universidade Federal de São Paulo, Rua Prof. Arthur Riedel n° 275, 09972-270, Diadema, SP, Brazil.
[C]Corresponding author. Email: ricrocha@usp.br

Abstract. The family Nomoclastidae is revised and, based on a cladistic analysis, *Callcosma* Roewer, 1932 is transferred to the family from Cranaidae. The monotypic genus *Napostygnus* Roewer, 1929, hitherto considered *incertae sedis*, is also assigned to Nomoclastidae. *Zygopachylus* Chamberlin, 1925 and *Poassa* Roewer, 1943 are synonymised under *Quindina* Roewer, 1914, consequently creating the new combinations *Quindina limbata* (Roewer, 1914) and *Quindina albomarginis* (Chamberlin, 1925). The new combination *Quindina marginata* (Roewer, 1963), comb. nov. is proposed, as the type-species of *Deriacrus*, *D. simoni* Roewer, 1932, is not congeneric with *Deriacrus marginatus* Roewer, 1963 and has the synapomorphies of *Quindina*, such as a row of large rounded tubercles on the lateral margin and enlarged tubercles on the dorsal scutum. A new genus and species are proposed, *Kichua rheimsae*, sp. nov., from Ecuador (type locality: Ecuador, Napo, Cantón Quijos, Parroquira Cozanga, Yanayacu Research Station). In addition, seven new species are herein described: *Callcosma abrapatricia*, sp. nov. (type locality: Peru, Moyobamba, Abra Patricia Private Conservation Area); *Callcosma cofan*, sp. nov. (type locality: Ecuador, Sucumbíos, Cabanas Cuyabeno); *Callcosma barasana*, sp. nov. (type locality: Colombia, Vaupés, Tararira, Estacción Biológica da Caparu); *Quindina albiocularia*, sp. nov. (type locality: Panama, Coclé, Valle de Antón); *Quindina burbayar*, sp. nov. (type locality: Panama, Reserva Natural Privada Burbayar); *Quindina kuna*, sp. nov. (type locality: Panama, Darién, Chucantí); and *Quindina morae*, sp. nov. (type locality: Panama, Gamboa, Sendero del Oleoducto).

Additional keywords: Cranaidae, male arena, Manaosbiidae, *Zygopachylus*.

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Introduction

The classification of Neotropical harvestmen of the superfamily Gonyleptoidea is under a profound reorganisation based on revisions and cladistic analyses (see, for example, Kury 2011, 2013; and Pinto-da-Rocha *et al.* 2014). The system created by Roewer, followed by several authors (for example, Mello-Leitão, Ringuelet and the Goodnight and Soares couples; see Kury 2003 for a complete list of references) during the 20th century, proved to be insufficient to represent the current diversity. The reason for this was that the system was based on only a few sets of external morphological characters suggested by Roewer as having taxonomic value (for example, see Kury 1990; Hara and Pinto-da-Rocha 2010; and Pinto-da-Rocha *et al*. 2014). During the course of this challenge, many taxa have been synonymised, up- or down-ranked, transferred to other groups or discovered (see a historical account in Kury 2007).

The family Manaosbiidae is of special interest because it is a good example of the fragility of the classification system created by Roewer. The type genus, *Manaosbia* Roewer, was proposed in 1943 based on a single female from Manaus, Brazil (Roewer 1943), and the family remained monotypic and monospecific until Kury (1997) added 21 genera and rediagnosed the group. In the catalogue of New World Laniatores, Kury (2003) added two genera and six species to the family, including the genus *Zygopachylus* Chamberlin, 1925 (Fig. 1*B*). This genus is remarkable because, despite having a similar body armature to other manaosbiids, the autapomorphy of the family, the sexual secondary dimorphism on leg I – the swollen basitarsus I (Kury 1997), is lacking. Another remarkable characteristic of *Zygopachylus* is the sexual behaviour. Males build and protect an open mud nest (Fig. 2*A*) under fallen tree trunks for copulating with as many females as possible, guarding their eggs and

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Fig. 1. Photos of live males, dorsal view. (*A*) *Callcosma abrapatricia*, sp. nov., (*B*) *Quindina albomarginis*, (*C*) *Q. burbayar*, sp. nov., (*D*) *Q. kuna*, sp. nov., (*E*) *C. gracillima*, (*F*) *Q. limbata*. Photos: (*A*, *D*) R. Pinto-da-Rocha; (*B*) Arthur Anker; (*C*) Alonso Santos; (*E*) Arthur Anker; (*F*) Daniel Proud.

protecting early-stage offspring (Rodriguez and Guerrero 1976; Mora 1990). It could be argued that the sexual role of each sex is reversed in this species, as females choose males based on an evaluation of the reproductive arena, and the male is essential for egg survival (Mora 1990). The only known species of this genus, *Z. albomarginis* Chamberlin, 1925, has also been used to study scent fluid behaviour and chemical constitution (see Eisner *et al*. 1977; Roach *et al*. 1980; and Cokendolpher 1987).

The taxonomic placement of *Zygopachylus* has been controversial since its description. It was originally described

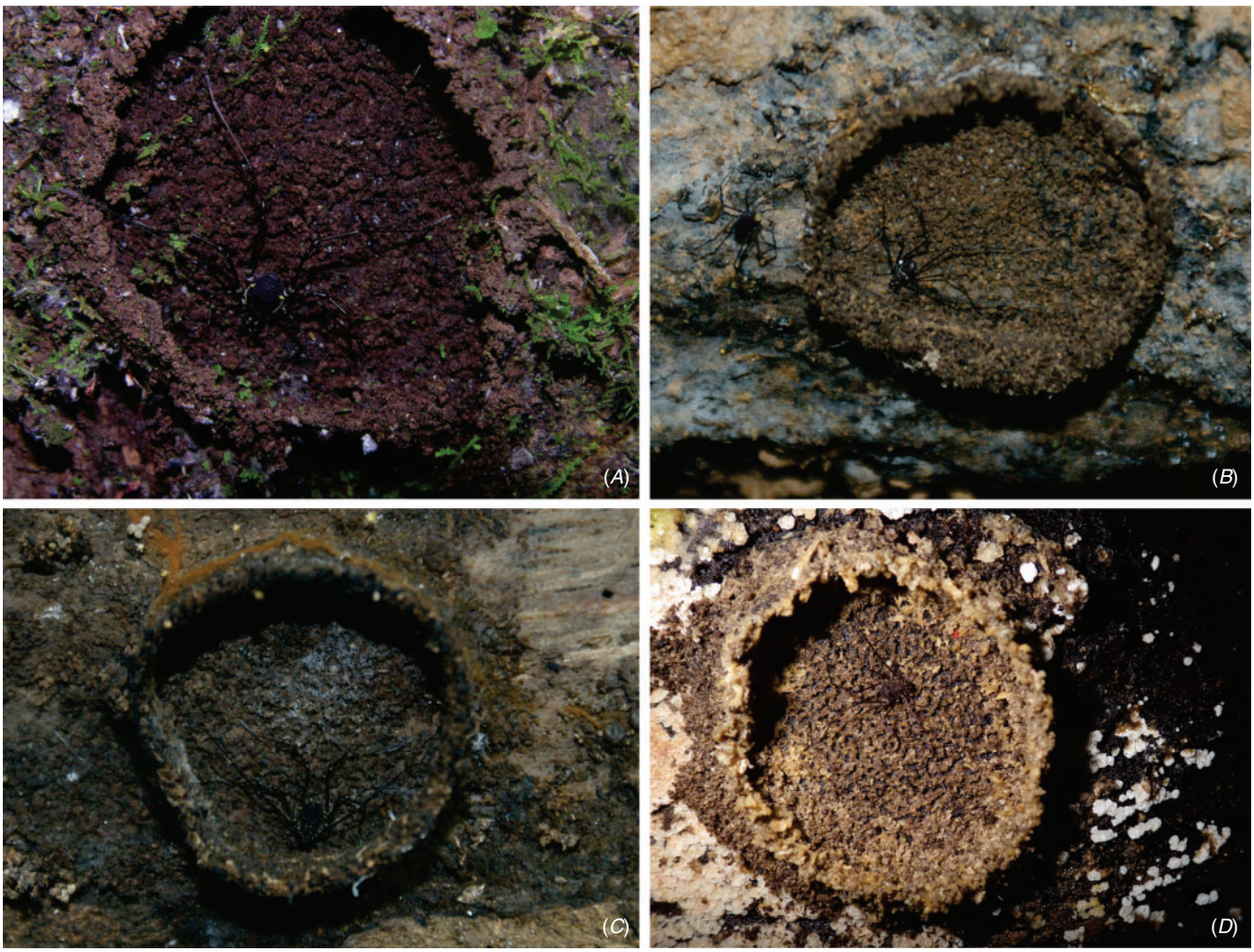

Fig. 2. Photos of nests of Nomoclastinae. (*A*) *Quindina albomarginis*, (*B*) *Q. burbayar*, sp. nov., (*C*) *Q. kuna*, sp. nov., (*D*) *Q. limbata*. Photos: (*A*) Arthur Anker; (*B*, *C*) Alonso Santos; (*D*) Diego Solano.

in Gonyleptidae (Chamberlin 1925), later assigned to Gonyleptidae-Pachylinae by Roewer (1929), to Cranaidae by Goodnight and Goodnight (1947) and to Manaosbiidae by Kury (2003). However, molecular studies conducted by Giribet *et al.* (2010) and Sharma and Giribet (2011) found an unidentified species of *Zygopachylus* sister to Cosmetidae and not related to the other studied manaosbiid, adding doubt to its familial assignment.

Recently, Kury and Villarreal (2015) proposed a new classification system for Gonyleptoidea using penial setae. They discovered several homologies and proposed a new classification for the suborder based on a morphological cladistic analysis. Nomoclastidae Roewer, 1943, previously assigned as a subfamily of Stygnidae, was ranked at family level, and currently includes two subfamilies (Nomoclastinae Roewer, 1943 and Zamorinae Kury, 1997). It comprises the following genera: *Nomoclastes* Soerensen, 1932, *Quindina* Roewer, 1915, *Zamora* Roewer, 1927 and *Zygopachylus*.

The ongoing taxonomical review of Manaosbiidae, as well as the results of multilocus molecular analyses on Gonyleptoidea (Pinto-da-Rocha *et al.*, in prep.), led us to review the systematic position of *Zygopachylus* and test its current assignment in Nomoclastidae (Kury and Villarreal 2015). The examination of type specimens of species described by Roewer in several Gonyleptoidea families called our attention to other taxa possibly related to the *Quindina-Zygopachylus* clade. Additionally, field observations made by the first author and data from behavioural researchers (Daniel Proud, R. Quesada, C. Toscano-Gadea, pers. comm.) revealed that the striking reproductive characteristics of *Z. albomarginis* are not restricted to this species. Field trips and the study of museum specimens also brought to light a new genus and eight new species, which are here described.

Materials and methods

Material examined

The following abbreviations are used to indicate the depositories (curator in parentheses): AMNH, American Museum of Natural History, New York, USA (L. Prendini); SMF, Naturmuseum Senckenberg, Frankfurt am Main, Germany (P. Jäger); MZSP, Museu de Zoologia, Universidade de São Paulo,

Table 1. Matrix of character states for the cladistic analysis of the Nomoclastidae
Characters 1–77 follow Kury and Villarreal (2015), except for new species and transfers

Taxa	Characters									
	0000000000 1234567890	1111111111 1234567890	2222222222 1234567890	3333333333 1234567890	4444444444 1234567890	5555555555 1234567890	6666666666 1234567890	7777777777 1234567890	8888888888 1234567890	999 123
Acumontia succinea	0000000000	2-0?000000	0200000200	0000000000	0300-0000-	000000-000	00-0------	-?--000000	0000000000	0??
Stygnomma fuhrmanni	000-100000	2-0?100100	0010000?00	0000000010	1001-0000-	000000-000	00-0------	-?--010000	0000000000	0??
Santobius annulipes	500-100000	2-0?100100	0220000000	0000000010	1001-0000-	000000-000	00-0------	-?--0110??	?0?????????	???
Pungoica simoni	3101001000	000?001002	01?0100000	0010000012	1001-0000-	0002000000	00-0-00010	00-01100??	?0?????????	???
Dibunus similis	810-100100	0200100000	1200000100	0010000010	1001-0000-	0002000000	00-0100001	4000110??	?0?????????	???
Pyramidops pygmaeus	5100000000	000?000000	12?0000000	0010200010	1001-0000-	0002000000	00-0150010	0000110??	?0?????????	???
Paramitraceras granulatum	5000000000	020?200000	12?0000200	0-10210010	1001-0000-	0002000000	00-0100025	?00011?000	0000000000	0??
Globibunus rubrofemoratus	1100001000	0001000003	1200000001	0010010110	1102-00000	0201000000	00-01000-	300011?000	0000000000	000
Ricstygnus quineti	511-101100	020?200000	0020000100	0002111111	1102-00000	0101000000	10-3100014	1301111000	0000000000	0??
Stenostygnellus macrochelis	101-101100	030?200000	0020000100	1002111111	1102-00001	0001000000	00-0100017	1000111000	0000000000	000
Taquara bicoloripes	6100010000	0000001000	0300100000	1010010110	1102-00000	0021000000	00-0100020	110011?000	0000000000	000
Gerdesius mapinguari	6100010000	0301001000	0000000000	1012210111	1102-00000	0001000000	1100100022	?00111?000	0000000000	000
Cajamarca cajamarca	2101001100	000?000000	1200000001	1000010110	1203000210	0101010110	10-0040025	141111?000	0000000000	0??
Chacoikeontus clavifemur	3101001100	130?000000	1200000001	1000010110	1203000210	0101010110	10-0040025	141111?000	0000000000	0??
Incasarcus dianae	2101011100	1001000000	1200000201	0010010110	1203000210	0001010110	1131040025	141111?000	0000100000	0??
Taito juruensis	3101002000	2-00011011	0121010401	1012010111	1203000200	0101000210	1122040025	1411111000	0000000000	0??
Cynorta conspersa	3101002100	2-00011011	0121010400	0000000111	1203000200	0101000210	1102040025	1411111000	0000000000	0??
Cosmetus variolosus	3101002200	2-0?011011	0121010400	0000000111	1203000200	0101000210	10-2040025	1411111000	0000000000	0??
Syncranaus cribrum	3101001100	2-00001000	1020000310	1002000111	1203000100	0001010000	1121040025	231111?000	0001100000	0??
Saramacia lucasae	3101001100	2-00001000	1020000310	1002000111	1203000100	0001010000	10-1040025	2311111000	0000000000	0??
Heterocranaus chlorogaster	3011013100	2-00200000	0210001200	1002010111	1213100202	0001111001	1201041125	131111?000	0000000000	0??
Chiriboga albituber	6011001100	2-00200000	0200001200	1002010111	1213100202	0001111001	1201041125	131111?000	0000000000	0??
Zannicrannaus monoclonius	4011013100	2-00202000	0220001200	1002010111	1213100202	0001111001	1201041025	131111?000	0000100000	0??
Phareicranaus giganteus	3101003100	1000002000	0300001200	1002010111	1213100202	0001111001	1201041025	?311111000	0001100000	0??
Phalangodus sp.	2101003100	0000002000	0310000200	1000010111	1213100202	0001011000	1200040025	?31111?000	0000000000	0??
Licornus tama	4101011110	0311001000	0000000300	1111211111	120300?002	0101210000	?0?0040025	?30111?100	0100000000	000
Hutamaia caramaschii	4101011020	031?001000	0000000300	1111211111	1203000002	0001210000	00-0040025	230111?100	0100000000	000
Ampycus telifer	2100011111	2-11001000	0000000300	1112211111	1203000302	1001210000	1210040025	230111?100	0000000000	000
Nesopachylus monoceros	2101011001	030?001000	0000000300	1112211111	1203000302	1001210000	1210040025	230111?000	0000000000	000
Glysterus metatarsalis	2101011111	030?001000	0000000300	1112211111	1203000302	1001210000	0000040025	230111?000	0000000000	000
Neopachyloides sp.	2101011011	1-1?001000	0000000300	1112211111	1203000302	1001210000	12100?0025	210111?000	0000000000	000
Discocyrtus crenulatus	4201011100	0301001000	1000000303	1110211111	1203000202	0011000000	1101040025	1411111100	0000000000	000
Gonyleptes horridus	4201011100	2-01001000	1000000303	1112-11111	1203000202	0011000000	1101030025	1411111110	0100000010	000
Acanthopachylus aculeatus	4101011000	0101001000	1000000303	1110211111	1203000202	0011000000	1200040025	1411111100	0000000000	000
Zamora granulata	5010001000	0200200000	0200000000	0002110111	120301040-	0001410000	00-0020123	14?111?000	0000000000	000
Napostygnus bispinosus	?201011011	0000001000	0020000000	0000000112	1203011000	0101410000	0-4030125	?111?1?000	0000000000	000
Nomoclastes quasimodo	50-102000	2-0?300000	0010000000	0000200111	1203011000	0001410000	00-00-0125	020111?000	0000000000	000
Callcosma abrapatricia	3101001100	1300001000	1000000000	0000000111	1203011000	0001410000	0--40-1125	020111?000	0000111000	001
Callcosma barasana	3101001100	0300001000	1020000000	0000000111	1203011000	0001410000	0--?0?1125	020111?000	0020111000	001
Callcosma cofan	3101001100	0300001000	1020000000	0000000111	1203011000	0001410000	0--?0-1125	02-?11?000	0020100000	001
Callcosma gracillima	3101001100	0300001000	1020000000	0000000111	1203011000	0001410000	0--?0-1125	020111?000	0020101000	001
Kichua rheimsae	3101001100	2-00001000	1020000000	0000000111	1203011000	0001410000	0--00-0125	020111?000	0000000000	000
Quindina albiocularia	3101001100	0320011000	1000000000	0000000111	1203011000	0001410000	0--40-1125	020111?210	0011100111	111
Quindina albomarginis	3101001100	1220011000	1000000000	0000000111	1203011000	0001410000	00-40-1125	0201111200	0210100101	011
Quindina bella	3101001100	0320011000	1000000000	0000000111	1203011000	0001410000	13100-1125	020111?211	0101100111	111
Quindina bimaculata	3101001100	0-20011000	1000000000	0002000111	1203011000	0001410000	0--?0--125	02??11?201	0100100111	011
Quindina burbayar	3101001100	0320011000	1000000000	0000000111	1203011000	0001410000	0--40-1125	020111?200	0011100101	011
Quindina limbata	3101001100	2-20011000	1000000000	0000000111	1203011000	0001410000	0--40-1125	020111?211	1011100101	111
Quindina marginata	3101001100	2-20011000	0000000000	0000000111	1203011000	0001410000	0--?0-0125	?2??11?200	0100000100	000
Quindina morae	3101001100	0120011000	1000000000	0000000111	1203011000	0001410000	0--40-1125	020111?200	0011100101	011
Quindina kuna	3101001100	0120011000	1000000000	0000000111	1203011000	0001410000	0--40-1125	020111?211	0110110111	111

São Paulo, Brazil (R. Pinto-da-Rocha); CAS-ENT, California Academy of Science, San Francisco, USA (L. Esposito); IBSP, Instituto Butantan, São Paulo, Brazil (A.D. Brescovit); ICN-AO, Instituto de Ciencias Naturales de la Universidad Nacional de Colombia, Bogotá, Colombia (E. Florez D.); MCZ, Museum of Comparative Zoology, Cambridge, MA (G. Giribet); MIUP, Laboratório de Artropodos Venenosos, Museo de Invertebrado G. B. Fairchild, Universidad de Panamá, Panama City, Panama (D. Quintero A.); MUSM-ENT, Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru (D. Silva D.); QCAZ, Museum of Invertebrates, Pontificia Universidad Católica, Quito, Ecuador (C. Keil).

The record of Flórez and Sánchez (1995: 367, cited as *Zygopachylus aff. albomarginis*) and the following undescribed species (based only on females) had their records included in the distribution map, Fig. 16).

Genus sp. 1: Panama, San Blas, Navagandí, 12.ii.1990, D. Quintero leg., 1 ♀ (MIUP); Reserva Natural Privada Burbayar, 18–20.i.2013. R. Pinto-da-Rocha and A. Santos leg., 4 ♀ (MZSP).

