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Revisão e filogenia de *Macropygium* Spinola, 1837 (Hemiptera: Pentatomidae: Ochlerini)

Dissertação apresentada ao Programa de Pós-Graduação em Biologia Animal, Instituto de Biociências da Universidade Federal do Rio Grande do Sul, como requisito á obtenção do título de Mestre em Biologia Animal.

Área de Concentração: Biologia Comparada

Orientador: Luiz Alexandre Campos

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Dissertação apresentada como parte dos requisitos para obtenção do grau de Mestre em Biologia Animal, área de concentração Biologia Comparada.

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RESUMO

Discocephalinae caracteriza-se pelo corpo ovalado, rostro em geral inserido posteriormente à linha imaginária transversal anterior aos olhos, pares de tricobótrios localizados lateralmente à linha imaginária que conecta os espiráculos, e é dividida nas tribos Dicocephalini e Ochlerini. Ochlerini é restrita à região Neotropical e atualmente tem 38 gêneros e 149 espécies, dentre os quais o gênero monotípico *Macropygium* Spinola, 1837. O método da Cladistica, criada por Hennig na década de 50 utiliza estados caráter para determinar as relações entre os clados e gerar hipóteses filogenéticas, muito utilizada em diversas áreas da biología. Hipóteses filogenéticas recentes recuperaram *Macropygium* num clado contendo *Clypona* Rolston, 1992 e *Uvaldus* Rolston, 1992 como possíveis grupos irmãos. Neste trabalho *Macropygium* é revisado, com a redescrição da espécie-tipo *M. reticulare* (Fabricius, 1803) e a descrição de três espécies novas, incluindo uma chave de identificação. Uma hipótese das relações filogenéticas é proposta entre as espécies de *Macropygium* e gêneros próximos. A análise filogenética incluiu oito táxons, espécies de *Macropygium* como grupo interno e *Clypona aerata* Rolston, 1992, *Miopygium cyclopeltoides* Breddin, 1904, *Uvaldus concolor* Rolston, 1992, *Schaefferella incisa* (Herrich-Schäffer, 1839) como grupo externo, sendo esta ultima o grupo mais externo utilizado na polarização dos estados de caracteres, O cálculo das árvores mais parcimoniosas foi feito no TNT por busca exaustiva (enumeração implícita), bem como do suporte absoluto de Bremer para árvores subótimas com até dez passos extras. A árvore mais parcimoniosa recuperou a monofilia de *M. reticulare* com as três espécies novas, e *Clypona aerata* Rolston, 1992 como grupo irmão de *Macropygium*.

Palavras chave: cladística, Discocephalinae, Heteroptera, Neotropical, taxonomia.

ABSTRACT

Discocephalinae is characterized by the oval body, the rostrum beginning posteriorly the imaginary transversal line at the height of the eyes, pair of tricobothria located laterally the imaginary line that connects the spiracles, is a group divided in two tribes: Dicocephalini and Ochlerini. The Ochlerini tribe is strict in the neotropical region and currently has 38 genera and 149 species, among these genera we can highlight *Macropygium* (Spinola, 1837). The Cladistica method, created by Hennig in the 1950s, uses character states to determine the relationships between clades and generate phylogenetic hypotheses, widely used in various areas of biology. Recent phylogenetic hypotheses recovered *Macropygium* in a clade containing the genera *Clypona* Rolston and *Uvaldus* Rolston as possible sister groups. This study *Macropygium* is reviewed with the redescription of the *M. reticulare* species type (Fabricius, 1803) and the description of three new species, including an identification key. A new hypothesis of phylogenetic relationships is proposed between species of *Macropygium* and nearby genera. The Phylogenetic analysis included eight taxa, *Macropygium* species as internal group and *Clypona aerata* Rolston, 1992, *Miopygium cyclopeltoides* Breddin, 1904, *Uvaldus concolor* Rolston, 1992, S*chaefferella incisa* (Herrich-Schäffer, 1839) as external group. The most parsimonious tree was calculated in TNT by exhaustive search (implicit enumeration), as well as Bremer's absolute support for suboptimal trees with up to ten extra steps. The most parsimonious tree recovered the monophyly of *M. reticulare* with the three new species, and *Clypona aerata* Rolston, 1992 as a sister group of *Macropygium*.

Key words: Cladistic, Discocephalinae, Heteroptera, Neotropícal, taxonomy.

INTRODUÇÃO

Hemiptera é uma ordem cosmopolita de insetos, caracterizada principalmente pelo seu aparelho bucal picador sugador. Possui quatro subordens, dentre essas subordens o grupo Heteroptera é bastante estudado e conhecido por sua diversidade, principalmente nas regiões tropicais. Heteroptera está dividida em sete infraordens: Enicocephalomorpha, Dipsocoromorpha, Gerromorpha, Nepomorpha, Leptopodomorpha, Cimicomorpha e Pentatomomorpha; esta última é uma das mais diversas e compreende os insetos conhecidos popularmente como percevejos, maria-fedida ou fede-fede, e são estudados com frequência por incluírem espécies de importância médica e agrícola (Panizzi & Grazia, 2015).

A família nominal de Pentatomomorpha, Pentatomidae está dividida em dez subfamílias, sendo sete destas subfamílias neotropcais (Asopinae, Discocephalinae, Cyrtocorinae, Edessinae, Pentatominae, Podopinae e Stirotarsinae), cerca de 940 gêneros (230 ocorrem na região neotropical), e mais de 4000 espécies (Grazia et al., 2015; McPherson, 2018). Discocephalinae, dividida nas tribos Dicocephalini e Ochlerini, tem ocorrência nas Américas e majoritariamente Neotropical e é caracterizada pelo corpo ovalado e cores que variam do ocre até marrom escuro, rostro iniciando posteriormente à linha imaginária transversal que tangencia a margem anterior dos olhos, tarsos trímeros e pares de tricobótrios localizados lateralmente à linha imaginária que conecta os espiráculos (Rolston, 1981).

Ochlerini é endêmica na Região Neotropical, com distribuição do México até a Argentina. Ochlerini foi proposta para abrigar 23 gêneros neotropicais anteriormente classificados em Halyini (Rolston, 1981; Garbelotto et al, 2013). Rolston (1992) publicou uma chave e diagnoses para os gêneros da tribo, além de descrever nove gêneros novos com 11 novas espécies. Trabalhos posteriores elevaram a composição de Ochlerini para 38 gêneros e 149 espécies. (Campos & Roell, 2017; Roell & Campos, 2018; Garbelotto et al., 2019; Roell & Campos, 2019).

Dentre os gêneros de Ochlerini *Macropygium* Spinola, 1837 é um gênero conhecido apenas pela espécie-tipo, *Macropygium reticulare* (Fabricius, 1803), caracterizado por ter um corpo oval marrom escuro, cabeça pequena e triangular, placas mandibulares estreitando em direção ao ápice, com registros desde o México até a Argentina (Rolston, 1981). *Macropygium* possui importância fitossanitária, sendo

reconhecido inicialmente por Dollet et al. (1963) como um dos vetores de *Phytomonas* spp. em palmeiras e coqueiros (Arecaceae) na América do Sul, causando nas plantas a doença conhecida como “murcha de phytomonas” gerando danos e perdas de produção em plantações, principalmente em em coco (*Cocos nucifera* L.) e dendê (*Elaeis guineenses* Jacq.).

A Cladística ou Sistemática Filogenética é um método utilizado para compreensão sobre a relação e evolução das espécies e transformar em uma classificação biológica, é aplicada em diversas áreas da biologia. Criada pelo entomólogo alemão Hennig na década de 1950, esse método se baseia na utilização de carateres e suas modificações para determinar as relações de parentesco entre as espécies, para isso é necessário que os clados sejam monofiléticos e seus grupos irmãos determinados, além do uso do principio da parcimônia (menor número de passos evolutivos) (Hennig, 1950; Andesen, 2001; Amorin, 2002). Atualmente é amplamente utilizada para criar hipóteses entre os mais diversos grupos biológicos.

Macropygium foi considerado próximo a *Ochlerus* Spinola, 1837 (Stål, 1862; Breddin, 1904), a *Herrichella* Distant, 1911 (*Alitocoris* Sailer, 1950 em Sailer, 1950; Ruckes, 1958), e a *Schaefferella* Spinola, 1850 (Rolston, 1992). Filogenias de Ochlerini recuperaram *Macropygium* no grupo *Alitocoris*+ (Clado *Herrichella*) tendo como grupo-irmão *Clypona* Rolston, 1992 (Campos & Grazia, 2006) ou o clado *Clypona* +*Uvaldus* (Gaberlotto et al, 2013; Roell & Campos, 2018). Após sua descrição original (Spinola, 1837) e uma breve diagnose ilustrada (Rolston, 1992), *Macropygium* não foi objeto de estudos morfológicos ou taxonômicos, deixando desconhecidas sua real diversidade morfológica e distribuição geográfica. Assim é interessante uma revisão taxonômica do gênero para a descoberta, avaliação e compreensão da sua diversidade, além de fornecer subsídios para estudos aplicados tais como programas de conservação e de avaliação de impactos ambientais, além do seu controle como agente de interesse fitossanitário (Tompson et al., 2018; Lyal et al., 2008).

O objetivo geral deste trabalho foi revisar o gênero *Macropygium* partindo das suas relações filogenéticas com gêneros próximos, com a inclusão de potenciais espécies novas para o gênero.

Foram examinados 900 indivíduos emprestados das seguintes coleções cientificas: American Museum of Natural History (American Museum of Natural History (AMNH, New York, USA), New York, USA); Centro de Coleções

Taxonômicas da Universidade Federal de Minas Gerais (CCT, Belo Horizonte, Brazil); David A. Rider Collection (DAR, Fargo, USA); Departamento de Zoologia da Universidade Federal do Rio Grande do Sul (UFRG, Porto Alegre, Brazil); Departamento de Zoologia da Universidade do Paraná (DZUP, Curitiba, Brazil); Florida State Collection of Arthropods (FSCA, Gainesville, USA); Instituto Nacional de Biodiversidad (INBio, San Jose, Costa Rica); John E. Eger Collection (JEE, Tampa, USA Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul (MCN, Porto Alegre, Brazil); Museo Argentino de Ciencias Naturales Bernardino Rivadavia (MACN, Buenos Aires, Argentina); United States National Museum (UNITED STATES NATIONAL MUSEUM (USNM, Washington DC, USA).

Foram feitas as redescrições do gênero e da espécie tipo, descritas três espécies novas, e elaborada uma chave de identificação para as espécies. Na análise filogenética foram incluídos oito táxons, sendo quatro no grupo externo que em estudos anteriores foram identificados como próximos a *Macropygium*. Uma matriz de dados com 39 caracteres foi feita em Mesquite v.3.40, . O cálculo das árvores mais parcimoniosas foi feito no TNT por busca exaustiva (enumeração implícita), bem como do suporte absoluto de Bremer para árvores subótimas com até dez passos extras. A visualização e a edição do cladograma foram realizadas no Winclada 1.00.08. A análise resultou em uma única árvore mais parcimoniosa, com a recuperação da monofilia de *M. reticulare* com as três espécies novas, e *Clypona aerata* Rolston, 1992 como grupo irmão de *Macropygium*.

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Cladistic analysis and review of *Macropygium* Spinola, 1837 (Hemiptera: Pentatomidae: Ochlerini).

Normas editoriais: Zootaxa (Anexo 1)

INTRODUTION:

Ochlerini (Discocephalinae) is a pentatomid tribe whose species are endemic in the Neotropical region, ranging from Mexico to Argentina (Grazia et al. 2015). The tribe was proposed to include 23 Neotropical genera previously placed in Halyini (Pentatominae) (Rolston, 1981), currently Ochlerini contain 38 genera and 149 species (Campos & Roell 2017; Roell & Campos 2018; Garbelotto at al 2019; Roell & Campos 2019).). Among the Ochlerini's genera, the most widespread in the Americas is the monotypic *Macropygium* Spinola, 1837 ranging from Mexico to Argentina (Rolston 1981). *Macropygium reticulare* is one of the few Ochlerini of phytosanitary importance, being firstly reconized by Dollet et al. (1963) as a vector of *Phytomonas* spp. in palm (Arecaceae) crops in South America, causing the phytomone wilt disease particularly in coconut trees (*Cocos nucifera* L.) and in the African oil palm (*Elaeis guineensis* Jacq.).

Macropygium has been already considered related to *Ochlerus* Spinola, 1837 (Stål, 1862; Breddin, 1904), *Herrichella* Distant, 1911 (*Alitocoris* Sailer, 1950 in Sailer, 1950; Ruckes, 1958), and *Schaefferella* Spinola, 1850 (Rolston, 1992). Phylogenies of genera of Ochlerini recovered *Macropygium* in the *Alitocoris*+ (*Herrichella* group), either sister to *Clypona* Rolston, 1992 (Campos & Grazia 2006) or to the clade *Clypona*+*Uvaldus* (Roell & Campos 2018). Nonetheless its wide distribution, phytosanitary importance, and phylogenetic placement, the taxonomy of *Macropygium* is restricted to the original descriptions (Spinola, 1837) and to a more diagnosis (Rolston, 1992). As pointed out previously (Campos & Roell 2018), taxonomic issues can be found and addressed when revising genera described in the 19th century as *Macropygium*. Here we present a phylogenetic hypothesis of *Macropygium*, the genus and its type species are redescribed, and three new species are described. A key for the species of *Macropygium* is provided.

