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KIM RIBEIRO BARÃO

Morfologia comparada, descrição de novos táxons e filogenia de um gênero de Pentatomidae (Hemiptera: Heteroptera)

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Dra. Andressa Paladini

Dr. Cristiano Feldens Schwertner

Dr. Luiz Alexandre Campos

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RESUMO

Pentatomidae tem sido extensivamente estudada taxonomicamente, com espécies novas e táxons supragenéricos ainda sendo descritos, porém tanto as suas relações filogenéticas quanto a classificação supra-genérica permanecem em discussão. Este trabalho aborda comentários sobre análises filogenéticas realizadas na família, morfologia comparada como subsídio para análises filogenéticas, descrição de espécies novas e análise filogenética de *Dichelops*. Ressaltamos a necessidade da descrição e ilustração claras de caracteres, amostragem ampla de grupos externos, codificação de exemplares ao invés do uso de *groundplan*, da avaliação e consideração de dados faltantes e do emprego claro de métodos filogenéticos, concluindo que análises filogenéticas em Pentatomidae deveriam, preferencialmente, incluir grupos externos mais representativos, a fim de melhor testar as hipóteses de monofilia. Estudando comparativamente a morfologia de algumas estruturas da tíbia das pernas anteriores de Pentatomidae, Scutelleridae e Thyreocoridae, concluimos que a estrutura pré-tarsal em Pentatomidae é pouco variável e que não permite a identificação de grupos taxonômicos, à exceção de Phyllocephalinae que apresenta pulvilos distintos; que algumas características pré-tarsais permitem diferenciar o pré-tarso de Thyrecoridae do pré-tarso das outras duas famílias; que o número de cerdas que compõem o aparato tibial varia consideravelmente dentro de Pentatomidae, possuindo um padrão por subfamílias, e entre subfamílias. Sugerimos que o número de cerdas do aparato tibial e o número de projeções espatulares do pente tibial sejam usadas e exploradas como caracteres contínuos em análises filogenéticas em níves supra-genéricos. Uma nova espécie de *Dichelops* (*Diceraeus*) e o macho de *Dichelops* (*Prodichelops*) *divisus* são descritos. As relações filogenéticas de *Dichelops*, incluindo 44 espécies de grupo externo, foram estudadas por parcimônia utilizando-se dados morfológicos e discretos. *Dichelops* foi sempre recuperado parafilético.

Decisões taxonômicas são tomadas e discussão sobre metodologia cladística e tratamento de caracteres contínuos são fornecidos.

INTRODUÇÃO GERAL

Pentatomoidea reúne aproximadamente 7000 espécies em 15 famílias (*sensu* Grazia et al. 2008: Acanthosomatidae, Canopidae, Cydnidae, Dinidoridae, Lestoniidae, Megarididae, Pentatomidae, Phloeidae, Plataspididae, Saileriolidae, Scutelleridae, Tessaratomidae, Thaumastellidae, Thyreocoridae, Urostylididae), é composta basicamente por insetos fitófagos, representados em todas as regiões biogeográficas. A sua diversidade morfológica é notável, desde espécies com aparência de casca-de-árvore (Phloeidae) até espécies com pernas especializadas para cavar (Cydnidae). Além da sua diversidade morfológica e hábitos, a interação com plantas cultiváveis têm chamado a atenção de biólogos e agrônomos para este grupo.

Estudo morfológicos comparados na superfamília já exploraram a morfologia das coxas (Lis 2010a), tíbias (Lis & Schaefer 2005), pré-tarso (Bonatto 1988; Lis 2010b; Lis & Ziaja 2010), sistema eferente odorífero externo das glândulas metatorácicas (Kment & Vilímová 2010a,b; Parveen et al. 2014) e genitália de machos (McDonald 1966; Davidová-Vilímová & McPherson 1991) e fêmeas (Scudder 1959). A base para a proposição de caracteres filogenéticos tem vindo destes e outros estudos.

Relações dentro de Pentatomoidea foram estudadas por diversos autores, alguns empregando métodos filogenéticos (Gapud 1991; Grazia et al. 2008) e outros propondo classificações por comparações morfológicas (Singh-Pruthi 1925; Leston 1958; China & Miller 1959; Cobben 1968, 1978). Grazia et al. (2008) utilizaram parcimônia para analisar dados moleculares, alinhados por homologia dinâmica, e morfológicos da mais representativa amostra taxonômica do grupo até o momento. Os resultados encontrados por Grazia et al. (2008) concordam com outros (Singh-Pruthi 1925; Leston 1958; China & Miller 1959; Cobben 1968, 1978; Gapud 1991) somente na posição de Urostylididae como grupo irmão dos demais pentatomóideos. Demais relações são reduzidas a duas politomias próximas à base do clado, que incluem 12 das 15 famílias. Neste pente, são reconhecidos um grupo formado por Cydnidae *s.l.* e outro por Scutelleridae + Plataspididae. Esforços amostrais maiores, tanto em grupos taxonômicos chave quanto em caracteres morfológicos e moleculares, são necessários para ajudar a resolver as relações nesse grupo.

Pentatomidae é a família mais diversa de Pentatomoidea, com aproximadamente 870 gêneros e 4.700 espécies. Com exceção de um grupo de espécies predadoras, *i.e.* Asopinae, todas as demais são fitófagas. Pentatomidae tem sido extensivamente estudada taxonomicamente, com espécies novas e táxons supragenéricos ainda sendo descritos (p.ex., Rider 2000; Rider & Brailovsky 2014), porém tanto as suas relações quanto a classificação supra-genérica permanecem em discussão.

A monofilia de Pentatomidae é suportada em uma série de estudos (Gapud 1991; Hasan & Kitching 1993; Grazia et al. 2008) e recentemente novas subfamílias foram incluídas nesta (Rider 2000: Stirotarsinae; Grazia et al. 2008: Aphylinae, Cyrtocorinae). Gapud (1991) foi o único que estudou as relações filogenéticas infra-familiares em Pentatomidae, porém a metodologia e os táxons utilizados não são claros, dificultando a interpretação, repetibilidade e aplicabilidade dos resultados encontrados. Ainda assim, Gapud (1991) encontrou Pentatominae e Podopinae polifiléticas e Asopinae, Aphylinae, Discocephalinae, Edessinae e Phyllocephalinae monofiléticas.

A falta de uma filogenia robusta para Pentatomidae fortemente influencia a sua classicação sistemática. Autores discordam quanto ao número de subfamílias e tribos em Pentatomidae, sendo aceitas até nove subfamílias (*sensu* Grazia et al. 2008: Aphylinae, Asopinae, Cyrtocorinae, Discocephalinae, Edessinae, Pentatominae, Phyllocephalinae, Podopinae, Stirotarsinae). A falta de classificação em Pentatominae é ainda mais confusa, 43 tribos já foram propostas (Rider *in litt.*) com base em similaridade morfológica e poucas foram testadas com métodos filogenéticos claros (Shwertner & Grazia 2012). Hasan & Kitching (1993) foram os únicos a estimar uma filogenia para Pentatominae, mas assim como em Gapud (1991) para Pentatomidae, diversas questões metodológicas impedem uma clara interpretação dos resultados.

Carpocorini, uma das tribos mais diversas de Pentatominae, com cerca de 450 espécies incluídas em 100 gêneros, não possui uma diagnose formal. Historicamente, autores reconhecem grupos de gêneros tratados empiricamente como próximos e que são incluídos na tribo. Foi originalmente descrita por Mulsant & Rey (1866) e reconhecida, com diferentes composições de gêneros e espécies por autores subsequentes (Stål 1876; Distant 1902; Putshkov 1965; Ahmad et al. 1974; Gross 1975). Rider (*in litt*.) agrupou 100 gêneros em Carpocorini, levando em consideração informações de literatura que hipotetizaram a sua relação baseando-se em similaridade morfológica.

O relacionamento entre tribos de Pentatomidae foi estudado por Hasan & Kitching (1993). Neste, Menidini, Carpocorini e Catacanthini formam um grupo relacionado pela presença de mesoesterno sulcado. O agrupamento de Carpocorini e Catacanthini é suportado por duas características: (i) búcula mais longa que o primeiro segmento do lábio e (ii) mesoesterno liso. Entretanto, estas sinapormorfias são evidências fracas da monofilia do grupo. De fato, neste trabalho não foram incluídas subfamílias e tribos exclusivamente neotropicais, cuja inclusão pode alterar as hipóteses de relacionamentos (Pollock et al. 2002).

Outros estudos sobre Carpocorini têm caráter regional, explorando as relações filogenéticas do grupo de espécies presentes, catálogos ou listas regionais (ex., Cassis & Gross 2002; Rider 2006), chaves dicotômicas para gêneros (ex., Ribes & Pagola-Carte 2009), entre outros. Zaidi (1987) propõe uma hipótese filogenética para Carpocorini, entretanto utiliza somente espécies da fauna do “subcontinente Indo-Paquistanês”. Desta forma, Carpocorini ainda carece de estudos que confirmem sua monofilia, que estabeleçam as relações filogenéticas intergenéricas e sua relação com outras tribos.

Dentre a fauna Neotropical de Carpocorini, *Dichelops* é um dos gêneros melhor estudados. Entretanto, ainda carece de atenção. *Dichelops* é composto por 16 espécies incluídas em três subgêneros: *Dichelops* Spinola, 1837 (10), *Diceraeus* Dallas, 1851 (5) e *Prodichelops* Grazia, 1978 (1). Grazia (1978) revisou extensivamente o gênero descrevendo novas espécies e produzindo a primeira proposta de relações entre os subgêneros. Klein et al. (2012) descreveram uma nova espécie e propuseram chave de identificação para as espécies do subgênero *Dichelops*. Segundo Grazia (1978), espécies de *Dichelops* podem ser facilmente identificadas por possuírem as placas mandibulares mais longas que o clípeo. Cada subgênero é suportado por uma série de características de morfologia geral e de genitália interna e externa de ambos os sexos.

Segundo Grazia (1978), *Dichelops* é morfologicamente próximo a *Euschistus* Dallas, 1851, *Berecynthus* Stål, 1862 e *Padaeus* Stål, 1862: entre outras características, todos apresentam mesosterno carenado. Por outro lado, *Dichelops* diferencia-se destes por possuir as placas mandibulares mais longas que o clípeo. Por similaridade em cor, tamanho e aparência geral, Rolston (1974) associa indiretamente *Dichelops* a nove gêneros que compõem o grupo *Euschistus*: *Proxys* Spinola, 1837, *Galedanta* Amyot & Serville, 1843, *Hymenarcys* Amyot & Serville, 1843, *Agroecus* Dallas, 1851, *Tibraca* Stål, 1860, *Menecles* Stål, 1867 e *Sibaria* Stål, 1872, além daqueles listados por Grazia (1978). Além desses gêneros, podem ser incluídos nesta lista gêneros subsequentemente relacionados taxonomicamente a *Euschistus*, como *Acledra* Signoret, 1864, *Caonabo* Rolston, 1974, *Coenus* Dallas, 1851, *Ladeaschistus* Rolston, 1973, *Mcphersonarcys* Thomas, 2012, *Padaeus* Stål, 1862, *Oenopiella* Bergroth, 1891 e *Spinalanx* Rolston & Rider, 1988. De acordo com

Rider (1995), a presença de um par de processos dorsais da phalloteca é característica diagnóstica do grupo *Euschistus*.

Nenhuma das propostas de agrupamento supracitadas, em nível de tribo ou inferior, foi testada filogeneticamente. A resolução das relações em Pentatomidae é necessidade primária na classificação de Pentatomoidea (Schuh & Slater 1995; Grazia et al. 2008). Análises filogenéticas com grupos de gêneros em Carpocorini possibilitarão a verificação do relacionamento entre gêneros historicamente tratados como próximos e a proposição de diagnoses mais precisas para os grupos analisados e classificação da tribo com base nas relações de parentesco.

Estrutura da tese

Esta tese está estruturada em formato de artigos, que compõem quatro capítulos. No Capítulo I escrevemos uma resposta ao trabalho de Memon et al. (2011), que versa sobre uma análise filogenética de Halyini ocorrentes no sub-continente Indo-Paquistanês. Na Carta ao Editor escrita por nós, fizemos um apanhado geral do avanço da sistemática filogenética nos últimos 50 anos e enumeramos boas práticas que deveriam ser seguidas em qualquer análise filogenética. Dentre elas, descrição e ilustração claras de caracteres, amostragem ampla de grupos externos, codificação de exemplares ao invés de plano básico, da avaliação e consideração de dados faltantes e do emprego de métodos filogenéticos.

No Capítulo II, estudamos comparativamente a morfologia de algumas estruturas da tíbia das pernas anteriores de Pentatomidae, tendo sido amostradas 81 espécies (55 gêneros) representantes de sete subfamílias. A titulo de comparação estudamos Scutelleridae e Thyreocoridae, representadas por três e 10 espécies, respectivamente.

No Capítulo III, descrevemos uma nova espécie de *Dichelops* (*Diceraeus*) Dallas, 1851 e o macho de *Dichelops* (*Prodichelops*) *divisus* (Walker, 1867). No Capítulo IV testamos filogeneticamente a monofilia de *Dichelops* e do grupo *Euschistus*, utilizando caracteres morfológicos discretos e contínuos em uma série de análises com pesos iguais e implicados e uma ampla amostragem de grupos externos.

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CAPÍTULO I[1]

Phylogeny of the South Asian Halyini? Comments on Memon et al. (2011) towards a better practice in Pentatomidae phylogenetic analysis

Kim R. Barão, Augusto Ferrari & Jocelia Grazia

[Barão et al. 2012. Ann. Entomol. Soc. Am. 105: 751-752. DOI: 10.1603/AN12091]

Laboratório de Entomologia Sistemática, Departamento de Zoologia, Instituto de Biociências, Universidade Federal do Rio Grande do Sul, Avenida Bento Gonçalves 9500, 91501–970, Porto Alegre, RS, Brasil.

Recently, Memon et al. (2011) published a paper entitled "Phylogeny of the South Asian Halyine stink bugs (Hemiptera: Pentatomidae: Halyini) based on morphological characters" (Ann. Entomol. Soc. Am. 104(6):1149–1169). The main goal of the authors was to estimate the phylogenetic relationships of the Halyini South Asian genera based morphological characters. In our understanding, the authors ignore some basic assumptions of a phylogenetic analysis, including the interpretation of a priori hypothesis of relationship, ingroup and outgroup choice, character and character state definitions, and interpretations of the results. Hereafter, we do not intend to determine the best practices in phylogenetic analysis but to discuss some points of their analysis that are under-developed and cannot be disregarded.

Ingroup and Outgroup sampling – According to Memon et al., Halyini is monophyletic, despite the fact that there is no published phylogeny, and its taxonomy and systematic position need revision. The taxon sampling of Memon et al. is restricted to South

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and Central Asian species; they did not include species from outside the studied area (the tribe is known to include species from North America, Africa, and Australia) or taxa that have been allied to Halyini. Therefore, the absence of outgroups and the restricted ingroup sampling do not allow the authors to investigate their main question or, much less, Halyini monophyly. A group monophyly is tested by the optimal placement of the outgroup terminals outside of the ingroup (Farris 1972). Even without changing ingroup monophyly, outgroup taxa can change their relationships. Furthermore, at least two outgroup terminals are required to test ingroup monophyly. These include one terminal that serves as the root and another that is free to potentially fall inside the ingroup. Memon et al. claim that all analyzed genera belong to Halyini due to basic halyine tribal characters (for such characters see p. 1150), which are used by all the researchers to identify tribe members. In the most comprehensive, although unpublished, phylogeny of Halyini, Wall (2004) described these characters as homoplasious and the tribe as paraphyletic, thereby making it impossible to define the tribe with an exclusive sinapormorphy.

Terminal taxa – Memon et al. adopted the ground plan character coding approach in their analysis. The authors’ data matrix has supraspecific taxa as terminals (p. 1151, for a species list see Appendix), but they do not mention the criteria used to manage intra- and interspecific variations nor how they coded the terminals. The ground plan character coding approach consists of a variety of methods that are frequently not specified by the authors and considered to be intuitive (some methodological explanations can be found in Prendini 2001). The main methodological objection to the use of supraspecific taxa as terminals is the assumption of its monophyly, which is particularly dangerous in very diverse taxa such as the Halyini. The exemplar coding approach seems to be superior in this regard because species as terminal taxa are defined on diagnosability criteria rather than monophyly. Therefore, the exemplar approach is preferable for interpreting character polarity because it uses observable and verifiable data, rather than hypothetical states and character combinations (Prendini 2001).

Characters and character states – The methods of Memon et al. do not adhere to any logical procedure for coding morphological characters. In the same character, is possible to observe information regarding quantitative traits and form as well as the presence or absence of particular characters, such as the character “Shape of Lateral Margins of Pronotum” (p. 1155). Brazeau (2011) analyzed the effects of different coding practices in morphological phylogenetic analysis and suggested that certain practices are undesirable and should be avoided. Particularly, multistate character information may impose congruence artificially by linking more than one character variable to a particular state. Additionally, their character explanations are biased and result in the a priori establishment of the typical character states of a particular taxon, e.g.: “A dentate lateral margin to the pronotum is a halyine character differentiating genera of the tribe from most others (apart from some Australian genera)”. Within a cladistics framework, such a conclusion should be resultant of an analysis and is dependent on the taxa included.

Missing data – Memon et al. justified the exclusion of some taxa from the analysis on the basis that taxa with large proportions of missing characters decrease the accuracy of phylogenetic inference. However, the level of data completeness alone should not guide the exclusion of taxa, and most studies suggest that it is generally possible to accurately place incomplete taxa in phylogenies if enough informative characters are sampled (Wiens & Morrill 2011). In addition, their matrices do not have large amounts of missing data, and the authors did not perform tests to ascertain whether such taxa would decrease the accuracy of phylogenetic inference to justify their exclusion.

Phylogenetic analysis – Although not explicitly stated, the phylogenetic analysis completed by Memon et al. supposedly followed the procedures of successive weighting using the rescaled consistency index with the sole purpose of reducing the number of equally parsimonious trees found. According to Goloboff (1993), some authors still incorrectly advocate weighting as a method only for selecting a tree among the shortest trees under equal weights. In the study by Memon et al., this argument does not apply because the tree determined under successive weighting was none of the equally parsimonious trees found in an analysis with equal weights. Under an equal weights parsimony analysis, the authors found 5825 equally parsimonious trees for the complete matrix (31 terminal genera) and 52 trees for the reduced matrix (22 terminal genera). This occurred because no collapsing rule was applied during the heuristic search, which was not mentioned. If one uses a collapsing rule, such as “collapsing branches if supported ambiguously” (min. length = 0: PAUP rule 1), 419 and 11 equally parsimonious trees would be determined for the same respective data sets (swapping algorithm = TBR, 3000 RAS, saving 150 trees per replication).

Final comments – As challenging as it may be to elect an outgroup taxon for cladistics analysis in Pentatomidae, such difficulty does not justify the exclusion or non-inclusion of any taxa. There are some cues to guide such choices, e.g., Hasan and Kitching (1993) suggest a monophyletic clade comprising Halyini, Megarrhamphini, Tetrodini and Phyllocephalini, and Wall (2005) states that Halyini putative genera do not form a monophyletic assemblage in any of his analyses. Moreover, as a first attempt, one can select outgroup taxa based on shared taxonomic history or by the morphological diversity of analyzed characters.

In the last three decades, cladistic analysis has improved with the development of several new procedures. There are current debates concerning relevant practices adopted in cladistic analysis, such as how to describe and encode characters; whether to weight all characters equally or based on some optimization criteria other than the number of steps (e.g., homoplasy); how to choose outgroup taxa and how many are needed; and which measure of branch support is the more appropriate to evaluate the results. Most of these questions are still dependent on the researcher's methodological background and theoretical beliefs, but we advocate that whatever method is chosen should be explained and justified.

Aiming a better practice of phylogenetic systematics and an improvement on the development and interpretations on the Pentatomidae phylogeny, we suggest the following: (i) the use of broader outgroup samples, allowing more reliable tests of monophyly; (ii) the use of more than one species per genus and its individual entry in the data matrix, avoiding the ground plan approach for character coding; (iii) encoding of the characters clearly and objectively, making clear the procedure coding type; (iv) illustration of the main characters and (v) clearly explaining all the methodological procedures, allowing for analytic repeatability.

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CAPÍTULO II[2]

Comparative morphology of selected characters of the Pentatomidae foreleg (Hemiptera, Heteroptera)

Kim R. Barão[a,b], Augusto Ferrari[a,c] and Jocelia Grazia[a,b]

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[a] Programa de Pós-Graduação em Biologia Animal, Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, Av. Bento Gonçalves 9500, 91501-970, Porto Alegre, Rio Grande do Sul, Brazil

[b] CNPq Fellowship, Brazil

[c] CAPES and FAPERGS Fellowship, Brazil

Abstract

Heteropteran legs are very diverse within and among taxa, and such variation is frequently correlated with life habits. Structural modifications are commonly present in the legs of the Pentatomoidea but are poorly studied. Using scanning electron microscopy, the tibia and pretarsal microstructure of 82 species of Pentatomidae (Heteroptera), three species of Scutelleridae, and ten species of Thyreocoridae were described, focusing on the pretarsal structure, the foretibial apparatus, and the foretibial comb. The Pentatomidae, the Scutelleridae, and the Thyreocoridae have uniform pretarsal structures. Variation can be found in the length of the parempodial setae and in the shape of the parempodial projections. The foretibial combs of the Pentatomidae, the Thyreocoridae, and the Scutelleridae are described for the first time, and we have demonstrated that there is low structural variation in the foretibial comb complex of the studied species. The setae organization and distribution on

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the foretibial apparatus is uniform in the families studied. However, the Asopinae (Pentatomidae) bear a foretibial apparatus that is uniquely organized. The taxonomic and phylogenetic relevance of the pretarsal traits, the foretibial apparatus, and the foretibial comb are discussed.

Keywords

Asopinae; foretibial apparatus; pretarsus; Scutelleridae; Thyreocoridae; tibial comb

1. Introduction

Heteropteran legs and their structures are very diverse within and among taxa, and such variation is frequently correlated with life habits (Lis and Schaefer, 2005). Structural modifications are commonly present on the posterior legs of the Pentatomoidea, whereas the anterior and median legs are less variable. Variations in the coxae (e.g., Lis, 2010a), the tibiae (e.g., Lis and Schaefer, 2005; Grazia et al., 2008), the tarsi (e.g., Grazia et al., 2008), and the pretarsi (e.g., Bonatto, 1988; Lis, 2010b; Lis and Ziaja, 2010) have been described in the Pentatomoidea. However, except for the work of Hasan (1990), and the unpublished thesis of Bonatto (1988), little attention has been given to the Pentatomidae, the most diverse group in the superfamily. Because the Pentatomidae have lower macrostructural variation compared to other groups of the Heteroptera (e.g., Schuh, 1975; Weirauch et al., 2011), the anterior legs have been neglected as taxonomic characters.

Although understudied, the forelegs bear some structures of potential phylogenetic interest, particularly the tibia and pretarsus. The foretibial apparatus, a group of modified setae found on the inner surface of the foretibia, located approximately one-third the distance from the apex, is a unique feature of the Pentatomoidea (Grazia et al., 2008). Previously described by McAtee and Malloch (1928), the foretibial apparatus has been explored in four studies (McDonald and Edwards, 1978; Dolling, 1981; Bonatto, 1988; Grazia et al., 2008), and this is the only information available about its morphology and possible phylogenetic relevance. A grooming comb that is located distally on the foretibia, called a tibial comb, is usually associated with cleaning the head appendages (Schuh and Slater, 1995). Its presence is widespread in the Heteroptera but it varies in the number and rows of setae (Lis and Schaefer, 2005). Within the Pentatomoidea, tibial combs have been described only in *Thaumastella* species (Thaumastellidae; Jacobs, 1989) and in the Cydnidae (Lis and Schaefer, 2005).

By contrast, the pretarsus has been widely investigated (e.g., Dashman, 1953a,b; Goel and Schaefer, 1970; Goel, 1972; Vasarhelyi, 1986; Hasan, 1990, 1995) and has proven to be phylogenetically relevant in the Heteroptera at higher group levels (e.g., Wheeler et al., 1993; Grazia et al., 2008) and in subordinate groups (e.g., Schuh, 1976; Weirauch, 2008). However, its structural variability and phylogenetic significance are not yet well known in the Pentatomoidea. The study with the broadest pretarsal sampling in the Pentatomoidea is the unpublished thesis of Bonatto (1988), which found large structural variation in the claws and pulvilli. Hasan and Nasreen (1994) studied eight pentatomoid families and found structural variations that were of significant taxonomic value, reflecting the systematics of the superfamily. More recently, Lis et al. (2002), Lis (2010b), and Lis and Ziaja (2010) presented new morphological comparisons on the pretarsus of the pentatomoid families Dinidoridae, Parastrachiidae, and Cydnidae.

We aim to explore the morphological diversity of the tibial and the pretarsal structures of the Pentatomidae foreleg and to draw attention to characteristics of possible phylogenetic interest using scanning electron microscopy. We intend to provide a basis for future systematic interpretations of the foreleg traits, which along with a wider set of characters, should be subjected to congruence testing in future phylogenetic analyses of higher level groups in the Pentatomidae.

2. Material and methods

2.1. Taxon sampling

Although the Pentatomidae is a group that has been extensively studied taxonomically, both the phylogeny and systematics remain confusing. The monophyly of the Pentatomidae has been supported by a series of studies (Gapud, 1991; Hasan and Kitching, 1993; Grazia et al., 2008). The sole study concerned with the internal relationships of the Pentatomidae is that of Gapud (1991), but the phylogeny was biased, i.e., the characters were polarized by a priori concepts of ancestral-derived sequences of evolution (see Nixon and Carpenter, 1993), the character optimization was based on characters that were considered a priori to be synapomorphies to structure the phylogenetic tree, and characters were eliminated to avoid homoplasy (see Farris, 1983). Such procedures hamper an unbiased interpretation of character evolution and taxa relationships.

Thus, the lack of a robust phylogeny of the Pentatomidae also influences its systematics. There is disagreement among heteropterists on the subfamilial and tribal groupings within the Pentatomidae (e.g., Schuh and Slater, 1995; Grazia et al., 2008). More confusing is the Pentatominae tribal composition; without phylogenies to settle the tribal arrangements, the tribal classification varies from eight (Schuh and Slater, 1995) to 42 tribes (Rider, 2012).

Such problems make it difficult to reliably sample the Pentatomidae phylogenetic diversity. In an attempt to minimize such problems, we sampled all the Pentatomidae subfamilies, except for the monotypic Stirotarsinae and the diverse Podopinae, and some of the most common and diverse tribes that are recognized by Rider (2012).

A total of 81 species (55 genera) representing seven pentatomid subfamilies and seven tribes of Pentatominae were examined. Additionally, 13 species that were assigned to the Scutelleridae (3) and the Thyreocoridae (10) were examined as outgroup representatives. The Pentatomidae classification follows Grazia et al. (2008) and Rider (2012) for subfamilies and tribes, respectively. The species examined and specimen collection data are listed in Tables S1 and S2, respectively. Both sexes were sampled for each species, but sexual differences were not observed. Images of all the studied species are available as Supplementary Figures S1-S27. The specimens used in this study were borrowed from the following institutions: AMNH, American Museum of Natural History, New York, United States; DARC, David Rider Collection, North Dakota, United States; DZUP, Museu de Entomologia Pe. Jesus Santiago Moure, Universidade Federal do Paraná, Paraná, Brazil; FIOC, Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Brazil; FSCA, Florida State Collection of Arthropods, Florida, United States; HDEC, Dodge Engleman Collection, Canal Zone, Panama; IBSP, Instituto Butantan, São Paulo, Brazil; IFML, Instituto Fundación Miguel Lillo, Tucumán, Argentina; INBio, Instituto Nacional de Biodiversidad, Costa Rica; J. E. Eger, Joe E. Eger Collection, Florida, United States; MACN, Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires, Argentina; MCNZ, Museu de Ciências Naturais da Fundação Zoobotânica do Rio Grande do Sul, Rio Grande do Sul, Brazil; MGAP, Museu Anchieta de Ciências Naturais, Rio Grande do Sul, Brazil; MIZA, Museo Del Instituto de Zoología Agrícola, Venezuela; MNRJ, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil; MZSP, Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil; UFRG, Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, Rio Grande do Sul, Brazil; NMNH, National Museum of Natural History, Washington D.C., United States; SAM, South Australian Museum, Adelaide, Australia.

2.2. Foreleg preparation

The tegumentary ultrastructure was studied using scanning electron microscopy (SEM) at the Centro de Microscopia Eletrônica of UFRGS. The prothoracic legs of pinned specimens were removed, cleaned manually, kept submersed in contact lens solution for 24 hours, and then agitated in a sonicator with water and detergent solution for three minutes. After, the legs were dehydrated by an alcohol series, stove dried at 40ºC for 24 hours, coated with gold and observed by SEM. The number of setae on the tibial comb and on the foretibial apparatus was counted on the SEM photographs. The values for each species are available in Table S3.

The tarsal and pretarsal terminology that we use follows Weirauch (2005). The tibial comb complex and the foretibial apparatus terminology follow Lis and Schaefer (2005) and Grazia et al. (2008), respectively.

3. Results

3.1. General morphology of the pretarsus in the Pentatomidae

Although the pretarsus comprises structures that are distal to the last tarsomere, the structures that are functionally correlated with the pretarsus are also present in the last tarsomere and are described here. The sclerotized structures of the pretarsus comprise paired claws, pulvilli, and parempodial sclerites with paired parempodial setae, a median sclerite, and the unguitractor plate, all of which are connected to one another by membranous areas (Figs. 1B,D).

The last tarsomere opens ventrodistally and has reinforced edges. There are two cylindrical paired setae along its margin. The ventralmost seta (vs, Figs. 1B,D) is directed outwards from the tarsomere margin, whereas the lateral seta (ls, Figs. 1B,D) is directed posteriorly. One asymmetric seta (as, Fig. 1D) is located at the internal ventrolateral angle of the tarsal rim.

The unguitractor plate is uniform among the Pentatomidae; it is ellipsoidal and tripartite (vsup, lsup, Figs. 1B,D, 3). The proximal portion of the unguitractor plate is beset with denticles, and the distal portion is divided into a median ventral row and paired lateral rows of transverse ridges (Figs. 1B,D). Distally, the unguitractor plate is apparently fused to the parempodial sclerites.

The parempodial sclerites are separated from one another by a deep and broad, median area (psc, Figs. 1B-F). Distally, the parempodial sclerites bear the paired parempodial setae, and dorsally, they have paired projections (pp, ps, Figs. 1D-F). The parempodial setae are slender, circular in cross-section, and equipped with a longitudinal ridge along the first third of their lengths (Figs. 1E, 4). A triangular median sclerite (ms, Fig. 1C) is located dorsal to the parempodial sclerites. The claws are flattened, with large bases, and taper from the base to the apex. Large and robust pulvilli are connected ventrally to the claws and divided into basi- and distipulvilli.

3.2. Comparative morphology of the pretarsal structures in the Pentatomidae

Differences in the pretarsal structures that are congruent with any taxonomic rank within the Pentatomidae could not be found. However, the variation that was found is described and discussed below for each particular case.

The tarsomere rim bears two setae in all examined Pentatomidae; the lateral seta is always longer than the ventral seta. The ventral seta varies in length, being a minute projection of one-sixth the length of the lateral seta, such as in *Dichelops melacanthus* (Fig. 3F), or one-third the length of the lateral seta (Fig. 3E). The asymmetric seta is always present in the Pentatomidae at the internal ventrolateral angle of the tarsomere rim and is the same length as the lateral seta (Fig. 3E), or is three times shorter than the lateral seta (Figs. 3D,F,I), which is the most common state.

The ventral surface of the unguitractor plate is one or two times wider than the lateral surfaces in most Pentatomidae. The number of ridges is variable depending on the overall size of the unguitractor plate, but the lateral surfaces have approximately twice the number of ridges as the ventral surface, except in *Lopadusa augur* (Fig. 3C), in which the number of ridges is similar. The ventral surface protrudes distally beyond the lateral surface in most pentatomids, but both can be equal, such as in *Alitocoris parvus* (Fig. 3B) and *Antestia degenera* (Fig. 3D). The ventral and lateral surfaces may bear microtrichia or small denticles, as observed in *Alcaeorrhynchus grandis* (Fig. 3A) and *Rhyncholepta meinanderi* (Fig. 3H), or they may be smooth, such as in *Cuspicona simplex* (Fig. 3E) and *Dichelops melacanthus* (Fig. 3F).

The parempodial sclerites are rather uniform throughout the Pentatomidae. The parempodial projection arises dorsally of the parempodial setae socket (Figs. 1E,F) and can be elongate with a rounded (Fig. 4A) or an acute apex (Fig. 4B), elongate with a median constriction (Fig. 4C), or star-shaped (Fig. 4D), or with a straight and smooth apex (Fig. 4E) or with different developmental degrees of fingerlike projections (Figs. 4F-H). The parempodial setae vary in length and are more commonly half the length of the claws or less commonly, approximately the same size as the claws (Fig. 2) but are diminutive in the single examined representative of the Phyllocephalinae (Fig. 2M).

The claws in most of the Pentatomidae are flattened, with large bases, and they taper from the base to the apex (Fig. 2), but the claws are slender and elongate in *Chloropepla vigens* (Fig. 2J), *Neotibilis* spp. (Fig. 2K), *Rhyncholepta* spp., and *Janeirona stali*, and they have very robust bases and sharply taper toward the apex in *Macrina juvenca* (Fig. 2M). The claw orientation is variable because of the membranous nature of the claw insertion area, but in dried-preserved specimens, the claws are commonly held obliquely to the axis of the tarsus. The claws lack projections and may be smooth (Fig. 2A) or bear reticulations near the base (Fig. 2C) or have a series of longitudinal ridges (Fig. 2G).

The typical pentatomoid pulvillus was the most common within the Pentatomidae, except for the long and narrow pulvillus of the single examined species of Phyllocephalinae (Fig. 2M). Because of its membranous nature, the distipulvilli shape is highly variable and therefore difficult to characterize by SEM.

3.3. Pretarsal structures in the outgroup representatives

The overall morphology of the Scutelleridae (Fig. 2N) and the Thyreocoridae (Fig. 2O) pretarsus is similar to the Pentatomidae pretarsus. The lateral and ventral setae and campaniform sensilla are present at the tarsomere rim, following the proportions that have been described for the Pentatomidae. The lateral and ventral surfaces of the unguitractor plate of the Thyreocoridae are the same width. The parempodial sclerite shape is conical in the Scutelleridae and the Thyreocoridae; the parempodial projections are variable in the Scutelleridae and homogeneous in the Thyreocoridae, elongate with an acute apex on the latter. The parempodial setae of the Scutelleridae follow the same pattern as in the Pentatomidae (Fig. 2N), whereas in the Thyreocoridae, the setae are less than half the length of the claws (Fig. 2O). The claws are flattened with large bases, and taper from the base to the apex in the Scutelleridae. In the Thyreocoridae, the claws are slender, smooth, and bear a longitudinal ventrolateral groove. Pulvilli similar to those found in the Pentatomidae were found in the Scutelleridae and the Thyreocoridae.

3.4. Foretibial comb

The tibial comb of the Pentatomidae and the Scutelleridae show little variation and consist of a single row of stout setae located almost apically on the inner surface of the tibiae (Figs. 1A, 5). The tibial fossula is covered by setae and consists of a broad depression that begins at the tibial comb and narrows and becomes shallower toward the distal sixth of the tibia.

The Thyreocoridae differ from the pentatomids and scutellerids because of a series of components that are associated with the tibial comb called the tibial comb complex (Figs. 5O,P). The tibial comb is bound by two outer setae, which are apically sharpened and longer than the remaining regular setae. Additionally, two apical tibial longitudinally ridged spines border the tibial comb. Apart from these differences, the tibial combs of the Pentatomidae, the Scutelleridae, and the Thyreocoridae differ only in the number of setae (Table 1).

3.5. Foretibial apparatus

The foretibial apparatus, which is always located on the ventral surface of the foreleg, approximately one-third or less from the apex, is characterized by a set of stout setae that are surrounded by a region lacking setae (Figs. 1A, 6). This region may be either delimited by elevations (Fig. 6M) or by depressions (Fig. 6O) in the integument, or have no indication of tegument differentiation (Fig. 6D).

The foretibial apparatus setae are arranged in two longitudinal rows that extend distally, forming a medial groove (Fig. 6). Each seta has a broad base and sinuously narrows toward an acute apex.

The foretibial apparatus of the Pentatomidae, the Scutelleridae and the Thyreocoridae differ only in the number of setae (Table 1), ranging from three to 23. The number of setae does not overlap in the Scutelleridae and the Thyreocoridae (Table 1). In the Pentatomidae, the number of setae on the foretibial apparatus overlaps with the other two families (Table 1).

Within the Pentatomidae, the Asopinae foretibial apparatus has the largest amount of setae and the largest variation in the number of setae (Table 1), whereas the other pentatomid subfamilies are closer to the family average. The Pentatominae subfamily is second after the

Asopinae regarding the number of setae and the variation of the foretibial apparatus setae, and the tribes Catacanthini, Rhynchocorini and Antestiini have the largest amounts of setae (Table 1).

4. Discussion

4.1. The pretarsal morphology

To the extent that one can generalize from the few species that we studied, the Pentatomidae, the Scutelleridae, and the Thyreocoridae are uniform regarding the pretarsal structure, which is consistent with studies of other pentatomoid families (e.g., Lis et al., 2002; Lis, 2010b; Lis and Ziaja, 2010). Indeed, studying the pretarsus in the Pentatomomorpha, including the Aradidae, the Alydidae, the Coreidae, the Largidae, the Lygaeidae, the Pyrrhocoridae, and almost all the families of Pentatomoidea, Bonatto (1988) concluded that the pretarsus is essentially similar in all the groups. However, Bonatto (1988), Hasan and Nasreen (1994), and Hasan (1995) found structural variation in the claws and pulvilli that were of significant taxonomic value and that reflected the so far phylogeny of the Pentatomoidea.

Flattened claws with large bases that taper from the base to the apex are found in all the Pentatomoidea, whereas cylindrical claws that have nearly equal diameters of the base and the apex are found in many pentatomomorphan families (Grazia et al., 2008). As in the Pentatomidae, the Scutelleridae, and the Thyreocoridae, the claws of most pentatomoid families are usually smooth and may bear small reticulations near the base or may have longitudinal grooves. However, the Urostylididae, the Saileriolidae, and the Acanthosomatidae bear articulated bristles on the claws (Bonatto, 1988). The bristles are also found on the claws of some coreoid Coreidae (Bonatto, 1988).

In contrast to the results of Bonatto (1988), Hasan and Nasreen (1994), and Hasan (1990), we found little variation in the structure of the pulvilli of the Pentatomidae, the

Scutelleridae, and the Thyreocoridae. Indeed, the most common pulvilli structure in the Pentatomoidea is divided into a round, lamellate, membranous distipulvillus that is supported by a narrow and stout basipulvillus (Bonatto, 1988; Lis et al., 2002; Grazia et al., 2008). Thus far, pulvilli that differ from the standard are scattered across pentatomoid families. Pulvilli that are long and narrow, usually flattened, and undivided into basi- and distipulvilli are found on some Cydnini and Geotomini (Cydnidae, Cydninae; Lis and Ziaja, 2010), on the Phloeidae (Bonatto, 1988), and on the single species of the Phyllocephalinae (Pentatomidae) that we studied. Very large, robust, and stout pulvilli were documented as a unique feature of the Parastrachiidae (Lis, 2010b), but we consider the structure essentially the same as the pulvilli of Pentatomoidea. The absence of pulvillar structures has been documented only for *Scaptocoris minor* (Cydnidae, Cephalocteinae, Scaptocorini; Grazia et al., 2008; Lis and Ziaja, 2010).

The unguitractor plate, the parempodia, and the parempodial setae are largely similar in the terrestrial heteropterans (Goel, 1972). Our findings on the unguitractor plate of the Pentatomidae, the Thyreocoridae, and the Scutelleridae are concordant with those of Goel (1972): ventral and lateral surfaces of the unguitractor plate are formed by sclerotized scales, which may bear microtrichia. We also found variation in the shape of the parempodial projections and the unguitractor plate, variation in the length of parempodial setae, and variation in the number of scale rows on the unguitractor plate of the Pentatomidae, the Thyreocoridae, and the Scutelleridae. Dashman (1953b) noted variation in the parempodia and suggested that the parempodia could be used to help family identification. Our observations are the first detailed compilation of these structures, and the lack of a phylogeny for the Pentatomidae, the Scutelleridae, or the Thyreocoridae hamper any interpretation of their evolution or their phylogenetic value.

4.2. The foretibial comb

In this study, the foretibial comb of the Pentatomidae, the Thyreocoridae, and the Scutelleridae is described for the first time, and we have demonstrated low structural variation of the foretibial comb complex within the studied tribes, subfamilies, and families.

The Thyreocoridae presented the greatest morphological variation in the elements of the foretibial comb complex. A foretibial comb complex composed of a tibial comb, outer setae, basal spines, and tibial fossula is characteristic of the Cydnidae (Lis and Schaefer, 2005). On the Pentatomidae and the Scutelleridae, the foretibial comb complex is rather uniform and composed of the tibial comb and fossula. Although the tibial comb remains understudied in the Pentatomomorpha, in groups that are supported by several morphological characteristics (e.g., Asopinae, Edessinae), the variation in setae number on the tibial comb is less than in groups of uncertain composition (e.g., Pentatominae).

4.3. The foretibial apparatus

Despite that the morphology of the foretibial apparatus is conserved in the Pentatomoidea, the arrangement and number of setae can be useful in taxonomic and phylogenetic frameworks. Within the Pentatomomorpha, the foretibial apparatus is a unique feature of the Pentatomoidea, absent only in the Megarididae, the Urostylididae, and the Saileriolidae and according to Grazia et al. (2008), its absence in the Megarididae is most likely because of secondary loss. Thus, the foretibial apparatus may be an important diagnostic feature for the Pentatomoidea.

According to Bonatto (1988), the setae organization and distribution on the foretibial apparatus is uniform among the pentatomoid families. His survey on the Acanthosomatidae, the Canopidae, the Dinidoridae, the Pentatomidae, the Phloeidae, the Plataspididae, the Scutelleridae, and the Tessaratomidae species, found that the number of setae varies between four and eight. Grazia et al. (2008) found a different number in the Acanthosomatidae, at least fifteen setae in *Bebaeus punctipes*. Additionally, we found 9-12 setae that comprise the foretibial apparatus of the Scutelleridae, in contrast to the 4-8 of Bonatto (1988). The species that were sampled by Bonatto (1988) and those that were sampled by us are different, so there may be more variation in the number of setae in species that are not yet sampled.

Within the Pentatomidae, five to six setae is the most common condition in the foretibial apparatus found both by Bonatto (1988) and by us. However, the Asopinae is an exception, bearing at least sixteen setae that are distributed in two longitudinally arranged rows. Members of the Asopinae are distinguished from the other pentatomid subfamilies by their essentially predaceous feeding habits (De Clercq, 2000), by possessing a crassate rostrum, and by the presence of genital plates with a thecal shield in the males (Thomas, 1992). The Asopinae have been considered to be a natural group (Gapud, 1991), but only further phylogenetic analysis can establish the group's monophyly and determine whether the foretibial characteristics, including a heavy foretibial apparatus, are synapomorphies.

4.4. Foreleg traits and the Pentatomoidea phylogenetic hypothesis

Of the foreleg traits that we studied, some were coded as characters in previous phylogenetic analyses of the Pentatomomorpha and the Pentatomidae (Gapud, 1991; Hasan and Kitching, 1993; Grazia et al., 2008). Both the foretibial apparatus and the tibial comb were only coded as characters in the phylogenetic analysis of the Pentatomoidea by Grazia et al. (2008).

Foretibial apparatus presence is considered a synapomorphy of the Pentatomoidea, except of Urostylididae and Saileriolidae (Grazia et al., 2008), but no distinction in its organization has been considered. We and Bonatto (1988) found that the foretibial apparatus varies in the number of setae within the pentatomoids. Although incipient, our results are consistent with those of Bonatto (1988), mainly regarding the number of the Asopinae foretibial apparatus setae, as commented in the Discussion section 4.3.

A tibial comb consisting of a complex of different setal types is characteristic of the Cydnidae *s.l.* (Lis and Schaefer, 2005). Although not coded in a phylogenetic analysis, the tibial comb complex may be a diagnostic characteristic of the families Cydnidae, Parastrachiidae, Thaumastellidae, and Thyreocoridae, once according to Grazia et al. (2008), these families are closely related. Thus, these families may share a common evolutionary history of the foretibial comb complex, but it remains necessary to explore this characteristic in the Parastrachiidae and the Thaumastellidae and to code the foretibial comb complex in a phylogenetic analysis.

Despite recent efforts, the foretibial apparatus and tibial comb remain understudied in the Pentatomoidea, thus their phylogenetic signal cannot be evaluated. However, the variation in the setae number of such structures could be coded as a continuous character, as proposed by Goloboff et al. (2006).

By contrast, the pretarsus was used in three studies regarding the Pentatomomorpha, the Pentatomoidea or the Pentatomidae (Gapud, 1991; Hasan and Kitching, 1993; Grazia et al. 2008). Large amounts of morphological variation in the pretarsi appears to be phylogenetically informative in higher group levels (Bonatto, 1988; Gapud, 1991; Hasan and Kitching, 1993; Grazia et al. 2008), e.g., the variation in the number of tarsal segments, the presence or absence of the claw cuticular appendages, and the overall morphology of the pretarsi.

In the light of the current phylogeny of the Pentatomoidea (Grazia et al., 2008), the claws and the pulvilli structure variation found in the superfamily most likely evolved independently in each lineage.Likewise, minor characteristics of the pretarsi that were coded by Hasan and Kitching (1993), such as unguitractor plate sculpturing, are found within the

Pentatomoidea and Pentatomidae (Bonatto, 1988). Hasan and Kitching (1993) used the ground plan approach to code their characters, and they do not list the analyzed species; this, compounded by the fact that the group's systematics have been continuously modified during the last two decades, make it difficult to evaluate the composition of the groups that were analyzed by them. We were able to find variation in the unguitractor plate and in other structures in the species that we studied, but we still cannot evaluate their phylogenetic value.

In summary, the lack of either a phylogenetic analysis of the Pentatomidae, or of the availability of information about the structures that we evaluated in most groups within Pentatomoidea, hamper further interpretations of the evolution of the pretarsal and the tibial structures. Our results show that both the pretarsal and foretibial structures in the Pentatomidae, the Scutelleridae, and the Thyreocoridae are rather uniform and the morphological differences between the taxa are of low taxonomic value. By contrast, the variation in the foretibial apparatus and the foretibial combs may be of interest in phylogenetic analysis for use as continuous characters. Further studies of other pentatomoid families are required to shed light on the taxonomic and phylogenetic value of the understudied structures, particularly on the foretibial apparatus and the foretibial comb complex.

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Table 1. Mean, standard error, and minimum and maximum values of setae in the tibial comb and the foretibial apparatus. [mean ± standard error (range)]

			Number of setae	
Family	Subfamily	Tribe	Tibial comb	Foretibial apparatus
Pentatomidae			30.1 ± 0.56 (16-46)	6.0 ± 0.29 (3-23)
	Aphylinae		20	4
	Asopinae		30.7 ± 1.70 (26-37)	16.5 ± 1.00 (13-23)
	Cyrtocorinae		21.6 ± 3.17 (18-28)	5.3 ± 0.33 (5-6)
	Discocephalinae		27.7 ± 1.86 (24-30)	5.3 ± 0.18 (5-6)
		Discocephalini	24	5
		Ochlerini	32.4 ± 1.44 (29-37)	5.5 ± 0.29 (5-6)
	Edessinae		34.3 ± 0.63 (33-36)	5.1 ± 0.14 (5-6)
	Pentatominae		30.3 ± 0.60 (16-46)	5.0 ± 0.10 (3-10)
		Antestiini	24.5 ± 0.29 (24-25)	5.6 ± 0.57 (5-9)
		Carpocorini	27.5 ± 0.64 (21-33)	4.3 ± 0.09 (3-5)
		Catacanthini	34.6 ± 0.60 (33-36)	8.0 ± 0.62 (5-10)
		Chlorocorini	35.4 ± 1.03 (30-42)	4.7 ± 0.14 (4-6)
		Pentatomini	31.1 ± 1.60 (16-43)	5.0 ± 0.14 (4-7)
		Procleticini	26.0 ± 1.45 (21-30)	4.8 ± 0.20 (4-5)
		Rhynchocorini	32.5 ± 6.5 (26-39)	6.3 ± 0.67 (5-9)
	Phyllocephalinae		36.0 ± 1.00 (35-37)	5
Scutelleridae			27.6 ± 1.20 (26-30)	10.7 ± 0.88 (9-12)
Thyreocoridae			17.0 ± 0.53 (14-21)	4.2 ± 0.11 (4-5)
	Corimelaeninae		17.3 ± 0.56 (14-21)	4.2 ± 0.12 (4-5)
	Thyreocorinae		15.0 ± 1.00 (14-16)	4

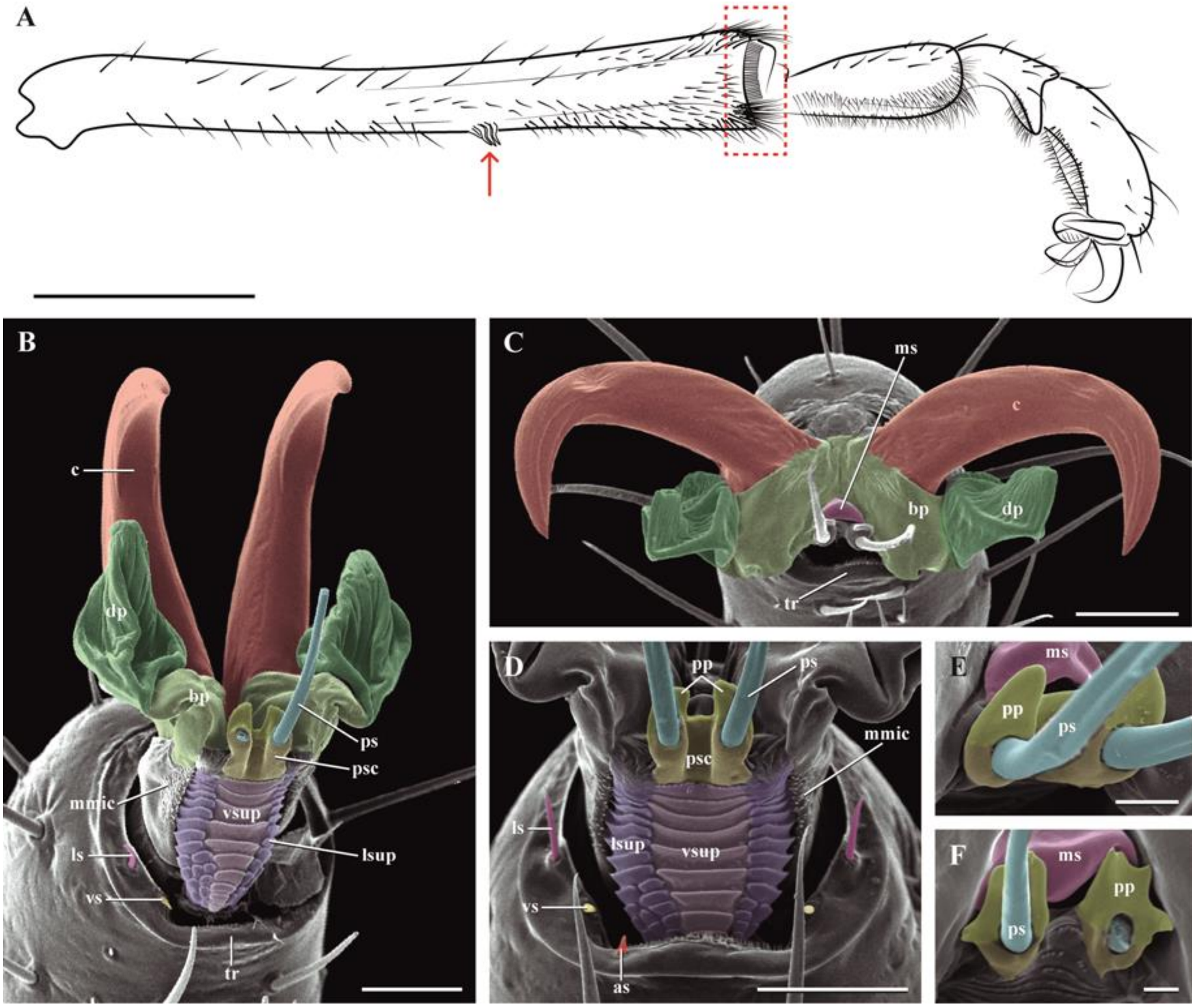

Fig. 1. Foreleg and pretarsus of the Pentatomidae. A, lateral view of the tibial and the tarsal segments of the pentatomid leg, the foretibial apparatus is indicated by a red arrow, whereas the tibial comb, by a dashed red square; B, Ventrodistal view of the foreleg pretarsus (*Dichelops furcatus*); C, distal view of the foreleg pretarsus (*Mormidea v-luteum*); D, structures on the rim of the distal tarsomere, unguitractorial plate and parempodia (*Dichelops furcatus*); E-F, parempodia (*Agroecus griseus* and *Rhyssocephala infuscata*, respectively). as, asymmetric seta; bp, basipulvillus; c, claw; dp, distipulvillus; ls, lateral seta; lsup, lateral surface of unguitractor plate; mmic, membrane with microtrichia; ms, median sclerite; pp, parempodial projection; ps, parempodial seta; psc, parempodial sclerite; tr, rim of distal tarsomere; vs, ventral seta; vsup, ventral surface of unguitractor plate. Scales: B-C, 50 µm; E-F, 10 µm.

Fig. 2. Pretarsus structures in the Pentatomidae, the Scutelleridae and the Thyreocoridae. A-M, Pentatomidae; A, Aphylinae sp.; B, *Oplomus salamandra* (Asopinae); C, *Cyrtocoris trigonus* (Cyrtocorinae); D, *Edessa quadridens* (Edessinae); E-L, Pentatominae; E, *Plautia stali* (Antestini); F, *Cosmopepla decorata* (Carpocorini); G, *Dolycoris baccarum* (Carpocorini); H, *Rhyssocephala infuscata* (Catacanthini); I, *Chlorocoris* (*Chlorocoris*) *complanatus* (Chlorocorini); J, *Chloropepla vigens* (Chlorocorini); K, *Neotibilis compascens* (Pentatomini); L, *Phalaeucus pustulatus* (Pentatomini); N, *Augocoris gomesi* (Scutelleridae); O, *Galgupha* (*Galgupha*) *cruralis* (Thyreocoridae). Scales = 100 µm.

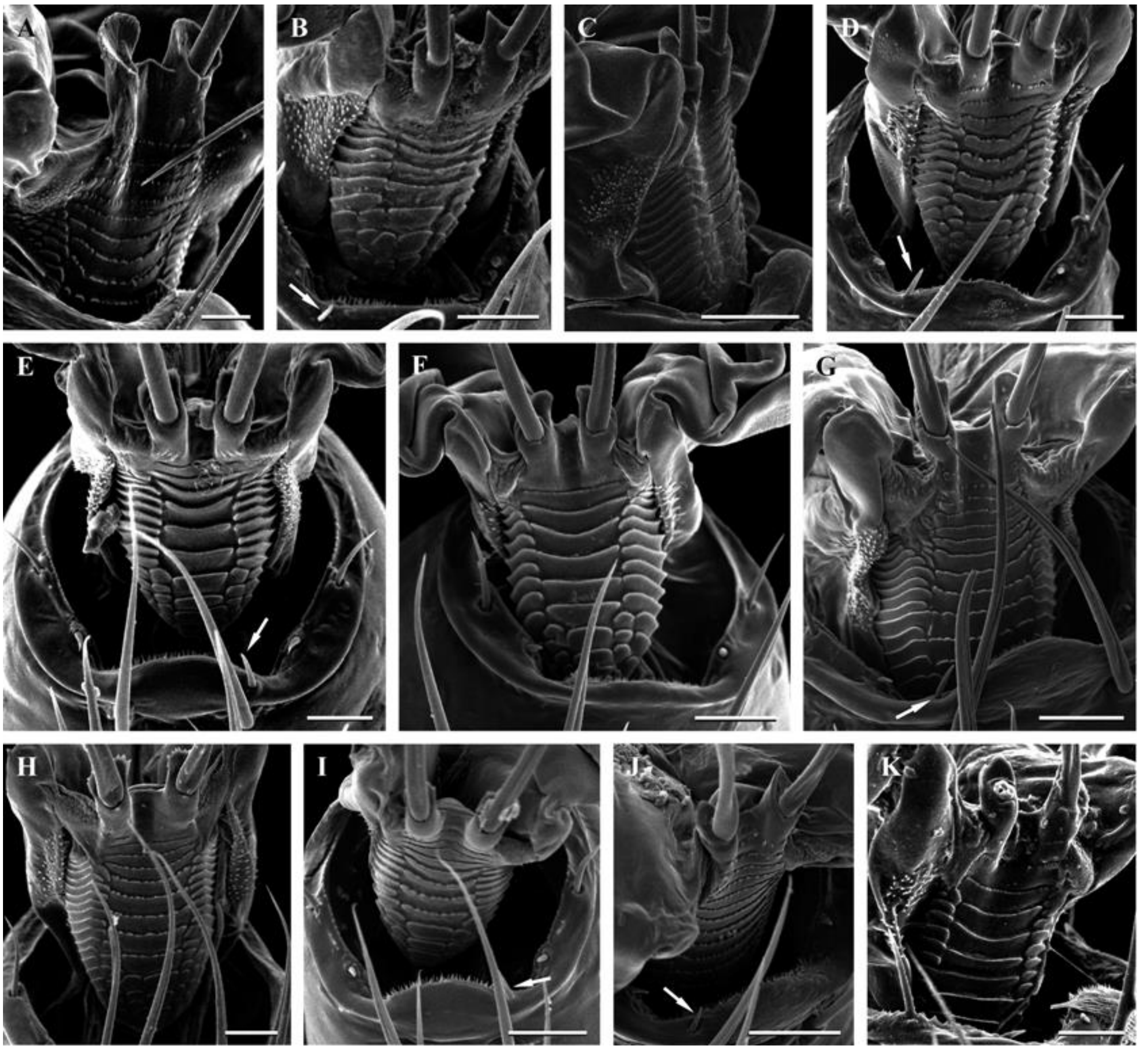

Fig. 3. Unguitractorial plate and related structures in the Pentatomidae. Arrows indicate the asymmetric sensilla. A, *Alcaeorrhynchus grandis* (Asopinae); B, *Alitocoris parvus* (Discocephalinae); C, *Lopadusa augur* (Edessinae); D, *Antestiade genera* (Antestini); E, *Cuspicona simplex* (Rhynchocorini); F, *Dichelops* (*Diceraeus*) *melacanthus* (Carpocorini); G, *Chlorocoris* (*Monochrocerus) subrugosus* (Chlorocorini); H, *Ryncholepta meinanderi* (Chlorocoris); I, *Banasa patagiata* (Pentatomini); J, *Pellaea stictica* (Pentatomini); K, *Lobepomis peltifera* (Procleticini). Scale: 25 µm.

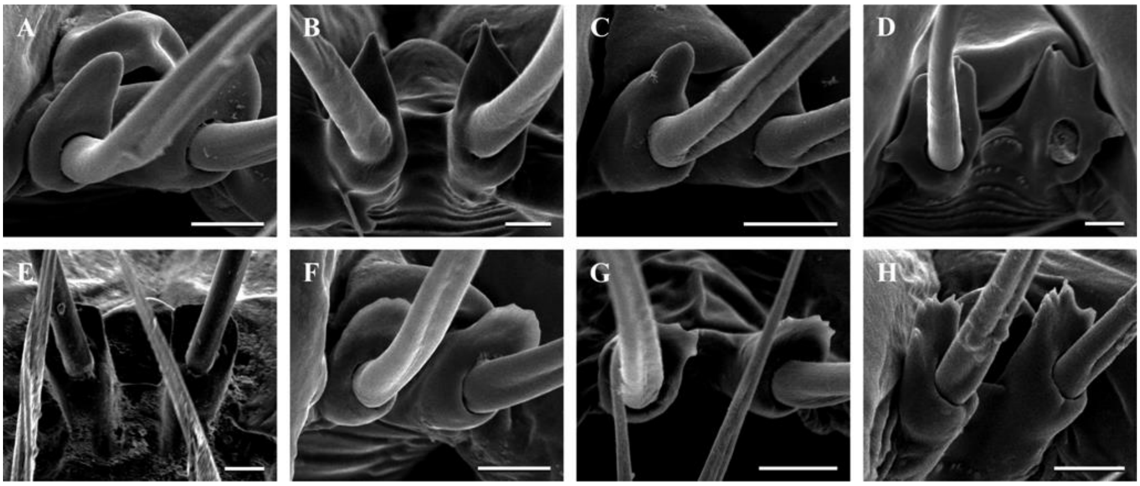

Fig. 4. Variation of the parempodial projections in the Pentatomidae. A, *Agroecus griseus* (Carpocorini); B, *Taurocerus achilles* (Pentatomini); C, *Cosmopepla decorata*(Carpocorini); D, *Rhyssocephala infuscata* (Catacanthini); E, *Oplomus salamandra* (Asopinae); F, *Mormidea v-luteum* (Carpocorini); G, *Banasa zeteki* (Pentatomini); H, *Thoreyella trinotata* (Procleticini). Scales: 10 µm.

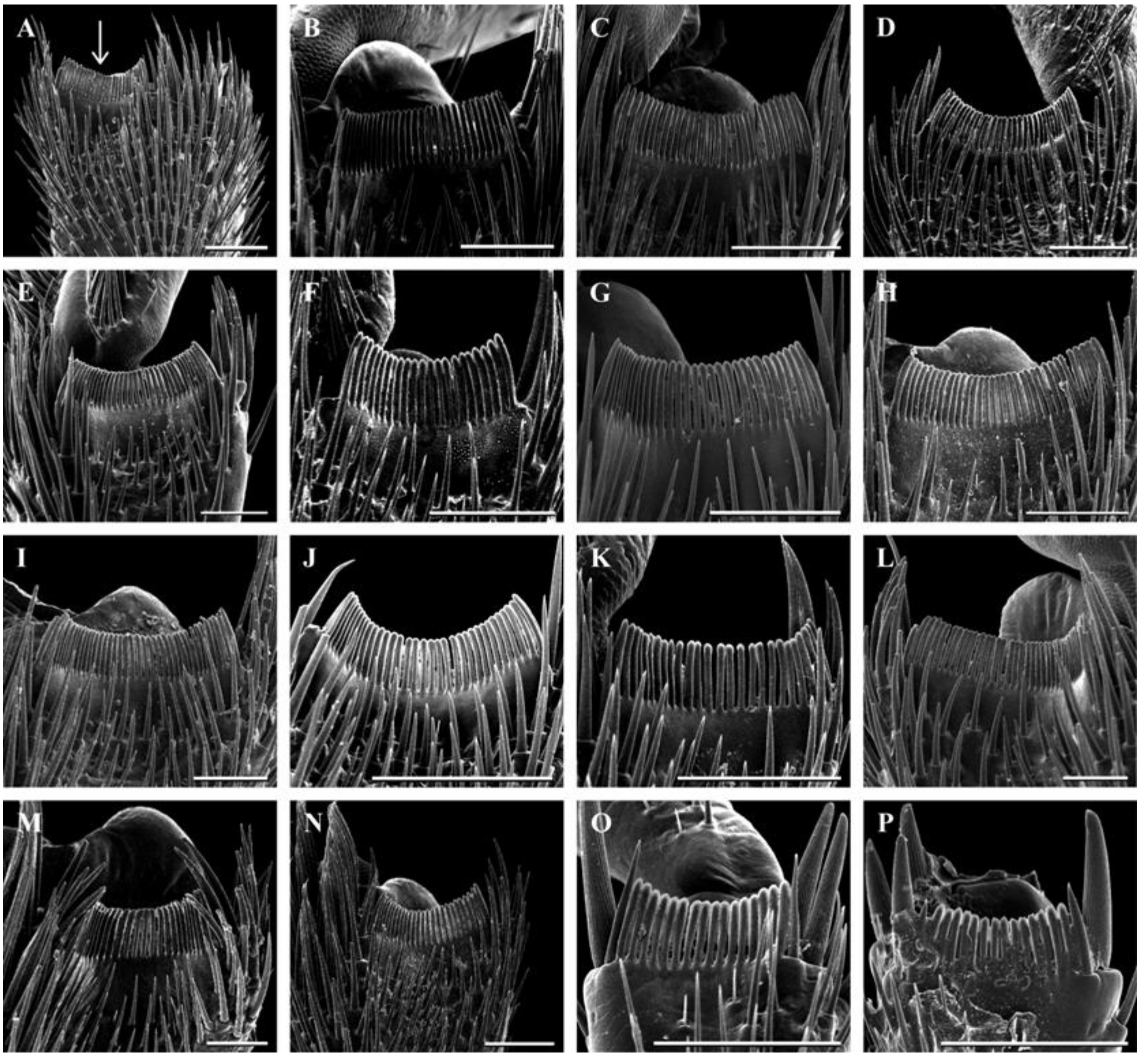

Fig. 5. Tibial combs in the Pentatomidae, the Scutelleridae and the Thyreocoridae. A-L, Pentatomidae; A, *Antestiopsisanchora* (Pentatominae, Antestini), arrows indicate the location of the tibial comb at the apex of tibia; B, *Oplomus salamandra* (Asopinae); C, *Podisus nigrispinus* (Asopinae); D, *Lincus securiger* (Discocephalinae); E, *Edessa quadridens* (Edessinae); F-L, Pentatominae; F, *Plautia stali* (Antestini); G, *Dichelops* (*Dichelops*) *punctatus*(Carpocorini); H, *Arocera placens* (Catacanthini); I, *Chlorocoris* (*Monochrocerus*) *flaviviridis* (Chlorocorini); J, *Neotibilis compascens* (Pentatomini); K, *Thoreyella trinotata* (Procleticini); L, *Biprorulus bibax* (Rhynchocorini); M, *Augocoris gomesi* (Scutelleridae); N, *Orsilochides leucoptera* (Scutelleridae); O, *Galgupha* (*Euryscytus*) *difficilis* (Thyreocoridae); P, *Thyreocoris scarabaeoides* (Thyreocoridae). Scales: 100 µm.

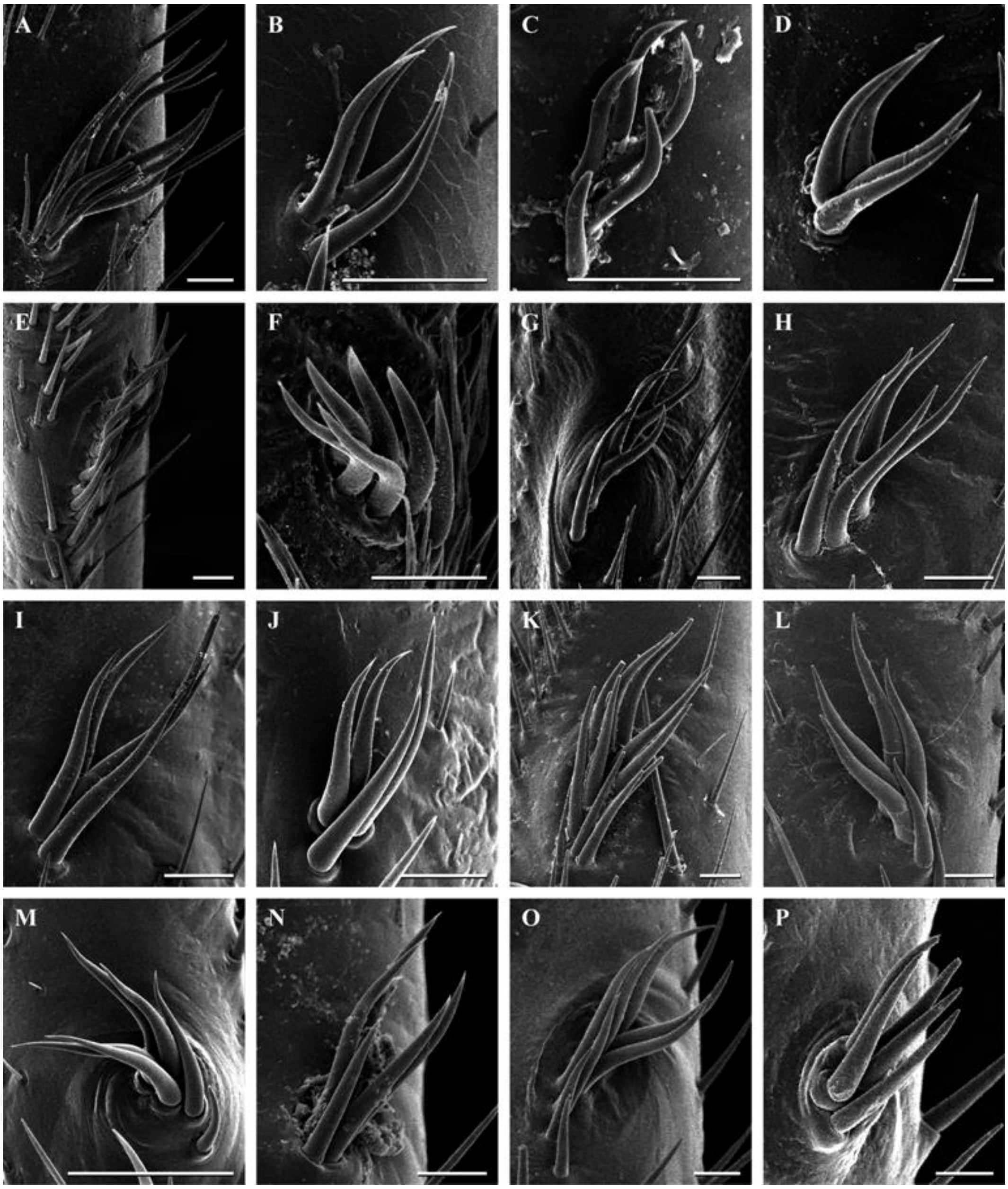

Fig. 6. Foretibial apparatus in the Pentatomidae, the Scutelleridae and the Thyreocoridae. A, *Augocoris gomesi* (Scutelleridae); B, *Galgupha* (*Galgupha*) *cruralis* (Thyreocoridae); C, *Cydnoides* (*Cydnoides*) *renormatus* (Thyreocoridae); D-O, Pentatomidae; D, Aphylinae sp.; E, *Oplomus cruentus* (Asopinae); F, *Cyrtocoris trigonus* (Cyrtocorinae); G, *Lincus securiges* (Discocephalinae); H, *Brachystethus geniculata* (Edessinae); I-O, Pentatominae; I, *Antestia ellenriederi* (Antestini); J, *Dichelops* (*Dichelops*) *melacanthus*(Carpocorini); K, *Arocera apta* (Catacanthini); L, *Loxa deducta* (Chlorocorini); M, *Pentatoma rufipes* (Pentatomini); N, *Thoreyella trinotata* (Procleticini); O, *Biprorulus bibax* (Rhynchocorini); P, *Macrina juvenca* (Phyllocephalinae). Scales: 50 μm.