Genus sp. 2: Colombia, Caquetá (Parque Nacional Los Picachos, 1630 m a.s.l.;), 24.xi.1997, V. Rodriguez, 3 ♀ (ICN-PO-351); Putumayo, Território Kofan, 18.ix.1998, V. Rodriguez leg., 2 ♀ (ICN-AO-342).

Descriptions and illustrations

The descriptions are listed in alphabetical order and were based on the type material. The nomenclature of structures and their relative positions follow Acosta *et al*. (2007). Illustrations of the external general morphology were made with the material immersed in 70% ethanol and using a stereomicroscope LEICA MZ-APO with the aid of a *camera lucida*. Male genitalia were prepared according to the method described by Acosta *et al*. (2007). The illustrations of male genitalia were made using a compound microscope Zeiss Axioskope 2 with a *camera lucida* or photographed using a Leica LEO 440 scanning electron microscope after being cleaned in an ultrasonic bath and gold-coated with a Sputter Coater Balzer SCD 050. Terminology for the macrosetae of the ventral plate follows Kury and Villarreal (2015). All measurements are in millimetres.

Cladistic analysis

A cladistic analysis was performed using the previous data matrix published by Kury and Villarreal (2015), including the eight new species here proposed and five newly transferred to Nomoclastidae. Kury and Villarreal's character 13 was subdivided into two (our #78 and #82), as it is related to two different aspects that are not correlated in all taxa: the colouration and the size of tubercles on lateral margin of dorsal scutum. Their characters 11 and 12 effectively doubled the weight of 'furrow entirely effaced', so we corrected this considering taxa that possess 11(2) as unobserved or missing [12(-)].

One character of their set of characters (Kury and Villarreal 2015) had a fourth state, here attributed:

(*64*) *Lateral fields of scale-bristles shape (always formed by type 4 scale-bristles)*: (0) absent; (1) restricted to corners of ventral plate; (2) prominent, occupying most of ventral plate; (3) two wide stripes almost touching each other in the centre; (4) restricted to the area of macrosetae group C.

The following 16 new characters are here proposed and the character codings are shown in Table 1.

(*78*) *Row of rounded and large tubercles on lateral margin*: (0) lacking (Fig. 4*B*); (1) present, coalescent and flattened (see Tourinho and Mendes 2014: 465, figs 1, 5); (2) present, rounded and well spaced (Fig. 5*D*).

(*79*) *White tubercles on ocularium*: (0) lacking (Fig. 5*C*); (1) present (Fig. 5*D*).

(*80*) *White tubercles on area I*: (0) lacking (Fig. 5*C*); (1) present (Fig. 5*D*).

(*81*) *White tubercles on area II*: (0) lacking; (Fig. 6*C*); (1) present (Fig. 6*D*).

(*82*) *White tubercles on lateral margin*: (0) lacking (Fig. 6*B*); (1) all tubercles (Fig. 5*C*); (2) only the largest pair (Fig. 5*B*).

(*83*) *Enlarged tubercles or elevation almost at end of lateral margin*: (0) lacking (Fig. 8*B*); (1) enlarged tubercles (Fig. 8*G*); (2) wide elevation (Fig. 8*D*).

(*84*) *Free tergite II with one pair of tubercles longer than tergite length*: (0) lacking (Fig. 8*D*); (1) present (Fig. 8*F*).

(*85*) *Free tergite III with one pair of tubercles longer than tergite length*: (0) lacking (Fig. 9*E*); (1) present (Fig. 8*F*).

(*86*) *Lateral margins of areas with white patches*: (0) lacking (Fig. 4*C*); (1) present (Fig. 4*A*).

(*87*) *White patches on posterior region of prosoma*: (0) lacking (Fig. 4*C*); (1) present (Fig. 4*D*).

(*88*) *Longer than wide tubercles on dorsal scutum areas I–IV*: (0) lacking, all about same size (Fig. 4*C*); (1) present (Fig. 5*B*).

(*89*) *Colour of tubercles on free tergite III*: (0) same as body (Fig. 6*B*); (1) white (Fig. 6*C*).

(*90*) *Ventral process on penial glans directed to ventral plate*: (0) lacking; (1) present.

(*91*) *Free tergite II with white tubercles*: (0) lacking (Fig. 6*B*); (1) present (Fig. 6*D*).

(*92*) *Femur IV apex with long prodorsal tubercle (longer than or as long as segment width)*: (0) lacking; (1) present.

(*93*) *Femur apex with long retrodorsal tubercle (longer than or as long as segment width)*: (0) lacking; (1) present.

All characters were considered non-additive. Parsimony analyses followed Kury and Villarreal's (2015) parameters and were performed with TNT (Goloboff *et al*. 2008*a*), using implied weights (concavity values of 1, 3 and 6) as well as equal-weighted and successive weighting analyses (script distributed with TNT). For a comprehensive discussion on concavities see Goloboff *et al*. (2008*b*). Heuristic searches were carried out using TBR replications with the following line commands: hold 100 000; xmu; re 10 000; hold 100.

Sexual dimorphism

We analysed the sexual dimorphism of Gonyleptoidea by measuring one male and one female of 60 species belonging to the following five families: Cosmetidae, Gonyleptidae, Manaosbiidae, Nomoclastidae and Stygnidae (Table S1, available as Supplementary material). In order to verify a possible sexual dimorphism on stigmatic area shape, we calculated the ratio between length (measured from the posterior border of the genital operculum to the posterior margin) and width (measured just below the genital operculum) of the stigmatic area and performed a paired *t*-test to analyse the differences in the ratio in males and females for all species of Gonyleptoidea studied here.

Results and discussion

Phylogenetic analysis

Nomoclastidae was recently ranked as a family with diverse body shapes (Kury and Villarreal 2015). Based on the current new familial allocations, other changes that will be published in the near future by Adriano Kury (pers. comm.) and the new taxa herein described, we can say that the family's diversity is still underestimated. In this paper, the family richness increased from six to 18 species.

An equal weighting analysis resulted in 125 equally parsimonious trees with 364 steps. Its strict consensus shows *Zamora* as sister to a large polytomy including all other Nomoclastidae, in which just a clade within *Quindina* (with the exception of *Q. marginata*) is recovered (see Fig. S1). A majority consensus recovered *Nomoclastes* as sister to all other Nomoclastinae, a polytomy with *Q. marginata*, *Kichua*, gen. nov., *Callcosma* (recovered as a monophyletic genus in 62%) and a clade with most species of *Quindina* (see Fig. S1). We also tried implied weighting under three different concavities and we obtained one (K = 1) or three (K = 3 and 6 each) trees (see Fig. S1). All those weighted trees were rediagnosed in equal weighting as having 365 steps. In all weighted trees, *Zamora* is sister to Nomoclastinae and all genera of the family are monophyletic. However, the generic relationships were not stable. *Nomoclastes*, *Napostygnus* or both forming a clade are sister to the remaining Nomoclastinae in six of seven trees obtained. The other three genera (*Kichua*, *Callcosma* and *Quindina*) form a clade in six trees, but internal relationships varied considerably. Nevertheless, implied weighting outperformed equal weights regardless of the concavity chosen; there is no criteria to choose one parameter over another (Goloboff *et al*. 2008*b*). Finally, we performed successive weighting based on retention index and obtained three trees rescaled as having 364 steps. We preferred to choose this analysis due to lowest tree length found, which means they are included in universe of most parsimonious trees obtained under equal weighting (see Carpenter 1988). See the strict consensus in Fig. 3 for compromise classification purposes (see Carpenter 1994). The consensus shows all Nomoclastinae genera as monophyletic and the same inconclusive generic relationships as observed in implied weighting analyses. However, it should be noted that Nomoclastidae relationships (see Fig. S1) under successive weighting are the same as with K = 3 (tree #1) and K = 6 (and tree # 3).

The genus *Quindina* was not recovered as monophyletic in equal weighting analyses, probably because *Q. marginata* is missing four characters due to unavailable genitalia for scanning microscopy (only the holotype is known). If we arbitrarily attributed the most common states of these characters (of other *Quindina* species) to *Q. marginata*, the genus was recovered as monophyletic in all analyses. *Quindina* is supported by five characters. The row of large and well-spaced tubercles on the lateral margin of the dorsal scutum is present in all species of the genus *Quindina* and no other genus (i.e. absent or very small tubercles). A striking feature is the very enlarged tubercle at the end of the row of smaller tubercles on the lateral margin of the dorsal scutum, which is present in most species of the genus. This characteristic is only lacking in *Q. marginata*, comb. nov. (sister species to the remaining species of *Quindina*), *Q. bimaculata* and *Q. bella*.

The genus *Callcosma* is supported by only one unambiguous character, the wide and long elevation from lateral margin of area II to almost the end of the lateral margin of the dorsal scutum. This feature is better seen in lateral view (Fig. 8*B–D*) and is reversed to the primitive state (elevation absent) in *C. abrapatricia*, sp. nov.

Sexual behaviour

A striking behavioural feature of some nomoclastines is the reproductive arena built by males for mating and to protect eggs or recently hatched offspring. This was first described for *Q. albomarginis*, comb. nov. (Mora 1990) and was recently presented in congress communications by Andre Rojas and Carlos Toscano-Gadea for *Q. limbata*, comb. nov. In field excursions conducted by R. Pinto-da-Rocha, similar arenas were found for three species of the same genus herein described: *Q. burbayar*, sp. nov., *Q. kuna*, sp. nov. and *Q. morae*, sp. nov. The arenas were never observed in *Nomoclastes quasimodo* (J. Moreno, pers. comm.), *Kichua rheimsae*, gen. nov., sp. nov. (C. Rheims, pers. comm.), *Callcosma gracillima* (C. Rheims and J. Cabra, pers. comm.) or *C. abrapatricia*, sp. nov. (RPR, pers. obs.). However, it should be stressed that field observations of the aforementioned species were restricted to a few days, none had their reproductive behaviour studied in detail and we cannot be sure that they do not build arenas. We should stress that the three Colombian species (*Q. marginata*, *Q. bella* and *Q. bimaculata*), for which the behaviour was never studied, bring uncertainty to the optimisation of such behaviour in our phylogeny. Considering that such behaviour was never observed in other harvestmen families, we can predict that it is a synapomorphy of *Quindina*, or at least of most of its species, as *Q. marginata* is sister to the remaining eight species of the genus, most of which (six spp.) build reproductive arenas (see Fig. 3).

Mora (1990), studying *Quindina albomarginis*, comb. nov., observed fighting between males and between females for territory or nest possession, and between males (within nests) and females for avoiding copulation or female predation on eggs. Unusual behaviour was photographed by biologist and amateur photographer Arthur Anker in Panama (see Fig. 1*B*) – individuals of *Q. albomarginis* back to back outside the arena, apparently measuring their second and/or fourth pair of legs. Indeed, similar agonistic behaviour has already been observed in males of some gonyleptids of the subfamilies Goniosomatinae and Mitobatinae (Buzatto and Machado 2008; Zatz *et al*. 2011). Unfortunately, the specimens photographed in the field were not collected and sexes were not determined. However, the large body size suggests that both are female and thus could be involved in a fight for territory or nest possession (G. Machado, G. S. Requena and R. Quesada, personal communication).

The use of behaviour in the phylogenetics of harvestmen provides a new source of data to infer the evolutionary history of the group (Caetano and Machado 2013) and call attention to the need for additional studies on reproduction of other

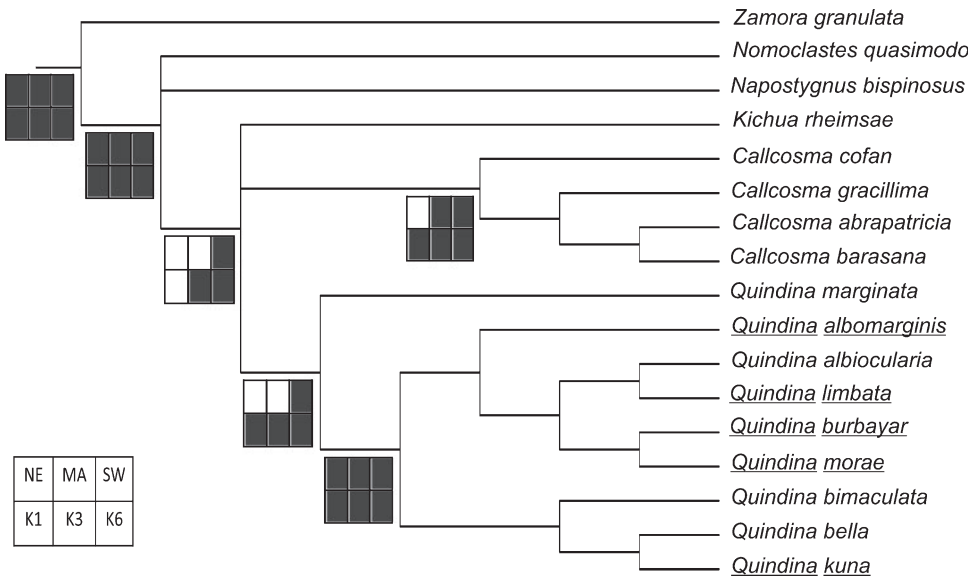

Fig. 3. Strict consensus phylogenetic hypothesis for Nomoclastidae genera performed on successive weighting. Underlined species built mud nests depicted in Fig. 2. Navarro rules: NE, Nelsen strict consensus; MA, majority rules >50%; SW, successive weighting; K, implied weighting (K 1, 2, 3).

Nomoclastinae genera to better understand the evolution of the group.

Sexual dimorphism

Another remarkable characteristic of members of Nomoclastidae is the apparent absence of sexual dimorphism in most representatives, with the exception of *Nomoclastes* and *Zamora* (Zamorinae). Sexual dimorphism in Opiliones is incredibly diverse, including: the presence of glands on the pedipalps, chelicerae, legs, sternal or anal regions of males; differences in the size and armature of the pedipalps, chelicerae, legs and ocularium; and differences in the shape, size and colouration of the body (Willemart *et al*. 2009). Males and females of Nomoclastinae – with the exception of *Nomoclastes quasimodo* Pinto-da-Rocha, 1997, in which males bear a huge ventral apophysis on male coxa IV – were thought to lack striking external morphological differences until Glauco Machado (pers. comm.) noted that the stigmatic area of females is apparently wider than in males in *Quindina limbata*. Fig. 17 summarises these observations for all Nomoclastidae species in which males and females are available compared with other Gonyleptoidea species. In fact, the length : width ratio of the stigmatic area is higher in males than in females. However, this apparent difference is not exclusive to Nomoclastidae; the same differences have been observed for other species of Gonyleptoidea (paired *t*-test; Cosmetidae = 6.4; $P < 0.00005$; Gonyleptidae = 7.4; $P < 0.00001$; Manaosbiidae = 6.5; $P < 0.00005$; Nomoclastidae = 9.4; $P < 0.00001$; Stygnidae = 4.7; $P < 00005$; all families = 11.17; $P < 0.0001$). This sexual dimorphism was recently observed in *Ventrifurca* Roewer, 1913 (Gonyleptidae, Cranainae) (Villarreal *et al*. 2015). Apparently, this is the first report of such mode of sexual dimorphism is widespread among Gonyleptoidea. However, future analysis with more species is needed for discussion about the evolution of this characteristic in the group.

Taxonomy

NOMOCLASTIDAE Roewer

Nomoclastidae Roewer, 1943: 14; Kury & Villarreal, 2015: 35.
Included subfamilies: Zamorinae, Nomoclastinae.

Diagnosis

See Kury and Villarreal (2015).

ZAMORINAE Kury

Zamorinae Kury, 1997: 339; Kury, 2003: 34; Pinto-da-Rocha & Hara, 2009: 36; Kury, 2012: 35; Kury & Villarreal, 2015: 36.
Included genus: *Zamora*.

Diagnosis

See Kury and Villarreal (2015).

NOMOCLASTINAE Roewer

Nomoclastinae Roewer, 1943: 14, 36; Pinto-da-Rocha, 1997: 170; Kury, 2003: 228; Kury & Villarreal, 2015: 37.
Included genera: *Callcosma*, *Kichua*, *Napostygnus*, *Nomoclastes*, *Quindina*.

Diagnosis (modified from Kury and Villarreal 2015)

Gonyleptoidea without marked dimorphism in chelicerae and pedipalps. Ocularium either low and elliptical, with median depression (*Nomoclastes*, *Quindina*, *Zygopachylus*). Anterior margin of carapace without frontal hump. Dorsal scutum either entirely smooth and unarmed (*Nomoclastes quasimodo*) or with a pair of robust paramedian spiniform processes on area III (*Quindina*, *Zygopachylus*). Legs I–IV unarmed, slender, but not extremely elongate. Coxa IV of male with immense ventral spur (*Nomoclastes quasimodo*). Basitarsus I similar in

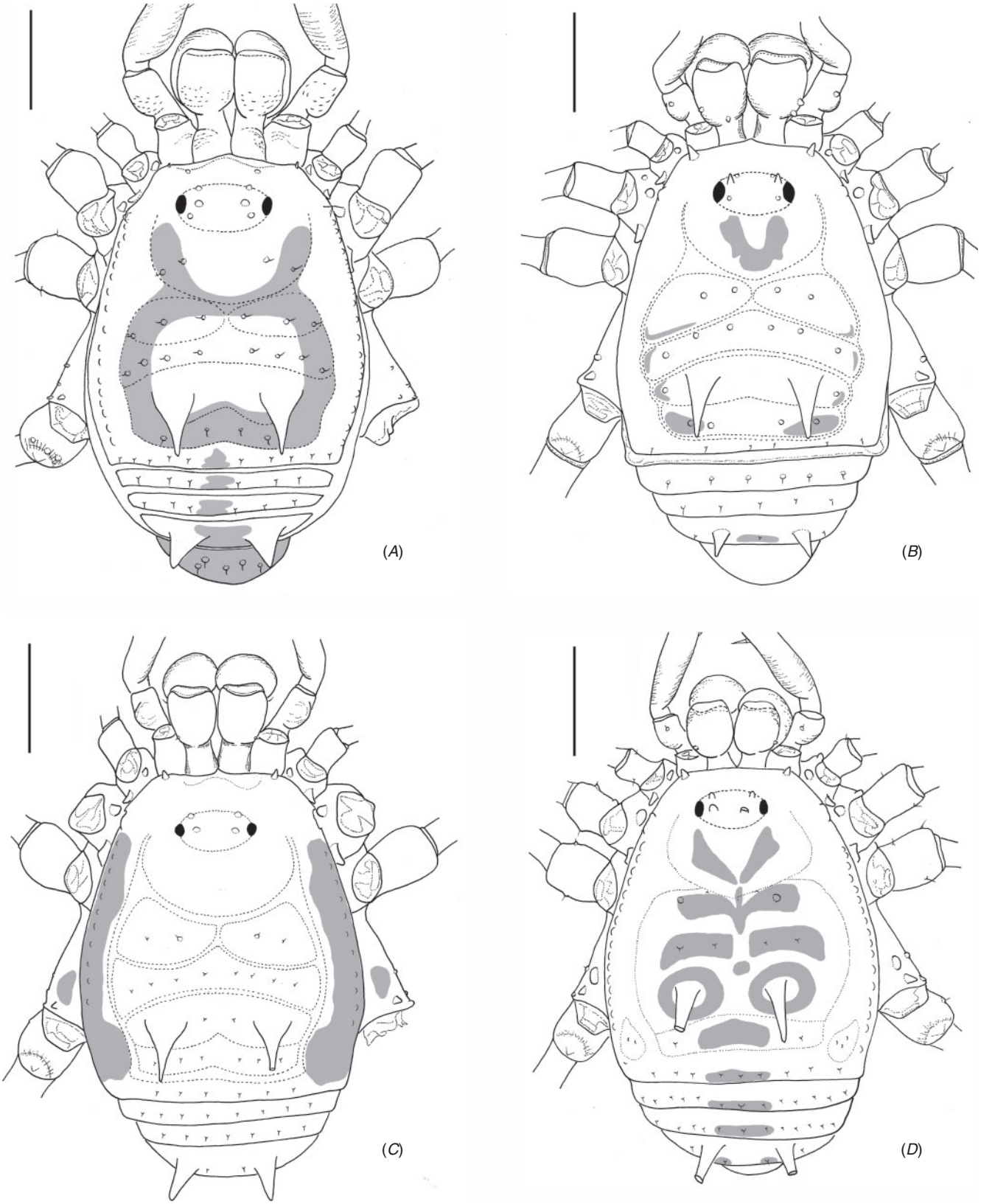

Fig. 4. Habitus, dorsal view of males of Nomoclastinae. (*A*) *Callcosma abrapatricia*, sp. nov., (*B*) *C. barasana*, sp. nov., (*C*) *C. cofan*, sp. nov., (*D*) *C. gracillima.* Scale bars = 1 mm.

both sexes. Tarsal claws III and IV smooth with well-developed median tarsal process. Ventral plate (VP) subrectangular to trapezoidal, arising from inside a rounded cavity on dorsal side of apical truncus penis. Patches of laminar scale-setae on the ventro-laterodistal borders of VP absent. Macrosetae (MS) C–C3 laterally inserted in most genera (except *Napostygnus*), well developed, only slightly curved, MS A1–A2 or only A1 following the same lateral row as MS C1–C3, sometimes macrosetae A absent. MS D1 small, inserted dorsally or dorso-laterally on the basal third of VP. MS E1–E2 as small stumps located ventrally on VP. Stylus short and sturdy with rounded head mounted atop a long columnar glans. Glans without dorsal processes in most genera (except *Napostygnus* with conspicuous dorsal process).