MATERIAL AND METHODS:

A total of 299 males and 601 females of *Macropygium* were examined, belonging to the following collections: American Museum of Natural History (American Museum of Natural History (AMNH, New York, USA), New York, USA); Centro de Coleções Taxonômicas da Universidade Federal de Minas Gerais (CCT, Belo Horizonte, Brazil); David A. Rider Collection (DAR, Fargo, USA); Departamento de Zoologia da Universidade Federal do Rio Grande do Sul (UFRG, Porto Alegre, Brazil); Departamento de Zoologia da Universidade do Paraná (DZUP, Curitiba, Brazil); Florida State Collection of Arthropods (FSCA, Gainesville, USA); Instituto Nacional de Biodiversidad (INBio, San Jose, Costa Rica); John E. Eger Collection (JEE, Tampa, USA Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul (MCN, Porto Alegre, Brazil); Museo Argentino de Ciencias Naturales Bernardino Rivadavia (MACN, Buenos Aires, Argentina); United States National Museum (UNITED STATES NATIONAL MUSEUM (USNM, Washington DC, USA). The especimens were observed and measured in stereomicroscope, and the range and mean of the following morphometric parameters were obtained: length and width of head, pronotum and scutellum, length of antennomeres, total length, and abdominal width.

For the study of genital morphology the female abdomen and the male pygophore were removed with tweezers, boiled in 10% KOH aqueous solution, rinsed with demineralized water, and dehydrated in 70% ethanol solution. The phallus, parameres, and the female ectodermal ducts were removed, and stained in Congo red solution, and preserved in liquid glycerin. The terminology adopted for genital structures follows Baker (1931), Dupuis (1970) and Schaefer (1977). Specimens were photographed using a Nikon AZ100M stereomicroscope, and the images were stacked with the software Nikon NIS-Elements Ar Microscope Imaging. Illustrations of genitalia were made using a camera lucida coupled to a light stereomicroscope and finalized with Adobe Illustrator® CS5.1.

For the cladistic analysis we used 39 morphological characters, 22 out of them as in Roell & Campos (2018), and 17 proposed here. The ingroup included *Macropygium reticulare* and three new species, and the outgroup included *Clypona aerata* Rolston, 1992, *Miopygium cyclopeltoides* Breddin, 1904, *Uvaldus concolor* Rolston, 1992, and *Schaefferella incisa* (Herrich-Schäffer 1839), the later used for character polarization and rooting the trees. The taxon-character matrix was made in Mesquite v.3.40 (Maddison & Maddison 2018). Character polarization followed the

outgroup method (Nixon & Carpenter 1993), and the trees were calculated using TNT 1.5 (Goloboff et al. 2008) by exhaustive searches (implicit enumeration). Absolute Bremer support values (subtrees up to ten extra steps; Bremer 1994) were calculated. Visualization, interpretation, and illustration of the most parsimonious cladogram were performed in Winclada v.1.00.08 (Nixon 2002).

Site collection data were georeferenced using the Google Earth 7.3 for those specimens without geographic coordinates informed in the respective labels, and the distribution map for the studied specimens was made with the software QGIS 3.2.

RESULTS AND DISCUSSION

The cladistic analysis resulted in one most parsimonious tree (fig. 1), and recovered the monophyly of *Macropygium* with *Clypona* as its sister. In previous works (Campos & Grazia, 2006; Roell & Campos, 2018) *Clypona* was also recovered sister to *Macropygium*, and in an alternative hypothesis Roell & Campos (2018) recovered a clade *Clypona+ Uvaldus* sister to *Macropygium*. The monophyly of *Macropygium* is supported by three synapomorphies (characters 1_1, 5_1, and 38_0) regarding characteristics of the head, and *Clypona+Macropygium* is supported be the spine-like anteocular processes (7_1) and other two synapomorphies: shape of anterocular process and evaporatorium area (35_2, 39_1) (Fig. 1, Tab. 1). *Macropygium* genera is supported by three synapomorphies, eyes width, bucculae apex shape and bucculae length (1_1,5_1,38_0) (Fig. 1, Tab.1). All the clades within *Macropygium* species are supported by male genital characters.

Identification key to the species of *Macropygium*

1. Antennae with four segments; male with lateral projections of dorsal rim of pygophore wide, placed away from the posterolateral angles (Fig. 3O); female with

middle portion of posterior margin of gonocoxites VIII projected over laterotergites IX (Fig. 6D) ..... *Macropygium* sp. nov. 3

– Antennae with five segments; male with lateral projections of dorsal rim of pygophore slim, placed near the posterolateral angles (Fig. 3C, G, K); female with lateral portion of posterior margin of gonocoxites VIII projected over laterotergites IX (Fig. 6A–C) 2

2. Male proctiger as wide as high in posterior view (Fig. 3E), its free portion as wide as long in ventral view (Fig. 3H); lateral portion of the posterior margin of female gonocoxites VIII projected well beyond the spiracles of laterotergites VIII, attaining or surpassing an imaginary line connecting the medial thrichobothria of urosternite VII (Fig. 6B) ..... *Macropygium* sp. nov. 1

– Male proctiger higher than wide in posterior view (Fig. 3D, L), its free portion longer than wide in ventral view (Fig. 3A, I); lateral portion of the posterior margin of female gonocoxites VIII not so projected (Fig. 6A, C) 3

3. Male conical projection of ventral rim of pygophore bifurcate at apex (Fig. 3I); lateral portion of the female gonocoxites VIII slightly swollen (Fig. 6C) *Macropygium* sp. nov. 2

– Male conical projection of ventral rim not bifurcate at apex (Fig. 3A); lateral portion of the female gonocoxites VIII not swollen (Fig. 6A) *Macropygium reticulare* (Fabricius)

Family Pentatomidae

Subfamily Discocephalinae

Tribe Ochlerini

Macropygium Spinola, 1837

Macropygium Spinola, 1837: 287; Herrich- Schäffer, 1844:48; Stål, 1867: 523.

Oxyrhinus Amyot & Serville, 1843 (synonymized by Dallas, 1851),Stål, 1872: 4. P. 12; Distant 1880: 49; Berg, 1884:181; Dallas, 1851: 150–159; Kirkaldy, 1909: 1; Rolston, 1992: 5, –24–25, figs 47–79; Campos & Grazia, 2006: 147, 151, 160, 162, figs 1, 4, 6, 22, 47, 55, 61; Garbelotto et al., 2013: 454, figs 1, 9; Roell & Campos, 2018: 1139, figs 6–7.

Type species: *Cimex reticularis* Fabricius, 1803 (senior synonym of *Macropygium atrum* Spinola, 1837).

Diagnosis. Medium size (10.0 – 13.9mm); oval body, brown or dark brown with black irregular spots, anterolateral margins of pronotum yellowish in some specimens ; head short and triangular; mandibular plates surpassing apex of clypeus, touching each other in some specimens; four or five antennomeres. Pronotum little sloping anterior to the humeri; scutellum shorter than coria; rostrum surpassing urosternite III. Male urosternite VII in the middle line as long or longer than all remainder abdominal segments together. Pygophore large, occupying more than 1/3 of the abdominal cavity.

Description. Head short and triangular; mandibular plates surpassing the the apex of clypeus, converging, touching each other in some specimens; anteocular processes spinose. Eyes pedunculated; ocelli posterior to a line connecting the hind margins of eyes; small punctures forming wrinkles over mandibular plates; antennae with four or five segments; insertion of the labium posterior to an imaginary line tangent to the anterior margin of the eyes; rostrum surpassing the urosternite III to IV (Fig. 1).

Pronotum wider than long; anterolateral margins slightly flattened; anterior margin sinuous; anterolateral angles with a small triangular projection; cicatrices weakly tumid, smooth or with inconspicuous spots. Scutellum completely brown or with 1+1 little yellow spots near the foveae, one median at anterior margin, and one apical; triangular, longer than wide, shorter than coria. Frenal lobe twice the length of the postfrenal lobe. Coria covered by fine and sparse punctures; apical angle surpassing connexival tergito V; membrane extending beyond the abdominal apex. Meso- and metasternum smooth, bearing flat median carina; pleura rugose with irregular yellowish spots in some specimens; evaporatorium smooth, velvety, covering one-third of the metapleura; peritreme short, spout like; legs yellowish with browm rounded spots on femora and tibiae. Abdominal sternites with dark spots (Fig. 1).

Male: large trapezoidal pygophore, occupying about 1/3 of the abdominal volume; ventral rim with a medial conical projection; dorsal rim bearing 1+1 lateral projection directed dorsoposteriorly; posterolateral angles acute directed

dorsoposteriorly, with a broad medial projection, rounded at apex and directed dorsally. Apex of parameres visible posteriorly and ventrally between the posterolateral angles, ventral to proctiger (proctiger) (Fig. 3; Fig. 5). Proctiger broad, ogival, exceeding posteriorly both the ventral rim and the posterolateral angles. Anal opening subapical, dorsal to the posterior projected portion of proctiger, this slit opened ventrally to give way to the phallus. Phallus highly sclerotized; piriform phallotheca narrowed apically; vesica curly and accompanying the ductus seminis distalis; conjunctiva reduced, surrounding vesical (Fig. 4).

Female: gonocoxites VIII longer than wide, posterior margin projecting over the base of laterotergites IX; sutural margins juxtaposed; disc evenly convex. Laterotergites VIII triangular, spiracles visible at basal angle lateral to gonocoxites VIII. Gonocoxites IX exposed, posterior margin biconcave; laterotergites IX trapezoid, toching each other in the medial angle; medial margins divergent; apex rounded. Proctiger partially exposed bettween the laterotergites IX (Fig. 6). Gonapophyses IX weakly sclerotized near the ring sclerites; infoldings of gonapophyses IX extending from gonocoxites IX amost to the ring sclerites; vaginal intima barely thickened, almost indistinguishable; proximal portion of ductus receptaculi large, wider than median duct of vesicular area, this globose at base; inner duct of vesicular area narrowing from the proximal aperture to the apical limit of vesicular area; capsula seminalis globose with thin processes as long as the pars intermedialis, this twice longer than capsula *seminalis* (Fig. 7).

Comments: Both cladistic analyses before ours (Campos & Grazia, 2006; Gaberotto et al, 2013; Roell & Campos, 2018) recovered *Macropygium* in the same clade with *Uvaldus* and *Clypona*. *Macropygium* can be easily distinguished from *Uvaldus* by the larger size, darker color, and longer mandibular plates; and differs from *Clypona* by the longer second rostral segment relative to the rostrum first segment, and triangular base of clypeus in ventral view.

Macropygium reticulare (Fabricius, 1803)

(Figs 2A – D, 3A – D, 4A – C, 5A – C, 6A, 7A)

Cimex reticularis Fabricius, 1803: 170

Macropygium atrum Spinola, 1837: 288

Pentatoma bifida Westwood, 1837: 43

Oxyrhinus subsulcatus Amyot & Serville, 1843: 12

Macropygium parvum Distant, 1880: 50

Macropygium spinolae Stål, 1860: 7: 18

Ochlerus guttipes Walker, 1867: 193

Macropygium reticulare: Stål, 1872: 4. P. 12; Distant 1880: 49; Berg, 1884:181; Dallas, 1851: 150–159; Kirkaldy, 1909: 1; Rolston, 1992: 5, –24–25, figs 47–79; Campos & Grazia, 2006: 147, 151, 160, 162, figs 1, 4, 6, 22, 47, 55, 61; Garbelotto et al., 2013: 454, figs 1, 9; Roell & Campos, 2018: 1139, figs 6–7.