CAPÍTULO III[3]

Contributions to the knowledge of *Dichelops* Spinola: description of a new species of *Dichelops* (*Diceraeus*) and of the male of *Dichelops* (*Prodichelops*) *divisus* (Heteroptera: Pentatomidae: Pentatominae: Carpocorini)

Priscila Poock-da-Silva[1], Kim R. Barão[1,2] & Jocelia Grazia[1,2]

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[1]*Laboratório de Entomologia Sistemática, Departamento de Zoologia, Instituto de Biociências, Universidade Federal do Rio Grande do Sul, Avenida Bento Gonçalves 9500, 91501–970, Porto Alegre, RS, Brasil. CNPq Fellowship. E-mails: pripoock@terra.com.br; kbarao@yahoo.com.br; jocelia@ufrgs.br*

[2]*Programa de Pós-Graduação em Biologia Animal, Universidade Federal do Rio Grande do Sul.*

Abstract

A new species of *Dichelops* (*Diceraeus*) Dallas and the so-far unknown male of *Dichelops* (*Prodichelops*) *divisus* (Walker, 1867) are described, based upon morphological characters. *D.*(*Dice.*) *caatinguensis* **sp. nov.** is compared to the other four species of *Diceraeus*. Revised keys to separate the subgenera of *Dichelops* and the species of *Diceraeus* are also presented. *D.* (*P.*) *divisus* male is described and compared to the type species. Comparative illustrations of external and internal genitalia of the species are provided.

Key words: genitalia, Hemiptera, Heteroptera, Neotropical, taxonomy.

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[3] Formatado conforme as normas do periódico Zootaxa. Veja Anexo III.

Introduction

The Neotropical genus *Dichelops* Spinola, 1837 was revised by Grazia (1978); it comprises three subgenera, *Dichelops* Spinola, 1837, *Diceraeus* Dallas, 1851 and *Prodichelops* Grazia, 1978. Subgenus *Dichelops* is the most diverse, bearing ten species (Grazia, 1978; Klein et al., 2012). The genus was recently revised by Klein *et al.* (2012): a new species was described, the genitalia terminology was updated, and an adapted key to the subgenus was provided.

The subgenera *Diceraeus* is, so far, represented by four species: *D.* (*Dice.*) *furcatus* (Fabricius, 1775), *D.* (*Dice.*) *lobatus* Grazia, 1978, *D.* (*Dice.*) *melacanthus* (Dallas, 1851) and *D.* (*Dice.*) *phoenix* Grazia, 1978. The study of material collected in northeast Brazil revealed a species, whose morphological characteristics resemble *Diceraeus*, but do not match with any of the species already described. Herein we describe *Dichelops caatinguensis* **sp. nov.** which is included in *Diceraeus* by serrated anterolateral and sinuated posterolateral margins of pronotum, presence of ventral process of conjunctiva, *pars intermedialis* twisted, and *capsula seminalis* lacking processes. Morphological comparisons of male and female genitalia among these species are presented. Additionally, a new key to the species of *Diceraeus*, adapted from Grazia (1978), is provided.

The subgenus *Prodichelops* is monotypic and was described from one female specimen, the holotype of *D.* (*P.*) *divisus* (Walker, 1867). It is characterized by humeral angles developed; anterolateral margins of pronotum crenulated, posterolateral margins sinuated, lacking projections, and capsula seminalis lacking processes. Recently, three specimens (one male and two females) were collected in the Brazilian and Colombian Amazonia. Here we describe the male of *D.* (*P.*) *divisus*, aiming to recognize the subgenus characteristics and to do comparisons with other subgenera. A revised key to separate the subgenera of *Dichelops* is also provided.

Material and methods

The study of *Dichelops* (*Diceareus*) *caatinguensis* **sp. nov.** was based on 40 specimens from the following collections: Fundação Oswaldo Cruz, Rio de Janeiro, Brazil (FIOC); Museu de Entomologia Pe. Jesus Santiago Moure, Universidade Federal do Paraná, Brazil (DZUP); Museu Nacional, Universidade Federal do Rio de Janeiro, Brazil (MNRJ); Museu de Zoologia, Universidade de São Paulo, Brazil (MZSP). The *Dichelops* (*P.*) *divisus* male description was based on the single specimen available, belonging to the Instituto Nacional de Pesquisas da Amazonia, Manaus, Brazil (INPA) collection.

The genital terminology follows Dupuis (1970), Schaefer (1977), Grazia (1978), and Klein *et al*. (2012). The structures of the pygophore named “processos do diafragma” by Grazia (1978) are here treated as “superior process of dorsal rim” (Grazia & Schwertner, 2008; Klein *et al*., 2012). In the female the “vesicula” present on pars intermedialis is considered here a twist of the duct in this structure.

For the study of internal genitalia, specimens were boiled in hot water before dissection and then prepared with a hot saturated potassium hydroxide solution. Measurements (average ± standard deviation, minimum and maximum values) are given in millimeters.

Results

Key to the subgenera of *Dichelops* (modified from Grazia, 1978)

1. Anterolateral margins of pronotum toothed or crenulated; black spiracles; abdominal punctures darker than the abdominal surface; conjuntiva lacking processes; pars intermedialis not twisted; capsula seminalis with or without processes … 2

1’. Anterolateral margins of pronotum serrated; posterolateral margins sinuated or crenulated (Fig. 1); spiracles and abdominal punctures concolorous with abdominal surface; process of conjunctiva present (Fig. 10); pars intermedialis twisted (Fig. 15); capsula seminalis lacking processes (Fig. 15) … *Diceraeus*

2. Anterolateral margins of pronotum toothed; posterolateral margins emarginated, with rhomboid projection between humeral angles and hemelytra base; process of conjunctiva absent; capsula seminalis with processes … *Dichelops*

2’. Anterolateral margins of pronotum crenulated; posterolateral margins sinuated, lacking projections; pygophore not dissected; capsula seminalis lacking processes … *Prodichelops*

***Dichelops* (*Diceraeus*) Dallas, 1851**

Diceraeus Dallas, 1851: 193, 208.

Dichelops (*Neodichelops*) Grazia, 1978: 14, 63-65.

Dichelops (*Diceraeus*) Rider, 1998: 505.

Type species: *Cimex furcatus* Fabricius, 1775 for *Neodichelops* Grazia, 1978 by original designation; *Diceraeus melacanthus* Dallas, 1851 for *Diceraeus* by monotypy.

Diagnosis. Anterolateral margins of pronotum serrated, posterolateral margins sinuated or crenulated; spiracles, and abdominal punctures concolorous with abdominal surface. Apex of scutellum without punctures, bearing a rounded or striped yellowish callus. Male: posterolateral angles of pygophore lacking bristle tufts; superior process of dorsal rim conspicuous, in a tubercle or forming a flap projected towards paramere base; parameres elongated, robust, and flattened; paramere head as long as base; ventral process of conjunctiva present. Female: pars intermedialis twisted; capsula seminalis lacking processes.

Grazia (1978) described the presence of the vesica and the processus vesicae in the phallus of *Diceraeus*. Actually, the processus vesicae formerly described by Grazia (1978) corresponds to the process of the conjunctiva (Fig. 10), and the former vesica corresponds to the processus vesicae (Fig. 12). The processus vesicae is the same structure observed in the subgenus *Dichelops* by Klein *et al*.(2012).

The vesicle of pars intermedialis (Grazia, 1978), present in all species of *Diceraeus*, is here indicated by a twist in this structure. We chose this designation, because the word “vesicle” denotes a secretory function, which cannot be ascertained by now. The extension of the twisted area is variable, occupying two-thirds of the pars intermedialis length in *D. furcatus*, *D. melacanthus*, and *D. phoenix*, and the entire pars intermedialis’s length in *D. lobatus*. In all these species the duct is tightly-twisted; however in *D. caatinguensis* **sp. nov.** the duct is loosely-twisted and occupies the basal half of the pars intermedialis.

Key to the species of subgenus *Diceraeus* (modified from Grazia, 1978)

1. Connexivum lacking spots or with diffuse castaneous spots; scuttelum apex with yellowish stripe … 2

1’. Connexivum with dark spots at anterior and posterior margins; scuttelum apex with yellowish callus … *D. (Dice.) caatinguensis* **sp. nov.**

2. Jugae acute; humeri varying from underdeveloped to forming long spines; pars intermedialis tightly-twisted along two-thirds of its length … 3

2’. Jugae obtuse; humeri with rhomboid projections laterally expanded; pars intermedialis tightly-twisted all its length … *D. (Dice) lobatus* Grazia

3. Gonocoxites 8 inflated, with the apical quarter folded dorsally, forming a conspicuous arch in lateral view; ventral rim of the pygophore straight or moderately sinuated at the middle; superior process of dorsal rim of the pygophore variable … 4

3'. Gonocoxites 8 less inflated, almost flattened; ventral rim of the pygophore medially bisinuated; superior process of dorsal rim in a scalloped flap structure … *D. (Dice.) melacanthus* Dallas

4. Superior process of dorsal rim of the pygophore in an entire flap structure; outer face of paramere with a hook projection; black punctures in the anterior half of the pronotal anterolateral margins, around the pronotal cicatrices and, forming three parallel stripes along the costa, in exochorion, often distinct … *D. (Dice.) phoenix* Grazia

4'. Superior process of dorsal rim of the pygophore in a tubercle placed inside the genital cup; paramere lacking projections; black punctures in the pronotum anterolateral margins and in exochorion, seldom distinct … *D. (Dice.) furcatus* Fabricius

***Dichelops* (*Diceraeus*) *caatinguensis* Grazia & Poock-da-Silva sp. nov.**

(Figs. 1, 3-15)

Etymology. The name is related to its geographic distribution (Caatinga biome, northeast Brazil, Rio Grande do Norte, Paraíba, Pernambuco, and Bahia states)

Type material. Holotype ♂, labeled: BRAZIL, Paraíba, Soledade, Juazeirinho, 08.VII.1956, A.G.A. Silva col., Coleção Campos SEABRA (MNRJ). Paratypes: 1♂, 1♀, BRAZIL, Rio Grande do Norte, Baixa Verde, VII.1950, B.J. Souza col., Coleção Campos SEABRA (UFRG); 1♀, Paraíba, Soledade, Juazeirinho, 22.III.1956, A.G.A. Silva col., Coleção Campos SEABRA (MNRJ); 1♂, Paraíba, Soledade, Juazeirinho, 08.VII.1956, A.G.A. Silva col., Coleção Campos SEABRA (MNRJ); 1♂, 10♀, Pernambuco, Casa Nova, V.1974, J.C.M. Carvalho col., Caatinga, (1♂, 2♀ UFRG, 8♀ MNRJ); 6♀, Pernambuco, Petrolina, V. 1974, J.C.M. Carvalho col., Caatinga (2♀ MCNZ, 4♀ MNRJ); 1♀, Pernambuco, Petrolina, V.1969, M. Alvarenga col. (MNRJ); 1♀, Pernambuco, Petrolina, Estrada Picos, V.1974, J.C.M. Carvalho col., caatinga (MNRJ); 1♀, divisa entre Pernambuco e sul do Piauí, Estrada Picos Km3, V.1974, J.C.M. Carvalho col., caatinga (MNRJ); 1♂, Bahia, Anajê, 16.V.1975, C. & P. Elias col. (MCNZ); 1♂, 1♀, Bahia, Brumado, 9.V.1975, C. & P. Elias col. (DZUP 212768, 212766); 1♂, 4♀, Bahia, Juazeiro, V.1974, J.C.M. Carvalho col., Caatinga (♀ MNRJ); 1♀, Bahia, Juremal, Estrada do Juazeiro, V.1974, J.C.M. Carvalho col., Caatinga (MNRJ); 1♀, Bahia, G. Bondar col.; 1♂, 2♀, nordeste, 1933, Ihering col. (1♂ UFRG; 2♀ FIOC); 2♀ (MZSP 72407, 72408).

Description. Ovoid, medium-sized (8-10mm) species. Dorsal color castaneous (Fig. 1), lighter castaneous ventrally.

Head slightly longer than wide (Fig. 1). Dorsal surface with coarse punctures regularly distributed, except in a circular area adjacent to eyes; ventral surface with sparsely distributed punctures. Juga clearly surpassing clypeus, length before clypeus equals one-third of first antennal segment; lateral margins straight, often convergent, and outlined by black, apex obtuse. Proportion of antennal segments: I<II<III<IV>V. Rostrum slightly surpassing metacoxae. First rostral segment entirely contained between buccula. Proportion of rostral segments: I<II>III>IV.

Pronotum. Anterolateral margins serrated. Posterolateral margins sinuated. Humeri varying from rhomboid to acutely projected, black at apex. Cicatrices sometimes delimited by dark punctures. Darker punctures concentrated at middle pronotum, forming a rounded spot.

Scutellum. Surface uniformly punctured, forming rounded areas lacking punctures. Two pairs of black spots formed by concentrated punctures, one basally and other medially. Distal region without punctures, bearing a yellow callus. Small black fovea at basal angles.

Hemelytra. Rusted-red punctures uniformly distributed. Reddish radial vein. Black spots near distal apex of radial vein.

Ventral surface light castaneous, punctures uniformly distributed and thinner than those on dorsal surface. Spiracles concolorous to ventral surface. Connexivum light castaneous, with dark spots at anterior and posterior margins. Legs light castaneous, with reddish spots in all segments.

Male genitalia. Pygophore subquadrangular (Figs. 5–8); genital cup well exposed dorsally (Figs. 5–6). Dorsal rim medially sinuated (Figs. 5–6). Superior process of dorsal rim conspicuous, as a sinuated flap projected into genital cup towards paramere base (Fig. 6). Posterolateral angles slightly projected, without bristle tufts. Ventral rim bisinuated, in a ‘V’ excavation at middle, with bristle tufts (Figs. 7–8). Parameres elongated, robust and flattened, directed dorsally. Paramere head as long as base, with a digitiform projection on inner surface (Fig. 9). Phallus almost pyriform in lateral view (Fig. 12); processus phallothecae not surpassing conjunctiva (Figs. 10, 12); ventral process of conjunctiva projecting towards phallotheca ventral wall (Figs. 10, 12); processus vesicae embracing ductus seminis distalis (Fig. 11).

Male measurements (n=6). Body length 8.81±0.22 (8.48–9.12); abdominal width 5.09±0.28 (4.8–5.44); head length 2.13±0.096 (2.08–2.32), width 2.07±0.12 (1.92–2.24); interocular distance 1.24±0.067 (1.2–1.36); length of antennal segments: I – 0.55±0.06 (0.48–0.64), II – 0.83±0.082 (0.8–0.96), III – 1.13±0.15 (0.96–1.36), IV – 1.16±0.62 (1.12–1.84), V – 1.16±0.61 (0.96–1.36); pronotum length 2.04±0.13 (1.84–2.24), width 4.92±0.34 (4.4–5.36), length to the height of the spine 5.89±0.4 (5.52–6.64); scutellum length 3.0±0.13 (2.8–3.12), width 3.11±0.12 (2.88–3.20).

Female genitalia.Gonocoxites 8 almost triangular, not covering gonocoxites 9; sutural margins sinuated, overlapping at base, sutural angles acute, tumid areas occupying ½ of each plate (Figs. 13–14). Laterotergites 8 acute at apex, but not forming a spine. Laterotergites 9 obtuse at apex, not surpassing laterotergites 8 (Figs. 13–14).Posterior margin of gonocoxites

9 biconvex.Chitinellipsen rounded (Fig. 15). Ductus receptaculi before vesicular area almost three times longer than ductus after vesicular area (Fig. 15). Internal wall of vesicular area conical at base; median wall dilated at basal quarter of vesicular area (Fig. 15). Basal half of pars intermedialis loosely-twisted; anterior annular flange flat, posterior annular flange convergent. Capsula seminalis rounded, lacking processes.

Female measurements (n=31). Body length 9.56±0.37 (9.2–10.24); abdominal width 5.57±0.22 (5.28–5.92); head length 2.13±0.2 (1.92–2.48), width 2.22±0.07 (2.16–2.32); interocular distance 1.34±0.09 (1.28–1.52); length of antennal segments: I – 0.56±0.07 (0.48–0.64), II – 0.85±0.065 (0.8–0.96), III – 1.2±0.06 (1.12–1.28), IV – 1.50±0.14 (1.36–1.68), V – 1.4±0.1 (1.28–1.52); pronotum length 2.28±0.16 (2.08–2.48), width 5.47±0.3 (5.12–5.92), length to the height of the spine 6.47±0.5 (5.92–7.2); scutellum length 3.64±0.13 (3.44–3.76), width 3.61±0.21 (3.28–3.84).

Comments. *Dichelops caatinguensis* **sp. nov.** is similar to *Dichelops lobatus*. From *D. lobatus* it can be distinguished by being smaller in length (male: 8.81±0.22 mm; female: 9.56±0.36 mm); by the presence of a yellow spot at the scutellum apex, which in *D. lobatus* is a stripe; connexivum with 1+1 dark spots at the anterior and posterior margins, while immaculate in *D. lobatus*; jugae convergent or juxtaposed, while parallel in *D. lobatus*. In the male genitalia both species have the paramere and the superior process of the dorsal rim similar in shape; *Dichelops caatinguensis* **sp. nov.** can be distinguished from *D. lobatus* by the ventral rim's being bisinuated, excavated in a 'V' at the middle, and with bristle tufts. *Dichelops caatinguensis* **sp. nov.** females can be distinguished from all *Diceraeus* species by the posterior margin of the gonocoxites 9 biconvex and by the pars intermedialis being loosely twisted along the basal half of its length.

Distribution. Northeast Brazil, corresponding to Caatinga, Cerrado and Para biogeographic provinces (*sensu* Morrone, 2006).

***Dichelops* (*Prodichelops*) Grazia, 1978**

Dichelops (*Prodichelops*) Grazia, 1978: 14, 87-89.

Type species: *Diceraeus divisus* Walker, 1867 by original designation.

Diagnosis. Head ventrally with narrow black stripe, sub-adjacent to juga outer margin, extending from antennal tubercle to bucculae apex. Pronotum with a transversal orange or yellowish stripe, without punctures; anterolateral margins crenulated; posterolateral margins sinuated, without projections (Fig. 2). Humeral angles developed. Male: pygophore dorso posteriorly opened, genital cup widely exposed; ventral rim of pygophore ventrally projected in a beaklike structure; parameres scythe-like, long, and slender. Female: pars intermedialis not twisted; capsula seminalis without processes.

***Dichelops* (*Prodichelops*) *divisus* (Walker, 1867)**

(Figs. 2, 16-21)

Diceraeus divisus Walker, 1867: 250.

Dichelops divisus; Lethierry & Severin, 1893: 129; Kirkaldy, 1909: 68.

Dichelops (*Prodichelops*) *divisus*; Grazia, 1978: 90-91.

Type: BMNH, HEM. 1056, female, Bates col., deposited on “British Museum (Natural History)”, examined.

Type locality. “Amazon Region”; according to label information, the specimen was collected in “St. Paulo” [São Paulo de Olivença, Rio Solimões, Amazonas, Brazil].

Head. Male proportion of antennal segments: I<II=III<IV>V; female proportion of antennal segments: I<II<III<IV<V.

Male genitalia. Pygophore quadrangular (Fig. 21); genital cup widely open dorso posteriorly (Figs. 16–19). Dorsal rim in an open ‘U’, sinuate at base, slightly projected over segment X (Figs.18–19). Superior processes of dorsal rim spine-like placed before middle of lateral margins of dorsal rim, clearly distant from paramere apices. Posterolateral angles almost truncate not projected posteriorly, with dense and convergent bristle tufts (Figs. 16–19). Ventral rim bisinuated, at middle in a shallow ‘U’ (Figs. 16–17, 20–21); inferior layer of ventral rim projecting ventrad in a beaklike structure, well-observed in profile and/or in posterior view of pygophore (Figs. 16–17). Bristles along ventral rim, especially over folded area inside genital cup, forming 1+1 tuft adjacent to posterolateral angles, 1+1 tuft laterad to ‘U’ concavity, and one tuft at middle of ‘U’ (Figs. 17, 21). Parameres long and slender, scyte like, laterad directed. Segment X almost pyriform, with 1+1 minute tubercles at middle (Fig. 19).

Male measurements (n=1). Body length 8.96; abdominal width 5.44; head length 1.92, width 2.0; interocular distance 0.96; length of antennal segments: I – 0.72, II – 0.8, III – 0.8, IV – 1.12, V – 1.6; pronotum length 2.16, width 5.6, length to the height of the spine 6.4; scutellum length 3.28, width 3.2.

Female measurements (n=2). Body length 9.32±0.06 (9.28–9.36); abdominal width 5.68±0.11 (5.6–5.76); head length 1.8±0.06 (1.76–1.84), width 2.2±0.06 (2.16–2.24); interocular distance 1.12±0.23 (0.96–1.28); length of antennal segments: I – 0.52±0.06 (0.48–0.56), II – 0.76±0.06 (0.72–0.8), III – 0.92±0.06 (0.88–0.96), IV – 1.2, V – 1.6; pronotum length 1.96±0.06 (1.92–2.0), width 6.2±0.06 (6.16–6.24), length to the height of the spine 7.56±0.51 (7.2–7.92); scutellum length 3.8±0.06 (3.76–3.84), width 3.76±0.34 (3.52–4.0).

Material examined. BRAZIL, Amazonas, Estirão da Preta, Rio Liberdade, 11-15.V.2011, D. Takyia col., sweep net (INPA), 1♂, 1♀. COLOMBIA, Amazonas, Prefectura de Tabatinga [Leticia], 12.IV.1992, A. Saenz col. (UFRG), 1♀.

Comments. The male genitalia of *Dichelops* (*Prodichelops*) *divisus* are similar to the species of *Dichelops* (*Dichelops*) by the superior process of the dorsal rim as a spine-like structure, and by the parameres' shape, wide at the base, tapering toward the apex. *Dichelops* (*Prodichelops*) *divisus* can be distinguished from the other subgenera by the dorsal rim of the pygophore being medially bisinuated, and by the ventral rim of the pygophore being ventrally projected, forming a beaklike structure.

Distribution. Western Amazonia, in Brazil and Colombia, which corresponds to Emeri, Varzea and Madeira biogeographic provinces (*sensu*Morrone, 2006).

Acknowledgments

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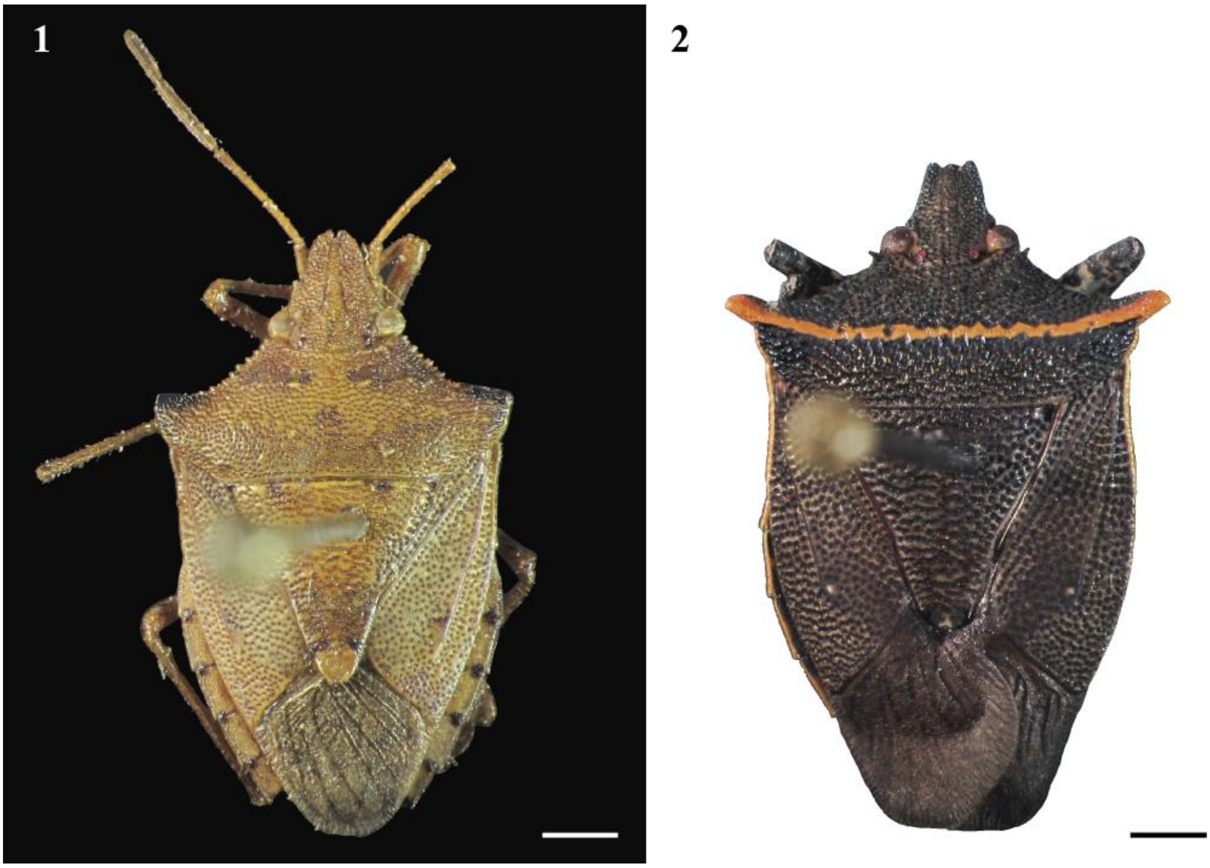
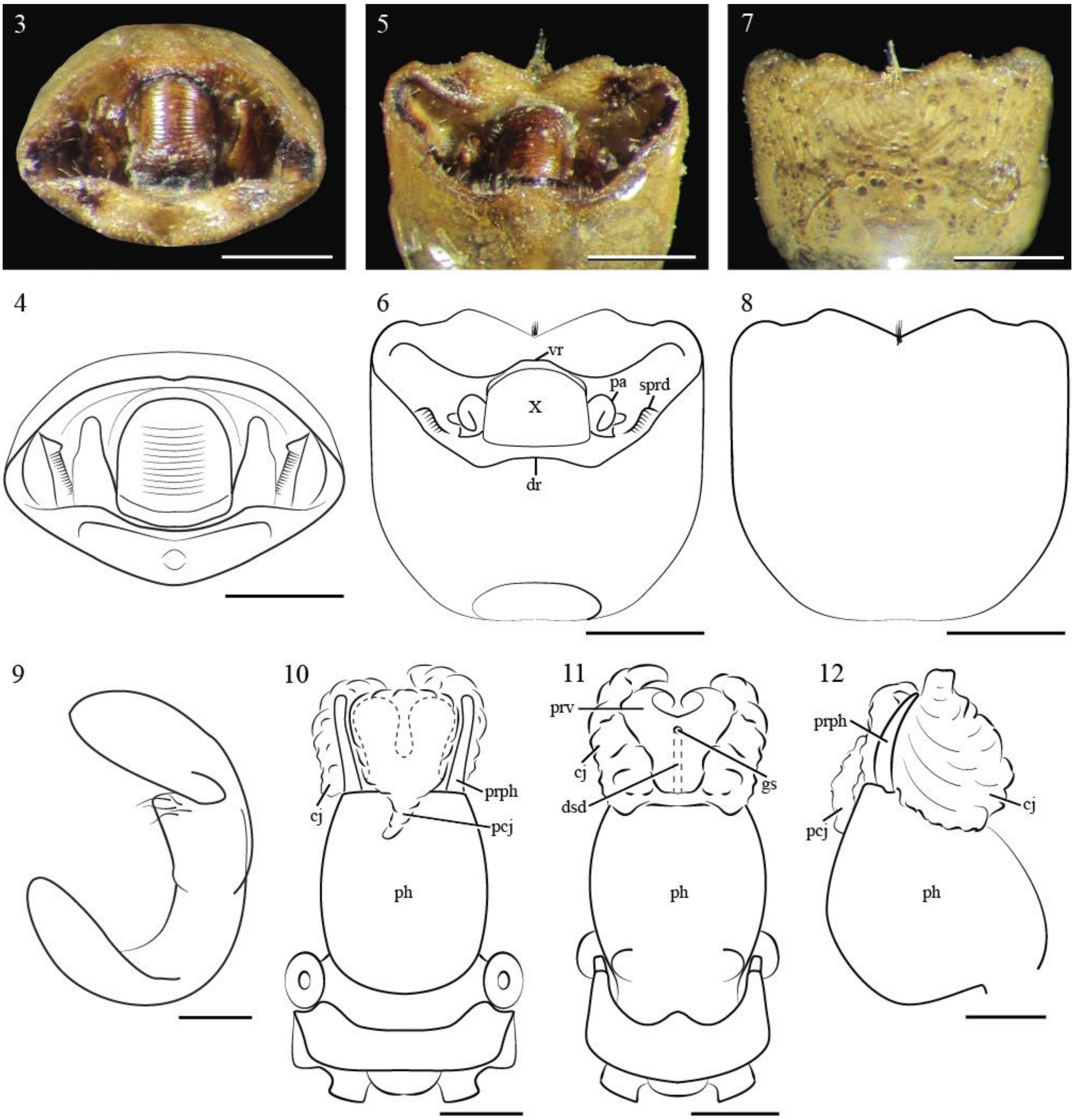
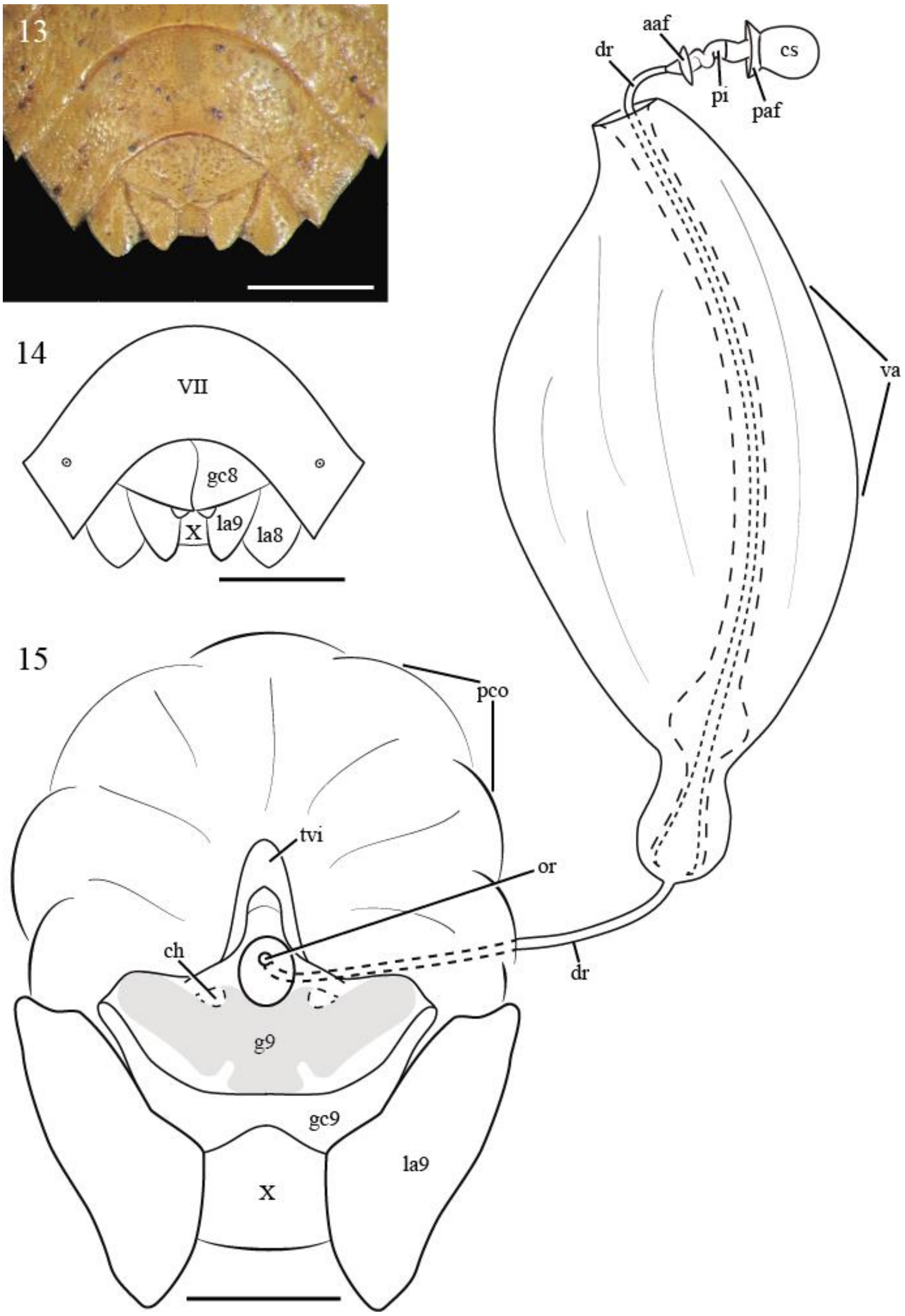


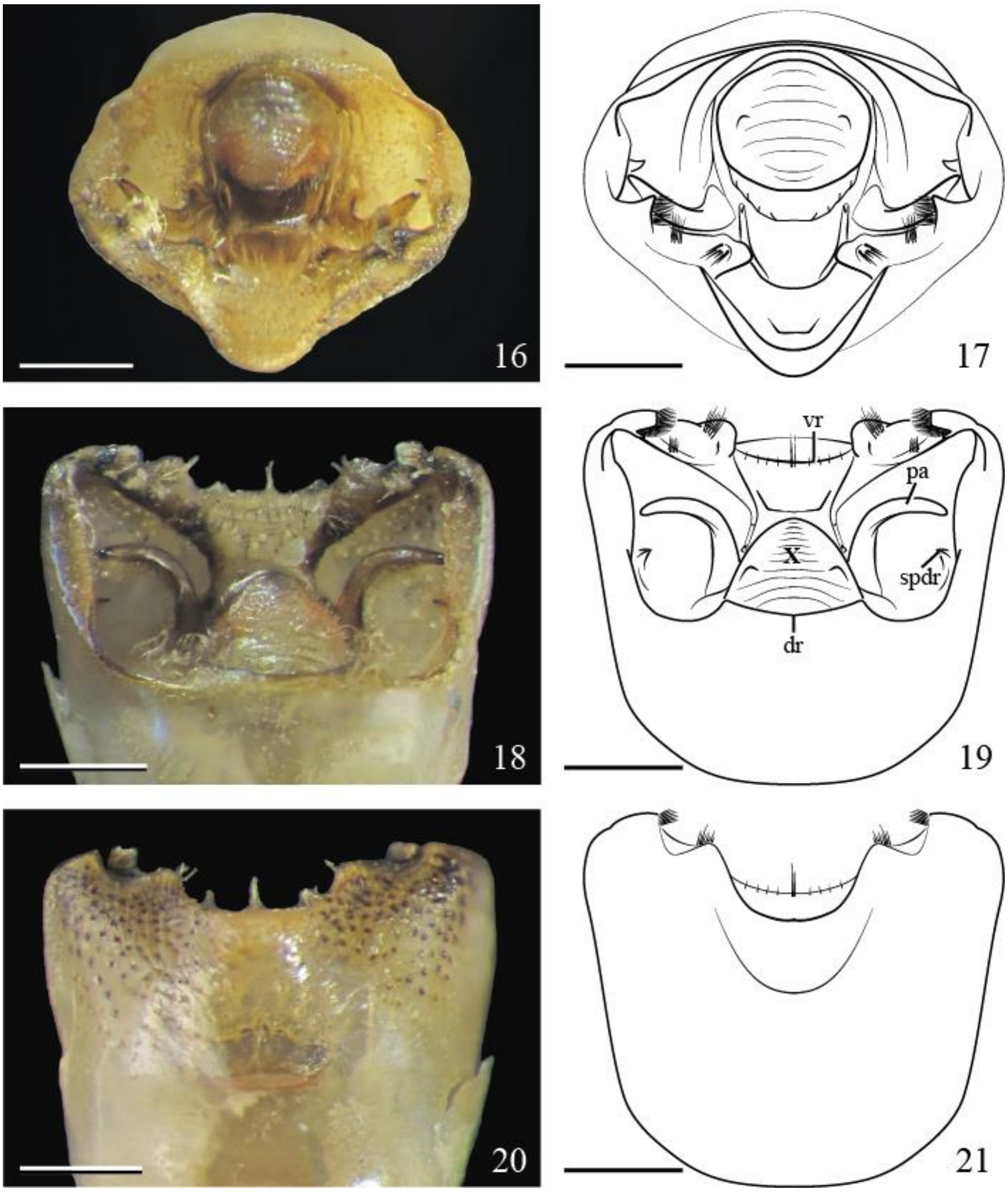
FIGURES 1-2. Dorsal view: 1, *Dichelops* (*Diceraeus*) *caatinguensis* **sp. nov.**; 2, *Dichelops divisus* (Scales = 1 mm).



FIGURES 3-12. *Dichelops* (*Diceraeus*) *caatinguensis* **sp. nov.**, male genitalia. 3-4, pygophore, posterior view; 5-6, pygophore, dorsal view; 7-8, pygophore, ventral view; 9, left paramere, dorsal view; 10-12, phallus, ventral, dorsal and lateral views, respectively. (cj, conjunctiva; dr, dorsal rim; dsd, ductus seminis distalis; gs, secondary gonopore; pa, paramere; pcj, process of conjunctiva; ph, phallotheca; prph, processus phallothecae; prv, processus vesicae; spdr, superior process of dorsal rim; vr, ventral rim; X, proctiger) (Scales: figs. 3-8 = 0.5 mm; 9-12 = 0.15 mm).



FIGURES 13-15. *Dichelops* (*Diceraeus*) *caatinguensis* **sp. nov.**, female genitalia. 13-14, genital plates, ventral view; 15, laterotergites, gonapophyses and gonocoxites of ninth segment, and ecto-dermical genital ducts, ventral view (aaf, anterior annular flange; ch, chitinellipsen; cs, capsula seminalis; dr, ductus receptaculi; g9, gonapophyses 9; gc9, gonocoxites 9; la9, laterotergite 9; or, orificium receptaculi; paf, posterior annular flange; pco, pars communis; pi, pars intermedialis; tvi, thickening of vaginal intima; va, vesicular area; X, tenth segment) (Scale: figs. 13-14 = 1 mm; 15 = 0.3 mm).



FIGURES 16-21. *Dichelops* (*Prodichelops*) *divisus*, pygophore. 16-17, posterior view; 18-19, dorsal view; 20-21, ventral view. (dr, dorsal rim; pa, paramere; spdr, superior process of dorsal rim; vr, ventral rim; X, tenth segment) (Scales = 0.5 mm).

CAPÍTULO IV[4]

Phylogeny of *Dichelops* (Heteroptera, Pentatomidae)

Kim R. Barão[1], Augusto Ferrari[1,2] and Jocelia Grazia[1]

[1] Programa de Pós-Graduação em Biologia Animal, Instituto de Biociências, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil

[2] Instituto de Ciências Biológicas, Universidade Federal do Rio Grande FURG, Rio Grande, RS, Brazil

Abstract

Dichelops comprises 16 species, included in three subgenera, with exclusive Neotropical distribution. The genus was revised recently and each subgenus have a set of distinct morphological characters, which allow their precise identification, and different distributional patterns, thus raising questions about the genus monophyly and the subgenera evolutionary relationships. The genus monophyly was tested under parsimony using discrete and continuous characters and two character weighting methods, equal weights and implied weights. The genus was paraphyletic in every analysis and the characters formerly proposed as diagnostic for the genus and subgenera were found to be shared with other taxa. Discussion about continuous characters treatment and use of weighting methods are provided.

Keywords: continuous characters, implied weighting, Neotropics, systematics.

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[4] Formatado conforme as normas do periódico Systematic Entomology. Veja Anexo IV.

Introduction

The cosmopolitan Pentatominae (Hemiptera: Pentatomidae) comprises about 60% of Pentatomidae diversity. Tribal classification of pentatomines has been changing for the last four decades and is still under dispute, ranging from eight (Schuh & Slater, 1995) to 43 (D.A. Rider *in litt.*) recognized tribes. In the latter tribal arrangement, the Neotropical Pentatomini *sensu* Rolston & McDonald (1979; 1980a,b; 1984) was divided into seven tribes: Antestiini Distant, 1902, Carpocorini Mulsant & Rey, 1866, Menidini Atkinson, 1888, Nezarini Atkinson, 1888, Pentatomini Leach, 1815, Piezodorini Atkinson, 1888, and Strachiini Mulsant & Rey, 1866.

Carpocorini, the most diverse pentatomine tribe (ca. 450 spp. and 100 genera), occurs in all continents except Antarctica. The highest tribal diversity occurs in the New World (ca. 290 spp. and 55 genera) and the most diverse genera are *Euschistus* Dallas, 1851 (74 spp.), *Mormidea* Amyot & Serville, 1843 (34 spp.), and *Dichelops* Spinola, 1837 (16 spp.). Some groups of genera within Carpocorini have been proposed based on morphological similarities and taxonomic history, but have not been tested with up-to-date cladistic methods.

Euschistus-group is one of those. Rolston (1974) grouped *Agroecus* Dallas, 1851, *Dichelops*, *Euschistus*, *Galedanta* Amyot & Serville, 1843, *Hymenarcys* Amyot & Serville, 1843, *Menecles* Stål, 1867, *Proxys* Spinola, 1837, *Sibaria* Stål, 1872, and *Tibraca* Stål, 1860, by similarities in coloration, size, and general morphology. One could add to this group, genera that have been erected from the above genera, *i.e. Ladeaschistus* Rolston, 1973 and *Mcphersonarcys* Thomas, 2012; or lately related taxonomically to them, *i.e. Acledra* Signoret, 1864, *Berecynthus* Stål, 1862, *Caonabo* Rolston, 1974, *Coenus* Dallas, 1851, *Padaeus* Stål, 1862, *Oenopiella* Bergroth, 1891, and *Spinalanx* Rolston & Rider, 1988. According to Rider (1995), a diagnostic feature of the group is the presence of a pair of dorsal processes on the phallotheca (*sic* dorsal thecal appendages). Recently, *Tibraca* has been referred as belonging to the *Mecocephala* group, which also has dorsal processes on the phalloteca, but is distinct in having very reduced or absent parameres (Frey-da-Silva et al., 2002; Schwertner et al. 2002).

The *Euschistus*-group includes some species associated to crops of legumes and which are important crop pests in the Neotropics. However, the *Euschistus* group has never been cladistically tested before, neither was the Carpocorini. In an effort to best understand the relationships and biogeographic history of Neotropical pentatomids, the Carpocorini and some genera of the *Euschistus*-group are under formal phylogenetic investigations (*e.g.* *Agroecus*, *Euschistus*, *Proxys*).

Here we study the phylogenetic relationships of *Dichelops*. The genus comprises 16 species, collectively recognized by having the mandibular plates longer than the clypeus, included in three subgenera: *Dichelops* Spinola, 1837 (10 spp.), *Diceraeus* Dallas, 1851 (5 spp.), and *Prodichelops* Grazia, 1978 (1 sp.). The genus was revised by Grazia (1978) and few species have been described since then (Klein et al., 2012; Poock-da-Silva et al., 2013). Each subgenus has a set of distinct morphological characters, which allow their precise identification, and different distributional patterns, thus raising questions about the genus monophyly and the sub-genera evolutionary relationships.

In this work two issues are addressed: (1) the monophyly of *Dichelops* and (2) the hypothesized generic affinities of the *Euschistus*-group.

Material and methods

Ingroup, outgroup and root

In the absence of a phylogenetic hypothesis to the *Euschistus*-group and to the Carpocorini, outgroup selection was based on taxonomic history and morphological diversity of the characters here studied (Barão et al., 2012). Rolston (1974) grouped on the same dichotomous key genera he considered similar to *Euschistus*, being followed by subsequent authors in considering those genera as belonging to the *Eushistus*-group.

The ingroup taxa (Table S1) comprises the 16 species currently assigned to *Dichelops* subgenera: 10 of *Dichelops*, five of *Diceraeus*, and one of *Prodichelops*. Out of the remaining 15 genera considered part of *Euschistus*-group, 27 species belonging to 13 genera were included (Table S1; M*cphersonarcys* and *Sibaria* were not included). Other 17 species (belonging to 11 genera) were included, representing taxa not related taxonomically to *Euschistus*-group (Table S1) but included in Carpocorini *sensu* Rider (*in litt*.). Trees were rooted on *Carpocoris*, the Carpocorini type genus. Appendix S1 is a list of examined specimens and its depositories.

Terminology

Terminology derives from Tsai et al. (2011) for general morphology; Baker (1931), Dupuis (1970) and Schaefer (1977) for genital terminology; and Kment & Vilímová (2010) for external scent efferent system (ESES) of the metasternal gland.

Character matrices

Of the 149 characters included, 10 are continuous and 139 are discrete characters. Discrete characters represent general morphology (73), female (24) and male genitalia (42). Terminals were coded for characters directly from series of available specimens (Appendix S1) and coded from literature when specimens were not available (Table S1).

Matrix of discrete characters was constructed on Mesquite 3.03 (Maddison & Madisson, 2015) and matrix of continuous characters was constructed using a spreadsheet. Continuous characters comprise the range of one standard error around the mean (*i.e.* [mean -

SE] – [mean + SE]). The two data matrices were combined into one matrix and formatted to run on TNT using a text editor. Matrix is available on Appendix S2.

Character statements were elaborated following the logical basis proposed by Sereno (2007), especially regarding the use of reductive coding (Forey & Kitching, 2000; Brazeau, 2011). Inapplicable data were coded as "-" and missing data as "?" – except for continuous characters where inapplicable data were coded as "?", because of TNT continuous characters handling options.

The following notations for characters are used in Results and Discussion sections: "X(Y)", in which X represents the character and Y represents the state; "s", to the number of steps; "CI", to consistency index (Kluge & Farris, 1969); and "RI", to retention index (Farris, 1989).

Morphological methods

Internal male and female genitalia were dissected, macerated in a supersaturated KOH solution, stained with Congo Red and/or Chlorazol Black, and observed with a stereo microscope. Images were taken in multiple focal planes using a DS-Fi2 camera coupled to a Nikon AZ100M scope and stacked with the NIS Elements AR software available at the Departament of Zoology, UFRGS.

Structures analyzed using scanning electron microscopy (SEM) were manually cleaned, subsequently kept submersed in contact lens solution (Renu®) for 24h to degrade proteins, and then sonicated at 5400 kHz during three minutes in a solution of water and detergent. Followed by dehydration by alcoholic series and stove dried at 40ºC for 24h, sputter-coated with gold, and observed in a SEM at the Centro de Microcopia Eletrônica (CME) of UFRGS.

Measurements were taken with a micrometer scale attached to the scope's ocular lens. Morphometric parameters (Table S2) were measured for all terminals, in an effort of 20 specimens per species (10 spec. per sex), following the recommendations of Marie-Stephane (2013) for Acari. Because of material availability, the number of measured specimens was lower for some species (Table S1). Morphometric parameters and measurements (mean, standard error, maximum and minimum values) are available in Table S2.

Phylogenetic analyses

Phylogenetic analyses were performed by parsimony using software TNT v.1.1 (Goloboff *et al.*, 2008b); discrete characters were treated as nonadditive and continuous characters as additive (Goloboff *et al.*, 2006). Continuous characters were always rescaled to unit in order to reduce dominance of large characters influence on matrix (Mongiardino *et al.*, 2014). Three matrices were used, with the same set of terminals but varying datasets: discrete characters only, continuous characters only, and continuous + discrete characters.

Matrices were analysed under equal weights (EW) and implied weights (IW). Implied weighting (Goloboff, 1993) downweights characters according to their degree of homoplasy: the higher their homoplasy, the lower their weight. Goloboff *et al*. (2008a) demonstrated that weighting against homoplasy on morphological datases improves jackknife-frequencies and produces more stable trees. Intending to explore the effect of datasets (continuous and discrete characters) and different weighting methods (EW and IW), five analyses (A-E) were performed with different combinations of datasets and weighting methods (Fig. 1). Matrices of discrete characters and continuous characters were analysed under EW and IW, whereas matrix of continuous character only was analysed solely under IW (Fig. 1). Strict consensus was calculated for each analysis as well as jackknife frequencies. The analysis of continuous data only was exploratory and not intended to discuss phylogenetic relationships.

Since *Dichelops* was recovered paraphyletic, we conducted other five analyses (Ac-Ec; Fig. 1) constraining the genus monophyly, to reflect the alternative *a priori* taxonomic hypothesis. We understand constraining the monophyly of *Dichelops* as a way to evaluate how better the results of not constrained analyses are, measured as tree length and/or fit. Constrained analysis followed the same analytical procedures as detailed to analyses A-E. No phylogenetic nor taxonomic conclusions were drawn from it.

Independent of the weighting method employed, heuristic searches were always performed under 700 random addition sequences, TBR branch swapping algorithm retaining 150 trees per replication, random seed 0, and holding up to 100,000 trees in memory (*rseed* 0; *mult* 700 = *tbr hold* 150). For IW analyses, the concavity value (*k*-value = 14) was determined as described below and employed in all.

Topology stability was calculated to each analyses by jackknife with symmetric resampling, recording absolute-group frequencies and GC (Group present/Contradicted) frequency differences (Goloboff *et al.*, 2003), using 1000 pseudo-replicates and removal probability of 33%. GC values are informative for the amount of contradictory information in the dataset: if absolute frequencies and GC values are equal, probably no contradictory groups are supported by the data. Compatibility of strict consensuses resultant of the 10 analyses (A-E, Ac-Ec) were compared by Similitud index and Robinson-Foulds distances.

Defining k*-value.* Approaches to choosing the *k*-value have included exploring an arbitrary range of *k*-values and subsequently evaluating results through consensus methods, and exploring a range of *k*-values adjusted to the fit (*F*) of an average character (Mirande, 2009).

The protocol proposed by Mirande (2009) was employed to define the *k*-value used in all IW analyses performed in this study. Mirande (2009) proposed using a measure of the “average homoplastic character”, based on the *number of observed steps* of the shortest trees found under equal weights. Implied weighting formula was thus rewritten as [$k = (F * S) / (1 - F)$], in order to obtain *k*-values, where *S* is a measure of the average homoplasy per character, calculated as [*S* = ((*number of observed steps*) – (*minimum number of steps*)) / (*number of characters*)]. We determined *k*-value based on the discrete dataset only.

Mirande's protocol was set to 24 distortion groups, that assign to an "average" character fits from 50 to 90%, finding the best tree five times, and *ratchet* and *drift* set to 10 iterations. Remaining parameters were set as default. The 24 runs resulted in 40 trees; strict consensus of each run was calculated and consensuses were compared through Similitud index (*tcomp*). Similitud index calculates RI resulting from mapping the Matrix Representation Parsimony of each tree to each other: the higher the index, more similar the trees. Tree topologies resultant from *k*-values ranging from 9.3 to 20.3 were the most similar, and the *k*-value used by us is its average (*k*-value = 14). Mirande's protocol output and tree comparisons are available on Appendix S3.

Results

Character statements

Continuous characters.

0. Head length
1. Head width between eyes
2. Eyes width
3. Length of mandibular plates ahead of clypeus
4. Interocellar distance
5. Pronotum length
6. Pronotum width at humeral angles
7. Pronotum width at distal margin
8. Scutellum width at basal margin

9. Scutellum length

Discrete characters.

Head

10. Mandibular plates, length related to apex of clypeus: (0) shorter (Fig. 5); (1) equal (Fig. 4); (2) longer (Fig. 2). Modified from Grazia (1997); Kocorek & Lis (2000); Weiler (2011).
11. Mandibular plates, form apically: (0) obtuse; (1) pointed.
12. Mandibular plates, apex position in relation to clypeal apex, in lateral view: (0) inferior; (1) leveled; (2) superior. Modified from Weiler (2011).
13. Mandibular plates, inner margins ahead of clypeus: (0) contiguous (Fig. 3); (1) not contiguous (Fig. 2).
14. Mandibular plates, outline color laterally related to background color of head: (0) concolour (Fig. 3); (1) not-concolour (Fig. 2).
15. Mandibular plates, orientation of lateral margins: (0) flat; (1) explanate (Fig. 3); (2) declivous (Fig. 5).
16. Mandibular plates, medial margins, unpunctuated area: (0) absent; (1) present (Fig. 4). Modified from Weiler (2011).
17. Clypeus, proximal limit of clypeal suture related to an imaginary line across anterior margin of eyes: (0) anterior; (1) posterior. Modified from Weiler (2011).
18. Clypeus, form of apex: (0) obtuse; (1) acute. Modified from Weiler (2011).
19. Clypeus, height related to mandibular plates, longitudinally: (0) leveled; (1) higher (Fig. 5).
20. Bucculae, anterior margin, form: (0) truncate; (1) lobate; (2) tapering toward apex of head.

21. Bucculae, posterior margin, form: (0) tapering toward base of head; (1) truncate; (2) lobate. Modified from Bernardes *et al*. (2009).
22. Labium, length of first segment related to bucculae: (0) contained; (1) surpassing.
23. Labium, placement of apex: (0) between pro- and meso-coxae; (1) between meso- and meta-coxae; (2) beyond metacoxae.
24. Antenniferous tubercles, lateral process: (0) absent; (1) present. Modified from Ferrari (2009).
25. Antenniferous tubercles, in dorsal view of head: (0) not visible; (1) visible. Modified from Grazia *et al*. (2008).
26. Antenniferous tubercles, ventral process: (0) absent; (1) present. Modified from Ferrari (2009).
27. Anteocular processes: (0) absent; (1) present.
28. First antennal segments, length related to anterior margin of head: (0) shorter; (1) sub-equal; (2) longer. Modified from Kocorek & Lis (2000).

Thorax

29. Pronotum, anterior angles, process: (0) absent; (1) present.
30. Pronotum, anterior angles, shape of process apically: (0) obtuse; (1) acute.
31. Pronotum, anterolateral margins, outline: (0) flat; (1) explanate (Fig. 7).
32. Pronotum, anterolateral margins, form: (0) straight (Fig. 8); (1) concave (Fig. 6); (2) convex (Fig. 7). Modified from Fernandes (1993).
33. Pronotum, anterolateral margins, ornamentation: (0) smooth (Fig. 7); (1) serrated (Fig. 6); (2) crenulated (Fig. 8). Modified from Grazia (1997).
34. Pronotum, humeral angles: (0) developed, (1) obsolete.

35. Pronotum, humeral angles, form: (0) obtuse; (1) pointed (Fig. 6); (2) quadrate (Fig. 9). Modified from Gapud (1991); Grazia (1997); Fortes & Grazia (2005); Bernardes *et al*. (2009); Grazia *et al*. (2008); Weiler (2011).
36. Pronotum, posterolateral margins, ornamentation, form: (0) smooth; (1) crenulated (FIG). Modified from Grazia (1997).
37. Pronotum, posterolateral margins, median tubercle: (0) absent; (1) present (Fig. 6).
38. Pronotum, anterior lobe related to posterior lobe: (0) leveled (Fig. 10); (1) sloping (Fig. 11).
39. Pronotum, transhumeral band: (0) absent; (1) present.
40. Pronotum, transhumeral band, sculpturing: (0) smooth; (1) punctuated.
41. Scutellum, apex, callus(es): (0) absent; (1) present. Modified from Weiler (2011).
42. Scutellum, apex, calloused area: (0) continuous; (1) divided in 1+1. Modified from Weiler (2011).
43. Scutellum, apex, callus shape: (0) rounded; (1) thin band.
44. Hemelytrum, corium, radial vein apex: (0) punctuated (Fig. 12); (1) calloused (Fig. 13); (2) smooth (Fig. 14). Modified from Barcellos & Grazia (2003); Weiler (2011).
45. Hemelytrum, membrane, venation: (0) parallel; (1) reticulate. Modified from Gapud (1991); Henry (1997); Grazia (1997); Grazia *et al*. (2008); Weiler (2011).
46. Hemelytrum, length related to abdominal apex: (0) surpassing; (1) not surpassing.
47. Mesosternum, carina: (0) absent; (1) present.
48. ESES, Peritreme, shape: (0) ruga (Fig. 19); (1) spout (Fig. 20); (2) reniform (Fig. 21). Modified from Kment & Vilímová (2010).
49. ESES, Peritreme, tegument surface finish: (0) smooth (Fig. 23); (1) circumvolutions (Fig. 24); (2) scales (Fig. 25); (3) cylindrical projections (Fig. 26).

50. Metapleura, range of evaporatorium related to metapleura width: (0) less than half (Fig. 15); (1) more than half (Fig. 16).

51. Metapleura, form of outer margin of evaporatorium: (0) convex (Fig. 15); (1) concave (Fig. 16); (2) straight (Fig. 17).

52. Metapleura, form of antero-lateral margin of evaporatorium: (0) rounded (Fig. 16); (1) acute (Fig. 15); (2) evanescent.

53. Mesopleura, range of evaporatorium related to mesopleura width: (0) less than half (Fig. 17); (1) more than half (Fig. 18).

54. Mesopleura, evaporatorium along the outer margin, in ventral view: (0) absent; (1) present.

55. ESES, Evaporatorium, punctures: (0) absent; (1) present (Fig. 22).

56. ESES, Evaporatorium, sensillum: (0) absent; (1) present (Fig. 22).

57. ESES, Evaporatorium, setae: (0) absent; (1) present (Fig. 22).

58. Metathoracic spiracle, form: (0) narrow (Fig. 27); (1) wide (Fig. 28). Modified from Kment & Vilímová (2010).

59. Metathoracic spiracle, filter system, surface ornamentation: (0) smooth (Figs. 29, 31); (1) spiny (Fig. 30).

60. Metathoracic spiracle, filter, lateral connections: (0) absent (Fig. 29); (1) present (Figs. 30, 31).

61. Legs, rounded pigmentation at bristles base: (0) absent; (1) present. Modified from Weiler (2011).

62. Legs, width of pigmentation at bristles base, related to bristles diameter: (0) less than twice ; (1) more than twice. Modified from Weiler (2011).

63. Legs, fore femorae, area around base of setae: (0) smooth; (1) elevated.

64. Legs, anterior tibiae, setae, appearance: (0) thin; (1) stout.

65. Pronotum, cicatrices, callus at postero-median margin: (0) absent; (1) present.

66. Pronotum, humeral angle, orientation: (0) laterad; (1) anteriad.

67. Scutellum, fovea, at latero-anterior angles: (0) absent; (1) present.

68. Scutellum, fovea, width related to ocelli width: (0) smaller; (1) wider.

69. Mesopleura, evaporatorium, diagonal extension towards antero-lateral angle of mesopleura: (0) absent; (1) present (Fig. 18).

Abdomen (pre-genital segments)

70. Sternites, longitudinal stripe medially: (0) absent; (1) present (Fig. 32).

71. Sternites, longitudinal stripes sub-laterally: (0) absent; (1) present (Fig. 32).

72. Sternites, postero-lateal angles protruding from sternite edge: (0) absent; (1) present

73. Sternites, postero-lateral angles, form of apex: (0) obtuse (Fig. 36); (1) acute (Fig. 37).

74. Sternites, coloration pattern of antero-lateral angles related to discal coloration: (0) concolour (Fig. 34); (1) not-concolour (Fig. 35).

75. Sternites, coloration pattern of postero-lateral angles related to discal coloration: (0) concolour (Fig. 34); (1) not-concolour (Fig. 35).

76. Sternites, calluses along posterior margin: (0) absent; (1) present (Fig. 33).

77. Sternite 7, development of postero-lateral angles related to postero-lateral angles of remaining abdominal sternites: (0) equal (Fig. 36); (1) longer (Fig. 38).

78. Sternite 7, length medially related to length at lateral margin in females: (0) equal; (1) longer.

79. Spiracles, color in relation to abdominal color: (0) concolour; (1) not-concolour.

80. Connexivum, in dorsal view, related to mesosternal wing development: (0) exposed; (1) concealed.

81. Connexivum, coloration pattern of antero-lateral angles related to discal coloration: (0) concolour; (1) not-concolour.

82. Connexivum, coloration pattern of postero-lateral angles related to discal coloration: (0) concolour; (1) not-concolour.

Female genitalia

83. Genital plates, gonocoxites 8, basal portion of sutural margins related to each other: (0) juxtaposed (Fig. 41); (1) overlapping (Fig. 40). Modified from Weiler (2011).

84. Genital plates, gonocoxites 8, posterior margin, form: (0) sinuous (Fig. 41); (1) straight (Fig. 40); (2) convex (Fig. 39).

85. Genital plates, gonocoxites 8, excavations in the inner folding: (0) absent (Fig. 42); (1) present (Fig. 43, 44).

86. Genital plates, gonocoxites 8, number of excavations in the inner folding: (0) one (Fig. 43); (1) two (Fig. 44).

87. Genital plates, gonocoxites 8, development degree over gonocoxite 9: (0) partially covering (Fig. 39); (1) completely covering.

88. Genital plates, gonocoxite 9, posterior margin, shape: (0) concave; (1) straight.

89. Genital plates, gonocoxite 9 position in relation to segment X: (0) levelled; (1) oblique, in an obtuse angle. Modified from Weiler (2011).

90. Genital plates, gonocoxites 9, surface: (0) flat; (1) swollen; (2) depressed.

91. Genital plates, gonocoxites 9, esclerotized lateral arms: (0) absent; (1) present (Fig. 45).

92. Genital plates, laterotergites 8, posterior margin, form: (0) straight (Fig. 39); (1) acutely projected (Fig. 40); (2) obtusely projected (Fig. 41). Modified from Weiler (2011).

93. Genital plates, laterotergites 8, spiracle: (0) absent; (1) present.

94. Genital plates, laterotergites 9, base, surface: (0) flat; (1) depressed; (2) swollen.

95. Genital plates, laterotergites 9, apex in relation to tergite 8: (0) not surpassing (Fig. 39); (1) surpassing (Fig. 41). Modified from Fortes & Grazia (2005); Weiler (2011).
96. Genital plates, gonapophyses 8, visible in ventral view: (0) absent; (1) present.
97. Genital plates, gonapophyses 9, sclerotized areas: (0) absent; (1) present.
98. Ectodermal ducts, thickening of vaginal intima, length of arcuate posterior portion related to round anterior portion: (0) shorter (Fig. 46); (1) longer (Fig. 45).
99. Ectodermal ducts, proximal ductus receptaculi, length in relation to vesicular area: (0) shorter; (1) longer. Modified from Hasan & Kitching (1993); Weiler (2011).
100. Ectodermal ducts, vesicular area, median wall, shape sub-proximally: (0) cylindrical (Fig. 48); (1) enlarged (Fig. 47).
101. Ectodermal ducts, distal ductus receptaculi: (0) straight (Fig. 48); (1) convolute (Fig. 47).
102. Ectodermal ducts, distal ductus receptaculi, before anterior annular flange, form: (0) tubular; (1) dilated. Modified from Gapud (1991); Weiler (2011).
103. Ectodermal ducts, pars intermedialis, form: (0) rectilinear (Fig. 49); (1) twisted (Fig. 50); (2) enlarged (Fig. 51). Modified from Fortes & Grazia (2005); Campos & Grazia (2006); Weiler (2011).
104. Ectodermal ducts, posterior annular flange, width related to capsula seminalis width: (0) thinner; (1) wider.
105. Ectodermal ducts, capsula seminalis, form: (0) globose (Fig. 50); (1) ovate (Fig. 51); (2) elongate (Fig. 49). Modified from Hasan & Kitching (1993); Grazia (1997); Fortes & Grazia (2005), Campos & Grazia (2006); Weiler (2011).
106. Ectodermal ducts, capsula seminalis, process(es): (0) absent; (1) present (Fig. 51).

Male genitalia

107. Pygophore, dorsal rim, marginal process: (0) absent; (1) present (Fig. 53).

108. Pygophore, dorsal rim, superior process: (0) absent (Fig. 54); (1) present.

109. Pygophore, dorsal rim, superior process, form: (0) flap-like (Fig. 56); (1) spine-like (Fig. 57); (2) tumescence (Fig. 58). Modified from Barcellos & Grazia (2003); Fortes & Grazia (2005); Ferrari *et al*. (2010); Weiler (2011).

110. Pygophore, postero-lateral angle, shape: (0) rounded (Fig. 53); (1) quadrate (Fig. 55); (2) acute (Fig. 52).

111. Pygophore, postero-lateral angles, bristles tufts: (0) absent; (1) present (Fig. 55). Modified from Fortes & Grazia (2005); Weiler (2011).

112. Pygophore, ventral rim, bristle tufts medially: (0) absent; (1) present (Fig. 55).

113. Pygophore, ventral rim, superior layer projected toward genital cup: (0) absent; (1) present (Fig. 54).

114. Pygophore, longitudinal ridges: (0) absent; (1) present (Fig. 55).

115. Pygophore, superior ridge, form: (0) concave; (1) convex.

116. Pygophore, superior ridge, processes: (0) absent; (1) present (Fig. 53).

117. Pygophore, genital cup, transversal striations: (0) absent; (1) present.

118. Pygophore, paramere: (0) well-developed; (1) reduced (Fig. 54).

119. Pygophore, paramere, length of head related to length of base: (0) shorter; (1) as long as; (2) longer.

120. Pygophore, segment X, processes: (0) absent; (1) present. Modified from Weiler (2011).

121. Pygophore, segment X, processes shape: (0) tumescence; (1) carina.

122. Pygophore, superior ridge, projecting over segment X: (0) absent; (1) present.

123. Pygophore, segment X, processes, placement of insertion: (0) basally; (1) medially.

124. Paramere, head, vestiture, setae: (0) absent; (1) present.

125. Paramere, head, vestiture, microtrichia: (0) absent; (1) present.

126. Phallus, phallotheca, length medially related to width apically: (0) shorter; (1) longer.

127. Phallus, phallotheca, ductus seminis proximalis insertion on ejaculatory reservoir, position related to phallotheca: (0) near base of; (1) beyond apical half of.

128. Phallus, phallotheca, ejaculatory reservoir, aspect: (0) smooth (Fig. 60); (1) striate (Fig. 61).

129. Phallus, phallotheca, postero-dorsal margin, projection(s), medially: (0) absent; (1) present (Figs. 62, 63).

130. Phallus, phallotheca, postero-dorsal margin, number of projection(s), medially: (0) one (Fig. 63); (1) two (Fig. 62).

131. Phallus, postero-lateral margins, rounded projections: (0) absent; (1) present (Fig. 63).

132. Phallus, phallotheca, thecal shield: (0) absent; (1) present (Fig. 64).

133. Phallus, phallotheca, processes of phallotheca: (0) absent; (1) present (Figs. 59-61).

134. Phallus, phallotheca, processes of phallotheca, width basally related to width medially: (0) narrower; (1) wider; (2) as wide as.

135. Phallus, phallotheca, processes, ventro-basally: (0) absent; (1) present.

136. Phallus, conjunctive, dorsal lobe: (0) absent; (1) present (Fig. 60).

137. Phallus, conjunctive, lateral lobes: (0) absent; (1) present (Fig. 63).

138. Phallus, conjunctive, median lobes: (0) absent; (1) present (Fig. 63).

139. Phallus, conjunctive, median lobes, aspect: (0) entirely membranous (Fig. 63); (1) sclerotized apically (Fig. 64); (2) entirely sclerotized (Fig. 59).

140. Phallus, conjunctive, median lobes, entirely sclerotized, shape apically: (0) rounded; (1) acute.

141. Phallus, conjunctive, ventral lobes: (0) absent; (1) present.

142. Phallus, processes of vesica: (0) absent; (1) present.

143. Phallus, processes of vesica, shape: (0) cup-like (Fig. 65); (1) sac-like (Fig. 66); (2) flap-like (Fig. 67); (3) keel-like; (4) geniculate (Fig. 68); (5) tubular.
144. Phallus, cup-like processes of vesica, form ventrally related to each other: (0) connected; (1) independent.
145. Phallus, vesica, length related to phallothecal lenght: (0) shorter; (1) longer (Fig. 67). Modified from Hasan & Kitching (1993); Barcellos & Grazia (2003); Fortes & Grazia (2005); Campos & Grazia (2006); Bernardes *et al*. (2009); Weiler (2011).
146. Phallus, vesica, aspect: (0) coiled (Fig. 67); (1) loose. Modified from Hasan & Kitching (1993); Barcellos & Grazia (2003); Fortes & Grazia (2005); Campos & Grazia (2006); Bernardes *et al*. (2009); Weiler (2011).
147. Phallus, vesica, sclerotized cap basally: (0) absent; (1) present (Fig. 67).
148. Phallus, vesical aperture, shape: (0) circular; (1) spatulate; (2) bifid.

Phylogenetic analysis

Missing data represent about 7% of the matrix and is largely due to inapplicable (-) characters resulted from reductive coding; only data from male genitalia of *Spinalanx monstrabilis* and male internal genitalia of *D*. (*P*.) *divisus* correspond to missing data (?) due to unavailability of specimens.

Analyses A resulted in six most parsimonious trees (MPT) of length of 878 steps. Only one MPT was found on each of the remaining analyses (Table 1). Consensus of analyses A is highly resolved, with two polytomies: one polytomy is basal and the other within *Dichelops* (*Dichelops*).

Topological comparisons by Similitud Index and Robinson-Foulds distances indicate that analyses A-D are more similar to each other than to E (Table S3). The highest tree topologies congruence, according to both tree comparison metrics, was A & B followed by C

& D. The remaining ranking of tree comparisons changed according to tree comparison metrics (Table S3).

Relationships among taxa were in broad agreement irrespective of datasets (discrete and discrete + continuous) on analyses A-D, with relatively minor topology differences (Figs 69-72), which are discussed subsequently. Analyses E, of continuous data only, resulted in a topology in great disagreement with remaining analyses (Fig. S1).