Key for the genera and species of Nomoclastinae

1. Ocularium with middle region hard to identify (Pinto-da-Rocha 1997: figs 1, 3, 7). ..... *Nomoclastes* 2
   Ocularium undivided 3
2. Both area III and free tergite III with a pair of spines..... ..... *Nomaclastes taedifer*
   Both area III and free tergite III unarmed .....*Nomoclastes quasimodo*
3. Area III unarmed, free tergites II and III with one large median tubercle (Pinto-da-Rocha *et al*. 2012; fig. 3A) ..... *Napostygnus bispinosus*
   Area III armed with two large spines, free tergites II and III unarmed or with a pair of large tubercles (with one large median tubercle in *Quindina kuna*) 4
4. Anterior lateral angle of area I and posterior angle of area III with prominent silver-coloured region (Fig. 8*E*) .....*Kichua rheimsae*
   Angles of areas I and III without any conspicuous prominence (Fig. 8*A*) 5
5. Lateral margin of dorsal scutum smooth (Fig. 4*B*), or with scattered low tubercles and a row of small and well-spaced tubercles (Fig. 4*C*) ..... *Callcosma* 6
   Lateral margin of dorsal scutum with a row of large tubercles very close to each other (Fig. 6)..... *Quindina* 9
6. Region posterior to ocularium without any coloured markings; lateral margin of dorsal scutum with wide white stripe along almost all its extension; coxa IV with one dorsoapical white spot (Fig. 4*C*) .... *Callcosma cofan*
   Region posterior to ocularium with white marks; lateral margin of dorsal scutum without coloured markings; coxa IV without dorsoapical white spot (Fig. 4*A*, *B*, *D*)..... 7
7. Areas I and II with transverse white stripe; area III with spines surrounded by white circle (Figs 1*E*, 4*D*)..... *Callcosma gracillima*
   Areas I–III without transverse white stripes or white circle markings (Fig. 4*C*)..... 8
8. Sulcus I, lateral of dorsal scutum areas and area IV with wide white stripe; anal operculum totally white (Fig. 4*A*) .....*Callcosma abrapatricia*
   Sulcus I, area IV and lateral areas without wide white stripe; with small white patches on lateroposterior region of areas I–V (Fig. 4*B*)..... .....*Callcosma barasana*
9. Free tergite III with similar-sized tubercles (Fig. 7*A*) .... *Quindina marginata*
   Free tergite III with one pair of large tubercles (Fig. 6)..... 10
10. Each lateral margin of dorsal scutum with one large tubercle on posterior region (at least five times larger than previous one, see Fig. 6*B–D*)... 12
    Lateral margin of dorsal scutum with similar-sized tubercles (Fig. 5*D*).. 11
11. Posterior region of lateral margin of dorsal scutum with a cluster of six tubercles (Fig. 5*D*) .....*Quindina bella*
    Posterior region of lateral margin of dorsal scutum with three sparse tubercles over a white or silver patch (Fig. 6*A*)..... .....*Quindina bimaculata*
12. Large tubercle on posterior region of lateral margin of dorsal scutum same colour as body (Fig. 8*G*)..... 13
    Large tubercle on posterior region of lateral margin of dorsal scutum white (Fig. 6*C*)..... 14
13. Posterior margin of dorsal scutum and free tergite I without tubercles (Fig. 6*B*) ..... *Quindina burbayar*
    Posterior margin of dorsal scutum and free tergite I with conspicuous tubercles (Fig. 7*B*).....*Quindina morae*
14. White tubercles on lateral margin of dorsal scutum (Fig. 5*C*) 5
    Only the posteriormost tubercle on lateral margin of dorsal scutum white (Fig. 5*B*) ..... *Quindina albiocularia*
15. White tubercles on ocularium, area I and at least one free tergite (Fig. 6*C*) 16
    Ocularium, areas of dorsal scutum, and free tergites without white tubercles (Fig. 5*C*) ..... *Quindina albomarginis*
16. Posterior margin of dorsal scutum and free tergites I and II with one white tubercle, larger than others of the same segment (Fig. 6*C*)..... ..... *Quindina kuna*
    Posterior margin of dorsal scutum and free tergites I and II with a pair of larger tubercles, only those from free tergite II are white (Fig. 6*D*) .....*Quindina limbata*

Genus ***Napostygnus*** Roewer, 1929 new familial assignment

Napostygnus Roewer, 1929: 274, 275; Kury, 2003: 145; Pinto-da-Rocha *et al.*, 2012: 31 (type species *Napostygnus bispinosus* Roewer, 1929 by monotypy).

Diagnosis

Napostygnus has a very distinctive armature of the body when compared with the other Nomoclastinae genera. The scutal areas I–IV, posterior margin of dorsal scutum and free tergite I are unarmed and free tergites II and III have one median spine. *Callcosma*, *Kichua*, gen. nov. and *Quindina* have only one pair of long spines on area III and free tergites with paired armature. *Nomoclastes quasimodo* (*N. taedifer* is armed with two spines) and *Zamora* have free tergites I–III unarmed. Other remarkable and unique characteristic of *Napostygnus* is the posterior margin of dorsal scutum concave (see Pinto-da-Rocha *et al*. 2012). The penis has a conspicuous dorsal process, absent in other nomoclastins; the ventral plate has a unique shape for the subfamily and macrosetae group C are placed more medially, instead of laterally as in most species (except *C. abrapatricia*, sp. nov.).

Note

Napostygnus was originally considered as Prostygninae (Cranaidae) by Roewer (1929), transferred to Metasarcidae (see Kury 2003) and finally considered as a genus *incertae sedis* by Pinto-da-Rocha *et al*. (2014). Kury and Villarreal (2015) suggested that it may be related to Nomoclastidae genera, but did not explicitly propose that due to the lack of penial macrosetae group E and other features. Examination of the penis under SEM and inclusion of this species in a data matrix of Gonyleptoidea modified from Kury and Villarreal (2015) revealed it as a member of Nomoclastidae. It is related

to Nomoclastinae by the presence of lateral fields of scale bristles restricted to macrosetae group C, ventral plate sunken into truncus and absence of sexual dimorphism on femur IV.

Napostygnus bispinosus Roewer

Napostygnus bispinosus Roewer, 1929: 275, fig. 42; Kury, 2003: 145; Pinto-da-Rocha *et al.* 2012: 31, fig. 3 (female holotype, Ecuador, Napo, Vale do Rio Napo, SMF RI, 1004/3, examined).

Material examined

Ecuador: Napo, Valley of Rio Napo, ♀ holotype. (SMF RI, 1004/3); Cantón Quijos, Parroquira Cozanga, Yanayacu Research Station 0°35′S 78°57′W, 2128 m a.s.l., 1 ♂ 2 ♀ (MZSP36132); 1 ♀ (IBSP-10723).

Redescription

See in Pinto-da-Rocha *et al.* (2012).

Penis (Fig. 15). Ventral plate with almost straight apical margin, with sides projected laterally; with two basal (group A) and three apical (group C) straight and long macrosetae, median lobe with two small macrosetae (group E), two small macrosetae more dorsally and placed just above basal macrosetae group A (group D) and a fold behind the apical setae in ventral view. Glans (according to Pinto-da-Rocha *et al.* 2012): stylus with oblique apex and a conspicuous dorsal process (broken in Fig. 15).

Genus ***Callcosma*** Roewer, 1932

Callcosma Roewer, 1932: 330; Mello-Leitão, 1935: 96; Soares & Soares, 1948: 590; Kury, 2003: 91 (type species *Callcosma gracillima* Roewer, 1932, by monotypy).

Diagnosis

Callcosma has a rounded body shape similar to *Quindina* and *Kichua*, sharing with them the same armature on body, only a pair of long spines on area III and free tergite III. *Callcosma* differs from other Nomoclastinae genera by the presence of an elevation on the lateral margin near area III. Each species has a unique pattern of stains on dorsal scutum.

Callcosma abrapatricia, sp. nov.

(Figs 1*A*, 4*A*, 8*A*, 10*A*, 11*A–C*)

http://zoobank.org/urn:lsid:zoobank.org:act:D461554A-EADD-48A3-949E-7140980D8005

Material examined

Holotype. ♂ from Peru, Moyobamba, Abra Patrícia Private Reserve (5°41′44″S, 77°48′36″W, 2500 m a.s.l.), 25.v.2010, R. Pinto-da-Rocha, D. Silva and J.A. Ochoa leg. (MUSM).

Paratypes. Same data as holotype, 1 ♀ (MUSM); same data, ♂ and ♀ (MZSP 68788); same data, 3 ♀ (MUSM).

Diagnosis

Callcosma abrapatricia can be distinguished from all other species of the genus by the wide white markings on sulcus I, lateral of dorsal scutum areas and on posterior region of area V.

Male description (holotype)

Measurements. Dorsal scutum: maximal width: 2.9; total length: 3.3; carapace length: 1.4; width: 2.1. Femur IV length: 5.4.

Dorsum (Figs 4*A*, 8*A*). Anterior margin of carapace with four tubercles. Ocularium with six tubercles, dorsalmost pair slightly larger than others. Carapace behind ocularium with four tubercles on each side, integumentary dome of ozopore not pronounced. Lateral margin with one row of similar-sized tubercles from end of ozopore to posterior margin. Area I with one conical central tubercle and three tubercles on each half; II with one row of eight tubercles; III with two slightly divergent pointed apophyses with wide bases and directed backwards; groove IV weak and incomplete; area IV with one row of six tubercles. Posterior margin with nine small tubercles. Free tergites I with four tubercles; II with five tubercles; III with two large (longer than segment length) tubercles. Anal operculum with 12 minute tubercles.

Chelicera. Bulla of segment I smooth; movable and fixed fingers with three teeth each.

Pedipalpus (Fig. 10*A*). Coxa with one ventral tubercle. Trochanter with two ventral tubercles. Femur with five ventral tubercles (basal three smaller), one prolateral subapical large tubercle. Femur-tibia without small dorsal tubercles. Tibia mesal IiIi, ectal iIi. Tarsus mesal/ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one large posterior; II with one larger tubercle before ozopore, one large posterior tubercle fused to one from III; III with one anterior tubercle fused to II and one posterior fused to IV; IV with five tubercles on dorsal subapical region. Trochanters I to IV with small scattered tubercles; I–III with one ventrobasal large tubercle. Femora I–IV tuberculate, II–IV with two dorsoapical tubercles (retrodorsal larger). Tarsal formula: 6(3), 14–16(3); 7, 7. Metatarsi III and IV with white bands of different widths.

Penis (Fig. 11*A–C*). Lateral of ventral plate straight and convergent apically, apex projected laterally, distal margin slightly concave. Four pairs of long and apically curved setae (length slightly shorter than distal margin width, groups C+A), basal pair directed ventrally (group A). Median pair of short setae (group E) ventrally to groups C+A. Glans long, stylus very short (length twice stylus width) and slightly swollen distally.

Colouration (in ethanol). Light brown with a conspicuous white saddle that covers groove I and lateral of areas I to IV, being lighter on areas III to IV; other areas darker. Spines of area III and free tergite III black. Median region of posterior margin to free tergite III and almost all anal operculums with white patches that form a stripe. Coxae I–IV yellow with small black dots. Legs yellow with longitudinal stripes of concentrated black dots. *In vivo* (Fig. 1*A*): coxae of pedipalp and legs greenish yellow. Pedipalp green, femur with subapical yellow stripe. Saddle yellow; lateral of areas I and II, base of spines of area III and all area IV light greenish brown.

Female description (paratype)

Measurements. Dorsal scutum: maximal width: 3.1; total length: 3.4; carapace length: 1.4; width: 2.2. Femur IV length: 5.9.

Anterior margin of carapace with two tubercles. Ocularium with four tubercles, one anterior pair and one dorsalmost pair slightly larger than the others. Carapace with one pair of tubercles

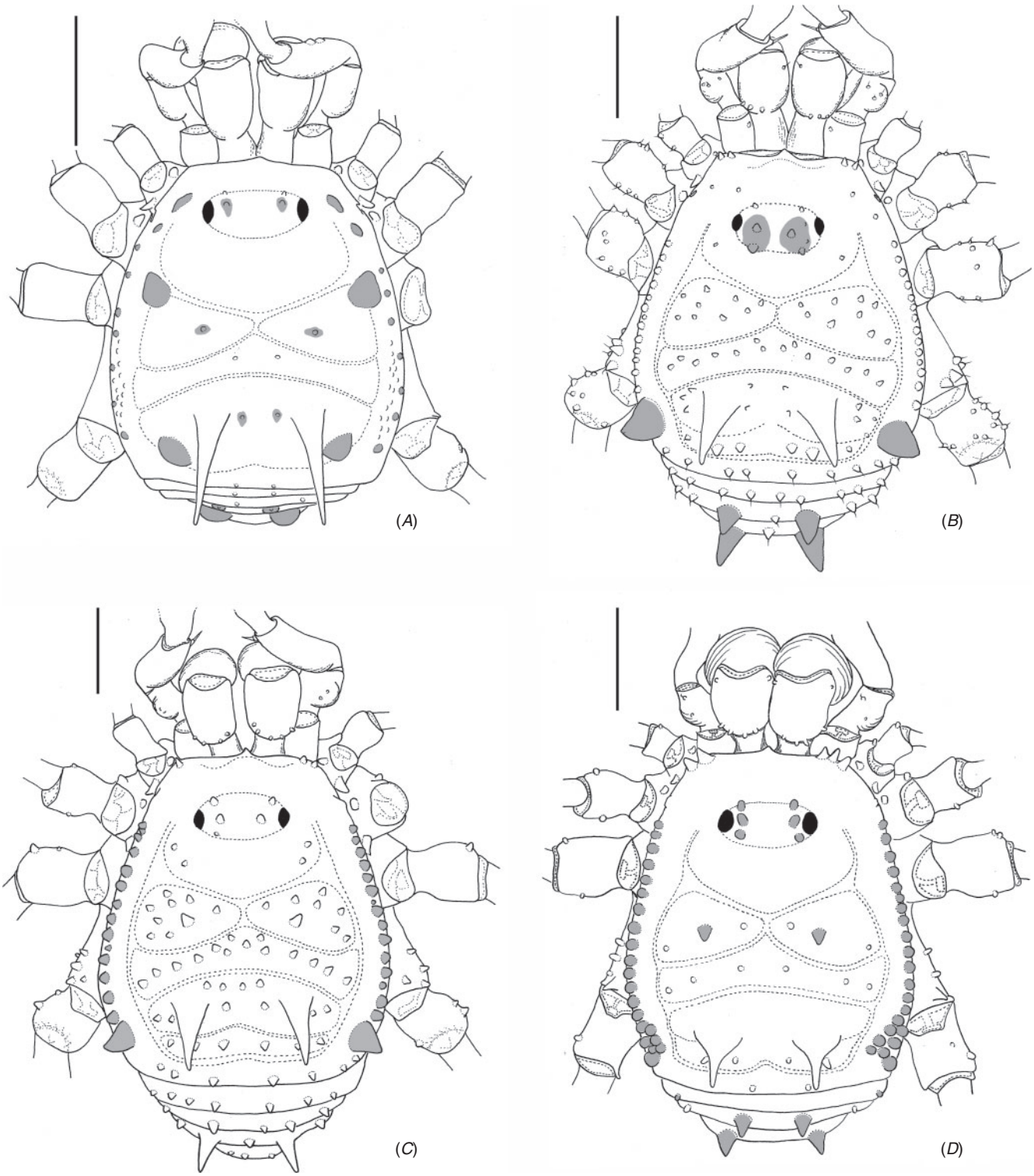

Fig. 5. Habitus, dorsal view of males of Nomoclastinae. (*A*) *Kichua rheimsae*, gen. nov., sp. nov., (*B*) *Quindina albiocularia*, sp. nov., (*C*) *Q. albomarginis*, (*D*) *Q. bella.* Scale bars = 1 mm.

behind ocularium. Area I with three pairs of tubercles, the central one slightly larger; area II with one row of eight tubercles; area III with two slightly divergent pointed apophyses with wide bases and directed backwards; area IV with one row of four tubercles. Posterior margin with six small tubercles. Free tergite I with five tubercles; free tergite II with six tubercles. Anal operculum with

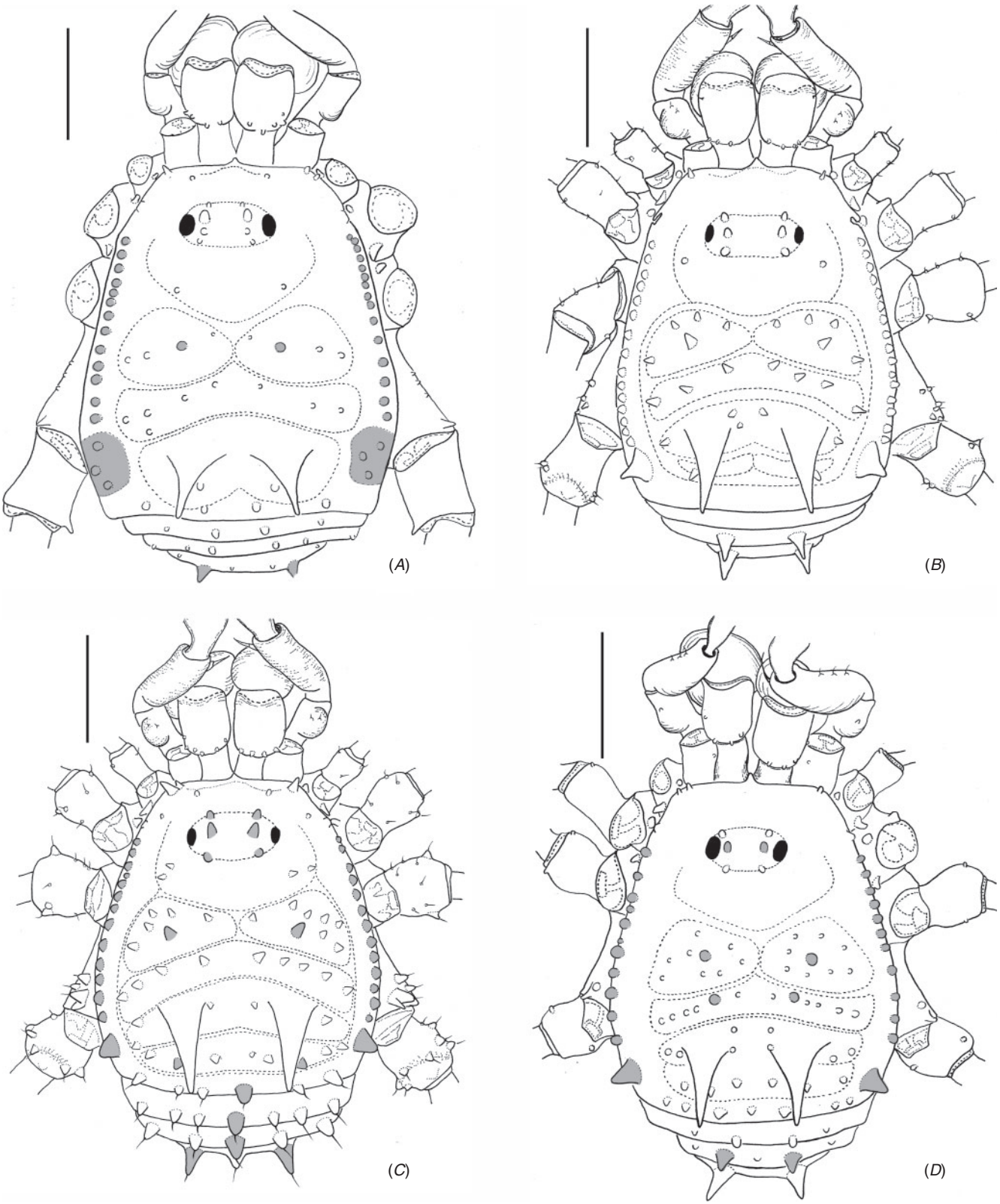

Fig. 6. Habitus, dorsal view of males of Nomoclastinae. (*A*) *Quindina bimaculata*, (*B*) *Q. burbayar*, sp. nov., (*C*) *Q. kuna*, sp. nov, (*D*) *Q. limbata*, comb. nov. Scale bars = 1 mm.