Material examined:

ARGENTINA, 1f#, 1994, David A. Ricer Collection (DAR, Fargo, USA); *Chacoguemes*, 9f# e 2m#, 1995, David A. Ricer Collection (DAR, Fargo, USA); *Misiones*, Puertoiguazu, 5f# e 4m#, 1991, David A. Ricer Collection (DAR, Fargo, USA), [-25.597, -54.578]. BOLIVIA, 1f#, 1969; 2f#, 1m#, 1959, FSCA; *Chapare*, 1f# e 1m#, 1950, United States National Museum (USNM, WASHINGTON DC, USA), [-17.34, -65.865]; *Cocha bamba*, Villa Tunari, 4f#, 1m#, 1992, John E. Eger Collection (JEE, Tampa, USA); Villa Tunari, 1f#, 1m#, 1992, John E. Eger Collection (JEE, Tampa, USA); Carrasco, 7f#, 1m#, 2002, John E. Eger Collection (JEE, Tampa, USA), [-17.333, -65.333]; *La paz*, Yungas 1f#, 1955, FSCA, [-16.183, -67.733]; *El cairo*, 1f#, 2003, John E. Eger Collection (JEE, Tampa, USA), [-13.133, -65.2]; *Ichilo*, 4f#, 2000, John E. Eger Collection (JEE, Tampa, USA), [-17.485, -63.516]; Hotel flora e fauna, 1f#, 2000, FSCA, [-17.458, -63.659]; Hotel flora e fauna, 7f#, 4m#, 2001, FSCA, [-17.458, -63.659]; Hotel rio selva, 1f#, 1m#, 2001, [-17.55 -63.2]; *Quindío*, Buena Vista, 1f#, 4m#, John E. Eger Collection (JEE, Tampa, USA), [-17.458, -63.659]; Buena Vista, 36f#, 15m#, 2004, FSCA, [-17.458, -63.659]; Buena Vista, 12f#, 4m#, 2001, FSCA, [-17.458, -63.659]; 12f#, 4m#, 2001, FSCA, [-17.458, -63.659]Buena vista, 2f#, 2000, John E. Eger Collection (JEE, Tampa, USA), [-17.458, -63.659]; *La paz*, 1f#, 1m#, 1992, United States National Museum (USNM, WASHINGTON DC, USA), [-16.5 -68.15]; *Santa cruz*, Saavedra, 26f#, 7f##, 1959, FSCA, [-17.225, -63.214]; 4f#, 1m#, 1960, FSCA, [-17.225, -63.214]; Tropical Transition Forest, 17f#, 12m#, 2001,

John E. Eger Collection (JEE, Tampa, USA), [-17.485, -63.516]; 1m#, 2002, John E. Eger Collection (JEE, Tampa, USA), [-17.485, -63.516]; Potrerillos del guendá, 1f#, 1m#, 2005, John E. Eger Collection (JEE, Tampa, USA), [-17.6675 -63.451]; Tropical Transition Forest, 3f##, 1m#, 2006, John E. Eger Collection (JEE, Tampa, USA), [-17.485, -63.516]; Buena Vista, 1m#, 2007, John E. Eger Collection (JEE, Tampa, USA), [-17.458, -63.659] *Uyapi*, 4f#, 4m#, 1993, John E. Eger Collection (JEE, Tampa, USA). BRASIL: *Amazonas*, Bejamim Constant, 3f#, 2m#, 1960, MZSP, [-4.376, -70.030]; 2f#, 3f#, 1962, MZSP, [-4.376, -70.030]; 1m#, 1963, MZSP, [-4.376, -70.030]; Itacoatiara, 11f#, 4m#, 2003, [-3.142, -58.443]; 1m#, 1952, MCN, [-3.142, -58.443]; Manaus, 1f#, 1m#, 1941, MNRJ, [-3.044,-60.107]; Manaus, 1f#, 1962, MZSP, [-3.044,-60.107]; 1f#, 1976, [-3.044,-60.107]; 1f#, 1978, [-3.044,-60.107]; 2f#, 1m#, 1986, [-3.044653,-60.1071934]; Muturaca, 1f#, 1980, [0.583, -56.166]; Purus, 2f#, 1979, [-3.68333, -61.45]; Rio purus, 1f#, 1967; Rio javari, 5f#, 1m#, 1979, [-4.55, -71.633]; Rio madeira, 1f#, MCN, [-26.105 -49.797]; Serra dos porcos, 3f#, 1m#, 1977, [-6.900, -36.833]; Tapuruquara, 1f#, 1965, MZSP, [-0.378, -64.991]; Urucu coari, 1f#, 2005, [-4.883, -65.355]; *Bahia*, Conquista, 2f#, 1969, American Museum of Natural History (AMNH, New York, USA), [-14.8661, -40.839]; 2f#, 1969, American Museum of Natural History (AMNH, New York, USA), [-14.866, -40.839]; Encruzilhada, 2f#, 2m#, 1972, American Museum of Natural History (AMNH, New York, USA), [-15.530, -40.908]; 1f#, 1980, [-15.530, -40.908]; *Espírito Santo*; 1m#, 1900, MNRJ, [-19.056, -40.147]; *Maranhão*, Bom Jardim, 1f#, 1m#, 2011, [-3.542, -45.609]; *Mato Grosso*, rio Papagaio, 1f#, 1966, MZSP, [-13.025, -16.675]; Vila vera, 1f#, 1973, American Museum of Natural History (AMNH, New York, USA), [-12.305, -55.316]; Dourados, 1f#, 1974, American Museum of Natural History (AMNH, New York, USA), [-21.220, -54.805]; 1m#, 1976, American Museum of Natural History (AMNH, New York, USA); *Minas Gerais*, 1f#, 1991; Serra caraça, 2f#, 1961, MZSP, [-17.694, -43.783]; Belo Horizonte, 1m#, 1963, MZSP, [-4.376, -70.030]; Pedra Azul, 1m#, 1970, American Museum of Natural History (AMNH, New York, USA), [-16.005, -41.296]; Marlieria, 6f, 2m#, 1978, CCT, BELO HORIZONTE, BRAZIL, [-19.711, -42.731]; CCT, BELO HORIZONTE, BRAZIL, 1f#, 1982, [-19.871 -43.966]; Sapucai mirim, 2f#, 1992, [-22.747, -45.742]; 1f#, 1994, United States National Museum (USNM, WASHINGTON DC, USA); *Pará*, Bragantina, 1f#, 1978, [-1.053, -46.765]; Melgaço, Caixuanã, 2f#, 2m#, 2003, [-1.792, -51.434]; Moju, 14f#, 5m, 1985, [-1.883, -48.768]; 10f, 9m, 1995, [-1.883, -48.768]; Santarém, 1f#, 1973, AMERICAN MUSEUM OF

NATURAL HISTORY (AMNH, NEW YORK, USA), [-2.442, -54.707]; 1m#, 1967, MZSP, [-2.442, -54.707]; Serra Norte, 1m#, 1985, [-6.108, -50.304]; Tomé Açu, 1m#, 1978, [-2.418, -48.151]; Tucurui, 1f#, 1979, [-3.766, -49.6725]; 1m#, 2005, [-3.766, -49.6725]; *Paraná*, Ipiranga, 1m#, 1962, [-25.023, -50.584]; Ponta grossa, 1f#, 1939, MCN, [-25.095, -50.1619]; Rio negro, 3f#, 1929, MCN, [m -26.105, -49.797]; *Rio Grande do Sul*, Porto Alegre, 1f#, 1958, [-30.108,-51.317]; Santa Maria, 2f#, 1971, MCN, [-29.683, -53.806]; Derrubadas, 1f#, 2004, [-27.265, -53.860]; Triunfo, 1f#, MCN, [-29.683, -53.806]; *Rio de Janeiro*, Itatiaia, 1f#, 1959, MNRJ, [-22.491, -44.559]; Bom Jardim, 1f#, 1m#, 2011, David A. Ricer Collection (DAR, Fargo, USA); Nova Friburgo, 1f#, 1980, MZSP, [-22.281, -42.530]; *Rondônia*, 1m#, 1967, MZSP, [-12.765, -64.422]; Fazenda Rancho Grande, 3f#, 1944, John E. Eger Collection (JEE, Tampa, USA), [-1.520, -52.581]; 2f#, 3m#, 1990, John E. Eger Collection (JEE, Tampa, USA), [-1.520, -52.581]; 5f, 1m#, 1992, John E. Eger Collection (JEE, Tampa, USA), [1.520, -52.581]; 20f#, 8m#, 1993, FSCA, [-1.520, -52.581]; 3f#, 3m#, 1994, John E. Eger Collection (JEE, Tampa, USA), [-1.520, -52.581]; 2f#, 1996, John E. Eger Collection (JEE, Tampa, USA), [-1.520, -52.581]; 5f#, 7f#, 1997, FSCA, [-1.520, -52.581]; 1f#, 1989,John E. Eger Collection (JEE, Tampa, USA), [-1.520, -52.581];Vilhena, 1m#, 1973, AMERICAN MUSEUM OF NATURAL HISTORY (AMNH, NEW YORK, USA), [-12.740, -60.145]; Cacaulandia, 1m#, 1989, John E. Eger Collection (JEE, Tampa, USA), [10.3411 -62.886]; Ariquemes, 2f#, 1m#, 1990, David A. Ricer Collection (DAR, Fargo, USA), [-9.913, -63.040]; Cacaulandia, 1m#, 1991, [10.3411, -62.886]; Ariquemes, 1m# , 1993, [-9.913, -63.0408]; *Santa Catarina*, Nova Teutônia, 1f#, 1957, FSCA, [-27.161 -52.416]*; São Paulo*, Campinas, 1f#, 1975, [-22.906, -47.061];Rio Claro, 1f#, 1943, [-22.410, -47.560]; Serra Negra, 1f#, 1943, MZSP [-22.550,-46.700]; 1f#, 1945; 1f#, 1946; São Bento do Sapucai, 1f#, 1953, [-22.688, -45.730]; Ribeirão preto, 2m#, 1954, MZSP, [-21.185, -47.809]; Barueri, 1f#, 1961, MZSP, [-4.376, -70.030]; Barueri, 1f#, 1966, MZSP, [-4.376, -70.030]; Nova Europa, 1m#, 1964, MZSP, [-21.777 -48.5608]; Piracicaba, 1f#, 1996, [-22.725, -47.648]. COLOMBIA, *Narino*, Tumaco, 2f#, 1m#, 2000, John E. Eger Collection (JEE, Tampa, USA), [1.806 -78.7647]; *Vaupés*, 1f#, 1990, United States National Museum (USNM, WASHINGTON DC, USA); 1f#, 1998, United States National Museum (USNM, WASHINGTON DC, USA); COSTA RICA, *Guapiles*, 1f#, 1915, [10.216 -83.783]; EQUADOR, Limon cocha, 1f#, 1977, UNITED United States National Museum (USNM, WASHINGTON DC, USA); *Los Rios*, 2f#, 1974, FSCA, [-1.816, -79.516];

Napo,1f#, 1m#, 1998, John E. Eger Collection (JEE, Tampa, USA); *Napo*, 1m#, 1977, United States National Museum (USNM, WASHINGTON DC, USA); *Pastaza*, 2m#, 1971, American Museum of Natural History (AMNH, New York, USA); *Pinchincha*, Tinalandia, 1f#, 2000, FSCA; *Quininde*, Certicoces, 1f#, 1982, [0.333, -79.483]; *Shushufindi*, 3f#, 1m#, 1982, [-0.1872, -76.646]; GUATEMALA, 1f#, 1923; MEXICO, *Cancun*, Quintana, 2f#, 1990, [21.160, -86.847]; *Chiapas*, 6f, 197; 1f#, 1990; *Michocan*, Tuxpan, 2f#, 1968, FSCA, [-17.483, -63.65]; Palitla, 1f#, 1970, John E. Eger Collection (JEE, Tampa, USA); *Quintana*, 1m#, 1978, John E. Eger Collection (JEE, Tampa, USA), [19.6, -87.916]; 4f#, 4m#, 1983, John E. Eger Collection (JEE, Tampa, USA), [19.6, -87.916]; 1f#, 1984, John E. Eger Collection (JEE, Tampa, USA), [19.6, -87.916];*Tabasco*, Villa nova, 1m#, 1963, FSCA, [17.990, -92.928]; *Vera Cruz*, Fortin de las flores, 1f#, 1964, FSCA, [1.087, -96.989];. PANAMA, 1f#, 1931; 1f#, 1973; Gamboa, 5f, 1m#, 1980 [9.11666666667, -79.7]; PARAGUAI, *Caazapa*, 1f#, 1990, John E. Eger Collection (JEE, Tampa, USA); 2f#, 1m#, 1993, John E. Eger Collection (JEE, Tampa, USA); Caapiata, 5f, 1m#, John E. Eger Collection (JEE, Tampa, USA); *Concepcion*, 1f#, 2003, John E. Eger Collection (JEE, Tampa, USA), [-22.533, -57.233]; Concepcion, 1f#, 2004, John E. Eger Collection (JEE, Tampa, USA), [-22.533, -57.233]; *Formosa*, 1f#, 1953 [-26.183, -58.175]; *Itapua*, Honehau, 12f#, 11m#, 1983, David A. Ricer Collection (DAR, Fargo, USA), [-27.078, -55.645]; Alto Panama, 3f#, 1986, FSCA, [-25.416, -54.633]; Asuncion, 1m#, 1989, John E. Eger Collection (JEE, Tampa, USA); Jardim Botânico, 4f#, 1990, John E. Eger Collection (JEE, Tampa, USA) [-25.243,-57.588]; *Itapua*, 1f#, 1991, John E. Eger Collection (JEE, Tampa, USA); *San Pedro*, 1f#, 1990, John E. Eger Collection (JEE, Tampa, USA); *San Pedro*, Yaveto, 1f#, 2006, John E. Eger Collection (JEE, Tampa, USA); PERU, Cuzco, 1f#, 1964, [-13.530,-72.009]; *Huanuco*, Tingo Maria, 2f#, 6m, 1987, John E. Eger Collection (JEE, Tampa, USA), [6.934, -76.772]; Tingo Maria, 4f#, 2m#, 1946, American Museum of Natural History (AMNH, New York, USA), [-6.934, -76.772]; Tingo Maria, 1f#, 1954, American Museum of Natural History (AMNH, New York, USA), [-6.934, -76.772]; Tingo Maria, 3f#, 4m#, 1988, J. E. Eger collection, [-9.295, -75.995]; Tingo Maria, 1m#, 1988, J. E. Eger collection, [-9.295, -75.995]; *Jenaro Herrera*, 1m#, 1988, David A. Ricer Collection (DAR, Fargo, USA), [-4.916 -73.666]; *Loreto*, 4f#, 1m#, 1970, American Museum of Natural History (AMNH, , New York USA); 2m#, 1972, American Museum of Natural History (AMNH, New York, USA); Inquitos, 1f#, 1988, [-3.748, -73.253]; 3f#, 4m#, 1989, FSCA; *Satipo*, 1f#, 1940, United

States National Museum (USNM, WASHINGTON DC, USA); *Satipo*, 1m#, 1945, American Museum of Natural History (AMNH, NEW YORK, USA); *San Ramon*, San Ramon, 2f#, 1972, American Museum of Natural History (AMNH, NEW YORK, USA), [-11.124, -75.356]; *Ucayali*, 2f#, 1920, American Museum of Natural History AMNH, NEW YORK, USA); Rio Santiago, 1f#, 1m#, 1924, American Museum of Natural History (AMNH, NEW YORK, USA). VENEZUELA, 1f#, 1932, American Museum of Natural History (AMNH, NEW YORK, USA); Cordero, 1m#, 1982; 1f#, 1985, David A. Ricer Collection (DAR, Fargo, USA), [7.856, -72.182]; Merida, 1f#, 1m#, 1974, American Museum of Natural History (AMNH, NEW YORK, USA). [8.586, -71.158]; Tachira, 1f#, 1980 [7.94, -72.12]; Tachira, 1f#, 1981, Tachira, 1f#, 1982.