Monophyly of *Dichelops* was not recovered, independent of datasets or weighting method employed (Figs 69-72): subgenera *Dichelops* and *Prodichelops* were grouped and subgenus *Diceraeus* was grouped elsewhere. Sister group relationships to *Dichelops* subgenera was consistent on analyses A-D (Figs 69-72). Most genera which we have included more than one species were recovered monophyletic, to the exception of *Euschistus*. Stability of subgenera of *Dichelops* was high, with jackknife absolute frequencies higher than 50% in analyses A-D (Figs 69-72).

When constraining monophyly of *Dichelops*, six MPT of 884 steps were found on analysis Ac. Consensus of analysis Ac was highly resolved (Fig. S2), with one basal polytomy and other polytomy within *Dichelops* (*Dichelops*). Only *Euschistus* was not recovered monophyletic. Overall jackknife absolute and GC frequencies were higher for constrained analysis than unconstrained (Table 1; Figs. S3-6).

Discussion

Datasets and analyses

One of the main issues in using continuous characters in phylogenetics is the differential influence of characters depending on the scale in which they are measured. Two strategies have been independently used to circumvent the scaling issue: range rescaling and implied weighting. Mongiardino et al. (2014) demonstrated that even though IW reduces continuous characters influence in determining a topology by 10 times, it does so only partially and there is still a major influence of characters scale. Therefore, characters are more accurately weighted according to their homoplasy after they have been rescaled (Mongiardino et al., 2014). Accordingly, continuous characters were more influent in our analyses when we did not use IW, even though most of its asymmetric influence was already circumvented by the rescaling procedure. IW decreases influence of homoplastic characters, thus reducing continuous characters influence in analysis (Goloboff et al., 2006).

Continuous features can be the result of heritable variation, but phenotypic variation in continuous characters might be so large as to confound the heritable variation. After rescaling continuous characters and analyzing it under IW, an estimate of how much phylogenetic information is contained on continuous characters can be obtained (Goloboff et al., 2006). According to Goloboff et al. (2006), the extent of the conflict or concordance between continuous and discrete datasets can be examined by the increase or decrease of groups supported by discrete characters alone when continuous characters are added to the dataset. In general in our datasets, irrespective of weighting method employed, the addition of continuous characters have not changed tree topology nor added support to basal nodes, however have increased support of clades close to branch tips (Figs 69-72).

Cladogram topologies resultant of analyses A-D were highly congruent, as demonstrated by both tree comparison metrics (Table S3). The results of analyses A and B are the most similar, followed by results of analyses C and D. Thus, comparing the topologies by those metrics, indicate that results of analyses were first grouped by weighting method disregarded datasets used, *i.e.* in our data, weighting methods had major influence in results than the different datasets.

Analysing continuous characters along with discrete characters improved clade support, but did not change topology. Thus, continuous characters had not highly influenced tree search on our datasets. Hence, using EW or IW had a major impact on analyses by weighting differentially homoplasy (Goloboff et al., 2008).

Moreover, because of the disproportional number of discrete characters related to continuous characters, the former play a more important role on tree topology. Characters with a strong influence in determining the optimal tree of the entire partition will, when isolated, support a similar tree (Mongiardino et al., 2014), what is evidenced by the few topological differences between the analyses of discrete dataset only and discrete + continuous datasets, on both weighting methods. Jackknife values were slightly higher when IW was employed, compared to EW analyses (C to A and D to B).

For the matter of discussing phylogenetic relationships and taxonomic decisions, we will follow the reasoning of Kluge (1989) concerning the philosophy of total evidence in phylogenetic analyses and the reasoning of Goloboff *et al*. (2008) for weighting character against homoplasy. Topology of analysis D (discrete + continuous characters, under IW) is the one that fits such criteria.

Constraining monophyly of Dichelops. As expected, tree length and adjusted homoplasy increased when forcing ingroup monophyly (Table 1). Topologies with constrained monophyly represent *a priori* hypotheses of relationships and, in the case of our analyses, suboptimal phylogenetic hypotheses. Topologies resultant of EW analyses were six steps shorter than the same analyses under constrained groups.

Taxa relationships

As argued above, phylogenetic relationships and taxonomic decisions were made based on topology resultant of analysis D. Subsequently, we comment the relationships of some clades, as numbered on Figs. 72-73.

Clade I. This clade was not supported by jackknife resampling; however was consistently found on every analysis. Genera in this clade comprise those attributed to the *Euschistus*-group, plus *Agroecus* and *Prionosoma*. Features sustaining this clade are the antero-lateral margins of pronotum serrated [33(1)], postero-lateral margins crenulated [36(1)] and membrane of hemelytrum not surpassing abdominal apex [46(1)], but several reversions occurs throughout the clade. A pair of dorsal processes on phallotheca, a characteristic diagnostic for the group suggested by Rider (1995), was a synapomorphy for the clade with reversions in *Galedanta* and *Caonabo*. Even though most basal clades were not supported by jackknife, relationships can be considered stable because were consistent in all analyses performed.

Clade II. *Dichelops* was found as sister group to *Proxys* + *Padaeus*, with high support values. The three genera share with each other, truncate posterior margin of bucculae [21(1)], outer margin of evaporatorium concave [51(1)] (but in some species it is straight), antero-lateral margin of evaporatorium acute [52(0)] (but in some species it is evanescent), absence of secondary thickenings of gonapophyses 9 [97(0)], and capsula seminalis oval [105(1)]. Grazia (1978) had already related *Dichelops* to *Padaeus* because of the shape of the bucculae.

Clade III. This clade comprises in part what Grazia (1978) considered *Dichelops*. Grazia (1978) produced extensive work concerning the taxonomy of *Dichelops* and was considered by some as the first phylogenetic analysis produced in Brazil: a list of eight characters was provided and analysed by congruence, resulting on *Diceraeus* as sister group to *D.* (*Dichelops*) + *D.* (*Prodichelops*). As characteristics shared by *D.* (*Dichelops*) and *D.*

(*Prodichelops*), Grazia (1978) enumerates calluses on posterior margin of pronotal cicatrices, scutellum foveate, laterotergites 8 with spiracles and pars intermedialis cylindrical.

All diagnosing characteristics proposed by Grazia are shared with other genera; an outcome of wide outgroup sampling, allowing better understanding of character evolution as well as taxa. Based on character optimization *Dichelops* can be diagnosed by a combination of characters: mandibular plates longer than clypeus [10(2)], presence of a black stripe on the outline of mandibular plates [14(1)], posterior margin of gonocoxites 8 concave [88(0)], presence of bristle tufts on postero-lateral angles (except on *D. nigrum*) [111(1)]. The subgenera *Dichelops* and *Prodichelops* can be recognized by a series of characteristics (Fig. 73); we highlight the presence of an unpunctuated transhumeral band [39(1), 40(0)] and postero-lateral angles of sternites [75(1)] and lateral angles of connexivum with black spots [81(1), 82(1)] in *Prodichelops* and in *Dichelops* a median-tubercle on the postero-lateral margins of pronotum [37(1)], gonocoxites 8 excavated in internal view [85(1)] and processes on capsula seminalis [106(1)].

Clade IV. This clade comprises other group previously included in *Dichelops* by Grazia (1978). *Diceraeus* **stat. nov.** is supported as a monophyletic genus, independent of *Dichelops*. Apex of scutellum calloused [41(1)], pars intermedialis twisted [103(1)], and process of vesical opened ventrally [134(1)] are some of the characteristics of *Diceraeus*, but also shared with other taxa. All diagnostic characters of *Diceraeus* proposed by Grazia (1978) are shared with other genera. Also, some of those diagnosing features were reinterpreted here: calloused areas on the posterior margin of pronotal cicatrices were found on *Diceraeus*, as well as very reduced, but present, fovea on the scutellum.

Proposed classification of Dichelops

Based on the results of Analyses A-D, which consistently recovered *Dichelops* paraphyly, we propose the new taxonomic arrangements below:

***Dichelops* Spinola, 1837**

Type species: *Dichelops punctatus* Spinola, 1837

***Dichelops* (*Dichelops*) Spinola, 1837**

Dichelops (D.) australis Grazia & Klein, 2012

Dichelops (*D.*) *avilapiresi* Grazia, 1978

Dichelops (*D.*) *bicolor* Distant, 1890

Dichelops (*D.*) *leucostigmus* (Dallas, 1851)

Dichelops (*D.*) *miriamae* Grazia, 1978

Dichelops (*D.*) *nigrum* Bergroth, 1914

Dichelops (*D.*) *peruanus* Grazia, 1978

Dichelops (*D.*) *pradoi* Grazia, 1978

Dichelops (*D.*) *punctatus* Spinola, 1837

Dichelops (*D.*) *saltensis* Grazia, 1978

***Dichelops* (*Prodichelops*) Grazia, 1978**

Type species: *Diceraeus divisus* Walker, 1867

Dichelops (*Prodichelops*) *divisus* (Walker, 1867)

Diceraeus* Dallas, 1851 *stat. nov.

Type species: *Diceraeus melacanthus* Dallas, 1851

Diceraeus caatinguensis (Grazia & Poock-da-Silva, 2013) **nov. comb.**

Diceraeus furcatus (Fabricius, 1775) **nov. comb.**

Diceraeus lobatus (Grazia, 1978) **nov. comb.**

Diceraeus melacanthus Dallas, 1851 **stat. nov.**

Diceraeus phoenix (Grazia, 1978) **nov. comb.**

Conclusions

Rescaling continuous characters, combining datasets, and downweighting homoplasy has great influence on tree topology. Our results showed that the phylogentic component of the continuous characters employed are low, but still enough for adding support to nodes closer to tips. The factors most influencing analyses were firstly, weighting method and, secondarily, datasets according to the different tree comparison metrics.

Dichelops was found paraphyletic in all not-constrained analyses. Results support *Dichelops* as comprising the subgenera *Dichelops* and *Prodichelops*, and the new generic status of *Diceraeus*. Conclusions about sister group relationships are still clouded by low values of branch support. However, to the exception of *Euschistus*, every genus with more than one species included in the analyses were recovered monophyletic with high values (>50%) of jackknife frequencies.

This is the first phylogenetic analysis of a pentatomid genus, under up-to-date cladistics methods, concerned in sampling a broad outgroup within a tribe. As such, can shed light on morphological diversity under phylogenetic analysis and on the necessity of broad taxonomic sampling for future taxonomic and systematic decisions on the group.

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Table 1. Summary of analyses results.

						Jackknife	
Analyses	**#MPT**	**Length**	**Adjusted Homoplasy**	**CI**	**RI**	**Absolute Frequency**	**GC**
A	6	878	-	0.194	0.624	43.9	48.4
B	1	917.842		0.195	0.618	48.8	50
C	1	-	33.73161	0.192	0.621	49.4	49.4
D	1	-	33.86172	0.194	0.615	48.6	50
E	1	-	0.68842	0.455	0.786	17.3	18.3
AC	4	884	-	0.192	0.621	47.4	52.3
BC	1	924.603	-	0.194	0.615	52.7	54.5
CC	1	-	33.93576	0.191	0.617	55.5	53.8
DC	1	-	34.07655	0.193	0.612	54.4	54.6
EC	1	-	0.78547	0.42	0.753	20.4	20.1

#MPT, number of most parsimonious trees; Length, number of steps of tree; CI, Consistency Index; RI, Retention Index.

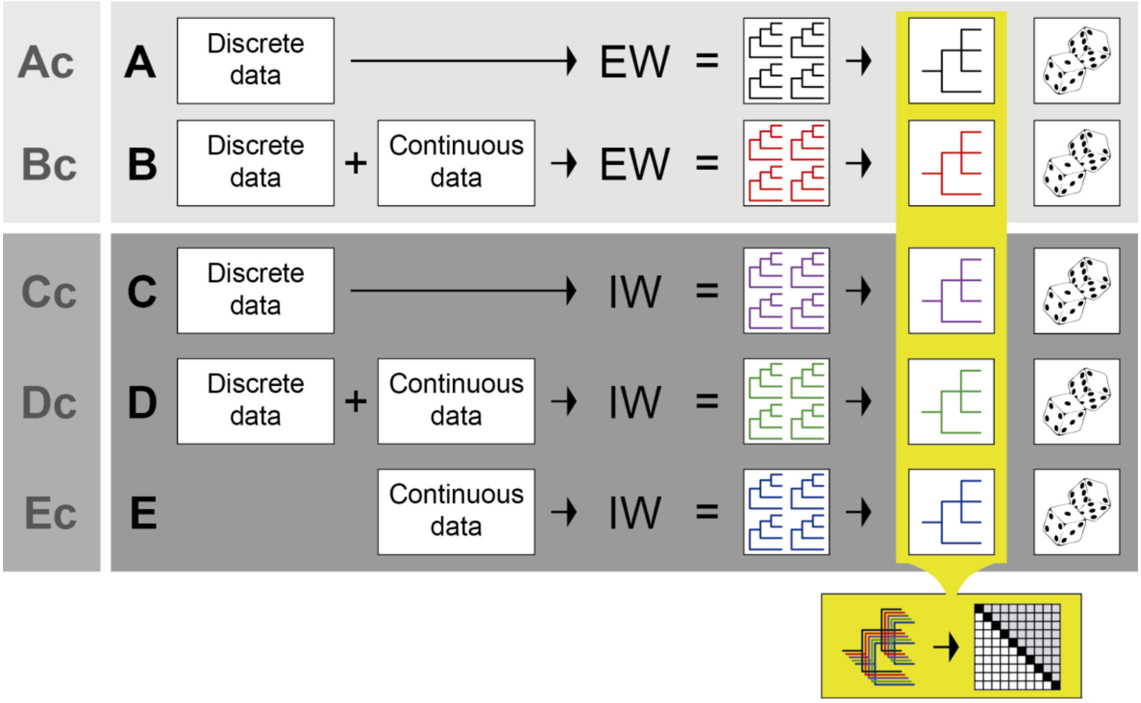
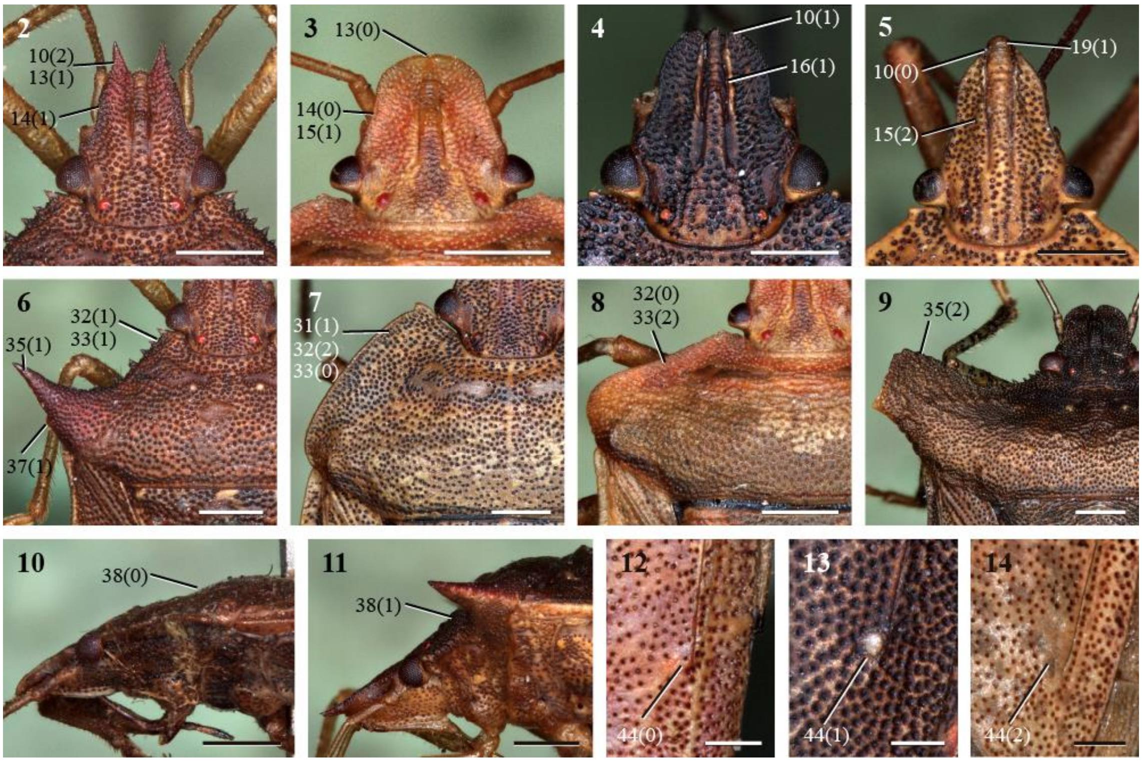
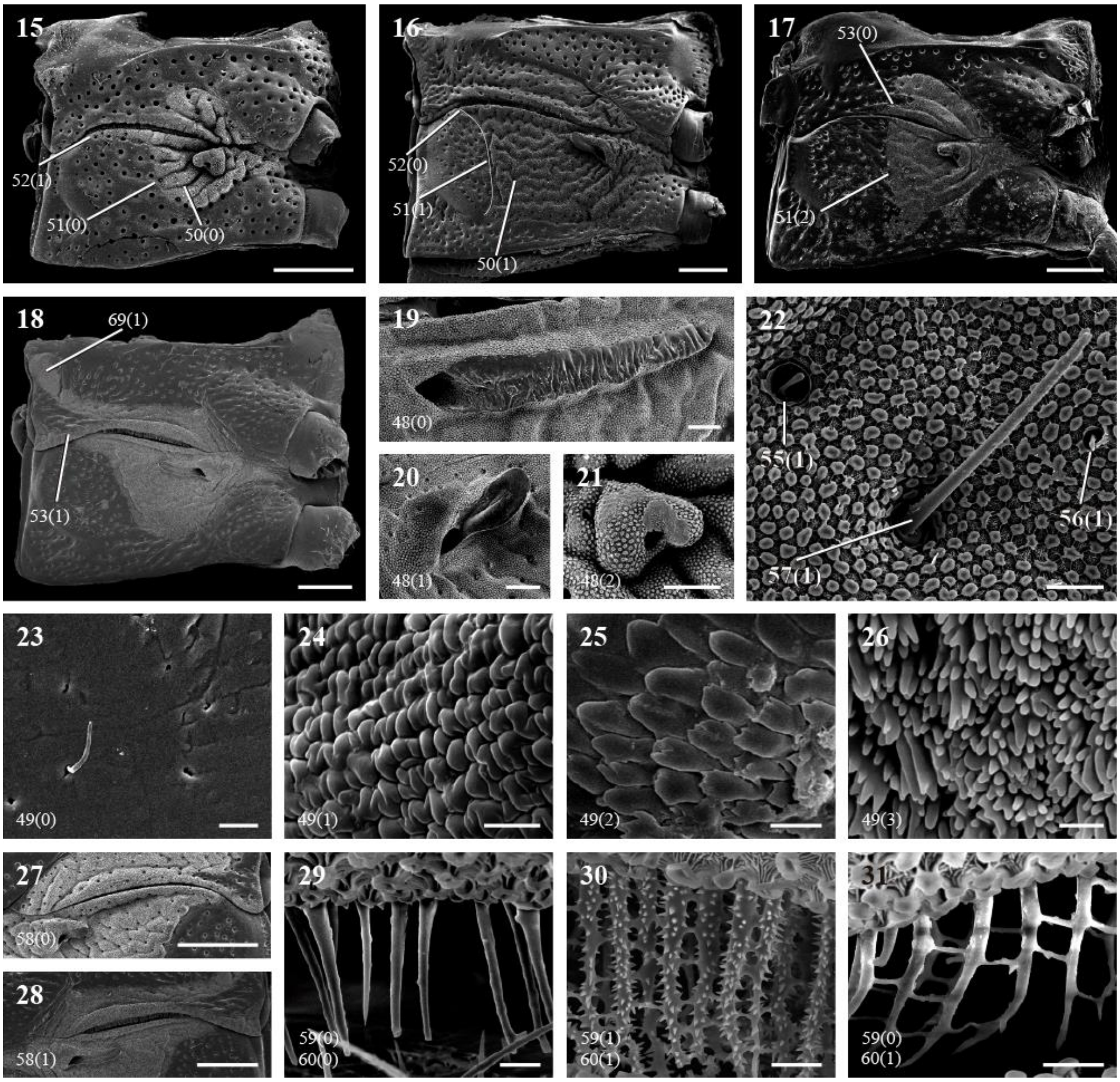


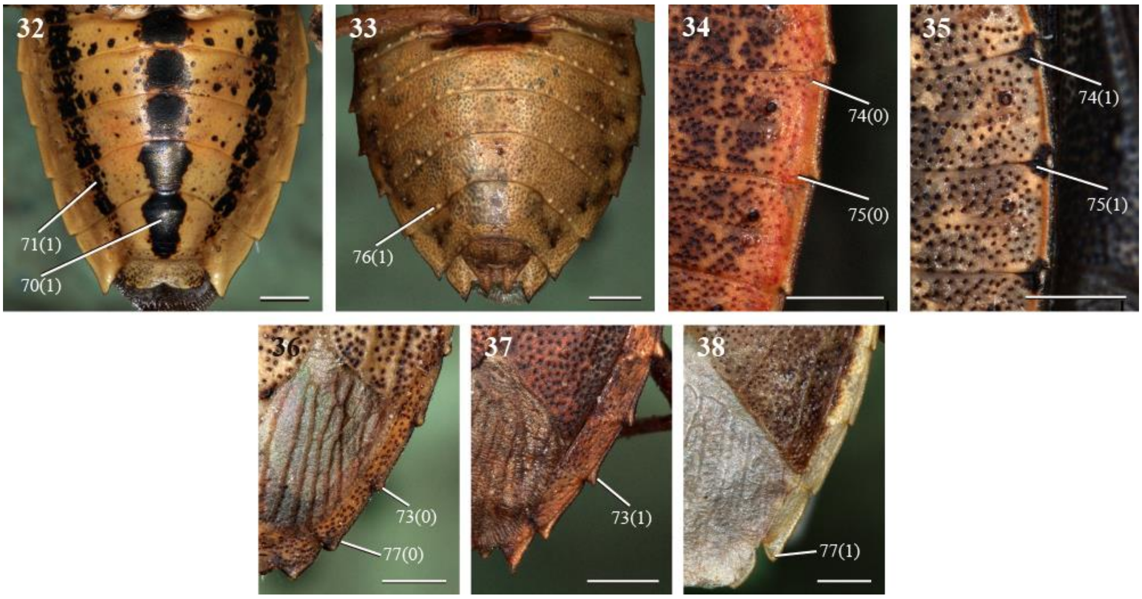
Fig. 1. Scheme of 10 analyses performed with different matrices and weighting algorithms. Three matrices (discrete data only, continuous data only and discrete + continuous data) were analyzed under the same searching parameters, however, with varying weighting criteria (EW, equal weights, and IW, implied weights), corresponding to analyses A-E. The consensus of the resultant most parsimonious trees were calculated for each analysis, as well as stability of nodes by Jackniffe with symmetric sampling recording absolute-group and GC frequencies. The same set of analyses were performed forcing *Dichelops* monophyly (analyses Ac-Ec). The resultant 10 consensus were then compared by Coefficient Distances and Robinson-Foulds distances.



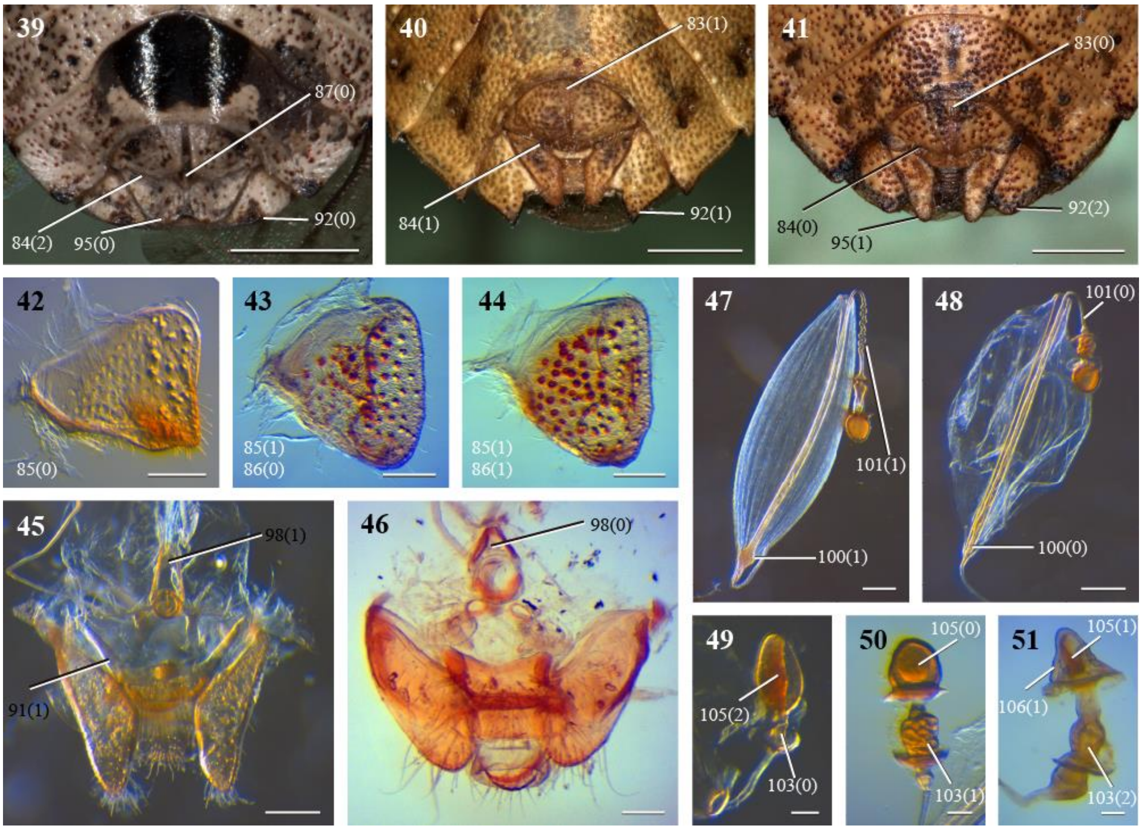
Figs. 2-14. Illustration of thoracic characters. (2-5) head in dorsal view; (2) *Dichelops* (*Dichelops*) *leucostigmus*; (3) *Acledra albocostata*; (4) *Euschistus* (*Lycipta*) *sharpi*; (5) *Tibraca limbativentris*; (6-9) pronotum in dorsal view; (6) *Dichelops* (*Dichelops*) *leucostigmus*; (7) *Menecles insertus*; (8) *Acledra albocostata*; (9) *Eushistus* (*Mitripus*) *grandis*; (10-11) head and prothorax in lateral view; (10) *Hypatropis sternalis*; (11) *Dichelops* (*Dichelops*) *leucostigmus*; (12-14) apex of radial vein on hemelytra; (12) *Carpocoris purpureipennis*; (13) *Dichelops* (*Dichelops*) *nigrum*; (14) *Dichelops* (*Diceraeus*) *melacanthus*. Scale bars: 2-11 = 1 mm; 12-14 = 10 µm



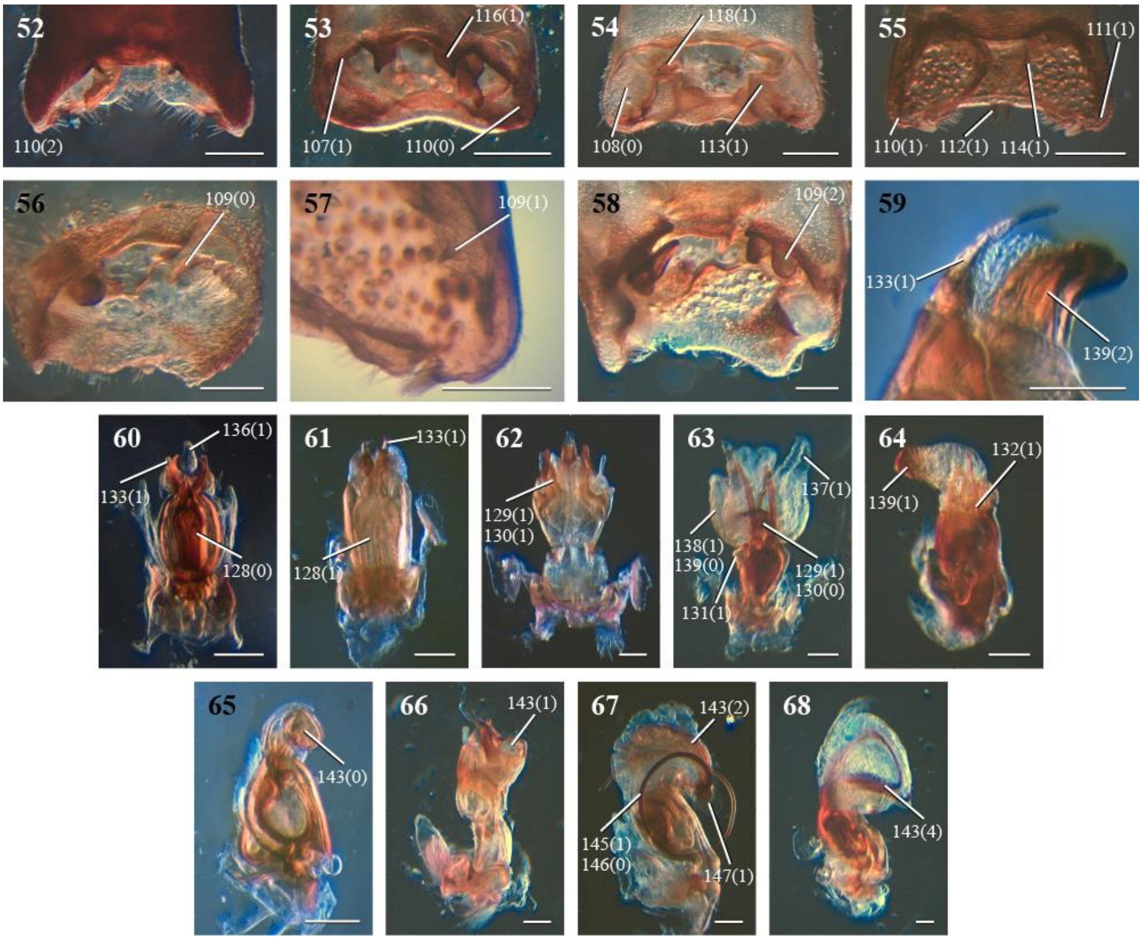
Figs. 15-31. Illustration of characters of external scent efferent system of mestasternal glands. (15-18) meso and meta pleura in ventral view; (15) *Glyphepomis setigera*; (16) *Dichelops* (*Dichelops*) *pradoi*; (17) *Coenus delia*; (18) *Dolycoris baccarum*; (19-21) peritreme; (19) *Carpocoris purpureipennis*; (20) *Proxys victor*; (21) *Glyphepomis setigera*; (22) evaporatorium surface, *Galedanta bituberculata*; (23-26) peritremal surface; (23) *Caribo fasciatus*; (24) *Acledra fraterna*; (25) *Agroecus scabricornis*; (26) *Spinalanx rolstoni*; (27-28) metathoracic spiracle; (27) *Hypatropis inermis*; (28) *Dolycoris baccarum*; (29-31) filtering system of metathoracic spiracle; (29) *Carpocoris purpureipennis*; (30) *Dichelops* (*Dichelops*) *peruanus*; (31) *Proxys victor*. Scale bars: 15-18, 27-28 = 500 µm; 19-21 = 100 µm; 22-26 = 5µm; 29-31 = 10 µm.



Figs. 32-38. Illustration of abdominal characters. (32-33) abdomen in ventral view; (32) *Padaeus trivittatus*; (33) *Dichelops* (*Diceraeus*) *melacanthus*; (34-35) lateral margin of 4th and 5th abdominal sternites; (34) *Dichelops* (*Dichelops*) *bicolor*; (35) *Dichelops* (*Prodichelops*) *divisus*; (36-38) lateral margin of 5-7th abdominal segments in dorsal view; (36) *Agroecus scabricornis*; (37) *Dichelops* (*Dichelops*) *punctatus*; (38) *Euschistus* (*Euschistus*) *variolarius*. Scale bars: 1 mm.



Figs. 39-51. Illustration of female genital characters. (39-41) external genitalia; (39) *Caribo fasciatus*; (40) *Dichelops* (*Diceraeus*) *melacanthus*; (41) *Hymenarcis nervosa*; (42-44) gonocoxite 8; (42) *Dichelops* (*Diceraeus*) *furcatus*; (43) *Dichelops* (*Dichelops*) *peruanus*; (44) *Dichelops* (*Dichelops*) *bicolor*; (45-46) dissected genital plates; (45) *Dichelops* (*Diceraeus*) *furcatus*; (46) *Dolycoris baccarum*; (47-51) spermatheca; (47) *Hymenarcis nervosa*; (48) *Dichelops* (*Diceraeus*) *melacanthus*; (49) *Cosmopepla decorata*; (50) *Dichelops* (*Diceraeus*) *furcatus*; (51) *Dichelops* (*Dichelops*) *peruanus*. Scale bars: 39-41 = 1 mm; 42-48 = 0.3 mm; 49-51 = 0.1 mm.



Figs. 52-68. Illustration of male genital characters. (52-55) pygophore in dorsal view; (52) *Dolycoris baccarum*; (53) *Mormidea maculata*; (54) *Tibraca limbativentris*; (55) *Dichelops* (*Dichelops*) *avilapiresi*; (56-58) pygophore in latero-dorsal view; (56) *Dichelops* (*Diceraeus*) *melacanthus*; (57) *Dichelops* (*Dichelops*) *avilapiresi*; (58) *Euschistus* (*Mitripus*) *grandis*; (59) apex of phallus in lateral view, *Dichelops* (*Dichelops*) *leucostigmus*; (60-63) phallus in dorsal view; (60) *Dichelops* (*Diceraeus*) *caatinguensis*; (61) Dichelops (Dichelops) saltensis; (62) *Tibraca limbativentris*; (63) *Berecynthus hastator*; (64-68) phallus in lateral view; (64) *Cosmopepla decorata*; (65) *Dichelops* (*Diceraeus*) *melacanthus*; (66) *Tibraca limbativentris*; (67) *Hymenarcis nervosa*; (68) *Berecynthus hastator*. Scales: 39-45 = 0.5 mm; 47-50 = 0.3 mm; 46, 51-55 = 0.2 mm.

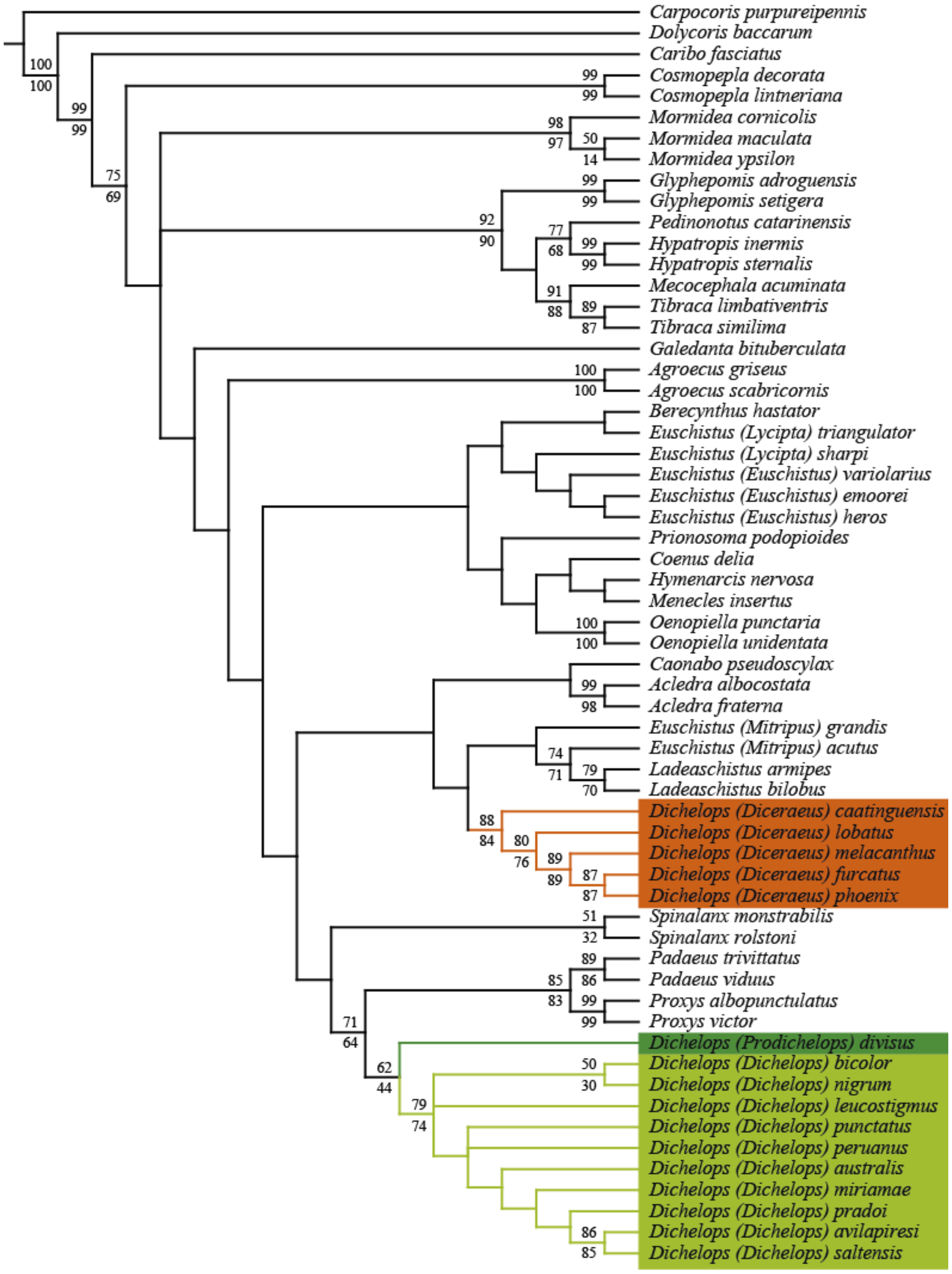


Fig. 69. Strict consensus of six equally parsimonious cladograms resultant of Analysis A (discrete characters only, equal weights). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. S: 878; CI: 0.19; RI: 0.624.

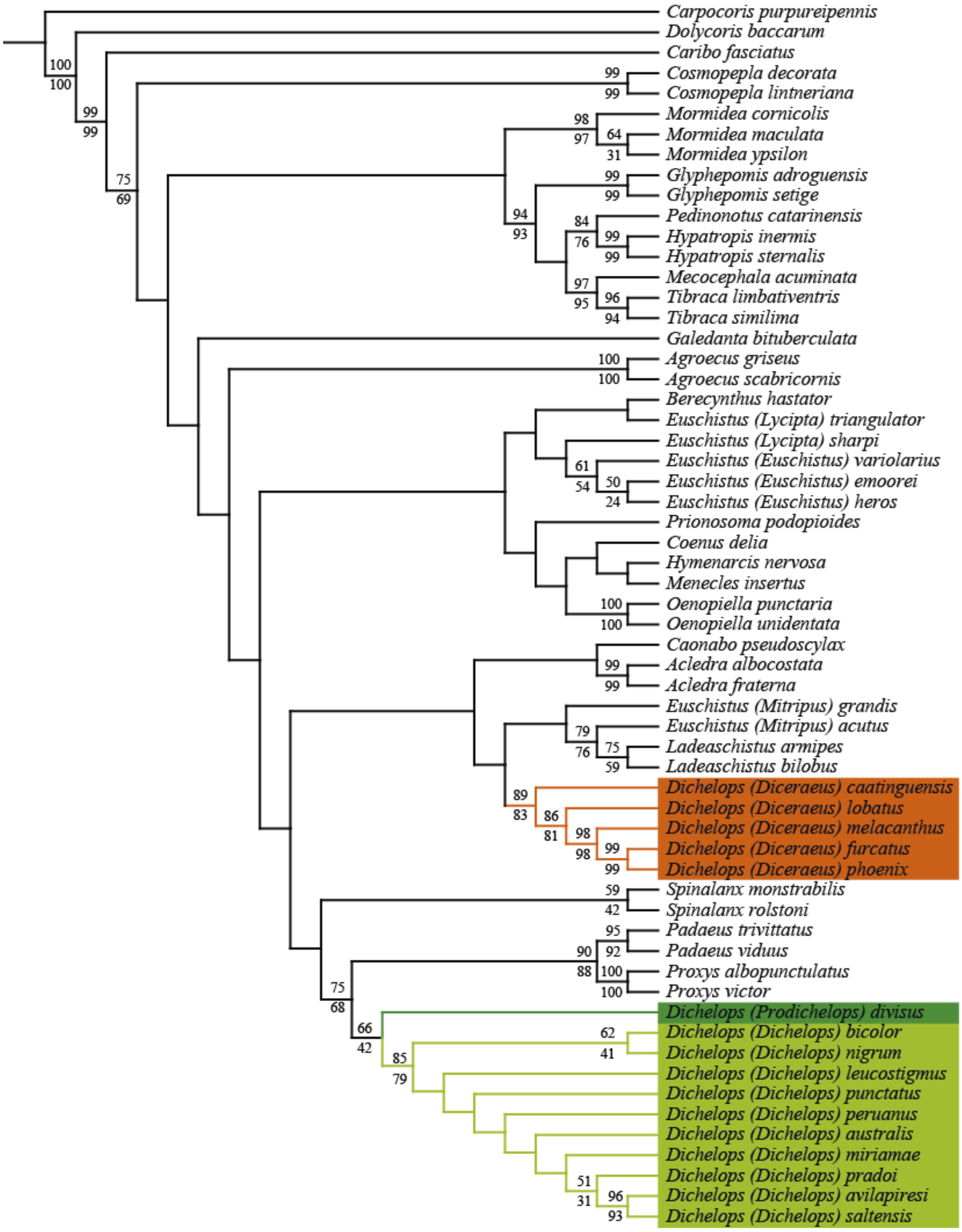


Fig. 70. Cladogram resultant of Analysis B (discrete + continuous characters, equal weights). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. S: 917.842; CI: 0.195; RI: 0.618.

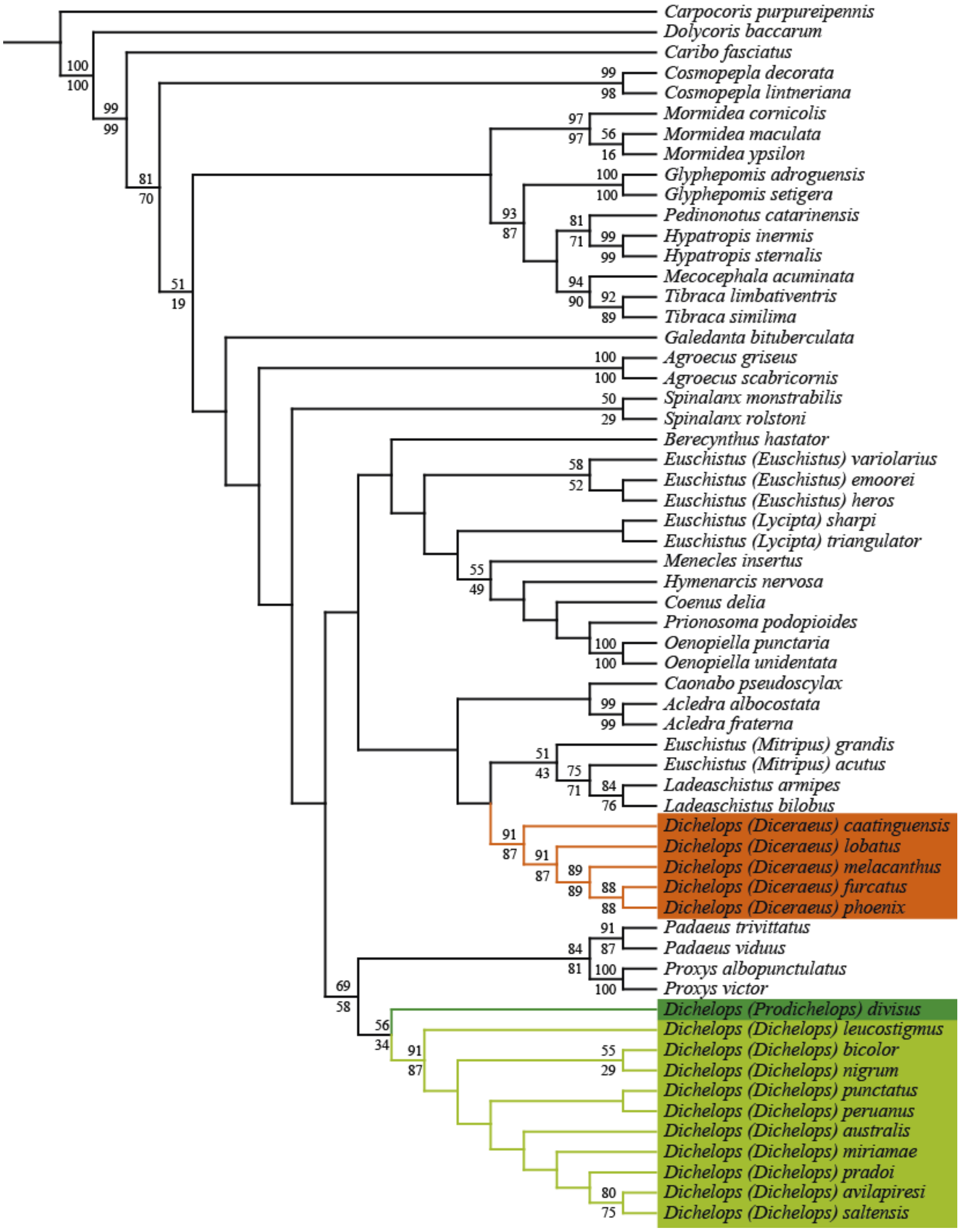


Fig. 71. Cladogram resultant of Analysis C (discrete characters only, implied weights). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. F: 33.73161; CI: 0.192; RI: 0.621.

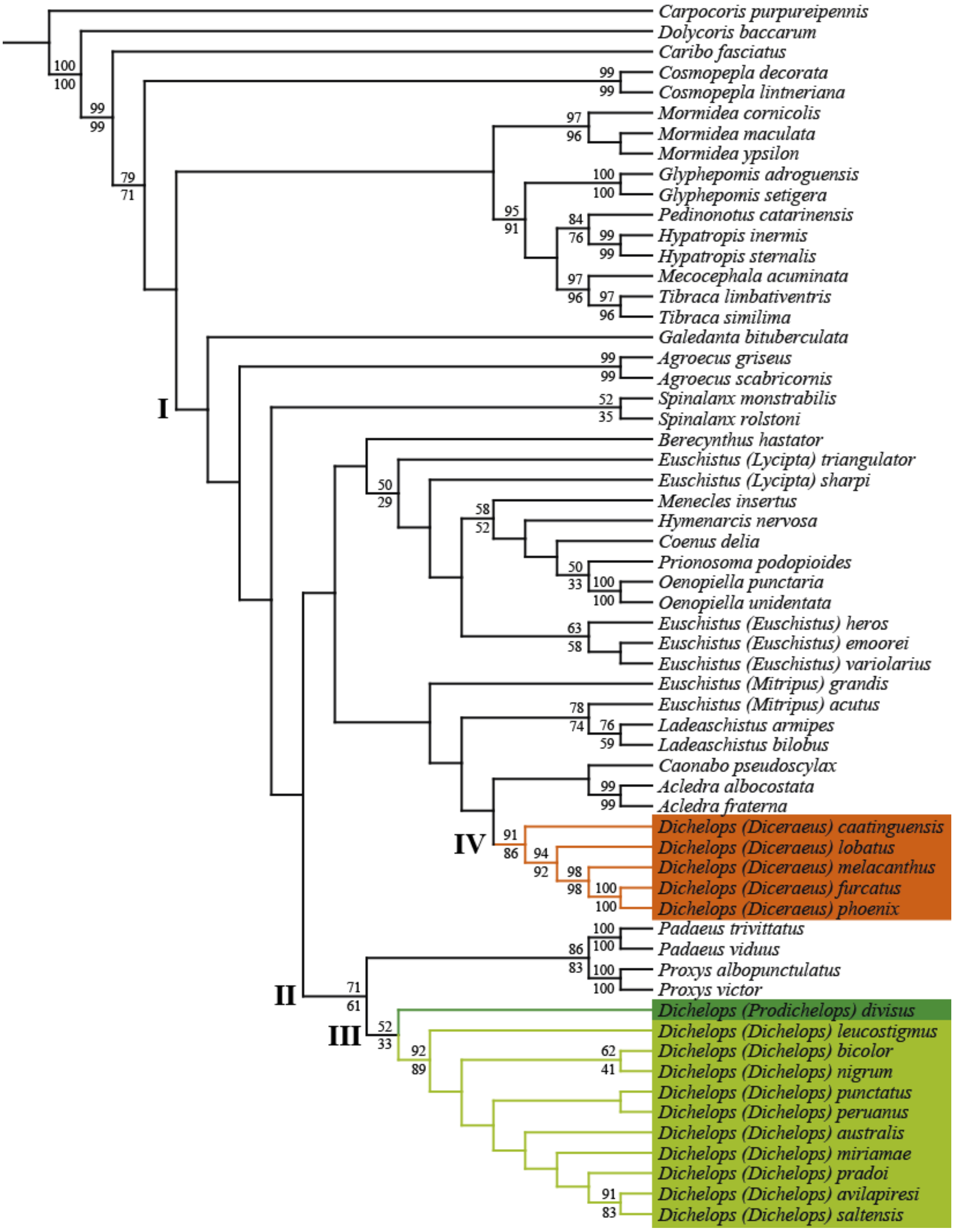


Fig. 72. Cladogram resultant of Analysis D (discrete + continuous characters, implied weights). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. F: 33.86172; CI: 0.194; RI: 0.615.

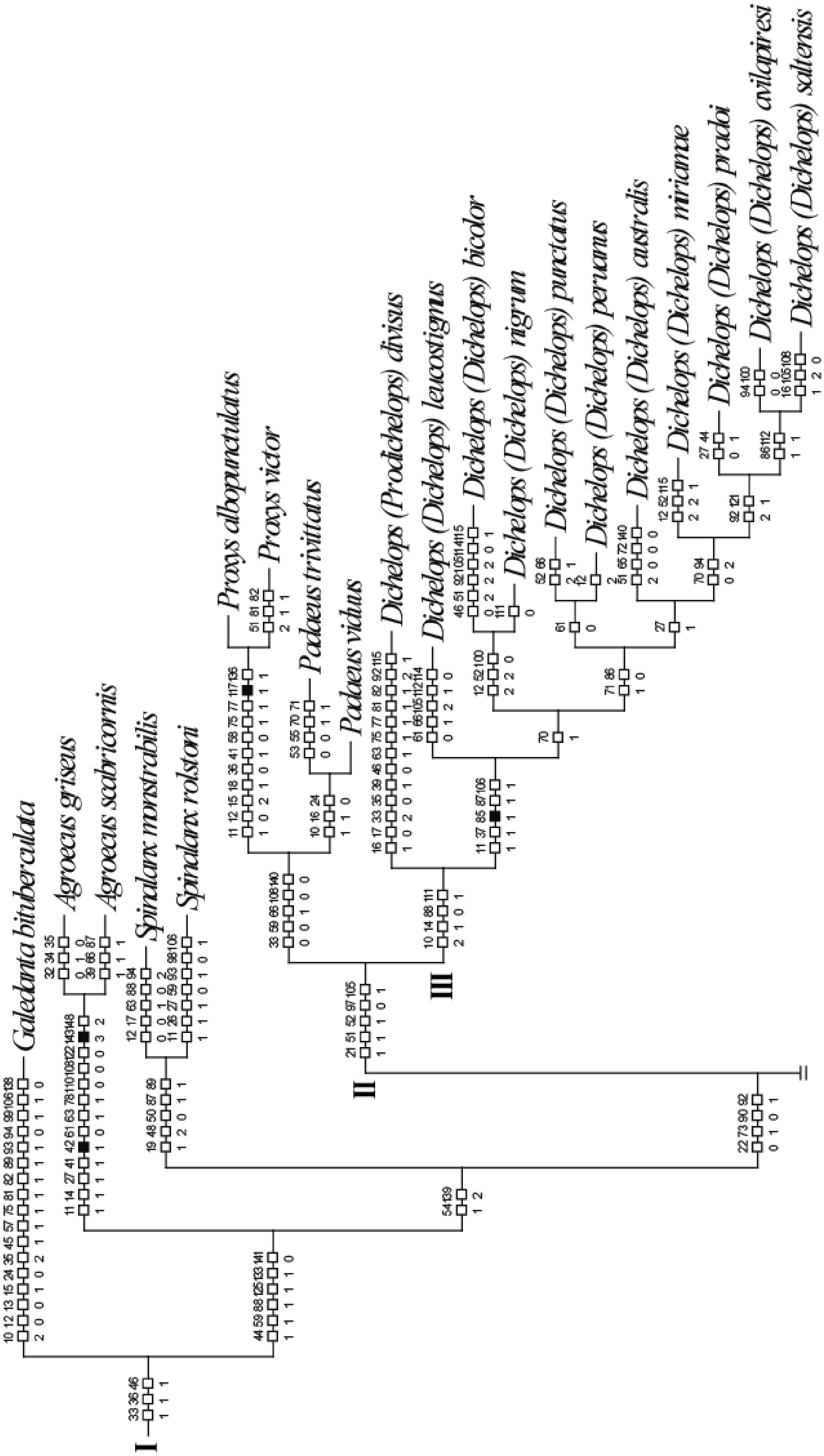


Figure 73a. Optimization of discrete characters on tree resultant of analysis D.

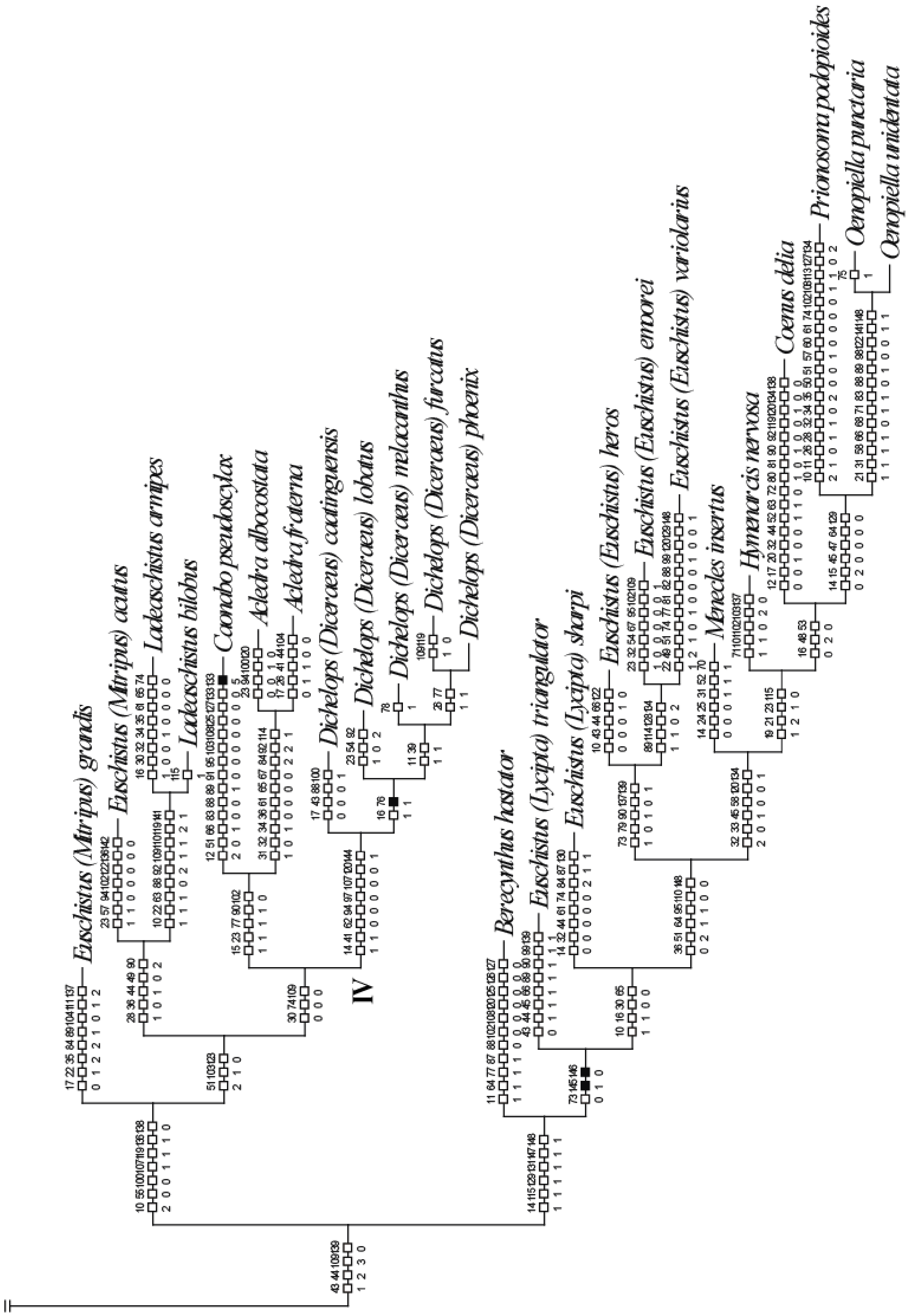


Figure 73b. (Continuation) Optimization of discrete characters on tree resultant of analysis D.

CONCLUSÕES

No Capítulo I escrevemos uma resposta ao trabalho de Memon et al. (2010), que versava sobre uma análise filogenética de Halyini ocorrentes no sub-continente Indo-Paquistanês. Concluimos que análises filogenéticas em Pentatomidae deveriam, preferencialmente, incluir grupos externos mais representativos, a fim de melhor testar as hipóteses de monofilia, e utilizar procedimentos metodológicos claros em todas as etapas das análises filogenéticas.

No Capítulo II, estudamos comparativamente a morfologia de algumas estruturas da tíbia das pernas anteriores de Pentatomidae, tendo sido amostradas 81 espécies (55 gêneros) representantes de sete subfamílias. A titulo de comparação estudamos Scutelleridae e Thyreocoridae, representadas por três e 10 espécies, respectivamente. Concluimos que a estrutura pré-tarsal em Pentatomidae é pouco variável e que não permite a identificação de grupos taxonômicos, à exceção de Phyllocephalinae que apresenta pulvilos distintos. Por outro lado, algumas características pré-tarsais permitem diferenciar o pré-tarso de Thyrecoridae do pré-tarso das outras duas famílias: em Thyreocoridae foi observado um vinco na face interna das garras, característica não observada nas demais famílias estudadas. As outras estruturas estudadas foram o aparato tibial e o pente tibial; ambas estruturas são formadas por projeções cuticulares, a primeira por cerdas espessas organizadas lado a lado e a segunda por projeções espatulares do tegumento organizadas em linha. Não observamos diferenças no aparato tibial tanto entre quanto dentre famílias. Por outro lado, o número de cerdas que compõem o aparato tibial varia consideravelmente dentro de Pentatomidae, possuindo um padrão por subfamílias, e entre subfamílias. Sugerimos que o número de cerdas do aparato tibial e o número de projeções espatulares do pente tibial sejam usadas e exploradas como caracteres contínuos em análises filogenéticas em níves supra-genéricos.

No Capítulo III, descrevemos uma nova espécie de *Dichelops* (*Diceraeus*) Dallas, 1851 e o macho de *Dichelops* (*Prodichelops*) *divisus* (Walker, 1867). A descrição da genitália masculina de *D*. (*P*.) *divisus* permitiu reconhecer que este é mais similar à genitália de *Dichelops* (*Dichelops*) Spinola, 1837, pela presença de processo superior do bordo dorsal triangular, parâmeros falciformes e ângulos póstero-laterais com tufos de cerdas. *Dichelops* (*D.*) *caatinguensis* Grazia & Poock-da-Silva, 2013 foi descrita com base em espécimes provenientes da Caatinga. A descrição dessa espécie ampliou a distribuição do gênero para essa eco-região e também ampliou a diversidade morfológica do subgênero: *D. caatinguensis* é única no subgênero por possuir calo arrendondado no ápice do escutelo e manchas escuras nas margens anteriores e posteriores do conexivo, nos machos, processo ventral da conjuntiva no pênis e, nas fêmeas, gonocoxitos 9 côncavos posteriormente. A descrição desta espécie para uma região onde até então o gênero não ocorria traz a atenção para a importância de coletas e do estudo da fauna de regiões pouco exploradas, como a Caatinga.

No Capítulo IV, investigamos as relações filogenéticas de *Dichelops*. O gênero foi sempre recuperado parafilético. Os resultados suportam *Dichelops* como formado pelos subgêneros *Dichelops* e *Prodichelops* e o novo status genérico de *Diceraeus*. Conclusões sobre as relações de parentesco ainda são obscurecidas por baixo valores de suporte para os clados. Entretanto, excetuando-se *Euschistus*, a monofilia de todos os gêneros amostrados por mais de uma espécie foi recuperada com altos valores de suporte por frequências de Jackknife (>50%). Também, ao explorar as diferentes análises, concluiu-se que reescalonar caracteres contínuos, combinar os conjuntos de dados contínuos e discretos e pesar os caracteres contra homoplasia tiveram grande influência nas análises. Os resultados demonstraram que o componente filogenético nos caracteres contínuos é pequeno, mas que ainda assim é suficiente para adicionar suporte aos nós próximos aos terminais. Conforme as métricas de comparações de árvores, os fatores que mais influenciaram as análises foram, primeiramente, os métodos de pesagem de caracteres e, secundariamente, o conjunto de dados (somente caracteres discretos, somente caracteres contínuos, ou matrizes combinadas).

APÊNDICE I

Material suplementar ao Capítulo II

Comparative morphology of selected characters in the Pentatomidae foreleg (Hemiptera: Heteroptera)

Table S1. List of examined species. The Pentatomidae clasification follows Grazia et al. (2008) and Rider (2012) for subfamilies and tribes, respectively.

Family	Subfamily	Tribe	Species
Pentatomidae	Aphylinae		Aphylinae sp.
	Asopinae		*Alcaeorrhynchus grandis* (Dallas, 1851)
			Oplomus cruentus (Burmeister, 1835)
			Oplomus salamandra (Burmeister, 1835)
			Podisus connexivus Bergroth, 1891
	Cyrtocorinae		*Cyrtocoris egeris* Packauskas & Schaefer, 1998
			Cyrtocoris trigonus (Germar, 1839)
	Discocephalinae	Discocephalini	*Antiteuchus mixtus* (Fabricius, 1787)
			Eurystethus microlobatus Ruckes, 1966
		Ochlerini	*Alitocoris parvus* (Distant, 1880)
			Catulona pensa Rolston, 1992
			Lincus securiger Breddin, 1904
	Edessinae		*Brachystethus geniculata* (Fabricius, 1787)
			Brachystethus vexillum Breddin, 1903
			Edessa quadridens Fabricius, 1803
			Edessa rufomarginata (De Geer, 1773)
			Lopadusa (Lopadusa) augur Stål, 1860
			Olbia elegans (Stål, 1862)
	Pentatominae	Antestiini	*Antestia ellenriederi* Breddin, 1900
			Antestiopsis anchora (Thunberg, 1783)
			Plautia stali Scott, 1874
			Starioides degenera (Walker, 1867)
		Carpocorini	*Acledra albocostata* (Spinola, 1852)
			Agonoscelis nubilis (Fabricius, 1775)
			Agroecus griseus Dallas, 1851
			Berecynthus hastator (Fabricius, 1794)
			Coenus delius (Say, 1831)
			Cosmopepla decorata (Hahn, 1834)
			Dichelops (Diceraeus) furcatus (Fabricius, 1775)
			Dichelops (Diceraeus) melacanthus (Dallas, 1851)
			Dichelops (Dichelops) punctatus Spinola, 1837
			Dichelops (Dichelops) saltensins Grazia, 1978

	Dichelops (Prodichelops) divisus (Walker, 1867)
	Diploxys sp.
	Dolycoris baccarum (Linnaeus, 1758)
	Hypatropis inermis (Stål, 1872)
	Mormidea quinqueluteum (Lichtenstein, 1796)
	Mormidea ypsilon (Linnaeus, 1758)
	Oebalus poecilus (Dallas, 1851)
	Tibraca limbativentris Stål,1860
Catacanthini	*Arocera apta* (Walker, 1867)
	Arocera contalineata Pirán, 1955
	Rhyssocephala infuscata (Rider, 1992)
	Rhyssocephala rufolimbata (Stål, 1872)
	Runibia decorata (Dallas, 1851)
	Runibia perspicua (Fabricius, 1798)
Chlorocorini	*Arvelius albopunctatus* (De Geer, 1773)
	Chlorocoris (Chlorocoris) complanatus Guérin-Méneville, 1831
	Chlorocoris (Chlorocoris) distinctus Signoret, 1851
	Chlorocoris (Monochricerus) flaviviridis Barber, 1914
	Chlorocoris (Monochricerus) subrugosus Stål, 1872
	Chloropepla rolstoni Grazia-Vieira, 1973
	Chloropepla vigens (Stål, 1860)
	Loxa deducta Walker, 1867
	Loxa flavicollis (Drury, 1773)
	Rhyncholepta grandicallosa Bergroth, 1911
	Rhyncholepta meinanderi Becker & Grazia-Vieira, 1971
Pentatomini	*Banasa dolabrata* Thomas, 1988
	Banasa patagiata (Berg 1879)
	Banasa zeteki Sailer, 1959
	Janeirona stali (Kormilev, 1956)
	Lelia octopunctata (Dallas, 1849)
	Myota aerea (Herrich-Schäffer, 1842)
	Neotibilis (Laeviscutis) compascens
	Neotibilis (Neotibilis) parva (Distant, 1893)
	Pallantia macula (Dallas, 1851)
	Pallantia macunaima Grazia, 1980
	Pellaea stictica (Dallas, 1851)
	Pentatoma japonica (Distant, 1882)
	Pentatoma metallifera (Motschulsky, 1859)
	Pentatoma rufipes (Linnaeus, 1758)
	Phalaecus pustulatus de Geer, 1773
	Taurocerus achilles (Stål, 1862)
Procleticini	*Dendrocoris arizonensis* Barber, 1911
	Dendrocoris pini Montandon, 1893
	Lobepomis peltifera Berg, 1891
	Thoreyella cornuta Berg, 1883
	Thoreyella trinotata Berg, 1878

		Rhynchocorini	*Biprorulus bibax* Breddin, 1900
			Cuspicona simplex Walker, 1867
	Phyllocephalinae		*Macrina juvenca* (Burmeister, 1835)
Scutelleridae			*Augocoris gomesi* Burmeister, 1835
			Orsilochides leucoptera (Germar, 1839)
			Pachycoris torridus Scopoli, 1772
Thyreocoridae	Corimelaeninae		*Corimelaena (Corimelaena) tibialis (Fabricius, 1803)*
			Corimelaena (Parapora) extensa Uhler, 1867
			Cydnoides (Cydnoides) ciliatus Uhler, 1863
			Cydnoides (Cydnoides) renormatus (Uhler, 1895)
			Galgupha (Euryscytus) difficilis (Breddin, 1914)
			Galgupha (Galgupha) atra Amyot&Serville, 1843
			Galgupha (Gyrocnemis) cruralis (Stål, 1862)
			Galgupha (Microcompsus) vinculata (Germar, 1839)
			Galgupha (Nothocoris) terminalis (Walker, 1867)
	Thyreocorinae		*Thyreocoris scarabaeoides* (Linnaeus, 1758)

Table S2. List of examined specimens.