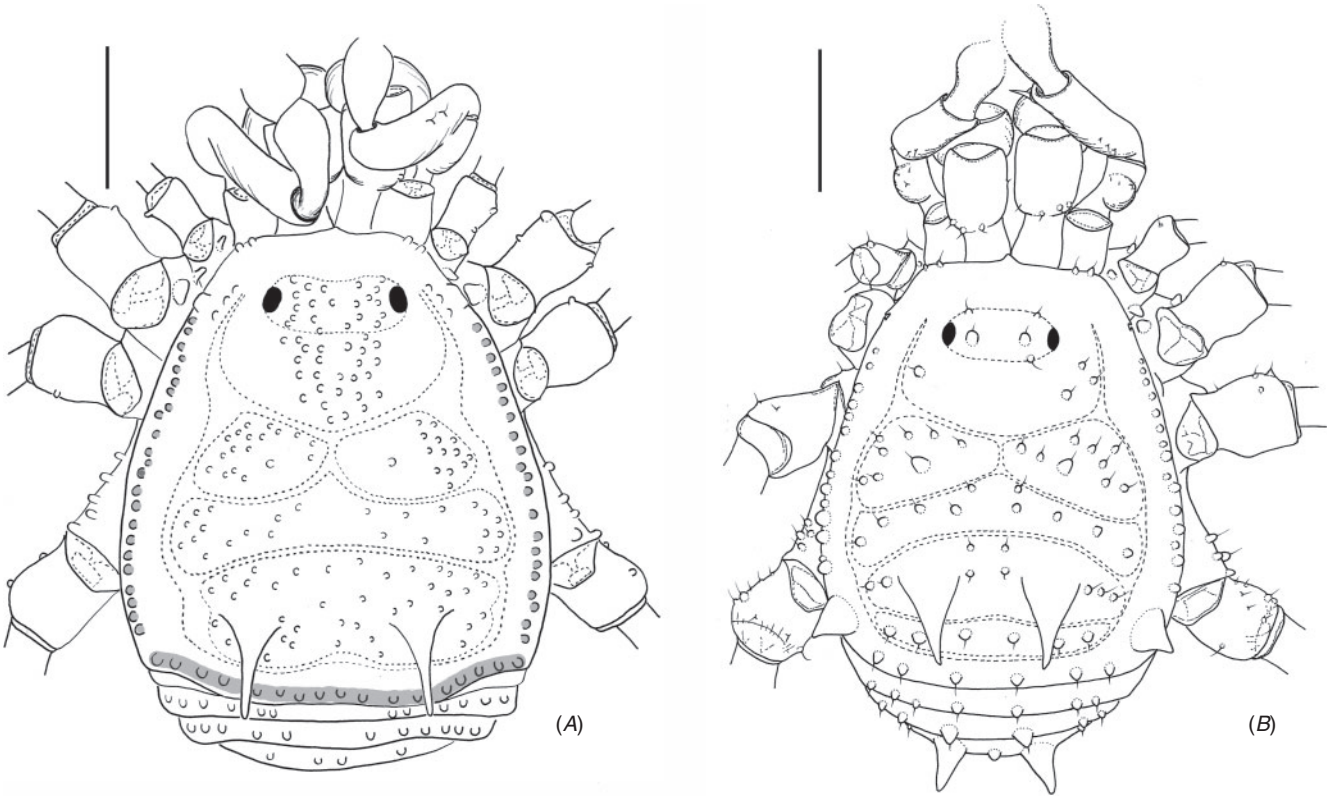

Fig. 7. Habitus, dorsal view of males of Nomoclastinae. (*A*) *Quindina marginata*, (*B*) *Q. morae*, sp. nov. Scale bars = 1 mm.

eight minute tubercles. Cheliceral fingers with four teeth each. Pedipalpal coxa with two ventral tubercles; femur with three ventral tubercles. Femur-tibia without small dorsal tubercles. Tarsal formula: 6(3), 13–14(3); 7, 8–9. Metatarsi III and IV with white bands of different width. Colouration similar to male, except saddle slightly smaller.

Distribution

Known only from the type locality in Peru (Fig. 16).

Etymology

Epithet in reference to the type locality, a beautiful reserve in northern Peru.

Callcosma barasana, sp. nov.

(Figs 4*B*, 8*B*, 10*B*, 13*A*, *B*)

http://zoobank.org/urn:lsid:zoobank.org:act:F92B79FB-F6AB-43A3-BE48-B21A3C81EAA7

Material examined

Holotype. ♂, Colombia, Vaupés, Taraira (Estación Biológica da Caparú, 200 m a.s.l.), 28.v.1993, L. Benavides leg. (ICN-AO-326).

Paratypes. Same data as holotype, 2 ♂ and 10 ♀ (ICN-AO-326); same data, 1 ♂ 4 ♀ (MZSP 68789); same locality, 10.iii.1993, 2 ♀ (ICN-AO-325).

Diagnosis

Differs from other species of the genus by the presence of narrow white stripes on lateral or lateroposterior region of all dorsal scutum areas. It shares with *C. gracillima* a V-shaped white mark on the posterior part of prosoma (absent in *C. abrapatricia*, sp. nov. and *C. cofan*, sp. nov.).

Male description (*holotype*)

Measurements. Dorsal scutum: maximal width: 2.4; total length: 3.1; carapace length: 1.2; carapace width: 1.9. Femur IV length: 4.2.

Dorsum (Figs 4*B*, 8*B*). Anterior margin of carapace with one tubercle on each side. Ocularium with three pairs of tubercles, dorsalmost longer (smaller than eye size). Carapace without tubercles behind ocularium, integumentary dome of ozopore not pronounced. Lateral margin smooth. Area I with two tubercles on each half; area II with one row of six tubercles near groove III; area III with one tubercle on each side, with two slightly divergent pointed apophyses directed backwards; area IV with two tubercles on each side. Posterior margin with seven tubercles. Free tergites: I with six tubercles; II with five tubercles; III with one tubercle on each corner, two tubercles longer than tergite length, one tubercle between them. Anal operculum with minute tubercules.

Chelicera. Segment I with two tubercles on lateral depressed margin of bulla; movable finger with four teeth; segment II with four teeth.

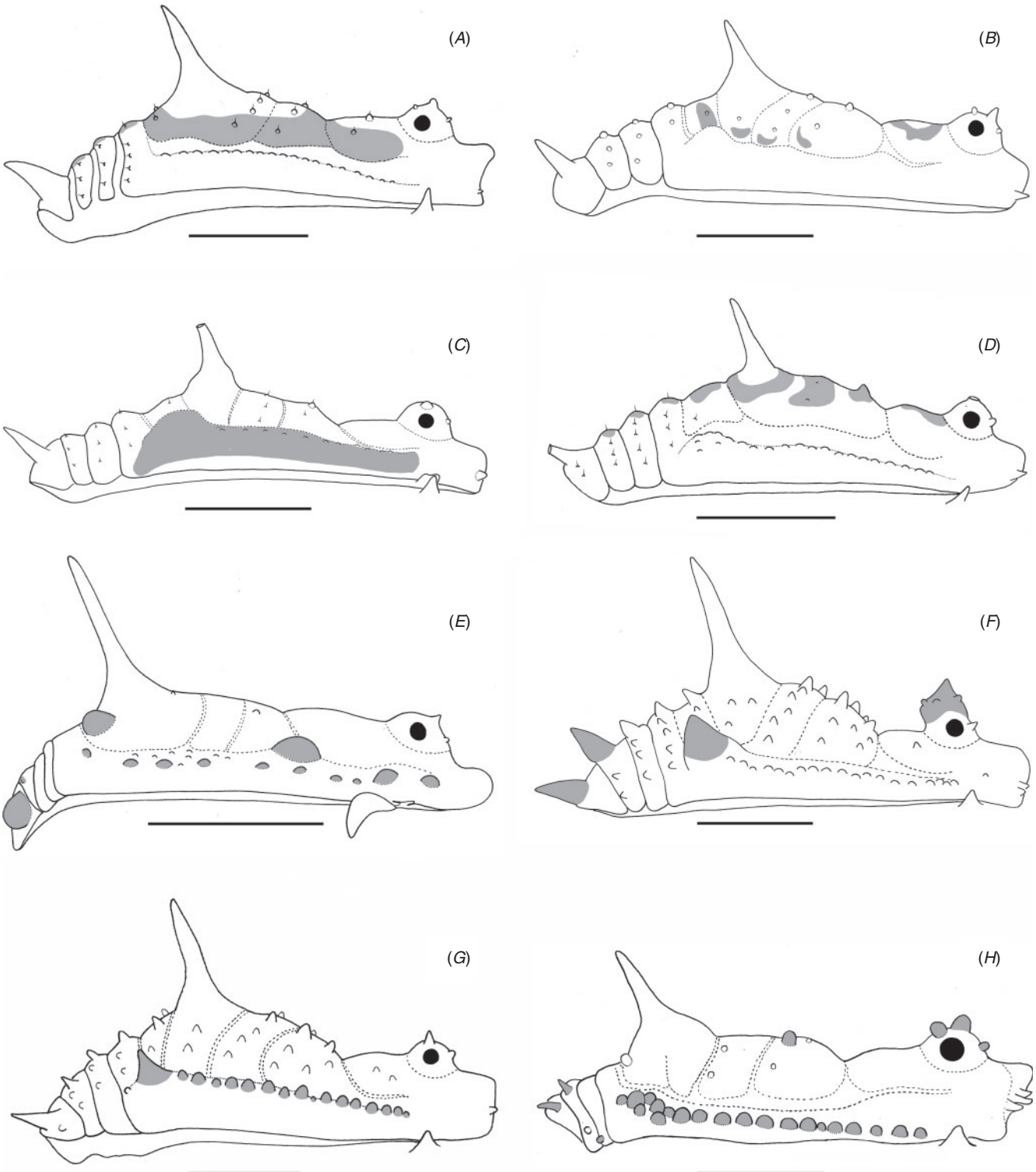

Fig. 8. Habitus, lateral view of males of Nomoclastinae. (*A*) *Callcosma abrapatricia*, sp. nov., (*B*) *C. barasana*, sp. nov., (*C*) *C. cofan*, sp. nov., (*D*) *C. gracillima*, (E) *Kichua rheimsae*, gen. nov., sp. nov., (F) *Quindina albiocularia*, sp. nov., (G) *Q. albomarginis*, (H) *Q. bella.* Scale bars = 1 mm.

Pedipalpus (Fig. 10*B*). Trochanter with two dorsal tubercles; two ventral tubercles. Femur with one ventrobasal tubercle, followed by four minute tubercles, and a prolateral subapical large tubercle. Femur-tibia without small dorsal tubercles, only setae are present. Tibia mesal IiIi, ectal iIi. Tarsus mesal/ectal IiIi.

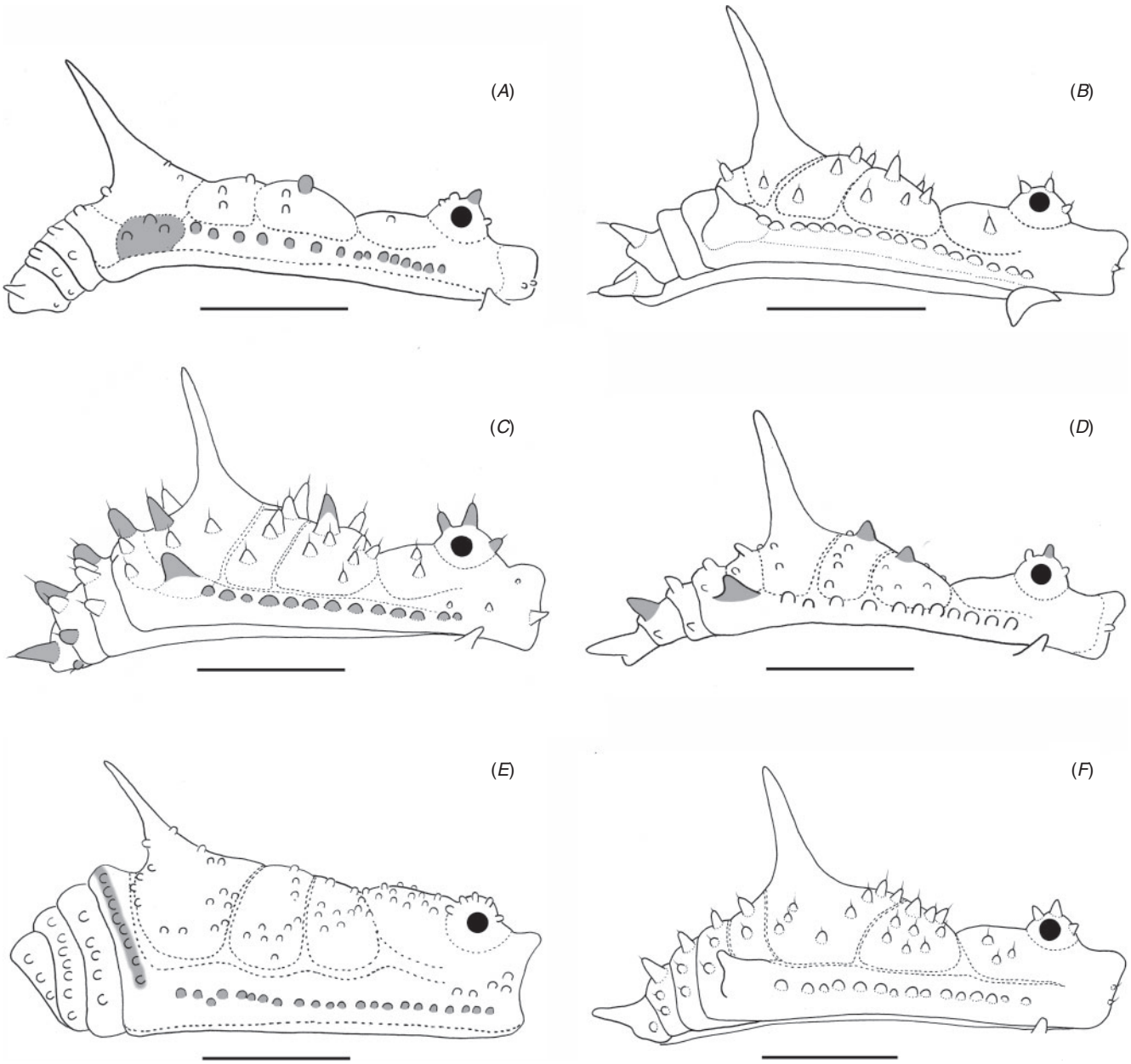

Fig. 9. Habitus, lateral view of males of Nomoclastidae. (*A*) *Quindina bimaculata*, (*B*) *Q. burbayar*, sp. nov., (*C*) *Q. kuna* sp. nov, (*D*) *Q. limbata*, (E) *Q. marginata*, (F) *Q. morae*, sp. nov. Scale bars = 1 mm.

Legs. Coxae: I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore, one posterior large tubercle fused to one from III; III with one anterior tubercle fused to II and one posterior tubercle fused to IV; IV with one dorsoapical large tubercle, two smaller subapical. Trochanters I–IV with small tubercules. Femora I–IV smooth, except III with one posterior dorsoapical tubercle, IV with two dorsoapical tubercles (retrodorsal larger). Tarsal formula: 6(3), 11(3); 6, 7. Metatarsi III and IV without white band.

Penis (Fig. 13*A*, *B*). Lateral of ventral plate wider at basal region, slightly wider at base and convergent apically, apex not projected laterally, distal margin convex. Three pairs of long, straight and spatulate setae (length much longer than distal margin width, group C), and one basal pair directed ventrally (group A). Two median pairs of short and rounded macrosetae (group E), placed ventrally. Macrosetae group D short and rounded. Glans long, stylus very short (length twice stylus width), very swollen distally, without papillae surrounding orifice.

Colouration. Body brown, posterior margin and free tergites slightly darker. Legs yellow, femora I to IV with longitudinal black stripes. Prosoma with a large V-shaped white patch between ocularium and groove I; areas I and II with small white patch on lateral; area III with large white patch, areas III and IV with a large white patch on each lateral margin.

Female description (*paratype*)

Measurements. Dorsal scutum: maximal width: 2.7; total length: 3.2; carapace length: 1.3; width: 1.8. Femur IV length: 4.6.

Ocularium with two pairs of tubercles: one anterior pair and one taller dorsalmost pair (smaller than eye size). Lateral margin with row of wide and short tubercles. Area IV with six tubercles. Cheliceral segment I with three small tubercles on lateral depressed margin of bulla; movable finger with three teeth; fixed finger with four teeth. Pedipalpal trochanter with one dorsal tubercle; femur with one ventrobasal tubercle and a large prolateral subapical tubercle. Tibia mesal IiII, ectal iII. Leg femora II to IV with two dorsoapical tubercles (posterior larger). Tarsal formula: 6(3), 12(3); 7, ?. Colouration similar to male, except sulcus II with white stripe interrupted at median region and area IV with large elliptical white patch.

Distribution

Known only from the type locality (Fig. 16).

Etymology

The species epithet refers to the indigenous Barasana group of the language family Tukano, who live in an area near the border of Colombia and Brazil.

Callcosma cofan, sp. nov.

(Figs 4*C*, 8*C*, 13*C*, *D*)

http://zoobank.org/urn:lsid:zoobank.org:act:C23AC2CD-390E-4A37-99BC-7E5FE1C74433

Material examined

Holotype. ♂, Ecuador, Sucumbíos, Cabanas Cuyabeno, 24–28.ix.1994, V. Roth leg. (CASENT-9033255).

Paratypes. Same data as holotype, iv.1996, E.S. Ross leg., 1 ♀ (CASENT-9033252); same, 2 ♀ (CASENT-9033264); PERU, Loreto, Rio Samiria (4°43′S 74°18′W), 8.v.1990, D. Silva leg., 1 ♀ (MUSM-ENT-0500537); Jenaro Herrera (4°55′S 73°45′W, 500 m a.s.l.), 25.iii.1988, D. Silva leg., 1 ♂ (MUSM-0500540).

Diagnosis

Differs from all other species of the genus by the long and wide white stripe on the lateral margin of the dorsal scutum and white patch on dorsal coxa IV.

Male description (*holotype*)

Measurements. Dorsal scutum: maximal width: 2.5; total length: 2.8; carapace length: 1.3; width: 1.8. Femur IV length: 4.8.

Dorsum (Figs 4*C*, 8*C*). Anterior margin of carapace with one tubercle on each side. Ocularium with four tubercles, dorsalmost longer (height shorter than eye size). Carapace smooth, integumentary dome of ozopore not pronounced. Lateral margin with similar-sized tubercles from coxa III to groove IV. Area I with one tubercle on each half; area II with one row of eight tubercles; area III with two slightly divergent pointed apophyses directed backwards, four tubercles on each side, two tubercles between apophyses; area IV well defined, with one row of six tubercles. Posterior margin with six tubercles. Free tergites: I with eight tubercles; II with seven tubercles; III with tubercles longer than tergite length, two tubercles between them. Anal operculum with one median row of minute tubercles and another row of minute tubercles on posterior margin.

Chelicera. Segment I with one tubercle on lateral margin of bulla; movable finger with three teeth; segment II with four teeth.