Diagnosis: Antennae five-segmented; first and third segmen thicker than others; third segment three times longer than the second. Pygophore: conical projection of ventral rim with cerdae on apex; proctiger oval, tapering towardapex.

Male. Measurements (n=14): head length, 1.76 ± 0.16 (1.55-2.01); width, 2.58 ± 0.14 (2.4-2.8); pronotum length, 2.62 ± 0.21 (2.34-2.94); anterior angle width, 3.16 ± 0.26 (2.84-3.72); humeral width, 6.08 ± 0.38 (5.6-7); scutellum length, 4.1 ± 0.29 (3.7-5) width, 3.83 ± 0.21 (3.55-4.1); length of antennomeres: I, 0.84 ± 0.1 (0.8-0.99); II, 0.6 ±0.07 (0.5-0.7); III, 2 ± 0.17 (1.7-2.29); IV, 1.72 ± 0.17 (1.5-1.88);V, 1.86 ± 0.2 (1.3-2.13); length of rostrum segments: I, 1.25 ± 0.09 (0.98-1.36); II, 1.74 ± 0.15 (1.51-1.98); III, 1.31 ± 0.17 (0.99-1.39); IV, 1.08 ± 0.09 (0.93-1.24); total length, 11.8 ± 0.7 (10-12.5); abdominal width, 7 ± 0.6 (6.4-8.3); pygophore length, 2.44 ± 0.11 (2.25-2.6).

Genitalia: conical projection of ventral rim of pygophore single, not furcate, with apical setae; postero-lateral angles acute, medial projection of posterolateral angles tumescent, attaining dorsally the level of dorsal limit of proctiger in lateral view; lateral projection of dorsal rim thin, spine like and lateral to the posterolateral angle; proctiger higher than wide in posterior view, its free portion longer than wide in ventral view (Fig.3 A-D); head of parameres covered by setae, apical projection long, larget part of head equals largest part of stem (Fig.5 A-C); phallus with 1+1 lateral projections of vesica robust, placed near the limits with phallotheca; ductus seminis distalis twisted in the median region (Fig. 4 A-C).

Female. Measurements (n= 14): head length, 1.70 ± 0.17 (1.40–2.0); width, 2.58 ± 0.14 (2.40–2.80); pronotum length, 2.66 ± 0.19 (2.30–2.90); anterior angles width, 3.35 ± 0.27 (2.90–3.60); humeral width, 6.70 ± 0.40 (6.20–7.40); scutellum length, 4.60 ±0.25 (4.30–4.80); width. 4.24 ± 0.20 (3.90–4.50); length of antennomeres: I, 0.67 ± 0.04 (0.60–0.70); II, 0.57 ± 0.04 (0.50–0.60); III, 1.84 ± 0.18 (1.50–2.10); IV, 1.61 ± 0.09 (1.45–1.80). V, 1.80 ± 0.14 (1.55–2.00); length of rostrum segments: I, 1.22 ± 0.08 (1.00– 1.30); II, 1.70 ± 0.18 (1.60–2.10); III, 1.28 ± 0.05 (1.20–1.33); IV, 1.01 ± 0.07 (0.90–1.10); total length, 12.23 ± 0.70 (11.00–13.10); abdominal width, 7.70 ±0.40 (7.10–8.40).

Genitalia: Gonocoxites VIII longer than wide, not completely covering the basal portion of the laterotergites IX; lateral angles little projected, attaining the level of a line connecting mesial thrichobotria of urosternite VII; disc evenly convex (Fig. 6 A). Gonapophyses IX with large folds covered by conical microsculptures; thickening of vaginal thin and translucent; ring sclerites half the diameter of orificium receptaculi, this almost the same width of vaginal intima (Fig. 7 A).

***Macropygium* sp. nov. 1, Harada & Campos**

(Figs 2E – H, 3E – H, 4D – F, 5D – F, 6B, 7B)

Holotype: MEXICO: *Quintana*, Felipe Carrillo Puerto, 1m#, 1990, FSCA, [19.577 -88.045].

Paratypes: BRASIL: *Santa Catarina*, Nova Teutonia, 2f#, 1975, David A. Ricer Collection (DAR, Fargo, USA), [27.183 -52.383]; Nova Teutonia, 1m#, 1957, American Museum of Natural History (AMNH, NEW YORK, USA), [27.1833 -52.383].

Material examined:

ARGENTINA, *Corrientes*, 1f#, 1991, David A. Ricer Collection (DAR, Fargo, USA); *Chaco*, Charata, 3f#, 1996, John E. Eger Collection (JEE, Tampa, USA), [-27.216, -61.2]. BOLIVIA, *Santa Cruz*, Saavedra, 1m#, 1959, David A. Ricer Collection (DAR, Fargo, USA), [-17. 252, -63. 211]; *Entre rios*, 1m#, 1996, John E. Eger Collection (JEE, Tampa, USA), [-31.75 -60.5]; BOLIVIA, *Santa Cruz*, Buena Vista, 1m#, 1961, David

A. Ricer Collection (DAR, Fargo, USA), [-17.666 -63.733]. BRASIL, *Amazonas*, Manaus, 1m#, 1929, [-3.1 -60.016]; Benjamim Constante, 1m#, 1942, American Museum of Natural History (AMNH, NEW YORK, USA), [-4.376 -70.030]; *Mato Grosso*, Aripuana, 1f#, 1978, [27.183 -52.383]; 1f#, 1976, American Museum of Natural History (AMNH, NEW YORK, USA); *Minas Gerais*, Viçosa, 1m#, 1944, United States National Museum, (USNM, WASHINGTON DC, USA), [-20.753 -42.881]; *Santa Catarina*, Nova Teutonia, 1f#, 1948, American Museum of Natural History AMNH, NEW YORK, USA), [27.183 -52.383]; Nova Teutonia, 2f#, 1963, David A. Ricer Collection (DAR, Fargo, USA); Nova Teutonia, 1f#, 1969, American Museum of Natural History (AMNH, NEW YORK, USA), [27.183 -52.383]; Nova Teutonia, 1f#, 1m#, 1974, David A. Ricer Collection (DAR, Fargo, USA), [27.183 -52.3833]; Nova Teutonia, 13f#, 10m#, 1975, David A. Ricer Collection (DAR, Fargo, USA), [27.183 -52.383]; *Pará*, Almerim, 1f#, 1981, David A. Ricer Collection (DAR, Fargo, USA), [-1.520 -52.581]; *São Paulo*, São Paulo, 1m#, 1944, MCN; São Paulo, 1m#, 1954, MZSP, [-4.376 -70.030]; São Paulo, 1f#, 1961, MZSP; 1m#, 1962, MZSP; 2f#, 1974, David A. Ricer Collection (DAR, Fargo, USA). COLOMBIA, 1f#, 1973, David A. Ricer Collection (DAR, Fargo, USA) [4.205 -69.932]; COSTA RICA, *Guanacaste*, 1m#, 1990, John E. Eger Collection (JEE, Tampa, USA), [10.99 -85.42]; *Heredia*, Chilamate, 1f#, 1995, John E. Eger Collection (JEE, Tampa, USA), [10.45 -84.066] *Puntarena*, Buenos Aires, 2m#, 1988, John E. Eger Collection (JEE, Tampa, USA), [9.169 -83.330]; GUATEMALA, *Suchitepequez*, 2f#, 2005, John E. Eger Collection (JEE, Tampa, USA), [14.516, -90.866]; HONDURAS, 1f#, 1993, FSCA; *Olancho*, 1f#, 1m#, John E. Eger Collection (JEE, Tampa, USA), [15.139 -86.67]; MEXICO, *Chiapas*, Tapilula, 1m#, 1983, David A. Ricer Collection (DAR, Fargo, USA); *Chiriqui*, Boquete, 1m#, 1939; *El Passo*, 1m#, 1970, FSCA; *Gamboa*, 1m#, 1944; *Herrera*, Chepo, 1f#, 1956,[7.733 -80.816]; *Hidalgo*, Jacala, 1f#, 1982, David A. Ricer Collection (DAR, Fargo, USA), [2.100, -99.171]; Minera autlan, 1m#, 1983, David A. Ricer Collection (DAR, Fargo, USA); *San Luis Potosi*, 1f#, 1963, FSCA; 1f#, 1968, FSCA 1f#, 1981, FSCA; Minera autlan, 24f#, 1982, David A. Ricer Collection (DAR, Fargo, USA); *Oaxaca*, 1m#, 1974, David A. Ricer Collection (DAR, Fargo, USA); *Quintana*, 1m#, 1983, David A. Ricer Collection (DAR, Fargo, USA); Felipe Carrillo, 1f#, 1990, FSCA, [19.577 -88.045]; *San Francisco*, 1f#, 1937; *Tres rios*, 1m#, 1931; Gatunlake, 1f#, 1m#, 1931; *Vera Cruz*, Vera Cruz, 3f#, 1963, FSCA; Cordoba, 1m#, 1964; *Yucatan*, 1f#, 1990, David A. Ricer Collection (DAR, Fargo, USA);

PANAMA, *Arraijan*, Cerro galera, 3m#, 1895, David A. Ricer Collection (DAR, Fargo, USA) [89.333, -79.616]; Barro Colorado, 4f#, 1m#, 1962, American Museum of Natural History (AMNH, NEW YORK, USA), [9.15, -79.85]; 1f#, 1963; Canal zone, 2f#, 1m#,1967, David A. Ricer Collection (DAR, Fargo, USA); Margarita, 2f#, 2m#, 1972, David A. Ricer Collection (DAR, Fargo, USA), [9.384 -79.883]; Canal zone, 2f#, 1m#, 1972, David A. Ricer Collection (DAR, Fargo, USA), [9.384 -79.883]; 2m#, 1974, David A. Ricer Collection (DAR, Fargo, USA); Canal zone, 1m#, 1982, John E. Eger Collection (JEE, Tampa, USA); Panama, 1f#, 1984, FSCA; Cerro Gaital, 1f#, 1985, David A. Ricer Collection (DAR, Fargo, USA); 1m#, 1987, David A. Ricer Collection (DAR, Fargo, USA); Cidade do Panama, Parque nacional Soberania Pipeline, 1m#, 1993, David A. Ricer Collection (DAR, Fargo, USA). PARAGUAI, *Itapua*, Hohenau, 1m#, 1983, David A. Ricer Collection (DAR, Fargo, USA), [-27.078 -55.645]. PERU, *Satipo*, 1f#, 1930, American Museum of Natural History (AMNH, NEW YORK, USA); 1m#, 1940, United States National Museum (USNM, WASHINGTON DC, USA); *Tingo Maria*, Yurac, 1f#, 1954, [-13.722 -70.686]; 1f#, 1968, American Museum of Natural History (AMNH, NEW YORK, USA); Estancia naranjal, 1m#, 1965, American Museum of Natural History (AMNH, NEW YORK, USA); Yarina cocha, 1f#, 1m#, 1968, American Museum of Natural History (AMNH, NEW YORK, USA); Chikiaco, 2f#, 1978, David A. Ricer Collection (DAR, Fargo, USA); *Lamas Caynarachi*, 1f#, 1m# 2008. VENEZUELA, *Merida*, Merida, 1m#, 1974, David A. Ricer Collection (DAR, Fargo, USA); *Tachira*, 1m#, 1980; Lara, 1f#, 1981, FSCA; 1m#, FSCA.

Diagnosis: Antennae five-segmented; Pygophore: proctiger wider than long, apex rounded with abundant setae; Female: lateral angles of laterotergites VIII projected well beyond the line connecting mesial thrichobotria of urosternite VII, and covering completely the base of laterotergites IX.

Male. Measurements (n= 15): head length, 1.55 ± 0.14 (1.3–1.7); width, 2.47 ± 0.15 (2.3–2.7); pronotum length, 2.41 ± 0.25 (1.9–2.8); anterior angle width, 3.24 ± 0.24 (2.8–3.7); humeral width, 6.05 ± 0.4 (5.5–6.6); scutellum length, 4.34 ± 0.29 (3.9–5); width, 3.87 ± 0.34 (3.4–4.3); length of antennomeres: I, 0.66 ± 0.06 (0.6–0.8); II, 0.63 ± 0.06 (0.55–0.7); III, 1.8 ± 0.28 (1.4–2.5); IV, 1.6 ± 0.37 (1.3–2.9);V, 1.72± 0.23 (1.3–2); length of rostrum segments: I, 1.16 ±0.06 (1.1–1.3); II, 1.73 ± 0.16 (1.5–2); III, 1.33

± 0.14 (1.1–1.67); IV, 1.04 ± 0.11 (0.9–1.2); total length. 10.99 ± 1.02 (9.6–12–48); abdominal width, 7 ± 0.37 (6.5–7.5); pygophore length, 2.5 ± 0.12 (2.32– 2.69).

