

**ARTUR ORSETTI SILVA ARAUJO**

**TAXONOMIA DE PELECIINI E MORFOLOGIA COMPARADA DO  
METENDOSTERNITO EM HARPALINAE (COLEOPTERA: CARABIDAE)**

**VIÇOSA - MINAS GERAIS  
2024**

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Tese apresentada à Universidade Federal de Viçosa,  
como parte das exigências do Programa de Pós-  
Graduação em Ecologia, para obtenção do título de  
*Doctor Scientiae*.

Orientador: Cristiano Lopes Andrade

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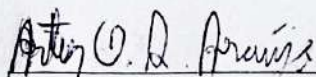
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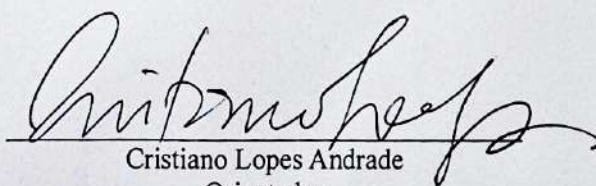
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## RESUMO

ORSETTI, Artur, D.Sc. Universidade Federal de Viçosa, julho de 2024. **Taxonomia de Peleciini e morfologia comparada do metendosternito em Harpalinae (Coleoptera: Carabidae).** Orientador: Cristiano Lopes Andrade.

Harpalinae é a subfamília mais diversa dentro de Carabidae, com aproximadamente 20.000 espécies descritas, agrupadas em 50 tribos. Os besouros harpalíneos exibem uma grande diversidade morfológica, a maioria das espécies é de predadores solitários, mas há espécies em que os indivíduos possuem outros hábitos alimentares. Eles podem ser encontrados em todo o globo e em habitats como dossel de árvores, cavernas, terrenos arenosos ou lamacentos, ou próximos de corpos d'água. A monofilia de Harpalinae é confirmada por características morfológicas e moleculares, mas permanecem dúvidas sobre as relações filogenéticas internas da subfamília, especialmente das tribos Chlaeini, Oodini, Panagaeini e Peleciini. Destas, Peleciini é de especial interesse por ser predominantemente neotropical e por ser pouco ou mal representada em estudos filogenéticos. Estudos em metendosternitos de coleópteros são escassos na literatura científica. Mesmo com potencial filogenético, tais estudos são inexistentes em Carabidae. O metendosternito é formado pela invaginação do metasterno verdadeiro e serve como fixação para vários músculos. Como contribuição à sistemática de Harpalinae, a presente tese fornece avanços no conhecimento dos Peleciini e no estudo comparativo do metendosternito na subfamília. No Capítulo I descrevemos nove espécies novas de *Pelecium* Kirby, fornecemos novos registros de distribuição e descrições de terminália abdominal para outras doze espécies, atualizamos e modificamos a chave taxonômica de Straneo & Ball (1989) e fornecemos imagens dorsais e das etiquetas de 29 tipos para os quais só existiam ilustrações e transcrições parciais na literatura. No Capítulo II fornecemos uma ilustração do metendosternito de Harpalinae para ajudar na compreensão de suas partes, delimitamos 12 caracteres morfológicos baseados no metendosternito, um sistema morfológico pouco explorado e comparamos com os resultados filogenéticos de outros autores.

Palavras-chave: Caracteres; Filogenia; Metendosternito; Morfologia comparada; Peleciini.

## ABSTRACT

ORSETTI, Artur, D.Sc. Universidade Federal de Viçosa, July 2024. **Taxonomy of Peleciini and comparative morphological study of the metendosternite within Harpalinae (Coleoptera: Carabidae).** Advisor: Cristiano Lopes Andrade.

Harpalinae is the most diverse subfamily in Carabidae, with approximately 20,000 described species, grouped into 50 tribes. Harpaline beetles exhibit great morphological diversity, most species are solitary predators, but there are species in which individuals have other eating habits. They can be found across the globe and in habitats such as tree canopies, caves, sandy or muddy terrain, or near bodies of water. The monophyly of Harpalinae is confirmed by morphological and molecular characteristics, but doubts remain about the internal phylogenetic relationships of the subfamily, especially the tribes Chlaeini, Oodini, Panagaeini and Peleciini. Those, Peleciini is of special interest because it is predominantly Neotropical and is little or poorly represented in phylogenetic studies. The metendosternite is formed by the invagination of the true metasternum and serves as an attachment for several muscles. Studies on Coleoptera metendosternites are scarce in the scientific literature. Even with phylogenetic potential, such studies are non-existent in Carabidae. As a contribution to the systematics of Harpalinae, this thesis provides advances in the knowledge of the Peleciini and in the comparative study of metendosternite in the subfamily. In Chapter I we describe new species of *Pelecium* Kirby, provide new records of distribution and orientation of abdominal terminalia for another twelve species, update and modify the taxonomic key of Straneo & Ball (1989) and provide dorsal and tag images of 29 types, which only existed illustrations and partial transcriptions in the literature. In Chapter II, we provide an illustration of the Harpalinae metendosternite to help understand its parts. We delimit 12 morphological characters based on the metendosternite, a little explored morphological system, and compare them with the phylogenetic results of other authors.

Keywords: Comparative morphology; Metendosternite; Peleciini; Phylogenetic characters.

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## I. INTRODUÇÃO GERAL

Coleoptera é uma ordem megadiversa com mais de 400.000 espécies descritas, divididas em quatro subordens com espécies viventes: Adephaga, Archostemata, Myxophaga e Polyphaga (Ślipiński *et al.* 2011). Os insetos dessa ordem são conhecidos popularmente pelo nome de “besouros”, possuem hábitos alimentares variados e habitam todas as regiões biogeográficas do globo, com exceção dos polos (Lawrence & Ślipiński 2013). Dentro de Adephaga, Carabidae se destaca como a família mais diversa, com cerca de 37.700 espécies viventes descritas (Cassola & Pearson 2000, Lawrence & Ślipiński 2013, Duran & Gough 2020).

Os besouros Carabidae possuem um tamanho corporal muito variado (1,0 mm – 85,0 mm), corpo em geral achatado dorsoventralmente, alongado e levemente convexo (Beutel & Leschen 2016). As cores são variadas, mas o preto e o marrom escuro predominam (Reichardt 1977). Geralmente, apresentam mandíbulas e palpos proeminentes, élitros estriados e pernas finas (Lawrence 1994). São considerados importantes agentes moduladores da biodiversidade em ecossistemas terrestres, por serem essencialmente carnívoros. Suas presas mais comuns são invertebrados, mas também podem preda pequenos vertebrados, como anfíbios (Lawrence & Ślipiński 2013). São geralmente solitários e muitas espécies possuem hábitos especializados, como os carabídeos termitófilos e os mirmecófilos, e podem ser encontrados em diversos habitats, desde ambientes costeiros de água-doce em terras altas a baixas, subsolo e copas de árvores, praias, cavernas, até rachaduras em rochas e sob a casca de árvores (Erwin 1991, 2007, 2011; Martínez 2005). Atualmente, Carabidae está dividida em 21 subfamílias (Bouchardt *et al.* 2011; Duran & Gough 2020).

Harpalinae é a subfamília mais diversa dentro de Carabidae, com aproximadamente 20.000 espécies descritas, agrupadas em 50 tribos (Bouchardt *et al.* 2011). Os besouros harpalíneos exibem uma grande diversidade morfológica, como por exemplo nos gêneros *Agra* Fabricius, 1801 (Fig. 1A) e *Leptotrachelus* Latreille, 1829 (Fig. 1B) com o corpo alongado e cilíndrico; nos gêneros *Mormolyce* Hagenbach, 1825 (Fig. 1C) e *Catapiesis* Solier, 1835 (Fig. 1D) com o corpo drasticamente achatado; no gênero *Ega* Laporte de Castelnau, 1835 (Fig. 1E) com o corpo semelhante ao de uma formiga e os besouros da tribo Pseudomorphini (Fig. 1F)

com o corpo fortemente compacto e cilíndrico. A maioria das espécies de harpalíneos é de predadores solitários, mas há espécies em que os indivíduos possuem outros hábitos alimentares como, por exemplo, granivoria (Martínez 2005, Reichardt 1977). Eles podem ser encontrados em todo o globo e em habitats como dossel de árvores, cavernas, terrenos arenosos ou lamacentos, ou próximos de corpos d'água (Martínez 2005).

A monofilia de Harpalinae é confirmada por características morfológicas, como por exemplo, perda da cerda no escrobo da mandíbula, perda de cerdas dos parâmeros masculinos e assimetria acentuada dos parâmeros (Jannel 1941, 1942). E é também confirmada por análises moleculares (Maddison *et al.* 1999, Ober 2002, Ober & Maddison 2008). Mas permanecem dúvidas sobre as relações filogenéticas internas da subfamília, especialmente das tribos Chlaeini, Oodini, Panagaeini e Peleciini (Ober 2002, Ober & Maddison 2008).

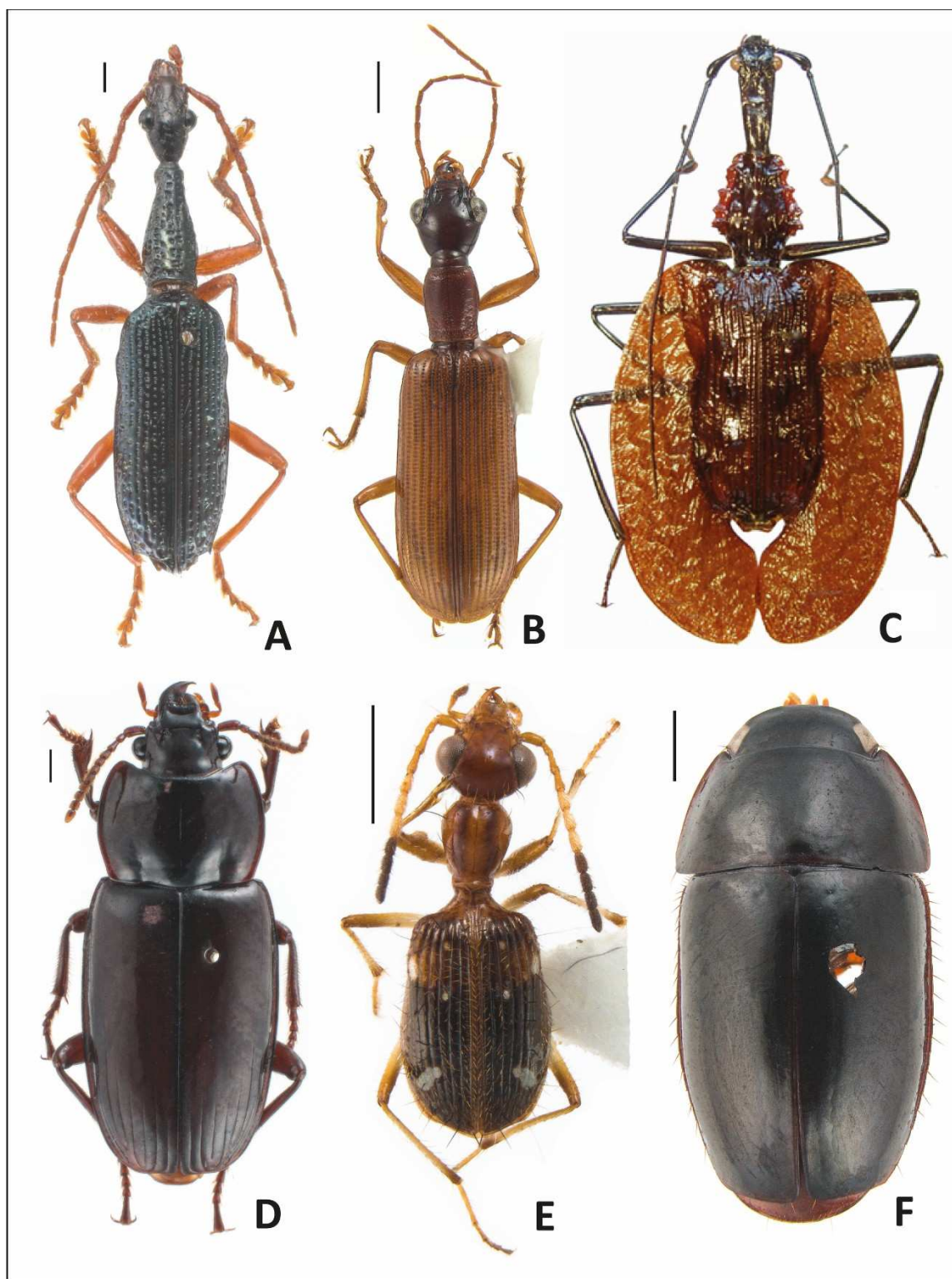
Peleciini é uma das 50 tribos de Harpalinae (Bouchard *et al.* 2011) e inclui 91 espécies em oito gêneros, agrupados em duas subtribos: Peleciina Sloane, 1920 e Agonicina Chaudoir, 1920. Peleciina reúne grande parte da tribo, com 74 espécies em seis gêneros. Três desses gêneros compreendem mais da metade das espécies de Peleciina e são encontrados no continente americano (número de espécies entre parênteses): *Eripus* Dejean, 1829 (10) na Amazônia Peruana e Guatemala; *Pelecium* Kirby, 1817 (34) do Panamá ao centro da Argentina; e *Stricteripus* Straneo & Ball, 1989 (3) na Bolívia, Peru e Venezuela. Os outros Peleciina ocorrem no sul e leste da África (*Disphaericus* Waterhouse, 1842, 17 espécies; *Dyschiridium* Chaudoir, 1861, 6 espécies) e no subcontinente indiano (*Ardistomopsis* Straneo & Ball, 1989, 5 espécies) (Straneo & Ball 1989; Fedorenko 2014). A outra subtribo, Agonicina, inclui apenas dois gêneros: *Agonica* Sloane, 1920 (4 espécies) e *Pseudagonica* Moore, 1960 (13), ambos confinados à Tasmânia e ao sudeste da Austrália (Straneo & Ball 1989; Baehr 2012).

*Pelecium* é o gênero mais diverso de Peleciini, com 34 espécies organizadas em dois subgêneros: *Pelecidium* Straneo & Ball 1989 com três espécies, e *Pelecium* com as 31 espécies restantes (Straneo & Ball 1989; Orsetti & Lopes-Andrade 2016). O gênero *Pelecium* foi extensivamente estudado pelo entomólogo italiano Stefano Ludovico Straneo (1902–1997), um prolífico especialista em besouros Carabidae que descreveu 64 gêneros e mais de 1.200 espécies na família (Bousquet 2012). Ele publicou uma série de artigos taxonômicos sobre *Pelecium* (Straneo 1953, 1955, 1962, 1970) que culminou em uma revisão dos gêneros de Peleciini

(Straneo & Ball 1989), e foi o único pesquisador que trabalhou consistentemente no gênero ao longo do século XX. Antes dele, houve um intervalo de mais de seis décadas após a descrição de *Pelecium drakei* por Quedenfeldt (1890) no século XIX. Depois de Straneo, o gênero foi completamente negligenciado até que descrevemos uma nova espécie do bioma Mata Atlântica (Orsetti & Lopes-Andrade 2016) e começamos a reunir material para mais estudos.

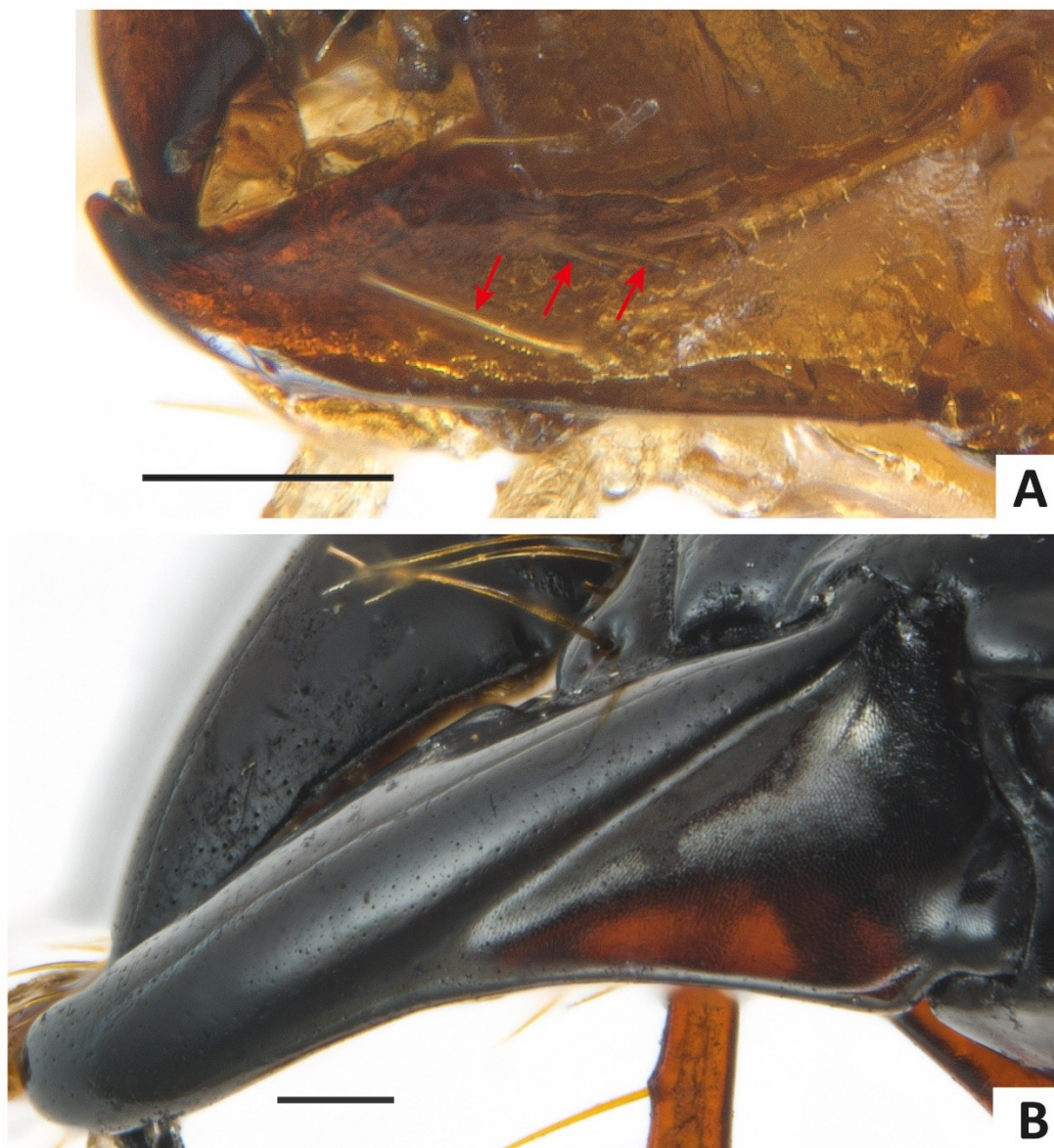
Pouco se sabe sobre o modo de vida dos besouros *Pelecium*. A maior parte do nosso conhecimento vem de algumas observações de larvas como parasitoides de pupas de besouros e milípedes jovens (Salt 1928), e de adultos como predadores de milípedes (Erwin 1979). Todas as espécies de *Pelecium* não voam e, portanto, presume-se que tenham uma baixa capacidade de dispersão, de modo que a modificação e perda de habitat podem ser sérias ameaças para elas. A maneira mais eficiente de coletar esses besouros é usando armadilhas de queda ou procurando ativamente durante a noite. O Brasil é o *hotspot* do gênero, com 29 espécies descritas, das quais 23 são endêmicas (Straneo & Ball 1989).

A maioria das espécies de *Pelecium* ocorre nos biomas da Mata Atlântica brasileira e do Cerrado brasileiro, principalmente nos estados de Minas Gerais, Mato Grosso, São Paulo, Paraná e Santa Catarina (Straneo & Ball 1989; Orsetti & Lopes-Andrade 2016). As espécies de *Pelecium* são difíceis de coletar e, por isso, são mal representadas em coleções científicas. Por exemplo, algumas espécies foram descritas com base em apenas um indivíduo do gênero masculino, como *P. striatipenne* Chaudoir, 1866, *P. paralelolum* Straneo & Ball, 1989 e recentemente *P. igneus* Orsetti & Lopes-Andrade, 2016; e *P. tenellum* Schaum, 1860, *P. punctatum* Straneo, 1953, *P. renti* Straneo, 1953, *P. paulae* Straneo & Ball, 1989 e *P. obscurum* Straneo, 1955, onde cada uma é conhecida apenas por um indivíduo do gênero feminino. Dentre as demais espécies, as séries conhecidas são, em sua maioria, pequenas (com menos de dez indivíduos). Consequentemente, as variações intraespecíficas e de gênero dentro das espécies de *Pelecium* são pouco compreendidas. A revisão de Straneo & Ball (1989) forneceu uma chave de identificação e desenhos de todas as espécies conhecidas até então. Apesar da ausência de fotografias e descrições de terminália abdominal, as informações morfológicas por eles fornecidas são razoáveis para identificar a maioria das espécies descritas de *Pelecium*.



**Figura 1.** Variação morfológica em Harpalinae. **A**, *Agra* Fabricius, 1801 (Lebiini). **B**, *Leptotrachelus* Latreille, 1829 (Ctenodactylini). **C**, *Mormolyce* Hagenbach, 1825 (Lebiini) Foto: Alexander Anitchenko. **D**, *Catapiesis* Solier, 1835 (Catapiesini). **E**, *Ega* Laporte de Castelnau, 1835 (Lachnophorini). **F**, *Notopseudomorpha* (Baehr, 1997) (Pseudomorphini). Escala = 1mm.





**Figura 2.** Caráter diagnóstico de Harpalinae. **A**, Escrobo da mandíbula de *Brachinus* sp. (Brachininae: Brachinini), cerdas presentes (setas vermelhas). **B**, Escrobo da mandíbula de *Pelecius helenae* (Harpalinae: Peleciini), cerdas ausentes. Escala = 0.5 mm.

### Morfologia comparada e filogenia em Harpalinae

Estudos detalhados de morfologia com o propósito de delimitar sistemas de caracteres filogenéticos tendem a abordar apenas partes externas, deixando de lado estruturas da morfologia interna. Trabalhos abrangentes como os de Doyen (1966) e Mc Hugh *et al.* (1997), com descrições detalhadas da morfologia externa e interna de adultos de *Tenebrio molitor* Linnaeus,

1758 e de *Megalodacne heros* (Say, 1823), respectivamente, são escassos. Ademais, esses trabalhos não apresentam caracteres de tal forma que possam ser usados na construção de matrizes para análises filogenéticas. Trabalhos mais amplos, que analisam uma grande quantidade de táxons e de caracteres (e.g. Dressler & Beutel 2010, Lawrence *et al.* 2011), muitas vezes incluem caracteres que são importantes para entender as relações filogenéticas de grandes táxons, mas que não resolvem problemas em táxons mais inclusivos, como subfamílias e tribos. Portanto, estudos de sistemas de caracteres dentro de um táxon mais inclusivo são de extrema importância, como, por exemplo, o de Pecci-Maddalena *et al.* (2021), que analisou o metendosternito e o flagelo peniano em Erotylidae.

Estudos de morfologia em Harpalinae abordam principalmente terminália masculina e feminina e são majoritariamente descritivos (e.g. Hunting 2008, Liebherr & Will 1998, Ortuño *et al.* 2003). E, quando se propõe a delimitar caracteres morfológicos, acabam se limitando aos mais tradicionais (e.g. Straneo & Ball 1989). Para compreender a evolução de um táxon tão diverso e estruturalmente complexo como Harpalinae, são necessários estudos de sistemas de caracteres de forma que possam ser utilizados em análises filogenéticas subsequentes.

O endosternito conhecido como “metendosternito”, também chamado de “metafurca”, é formado pela invaginação do metasterno verdadeiro e serve como fixação para vários músculos (Lawrence *et al.* 2011). Estudos detalhados da morfologia do metendosternito de besouros são escassos na literatura científica. Os primeiros trabalhos abrangentes sobre o metendosternito em Coleoptera foram feitos por Crowson (1938, 1944) com foco em descrever, comparar e distinguir vários padrões morfológicos básicos da estrutura em diversas famílias e, em alguns casos, também em subfamílias e tribos. Houve também estudos descritivos detalhados com foco em somente uma espécie, como os de Doyen (1966) e McHugh (1997), que incluem uma descrição detalhada do metendosternito de *Tenebrio molitor* e *Megalodacne heros*, respectivamente. Informações comparativas mais modernas sobre o metendosternito em Coleoptera aparecem na filogenia morfológica de Lawrence *et al.* (2011). Estudos comparativos focados em uma subfamília ou família são ainda mais escassos, valendo citar o de Hübler & Klass (2013) para Chrysomelinae, e o de Pecci-Maddalena *et al.* (2021) para Erotylidae em ambos são propostos caracteres e estados de caracteres redigidos de forma tal que podem ser utilizados em uma matriz de caracteres para análise filogenética. Aparte descrições simples do metendosternito de algumas espécies de Carabidae em trabalhos mais gerais como os de Crowson (1938, 1944) e a

informação sobre essa estrutura que pode ser extraída da matriz de caracteres em Lawrence *et al.* (2011), não há descrição minuciosa do metendosternito e nem trabalho de morfologia comparada da estrutura para Carabidae e nenhum de seus táxons inclusivos.