Pedipalpus. Coxa with one ventral large tubercle. Trochanter with one ventral tubercle, smooth dorsally. Femur with one ventrobasal tubercle and one large prolateral subapical tubercle. Femur-tibia without small dorsal tubercles. Tibia mesal IiIi, ectal iIi. Tarsus mesal/ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore, one posterior large tubercle fused to one from III; III with one anterior tubercle fused to II and one posterior fused to IV; IV with one tubercle on subapical region, without dorsosubapical tubercle. Trochanters I to IV with a few scattered minute tubercles. Femora I to IV tuberculate, II to IV with dorsoapical tubercles (retrodorsal larger, approximate diameter of femur base). Tarsal formula: 6(3), 11(3); 7, 7. Metatarsi III and IV without white band.

Penis (Fig. 13*C*, *D*). Lateral margin of ventral plate wider at basal region, slightly wider at base of basalmost and distalmost macrosetae group C and strongly convergent apically, apex not projected laterally, distal margin convex. Three pairs of long, straight and spatulate setae (length much longer than distal margin width, group C), and one basal pair directed ventrally (group A). Median pair of short and rounded macrosetae (group D). Macrosetae group E unobserved. Glans long, stylus very short (length twice stylus width), very swollen distally, with papillae surrounding orifice.

Colouration (in ethanol). Body and legs yellowish brown. Lateral margin with large white stripe more elevated near posterior margin (see lateral view in Fig. 8*C*). Coxa IV with a dorsolateral white patch. Femora with several small black stripes.

Female description (*MUSM Ent 0500537*)

Measurements. Dorsal scutum: maximal width: 2.3; total length: 2.7; carapace length: 1.0; carapace width: 1.6. Femur IV length: 4.9.

Anterior margin of carapace smooth. Ocularium with two tubercles. Carapace smooth, integumentary dome of ozopore not pronounced. Lateral margin with small tubercles about same size from coxa III to groove IV. Area I with one tubercle on each half; area II with one row of 16 small setiferous tubercles; area III with two slightly divergent pointed apophyses directed backwards; area IV well defined, smooth. Posterior margin with a row of small setiferous tubercles. Free tergites I–III with a row of small setiferous tubercles. Tibia mesal IiIi, ectal iIi. Tarsus mesal/ectal IiIi. Tarsal formula: 6(3), ?, 6, 7.

Distribution

This species is known from the Amazonian rainforest of Peru and Ecuador (Fig. 16).

Etymology

In reference to the indigenous Cofán people who inhabit the type locality in Sucumbíos Province of Ecuador and southern

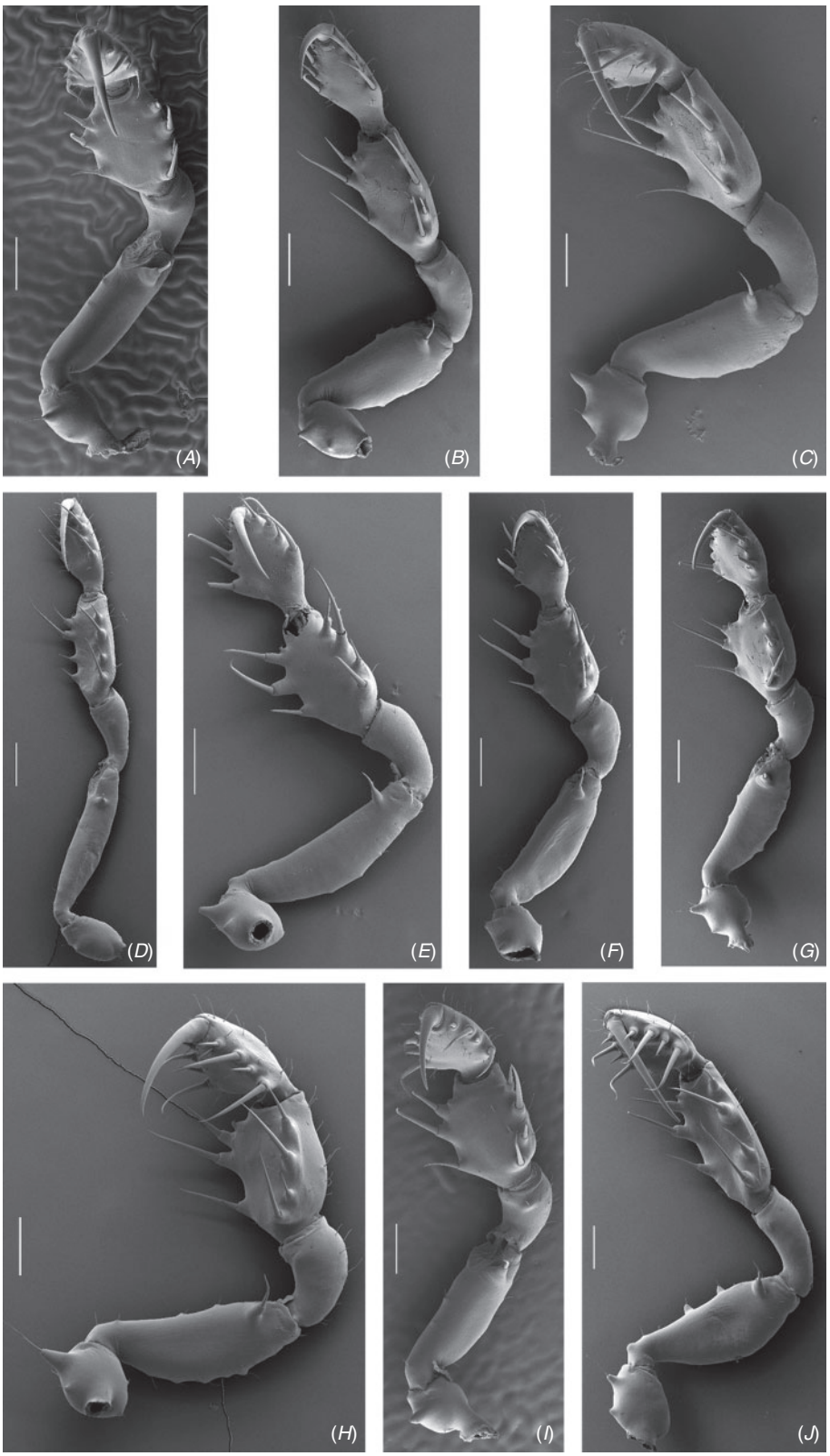

Fig. 10. Ventral view of right pedipalp of Nomoclastidae. (*A*) *Callcosma abrapatricia*, sp. nov., (*B*) *C. barasama*, sp. nov., (*C*) *C. gracillima*, (*D*) *Kichua rheimsae*, gen. nov, sp. nov., (E) *Quindina albomarginis*, (F) *Q. albiocularia*, sp. nov., (G) *Q. burbayar*, sp. nov., (H) *Q. kuna*, sp. nov., (I) *Q. limbata*, (J) *Q. morae*, sp. nov.

Fig. 11. Distal part of penis of Nomoclastinae. (*A–C*) *Callcosma abrapatricia*, sp. nov.: (*A*) dorsal view, (*B*) ventral view, (*C*) lateral view. (*D–G*) *Kichua rheimsae*, gen nov., sp. nov.: (*D*) dorsal view, (*E*) ventral view, (*F*) lateral view, (*G*) glans detail. (*H–J*) *Quindina albiocularia*, sp. nov.: (*H*) dorsal view, (*I*) ventral view, (*J*) lateral view. Scale bars = 0.01 mm.

Fig. 12. Distal part of penis of Nomoclastinae. (*A–C*) *Quindina albomarginis*: (*A*) dorsal view, (*B*) ventral view, (*C*) lateral view. (*D–F*) *Quindina burbayar*, sp. nov.: (*D*) dorsal view, (*E*) ventral view, (*F*) lateral view. (*G–I*) *Quindina kuna*, sp. nov.: (*G*) dorsal view, (*H*) ventral view, (*I*) lateral view. (*J–L*) *Quindina morae*, sp. nov.: (*J*) dorsal view, (*K*) ventral view, (*L*) lateral view. Scale bars = 0.01 mm.

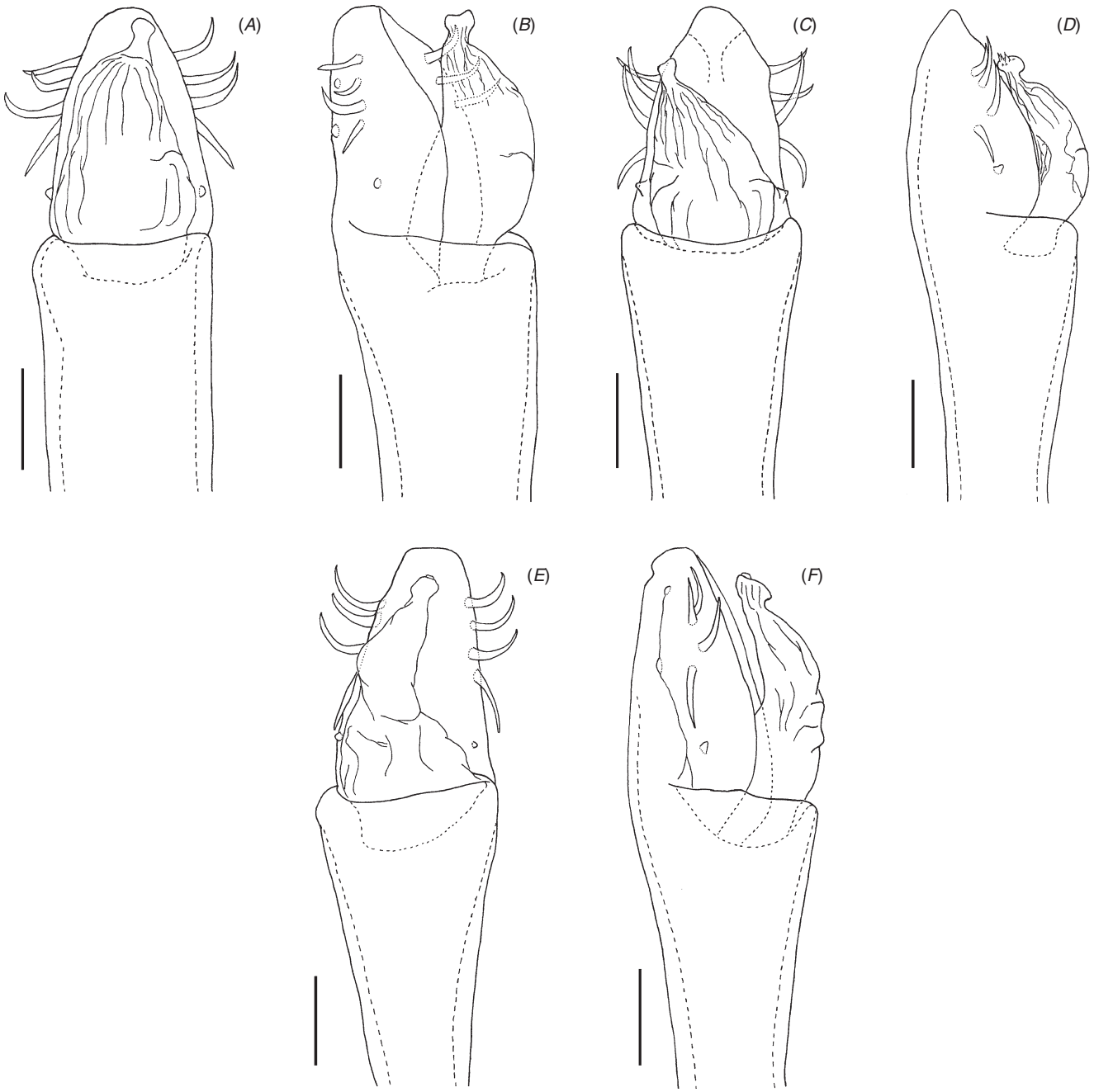

Fig. 13. Distal part of penis of Nomoclastinae. (*A–B*) *Callcosma barasana*, sp. nov.: (*A*) dorsal view, (*B*) lateral view. (*C–D*) *Callcosma cofan*, sp. nov.: (*C*) dorsal view, (*D*) lateral view. (*E*, *F*) *Callcosma gracillima*: (E) dorsal view, (F) lateral view. Scale bars = 0.05 mm.

Colombia. The ancient language of these people is also called Cofán.

Callcosma gracillima Roewer, 1932

(Figs 1*E*, 4*D*, 8*D*, 10*C*, 13*E*, *F*)

Callcosma gracillima Roewer, 1932: 331, fig. 47; Soares & Soares, 1948: 591; Kury, 2003: 91 (female holotype SMF RII 1414/25, type locality Ecuador, Chimborazo, Alausi, Andes, labelled as male, examined).
Callcosma gracillima Kury, 2003: 91.

Material examined

Brazil: Amazonas, São Paulo de Olivença (Sakaia, 3°58′33.6″S, 69°19′40.8″W, 2 ♂ (INPA-128); idem, 1 ♀ (INPA-134); idem (Rio Camatiã, 3°28′37.2″S, 69°2′60″W), 1 ♀ (INPA-47); idem (–4.014, –69.464), 1 ♀ (INPA-116); Tefé (Guariba, 3°39′50.4″S, 64°10′12″W), 1 ♀ (INPA-195); Alvarães (Comunidade Jarauá, Reserva Mamirauá), 1 ♀ (IBSP). **Colombia:** Amazonas, Leticia, 3 ♀ and 2 juveniles (CASENT-9033256).

Diagnosis

Differs from all other species of the genus by area I with one white circles in each of two halves, area II with transverse stripe

interrupted at the middle and area III with spines surrounded by white circle.

Male description (*INPA*)

Measurements. Dorsal scutum: maximal width: 2.2; total length: 2.6; carapace length: 1.1; width: 1.6. Femur IV length: 4.7.

Dorsum (Figs 4*D*, 8*D*). Anterior margin of carapace with one wide tubercle on each side. Ocularium with two pairs of tubercles, dorsalmost slightly longer (height smaller than eye size). Carapace without tubercles behind and after ocularium, integumentary dome of ozopore not pronounced. Lateral margin with similar-sized tubercles from the end of coxa II almost to the posterior margin. Area I with two tubercles on each side (one near sulcus I very reduced); area II with two small tubercles; area III with two slightly divergent and pointed apophyses directed backwards; area IV with anterior groove weak, with two tubercles. Posterior margin with 10 small tubercles. Free tergites: I with 13 small tubercles; II with 12 small tubercles; III with one small tubercle on each side, two very long and divergent apophyses and two small tubercles between apophyses. Anal operculum with minute tubercles.

Chelicera. Segment I with one tubercle on lateral margin of bulla; movable finger with three teeth; fixed finger with five teeth.

Pedipalpus (Fig. 10*C*). Trochanter with one dorsal tubercle; one large ventral tubercle. Femur with one ventral tubercle and one long prolateral subapical tubercle. Femur-tibia without small dorsal tubercles. Tibia mesal IiIi, ectal iIi. Tarsus mesal/ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore and one large posterior tubercle fused to one from III; III with one anterior tubercle fused to II and one posterior tubercle fused to IV; IV with four tubercles on dorsosubapical region. Trochanters I–IV with small similar-sized tubercles. Femora I–IV smooth, II–IV with two dorsoapical tubercles (length of retrodorsal approximately femur width). Tarsal formula: 6(3), 12–14(3), 7, 7.

Penis (Fig. 13*E*, *F*). Lateral margins of ventral plate wider at base, straight and convergent apically, apex not projected laterally, distal margin straight. Three pairs of long, straight and spatulate macrosetae (much longer than distal margin width, group C), and one basal pair directed ventrally (group A). Median pair of short and rounded setae (group D) near base of ventral plate. Two ventral pairs of rounded setae behind those of group C (group E). Glans long, stylus very short (length twice stylus width) and swollen distally.

Colouration (Fig. 1*E*). Light brown. Two white patches from close to the ocularium to near the middle of groove I, where they almost touch; one white patch on the middle of area I invading sulcus I and almost reaching area II; one white stripe on area IV, posterior margin of dorsal scutum and free tergites I and II; free tergite III with two small white patches between spines; area II with one large white patch on each side; armature of area III surrounded by white circle, with one almost circular patch near median groove III.

Female redescription (*SMF-1414, holotype*)

Measurements. Dorsal scutum: maximal width: 2.1; total length: 2.0; carapace length: 1.1; width: 1.4. Femur IV length: 4.4.

Area I with three tubercles on each half (median larger with rounded apex); area II smooth; area III with two divergent pointed apophyses directed backwards; area IV seems to be present, groove weak, without tubercles. Posterior margin with seven small tubercles. Free tergites: I with eight small tubercles; II with small tubercles; III with two small tubercles on each side, two very long and divergent apophyses, two small tubercles between apophyses. Cheliceral segment I with three tubercles on lateral margin of bulla; movable finger with four teeth; II with five teeth. Tarsal formula of legs: 6(3), ?, ?, 7. Body brown; two white patches from close to ocularium to groove I, where they almost touch, one white patch in the middle of each area, one stripe increasing in size from the posterior margin of dorsal scutum to free tergite II; armature of areas I and III surrounded by white circle. Lateral of area II with white patch.

Distribution

Known from alongside the Solimões River, which is in the middle of the Amazonas river (Fig. 16).

Kichua, gen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:14A918CD-7C48-4CFB-9E9F-E8368F37CE22

Type species: *Kichua rheimsae*, gen. nov., sp. nov. by present designation.

Diagnosis

Distinguished from other genera of the family by a pair of wide copper-silver elevations on the anterior angle of area I, posterior angle of area III and anal operculum. The penis of *Kichua* has two pairs of long macrosetae group A, contrasting with *Quindina* and *Callcosma* with only one pair; the very reduced stylus and flabelliform ventral process are unique among Nomoclastidae members.

Etymology

In honour of the native Indian people from Equador and Peru, Quechua or Kichua, who speak a language of the same name. Feminine gender.

Kichua rheimsae, sp. nov.

(Figs 5*A*, 8*E*, 10*D*, 11*D–G*)

http://zoobank.org/urn:lsid:zoobank.org:act:A53E0180-D2A8-4964-9A04-F8284C08B5B4

Material examined

Holotype. Ecuador, Napo, Cantón Quijos, Parroquira Cozanga, Yanayacu Research Station, 0°35′S, 78°57′W, 2128 m a.s.l., 24–31.xi.2009, C.A. Rheims leg., ♂ holotype (QCAZ, temporarily housed in IBSP).

Paratypes. 5 ♂ (IBSP-10725), same data 4 ♂ (MZSP 68790); same data 20 ♀ (IBSP-10726), same data 5 ♀ (MZSP 68791).

Diagnosis

See genus diagnosis.

Male description (*holotype – QCAZ*)

Measurements. Dorsal scutum: maximal width: 2.1; total length: 2.6; carapace length: 1.2; carapace width: 1.7. Femur IV length: 6.3.

Dorsum (Figs 5*A*, 8*E*). Prosoma, including anterior margin of carapace without tubercles. Ocularium with two pairs of tubercles, dorsalmost longer (height much shorter than eye height). Lateral margin with one row of similar-sized tubercles from coxa III to almost posterior margin. One pair of low conical copper-silver elevations on anterior angle of area I, posterior angle of area III and anal operculum. Area I with one tubercle on each half; II with two tubercles; III with two pointed, long and divergent apophyses directed backwards, two tubercles between spines. Posterior margin and free tergites I to III with one pair of small tubercles. Anal operculum smooth.

Chelicera. Segment I smooth on posterior margin of bulla; movable finger with four teeth; segment II with three teeth.

Pedipalpus (Fig. 10*D*). Trochanter with one ventral tubercle. Femur with ventral setae scattered, large prolateral subapical tubercle with long seta. Patella short. Femur-tarsus without small dorsal tubercles, few scattered setae. Tibia mesal IiIii, ectal IiIi. Tarsus mesal/ectal IiIi.

Legs. Coxa: I with one very long anterior tubercle and one posterior tubercle; II with one larger tubercle before ozopore, one large posterior tubercle fused to one from III; III with one anterior fused to II; IV with one tubercle near dorsoapical region, and a few small tubercles scattered on lateroventral side. Trochanters I to IV with minute tubercles. Femora I–IV smooth. Tibia IV dilated near apex, apparently with glandular ventral zone. Tarsal formula: 6(3); 16(3); 8, 9–10. Basitarsus I not swollen.