Genitalia: conical projection of ventral rim of pygophore single, with apical setae; posterolateral angles slightly rounded at apex, medial projection of posterolateral angles tumescent, much shorter than the level of dorsal limit of proctiger in lateral view; lateral projection of dorsal rim thin, spine like and lateral to the posterolateral angle; proctiger covered by setae, as wide as high in posterior view, its free portion as wide as long in ventral view (Fig.3 E-H); apical projection of parameres short, with tuft of setae, largest part of head smaller than half of largest part of stem (Fig. 5 D-F); phallus with 2+2 lateral projections of vesica; ductus seminis distalis twisted, bifid at secondary gonopore; thin conjunctiva accompanying the full length of ductus seminis distalis (Fig. 4 D-F).

Female. Measurements (n= 15): head length, 1.57 ± 0.13 (1.2–1.61); width, 2.5 ± 0.15 (2.1–2.8); pronotum length, 2.60 ± 0.21 (2.4–3.1); anterior angle width, 3.60 ± 0.22 (3–3.8); humeral width, 6. 30 ± 0.40 (5.6–6.9) ; scutellum length, 4.60 ± 0.22 (4.3–5); width, 4.20 ± 0.32 (3.9–4.9); length of antennomeres: I, 0.66 ± 0.06 (0.58–0.68); II, 0.63 ± 0.06 (0.5–0.7); III, 1.80 ± 0.20 (1.4–2.2);IV, 1.60 ± 0.37 (1.3–2.9);V, 1.70 ± 0.23 (1.3–2); length of rostrum segments: I, 1.16 ± 0.06 (1.08–1.3); II, 1.80 ± 0.37 (1.5 –3); III,1.33 ± 0.14 (1.1–1.67); IV, 1.04 ± 0.11 (0.9–1.3); total length, 12.16 ± 0.46 (11.5–12.9); abdominal width, 7.50 ± 0.28 (6.9–8).

Genitalia: Gonocoxites VIII longer than wide, completely covering the basal portion of the laterotergites IX; lateral angles well projected, surpassing the lateral margin of laterotergites IX and the level of a line connecting mesial thrichobotria of urosternite VII; expansion of lateral angles of gonocoxites VIII tumescent (Fig.6 B). Folds of gonapophyses IX with inconspicuous conical microsculptures; thickening of vaginal intima thin and translucent; ring sclerites half the diameter of orificium receptaculi, this about half the width of vaginal intima (Fig. 7).

***Macropygium* sp. nov. 2, Harada & Campos**

(Figs 2I–L, 3I–L, 4G–I, 5G–I, 6C, 7C)

Holotype: BOLIVIA, *Santa Cruz*, Saavedra, 1m#, 1959, FSCA, [-17. 25277777778, -63. 211466666667].

Paratypes: BOLIVIA, *Santa Cruz*, Saavedra, 1m#, 2f#, 1959, FSCA, [-17. 25277777778, -63. 211466666667].

Material examined:

BOLIVIA, *Santa Cruz*, Saavedra, 25f#, 10m#, 1959, FSCA, [-17. 25277777778, -63. 211466666667]; *Santa Cruz*, 2m#, 1960, FSCA; 1f#, 1973, David A. Ricer Collection (DAR, Fargo, USA), [-17.8 -631666666667]. PARAGUAI, *San Pedro*, 1m#, 1989, John E. Eger Collection (JEE, Tampa, USA).

Diagnosis: Antennae five–segmented; Pygophore: conical projection of ventral rim of pygophore bifurcate at apex; Female : lateral angles of laterotergites VIII little projected, not attaining the urosternite VII.

Male. Measurements (n= 9): head length, 1.65 ± 0.22 (1.4–1.99); width, 2.43 ± 0.07 (2.3–2.51); pronotum length, 2.37 ± 0.15 (2.2–2.44); anterior angle width, 3.05 ± 0.07 (2.99–3.2); humeral width, 6.14 ± 0.18 (5.8–6.33); scutellum length, 4.28 ± 0.24 (4–4.8); width, 3.92 ± 0.16 (3.7–4.2); length of antennomeres: I, 0.71 ± 0.06 (0.6–0.77); II, 0.65 ± 0.06 (0.6–0.74); III, 2.05 ± 0.22 (1.7–2.4); IV, 1.69 ± 0.14 (1.6–2); V, 1.73 ± 0.25 (1.5–2); length of rostrum segments: I, 1.07 ± 0.06 (0.99–1.17); II, 1.56 ± 0.08 (1.45–1.73); III, 1.07 ± 0.09 (0.98– 1.2); IV, 0.98 ± 0.03 (0.9–1.1); total length, 11.19 ± 0.37 (10.7–11.7); abdominal width, 6.79 ± 0.23 (6.4–7); pigophoro length, 2.23 ± 0.09 (2.1–2.4).

Genitalia: conical projection of ventral rim of pygophore bifurcate at apex; posterolateral angles acute, medial projection of posterolateral angles directed dorsoposteriorly, attaining the level of dorsal limit of proctiger in lateral view; lateral projection of dorsal rim thin, spine like, dorsal to the posterolateral angle, and partially covering the medial projection; proctiger as large than wide in posterior view, its free portion as longer than wide in ventral view (Fig. 3 I-L); parameres short, apical projection short and truncate covered by long setae; largest part of head equals half of

largest part of stem (Fig. 5 G-I); vesica without lateral projections; ductus seminis distalis slender, twisted in middle portion (Fig. 4 G-I).

Female. Measurements (n=10): head length, 1.60 ± 0.07 (1.51–1.7); width, 2.43 ± 0.07 (2.3–2.51); pronotum length, 2.53 ± 0.22 (2.2–2.51); anterior angle width, 3.20 ± 0.22 (2.99–3.6); humeral width, 6.70 ± 0.5 (6.1–7.5); scutellum length, 4.47 ± 0.5 (4–5.8); width, 4.20 ± 0.37 (3.7–4.69); length of antennomeres: I, 0.72 ± 0.03 (0.68– 0.79); II, 0.67 ± 0.06 (0.59–0.83); III, 2.00 ± 0.20 (1.8–2.1) IV, 1.70 ± 0.18 (1.5– 1.92);V, 1.64 ± 0.30 (1.2–2.1); length of rostrum segments: I, 1.29 ± 0.27 (0.9–1.8); II, 1.88 ± 0.28 (1.5–2.3); III, 1.12 ± 0.16 (0.99–1.48); IV, 1.01 ± 0.08 (0.9–1.2); total length, 12.7 ± 0.90 (11.3–13.88); abdominal width, 7.50 ± 0.60 (6.55– 8.5).

Genitalia: Gonocoxites VIII longer than wide, lateral angles little projected, not totally covering the basal portion of laterotergites IX, and much shorter than the level of a line connecting mesial thrichobotria of urosternite VII; expansion of lateral angles of gonocoxites VIII tumescent; laterotergites IX with mid-lateral depression (Fig. 6 C). Folds of gonapophyses IX with few villi, conical microsculptures conspicuous; thickening of vaginal thin and translucent; ring sclerites half the diameter of orificium receptaculi, this almost the width of vaginal intima (Fig. 7 C).

***Macropygium* sp. nov. 3, Harada & Campos**

Figs. 2 (M-P), 3 (M-P), 4 (J-L), 5 (J-L), 6 D,7 D.

Holotype: BRASIL, *Mato Grosso*, 1m#, 1981.

Paratypes: ARGENTINA, *Entre rios*, 3f#, 1996, John E. Eger Collection (JEE, Tampa, USA); *Entre rios*, 1m#, 1991; San Javier, La Paz, 1m#, 1928; *Rio Grande do Sul*, Guaíba, 1m#, 1974, [-30.113, -51,325].

Material examined:

ARGENTINA, Buenos Aires, 1f#, 1997, [-34. 599, -58.381]; ARGENTINA, *Entre rios*, 2m#, 1996; Corrientes, Alvear, 1f#, 1991; La paz, San Javier, 2f#, 1928. BRASIL, *Rio Grande do sul*, Guaíba, 7f#, 1m#, 1974, [-30.113, -51,325]; Taim, 2f#, 1982, [-32.538,-52.540]; Taim, 1f#, 1985, [-32.538-52.540].

Diagnosis: Antennae four-segmented, length of segment II equals III and IV combined; lateral projection of dorsal rim broad and apart from the posterolateral angle of pygophore; middle portion of posterior margin of gonocoxites VIII projected over laterotergites IX, lateral angles not projected.

Male. Measurements (n= 3): head length, 1.6 ± 0.26 (1.4 – 1.9); width, 2.31 ± 0.27 (2–2.45); pronotum length, 2.26 ± 0.4 (1.8–2.6); anterior angle width, 2.86 ± 0.3 (2.5–3.1); humeral width, 5.5 ± 0.7 (4.7–6.1); scutellum length, 3.8 ± 0.3 (3.4–4); width, 3.46 ± 0.5 (2.9–3.9); length of antennomeres: I, 0.64 ± 0.08; II, 2.23 ± 0.3; III, 1.32 ± 0.25; IV, 1.85 ± 0.07; length of rostrum segments: I, 0.99± 0.2 (0.55–0.7); II, 1.5 ± 0.4 (1.9–2.5); III, 1.32 ± 0.2 (1.14–1.5); IV, 1.85 ± 0.07 (1.8–1.9); total length, 10.85 ± 0.2 (10.7–11); abdominal width, 6.4 ± 0.6 (5.7–6.9); pygophore length, 2 ± 0.2 (1.72–2.2).

Genitalia: conical projection of ventral rim of pygophore bifurcate at apex; posterolateral angles acute, medial projection of posterolateral angles broadly rounded and tumescent, almost attaining the level of dorsal limit of proctiger in lateral view; lateral projection of dorsal rim large, subtriangular, appart from posterolateral angle, and partially covering the medial projection in lateral view; proctiger higher than wide in posterior view, its free portion longer than wide in ventral view (Fig. 3 M-P); parameres short, apical projection broad with a second apical process (Fig. 5 J-L), largest part of head smaller than half of largest part of stem; vesical without lateral projections, ductus seminis distalis thin, helicoidal in the middle portion (Fig.4 J-L).

Female. Measurements (n= 6): head length, 1.30 ± 0.08 (1.22–1.39); width, 2.18 ± 0.07 (2.05–2.27); pronotum length, 2.37 ± 0.22 (2.04–2.6); anterior angle width, 2.70 ± 0.13 (2.5–2.88); humeral width, 5.69 ± 0.35 (5.16–6.17); scutellum length, 4.01 ± 0.11 (3.84–4.1); width, 3.62 ± 0.20 (3.4–3.9); length of antennomeres : I, 0.83 ± 0.10 (0.7–1); II, 1.74 ± 0.14 (1.55–1.92); III, 1.30 ± 0.07 (1.2–1.42); IV, 0.80 ± 0.09 (0.64–0.89); length of rostrum segments: I,0.95 ± 0.03 (0.95–1); II, 1.48 ± 0.07 (1.36–1.52); III, 0.94 ± 0.09 (0.8–1.05); IV, 0.80 ± 0.09 (0.64–0.89); total length, 10.18 ± 0.13 (10–10.25); abdominal width, 6.14 ± 0.18 (5.82–6.31).

Genitalia: Gonocoxites VIII partially covering the basal portion of laterotergites IX; middle portion of posterior margin of gonocoxites VIII projected over laterotergites IX, lateral angles not projected; laterotergites IX with mild lateral depression (Fig. 6 D). Folds of gonapophyses IX occupying almost half the gonapophyses surface, with few

villi, conical microsculptures barely visible; ring sclerites diameter equals the width of vaginal intima, weakly sclerotized and connected to the thickening of vagina intima, this weakly sclerotized; orificium receptaculi about 2/3 the width of vaginal intima (Fig. 7 D).

Conclusões gerais:

Foi possivel concluir que *Clypona* é provalvelmente um grupo irmão de *Macropygium*, apesar de precisar de mais estudos e dados complementares de *Clypona* e outros gêneros próximos, para uma analise mais completa. *Macropygium* mostrou ter uma diversidade maior do que a conhecida, com a descrição de três espécies novas.

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FIGURES:

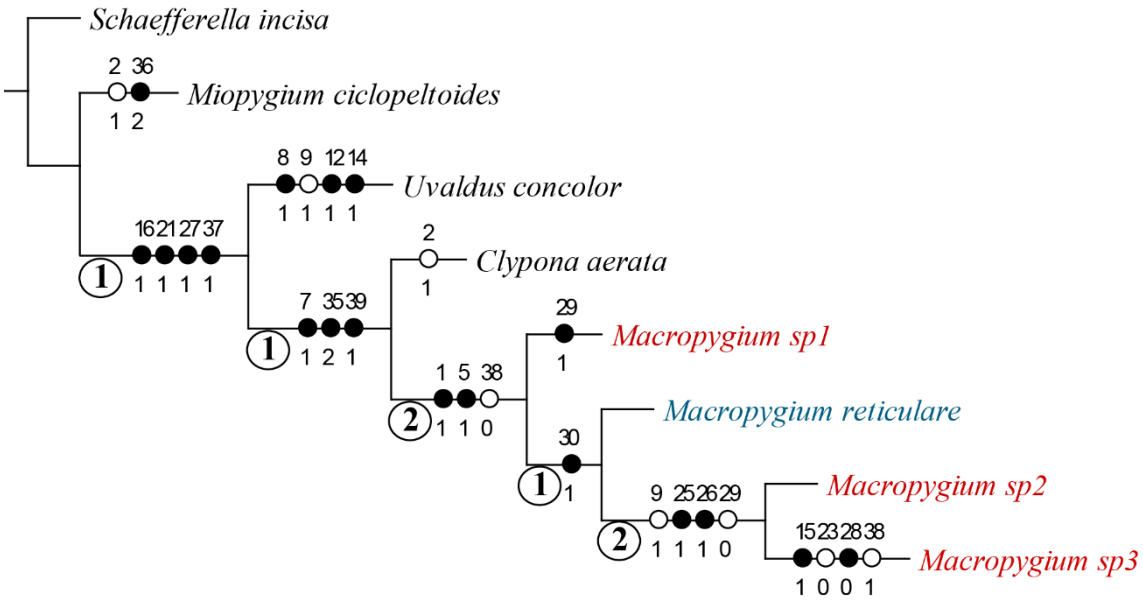

Figure 1: Most parsimonious tree depicting the phylogenetic relationships between *Macropygium* species and related genera. Black circles identify exclusive synapomorphies, white circles identify homoplasious synapomorphies, circles with numbers identify the absolute Bremer suport for suboptimal trees with up to 10 steps.