## **Justificativa**

Os besouros Harpalinae possuem uma grande diversidade de espécies, são considerados importantes agentes moduladores da biodiversidade, por serem essencialmente carnívoros, e muitas de suas espécies possuem uma grande variedade morfológica e comportamental, tornando-os um interessante modelo de estudos evolutivos, ecológicos e biogeográficos. Para a condução de qualquer estudo biológico sobre esses organismos é imprescindível que a taxonomia e filogenia da subfamília estejam bem resolvidas. A descrição de novas espécies e incremento de informações como distribuição geográfica e morfologia da terminália abdominal constituem uma contribuição importante ao conhecimento dos Harpalinae, especialmente do Brasil. Além disso, um estudo comparativo de um sistema de caracteres ainda não estudado na subfamília irá incrementar o entendimento da morfologia e da história evolutiva desses organismos.

## **Objetivos**

O objetivo geral dessa tese foi:

- i. Contribuir com a taxonomia, sistemática e morfologia da subfamília Harpalinae.

Os objetivos específicos dessa tese foram:

- i. Descrever nove espécies do gênero *Pelecium* (Harpalinae: Peleciini);
- ii. Fornecer novos registros de distribuição geográfica e descrições de terminália abdominal para outras doze espécies de *Pelecium*;
- iii. Desenvolver um estudo comparativo do metendosternito em Harpalinae .

## Resultados

A tese contém dois capítulos, ambos sob a forma de artigo científico. O Capítulo I foi publicado na revista *European Journal of Taxonomy*, e pretende-se submeter o Capítulo II após a defesa da presente tese. Abaixo é apresentada uma descrição sucinta de cada capítulo:

**Capítulo 1:** “A contribution to the taxonomy of the genus *Pelecium* Kirby (Coleoptera: Carabidae: Peleciini)”. Este capítulo teve como objetivo compilar e incrementar as informações taxonômicas sobre o gênero *Pelecium*. Nele descrevemos nove espécies brasileiras, fornecemos novos registros de distribuição e descrições de terminália abdominal para doze espécies previamente descritas, atualizamos e modificamos a chave taxonômica de Straneo & Ball (1989), além de fornecemos imagens dorsais e das etiquetas de 29 tipos, para os quais só havia ilustrações e transcrições na literatura científica.

**Capítulo 2:** “Morphology of the metendosternite in Harpalinae”. Este capítulo é um estudo de morfologia comparada do metendosternito de Harpalinae, com proposição de caracteres e delimitação de seus estados de modo que possam ser incluídos em matriz para análise filogenética. Nele fornecemos ilustração e descrição do metendosternito, delimitamos 12 caracteres dessa estrutura, os quais são discutidos a partir do cenário filogenético proposto por Ober *et al.* (2008).

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## II. CAPÍTULO 1

### **A contribution to the taxonomy of the genus *Pelecium* Kirby (Coleoptera: Carabidae: Peleciini)**

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# A contribution to the taxonomy of the genus *Pelecium* Kirby (Coleoptera: Carabidae: Peleciini)

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**Abstract.** *Pelecium* Kirby, 1817 is a neotropical genus of flightless carabid beetles comprising 34 species, distributed from Panama to middle Argentina. Most species of *Pelecium* are known from short series and few localities, in some cases only from the holotype. Male and female abdominal terminalia are not described for the majority of the species, a situation that makes it difficult to describe new species or to study intraspecific variation. Here, we describe nine new species based on individuals from Brazil: *Pelecium buckupi* sp. nov., *P. fistulosus* sp. nov. and *P. zaguryi* sp. nov. from the Centre-West region, *P. belloi* sp. nov., *P. chrissquirei* sp. nov., *P. straneoi* sp. nov. and *P. zophos* sp. nov. from the Southeast region, and *P. balli* sp. nov. and *P. grossii* sp. nov. from the South region. We also provide new distributional records and descriptions of abdominal terminalia for twelve species: *Pelecium atrovioleaceum* Straneo & Ball, 1989, *P. bolivianum* Straneo & Ball, 1989, *P. cyanipes* Kirby, 1817, *P. helenae* Straneo & Ball, 1989, *P. laeve* Chaudoir, 1854, *P. negrei* Straneo, 1962, *P. drakei* Quedenfeldt, 1890, *P. punctatostratum* Straneo, 1970, *P. purpureum* Straneo, 1955, *P. rotundipenne* Schaum, 1860, *P. striatum* Straneo, 1955 and *P. violaceum* Brullé, 1838.

**Key words.** Entomology, ground beetles, Harpalinae, Neotropical, South America.

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## Introduction

Peleciini Chaudoir, 1880 is one of the 50 tribes of Harpalinae (Bouchard *et al.* 2011), and includes 91 species in eight genera grouped into two subtribes: Peleciina Straneo & Ball, 1989 and Agonicina Straneo & Ball, 1989. Peleciina gathers the great part of the tribe, with 74 species in six genera. Three of these genera comprise more than half of the species of Peleciina and they are found on the American continent (number of species in parentheses): *Eripus* Dejean, 1829 in Amazonian Peru, Guatemala and

|       |   |                                                                                                                                              |
|-------|---|----------------------------------------------------------------------------------------------------------------------------------------------|
| CAMB  | = | Coleção Entomológica Ayr de Moura Bello (Rio de Janeiro, Rio de Janeiro, Brazil)                                                             |
| CELC  | = | Coleção Entomológica do Laboratório de Sistemática e Biologia de Coleoptera da Universidade Federal de Viçosa (Viçosa, Minas Gerais, Brazil) |
| CEMT  | = | Coleção Entomológica da Universidade Federal de Mato Grosso (Cuiabá, Mato Grosso, Brazil)                                                    |
| CERPE | = | Coleção Entomológica da Universidade Federal Rural de Pernambuco (Recife, Pernambuco, Brazil)                                                |
| FZBRS | = | Fundação Zoobotânica do Rio Grande do Sul (Porto Alegre, Rio Grande do Sul, Brazil)                                                          |
| MCSN  | = | Museo civico di Storia Naturale (Milan, Italy)                                                                                               |
| MNHN  | = | Muséum national d'histoire naturelle (Paris, France)                                                                                         |
| MUB   | = | Museum für Naturkunde (Berlin, Germany)                                                                                                      |
| MZSP  | = | Coleção Entomológica do Museu de Zoologia da Universidade de São Paulo (São Paulo, São Paulo, Brazil)                                        |

The specimens were measured under a Zeiss Stemi 2000-C stereo microscope and photographed under a Zeiss Discovery V20 stereo microscope equipped with a Zeiss AxioCam 506 colour digital camera. All images were taken by the senior author unless otherwise specified. Final images of the body were stacked using the extended focus module of Helicon Focus software. For dissection, each specimen was placed in a container with warm water for a day for relaxing tissues, then the parts of interest were placed in KOH for a few hours to remove the soft tissues and then placed in solution of 10% acetic acid for a few minutes to neutralize the KOH. Maps were generated using the on-line SimpleMapp tool (Shorthouse 2010). The biogeographical regionalisation of the Neotropical region follows Morrone (2014).

Measurements (in mm) and ratios are as follows:

|      |   |                                                                                                                       |
|------|---|-----------------------------------------------------------------------------------------------------------------------|
| AL1  | = | length of antennomere 1 (scape)                                                                                       |
| AL2  | = | length of antennomere 2 (pedicel)                                                                                     |
| EL   | = | elytral length measured from base of scutellar shield to elytral apex                                                 |
| EW   | = | greatest elytral width                                                                                                |
| HL   | = | head length measured from labrum base to frons                                                                        |
| HW   | = | greatest head width including eyes                                                                                    |
| lp2L | = | length of the second labial palpomere                                                                                 |
| lp3L | = | length of the third labial palpomere                                                                                  |
| lp3W | = | greatest width of the third labial palpomere                                                                          |
| mp3L | = | length of the third maxillary palpomere                                                                               |
| mp4L | = | length of the fourth maxillary palpomere                                                                              |
| mp4W | = | greatest width of the fourth maxillary palpomere                                                                      |
| PL   | = | pronotal length along midline                                                                                         |
| PW   | = | greatest pronotal width                                                                                               |
| TL   | = | total body length measured from apex of labrum to apex of elytra; the ratio TL/EW indicates degree of body elongation |

## Results

### *Taxonomy*

Class Insecta Linnaeus, 1758  
 Order Coleoptera Linnaeus, 1758  
 Family Carabidae Latreille, 1802  
 Subfamily Harpalinae, Bonelli, 1810  
 Tribe Peleciini Chaudoir, 1880

***Pelecium* Kirby, 1817**

Figs 1–24

**Diagnosis**

Dorsal surface bright. Head usually with a pair of frontal foveae (Fig. 24A) and one pair of supraorbital setae. Labium and maxilla well developed; fourth maxillary palpomere twice as long as the third; terminal maxillary and labial palpomeres usually triangular to securiform (Fig. 1A, C), but in some cases ovate (Fig. 1B, D); mandible groove large and glabrous; glossa bisetose (Fig. 1C). Labrum with three pairs of setae dorsally (Fig. 1F). Mentum with median tooth (Fig. 1E). Antennae (Fig. 1H) pubescent, filiform; scape two to three times larger than pedicel. Pronotum shape variable, usually with median line and pair of posterior impressions (Fig. 24A). Scutellar shield triangular. Legs with short trochanter, one-fourth to one-fifth as long as metafemur. Tibiae with yellow setae throughout inner margin; inner spur present; long spur inserted on anterior border of antennal cleaner. Protarsomeres (Fig. 1I) 1–4 enlarged and ventrally covered by adhesive setae, protarsomeres 4 bilobed; mesotarsomeres (Fig. 1K) and metatarsomeres (Fig. 1L) 1–4 ventrally covered with yellow setae. Metendosternite (Fig. 1G) stalk twice as long as wide; laminae well developed; lateral arms moderately long; ventrolateral processes absent; anterior processes absent. Elytra ovate, usually with deeply impressed striae. Hind wings not developed. Males with one pair of setae on abdominal ventrite VII. Male terminalia asymmetrical; aedeagus cylindrical (Fig. 24C–D); parameres drastically asymmetrical. Female terminalia with gonocoxite (Fig. 24B) bearing ensiform setae on each side at basal lobe.

Below is a list of species of the genus *Pelecium* and synonyms (asterisks indicate species occurring in Brazil), species groups are sensu Straneo & Ball (1989):

Subgenus *Pelecidium* Straneo & Ball, 1989

*Pelecium laevigatum* Guérin-Ménéville, 1843

*Pelecium sulcipenne* Chaudoir, 1861

*Pelecium sulcatum* Guérin-Ménéville, 1843

Subgenus *Pelecium* Kirby, 1817

*Pelecium cyanipes* species group

\**Pelecium cyanipes* Kirby, 1817

*Pelecium carinatum* Chaudoir, 1846

*Pelecium ovipenne* Chaudoir, 1861

*Pelecium humeratum* Chaudoir, 1866

*Pelecium faldermanni* species group

\**Pelecium besckii* (Chaudoir, 1850)

*Augasmosomus besckii* Chaudoir, 1850

*Pelecium bisulcatum reichardti* Straneo, 1970

*Pelecium bisulcatum* Straneo, 1970

\**Pelecium faldermanni* (Chaudoir, 1846)

*Augasmosomus faldermanni* Chaudoir, 1846

*Augasmosomus iridescens* Chaudoir, 1850

*Pelecium brevisulcis* Straneo, 1953

\**Pelecium foveicolle* Chaudoir, 1866

\**Pelecium obtusum* Straneo, 1953

*Pelecium laeve* species group

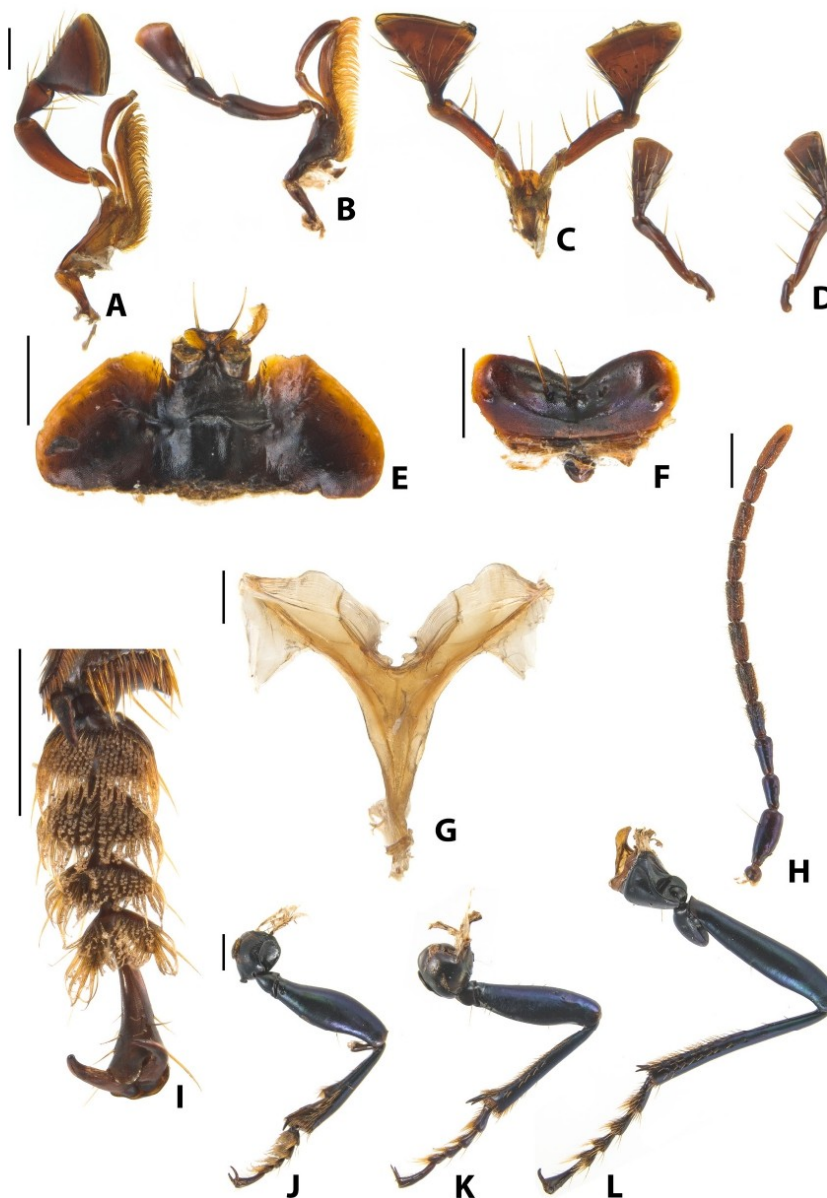
\**Pelecium belloii* sp. nov.

\**Pelecium laeve* Chaudoir, 1854

*Pelecium politum* Schaum, 1860

\**Pelecium nicki* Straneo, 1955

\**Pelecium obscurum* Straneo, 1955



**Fig. 1.** Dissected parts of *Pelecium violaceum* Brullé, 1838, male from Indiavaí, Mato Grosso, Centre-West Brazil (A, C, G) and female from Pontes e Lacerda, Mato Grosso, Centre-West Brazil (B, D–F, H–L). **A–B.** Maxilla. **C.** Labial palpomeres and glossa. **D.** Labial palpomeres. **E.** Mentum. **F.** Labrum. **G.** Metendosternite. **H.** Antenna. **I.** Protarsomeres. **J.** Anterior leg. **K.** Median leg. **L.** Posterior leg. Scale bars: A–G = 1 mm; H–L = 0.5 mm.





3. Dorsal surface of pronotum and elytra subopaque. Elytral striae 2–4 terminated closer to base, intervening smooth space rather narrow ..... *P. sulcatum* Guérin-Ménéville, 1843
- Dorsal surface of pronotum and elytra shining, iridescent. Elytral striae 2–4 terminated far from base, intervening smooth space extensive ..... *P. sulcipenne* Chaudoir, 1861
4. Elytron with striation complete: eight clearly impressed striae, striae 7 or 6 and 7 joined to 8 at lateral margin, not extended to base ..... 5
- Elytron with striation incomplete, or wholly smooth ..... 18
5. Tarsomere 5 with row of few slender setae on each ventrolateral margin ..... 6
- Tarsomere 5 without setae ventrolaterally ..... 8
6. Dorsal surface of pronotum and elytra blue or black; microsculpture meshes isodiametric, surface dull ..... *P. cyanipes* Kirby, 1817 (Figs 7D–K, 14A–B)
- Dorsal surface of pronotum and elytra violaceous; microsculpture meshes transverse, on elytra transverse-grated, surface shining to iridescent ..... 7
7. Pronotum with posterior edge not margined. Elytron with humerus projected anteriorly ..... *P. renati* Straneo, 1953 (Fig. 18C)
- Pronotum with posterior edge margined laterally. Elytron with humerus not projected anteriorly ..... *P. striatum* Straneo, 1955 (Figs 11I–P, 19D)
8. Elytron with striae impunctate ..... 9
- Elytron with striae punctate at least on apical declivity ..... 16
9. Dorsal surface dark, with greenish reflections. Head with frontal impressions sinuous, elongate ..... *P. longicollis impunctatum* Straneo & Ball, 1989
- Varied dorsal surface colour. Head with frontal impressions not sinuate, short or long ..... 10
10. Size shorter, length of body less than 10 mm. Colour of dorsal surface dull. Head with short frontal impressions, punctiform, at most extended to level of anterior margin of compound eye ..... 11
- Size of most specimens large (9–20 mm). Varied dorsal surface colour. Head with long frontal impressions, extended to mid-eye level, or more posteriorly ..... 13
11. Body elongate and sub-parallel. Pronotum with lateral margins only slightly arcuate; posterolateral impressions very short. Elytra with apical declivity very steep ..... *P. parallelum* Straneo & Ball, 1989
- Varied body shape. Pronotum with lateral margins more arcuate; posterolateral impressions longer. Apical declivity of elytra more gradually sloped ..... 12
12. Pronotum evenly arcuate, rounded ..... *P. tenellum* Schaum, 1860 (Fig. 20A)
- Pronotum arcuate, posterior fourth forming a sinuous line with posterior angles ..... *P. zophos* sp. nov. (Fig. 6A–H)
13. Surface black with no bright colour. Eyes small. Elytra elongate ..... 14
- Varied surface colour. Eyes large. Elytra widened; lateral margins markedly arcuate ..... 15
14. Elytral margins markedly parallel ..... *P. striatipenne* Chaudoir, 1866 (Fig. 19C)
- Elytral margins slightly arcuate ..... *P. grossii* sp. nov. (Fig. 4I–P)

|                                                                                                                                                                                                                |                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| 15. Dorsal surface bright green. Pronotum with or without bluish reflections.....                                                                                                                              | <i>P. drakei</i> Quedenfeldt, 1890 (Figs 8A–H, 14C)        |
| – Dorsal surface violaceous or bluish. Pronotum with bluish reflections.....                                                                                                                                   | <i>P. violaceum</i> Brullé, 1838 (Fig. 12A–H)              |
| 16. Body stout. Pronotum short, wider than long.....                                                                                                                                                           | <i>P. punctatum</i> Straneo, 1953 (Fig. 18B)               |
| – Body elongate. Pronotum elongate, longer than wide.....                                                                                                                                                      | 17                                                         |
| 17. Head with frontal impressions shorter, not sinuate laterally. Elytron with striae punctate throughout their lengths.....                                                                                   | <i>P. brasiliense</i> Straneo, 1962 (Fig. 13D)             |
| – Head with frontal impressions elongate, markedly sinuate laterally. Elytral striae with punctures restricted to apical declivity.....                                                                        | <i>P. longicollae longicollae</i> Straneo, 1953 (Fig. 16B) |
| 18. Head with frontal impressions elongate, extended posteriorly to postocular transverse impression.....                                                                                                      | 19                                                         |
| – Head with frontal impressions shorter, punctiform or not, not extended beyond posterior margin of compound eyes.....                                                                                         | 21                                                         |
| 19. Pronotum and elytra black, with aeneous lustre. Elytron with striae 1–4 deeply impressed, 4 short, not extended to apical declivity posteriorly.....                                                       | <i>P. negrei</i> Straneo, 1962 (Figs 10A–H, 16C)           |
| – Pronotum and elytra bright copper. Elytron with more than four impressed striae.....                                                                                                                         | 20                                                         |
| 20. Elytron with striae 1–5 deeply impressed, but stria 5 very short.....                                                                                                                                      | <i>P. fulgidum</i> Straneo, 1962 (Figs 8I–J, 14D, 15A)     |
| – Elytron with striae 1–6 deeply impressed, but stria 6 very short.....                                                                                                                                        | <i>P. refulgens</i> Guérin-Ménéville, 1831                 |
| 21. Elytron with more than three discal striae deeply impressed in at least part of their lengths.....                                                                                                         | 22                                                         |
| – Elytron with three or fewer discal striae deeply impressed, or wholly smooth.....                                                                                                                            | 36                                                         |
| 22. Pronotum with lateral margins rounded, with three pairs of marginal setae.....                                                                                                                             | 23                                                         |
| – Varied pronotal shape, with two pairs of marginal setae.....                                                                                                                                                 | 24                                                         |
| 23. Tarsomere 5 with row of few slender setae on each ventrolateral margin.....                                                                                                                                | <i>P. zaguryi</i> sp. nov. (Fig. 5I–J)                     |
| – Tarsomere 5 without setae ventrolaterally.....                                                                                                                                                               | <i>P. rotundipenne</i> Schaum, 1860 (Figs 18D, 19A)        |
| 24. Tarsomere 5 with row of few slender setae on each ventro-lateral margin.....                                                                                                                               | 25                                                         |
| – Tarsomere 5 glabrous ventrally.....                                                                                                                                                                          | 30                                                         |
| 25. Elytron with striae smooth, impunctate.....                                                                                                                                                                | 26                                                         |
| – Elytral striae markedly punctate.....                                                                                                                                                                        | 27                                                         |
| 26. Dorsal surface dark metallic green with purple reflections. Pronotal sides slightly arcuate, almost parallel. Elytra elongate, subparallel-sided.....                                                      | <i>P. buckupi</i> sp. nov. (Fig. 3A–G)                     |
| – Dorsal surface black with faint violaceous reflections. Pronotum convex anteriorly, with lateral margins arcuate and subsinuate before postero-lateral angles. Elytra ovate, with sides markedly convex..... | <i>P. bolivianum</i> Straneo & Ball, 1989 (Figs 7A–C, 13C) |
| 27. Elytron with more than five discal striae deeply impressed. Pronotum wider than long.....                                                                                                                  | 28                                                         |
| – Elytron with five or fewer discal striae deeply impressed. Pronotum at least as long as wide.....                                                                                                            | 29                                                         |



28. Elytron with striae 1–7 deeply impressed. Dorsal surface bright black without reflections ..... *P. fistulosus* sp. nov. (Fig. 4A–H)
- Elytron with striae 1–6 deeply impressed. Dorsal surface black with violaceous reflections ..... *P. atrovioleaceum* Straneo & Ball, 1989 (Figs 6I–P, 13A)
29. Dorsal surface coppery. Elytron with striae 1–5 impressed. Pronotum longer than wide ..... *P. punctatostratum* Straneo, 1970 (Fig. 18A)
- Varied colour; head black with or without greenish reflections; pronotum dark green; elytra black with bluish-violaceous reflections. Elytron with only striae 1–4 impressed. Pronotum as long as wide ..... *P. semistriatum* Straneo & Ball, 1989 (Fig. 19B)
30. Elytron with only discal striae 1–4 deep, and only stria 1 extended to apical declivity, stria 4 remote from base and apex. Pronotum with posterolateral impressions indistinct, shallow ..... *P. purpureum* Straneo, 1955 (Fig. 11A–H)
- Elytron with at least striae 1–5 moderately deeply impressed, and extended to rather gradually sloped apical declivity. Pronotum with postero-lateral impressions various ..... 31
31. Pronotum with sides markedly rounded ..... 32
- Pronotum with sides less rounded, subsinuate to sinuate posteriorly ..... 34
32. Pronotum posterolateral impressions indistinct ..... *P. straneoi* sp. nov. (Fig. 5A–H)
- Pronotum posterolateral impressions distinct ..... 33
33. Pronotum posterior impression line-shaped toward the disc of pronotum ..... *P. balli* sp. nov. (Fig. 2A–H)
- Pronotum posterior impression rounded ..... *P. paulae* Straneo & Ball, 1989 (Fig. 17C)
34. Pronotum red, with green reflections laterally; shape subcordate to sinuate; lateral edges more arcuate near posterior margin. Elytra black, rounded shape ..... *P. igneus* Orsetti & Lopes-Andrade, 2016
- Dorsum unicolorous. Pronotum subsinuate or subquadrate. Elytra sub-elongate ..... 35
35. Male maxillary palpomere 4 broadly ovate, with apex oblique truncated. Pronotum posterior impression shallow, elongate toward centre ..... *P. chrissquirei* sp. nov. (Fig. 3H–N)
- Male maxillary palpomere 4 triangular. Pronotum posterior impression shallow and short, indiscernible ..... *P. helenae* Straneo & Ball, 1989 (Figs 9A–H, 15B–D)
36. Tarsomere 5 glabrous ventrally ..... 37
- Tarsomere 5 with row of few slender setae on each ventrolateral margin ..... 43
37. Elytron with at least portions of striae 1 and 2 deeply impressed ..... 38
- Elytron with not more than stria 1 deeply impressed in part of length ..... 39
38. Dorsum dark blue or bluish-violaceous. Pronotum with lateral margins broadly rounded to posterolateral angles ..... *P. obtusum* Straneo, 1953 (Fig. 17B)
- Dorsal surface black with faint violaceous reflections. Pronotum with lateral margins slightly sinuate posteriorly, posterolateral angles slightly projected ..... *P. bisulcatum* Straneo, 1970 (Fig. 13B)
39. Dorsal surface green. Head with frontal impressions slightly elongate, extended to or slightly posteriorly to anterior margin of compound eyes ..... *P. foveicollis* Chaudoir, 1866
- Varied dorsal surface colour. Head with frontal impressions punctiform ..... 40

40. Elytra with no discal striae deeply impressed..... 41  
 – Elytron with at least stria 1 deeply impressed, with or without shallow vestiges of some other striae..... 42
41. Pronotum slightly wider than long, with sides arcuate and shortly subsinuate posteriorly.....  
 ..... *P. belloi* sp. nov. (Fig. 2I–K)  
 – Pronotum elongate and slender with sides equally arcuate for entire length .....  
 ..... *P. laeve* Chaudoir, 1854 (Figs 9I–P, 16A, 17D)
42. Stria 2 shallow, but quite distinct..... *P. besckii* Chaudoir, 1850  
 – Stria 2 evanescent ..... *P. fuldermanni* (Chaudoir, 1846)
43. Dorsal surface blue. Anterior portion of pronotum narrower than posterior portion. Elytron with lateral border terminated in small deep fovea..... *P. obscurum* Straneo, 1955  
 – Dorsal surface copper. Anterior portion of pronotum not narrower than posterior portion.....  
 ..... *P. nicki* Straneo, 1955 (Figs 10I–P, 16D, 17A)

### Descriptions of new species

#### *Pelecium balli* sp. nov.

urn:lsid:zoobank.org:act:FC546130-65BD-48EC-9988-FFE154C52C74

Figs 2A–H, 25

#### Diagnosis

A medium-sized species (10 mm), distinguishable among other congeners by the combination of the following features. Body elongate. Head frontal fovea punctiform (Fig. 2B). Pronotum median line fine and shallow. Each elytron with striae 1–5 deeply impressed and 6 shallow. Adults of *P. balli* sp. nov. and *P. paulae* are quite similar, but in the former the pronotum posterior impression is shallow and line-shaped toward the disc, resembling a channel, while in the latter the posterior impression is also shallow, but rounded.