Classification							Data collection					
Family	**Subfamily**	**Tribe**	**Genus**	**Subgenus**	**Species**	**Sex**	**Country**	**State/Province**	**Locality**	**Data**	**Colector**	**Collection**
Pentatomidae	Aphylinae									V.1967	R. Edwards	S. A. Museum
Pentatomidae	Asopinae		Alcaeorrynchus		grandis	F	Venezuela	Zulia	Snza. Rosa Dzo. Colon	19.II.1961	N. Ange & R. Veja	MIZA
Pentatomidae	Asopinae		Alcaeorrynchus		grandis	M	Venezuela	Aragua	Ramizito	1.X.1945	FFY & FDR	MIZA
Pentatomidae	Asopinae		Oplomus		cruentus	F	Brazil	Rio Grande do Sul	Estação Ecológia do Taim	18.III.1982	J. Grazia	UFRG
Pentatomidae	Asopinae		Oplomus		cruentus	M	Brazil	Rio Grande do Sul	Rio Grande	04.II.1981	J. Grazia	UFRG
Pentatomidae	Asopinae		Oplomus		cruentus	M	Brazil	Rio Grande do Sul	Rio Grande	05.II.1981	J. Grazia	UFRG
Pentatomidae	Asopinae		Oplomus		salamandra	F	Venezuela	Aragua	Rancho Grande	3.VIII.1953	Ferd. Kern	MIZA
Pentatomidae	Asopinae		Oplomus		salamandra	M	Brazil	Pará	Bujaru	24.III.1978	M. Carvalho	UFRG
Pentatomidae	Asopinae		Oplomus		salamandra	M	Brazil	Pará	Serra Norte	18.X.1984	T. Pimentel	UFRG
Pentatomidae	Asopinae		Podisus		connexivus	M	Brazil	Rio Grande do Sul	Derrubadas	16.IV.1983	S. Bonatto	UFRG
Pentatomidae	Asopinae		Podisus		connexivus	M	Brazil	Rio Grande do Sul	Derrubadas	22.XII.1982	S. Bonatto	UFRG
Pentatomidae	Asopinae		Podisus		connexivus	M	Brazil	Rio Grande do Sul	Derrubadas	22.XII.1982	S. Bonatto	UFRG
Pentatomidae	Asopinae		Podisus		mellipes	F	Venezuela	Zulia	Kasmera	19.IX.1961	C.J. RosaUFRG & F. Fernandez	MIZA
Pentatomidae	Asopinae		Podisus		mellipes	M	Brazil	Rio Grande do Sul	Porto Alegre	19.V.1954		MGAP
Pentatomidae	Cyrtocorinae		Cyrtocoris		egeris		Brazil	Rio Grande do Sul	Maquiné, Garapiá	21.XII.2006	L.M. Weiler & R.C. Bins-Neto	UFRG
Pentatomidae	Cyrtocorinae		Cyrtocoris		egeris		Brazil	Rio Grande do Sul	Maquiné, Trilha 4	02.IV.2006	J.L.C. Bernardes	UFRG
Pentatomidae	Cyrtocorinae		Cyrtocoris		egeris		Brazil	Rio Grande do Sul	Maquiné, Trilha 4	02.IV.2006	J.L.C. Bernardes	UFRG
Pentatomidae	Cyrtocorinae		Cyrtocoris		trigonus	M	Brazil	Espírito Santo	Linhares	8.VII.1995	A.J. Cardoso	UFRG
Pentatomidae	Cyrtocorinae		Cyrtocoris		trigonus	M	Brazil	Espírito Santo	Linhares	8.VII.1995	A.J. Cardoso	UFRG
Pentatomidae	Cyrtocorinae		Cyrtocoris		trigonus	M	Brazil	Espírito Santo	Linhares	8.VII.1995	A.J. Cardoso	UFRG
Pentatomidae	Discocephalinae	Discocephalini	Antiteuchus		mixtus	F	Brazil	Pará	Belém, EMBRAPA-CPATU	15.I.1997	J.A.M. Fernandes	UFRG
Pentatomidae	Discocephalinae	Discocephalini	Antiteuchus		mixtus	F	Brazil	São Paulo	Campinas, Taquaral	18.V.1977	I. Sagima	UFRG
Pentatomidae	Discocephalinae	Discocephalini	Antiteuchus		mixtus	M	Brazil	Espírito Santo	São Mateus	5.VI.1992	A.D. Araújo	UFRG
Pentatomidae	Discocephalinae	Discocephalini	Antiteuchus		mixtus	M	Brazil	São Paulo	Campinas	26.III.1976		UFRG
Pentatomidae	Discocephalinae	Discocephalini	Eurystethus		microlobates	F	Brazil	Minas Gerais	Santana do Riacho	X.2007	T.J.A. Guerra	UFRG
Pentatomidae	Discocephalinae	Discocephalini	Eurystethus		microlobates	F	Brazil	Minas Gerais	Santana do Riacho	X.2007	T.J.A. Guerra	UFRG
Pentatomidae	Discocephalinae	Discocephalini	Eurystethus		microlobates	M	Brazil	Minas Gerais	Santana do Riacho	X.2007	T.J.A. Guerra	UFRG
Pentatomidae	Discocephalinae	Discocephalini	Eurystethus		microlobates	M	Brazil	Minas Gerais	Santana do Riacho	X.2007	T.J.A. Guerra	UFRG

Pentatomidae	Discocephalinae	Ochlerini	Alitocoris		parvus	F	Ecuador	Napo	Puerto Misahuali	6-19.IX.1998	J.E. Eger	J. E. Eger
Pentatomidae	Discocephalinae	Ochlerini	Alitocoris		parvus	F	Venezuela	Zulia	Kasmera	23.IX.1961	F. Fernandes & C.J. RosaUFRG	MIZA
Pentatomidae	Discocephalinae	Ochlerini	Alitocoris		parvus	M	Costa Rica	Puntarenas	Las Cruces, near San Vito	24-27.V.1988	B. Ratcliffe & M. Jameson	UFRG
Pentatomidae	Discocephalinae	Ochlerini	Alitocoris		parvus	M	Ecuador	Napo	Puerto Misahuali	6-19.IX.1998	J.E. Eger	J. E. Eger
Pentatomidae	Discocephalinae	Ochlerini	Catulona		pensa	F	Brazil	Rio Grande do Sul	Caxias do Sul	11.I.2012	L.A. Campos	UFRG
Pentatomidae	Discocephalinae	Ochlerini	Catulona		pensa	M	Brazil	Rio Grande do Sul	Caxias do Sul	11.I.2012	L.A. Campos	UFRG
Pentatomidae	Discocephalinae	Ochlerini	Lincus		securiges	F	Brazil	Pará	Moju			UFRG
Pentatomidae	Discocephalinae	Ochlerini	Lincus		securiges	F	Brazil	Pará	Moju			UFRG
Pentatomidae	Discocephalinae	Ochlerini	Lincus		securiges	M	Brazil	Pará	Moju			UFRG
Pentatomidae	Discocephalinae	Ochlerini	Lincus		securiges	M	Brazil	Pará	Moju			UFRG
Pentatomidae	Edessinae		Brachystethus		geniculata	F	Brazil	Rio Grande do Sul	Porto Alegre	13.VIII.1982	S. Bonatto	UFRG
Pentatomidae	Edessinae		Brachystethus		geniculata	M	Brazil	Rio Grande do Sul	Porto Alegre	13.VIII.1982	S. Bonatto	UFRG
Pentatomidae	Edessinae		Brachystethus		geniculata	M	Brazil	Rio Grande do Sul	Porto Alegre	13.VIII.1982	S. Bonatto	UFRG
Pentatomidae	Edessinae		Brachystethus		geniculata	M	Brazil	Rio Grande do Sul	Porto Alegre	13.VIII.1982	S. Bonatto	UFRG
Pentatomidae	Edessinae		Brachystethus		vexillum	F	Peru	Cusco	Machu Picchu	1.VII.1964	B. Malkin	MZSP
Pentatomidae	Edessinae		Brachystethus		vexillum	F	Peru	Cusco	Machu Picchu	1.VII.1964	B. Malkin	MZSP
Pentatomidae	Edessinae		Brachystethus		vexillum	F	Peru	Cusco	Pilhahuata	19.XII1952.	E. Woytkowski	USNM
Pentatomidae	Edessinae		Brachystethus		vexillum	M	Peru	Cusco	Pilhahuata	19.XII1952.	E. Woytkowski	USNM
Pentatomidae	Edessinae		Edessa		quadridens	F	Brazil	Pernambuco	Recife	IV-V.1991	K.G. Rehn	UFRG
Pentatomidae	Edessinae		Edessa		quadridens	F	Brazil	Pernambuco	Recife	IV-V.1991	K.G. Rehn	UFRG
Pentatomidae	Edessinae		Edessa		rufomarginata	F	Brazil	São Paulo	Caraguatatuba	10.III.1978	B. Amaral Filho	UFRG
Pentatomidae	Edessinae		Edessa		rufomarginata	M	Brazil	São Paulo	São Paulo	I.1992	G. Accacio	UFRG
Pentatomidae	Edessinae		Lopadusa	Lopadusa	algur	F	Brazil	São Paulo	Cantareira	17.II.1962	F. Hzlik	UFRG
Pentatomidae	Edessinae		Olbia		elegans	F	Brazil	Rio Grande do Sul	Estação Ecológia do Taim	16.III.1982	J. Grazia	UFRG
Pentatomidae	Edessinae		Olbia		elegans	M	Brazil	Rio Grande do Sul	Estação Ecológia do Taim	15.III.1982	J. Grazia	UFRG
Pentatomidae	Edessinae		Olbia		elegans	M	Brazil	Rio Grande do Sul	Estação Ecológia do Taim	16.III.1982	J. Grazia	UFRG
Pentatomidae	Pentatominae	Antestiini	Antestia		ellenriederi	F	Indonesia	Sumatra	Simpangempat	VII.1992		AMNH
Pentatomidae	Pentatominae	Antestiini	Antestiopsis		anchora	M	China	Hainan Sheng		1929		UFRG
Pentatomidae	Pentatominae	Antestiini	Plautia		stali	M	China			VI.1929		USNM
Pentatomidae	Pentatominae	Antestiini	Starioides		degenera	M	Indonesia	Sumatra	Simpangempat	VII.1992		USNM
Pentatomidae	Pentatominae	Rhynchocorini	Biprorulus		bibax	F	Australia	New South WaUFRG	Tregeagle	29.XII.1947	C.E. Chadwick	USNM
Pentatomidae	Pentatominae	Rhynchocorini	Biprorulus		bibax	F	Australia	New South WaUFRG	Tregeagle	29.XII.1947	C.E. Chadwick	USNM

Pentatomidae	Pentatominae	Rhynchocorini	Cuspicona		simplex	F	Australia		Nat Park Q McPherson Rge	15.III.1932	Harvard Exp.	AMNH
Pentatomidae	Pentatominae	Rhynchocorini	Cuspicona		simplex	M	Australia		Nat Park Q McPherson Rge	19.III.1932	Harvard Exp.	AMNH
Pentatomidae	Pentatominae	Carpocorini	Acledra		albocostata	F	Argentina	Chubut	El Maiten	8.II.1965	A. Kovacs	UFRG
Pentatomidae	Pentatominae	Carpocorini	Acledra		albocostata	F	Chile	Coquimbo	Condoriaco	10.XI.1964	L.E. Pena	UFRG
Pentatomidae	Pentatominae	Carpocorini	Agonoscelis		nubilis	F	India		Dobhalwalla	10.XI.1945		AMNH
Pentatomidae	Pentatominae	Carpocorini	Agonoscelis		nubilis	M	India			X.1951	P.S. Nathan	AMNH
Pentatomidae	Pentatominae	Carpocorini	Agroecus		griseus	F	Brazil	Amazonas	Uaupes	7-12.VII.1956	M. Alvarenga	MNRJ
Pentatomidae	Pentatominae	Carpocorini	Agroecus		griseus	M	Brazil	Paraná	Londrina	VI.2010	M. M. Rodrigues	UFRG
Pentatomidae	Pentatominae	Carpocorini	Berecynthus		hastator	F	Colombia	Amazonas	Leticia	2-7.IV.1975	D. Engleman	UFRG
Pentatomidae	Pentatominae	Carpocorini	Berecynthus		hastator	M	Brazil	Mato Grosso		17-22.III.1977	D. Engleman	UFRG
Pentatomidae	Pentatominae	Carpocorini	Coenus		delius	F	United States	New York	McLean	29.V.1915		MNRJ
Pentatomidae	Pentatominae	Carpocorini	Coenus		delius	M	United States	New York	Olean	5.IX.1913		MNRJ
Pentatomidae	Pentatominae	Carpocorini	Cosmopepla		decorata	F	United States	Texas	Culberso Co.	4.X.1982	E.G. Riley	AMNH
Pentatomidae	Pentatominae	Carpocorini	Cosmopepla		decorata	M	Mexico	Hidalgo	Mineral del Real del Monte	4.VIII.1982	C.W. & L. O'Brien & G. Wibmer	AMNH
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Diceraeus	furcatus	F	Brazil	Rio Grande do Sul	Bagé	27-30.III.2006	Cohen & Schwertner	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Diceraeus	furcatus	F	Brazil	Rio Grande do Sul	Derrubadas	20.XII.1982	S. Bonatto	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Diceraeus	furcatus	M	Brazil	Rio Grande do Sul	Derrubadas	20.XII.1982	S. Bonatto	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Diceraeus	furcatus	M	Brazil	Rio Grande do Sul	Derrubadas	22.XII.1982	S. Bonatto	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Diceraeus	furcatus	M	Brazil	São Paulo	Campinas	7.XI.1989	I. Boselli	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Diceraeus	melacanthus	F	Brazil	Paraná	Londrina	25.XI.1998	V.R. Chocorosqui	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Diceraeus	melacanthus	M	Brazil	Goiás	Minaçu, Serra da Mesa	19-30.XI.1996	L. Moura	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Diceraeus	melacanthus	M	Brazil	Rio Grande do Sul	Santa Maria	28.XII.1981	Link & Costa	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Dichelops	punctatus	F	Brazil	Rio de Janeiro	Rio de Janeiro	X.1944	Carvalho	MNRJ
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Dichelops	saltensis	F	Argentina	Tucuman	Tucuman	III.1959	Golbach	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Dichelops	saltensis	F	Argentina	Tucuman	Tucuman	III.1960	Golbach	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Dichelops	saltensis	M	Argentina	Tucuman	Tucuman	III.1959	Golbach	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Dichelops	saltensis	M	Argentina	Tucuman	Tucuman	III.1959	Golbach	UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Prodichelops	divisus	F	Brazil	Amazonas				UFRG
Pentatomidae	Pentatominae	Carpocorini	Dichelops	Prodichelops	divisus	F	Colombia	Amazonas	Tabatinga	12.IV.1992	A. Saenz	UFRG
Pentatomidae	Pentatominae	Carpocorini	Diploxys		sp.	F	Senegal	Dakar		X.1951	M. Brun	MNRJ
Pentatomidae	Pentatominae	Carpocorini	Dolycoris		baccarum	F	Cyprus	Limassol	Yermasoyia	1.III.1950	G. Mavromoustakis	AMNH
Pentatomidae	Pentatominae	Carpocorini	Dolycoris		baccarum	M				13.V.1950		AMNH

Pentatomidae	Pentatominae	Carpocorini	Hypatropis		inermis	F	Brazil	Pará	Belém	29.I.1964	Apol. Souza	UFRG
Pentatomidae	Pentatominae	Carpocorini	Hypatropis		inermis	M	Brazil	São Paulo	Ilha da Vitória	16-27.III.1964	Exp. Dep. Zool.	UFRG
Pentatomidae	Pentatominae	Carpocorini	Mormidea		quinqueluteum	F	Brazil	Rio Grande do Sul	Estação Ecológia do Taim	23.III-4.IV.1981	J. Grazia	UFRG
Pentatomidae	Pentatominae	Carpocorini	Mormidea		quinqueluteum	F	Brazil	Rio Grande do Sul	Pelotas	11.III.1982	J. Grazia	UFRG
Pentatomidae	Pentatominae	Carpocorini	Mormidea		ypsilon	F	Brazil	São Paulo	Ilha Seca	19-26.II.1940		UFRG
Pentatomidae	Pentatominae	Carpocorini	Mormidea		ypsilon	M	Brazil	Rio Grande do Sul	Dois Irmãos	4.III.1951	R. Barth	UFRG
Pentatomidae	Pentatominae	Carpocorini	Oebalus		poecilus	F	Brazil	Amazonas	Manaus	2.I.1982	J. Grazia	UFRG
Pentatomidae	Pentatominae	Carpocorini	Oebalus		poecilus	M	Brazil	Santa Catarina	Porto Belo	2.I.1993	J.A.M. Fernandes	UFRG
Pentatomidae	Pentatominae	Carpocorini	Tibraca		limbativentris	F	Venezuela	Guarico	Calabozo	9.X.1965	D. Villasmil & M Gelbea	MIZA
Pentatomidae	Pentatominae	Carpocorini	Tibraca		limbativentris	M	Brazil	Rio Grande do Sul	Eldorado do Sul	16.VIII.1989	U. Aner	UFRG
Pentatomidae	Pentatominae	Catacanthini	Arocera	Euopta	apta	M	Venezuela	Aragua	Rancho Grande	21.V.1958		MIZA
Pentatomidae	Pentatominae	Catacanthini	Arocera	Euopta	apta	M	Venezuela	Aragua	Rancho Grande	23.IX.1964		MIZA
Pentatomidae	Pentatominae	Catacanthini	Arocera		contralineata	F	Venezuela	Miranda	Guatopo	29.VIII.1964	F. Fernandez & C.J. RosaUFRG	MIZA
Pentatomidae	Pentatominae	Catacanthini	Arocera		contralineata	M	Venezuela	Miranda	Guatopo	26.VIII.1964	F. Fernandez & C.J. RosaUFRG	MIZA
Pentatomidae	Pentatominae	Catacanthini	Rhyssocephala		infuscata	M	Mexico	Chiapas	Motozintla	06.V.1962	M.A. Vulcano	UFRG
Pentatomidae	Pentatominae	Catacanthini	Rhyssocephala		infuscata	M	Mexico	Chiapas	Motozintla	06.V.1962	M.A. Vulcano	UFRG
Pentatomidae	Pentatominae	Catacanthini	Rhyssocephala		rufolimbata	F	Brazil	Rio de Janeiro	Itatiaia	21.X.1943	J.F. Zikan	FIOC
Pentatomidae	Pentatominae	Catacanthini	Rhyssocephala		rufolimbata	M	Venezuela	Aragua	Rancho Grande	22.XII.1963		MIZA
Pentatomidae	Pentatominae	Catacanthini	Runibia		decorata	M	Bolivia	Santa Cruz	Buena Vista	III.1960		DARC
Pentatomidae	Pentatominae	Catacanthini	Runibia		decorata	M	Brazil	Acre	Porto Walter	IX.1957	H. Rueth	DZUP
Pentatomidae	Pentatominae	Catacanthini	Runibia		decorata	M	Brazil	Rondônia	Vilhena	26.IX.1986	C. Elias	DZUP
Pentatomidae	Pentatominae	Catacanthini	Runibia		perspicua	F	Brazil	Paraná	Londrina			UFRG
Pentatomidae	Pentatominae	Catacanthini	Runibia		perspicua	F	Brazil	São Paulo	São Paulo	10.III.1962	F. Grossmann	MZSP
Pentatomidae	Pentatominae	Catacanthini	Runibia		perspicua	M	Brazil	São Paulo	São Paulo	XI.1934	Hambleton	IBSP
Pentatomidae	Pentatominae	Chlorocorini	Arvelius		albopunctatus	F	Brazil	São Paulo	Campinas	11.XI.1951	R. Tella	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Arvelius		albopunctatus	M	Brazil	São Paulo	Campinas	3.IX.1949	R. Tella	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chlorocoris	Chlorocoris	complanatus	F	Brazil	São Paulo	Patrocínio Paulista		Claudionor Elias I.	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chlorocoris	Chlorocoris	complanatus	M	Brazil	Distrito Federal	Brasíla	20.II.1977	J.G. Smith	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chlorocoris	Chlorocoris	distinctus	F	Honduras	La Ceiba		1918	W.M. Mann	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chlorocoris	Chlorocoris	distinctus	M	Panama					UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chlorocoris	Monochricerus	flaviviridis	F	United States	Arizona	Huachaca	VII.1905		UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chlorocoris	Monochricerus	flaviviridis	M	United States	Arizona	Huachaca	VII.1905		UFRG

Pentatomidae	Pentatominae	Chlorocorini	Chlorocoris	Monochricerus	flaviviridis	M	United States	Arizona	Huachaca	VII.1905		UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chlorocoris	Monochricerus	subrugosus	M	United States	Arizona	Huachaca	23.VII.1932	D.K. Duncan	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chlorocoris	Monochricerus	subrugosus	M	United States	Arizona	Huachaca	31.X.1937		UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chloropepla		rolstoni	F	French Guiana			12-14.XII.2009	L. Põllumaa & O. Maasikas	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chloropepla		rolstoni	F	French Guiana			15.II.2010	J.E. Eger	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Chloropepla		vigens	M	Brazil	Rio Grande do Sul	Palmares do Sul	14.XI.2003	Equipe Probio	MCNZ
Pentatomidae	Pentatominae	Chlorocorini	Chloropepla		vigens	M	Brazil	Rio Grande do Sul	Palmares do Sul	14.XI.2003	Equipe Probio	MCNZ
Pentatomidae	Pentatominae	Chlorocorini	Loxa		deducta	F	Brazil	Rio Grande do Sul	Porto Alegre	26.XII.1984	J. Grazia	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Loxa		deducta	M	Brazil	Rio Grande do Norte	Natal	11.VII.1981	J. Grazia	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Loxa		flavicolis	F	Brazil	Pará	Tucuru	I.1979	M. Alvarenga	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Loxa		flavicolis	F	Brazil	Pará	Tucuru	I.1979	M. Alvarenga	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Rhyncholepta		grandicallosa	M	Brazil	Amazonas	Manaus	18-21.II.2004	J.A. Rafael	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Rhyncholepta		grandicallosa	M	Brazil	Amazonas	Manaus	19-22.III.2004	J.A. Rafael	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Rhyncholepta		meinderi	M	Brazil	Amazonas	Manaus	10-13.XII.2004	C.S. Motta	UFRG
Pentatomidae	Pentatominae	Chlorocorini	Rhyncholepta		meinderi	M	Brazil	Amazonas	Manaus	21-24.I.2004	C.S. Motta	UFRG
Pentatomidae	Pentatominae	Pentatomini	Banasa		dolabrata	F	Ecuador	El Oro	Zaruma	10.IV.1965	L. E. Pena	AMNH
Pentatomidae	Pentatominae	Pentatomini	Banasa		dolabrata	M	Ecuador	Zamora	Santiago	27.III.1965	L. E. Pena	AMNH
Pentatomidae	Pentatominae	Pentatomini	Banasa		patagiata	M	Brazil	Bahia	Encruzilhada	XI.1972	M. Alverenga	AMNH
Pentatomidae	Pentatominae	Pentatomini	Banasa		patagiata	M	Brazil	Bahia	Encruzilhada	XI.1973	M. Alverenga	AMNH
Pentatomidae	Pentatominae	Pentatomini	Banasa		zeteki	F	Guatemala	Alta Verapaz	Pancajché	14.VII.1947	C. & P. Vaurie	AMNH
Pentatomidae	Pentatominae	Pentatomini	Banasa		zeteki	M	Mexico	Quintana Roo	Xcan Nuevo	6-7.VI.1959	P. & C. Vaurie	AMNH
Pentatomidae	Pentatominae	Pentatomini	Janeirona		stali	F	Brazil	São Paulo	Salesópolis	25.III.1961	Reichardt	UFRG
Pentatomidae	Pentatominae	Pentatomini	Janeirona		stali	M	Brazil	São Paulo	Salesópolis	25.III.1961	Reichardt	UFRG
Pentatomidae	Pentatominae	Pentatomini	Lelia		octopunctata	F						AMNH
Pentatomidae	Pentatominae	Pentatomini	Lelia		octopunctata	M						AMNH
Pentatomidae	Pentatominae	Pentatomini	Myota		aerea	M	Brazil	Rio de Janeiro	Rio de Janeiro	1940	M. Alvarenga	UFRG
Pentatomidae	Pentatominae	Pentatomini	Myota		aerea	M	Brazil	São Paulo	São Paulo	10.XII.1993	G. Ckuk	UFRG
Pentatomidae	Pentatominae	Pentatomini	Neotibilis	Laeviscutis	compascens	F	Brazil	Pará	Serra Nova	22.I.1985		UFRG
Pentatomidae	Pentatominae	Pentatomini	Neotibilis	Laeviscutis	compascens	F						UFRG
Pentatomidae	Pentatominae	Pentatomini	Neotibilis	Neotibilis	parva	M	Panama		Pipeline Road	12.VII.1976		UFRG
Pentatomidae	Pentatominae	Pentatomini	Neotibilis	Neotibilis	parva	M	Panama		Pipeline Road	17.VII.1976		UFRG
Pentatomidae	Pentatominae	Pentatomini	Pallantia		macula	F	Brazil	Rio de Janeiro	Alto da Boa Vista	27.X.1989	R. Kernshak	UFRG

Pentatomidae	Pentatominae	Pentatomini	Pallantia	macula	F	Brazil	Rio Grande do Sul	Parque Estadual do Nonoai	III.1993	J.A.M. Fernandes	UFRG
Pentatomidae	Pentatominae	Pentatomini	Pallantia	macunaima	M	Brazil	Paraná	Londrina	II.1995	L.M. Vivan	UFRG
Pentatomidae	Pentatominae	Pentatomini	Pallantia	macunaima	M	Brazil	Paraná	Londrina	II.1996	L.M. Vivan	UFRG
Pentatomidae	Pentatominae	Pentatomini	Pellaea	stictica	F	Peru	Cusco	Limatambo	10.III.1967	F. Carrasco	UFRG
Pentatomidae	Pentatominae	Pentatomini	Pellaea	stictica	F	Venezuela	Aragua	Maracay	2.X.1982	F. Fernandez	MIZA
Pentatomidae	Pentatominae	Pentatomini	Pentatoma	japonica	F			Mount Tasiro	20.VIII.1971	Y. Kurosanja	NMNH
Pentatomidae	Pentatominae	Pentatomini	Pentatoma	metallifera	F	China	Jilin Sheng	Dunhua	28.VI-2VII.1982	P. Schaefer	NMNH
Pentatomidae	Pentatominae	Pentatomini	Pentatoma	metallifera	M	China		Radde, Amur		H.L. Parker	NMNH
Pentatomidae	Pentatominae	Pentatomini	Pentatoma	rufipes	F		Morava	Chvojnice		J.L. Stehlik	AMNH
Pentatomidae	Pentatominae	Pentatomini	Pentatoma	rufipes	F						AMNH
Pentatomidae	Pentatominae	Pentatomini	Phalaeucus	pustulatus	F	Brazil	Goiás	Goiânia	26.III.1985	M.J. Ferreira	UFRG
Pentatomidae	Pentatominae	Pentatomini	Taurocerus	achilles	F	Brazil	Amazonas		X.1943	A. Parko	UFRG
Pentatomidae	Pentatominae	Pentatomini	Taurocerus	achilles	M	Brazil	Rio de Janeiro	Itatiaia	21.XI.1948	Wygodzinsky	MNRJ
Pentatomidae	Pentatominae	Pentatomini	Taurocerus	achilles	M	Brazil	Rio de Janeiro	Itatiaia	II.1943	Wygodzinsky	MNRJ
Pentatomidae	Pentatominae	Procleticini	Dendrocoris	arizonensis	F	United States	California	Lemon Cave	III.1934	Univ Berkeley Calif Insect Survey	UFRG
Pentatomidae	Pentatominae	Procleticini	Dendrocoris	arizonensis	M	United States	California	Lemon Cave	III.1934	Univ Berkeley Calif Insect Survey	UFRG
Pentatomidae	Pentatominae	Procleticini	Dendrocoris	arizonensis	M	United States	California	Lemon Cave	III.1934	Univ Berkeley Calif Insect Survey	UFRG
Pentatomidae	Pentatominae	Procleticini	Dendrocoris	pini	F	United States	California	Clayton	27.V.1961	Univ Berkeley Calif Insect Survey	R. L. Langston
Pentatomidae	Pentatominae	Procleticini	Dendrocoris	pini	M	United States	California	Monterey	9.V.1959	Univ Berkeley Calif Insect Survey	NZ
Pentatomidae	Pentatominae	Procleticini	Lobepomis	peltifera	F	Argentina	Catamarca	Rodeo	25.I.1958	R. Golbach	IFML
Pentatomidae	Pentatominae	Procleticini	Lobepomis	peltifera	M	Argentina	Santiago del Estero	Lago Muyoj	29.III.1957	R. Golbach	IFML
Pentatomidae	Pentatominae	Procleticini	Thoreyella	cornuta	F	Brazil	Rio Grande do Sul	Porto Alegre, Morro do Coco	19.II.1962		UFRG
Pentatomidae	Pentatominae	Procleticini	Thoreyella	cornuta	M	Argentina	Buenos Aires				MACN
Pentatomidae	Pentatominae	Procleticini	Thoreyella	trinotata	F	Argentina	Buenos Aires		15.X.1896	S. Venturi	MACN
Pentatomidae	Pentatominae	Procleticini	Thoreyella	trinotata	M	Argentina	Buenos Aires		19.X.1896	S. Venturi	MACN
Pentatomidae	Phyllocephalinae	Macrina		juvencus	M	Congo	Belg.	Buta		F.R. Wulsin	AMNH
Scutelleridae			Augocoris	gomesii		Brazil	Amazonas	Coari, Rio Urucu	27.X.2008	J.A.M. Fernandes e equipe col.	MCNZ
Scutelleridae			Augocoris	gomesii		Brazil	Amazonas	Coari, Rio Urucu	28.X.2008	J.A.M. Fernandes e equipe col.	MCNZ
Scutelleridae			Augocoris	gomesii		Brazil	Amazonas	Coari, Rio Urucu	30.X.2008	J.A.M. Fernandes e equipe col.	MCNZ
Scutelleridae			Orsilochides	leucoptera		Brazil	Santa Catarina	Criciuma	2008	F.M. Bianchi	MCNZ
Scutelleridae			Orsilochides	leucoptera		Brazil	Santa Catarina	Criciuma	2008	F.M. Bianchi	MCNZ
Scutelleridae			Pachycoris	torridus		Brazil	Paraíba	João Pessoa			UFRG

Scutelleridae	Pachycoris		torridus		Brazil	Paraíba	João Pessoa			UFRG
Scutelleridae	Pachycoris		torridus		Brazil	Paraíba	João Pessoa			UFRG
Thyreocoridae	Corimelaena	Corimelaena	tibialis	F	Brazil	Rio Grande do Sul	Palmares do Sul	20.V.2004	Eq. Probio	MCNZ
Thyreocoridae	Corimelaena	Corimelaena	tibialis	F	Trinidad and Tobago	Saint George	Valencia	29.VIII.1981	R.M. Baranowski	FSCA
Thyreocoridae	Corimelaena	Corimelaena	tibialis	M	Brazil	Rio Grande do Sul	Palmares do Sul	20.V.2004	Eq. Probio	MCNZ
Thyreocoridae	Corimelaena	Corimelaena	tibialis	M	Trinidad and Tobago	Saint George	Valencia	29.VIII.1981	R.M. Baranowski	FSCA
Thyreocoridae	Corimelaena	Parapora	extensa	F	United States	Idaho	Idaho	5.VIII.1990	G.M. Stephens	FSCA
Thyreocoridae	Corimelaena	Parapora	extensa	M	United States	Idaho	Idaho	15.VII.1990	G.M. Stephens	FSCA
Thyreocoridae	Cydnoides	Cydnoides	ciliatus	F	United States	Florida	Miami	18.XII.2005	T. Smith	FSCA
Thyreocoridae	Cydnoides	Cydnoides	ciliatus	F	United States	Wyoming	Sweetwater Co.	13.VI.2008	P. & P. Skelley, R. Gordon	FSCA
Thyreocoridae	Cydnoides	Cydnoides	ciliatus	M	United States	Arizona	Navajo Co.	7.IX.2003	C.W. & L. O'Brien	FSCA
Thyreocoridae	Cydnoides	Cydnoides	ciliatus	M	United States	Florida	Miami	18.XII.2005	T. Smith	FSCA
Thyreocoridae	Cydnoides	Cydnoides	renormatus	F	United States	Arizona		2.IX.2005	C.W. & L.O'Brien	FSCA
Thyreocoridae	Cydnoides	Cydnoides	renormatus	M	United States	Arizona		30.VII.2000	W.B. Warner	FSCA
Thyreocoridae	Galgupha	Euryscytus	difficilis	F	Brazil	Rio Grande do Sul	Maquiné	1.IV.2006	J.L.C. Bernardes	UFRG
Thyreocoridae	Galgupha	Euryscytus	difficilis	F	Brazil	Rio Grande do Sul	Maquiné, Garapiá	10.I.2007	C.F. Schwertner	UFRG
Thyreocoridae	Galgupha	Euryscytus	difficilis	M	Brazil	Rio Grande do Sul	Esmeralda	18-19.III.1981	J. Grazia	UFRG
Thyreocoridae	Galgupha	Euryscytus	difficilis	M	Brazil	Rio Grande do Sul	Maquiné	1.IV.2006	V.C. Matesco	UFRG
Thyreocoridae	Galgupha	Galgupha	atra	F	United States	Florida	Osceola Co. Deer Park	27.IV.1989	J.E. Eger	FSCA
Thyreocoridae	Galgupha	Galgupha	atra	F	United States	Florida	Osceola Co. Deer Park	27.IV.1989	J.E. Eger	FSCA
Thyreocoridae	Galgupha	Galgupha	atra	M	United States	Florida	Osceola Co. Deer Park	27.IV.1989	J.E. Eger	FSCA
Thyreocoridae	Galgupha	Gyrocnemis	cruralis	F						UFRG
Thyreocoridae	Galgupha	Gyrocnemis	cruralis	F						UFRG
Thyreocoridae	Galgupha	Gyrocnemis	cruralis	M	Brazil	Paraná	Bandeirantes	III.2008	J. Raudo	UFRG
Thyreocoridae	Galgupha	Gyrocnemis	cruralis	M	Brazil	Paraná	Bandeirantes	III.2008	J. Raudo	UFRG
Thyreocoridae	Galgupha	Microcompsus	vinculata	F	Brazil	Amazonas	Coari, Rio Urucu	26.X.2008	J.A.M. Fernandes	UFRG
Thyreocoridae	Galgupha	Microcompsus	vinculata	F	Brazil	Amazonas	Coari, Rio Urucu	31.X.2008	J.A.M. Fernandes	UFRG
Thyreocoridae	Galgupha	Microcompsus	vinculata	M	Brazil	Amazonas	Coari, Rio Urucu	26.X.2008	J.A.M. Fernandes	UFRG
Thyreocoridae	Galgupha	Microcompsus	vinculata	M						UFRG
Thyreocoridae	Galgupha	Nothocoris	terminalis	F	Brazil	Rio Grande do Sul	Porto Alegre, Morro Santana	09.XII.2010		UFRG
Thyreocoridae	Galgupha	Nothocoris	terminalis	F	Brazil	Rio Grande do Sul	Porto Alegre, Morro Santana		UFRG	
Thyreocoridae	Galgupha	Nothocoris	terminalis	M	Brazil	Rio Grande do Sul	Maquiné, Garapiá	21.XII.2006	R.C. Bins-Neto & L.M. Weiler	UFRG

Thyreocoridae	Galgupha	Nothocoris	terminalis	M	Brazil	Rio Grande do Sul	Porto Alegre, Morro Santana		UFRG	
Thyreocoridae	Thyreocoris		scarabaeoides	F	Suécia					AMNH
Thyreocoridae	Thyreocoris		scarabaeoides	F	Suécia					AMNH
Thyreocoridae	Thyreocoris		scarabaeoides	M	Suécia					AMNH
Thyreocoridae	Thyreocoris		scarabaeoides	M			Box Hill	2.X.1949	D. UFRGton	AMNH

F, Female; M, Male. Museum Acronyms’: AMNH, American Museum of Natural History, United States; DARC, David Rider Collection, North Dakota, United States; DZUP, Museu de Entomologia Pe. Jesus Santiago Moure, Universidade Federal do Paraná, Curitiba, Brazil; FIOC, Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Brazil; FSCA, Florida State Collection of Arthropods, United States; HDEC, Dodge Engleman Collection, Canal Zone, Panama; IBSP, Instituto Butantan, São Paulo, Brazil; IFML, Instituto Fundación Miguel Lillo, Tucumán, Argentina; INBio, Instituto Nacional de Biodiversidad, Costa Rica; J. E. Eger, Joe E. Eger Collection, Forida, United States; MACN, Museo Argentino de CienciasNaturales “Bernardino Rivadavia”, Buenos Aires, Argentina; MCNZ, Museu de Ciências Naturais da Fundação Zoobotânica do Rio Grande do Sul, Brazil; MGAP, Museu Anchieta de Ciências Naturais, Brazil; MIZA, Museo del Instituto de Zoología Agrícola, Venezuela; MNRJ, Museu Nacional, Universidade Federal do Rio de Janeiro, Brazil; MZSP, Museu de Zoologia da Universidade de São Paulo, Brazil; UFRG, Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, Brazil; NMNH, National Museum of Natural History, Washington D.C., United States; SAM, South Australian Museum, Adelaide, Australia.

Table S3. Mean, standard error, and minimum and maximum values of setae in the tibial comb and the foretibial apparatus, and number of examined specimens (N), for each of the examined species of Pentatomidae, Thyreocoridae, and Scutelleridae . [mean ± standard error (range)]

Family	Subfamily	Tribe	Especies	Tibial comb	N	Foretibial apparatus	N
Pentatomidae	Aphylinae		Aphylinae sp.	20	1	4	1
	Asopinae		*Alcaeorrhynchus grandis* (Dallas, 1851)			20.5±2.5 (18-23)	2
			Oplomus cruentus (Burmeister, 1835)	37	1	14.5±0.5 (14-15)	2
			Oplomus salamandra (Burmeister, 1835)	29.6±2.03 (26-33)	3	13.6±0.67 (13-15)	3
			Podisus nigrispinus (Dallas, 1851)	17.7±1.38 (15-21)	4	29±3 (26-32)	4
	Cyrtocorinae		*Cyrtocoris egeris* Packauskas & Schaefer, 1998	18.5±0.5 (18-19)	2	5.0	2
			Cyrtocoris trigonus (Germar, 1839)	28.0	1	6.0	1
	Discocephalinae	Discocephalini	*Antiteuchus mixtus* (Fabricius, 1787)	24.0	1	5.0	1
			Eurystethus microlobatus Ruckes, 1966			5.0	2
		Ochlerini	*Alitocoris parvus* (Distant, 1880)	29.5±0.5 (29-30)	2	5.0	1
			Catulona pensa Rolston, 1992	36.0	1	6.0	1
			Lincus securiger Breddin, 1904	35.5±1.5 (34-37)	2	5.5±0.5 (5-6)	2
	Edessinae		*Brachystethus geniculatus* (Fabricius, 1787)	34.0	1	5.0	1
			Brachystethus vexillum Breddin, 1903	34.0	1	5.0	1
			Edessa quadridens Fabricius, 1803	33.0	1	5.5±0.5 (6-5)	2
			Edessa rufomarginata (De Geer, 1773)	36.0	1		
			Olbia elegans (Stål, 1862)			5.0	2
	Pentatominae	Antestiini	*Antestia ellenriederi* Breddin, 1900	24.0	1	7±2 (5-9)	2
			Antestiopsis anchora (Thunberg, 1783)	25.0	1	5.0	1
			Plautia stali Scott, 1874	25.0	1	5.0	2
			Starioides degenera (Walker, 1867)	24.0	1	5.0	2
		Carpocorini	*Acledra albocostata* (Spinola, 1852)	25±1 (24-26)	2	4.0	2
			Agonoscelis nubilis (Fabricius, 1775)	31.0	1	4.0	2
			Agroecus griseus Dallas, 1851	28±0.58 (27-29)	3	3.0	1
			Berecynthus hastator (Fabricius, 1794)	28.5±0.5 (28-29)	2	4.0	1

	Coenus delius (Say, 1831)	30.0	1	4.0	2
	Cosmopepla decorata (Hahn, 1834)	23±1.53 (21-26)	3	4.0	2
	Dichelops (Diceraeus) furcatus (Fabricius, 1775)	31.0	1	4.0	2
	Dichelops (Diceraeus) melacanthus (Dallas, 1851)	24.0	2	4.5±0.5 (4-5)	2
	Dichelops (Dichelops) punctatus Spinola, 1837	31.0	1	5.0	1
	Dichelops (Dichelops) saltensins Grazia, 1978	27.5±1.5 (26-29)	2	4.0	2
	Dichelops (Prodichelops) divisus (Walker, 1867)	32.3±0.33 (32-33)	3	5.0	1
	Diploxys sp.	22.0	1	4.0	1
	Dolycoris baccarum (Linnaeus, 1758)	32±1 (31-33)	2	4.0	2
	Hypatropis inermis (Stål, 1872)	26.0	1	5.0	2
	Mormidea v-luteum (Lichtenstein, 1796)	23.0	1	4.0	2
	Mormidea ypsilon (Linnaeus, 1758)	25.0	2	4.5±0.5 (4-5)	2
	Oebalus poecilus (Dallas, 1851)	24.0	1	4.0	2
	Tibraca limbativentris Stål,1860	29.5±2.5 (27-32)	2	5.0	3
Catacanthini	*Arocera apta* (Walker, 1867)	34.0	1	10.0	1
	Arocera placens (Walker, 1867)	33.0	1	8.0	1
	Rhyssocephala infuscata (Rider, 1992)			9.0	2
	Rhyssocephala rufolimbata (Stål, 1872)	36.0	1	8.0	1
	Runibia decorata (Dallas, 1851)	36.0	1	5.0	1
	Runibia perspicua (Fabricius, 1798)	34.0	1	7.0	1
Chlorocorini	*Arvelius albopunctatus* (De Geer, 1773)	35.5±1.5 (34-37)	2	5.0	2
	Chlorocoris (Chlorocoris) complanatus Guérin-Méneville, 1831	30.0	1	5.0	2
	Chlorocoris (Chlorocoris) distinctus Signoret, 1851	31.5±1.5 (30-33)	2	4.0	2
	Chlorocoris (Monochrocerus) flaviviridis Barber, 1914	40±1 (39-41)	2	5.0	1
	Chlorocoris (Monochrocerus) subrugosus Stål, 1872	42.0	1	5.0	1
	Chloropepla rolstoni Grazia-Vieira, 1973	37.0	1	4.0	1
	Chloropepla vigens (Stål, 1860)	37±1 (36-38)	2	4.0	2
	Loxa deducta Walker, 1867	38.0	1	5.5±0.5 (5-6)	2
	Loxa flavicollis (Drury, 1773)	35.0	1	5.0	1
	Rhyncholepta grandicallosa Bergroth, 1911	31.0	1	5.0	2

			Rhyncholepta meinanderi Becker & Grazia-Vieira, 1971	30.0	2	4.5±0.5 (4-5)	2
		Pentatomini	*Banasa dolabrata* Thomas, 1988	27±1 (26-28)	2	4.0	1
			Banasa patagiata (Berg 1879)	19.5±0.5 (19-20)	2	4.0	1
			Banasa zeteki Sailer, 1959	20.5±.4.5 (16-25)	2	4.0	2
			Janeirona stali (Kormilev, 1956)	36.0	1	6.5±0.5 (6-7)	2
			Lelia octopunctata (Dallas, 1849)	30.0	1	5.0	2
			Myota aerea (Herrich-Schäffer, 1842)	32.0	1	5.0	2
			Neotibilis (*Laeviscutis*) *compascens* (Bergroth, 1914)	34±1 (33-35)	2	5.0	3
			Neotibilis (Neotibilis) parva (Distant, 1893)	42.0	1	5.0	1
			Pallantia macula (Dallas, 1851)	27.5±2.5 (25-30)	2	5.0	1
			Pallantia macunaima Grazia, 1980	30.0	1	5.0	2
			Pellaea stictica (Dallas, 1851)	42.5±0.5 (42-43)	2	6.0	1
			Pentatoma japonica (Distant, 1882)	31.0	1	4.0	1
			Pentatoma metallifera (Motschulsky, 1859)	41.0	1	6.0	2
			Pentatoma rufipes (Linnaeus, 1758)	29.0	1	5.0	2
			Phalaecus pustulatus de Geer, 1773			6.0	1
			Taurocerus achilles (Stål, 1862)	34.0	1	5.0	1
		Procleticini	*Dendrocoris arizonensis* Barber, 1911	28±2 (26-30)	2	5.0	1
			Dendrocoris pini Montandon, 1893	27.0	1	5.0	1
			Thoreyella cornuta Berg, 1883	21.0	1	5.0	1
			Thoreyella trinotata Berg, 1878	26.0	1	4.5±0.5 (4-5)	2
		Rhynchocorini	*Biprorulus bibax* Breddin, 1900	39.0	1	7.0	2
			Cuspicona simplex Walker, 1867	26.5±0.5 (26-27)	2	5.0	1
	Phyllocephalinae		*Macrina juvenca* (Burmeister, 1835)	36±1 (35-37)	2	5.0	2
Scutelleridae			*Augocoris gomesi* Burmeister, 1835	28.5±1.5 (27-30)	2	11.5±0.5 (11-12)	2
			Orsilochides leucoptera (Germar, 1839)	26.0	1	9.0	1
Thyreocoridae	Corimelaeninae		*Corimelaena* (*Corimelaena*) *tibialis* (Fabricius, 1803)	15.0	1		
			Corimelaena (Parapora) extensa Uhler, 1867	14.0	1	5.0	1
			Cydnoides (Cydnoides) ciliatus Uhler, 1863	16.0	1	4.0	1
			Cydnoides (*Cydnoides*) *renormatus* (Uhler, 1895)	16.0	1	5.0	1

	Galgupha (Euryscytus) difficilis (Breddin, 1914)	18.0	1	4.0	1
	Galgupha (*Galgupha*) *atra* Amyot & Serville, 1843)	17.5±0.5 (17-18)	2	4.0	2
	Galgupha (Gyrocnemis) cruralis (Stål, 1862)	20±1 (19-21)	2	4.0	1
	Galgupha (*Microcompsus*) *vinculata* (Germar, 1839)	17.0	1	4.0	2
	Galgupha (Nothocoris) terminalis (Walker, 1867)	18.5±0.5 (18-19)	2	4.0	2
Thyreocorinae	*Thyreocoris scarabaeoides* (Linnaeus, 1758)	15±1 (14-16)	2	4.0	1

Tibial comb and foretibial apparatus of the following species were not observed: PENTATOMIDAE: EDESSINAE: *Lopadusa (L.) augur* Stål, 1860; PENTATOMINAE: Procleticini: *Lobepomis peltifera* Berg, 1891; SCUTELLERIDAE: *Pachycoris torridus* Scopoli, 1772.

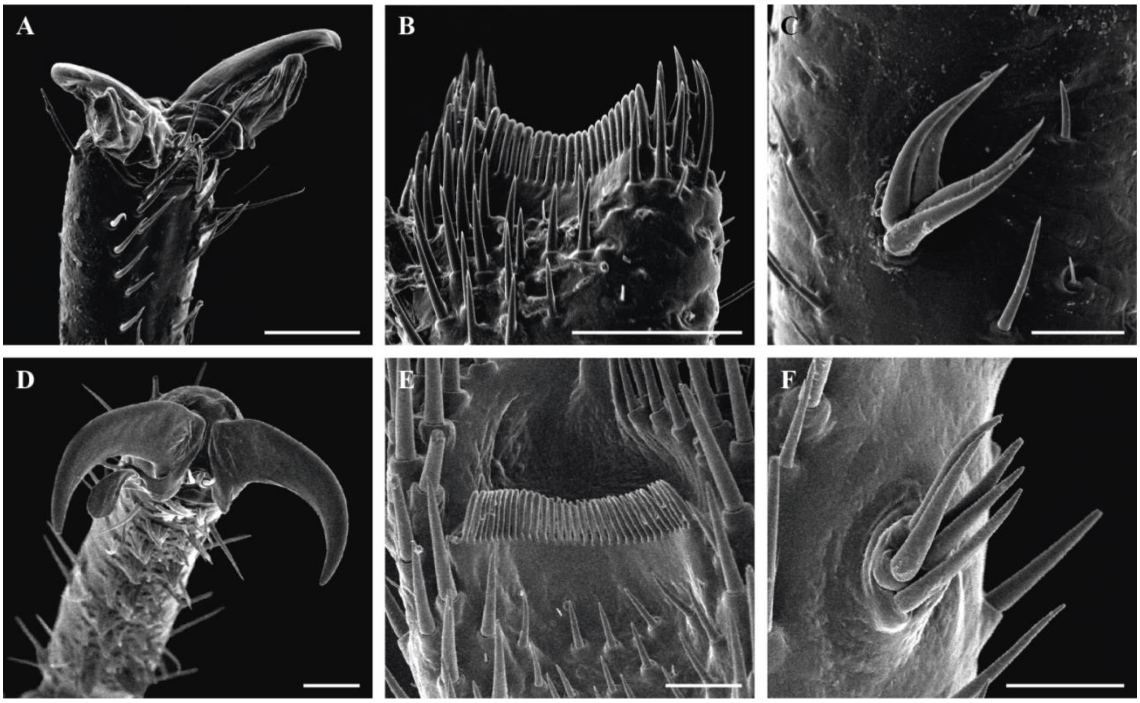


Figure S1. Pretarsus, tibial comb, and tibial apparatus of Aphylinae and Phyllocephalinae (Pentatomidae). **A-C**, Aphylinae sp.; **D-F**, *Macrina juvencus* (Phyllocephalinae). Scales: 100 µm.

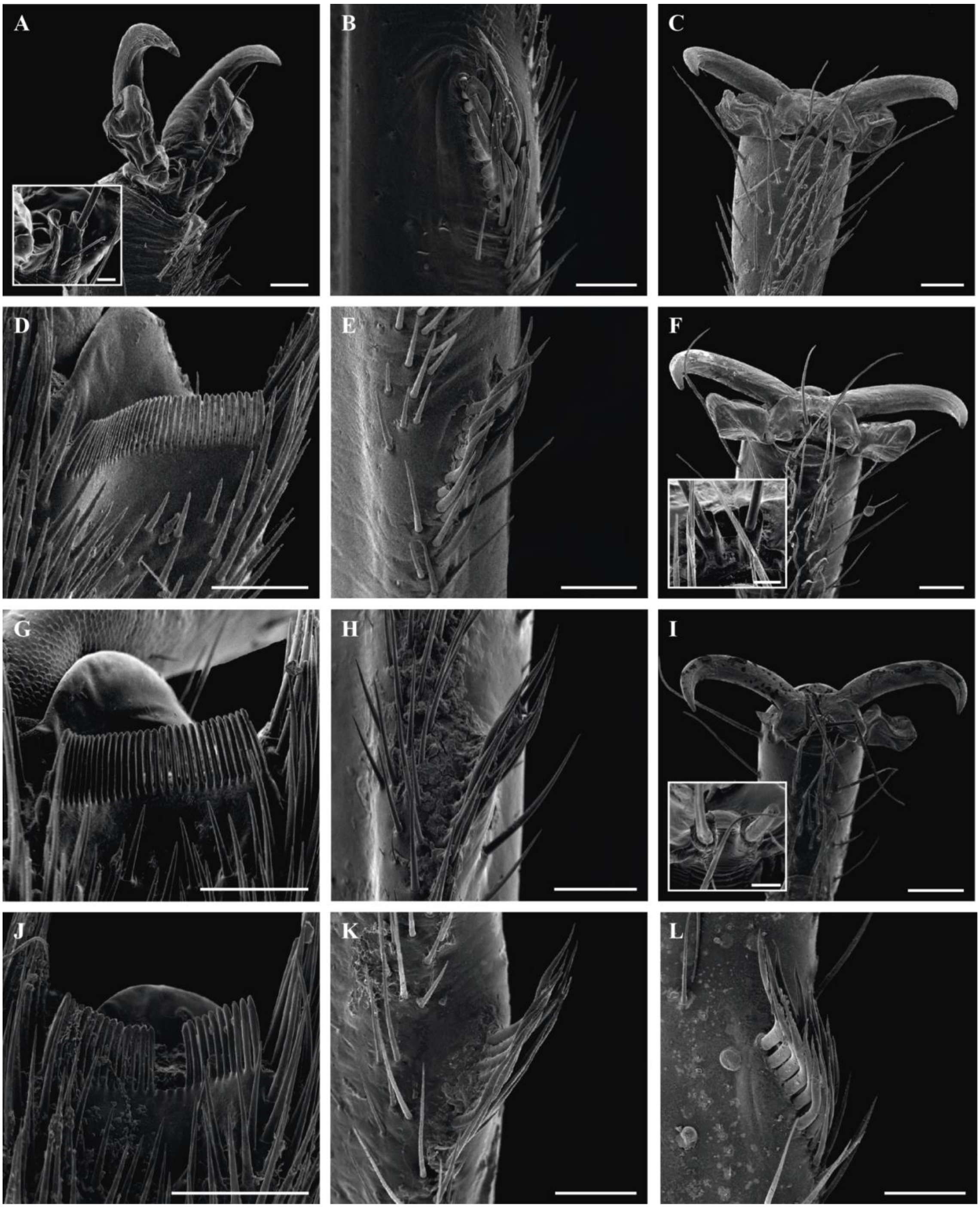


Figure S2. Pretarsus, tibial comb, and tibial apparatus of Asopinae (Pentatomidae). **A-B**, *Alcaeorrynchus grandis*; **C-E**, *Oplomus cruentus*; **F-H**, *Oplomus salamandra*; **I-K**, *Podisus connexivus*; **L**, *Podisus mellipes*. Scales: 100 µm; insets, 20 µm.

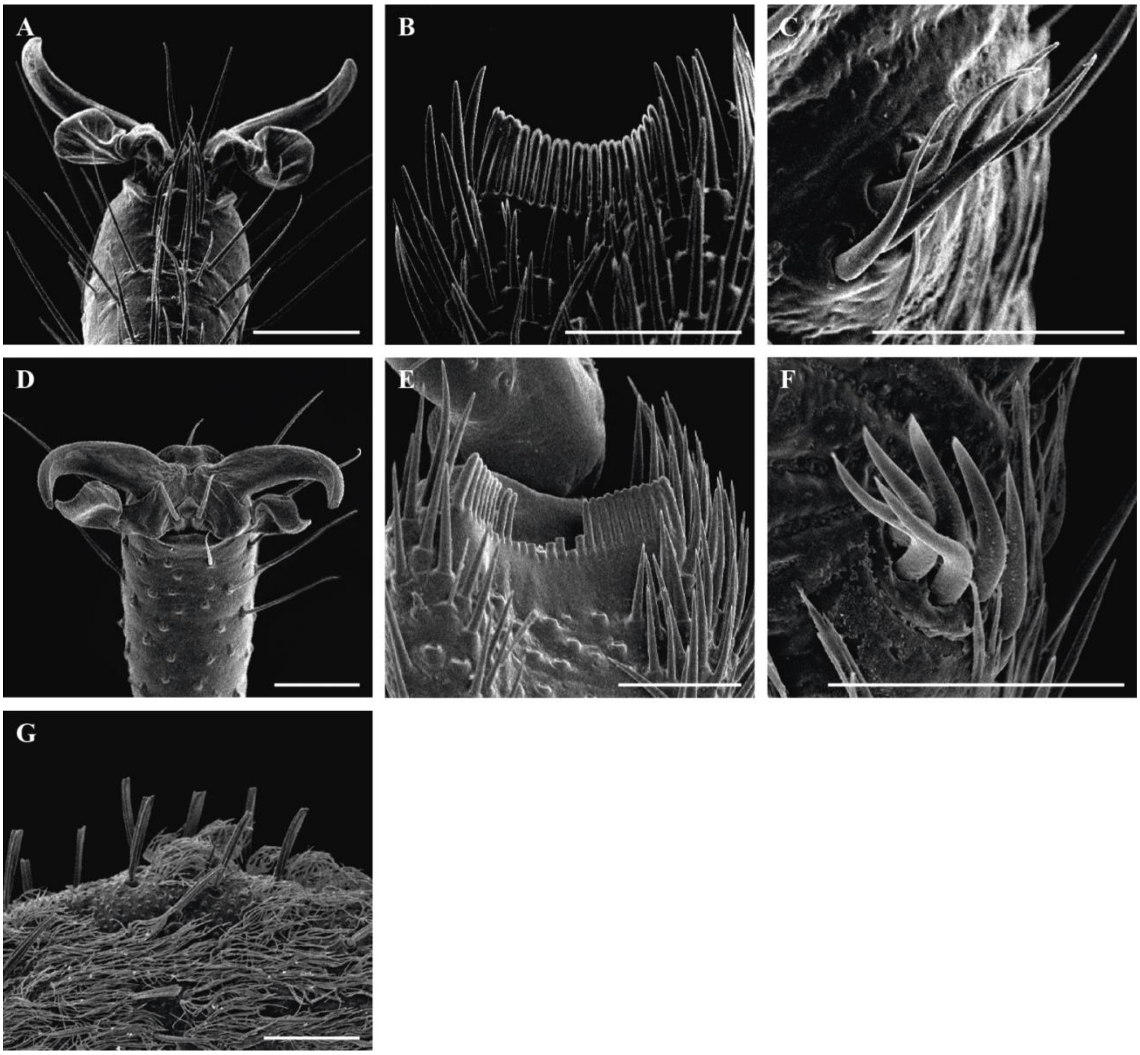


Figure S3. Pretarsus, tibial comb, and tibial apparatus of Cyrtocorinae (Pentatomidae). **A-C**, *Cyrtocoris egeris*; **D-G**, *Cyrtocoris trigonus*. Scales: 100 µm.

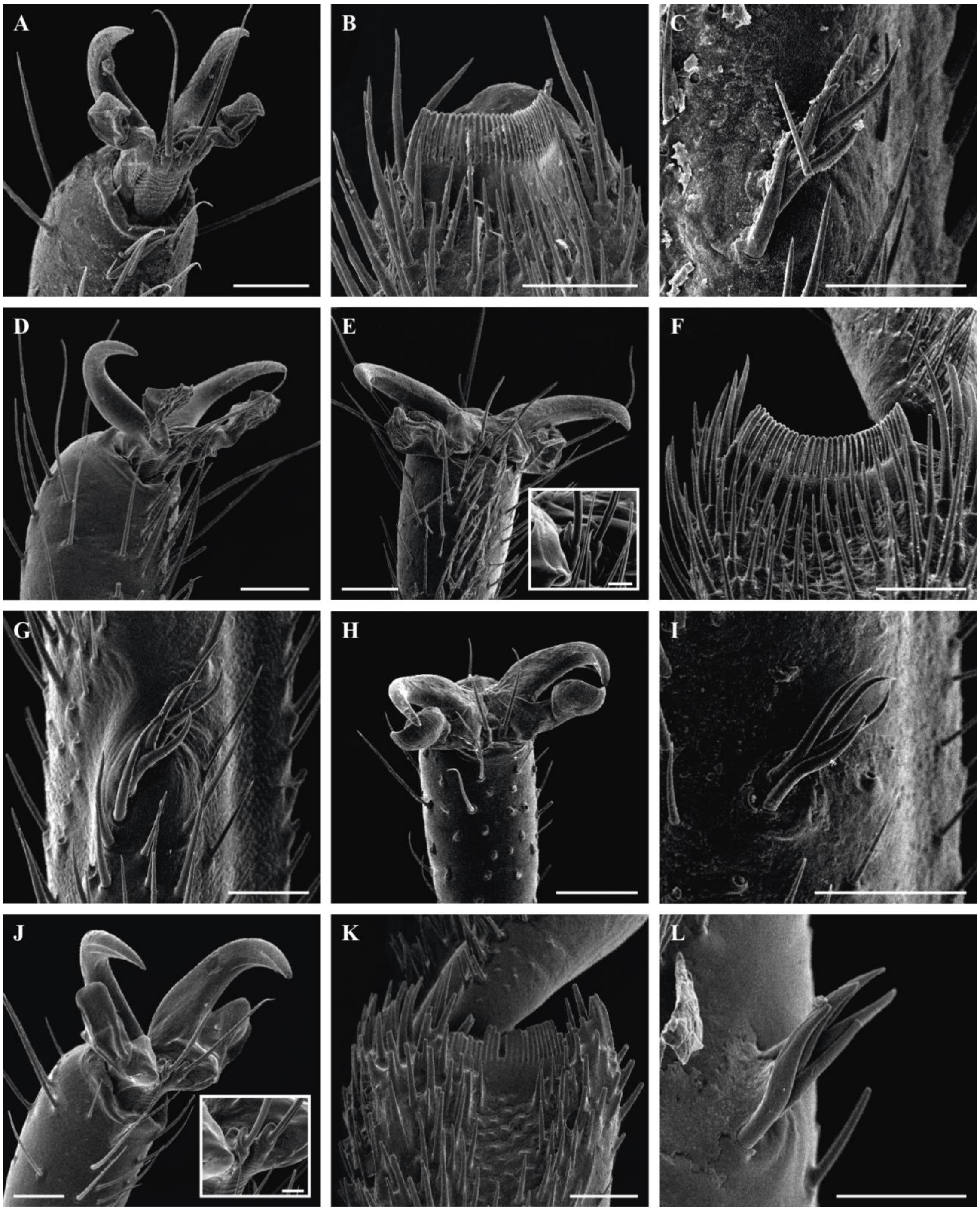


Figure S4. Pretarsus, tibial comb, and tibial apparatus of Discocephalini (**A-G**) and Ochlerini (**H-L**) (Discocephalinae, Pentatomidae). **A-C**, *Alitocoris parvus*; **D**, *Catulona pensa*; **E-G**, *Lincus securiges*; **H-I**, *Eurystethus microlobates*; **J-L**, *Antiteuchus mixtus*. Scales: 100 µm; insets, 20 µm.

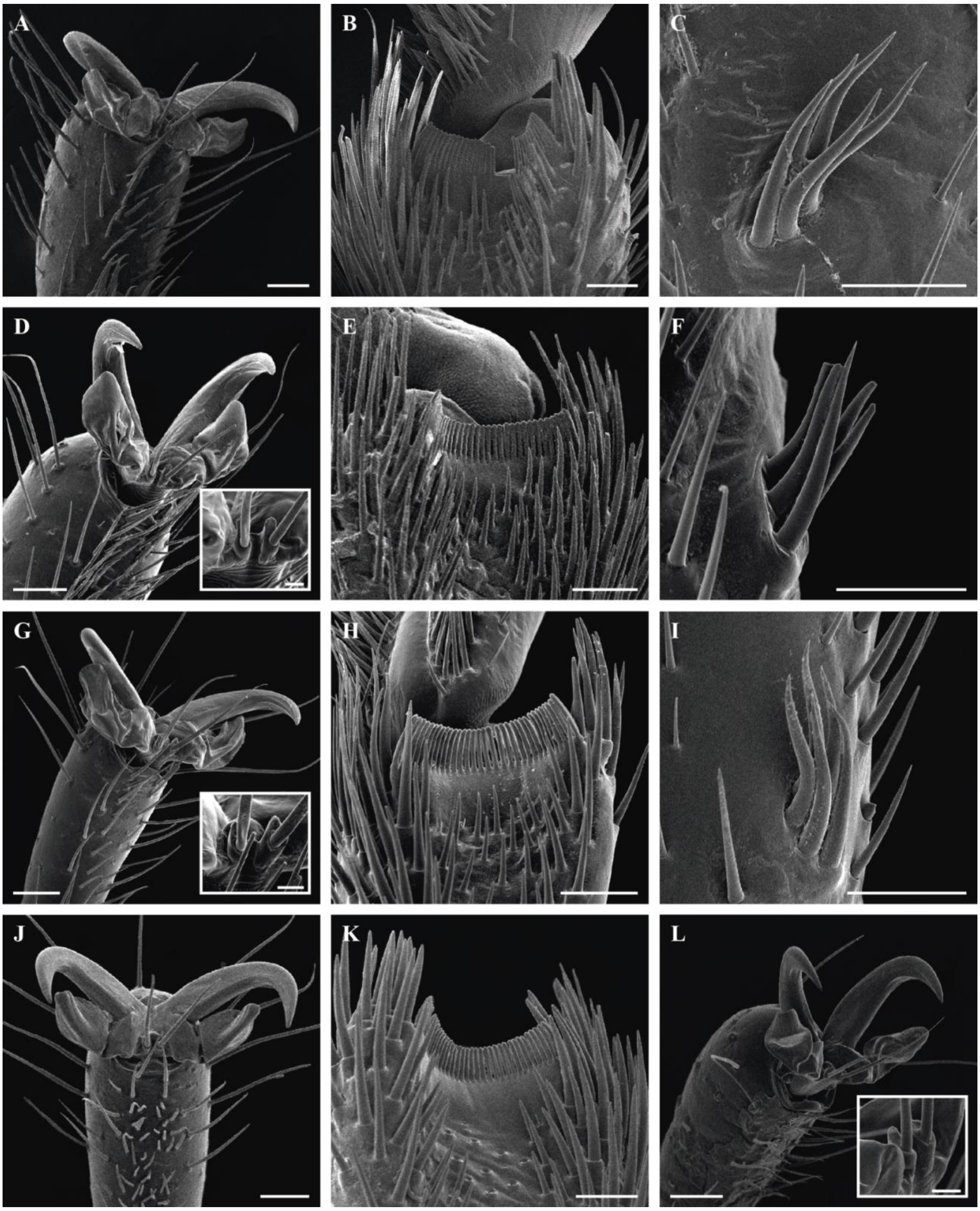


Figure S5. Pretarsus, tibial comb, and tibial apparatus of Edessinae (Pentatomidae). **A-C**, *Brachystethus geniculata*; **D-F**, *Brachystethus vexillum*; **G-I**, *Edessa quadridens*; **J-K**, *Edessa rufomarginata*; **L**, *Lopadusa algur*. Scales: 100 µm; insets, 20 µm.

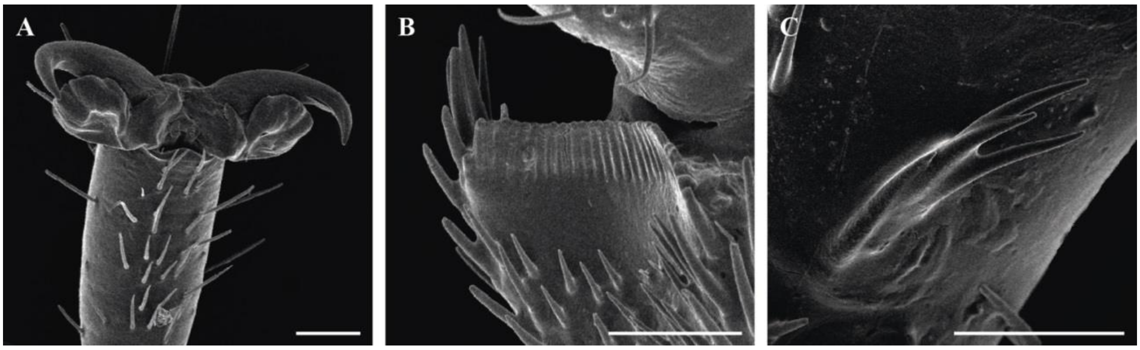


Figure S6. Pretarsus, tibial comb, and tibial apparatus of Edessinae (Pentatomidae). **A-C**, *Olbia elegans*. Scales: 100 µm.

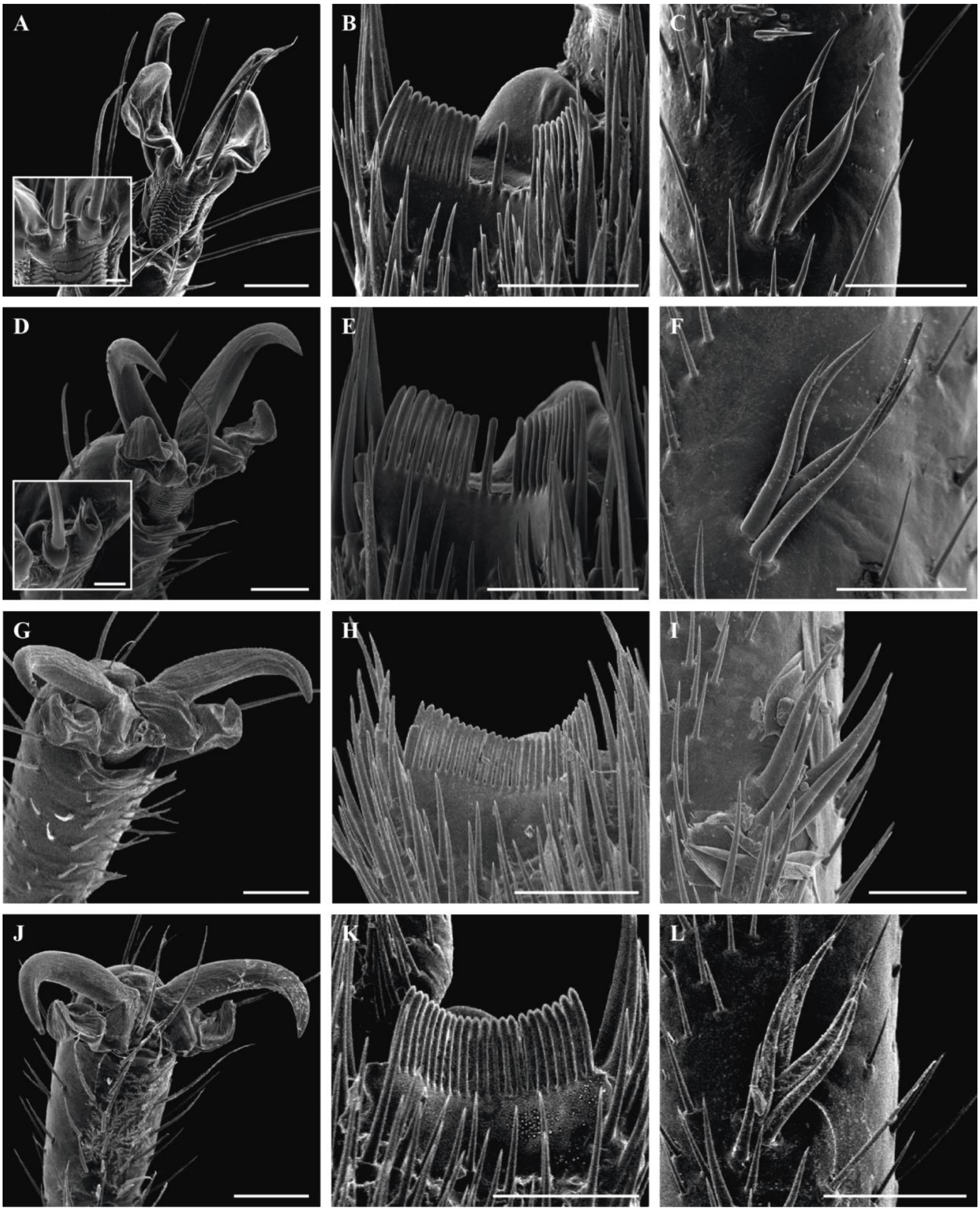


Figure S7. Pretarsus, tibial comb, and tibial apparatus of Antestini (Pentatominae, Pentatomidae). **A-C**, *Starioides degenera*; **D-F**, *Antestia elleriederi*; **G-I**, *Antestiopsis anchora*; **J-L**, *Plautia stalli*. Scales: 100 µm; insets, 20 µm.