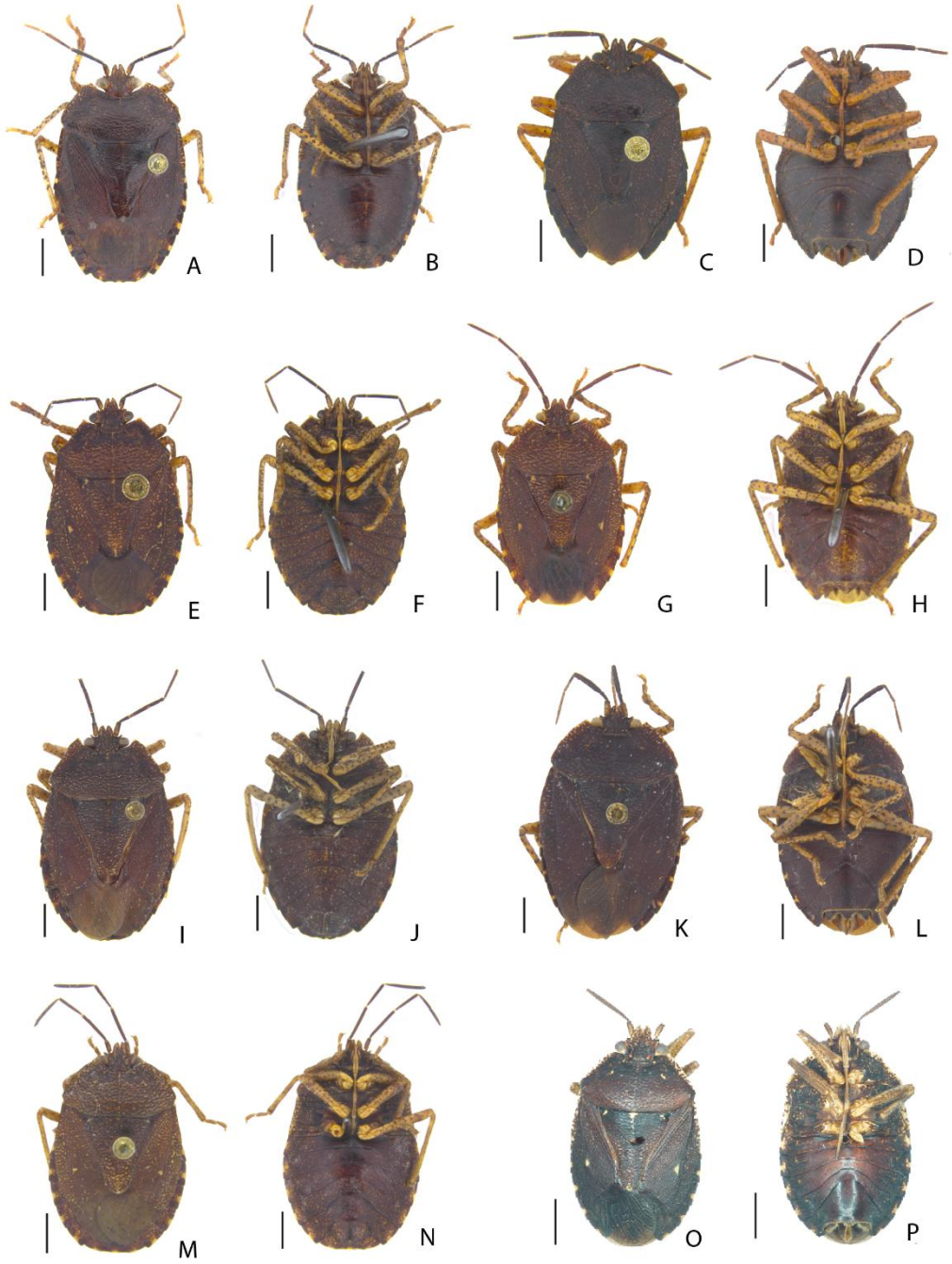

Figure 2: Ventral and dorsal view of *Macropygium* species (female and male). A–D *Macropygium reticulare*; E–H *Macropygium* sp. nov. 1; I–L *Macropygium* sp. nov. 2; M–P *Macropygium* sp. nov. 3. Scale 1 mm.

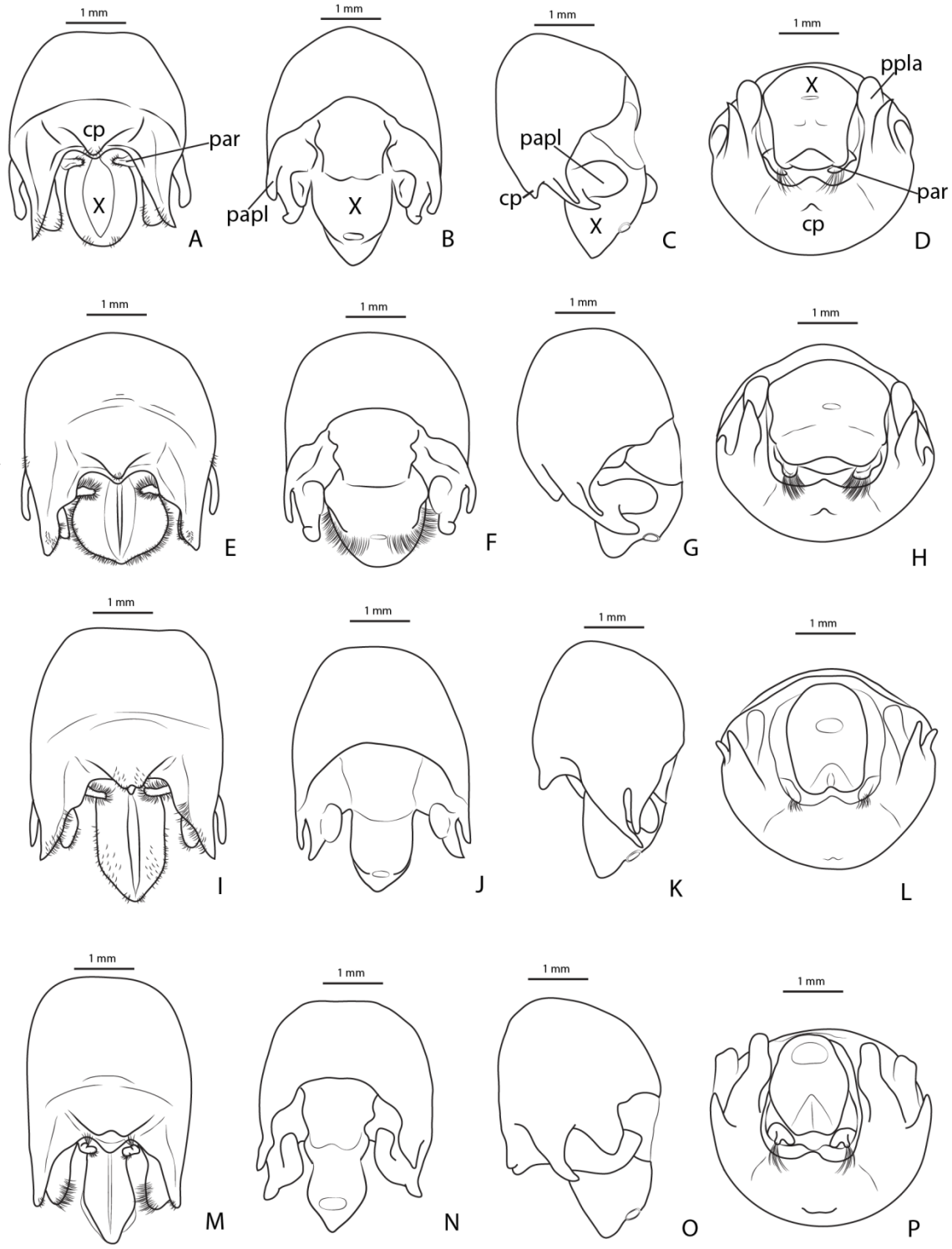

Figure 3: Pygophore of *Macropygium* species, ventral, dorsal, lateral, and posterior view respectively. A–D *Macropygium reticulare*; E–H *Macropygium* sp. nov. 1; I–L *Macropygium* sp. nov. 2; M–P *Macropygium* sp. nov. 3. Abbreviations: X, proctiger (proctiger); cp, conical projection; par, parameres; papl, medial projetion of posterolateral angle.

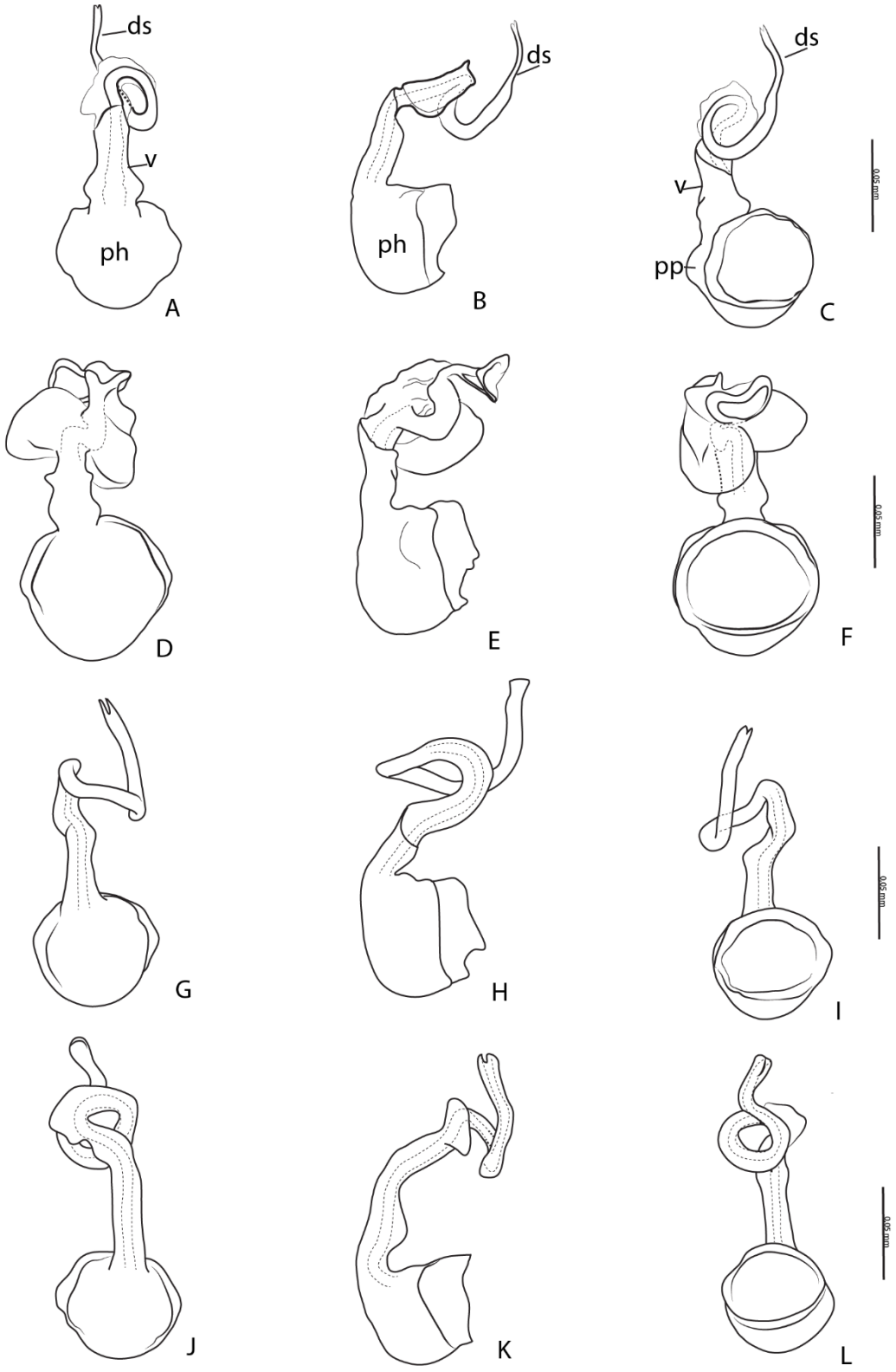

Figure 4: Phallus of *Macropygium* species, dorsal, lateral, and ventral view respectively. A–C *Macropygium reticulare*; E–G *Macropygium* sp. nov. 1; H–J *Macropygium* sp. nov. 2; K–M *Macropygium* sp. nov. 3. Abbreviations: ph, phalloteca; v, vesica; ds, ductus seminis distalis; pp, projection of phalloteca.