#### Etymology

The specific epithet ‘*balli*’ is an eponym in honor of the American entomologist George Eugene Ball (1926–2019), an expert in ground beetles (Carabidae).

#### Type material

##### Holotype

BRAZIL • ♀; Paraná, Balsa Nova, São Luiz do Purunã, Faz. Monjolo; 15 Dec. 2006–20 Jan. 2007; P. Löwenberg Neto leg.; pitfall; “\\Pelecium balli Orsetti & Lopes-Andrade HOLOTYPE” [printed on red paper]; CERPE.

##### Paratypes

BRAZIL • 1 ♂, 1 ♀; same collection data as for holotype; “\\Pelecium balli Orsetti & Lopes-Andrade PARATYPE” [printed on yellow paper]; CERPE.

#### Description

##### Female (holotype, fully pigmented adult)

MEASUREMENTS (in mm). AL1 0.8, AL2 0.4, EL 6.0, EW 4.0, PL 3.3, PW 3.3, HL 1.5, HW 2.1, TL 10.8, TL/EW 2.7, lp2L 0.5, lp3L 0.6, lp3W 0.2, mp3L 0.3, mp4L 0.6, mp4W 0.3.

**BODY.** Elongate, flat; disc of head, pronotum and elytra shiny black in dorsal view; glabrous (Fig. 2A). Ventral surface shiny black; sternite V with mesh of short yellowish setae in posterior portion.

**HEAD.** Microreticulate; frontal fovea punctiform (Fig. 2B). Antennae reddish brown, moderately long, almost reaching posterior margin of pronotum; antennomeres 1–3 with few long, sparse yellowish setae on apical portion; antennomeres 4–11 fully covered with small yellowish setae. Apical labial and maxillary palpomeres with long, sparse yellowish setae; broadly ovate, with apex obliquely truncated; reddish brown, with apicalmost portion lighter.

**PRONOTUM.** Sides rounded, each with a pair of long setae; posterior fourth oblique; median line narrow, shallow; posterior impressions shallow, line-shaped toward disc.

**ELYTRA.** Ovate; humeral projections evident; five striae deeply impressed; fifth stria short, sixth and seventh shallowly impressed, in between striae shiny and impunctate.

**LEGS.** Dark reddish brown; protarsomere 1–4 expanded, ventrally with vestiture of adhesive setae; protibiae expanded at apex, with few long yellowish setae ventrally and around antennal cleaner; mesotibiae slender, with few long yellowish setae throughout inner margin; metatibiae slender, with few long yellowish setae ventrally on apical half.

**GONOCOXITE 1** (Fig. 2H). With outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

**GONOCOXITE 2** (Fig. 2H). Subtriangular; basal lobe bearing ensiform setae on each side; ensiform setae long, with half to one third the length of gonocoxite 2; slender setae at apex.

#### Male

**MEASUREMENTS.** AL1 0.6, AL2 damaged, EL 5.6, EW 3.7, PL 3.3, PW 3.1, HL 1.5, HW 2.0, TL 10.4, TL/EW 2.8, lp2L 0.6, lp3L 0.6, lp3W 0.3, mp3L 0.3, mp4L 0.6, mp4W 0.3. Similar to females but devoid of mesh of short yellowish setae on sternite V. Apical labial and maxillary palpomeres triangular.

**ABDOMINAL TERGITE IX** (Fig. 2E). Oval, asymmetrical; anterior portion angulating toward left; inner anterior angle rounded; posterior portion rounded, with small projections on each side in apical portion.

**AEDEAGUS** (Fig. 2C–D, F–G). With **median lobe** (Fig. 2C–D) cylindrical, slender, asymmetrical; ostium reaching middle area of median lobe; apical lamella not evenly narrowed, bending a bit to the right; apical edges narrow; basal bulb thin; **parameres** (Fig. 2F–G) asymmetrical, left paramere (Fig. 2F) longer and thinner than right paramere (Fig. 2G).

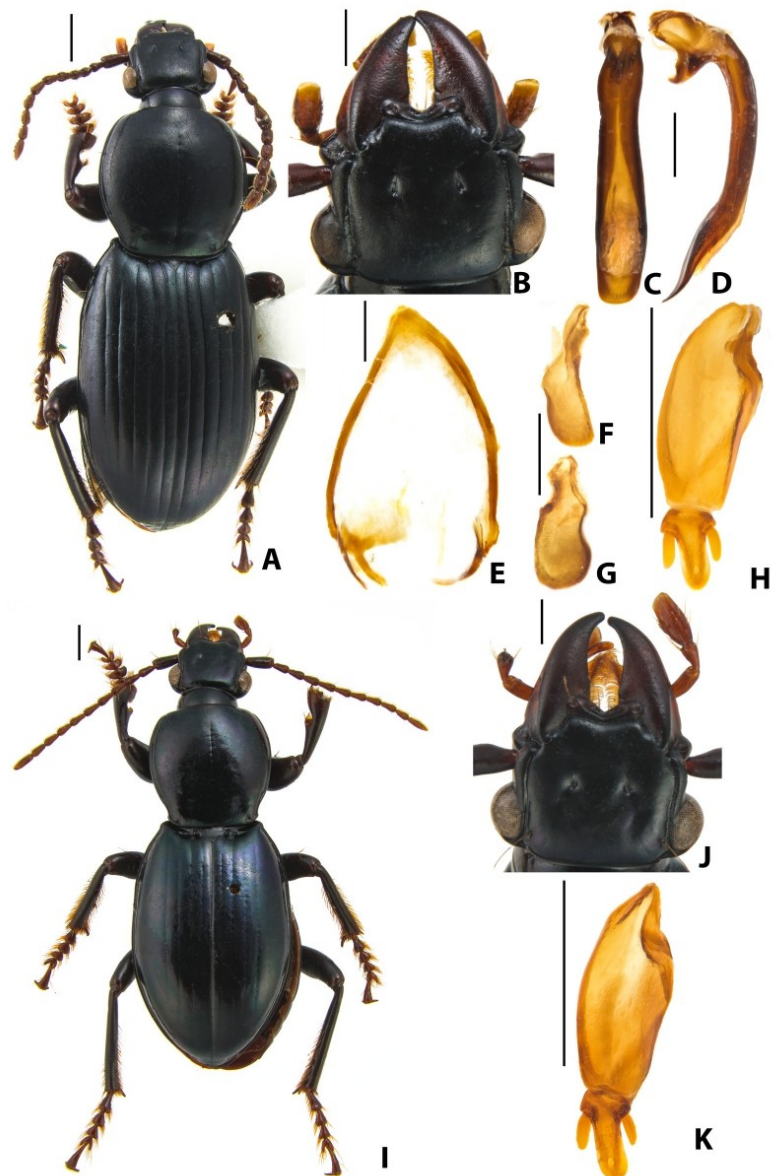
#### Variation

Among all specimens examined, the one in the best condition was chosen as the holotype.

**MEASUREMENTS** (in mm). Females (n = 2): AL1 0.7–0.8 (0.75 ± 0.07), AL2 0.3–0.4 (0.35 ± 0.07), EL 5.1–6.0 (5.55 ± 0.64), EW 3.3–4.0 (3.65 ± 0.49), PL 2.8–3.3 (3.05 ± 0.42), PW 2.8–3.3 (3.0 ± 0.42), HL 1.4–1.5 (2.9 ± 0.07), HW 1.8–2.1 (1.95 ± 0.21), TL 9.3–10.8 (10.05 ± 1.06), TL/EW 2.7–2.8 (2.76 ± 0.08), lp2L 0.5–0.5 (0.50 ± 0.0), lp3L 0.5–0.6 (0.55 ± 0.07), lp3W 0.2–0.2 (0.2 ± 0.0), mp3L 0.2–0.3 (0.25 ± 0.07), mp4L 0.5–0.6 (0.55 ± 0.07), mp4W 0.2–0.3 (0.25 ± 0.07).

#### Remarks

We include *P. balli* sp. nov. in the *P. rotundipenne* species group due to the following features: head frontal impressions punctiform, at least five elytral striae deeply impressed and fifth tarsomere without ventro-lateral setae.



**Fig. 2.** Habitus and dissected parts of some new species of *Pelecium* Kirby, 1817. **A–H.** *Pelecium balli* sp. nov., female holotype from São Luiz do Purunã, Paraná, Brazil (A–B, H) (CERPE) and male paratype from Balsa Nova, Paraná, Brazil (C–G) (CERPE). **A.** Dorsal view. **B.** Detail of head. **C–D.** Median lobe. **E.** Tergite IX. **F.** Left paramere. **G.** Right paramere. **H.** Female genitalia. – **I–K.** *Pelecium belloi* sp. nov., female holotype from São Luiz do Paraitinga, São Paulo, Brazil (CAMB). **I.** Dorsal view. **J.** Detail of head. **K.** Dissected genitalia. Scale bars: A–B, I–J = 1 mm; C–H, K = 0.5 mm.



*Pelecium belloi* sp. nov.

[um:lsid:zoobank.org:act:7959B9EA-F55F-4ED2-98F1-DC4CC6383E2A](https://zoobank.org/act:7959B9EA-F55F-4ED2-98F1-DC4CC6383E2A)

Figs 2I–K, 25

**Diagnosis**

A medium-sized species (10 mm) distinguishable among other congeners by the combination of the following features. Head frontal fovea punctiform (Fig. 2J). Pronotum median line fine and shallow; posterior impressions shallow, inconspicuous. Elytra ovate, without any deeply impressed striae (Fig. 2I). Adults of *P. belloi* sp. nov. and *P. laeve* are quite similar, as both have no deeply impressed elytral striae, but in the former species the pronotum is slightly wider than long, with sides arcuate and shortly subsinuate posteriorly, while in the latter the pronotum is elongate and slender, with sides equally arcuate throughout their lengths.

**Etymology**

The specific epithet '*belloi*' is an eponym in honor of the Brazilian coleopterist Ayr de Moura Bello, who lent us Carabidae beetles important for the present work and other taxonomic and morphological studies in progress.

**Type material**

**Holotype**

BRAZIL • ♀; São Paulo, São Luis do Paraitinga, Parque Estadual Serra do Mar Núcleo Sta. Virginia; Nov. 2004; M. Uehara leg.; “\\ Coleção A.M.BELLO \\ *Pelecium belloi* Orsetti & Lopes-Andrade HOLOTYPE” [printed on red paper]; CAMB.

**Paratypes**

BRAZIL • 3 ♀♀; same collection data as for holotype; 1 Jan. 2005; “\\ Coleção A.M.BELLO \\ *Pelecium belloi* Orsetti & Lopes-Andrade PARATYPE” [printed on yellow paper]; CAMB.

**Description**

**Female** (holotype, fully pigmented adult)

MEASUREMENTS (in mm). AL1 0.6, AL2 0.3, EL 4.7, EW 3.5, PL 2.6, PW 2.6, HL 1.3, HW 1.9, TL 8.6, TL/EW 2.5, lp2L 0.5, lp3L 0.5, lp3W 0.2, mp3L 0.2, mp4L 0.5, mp4W 0.2.

BODY. Ovate, flat; disc of head, pronotum and elytra shiny black, with purple and green reflections on sides in dorsal view; glabrous (Fig. 2I). Ventral surface shiny black.

HEAD. Microreticulate; frontal foveae shallow, punctiform (Fig. 2J). Antennae reddish brown, long, reaching anterior portion of elytra; antennomeres 1–3 with few long, sparse yellowish setae on apical portion; antennomeres 4–11 fully covered by short yellowish setae. Apical labial and maxillary palpomeres with long, sparse yellowish setae; ovate with apex obliquely truncated; reddish brown, apicalmost portion lighter.

PRONOTUM. Slightly wider than long; sides arcuate, shortly subsinuate posteriorly, each with pair of long setae; median line narrow, shallow; posterior impressions shallow, inconspicuous.

ELYTRA. Ovate, without any deeply impressed striae; three striae faintly impressed; in between striae shiny and impunctate.

LEGS. Dark reddish brown; protarsomeres 1–4 expanded, ventrally with vestiture of adhesive setae; protibiae expanded at apex, with few long yellowish setae ventrally and around antennal cleaner;

mesotibiae slender, with few long yellowish setae laterally throughout their lengths; metatibiae slender, with few long yellowish setae ventrally on apical half.

GONOCOXITE 1 (Fig. 2K). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 2K). Subtriangular; apex rounded; basal lobe with ensiform setae on each side; ensiform setae long, with half to one-third the length of gonocoxite 2; apex with slender setae.

#### Male

Unknown.

#### Variation

All specimens examined are females and, among all, the one in the best condition was chosen as the holotype.

MEASUREMENTS (in mm) (n=4). AL1 0.6–0.9 ( $0.75 \pm 0.13$ ), AL2 0.3–0.4 ( $0.33 \pm 0.05$ ), EL 4.7–7.0 ( $5.6 \pm 0.99$ ), EW 3.5–4.6 ( $3.83 \pm 0.53$ ), PL 2.6–3.6 ( $2.95 \pm 0.44$ ), PW 2.6–3.6 ( $2.95 \pm 0.44$ ), HL 1.3–1.6 ( $1.38 \pm 0.15$ ), HW 1.9–2.0 ( $1.93 \pm 0.05$ ), TL 8.6–12.2 ( $9.93 \pm 1.57$ ), TL/EW 2.5–2.7 ( $2.59 \pm 0.09$ ), lp2L 0.5–0.5 ( $0.5 \pm 0.0$ ), lp3L 0.5–0.6 ( $0.53 \pm 0.05$ ), lp3W 0.2–0.2 ( $0.2 \pm 0.0$ ), mp3L 0.2–0.3 ( $0.28 \pm 0.05$ ), mp4L 0.5–0.7 ( $0.6 \pm 0.08$ ), mp4W 0.2–0.3 ( $0.25 \pm 0.06$ ).

#### Remarks

We include *P. belloi* sp. nov. in the *P. laeve* species group due to the punctiform frontal impressions and the lack of elytral striation.

#### *Pelecium buckupi* sp. nov.

[urn:lsid:zoobank.org:act:8D044F54-985E-451D-AC66-FCFFDD0349F4](https://zoobank.org/act:8D044F54-985E-451D-AC66-FCFFDD0349F4)

Figs 3A–G, 25

#### Diagnosis

A medium-sized species (12 mm) distinguishable among other congeners by the combination of the following features. Body elongate (Fig. 3A). Head with frontal fovea (Fig. 3B) short and shallow. Pronotum longer than wide; median line fine and shallow, deeper in the disc; posterior impressions punctiform (Fig. 3A), surrounded by a shallow excavation. Adults of *P. buckupi* sp. nov. and *P. bolivianum* are quite similar, but in the former the elytra are elongate, subparallel-sided, and the pronotal sides are slightly arcuate, almost parallel, while in the latter the elytra are ovate, with sides markedly convex, and the pronotum is anteriorly very convex, with lateral margins arcuate and subsinuate anterior to postero-lateral angles.

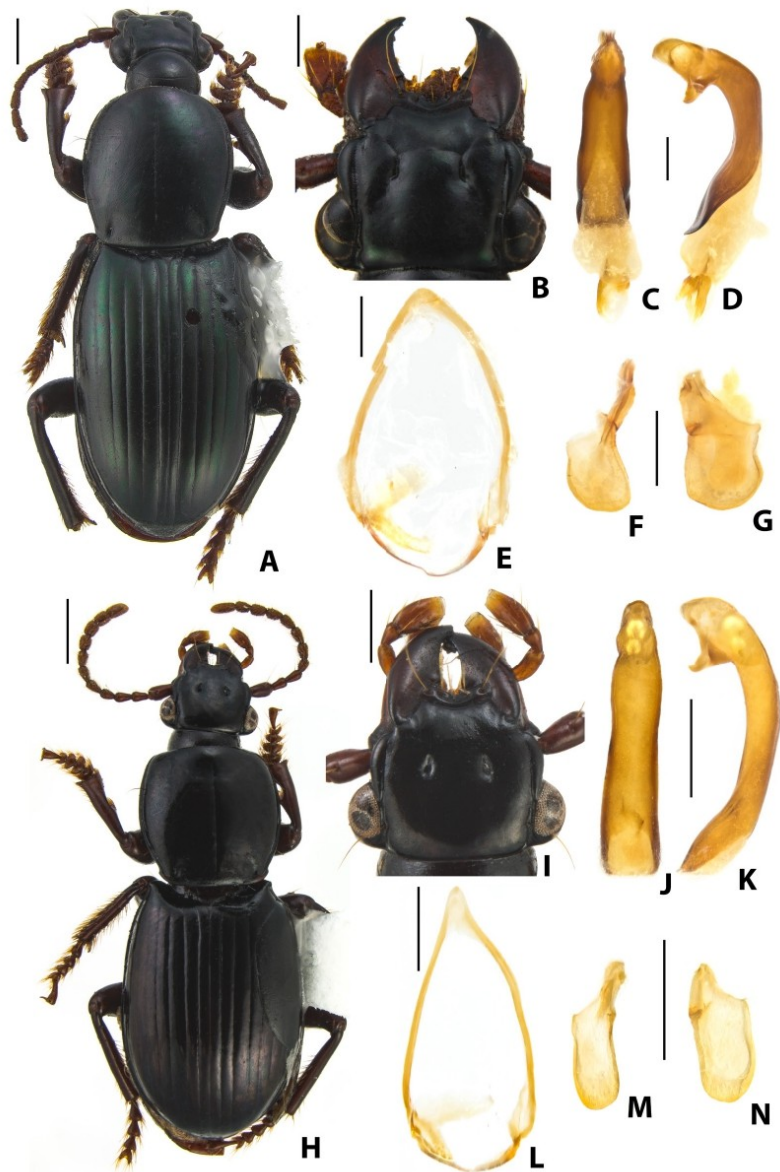
#### Etymology

The specific epithet ‘*buckupi*’ is an eponym in honor of the Brazilian researcher Ludwig Buckup (1932–2021), one of the founders of Fundação Zoobotânica do Rio Grande do Sul (FZBRS).

#### Type material

##### Holotype

BRAZIL • ♂; Goiás, Minaçu, Serra da Mesa; 9–20 Dec. 1996; “\ Col. MCN 159949 \ *Pelecium buckupi* Orsetti & Lopes-Andrade HOLOTYPUS” [printed on red paper]; FZBRS.



**Fig. 3.** Habitus and dissected parts of some new species of *Pelecium* Kirby, 1817. **A–G.** *Pelecium buckupi* sp. nov., male holotype from Serra da Mesa, Goiás, Brazil (FZBRS). **A.** Dorsal view. **B.** Detail of head. **C–D.** Median lobe. **E.** Tergite IX. **F.** Left paramere. **G.** Right paramere. – **H–N.** *Pelecium chrissquirei* sp. nov., male holotype from Alto Caparaó, Minas Gerais, Brazil (CELC). **H.** Dorsal view. **I.** Detail of head. **J–K.** Median lobe. **L.** Tergite IX. **M.** Left paramere. **N.** Right paramere. Scale bars: A–B, H–I = 1 mm; C–G, J–N = 0.5 mm.



### Description

**Male** (holotype, fully pigmented adult)

MEASUREMENTS (in mm). AL1 0.8, AL2 0.4, EL 6.2, EW 0.4, PL 3.7, PW 3.3, HL 1.6, HW 2.3, TL 11.5, TL/EW 2.9, lp2L 0.7, lp3L 0.7, lp3W 0.5, mp3L 0.2, mp4L 0.7, mp4W 0.4.

**BODY.** Elongate, flat; discs of head, pronotum and elytra metallic dark green, with purple reflections alongside in dorsal view; glabrous (Fig. 3A). Ventral surface shiny black.

**HEAD.** Microreticulate, with a pair of frontal foveae, each formed by shallow excavation reaching anterior plane of eyes (Fig. 3B). Antennae reddish brown, short, reaching middle of pronotum; antennomeres 1–3 with few long, sparse yellowish setae at apical portion; antennomere 4 with apical half covered with both short and long yellowish setae; antennomeres 5–11 fully covered with both short and long yellowish setae. Apical labial and maxillary palpomeres with long, sparse yellowish setae; triangular, reddish brown, apicalmost portion lighter.

**PRONOTUM.** Longer than wide; sides arcuate, each with pair of long setae; posterior fourth subparallel; posterolateral angles obtuse; median line narrow, shallow, deeper on disc; posterior impressions punctiform; anterior extension shallow toward pronotal disc (Fig. 3A).

**ELYTRA.** Elongate, sides subparallel; fifth stria deeply impressed; striae 3–5 short, not reaching elytral apex; stria 6 shallow; in between striae shiny, impunctate.

**LEGS.** Dark reddish brown; protarsomeres 1–4 expanded, ventrally with vestiture of adhesive setae; protibiae expanded at apex, with few long yellowish setae ventrally and around antennal cleaner; mesotibiae slender, with few long yellowish setae laterally throughout their lengths; metatibiae slender, with few long yellowish setae ventrally on apical half.

**ABDOMINAL TERGITE IX** (Fig. 3E). Oval, asymmetrical; anterior portion angulate; inner anterior angle rounded; posterior portion rounded, with inconspicuous sinuous line at apex.

**AEDEAGUS** (Fig. 3C–D, F–G). With **median lobe** (Fig. 3C–D) short, cylindrical, sinuous at apical third, asymmetrical, bent over toward base, slightly broadening apically in apical lamella; ostium short; apical lamella edges narrow, evenly narrowed; basal bulb thin; **parameres** (Fig. 3F–G) asymmetrical, left paramere (Fig. 3F) securiform, narrow; right paramere square with round angles (Fig. 3G).

### Female

Unknown.

### Remarks

We include *P. buckupi* sp. nov. in the *P. punctatostriatum* species group based on the following features: long frontal cephalic impression, each elytron with five elytral striae deeply impressed and fifth tarsomere with row of setae on each ventrolateral margin (Straneo & Ball 1989). It is necessary to expand the group limits to include species with green reflections on the dorsal surface in order to include *P. buckupi* in the *P. punctatostriatum* group.

*Pelecium chrissquirei* sp. nov.

[urn:lsid:zoobank.org:act:01D54246-34A9-4789-9AF0-A47C57560EFD](https://zoobank.org/act:01D54246-34A9-4789-9AF0-A47C57560EFD)

Figs 4A–G, 25

**Diagnosis**

A small-sized species (7 mm) distinguishable among other congeners by the combination of the following features. Head with frontal fovea punctiform, surrounded by short excavations (Fig. 4B). Pronotum median line shallow; posterior impression shallow, curving toward centre. Elytral striae 1–5 deeply impressed and stria 6 shallow. Adults of *P. chrissquirei* sp. nov. and *P. helenae* are quite similar, but in the former the pronotal posterior impression is shallow, elongate toward centre and the male maxillary palpomere 4 is broadly ovate with the apex obliquely truncated, while in the latter the pronotal posterior impression is short, shallow, almost indiscernible, and the maxillary palpomere 4 is triangular.