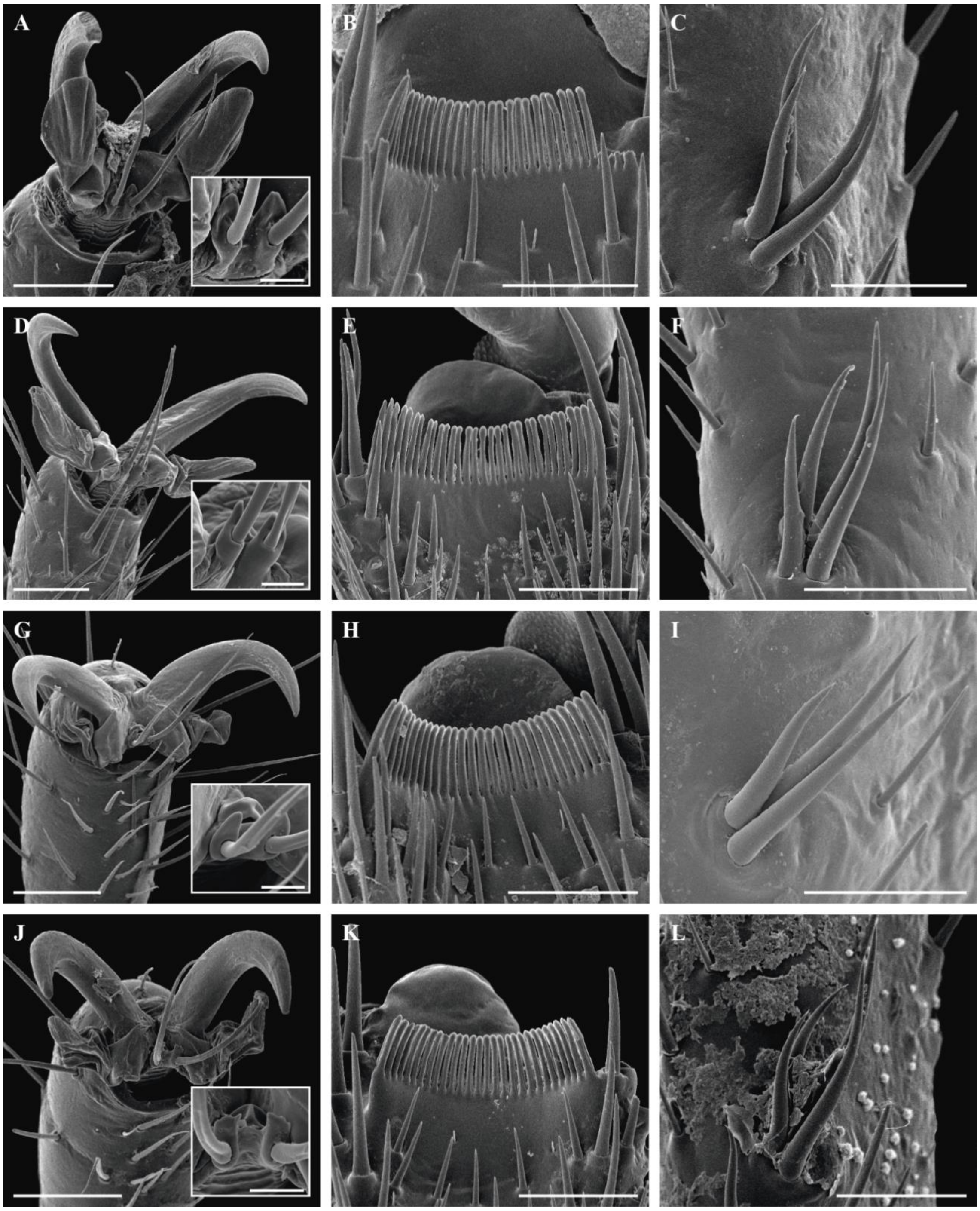


Figure S8. Pretarsus, tibial comb, and tibial apparatus of Carpocorini (Pentatominae, Pentatomidae). **A-C**, *Acledra albocostata*; **D-F**, *Agonoscelis nubilis*; **G-I**, *Agroecus griseus*; **J-L**, *Berecynthus hastator*. Scales: 100 µm; insets, 20 µm.

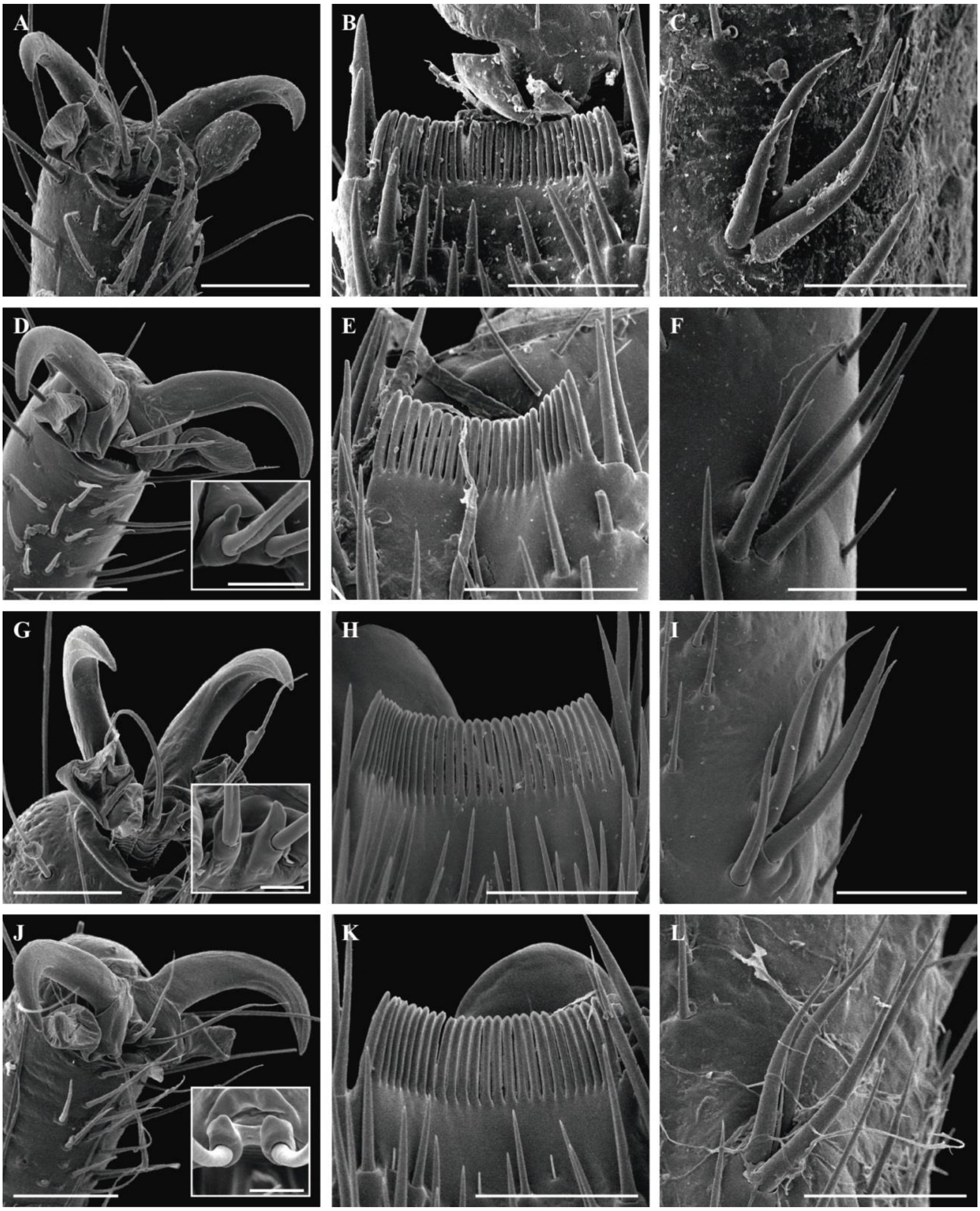


Figure S9. Pretarsus, tibial comb, and tibial apparatus of Carpocorini (Pentatominae, Pentatomidae). **A-C**, *Coenus delius*; **D-F**, *Cosmopepla decorata*; **G-I**, *Dichelops* (*Dichelops*) *punctatus*; **J-L**, *Dichelops* (*Dichelops*) *saltensis*. Scales: 100 µm; insets, 20 µm.

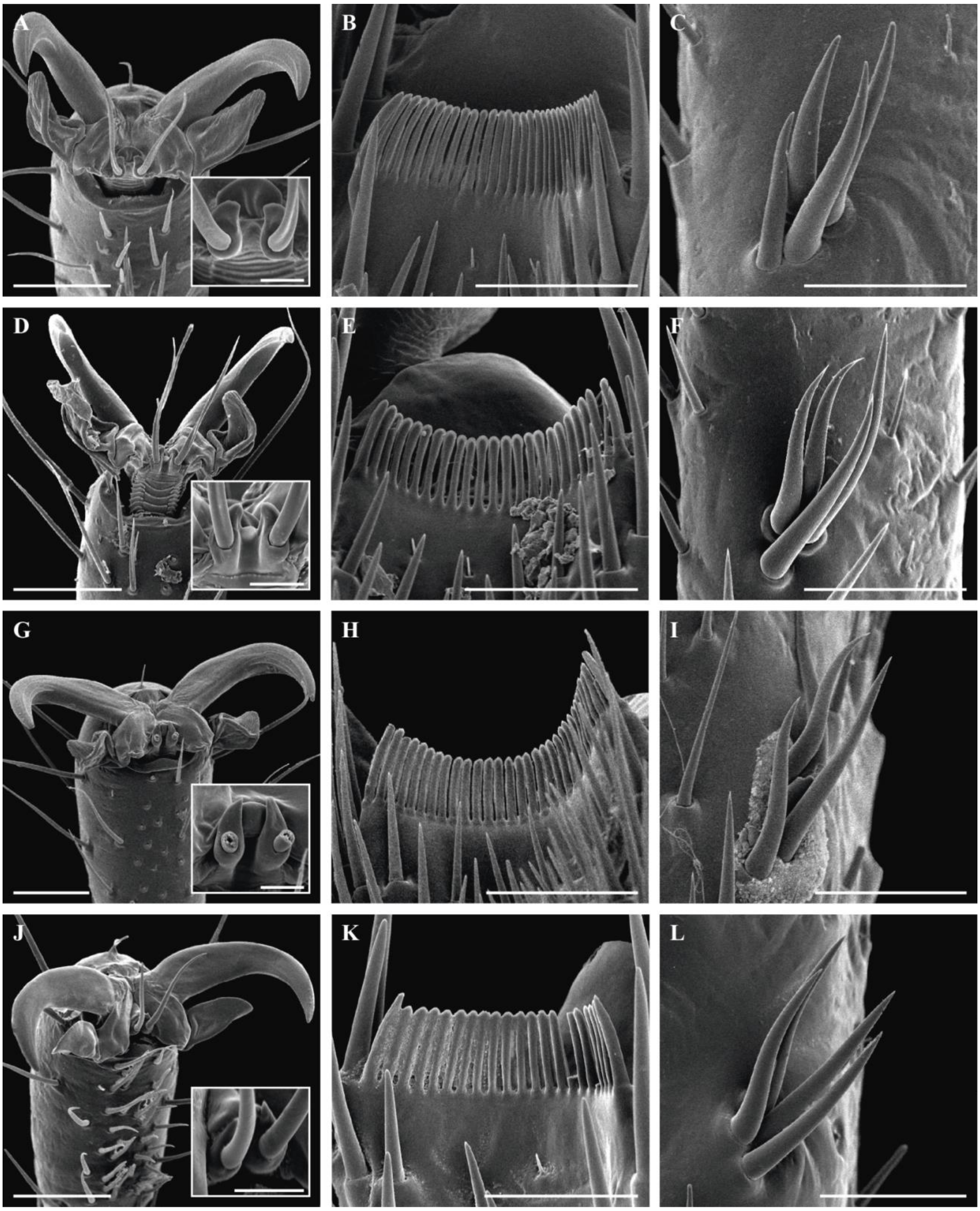


Figure S10. Pretarsus, tibial comb, and tibial apparatus of Carpocorini (Pentatominae, Pentatomidae). **A-C**, *Dichelops* (*Diceraeus*) *furcatus*; **D-F**, *Dichelops* (*Diceraeus*) *melacanthus*; **G-I**, *Dichelops* (*Prodichelops*) *divisus*; **J-L**, *Diploxys* sp. Scales: 100 µm; insets, 20 µm.

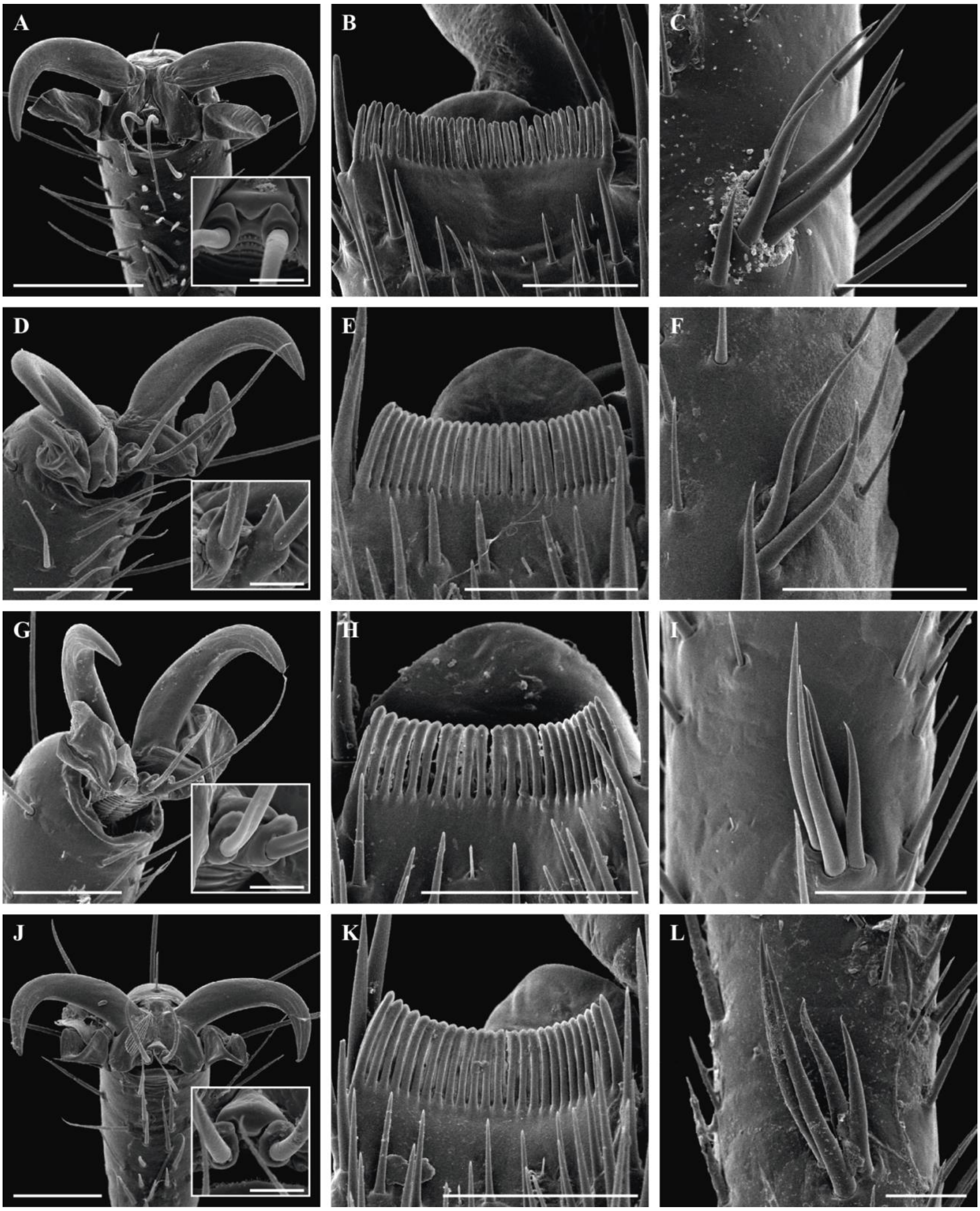


Figure S11. Pretarsus, tibial comb, and tibial apparatus of Carpocorini (Pentatominae, Pentatomidae). **A-C**, *Dolycoris baccarum*; **D-F**, *Hypatropis inermis*; **G-I**, *Mormidea quinqueluteum*; **J-L**, *Mormidea ypsilon*. Scales: 100 µm; insets, 20 µm.

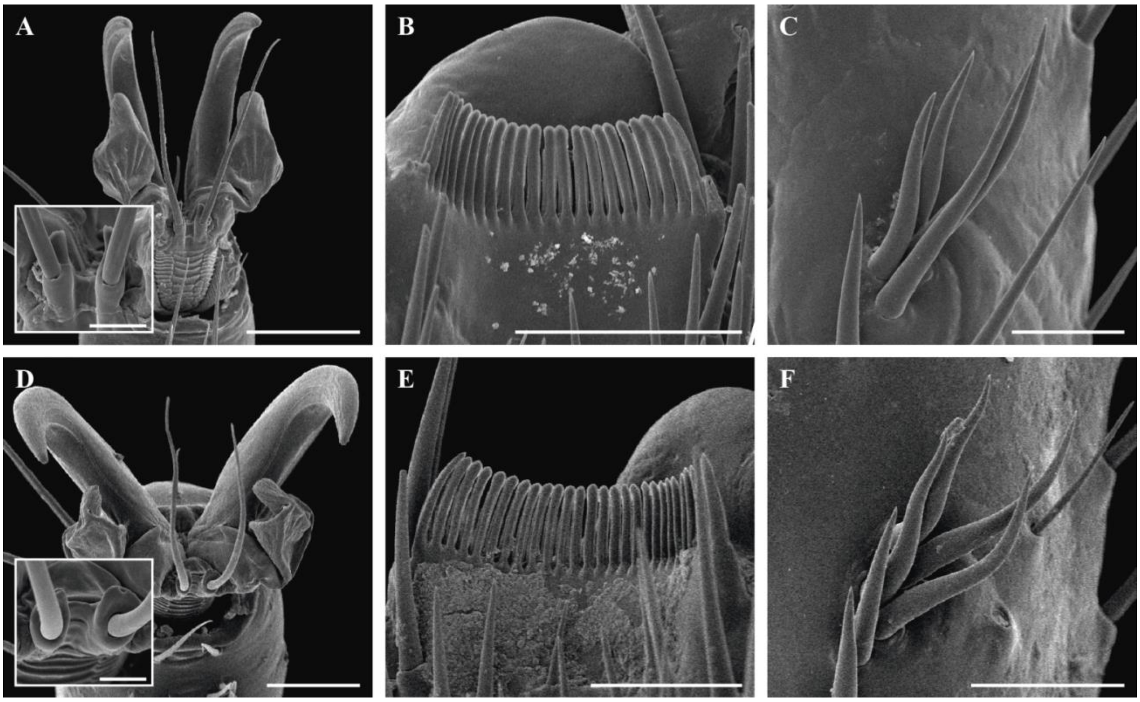


Figure S12. Pretarsus, tibial comb, and tibial apparatus of Carpocorini (Pentatominae, Pentatomidae). **A-C**, *Oebalus poecilus*; **D-F**, *Tibraca limbativentris*. Scales: 100 µm; insets, 20 µm.

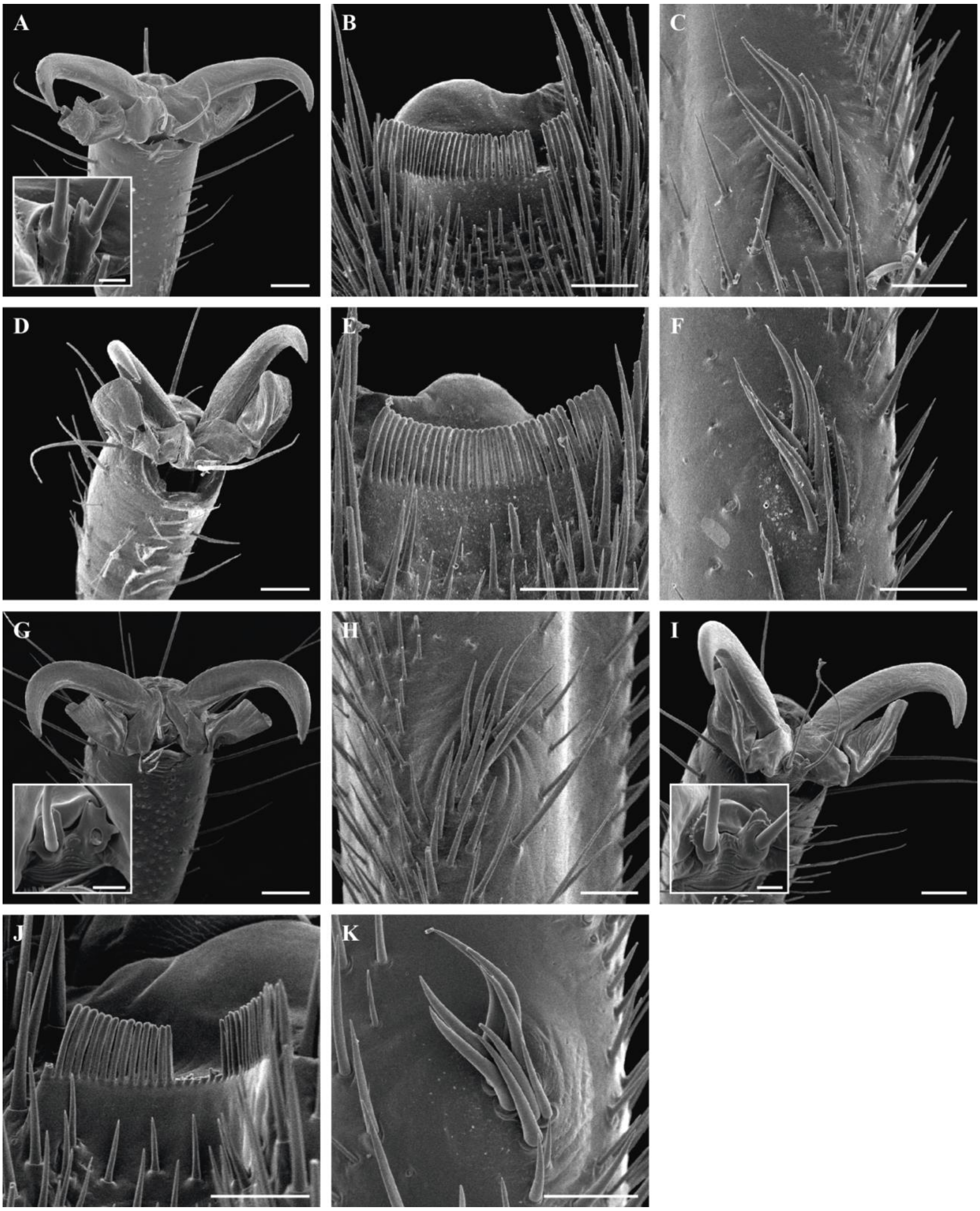


Figure S13. Pretarsus, tibial comb, and tibial apparatus of Catacanthini (Pentatominae, Pentatomidae). **A-C**, *Arocera apta*; **D-F**, *Arocera contralineata*; **G-H**, *Rhyssocephala infuscata*; **I-K**, *Rhyssocephala rufolimbata*. Scales: 100 µm; insets, 20 µm.

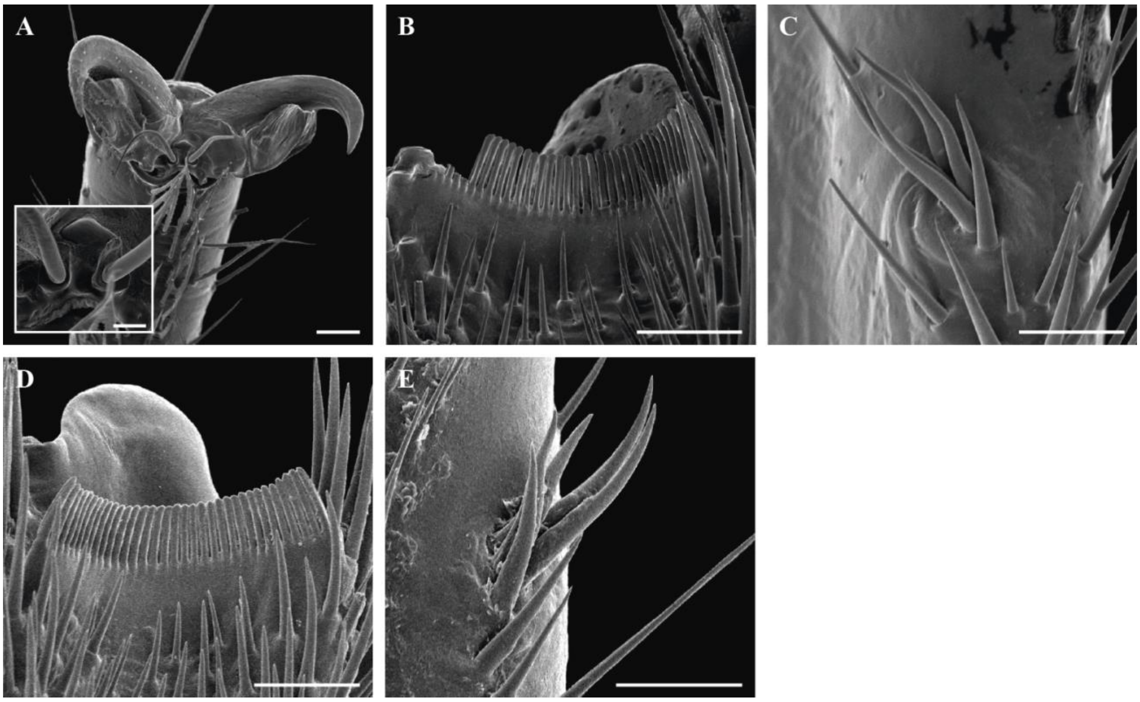


Figure S14. Pretarsus, tibial comb, and tibial apparatus of Catacanthini (Pentatominae, Pentatomidae). **A-C**, *Runibia decorata*; **D-E**, *Runibia perspicua*. Scales: 100 µm; insets, 20 µm.

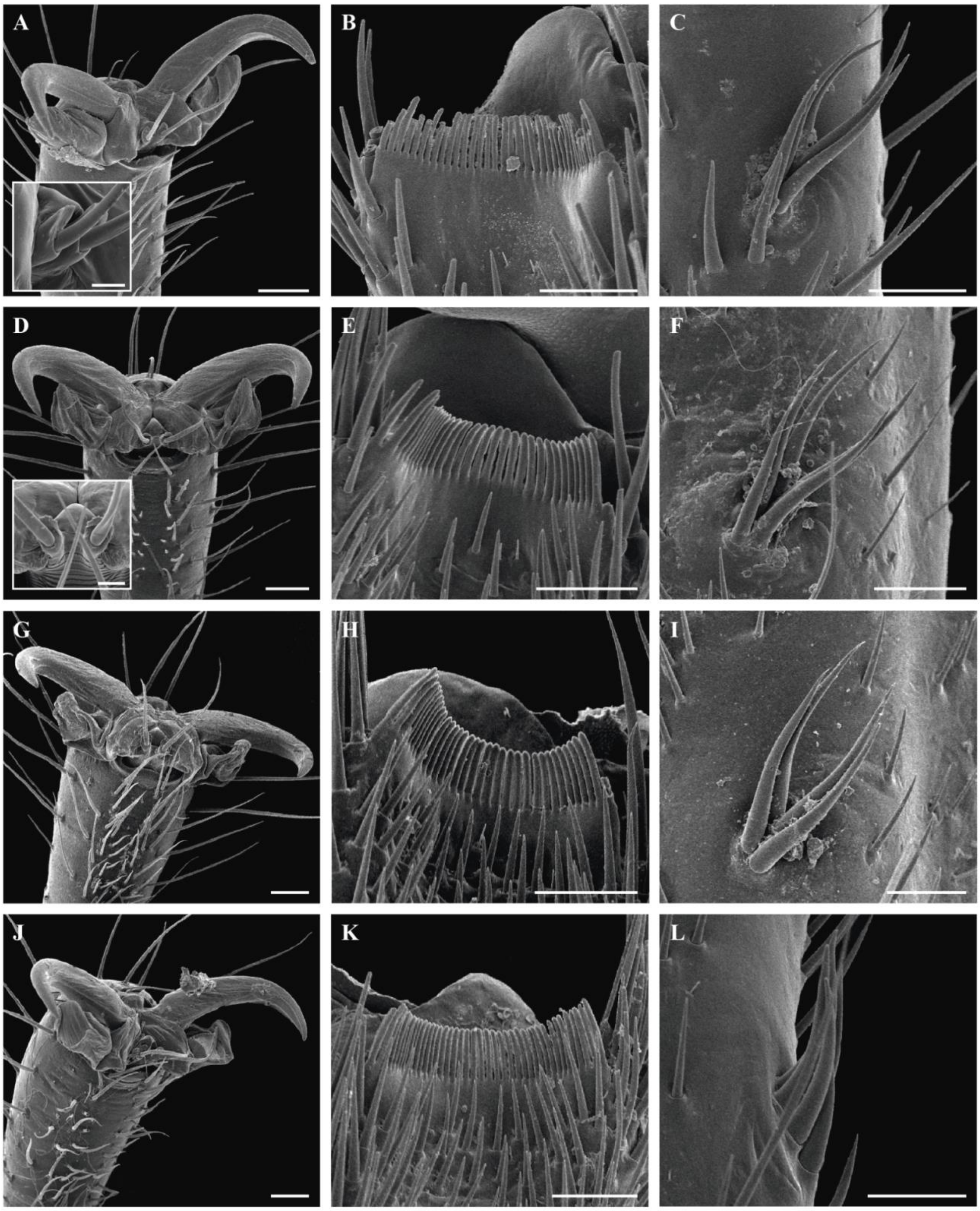


Figure S15. Pretarsus, tibial comb, and tibial apparatus of Chlorocorini (Pentatominae, Pentatomidae). **A-C**, *Arvelius albopunctatus*; **D-F**, *Chlorocoris* (*Chlorocoris*) *complanatus*; **G-I**, *Chlorocoris* (*Chlorocoris*) *distinctus*; **J-L**, *Chlorocoris* (*Monochricerus*) *flaviviridis*. Scales: 100 µm; insets, 20 µm.

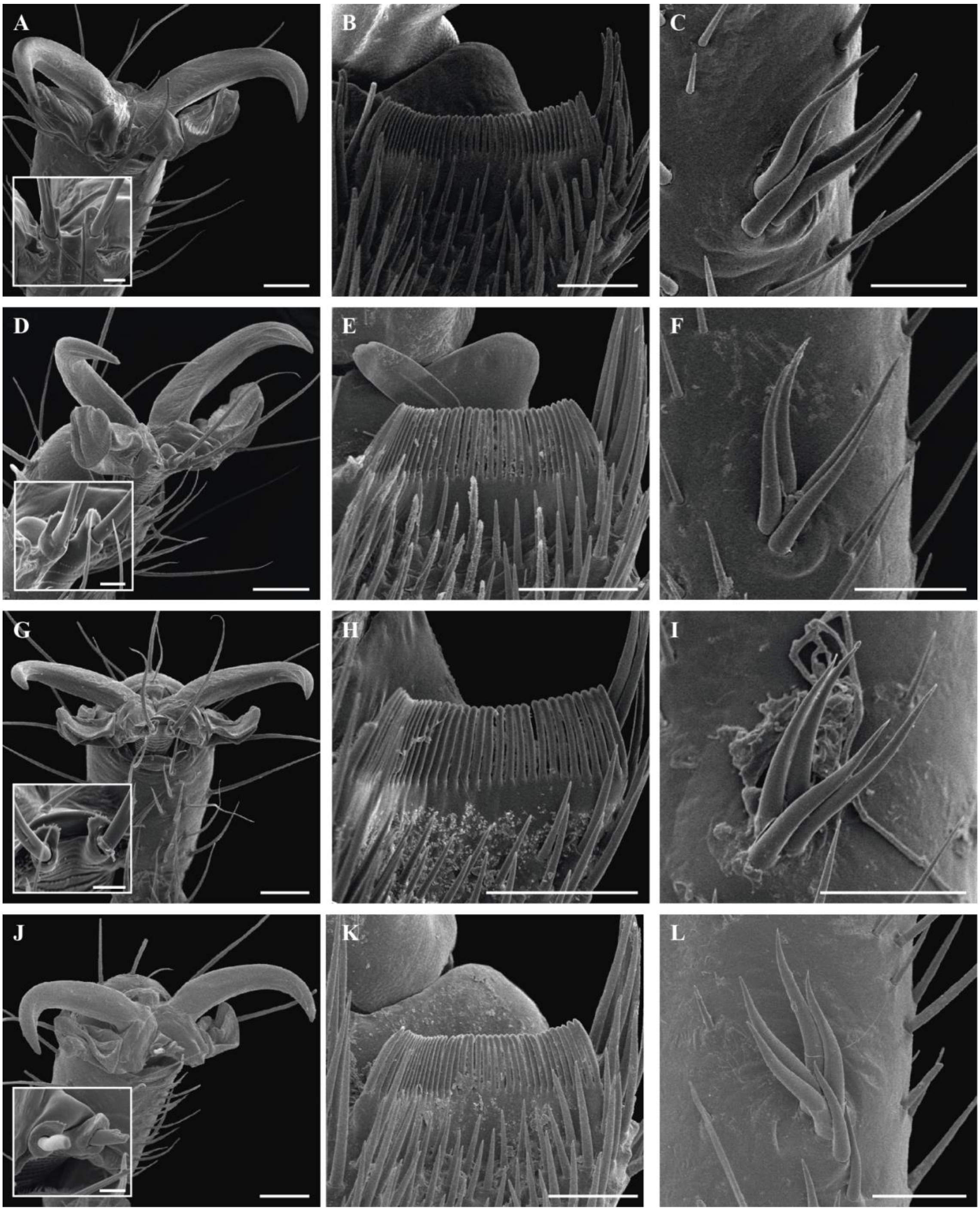


Figure S16. Pretarsus, tibial comb, and tibial apparatus of Chlorocorini (Pentatominae, Pentatomidae). **A-C**, *Chlorocoris* (*Monochricerus*) *subrugosus*; **D-F**, *Chloropepla rolstoni*; **G-I**, *Chloropepla vigens*; **J-L**, *Loxa deducta*. Scales: 100 µm; insets, 20 µm.

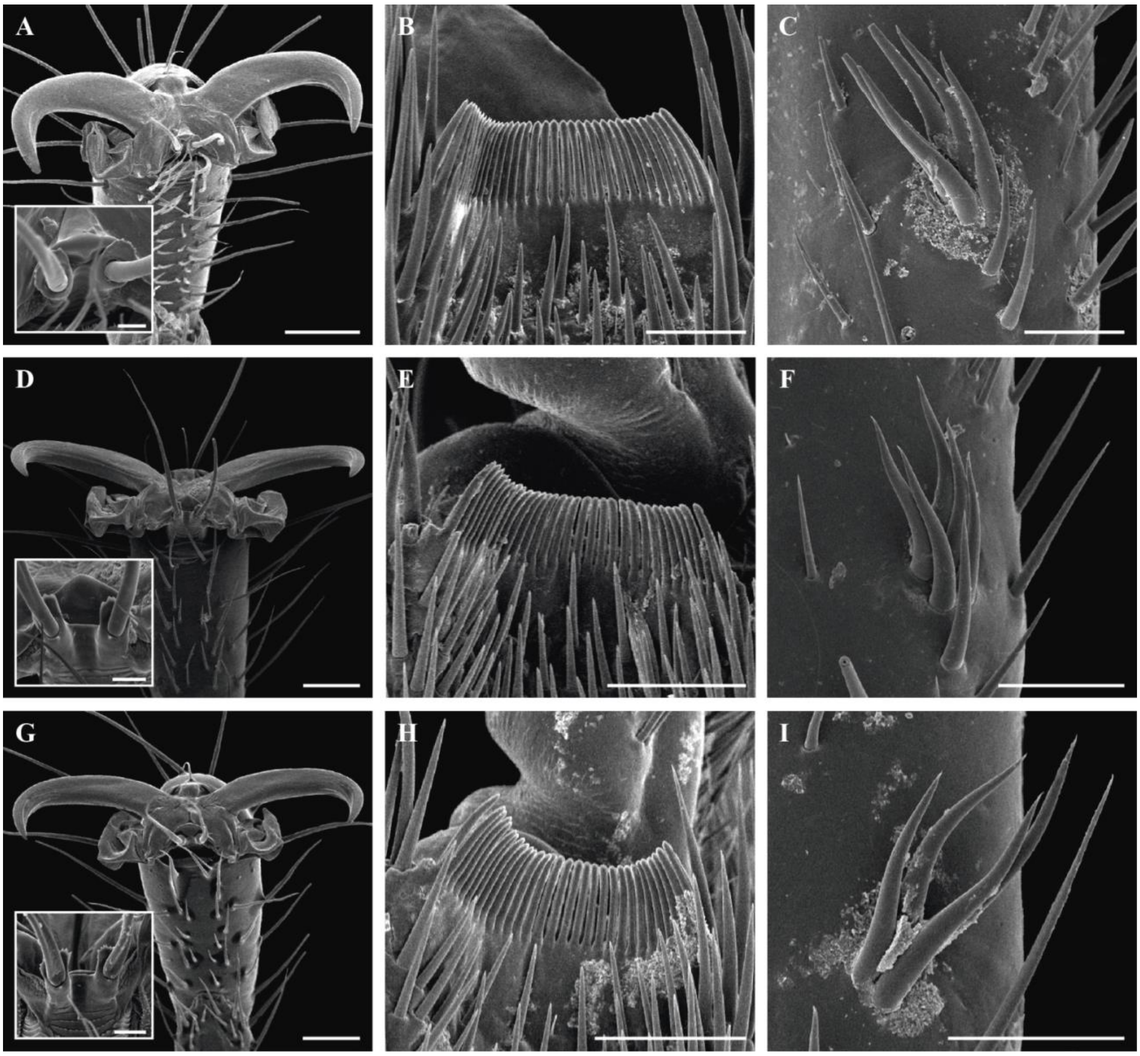


Figure S17. Pretarsus, tibial comb, and tibial apparatus of Chlorocorini (Pentatominae, Pentatomidae). **A-C**, *Loxa flavicolis*; **D-F**, *Rhyncholepta grandicallosa*; **G-I**, *Rhyncholepta meinderi*. Scales: 100 µm; insets, 20 µm.

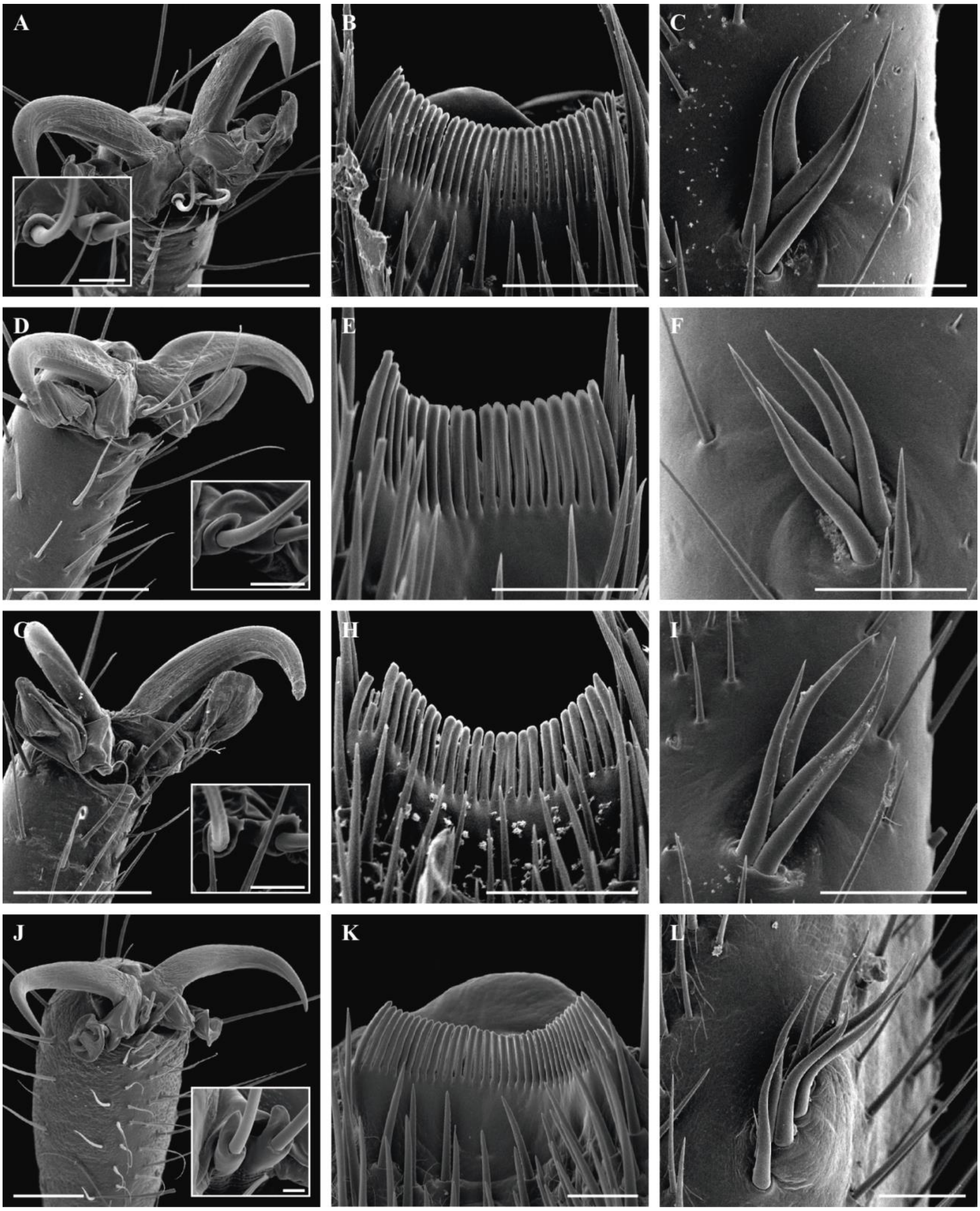


Figure S18. Pretarsus, tibial comb, and tibial apparatus of Pentatomini (Pentatominae, Pentatomidae). **A-C**, *Banasa dolabrata*; **D-F**, *Banasa patagiata*; **G-I**, *Banasa zeteki*; **J-L**, *Janeirona stali*. Scales: 50 µm; insets, 10 µm.

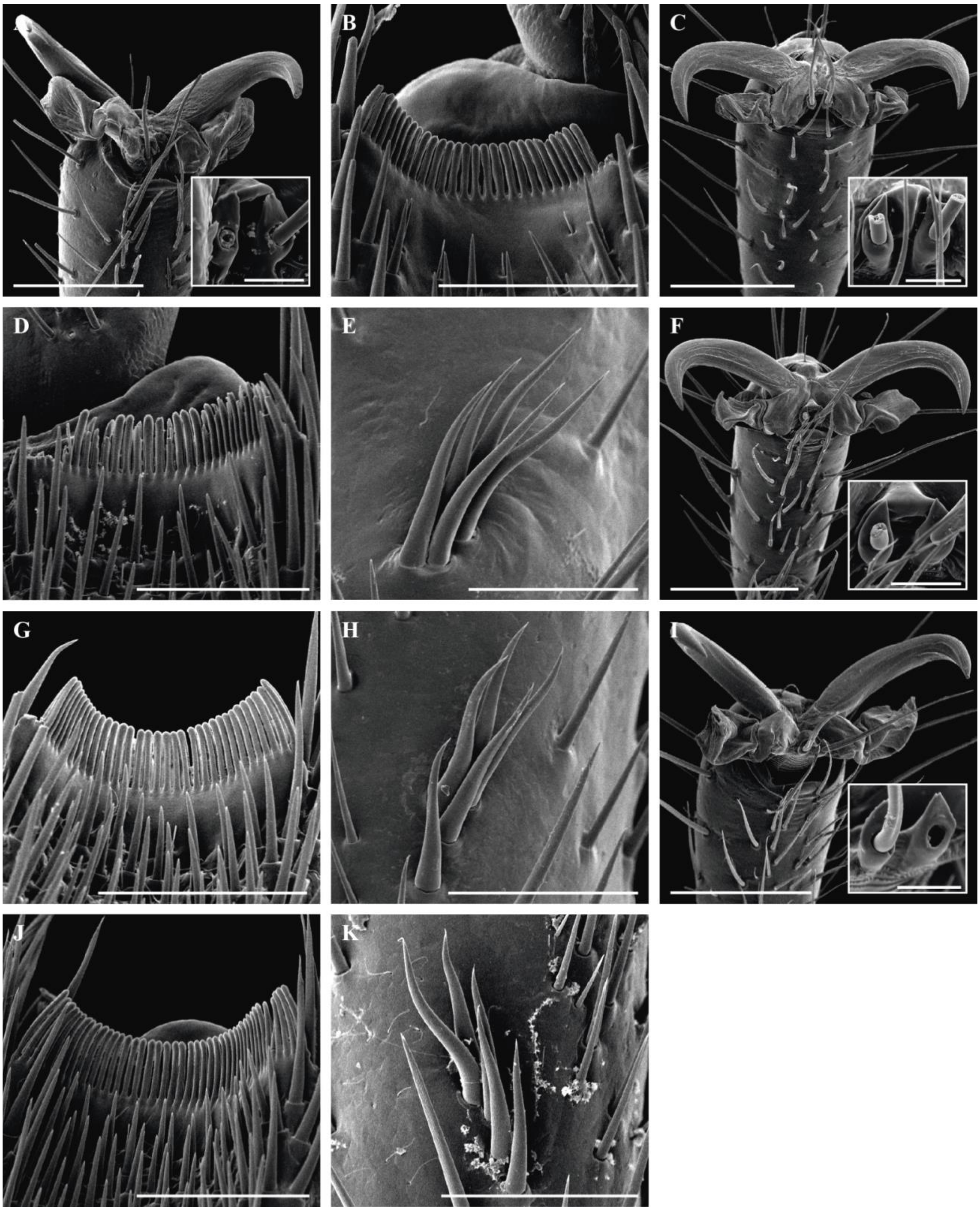


Figure S19. Pretarsus, tibial comb, and tibial apparatus of Pentatomini (Pentatominae, Pentatomidae). **A-B**, *Lelia octopunctata*; **C-E**, *Myota aerea*; **F-H**, *Neotibilis compascens*; **I-K**, *Neotibilis parva*. Scales: 100 µm; insets, 20 µm.

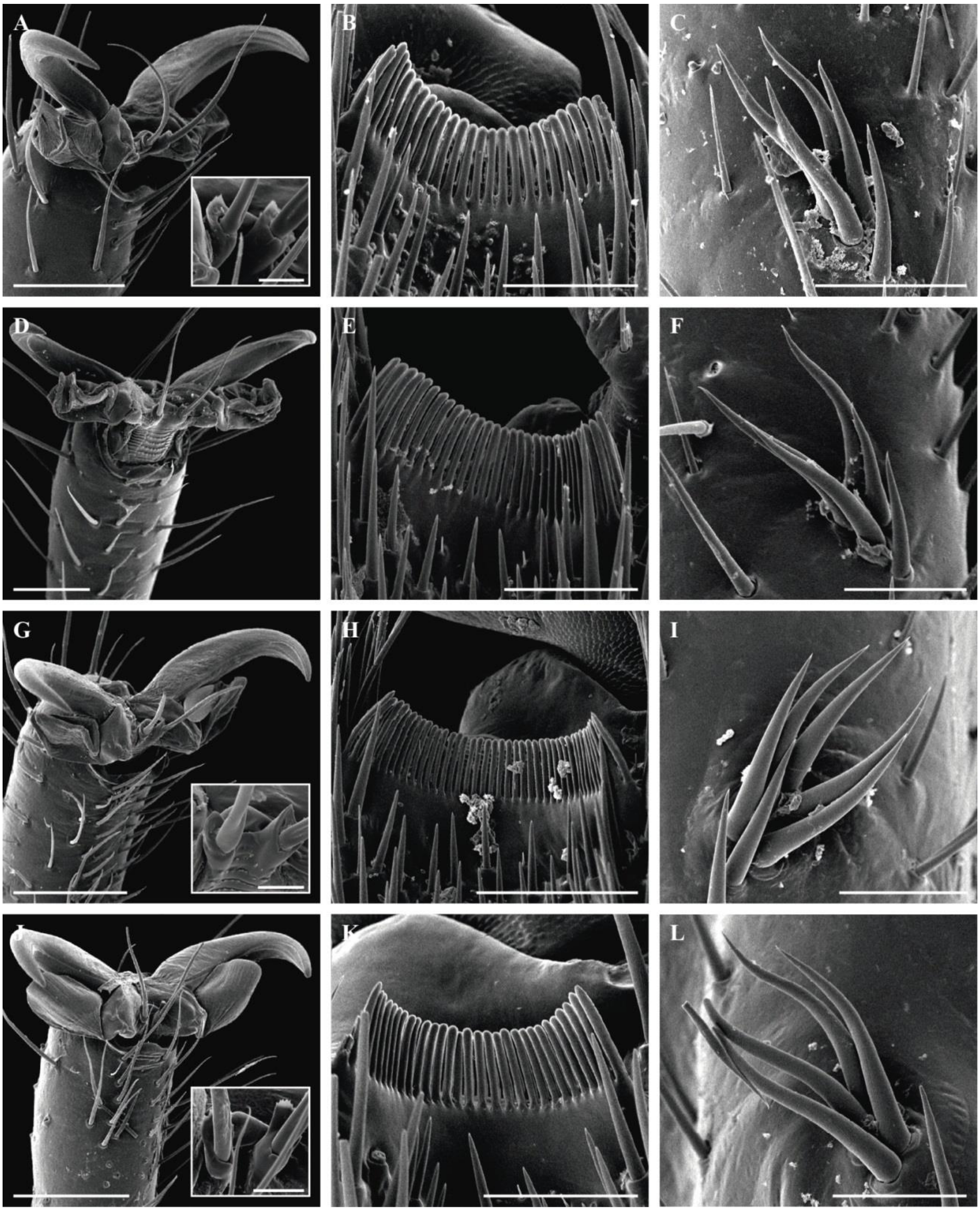


Figure S20. Pretarsus, tibial comb, and tibial apparatus of Pentatomini (Pentatominae, Pentatomidae). **A-C**, *Pallantia macula*; **D-F**, *Pallantia macunaima*; **G-I**, *Pellaea stictica*; **J-L**, *Pentatoma japonica*. Scales: 100 µm; insets, 20 µm.

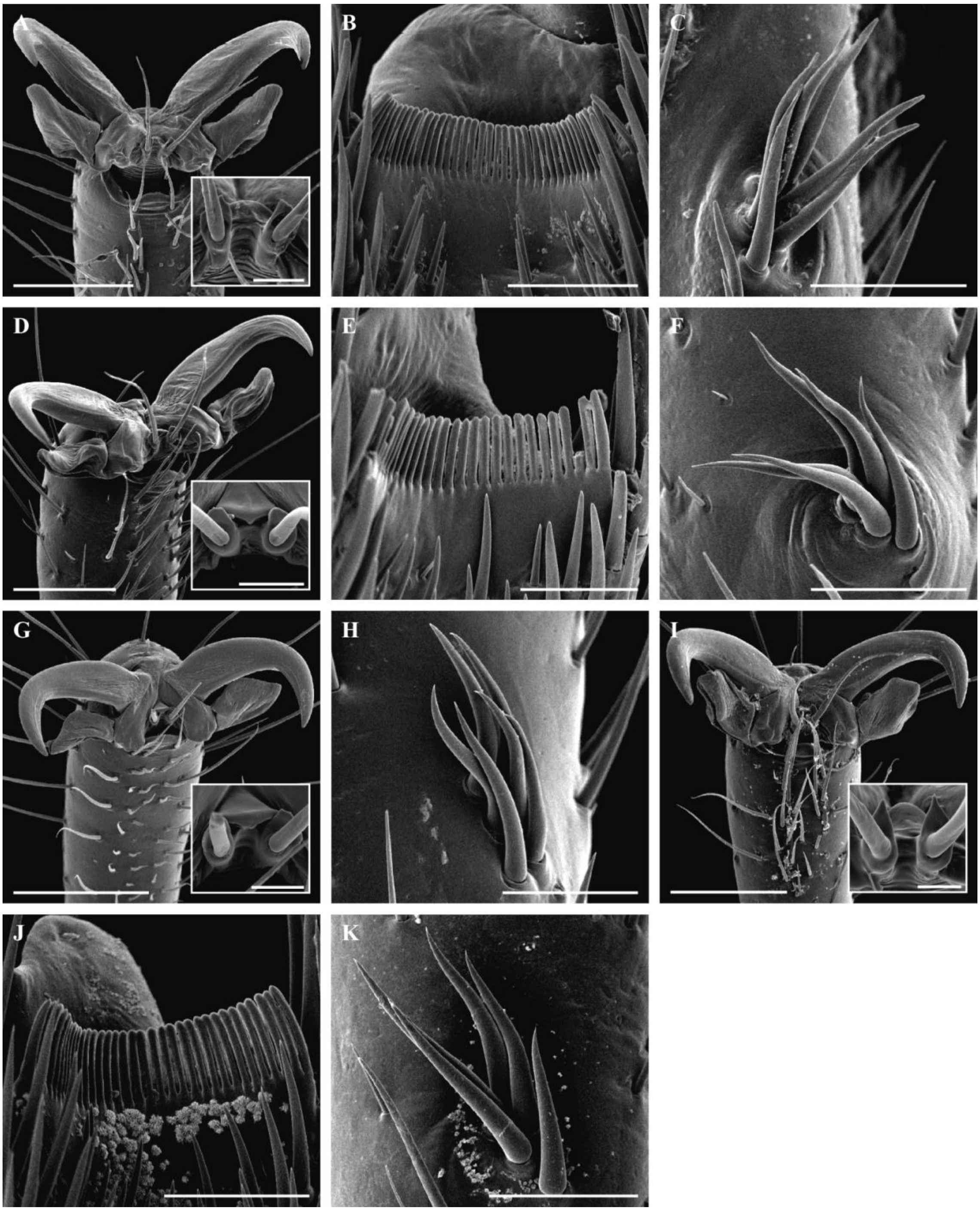


Figure S21. Pretarsus, tibial comb, and tibial apparatus of Pentatomini (Pentatominae, Pentatomidae). **A-C**, *Pentatoma metallifera*; **D-F**, *Pentatoma rufipes*; **G-H**, *Phalaeucus pustulatus*; **I-K**, *Taurocerus achilles*. Scales: 100 µm; insets, 20 µm.

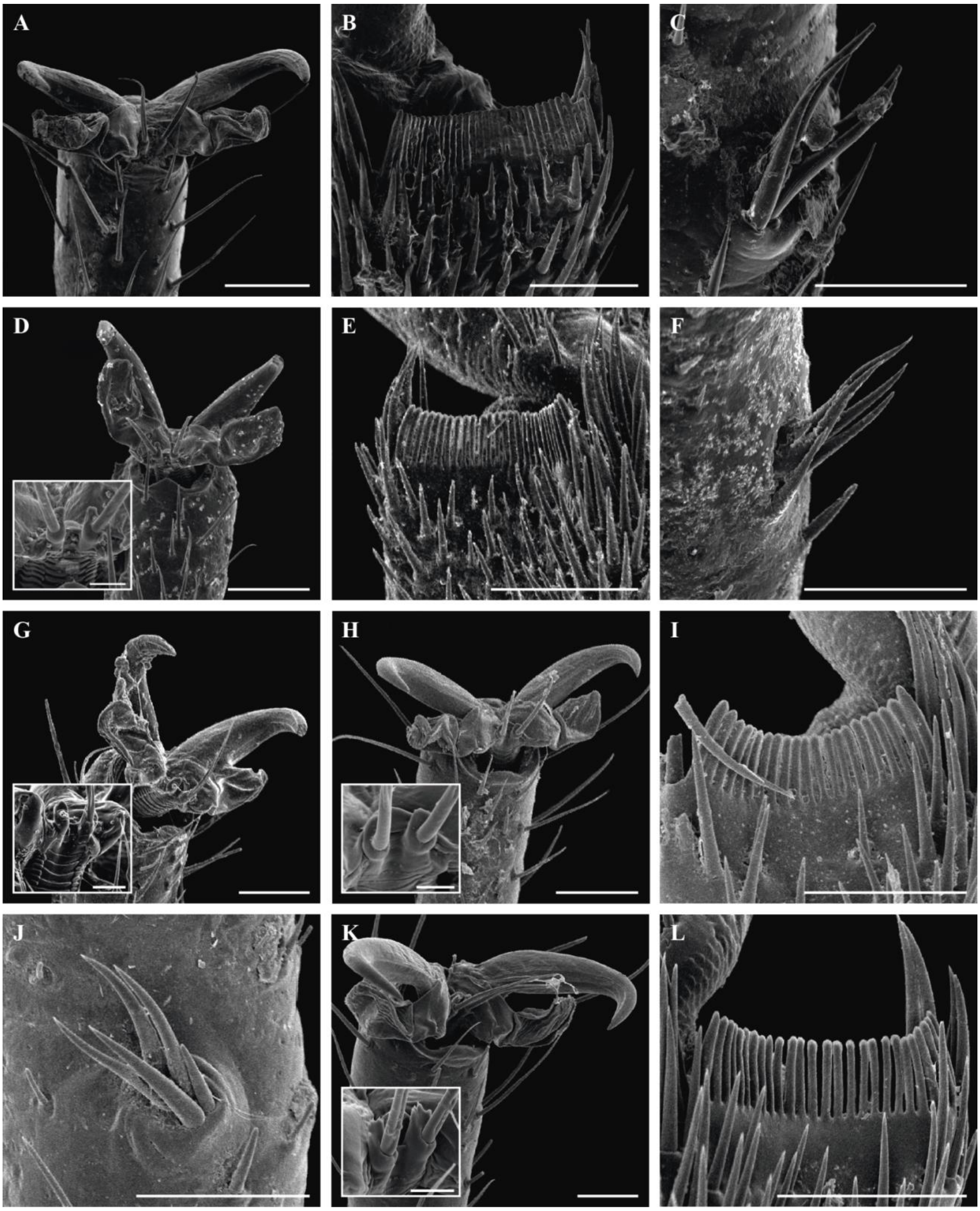


Figure S22. Pretarsus, tibial comb, and tibial apparatus of Procleticini (Pentatominae, Pentatomidae). **A-C**, *Dendrocoris arizonensis*; **D-F**, *Dendrocoris pini*; **G**, *Lobepomis peltifera*; **H-J**, *Thoreyella cornuta*; **K-L**, *Thoreyella trinotata*. Scales: 100 µm; insets, 20 µm.

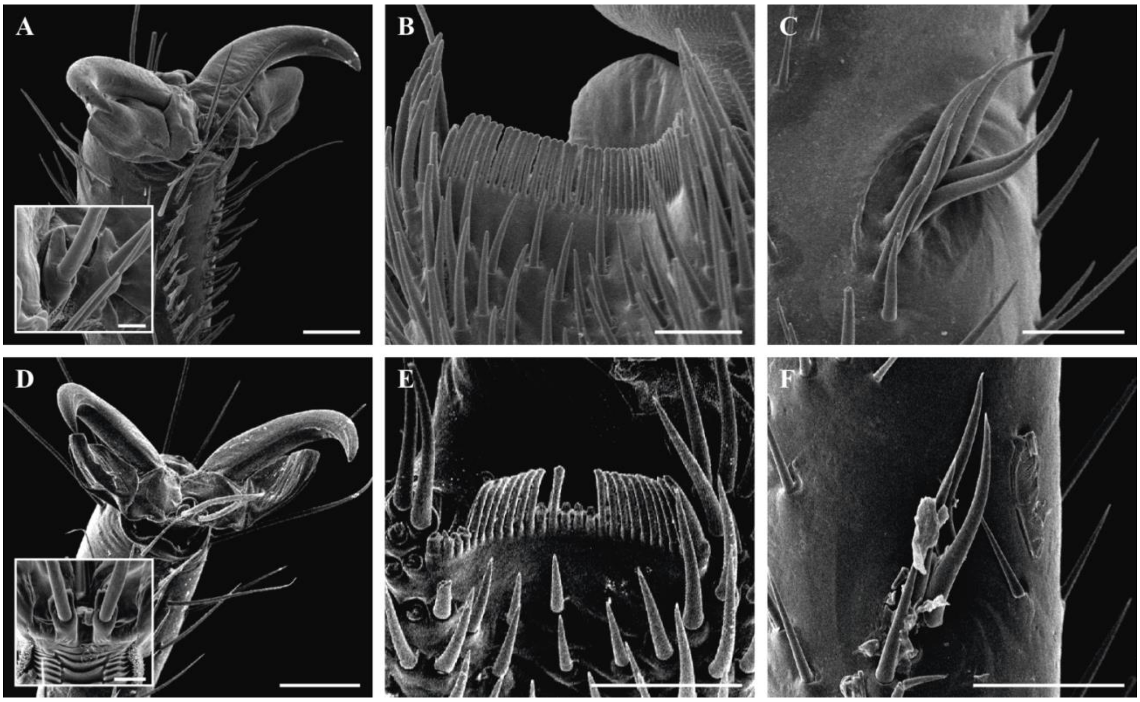


Figure S23. Pretarsus, tibial comb, and tibial apparatus of Rhynchocorini (Pentatominae, Pentatomidae). **A-C**, *Biprorulus bibax*; **D-F**, *Cuspicona simplex*. Scales: 100 µm; insets, 20 µm.

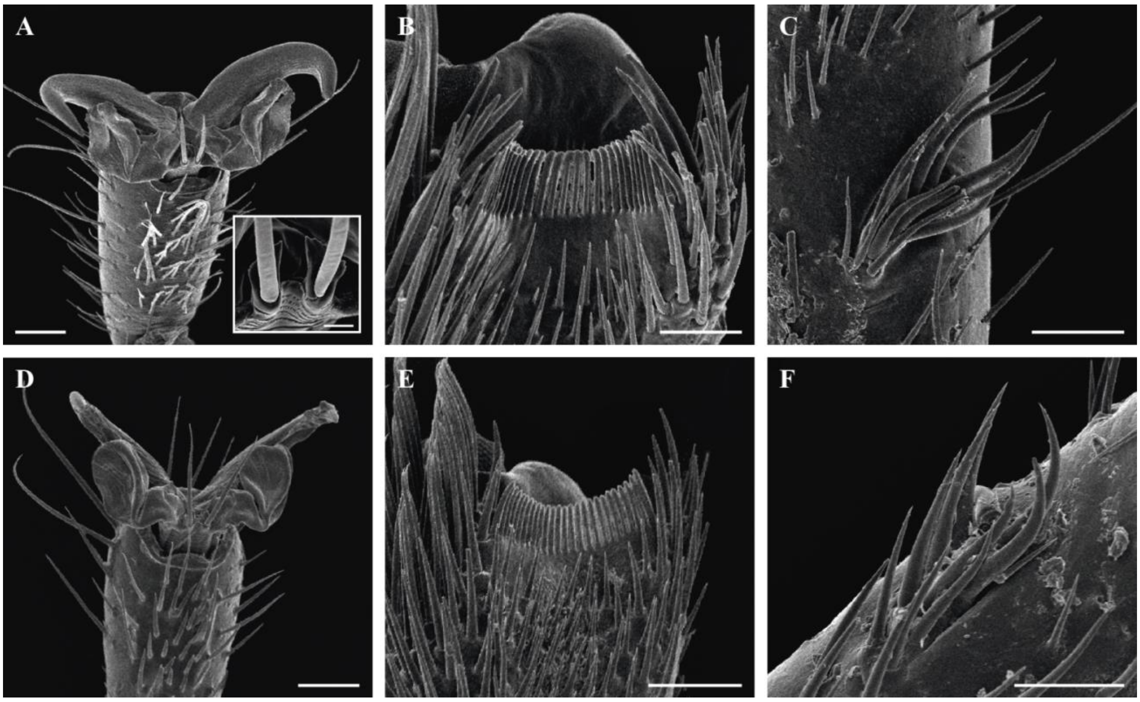


Figure S24. Pretarsus, tibial comb, and tibial apparatus of Scutelleridae. **A-C**, *Augocoris gomesi*; **D-F**, *Orsilochides leucoptera*. Scales: 100 µm; insets, 20 µm.

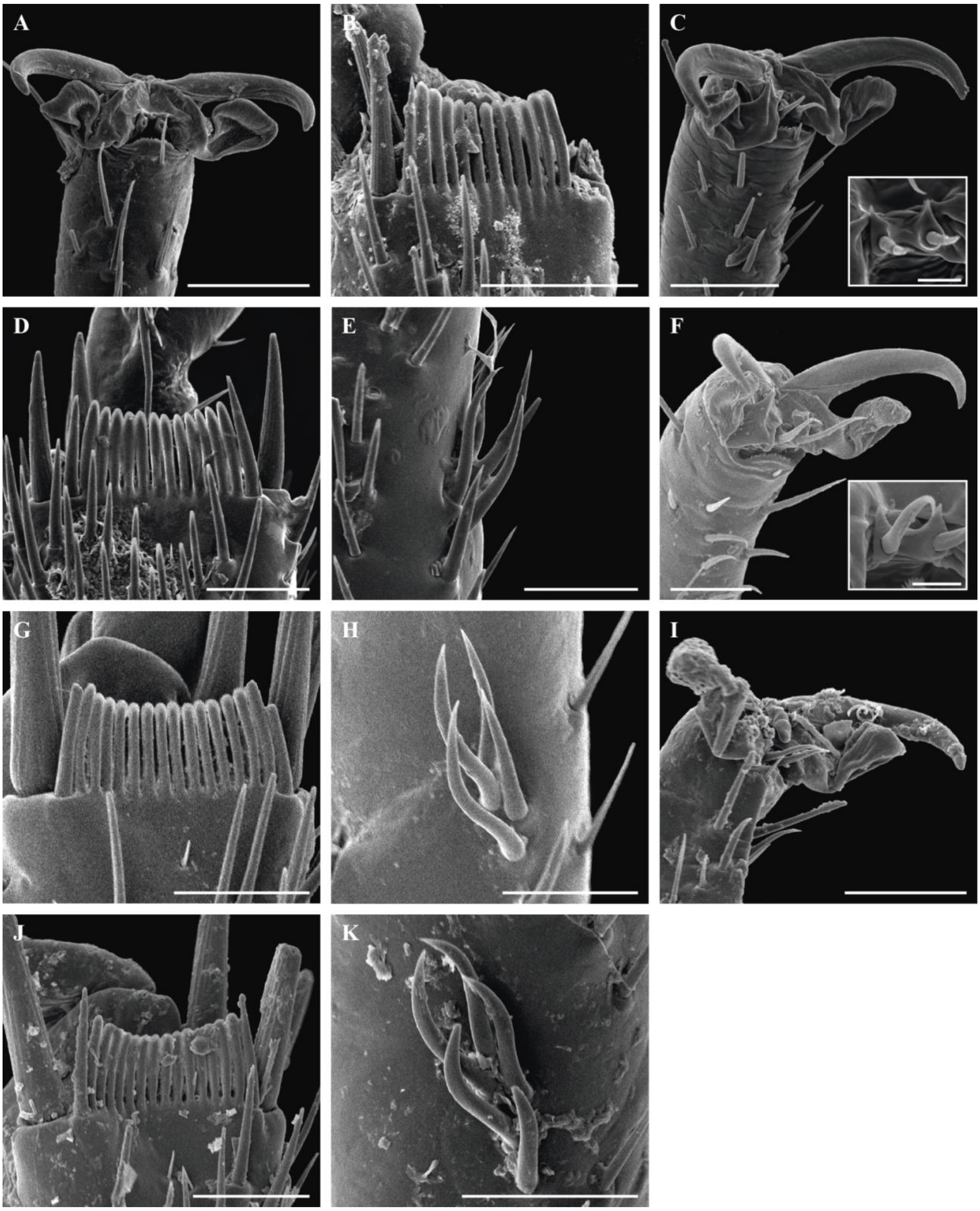


Figure S25. Pretarsus, tibial comb, and tibial apparatus of Thyreocoridae. **A-B**, *Corimelaena* (*Corimelaena*) *tibialis*; **C-E**, *Corimelaena* (*Parapora*) *extensa*; **F-H**, *Cydnoides* (*Cydnoides*) *ciliatus*; **I-K**, *Cydnoides* (*Cydnoides*) *renormatus*. Scales: 50 µm; insets, 10 µm.

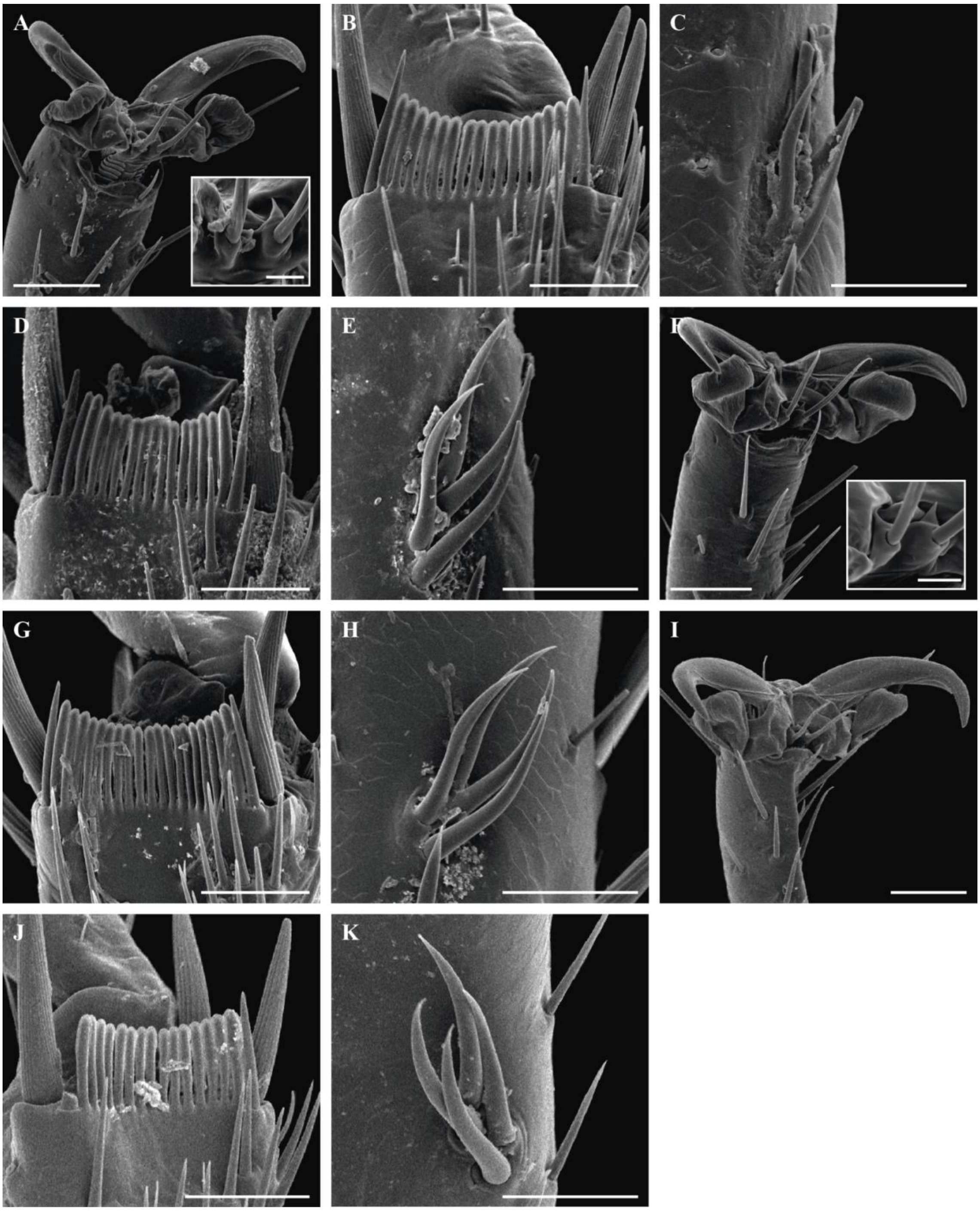


Figure S26. Pretarsus, tibial comb, and tibial apparatus of Thyreocoridae. **A-C**, *Galgupha* (*Euryscytus*) *difficilis*; **D-E**, *Galgupha* (*Galgupha*) *atra*; **F-H**, *Galgupha* (*Galgupha*) *cruralis*; **I-K**, *Galgupha* (*Microcompsus*) *vinculata*. Scales: 50 µm; insets, 10 µm.