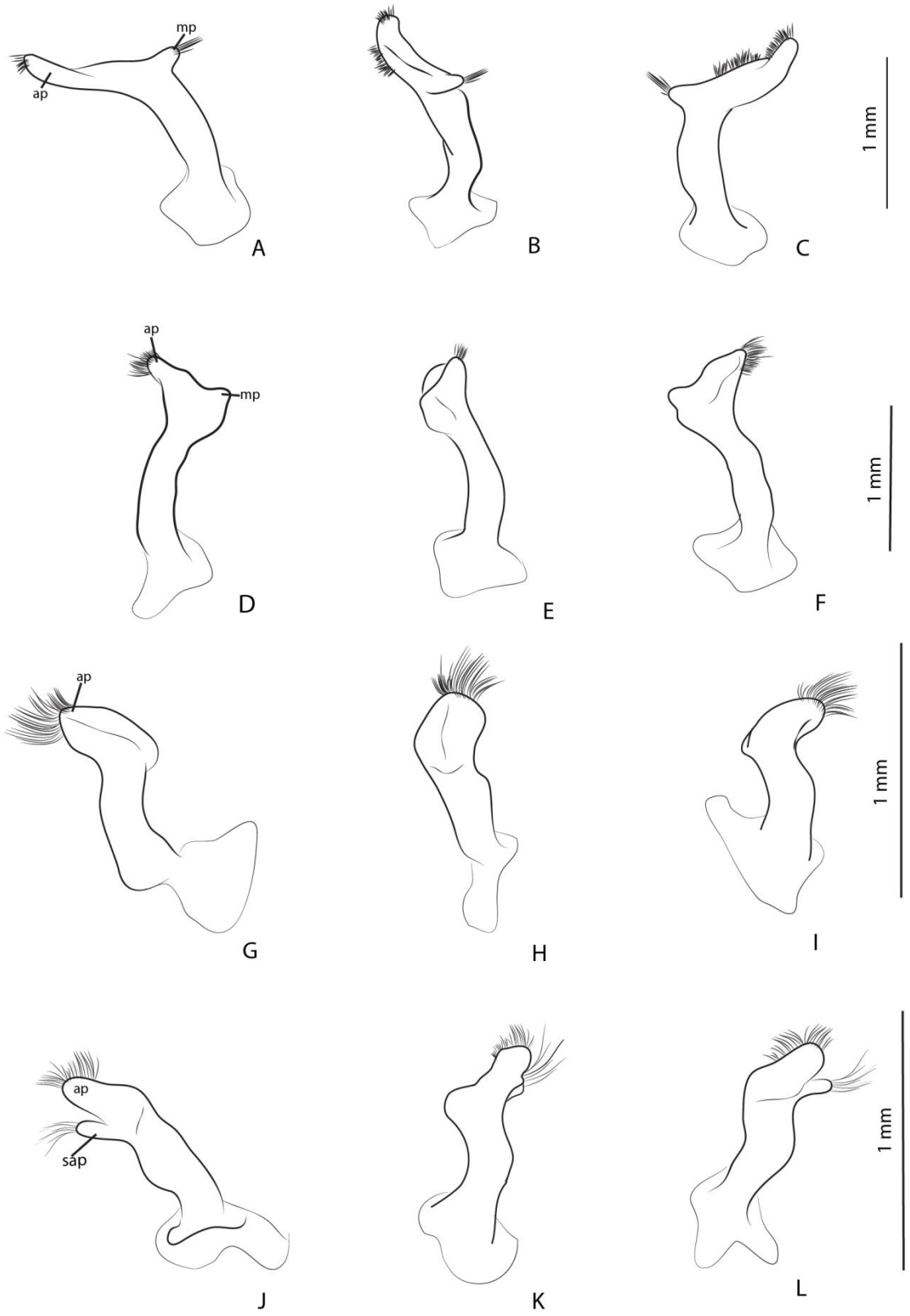

Figure 5: Paramere of *Macropygium* species, ventral, lateral, and dorsal view respectively. A–C *Macropygium reticulare*; D–F *Macropygium* sp. nov. 1; G–I *Macropygium* sp. nov. 2; J–L *Macropygium* sp. nov. 3. Abbreviations: ap, apical projection; mp, medial projection; sap, second apical projection.

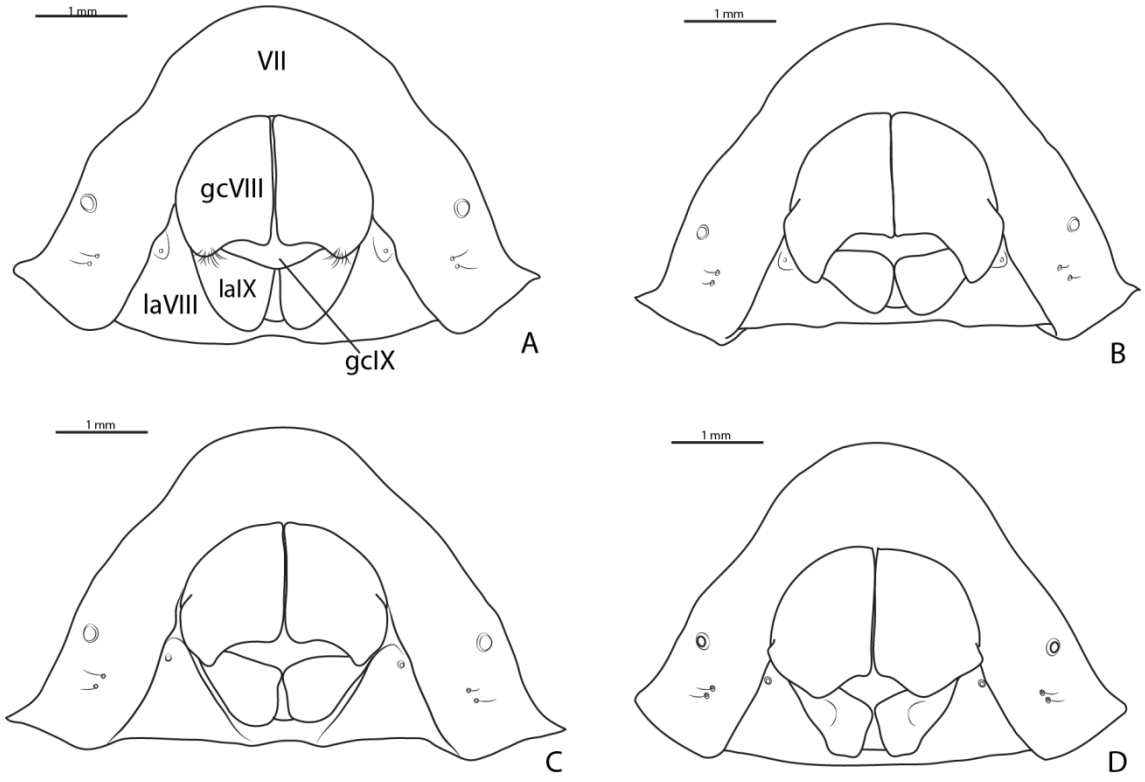

Figure 6: Female external genital plates of *Macropygium* species, ventroposterior view. A *Macropygium reticulare*; B *Macropygium* sp. nov. 1; C *Macropygium* sp. nov. 2; D *Macropygium* sp. nov. 3. Abbreviations: VII, urosternite VII; gcVIII, gonocoxite VIII; laVIII, laterotergite VIII; laIX, laterotergite IX; gcIX, gonocoxite IX.

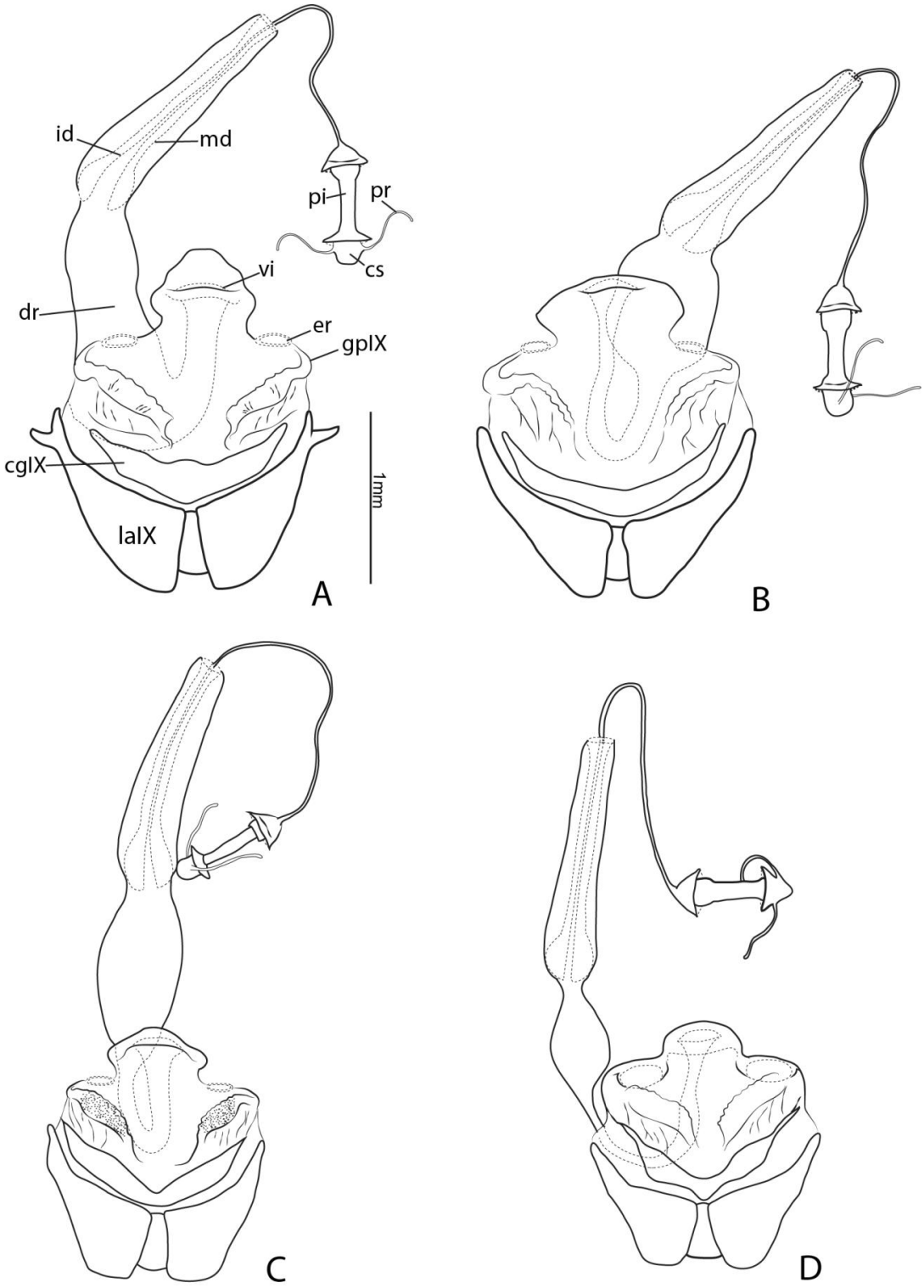

Figure 7: Female internal genitalia of *Macropygium* species, ventral view. A *Macropygium reticulare*; B *Macropygium* sp. nov. 1; C *Macropygium* sp. nov. 2; D *Macropygium* sp. nov. 3. Abbreviations: laIX, laterotergite IX; gcIX, gonocoxite IX; gpIX, gonapophyses IX; er, ring sclerites; dr, ductus recptaculi; vi, vagina intima; id,

internal ductus; md, median ductus; pi, pars intermedialis; pr, processes of capsula seminalis; cs, capsula seminalis.