**Etymology**

The specific epithet '*chrissquirei*' is an eponym in honor of the British musician Christopher Russell Edward Squire (1948–2015), known as Chris Squire, who was one of the founding members and bass player of the progressive rock band "Yes".

**Type material**

**Holotype**

BRAZIL • ♂; Minas Gerais, Alto Caparaó, PARNA Caparaó; 14 Nov. 2016; A. Orsetti and S. Aloquio leg.; pitfall; "\ *Pelecium chrissquirei* Orsetti & Lopes-Andrade HOLOTYPE" [printed on red paper]; CELC.

**Description**

**Male** (holotype, fully pigmented adult)

MEASUREMENTS (in mm). AL1 0.5, AL2 0.3, EL 4.0, EW 2.9, PL 2.2, PW 2.3, HL 1.1, HW 1.6, TL 7.3, TL/EW 2.5, lp2L 0.3, lp3L 0.4, lp3W 0.2, mp3L 0.2, mp4L 0.4, mp4W 0.2.

BODY. Ovate, flat; disc of head, pronotum and elytra black, with light metallic green reflections alongside in dorsal view; glabrous (Fig. 4A). Ventral surface shiny black.

HEAD. Microreticulate, frontal foveae punctiform, with short excavation around foveae (Fig. 4B). Antennae reddish brown, moderately long, almost reaching posterior portion of pronotum; antennomeres 1–3 with few long, sparse yellowish setae at apical portion; antennomere 4 with apical half covered with both short and long yellowish setae; antennomeres 5–11 fully covered with both short and long yellowish setae. Apical labial and maxillary palpomeres with long, sparse yellowish setae; broadly ovate with apex obliquely truncated; reddish brown; apicalmost portion lighter.

PRONOTUM. Wider than long, sub-quadrate; sides arcuate, each with pair of long setae; posterolateral angles obtuse; median line narrow, shallow, deeper on disc; posterior impressions shallow, curving toward centre.

ELYTRA. Ovate; striae 1–5 deeply impressed; stria 6 shallowly impressed; in between striae shiny, impunctate.

LEGS. Reddish brown; protarsomeres 1–4 expanded, ventrally with vestiture of adhesive setae; protibiae expanded at apex, with few long yellowish setae ventrally and around antennal cleaner; mesotibiae slender, with few long yellowish setae laterally throughout their lengths; metatibiae slender, with few long yellowish setae ventrally on apical half.

ABDOMINAL TERGITE IX (Fig. 4E). Oval, elongate, asymmetrical; anterior portion tapered in an acute projection; right side more arcuate than left side; inner anterior angle rounded; posterior portion rounded; apical sides subsinuous.

AEDEAGUS (Fig. 4C–D, F–G). With **median lobe** (Fig. 4C–D) cylindrical, elongate, asymmetrical, bent over smoothly, broadening apically; ostium very short, confined to apical fourth; apical lamella very short, indiscernible, apical edges steep; basal bulb thin; **parameres** (Fig. 4F–G) asymmetrical, left paramere (Fig. 4F) longer and thinner than right paramere (Fig. 4G).

#### Female

Unknown.

#### Remarks

We include *P. chrissquirei* sp. nov. in the *P. rotundipenne* species group due to the following features: head frontal impressions punctiform, each elytron with at least five deeply impressed striae and fifth tarsomere without ventro-lateral setae.

#### *Pelecium fistulosus* sp. nov.

[urn:lsid:zoobank.org:act:130FE372-E6E1-45E0-A5EB-DC065904253D](https://zoobank.org/act:130FE372-E6E1-45E0-A5EB-DC065904253D)

Figs 4A–H, 25

#### Diagnosis

A large-sized species (16 mm) distinguishable among other congeners by the combination of the following features. Head frontal fovea short, deeply impressed (Fig. 4A). Pronotum median line long and deep; posterior impressions deep. Elytra elongate, ovate, each with 7 striae deeply impressed and punctate (Fig. 4A). Adults of *P. fistulosus* sp. nov. and *P. punctatostriatum* are quite similar, as both have punctate elytral striae, but in the former the pronotum is wider than long and each elytron has 7 deeply impressed striae, while in the latter the pronotum is longer than wide and each elytron has 5 deeply impressed striae.

#### Etymology

The specific epithet is from the Latin “*fistulosus*”, which means “full of holes”, in reference to the punctate elytral striae.

#### Type material

##### Holotype

BRAZIL • ♂; Mato Grosso, Novo Mundo, PE Cristalino; Nov. 2012; V. Magalhães leg.; “Pitfall \\\ *Pelecium fistulosus* Orsetti & Lopes-Andrade HOLOTYPUS” [printed on red paper]; CEMT.

##### Paratypes

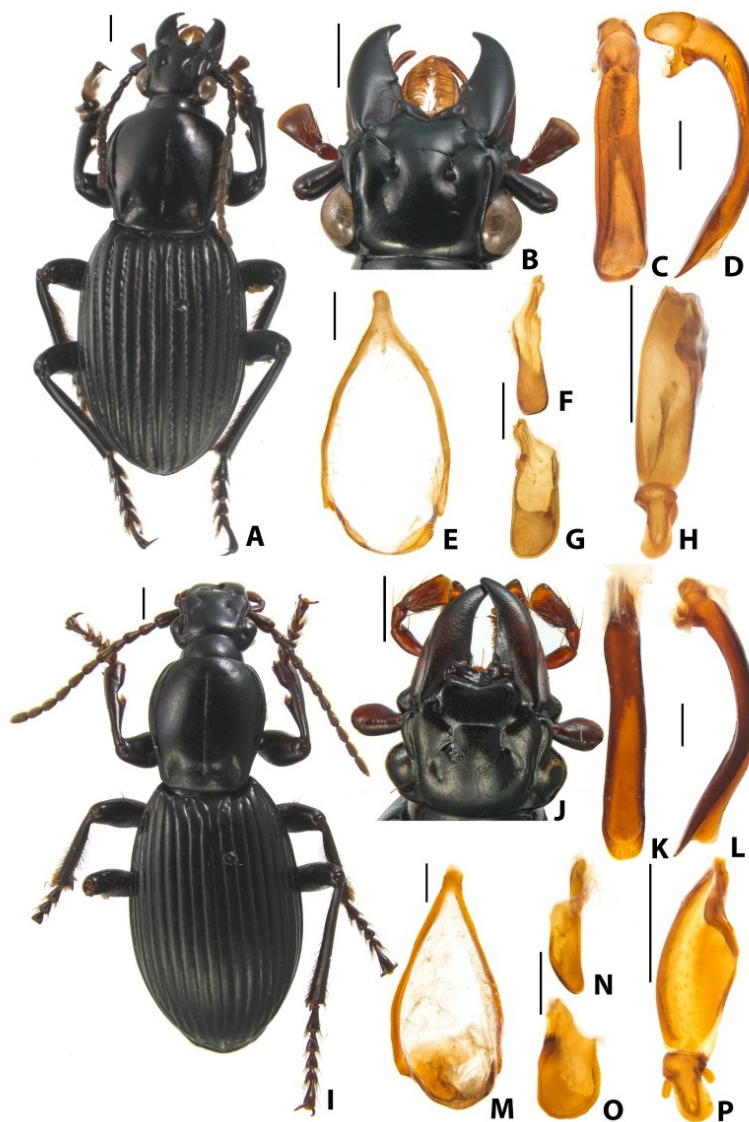
BRAZIL • 4 ♀♀; same collection data as for holotype; 2 ♀♀; May 2013; “// *Pelecium fistulosus* Orsetti & Lopes-Andrade PARATYPUS” [printed on yellow paper]; CEMT.

#### Description

##### Male (holotype, fully pigmented adult)

MEASUREMENTS (in mm). AL1 1.3, AL2 0.6, EL 9.0, EW 6.4, PL 4.0, PW 5.0, HL 2.2, HW 3.3, TL 16.0, TL/EW 2.5, lp2L 0.8, lp3L 0.9, lp3W 0.6, mp3L 0.4, mp4L 0.9, mp4W 0.6.

BODY. Elongate, flat; head, pronotum and elytra shiny black; glabrous. Ventral surface shiny black (Fig. 4A).



**Fig. 4.** Habitus and dissected parts of some new species of *Pelecium* Kirby, 1817. **A–H.** *Pelecium fistulosus* sp. nov., male holotype from Novo Mundo, Mato Grosso, Brazil (A–G) (CEMT) and female paratype from Novo Mundo, Mato Grosso, Brazil (H) (CEMT). **A.** Dorsal view. **B.** Detail of head. **C–D.** Median lobe. **E.** Tergite IX. **F.** Left paramere. **G.** Right paramere. **H.** Genitalia. – **I–P.** *Pelecium grossii* sp. nov., male holotype from Florianópolis, Santa Catarina, Brazil (I–O) (FZBRS) and female paratype from Florianópolis, Santa Catarina, Brazil (P) (FZBRS). **I.** Dorsal view. **J.** Detail of head. **K–L.** Median lobe. **M.** Tergite IX. **N.** Left paramere. **O.** Right paramere. **P.** Genitalia. Scale bars: A–B, I–J = 1 mm; C–H, K–P = 0.5 mm.



**HEAD.** Microreticulate, frontal foveae deeply impressed, short (Fig. 4B). Antennae reddish brown, long, reaching anterior portion of elytra; antennomeres 1–3 with few long, sparse yellowish setae at apical portion; antennomere 4 half covered with short yellowish setae; antennomeres 5–11 fully covered with short yellowish setae. Apical labial and maxillary palpomeres with long, sparse yellowish setae; triangular, reddish brown, apicalmost portion lighter.

**PRONOTUM.** Slightly wider than long, sides arcuate, each with pair of long setae; median line long, deeply impressed, with anterior edge limited by elongated punctation; posterior impressions deep toward pronotal disc.

**ELYTRA.** Elongate, ovate; each with 7 deeply impressed striae, markedly punctate; in between striae shiny, impunctate.

**LEGS.** Black; protarsomere 1–4 expanded, ventrally with vestiture of adhesive setae; protibiae expanded at apex, with few long yellowish setae ventrally and surrounding antennal cleaner; mesotibiae slender, slightly expanded at apex, with few long yellowish setae throughout inner margins; metatibiae slender, with few long yellowish setae ventrally on apical half.

**ABDOMINAL TERGITE IX** (Fig. 4E). Oval, slightly asymmetrical, sides converging in long projection at base; anterior inner angle rounded; apex rounded.

**AEDEAGUS** (Fig. 4C–D, F–G). With **median lobe** (Fig. 4C–D) cylindrical, dorsoventrally flattened in medial half, elongate, asymmetrical, slightly broadening apically; ostium long, reaching central area of median lobe; apical lamella short, not evenly narrowed; basal bulb thin; **parameres** (Fig. 4F–G) asymmetrical; left paramere (Fig. 4F) longer and thinner than right paramere (Fig. 4G).

#### Female

Similar to males but with mesh of long yellow setae on basal region of tergite V.

**GONOCOXITE 1** (Fig. 4H). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

**GONOCOXITE 2** (Fig. 4H). Elongate, basal lobe bearing ensiform setae on each side; ensiform setae long, with half length of gonocoxite 2; slender setae at apex.

#### Variation

Among all specimens examined, the one in the best condition was chosen as the holotype.

**MEASUREMENTS** (in mm). Females ( $n = 4$ ): AL1 1.2–1.0 ( $1.13 \pm 0.1$ ), AL2 0.4–0.5 ( $0.5 \pm 0.08$ ), EL 8.9–9.5 ( $9.15 \pm 0.3$ ), EW 6.0–6.7 ( $6.35 \pm 0.31$ ), PL 4.5–5.2 ( $4.88 \pm 0.3$ ), PW 4.6–5.4 ( $5.05 \pm 0.34$ ), HL 2.0–2.2 ( $2.13 \pm 0.1$ ), HW 3.0–3.5 ( $3.28 \pm 0.22$ ), TL 15.4–16.9 ( $16.15 \pm 0.65$ ), TL/EW 2.5–2.6 ( $2.54 \pm 0.02$ ), lp2L 0.8–0.9 ( $0.83 \pm 0.05$ ), lp3L 0.8–1.0 ( $0.9 \pm 0.08$ ), lp3W 0.3–0.4 ( $0.35 \pm 0.06$ ), mp3L 0.4–0.5 ( $0.45 \pm 0.06$ ), mp4L 0.8–0.9 ( $0.83 \pm 0.05$ ), mp4W 0.4–0.4 ( $0.4 \pm 0.0$ ).

#### Remarks

We include *P. fistulosus* sp. nov. in the *P. punctatostriatum* species group due to the punctiform frontal impressions of the head, the deep and elongate posterior impression of the pronotum and tarsomere 5 having a row of setae on the ventrolateral margin.

*Pelecium grossii* sp. nov.

urn:lsid:zoobank.org:act:30469A6E-D796-4291-8D99-42B9D75EF2B0

Figs 4I–P, 25

**Diagnosis**

A medium-sized species (15 mm) distinguishable among other congeners by the combination of the following features. Head frontal fovea extended, reaching plane of eyes (Fig. 4J). Pronotum median line long and deep; posterior impressions deep. Elytra elongate, ovate, each with 8 deeply impressed striae (Fig. 4I). Adults of *P. grossii* sp. nov. and *P. violaceum* are quite similar, as both have 8 deeply impressed striae in each elytron, but in the former the eyes are small and the dorsal surface has no bright colour, while in the latter the eyes are large and the dorsal surface is violaceous bright at least on the sides.

**Etymology**

The specific epithet '*grossii*' is an eponym in honor of the Brazilian coleopterist Paschoal Coelho Grossi, who lent us Carabidae beetles important for the present work and other taxonomic and morphological studies in progress.

**Type material**

**Holotype**

BRAZIL • ♂; Paraná, Cap. Leonidas Marques; 25 Mar. 1993; A.B. Bonaldo leg.; “// *Pelecium grossii* Orsetti & Lopes-Andrade HOLOTYPUS” [printed on red paper]; FZBRS.

**Paratypes**

BRAZIL • 1 ♀; same collection data as for holotype; “// *Pelecium grossii* Orsetti & Lopes-Andrade PARATYPUS” [printed on yellow paper]; FZBRS • 1 ♂; Santa Catarina, Florianópolis, UCAD; 3–10 Nov. 2003; C. Espírito Santo leg.; pitfall; “// *Pelecium grossii* Orsetti & Lopes-Andrade PARATYPUS” [printed on yellow paper]; CERPE • 1 ♀, Santa Catarina, Urubici, R.I.P.N. Leão da Montanha; 6 Nov. 2015; P.G. da Silva leg.; “\\ Coleção A. M. BELLO \\ *Pelecium grossii* Orsetti & Lopes-Andrade PARATYPUS” [printed on yellow paper]; CAMB • 1 ♀; Santa Catarina, Florianópolis, UCAD; 26 Jun.–5 Jul. 2004; C. Espírito Santo leg.; pitfall; “// *Pelecium grossii* Orsetti & Lopes-Andrade PARATYPUS” [printed on yellow paper]; CERPE.

**Description**

**Male** (holotype, fully pigmented adult)

MEASUREMENTS (in mm). AL1 1.0, AL2 0.5, EL 7.9, EW 5.2, PL 4.3, PW 3.9, HL 2.1, HW 2.4, TL 14.3, TL/EW 2.8, lp2L 0.9, lp3L 1.0, lp3W 0.8, mp3L 0.4, mp4L 0.9, mp4W 0.6.

BODY. Elongate, flat; head, pronotum and elytra shiny black; glabrous. Ventral surface shiny black (Fig. 4I).

HEAD. Microreticulate; frontal foveae deeply impressed, with a shallow excavation reaching anterior plane of eyes (Fig. 4J). Antennae reddish brown, long, reaching anterior portion of elytra; antennomeres 1–3 with few long, sparse yellowish setae at apical portion; antennomeres 4–11 fully covered with short yellowish setae. Apical labial and maxillary palpomeres with long, sparse yellowish setae; triangular, reddish brown, with apicalmost portion lighter.

PRONOTUM. Slightly longer than wide, sides arcuate, each with a pair of long setae; median line long and deeply impressed, with anterior edge limited by elongated punctation; posterior impressions deep, toward pronotal disc.

ELYTRA. Elongate, ovate, each with 8 deeply impressed striae; in between striae shiny, impunctate.



LEGS. Dark reddish brown; protarsomeres 1–4 expanded, ventrally with vestiture of adhesive setae; protibiae expanded at apex, with few long yellowish setae ventrally and surrounding antennal cleaner; mesotibiae slender, with few long yellowish setae throughout inner margin, slightly expanded at apex; metatibiae slender, with few long yellowish setae ventrally on apical half.

ABDOMINAL TERGITE IX (Fig. 4M). Elongate, triangular, asymmetrical, with round basal projection; inner anterior angle sharp; apex rounded.

AEDEAGUS (Fig. 4K–L, N–O). With **median lobe** (Fig. 4K–L) cylindrical, slender, asymmetrical, sinuous; ostium elongate, reaching middle area of median lobe; apical lamella short, apical edges sharp; basal bulb thin; **parameres** (Fig. 4N–O) asymmetrical; left paramere (Fig. N) elongate, posterior angle rounded; right paramere (Fig. O) larger than left paramere, with posterior angle rounded.

#### Female

Similar to males but with mesh of long yellow setae in basal region of tergite V.

GONOCOXITE 1 (Fig. 4P). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 4P). Elongate, basal lobe bearing ensiform setae on each side; ensiform setae short, with fourth to fifth the length of gonocoxite 2; slender setae at apex.

#### Variation

Among all specimens examined, the one in the best condition was chosen as the holotype.

MEASUREMENTS (in mm). Males (n = 2): AL1 1.0–1.1 (1.05 ± 0.14), AL2 0.5–0.7 (0.6 ± 0.14), EL 7.9–8.7 (8.3 ± 0.57), EW 5.3–5.9 (5.55 ± 0.49), PL 4.3–4.9 (4.6 ± 0.42), PW 3.9–4.6 (4.25 ± 0.49), HL 2.1–2.2 (2.15 ± 0.07), HW 2.4–3.1 (2.75 ± 0.49), TL 14.3–15.8 (15.05 ± 1.06), TL/EW 2.8–2.7 (2.71 ± 0.05), lp2L 0.9–1.0 (0.95 ± 0.07), lp3L 1.0–1.1 (1.05 ± 0.07), lp3W 0.8–0.9 (0.85 ± 0.07), mp3L 0.4–0.4 (0.4 ± 0.0), mp4L 0.9–1.1 (1.0 ± 0.14), mp4W 0.6–0.8 (0.7 ± 0.14). Females (n = 3): AL1 1.0–1.6 (1.2 ± 0.35), AL2 0.6–0.8 (0.67 ± 0.12), EL 8.13–11.0 (9.23 ± 1.53), EW 5.3–7.0 (6.0 ± 0.89), PL 4.0–5.8 (4.7 ± 0.96), PW 3.8–5.3 (4.3 ± 0.87), HL 1.9–2.8 (2.27 ± 0.47), HW 2.5–3.7 (3.0 ± 0.62), TL 14.2–19.6 (16.2 ± 2.96), TL/EW 2.7–2.8 (2.69 ± 0.1), lp2L 0.8–0.9 (0.83 ± 0.06), lp3L 0.9–1.1 (1.0 ± 0.1), lp3W 0.5–0.6 (0.57 ± 0.06), mp3L 0.4–0.4 (0.4 ± 0.0), mp4L 0.8–1.2 (0.93 ± 0.23), mp4W 0.4–0.6 (0.5 ± 0.1).

#### Remarks

We include *P. grossii* sp. nov. in the *P. violaceum* species group due to the elongate and narrow frontal impressions of the head, pronotal impressions deep and each elytron with eight deeply impressed striae.

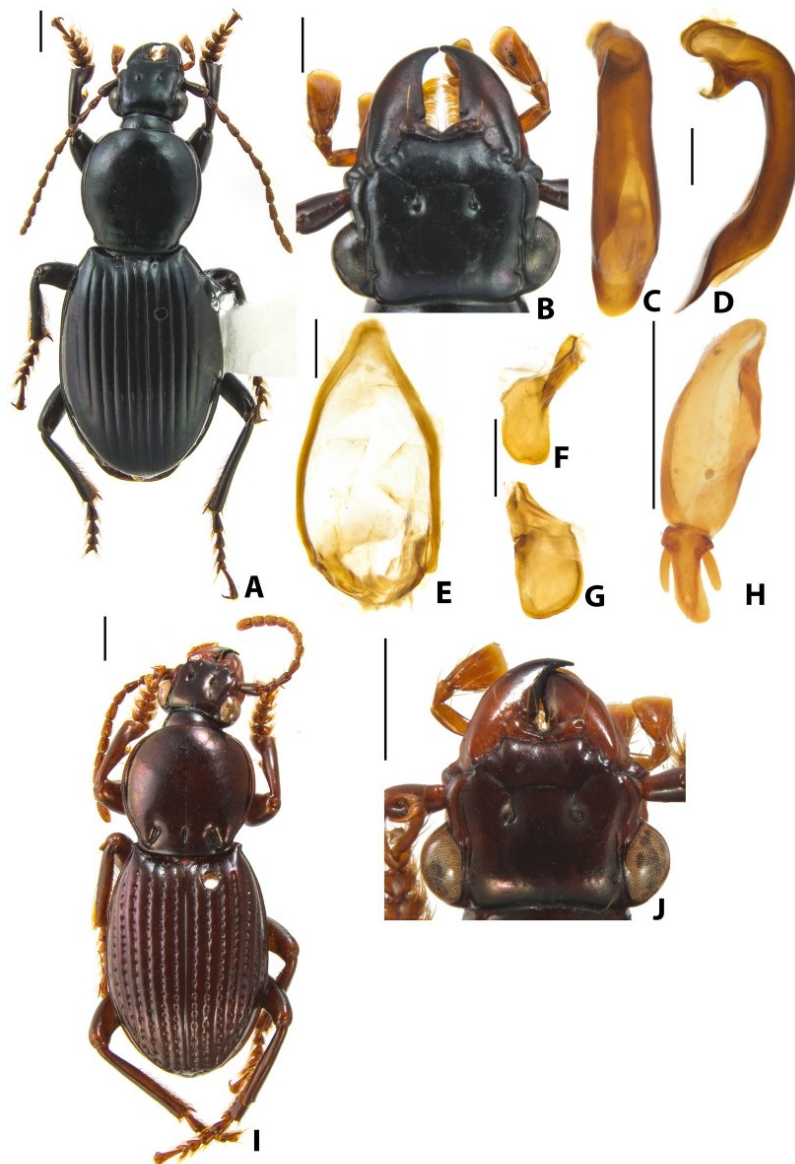
*Pelecium straneoi* sp. nov.

um:lsid:zoobank.org:act:EF1F8585-1612-429A-8267-D24419480913

Figs 5A–H, 25

#### Diagnosis

A medium-sized species (10 mm) distinguishable among other congeners by the combination of the following features. Head frontal fovea punctiform (Fig. 5B). Pronotum lateral margins rounded, sinuous right before posterolateral angles; median line fine and shallow; posterior impressions inconspicuous. Each elytron with striae 1–6 deeply impressed. Adults of *P. straneoi* sp. nov. and *P. paulae* are quite similar, but the former has the posterior impressions of the pronotum less distinct.



**Fig. 5.** Habitus and dissected parts of some new species of *Pelecium* Kirby, 1817. **A–H.** *Pelecium straneoi* sp. nov., male holotype from São Luís do Piratinga, São Paulo, Brazil (A–G) (CAMB) and female paratype from São Luís do Piratinga, São Paulo, Brazil (H) (CAMB). **A.** Dorsal view. **B.** Detail of head. **C–D.** Median lobe. **E.** Tergite IX. **F.** Left paramere. **G.** Right paramere. **H.** Genitalia. – **I–J.** *Pelecium zaguryi* sp. nov., male holotype from Cotriguaçu, Mato Grosso, Brazil (CEMT). **I.** Dorsal view. **J.** Detail of head. Scale bars: A–B, I–J = 1 mm; C–H = 0.5 mm.

### Etymology

The specific epithet '*straneoi*' is an eponym in honor of the Italian coleopterist Stefano Ludovico Straneo (1902–1997), who was an expert in ground beetles (Carabidae) and made great contributions to the taxonomy of the genus *Pelecium*.

### Type material

#### Holotype

BRAZIL • ♂; São Paulo, São Luís do Paraitinga, Pq. Est. Serra do Mar, Núcleo Sta. Virginia; Jan. 2005; M. Uehara leg.; “\\ Coleção A.M.BELLO \\ *Pelecium straneoi* Orsetti & Lopes-Andrade HOLOTYPE” [printed on red paper]; CAMB.