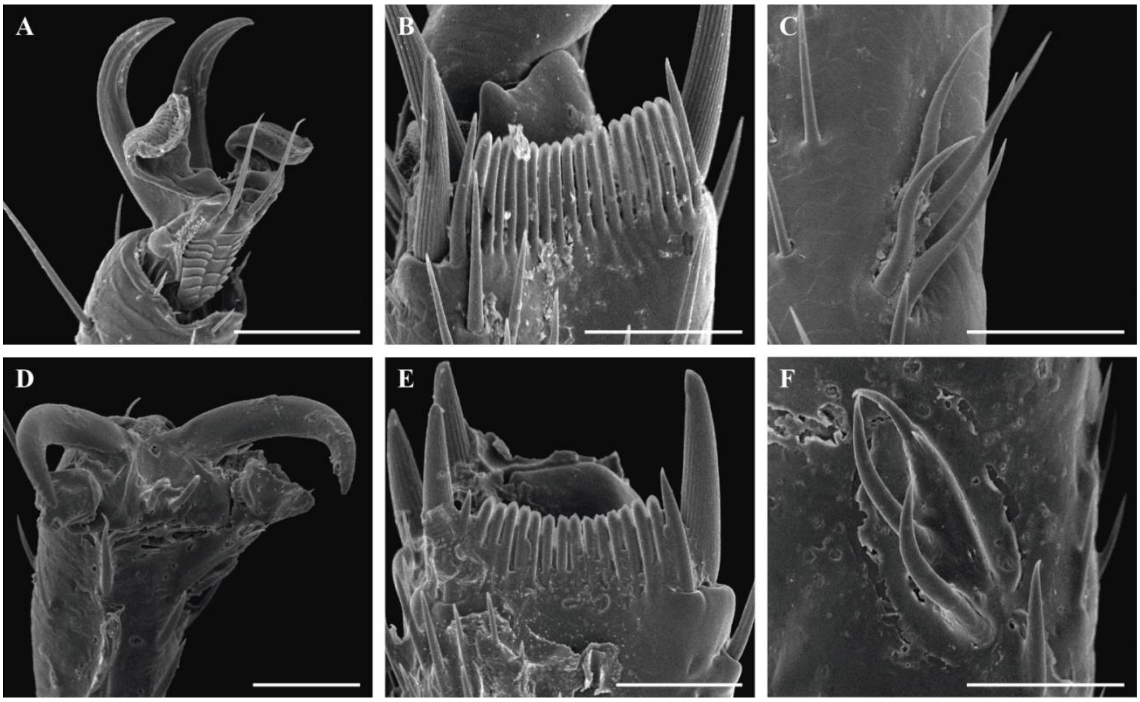


Figure S27. Pretarsus, tibial comb, and tibial apparatus of Thyreocoridae. **A-C**, *Galgupha* (*Nothocoris*) *terminalis*; **D-E**, *Thyreocoris scarabaeoides*. Scales: 50 µm; insets, 10 µm.

APÊNDICE II

Material suplementar ao Capítulo IV

Phylogeny of Dichelops (Hemiptera: Pentatomidae)

Appendix S1: List of examined material

Depositories (curators within parentheses)

AMNH	American Museum of Natural History, New York, United States (R.T. Schuh).
DARC	David Rider Collection, North Dakota, United States (D.A. Rider).
DZUP	Museu de Entomologia Pe. Jesus Santiago Moure, Universidade Federal do Paraná, Paraná, Brazil (R.R. Cavichioli).
FIOC	Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Brazil (J.Costa).
IFML	Instituto Fundación Miguel Lillo, Tucumán, Argentina (L. Claps).
MACN	Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires, Argentina (A. Bachmann).
MCNZ	Museu de Ciências Naturais da Fundação Zoobotânica do Rio Grande do Sul, Rio Grande do Sul, Brazil (A. Barcellos).
MIZA	Museo del Instituto de Zoología Agrícola , Maracay, Venezuela (E. Osuna).
MNNC	Museo Nacional de Historia Natural, Santiago, Chile (M. Elgueta).
MNRJ	Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (G. Mejdalani).
MPUJ	Pontificia Universidad Javeriana, Museo Javeriano de Historia Natural, Laboaratorio de Entomologia, Bogotá, Colombia (D. Forero).
MZSP	Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (M. Duarte).
RMNH	National Museum of Natural History (Naturalis), Leiden, The Netherlands (Y. van Nierop).
UEMA	Universidade Estadual do Maranhão, São Luiz, Maranhão, Brazil (F. Oliveira).
UFRG	Departamento de Zoologia, Universidade Federal do Rio Grande do Sul, Rio Grande do Sul, Brazil (J. Grazia).

USNM	National Museum of Natural History, (United States National Museum), Washington D.C., Estados Unidos (T. Henry).
ZUEC	Museu de Zoologia "Adão José Cardoso", Universidade Estadual de Campinas, Campinas, São Paulo, Brazil (A. Freitas).

***Dichelops* (*Dichelops*) *australis* Grazia & Klein, 2012**

Holotype, ♂, BRAZIL: Rio Grande do Sul, Eldorado do Sul (*J. Klein*) (MCNZ). *Paratypes*, ARGENTINA: 4 ♂, 3 ♀, Santa Fe, El Sombrerito, 11.ix.1964 (*A.A. Pirán*) (MACN); BRAZIL: 1 ♂, São Paulo, Campinas (UFRG); 2 ♂, Rio Grande do Sul, Cachoeirinha, 17.vii.1985 (*Albuquerque*) (UFRG).

***Dichelops* (*Dichelops*) *avilapiresi* Grazia, 1978**

Paratype, 1 ♂, BRAZIL: *Santa Catarina*: Pinhal, xii.1948 (*A. Maller*) (DARC). Additional material examined. BRAZIL: *São Paulo*: 1 ♂, Americana, 11.xi.1976 (*W.A. Lacerda*) (UFRG); 1 ♀, Santo André, 20.ii.1962 (*L. Stowbunenko*) (UFRG); *Paraná*: Pinhão, 1 ♀, VII.1992 (*G. Skuk*) (UFRG), 1 ♂, 26.x.1991 (*R.P. da Rocha*) (UFRG); *Santa Catarina*: Nova Teutônia, 300-500m, 27°11'S 52°23'E (*F. Plaumann*); 2 ♂, ix.1939 (DARC); 1 ♂, ii.1969 (DARC); 2 ♀, iii.1971 (DARC); 1 ♂, xi.1973 (DARC); 1 ♂, 1 ♀, xii.1973 (DARC); 1♀, i.1974 (DARC); 2♂, 2♀, xii.1975 (DARC); 1♀, i.1976 (DARC); 1 ♂, *Rio Grande do Sul,* Derrubadas, 16.iv.1983 (*S.L. Bonatto*) (UFRG); 1 ♂, 4 ♀, no data.

***Dichelops* (*Dichelops*) *bicolor* Distant, 1890**

2 ♂, 1 ♀, BRAZIL: *Mato Grosso,* Juína, 01.xi.1978 (*K.S. Brown Jr.*) (ZUEC); 1♂, 1♀, COLOMBIA: *Valle del Cauca*, Tuluá, 24-31.viii.1996 (*M. Reyes*) (MPUJ); 1 ♂, ECUADOR: *Napo,* Santa Cecilia, 240m, 8.vi-1.viii.1968 (*W.G. Saul*) (DARC); PERU: 1 ♂, *Junin,* Valle Chanchamayo, 800m, 13.viii.1956 (*Weirauch*) (DARC); 1 ♂, Satipo, ii.1944 (*P. Paprzyck*) (UFRG).

***Dichelops* (*Dichelops*) *leucostigmus* (Dallas, 1851)**

BRAZIL: 1 ♀, *Acre*, Rio Branco, 06-10.v.1981 (*J. Arias*) (UFRG); *Amazonas,* 1 ♂, 3 ♀, Alexo, 06.vii.1941 (*Parko*) (FIOC); 1 ♂, 2 ♀, Manaus, 06.vii.1941 (*Parko*) (UFRG); 1 ♂, Manaus, 25.v.1982 (*L.R. Loterre*) (UFRG); 1 ♂, Manaus, 24.iii.1986 (*R. Sampaio*) (UFRG); 1 ♀, Serra dos Porcos, viii.1977 (*M. Franklin*) (UFRG); 1 ♀, *Distrito Federal,* Planaltina, 23.iii.1977 (*V.O. Becker*) (CPAC); 1 ♂, *Goiás*: Goiânia, 13.i.1975 (*E. Ferreira*) (DARC); *Maranhão*: 1 ♂, Bom Jardim, Reserva Biológica Gurupi, 17-27.i.2010 (*F. Limeira-de-Oliveira, R.O. Souza & M.B. Aguiar Neto*) (UEMA); 6 ♂, 9 ♀, Carolina, Fazenda Cincorá, 17-22.x.2009 (*F. Limeira-de-Oliveira, R.O. Souza & M.B. Aguiar Neto*) (UEMA); *Mato*

Grosso, 1 ♀, Jaçanã, P.N. Xingu, xi.1960 (*W. Alvarenga*) (DZUP); 2 ♂, 1 ♀, Aripuana, 10°25’S 59°28’E, 300m, 17-22.iii.1977 (*D. Engleman*) (DARC); *Rondônia*: 1 ♀, Porto Velho, 15.iii.1979 (*J. Campbell*) (UFRG); 1 ♀, 62km SW Ariquemes, 30.iii-10.iv.1992 (*J.E. Eger*) (DARC); 1 ♂, 62km SW Ariquemes, 25.x.1993 (*U. Schmitz*) (DARC); 1 ♂, 1 ♀, 62km SW Ariquemes, 08-20.xi.1994 (*J.E. Eger & L.B. & C.W. O’Brien*) (DARC); COLOMBIA: 1 ♂, *Meta*, Puerto Lopez, ix.1991 (*Martinez Guerra*) (MPUJ).

***Dichelops* (*Dichelops*) *miriamae* Grazia, 1978**

Paratypes, BRAZIL: *Rio Grande do Norte:* Natal, 1 ♂, i.1950 (*M. Alvarenga*) (UFRG); 1 ♂, 1 ♀, ii.1950 (*M. Alvarenga*) (FIOC, MNRJ); 1 ♂, xii.1952 (*M. Alvarenga*) (MNRJ); 1 ♀, iii.1952 (*M. Alvarenga*) (MNRJ). *Additional analyzed specimens*. BRAZIL: 1♂, 1♀, *Bahia,* Encruzilhada, xi.1972 (*M. Alvarenga*) (DARC).

***Dichelops* (*Dichelops*) *nigrum* Bergroth, 1914**

ARGENTINA: 1 ♀, *Misiones*, Puerto Iguazu, 30.xii.1991 (DARC); BRAZIL: *Amazonas*: 1 ♂, Manaus, 06.vii.1941 (*Parko*) (UFRG); 1 ♀, Manaus, 06.iii.1988 (*J.C. Furtado*) (UFRG); 1 ♂, *Espírito Santo*, Santa Tereza, 07.xii.1964 (*C. Elias*) (DZUP); 1 ♂, *Maranhão,* Bom Jardim, R.B. Gurupi, 05-15.vi.2010 (*F. Limeira-de-Oliveira, R.O. Souza & M.B. Aguiar Neto*) (UEMA); *Rio de Janeiro*: 1 ♂, Rio de Janeiro, 25.xi.1952 (*Zajciv*) (UFRG); 1 ♀, Rio de Janeiro, vi.1949 (*Carvalho*) (UFRG); 1 ♀, *Rio Grande do Sul*, Derrubadas, P.E. Turvo, 17.xii.1982 (*S.L. Bonatto*) (UFRG); *Santa Catarina*: Nova Teutonia, 300-500m, 27°11’S 52°23’E (*F. Plaumann*) 1 ♀ iv.1973 (DARC), 1♂ xii.1975 (DARC); COLOMBIA: 1 ♂, 1 ♀, *Meta*, Restrepo (*G. Gómez*) (UFRG); VENEZUELA: 1 ♂, 1 ♀, *Amazonas*, San Juan de Manapiare, 03.iv.1958 (UFRG); 1 ♂, *Aragua*, Cata, 15.ix.1965 (*J. & B. Bechyné*) (UFRG).

***Dichelops* (*Dichelops*) *peruanus* Grazia, 1978**

Paratypes, PERU: *Junin*: Satipo, 2 ♀, i.1937 (*P. Paprzyck*) (FIOC, MNRJ); 12 ♀, xii.1937 (*P. Paprzyck*) (FIOC); 1 ♀, xii.1943 (*P. Paprzyck*) (FIOC); 1 ♂, 1 ♀, iii.1944 (*P. Paprzyck*) (FIOC). *Additional analyzed specimens*. ECUADOR: *Napo*: Limón Cocha, 1 ♀, 1965 (*C.R. Patrick*) (DARC); 1 ♂, 1 ♀, 17.ix.1964 (*G. Dozier*) (DARC); 1 ♂, 17.viii.1964 (*G. Dozier*) (DARC); 1 ♀, 19.vi.1965 (*C.R. Patrick*) (DARC); 2 ♂, 1♀, 25.vi.1965 (*C.R. Patrick*) (DARC); PERU: *Huanuco*: 1 ♂, Tingo Maria, Monzon Valley, 02.xi.1954 (*E.I. Schlinger & E.S. Ross*) (DARC); 1 ♂, Tingo Maria, 650m, 5.iv.1963 (*T.H. Hubbell & L.E. Pena*) (DARC).

***Dichelops* (*Dichelops*) *pradoi* Grazia, 1978**

Paratypes, 1 ♀, BRAZIL: *Goiás*, Aragarças, xi.1965 (*Alvarenga*) (MZSP); 1 ♀, BRAZIL: *Mato Grosso do Sul*, Corumbá, Serra do Urucum, 29.xi.1940 (*K. Lenko*) (MZSP). *Additional* *analyzed specimens*. BRAZIL: *Maranhão*: 1 ♂, Caxias, Morro do Alecrim, 01-10.i.2010 (*F. Limeira-de-Oliveira*) (UEMA); *São Paulo*: 1 ♂, Araçatuba, Rio Jacarecatinga, x.1961 (*Lane & Rabello*) (MZSP).

***Dichelops* (*Dichelops*) *punctatus* Spinola, 1837**

BRAZIL: 1 ♂, *Minas Gerais*: Viçosa, iii.1963 (*F. Werner, U. Martins & L. Silva*) (UFRG); *Rio de Janeiro*: 1 ♀, Petrópolis, 05-07.iii.1962 (*J. Bechyné*) (UFRG); 1 ♀, Rio de Janeiro, x.1944 (*Carvalho*) (MNRJ); *São Paulo*: 1 ♂, São Paulo, ii.1938 (*E. Schur*) (UFRG); 1 ♀, São Paulo, 17.ii.1934 (MZSP).

***Dichelops* (*Dichelops*) *saltensis* Grazia, 1978**

ARGENTINA: 1 ♀, *Salta*, S. Martin Pocitos, i.1962 (*A. Martinez*) (MZSP); *Tucumán*: 1 ♀, Aconquija, xi.1946 (*R. Golbach*) (DARC); 7 ♂, 23 ♀, Tucumán, iii.1959 (*Golbach*) (UFRG); 1 ♂, 1 ♀, Tucumán, 25.i.1962 (*W. Weirauch*) (IFML).

***Dichelops* (*Diceraeus*) *caatinguensis* Grazia & Poock-da-Silva, 2013**

Holotype ♂, BRAZIL: *Paraíba*, Soledade, Juazeirinho, 08.vii.1956 (*A.G.A. Silva*) (MNRJ). *Paratypes*: 1 ♂, 1 ♀, BRAZIL: *Rio Grande do Norte,* Baixa Verde, vii.1950 (*B.J. Souza*) (UFRG); 1 ♀, BRAZIL: *Paraíba,* Soledade, Juazeirinho, 22.iii.1956 (*A.G.A. Silva*) (MNRJ); 1 ♂, BRAZIL; *Paraíba*, Soledade, Juazeirinho, 08.vii.1956 (*A.G.A. Silva*) (MNRJ); 1 ♂, 10 ♀, BRAZIL: *Pernambuco,* Casa Nova, v.1974, Caatinga (*J.C.M. Carvalho*) (UFRG, MNRJ); 6 ♀, BRAZIL: *Pernambuco,* Petrolina, v.1974, Caatinga (*J.C.M. Carvalho*) (MCNZ, MNRJ); 1 ♀, BRAZIL: *Pernambuco,* Petrolina, v.1969 (*M. Alvarenga*) (MNRJ); 1 ♀, BRAZIL: *Pernambuco,* Petrolina, Estrada Picos, v.1974, Caatinga (*J.C.M. Carvalho*) (MNRJ); 1 ♀, BRAZIL: divisa entre *Pernambuco* e sul do *Piauí,* Estrada Picos Km3, v.1974, Caatinga (*J.C.M. Carvalho*) (MNRJ); 1 ♂, BRAZIL: *Bahia,* Anajê, 16.v.1975 (*C. & P. Elias*) (MCNZ); 1 ♂, 1 ♀, BRAZIL: *Bahia,* Brumado, 9.v.1975 (*C. & P. Elias*) (DZUP); 1 ♂, 4 ♀, BRAZIL: *Bahia*, Juazeiro, v.1974, Caatinga (*J.C.M. Carvalho*) (MNRJ); 1 ♀, BRAZIL: *Bahia,* Juremal, Estrada do Juazeiro, v.1974, Caatinga (*J.C.M. Carvalho*) (MNRJ); 1 ♀, BRAZIL: *Bahia* (*G. Bondar*); 1 ♂, 2 ♀, BRAZIL: nordeste, 1933 (*Ihering*) (UFRG, FIOC).

***Dichelops* (*Diceraeus*) *furcatus* (Fabricius, 1775)**

ARGENTINA: 2 ♂, *Buenos Aires,* Pergamino (*P. Rebagliati*) (UFRG); 1 ♀, *Chaco,* Pozo La Gringa, i.1995 (DARC); 1 ♂, *Entre Rios,* Concordia, Parque San Carlo (*P. Rebagliati*) (UFRG); 1 ♀, *Mendoza,* Junin, 20.iii.1945 (*A. Silva*) (UFRG); 1 ♂, *Santa Fé,* Huges, iii.2000 (*P. Rebagliati*) (UFRG); BOLIVIA: 1 ♂, *Cochabamba,* Cristal Mayu, 600m, x.1962 (DARC); 1 ♂, *Santa Cruz*, Buena Vista, xi.1961 (DARC); BRASIL: 1 ♀, *Minas Gerais,* Viçosa, 01.xii.1990 (*J.E.M. Leite*) (UFRG); *Paraná*: 2 ♀, Cascavel, 10.viii.1993 (*J.B. Nessa*)

(UFRG); 2 ♂, Guarapuava, 13.ii.1974 (*A.R. Panizzi*) (UFRG); *Rio de Janeiro*: 1 ♂, Campos do Jordão, Morundo, viii.1978 (*M. Alvarenga*) (UFRG); 1 ♂, Itatiaia, v.1949 (*W. Zikán*) (UFRG); *Rio Grande do Sul*: 13 ♂, 27 ♀, Bagé, 27-30.iii.2006 (*Cohen & Schwertner*) (UFRG); 4 ♂, 3 ♀, Derrubadas, P.E. Turvo, 26-30.ix.1983 (*S.L. Bonatto*) (UFRG); *Santa Catarina*: 2 ♂, 3 ♀, Água Doce, 11.iii.2012 (*E. Foelkel*) (UFRG); 3 ♂, Chapecó, 18.iii.1983 (*J.M. Milani*) (UFRG); 1♂, 1♀, *São Paulo,* Piracicaba, 12.iv.1938 (*A. Silva*) (UFRG); PARAGUAY: *Central*: 1 ♂, Asunción, 15.i.1983 (*E.G. Riley*) (DARC); 1 ♂, 1 ♀, Nemby, 11.i.1983 (*E.G. Riley*) (DARC); 1 ♂, San Lorenzo, 16.i.1983 (*E.G. Riley*) (DARC); 1 ♂, *Cordillera,* Caacupe, 17-20.i.1983 (*E.G. Riley*) (DARC); 3 ♂, 1 ♀, *Presidente Hayes,* 42 km NW Benjamin Aceval, 31.i.1983 (*E.G. Riley*) (DARC); URUGUAY: 1 ♀, *Colonia,* La Estanzuela, 11.v.1945 (*A. Silva*) (UFRG); 1 ♀, *Maldonado,* Piriapolis, Punta Maldonado, 17.ii.1997 (*P. Araújo*) (UFRG).

***Dichelops* (*Diceraeus*) *lobatus* Grazia, 1978**

ARGENTINA: 1 ♀, *Catamarca,* El Rodeo, 20-28.ii.1958 (*Golbach*) (IFML); 1 ♂, *Cordoba,* La Caleta, ii.1956 (*A. Willink*) (IFML); *Salta*: 1 ♀, Cafayate, 12.xi.1948 (*Monrós-Willink*) (IFML); 1 ♂, Cafayate, 10.iii.1951 (*K. Hayward*) (IFML).

***Dichelops* (*Diceraeus*) *melacanthus* (Dallas, 1851)**

ARGENTINA: 1 ♂, *Catamarca,* Andalgala, 7.xii.1971 (*D.J. Brothers*) (DARC); *Chaco*: 4 ♀, Pozo La Gringa, i.1995 (DARC); 1 ♂, Charata, xi.1994-i.1995 (DARC); 1 ♂, *Cordoba*: Agua de Oro, 3.iii.1976 (*A. Willink*) (DARC); *Corrientes*: 1 ♂, 3 ♀, 7km S Bella Vista, 16.i.1989 (*C.W. & L. O'Brien & G. Wibmer*) (DARC); 1 ♀, 3km W Valencia, 23.i.1989 (*C.W. & L. O'Brien & G. Wibmer*) (DARC); 2 ♂, 7 ♀, 24km W Ituzaingo, 29.i.1989 (*C.W. & L. O'Brien & G. Wibmer*) (DARC); 3 ♂, 4 ♀, *Entre Rios,* Colon, iii.1990 (DARC); 1 ♂, 1 ♀, *Formosa,* 5km N. Pirane, 27.i.1989 (*C.W. & L. O'Brien & G. Wibmer*) (DARC); 2 ♂, 2 ♀, *Santa Fe,* Santa Fe, 31.i.1989 (*C.W. & L. O'Brien & G. Wibmer*) (DARC); BOLIVIA: *Santa Cruz*: 1 ♀, 8mi S Santa Cruz de la Sierra, 18.iv.1978 (*O'Brien & Marshall*) (DARC); 1 ♂, 5km N Warnes, 14.v.1980 (*D. Foster*) (DARC); BRAZIL: 1 ♀, *Amapá,* Porto Platon, ii.1964 (*J.C.M. Carvalho*) (MNRJ); *Ceará*: 1 ♂, Aracati, iii.1952 (*F.S. Silva*) (MNRJ); 1 ♀, Fortaleza, 02.xi.1967 (*F. Costa*) (UFRG); 1 ♂, 1 ♀, *Goiás,* Minaçu, Serra da Mesa, 19-30.xi.1996 (*L. Moura*) (UFRG); 3 ♂, 6 ♀, *Maranhão,* Caxias, Campus UEMA, Morro do Alecrim, 01-08.iii.2010 (*D.W.A. Marques*) (UEMA); 2 ♂, 1 ♀, *Mato Grosso,* Barranco Branco, 12.xii.1935 (*Souto Maior*) (UFRG); 1 ♂, 1 ♀, *Mato Grosso do Sul,* Dourados, xi.1993 (*A.R. Panizzi*) (UFRG); 1 ♂, 1 ♀, *Paraná,* Londrina, 25.xi.1998 (*V.R. Chocorosqui*) (UFRG); *Rio Grande do Sul*: 3 ♂, Santa Maria, xii.1981 (*D. Link*) (UFRG); 1 ♂, 2 ♀, São Sepé, 1981 (*Costa & Link*) (UFRG); COLOMBIA: *Cundinamarca*: 3 ♂, Tolemaida, Quebrada La Naranjola, 18.v.1968 (*E. Ramirez Z.*) (MHNM); 1 ♀, Villeta, 28.iv.1968 (*G. Aguiar*) (MHNM); 1 ♀, Girardo, v.1969 (*Arias*) (MHNM); 1 ♂, *Meta,* Puerto Lopez, ix.1991 (*H. Rodriguez V.*) (MPUJ); 1 ♀, *Tolima,* Mariquita, ix.1992 (MPUJ); FRENCH GUIANA: 1 ♂, *La Guyane,* Highway N1 to Saint Laurent, 9km SE Iracoubo, 7.vi.1986 (*E.G. Riley & D.A.*

Rider) (DARC); GUYANA: 1 ♂, *Demerara-Mahaica*, Georgetown, Ogle airport, vi.1965 (*M. Medina*) (DARC); PARAGUAY: *Central*: 1 ♀, Asunción, 5.ii.1983 (*E.G. Riley*) (DARC); 1 ♀, Capiatá, 21.ii.1994 (*G. Arviagada*) (DARC); 1 ♀, San Lorenzo, 20.i.1983 (*E.G. Riley*) (DARC); 2 ♀, *Presidente Hayes*, 42km NW Benjamin Aceval, 31.i.1983 (*E.G. Riley*) (DARC); PERU: 1 ♂, *Cusco*, Limatambo, 30.iv.1968 (UFRG); VENEZUELA: 1 ♂, 1 ♀, *Zulia*, Maracaibo, viii.1971 (*J. Maldonado*) (DARC).

***Dichelops* (*Diceraeus*) *phoenix* Grazia, 1978**

Paratypes, 1 ♀, BRAZIL: *Rio de Janeiro*, Ramos, i.1953 (*E. Lebato*) (FIOC); 1 ♂, BRAZIL: *São Paulo*, Pirassununga, iv.1948 (FIOC). *Additional analyzed specimens*. BOLIVIA: 1 ♂, 1 ♀, *Santa Cruz*, Buena Vista, xi.1961 (DARC); BRAZIL: *Distrito Federal*: Brasília, Campus UNB, 1 ♂, 1 ♀, 10.xii.1970 (*A. Carlos*) (UFRG); 1 ♂, 15.xii.1970 (*A. Carlos*) (UFRG); 1 ♂, Brasília, Fazenda UNB, 15.ii.1969 (*I.C.B.*) (UFRG); 1 ♂, 1 ♀, *Mato Grosso do Sul*, Itaum, Dourados, iii.1974 (*M. Alvarenga*) (DARC); 1 ♀, *Paraná*, Laranjeiras, 25°24'S 52°23'E, 900m, iii.1963 (*F. Plauman*) (DARC); 1 ♂, *Santa Catarina*, Nova Teutônia, 27°11'S 52°23'E, 300-500m, 7.i.1964 (*F. Plaumann*) (DARC).

***Dichelops* (*Prodichelops*) *divisus* (Walker, 1867)**

BRAZIL: 1 ♂, 1 ♀, *Amazonas*, Estirão da Preta, Rio Liberdade, 11-15.V.2011, sweep net (*D. Takyia*) (INPA); COLOMBIA: 1 ♀, *Amazonas*, Leticia, 12.iv.1992 (*A. Saenz*) (UFRG).

***Acledra albocostata* (Spinola, 1852)**

ARGENTINA: 1 ♂, 5 ♀, *Chubut*, El Maiten, 08.ii.1965 (UFRG); 1 ♂, Río Negro, El Bolson, 20.xii.1963 (UFRG); CHILE: 7 ♂, 5 ♀, *Coquimbo*, Condoriaco, 10xi.1964 (*L.E. Pena*) (UFRG); 1 ♂, *Coquimbo*, Condoriaco (*L.E. Pena*) (UFRG).

***Acledra fraterna* (Stål, 1859)**

ARGENTINA: 2 ♀, *Distrito Federal*, Buenos Aires (MACN); 1 ♂, *San Luis*, San Luis, vi.1953 (UFRG); CHILE: *Santiago*: Santiago, 4 ♂, 4 ♀, 27.vii.1964 (UFRG); 3 ♂, 4 ♀, Santiago, xi.1947 (*T. Ramirez*) (UFGR).

***Agroecus griseus* Dallas, 1851**

BRAZIL: *Amazonas*: 1 ♂, 1 ♀, Uaupes, 07-12.vii.1956 (*M. Alvarenga*); 1 ♂, Uaupes, vi.1949 (J.C.M. Carvalho); 1 ♀, *Mato Grosso*, Utiariti, viii.1961 (*K. Lenko*) (MNRJ); *Paraná*: 1 ♀, Arapongas, ii.1952 (*A. Mallep*) (UFRG); 2 ♂, 2 ♀, Londrina, vi.2010 (*M.M.*

Rodrigues) (UFRG); 2 ♀, *Rio de Janeiro*, Rio de Janeiro, Tijuca, 1954 (*Zajciv*) (UFRG); 1 ♂, *Rio Grande do Sul*, Porto Alegre, 26.xi.1991 (*J.A.M. Fernandes*) (UFRG); 1 ♀, *São Paulo*, Barueri, 22.i.1961 (*K. Lenko*) (UFRG); PERU: *Junin*: 1 ♂, 1 ♀, Satipo, i.1937 (*P. Paprzyck*) (UFRG); 1 ♂, Satipo, i.1937 (UFRG). 1 ♂, VENEZUELA: *Aragua*, Tiara, 07.viii.64 (*F. Fernandes & C.J Rosales*) (UFRG).No data, 2 ♂, 08.iv.1938 (*W. Zikán*) (UFRG), 1 ♀, 25.xi.1952 (*Zajciv*) (UFRG).

***Agroecus scabricornis* (Herrich-Schäffer, 1844)**

BRAZIL: *Rio Grande do Sul*: 1 ♀, Catiporã, 22.ix.1986 (*P. Marson*) (UFRG); 1 ♂, Torres, 03.i.1989 (*R. Hildebrand*) (UFRG); 2 ♀, *Santa Catarina*, Florianópolis, 28.i.1986 (*B.P. Mohe*); *São Paulo*: 1 ♀, Caraguatatuba, 02.iv.1962 (*M. Reichardt & Silva*) (UFRG); 1 ♂, Caraguatatuba, 22.v-1.vi.1962 (UFRG); 2 ♀, Ilha dos Búzios, 16.x-04.xi.1963 (UFRG); 1 ♀, Itanhaem, 01-05.v.1961 (*U. Martins*) (UFRG); 1 ♂, Salesópolis, 12.ii.1963 (*L. Silva & H. Reichardt*) (UFRG); 1 ♂, Santo André, 20.ii.1962 (*L. Stowbunenko*) (UFRG); 1 ♂, Santos, 17.x.2000 (UFRG); 1 ♀, São Sebastião, ii.1992 (F. Silveira).

***Berecynthus hastator* (Fabricius, 1798)**

BRAZIL: 3 ♂, 4 ♀, *Mato Grosso*, 17-22.iii.1977 (D. Engleman) (UFRG); COLOMBIA: 2 ♂, 1 ♀, *Amazonas*, Leticia, 02-07.iv.1975 (*D. Engleman*) (UFRG); HONDURAS: 1 ♀, *Olancho*, Catacamas, 13.vi.1974 (*C.W & L.O'Brien & Marshall*) (UFRG); PANAMA: *Panama*: 1 ♂, Coco, 25.iv.1972 (*D. Engleman*) (UFRG); 1 ♀, Fort Kobbe, 20.vi.1976 (UFRG); 1 ♂, Las Cumbres, 02.vi.1975 (*Henk Wolda*) (UFRG); 1 ♂, *Veraguas*, Santiago, 06.x.1973 (D. Engleman) (UFRG); SURINAME: Paramaribo, 1 ♂, 16-18.vii.1975 (D. Engleman) (UFRG); 2 ♀, 22-30.vii.1975 (*D. Engleman*) (UFRG); VENEZUELA: *Trujillo*: 1 ♀, Agua Viva, 19.iv.1952 (*L. Rey & J.Araujo*) (UFRG); 1 ♂, Escuque, 07.xii.1969 (*R. Casares & J.B. Teran*) (UFRG);

***Caonabo pseudoscilax* (Bergroth, 1891)**

BRAZIL: *Rio Grande do Sul*: Itapuã, 2 ♂, 1 ♀, 16.iii.2002 (*E. Silva & A. Barcellos*) (UFRG); 41 ♀, 25.iii.2002 (*E. Silva & C. Schwertner*) (UFRG); 1 ♂, São Francisco de Paula, 01.ii.2007 (*B.B. Furstenau & L.M. Weiler*) (UFRG); 1 ♂, 1 ♀,São Francisco de Paula, 17-19.xii.2005 (*P.R.S. Bunde*) (UFRG); 2 ♂, 2 ♀, São Francisco de Paula, 18.iii.2007 (*C.F. Schwertner*) (UFRG); 1 ♂, 2 ♀, São Francisco de Paula, 18.iii.2007 (*J.L.C. Bernardes*) (UFRG); 1 ♂, *São Paulo*, Bocaina, 24.iv (UFRG); 1 ♂, no data (UFRG).

***Caribo fasciatus* Rolston, 1984**

UNITED STATES: *Puerto Rico*: 3 ♂, Guanica, Bosque Estatal de Guánica, Ballena Trail, 26.vii.2004, 17°58'49"N 66°51'74"W, Blacklighting (*S.W. Ligafelter*) (USNM); 1 ♂, Lajas, Parguera, Island Magueyes, 19.xii.1962 (*Paul & Phyllis Spangler*) (USNM). DOMINICAN REPUBLIC: 1 ♂, 1 ♀, La Veja, RD-149 Loma La Golondrina, Reserve Ebano Verde, 11.vii.2003, 19°03.498'N 70°32.670'W (*D. Perez, R. Bastardo, B. Hierro*) (USNM); 1 ♀, Barahona, 5km NE of Barahona, 29-30.iv.1978 (*Agr. Exp. Sta.*) (USNM). BRITISH VIRGIN ISLANDS: 1 ♂, *Guana Island*, 5-23.vii.1985 (*S.E. & P.M. Miller*) (USNM); 1 ♀, *Prickley Pear Island*, Vixen Point (*J.F.G. Clarke*) (USNM).

Carpocoris purpureipennis **(DeGeer, 1783)**

1 ♀, AUSTRIA: *Niederosterreich*, 26.vi.1988 (*Stella & Tatro*) (DARC); 1 ♂, 1 ♀, INDIA (*M.M. Carleton*) (AMNH); 1 ♂, KAZAKHSTAN: 15.v.1992 (DARC); 1 ♀, POLAND: Warsaw, 20-30.v.1988 (*M.A. Ivie*) (DARC); 1 ♂, UKRAINE: *Donets'ka Oblast'*, Novotroitskoye, 14.iii.1995 (DARC).

Coenus delius **(Say, 1832)**

UNITED STATES: 1 ♀, *Minnesota*, Homer, 10.ix.1927 (*F.M. Uhler*) (USNM); 1 ♂, *Missouri*, Clayton, 01.x.1919 (USNM); 1 ♂, *Montana*, Musselshell, 16.viii.1917 (USNM); *New York*: 1 ♀, Ithaca, 10.v.1911 (MNRJ); 1 ♀, McLean, 29.v.1915 (MNRJ); 1 ♂, Olean, 05.ix.1913 (MNRJ); 1 ♀, no data (USNM).

Cosmopepla decorata **(Hahn, 1834)**

MEXICO: 1 ♂, 1 ♀, *Hidalgo*, Tlanchinol, 31.vii.1982 (*L. O'Brien & G. Wibmer*) (AMNH); 1 ♂, *Michoacan de Ocampo*, San Jose Purua, 05.v.1962 (*Harffer & Pereira*) (MZSP); 1 ♀, *Puebla*, Teziutlan, 18.vii.1982 (*L. O'Brien & G. Wibmer*) (AMNH)

Cosmopepla lintneriana **Kirkaldy, 1909**

UNITED STATES: 1 ♂, *Illinois*, Chicago, 13.vi.1956 (*J.B. Rayes*) (AMNH); 1 ♀, *Kentucky*, 13.vii.1959 (*J.M. Campbell*) (AMNH); 1 ♀, *Michigan*, East Lansing, 1965 (*E.D. Evans*) (AMNH); *New York*: 1 ♂, Ithaca, 19.v.1946 (*F. Fernandez*) (MIZA); 1 ♂, 1 ♀, Ithaca (UFRG); 2 ♀, *Oregon*, Gardiner, 27.v.1964 (*J.D.Vertrees*) (AMNH)

Dolycoris baccarum **(Linnaeus, 1758)**

1 ♀, CYPRUS: Yermasoyia River, 01.iii.1950 (*G. Mavromoustakis*) (AMNH); Unknown country: 3 ♂, 1 ♀, Médio Rio Amur, vi.1968 (*A. Maslov*) (MNRJ); 1 ♂, 13.v.1950 (*D. Leston*) (AMNH).

***Euschistus* (*Euschistus*) *emoorei* Rolston, 1972**

VENEZUELA: *Aragua*: 2 ♀, Cagua, 28.v.1958 (*A. Fernandez*) (MIZA); 1 ♂, 1 ♀, El Limón, 01.vi.1965 (*E. Osuma*) (MIZA); 1 ♂, 1 ♀, El Limón, 03.vi.1965 (*F. Fernandez*) (MIZA); 1 ♂, El Limón, 12.V.1963 (*E. Osuma*) (MIZA); 2 ♂, 2 ♀, Maracay, 02.v.1948 (*F. Fernandez*) (MIZA); 1 ♂, Rancho Grande, 20.xi.1965 *(F. Romero*) (MIZA); *Cojedes*: 2 ♂, El Tinaco, 24.v.1948 (*F. Fernandez*) (MIZA); 2 ♂, 1 ♀, San Carlos, 24.v.1948 (*F. Fernandez & L. Salas*) (MIZA); 1 ♀, *Lara,* Sarare, 27.vii.1949 (*F. Aponte*) (MIZA).

***Euschistus* (*Euschistus*) *heros* (Fabricius, 1794)**

BRAZIL: *Rio Grande do Sul*: 2 ♂, 2 ♀, Cruz Alta, 24.v.2006 (*M.T.B. da Silva*) (UFRG); 1 ♀, Derrubadas, 13.iv.1983 (*S.L. Bonatto*) (UFRG); 2 ♂, 1 ♀, Derrubadas, 26-30.ix.1983 (*S.L. Bonatto*) (UFRG); 1 ♂, 1 ♀, Santa Maria, x.1980 (*D. Link*) (UFRG); 1 ♂, *Rondônia,* Porto Velho, 30.xii.1964 (*R.T. Lima*) (MZSP); *Santa Catarina*: 1 ♂, Guatambú, 04.xii.2004 (UFRG); 1 ♀, Guatambú, 06.xi.2004 (UFRG); 1 ♂, 1 ♀, Guatambú, 27.xi.2004 (UFRG); *São Paulo*: 1 ♂, Campinas, 04.ii (UFRG); 1 ♀, Iporanga, xii.1987 (*G. Accacio*) (UFRG); 1 ♀, São Paulo, 02.ii.1975 (*C.M. De Caro*) (UFRG); 1 ♀, São Sebastião, 07-16.i.1992 (*J.A.M. Fernandes*) (UFRG); 1 ♂, Teodoro Sampaio, xi.1977 (*M. Alvarenga*) (UFRG).

***Euschistus* (*Euschistus*) *variolarius* (Palisot de Beauvois, 1817)**

UNITED STATES: 1 ♀, *New York*, Ithaca, 07.ix.1977 (UFRG); *North Dakota*: 1 ♀, Oakville Prairie, 22.vi.2012 (*D.A. Rider*) (DARC); 1 ♂, 1 ♀, Sheldon, 27.vi.2012 (*D.A. Rider*) (DARC); 1 ♂, Sheyenne National Grasslands, 27.vi.2012 (*D.A. Rider*) (DARC); 1 ♂, 1 ♀, Wild Rice River at Red River, 01.viii.2012 (*D.A. Rider*) (DARC).

***Euschistus* (*Lycipta*) *sharpi* (Bergroth, 1891)**

BRAZIL: *Rio Grande do Sul*: 1 ♂, Estação Ecológica do Taim, 23.iii-23.iv.1981 (*J. Grazia*) (UFRG); 1 ♀, Pelotas (UFRG); *São Paulo*: 1 ♂, 1 ♀, Santo Amaro, x.1960 (*J. Lane*) (MZSP); 1 ♂, 1 ♀, Santo Amaro, xi.1960 (*J. Lane*) (MZSP); 1 ♀, Santo Amaro, xii.1969 (*J. Lane*) (MZSP); 4 ♂, 6 ♀, no data (MZSP).

***Euschistus* (*Lycipta*) *triangulator* (Herrich-Schäffer, 1842)**

BRAZIL: 1 ♂, *Distrito Federal* (Carvalho) (MNRJ); *Rio Grande do Sul*: 1 ♀, Maquiné, 01.iv.2006 (*V.C. Matesco*) (UFRG); 1 ♂, Maquiné, 12.x.2005 (*M.O.* Marchiori) (UFRG); 1 ♂, São Francisco de Paula, 18.iii.2007 (*C.F. Schwertner*) (UFRG); *Santa Catarina*: 1 ♀, Corupá, xi.1953 (*Maller*) (MNRJ); 1 ♂, Maracajá, 19.iv.2006 (*T. Bertolin*) (UFRG); *São Paulo*: 1 ♀, Ilhabela, ii.1953 (*E. Rabello*) (MZSP); 1 ♂, Ilhabela, 13.iv.1963 (*H.M. Canter*) (MZSP); 1 ♂, Ilhabela, 03-05.v.1963 (*H. Urban*) (MZSP); 1 ♂, São Sebastião, 03.vii.1961 (*K. Lenko*) (MZSP); 1 ♀, no data, 07.ii.2008 (UFRG); 1 ♂, no data.

Euschistus (*Mitripus*) *acutus* Dallas, 1851

BOLIVIA: 1 ♀, *Beni*, Rurrenabaque, x.1956 (*Dirings*) (MZSP); 1 ♀, *Santa Cruz*, Roboré, 06-08.ii.1958 (*Monrós*) (IFML); BRAZIL: *Amazonas*: 2 ♂, 1 ♀, Benjamin Constant, xi.1962 (*A. Silva*) (MZSP); 1 ♀, Itacoatiara, vi.1960 (*Dirings*) (MZSP); 1 ♀, Rio Purus, Lago de Beruri, 06-08.iv.1967 (*Exp. Perm. Amaz.*) (MZSP); 1 ♂, *Goiás*, Jataí, i.1955 (*M. Canera*) (MZSP); 1 ♀, *Maranhão*, Igarapé Gurupi-Una, Aldeia Araçu, ii.1966 (*Malkin*) (MZSP); 1 ♂, 1 ♀, *Mato Grosso*, Barra do Tapiragé, 14.xii.1964 (*R. Malkin*) (MZSP); 1 ♂, *Pará*, Maraba, 05.v.1959 (*Alvarenga*) (UFRG); 1 ♀, *Rio de Janeiro*, Itatiaia, xii.1950 (*L. Iravamos*) (UFRG); 1 ♂, *Roraima*, Boa Vista, 17-18.ix.1964 (*A. Mones*) (UFRG); PERU: 1 ♂, *Cuzco*, Carrasco, 20.iv.1967 (*N. Bellavista*) (UFRG); *Junin*: 1 ♀, Satipo, iii.1944 (*P. Paprzyck*) (FIOC); 1 ♀, Satipo, v.1937 (*P. Paprzyck*) (FIOC); 2 ♂, Valle Chanchamayo, viii.1944 (*Weyrauch*) (IFML); 1 ♂, VENEZUELA: *Barinas*,Ticoporo, 22-28.v.1968 (*M. Galbez & J. Salcedo*) (MIZA).

Euschistus (*Mitripus*) *grandis* Rolston, 1978

BRAZIL: 1 ♂, *Paraná*, Morretes, 21.ix.1974 (*Pe. Moure*) (DZUP); *Rio de Janeiro*: 1 ♀, Itatiaia, 15.xii.1966 (*H. Reichardt*) (DZUP); 1 ♀, Rio de Janeiro, 1954 (*Zajciv*) (MNRJ); 2 ♂, Serra dos Órgãos, 29.viii.1957 (*J. Bécker*) (MNRJ); 1 ♂, Teresópolis, 1954 (*Zajciv*) (MNRJ); *Rio Grande do Sul*: 1 ♂, São Francisco de Paula, 20-21.xii.2006 (*L. Moura*) (UFRG); 1 ♀, São Francisco de Paula, 13.i.2007 (*C.F. Schwertner*) (UFRG); 1 ♂, São Francisco de Paula, 18.iii.2007 (*L.M. Weiler*) (UFRG); 3 ♂, 2 ♀, São Francisco de Paula, 11.x.2007 (*B. Marks & L.M. Weiler*) (UFRG); 1 ♂, 1 ♀, São Francisco de Paula, 16.iii.2008 (*B. Marks & L.M. Weiler*) (UFRG); *São Paulo*: 1 ♀, Campos do Jordão, 29.iv.1962 (*J. Halik*) (MZSP); 1 ♂, Capão Bonito, 12.x.1991 (*J.A.M. Fernandes*) (UFRG); 1 ♀, Paranapiacaba, 25.ii.1962 (*L. Stowbunenko*) (MZSP); 1 ♀, São José do Barreiro, 04.xi.1965 (*F.M. Oliveira*) (DZUP).

Galedanta bituberculata Amyot & Serville, 1843

1 ♂, ARGENTINA: *Misiones*, Eldorado, 18.viii,1967 (DARC); BRAZIL: 1 ♀, *Rio de Janeiro*, Rio de Janeiro (*Zajciv*) (MNRJ); *Rio Grande do Sul*: 1 ♀, Canela, 04.xi.1998 (*L. Moura*) (MCNZ); 1 ♂, Maquiné, 11-13.x.2005 (*R.Ott*) (MCNZ); 1 ♀, Porto Alegre,

25.ix.1957 (MCNZ); 1 ♀, Torres, 13.i.2005 (*L. Kaminski*) (MCNZ); 1 ♀, Triunfo, 18.ix.2006 (*R. Ott & A. Barcellos*) (MCNZ); 3 ♀, Triunfo, 19.xi.2002 (*A. Barcellos*) (MCNZ); 1 ♀, Triunfo, 19.xi.2002 (*M.P. de Barros*) (MCNZ); 1 ♀, Triunfo, 30.xi.2004 (*R. Ott & A. Barcellos*) (MCNZ); 2 ♂, 10.xi.1966 (*F.M.Oliveira*) (MNRJ, ZUEC); *São Paulo*: 1 ♀, Guanabara, x.1975 (MNRJ); 1 ♂, São Sebastião, 05-08.x.1979 (*F.M.P. Balestieri*) (UFRG).

***Glyphepomis adroguensis* Berg, 1891**

1 ♀, ARGENTINA: *Corrientes,* San Tome, ii.1927 (UFRG); BRAZIL: *Rio Grande do Sul*: 1 ♀, Cachoeirinha, 17.vii.1985 (*Albuquerque*) (UFRG); 1 ♀, Capão do Leão, ii.1988 (*L.C. Belarmino*) (UFRG); 1 ♂, Estação Ecológica do Taim, 23.iii-4.iv.1981 (*J. Grazia*) (UFRG); 1 ♀, Gramado, 09.xii.1990 (*J. Grazia*) (UFRG); 1 ♀, Guaíba, 04.vii.1985 (*Albuquerque*) (UFRG); 1 ♀, Guaíba, 21.ix.1982 (*G.R.P. Moreira*) (UFRG); 1 ♂, Pelotas, 01.v.1963 (UFRG); 1 ♀, Porto Alegre, 02.i.1994 (*L.A. Campos*) (UFRG); 1 ♂, Porto Alegre, 19.vi.1992 (*J.A.M. Fernandes*) (UFRG); 2 ♂, 1 ♀, Porto Alegre, 31.I.1969 (*Soffel*) (UFRG); 1 ♂, 1 ♀, Santa Maria, 08.iii.1986 (*D. Link*) (UFRG); 1 ♀, Santo Antônio da Patrulha, 24.vii.1985 (*Becker*) (UFRG); 1 ♂, Taquara, 03.ix.1989 (UFRG); 1 ♂, *Tocantins,* Gurupi, 01.vi.1988 (*K. Kishing*) (UFRG).

***Glyphepomis setigera* Kormilev & Pirán, 1952**

BRAZIL: *Rio Grande do Sul*: 3 ♂, 11 ♀, Capão do Leão, ii.1988 (*L.C. Belarmino*) (UFRG); 2 ♂, Santa Maria, i.1990 (*D. Link*) (UFRG); No data: 1 ♂, 07.iii.1972 (UFRG); 1 ♂, 11.iii.1974 (UFRG).

***Hymenarcis nervosa* (Say, 1831)**

1 ♀, MEXICO: *Tamaulipas*, Nuevo Laredo, 02.vii.1970 (USNM); UNITED SATES: 2 ♂, *Maryland,* Odenton, 13.i.1985 (*W.E. Steiner & J.E. Lowry*) (USNM); 1 ♀, *Texas*, Punkin Cave, 04.ix.1965 (*I. Reddell*) (USNM); *Virginia*: 1 ♂, Vienna, 16.vii.1922 (*H.G. Barber*) (USNM); 1 ♂, Vienna, 08.vii.1925 (USNM).

***Hypatropis inermis* (Jensen-Haarup, 1928)**

BRAZIL: *Pará*: 1 ♀, Belém, 14.iii.1929 (*Bonifácio*) (UFRG); 1 ♀, Belém, 29.i.1964 (*A. Souza*) (UFRG); 2 ♀, Belém, i.1997 (UFRG); *Rio Grande do Sul*: 2 ♀, Cachoeirinha, 17.vii.1985 (*Albuquerque*) (UFRG); 1 ♂, Eldorado do Sul, 16.vii.1983 (*V. Aner*) (UFRG); 1 ♂, Pelotas, 10.x.1967 (UFRG); 1 ♀, Pelotas, 08.v.1978 (*Elói*) (UFRG); 1 ♀, Triunfo, 25.v.1990 (*L. Moura*) (MCNZ); 1 ♀, *Santa Catarina,* Morro das Pedras, 19.i.1957 (UFRG);

São Paulo: 1 ♀, Paulínia, 21.v.1982 (*C. Paiva*) (UFRG); 1 ♂, Ubatuba, 16-27.iii.1964 (UFRG); 1 ♂, URUGUAY: *Montevideo*, Santiago Vazquez, 21.x.1960 (UFRG).

Hypatropis sternalis (Stål, 1869)

1 ♂, ARGENTINA: *Buenos Aires*, Rosas (*J.B. Daguerre*) (MACN); BRAZIL: *Rio Grande do Sul*: 1 ♀, Imbé, ii.1961 (*E. & L. Buckup*) (UFRG); 1 ♀, Pelotas, ii.1950 (UFRG); 1 ♂, Pelotas, iv.1975 (*J. Claudino*) (UFRG); 1 ♂, *Santa Catarina*, Morro das Pedras, 22.i.1957 (*Pe. Buck*) (UFRG).

_Ladeaschistus armipes (_Stål, 1872)

BRAZIL: 2 ♂, *Bahia*, Rio de Contas, 17.ii.2002 (*M.J.S. Lopes*) (UFRG); 1 ♂, *Distrito Federal*, Planaltina, 14.iii.1979 (*Kishino*) (UFRG); *Mato Grosso*: 1 ♀, Chapada dos Guimarães, xi.1963 (*M. Alvarenga*) (UFRG); 1 ♀, Chapada dos Guimarães, 01-04.ii.1965 (*S. Laroca*) (UFRG); 1 ♀, Cuiabá, i.1963 (*M. Alvarenga*); *São Paulo*: 2 ♀, Itirapina, 01.x.2005 (*L. Kaminski*) (UFRG); 1 ♂, 1 ♀, Jundiaí, 14.x.1961 (*Werner*) (MZSP); 2 ♀, Pirassununga, 06-13.i.1983 (*Exc. DZ USP*) (MZSP); 1 ♀, Pirassununga, 12.x.1991 (*F. Silveira*) (UFRG).

Ladeaschistus bilobus (Stål, 1872)

ARGENTINA: *Misiones*: 1 ♀, Panambi, 24.xi.1951 (*Willink-Monrós*) (IFML); 1 ♀, San Ignacio, 21.xi.1951 (*F. Monrós*) (IFML); 1 ♀, San Javier, 20.xi.1973 (*Willink-Tomsic*) (IFML); BRAZIL: 1 ♀, *Mato Grosso*, Riacho do Herv, Rio Paraná (*Dirings*) (MZSP); *Rio Grande do Sul*: 1 ♀, Catuípe, 07.xi.2004 (*F.L. Santos*) (UFRG); 2 ♂, Catuípe, 27.xi.2004 (*F.L. Santos*) (UFRG); 1 ♂, 2 ♀, Derrubadas, 15.iv.1983 (*S.L. Bonatto*) (UFRG); 1 ♂, Derrubadas (UFRG); *Santa Catarina*: 1 ♂, Guatambú, 19.ix.2004 (UFRG); 1 ♀, Guatambú, 02.x.2004 (UFRG); 1 ♀, *São Paulo*, Porto Cabral, iii-iv.1944 (*L. Travassos*) (FIOC); 1 ♀, PERU: *Cusco,* Quilla Bamba, 31.i.1952 (*F. Monrós*) (IFML); No data, 4 ♂ (UFRG).

Mecocephala acuminata Dallas, 1851

ARGENTINA: *Buenos Aires*: 1 ♀, General Alvarado, 18.xi.1946 (*Mirama & Bachmann*) (MACN); 1 ♂, Mar del Plata, 22.xii.1919 (*A. Frers*) (UFRG); no data, 1 ♂ (UFRG).

Menecles insertus (Say, 1832)

UNITED STATES: *Arizona*: 1 ♀, Portal, 20-23.viii.1922 (*W.J Gertsch*) (AMNH); 1 ♂, Portal, 20.viii.1966 (AMNH); 1 ♀, *Maryland*, Plummers Island, 14.xii.1913 (*W.L. McAtee*) (USNM); 1 ♂, 1 ♀, *New Jersey*, Brigantine, 02.viii.1931 (*J.C. Lutz*) (USNM); *Pennsylvania*: 1 ♂, Gulph Mills, 22.v.1938 (*Ed. Endy*) (USNM); 1 ♂, Philadelphia, 15.vii.1946 (*J.C. Lutz*) (USNM).

Mormidea cornicollis (Stål, 1860)

BRAZIL: *Minas Gerais*: 1 ♂, 2 ♀, Belo Horizonte, 22.i.1963 (*N. Papavero*) (MNRJ, UFRG); 1 ♂, Caxambu, ii.1971 (*J. Jurberg & A.L. Perachi*) (FIOC); 1 ♂, Pouso Alegre, xii.1953 (*P. Pereira*) (MNRJ); *Rio de Janeiro*: 1 ♂, Itatiaia, i.1978 (*Carvalho & Schaffner*) (MNRJ); 1 ♀, Petrópolis, 03.vii.1941 (*Parko*) (MNRJ); 1 ♀, Teresópolis, ii.1969 (*J. Jurberg*) (FIOC); *Rio Grande do Sul*: 1 ♀, Esmeralda, 18-19.iii.1981 (*J. Grazia*) (UFRG); 1 ♂, Pelotas, 11.iii.1982 (*J. Grazia*) (UFRG); 1 ♀, São Francisco de Paula, 20.xii.1959 (*Pereira, Ditadi, Petersen, Meyrer & Volkmer*) (MNRJ); 2 ♂, 1 ♀, São Francisco de Paula, 28.iii.1959 (*Pereira, Ditadi, Petersen, Meyrer & Volkmer*) (MNRJ); *São Paulo*: 1 ♂, 1 ♀, Barueri, xi.1965 (*K. Lenko*) (MNRJ); 1 ♀, Mairiporã, 04-13.i.1967 (*C. Costa*) (MNRJ); 1 ♂, Salesópolis, 15.iii.1963 (*E.X. Rabello*) (MNRJ); 1 ♀, São Paulo, 13.iv.1962 (*Lenko & Reichardt*) (MNRJ); 1 ♂, São Paulo, 18.i.1962 (*J. Halik*) (MNRJ).

Mormidea maculata Dallas, 1851

BRAZIL: *Amazonas*: 1 ♀, Manaus, 19.vii.1917 (*J. Grazia*) (UFRG); 1 ♂, Manaus, 12.v.1976 (UFRG); 1 ♂, 1 ♀, Nova Olinda, 15.ii.1963 (*E. Cerqueira*) (UFRG); 2 ♂, 2 ♀, *Pará*, Belém, 25.i.1959 (*I.C. Leite*) (UFRG); 2 ♂, 2 ♀, *São Paulo*, Ilha Seca, 19-26.ii.1940 (FIOC); PERU: *Junin*: 1 ♂, 1 ♀, Satipo, i.1937 (*P. Paprzyck*) (FIOC); 1 ♀, Satipo, xii.1937 (*P. Paprzyck*) (FIOC); 1 ♂, Satipo, i.1944 (*P. Paprzyck*) (FIOC); 1 ♂, Satipo, iii.1944 (*P. Paprzyck*) (FIOC); VENEZUELA: 1 ♀, *Aragua*, Tocorón, 06.xi.1947 (*F. Fernandez*) (MIZA); *Territorio Federal*: 1 ♀, Maracay, 15.iv.1965 (*F. Fernandez*) (MIZA); 1 ♂, Maracay, 15.iv.1966 (*F. Fernandez*) (MIZA).

Mormidea ypsilon (Linnaeus, 1758)

BRAZIL: *Pará*: 1 ♂, 05-08.vii.1978 (UFRG); 1 ♀, 23.iii.1978 (*M. Andrade*) (UFRG); 1 ♀, 25.iii.1978 (UFRG); *Rio Grande do Sul*: 1 ♂, Derrubadas, 13.iv.1983 (*S.L. Bonatto*) (UFRG); 1 ♂, Derrubadas, 15.iv.1983 (*S.L. Bonatto*) (UFRG); 1 ♂, 1 ♀, Derrubadas, 16.iv.1983 (*S.L. Bonatto*) (UFRG); 1 ♀, Derrubadas, 17.xii.1982 (*S.L. Bonatto*) (UFRG); *São Paulo*: 1 ♂, Picinguaba, 18.xi.1991 (*A.C. Marques*) (UFRG); 2 ♀, Porto Cabral, iii-iv.1944 (*L.Travassos*) (UFRG); 1 ♀, São Paulo, 18-26.ii.1940 (UFRG); PERU: *Junin*: 1 ♂, Satipo, v.1937 (*P. Paprzyck*) (UFRG); 1 ♂, Satipo, x.1943 (*P. Paprzyck*) (UFRG); 2 ♀, Satipo, xii.1963 (*P. Paprzyck*) (UFRG); VENEZUELA: *Aragua*: 1 ♂, El Limón, 30.v.1965 (*F. Fernandez*)

(UFRG); 1 ♀, Rancho Grande, 13.ii.1965 (*F. Romero*) (UFRG); 1 ♂, *Bolivar*, Santa Elena, 13.xi.1966 (*J & B Bechyne, E. Osuna*) (UFRG); 1 ♂, no data, 15.iv.1965 (*F. Fernandez*) (UFRG).

Oenopiella punctaria (Spinola, 1859)

ARGENTINA: 5 ♂, 5 ♀, *Buenos Aires*, Tandil, Buenos Aires, ii.1960 (*F.H. Walz*) (RMNH); BRAZIL: *Rio Grande do Sul*: 1 ♀, Pelotas, iv.1991 (*Piero*) (UFRG); 1 ♂, Pelotas (UFRG); CHILE: 1 ♂, *Santiago*, Rangue, 13.xii.1983 (*G. Arriagada*) (MNNC); 1 ♂, 2 ♀, *Aisen del General Carlos Ibanez del Campo*, Aysen, 12.ii.1960-61 (*L. Pena*) (AMNH); URUGUAY: 1 ♂, 2 ♀, *Montevideo*, Montevideo, 1.i.1953 (*C. Biezanko*) (AMNH); 1 ♂, Colonia, La Estanzuela, 16.i.1953 (*C. Biezanko*) (AMNH).

Oenopiella unidentata (Stål, 1859)

CHILE: 1 ♂, *Atacama*, Copiapó, 22.vi.1955 (*L.E. Pena*) (AMNH); *Valparaiso*: 1 ♂, Concon, 13.iii.1964 (AMNH); 6 ♂, 1 ♀, El Convento, San Antonio, 4.xii.1964 (*L.E. Pena*) (AMNH); *Santiago*: 2 ♂, Apoquindo, vi.1953 (*L.E. Pena*) (AMNH); 3 ♀, Apoquindo, vii.1954 (*L.E. Pena*) (AMNH); 1 ♀, La Rinconada, 19.i.1956 (R.H. González) (UFRG); 1 ♀, Maipu, 2.v.1961 (AMNH); *Biobio*: 4 ♀, Río Chirihuillin, 9.ii.1965 (*T. Cekalovic*) (MZSP).

Padaeus trivitatus **Stål, 1872**

MEXICO: 1 ♀, *Distrito Federal*, Pedregal de San Ángel, 13.viii.1969 (*Diaz Batrez*) (MHNM); *Mexico*: 1 ♂, Coatlinchan, 29.vi.1968 (*M.E. Díaz B.*) (MHNM); 1 ♂, Villa de Allende, 06.vii.1911 (*M.A. Morón*) (MHNM); 1 ♂, *Michoacan de Ocampo*, Patzcuaro, 18.vi.1968 (*G. Halffier*) (UFRG); 1 ♂, *Morelos*, Tepoztlán, 13.xi.1971 (*A. Espinoza*) (MHNM).

Padaeus viduus **(Vollenhoven, 1868)**

1 ♂, COSTA RICA: San Rafael, 10.ii.1935 (MIZA); 1 ♂, 1 ♀, MEXICO: *Mexico*, Tejupilco, 09.xii.1973 (*A. Barrera*) (MHNM).

Pedinonotus catarinensis **Fernandes & Grazia, 2002**

Holotype ♂, BRAZIL: *Santa Catarina*, Nova Teutônia, xii.1939 (*F. Plaumann*) (AMNH). *Paratypes*: 1 ♂, 1 ♀, BRAZIL: *Santa Catarina*, Nova Teutônia, ix.1939 (*F. Plaumann*) (AMNH, UFRG); 1 ♀, BRAZIL: *Santa Catarina*, Corupá, x.1953 (*A. Maller*) (UFRG).

Additional analyzed material. BRAZIL: *Santa Catarina*: 2 ♂, 1 ♀, Nova Teutônia, ix.1939 (*F. Plaumann*) (AMNH); 1 ♀, Nova Teutônia, xii.1939 (*F. Plaumann*) (AMNH); 1 ♀, Nova Teutônia, 29.iv.1966 (*F. Plaumann*) (AMNH); 1 ♂, 1 ♀, Nova Teutônia, v.1967 (*F. Plaumann*) (AMNH); 1 ♀, Nova Teutônia, x.1969 (*F. Plaumann*) (AMNH); 1 ♂, Nova Teutônia, x.1974 (*F. Plaumann*) (AMNH); 1 ♂, Nova Teutônia, xi.1975 (*F. Plaumann*) (AMNH).

Prionosoma podopioides **Uhler, 1863**

UNITED STATES: 1 ♀, *Arizona*, Douglas, 21.viii.1932 (USNM); 1 ♀, *California*, Hammil, 19.vii.1952 (*W.J. Gertsch & R. Schrammel*) (UFRG); 1 ♀, *Colorado* (USNM); 1 ♂, *Iowa*, Iowa, 30.x.1945 (USNM); 1 ♂, *Oklahoma*, Fort Sill, 29.iii.1954 (*J.C. Schaffner*) (DARC); 1 ♂, *Texas*, vii.1917 (USNM).

Proxys albopunctulatus **(Palisot, 1811)**

BRAZIL: 1 ♂, *Amazonas*, Itacoatiara, 19.vi.1952 (*O.M. Rego*) (MNRJ); *Espírito Santo*: 1 ♀, Linhares, 02-07.viii.1974 (*C. Elias*) (DZUP); 1 ♀, Linhares, 09-15.i.1975 (*C. Elias*) (DZUP); 2 ♂, Linhares (*D. Zajclw*) (MNRJ); 1 ♀, *Minas Gerais*, Araxá, 22.iv.1965 (*C. Elias*) (DZUP); 1 ♂, 1 ♀, *Paraná*, Maringá, 07.xii.1965 (*V. Graf & L. Azevedo*) (DZUP); 2 ♂, *Rio Grande do Norte*, Natal, v.1950 (*M. Alvarenga*) (MNRJ); *Rio Grande do Sul*: 1 ♀, Derrubadas, 11.x.1981 (*S.L. Bonatto*) (UFRG); 1 ♀, Derrubadas, 22.xii.1982 (*S.L. Bonatto*) (UFRG); 1 ♀, Derrubadas, 24-25.v.1984 (*S.L. Bonatto*) (UFRG); 1 ♂, Triunfo, 15.ix.1977 (*M.H. Galileo*) (MCNZ); COLOMBIA: *Bolivar*: 1 ♂, Monterrey (*F. Fernandez & G. Ulloa*) (UFRG); 1 ♀, Totumito, 09.xii.1993 (*F. Fernandez*) (UFRG); UNITED STATES: 1 ♀, *Florida*, Silver Springs, 04.vi.1969 (*J. Slater, T.Schuh & J. Harrington*) (AMNH); VENEZUELA: *Aragua*: 1 ♀, Cagua, 28.v.1958 (*A. Fernandez*) (UFRG); 1 ♂, 1 ♀, El Limón, 31.v.1957 (*F. Fernandes & L. Salas*) (UFRG).

Proxys victor **(Fabricius, 1775)**

1 ♂, COLOMBIA, *Valle del Cauca*, Bajo Calima, 22.iii.1995 (UFRG); 1 ♂, ECUADOR, S. Domingos, ix.1962 (*J.C.M. Carvalho*) (UFRG); 1 ♂, PUERTO RICO, 1967 (*N. Virkki*); VENEZUELA: *Aragua*: 2 ♀, Cagua, 28.v.1958 (*A. Fernandez*) (UFRG); 1 ♂, El Limón, 12.v.1963 (UFRG); 1 ♀, Maracay, 24.v.1950 (*F. Fernandez*) (UFRG); 1 ♀, *Barinas*, Barinas, 4.ix.1949 (*F.A. Ponte*) (UFRG); 1 ♂, 4 ♀, *Cojedes*, San Carlos, 24.v.1948 (*F. Fernandes & L. Salas*) (UFRG); 2 ♂, *Distrito Federal*, El Valle, 14.VII.1942 (UFRG); 1 ♀, *Monagas*, Jusepin, 07.x.1965 (*F. Fernandes & C.J Rosales*) (UFRG); 1 ♂, no data, 13.iv.1960 (UFRG).

Spinalanx monstrabilis **Rolston & Rider, 1988**

BRAZIL: *Pará*: 1 ♀, Belém, 07-30.iv.1966 (*Malkin*) (UFRG); 1 ♂, Itaituba, ii.1965 (*Dirings*) (UFRG).

Spinalanx rolstoni Thomas, 1995

BRAZIL: *Rio Grande do Sul*: 1 ♀, São Francisco de Paula, 17-19.xii.2005 (*P.R.S. Bunde*) (UFRG); 1 ♂, São Francisco de Paula, 16.iii.2008 (*L.M. Weiler*) (UFRG); 1 ♂, São Francisco de Paula, 18.xii.2010 (*F.M. Bianchi*) (UFRG)

Tibraca limbativentris Stål, 1860

1 ♂, BRAZIL: *Espírito Santo,* Santa Tereza, 19.x.1964 (*C. Elias*) (DZUP); 1 ♂, *Maranhão,* São Luís, 04.i1974 (*E. Chagas*) (UFRG); 1 ♀, *Mato Grosso do Sul,* Rio Brilhante, ii-iii.1995 (UFRG); *Rio Grande do Sul*: 1 ♂, Capão do Leão, ix.1995 (*L. Rodrigues*) (UFRG); 1 ♀, Guaíba, 04.vii.1985 (*E. Albuquerque*) (UFRG); 1 ♂, Pelotas, xii.1993 (*J. F. Fonseca*) (UFRG); 1 ♀,Santa Maria, 29.iv.1988 (*Equipe DFS*) (UFRG); 1 ♀, *Santa Catarina,* Lages, viii.1988 (*H. Kalvelage*) (UFRG); *Tocantins*: 1 ♀, Gurupi, 01.vi.1988 (*K. Kishino*) (UFRG); 1 ♂, Gurupi, 24.v.1989 (*K. Kishino*) (UFRG); 1 ♀, COLOMBIA: *Valle del Cauca,* Palmira, 10.x.1989 (*A. Baena*) (DARC); 1 ♀, COSTA RICA: *Heredia,* Sarapiqui, 24.vi.1963 (*T.R. Everett*) (DARC); 1 ♂, 1 ♀, DOMINICAN REPUBLIC: 13.xi.1997 (*De Benitez*) (UFRG); PERU: 1 ♂, 1 ♀, *Cajamarca,* Bagua, 10-15.i.1954 (*W. Ebeling*) (DARC); 1 ♂, *Junin,* Satipo, ii.1938 (*P. Paprzyck*) (FIOC); 1 ♂, *Loreto,* Yurimaguas, 27.x.1983 (M. Calderon) (DARC); VENEZUELA: 1 ♂, Portuguesa, Payara, 14.viii.1957 (*M. Angeles*) (MIZA); 1 ♀, v.1948 (MIZA).

Tibraca simillima Barber, 1941

Paratypes: 1 ♂, 1 ♀, ECUADOR (AMNH). *Additional analyzed specimens*. ECUADOR: 6 ♂, 4 ♀, *Azuay,* Cuenca, 10.iii.1963 (*J. Davis*) (AMNH); 2 ♂, 5 ♀, Portoviejo (*F. Campos*) (FIOC); 1 ♂, no data (UFRG).

Appendix S2: Complete dataset: 10 continous characters and 139 discrete characters.