Penis (Fig. 11*D–G*). Lateral of ventral plate narrower at 1/3 basal region, straight until distalmost macrosetae group C, after which it slightly converges apically, not projected laterally; distal margin almost straight. Three pairs of long, straight and striate macrosetae group C (much longer than distal margin width), without basal pair directed ventrally (group A). Median pair of short and rounded setae (group D) in the middle of groups A and C. Glans moderately long, reaching distalmost macrosetae group C; stylus very short, with small papillae surrounding orifice; with ventral flabelliform process.

Colouration. Body and appendages blackish brown. Chelicerae bulla black, reticulate. Anterior angle of area I, posterior angle of area III and anal operculum with a large copper-silver patches. Two small copper patches under main ocularium tubercles, between apophyses of area I and free tergite III; four small patches on prosoma. Tubercles of lateral margin silver.

Female (*IBSP*)

Measurements. Dorsal scutum: maximal width: 2.0; total length: 2.9; carapace length: 1.2; width: 1.5. Femur IV length: 7.1.

Ocularium with one pair of taller tubercles in the middle and one smaller posterior tubercle. Area I with three small tubercles on each half; area II with five tubercles; area III with two long, divergent, pointed apophyses directed backwards, four tubercles between spines, two tubercles beside each spine. Posterior margin and free tergite I with seven small tubercles each; free tergite II with five tubercles; free tergite III with six small tubercles. Cheliceral movable finger with four teeth; fixed finger with five teeth. Pedipalpal tibia mesal iiIii, ectal IiIi; tarsus mesal IiIi, ectal IIi. Tarsal formula: 6(3); 15–16(3); 8, 9. Prosoma with an irregular long copper stripe following sulcus I until the elevation of the external angle of area I. Lateral margin with an irregular stripe under tubercles. Areas with copper spot under tubercles, posterior margin with stripe on laterals and under three median tubercles; free tergites with copper stripe under tubercles, discontinuous medially.

Distribution

Known only from type locality (Fig. 16).

Genus ***Quindina*** Roewer, 1914

Quidina [misspelling] Roewer, 1914: 128.

Quindina Roewer, 1914: 129; Roewer, 1923: 564; Mello-Leitão, 1932, 1926: 361; 1932: 118; Roewer, 1932: 304; Mello-Leitão, 1935: 96; Soares & Soares, 1948: 615; Kury, 2003: 97 (type species *Quindina bella* Roewer, 1914 by monotypy).

Zygopachylus Chamberlin, 1925: 243; Roewer, 1929: 231; Mello-Leitão, 1932: 187; Goodnight & Goodnight, 1942: 12; Goodnight & Goodnight, 1947: 12; Juberthie, 1970: 142; Rodriguez & Guerrero, 1976: 242, figs 1–3; Soares, Soares & Jim, 1992: 13; Kury, 2003: 210; Kury & Villarreal, 2015: 14, 21, 23, 25, 29, 30, 36–38 (type species *Zygopachylus albomarginis* Chamberlin, 1925 by original designation), syn. nov.

Panamella Roewer, 1932: 314; Mello-Leitão, 1935: 96; Soares & Soares, 1948: 611 (type species *Panamella gracilis* Roewer, 1932, by monotypy), synonymy with *Zygopachylus* established by Goodnight & Goodnight, 1947.

Poassa Roewer, 1943: 33; Soares, Soares & Jim, 1992: 9; Kury, 2003: 208 (type species *Poassa limbata* Roewer, 1943, by monotypy), syn. nov.

Zygobunus Kury & Villarreal, 2015: 35 (*lapsus*).

Diagnosis

Quindina has the same body armature as *Callcosma* and *Kichua*, with a pair of long spines on area III and free tergites with a pair of spines. It can be distinguished from the other genera of the family by: the very enlarged tubercles on dorsal scutal areas, the largest at the end of a row of rounded and well-spaced tubercles on the lateral margin of the dorsal scutum (except *Q. bella*, *Q. bimaculata* and *Q. marginata*); absence of elevation on lateral margin; and the presence of an elongated tubercle on the prodorsal apex of femur IV (except *Q. marginata*).

Synonymic notes

Poassa and Zygopachylus are here synonymised under *Quindina* due to the presence of a lateral row of rounded and well-spaced tubercles on the lateral margin of the dorsal scutum. Both genera share with most species of *Quindina* a very enlarged tubercle at the end of the lateral margin of the dorsal scutum (except *Q. bella*, *Q. bimaculata* and *Q. marginata*) and a median ventral process on the glans of the penis (except *Q. bimaculata* and *Q. marginata*).

Quindina albiocularia, sp. nov.

(Figs 5*B*, 8*F*, 10*F*, 11*H–J*)

http://zoobank.org/urn:lsid:zoobank.org:act:2ABC25F6-87EE-4D15-A38D-6D90D856D788

Material examined

Holotype. ♂, Panama, Coclé, Valle de Antón (in *Nasutitermes* nest), 30.iv.2011, J. Claahorn leg. (MIUP).

Paratypes. 2 ♀ paratypes, same data as holotype (MIUP); Panama, El Cope, ix.2007 (MIUP); Parque Nacional Campana, 16.v.2010, O. Vasquez leg., 1 ♂ (MIUP); Cerro Azul (Urbanización Las Nubes, camino a rio Las Cascadas), 17.iv.2004, R.J. Miranda leg., 1 ♀ (MIUP); Cerro Campana (670 m a.s.l.), 29.ix.1976, E.S. Ross leg., 1 ♀ (CASENT-9033253).

Diagnosis

The enlarged dorsal white tubercles on the ocularium easily distinguish this species from other species of the genus.

Male description (holotype)

Measurements. Dorsal scutum: maximal width: 2.9; total length: 3.2; carapace length: 1.3; width: 2.2. Femur IV length: 4.3.

Dorsum (Figs 5*B*, 8*F*). Anterior margin of carapace with one or two tubercles on each side. Ocularium with two elevations, both with seven tubercles, dorsalmost pair taller (slightly smaller than eye size). Carapace with three tubercles on each side of ocularium, integumentary dome of ozopore not pronounced. Lateral margin with large tubercles from end of ozopore to the posterior margin, distalmost much taller than the others. Area I with nine similar-sized tubercles on each half; II with one irregular row of 14 tubercles; III with two divergent pointed apophyses directed backwards, three tubercles on each side, four between apophyses; groove IV incomplete; area IV difficult to see with one row of six tubercles. Posterior margin with nine tubercles. Free tergites: I with nine tubercles; II with two tubercles, one pair of large tubercles (slightly larger than segment length), one small tubercle between them; III with one tubercle on each corner, two tubercles longer than tergite length, one tubercle between them. Anal operculum with 24 minute tubercles.

Chelicera. Segment I with four tubercles on lateral margin of bulla; movable finger with five teeth; fixed finger with four teeth.

Pedipalpus (Fig. 10*F*). Trochanter with three small dorsal tubercles; two ventral tubercles. Femur with three ventral tubercles and a large prolateral subapical tubercle. Femur-tibia without small dorsal tubercles. Tibia mesal IiIi, ectal iIi. Tarsus mesal/ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one posterior fused to one of coxa II; II with one larger tubercle before ozopore, one large posterior tubercle fused to one from III; III with one anterior tubercle fused to II and one posterior tubercle fused to IV; IV with 5–6 tubercles on subapical region, one slightly larger dorsosubapical tubercle. Trochanters: I with one prolateral, one retrolateral, four dorsal and two ventral tubercles; II with two prolateral, two retrolateral, four dorsal and six ventral tubercles; III with eight dorsal, two prolateral, five ventral and three retrolateral tubercles; IV with six prolateral, six ventral, six dorsal and two retrolateral tubercles. Femora I to IV tuberculate, II to IV with long dorsoapical similar-sized tubercles. Tarsal formula: 6(3), 10–11(3); 6, 7. Metatarsi III and IV without white band.

Penis (Fig. 11*H–J*). Lateral margins of ventral plate straight and convergent apically, apex of ventral plate slightly projected laterally, distal margin almost straight. Four pairs of long (distalmost 2/3 size of others), straight and spatulate setae (slightly shorter than distal margin width), basal pair directed ventrally. Median pair of short setae. Two ventral pairs of rounded setae. Glans long, stylus very short (length twice stylus width), with spicule ventrally placed and slightly swollen distally.

Colouration. Body dark brown, legs, pedipalps and chelicerae brown with black marks. Ocularium with two white (*in vivo*) or yellow (in ethanol) patches on most tubercles on each side. Apical large tubercle on lateral margin and main armature of tergites II and III white (*in vivo*) or yellow (in ethanol).

Female description (MIUP, same lot as holotype)

Measurements. Dorsal scutum: maximal width: 3.1; total length: 3.6; carapace length: 1.4; width: 2.2. Femur IV length: 4.8.

Anterior margin of carapace with one tubercle on each side. Ocularium with two elevations, both with six tubercles in total, dorsalmost pair taller (slightly taller than eye size). Tubercles of areas, posterior margin and free tergites with long setae. Carapace with four pairs of tubercles behind ocularium. Area I with eight similar-sized tubercles on each half; II with one irregular row of 12 tubercles. Posterior margin with 10 tubercles. Free tergites: I with eight tubercles; II with one tubercle on each side, one pair of large tubercles, one small tubercle between them; III with one tubercle on each corner, two tubercles longer than tergite length, two tubercles between them. Anal operculum with 20 minute tubercles. Cheliceral movable finger with three teeth; fixed finger with four teeth. Pedipalpal coxa with one ventral tubercle; trochanter with three small dorsal tubercles; four ventral tubercles. Tibia mesal IiIi, ectal IIi. Femora I to IV with two long dorsoapical tubercles, anterior larger. Tarsal formula: 6(3), 11–12(3); 6, 7–8.

Colouration (in ethanol). Free tergites paler than in male.

Distribution

Known from Panama Province, Panama (Fig. 16).

Etymology

From Latin *albi* = white, *ocularia* = eye. In reference to the two white patches on the ocularium, which gives impression there are two eye mounds.

Quindina albomarginis (Chamberlin, 1925), comb. nov.

(Figs 1*B*, 2*A* 5*C*, 8*G*, 10*E*, 12*A–C*)

Zygopachylus albomarginis Chamberlin, 1925: 243; Cokendolpher, 1987: 60, fig. 1; Mora, 1990: 582; Soares, Soares & Jim, 1992: 13; Acosta *et al.*, 1993: 27; Cokendolpher and Lee, 1993: 136; Humphreys, 1995: 178, fig 5b; Kury, 2003: 210; Kury & Villarreal, 2015: 4, fig. 8D–F (female holotype MCZ-1342, Panama, Canal Zone, Barro Colorado Island, examined).

Zygopachylus albomarginatus [misspelling] Roewer, 1929: 231.

Zygopachylus albimarginis [misspelling] Goodnight & Goodnight, 1942: 12, fig. 28; Goodnight & Goodnight, 1947: 12; Eisner *et al.*, 1977: 322; Roach *et al.*, 1980: 512; Kury & Villarreal, 2015: 13, fig. 20H.

Panamella gracilis Roewer, 1932: 314, fig. 30; Soares & Soares, 1948: 611 (male holotype SMF-1409/20, Panama, examined), synonymy established by Goodnight & Goodnight, 1947.

Material examined

Panama: Canal Zone (Isla Barro Colorado in damp tree hole debris), 1 ♂ (MCZ045680); Parque Nacional Soberania, 1 ♀ (MIUP); (Camino de Cruces), 153 m a.s.l. (MZSP 68792); idem, (sendero Charco), 91 m a.s.l. (MZSP 68793); Reserva Florestal Madden (Canal Zone), 2 ♀ (MIUP); idem, 1 ♀ (MIUP); Arraiján (Cerro Cabra), 1 ♀ (MIUP); Rio Aguacate, 2 ♂ (MIUP); Isla Barro Colorado, 1 ♀, 1 immature (MIUP); idem, 2 ♀ (MIUP); idem, damp tree

hole debris, 1 ♂ (MCZ-45680); Gamboa (camino a plantación), 2 ♀ (MIUP); Arraijan, 2 ♀ (MIUP); Bocas Del Toro, Corriente Grande, Changuinola, 1 ♀ (MIUP); Coclé, Valle de Antón, entrada Cerro Gaital, 2 ♂ (MIUP); Reserva Privada Távida, 2 ♀ (MZSP 68794).

Diagnosis

Quindina albomarginis resembles *Q. albiocularia*, *Q. burbayar*, *Q. kuna*, *Q. limbata* and *Q. morae* in having a very enlarged tubercle on the posterior part of the lateral margin of the dorsal scutum. It is most similar to *Q. morae* and *Q. burbayar*, but can be distinguished from them by the combination of the following characters: absence of white tubercles on the ocularium, areas and posterior margin of dorsal scutum and free tergites. It differs from *Q. morae* and *Q. burbayar* in having coloured tubercles on the lateral margin of the dorsal scutum.

Male description (*MCZ-45680*)

Measurements. Dorsal scutum: maximal width: 2.4; total length: 3.1; carapace length: 1.1; width: 1.5. Femur IV length: 4.7.

Dorsum (Figs 5*C*, 8*G*). Anterior margin of carapace with one or two tubercles on each side. Ocularium with five tubercles, dorsalmost pair tallest (height much shorter than eye size). Carapace with two tubercles on each side behind ocularium, integumentary dome of ozopore not pronounced. Lateral margin with large tubercles from ozopore end to posterior margin, distalmost much taller. Area I with one conical central tubercle and six to eight tubercles on each half; area II with three tubercles near longitudinal sulci of area I and one transversal row of 11 tubercles; area III with two slightly divergent pointed apophyses directed backwards, two tubercles on each side, six between apophyses; area IV with one row of six tubercles. Posterior margin with seven tubercles. Free tergites: I with seven tubercles; II with five tubercles; III with one tubercle on each corner, two tubercles longer than tergite length, one tubercle between them. Anal operculum with two rows of tubercles (anterior with seven, posterior with five), posterior margin with seven tubercles.

Chelicera. Segment I with 4–5 tubercles on lateral depressed margin of bulla; movable finger with three teeth; fixed finger with three teeth.

Pedipalpus (Fig. 10*E*). Trochanter with two dorsal tubercles; two ventral tubercles. Femur with three minute ventral tubercles, large prolateral subapical tubercle. Femur-tibia without small dorsal tubercles. Tibia mesal IiiIi, ectal iIi. Tarsus mesal/ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one large posterior; II with one larger tubercle in front of ozopore, one large posterior tubercle fused to one from III; III with one anterior tubercle fused to II and one posterior fused to IV; IV with three tubercles on subapical region, dorsosubapical larger, with scattered ventrolateral tubercles. Trochanters: I with one retrolateral and three ventral tubercles; II with one prolateral, three ventral tubercles; III with two dorsal, four ventral and one retrolateral tubercles; IV with three retrolateral, three prolateral, five ventral and three dorsal tubercles. Femora I to IV tuberculate, IV with large dorsoapical tubercles (similar sized). Tarsal formula: 6(3), 13(3); 6, 7. Metatarsi III and IV without white band.

Penis (Fig. 12*A–C*). Lateral margins of ventral plate wider at basal 1/3 region, straight and strongly convergent apically, apex slightly projected laterally, distal margin almost straight. Three pairs of long, straight and spatulate setae (much longer than distal margin width, group C), and one basal pair directed ventrally (group A). Median pair of short and rounded setae (group D). Two ventral pairs of rounded setae behind those of group C (group E). Glans long, stylus very short (twice stylus width) and not swollen distally.

Colouration (Fig. 1*B*). Dark brown; free tergites, lateral margins and apophysis of area III darker. Legs yellowish brown with small black patches. Tubercles of lateral margin of dorsal scutum yellowish white. Bulla of chelicera and dorsoanterior half of tibia and tarsus black, reticulate.

Female redescription (*SMF-1409/20*)

Measurements. Dorsal scutum: maximal width: 2.7; total length: 2.9; carapace length: 1.2; carapace width: 1.8. Femur IV length: 4.7.

Anterior margin of carapace with one tubercle on each side. Ocularium with three tubercles, dorsalmost longer (height about eye size). Carapace with one or two tubercles on each side behind the ocularium. Area I with one conical tubercle and 15 tubercles near grooves on each half; area II with one row of 10 tubercles near groove III, six scattered; area III with four tubercles on each side, four between apophyses; area IV seems to be present, groove weak, with one row of seven tubercles. Free tergite II with seven tubercles. Anal operculum with 10 minute tubercles. Cheliceral segment I with four tubercles on lateral depressed margin of bulla; fingers with four teeth. Pedipalpus: femur with one ventrobasal tubercle. Femur IV with dorsoapical tubercles (retrodorsal larger). Tarsal formula: 4–6(3), 11(3); 6, 7.

Distribution

Known only from Panama (Fig. 16).

Quindina bella Roewer, 1914

(Figs 5*D*, 8*H*, 14*A*, *B*)

Quindina bella Roewer, 1914: 128, fig. 14; Roewer, 1923: 564, fig. 707; Soares & Soares, 1948: 615; Flórez & Sánchez, 1995: 369; Kury, 2003: 97 (male and female paralectotypes Eduard Reimoser Private Collection, not examined; SMF-1062, Columbien, Quindio, Alto de la Linea, +3800 m a.s.l., male lectotype, here designated, examined).

Material examined

Colombia: Tolima, Ibague (Vereda Anibala, Reserva Florestal Bellavista, 1880 m a.s.l.), 1 ♂ (ICN-AO).

Diagnosis

Quindina bella is most similar to *Q. bimaculata* and *Q. marginata* due to the lack of enlarged tubercle on the posterior lateral margin of dorsal scutum. It differs from *Q. marginata* in having a pair of large tubercles on free tergite III and only a pair of tubercles on the posterior half of the prosoma (densely tuberculate between ocularium and groove I in *Q. marginata*). *Quindina bella* differs from *Q. bimaculata* in having a cluster of six white tubercles on the posterior lateral margin of the dorsal scutum (white patch with three tubercles in *Q. bimaculata*).

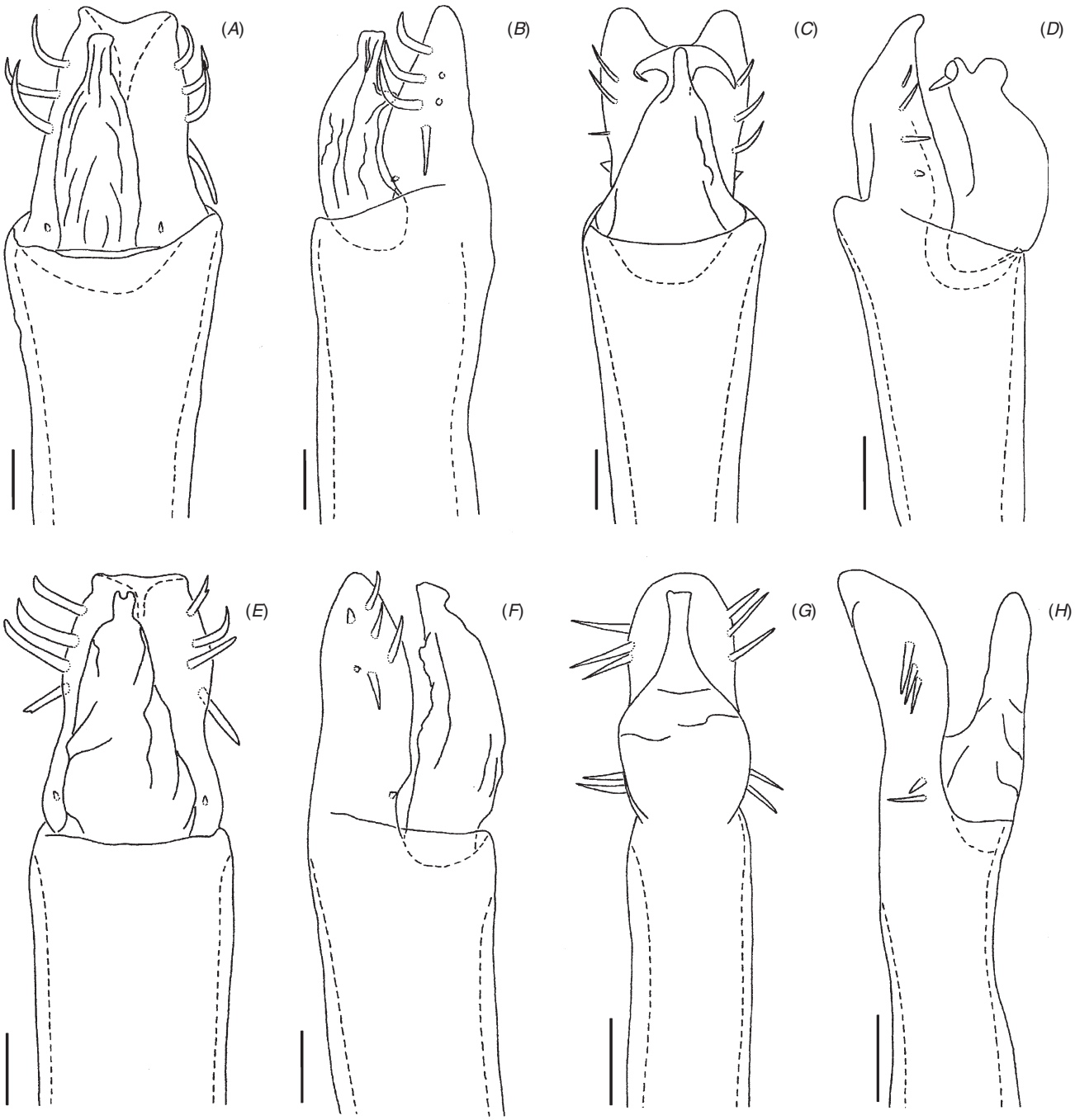

Fig. 14. Distal part of penis of Nomoclastinae. (*A–B*) *Quindina bella*: (*A*) dorsal view, (*B*) lateral view. (*C–D*) *Quindina bimaculata*: (*C*) dorsal view, (*D*) lateral view. (*E*, *F*) *Quindina limbata*, comb. nov.: (*E*) dorsal view, (*F*) lateral view. (*G*, *H*) *Quindina marginata*, comb. nov.: (*G*) dorsal view, (*H*) lateral view. Scale bars = 0.05 mm.