#### Paratypes

BRAZIL • 1 ♂, 2 ♀♀; same collection data as for holotype; 1 May 2005; “\\ Coleção A.M.BELLO \\ *Pelecium straneoi* Orsetti & Lopes-Andrade PARATYPE” [printed on yellow paper]; CAMB • 1 ♀; São Paulo, Campos do Jordão, Horto; Feb. 1990; A. Bello leg.; “\\ Coleção A.M.BELLO \\ *Pelecium straneoi* Orsetti & Lopes-Andrade PARATYPE” [printed on yellow paper]; CAMB.

### Description

#### Male (holotype, fully pigmented adult)

MEASUREMENTS (in mm). AL1 0.7, AL2 0.4, EL 5.9, EW 4.0, PL 3.1, PW 3.0, HL 1.4, HW 2.0, TL 10.4, TL/EW 2.6, lp2L 0.5, lp3L 0.6, lp3W 0.3, mp3L 0.3, mp4L 0.6, mp4W 0.3.

BODY. Ovale, flat; disc of head, pronotum and elytra shiny black in dorsal view; glabrous (Fig. 5A). Ventral surface shiny black.

HEAD. Microreticulate, longer than wide; frontal foveae punctiform, with no excavations (Fig. 5B). Antennae reddish brown, long, reaching anterior portion of elytra; antennomeres 1–3 with few long, sparse yellowish setae at apical portion; antennomeres 4–11 fully covered with both short and long yellowish setae. Apical labial and maxillary palpomeres with long, sparse yellowish setae; ovate with apex obliquely truncated, reddish brown, with apicalmost portion lighter.

PRONOTUM. With pair of long setae on each side; lateral margins rounded, sinuous right before posterolateral angles; anterolateral angles rounded; posterior angles nearly sinuate; median line narrow, shallow, deeper on disc; posterior impressions inconspicuous.

ELYTRA. Ovale; each with six deeply impressed striae; in between striae shiny, impunctate.

LEGS. Dark reddish brown; protibiae expanded at apex, with few long yellowish setae ventrally and surrounding antennal cleaner; protarsomeres 1–4 expanded, ventrally with vestiture of adhesive setae; mesotibiae slender, with few long yellowish setae throughout inner margin; metatibiae slender, with few long yellowish setae ventrally on apical half.

ABDOMINAL TERGITE IX (Fig. 5E). Subelongate, asymmetrical; sides subparallel, right side more curved than left side, posterior third rounded; anterior portion converging in rounded projection; inner anterior angle rounded.

AEDEAGUS (Fig. 5C–D, F–G). With **median lobe** (Fig. 5C–D) cylindrical, short, asymmetrical, apical portion expanded; ostium short, confined to apical third; apical lamella elongate, not evenly narrowed, apical edges sharp; basal bulb thin; **parameres** (Fig. 5F–G) asymmetrical, left paramere (Fig. 5F) securiform, longer and thinner than right paramere (Fig. 5G).

#### Female

Similar to males but with mesh of long yellow setae on basal region of tergite V.

GONOCOXITE 1 (Fig. 5H). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 5H). Subtriangular, basal lobe bearing ensiform setae on each side; ensiform setae long, with half length of gonocoxite 2; slender setae at apex.

#### Variation

Among all specimens examined, the one in the best condition was chosen as the holotype.

MEASUREMENTS (in mm). Males (n = 2): AL1 0.7–0.7 (0.7±0.0), AL2 0.4–0.3 (0.35±0.07), EL 5.0–5.9 (5.45±0.64), EW 3.5–4.0 (3.75±0.35), PL 2.8–3.1 (2.95±0.21), PW 2.6–3.0 (2.8±0.28), HL 1.3–1.4 (1.35±0.07), HW 1.8–2.0 (1.9±0.14), TL 9.1–10.4 (9.75±0.92), TL/EW 2.6–2.6 (2.6±0.0), lp2L 0.5–0.5 (0.5±0.0), lp3L 0.6–0.6 (0.6±0.0), lp3W 0.2–0.3 (0.25±0.07), mp3L 0.2–0.3 (0.25±0.07), mp4L 0.5–0.6 (0.55±0.07), mp4W 0.3–0.3 (0.3±0.0). Females (n = 3): AL1 0.7–0.9 (0.8±0.10), AL2 0.2–0.4 (0.33±0.12), EL 5.5–7.0 (6.23±0.75), EW 3.7–4.7 (4.23±0.5), PL 3.0–3.6 (3.33±0.31), PW 3.0–3.5 (3.27±0.25), HL 1.4–1.7 (1.6±0.17), HW 2.0–2.4 (2.23±0.21), TL 9.9–12.3 (11.17±1.21), TL/EW 2.6–2.7 (2.64±0.03), lp2L 0.5–0.6 (0.57±0.06), lp3L 0.6–0.7 (0.63±0.06), lp3W 0.2–0.2 (0.2±0.0), mp3L 0.3–0.3 (0.3±0.0), mp4L 0.5–0.7 (0.6±0.1), mp4W 0.2–0.3 (0.2±0.3).

#### Remarks

We include *P. straneoi* sp. nov. in the *P. rotundipenne* species group due to the following features: head frontal impressions punctiform; each elytron with at least five deeply impressed striae and the fifth tarsomeres without ventrolateral setae.

#### *Pelecium zaguryi* sp. nov.

urn:lsid:zoobank.org:act:0FAA8D93-5A52-49BE-A94D-09DAB358E3A9

Figs 5I–J, 25

#### Diagnosis

A medium-sized species (10 mm) distinguishable among other congeners by the combination of the following features. Head frontal fovea short and deep (Fig. 5J). Pronotum short, with three pairs of marginal setae; median line shallow; posterior impressions deep. Elytra elongate, ovate, with punctate striae (Fig. 5I). Adults of *P. zaguryi* sp. nov. and *P. rotundipenne* are quite similar, as both have a short pronotum with three pairs of marginal setae, but in the former the tarsomeres 5 bear a row of a few slender setae on each ventral margin, while in the latter the tarsomeres 5 are glabrous ventrally.

#### Etymology

The specific epithet '*zaguryi*' is an eponym in honor of the Brazilian coleopterist Fernando Zagury Vaz de Mello, who lent us Carabidae beetles important for the present work and other taxonomic and morphological studies in progress.

#### Type material

##### Holotype

BRAZIL • ♂; Mato Grosso, Cotriguaçu, Fazenda São Nicolau, Matinha fundos da mata; 13 Dec. 2009; Vaz-de-Mello leg.; pitfall; “// *Pelecium zaguryi* Orsetti & Lopes-Andrade HOLOTYPE” [printed on red paper]; CEMT.



### Description

**Male** (holotype, fully pigmented adult)

MEASUREMENTS (in mm). AL1 0.8, AL2 0.3, EL 5.0, EW 3.8, PL 3.0, PW 3.1, HL 1.5, HW 2.2, TL 9.5, TL/EW 2.5, lp2L 0.6, lp3L 0.6, lp3W 0.4, mp3L 0.3, mp4L 0.4, mp4W 0.4.

**BODY.** Elongate, flat; head, pronotum and elytra dark reddish brown; glabrous (Fig. 5I). Ventral surface dark reddish brown.

**HEAD.** Microreticulate; frontal foveae deeply impressed, short, not extended (Fig. 5J). Antennae reddish brown, long, reaching anterior portion of elytra; antennomeres 1–3 with few long, sparse yellowish setae at apical portion; antennomeres 4–11 fully covered with short yellowish setae. Apical labial and maxillary palpomeres with long, sparse yellowish setae; triangular, reddish brown, with apicalmost portion lighter.

**PRONOTUM.** Slightly wider than long; sides arcuate, each with three long setae; median line long, shallowly impressed, with anterior edge limited by elongated punctation; posterior impressions deep toward the pronotal disc.

**ELYTRA.** Elongate, ovate, each with 7 deeply impressed striae, markedly punctate; in between striae shiny and impunctate.

**LEGS.** Dark reddish brown; protarsomeres 1–4 expanded, ventrally with vestiture of adhesive setae; protibiae expanded at apex, with few long yellowish setae ventrally and surrounding antennal cleaner; mesotibiae slender, with few long yellowish setae throughout inner margin, slightly expanded at apex; metatibiae slender, with few long yellowish setae ventrally on apical half.

### Female

Unknown.

### Remarks

We include *P. zaguryi* sp. nov. in the *P. punctatostratum* species group due to the punctiform frontal impressions of the head, deep posterior impression of the pronotum and tarsomeres 5 having rows of setae on the ventrolateral margin.

*Pelecium zophos* sp. nov.

[urn:lsid:zoobank.org:act:A2F75B1D-47B4-4591-8EC3-5C4F720BF52F](https://zoobank.org/act:A2F75B1D-47B4-4591-8EC3-5C4F720BF52F)

Figs 6A–H, 25

### Diagnosis

A medium-sized species (13 mm) distinguishable from its congeners by the combination of the following features. Head frontal fovea short and deep (Fig. 6B). Pronotum elongated; median line shallow; posterior impressions deep. Elytra elongate, ovate, each with eight deeply impressed striae (Fig. 6A). Adults of *P. zophos* sp. nov. and *P. cyanipes* are quite similar, but in the former the tarsomeres 5 are glabrous ventrally, while in the latter the tarsomeres 5 bear a row of few slender setae on ventral margin.

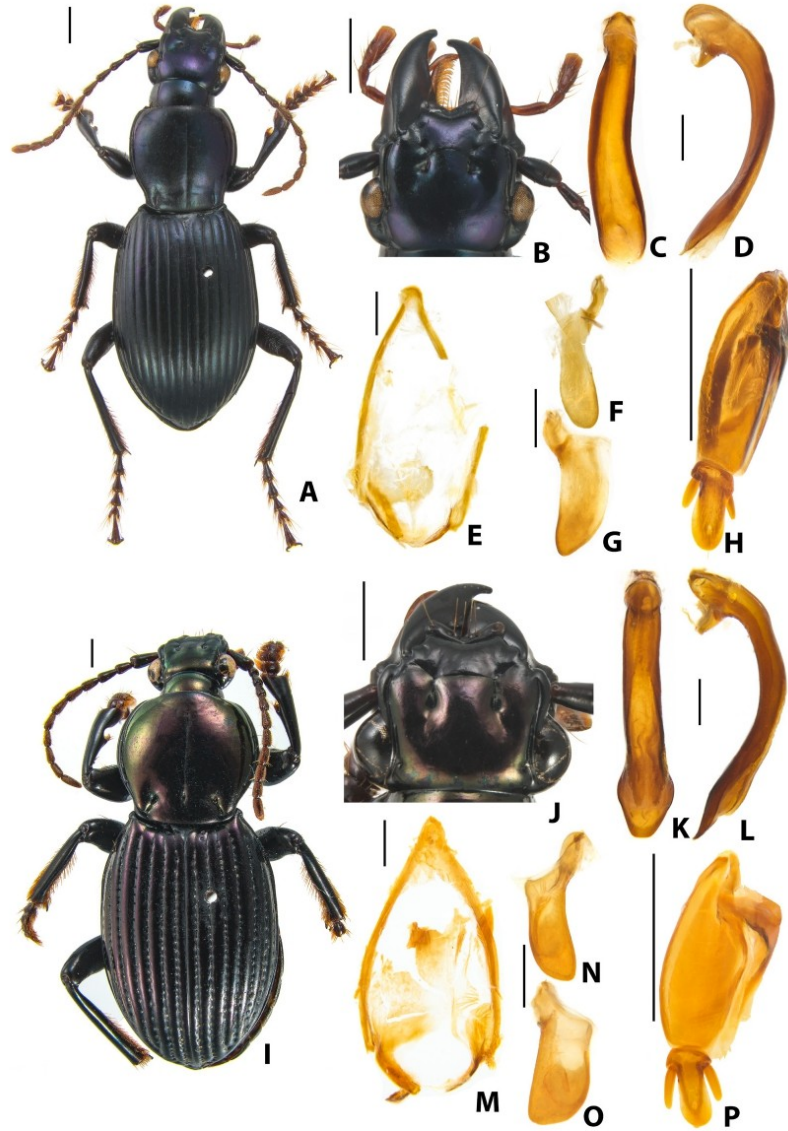
### Etymology

The specific epithet is from the Greek “*zophos*”, which means “darkness”, in reference to the dark dorsal colour.

### Type material

#### Holotype

BRAZIL • ♂; Rio de Janeiro, Teresópolis; Dec. 1992; A. Bello leg.; “\ Coleção A. M. BELLO \ *Pelecium zophos* Orsetti & Lopes-Andrade HOLOTYPUS” [printed on red paper]; CAMB.



**Fig. 6.** Habitus and dissected parts of some species of *Pelecium* Kirby, 1817. **A–H.** *Pelecium zophos* sp. nov., male holotype from Teresópolis, Rio de Janeiro, Brazil (A–G) (CAMB) and female paratype from Itatiaia, Rio de Janeiro, Brazil (H) (CAMB). **A.** Dorsal view. **B.** Detail of head. **C–D.** Median lobe. **E.** Tergite IX. **F.** Left paramere. **G.** Right paramere. **H.** Genitalia. – **I–P.** *Pelecium atroviolaceum* Straneo & Ball, 1989, male from Cotriguaçu, Mato Grosso, Brazil (I–O) (CEMT) and female from Cotriguaçu, Mato Grosso, Brazil (P) (CEMT). **I.** Dorsal view. **J.** Detail of head. **K–L.** Median lobe. **M.** Tergite IX. **N.** Left paramere. **O.** Right paramere. **P.** Genitalia. Scale bars: A–B, I–J = 1 mm; C–H, K–P = 0.5 mm.



### Paratype

BRAZIL • 1 ♀; Rio de Janeiro, Itatiaia, P.N. Itatiaia; Jan. 2014; R. Monteiro leg.; “\ Coleção A. M. BELLO \ *Pelecium zophos* Orsetti & Lopes-Andrade PARATYPUS” [printed on yellow paper]; CAMB.

### Description

**Male** (holotype, fully pigmented adult)

MEASUREMENTS (in mm). AL1 1.0, AL2 0.5, EL 7.0, EW 5.3, PL 4.0, PW 3.7, HL 2.4, HW 3.1, TL 13.4, TL/EW 2.5, lp2L 0.8, lp3L 0.9, lp3W 0.5, mp3L 0.4, mp4L 0.9, mp4W 0.4.

**BODY.** Ovale, flat; disc of head, pronotum and elytra shiny black in dorsal view; with light metallic violaceous reflections alongside in dorsal view; glabrous (Fig. 6A).

**HEAD.** Microreticulate, with pair of punctiform frontal foveae, with shallow excavation reaching anterior plane of eyes (Fig. 6B). Antennae reddish brown, long, reaching anterior portion of elytra; antennomeres 1–3 with few long, sparse yellowish setae at apical portion; antennomeres 4–11 fully covered with both short and long yellowish setae. Apical labial and maxillary palpomeres with long, sparse yellowish setae; ovate, with apex obliquely truncated, reddish brown, with apicalmost portion lighter.

**PRONOTUM.** Longer than wide; sides arcuate, each with pair of long setae; posterior fourth forming sinuous line with posterolateral angles; median line long, shallow; posterior impressions deep, almost parallel with median line (Fig. 6A).

**ELYTRA.** Oval; each with eight deeply impressed striae; in between striae shiny, impunctate.

**LEGS.** Dark reddish brown; protarsomeres 1–4 expanded, ventrally with vestiture of adhesive setae; protibiae expanded at apex, with few long yellowish setae ventrally and surrounding antennal cleaner; mesotibiae slender, with few long yellowish setae laterally in full length; metatibiae slender, with few long yellowish setae ventrally on apical half.

**ABDOMINAL TERGITE IX** (Fig. 6E). Oval, elongate, asymmetrical; sides subparallel, converging in anterior portion and forming rounded projection; inner anterior angle rounded; posterior portion rounded.

**AEDEAGUS** (Fig. 6C–D, F–G). With **median lobe** (Fig. 6C–D) cylindrical, sinuous, asymmetrical, flattened dorsoventrally in medial area, slightly broadening apically; ostium very short, confined to apical fourth; apical lamella very short, indiscernible, apical edges sharp; **parameres** (Fig. 6F–G) asymmetrical; left paramere elongate, posterior angle rounded; right paramere with parallel sides converging to rounded apex.

### Female

Similar to males but with mesh of long yellow setae on basal region of tergite V.

MEASUREMENTS (in mm). AL1 0.9, AL2 0.4, EL 6.1, EW 4.1, PL 3.0, PW 3.0, HL 2.0, HW 2.4, TL 11.1, TL/EW 2.7, lp2L 0.7, lp3L 0.7, lp3W 0.2, mp3L 0.3, mp4L 0.8, mp4W 0.2.

**GONOCOXITE 1** (Fig. 6H). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

**GONOCOXITE 2** (Fig. 6H). Elongate, basal lobe bearing ensiform setae on each side; ensiform setae moderately long, with one-third length of gonocoxite 2; slender setae at apex.

### Remarks

We include *P. zophos* sp. nov. in the *P. violaceum* species group due to the head having a punctiform frontal impressions, a deep posterior impression of the pronotum and tarsomeres 5 having a row of setae on the ventrolateral margin.

### New records and complementary descriptions

Below, we provide new distributional records and supplementary descriptions for some species studied by Straneo & Ball (1989), focused mainly on body measurements and the morphology of the abdominal terminalia of the following species: *P. atrovioleaceum*, *P. bolivianum*, *P. cyanipes*, *P. drakei*, *P. fulgidum*, *P. helenae*, *P. laeve*, *P. negrei*, *P. nicki*, *P. purpureum*, *P. striatum* and *P. violaceum*. We had access only to female individuals of *P. bolivianum* and only to male individuals of *P. purpureum*.

#### *Pelecium atrovioleaceum* Straneo & Ball, 1989

Figs 6I–P, 13A, 20B, 15

### Specimens examined

BRAZIL • 1 ♂, 2 ♀♀; Mato Grosso, Cotriguaçu, Faz. São Nicolau; 20 Aug. 2018; R. Stofel leg.; CEMT • 1 ♀; Mato Grosso, Cotriguaçu, Margem do Juruena; May 2011; R.E. Vicente leg.; CEMT.

### Notes

The only previously known specimen of *P. atrovioleaceum* was the male holotype from Chapada dos Guimarães, state of Mato Grosso, in the South Brazilian dominion. The new record is from the same biogeographical dominion, but from a different province: the holotype is from the Rondônia province, while the new record is from the Madeira province.

### Complementary description

ABDOMINAL TERGITE IX (Fig. 6M): Oval, slightly asymmetrical, sides arcuate, converging to pointed projection at base; inner anterior angle rounded; posterior portion rounded.

AEDEAGUS (Fig. 6K–L, N–O). With **median lobe** (Fig. 6K–L) cylindrical, elongate, asymmetrical, broadening apically; ostium long, reaching middle of median lobe; apical lamella short, abruptly narrowed, apical edges narrow; basal bulb thin; **parameres** (Fig. 6N–O) asymmetrical; left paramere longer and thinner than right paramere.

GONOCOXITE 1 (Fig. 6P). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 6P). Elongate; basal lobe bearing ensiform setae on each side; ensiform setae long, with half to one-third the length of gonocoxite 2; slender setae at apex.

MEASUREMENTS (in mm). Male (n = 1): AL1 1.1, AL2 0.6, EL 7.5, EW 5.7, PL 4.4, PW 4.3, HL 2.0, HW 2.9, TL 13.9, TL/EW 2.4, lp2L 0.8, lp3L 0.9, lp3W 0.7, mp3L 0.3, mp4L 0.8, mp4W 0.6. Females (n = 3): AL1 0.9–1.3 (1.13±0.21), AL2 0.5–0.6 (0.57±0.06), EL 6.5–8.0 (7.8±1.21), EW 5.0–6.4 (5.93±0.81), PL 3.7–4.9 (4.40±0.62), PW 3.9–5.0 (4.63±0.64), HL 1.6–2.2 (1.93±0.31), HW 2.6–3.3 (3.03±0.38), TL 11.8–15.7 (14.13±2.06), TL/EW 2.3–2.5 (2.38±0.06), lp2L 0.7–0.8 (0.75±0.07), lp3L 0.7–0.9 (0.8±0.14), lp3W 0.4–0.4 (0.4±0.0), mp3L 0.3–0.4 (0.37±0.06), mp4L 0.7–0.9 (0.8±0.1), mp4W 0.3–0.4 (0.37±0.06).

***Pelecium bolivianum* Straneo & Ball, 1989**

Figs 7A–C, 13C, 20D, 26

**Specimen examined**

BRAZIL • 1 ♀; Mato Grosso, Corumbá, Serra do Amolar; Mar.–Apr. 2011; C. Aloki leg.; “\ Coleção A. M. BELLO”; CAMB.

**Notes**

The only previously known specimens of *P. bolivianum* were the holotype and one paratype, both females, from Sta. Cruz de la Sierra, Bolivia. The new record is from the same biogeographical province, the Rondônia province of the South Brazilian dominion.

**Complementary description**

GONOCOXITE 1 (Fig. 7C). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 7C). Elongate, basal lobe bearing ensiform setae on each side; ensiform setae long, with half the length of gonocoxite 2; slender setae at apex.

MEASUREMENTS (in mm). Female (n = 1): AL1 0.7, AL2 0.4, EL 6.9, EW 5.1, PL 4.0, PW 4.1, HL 1.8, HW 2.6, TL 12.7, TL/EW 2.5, lp2L 0.6, lp3L 0.8, lp3W 0.4, mp3L 0.3, mp4L 0.7, mp4W 0.4.

***Pelecium cyanipes* Kirby, 1817**

Figs 7D–K, 14A–B, 20F, 21A, 26

**Specimens examined**

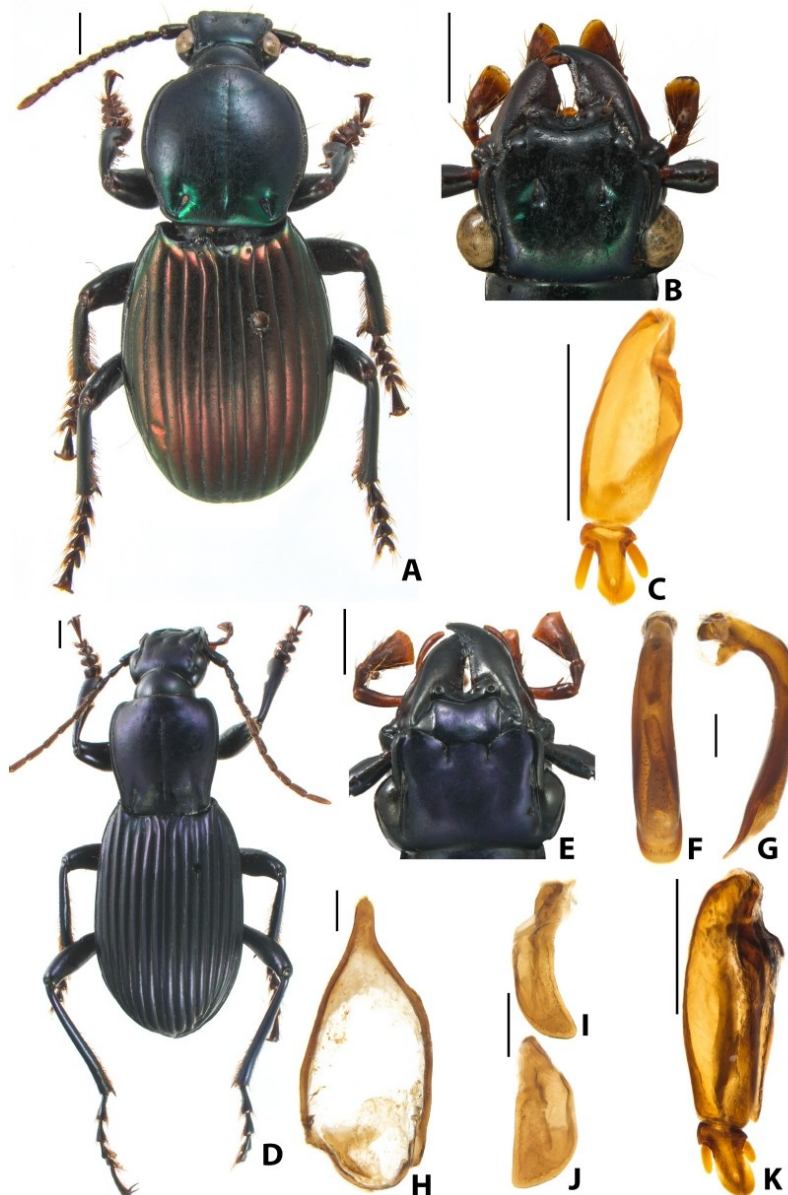
BRAZIL • 6 ♂♂, 3 ♀♀; Rio de Janeiro, Teresópolis, Pq. Nac. Serra dos Orgãos; Jan. 2014; R. Monteiro leg.; CAMB • 1 ♀; Rio de Janeiro; Nova Friburgo, Macaé de Cima; 5 Nov. 2009; E.E & P. Grossi leg.; CERPE • 2 ♂♂; Minas Gerais, Alto Caparaó, PARNA Caparaó; 5–6 Nov. 2016; A. Orsetti and S. Aloquio leg.; Ativa/Noturna; CELC • 1 ♂; Minas Gerais, Alto Caparaó, PARNA Caparaó; 6–10 Nov. 2016; A. Orsetti and S. Aloquio leg.; pitfall; CELC.