	0									9
DDpunctatus	2.01-2.13	1.23-1.27	0.79-0.89	0.22-0.3	0.7-0.74	2.09-2.23	7.1-7.3	5.38-5.56	3.35-3.49	3.43-3.55
DDleucostigmus	1.75-1.81	1.14-1.16	0.78-0.8	0.33-0.35	0.69-0.71	1.94-2.02	6-6.22	4.89-4.99	3.12-3.18	3.1-3.18
DDbicolor	2.06-2.12	1.27-1.33	0.81-0.85	0.19-0.21	0.81-0.85	2.25-2.31	6.69-6.95	5.72-5.84	3.64-3.74	3.96-4.16
DDnigrum	1.88-1.94	1.18-1.2	0.88-0.92	0.33-0.37	0.76-0.78	2.24-2.32	7.21-7.47	5.65-5.81	3.56-3.64	3.69-3.79
DDavilapiresi	1.66-1.84	1.15-1.17	0.76-0.78	0.08-0.1	0.75-0.77	2.14-2.26	5.43-5.55	5.04-5.14	3.21-3.31	3.31-3.43
DDmiriamae	1.79-1.83	1.18-1.22	0.79-0.83	0.35-0.39	0.77-0.81	2.03-2.13	5.92-6.14	4.77-4.91	3.13-3.23	3.35-3.47
DDperuanus	1.71-1.79	1.19-1.21	0.76-0.8	0.24-0.26	0.71-0.73	2-2.08	6.09-6.25	5.04-5.18	3.2-3.26	3.25-3.31
DDpradoi	1.98-2.04	1.25-1.35	0.76-0.94	0.18-0.22	0.75-0.85	2.16-2.52	6.1-6.8	5.35-5.77	3.43-3.97	3.76-4.22
DDsaltensis	1.61-1.71	1.08-1.1	0.8-0.84	0.2-0.22	0.74-0.76	1.86-1.92	4.91-5.01	4.64-4.74	2.92-2.96	3.07-3.13
DDaustralis	1.97-2.01	1.34-1.36	0.84-0.86	0.17-0.19	0.85-0.87	2.33-2.43	5.95-6.13	5.79-5.93	3.71-3.81	3.88-3.96
Ddfurcatus	1.97-2.03	1.33-1.37	0.76-0.78	0.46-0.48	0.85-0.87	2.08-2.16	6.76-7.04	5.38-5.58	3.4-3.52	3.27-3.43
Ddmelacanthus	1.86-1.9	1.26-1.28	0.64-0.66	0.42-0.44	0.82-0.84	1.91-1.97	6.51-6.75	4.98-5.12	3.2-3.3	2.92-3.02
Ddphoenix	2.09-2.17	1.36-1.4	0.66-0.72	0.44-0.48	0.8-0.84	2.09-2.15	6.93-7.23	5.48-5.66	3.56-3.68	3.4-3.52
Ddlobatus	1.89-1.99	1.32-1.38	0.7-0.72	0.24-0.28	0.83-0.87	2-2.08	5.46-5.86	5.09-5.35	3.22-3.38	3.06-3.22
Ddcaatinguensis	1.67-1.75	1.06-1.1	0.7-0.72	0.15-0.15	0.68-0.7	1.79-1.87	5.02-5.26	4.47-4.63	2.87-2.97	2.71-2.83
DPdivisus	2.03-2.15	1.19-1.21	0.9-1.02	0.08-0.1	0.71-0.81	2.35-2.49	7.07-7.47	5.7-6.1	3.49-3.65	3.46-3.6
Aalbocostata	2.1-2.14	1.51-1.55	0.73-0.75	0.07-0.07	0.97-0.99	2.3-2.36	5.98-6.08	5.58-5.7	3.47-3.55	3.9-4
Afraterna	1.5-1.54	1.27-1.29	0.66-0.68	0.33-0.37	0.81-0.85	2.12-2.18	5.8-5.94	5.35-5.49	3.34-3.42	3.5-3.6
Agriseus	1.9-1.96	1.25-1.29	0.95-0.99	?	0.86-0.9	2.33-2.43	6.02-6.24	5.75-5.95	3.79-3.93	3.62-3.78
Ascabricornis	1.97-2.03	1.26-1.3	0.87-0.89	?	0.78-0.8	2.32-2.42	7.2-7.5	5.76-5.98	3.85-3.99	3.57-3.75
Bhastator	2.13-2.17	1.27-1.29	0.78-0.82	?	0.76-0.78	1.87-1.93	5.56-5.82	4.46-4.56	2.89-2.95	3-3.08
Cpseudoscylax	1.78-1.82	1.12-1.14	0.61-0.63	?	0.6-0.62	1.87-1.93	5.56-5.74	4.55-4.69	2.89-3.01	2.99-3.11
Cfasciatus	1.6-1.64	1.04-1.08	0.77-0.85	?	0.77-0.81	1.46-1.52	4.76-4.94	4.52-4.68	2.94-3.04	2.73-2.87
Cpurpureipennis	2.18-2.22	1.38-1.44	0.89-0.97	?	0.84-0.9	2.32-2.44	6.76-7.06	6.21-6.45	3.99-4.15	4.18-4.46
Cdelia	1.99-2.05	1.53-1.59	0.68-0.7	?	0.94-0.96	2.05-2.11	4.53-4.71	4.47-4.65	3.06-3.2	3.33-3.53
Cdecorata	1.24-1.36	1.04-1.1	0.59-0.61	?	0.66-0.68	1.34-1.5	3.95-4.37	3.87-4.27	2.45-2.77	2.64-2.8
Clintneriana	1.21-1.27	1-1.04	0.45-0.49	?	0.6-0.62	1.38-1.44	3.56-3.74	3.52-3.7	2.28-2.42	2.15-2.27
Dbaccarum	1.86-2.22	1.62-1.66	0.83-0.87	0.12-0.14	0.97-1.01	2.08-2.14	6.09-6.35	5.82-6.06	3.67-3.81	4.23-4.39
EMacutus	1.63-1.67	0.85-0.87	0.76-0.78	0.05-0.05	0.52-0.56	1.66-1.72	6.07-6.27	4.91-5.03	3-3.08	2.72-2.8
EEemoorei	2.22-2.24	1.3-1.34	0.79-0.85	?	0.91-0.93	2.08-2.12	6.15-6.25	5.51-5.57	3.45-3.49	3.72-3.78
EMgrandis	2.09-2.17	1.35-1.37	0.85-0.87	0.11-0.13	0.77-0.79	2.24-2.3	8.7-8.98	6.64-6.78	4.04-4.14	3.93-4.01
EEheros	2.36-2.4	1.33-1.37	0.8-0.84	?	0.88-0.9	2.26-2.32	8.39-8.57	6.29-6.41	3.93-4.03	4.09-4.19
ELsharpi	2.29-2.43	1.44-1.46	0.93-0.97	?	0.82-0.84	2.45-2.53	6.7-6.86	6.38-6.54	4.11-4.23	4.28-4.4
ELtriangulator	2.05-2.11	1.15-1.19	0.77-0.79	?	0.68-0.7	1.9-1.96	7.12-7.34	5.27-5.39	3.39-3.47	3.35-3.43
EEvariolarius	2.42-2.46	1.59-1.63	0.86-0.88	?	1-1.02	2.28-2.38	7.78-8.04	6.71-6.91	4.1-4.26	4.61-4.79
Gbituberculata	2.9-2.98	2.19-2.25	1.35-1.41	0.24-0.3	1.6-1.66	3.65-3.73	10.71-11.01	8.91-9.13	5.78-5.94	6.2-6.4
Gadroguensis	1.38-1.52	0.86-0.90	0.63-0.65	?	0.55-0.57	1.4-1.44	3.78-3.88	3.55-3.65	2.31-2.37	2.36-2.44
Gsetigera	1.36-1.38	0.74-0.76	0.59-0.61	?	0.53-0.85	1.26-1.3	3.31-3.39	3.07-3.15	1.96-2	2.06-2.12
Hnervosa	1.79-1.85	1.35-1.41	0.8-0.86	?	0.57-0.61	2.29-2.43	5.37-5.59	5.27-5.47	3.35-3.51	3.41-3.63
Hinermis	1.47-1.51	1.14-1.18	0.66-0.68	?	0.65-0.73	1.79-1.87	4.31-4.43	4.22-4.34	2.73-2.81	3.02-3.1
Hsternalis	1.46-1.5	1.14-1.20	0.65-0.69	0.22-0.24	0.59-0.61	1.76-1.8	4.07-4.21	3.84-4	2.45-2.51	3.17-3.29
Larmipes	2.04-2.1	1.23-1.25	0.9-0.94	?	0.81-0.85	2.12-2.18	6.47-6.65	6.2-6.38	3.89-4.01	3.56-3.68
Lbilobus	1.74-1.78	0.97-1.01	0.81-0.83	0.03-0.03	0.64-0.66	1.69-1.75	5.6-5.82	5-5.14	3.11-3.19	2.86-2.96
Macuminata	2.91-3.09	1.41-1.49	0.83-0.83	?	0.79-0.85	2.36-2.54	5.62-6.02	5.43-5.75	3.47-3.71	4.19-4.67
Minsertus	2.44-2.5	1.53-1.71	0.77-0.95	?	0.93-1.01	2.44-2.56	6.33-6.59	6.12-6.36	4-4.16	4.47-4.63
Mcornicolis	1.83-1.87	1.2-1.24	0.78-0.8	?	0.55-0.57	1.68-1.74	5.86-6.14	4.59-4.71	2.97-3.05	3.04-3.14
Mmaculata	1.53-1.55	0.96-0.98	0.74-0.76	?	0.44-0.46	1.44-1.48	4.55-4.75	3.78-3.88	2.39-2.45	2.65-2.73
Mypsilon	1.57-1.61	1.02-1.1	0.5-0.76	?	0.43-0.45	1.41-1.47	4.66-4.82	3.82-3.94	2.47-2.57	2.8-2.9
Opunctaria	1.58-1.64	1.3-1.34	0.72-0.74	?	?	1.83-1.85	4.7-4.78	4.52-4.6	2.91-2.97	3.14-3.2
Ounidentata	1.65-1.69	1.29-1.31	0.64-0.66	?	?	1.72-1.78	4.25-4.37	4.1-4.24	2.67-2.75	2.88-2.98
Ptrivittatus	2.14-2.2	1.17-1.21	0.85-0.89	?	0.82-0.84	2.06-2.16	6.6-6.78	5.82-6.1	3.57-3.69	4.01-4.21
Pviduus	2.16-2.22	1.16-1.22	0.75-0.91	?	0.81-0.85	2.17-2.39	6.56-6.96	5.44-5.92	3.36-3.7	3.84-4.08
Pcatarinensis	1.69-1.73	1.1-1.12	0.73-0.75	0.1-0.12	0.57-0.59	1.87-1.93	4.42-4.52	4.24-4.34	2.68-2.76	3.1-3.18
Ppodopioides	1.77-2.05	1.35-1.43	0.56-0.6	0.08-0.12	0.94-0.96	1.97-2.05	5.56-5.82	4.94-5.14	3.13-3.29	3.72-4
Palbopunctulatus	2.45-2.49	0.91-0.93	0.81-0.83	?	0.6-0.62	2.12-2.2	7.62-7.9	4.91-5.05	3.05-3.15	3.35-3.47
Pvictor	2.47-2.53	0.86-0.88	0.83-0.87	?	0.57-0.59	2.11-2.19	7.83-8.09	4.81-4.93	2.98-3.08	3.4-3.48
Smonstrabilis	2.25-2.33	1.33-1.33	0.86-0.92	?	0.86-0.96	1.9-1.9	5.77-5.81	5.19-5.33	3.33-3.53	3.14-3.44
Srolstoni	2.42-2.52	1.5-1.52	1-1.04	?	0.95-0.99	1.94-2	6.13-6.29	5.34-5.48	3.54-3.7	3.56-3.7
Tlimbativentris	2.86-2.92	1.49-1.53	0.93-0.95	?	0.84-0.88	2.62-2.72	7.11-7.31	6.55-6.73	4.34-4.46	4.81-4.95
Tsimilima	2.79-2.83	1.53-1.55	0.94-0.96	?	0.92-0.94	2.63-2.69	6.73-6.81	6.34-6.44	4.15-4.23	4.48-4.6

	1 2 3 4 5 6 0 0 0 0 0 0
DDpunctatus	2 1 1 1 1 0 0 1 0 0 0 1 0 2 1 1 0 0 0 1 1 0 1 1 0 1 1 1 1 0 - 0 - - 1 0 1 1 1 1 1 1 2 1 1 1 1 0 1 1 1 0 - 0 0 1 1 1 0 0
DDleucostigmus	2 1 1 1 1 0 0 1 0 0 0 1 0 2 1 1 0 0 0 1 1 0 1 1 0 1 1 1 1 0 - 0 - - 1 0 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 0 - 0 0 1 1 1 0 0
DDbicolor	2 1 2 1 1 0 0 1 0 0 0 1 0 2 1 1 0 0 0 1 1 0 1 1 0 1 1 1 1 0 - 0 - - 1 0 0 1 1 1 1 2 2 1 ? 1 1 0 1 1 1 1 1 0 0 1 0 1 0 0
DDnigrum	2 1 2 1 1 0 0 1 0 0 0 1 0 2 1 1 0 0 0 1 1 0 1 1 0 1 1 1 1 0 - 0 - - 1 0 1 1 1 1 1 1 2 1 1 1 1 0 1 1 1 1 1 0 0 1 0 1 0 0
DDavilapiresi	2 1 1 1 1 0 0 1 0 0 0 1 0 2 1 1 0 1 0 1 1 0 1 1 1 1 1 1 1 0 - 0 - - 2 0 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 0 0 1 0 1 0 0
DDmiriamae	2 1 2 1 1 0 0 1 0 0 0 1 0 2 1 1 0 1 0 1 1 0 1 1 0 1 1 1 1 0 - 0 - - 2 0 0 1 1 1 1 1 2 1 1 1 1 0 1 1 1 1 1 0 0 1 0 1 0 0
DDperuanus	2 1 2 1 1 0 0 1 0 0 0 1 0 2 1 1 0 0 0 1 1 0 1 1 0 1 1 1 1 0 - 0 - - 2 0 1 1 1 1 1 1 1 1 ? 1 1 0 1 1 1 0 - 0 0 1 0 1 0 0
DDpradoi	2 1 1 1 1 0 0 1 0 0 0 1 0 2 1 1 0 0 0 1 1 0 1 1 1 1 1 1 1 0 - 0 - - 1 0 0 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 0 0 1 0 1 0 0
DDsaltensis	2 1 1 1 1 0 1 1 0 0 0 1 0 2 1 1 0 1 0 1 1 0 1 1 1 1 1 1 1 0 - 0 - - 2 0 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 0 0 1 0 1 0 0
DDaustralis	2 1 1 1 1 0 0 1 0 0 0 1 0 2 1 1 0 1 0 1 1 0 1 1 1 1 1 1 1 0 - 0 - - 2 0 1 1 1 1 1 2 1 1 1 1 1 0 1 1 1 1 1 0 0 0 0 1 0 0
Ddfurcatus	2 1 1 1 1 0 1 1 0 0 0 1 0 2 1 1 1 0 0 1 0 0 1 1 0 1 1 0 1 1 0 1 0 1 2 0 1 1 1 1 1 2 2 1 1 0 1 0 1 1 1 1 0 0 0 1 0 1 0 0
Ddmelacanthus	2 1 1 1 1 0 1 1 0 0 0 1 0 2 1 1 0 0 0 1 0 0 1 1 0 1 1 0 1 1 0 1 0 1 2 0 1 1 1 1 1 2 2 1 1 0 1 0 1 1 1 1 0 0 0 1 0 1 0 0
Ddphoenix	2 1 1 1 1 0 1 1 0 0 0 1 0 2 1 1 1 0 0 1 0 0 1 1 0 1 1 0 1 1 0 1 0 1 2 0 1 1 1 1 1 2 2 1 ? 0 1 0 1 1 1 1 0 0 0 1 0 1 0 0
Ddlobatus	2 0 1 1 1 0 1 1 0 0 0 1 0 1 1 1 0 0 0 1 0 0 1 1 0 0 1 0 1 0 - 1 0 1 2 0 1 1 1 1 1 2 2 1 0 0 1 0 1 1 1 1 0 0 0 1 0 1 0 0
Ddcaatinguensis	2 0 1 1 1 0 0 0 0 0 0 0 0 2 1 1 0 0 0 1 0 0 1 1 0 0 1 0 1 0 - 1 0 0 2 0 1 1 1 1 1 2 2 1 1 0 1 0 1 1 1 1 0 0 0 1 0 1 0 0
DPdivisus	2 0 1 1 1 0 1 0 0 0 0 1 0 2 1 1 0 0 0 1 1 0 1 2 0 0 1 0 1 1 0 0 - - 1 0 0 1 1 ? 1 ? ? 1 1 1 ? 0 1 ? ? 1 1 1 0 1 0 1 0 0
Aalbocostata	2 0 1 0 0 1 0 1 0 0 0 1 0 0 1 1 0 0 0 1 0 1 0 2 1 0 0 0 1 0 - 0 - - 2 0 1 1 1 1 1 2 2 1 1 0 1 0 1 1 1 0 - 0 0 0 0 0 - 0
Afraterna	1 0 1 - 0 1 0 0 0 0 0 1 0 1 1 1 1 0 0 1 0 1 0 2 1 0 0 0 1 0 - 1 0 1 0 0 1 1 1 1 1 2 2 1 1 0 1 0 1 1 1 0 - 0 0 0 0 0 - 0
Agriseus	1 1 1 - 1 0 0 1 0 0 0 0 1 2 1 1 0 1 0 1 1 0 0 1 1 0 1 0 1 0 - 1 1 0 1 0 1 1 1 2 1 0 2 1 0 1 1 0 1 1 1 0 - 1 0 0 0 1 1 0
Ascabricornis	1 1 1 - 1 0 0 1 0 0 0 0 1 2 1 1 0 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 0 1 1 1 2 1 0 2 1 0 1 1 0 1 1 1 0 - 1 0 1 1 1 1 0
Bhastator	0 1 1 - 1 0 0 1 1 0 0 0 0 1 1 1 0 0 0 1 1 0 1 1 0 1 1 0 1 0 - 1 0 1 2 0 1 1 1 1 1 0 2 1 1 1 1 0 1 1 1 1 1 0 1 1 0 1 1 0
Cpseudoscylax	1 0 2 - 0 1 0 1 0 0 0 1 0 1 1 1 0 0 0 1 0 0 1 0 0 1 1 0 1 0 - 0 - - 2 0 1 1 1 1 1 0 2 1 1 0 1 0 1 1 1 1 1 0 0 1 1 1 0 0
Cfasciatus	1 0 1 - 0 0 0 1 0 0 0 0 1 2 0 1 0 0 0 1 0 0 1 0 1 0 0 0 1 1 1 0 - - 0 0 0 0 0 0 1 0 1 1 0 0 1 0 1 0 0 1 1 0 0 0 0 1 0 1
Cpurpureipennis	1 0 1 - 1 0 0 1 0 0 1 1 0 2 1 0 1 0 0 1 0 1 0 0 1 0 0 0 1 0 - 0 - - 0 0 0 1 0 0 1 ? 1 1 0 0 1 0 1 0 0 1 0 0 0 0 0 1 0 1
Cdelia	1 0 0 - 1 0 0 0 0 1 1 2 0 1 1 1 1 0 0 1 0 0 0 0 1 0 0 0 0 0 - 0 - - 0 1 1 1 2 2 1 2 1 0 0 0 1 0 0 1 1 1 1 1 1 1 0 0 1 1 0
Cdecorata	1 0 1 - 0 0 0 1 0 0 0 2 1 2 1 1 0 0 0 0 - 0 0 0 1 0 0 0 1 1 0 1 0 0 2 0 0 1 1 1 1 ? 1 1 1 0 1 0 0 0 1 0 - 0 0 0 0 0 - 0
Clintneriana	1 0 1 - 0 0 0 1 0 0 0 2 1 2 1 0 0 0 0 0 - 0 0 0 1 0 0 0 1 1 0 1 0 0 2 0 0 1 1 1 1 ? 1 1 0 1 0 0 0 0 1 0 - 0 0 0 0 0 - 0
Dbaccarum	2 0 1 1 1 0 0 0 0 0 0 1 0 2 1 0 1 0 0 1 0 1 2 0 1 0 0 0 1 0 - 1 0 0 0 0 0 1 1 2 1 ? 1 1 0 0 1 1 1 1 0 1 0 0 0 0 0 1 0 1
EMacutus	2 0 1 1 0 0 0 1 0 0 0 0 0 1 1 1 0 0 1 1 1 0 1 2 0 1 0 0 1 0 - 0 - - 1 0 0 1 1 0 1 2 2 1 ? 0 1 1 0 ? ? 1 1 0 0 1 0 1 0 0
EEemoorei	1 0 1 - 1 0 1 1 0 0 0 0 0 1 1 1 0 0 0 1 0 0 0 1 0 1 0 0 1 0 - 1 0 1 2 0 0 1 1 1 1 2 2 1 0 0 1 0 1 1 1 1 0 0 1 0 0 0 - 0
EMgrandis	2 0 1 1 0 0 0 0 0 0 0 0 1 2 1 1 0 0 0 1 1 0 1 1 0 2 1 0 1 0 - 0 - - 2 0 0 1 1 1 1 0 2 1 1 0 1 0 1 1 1 1 1 0 0 1 0 1 1 0
EEheros	0 0 1 - 1 0 1 1 0 0 0 0 0 2 1 1 0 0 0 1 0 0 1 1 0 1 0 0 1 0 - 1 0 0 0 0 0 1 1 1 1 2 2 1 1 0 1 0 1 1 1 1 0 0 1 0 1 1 0 0
ELsharpi	1 0 1 - 0 0 1 1 0 0 0 0 0 2 1 1 1 0 0 1 0 0 0 1 1 0 1 0 1 0 - 0 - - 0 0 0 1 1 1 1 0 2 1 1 0 1 0 1 1 1 0 - 0 0 0 0 1 1 0
ELtriangulator	0 0 1 - 1 0 0 1 1 0 0 0 0 1 1 1 1 0 0 1 1 0 1 1 0 1 1 0 1 0 - 1 0 0 1 1 1 1 1 1 1 0 2 1 ? 1 1 0 1 1 1 1 1 0 0 1 1 1 0 0
EEvariolarius	1 0 1 - 1 0 1 1 0 0 0 0 1 2 1 1 0 0 0 1 0 0 1 1 0 1 0 0 1 0 - 0 - - 2 0 0 1 1 2 1 1 2 1 1 0 1 0 1 1 1 1 1 0 1 0 0 1 0 0
Gbituberculata	2 0 0 0 0 1 0 1 0 0 0 0 1 1 0 1 0 0 0 1 0 0 1 1 0 2 1 0 1 0 - 0 - - 2 1 1 1 1 3 1 0 2 1 0 1 1 1 1 0 1 1 1 0 0 0 0 1 1 0
Gadroguensis	0 0 0 - 1 2 0 1 0 1 2 0 0 1 1 1 0 0 0 1 0 0 1 0 0 1 0 0 1 0 - 0 - - 2 0 0 1 2 2 0 0 2 1 0 1 0 0 1 0 1 1 0 0 0 1 0 1 1 0
Gsetigera	0 0 0 - 1 2 0 1 0 1 2 0 0 1 1 1 0 0 0 1 1 0 1 0 0 1 0 0 1 0 - 0 - - 2 0 0 1 2 2 0 0 2 1 0 1 0 0 1 0 1 1 0 0 0 0 0 1 1 0
Hnervosa	1 0 1 - 1 0 1 1 0 1 0 2 0 1 1 1 1 0 0 1 0 0 2 0 1 0 0 0 1 0 - 1 0 1 2 1 1 1 1 1 1 2 2 1 0 1 1 0 0 1 1 1 0 0 1 0 0 1 1 0
Hinermis	1 0 1 - 0 0 0 1 0 0 0 0 0 0 1 1 1 1 1 1 0 0 0 2 1 0 0 1 0 0 - 0 - - 1 0 1 0 1 2 1 1 2 1 1 1 1 0 0 0 1 1 1 0 0 1 0 1 1 0
Hsternalis	2 0 1 0 0 1 0 1 0 0 0 0 0 0 1 1 1 1 1 1 0 0 0 1 1 0 0 1 0 0 - 0 - - 1 0 1 0 1 1 1 1 1 1 1 1 1 0 0 0 1 1 0 0 0 1 0 1 1 0
Larmipes	1 0 1 - 0 0 1 1 0 0 0 0 1 2 1 1 0 0 1 1 0 0 0 2 1 0 0 0 1 0 - 0 - - 1 0 0 1 1 0 1 2 2 1 0 0 1 0 1 1 1 0 - 1 0 0 0 1 0 0
Lbilobus	1 0 1 - 0 0 0 1 0 0 0 0 1 2 1 1 0 0 1 1 1 0 1 1 0 1 0 0 1 0 - 0 - - 1 0 0 1 1 0 1 2 2 1 0 0 1 0 0 1 1 1 1 1 0 1 0 1 0 0
Macuminata	0 0 0 - 0 2 0 0 0 1 2 0 0 2 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 - 0 - - 1 0 1 1 1 1 1 2 1 1 1 0 1 0 1 1 1 0 - 0 0 0 0 1 0 1
Minsertus	1 0 1 - 0 0 1 1 0 0 0 0 0 2 0 0 0 0 0 1 0 1 2 0 1 0 0 0 0 0 - 0 - - 2 1 1 1 1 1 1 2 1 1 1 1 1 0 0 1 1 1 1 0 1 0 0 1 0 0
Mcornicolis	0 0 1 - 0 0 0 1 0 0 0 0 1 1 1 1 1 0 0 1 0 0 1 0 1 1 0 0 1 0 - 0 - - 2 0 0 1 1 1 0 0 2 1 0 1 1 0 0 0 1 1 1 0 0 1 0 1 0 0
Mmaculata	0 0 1 - 1 0 0 1 0 0 0 0 1 1 1 1 1 0 0 1 0 0 1 0 1 1 0 0 1 0 - 1 0 0 1 0 0 1 1 1 1 2 2 1 0 1 1 0 0 0 1 1 1 0 0 1 0 0 - 0
Mypsilon	0 0 1 - 1 0 0 1 0 0 0 0 1 2 1 1 1 0 0 1 0 0 1 0 1 1 0 0 1 0 - 1 0 0 1 0 0 1 1 1 1 2 2 1 0 0 1 0 0 0 1 1 1 0 0 1 0 0 - 0
Opunctaria	1 0 1 - 0 2 0 1 0 1 0 1 0 1 1 1 1 0 0 1 0 1 2 0 1 0 0 0 0 0 - 0 - - 2 0 1 0 2 1 1 2 2 0 1 1 0 0 1 1 1 1 0 0 0 0 1 1 0 0
Ounidentata	1 0 1 - 0 2 0 1 0 1 0 1 0 1 1 1 1 0 0 1 0 1 2 0 1 0 0 0 0 0 - 0 - - 2 0 1 0 2 1 1 2 2 0 1 1 1 0 1 1 1 1 0 0 0 0 1 1 0 0
Ptrivittatus	1 0 1 - 0 0 1 1 0 0 0 1 0 2 0 1 0 0 0 1 1 0 1 0 0 1 1 0 1 0 - 0 - - 1 0 1 1 1 1 1 1 1 0 ? 0 1 0 1 0 1 1 1 0 0 1 1 1 0 0
Pviduus	1 0 1 - 0 0 1 1 0 0 0 1 0 2 0 1 0 0 0 1 1 0 1 0 0 1 1 0 1 0 - 0 - - 1 0 1 1 1 1 1 1 1 1 0 1 1 0 1 0 1 1 1 0 0 1 1 1 0 0
Pcatarinensis	2 0 0 1 1 1 0 1 0 1 0 0 0 1 1 1 0 1 1 1 0 1 0 2 1 0 0 0 0 0 - 0 - - 0 0 1 1 1 0 1 2 2 1 1 1 1 0 1 0 1 1 1 0 0 0 0 1 1 0
Ppodopioides	2 1 1 1 0 2 0 1 0 1 0 2 0 1 1 1 0 0 1 1 0 0 1 0 0 2 0 0 1 0 - 0 - - 2 0 1 0 2 2 0 0 2 0 ? 0 0 1 0 1 0 0 - 0 0 0 0 1 1 0
Palbopunctulatus	0 1 0 - 0 2 0 1 1 0 0 1 0 2 1 1 0 0 0 1 1 0 1 0 0 1 0 0 1 0 - 1 0 0 1 0 1 1 1 1 1 1 1 1 1 1 1 0 0 0 1 1 1 0 0 1 1 1 0 0
Pvictor	0 1 0 - 0 2 0 1 1 0 0 1 0 2 1 1 0 0 0 1 1 0 1 0 0 1 0 0 1 0 - 1 0 0 1 0 1 1 1 1 1 2 1 1 1 1 1 0 0 0 1 1 1 0 0 1 1 1 0 0
Smonstrabilis	0 0 0 - 0 0 0 0 0 1 0 0 1 2 1 1 0 0 0 1 0 0 1 1 0 1 1 0 1 0 - 0 - - 1 0 1 1 2 2 0 0 2 1 1 1 1 0 0 1 1 1 1 1 0 1 0 1 1 0
Srolstoni	0 1 1 - 0 0 0 1 0 1 0 0 1 2 1 1 1 1 0 1 0 0 1 1 0 1 1 0 1 0 - 0 - - 1 0 1 1 2 3 0 0 2 1 1 1 1 0 ? 0 1 1 1 0 0 1 0 1 1 0
Tlimbativentris	0 0 0 - 0 2 0 0 0 1 2 0 0 2 1 0 0 0 0 1 0 0 1 0 0 1 0 0 1 0 - 0 - - 1 0 1 1 1 1 1 2 1 1 1 0 1 0 1 0 1 1 0 0 0 1 0 1 1 1
Tsimilima	0 0 0 - 0 2 0 0 0 1 2 0 0 2 1 0 0 0 0 1 0 0 1 0 1 0 0 0 1 0 - 0 - - 1 0 1 1 1 0 1 2 1 1 1 0 1 0 1 0 1 1 0 0 0 0 0 1 1 1

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                                                                              1                   1                   1
                  7                   8                   9                   0                   1                   2
                  0                   0                   0                   0                   0                   0
DDpunctatus       1 1 1 1 1 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 0 1 1 1 1 1 0 0 0 0 1 0 1 2 1 1 1 0 1 1 1 1 0 0 1 0 0 0 0 2 1   0 1 1 1 1 1 1 1 0
DDleucostigmus    0 0 1 1 0 0 0 0 0 1 0 0 0 0 0 1 1 1 0 0 0 1 1 1 1 1 0 0 0 0 1 0 1 2 1 2 1 0 1 1 1 1 1 0 0 0 0 0 0 2 1   0 1 1 1 1 1 1 1 0
DDbicolor         1 0 1 1 0 0 0 0 0 1 0 0 0 0 0 1 1 1 0 0 0 1 2 1 1 1 0 0 0 0 0 0 1 2 1 2 1 0 1 1 1 1 0 0 0 1 0 0 0 2 1   0 1 1 1 1 1 1 1 0
DDnigrum          1 0 1 1 0 0 0 0 0 1 0 0 0 0 0 1 1 1 0 0 0 1 1 1 1 1 0 0 0 0 0 0 1 2 1 1 1 0 1 1 1 0 0 0 1 0 0 0 0 2 1   0 1 1 1 1 1 1 1 0
DDavilapiresi     0 1 1 1 1 0 0 0 0 1 0 0 0 0 0 1 1 1 0 0 0 1 2 1 0 1 0 0 0 0 0 0 1 2 1 1 1 0 1 1 1 1 1 0 1 0 0 0 0 2 1   1 1 1 1 1 1 1 1 0
DDmiriamae        0 1 1 1 1 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 0 1 1 1 2 1 0 0 0 0 1 0 1 2 1 1 1 0 1 1 1 1 0 0 1 1 0 0 0 2 1   0 1 1 1 1 1 1 1 0
DDperuanus        1 1 1 1 1 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 0 1 1 1 1 1 0 0 0 0 1 0 1 2 1 1 1 0 1 1 1 1 0 0 1 0 0 0 0 2 1   0 1 1 1 1 1 1 1 0
DDpradoi          0 1 1 1 1 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 0 1 2 1 ? ? 0 0 0 0 1 0 1 2 1 1 1 0 1 1 1 1 0 0 1 0 0 0 0 2 1   1 1 1 1 1 1 1 1 0
DDsaltensis       0 1 1 1 1 0 0 0 0 1 0 0 0 0 0 1 1 1 0 0 0 1 2 1 2 1 0 0 0 0 1 0 1 2 1 2 1 0 0 - 1 1 1 0 1 0 0 0 0 2 1   1 1 1 1 1 1 1 1 0
DDaustralis       1 1 0 - 1 0 0 0 0 1 0 0 0 0 0 1 0 1 0 0 0 1 1 1 1 1 0 0 0 0 1 0 1 2 1 1 1 0 1 1 1 1 0 0 1 0 0 0 0 2 1   0 1 1 1 1 1 1 1 0
Ddfurcatus        0 0 1 1 0 0 1 1 0 0 0 0 0 1 0 0 - 0 1 0 0 1 1 0 0 1 0 0 1 0 0 0 1 1 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0   - 1 - 1 1 1 1 0 0
Ddmelacanthus     0 0 1 1 0 0 1 0 1 0 0 0 0 1 0 0 - 0 1 0 0 1 1 0 0 1 0 0 1 0 0 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0   - 1 - 1 1 1 1 0 0
Ddphoenix         0 0 1 1 0 0 1 1 0 0 0 0 0 1 0 0 - 0 1 0 0 1 1 0 0 1 0 0 1 0 0 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0   - 1 - 1 1 1 1 0 0
Ddlobatus         0 0 1 1 0 0 1 0 0 0 0 0 0 1 0 0 - 0 1 0 0 1 2 0 0 1 0 0 1 0 0 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0   - 1 - 1 1 1 1 0 0
Ddcaatinguensis   0 0 1 1 0 0 0 0 0 0 0 1 1 1 0 0 - 0 0 0 0 1 1 0 0 1 0 0 1 0 1 0 1 1 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0   - 1 - 1 1 1 1 0 0
DPdivisus         0 0 1 1 1 1 0 1 0 1 0 1 1 0 0 0 - 0 0 0 0 1 2 1 1 1 0 0 1 0 1 0 1 2 1 1 0 0 1 1 1 1 0 0 1 1 0 0 0 2 1   0 1 1 1 1 ? ? ? ?
Aalbocostata      0 0 1 1 0 0 0 1 0 0 0 0 0 1 2 0 - 0 1 0 1 1 2 0 0 1 0 1 1 0 1 0 0 1 1 0 0 1 1 0 0 0 - 0 1 0 0 0 0 1 0   - 1 - 1 1 1 1 0 0
Afraterna         0 0 1 1 0 0 0 1 0 0 0 0 0 1 2 0 - 0 1 0 1 1 2 0 1 1 0 1 1 0 0 0 0 1 0 2 0 1 1 0 0 0 - 0 1 0 0 0 0 1 1   1 1 0 1 1 1 1 0 0
Agriseus          0 0 1 0 1 0 0 0 1 1 0 0 0 0 0 0 - 0 1 0 1 1 2 0 1 0 0 1 1 0 0 0 0 2 0 0 0 0 0 - 0 0 - 0 0 0 0 0 0 2 1   0 0 0 1 1 1 1 0 0
Ascabricornis     0 0 1 0 1 0 0 0 1 1 0 0 0 0 0 0 - 1 1 0 1 1 2 0 1 0 0 1 1 0 0 0 0 2 0 0 0 0 0 - 0 0 - 0 0 0 0 0 0 2 1   0 0 1 1 1 1 1 0 0
Bhastator         0 0 1 1 1 0 0 1 0 0 0 0 0 0 0 0 - 1 0 0 0 1 1 0 0 0 0 1 1 0 1 0 0 0 1 0 0 0 0 - 1 0 - 0 0 1 0 0 0 2 0   - 1 - 1 0 0 0 0 1
Cpseudoscylax     0 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 - 0 0 1 1 0 1 0 1 0 0 1 1 0 0 0 0 0 1 2 0 1 0 - 0 0 - 0 0 0 0 0 0 1 1   1 1 0 1 0 1 0 0 0
Cfasciatus        0 0 0 - 1 1 0 - 1 1 1 1 1 0 2 0 - 0 0 1 0 1 0 0 1 0 0 0 0 0 0 0 0 0 1 0 1 0 0 - 1 0 - 0 0 0 0 0 0 2 1   1 0 1 0 1 1 1 0 1
Cpurpureipennis   0 0 1 0 1 1 0 0 1 0 0 1 1 0 0 0 - 0 1 0 0 0 2 1 0 1 1 0 0 0 0 0 1 0 0 0 0 1 0 - 2 0 - 0 1 1 0 0 0 2 1   1 ? 0 ? ? 0 0 0 0
Cdelia            0 0 0 - 1 0 0 - 1 1 1 0 0 0 0 0 - 0 1 0 1 1 0 0 0 0 0 1 1 0 0 0 1 0 1 0 0 0 0 - 0 0 - 0 0 0 0 0 0 0 1   0 1 1 1 0 1 1 1 1
Cdecorata         0 0 0 - 0 0 0 - 1 0 1 0 0 0 2 0 - 0 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 2 0 0 1 0 2 0 - 0 0 1 0 0 0 2 1   0 1 0 1 0 1 1 0 0
Clintneriana      0 0 0 - 0 0 0 - 1 0 1 0 0 0 1 0 - 0 1 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 0 2 0 0 1 0 2 0 - 0 0 1 0 0 0 2 1   0 0 0 1 0 1 1 0 0
Dbaccarum         0 0 0 - 1 1 0 - 1 1 0 1 1 0 2 0 - 0 1 0 0 0 0 1 0 1 1 1 0 1 0 0 1 0 1 0 0 0 1 1 2 1 - 0 0 0 0 0 0 2 1   1 1 0 0 0 1 0 0 0
EMacutus          0 0 1 1 1 1 0 0 0 0 0 1 1 1 0 0 - 0 1 0 2 1 1 0 0 1 0 1 1 0 0 0 0 1 1 2 0 1 1 3 0 0 - 0 0 0 0 0 0 1 1   0 0 0 1 1 1 1 0 0
EEemoorei         0 0 1 1 1 0 0 0 0 0 0 1 1 0 0 0 - 0 1 1 1 1 1 0 1 0 0 1 1 0 0 0 0 0 1 0 0 0 1 1 0 0 - 0 1 1 0 0 0 2 1   0 1 1 1 1 0 1 0 1
EMgrandis         0 0 1 1 1 1 0 0 0 1 0 1 1 1 2 0 - 0 1 1 0 1 1 0 1 1 0 1 1 0 0 0 1 0 0 0 0 1 1 3 0 1 - 0 1 0 0 0 0 1 1   0 1 1 1 1 1 1 0 0
EEheros           0 0 1 1 1 0 0 0 0 0 0 1 1 0 0 0 - 0 1 0 1 1 1 0 1 1 0 1 1 0 0 0 1 0 1 0 0 0 0 - 0 0 - 0 0 ? 0 0 0 1 1   0 0 1 1 1 0 1 1 1
ELsharpi          0 0 1 0 0 0 0 - ? 1 0 0 0 1 2 0 - 1 1 0 0 1 2 0 0 0 0 1 1 0 0 0 1 0 1 0 0 0 1 3 1 0 - 0 0 1 0 0 0 1 1   0 1 1 1 1 1 1 1 1
ELtriangulator    0 0 1 0 1 0 0 0 0 1 0 1 1 1 0 0 - 0 1 1 1 1 1 0 1 0 0 1 1 1 1 0 1 0 1 0 0 0 1 3 1 0 - 0 0 1 0 0 0 2 1   0 1 1 1 1 1 1 1 1
EEvariolarius     0 0 1 1 0 0 0 1 0 0 0 0 0 0 0 0 - 0 0 1 1 1 2 0 1 1 0 1 1 1 0 0 1 0 1 0 0 0 1 3 0 0 - 0 1 1 0 0 0 2 0   0 1 1 1 1 1 1 0 0
Gbituberculata    0 0 1 0 1 1 0 0 0 1 0 1 1 0 1 0 - 0 0 1 1 1 2 1 0 0 1 ? ? 1 1 0 0 2 1 0 1 0 1 1 1 0 - 0 0 0 0 0 0 2 1   0 1 1 1 0 1 1 0 0
Gadroguensis      0 0 1 0 0 0 0 0 0 1 1 0 0 0 2 0 - 0 0 0 1 1 2 0 1 1 0 1 1 1 1 0 0 0 0 0 0 0 0 - 1 0 - 1 0 1 0 0 1 1 0   - 0 - 1 0 0 1 0 1
Gsetigera         0 0 1 0 0 0 0 0 0 1 1 0 0 0 2 0 - 0 0 0 1 1 2 0 1 1 0 1 1 1 1 0 0 0 0 0 0 0 0 - 1 0 - 1 0 1 0 0 1 1 0   - 0 - 1 0 0 1 0 1
Hnervosa          0 1 1 0 1 1 0 - 0 1 0 1 1 0 0 0 - 0 1 0 0 1 2 0 1 1 0 1 1 0 1 1 0 2 1 0 0 0 0 - 0 0 - 0 0 0 0 0 0 1 0   - 1 - 1 0 1 1 1 1
Hinermis          0 0 1 0 1 1 0 0 0 1 0 0 0 0 2 0 - 0 1 0 1 1 2 0 1 1 0 1 1 1 1 1 0 0 1 0 0 0 0 - 1 0 - 1 0 1 0 0 1 - 1   0 0 0 - - 0 1 0 1
Hsternalis        0 0 1 0 1 1 0 0 0 1 0 0 0 0 2 0 - 0 1 0 2 1 2 0 1 1 0 1 1 1 1 1 0 0 1 2 0 0 0 - 1 0 - 1 0 1 0 0 1 - 1   0 0 0 - - 0 1 0 1
Larmipes          0 0 1 1 0 0 0 0 0 0 0 1 1 1 0 0 - 0 0 0 2 1 2 0 1 1 0 1 1 0 0 0 1 1 1 2 0 1 1 1 1 0 - 0 0 0 0 0 0 2 1   0 1 0 1 1 1 1 0 0
Lbilobus          0 0 1 1 1 1 0 0 0 0 0 1 1 1 0 0 - 0 0 0 2 1 2 0 1 1 0 1 1 0 0 0 1 1 1 2 0 1 1 1 1 0 - 0 0 1 0 0 0 2 1   0 1 0 1 1 1 1 0 0
Macuminata        0 0 0 - 1 0 0 - ? 0 0 1 0 0 2 0 - 0 1 0 0 1 2 0 ? 1 0 1 1 1 1 1 0 0 1 0 0 0 0 - 2 0 - 1 0 0 0 0 1 ? 1[01] 0 0 ? ? 0 1 0 1
Minsertus         1 0 1 0 1 1 0 - 0 1 0 1 1 0 0 0 - 0 1 0 0 1 2 0 0 1 0 1 1 0 1 0 1 0 1 0 0 0 0 - 0 0 - 0 0 1 0 0 0 2 0   - 1 - 1 1 1 1 1 1
Mcornicolis       1 1 1 1 0 0 0 1 0 1 0 0 0 0 2 0 - 0 0 1 1 1 1 0 0 0 1 1 1 0 1 0 0 0 0 0 0 0 1 0 0 0 - 0 0 1 1 0 0 2 0   - 1 - 1 1 0 ? ? 0
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Mypsilon          0 0 1 1 0 0 0 1 0 0 0 0 0 0 2 0 - 0 0 1 1 1 1 0 0 1 0 1 1 0 0 1 0 0 0 0 1 0 0 - 0 0 - 0 0 1 0 0 0 1 0   - 0 - 0 1 0 ? ? 0
Opunctaria        0 1 1 0 1 1 0 0 0 1 0 1 1 1 0 0 - 0 0 1 0 1 2 0 0 0 0 1 0 0 0 0 1 0 1 0 0 0 0 - 0 0 - 0 0 0 0 0 0 1 0   - 0 - 1 1 1 1 1 0
Ounidentata       0 1 1 0 1 0 0 0 0 1 0 1 1 1 0 0 - 0 0 1 0 1 2 0 0 0 0 1 0 0 0 0 1 0 1 0 0 0 0 - 0 0 - 0 ? 0 0 0 0 1 0   - 0 - 1 1 1 1 1 0
Ptrivittatus      1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 - 0 1 0 0 1 1 1 1 1 0 0 0 0 1 0 1 0 1 1 0 0 0 - 0 0 - 0 1 0 0 0 0 2 1   0 1 1 1 1 1 1 1 0
Pviduus           0 0 1 1 0 0 0 0 0 1 0 0 0 0 0 0 - 0 1 0 0 1 1 1 1 1 0 0 0 0 1 0 1 0 1 1 0 0 0 - 0 0 - 0 1 0 0 0 0 2 1   0 1 1 1 1 1 1 1 0
Pcatarinensis     0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 - 0 1 0 0 1 2 0 ? 0 0 1 1 0 1 0 0 0 1 0 1 0 0 - 1 0 - 1 ? 1 0 0 1 - 1   0 1 0 - - 0 1 0 1
Ppodopioides      0 0 1 0 0 0 0 0 1 1 0 1 0 0 0 0 - 0 1 0 0 1 2 0 1 1 0 1 1 0 1 0 0 0 1 0 0 0 1 0 0 0 - 1 0 0 0 0 0 2 0   - 1 - 1 1 1 0 1 0
Palbopunctulatus  0 0 1 1 0 1 0 1 0 0 0 0 0 0 0 0 - 0 1 0 0 1 1 0 1 1 0 0 0 0 1 0 1 0 1 1 0 0 0 - 1 0 - 0 1 0 0 1 0 2 1   0 1 1 1 1 1 1 1 0
Pvictor           0 0 1 1 0 1 0 1 0 0 0 1 1 0 0 0 - 0 1 0 0 1 1 0 1 1 0 0 0 0 1 0 1 0 1 1 0 0 0 - 1 0 - 0 1 0 0 1 0 2 1   0 1 1 1 1 1 1 1 0
Smonstrabilis     0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 - 1 0 1 1 1 2 0 2 0 0 1 1 ? ? 0 0 0 1 0 0 ? ? ? ? ? ? ? ? ? ? ? ? ? ?   ? ? ? ? ? ? ? ? ?
Srolstoni         0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 - 1 1 1 1 1 2 1 1 1 0 1 0 0 1 0 1 2 1 0 1 0 1 1 0 0 - 0 1 0 0 0 0 ? 1   0 1 0 ? ? 1 1 1 0
Tlimbativentris   0 0 1 0 1 1 0 0 0 1 0 1 0 0 2 0 - 0 1 0 0 1 1 0 1 1 0 1 1 1 1 1 0 0 1 0 0 0 0 - 1 0 - 1 0 0 0 0 1 1 1[01] 0 0 1 0 0 0 0 1
Tsimilima         0 0 1 0 1 1 0 0 0 1 0 1 0 0 2 0 - 0 1 0 0 1 1 0 1 1 0 1 1 1 1 1 0 0 1 0 0 0 0 - 1 0 - 1 0 0 0 0 1 1 1[01] 0 0 1 0 0 0 0 1
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	130										140								
DDpunctatus	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
DDleucostigmus	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
DDbicolor	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
DDnigrum	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
DDavilapiresi	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
DDmiriamae	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
DDperuanus	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
DDpradoi	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
DDsaltensis	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
DDaustralis	-	0	0	1	1	0	0	1	1	2	0	0	1	0	0	0	1	0	0
Ddfurcatus	-	0	0	1	1	0	1	1	0	-	-	0	1	0	1	0	1	0	0
Ddmelacanthus	-	0	0	1	1	0	1	1	0	-	-	0	1	0	1	0	1	0	0
Ddphoenix	-	0	0	1	1	0	1	1	0	-	-	0	1	0	1	0	1	0	0
Ddlobatus	-	0	0	1	1	0	1	1	0	-	-	0	1	0	1	0	1	0	0
Ddcaatinguensis	-	0	0	1	1	0	1	1	0	-	-	0	1	0	1	0	1	0	0
DPdivisus	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Aalbocostata	-	0	0	1	2	0	1	1	1	0	-	1	1	0	0	0	1	0	0
Afraterna	-	0	0	1	1	0	1	1	1	0	-	1	1	0	0	0	1	0	0
Agriseus	-	0	0	1	2	0	0	1	1	1	-	0	1	3	-	0	1	0	2
Ascabricornis	-	0	0	1	2	0	0	1	1	1	-	0	1	3	-	0	1	0	2
Bhastator	0	1	0	1	2	0	0	1	1	0	-	0	1	4	-	0	1	1	1
Cpseudoscylax	-	0	0	0	-	0	-	-	-	-	-	-	1	5	-	0	1	0	0
Cfasciatus	0	0	1	0	-	0	0	1	1	0	-	1	1	0	0	0	1	0	0
Cpurpureipennis	-	1	1	0	-	0	0	1	1	0	-	0	0	-	-	0	1	1	1
Cdelia	0	1	0	1	0	0	0	1	0	-	-	0	1	2	?	1	0	1	0
Cdecorata	-	0	0	0	-	0	0	0	1	1	-	1	0	-	-	0	1	0	1
Clintneriana	-	0	0	0	-	0	0	0	1	1	-	1	0	-	-	0	1	0	1
Dbaccarum	-	1	1	0	-	0	0	1	1	1	-	0	0	-	-	0	1	0	1
EMacutus	-	0	0	1	2	0	0	1	0	-	-	0	0	-	-	0	1	0	0
EEemoorei	0	1	0	1	2	0	0	0	1	1	-	0	1	2	-	1	0	1	0
EMgrandis	-	0	0	1	2	0	1	2	0	-	-	0	1	0	0	0	1	0	0
EEheros	0	1	0	1	0	0	0	0	1	1	-	0	1	2	-	1	0	1	0
ELsharpi	1	1	0	1	0	0	0	1	1	0	-	0	1	2	-	1	0	1	1
ELtriangulator	0	1	0	1	0	0	0	1	1	1	-	0	1	2	-	1	0	1	1
EEvariolarius	-	1	0	1	2	0	0	0	1	1	-	0	1	2	-	1	0	1	1
Gbituberculata	-	0	0	0	-	0	0	1	0	-	-	1	1	0	0	0	1	0	0
Gadroguensis	1	1	0	1	2	1	0	0	1	1	-	1	1	1	-	0	1	0	0
Gsetigera	1	1	0	1	2	1	0	0	1	1	-	1	1	1	-	0	1	0	0
Hnervosa	0	1	0	1	1	0	0	0	1	0	-	0	1	2	1	1	0	1	0
Hinermis	1	1	0	1	1	1	0	0	1	2	1	1	1	1	-	0	1	0	0
Hsternalis	1	1	0	1	1	1	0	0	1	2	1	1	1	1	-	0	1	0	0
Larmipes	-	0	0	1	1	0	1	1	0	-	-	1	1	0	0	0	1	0	0
Lbilobus	-	0	0	1	1	0	1	1	0	-	-	1	1	0	0	0	1	0	0
Macuminata	1	1	0	1	1	1	0	0	1	2	1	1	1	1	-	0	1	0	0
Minsertus	0	1	0	1	1	0	0	1	1	0	-	0	1	2	-	1	0	1	0
Mcornicolis	-	0	1	0	-	1	0	0	0	-	-	1	0	-	-	0	1	0	0
Mmaculata	-	0	1	0	-	1	0	0	0	-	-	1	0	-	-	0	1	0	0
Mypsilon	-	0	1	0	-	1	0	0	0	-	-	1	0	-	-	0	1	0	0
Opunctaria	-	1	0	1	1	0	0	1	1	0	-	1	1	2	-	1	0	1	1
Ounidentata	-	1	0	1	1	0	0	1	1	0	-	1	1	2	-	1	0	1	1
Ptrivittatus	-	0	0	1	2	0	0	1	1	2	0	0	1	0	0	0	1	0	0
Pviduus	-	0	0	1	2	0	0	1	1	2	0	0	1	0	0	0	1	0	0
Pcatarinensis	1	1	0	1	1	1	0	0	1	2	1	1	1	1	-	0	1	0	0
Ppodopioides	-	1	0	1	2	0	0	1	1	0	-	0	1	2	-	1	0	1	0
Palbopunctulatus	-	0	0	1	1	0	1	1	1	2	0	0	1	0	0	0	1	0	0
Pvictor	-	0	0	1	1	0	1	1	1	2	0	0	1	0	0	0	1	0	0
Smonstrabilis	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Srolstoni	-	0	0	1	1	0	0	1	1	2	1	0	1	0	0	0	1	0	0
Tlimbativentris	1	1	0	1	2	1	0	1	1	2	1	1	1	1	-	0	1	0	0
Tsimilima	1	1	0	1	2	1	0	1	1	2	1	1	1	1	-	0	1	0	0

Appendix S3: Defining *k*-value

Results of explored parameters under Implied Weighting using Mirande (2009) protocol. Parameter used were *default*, except for distortion groups (24), hits of best trees (5), and *drift* and *ratchet* iterations (10).

Runs	distref	kref	length	trees	fit
k0	50.000	4.165	898	3	65.745
k1	51.739	4.465	898	3	63.826
k2	53.478	4.787	898	3	61.897
k3	55.217	5.135	898	3	59.957
k4	56.957	5.511	898	3	58.003
k5	58.696	5.918	893	3	56.028
k6	60.435	6.361	893	3	54.032
k7	62.174	6.845	890	3	52.017
k8	63.913	7.376	885	1	49.978
k9	65.652	7.96	885	1	47.911
k10	67.391	8.607	885	1	45.823
k11	69.130	9.327	884	1	43.71
k12	70.870	10.132	884	1	41.573
k13	72.609	11.04	884	1	39.411
k14	74.348	12.071	884	1	37.222
k15	76.087	13.251	884	1	35.003
k16	77.826	14.617	884	1	32.753
k17	79.565	16.216	884	1	30.468
k18	81.304	18.112	884	1	28.147
k19	83.043	20.396	884	1	25.787
k20	84.783	23.203	878	1	23.372
k21	86.522	26.735	878	1	20.911
k22	88.261	31.312	878	1	18.404
k23	90.000	37.482	878	1	15.848

Comparison matrix of tree consensuses topologies found for each run of Mirande’s script. Values are Coefficient Distances: the higher the index, more similar the trees. Range of *k*11-19 was found to be the *k*’s best adjusted to the matrix. *k*-value defined to perform Implied Weight analyses is the average of such range (*k*-value = 14).

	k0	k1	k2	k3	k4	k5	k6	k7	k8	k9	k10	k11	k12	k13	k14	k15	k16	k17	k18	k19	k20	k21	k22	k23
k0		1.000	1.000	1.000	1.000	0.987	0.987	0.989	0.973	0.973	0.973	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.934	0.934	0.934	0.934
k1	1.000		1.000	1.000	1.000	0.987	0.987	0.989	0.973	0.973	0.973	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.934	0.934	0.934	0.934
k2	1.000	1.000		1.000	1.000	0.987	0.987	0.989	0.973	0.973	0.973	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.934	0.934	0.934	0.934
k3	1.000	1.000	1.000		1.000	0.987	0.987	0.989	0.973	0.973	0.973	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.934	0.934	0.934	0.934
k4	1.000	1.000	1.000	1.000		0.987	0.987	0.989	0.973	0.973	0.973	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.966	0.934	0.934	0.934	0.934
k5	0.987	0.987	0.987	0.987	0.987		1.000	0.982	0.966	0.966	0.966	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.927	0.927	0.927	0.927
k6	0.987	0.987	0.987	0.987	0.987	1.000		0.982	0.966	0.966	0.966	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.927	0.927	0.927	0.927
k7	0.989	0.989	0.989	0.989	0.989	0.982	0.982		0.984	0.984	0.984	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.977	0.946	0.946	0.946	0.946
k8	0.973	0.973	0.973	0.973	0.973	0.966	0.966	0.984		1.000	1.000	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.963	0.963	0.963	0.963
k9	0.973	0.973	0.973	0.973	0.973	0.966	0.966	0.984	1.000		1.000	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.963	0.963	0.963	0.963
k10	0.973	0.973	0.973	0.973	0.973	0.966	0.966	0.984	1.000	1.000		0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.993	0.963	0.963	0.963	0.963
k11	0.966	0.966	0.966	0.966	0.966	0.959	0.959	0.977	0.993	0.993	0.993		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970
k12	0.966	0.966	0.966	0.966	0.966	0.959	0.959	0.977	0.993	0.993	0.993	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970
k13	0.966	0.966	0.966	0.966	0.966	0.959	0.959	0.977	0.993	0.993	0.993	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970
k14	0.966	0.966	0.966	0.966	0.966	0.959	0.959	0.977	0.993	0.993	0.993	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970
k15	0.966	0.966	0.966	0.966	0.966	0.959	0.959	0.977	0.993	0.993	0.993	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	0.970	0.970	0.970	0.970
k16	0.966	0.966	0.966	0.966	0.966	0.959	0.959	0.977	0.993	0.993	0.993	1.000	1.000	1.000	1.000	1.000		1.000	1.000	1.000	0.970	0.970	0.970	0.970
k17	0.966	0.966	0.966	0.966	0.966	0.959	0.959	0.977	0.993	0.993	0.993	1.000	1.000	1.000	1.000	1.000	1.000		1.000	1.000	0.970	0.970	0.970	0.970
k18	0.966	0.966	0.966	0.966	0.966	0.959	0.959	0.977	0.993	0.993	0.993	1.000	1.000	1.000	1.000	1.000	1.000	1.000		1.000	0.970	0.970	0.970	0.970
k19	0.966	0.966	0.966	0.966	0.966	0.959	0.959	0.977	0.993	0.993	0.993	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		0.970	0.970	0.970	0.970
k20	0.934	0.934	0.934	0.934	0.934	0.927	0.927	0.946	0.963	0.963	0.963	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970		1.000	1.000	1.000
k21	0.934	0.934	0.934	0.934	0.934	0.927	0.927	0.946	0.963	0.963	0.963	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	1.000		1.000	1.000
k22	0.934	0.934	0.934	0.934	0.934	0.927	0.927	0.946	0.963	0.963	0.963	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	1.000	1.000		1.000
k23	0.934	0.934	0.934	0.934	0.934	0.927	0.927	0.946	0.963	0.963	0.963	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	0.970	1.000	1.000	1.000	
∑ tcomp	22.313	22.313	22.313	22.313	22.313	22.149	22.149	22.440	22.575	22.575	22.575	**22.585**	**22.585**	**22.585**	**22.585**	**22.585**	**22.585**	**22.585**	**22.585**	**22.585**	22.093	22.093	22.093	22.093

Table S1. List of terminals included on the analysis, with information on the genitalia studied per species and sex (species marked with “*” only data on external genitalia was available; species marked with “^{L}”, data on internal genitalia was retrieved from literature), the availability of SEM of external scent efferent system of the metasternal glands (ESES), number of specimens measured per species and sex, and literature used for species determination when available.

	Genitalia		ESES	# spec measured			
Species	♂	♀	**SEM**	**Total**	♂	♀	**Literature for determination**
Acledra albocostata (Spinola, 1852)	X	X	X	20	10	10	Faúndez & Verdejo (2009)
Acledra fraterna (Stål, 1859)	X	X	X	18	8	10	Faúndez & Verdejo (2009)
Agroecus griseus Dallas, 1851	X	X	X	20	10	10	Rider & Rolston (1987)
Agroecus scabricornis (Herrich-Schäffer, 1844)	X	X	X	13	5	8	Rider & Rolston (1987)
Berecynthus hastator (Fabricius, 1798)	X	X	X	20	10	10	Grazia & Hildebrand (1982)
Caonabo pseudoscylax (Bergroth, 1891)	X	X	X	19	9	10	Rolston (1974)
Caribo fasciatus Rolston, 1984	X	X	X	12	9	3	Rolston & McDonald (1984)
Carpocoris purpureipennis (DeGeer, 1783)	X	X	X	6	3	3	
Coenus delius (Say, 1832)	X	X	X	7	3	4	Rider (1995)
Cosmopepla decorata (Hahn, 1834)	X	X	X	4	2	2	McDonald (1986)
Cosmopepla lintneriana Kirkaldy, 1909	X	X	X	8	3	5	McDonald (1986)
Dichelops (*Diceareus*) *caatiguensis* Grazia & Poock-da-Silva, 2013	X	X	X	16	6	10	Poock-da-Silva et al. (2013)
Dichelops (*Diceareus*) *furcatus* (Fabricius, 1775)	X	X	X	20	10	10	Grazia (1978), Poock-da-Silva et al. (2013)
Dichelops (*Diceareus*) *lobatus* Grazia, 1978	X	X	X	4	2	2	Grazia (1978), Poock-da-Silva et al. (2013)
Dichelops (*Diceareus*) *melacanthus* (Dallas, 1851)	X	X	X	20	10	10	Grazia (1978), Poock-da-Silva et al. (2013)
Dichelops (*Diceareus*) *phoenix* Grazia, 1978	X	X	X	9	6	3	Grazia (1978), Poock-da-Silva et al. (2013)
Dichelops (*Dichelops*) *australis* Grazia & Klein, 2012	X	X	X	11	8	3	Klein et al. (2012)
Dichelops (*Dichelops*) *avilapiresi* Grazia, 1978	X	X	X	9	3	6	Grazia (1978), Klein et al. (2012)
Dichelops (*Dichelops*) *bicolor* Distant, 1890	X	X	X	6	4	2	Grazia (1978), Klein et al. (2012)
Dichelops (*Dichelops*) *leucostigmus* (Dallas, 1851)	X	X	X	20	10	10	Grazia (1978), Klein et al. (2012)
Dichelops (*Dichelops*) *miriamae* Grazia, 1978	X	X	X	8	5	3	Grazia (1978), Klein et al. (2012)
Dichelops (*Dichelops*) *nigrum* Bergroth, 1914	X	X	X	16	7	9	Grazia (1978), Klein et al. (2012)
Dichelops (*Dichelops*) *peruanus* Grazia, 1978	X^{L}	X	X	11	2	9	Grazia (1978), Klein et al. (2012)
Dichelops (*Dichelops*) *pradoi* Grazia, 1978	X^{L}	X	X	4	2	2	Grazia (1978), Klein et al. (2012)
Dichelops (*Dichelops*) *punctatus* (Spinola, 1837)	X^{L}	X	X	5	2	3	Grazia (1978), Klein et al. (2012)
Dichelops (*Dichelops*) *saltensis* Grazia, 1978	X	X	X	17	7	10	Grazia (1978), Klein et al. (2012)
Dichelops (*Prodichelops*) *divisus* (Walker, 1867)	X*	X*	-	3	1	2	Grazia (1978), Poock-da-Silva et al. (2013)
Dolycoris baccarum (Linnaeus, 1758)	X	X	X	6	4	2	
Euschistus (*Euschistus*) *emoorei* Rolston, 1972	X	X	X	18	10	8	Rolston (1974)
Euschistus (*Euschistus*) *heros* (Fabricius, 1794)	X	X	X	20	10	10	Rolston (1974)

Euschistus (*Euschistus*) *variolarius* (Palisot de Beauvois, 1817)	X	X	X	7	3	4	
Euschistus (*Lycipta*) *sharpi* (Bergroth, 1891)	X	X	X	17	7	10	Rolston (1982)
Euschistus (*Lycipta*) *triangulator* (Herrich-Schäffer, 1842)	X	X	X	12	8	4	Rolston (1982)
Euschistus (*Mitripus*) *acutus* Dallas, 1851	X	X	X	20	10	10	Rolston (1978a)
Euschistus (*Mitripus*) *grandis* Rolston, 1978	X	X	X	20	10	10	Rolston (1978a)
Galedanta bituberculata Amyot & Serville, 1843	X	X	X	15	5	10	Grazia (1967), Grazia (1981)
Glyphepomis adroguensis Berg, 1891	X	X	X	18	8	10	Campos & Grazia (1998)
Glyphepomis setigera Kormilev & Pirán, 1952	X	X	X	17	7	10	Campos & Grazia (1998)
Hymenarcis nervosa (Say, 1831)	X	X	X	6	4	2	Rolston (1973b)
Hypatropis inermis (Jensen-Haarup, 1928)	X	X	X	14	4	10	Fernandes & Grazia (1996)
Hypatropis sternalis (Stål, 1869)	X^{L}	X	X	5	3	2	Fernandes & Grazia (1996)
Ladeaschistus armipes (Stål, 1872)	X	X	X	13	4	9	Rolston (1973a)
Ladeaschistus bilobus (Stål, 1872)	X	X	X	19	9	10	Rolston (1973a)
Mecocephala acuminata Dallas, 1851	X^{L}	X	X	3	2	1	Schwertner et al. (2002)
Menecles insertus (Say, 1832)	X	X	X	7	4	3	Rolston (1972)
Mormidea cornicollis (Stål, 1860)	X	X	X	20	10	10	Rolston (1978b)
Mormidea maculata Dallas, 1851	X	X	X	20	10	10	Rolston (1978b)
Mormidea ypsilon (Linnaeus, 1758)	X	X	X	20	10	10	Rolston (1978b)
Oenopiella punctaria (Spinola, 1859)	X	X	X	20	10	10	Fernández-Aldea et al. (2014)
Oenopiella unidentata (Stål, 1859)	X	X	X	20	10	10	Fernández-Aldea et al. (2014)
Padaeus trivittatus Stål, 1872	X	X	X	5	4	1	
Padaeus viduus (Vollenhoven, 1868)	X	X	X	3	2	1	
Pedinonotus catarinensis Fernandes & Grazia, 2002	X^{L}	X	X	14	7	7	Fernandes & Grazia (2002)
Prionosoma podopioides Uhler, 1863	X	X	X	6	2	4	
Proxys albopunctulatus (Palisot, 1811)	X	X	X	20	10	10	
Proxys victor (Fabricius, 1775)	X	X	X	17	8	9	
Spinalanx monstrabilis Rolston & Rider, 1988	-	X^{L}	X	2	1	1	Rolston & Rider (1988), Thomas (1995)
Spinalanx rolstoni Thomas, 1995	X	X	X	3	2	1	Rolston & Rider (1988), Thomas (1995)
Tibraca limbativentris Stål, 1860	X	X	X	20	10	10	Fernandes & Grazia (1998)
Tibraca similima Barber, 1941	X	X	X	20	10	10	Fernandes & Grazia (1998)

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Table S2. Morphometric parameters measured on terminal taxa. Measurements are given in millimeters and represent [mean ± standard error (minimum – maximum)].