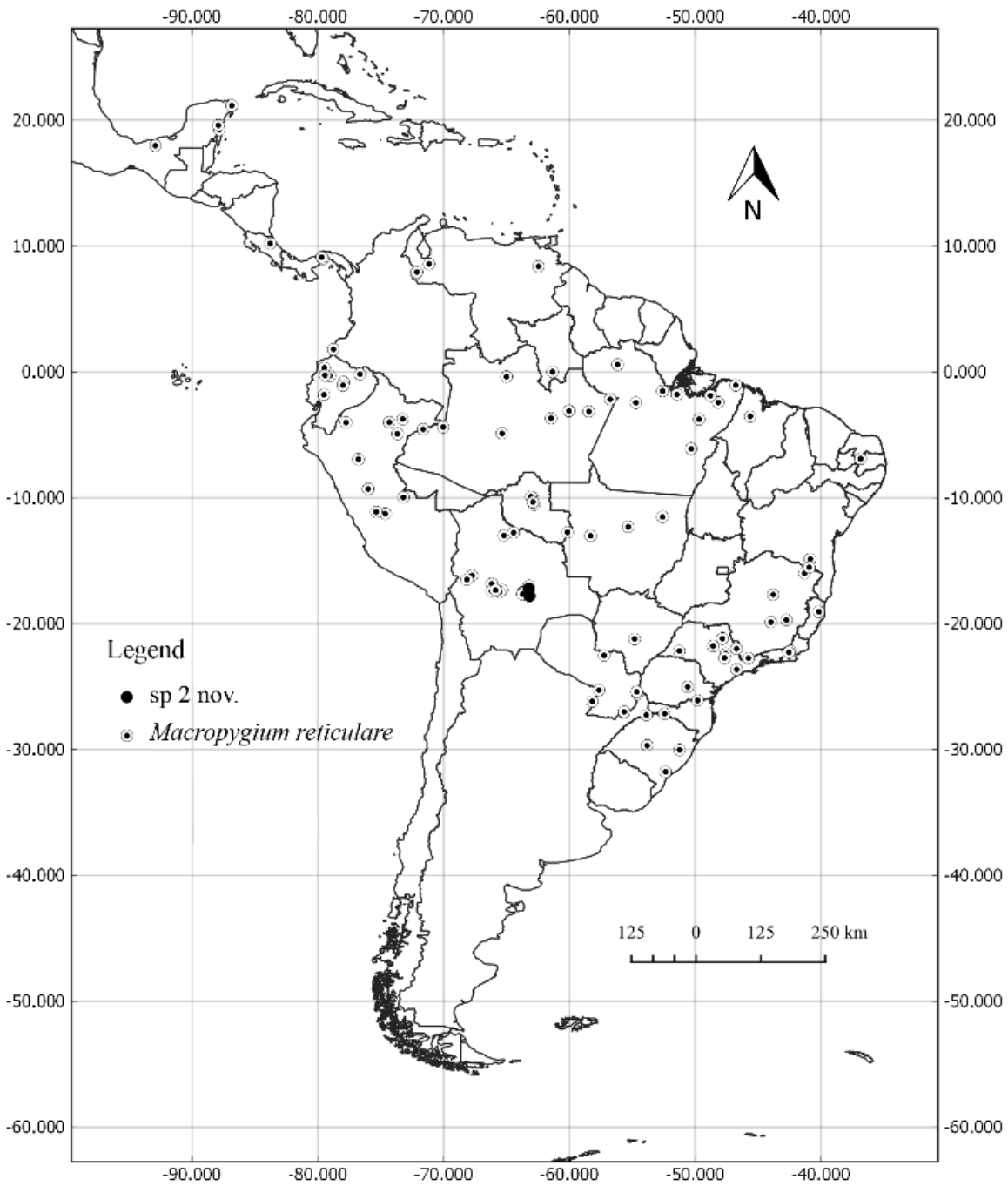

Figure 8: Distribution map of *Macropygium reticulare* and *Macropygium* sp. nov. 2.

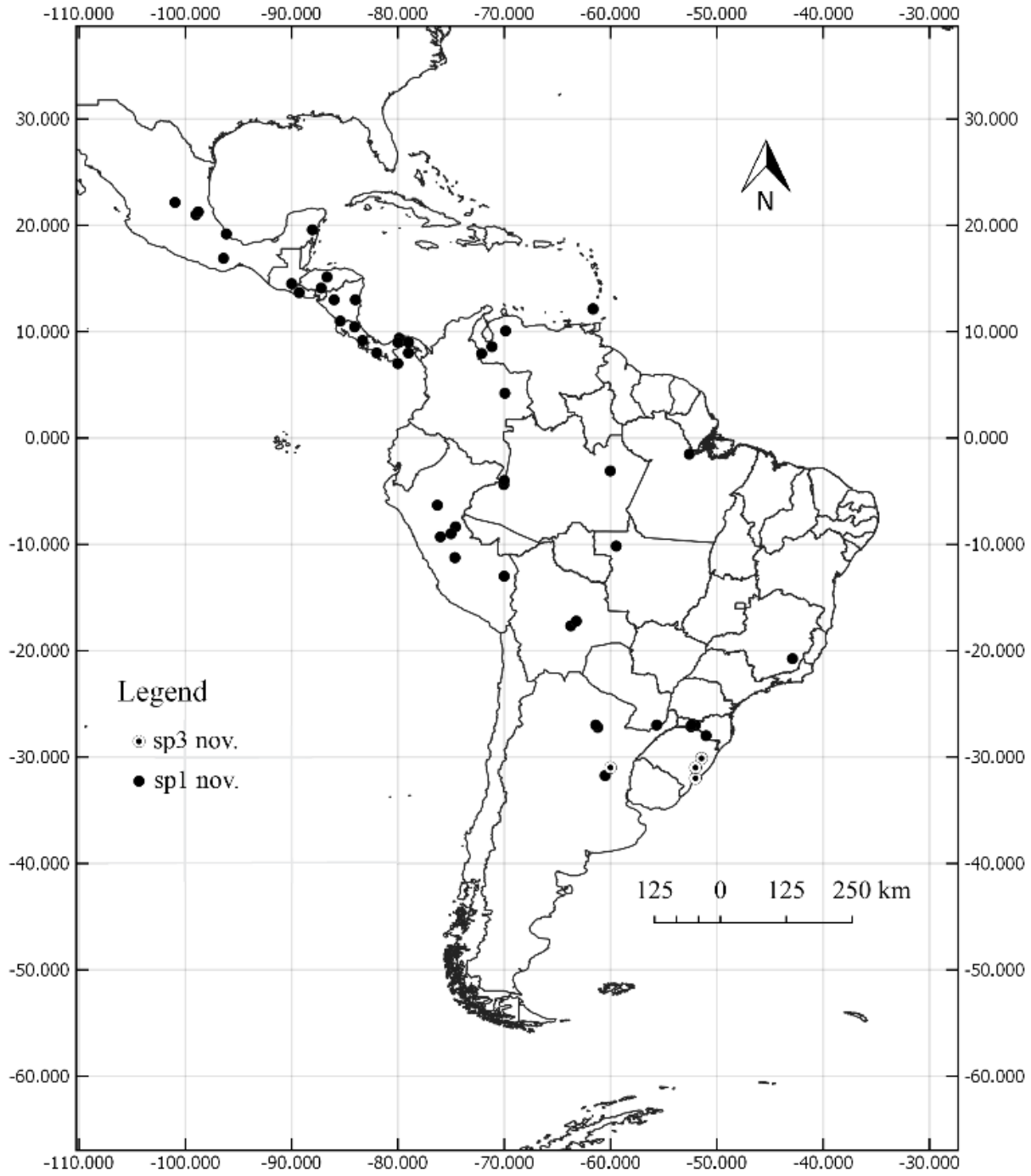

Figure 9: Distribution map of *Macropygium* sp. nov. 1 and *Macropygium* sp. nov. 3

TABLES:

Table 1: List of characters and states for the cladistica analysis of *Macropygium* Spinola.

	Charatere/State	State 0	State 1	State 2
1	Eyes, width (Campos & Grazia, 2006. Char. 9)	less or equal than 1/3 of inteocular distance	equal or more than half of inteocular distance	
2	Vertex, distance between inner limit of eye and external limit of occeli (mod. Campos & Grazia, 2006. Char. 7)	less than ocelli width	equal the ocelli width or more	
3	Labium, first segment, insertion, position (mod. Campos & Grazia, 2006. Char. 12)	before the middle of bucculae	after the middle of bucculae	
4	Labium, second segment, apex, range (Campos & Grazia, 2006. Char. 15)	reaching or surpassing mesocoxae	between pró- and mesocoxae	
5	Bucculare, apex, shape (Roell & Campos, 2015. Char 10)	triangular	obtusely rounded	
6	Region anterior to the eyes, length (Campos & Grazia, 2006. Char. 2)	more than 2'3 of the interocular distance	equal the half of the interocular distance	
7	Mesopleuron, antero-lateral angle, evaporatorium (Barão et al. 2016. Char 15)	absent	present	
8	Metapleuron, evaporatorium, punctuation (Barão et al. 2016. Char 22)	present	absent	
9	Metapleuron, evaporatorium, ostiole, opening orientation (Barão et al 2016. Char 3)	laterally	latero-posteriorly	ventrally
10	Segments IV and V, tubercle of trichobotria, connection line, position (Roell & Campos, 2015. Char 24)	oblique with the margins of abdominal segments	parallel with the margins of abdominal segments	
11	Segments IV and V, trichobotria, distance relative to diameter of respective spiracles (Campos & Grazia, 2006. Char. 33)	at least 2x longer	subequal	
12	Gonocoxites 9, position (Campos & Grazia, 2006. Char. 43)	exposed	covered by gonocoxites 8	
13	Segment X, position (Campos & Grazia, 2006. Char. 46)	hidden by laterotergites 9	exposed	
14	Ring sclerites (Campos & Grazia, 2006. Char. 48)	present	absent	
15	Ring sclerites	closed	opened	
16	Vesicular area, inner duct, caliber (C & G 51)	uniform	narrowing to apex	
17	Pygophore, parameres, head, placement relative to Segment X (Garbelloto et al., 2013. Char 47)	ventral	lateral	
18	Pygophore, segment X, position (Roell & Campos, 2015. Char 44)	facing ventrally	facing posteriorly	
19	Segment X, ventral region, pos anal projection (Campos & Grazia, 2006. Char. 38)	present	absent	
20	Segment X, ventral region, pre anal sclerotization (mod. Campos & Grazia, 2006. Char. 39)	present	absent	
21	Vesica, basal third, articulation (Campos & Grazia, 2006. Char 60)	absent	present	
22	Gonocoxite VIII with lateral projection covering the base of lat ix	absent	present	
23	Gonocoxite VIII with projection in the median portion	present	absent	
24	Ventral rim of the pigophore with projection	present	absent	
25	Projection apex of the ventral rim of pigopore	truncated	bifurcate	pointed
26	Direction of the projection, in the pigophore rim in lateral view	dorsal	ventral	
27	Lateral projections of the pigophore	absent	present	
28	Shape of lateral projection	long, spatulate	narrow, elongated	
29	X segment of pigophore	trapezoidal	rounded	oval
30	Vesica, shape	sinuous	helicoidal	
31	Ventral projection of the postero lateral angle	absent	present	
32	Dorsal projection of the postero lateral angle	present	absent	
33	Head length ahead of the eyes (Campos & Grazia, 2006)	greater than 2/3 of the interocular distance	approximately equal to half of the interocular distance	
34	Anterocular process (Campos & Grazia, 2006)	absents	present	
35	Shape of anterocular process	rounded	triangular	spine like
36	Firts antennal segment (Campos & Grazia, 2006)	width equivalent to 1/3 of the length	width equal to 1/5 of the length	width equal to 1/2 of the length
37	Mandibular plates emarginated	elevated	not elevated	
38	Bucculae length	approximately 1/2 of labium length	2/3 or more of labium length	
39	Evaporatorium area	marked wrinkles	sinuous	

Table 2: Taxon-character matrix for the cladistic analysis of *Macropygium* Spinola.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Schaefferella incisa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0
Clypona aerata	0	1	1	1	0	1	1	0	0	?	?	0	1	0	?	1	?	?	?	?	?	0	0	?	?	?	?	?	?	?	?	?	0	1	2	0	1	1	1
Miopygium ciclopeltoides	0	1	1	0	0	1	0	0	0	1	1	0	0	0	0	0	1	0	0	?	0	0	0	1	-	-	0	-	2	0	0	0	1	1	1	2	0	1	0
Uvaldus concolor	0	0	1	1	0	0	0	1	1	1	0	1	1	1	-	1	1	0	0	1	1	1	1	1	-	-	1	1	2	0	0	0	1	1	1	0	1	1	1
Macropygium reticulare	1	0	1	0	1	1	1	0	0	0	1	0	0	0	0	1	1	0	0	1	1	1	1	0	2	0	1	1	2	1	1	0	0	1	2	0	1	0	1
Macropygium sp*1*	1	0	1	0	1	1	1	0	0	0	1	0	0	0	0	1	1	0	0	1	1	1	1	0	2	0	1	1	1	0	1	0	0	1	2	0	1	0	1
Macropygium sp*2*	1	0	1	0	1	1	1	0	1	0	1	0	0	0	0	1	1	0	0	1	1	1	1	0	1	1	1	1	0	1	1	0	0	1	2	0	1	0	1
Macropygium sp*3*	1	0	1	0	1	1	1	0	1	0	1	0	0	0	1	1	1	0	0	1	1	1	0	0	1	1	1	0	0	1	1	0	0	1	2	0	1	1	1

ANEXO 1

Zootaxa

Information for authors

- **Aim and scope**
    - Research article
    - Correspondence
    - Special issues with collected papers (e.g. Festschrift)
- **Preparation of manuscripts**
- **Submission of manuscripts**
- **Review process**
- **Publication**
    - Page charge and colour plates
    - Open access
    - Reprints

Aim and scope

Zootaxa is a peer-reviewed international journal for rapid publication of high quality papers on any aspect of systematic zoology, with a preference for large taxonomic works such as monographs and revisions. *Zootaxa* considers papers on all animal taxa, both living and fossil, and especially encourages descriptions of new taxa. All types of taxonomic papers are considered, including theories and methods of systematics and phylogeny, taxonomic monographs, revisions and reviews, catalogues/checklists, biographies and bibliographies, identification guides, analysis of characters, phylogenetic relationships and zoogeographical patterns of distribution, descriptions of taxa, and nomenclature. Open access publishing option is strongly encouraged for authors with research grants and other funds. For those without grants/funds, all

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- commentary on or additions/corrections to papers previously published in *Zootaxa*(e.g. Zootaxa 1494: 67-68)

- obituary in memory of deceased systematic zoologists (e.g. Zootaxa 545: 67-68)
- taxonomic/nomenclatural notes of importance
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