**Notes**

The new record is from the same biogeographical dominion, the South Brazilian dominion, but from the Madeira province, while the holotype is from the Rondônia province. In Straneo & Ball (1989) the authors synonymized four species (*P. cyanipes*, *P. carinatum*, *P. ovipenne* and *P. humeratum*) and divided *P. cyanipes* into four “morphs” (*cyanipes* morph, *carinatum* morph, *ovipenne* morph and *humeratum* morph). All specimens of *P. cyanipes* examined by us fit in the *humeratum* “morph”. Comparing the examined specimens with photographs of the holotype of *P. cyanipes* and the “morph” descriptions, we noted morphological differences that are sufficient to question the aforementioned synonymies, such as body shape and head frontal fovea. However, in order to review the species limits, it is necessary to examine the holotypes of *P. carinatum*, *P. ovipenne* and *P. humeratum*.

**Complementary description**

ABDOMINAL TERGITE IX (Fig. 7H). Oval, asymmetrical, sides converging to anterior portion, forming long projection; left side more angulate than right side; inner anterior angle rounded, posterior portion rounded.



**Fig. 7.** A–C. *Pelecium bolivianum* Straneo & Ball, 1989, female from Serra do Amolar, Mato Grosso, Brazil (CAMB). A. Dorsal view. B. Detail of head. C. Terminalia. – D–K. *Pelecium cyanipes* Kirby, 1817, male from Teresópolis, Rio de Janeiro, Brazil (D–J) (CAMB) and female from Teresópolis, Rio de Janeiro, Brazil (K) (CAMB). D. Dorsal view. E. Detail of head. F–G. Median lobe. H. Tergite IX. I. Left paramere. J. Right paramere. K. Genitalia. Scale bars: A–B, D–E = 1 mm; C, F–K = 0.5 mm.



AEDEAGUS (Fig. 7F–G, I–J). With **median lobe** (Fig. 7F–G) cylindrical, asymmetrical, bent to left, slightly broadening apically; ostium short, confined to apical fourth; apical lamella long, apical edges narrow; basal bulb thin. **Parameres** (Fig. 7I–J) asymmetrical; left paramere elongate, posterior angle rounded; right paramere square, with protuberant rounded lateral angle.

GONOCOXITE 1 (Fig. 7K). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 7K). Short; basal lobe bearing ensiform setae on each side; ensiform setae very short, with one-fifth to one-sixth the length of gonocoxite 2; slender setae at apex.

MEASUREMENTS (in mm). Males (n = 9): AL1 1.0–1.3 ( $1.11 \pm 0.11$ ), AL2 0.5–0.7 ( $0.62 \pm 0.07$ ), EL 7.7–9.7 ( $8.15 \pm 0.66$ ), EW 5.2–7.2 ( $5.80 \pm 0.61$ ), PL 4.3–5.7 ( $4.8 \pm 0.48$ ), PW 4.1–5.5 ( $4.67 \pm 0.48$ ), HL 2.2–2.6 ( $2.33 \pm 0.17$ ), HW 3.0–3.6 ( $3.23 \pm 0.28$ ), TL 14.3–18.0 ( $15.31 \pm 1.17$ ), TL/EW 2.5–2.8 ( $2.65 \pm 0.11$ ), lp2L 0.9–1.3 ( $1.04 \pm 0.12$ ), lp3L 0.9–1.2 ( $1.04 \pm 0.09$ ), lp3W 0.5–0.9 ( $0.71 \pm 0.12$ ), mp3L 0.4–0.5 ( $0.44 \pm 0.05$ ), mp4L 0.8–1.1 ( $0.93 \pm 0.1$ ), mp4W 0.6–1.0 ( $0.73 \pm 0.14$ ). Females (n = 4): AL1 1.1–1.4 ( $1.18 \pm 0.15$ ), AL2 0.6–0.8 ( $0.65 \pm 0.1$ ), EL 9.4–12.1 ( $10.18 \pm 1.29$ ), EW 6.2–6.6 ( $6.4 \pm 0.18$ ), PL 4.9–6.7 ( $5.4 \pm 0.87$ ), PW 3.2–6.5 ( $4.8 \pm 1.35$ ), HL 2.5–3.0 ( $2.73 \pm 0.25$ ), HW 3.3–3.4 ( $3.37 \pm 0.06$ ), TL 16.9–21.8 ( $18.63 \pm 2.75$ ), TL/EW 2.7–3.3 ( $2.92 \pm 0.33$ ), lp2L 0.9–1.1 ( $1.05 \pm 0.1$ ), lp3L 0.7–1.0 ( $0.88 \pm 0.15$ ), lp3W 0.4–0.6 ( $0.5 \pm 0.08$ ), mp3L 0.5–1.0 ( $0.55 \pm 0.1$ ), mp4L 0.9–1.2 ( $0.98 \pm 0.15$ ), mp4W 0.5–0.7 ( $0.55 \pm 0.1$ ).

*Pelecium drakei* Quedenfeldt, 1890

Figs 8A–H, 14C, 21B, 26

**Specimens examined**

BRAZIL • 1 ♂, 2 ♀♀; Mato Grosso do Sul, Corumbá; Dec. 2007; C. Aoki leg.; “\ Coleção A. M. BELLO”; CAMB.

**Notes**

The known specimens are from the state of Mato Grosso, Brazil, and from Colombia, all of them from the Chacoan province in the Chacoan subregion. The new records are from the state of Mato Grosso do Sul, Brazil, in the same biogeographical region as the other available records.

**Complementary description**

ABDOMINAL TERGITE IX (Fig. 8E). Oval, asymmetrical, sides converging to round and large anterior portion; right side more angulate than left side; inner anterior angle rounded; posterior portion rounded.

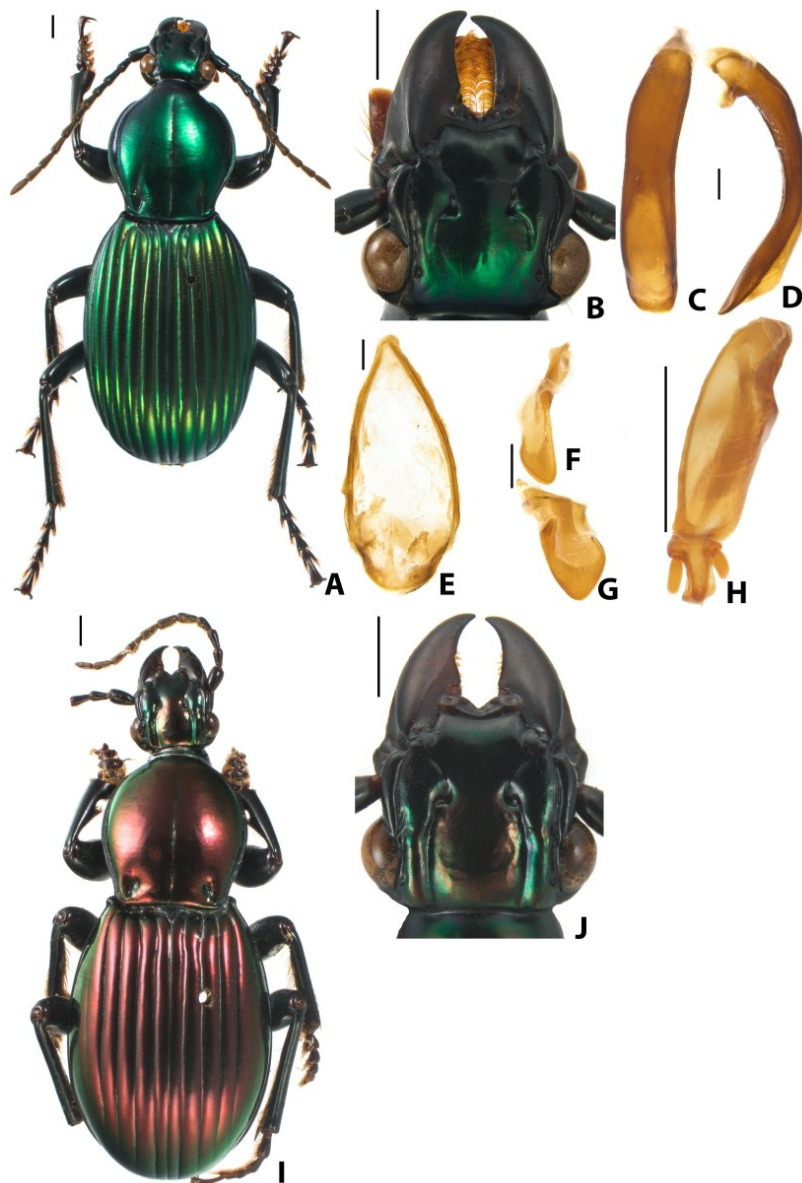
AEDEAGUS (Fig. 8C–D, F–G). With **median lobe** (Fig. 8C–D) cylindrical, asymmetrical, bent to left, sides slightly subparallel; ostium short, confined to apical third; apical lamella long, apical edges narrow; basal bulb thin. **Parameres** (Fig. 8F–G) asymmetrical; left paramere (Fig. 8F) elongate, posterior angle rounded; right paramere (Fig. 8G) trapezoid, with protuberant rounded apical angle.

GONOCOXITE 1 (Fig. 8H). Outer side with obtuse angle; inner side arcuate, forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 8H). Short; basal lobe bearing ensiform setae on each side; ensiform setae long, with half length of gonocoxite 2; slender setae at apex.

MEASUREMENTS (in mm). Male (n = 1): AL1 1.3, AL2 0.7, EL 10.9, EW 7.6, PL 5.7, PW 5.5, HL 2.7, HW 3.4, TL 19.3, TL/EW 2.5, lp2L 1.1, lp3L 1.3, lp3W 1.2, mp3L 0.5, mp4L 0.9, mp4W 1.0. Females





**Fig. 8.** A–H. *Pelecium drakei* Quedenfeldt, 1890, male from Corumbá, Mato Grosso do Sul, Brazil (A–G) (CAMB) and female from Corumbá, Mato Grosso do Sul, Brazil (H) (CAMB). A. Dorsal view. B. Detail of head. C–D. Median lobe. E. Tergite IX. F. Left paramere. G. Right paramere. H. Genitalia. – I–J. *Pelecium fulgidum* Straneo, 1962, male from Encruzilhada, Bahia, Brazil (CELC). I. Dorsal view. J. Detail of head. Scale bars: A–B, I–J = 1 mm; C–H = 0.5 mm.

(n = 2): AL1 1.2–1.3 ( $1.25 \pm 0.07$ ), AL2 0.6–0.8 ( $0.7 \pm 0.17$ ), EL 8.5–11.1 ( $9.80 \pm 1.84$ ), EW 6.7–7.9 ( $7.3 \pm 0.85$ ), PL 4.9–6.0 ( $5.45 \pm 0.78$ ), PW 4.7–5.2 ( $4.95 \pm 0.35$ ), HL 1.2–2.3 ( $1.75 \pm 0.78$ ), HW 1.6–3.4 ( $2.5 \pm 1.27$ ), TL 14.6–19.4 ( $17.0 \pm 3.39$ ), TL/EW 2.2–2.5 ( $2.32 \pm 0.2$ ), lp2L 0.8–0.9 ( $0.85 \pm 0.07$ ), lp3L 0.8–0.1 ( $0.95 \pm 0.21$ ), lp3W 0.6–0.8 ( $0.7 \pm 0.14$ ), mp3L 0.6–0.8 ( $0.7 \pm 0.14$ ), mp4L 0.7–0.8 ( $0.75 \pm 0.07$ ), mp4W 0.5–0.6 ( $0.55 \pm 0.07$ ).

***Pelecium fulgidum* Straneo, 1962**

Figs 8I–J, 14D, 15A, 21C–D, 26

**Specimen examined**

BRAZIL • 1 ♀; Bahia, Encruzilhada; Dec. 2012; P.C. Grossi, J.A. Rafael, E.J. Grossi and G.A.R. Melo leg.; CELC.

**Notes**

The only previously known specimens of *P. fulgidum* were the type material (holotype, allotype and four paratypes), labelled only with state information (Bahia, Brazil). The new record is from the Caatinga biogeographical province.

**Complementary description**

MEASUREMENTS (in mm). Male (n = 1): AL1 1.2, AL2 0.6, EL 8.6, EW 6.7, PL 5.0, PW 4.9, HL 2.5, HW 3.0, TL 16.1, TL/EW 2.4.

***Pelecium helenae* Straneo & Ball, 1989**

Figs 9A–H, 15B–D, 21E–G, 26

**Specimens examined**

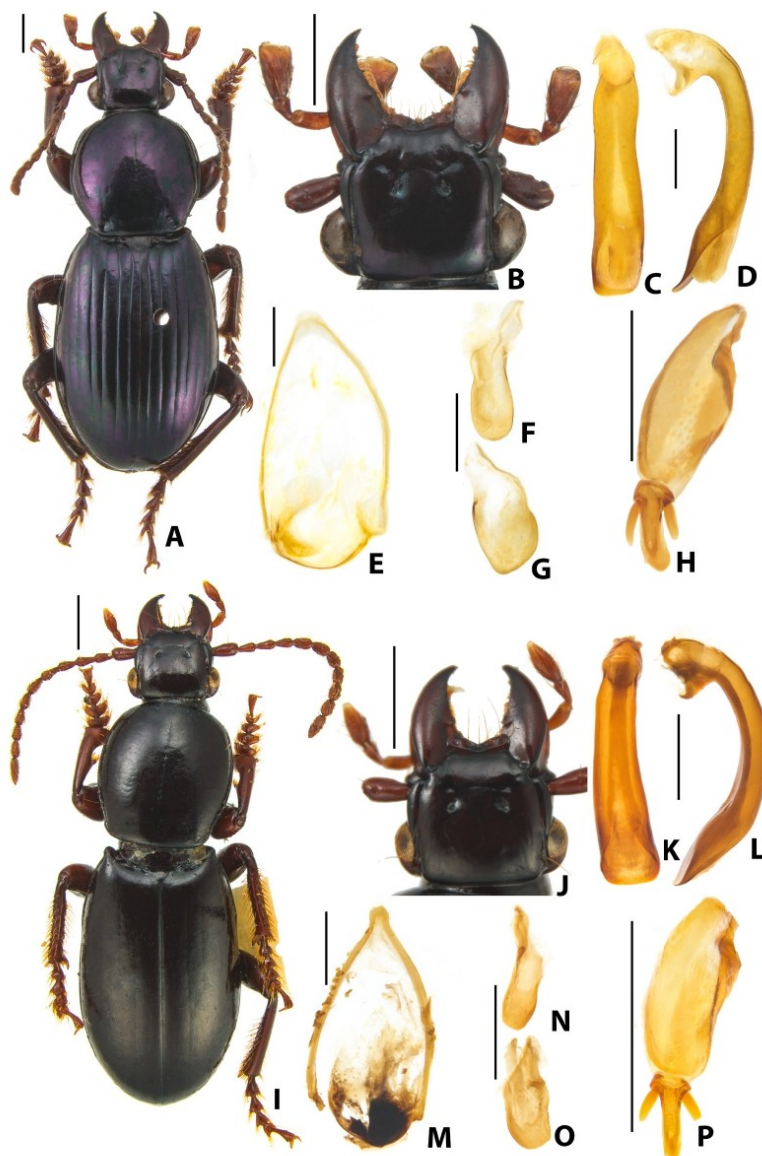
BRAZIL • 2 ♂♂; Paraná, Piraquara, Manancial da Serra; 19 Oct. 2011; P. Grossi and Santos leg.; CERPE • 1 ♂; Paraná, Castro, Estr. Castro-Tibagi km 15; 9 Apr. 2006; Grossi and Parizotto leg.; CERPE • 1 ♂; Paraná, Piraquara, Mananciais da Serra; 30 Nov. 2005; P. Grossi leg.; CERPE • 1 ♀; São Paulo, Mogi das Cruzes, Parque das Neblinas; 24–28 Feb. 2015; R.V. Nunes leg.; CEMT • 1 ♂; São Paulo, Est. Biologica Paranapiacaba; Jan. 2007; M. Huhara leg.; “\ Coleção A. M. BELLO”; CAMB.

**Notes**

Most known specimens of *P. helenae* are from Southeast Brazil, including the holotype and the allotype (both from the state of São Paulo), and eight paratypes (states of Minas Gerais and São Paulo). Only one paratype was collected in the state of Pará, North Brazil. The new records are from the Araucaria Forest province, while the allotype is from the Atlantic province and the paratypes from the state of Minas Gerais are from the Paraná Forest province, but all the three provinces belong to the Paraná dominion. Paratypes from the state of Pará are from the Pará province of the Brazilian boreal dominion. The red label (Fig. 21E) of the holotype of *P. helenae* is wrongly labelled as *P. paulae*, but following the original description and comparing the locality label we can conclude that it is the holotype of *P. helenae*.

**Complementary description**

ABDOMINAL TERGITE IX (Fig. 9E). Oval, asymmetrical, sides converging to anterior portion forming a rounded angle; left side more angulate than right side; inner anterior angle rounded; posterior portion rounded.



**Fig. 9.** A–H. *Pelecium helenae* Straneo & Ball, 1989, male from Piraquara, Paraná, Brazil (A–G) (CERPE) and female from Mogi das Cruzes, São Paulo, Brazil (H) (CEMT). A. Dorsal view. B. Detail of head. C–D. Median lobe. E. Tergite IX. F. Left paramere. G. Right paramere. H. Genitalia. – I–P. *Pelecium laeve* Chaudoir, 1854, male from Porto Alegre, Rio Grande do Sul, Brazil (I–O) (FZRBS) and female from Porto Alegre, Rio Grande do Sul, Brazil (P) (FZRBS). I. Dorsal view. J. Detail of head. K–L. Median lobe. M. Tergite IX. N. Left paramere. O. Right paramere. P. Genitalia. Scale bars: A–B, I–J = 1 mm; C–H, K–P = 0.5 mm.

AEDEAGUS (Fig. 9C–D, F–G). With **median lobe** (Fig. 9C–D) cylindrical, slightly asymmetrical, bent to left, slightly broadening apically; ostium short, confined to apical fourth; apical lamella long, not evenly narrowed, apical edges narrow; basal bulb thin. **Parameres** (Fig. 9F–G) asymmetrical; left paramere elongate with posterior angle rounded; right paramere square-shaped with protuberant, rounded lateral angle.

GNOCOXITE 1 (Fig. 9H). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GNOCOXITE 2 (Fig. 9H). Elongate; basal lobe bearing ensiform setae on each side; ensiform setae long, with half length of gonocoxite 2; slender setae at apex.

MEASUREMENTS (in mm). Males (n = 4): AL1 0.8–0.9 (0.83±0.05), AL2 0.3–0.5 (0.43±0.1), EL 4.7–6.7 (5.78±0.85), EW 3.2–4.3 (3.98±0.52), PL 2.7–3.6 (3.28±0.39), PW 2.6–3.6 (2.25±0.39), HL 1.3–1.6 (1.53±0.15), HW 1.7–2.4 (2.15±0.31), TL 8.7–11.9 (10.58±1.36), TL/EW 2.5–2.8 (2.66±0.11), lp2L 0.5–0.7 (0.6±0.08), lp3L 0.6–0.7 (0.68±0.1), lp3W 0.3–0.4 (0.35±0.06), mp3L 0.2–0.3 (0.28±0.05), mp4L 0.5–0.7 (0.63±0.1), mp4W 0.3–0.4 (0.33±0.05). Females (n = 2): AL1 1.1–1.2 (1.15±0.07), AL2 0.6–0.6 (0.6±0.0), EL 8.95–0.35 (8.95±0.35), EW 5.7–5.9 (5.8±0.14), PL 4.8–4.9 (4.85±0.07), PW 4.3–4.7 (4.5±0.28), HL 2.8–3.0 (2.1±0.28), HW 2.8–3.0 (2.9±0.14), TL 15.5–16.3 (15.9±0.57), TL/EW 2.7–2.8 (2.74±0.03), lp2L 0.8–0.9 (0.85±0.07), lp3L 0.8–0.9 (0.85±0.07), lp3W 0.3–0.3 (0.3±0.0), mp3L 0.4–0.5 (0.45±0.07), mp4L 0.8–0.8 (0.8±0.0), mp4W 0.3–0.4 (0.35±0.07).

*Pelecium laeve* Chaudoir, 1854  
Figs 9I–P, 16A, 17D, 21H, 22E, 27

#### Specimens examined

BRAZIL • 1 ♂, 3 ♀♀; Rio Grande do Sul, Porto Alegre, LAMI Ponta do Cego; 7–27 Jul. 2006; R. Moraes leg.; FZBRS • 9 ♂♂, 2 ♀♀; Rio Grande do Sul, Porto Alegre, LAMI Ponta do Cego; 21 Oct.–9 Nov. 2005; R. Moraes leg.; FZBRS • 1 ♂; Rio Grande do Sul, Porto Alegre, LAMI Ponta do Cego; 5–16 Jan. 2006; R. Moraes leg.; FZBRS • 1 ♂, 1 ♀; Rio Grande do Sul, Montenegro; 7 Jul. 1977; H. Bischoff leg.; FZBRS • 1 ♂; Paraná, Cap. Leonidas Maeques; 25 Mar. 1993; A.B. Bonaldo leg.; FZBRS • 1 ♀; Rio de Janeiro, Nova Friburgo; Dec. 2001; E. Grossi leg.; CAMB.

#### Notes

In Straneo & Ball (1989) the geographical distribution of *P. laeve* is restricted to “Espírito Santo” (probably a misspelling of the state of Espírito Santo), but the lectotype and the paralectotype are labelled “Novofriburgo”, referring to “Nova Friburgo”, a city in the state of Rio de Janeiro. Those specimens are from the Atlantic province, in the Paraná biogeographic dominion. The new records are from Pampean province in the Chacoan subregion and from the Paraná Forest dominion in the Paraná dominion.

#### Complementary description

ABDOMINAL TERGITE IX (Fig. 9M). Oval, asymmetrical, sides converging to short-pointed projection expanded at base; inner anterior angle rounded; base rounded.

AEDEAGUS (Fig. 9K–L, N–O). With **median lobe** (Fig. 9K–L) cylindrical, elongate, asymmetrical, slightly broadening apically; ostium short, confined to apical third; apical lamella short, abruptly narrowed, apical edges narrow; basal bulb thin; **parameres** (Fig. 9N–O) asymmetrical; left paramere longer and thinner than right paramere.



GONOCOXITE 1 (Fig. 9P). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 9P). Elongate; basal lobe bearing ensiform setae on each side; ensiform setae long, with one-third to half the length of gonocoxite 2; slender setae at apex.

MEASUREMENTS (in mm). Males (n = 13): AL1 0.3–0.6 (0.26±0.05), AL2 0.2–0.3 (0.26±0.05), EL 3.4–5.1 (4.08±0.53), EW 2.4–3.4 (2.89±0.28), PL 1.8–2.8 (2.33±0.28), PW 1.7–2.7 (2.22±0.27), HL 1.0–1.4 (1.15±0.12), HW 1.3–2.0 (1.62±0.17), TL 6.2–9.3 (7.57±0.88), TL/EW 2.5–2.7 (2.61±0.06), lp2L 0.3–0.5 (0.36±0.07), lp3L 0.4–0.5 (0.46±0.05), lp3W 0.2–0.3 (0.22±0.04), mp3L 0.1–0.2 (0.18±0.04), mp4L 0.4–0.5 (0.44±0.05), mp4W 0.2–0.3 (0.22±0.04). Females (n = 7): AL1 0.4–0.6 (0.49±0.07), AL2 0.2–0.3 (0.23±0.05), EL 4.0–5.4 (4.39±0.53), EW 2.7–3.4 (3.01±0.27), PL 2.2–3.0 (2.49±0.31), PW 2.1–2.8 (2.36±0.25), HL 1.0–1.4 (1.2±0.14), HW 1.5–2.0 (1.73±0.21), TL 7.3–9.8 (8.07±0.95), TL/EW 2.5–2.9 (2.68±0.15), lp2L 0.3–0.4 (0.36±0.05), lp3L 0.4–0.5 (0.44±0.05), lp3W 0.1–0.2 (0.17±0.05), mp3L 0.2–0.2 (0.2±0.0), mp4L 0.4–0.5 (0.41±0.04), mp4W 0.2–0.3 (0.23±0.05).

*Pelecium negrei* Straneo, 1962

Figs 10A–H, 16C, 21J, 27

**Specimens examined**

BRAZIL • 1 ♀; Bahia, Boa Nova; 28 Feb. 2015; Cerqueira P. *et al.* leg.; CEMT • 1 ♂; Bahia, Itapetinga; C.M.P. Leite leg.; CEMT.

**Notes**

The previously known specimens are from Bahia, a state in the Northeast Region of Brazil, in the Caatinga province of the Chacoan dominion. The new records are from the same state in the same biogeographic province.

**Complementary description**

ABDOMINAL TERGITE IX (Fig. 10E). Elongate, asymmetrical; sides subparallel at base and converging at middle to rounded projection on apex; inner anterior angle rounded; apex straight.