	Measurements									
Species	**HD**	**IOD**	**EW**	**LMP**	**IOC**	**PL**	**PWH**	**PWM**	**SWB**	**SL**
Acledra albocostata	2.12 ± 0.02	1.53 ± 0.02	0.74 ± 0.01	0.07	0.98 ± 0.01	2.33 ± 0.03	6.03 ± 0.05	5.64 ± 0.06	3.51 ± 0.04	3.95 ± 0.05
	(1.96–2.27)	(1.42–1.65)	(0.65–0.85)	(0.04–0.08)	(0.85–1.04)	(2.12–2.58)	(5.69–6.38)	(5.08–6.15)	(3.23–3.92)	(3.58–4.35)
Acledra fraterna	1.52 ± 0.02	1.28 ± 0.01	0.67 ± 0.01	0.35 ± 0.02	0.83 ± 0.02	2.15 ± 0.03	5.87 ± 0.07	5.42 ± 0.07	3.38 ± 0.04	3.55 ± 0.05
	(1.27–1.69)	(1.15–1.38)	(0.61–0.81)	(0.23–0.46)	(0.69–0.92)	(1.96–2.42)	(5.38–6.46)	(4.88–5.85)	(3.12–3.73)	(3.19–3.92)
Agroecus griseus	1.93 ± 0.03	1.27 ± 0.02	0.97 ± 0.02	–	0.88 ± 0.02	2.38 ± 0.05	6.13 ± 0.11	5.85 ± 0.10	3.86 ± 0.07	3.70 ± 0.08
	(1.73–2.15)	(1.19–1.42)	(0.85–1.15)		(0.77–1.04)	(2.04–2.73)	(5.42–6.92)	(5.08–6.62)	(3.42–4.42)	(3.08–4.31)
Agroecus scabricornis	2.00 ± 0.03	1.28 ± 0.02	0.88 ± 0.01	–	0.79 ± 0.01	2.37 ± 0.05	7.35 ± 0.15	5.87 ± 0.11	3.92 ± 0.07	3.66 ± 0.09
	(1.88–2.31)	(1.15–1.38)	(0.80–0.97)		(0.69–0.85)	(1.92–2.62)	(6.54–8.27)	(5.00–6.35)	(3.50–4.35)	(3.19–4.04)
Berecynthus hastator	2.15 ± 0.02	1.28 ± 0.01	0.80 ± 0.02	–	0.77 ± 0.01	1.90 ± 0.03	5.69 ± 0.13	4.51 ± 0.05	2.92 ± 0.03	3.04 ± 0.04
	(2.04–2.31)	(1.19–1.38)	(0.42–0.88)		(0.69–0.81)	(1.77–2.23)	(5.00–7.12)	(4.12–4.92)	(2.73–3.19)	(2.81–3.38)
Caonabo pseudocylax	1.80 ± 0.02	1.13 ± 0.01	0.62 ± 0.01	–	0.61 ± 0.01	1.90 ± 0.03	5.65 ± 0.09	4.62 ± 0.07	2.95 ± 0.06	3.05 ± 0.06
	(1.65–2.04)	(1.04–1.19)	(0.54–0.70)		(0.54–0.69)	(1.69–2.15)	(5.00–6.23)	(4.04–5.12)	(2.46–3.31)	(2.58–3.42)
Caribo fasciatus	1.62 ± 0.02	1.06 ± 0.02	0.81 ± 0.04	–	0.79 ± 0.02	1.49 ± 0.03	4.85 ± 0.09	4.60 ± 0.08	2.99 ± 0.05	2.80 ± 0.07
	(1.52–1.72)	(0.96–1.16)	(0.64–1.04)		(0.72–0.88)	(1.36–1.60)	(4.56–5.36)	(4.24–5.00)	(2.80–3.28)	(2.56–3.16)
Carpocoris purpureipennis	2.20 ± 0.02	1.41 ± 0.03	0.93 ± 0.04	–	0.87 ± 0.03	2.38 ± 0.06	6.91 ± 0.15	6.33 ± 0.12	4.07 ± 0.08	4.32 ± 0.14
	(2.14–2.24)	(1.33–1.48)	(0.81–1.00)		(0.76–0.95)	(2.19–2.52)	(6.38–7.24)	(5.90–6.62)	(3.76–4.29)	(3.86–4.86)
Coenus delia	2.02 ± 0.03	1.56 ± 0.03	0.69 ± 0.01	–	0.95 ± 0.01	2.08 ± 0.03	4.62 ± 0.09	4.56 ± 0.09	3.13 ± 0.07	3.43 ± 0.10
	(1.92–2.15)	(1.46–1.65)	(0.65–0.73)		(0.92–1.00)	(2.00–2.19)	(4.31–5.00)	(4.23–5.00)	(2.88–3.42)	(3.08–3.85)
Cosmopepla decorata	1.30 ± 0.06	1.07 ± 0.03	0.60 ± 0.01	–	0.67 ± 0.01	1.42 ± 0.08	4.16 ± 0.21	4.07 ± 0.20	2.61 ± 0.16	2.72 ± 0.08
	(1.15–1.42)	(1.00–1.12)	(0.58–0.61)		(0.65–0.69)	(1.27–1.65)	(3.69–4.54)	(3.62–4.42)	(2.23–2.92)	(2.54–2.85)
Cosmopepla lintneriana	1.24 ± 0.03	1.02 ± 0.02	0.47 ± 0.02	–	0.61 ± 0.01	1.41 ± 0.03	3.65 ± 0.09	3.61 ± 0.09	2.35 ± 0.07	2.21 ± 0.06
	(1.15–1.38)	(0.94–1.09)	(0.41–0.56)		(0.56–0.68)	(1.26–1.50)	(3.32–4.06)	(3.29–4.00)	(2.18–2.71)	(2.00–2.44)
Dichelops (*Dichelops*) *australis*	1.99 ± 0.02	1.35 ± 0.01	0.85 ± 0.01	0.18 ± 0.01	0.86 ± 0.01	2.38 ± 0.05	6.04 ± 0.09	5.86 ± 0.07	3.76 ± 0.05	3.92 ± 0.04
	(1.88–2.08)	(1.31–1.38)	(0.77–0.92)	(0.12–0.23)	(0.81–0.92)	(2.19–2.62)	(5.69–6.62)	(5.54–6.15)	(3.54–4.04)	(3.77–4.23)
Dichelops (*Dichelops*) *avilapiresi*	1.75 ± 0.09	1.16 ± 0.01	0.77 ± 0.01	0.09 ± 0.01	0.76 ± 0.01	2.20 ± 0.06	5.49 ± 0.06	5.09 ± 0.05	3.26 ± 0.05	3.37 ± 0.06
	(1.08–1.88)	(1.12–1.19)	(0.70–0.81)	(0.04–0.15)	(0.73–0.85)	(2.00–2.62)	(5.23–5.85)	(4.92–5.38)	(3.08–3.46)	(3.12–3.73)
Dichelops (*Dichelops*) *bicolor*	2.09 ± 0.03	1.3 ± 0.03	0.83 ± 0.02	0.20 ± 0.01	0.83 ± 0.02	2.28 ± 0.03	6.82 ± 0.13	5.78 ± 0.06	3.69 ± 0.05	4.06 ± 0.10
	(2.00–2.21)	(1.23–1.42)	(0.77–0.89)	(0.15–0.23)	(0.77–0.92)	(2.19–2.38)	(6.23–7.15)	(5.58–5.92)	(3.58–3.85)	(3.77–4.42)
Dichelops (*Diceraeus*) *caatinguensis*	1.71 ± 0.04	1.08 ± 0.02	0.71 ± 0.01	0.15	0.69 ± 0.01	1.83 ± 0.04	5.14 ± 0.12	4.55 ± 0.08	2.92 ± 0.05	2.77 ± 0.06
	(1.42–2.00)	(1,00–1.20)	(0.65–0.84)	(0.12–0.16)	(0.64–0.76)	(1.58–2.08)	(4.44–5.92)	(3.92–5.12)	(2.60–3.28)	(2.44–3.16)
Dichelops (*Prodichelops*) *divisus*	2.09 ± 0.06	1.20 ± 0.01	0.96 ± 0.06	0.09 ± 0.01	0.76 ± 0.05	2.42 ± 0.07	7.27 ± 0.20	5.90 ± 0.20	3.57 ± 0.08	3.53 ± 0.07
	(1.96–2.15)	(1.19–1.23)	(0.85–1.04)	(0.08–0.12)	(0.65–0.81)	(2.31–2.54)	(6.88–7.54)	(5.54–6.23)	(3.42–3.65)	(3.38–3.62)
Dichelops (*Diceraeus*) *furcatus*	2.00 ± 0.03	1.35 ± 0.02	0.77 ± 0.01	0.47 ± 0.01	0.86 ± 0.01	2.12 ± 0.04	6.90 ± 0.14	5.48 ± 0.10	3.46 ± 0.06	3.35 ± 0.08
	(1.80–2.32)	(1.12–1.48)	(0.68–0.88)	(0.40–0.60)	(0.76–0.96)	(1.76–2.36)	(6.00–8.16)	(4.80–6.08)	(2.96–3.92)	(2.36–3.84)
Dichelops (*Dichelops*) *leucostigmus*	1.78 ± 0.03	1.15 ± 0.01	0.79 ± 0.01	0.34 ± 0.01	0.70 ± 0.01	1.98 ± 0.04	6.11 ± 0.11	4.94 ± 0.05	3.15 ± 0.03	3.14 ± 0.04
	(1.58–2.19)	(1.08–1.23)	(0.73–0.89)	(0.23–0.46)	(0.65–0.77)	(1.77–2.46)	(5.38–6.92)	(4.65–5.31)	(2.88–3.46)	(2.81–3.54)
Dichelops (*Diceraeus*) *lobatus*	1.94 ± 0.05	1.35 ± 0.03	0.71 ± 0.01	0.26 ± 0.02	0.85 ± 0.02	2.04 ± 0.04	5.66 ± 0.20	5.22 ± 0.13	3.30 ± 0.08	3.14 ± 0.08
	(1.85–2.08)	(1.27–1.42)	(0.69–0.73)	(0.23–0.31)	(0.81–0.88)	(1.92–2.12)	(5.08–6.00)	(4.85–5.42)	(3.12–3.46)	(2.92–3.27)
Dichelops (*Diceraeus*) *melacanthus*	1.88 ± 0.02	1.27 ± 0.01	0.65 ± 0.01	0.43 ± 0.01	0.83 ± 0.01	1.94 ± 0.03	6.63 ± 0.12	5.05 ± 0.07	3.25 ± 0.05	2.97 ± 0.05
	(1.68–2.08)	(1.16–1.36)	(0.60–0.72)	(0.32–0.52)	(0.72–0.92)	(1.64–2.15)	(5.77–7.60)	(4.60–5.44)	(2.84–3.50)	(2.52–3.35)
Dichelops (*Dichelops*) *miriamae*	1.81 ± 0.02	1.20 ± 0.02	0.81 ± 0.02	0.37 ± 0.02	0.79 ± 0.02	2.08 ± 0.05	6.03 ± 0.11	4.84 ± 0.07	3.18 ± 0.05	3.41 ± 0.06
	(1.73–1.92)	(1.15–1.27)	(0.73–0.89)	(0.27–0.46)	(0.69–0.88)	(1.92–2.31)	(5.69–6.54)	(4.42–5.08)	(2.96–3.38)	(3.23–3.65)

Dichelops (*Dichelops*) *nigrum*	1.91 ± 0.03	1.19 ± 0.01	0.90 ± 0.02	0.35 ± 0.02	0.77 ± 0.01	2.28 ± 0.04	7.34 ± 0.13	5.73 ± 0.08	3.60 ± 0.04	3.74 ± 0.05
	(1.73–2.16)	(1.15–1.31)	(0.81–1.04)	(0.24–0.44)	(0.69–0.85)	(1.92–2.64)	(5.77–8.08)	(4.92–6.23)	(3.27–3.92)	(3.35–4.04)
Dichelops (*Dichelops*) *peruanus*	1.75 ± 0.04	1.20 ± 0.01	0.78 ± 0.02	0.25 ± 0.01	0.72 ± 0.01	2.04 ± 0.04	6.17 ± 0.08	5.11 ± 0.07	3.23 ± 0.03	3.28 ± 0.03
	(1.58–1.92)	(1.15–1.27)	(0.65–0.85)	(0.23–0.31)	(0.65–0.77)	(1.65–2.19)	(5.77–6.54)	(4.77–5.54)	(3.08–3.46)	(3.12–3.42)
Dichelops (*Diceraeus*) *phoenix*	2.13 ± 0.04	1.38 ± 0.02	0.69 ± 0.03	0.46 ± 0.02	0.82 ± 0.02	2.12 ± 0.03	7.08 ± 0.15	5.57 ± 0.09	3.62 ± 0.06	3.46 ± 0.06
	(1.92–2.35)	(1.27–1.46)	(0.46–0.77)	(0.38–0.54)	(0.73–0.88)	(2.00–2.31)	(6.54–7.85)	(5.23–6.00)	(3.23–3.83)	(3.23–3.75)
Dichelops (*Dichelops*) *pradoi*	2.01 ± 0.03	1.30 ± 0.05	0.85 ± 0.09	0.20 ± 0.02	0.80 ± 0.05	2.34 ± 0.18	6.45 ± 0.35	5.56 ± 0.21	3.70 ± 0.27	3.99 ± 0.23
	(1.96–2.08)	(1.19–1.42)	(0.58–0.96)	(0.13–0.23)	(0.67–0.92)	(1.83–2.58)	(5.42–6.92)	(4.92–5.77)	(3.00–4.27)	(3.50–4.58)
Dichelops (*Dichelops*) *punctatus*	2.07 ± 0.06	1.25 ± 0.02	0.84 ± 0.05	0.26 ± 0.04	0.72 ± 0.02	2.16 ± 0.07	7.20 ± 0.10	5.47 ± 0.09	3.42 ± 0.07	3.49 ± 0.06
	(1.92–2.27)	(1.19–1.33)	(0.75–1.00)	(0.17–0.38)	(0.65–0.77)	(1.92–2.31)	(6.83–7.35)	(5.17–5.69)	(3.17–3.58)	(3.33–3.69)
Dichelops (*Dichelops*) *saltensis*	1.66 ± 0.05	1.09 ± 0.01	0.82 ± 0.02	0.21 ± 0.01	0.75 ± 0.01	1.89 ± 0.03	4.96 ± 0.05	4.69 ± 0.05	2.94 ± 0.02	3.10 ± 0.03
	(0.84–1.84)	(1.04–1.16)	(0.69–0.96)	(0.15–0.24)	(0.68–0.84)	(1.64–2.08)	(4.62–5.36)	(4.15–5.08)	(2.76–3.08)	(2.96–3.44)
Dolycoris baccarum	2.04 ± 0.18	1.64 ± 0.02	0.85 ± 0.02	0.13 ± 0.01	0.99 ± 0.02	2.11 ± 0.03	6.22 ± 0.13	5.94 ± 0.12	3.74 ± 0.07	4.31 ± 0.08
	(1.19–2.38)	(1.58–1.73)	(0.73–0.89)	(0.12–0.15)	(0.92–1.08)	(2.00–2.19)	(5.77–6.65)	(5.58–6.35)	(3.46–3.92)	(4.04–4.54)
Euschistus (*Mitripus*) *acutus*	1.65 ± 0.02	0.86 ± 0.01	0.77 ± 0.01	0.05	0.54 ± 0.02	1.69 ± 0.03	6.17 ± 0.10	4.97 ± 0.06	3.04 ± 0.04	2.76 ± 0.04
	(1.48–1.81)	(0.81–0.95)	(0.67–0.86)	(0.02–0.10)	(0.48–0.81)	(1.52–1.90)	(5.48–6.90)	(4.48–5.48)	(2.71–3.38)	(2.48–3.10)
Euschistus (*Euschistus*) *emoorei*	2.23 ± 0.01	1.32 ± 0.02	0.82 ± 0.03	–	0.92 ± 0.01	2.10 ± 0.02	6.20 ± 0.05	5.54 ± 0.03	3.47 ± 0.02	3.75 ± 0.03
	(2.17–2.33)	(1.00–1.42)	(0.75–1.25)		(0.83–1.00)	(1.92–2.25)	(5.83–6.58)	(5.33–5.75)	(3.25–3.67)	(3.58–3.96)
Euschistus (*Mitripus*) *grandis*	2.13 ± 0.04	1.36 ± 0.01	0.86 ± 0.01	0.12 ± 0.01	0.78 ± 0.01	2.27 ± 0.03	8.84 ± 0.14	6.71 ± 0.07	4.09 ± 0.05	3.97 ± 0.04
	(1.88–2.82)	(1.29–1.47)	(0.77–0.94)	(0.06–0.24)	(0.65–0.88)	(2.06–2.65)	(7.76–9.88)	(6.12–7.29)	(3.76–4.59)	(3.65–4.35)
Euschistus (*Euschistus*) *heros*	2.38 ± 0.02	1.35 ± 0.02	0.82 ± 0.02	–	0.89 ± 0.01	2.29 ± 0.03	8.48 ± 0.09	6.35 ± 0.06	3.98 ± 0.05	4.14 ± 0.05
	(2.17–2.67)	(1.25–1.50)	(0.67–0.92)		(0.75–1.00)	(2.08–2.50)	(7.83–9.42)	(5.83–6.92)	(3.58–4.42)	(3.75–4.58)
Euschistus (*Lycipta*) *sharpi*	2.36 ± 0.07	1.45 ± 0.01	0.95 ± 0.02	–	0.83 ± 0.01	2.49 ± 0.04	6.78 ± 0.08	6.46 ± 0.08	4.17 ± 0.06	4.34 ± 0.06
	(1.29–2.58)	(1.35–1.53)	(0.77–1.00)		(0.75–0.92)	(2.12–2.67)	(6.12–7.17)	(5.71–6.83)	(3.76–4.50)	(3.94–4.67)
Euschistus (*Lycipta*) *triangulator*	2.08 ± 0.03	1.17 ± 0.02	0.78 ± 0.01	–	0.69 ± 0.01	1.93 ± 0.03	7.23 ± 0.11	5.33 ± 0.06	3.43 ± 0.04	3.39 ± 0.04
	(1.88–2.18)	(1.12–1.29)	(0.70–0.88)		(0.65–0.76)	(1.76–2.12)	(6.24–7.65)	(5.06–5.71)	(3.24–3.71)	(3.18–3.59)
Euschistus (*Euschistus*) *variolarius*	2.44 ± 0.02	1.61 ± 0.02	0.87 ± 0.01	–	1.01 ± 0.01	2.33 ± 0.05	7.91 ± 0.13	6.81 ± 0.10	4.18 ± 0.08	4.7 ± 0.09
	(2.42–2.58)	(1.58–1.67)	(0.83–0.92)		(0.96–1.08)	(2.17–2.58)	(7.42–8.25)	(6.50–7.17)	(3.92–4.50)	(4.25–5.00)
Galedanta bituberculata	2.94 ± 0.04	2.22 ± 0.03	1.38 ± 0.03	0.27 ± 0.03	1.63 ± 0.03	3.69 ± 0.04	10.86 ± 0.15	9.02 ± 0.11	5.86 ± 0.08	6.30 ± 0.10
	(2.69–3.31)	(2.00–2.45)	(1.27–1.77)	(0.09–0.50)	(1.46–1.96)	(3.38–3.91)	(9.62–12.27)	(8.08–9.73)	(5.45–6.55)	(5.50–6.91)
Glyphepomis adroguensis	1.45 ± 0.07	0.88 ± 0.02	0.64 ± 0.01	–	0.56 ± 0.01	1.42 ± 0.02	3.83 ± 0.05	3.60 ± 0.05	2.34 ± 0.03	2.40 ± 0.04
	(0.74–1.79)	(0.74–1.00)	(0.59–0.76)		(0.50–0.62)	(1.29–1.59)	(3.53–4.24)	(3.24–3.97)	(2.06–2.65)	(2.12–2.71)
Glyphepomis setigera	1.37 ± 0.01	0.75 ± 0.01	0.60 ± 0.01	–	0.69 ± 0.16	1.28 ± 0.02	3.35 ± 0.04	3.11 ± 0.04	1.98 ± 0.02	2.09 ± 0.03
	(1.24–1.44)	(0.68–0.79)	(0.56–0.65)		(0.47–3.18)	(1.18–1.38)	(3.15–3.59)	(2.94–3.38)	(1.79–2.18)	(1.91–2.35)
Hymenarcis nervosa	1.82 ± 0.03	1.38 ± 0.03	0.83 ± 0.03	–	0.59 ± 0.02	2.36 ± 0.07	5.48 ± 0.11	5.37 ± 0.10	3.43 ± 0.08	3.52 ± 0.11
	(1.73–1.92)	(1.27–1.50)	(0.77–0.96)		(0.54–0.65)	(2.23–2.62)	(5.15–5.85)	(5.08–5.73)	(3.23–3.73)	(3.31–3.96)
Hypatropis inermis	1.49 ± 0.02	1.16 ± 0.02	0.67 ± 0.01	–	0.69 ± 0.04	1.83 ± 0.04	4.37 ± 0.06	4.28 ± 0.06	2.77 ± 0.04	3.06 ± 0.04
	(1.35–1.65)	(1.08–1.35)	(0.61–0.73)		(0.50–0.92)	(1.62–2.19)	(4.12–4.81)	(3.96–4.69)	(2.58–3.19)	(2.81–3.31)
Hypatropis sternalis	1.48 ± 0.02	1.17 ± 0.03	0.67 ± 0.02	0.23 ± 0.01	0.60 ± 0.01	1.78 ± 0.02	4.14 ± 0.07	3.92 ± 0.08	2.48 ± 0.03	3.23 ± 0.06
	(1.42–1.50)	(1.08–1.23)	(0.62–0.70)	(0.19–0.27)	(0.58–0.62)	(1.69–1.81)	(3.92–4.31)	(3.65–4.12)	(2.38–2.54)	(3.08–3.38)
Ladeaschistus armipes	2.07 ± 0.03	1.24 ± 0.01	0.92 ± 0.02	–	0.83 ± 0.02	2.15 ± 0.03	6.56 ± 0.09	6.29 ± 0.09	3.95 ± 0.06	3.62 ± 0.06
	(1.94–2.24)	(1.18–1.29)	(0.82–1.00)		(0.71–1.06)	(2.00–2.35)	(5.88–6.94)	(5.59–6.71)	(3.53–4.29)	(3.24–3.88)
Ladeaschistus bilobus	1.76 ± 0.02	0.99 ± 0.02	0.82 ± 0.01	0.03	0.65 ± 0.01	1.72 ± 0.03	5.71 ± 0.11	5.07 ± 0.07	3.15 ± 0.04	2.91 ± 0.05
	(1.62–2.00)	(0.86–1.14)	(0.76–0.90)	(0.010.05)	(0.57–0.76)	(1.43–1.90)	(5.14–6.95)	(4.52–5.71)	(2.90–3.52)	(2.62–3.33)
Mecocephala acuminata	3.00 ± 0.09	1.45 ± 0.04	0.83	–	0.82 ± 0.03	2.45 ± 0.09	5.82 ± 0.20	5.59 ± 0.16	3.59 ± 0.12	4.43 ± 0.24
	(2.88–3.18)	(1.41–1.53)	(0.82–0.83)		(0.76–0.88)	(2.29–2.59)	(5.47–6.18)	(5.29–5.82)	(3.35–3.76)	(4.06–4.88)
Menecles insertus	2.47 ± 0.03	1.62 ± 0.09	0.86 ± 0.09	–	0.97 ± 0.04	2.50 ± 0.06	6.46 ± 0.13	6.24 ± 0.12	4.08 ± 0.08	4.55 ± 0.08
	(2.35–2.59)	(1.41–2.12)	(0.35–1.00)		(0.82–1.12)	(2.24–2.65)	(5.94–6.82)	(5.71–6.59)	(3.71–4.35)	(4.12–4.76)

Mormidea cornicollis	1.85 ± 0.02 (1.72–1.96)	1.22 ± 0.02 (1.08–1.36)	0.79 ± 0.01 (0.68–0.88)	–	0.56 ± 0.01 (0.44–0.65)	1.71 ± 0.03 (1.52–1.96)	6.00 ± 0.14 (5.04–6.80)	4.65 ± 0.06 (4.08–5.12)	3.01 ± 0.04 (2.72–3.36)	3.09 ± 0.05 (2.76–3.40)
Mormidea maculata	1.54 ± 0.01 (1.40–1.64)	0.97 ± 0.01 (0.88–1.00)	0.75 ± 0.01 (0.68–0.84)	–	0.45 ± 0.01 (0.40–0.48)	1.46 ± 0.02 (1.20–1.60)	4.65 ± 0.10 (3.60–5.20)	3.83 ± 0.05 (3.28–4.36)	2.42 ± 0.03 (2.12–2.60)	2.69 ± 0.04 (2.28–3.00)
Mormidea ypsilon	1.59 ± 0.02 (1.40–1.76)	1.06 ± 0.04 (0.92–1.76)	0.63 ± 0.13 (1.76–0.84)	–	0.44 ± 0.01 (0.40–0.48)	1.44 ± 0.03 (1.20–1.68)	4.74 ± 0.08 (4.04–5.52)	3.88 ± 0.06 (3.20–4.40)	2.52 ± 0.05 (2.08–2.96)	2.85 ± 0.05 (2.40–3.28)
Oenopiella punctaria	1.61 ± 0.03 (1.38–1.82)	1.32 ± 0.02 (1.19–1.42)	0.73 ± 0.01 (0.59–0.81)	–	–	1.84 ± 0.01 (1.70–1.94)	4.74 ± 0.04 (4.43–5.14)	4.56 ± 0.04 (4.24–4.86)	2.94 ± 0.03 (2.71–3.12)	3.17 ± 0.03 (2.94–3.38)
Oenopiella unidentata	1.67 ± 0.02 (1.55–1.89)	1.30 ± 0.01 (1.21–1.38)	0.65 ± 0.01 (0.52–0.75)	–	–	1.75 ± 0.03 (1.56–1.97)	4.31 ± 0.06 (3.90–4.86)	4.17 ± 0.07 (3.71–4.62)	2.71 ± 0.04 (2.41–3.03)	2.93 ± 0.05 (2.65–3.38)
Padaeus trivitatus	2.17 ± 0.03 (2.08–2.23)	1.19 ± 0.02 (1.15–1.23)	0.87 ± 0.02 (0.85–0.93)	–	0.83 ± 0.01 (0.81–0.85)	2.11 ± 0.05 (2.00–2.23)	6.69 ± 0.09 (6.38–6.92)	5.96 ± 0.14 (5.58–6.35)	3.63 ± 0.06 (3.46–3.85)	4.11 ± 0.10 (3.88–4.46)
Padaeus viduus	2.19 ± 0.03 (2.15–2.23)	1.19 ± 0.03 (1.15–1.23)	0.83 ± 0.08 (0.73–0.93)	–	0.83 ± 0.02 (0.81–0.85)	2.28 ± 0.11 (2.08–2.46)	6.76 ± 0.20 (6.42–7.12)	5.68 ± 0.24 (5.38–6.15)	3.53 ± 0.17 (3.27–3.85)	3.96 ± 0.12 (3.81–4.19)
Pedinonotus catarinensis	1.71 ± 0.02 (1.57–1.86)	1.11 ± 0.01 (1.00–1.14)	0.74 ± 0.01 (0.66–0.81)	0.11 ± 0.01 (0.05–0.19)	0.58 ± 0.01 (0.48–0.67)	1.90 ± 0.03 (1.76–2.05)	4.47 ± 0.05 (4.14–4.71)	4.29 ± 0.05 (3.95–4.57)	2.72 ± 0.04 (2.43–2.86)	3.14 ± 0.04 (2.81–3.48)
Prionosoma podopioides	1.91 ± 0.14 (1.23–2.15)	1.39 ± 0.04 (1.27–1.50)	0.58 ± 0.02 (0.54–0.65)	0.10 ± 0.02 (0.04–0.15)	0.95 ± 0.01 (0.92–1.00)	2.01 ± 0.04 (1.85–2.15)	5.69 ± 0.13 (5.31–6.15)	5.04 ± 0.10 (4.73–5.42)	3.21 ± 0.08 (2.96–3.42)	3.86 ± 0.14 (3.54–4.50)
Proxys albopunctulatus	2.47 ± 0.02 (2.31–2.58)	0.92 ± 0.01 (0.81–0.96)	0.82 ± 0.01 (0.77–0.89)	–	0.61 ± 0.01 (0.50–0.73)	2.16 ± 0.04 (1.69–2.38)	7.76 ± 0.14 (6.73–9.23)	4.98 ± 0.07 (4.19–5.46)	3.10 ± 0.05 (2.54–3.35)	3.41 ± 0.06 (2.46–3.73)
Proxys victor	2.50 ± 0.03 (2.27–2.69)	0.87 ± 0.01 (0.81–0.92)	0.85 ± 0.02 (0.74–0.96)	–	0.58 ± 0.01 (0.54–0.62)	2.15 ± 0.04 (1.77–2.46)	7.96 ± 0.13 (7.15–8.85)	4.87 ± 0.06 (4.54–5.38)	3.03 ± 0.05 (2.65–3.46)	3.44 ± 0.04 (3.15–3.77)
Spinalanx monstrabilis	2.29 ± 0.04 (2.24–2.33)	1.33	0.89 ± 0.03 (0.86–0.91)	–	0.91 ± 0.05 (0.86–0.95)	1.9	5.79 ± 0.02 (5.76–5.81)	5.26 ± 0.07 (5.19–5.33)	3.43 ± 0.10 (3.33–3.52)	3.29 ± 0.15 (3.14–3.43)
Spinalanx rolstoni	2.47 ± 0.05 (2.38–2.52)	1.51 ± 0.01 (1.48–1.52)	1.02 ± 0.02 (1.00–1.05)	–	0.97 ± 0.02 (0.95–1.00)	1.97 ± 0.03 (1.90–2.00)	6.21 ± 0.08 (6.05–6.33)	5.41 ± 0.07 (5.29–5.52)	3.62 ± 0.08 (3.48–3.76)	3.63 ± 0.07 (3.52–3.76)
Tibraca limbativentris	2.89 ± 0.03 (2.59–3.12)	1.51 ± 0.02 (1.35–1.71)	0.94 ± 0.01 (0.88–1.00)	–	0.86 ± 0.02 (0.76–1.00)	2.67 ± 0.05 (2.29–3.12)	7.21 ± 0.10 (6.35–8.12)	6.64 ± 0.09 (5.82–7.35)	4.40 ± 0.06 (3.88–4.88)	4.88 ± 0.07 (4.29–5.35)
Tibraca simillima	2.81 ± 0.02 (2.59–2.94)	1.54 ± 0.01 (1.47–1.65)	0.95 ± 0.01 (0.88–1.17)	–	0.93 ± 0.01 (0.88–1.00)	2.66 ± 0.03 (2.47–2.88)	6.77 ± 0.04 (6.35–7.00)	6.39 ± 0.05 (6.00–6.76)	4.19 ± 0.04 (3.82–4.41)	4.54 ± 0.06 (4.12–4.88)

HD, head length; IOD, interocular distance; EW, eyes width; LMP, length of mandibular plates ahead of clypeus; IOC, interocellar distance; PL, pronotum lenght; PWH, pronotum width at humeral angles; PWM, pronotum width at distal margin; SWB, scutellum width at basal margin; SL, scutellum length.

Table S3. Comparison of analyses consensuses. Values above diagonal correspond to Similitud Index and below diagonal, to Robinson-Foulds distances.

	A	B	C	D	E	Ac	Bc	Cc	Dc	Ec
A	-	0.994485	0.963768	0.955908	0.401934	0.967985	0.965328	0.949821	0.949821	0.473438
B	0.004784	-	0.963415	0.955857	0.395442	0.96745	0.97193	0.953448	0.953448	0.468278
C	0.10179	0.099116	-	0.98325	0.385942	0.957219	0.958478	0.982993	0.982993	0.447761
D	0.139401	0.135754	0.050483	-	0.39922	0.949653	0.951096	0.968491	0.968491	0.456934
E	0.842857	0.846957	0.846957	0.846957	-	0.379263	0.376	0.377632	0.377632	0.872922
Ac	0.080593	0.080708	0.117547	0.15434	0.844248	-	0.996409	0.975309	0.975309	0.466872
Bc	0.082686	0.075887	0.114246	0.150405	0.846957	0.003489	-	0.976027	0.976027	0.463964
Cc	0.123763	0.118057	0.046454	0.087598	0.846957	0.070277	0.067792	-	1	0.464497
Dc	0.123763	0.118057	0.046454	0.087598	0.846957	0.070277	0.067792	0	-	0.464497
Ec	0.825054	0.829657	0.829657	0.829657	0.267491	0.80233	0.805798	0.805798	0.805798	-

Fig. S1. Cladogram resultant of Analysis E (continuous characters only, implied weights). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. F: 0.68842; CI: 0.455; RI: 0.786.

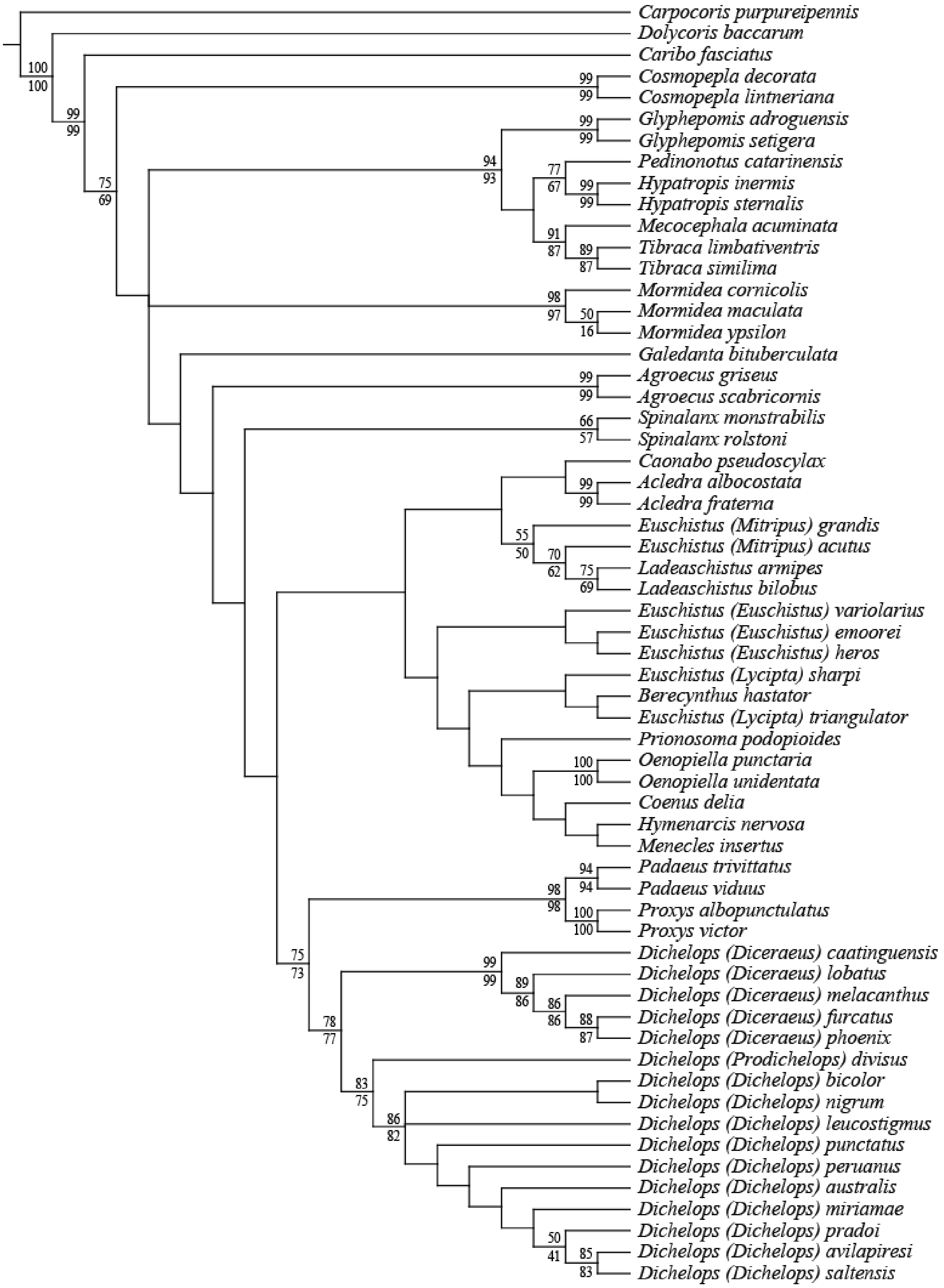

Fig. S2. Strict consensus of four equally parsimonious cladograms resultant of Analysis Ac (discrete characters only, equal weights, forcing *Dichelops* monophyly). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. S: 884; CI: 0.192; RI: 0.621.

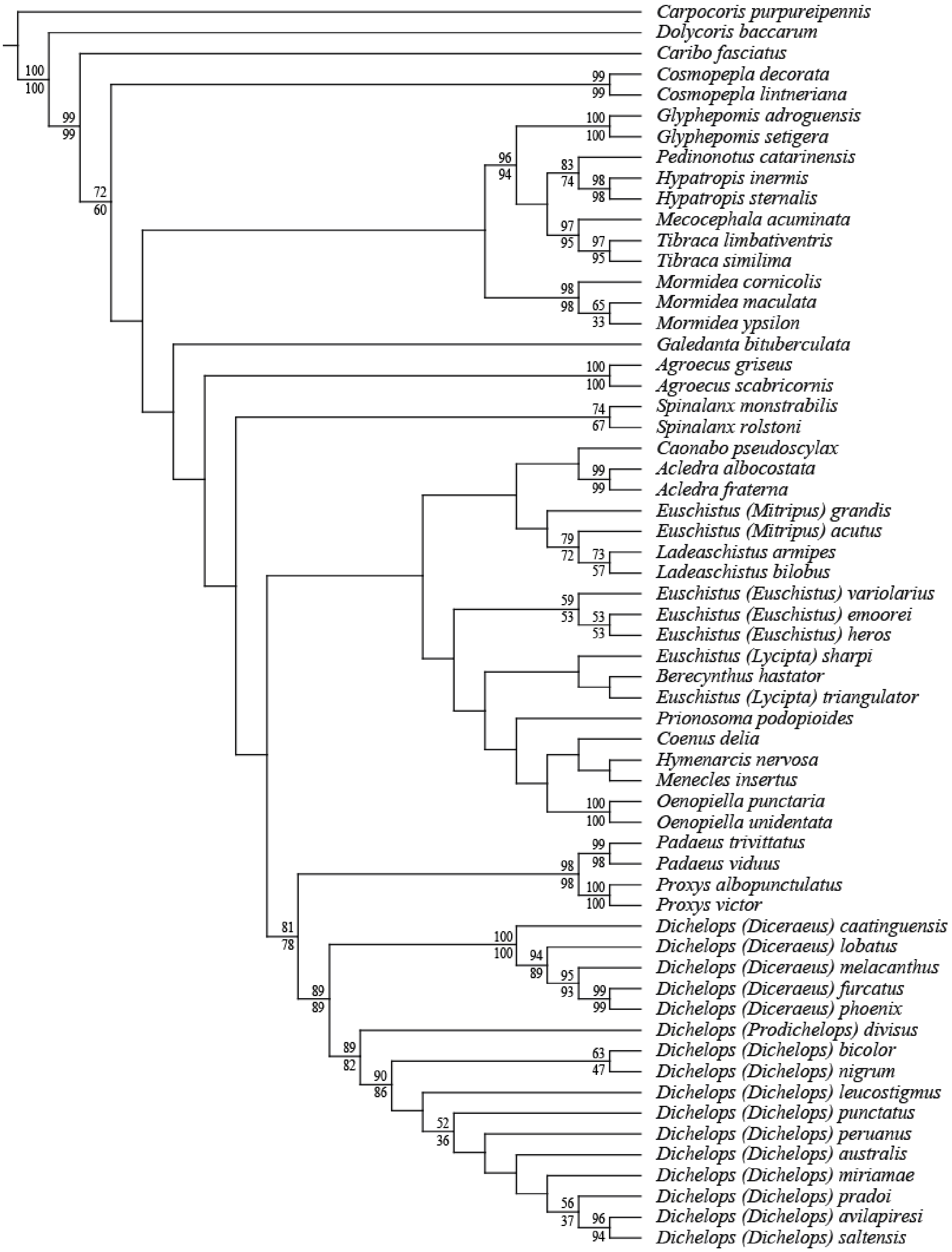

Fig. S3. Cladogram resultant of Analysis Bc (continuous characters only, equal weights, forcing *Dichelops* monophyly). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. S: 924.603; CI: 0.194; RI: 0.615.

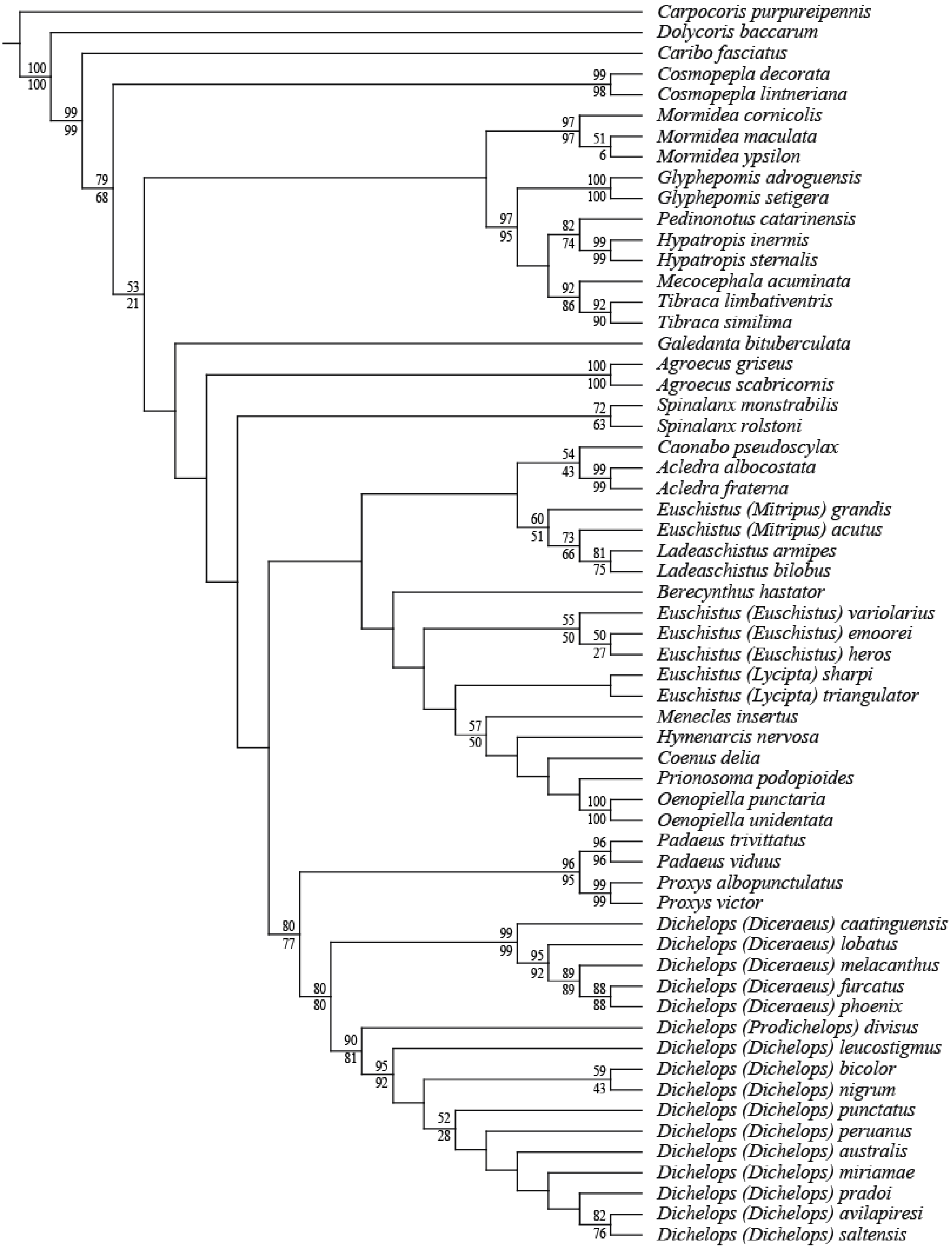

Fig. S4. Cladogram resultant of Analysis Cc (continuous + discrete characters, implied weights, forcing *Dichelops* monophyly). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. F: 33.93576; CI: 0.193; RI: 0.615.

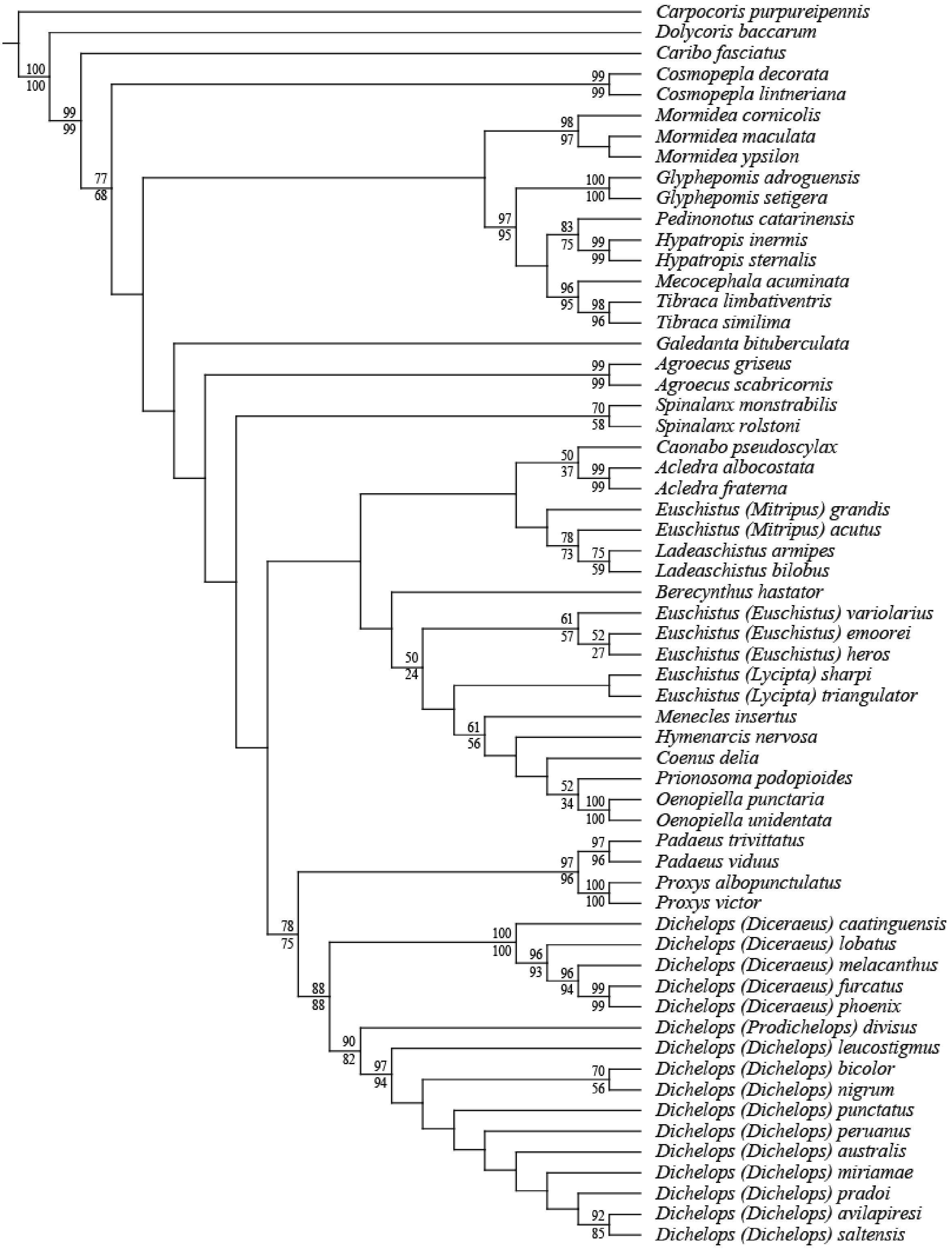

Fig. S5. Cladogram resultant of Analysis Dc (continuous + discrete characters, implied weights, forcing *Dichelops* monophyly). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. F: 34.07655; CI: 0.191; RI: 0.617.

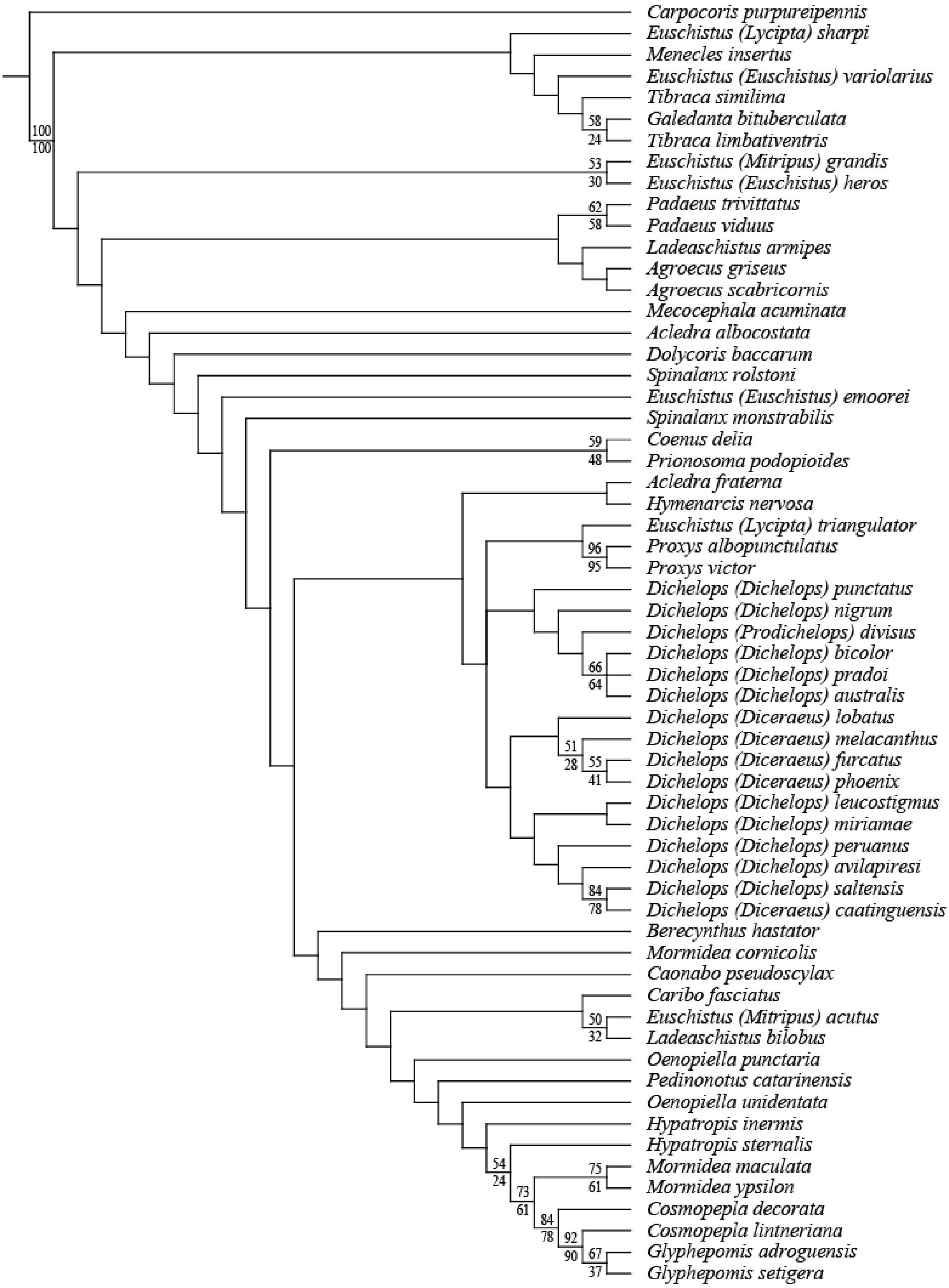

Fig. S6. Cladogram resultant of Analysis Ec (continuous characters only, implied weights, forcing *Dichelops* monophyly). Values above and below branches represent jackknife absolute frequencies and GC values, respectively. F: 0.78547; CI: 0.42; RI: 0.753.

ANEXO I

NORMAS PARA PUBLICAÇÃO:

ANNALS OF THE ENTOMOLOGICAL SOCIETY OF AMERICA

Disponível em: http://www.entsoc.org/pubs/publish/style

ESA Style Guide

Find everything you need to know about writing and formatting your manuscript for Annals of the ESA, Environmental Entomology, Journal of Economic Entomology, Journal of Insect Science, Journal of Medical Entomology, and American Entomologist.

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Order of Elements

Order of elements are as follows: title page; Abstract and key words; introduction (no heading); Materials and Methods; Results; and Discussion (or Results and Discussion); Acknowledgments; References Cited; footnotes; tables; figure legends; and figures.

The introduction should clearly state the basis of your study along with the background of the problem and a statement of purpose. The Materials and Methods section should include a clear and concise description of the study design, experimental execution, materials, and method of statistical analysis. Results should be clearly differentiated from the interpretation of your findings in the Results section or within the Results and Discussion. Cite tables and figures in numerical order as they should appear in the text. Include suggestions for direction of future studies, if appropriate.

Title Page

The title page should include the name, complete address, phone number, fax number, and e-mail address of corresponding author.

Include a running head of <65 characters, including author names. Example: Smith and Jones: Biological Control of C. capitata (no period). For more than two authors, use the senior author's name followed by et al. Example: Smith et al.: Biological Control of C. capitata (no period).

Include the section of the journal.

The title should be concise and informative. Include either the ESA approved common name or the scientific name, but not both of the subject. Common names used in the title must be listed in the ESA Common Names of Insects & Related Organisms. Do not include authors of scientific names in the title. Do not capitalize the following words in the title or subheadings: a, an, and, as, at, be, by, for, in, of, on, per, to, the. Insert (Order: Family) immediately after the name of the organism.

Affiliation line includes a complete address. If appropriate, designate current addresses for all authors by numbered footnotes (superscripted numbers) placed at the bottom of the title page. Example:

1Department of Entomology, University of Colorado, 345 East 7th Street, Denver, CO 78095.

Include all authors' names below the title. Footnote numbers are placed outside commas in multi-authored articles.

Abstract and Key Words

Abstract. On a separate page, provide an abstract of fewer than 250 words. Give scientific name and authority at first mention of the subject organism. Do not cite references, figures, tables, probability levels, or results. Refer to results only in the general sense.

Keywords. Place three to five key words, separated by commas, on a line below the abstract. Use only singular words/noun. Spell out scientific names (e.g., spell out Aedes albopictus instead of Ae. albopictus). Do not combine different subjects as one key word (e.g., "pesticides and grass," should be two separate keywords, "pesticide, grass." Do not use scientific names and common name at the same time as one key word [e.g., use "coffee, Coffea Arabica" (as 2 key words) instead of coffee (Coffea Arabica).

Optional foreign language abstract: All articles will have an English abstract. However, to encourage international communication, authors may include a second abstract in a language other than English. (Spanish, French, German, Russian, Portuguese, Chinese, or Japanese are accepted.) It is the author's responsibility to provide an accurate, and grammatically correct non-English version. Do not repeat the keywords.

Methods and Results

Heading Levels

First-level headings are centered and boldfaced on their own line. Initial capital letters. Used to divide the manuscript into major sections (e.g., Materials and Methods, Results).

Second-level headings are flush left, boldface, and are also on their own line with initial capital letters. Second-level headings are rarely used except in taxonomic articles where multilevels of headings may be necessary.)

Third-level headings are boldfaced, paragraph indented, have initial capital letters, and are followed by a period. Third-level headings are used to divide first-level sections into smaller sections.

Fourth-level headings are italicized (but not boldfaced), paragraph indented, have initial capital letters, follow immediately after a third-level heading or start a new paragraph, and are followed by a period. Fourth-level headings are used to divide third-level sections into smaller sections.

In-text Citation

Single Author

(Smith 1993)

Two Authors

(Smith and Jones 1993)

Multiple Citations

(Smith 1996, Smith et al. 1997, Jones 1998)

Multiple Publications by Same Author(s)

(Smith et al. 1995a, 1995b, 1997; Jones 1996)

Personal Communications

(Jones 1988; L. J. Smith, personal communication). Obtain and forward (at submission) a letter of permission to use citations to personal communications (from those other than authors).

Unpublished Data

(L.J.S., unpublished data) for one author or (unpublished data) for all authors. Obtain and forward (at submission) a letter of permission to use citations to unpublished data (from those other than authors).

In Press

(Smith 1997) for in press, cite projected year of publication.

Software

(PROC GLM, SAS Institute 1999) for software user's manual.

Manufacturers

In parentheses, provide manufacturer's name and location (city, state) and model number of relevant materials and equipment. Example: (Model 3000, LI-COR, Lincoln, NE). Use generic names when possible (e.g., self-sealing plastic bags).

Reporting Requirements for Statistical Tests

All data reported (except for descriptive biology) must be subjected to statistical analysis. Descriptive biology should include information such as sample sizes and number of replications. Authors are responsible for the statistical method selected and for the accuracy of their data. Authors should be able to justify the use of a particular statistical test when requested by an editor. Results of statistical tests may be presented in the text, in tables, and in figures. Statistical methods should be described in Materials and Methods with appropriate references. Experimental designs should also be described fully in Materials and Methods. Descriptions should include information such as sample sizes and number of replications. See specific section in this style guide for suggestions on formatting statistical results. Only t-tests and analyses of variance require no citation. Cite the computer program user's manual in the References Cited.

Probit/logit

When presenting results of probit/logit analysis, these columns should be included in tables (in this order, left to right); n, slope + SE, LD (or LC) (95% CL), and chi-square. When a ratio of one LD versus another is given, it should be given with its 95% CI.

Statistical tests to show what model best fits data intended to estimate the 99.9986% level of effectiveness should be presented to justify use of any model, including the probit model. Thus, we do not recommend use of the Probit 9 without tests to show that the probit model fits the data.

Analysis of Variance or t-test

When presenting the results of analysis of variance or a t-test, specify F (or t) values, degrees of freedom, and P values. This information may be placed in parentheses in the text. Example: ($F = 9.26$; df = 4, 26; $P < 0.001$). If readability of the text is affected by the presence of repeated parenthetical statistical statements, place them in a table.

Regression

In regressions, specify the model, define all variables, and provide estimates of variances for parameters and the residual mean-square error. Italicize variables in equations and text.

Variance and sample size

Include an estimate of the variance and sample size for each mean regardless of the method chosen for unplanned multiple comparisons. The use of Duncan's Multiple Range Test (DMRT) is not acceptable as a mean separation test as it is no longer commonly accepted as a method for post hoc mean separation anlysis.

Model Analysis

At the beginning of the manuscript, authors should state clearly the goals of their model construction and analysis. Evaluation by reviewers depends upon these goals and the type of model. Authors should attempt to describe the main conclusions, limitations, and sensitivity of results to assumptions. For stochastic models, describe the variability in the results.

Modeling Guidelines

The following guidelines pertain to any mathematical model calculated for purposes other than statistical analysis. Authors must adequately describe both model structure and model analysis. Authors must explain and justify original equations and computer programs or justify the selection of a published software package used in the computation of models. Model structure and steps in the analysis must be described in the Materials and Methods section. Without presenting extensive computer code, the text must permit an understanding of the model that would allow most mathematically inclined scientists to duplicate the work. Present all equations that represent the biology of the system being modeled. Unless their derivation is self-evident, show how the equations were derived and mention the underlying assumptions. Express how the equations are solved over time and space. Provide references for standard techniques (e.g., matrix manipulation, integration). Define all variables and parameters in each equation and describe their units (e.g., time, space, and mass). In the Materials and Methods or Results section, present the range of parameter values included in the model, and describe the uncertainty in or range of validity of these values.

Equations

Consult Mathematics into Type for correct formatting of equations and mathematical variables. Italicize all mathematical variables. Center more complex equations on a separate line.

$R = A\ \mathrm{barrtype} + \ B\mathrm{log}\ 10\ (f) \qquad (2)$

Validation or the Testing of Model Results

Authors must state why the model did not require testing (e.g., theoretical study), why it cannot be tested (e.g., lack of data), or how it was tested. Data used for testing must be independent of data used to build or calibrate the model. Describe the data and procedures in Materials and Methods. Authors should be aware that the testing of models is an important step that should be a part of most studies.

Structure of Computer Code

For models solved or simulated by computers, mention the programming language and computer used. Describe the important numerical methods used in calculating the model (e.g., integration and random number generation). Mention how the program's logic and algorithms were tested and verified. When published software is computed, provide a reference and state which procedures were used. Discuss in any section of the manuscript the limitations of the published software. Original computer programs should be made available at the request of reviewers and readers.

Gene Sequencing

Inclusion of a GenBank/EMBL accession number for primary nucleotide and amino acid sequence data is a criterion for the acceptance of a manuscript for publication. Sequences from new species and new genes must indicate the proportion of the gene sequenced and should include data from both strands. The accession number may be included in the original manuscript or the sequence may be provided for review and an accession number provided when the manuscript is revised. A manuscript will not be accepted for publication until the accession number is provided.

GenBank may be contacted at their website at http://www.ncbi.nlm.nih.gov/Genbank/submit.html. The EMBL Data Library may be contacted at their website at http://www.ebi.ac.uk/embl/Submission/index.html.

Reporting Taxonomy

Follow the International Code of Zoological Nomenclature, 4th ed., for taxonomic style. Center the heading that indicates the name of the taxon in bold type. Center figure numbers in parentheses under the main heading; do not use bold type. Start all synonomies at the left margin with runovers indented. Include authors and date. References must appear in References Cited section. Use telegraphic style throughout descriptions.

For Journal of Medical Entomology Authors only: Please refer to the journal's Policy on Names of Aedine Mosquito Genera and Subgenera if writing about these insects.

Taxonomy Headings

Use only acceptable 3rd-level subheadings such as:

Male

Female

Material Examined

Type Material

Distribution

Etymology

Biology

Discussion

Avoid using Description as a subheading.

Dates

Use Roman numerals I through XII to designate month of collection. Use arabic numerals 00 through 99 to designate collection years in the 20th century. Do not abbreviate other years, including the 21st century. Express data in this format: day-month (use a Roman numeral)-year. Example: 2-V-97.

Locality Other than Principal Types

Start with the largest area followed by successively smaller areas separated by colons. Capitalize countries. Arrange data for each locality in the following order: count of specimens and sex or stage (as applicable), city or vicinity, date, collector, and depository. Example: MEXICO: Tamaulipas: 1 male, 1 female, Ciudad Mante, 15-III-97, K. Haack; 5 females, Ciudad Victoria, 3-VII-99, C. Hughes, MCZ. Arrange localities alphabetically. Use a semicolon to separate data for different localities. Define depositories in the Materials and Methods.

Type Material

Start description with the principal type in capital letters. Follow this immediately with count and sex of specimens (use male and female symbols if possible), then place additional data in the order of locality, date, additional data, and collector. Separate these items with commas. Example: HOLOTYPE: 1 male, Locust Grove, VA, 22-X-98, on Cercis canadensis, R. H. Foote. PARATYPES: 2 males, same data.

Voucher Specimens

Voucher specimens of arthropods serve as future reference for published names used in scientific publications. Although the deposition of voucher specimens is not required as a condition for publication, authors are encouraged to deposit specimens in an established, permanent collection and to note in the published article that the expected deposition has been made and its location. Authors should contact the curator of a voucher repository before deposition concerning the procedures required for curation to ensure that the collection will accept the voucher materials. The designation and proper labeling of voucher specimens is the author's responsibility. When available, at least three specimens should be deposited. Each specimen should have the following information provided at the time of deposition:

Standard label data that are required for the specimens collection (i.e., locality, date of collection, collector, host, ecological data, whether the specimen is from a laboratory collection, etc.).

An identification label that includes the identifier and date of identification.

A label that designates the specimen as "voucher."

Acknowledgments

Place the acknowledgments after the text. Organize acknowledgments in paragraph form in the following order: persons (omit all professional titles and degrees), groups, granting institutions, grant numbers, and serial publication number.

Human and Animal Use in Research and Testing

For research articles that involved the use of humans or animals, the Entomological Society of America requires that the following types of notification, as applicable, be included in the acknowledgement section of the article.

Humans. All human subjects work should reference approved Internal Review Board protocols or compliance with Health Insurance Portability and Accountability Act information policies for their organization, if the protocols are not available.

Animals. All studies should reference an approved Institutional Animal Care and Use Committee protocol or similar documents from their institutions. For trapping/collecting wild animals/birds, reference to collecting permits at the national or state level should be referenced.

Pathogens. Reference should be made to Biological Use Authorization approved by an institutional Environmental Health and Safety committee or similar body.

Sample notification: The collection and infection of wild birds with encephalitis viruses was done under Protocol 11184 approved by the Institutional Animal Care and Use Committee of the University of California, Davis, California Resident Scientific Collection Permit 801049-02 by the State of California Department of Fish and Game, and Federal Fish and Wildlife

Permit No. MB082812-0. Use of arboviruses was approved under Biological Use Authorization #0554 by Environmental Health and Safety of the University of California, Davis, and USDA Permit #47901.

Disclosure of Potential Conflicts of Interest

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References Cited: Alphabetical order (chronological for one author or more than two authors, and alphabetical order [by surname of second author] for two authors)

Journal Articles

Evans, M. A. 2000. Article title: subtitle (begin with lowercase after colon

or dash unless first word is a proper noun). J. Abbr. 00:000–000.

Evans, M. A. 2001a. Article title. J. Abbr. 00: 000–000.

Evans, M. A. 2001b. Article title.J. Abbr. 00: 000–000.

Evans, M. A., and R. Burns. 2001. Article title. J. Abbr. 00: 000–000.

Evans, M. A., and A. Tyler. 2001. Article title. J. Abbr. 00: 000–000.

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In Press

Evans, M. A. 2002. Article title. J. Econ. Entomol. (in press).

Books

Burns, R. 2001. Title (initial cap only): subtitle (no initial cap after colon). Publisher, city, state abbreviation or country.

Evans, M. A. 2001. Colorado potato beetle, 2nd ed. Publisher, city, state abbreviation or country.

Tyler, A. 2001. Western corn rootworm, vol. 2. Publisher, city, state abbreviation or country.

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Tyler, A. 2001. Article or chapter title, pp. 000–000. In T.A.J. Royer and R. B. Burns (eds.), Book title. Publisher, city, state abbreviation or country.

Tyler, A., R.S.T. Smith, and H. Brown. 2001. Onion thrips control, pp. 178–195. In R. S. Green and P. W. White (eds.), Book title, vol. 13. Entomological Society of America, Lanham, MD.

No Author Given

(USDA) U.S. Department of Agriculture. 2001. Title. USDA, Beltsville, MD.

(IRRI) International Rice Research Institute. 2001. Title. IRRI, City, State or Country.

Patents

Harred, J. F., A. R. Knight, and J. S. McIntyre, inventors; Dow Chemical Company, assignee. 1972 Apr 4. Epoxidation process. U.S. patent 3,654,317.

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Martin, P. D., J. Kuhlman, and S. Moore. 2001. Yield effects of European corn borer (Lepidoptera: Pyralidae) feeding, pp. 345–356.In Proceedings, 19th Illinois Cooperative Extension Service Spray School, 24–27 June 1985, Chicago, IL. Publisher, City, State.

Rossignol, P. A. 2001. Parasite modification of mosquito probing behavior, pp. 25–28. In T. W. Scott and J. Grumstrup-Scott (eds.), Proceedings, Symposium: the Role of Vector-Host Interactions in Disease Transmission. National Conference of the Entomological Society of America,10 December 1985, Hollywood, FL. Miscellaneous Publication 68. Entomological Society of America, Lanham, MD.

Theses/Dissertations

James, H. 2001. Thesis or dissertation title. M.S. thesis or Ph.D. dissertation, University of Pennsylvania, Philadelphia.

Software

SAS Institute. 2001. PROC user's manual, version 6th ed. SAS Institute, Cary, NC.

Online Citations

Reisen, W. 2001. Title. Complete URL (protocol://host.name/path/file.name) and/or DOI (Digital Object Identifier)

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Place tables after the References Cited section. Double-space and number all tables. Boldface table title. Do not repeat data already presented in text. If a table continues on more than one page, repeat column headings on subsequent page(s).

Title

Title should be short and descriptive. Boldface table number and title only. Include "means + SEM" in title if applicable. Do not footnote title; use the unlettered first footnote to include general information necessary to understand the table (e.g., define terms, abbreviations, and statistical tests).

Lines

Use horizontal lines to separate title from column headings, column headings from data field, and data field from footnotes. Do not use vertical lines to separate columns. All columns must have headings.

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Use approved abbreviations. Use abbreviations already defined in the text and define others in the general footnote. Use the following abbreviations in the body or column headings of tables only: amt (amount), avg (average), concn (concentration), diam (diameter), exp (experiment), ht (height), max (maximum), min. (minimum), no. (number), prepn (preparation), temp (temperature), vs (versus), vol (volume), wt (weight). Use the following abbreviations for months: Jan., Feb., Mar., April, May, June, July, Aug., Sept., Oct., Nov., and Dec.

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Repeat operational signs throughout data field. Insert a space on either side of sign (1.42 ± 1.36).

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Fig. 1. Relationship between percentage of defoliation of oak trees and gypsy moth population density. (A) Defoliation and egg mass density. (B) Defoliation of egg density.

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Supplemental Material may be submitted in the form of one or more (8 maximum) files to accompany the online version of an article. Such material often consists of large tables, data sets, or videos which normally are not possible or convenient to present in print media. Supplemental Material represents substantive information to be posted on the ESA journal website that enhances and enriches the information presented in the main body of a paper. However, the paper must stand on its own without the need for the reader to access the supplemental information to understand and judge the merits of the paper. Any files containing Supplemental Material must be provided at the time of manuscript submission, and will be distributed to reviewers as part of the normal peer-review process. Authors should alert the editor to the presence of Supplementary Material in their cover letter at submission. Once a paper is published, the content of accompanying Supplemental Material files cannot be altered. Although the content of any submitted Supplementary Material is subject to normal peer-review and any changes required by the editor, no copy editing will be performed by the journal's production staff. Therefore, the authors are responsible for suitable format and final appearance of Supplemental Material after acceptance of the paper.

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Scientific names and authorities must be spelled out (except for Fabricius and Linnaeus, which are abbreviated as F. and L., respectively) the first time a species is mentioned in the abstract and again in the main body of text.

Common Names

Use only those common names cited in the current ESA Common Names of Insects & Related Organisms online database, or those names approved by the ESA Common Names Committee. Do not use any other common name. Do not abbreviate common names (e.g., CPB for Colorado potato beetle).

Give scientific name and authority at first mention of each organism (including plants) in the abstract and again in the text.

Use of "Stadium," "Stage," and "Instar"

Manuscripts received for publication in ESA periodicals refer to arthropods and the periods of time in their development in various ways. These designations should be used consistently.

Stadium (Plural: Stadia): The period of time between two successive molts.

Stage: One of the successive principal divisions in the life cycle of an arthropod (e.g., egg, nymph, larva, prepupa, pupa, subimago, and adult).

Instar: The arthropod itself between two successive molts. For the purposes of the definition, hatching is considered a molt.

Examples of Usage:

Nymphs feed on the underside of leaves during the first stadium.

Larvae of some dermestids go through an indefinite number of stadia (or have an indefinite number of instars).

The nymphs were reared through the fifth stadium. Immature stages (e.g., eggs, larvae, and pupae; eggs and nymphs) are illustrated.

First instar of cerambycids make galleries in wood.

Some 200 first-instar spiderlings were collected. The predators fed readily on early instars of the face fly.

Notes on Formatting

Capitalization

Do not capitalize the following words in titles or subheadings: a, an, and, as, at, be, by, for, in, of, on, per, to, the.

Abbreviations

Use standard abbreviations as listed in the Council of Science Editors' Scientific Style and Format or those listed in this guide. Avoid nonstandard abbreviations.

Abbreviations for Time

Use the following abbreviations for time: h (hour), min (minute), s (second), yr (year), mo (month), wk (week), d (day). Do not add "s" to create plurals (e.g., wks).

Fig./Figs.

Use "Fig." if singular and "Figs." if plural (e.g., Fig. 1; Figs. 2 and 3).

Dates

When citing dates in the text (not in tables or taxonomic reports), do not abbreviate month, and use this format: 26 January 1997.

Metric Units

Use metric units. English units may follow within parentheses only if they are of direct practical purpose.

Liter

Do not abbreviate "liter" by itself or when accompanied by a numeral.

% versus percentage

Use "%" only with numerals and in tables and figures. Close up space to numerals (e.g., 50%). Otherwise, use the word percentage (e.g., percentage of defoliation).

Per versus slash

Use "per" rather than a slash unless reporting measurements in unit to unit (e.g., insects per branch, not insects/branch; but g/cm2, not g per cm2.

Numbers

Spell out numbers at the beginning of a sentence. Spell out the numbers one through nine (10 and up are always used as numerals), unless they are used as units of measure (e.g., eight children, three dogs, 8 g, 3 ft, 0600 hours; NOT 8 children, 3 dogs, eight grams, three feet, or six o'clock am). This includes spelling out the ordinals first through ninth, along with twofold, one-way ANOVA, and one-half. Ordinals from 10 and higher are numerals, such as 10th or 51st. In some cases, such as where there is a long list of items (e.g., 8 flies, 6 mosquitoes, 4 butterflies, and 10 bees), exceptions can be made if the editor concurs. The editorial staff will have flexibility in interpreting the rule.

Zeros with P values

All numbers <1 must be preceded by a zero (e.g., $P < 0.05$).

Commas

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Semicolon

Use a semicolon to separate different types of citations (Fig. 4; Table 2).

Repeating symbols

It is not necessary to repeat symbols or units of measure in a series (e.g., 30, 40, and 60%, respectively).

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Avoid footnotes in the text. Use unnumbered footnotes only for disclaimers and animal use information. Place all footnotes on a separate page after References Cited. Examples of footnotes are:

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Disponível em: http://www.elsevier.com/journals/arthropod-structure-and-development/1467-8039/guide-for-authors

Guide for Authors

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Types of Contributions

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E-mail: asd@orn.mpg.de

Nicholas J Strausfeld
ARL Division of Neurobiology
University of Arizona

611 Gould-Simpson Building

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Acknowledgements

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taxonomic/nomenclatural notes of importance

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