Male redescription (*SMF-1062*)

Measurements. Dorsal scutum: maximal width: 2.9; total length: 3.6; carapace length: 1.7; width: 2.4. Femur IV length: 6.7.

Dorsum (Figs 5*D*, 8*H*). Anterior margin of carapace with 2–3 tubercles on each side. Ocularium with three tubercles, dorsalmost longer (height about eye size). Carapace without tubercles behind ocularium, integumentary dome of ozopore pronounced. Lateral margin with similar-sized tubercles from ozopore end of coxa II to posterior margin. Area I with three tubercles on each half (median larger, with rounded apex); II with one row of six tubercles; III with two slightly pointed apophyses directed backwards; area IV seems to be present, groove weak, with four tubercles. Posterior margin with one tubercle. Free tergites: I with one or two tubercles on corner; II with one on each corner, the central two taller (almost the same length as tergite);

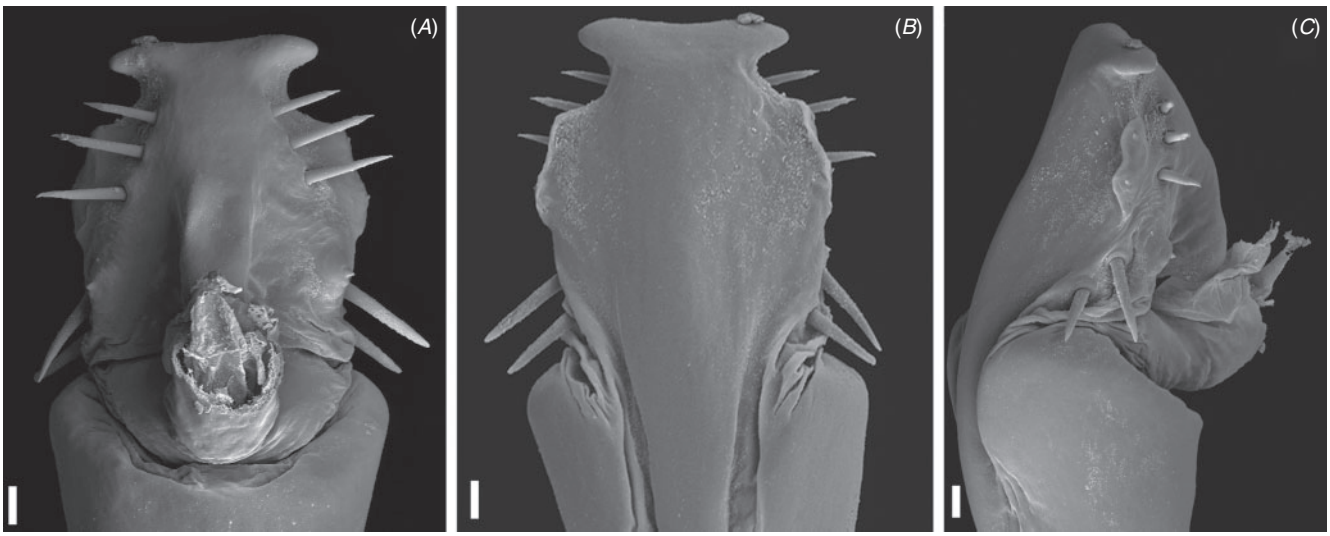

Fig. 15. Distal part of penis of *Napostygnus bispinosus*: (*A*) dorsal view, (*B*) ventral view, (*C*) lateral view. Glans was damaged during SEM preparation. Scale bars = 0.02 mm.

III with one tubercle on each corner, two longer than tergite on median region. Anal operculum with minute tubercles.

Chelicera. Segment I with six tubercles on lateral depressed margin of bulla; movable finger with three teeth; segment II with three teeth.

Pedipalpus. Trochanter with two dorsal tubercles; four small ventral tubercles. Femur with three small ventral tubercles, long prolateral subapical tubercle. Femur-tibia without small dorsal tubercles. Tibia mesal IiiIi, ectal IiII. Tarsus mesal/ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore, one posterior large fused with to from III; III with one anterior tubercle fused to II and one posterior fused to IV; IV with five tubercles scattered on dorsolateral region and one slightly wider on dorsosubapical. Trochanters I–IV with similar-sized tubercles. Femora I–IV tuberculate, IV with dorsoapical tubercles (posterior larger). Tarsal formula: 6(3); 12–13 (according to Roewer); 7, 7. Calcaneus I slightly swollen. Metatarsi III and IV with one white band.

Penis (Fig. 14*A–C*). Lateral of ventral plate sinuous (base and region of three distalmost setae wider), distal margin slightly concave. Four pairs of long macrosetae (slightly shorter than distal margin width, groups A+C), basal pair (group A) directed ventrally. Macrosetae group E unobserved. Glans long, stylus very short (length twice stylus width) and slightly swollen distally.

Colouration. Brown. Appendages yellowish brown. With silver tubercles on ocularium anterior and lateral margin of dorsal scutum on area I (highest tubercle) and free tergite II. Spines of area III dark brown.

Female

Unknown.

Distribution

Recorded from Tolima and Quindío provinces of Colombia (Fig. 16).

Quindina bimaculata Roewer, 1932

(Figs 6*A*, 9*A*, 14*C*, *D*)

Quindina bimaculata Roewer, 1932: 304, fig. 20; Soares & Soares, 1948: 616; Kury, 2003: 97 (male holotype, SMF 1411/22, Ecuador, Fortaleza, near Napo River, wrongly stated as female in original publication, examined).

Diagnosis

Quindina bimaculata is most similar to *Q. bella* and *Q. marginata* due to the lack of enlarged tubercle on posterior lateral margin of the dorsal scutum. It differs from *Q. marginata* in having a pair of large tubercles on free tergite III and only a pair of tubercles on the posterior half of prosoma (densely tuberculate between ocularium and sulcus I in *Q. marginata*). *Quindina bimaculata* differs from *Q. bella* in having a white patch with three tubercles on the posterior lateral margin of the dorsal scutum (patch absent and posterior region with a cluster of six tubercles in *Q. bella*).

Male redescription (holotype)

Measurements. Dorsal scutum: maximal width: 2.6; total length: 3.2; carapace length: 1.4; width: 2.1. Femur IV length: 5.2.

Dorsum (Figs 6*A*, 9*A*). Anterior margin of carapace with one tubercle on each side. Ocularium with four tubercles, dorsalmost longer (smaller than eye size). Carapace with one pair of tubercles behind ocularium, integumentary dome of ozopore not pronounced. Lateral margin with similar-sized tubercles from ozopore end of coxa II to posterior margin. Area I with four tubercles on each half (median larger, with rounded apex); area II with three to five tubercles; area III with two long pointed apophyses directed backwards, six small scattered tubercles, one larger tubercle behind; area IV seems to be present, groove weak, with four tubercles. Posterior margin with four tubercles. Free tergites: I with four tubercles; II with five; III with one tubercle on each corner, two on median region slightly smaller than tergite length, two small tubercles between larger tubercles. Anal operculum with minute tubercles.

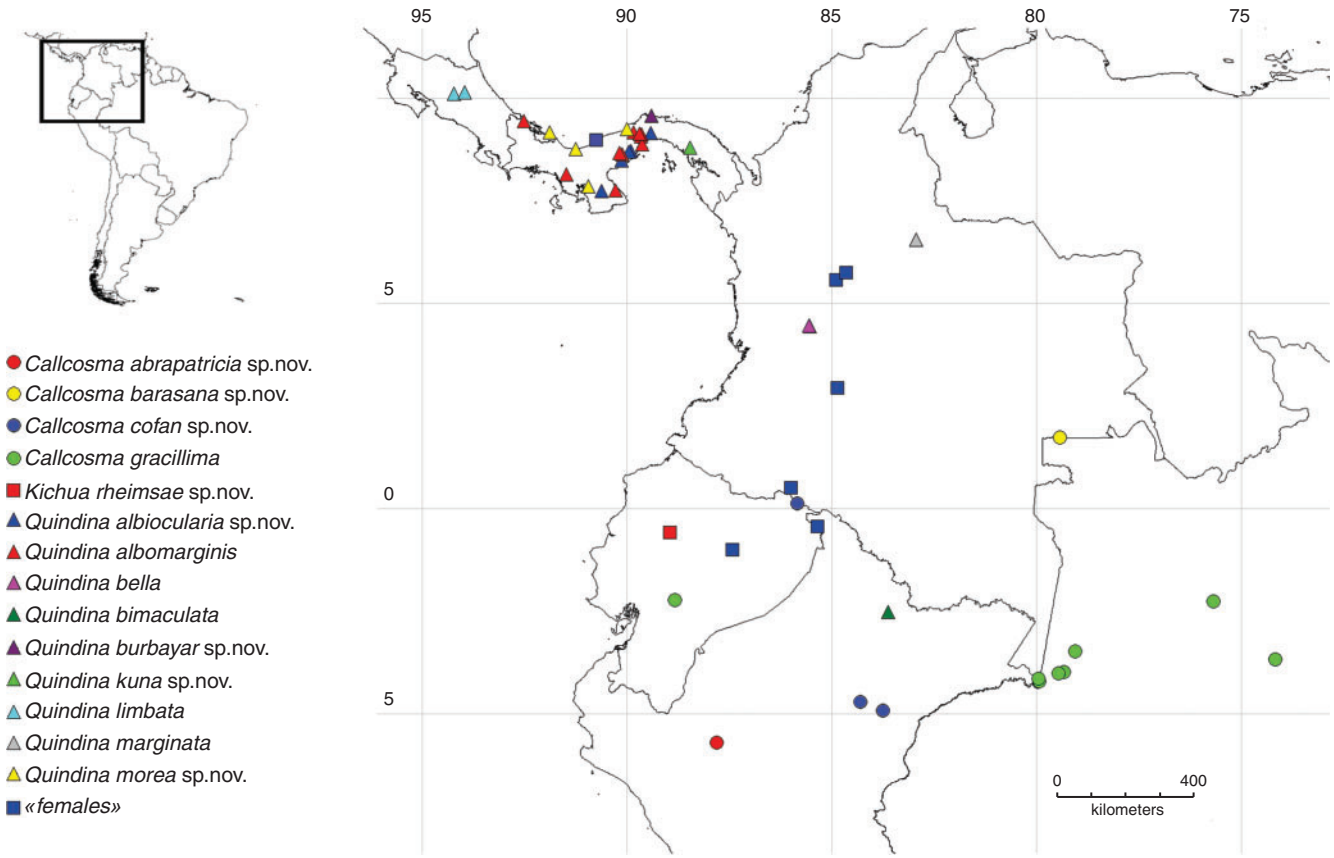

Fig. 16. Geographical records of distribution of *Callcosma*, *Quindina* and *Kichua*, gen. nov. species (Nomoclastidae).

Chelicera. Segment I with four tubercles on lateral depressed margin of bulla; movable finger with three teeth; segment II with three teeth.

Pedipalpus. Trochanter with one dorsal tubercle, four small ventral tubercles. Femur with three small ventral tubercles, prolateral subapical long tubercle. Femur-tibia without small dorsal tubercles. Tibia-tarsus mesal-ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore, one large posterior tubercle fused to one from III; III with one anterior tubercle fused to II and one posterior fused to IV; IV with three tubercles scattered on dorsolateral region and one slightly wider on dorsosubapical region. Trochanters: II with one ventral tubercle; III with one retrolateral apical, one ventral tubercle; IV with one ventral, one retrolateral apical tubercle. Femora I and II smooth, III and IV with small tubercules, IV with dorsoapical tubercles (posterior larger). Tarsal formula: 6(3); 13(3); 7, 7.

Penis (Fig. 14*C*, *D*). Lateral margins of ventral plate almost straight and parallel, apex not projected laterally, distal margin with strong U-shaped cleft. Three pairs of long (distalmost half the size of others, group C), straight and cylindrical setae (slightly shorter than distal margin width), basal pair small and directed ventrally (group A). Median pair of short setae (group E). Glans long, stylus very short (length one fourth of glans width in lateral view) and slightly swollen distally; with very peculiar ventral process, represented by a thin lamina expanded laterally with convex distal and concave basal margins.

Colouration. Brown; tubercles of lateral margin of dorsal scutum, longest tubercle on area I and longest pair of tubercles on free tergite II yellowish white. Appendages yellowish brown. Lateral area with wide yellowish white patch comprising the last three tubercles. Metatarsus II with 13 white bands.

Female

Unknown.

Distribution

Known only from type locality (Fig. 16).

Quindina burbayar, sp. nov.

(Figs 1*C*, 6*B*, 9*B*, 12*D–F*, 10*G*, 12*B*)

http://zoobank.org/urn:lsid:zoobank.org:act:E66912AE-3F79-47A7-9AEE-C9B4B72B5B61

Material examined

Panama: Reserva Natural Privada Burbayar (9°19′57″N, 78°59′15″W), 20.i.2013, R. Pinto-da-Rocha and A. Santos leg., male holotype (MIUP); idem, 3 ♂, 15 ♀ (MIUP, MZSP 68795); Colón, Viento Frio, 16.vi.2012, A. Bethancourt leg., 1 ♂, 2 ♀ (MIUP, MZSP 68797).

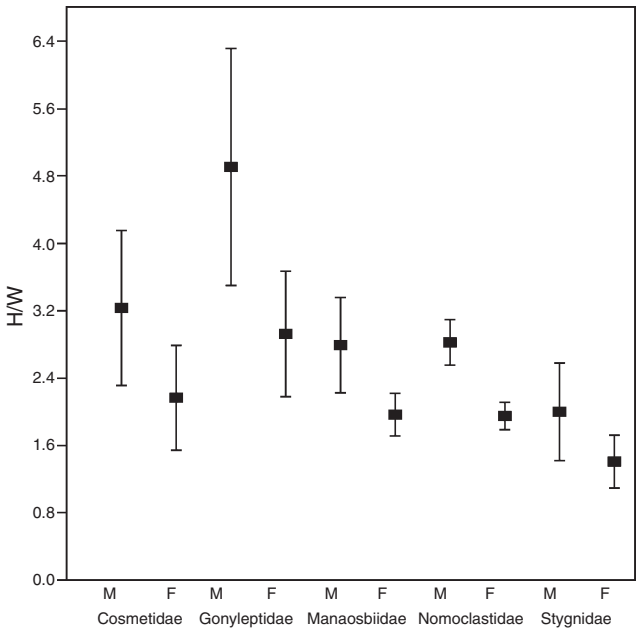

Fig. 17. Comparision of mean (standard deviation indicated by whiskers) of the ratio of length and width of stigmatic area from males and females of five families of Gonyleptoidea. H/W, ratio of length and width of the stigmatic area.

Diagnosis

Quindina burbayar resembles *Q. albiocularia*, *Q. albomarginis*, *Q. kuna*, *Q. limbata* and *Q. morae* in having a much enlarged tubercle on posterior lateral margin of dorsal scutum. It is distinguished from the latter species, except *Q. morae*, by the lack of distinct colour on tubercles of dorsal scutum and free tergites. *Quindina burbayar* differs from *Q. morae* in having only one pair of tubercles on free tergites II and III (several small tubercles on free tergites I–III in *Q. morae*).

Male description (*holotype*)

Measurements. Dorsal scutum: maximal width: 2.1; total length: 3.1; carapace length: 1.1; width: 1.6. Femur IV length: 4.9.

Dorsum (Figs 6*B*, 9*B*). Tubercles of dorsal scutum (except lateral margin) and tubercles of free tergites with one seta each. Anterior margin of carapace with one tubercle on each side. Ocularium with three pairs of tubercles, dorsalmost longer (slightly shorter than eye height). Carapace with two tubercles, one on each side behind ocularium; integumentary dome of ozopore not pronounced. Lateral margin with one row of tubercles from ozopore end to posterior margin, distalmost much larger. Area I with five tubercles on each half, centralmost taller; area II with one row of seven similar-sized tubercles; area III with two divergent pointed apophyses slightly directed backwards, three tubercles between spines, one tubercle on each side; area IV with one row of two tubercles. Posterior margin smooth. Free tergites: I smooth; II with two long tubercles (approximately same length as tergite); III with two tubercles longer than tergite. Anal operculum with 14 small tubercles.

Chelicera. Segment I with four tubercles on posterior margin of bulla; movable finger with three teeth; segment II with three teeth.

Pedipalpus (Fig. 10*G*). Trochanter with one dorsal tubercle, one long ventral tubercle. Femur with scattered ventral setae, large prolateral subapical tubercle with long seta. Patella short. Femur-tarsus without small dorsal tubercles, only few scattered setae. Tibia mesal iIi, ectal iIi. Tarsus mesal/ectal IiIi.

Legs. Coxa I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore, one posterior large tubercle fused to one from III; III with one anterior fused to II; IV with three tubercles near lateroapical region. Trochanters: I with one apical retrolateral, four ventral tubercles; II with two retrolateral, five ventral tubercles; III with one prolateral apical, two retrolateral, five ventral tubercles; IV with three dorsal, one prolateral apical, one large retrolateral, six ventral tubercles. Femora I–IV tuberculate, smooth on basal third, dorsoapical tubercles on femur I and two large tubercles on femora II–IV. Tarsal formula: 6(3); 10(3); 6, 7.

Penis (Fig. 12*D–F*). Lateral of ventral plate slightly dilated on base and straight on distal 2/3, apex slightly projected laterally, distal margin slightly straight. Four pairs of long (distalmost 2/3 size of others), straight and spatulate macrosetae (slightly shorter than distal margin width, groups A+C), slightly curved apically, basal pair directed ventrally (group A). Median pair of short setae (group E) ventrally placed. Basal pair reduced, on base of ventral plate (group D). Glans long, stylus very short (length twice stylus width) and slightly swollen distally.

Colouration (Fig. 1*C*). Body and appendices brown. Center of areas, lateral margins and free tergites darker, spines of area III black. Dark reticulate zone on cheliceral segment I, femur and patella of pedipalps, and between ocularium and anterior margin. With white large patch on dorsoapical region of coxa IV.

Female description (*paratype MZSP 68795*)

Measurements. Dorsal scutum: maximal width: 2.4; total length: 3.1; carapace length: 1.2; width: 1.8. Femur IV length: 5.2.