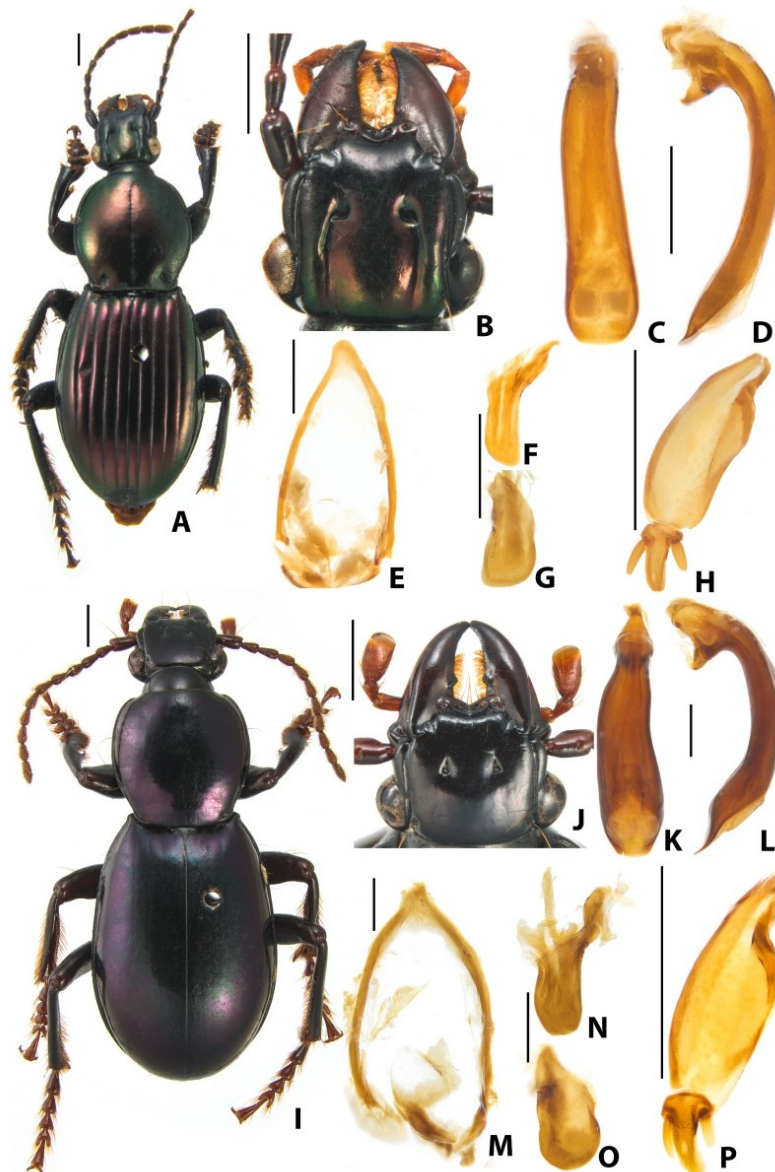
AEDEAGUS (Fig. 10C–D, F–G). With **median lobe** (Fig. 10C–D) cylindrical, slender, asymmetrical, slightly sinuous, apical portion expanded; ostium very short, confined to apical fourth; apical lamella short, abruptly narrowed; apical edge sharp; basal bulb thin. **Parameres** (Fig. 10F–G) asymmetrical, left paramere securiform, longer and thinner than right paramere.

GONOCOXITE 1 (Fig. 10H). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 10H). Elongate; basal lobe bearing ensiform setae on each side; ensiform setae long, with half to one-third length of gonocoxite 2; inner ensiform setae visibly longer than inner setae; slender setae at apex.

MEASUREMENTS (in mm). Male (n = 1): AL1 0.6, AL2 0.4, EL 4.3, EW 3.1, PL 2.6, PW 2.5, HL 1.3, HW 1.7, TL 8.2, TL/EW 2.6, lp2L 0.4, lp3L 0.5, lp3W 0.3, mp3L 0.2, mp4L 0.5, mp4W 0.2. Female (n = 1): AL1 0.8, AL2 0.5, EL 6.5, EW 4.7, PL 3.8, PW 3.7, HL 1.8, HW 2.3, TL 12.1, TL/EW 2.6, lp2L 0.7, lp3L 0.7, lp3W 0.3, mp3L 0.3, mp4L 0.6, mp4W 0.3.





**Fig. 10.** A–H. *Pelecium negrei* Straneo, 1962, male from Itapetinga, Bahia, Brazil (A–G) (CEMT) and female from Boa Nova, Bahia, Brazil (H) (CEMT). A. Dorsal view. B. Detail of head. C–D. Median lobe. E. Tergite IX. F. Left paramere. G. Right paramere. H. Genitalia. – I–P. *Pelecium nicki* Straneo, 1955, male from Florianópolis, Santa Catarina, Brazil (I–O) (CERPE) and female from Florianópolis, Santa Catarina, Brazil (P) (CERPE). I. Dorsal view. J. Detail of head. K–L. Median lobe. M. Tergite IX. N. Left paramere. O. Right paramere. P. Genitalia. Scale bars: A–B, I–J = 1 mm; C–H, K–P = 0.5 mm.

*Pelecium nicki* Straneo, 1955  
Figs 10I–P, 16D, 17A, 22A, 22B, 26

**Specimens examined**

BRAZIL • 2 ♂♂; Santa Catarina, Florianópolis, UCAD; 5–12 Jan. 2004; C. Espírito Santo leg.; CERPE • 3 ♂♂, 1 ♀; Santa Catarina, Florianópolis, UCAD; 3–10 Nov. 2003; C. Espírito Santo leg.; CERPE • 1 ♂; same collection data as for preceding; FZBR • 1 ♂, 1 ♀; Rio de Janeiro, Itatiaia, P.N. do Itatiaia; Jan. 1957; L.C. Alvarenga leg.; MZSP • 1 ♂; Rio de Janeiro, Itatiaia, P.N. Itatiaia; Jan. 1993; CERPE • 1 ♂; Santa Catarina, Urubici, Pq. Nac. São Joaquim; Jun.–Dec. 2015; P.G. da Silva leg.; CAMB • 1 ♀; Santa Catarina, Florianópolis; 9 Mar. 2013; P.G. Silva leg.; CERPE.

**Notes**

Known specimens of *P. nicki* are from the states of Paraná and Santa Catarina, South Region of Brazil, in the Pampean and the Paraná Forest provinces, respectively. The new record is from the Atlantic Forest province in the Paraná dominion.

**Complementary description**

ABDOMINAL TERGITE IX (Fig. 10M). Oval, asymmetrical; sides subparallel at base and converging at middle in projection on apex; inner anterior angle rounded; apex straight with inner posterior angle rounded.

AEDEAGUS (Fig. 10K–L, N–O). With **median lobe** (Fig. 10K–L) cylindrical, slender, asymmetrical; slightly sinuous, apical portion expanded; ostium very short, confined to apical fourth; apical lamella moderately long, abruptly narrowed; apical edge sharp; basal bulb thin. **Parameres** (Fig. 10N–O) asymmetrical, left paramere (Fig. 10N) securiform, longer and thinner than right paramere (Fig. 10O).

GONOCOXITE 1 (Fig. 10P). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 10P). Elongate; basal lobe bearing ensiform setae on each side; ensiform setae long, with half the length of gonocoxite 2, inner ensiform setae visibly longer than external setae; slender setae at apex.

MEASUREMENTS (in mm). Males (n = 9): AL 1 0.6–0.9 (0.77 ± 0.12), AL2 0.3–0.5 (0.39 ± 0.08), EL 5.3–6.7 (5.76 ± 0.45), EW 3.9–5.4 (4.46 ± 0.42), PL 3.0–4.0 (3.39 ± 0.31), PW 3.1–4.0 (3.48 ± 0.27), HL 1.4–2.0 (1.63 ± 0.18), HW 2.2–2.8 (2.44 ± 0.19), TL 9.7–12.7 (10.78 ± 0.93), TL/EW 2.3–2.6 (2.42 ± 0.09), lp2L 0.5–0.7 (0.57 ± 0.07), lp3L 0.6–0.8 (0.67 ± 0.07), lp3W 0.4–0.5 (0.42 ± 0.04), mp3L 0.3–0.4 (0.31 ± 0.03), mp4L 0.6–0.8 (0.68 ± 0.08), mp4W 0.4–0.6 (0.43 ± 0.07). Females (n = 3): AL1 0.7–0.8 (0.73 ± 0.06), AL2 0.3–0.4 (0.33 ± 0.06), EL 5.3–6.0 (5.63 ± 0.35), EW 4.2–4.4 (4.33 ± 0.12), PL 3.2–3.3 (3.23 ± 0.06), PW 3.4–3.3 (3.43 ± 0.06), HL 1.3–1.5 (1.43 ± 0.12), HW 2.2–2.4 (2.3 ± 0.1), TL 10.0–10.8 (10.3 ± 0.44), TL/EW 2.3–2.5 (2.38 ± 0.09), lp2L 0.5–0.6 (0.53 ± 0.06), lp3L 0.5–0.6 (0.57 ± 0.06), lp3W 0.2–0.3 (0.27 ± 0.06), mp3L 0.2–0.3 (0.27 ± 0.06), mp4L 0.6–0.6 (0.60 ± 0.0), mp4W 0.3–0.3 (0.3 ± 0.0).

*Pelecium purpureum* Straneo, 1955  
Figs 11A–H, 27

**Specimens examined**

BRAZIL • 1 ♂; Minas Gerais, Alto Caparaó, PARNA Caparaó; 6–10 Nov. 2016; A. Orsetti and S. Aloquio leg.; CELC • 1 ♂, 1 ♀; Minas Gerais, Viçosa, Mata da Biologia; 2012; S. Aloquio and A. Puker leg.; CELC • 1 ♂; Espírito Santo, Venda Nova do Imigrante, Lavrinhas; 10–14 Jan. 2011; F.Z. Vaz-de-Mello leg.; CEMT.

### Notes

The only two previously known specimens of *P. purpureum* were the male holotype and an additional specimen labelled only with state information (“Espírito Santo”). The new reports are from the Atlantic and the Paraná Forest provinces, both in the Paraná dominion.

### Complementary description

ABDOMINAL TERGITE IX (Fig. 11E). Oval, slightly asymmetrical; sides subparallel, converging to projection at base; inner anterior angle rounded; apex rounded.

AEDEAGUS (Fig. 11C–D, F–G). With **median lobe** (Fig. 11C–D) cylindrical, elongate, asymmetrical, sinuous, slightly broadening apically; ostium short, confined to apical fourth; apical lamella short, evenly narrowed; basal bulb thin; **parameres** (Fig. 11F–G) asymmetrical; left paramere elongate, longer and thinner than right paramere.

GONOCOXITE 1 (Fig. 11H). Outer side straight and inner side arcuate, forming acute projection on posterior margin; anterior margin dull.

GONOCOXITE 2 (Fig. 11H). Elongate; basal lobe bearing ensiform setae on each side; ensiform setae long, with half length of gonocoxite 2; inner ensiform setae visibly longer than external setae; anterior margin dull, with a slender seta at apex.

MEASUREMENTS (in mm). Males (n = 3): AL1 0.9–1.0 ( $0.97 \pm 0.06$ ), AL2 0.4–0.5 ( $0.47 \pm 0.06$ ), EL 5.7–6.6 ( $6.03 \pm 0.49$ ), EW 4.5–5.2 ( $4.73 \pm 0.4$ ), PL 3.2–3.8 ( $3.5 \pm 0.3$ ), PW 3.3–3.7 ( $3.53 \pm 0.21$ ), HL 1.7–1.8 ( $1.73 \pm 0.06$ ), HW 2.4–2.8 ( $2.57 \pm 0.21$ ), TL 10.7–12.2 ( $11.27 \pm 0.81$ ), TL/EW 2.3–2.4 ( $2.38 \pm 0.04$ ), lp2L 0.6–0.7 ( $0.63 \pm 0.06$ ), lp3L 0.6–0.7 ( $0.63 \pm 0.06$ ), lp3W 0.4–0.5 ( $0.43 \pm 0.06$ ), mp3L 0.3–0.3 ( $0.03 \pm 0.0$ ), mp4L 0.6–0.7 ( $0.67 \pm 0.06$ ), mp4W 0.4–0.4 ( $0.4 \pm 0.0$ ). Female (n = 1): AL1 1.0, AL2 0.5, EL 6.4, EW 4.5, PL 3.4, PW 3.5, HL 1.6, HW 2.4, TL 11.4, TL/EW 2.5, lp2L 0.6, lp3L 0.7, lp3W 0.3, mp3L 0.3, mp4L 0.7, mp4W 0.7.

### *Pelecium striatum* Straneo, 1955

Figs 11I–P, 19D, 23B, 27

### Specimens examined

BRAZIL • 1 ♂; Santa Catarina, R. Vermelho; MZSP • 1 ♀; Santa Catarina, Corupá; MZSP • 1 ♂; Santa Catarina, Corupá; Oct. 1937; A. Maller leg.; MZSP • 1 ♀; Santa Catarina, Corupá; Nov. 1937; A. Maller leg.; MZSP • 1 ♀; Santa Catarina, Corupá; Feb. 1954; A. Maller leg.; MZSP.

### Notes

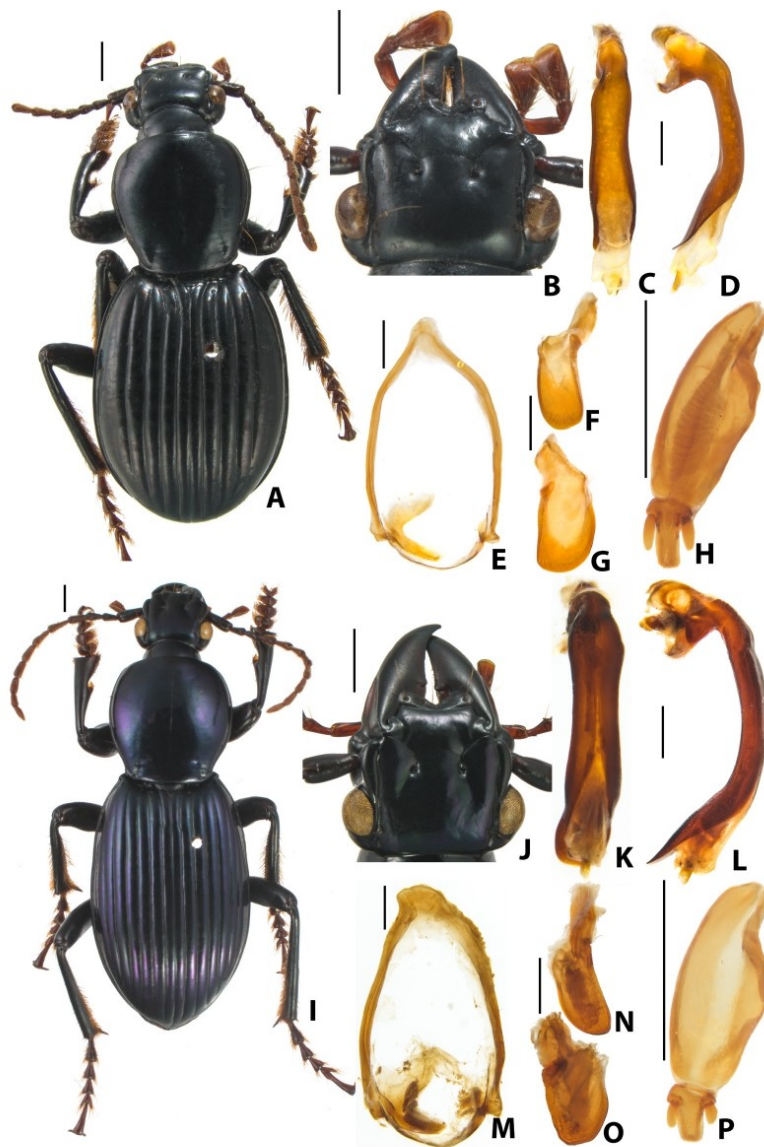
This species was known only from the state of Santa Catarina, South Region, Brazil. The new records are from the Araucaria Forest province, while the holotype is from the Atlantic province, both in the Chacoan dominion.

### Complementary description

ABDOMINAL TERGITE IX (Fig. 11M). Oval, subelongate, asymmetrical; sides arcuate; posterior third rounded; anterior portion converging to a flat projection.

AEDEAGUS (Fig. 11K–L, N–O). With **median lobe** (Fig. 11K–L) cylindrical, asymmetrical; sides in apical fourth sinuous; ostium short, confined to apical third; apical lamella moderately long, narrowed





**Fig. 11.** A–H. *Pelecium purpureum* Straneo, 1955, male from Alto Caparaó, Minas Gerais, Brazil (A–G) (CELC) and female from Viçosa, Minas Gerais, Brazil (H) (CELC). A. Dorsal view. B. Detail of head. C–D. Median lobe. E. Tergite IX. F. Left paramere. G. Right paramere. H. Genitalia. – I–P. *Pelecium striatum* Straneo, 1955, male from Corupá, Santa Catarina, Brazil (I–O) (MZSP) and female from Corupá, Santa Catarina, Brazil (P) (MZSP). I. Dorsal view. J. Detail of head. K–L. Median lobe. M. Tergite IX. N. Left paramere. O. Right paramere. P. Genitalia. Scale bars: A–B, I–J = 1 mm; C–H, K–P = 0.5 mm.

to a square apex; apical edges sharp. **Parameres** (Fig. 11N–O) asymmetrical; left paramere longer and thinner than right paramere, square.

**GONOCOXITE 1** (Fig. 11P). Outer and inner sides arcuate, forming acute projection on posterior margin; anterior margin dull.

**GONOCOXITE 2** (Fig. 11P). Elongate; basal lobe bearing ensiform setae on each side; ensiform setae long, with half the length of gonocoxite 2; slender setae at apex.

**MEASUREMENTS** (in mm). Male (n = 2): AL1 1.0–1.1 (1.05 ± 0.07), AL2 0.6–0.6 (0.6 ± 0.0), EL 6.9–7.2 (7.05 ± 0.21), EW 5.0–5.2 (5.1 ± 0.14), PL 4.0–4.1 (3.8 ± 0.1), PW 3.8–4.1 (3.95 ± 0.21), HL 1.9–2.0 (1.95 ± 0.07), HW 2.6–2.9 (2.75 ± 0.21), TL 12.9–13.2 (13.05 ± 0.21), TL/EW 2.5–2.6 (2.56 ± 0.03), lp2L 0.8–0.8 (0.8 ± 0.0), lp3L 0.9–0.9 (0.9 ± 0.0), lp3W 0.6–0.6 (0.6 ± 0.0), mp3L 0.4–0.4 (0.4 ± 0.0), mp4L 0.8–0.9 (0.85 ± 0.07), mp4W 0.5–0.6 (0.55 ± 0.07). Females (n = 3): AL1 1.0–1.1 (1.03 ± 0.06), AL2 0.5–0.6 (0.53 ± 0.06), EL 6.8–7.1 (6.93 ± 0.15), EW 4.9–5.0 (4.97 ± 0.06), PL 3.5–3.9 (3.7 ± 0.2), PW 3.8–4.1 (3.93 ± 0.15), HL 1.8–2.0 (1.9 ± 0.1), HW 2.6–2.8 (2.67 ± 0.12), TL 12.2–12.7 (12.53 ± 0.29), TL/EW 2.4–2.6 (2.52 ± 0.08), lp2L 0.6–0.7 (0.65 ± 0.07), lp3L 0.8–0.8 (0.8 ± 0.0), lp3W 0.2–0.2 (0.2 ± 0.0), mp3L 0.3–0.3 (0.3 ± 0.0), mp4L 0.7–0.8 (0.73 ± 0.06), mp4W 0.3–0.3 (0.3 ± 0.0).

*Pelecium violaceum* Brullé, 1838

Figs 1, 12, 27

**Specimens examined**

BRAZIL • 1 ♂; Maranhão, Bom Jardim, REBIO Res. Biol. Gurupi; 5–15 Jun. 2010; J.C. Silva, J.A. Silva, A.A. Santos and T.T.A. Silva leg.; CERPE • 1 ♀; Rio Grande do Sul, Derrubadas, P.E. do Turvo; 22 Oct. 2004; L. Moura leg.; FZBRS • 1 ♂, 1 ♀; Mato Grosso, Pontes e Lacerda, Min. Yamana; 5–11 Nov. 2012; R.A.K. Ribeiro; CEMT • 2 ♂♂, 1 ♀; Mato Grosso, Indiavaí, Faz. Alto Jauru, Bacia Jauru; Feb. 2003; M. Santos-Filho leg.; CEMT • 1 ♂, 1 ♀; Mato Grosso, Araputanga, Faz. Bandeirantes, Bacia, Jauru; Dec. 2002; M. Santos-Filho leg.; CEMT • 2 ♀♀; Mato Grosso, Curvelândia, Faz. Aparecido, Bacia Cabaçal; Feb. 2004; M. Santos-Filho; CEMT • 1 ♀; Mato Grosso, P.N. Nascente do Rio Taquari; Apr. 2000; F. Rodrigues leg.; CERPE • 1 ♂, 1 ♀; Mato Grosso, Cáceres, Faz. Baía de Pedra; Mar. 2009; D.D. Pinheiro leg.; CEMT • 1 ♀; Mato Grosso, Pontes e Lacerda, Mineração Yamana, P. Ernesto; 1–6 Mar. 2013; R.A.K. Ribeiro leg.; CEMT • 1 ♂; Mato Grosso, Poconé; Jul. 2012; G. Pessoa leg.; CEMT • 1 ♂; Mato Grosso, Curvelândia, Faz. Calça Vermelha, Bacia Cabaçal; Feb. 2004; M. Santos-Filho leg.; CEMT.

**Notes**

*Pelecium violaceum* has one of the widest geographical distributions of the genus and it can be found in Bolivia, Paraguay, middle Argentina and in the Brazilian states of Rondônia, Mato Grosso, Goiás and São Paulo. *Pelecium violaceum* was reported from four South American dominions: South Brazilian, Chacoan, Paraná and the South America transition zone. The new records are from the Pampean province, in the Chacoan dominion, and Roraima province in the Boreal Brazilian dominion.

**Complementary description**

**ABDOMINAL TERGITE IX** (Fig. 12E). Oval, asymmetrical, elongate, sides subparallel converging to anterior portion, forming a rounded inner angle and a short projection at base; posterior portion rounded.

**AEDEAGUS** (Fig. 12C–D, F–G). With **median lobe** (Fig. 12C–D) cylindrical, asymmetrical, sinuous, slightly broadening apically; ostium elongate, reaching middle area of median lobe; posterior margin

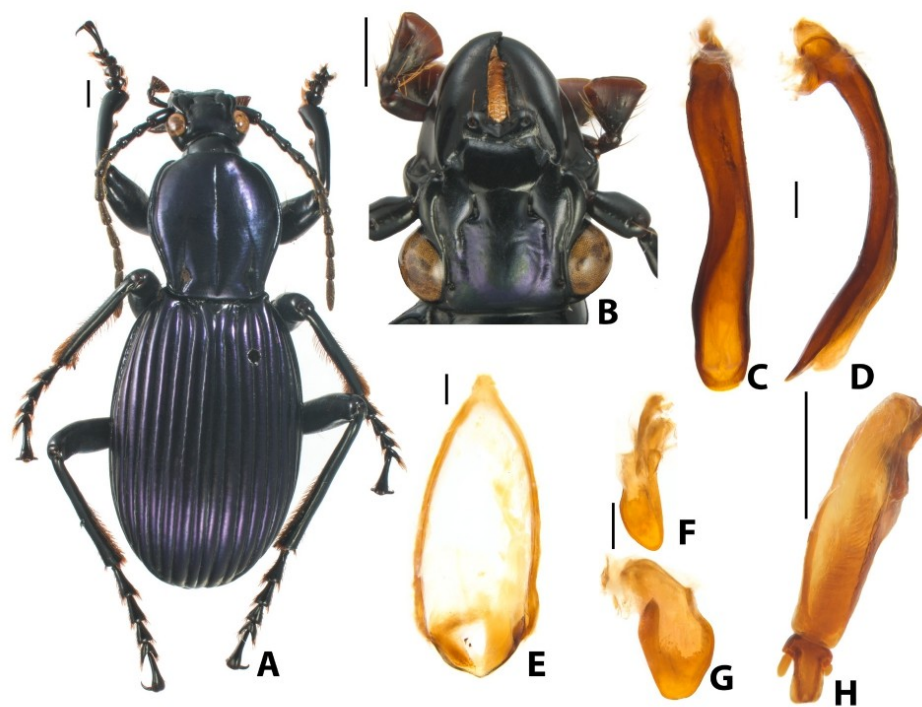


thin; apical lamella short; apical edges narrow; basal bulb thin; **parameres** (Fig. 12F–G) asymmetrical; left paramere elongate, with posterior angle rounded; right paramere wider, with posterior angle rounded.