Ocularium with three pairs of tubercles, dorsalmost longer. Area I with three tubercles on each half, centralmost taller; II with one row of six similar-sized tubercles; III with two divergent pointed apophyses slightly directed backwards, two tubercles between spines, one tubercle on each side. Posterior margin with two tubercles. Free tergites: I with one or two tubercles on each side; II with two long tubercles and one on each side; III with two median tubercles. *Pedipalpus.* Tibia mesal IiIi, ectal iIi. Tarsus mesal/ectal IiIi. Tarsal formula: 6(3); 13(3); 6, 7.

Distribution

Known only from type locality (Fig. 16).

Etymology

It is a noun of the type locality, the Burbayar Private Reserve.

Quindina kuna, sp. nov.

(Figs 6*C*, 9*C*, 10*H*, 12*G–I*, 1*D*, 2*C*)

http://zoobank.org/urn:lsid:zoobank.org:act:EC37F55B-2592-4432-BD0A-43C03D819A55

Material examined

Panama: Darién, Chucantí (8°48′N, 78°28′W), 11–13.i.2013, R. Pinto-da-Rocha and A. Santos leg., ♂ holotype (MIUP). Paratypes: same data as holotype, 4 ♂, 11 ♀ (MZSP 68796, MIUP).

Diagnosis

Quindina kuna resembles *Q. albiocularia*, *Q. albomarginis*, *Q. burbayar*, *Q. limbata* and *Q. morae* in having a much enlarged tubercle on the posterior lateral margin of the dorsal scutum. It differs from *Q. morae* and *Q. burbayar* in having coloured tubercles on dorsal scutum and free tergites. It differs from the remaining species in having one central larger and white tubercle on posterior margin of the dorsal scutum and on free tergites I and II.

Male description (*holotype*)

Measurements. Dorsal scutum: maximal width: 2.6; total length: 2.9; carapace length: 1.2; width: 1.9. Femur IV length: 3.5.

Dorsum (Figs 6*C*, 9*C*). Tubercles of dorsal scutum (except lateral margin) and free tergites with long seta. Anterior margin of carapace with two tubercles on each side. Ocularium with three pairs of tubercles, dorsalmost longer (approximately as high as ocularium). Carapace with two tubercles on each side behind ocularium, integumentary dome of ozopore not pronounced. Lateral margin with one row of tubercles from the end of the ozopore to the posterior margin, distalmost much larger. Area I with 7–10 tubercles on each half, centralmost taller; II with one row of 10 tubercles (central pair taller); III with two divergent pointed apophyses slightly directed backwards, one tubercle on each side, one tubercle at base of each apophysis; area IV with one row of eight tubercles. Posterior margin with six tubercles (centralmost larger). Free tergite I with seven tubercles (centralmost larger); II with five tubercles (centralmost larger); III with five tubercles, one central tubercle, one large on each side (longer than tergite length) and one small on each side of tergite. Anal operculum with eight small tubercles.

Chelicera. Segment I with four tubercles on posterior margin of bulla; movable finger with four teeth; segment II with three teeth.

Pedipalpus (Fig. 10*H*). Trochanter with one dorsal tubercle; one long ventral tubercle. Femur with four small ventral tubercles, large prolateral subapical tubercle with long seta. Patella short. Femur-tarsus without small dorsal tubercles, only few scattered setae. Tibia mesal IiIi, ectal iIi. Tarsus mesal/ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore, one large posterior fused to one from III; III with one anterior tubercle fused to II; IV with six tubercles scattered on dorsolateral region, three of which cluster at apex. Trochanters: I with three dorsal, one apical retrolateral, three ventral tubercles; II with four dorsal, one apical, one large retroapical, four ventral tubercles; III with four dorsal, one apical prolateral, two large apical retrolateral, four ventral tubercles; IV with four dorsal, two large prolateral apical, two small prolateral basal, two large retrolateral, six ventral tubercles. Femora I–IV tuberculate on basal 2/3, with small dorsoapical tubercles on femur I and two large (about the same length as basal femur width) on femora II–IV. Tarsal formula: 6(3); 11–12(3); 6, 6.

Penis (Fig. 12*G–I*). Lateral of ventral plate straight and convergent apically, apex slightly projected laterally, distal margin slightly straight. Four pairs of long (distalmost half the size of others), straight and spatulate setae (slightly shorter than distal margin width), basal pair directed ventrally. Median pair of short setae. Glans long, stylus very short (length twice stylus width) and slightly swollen distally.

Colouration (Fig. 1*D*). Body and appendices dark brown, dark reticulate zone between ocularium and anterior margin. Yellowish white tubercles on dorsal body: three on ocularium; highest tubercle on each half of area I; lateralmost tubercle on each side of area IV; lateral margin including taller tubercles near posterior margin; centralmost tubercle of posterior margin and areas I–II; and larger tubercles of free tergite III.

Female description (*paratype MZSP 68796*)

Measurements. Dorsal scutum: maximal width: 2.6; total length: 3.1; carapace length: 1.2; width: 1.8. Femur IV length: 4.2.

Anterior margin of carapace with one tubercle on each side. Carapace with one or two tubercles on each side behind ocularium. Area I with 10–12 tubercles on each half, centralmost taller; area II with one row of nine tubercles (central pair taller); area III with two divergent pointed apophyses slightly directed backwards, two tubercles on each side, one on base of each apophysis; area IV with one row of 10 tubercles. Posterior margin with 10 tubercles (centralmost largest). Free tergites: I with 10 tubercles (centralmost largest); II with eight tubercles (centralmost largest); III with six tubercles, central tubercle longer than tergite length. Anal operculum with 12 wide tubercles. Cheliceral movable finger with three teeth; fixed finger with five teeth. Pedipalpal coxa with one dorsal tubercle; trochanter with two ventral tubercles. Tibia mesal/ectal IIi. Femora II–IV with two large distal tubercles (approximately the same length as basal femur width). Tarsal formula: 6(3); 10–11(3); 6, 7. With yellowish white tubercles on dorsal body: four on ocularium; on highest tubercle (only distal half) of each half of area I; lateralmost tubercle on each side of area IV dark brown; lateral margin including taller tubercles near posterior margin; centralmost tubercle of posterior margin and free tergites I–II; three central tubercles on free tergite III.

Distribution

This species is restricted to Costa Rican rainforests (Fig. 16).

Etymology

It is a noun in reference to the indigenous people who live in the region of the type locality. The Kunas live in Darién and San Blás Provinces of Panama and adjacent areas of Colombia. They produce a fine, colourful textile art called *mola*, which divulges their culture worldwide and provides an important income to Kunas communities.

Quindina limbata (Roewer, 1943), comb. nov.

(Figs 1*F*, 6*D*, 9*D*, 10*I*, 14*E*, *F*, 2*D*)

Poassa limbata Roewer, 1943: 33, pl. 3, fig. 30; Soares, Soares & Jim, 1992: 10; Kury, 2003: 208 (male lectotype, male paralectotype, here designated, SMF RII 3035/13, type locality Costa Rica, Poas, stated as two females on label, examined).

Material examined

Costa Rica: Limón, Refúgio Nacional de Vida Silvestre Gandoca-Manzanillo (sector Manzanillo Talamanca), 17.ii.2015, R. Quesada, 5 ♂, 1 ♀ (MZSP 68797); Parque Nacional Braulio Carillo (sector Quebrada González, 400 m a.s.l.); 15.i.2015, R. Quesada, 4 ♂ (MZSP 68798).

Diagnosis

Quindina limbata resembles *Q. albiocularia*, *Q. albomarginis*, *Q. burbayar*, *Q. kuna* and *Q. morae* in having a much enlarged tubercle on the posterior lateral margin of the dorsal scutum. It differs from *Q. burbayar* and *Q. morae* in having white tubercles on dorsal scutum and free tergites. *Quindina limbata* is the only species of the genus with large white tubercles only on free tergite II.

Male redescription (*SMF-1409/20*)

Measurements. Dorsal scutum: maximal width: 2.6; total length: 2.7; carapace length: 1.2; width: 2.0. Femur IV length: 4.4.

Dorsum (Figs 6*D*, 9*D*). Anterior margin of carapace with one or two tubercles on each side. Ocularium with three tubercles, dorsalmost highest (height about eye size). Carapace without tubercles behind ocularium, integumentary dome of ozopore not pronounced. Lateral margin with tubercles from end of ozopore to posterior margin, distalmost taller. Area I with one conical tubercle and 3–4 tubercles on each half; II with two conical tubercles, four small on sides, two between conical tubercles; III with two slightly divergent pointed long apophyses directed backwards, two tubercles on each side, four between apophyses; area IV seems to be present, groove weak, with one row of six tubercles. Posterior margin with eight tubercles. Free tergites I with four tubercles (median slightly higher); II with one tubercle on each side, one central, two larger median tubercles; III with two median apophyses higher than tergite length, one tubercle between them. Anal operculum with minute tubercules.

Chelicera. Segment I with four tubercles on lateral depressed margin of bulla; movable finger with five teeth; segment II with five teeth.

Pedipalpus (Fig. 10*I*). Trochanter with one dorsal tubercle, three ventral tubercles (one much larger). Femur with four ventral tubercles, large prolateral subapical tubercle. Femur-tibia without small dorsal tubercles. Tibia mesal IiiIi, ectal IiI/IIi. Tarsus mesal/ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore, one large posterior tubercle fused to one from III; III with one anterior tubercle fused to II and one posterior fused to IV; IV with six tubercles on subapical region, without dorsosubapical tubercle. Trochanters: I with one prolateral, two ventral tubercles; II with one prolateral, two ventral tubercles; III one prolateral, four ventral tubercles; IV two prolateral, three ventral tubercles. Femora I–IV with minute tubercules, II–IV with two dorsoapical similar-sized tubercles (shorter than segment width). Tarsal formula: 6(3), 11(3); 6, 7. Metatarsi I and IV without white band; II with five; III with two.

Penis (Fig. 14*E*, *F*). Lateral of ventral plate sinuous (base and region near three distalmost macrosetae wider), distal margin almost straight. Four pairs of long macrosetae (length slightly shorter than distal margin width, groups A+C), one pair of short setae placed more ventrally than distal (group E). Glans long, stylus very short (length twice stylus width) and slightly swollen distally.

Colouration (Fig. 1*F*). Brown, lateral margins and free tergites slightly darker. Appendages yellowish brown. White-silver tubercles on ocularium, and areas I and II (only the highest pair), lateral margin and free tergite II.

Female description (*MZSP68797*)

Measurements. Dorsal scutum: maximal width: 2.5; total length: 2.9; carapace length: 1.3; width: 1.9. Femur IV length: 3.5.

Dorsum. Lateral margin with tubercles from ozopore end to posterior margin, distalmost higher. Area I with one conical tubercle and 3–4 tubercles on each half. Free tergites: I with five tubercles; II with seven tubercles; III with two median apophyses longer than tergite length, one tubercle on each side and one tubercle between them.

Pedipalpus. Tibia mesal IiIi, ectal IiI. Tarsus mesal/ectal IiIi. Leg femora II–IV with two dorsoapical tubercles (posterior larger). Tarsal formula: 6(3), 12(3); 6, 7.

Distribution

Costa Rica (Fig. 16).

Quindina marginata (Roewer, 1963), comb. nov.

(Figs 7*A*, 9*E*, 14*G*, *H*)

Deriacrus marginatus Roewer, 1963: 68, fig. 42; Flórez & Sánchez, 1995: 368; Kury, 2003: 92 (male holotype SMF 12714/1, stated as female on label, Colombia, Resina Bochta, 1800 m, Sturm leg., 4.VI.1956, examined).

Diagnosis

Most similar to *Q. bimaculata* and *Q. bella* due to lack of enlarged tubercle on posterior lateral margin of the dorsal scutum. *Quindina marginata* can be distinguished from all other species of the genus in lacking enlarged tubercles on free tergite III and by the presence of coloured stripes on the posterior margin of the dorsal scutum.

Male redescription (*SMF-12714/1*)

Measurements. Dorsal scutum: maximal width: 2.8; total length: 3.1; carapace length: 1.4; width: 1.9. Femur IV length: 4.5.

Dorsum (Figs 7*A*, 9*E*). Anterior margin of carapace with one small tubercle on each side. Ocularium with 18 similar-sized conical tubercles. Carapace with 23 tubercles behind ocularium, integumentary dome of ozopore pronounced. Lateral margin with similar-sized tubercles from ozopore almost to posterior margin of dorsal scutum. Area I with median large rounded tubercle, 12 tubercles on each half; area II with 24 tubercles; area III with two parallel pointed apophyses directed backwards, with 22–24 tubercles on each half. Posterior margin with 16 tubercles. Free tergites with similar-sized tubercles; I with 14; II with 13; III with five. Anal operculum with minute tubercles.

Chelicera. Segment I with one tubercle on lateral margin of bulla; movable finger with three teeth; segment II with one tooth.

Pedipalpus. Trochanter with one dorsal tubercle, four small ventral tubercles. Femur with four small ventral similar-sized

tubercles. Femur-tibia without small dorsal tubercles. Tibia mesal IiIi/Iii, ectal IiIi. Tarsus mesal/ectal IiIi.

Legs. Coxa: I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore, one large posterior fused to one from III; III with one anterior fused to II and one posterior fused to IV; IV with six tubercles scattered on dorsolateral region and one slightly larger on dorsosubapical. Trochanters I–IV with similar-sized tubercles. Femora I–IV tuberculate, without dorsoapical tubercles. Tarsal formula: 6(3); 15(3); 7, 8. Calcaneus I swollen.

Penis (Fig. 14*G*, *H*). Ventral plate rectangular, distal margin strongly convex. Lateral macrosetae long and divided in two groups, basal with two pairs (group A), distal with three pairs (group C). Glans wide and about half length of ventral plate length, stylus long.

Colouration. Body and appendices light brown, lateral margin and free tergites darker. Spines of area III dark brown. Lateral of areas I–III with light silver patches. With silver tubercles on ocularium to sulcus I, lateral margin, posterior margin and lateral of free tergites (I and II with four-five, each, III with one-three). Silver stripe on anterior part of sulcus I. Dorsal anal operculum with two wide white-silver patches.

Female

Unknown.

Distribution

Known only from type locality (Fig. 16).

Quindina morae, sp. nov.

(Figs 7*B*, 9*F*, 10*J*, 12*J–L*)

http://zoobank.org/urn:lsid:zoobank.org:act:8C7657AE-D8C7-48B5-84C1-90D1A07F0384

Material examined

Holotype. Panama: Gamboa, Sendero del Oleoducto, 4.xi.2009, E. Laynela leg., ♂ holotype (MIUP).

Paraypes. 1 ♀ paratype (MIUP), same data as holotype; near Pina, 23.xi.1974, D. Quintero, 3 ♀ (MIUP); Rio Chagres, i.1980, A. Lee leg., 3 ♂, 4 ♀, 1 immature (MIUP); Parque Nacional Soberanía (Camino del Oleoduto), 21.ix.2005, R.J. Miranda leg., 2 ♀ (MIUP); Colon, Buena Vista, 23.vi.2012, A. Bethancourt leg., 4 ♀ (MIUP); Sierra Llorona, 23.xii.1998, D. Quintero, 2 ♀ (MIUP); (Pavon Hill road, 1 km left to San Lorenzo), 7.ix.1987, D. Quintero leg., 2 ♂ (MIUP); Veraguas, road to Calovébora, 14–16.xi.1974, D. Quintero, 1 ♂, 7 ♀ (MIUP); Bocas del Toro, El Guabo, 6.xii.1988, D. Quintero leg., 1 ♂ (MIUP); Chiquiri, Reserva Florestal Fortuna, 08°43′20″S 82°14′09″W, 1213 m, 26.ii.2014, R. Pinto-da-Rocha and J. Bernal leg., 2 ♂, 2 ♀ (MZSP 68121); near dam of Fortune, 1200 m a.s.l., i.2015, inside nest (MZSP 68799).

Diagnosis

Quindina morae is most similar to *Q. burbayar* in having no white tubercles on dorsal scutum or free tergites. It differs from *Q. burbayar* in having small tubercles on free tergites (only a pair of enlarged tubercles on free tergites II and III of *Q. burbayar*).

Male description (holotype)

Measurements. Dorsal scutum: maximal width: 3.0; total length: 2.6; carapace length: 1.3; width: 1.9. Femur IV length: 4.6.

Dorsum (Fig. 7*B*, *F*). Tubercles of dorsal scutum (except lateral margin) and free tergites with long setae. Anterior margin of carapace with two tubercles on each side. Ocularium with 2–3 pairs of tubercles, dorsalmost higher (slightly smaller than eye height). Carapace with 1–3 tubercles on each side behind ocularium, integumentary dome of ozopore not pronounced. Lateral margin with one row of tubercles from ozopore end to posterior margin, distalmost much larger. Area I with 8–9 tubercles on each half, centralmost higher; II with two anterior, one posterior row of eight similar-sized tubercles; III with two divergent pointed apophyses slightly directed backwards, four tubercles between spines, two-three tubercles each side; area IV with one row of six tubercles. Posterior margin with six tubercles. Free tergites I with seven tubercles; II with six tubercles (central pair larger); III with two tubercles longer than tergite length, one central small tubercle, one on each side. Anal operculum with 18 small tubercles.

Chelicera. Segment I with three tubercles on posterior margin of bulla; movable finger with three teeth; fixed finger with four teeth.

Pedipalpus (Fig. 10*J*). Trochanter with one dorsal tubercle; two long ventral tubercles. Femur with three ventral tubercles, large prolateral subapical tubercle with long seta. Patella short. Femur-tarsus without small dorsal tubercles, only few scattered setae. Tibia mesal IiIi, ectal IIi. Tarsus mesal/ectal IiIi.

Legs. Coxae: I with one anterior tubercle and one posterior; II with one larger tubercle before ozopore, one large posterior fused to one from III; III with one anterior fused to II; IV with five tubercles near lateroapical region, few small scattered tubercles, one larger on dorsoapical region. Trochanters: I with one apical retrolateral, one prolateral, two dorsal, three ventral tubercles; II with two retrolateral, four ventral tubercles; III with one prolateral-apical, two retrolateral, four dorsal, five ventral tubercles; IV four dorsal, five prolateral apical, one large retrolateral, six ventral tubercles. Femora I–IV smooth, except for one dorsoapical tubercle on femur I and two large (about same size, slightly shorter than femur width) on femora II–IV. Tarsal formula: 6(3); 11–12(3); 6, 7.

Penis (Fig. 12*J–L*). Lateral of ventral plate slightly dilated at base and straight on distal 2/3, apex slightly projected laterally, distal margin straight. Four pairs of long (distalmost 2/3 size of others), straight and spatulate macrosetae (slightly shorter than distal margin width, groups A+C), slightly curved apically (group C), basal pair directed ventrally (group A). Median pair of short setae (group E) ventrally placed. Basal pair reduced, on lateral base of ventral plate (group D). Glans long with submedian ventral process (Fig. 12*L*), stylus very short, slightly swollen distally.

Colouration. Body and appendices brown. Center of areas, lateral margins and free tergites darker, spines of area III blackish brown. Dark reticulate zone on cheliceral segment I, femur to tarsus of pedipalps, and between ocularium and anterior margin. Femora-tibiae of legs brown with small black patches.

Female description (paratype, same data as holotype)

Measurements. Dorsal scutum: 3.3; maximal width: 2.8; total length: 2.7; carapace length: 1.4; width: 2.0. Femur IV length: 4.6.

Anterior margin of carapace with one tubercle on each side. Carapace behind ocularium with one or two tubercles on each side. Lateral margin with one row of tubercles from coxa II to posterior margin, distalmost much larger. Area I with 7–9 tubercles on each half, centralmost higher; area II with two anterior, one posterior row of 10 tubercles about same size; area III with two divergent pointed apophyses slightly directed backwards, four tubercles between spines, two tubercles on each side; area IV with one row of seven tubercles. Posterior margin with five tubercles. Cheliceral segment I with four tubercles on posterior margin of bulla; movable and fixed fingers with five teeth each. Tarsal formula: 6(3); 11–12(3); 6, 7. Femora-metatarsi of legs light brown with small black patches.

Distribution

This species was recorded in central-northern Panama (Fig. 16).

Etymology

In honour of Giselle Mora, who produced her Ph.D. thesis on *Q. albomarginis*, comb. nov.

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