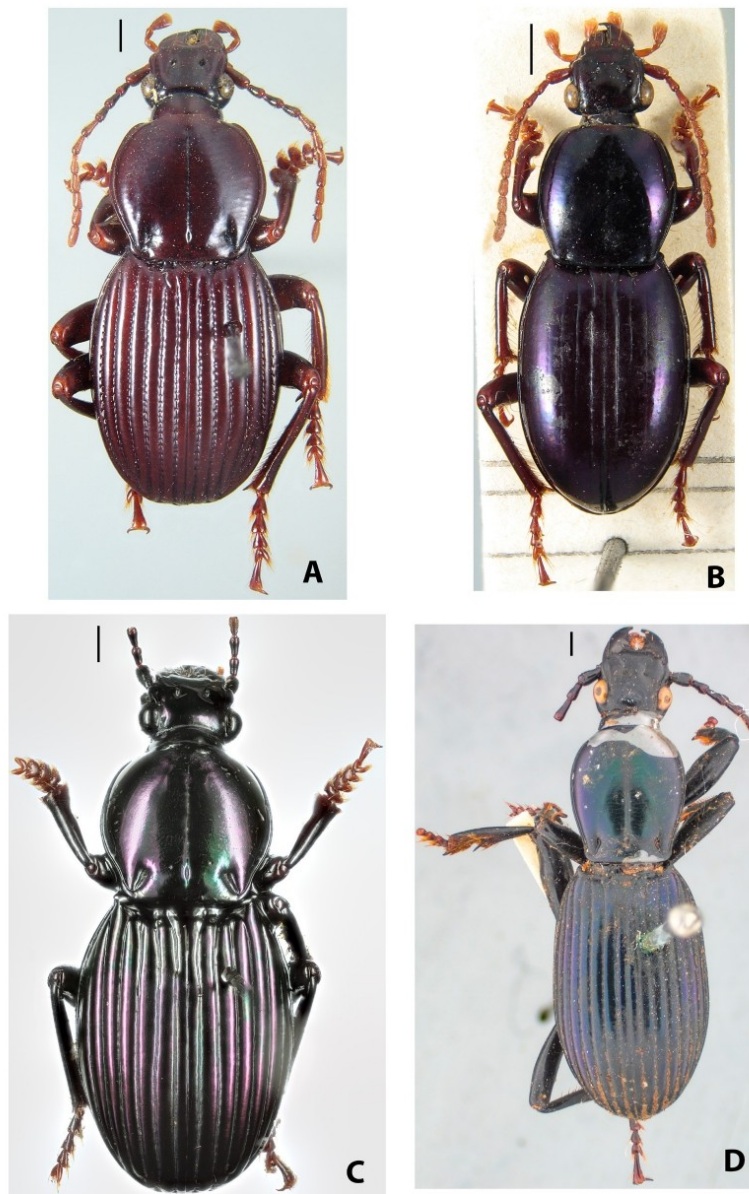
**GONOCOXITE 1** (Fig. 12H). Outer and inner sides arcuate; inner side forming acute projection on posterior margin; anterior margin dull.

**GONOCOXITE 2** (Fig. 12H). Elongate; basal lobe bearing ensiform setae on each side; ensiform setae long, with half length of gonocoxite 2; slender setae at apex.

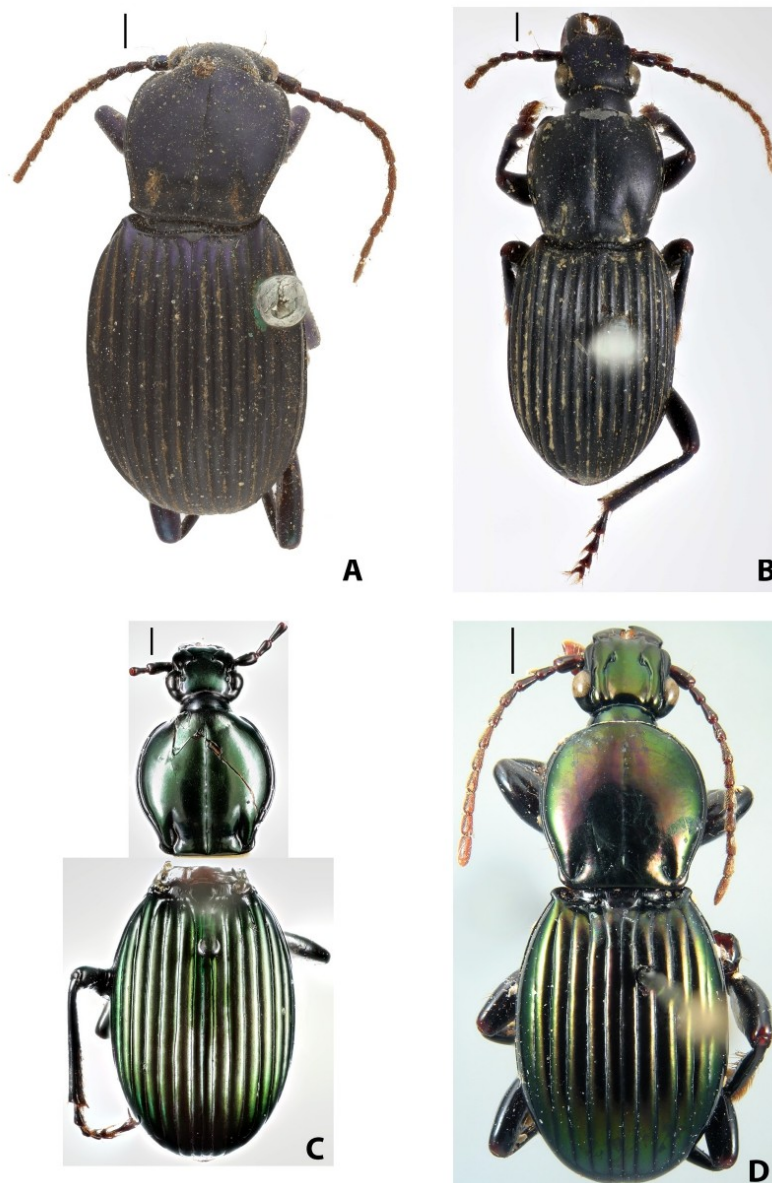
**MEASUREMENTS (in mm).** Males (n = 8): AL1 1.1–1.6 ( $1.36 \pm 0.16$ ), AL2 0.7–1.0 ( $0.84 \pm 0.09$ ), EL 10.3–12.4 ( $11.3 \pm 0.74$ ), EW 7.3–9.0 ( $8.05 \pm 0.56$ ), PL 5.6–6.6 ( $6.14 \pm 0.35$ ), PW 5.1–6.3 ( $5.73 \pm 0.35$ ), HL 2.1–3.2 ( $2.79 \pm 0.33$ ), HW 3.2–3.6 ( $3.46 \pm 0.14$ ), TL 18.5–22.0 ( $20.23 \pm 1.24$ ), TL/EW 2.4–2.7 ( $2.51 \pm 0.09$ ), lp2L 0.8–1.2 ( $2.51 \pm 0.09$ ), lp3L 1.1–1.4 ( $1.21 \pm 0.11$ ), lp3W 0.9–1.3 ( $1.06 \pm 0.16$ ), mp3L 0.4–0.6 ( $0.5 \pm 0.08$ ), mp4L 0.9–1.2 ( $0.99 \pm 0.16$ ), mp4W 0.7–1.1 ( $0.99 \pm 0.16$ ). Females (n = 9): AL1 1.1–1.4 ( $1.26 \pm 0.12$ ), AL2 0.6–0.8 ( $0.71 \pm 0.09$ ), EL 8.3–12.3 ( $10.79 \pm 1.47$ ), EW 5.8–8.6 ( $7.59 \pm 0.95$ ), PL 4.7–6.5 ( $5.9 \pm 0.73$ ), PW 4.4–6.1 ( $5.47 \pm 0.64$ ), HL 2.1–2.9 ( $2.63 \pm 0.32$ ), HW 2.8–3.7 ( $3.32 \pm 0.33$ ), TL 15.1–21.7 ( $19.32 \pm 2.47$ ), TL/EW 2.4–2.7 ( $2.55 \pm 0.08$ ), lp2L 0.7–1.2 ( $1.02 \pm 0.16$ ), lp3L 0.8–1.3 ( $1.04 \pm 0.18$ ), lp3W 0.6–0.9 ( $0.74 \pm 0.09$ ), mp3L 0.4–0.6 ( $0.5 \pm 0.09$ ), mp4L 0.7–1.1 ( $0.94 \pm 0.15$ ), mp4W 0.8–0.4 ( $0.63 \pm 0.12$ ).



**Fig. 12.** *Pelecium violaceum* Brullé, 1838, male from Bom Jardim, Maranhão, Brazil (A–G) (CERPE) and female from Pontes e Lacerda, Mato Grosso, Brazil (H) (CEMT). A. Dorsal view. B. Detail of head. C–D. Median lobe. E. Tergite IX. F. Left paramere. G. Right paramere. H. Genitalia. Scale bars: A–B = 1 mm; C–H = 0.5 mm.

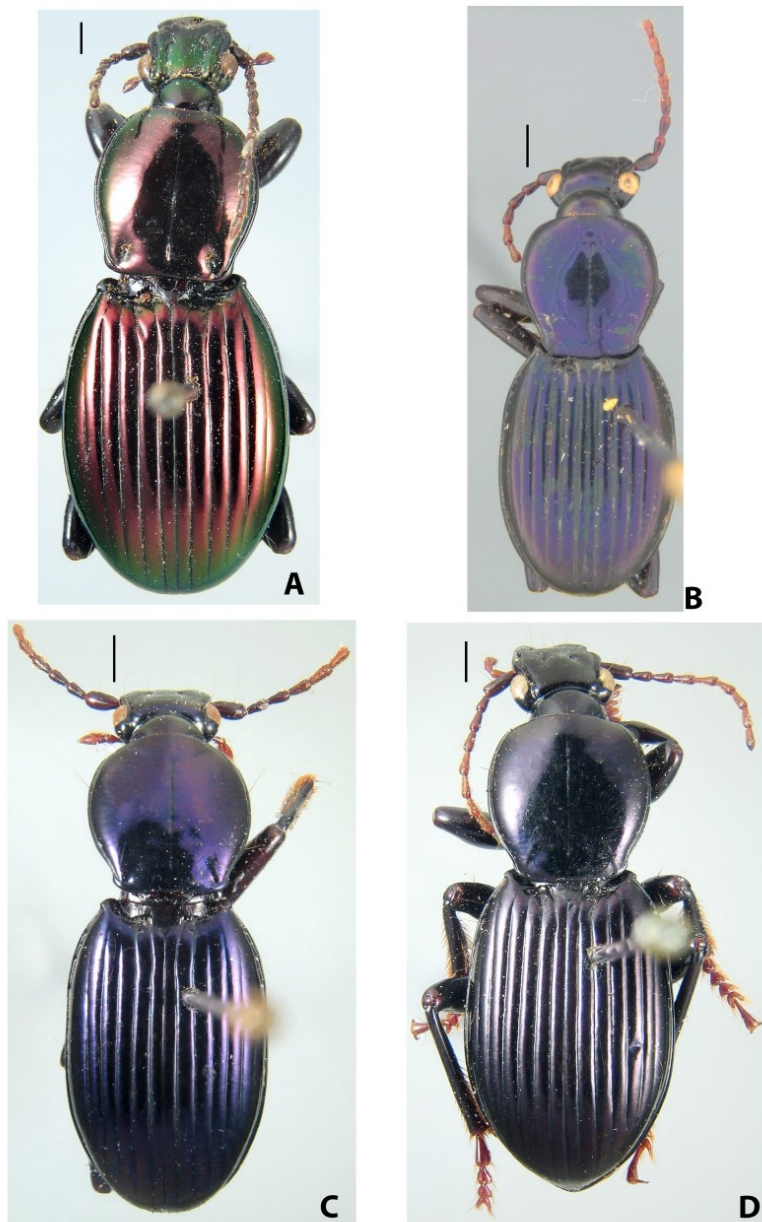


**Fig. 13.** Types of *Peleciium* Kirby, 1817, dorsal view. **A.** *Peleciium atroviolaceum* Straneo & Ball, 1989, allotype (MCSN), photograph by Michele Zilioli. **B.** *Peleciium bisulcatum* Straneo, 1970, holotype (MCSN), photograph by Michele Zilioli. **C.** *Peleciium bolivianum* Straneo & Ball, 1989, paratype (MUB), photograph by Bernd Jaeger. **D.** *Peleciium brasiliense* Straneo, 1962, holotype (MZSP), photograph by Guilherme Ide. Scale bars: 1 mm.

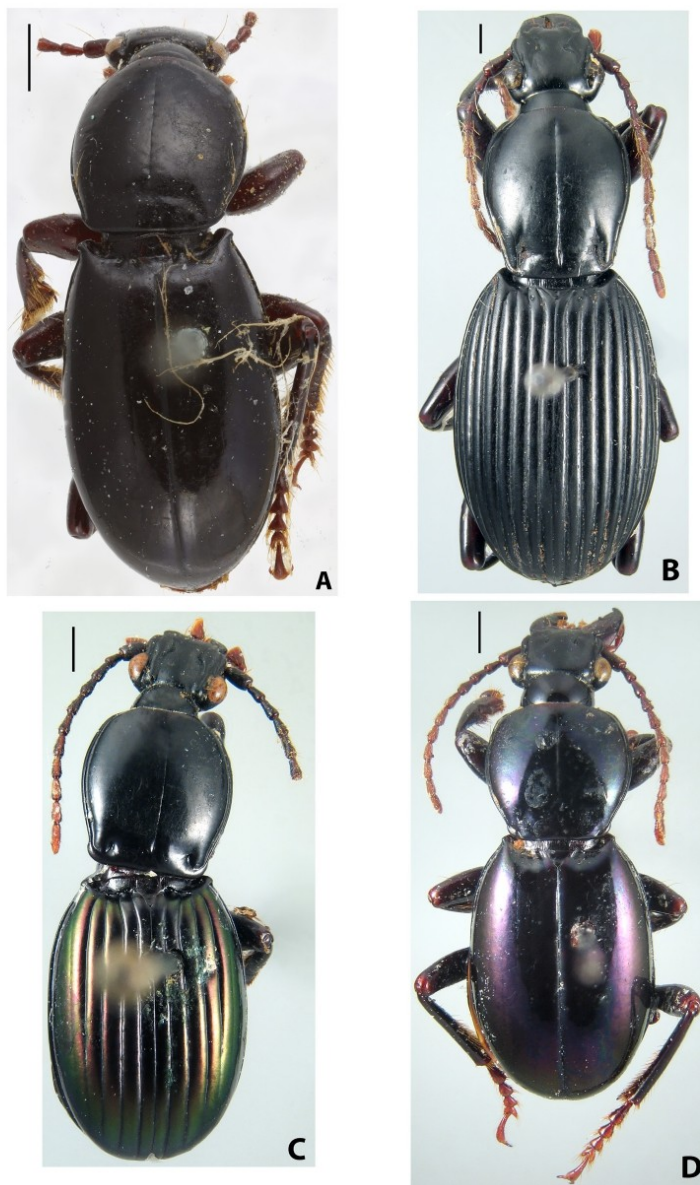


**Fig. 14.** Types of *Pelecium* Kirby, 1817, dorsal view. **A.** *Pelecium carinatum* Chaudoir, 1846, lectotype (MNHN), junior synonym of *Pelecium cyanipes* Kirby, 1817, photograph by Azadeh Taghavian. **B.** *Pelecium cyanipes*, holotype (BMNH), photograph by Keita Matsumoto. **C.** *Pelecium drakei* Quedenfeldt, 1890, lectotype (MUB), photograph by Bernd Jaeger. **D.** *Pelecium fulgidum* Straneo, 1962, holotype (MCSN), photograph by Michele Zilioli. Scale bars: 1 mm.



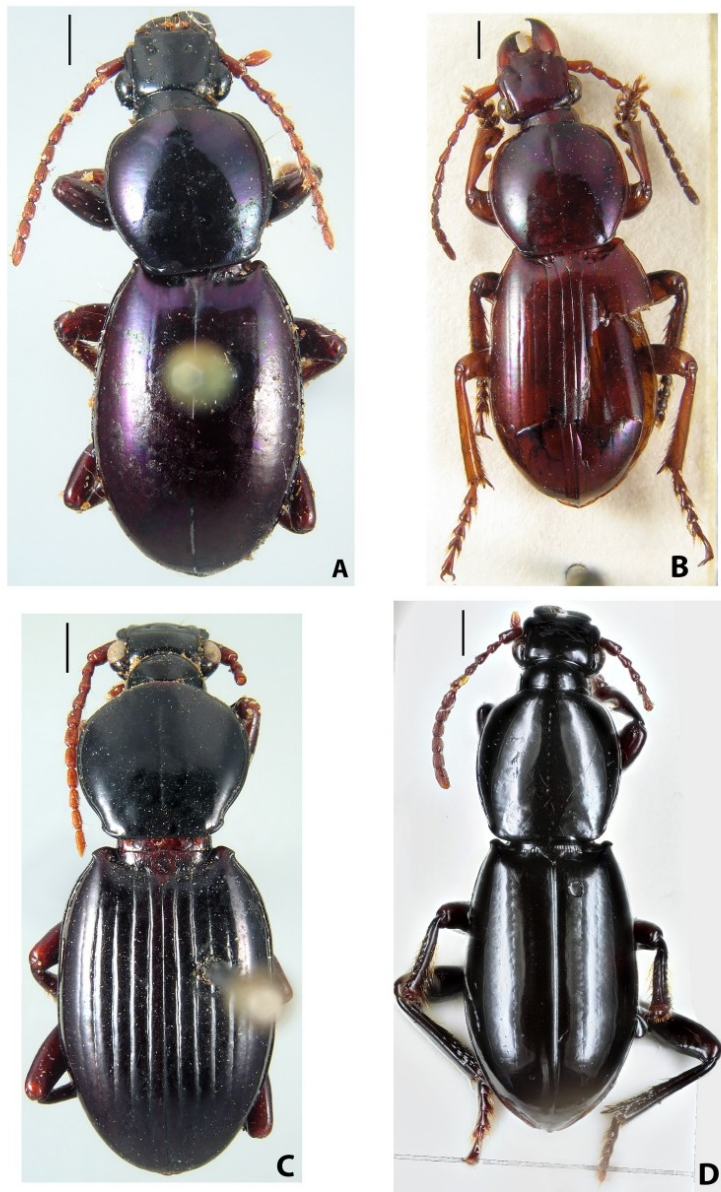


**Fig. 15.** Types of *Pelecium* Kirby, 1817, dorsal view. **A.** *Pelecium fulgidum* Straneo, 1962, allotype (MCSN), photograph by Michele Zilioli. **B.** *Pelecium helenae* Straneo & Ball, 1989, holotype (MZSP), photograph by Guilherme Ide. **C.** *Pelecium helenae*, paratype (MCSN), photograph by Michele Zilioli. **D.** *Pelecium helenae*, allotype (MCSN), photograph by Michele Zilioli. Scale bars: 1 mm.

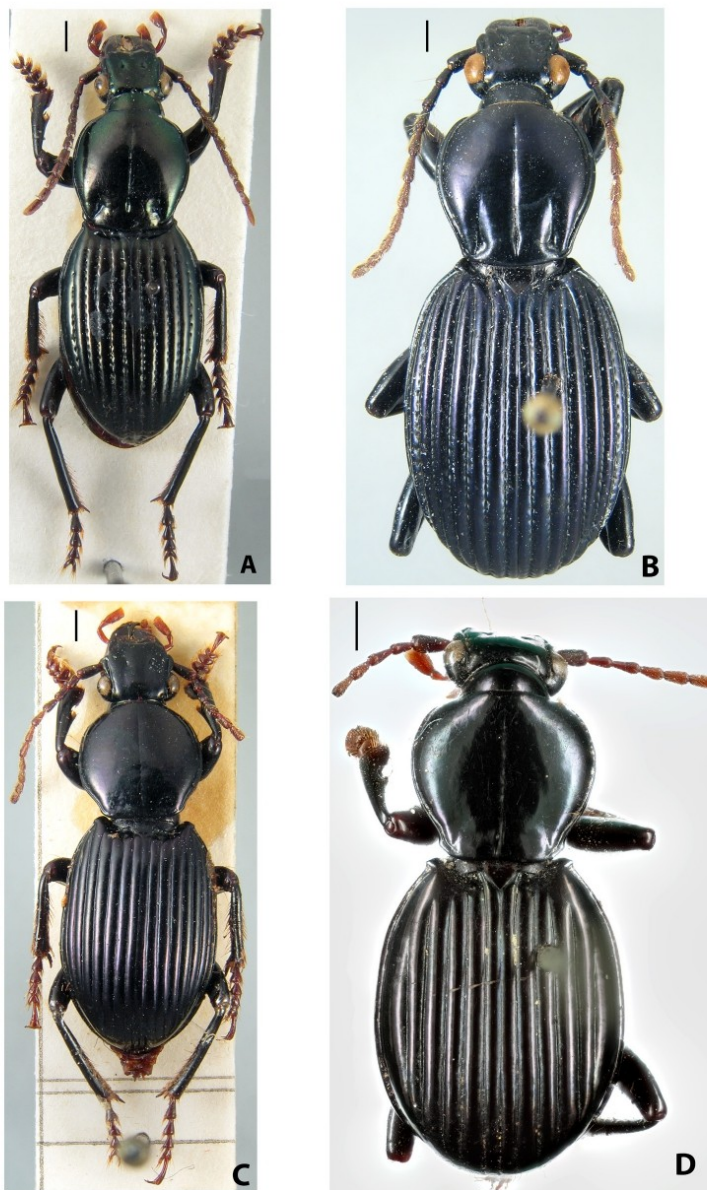


**Fig. 16.** Types of *Pelecium* Kirby, 1817, dorsal view. **A.** *Pelecium laeve* Chaudoir, 1854, holotype (MNHN), photograph by Azadeh Taghavian. **B.** *Pelecium longicolle* Straneo, 1953, allotype (MCSN), photograph by Michele Zilioli. **C.** *Pelecium negrei* Straneo, 1962, holotype (MCSN), photograph by Michele Zilioli. **D.** *Pelecium nicki* Straneo, 1955, holotype (MCSN), photograph by Michele Zilioli. Scale bars: 1 mm.

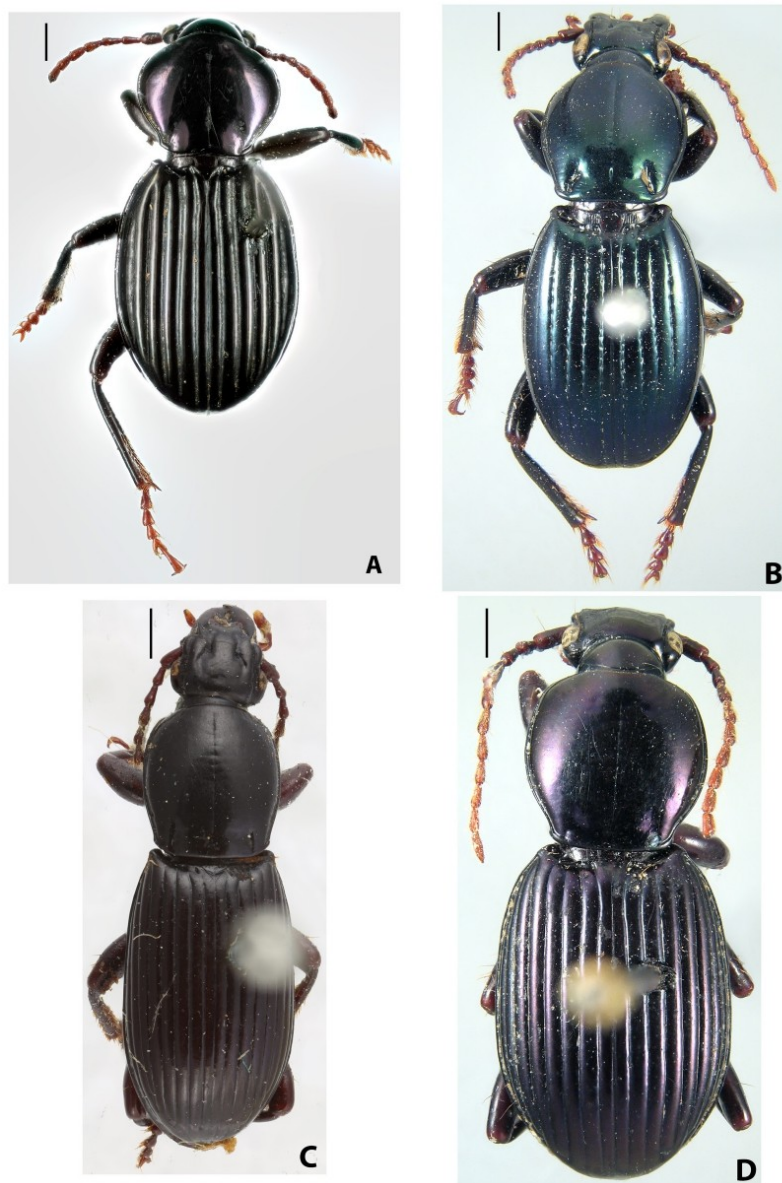




**Fig. 17.** Types of *Peleciium* Kirby, 1817, dorsal view. **A.** *Peleciium nicki* Straneo, 1955, paratype (MCSN), photograph by Michele Zilioli. **B.** *Peleciium obtusum* Straneo, 1953, holotype (MCSN), photograph by Michele Zilioli. **C.** *Peleciium paulae* Straneo & Ball, 1989, holotype (MCSN), photograph by Michele Zilioli. **D.** *Peleciium politum* Schaum, 1860, syntype (MUB), junior synonym of *Peleciium laeve* Chaudoir, 1854, photograph by Bernd Jaeger. Scale bars: 1 mm.

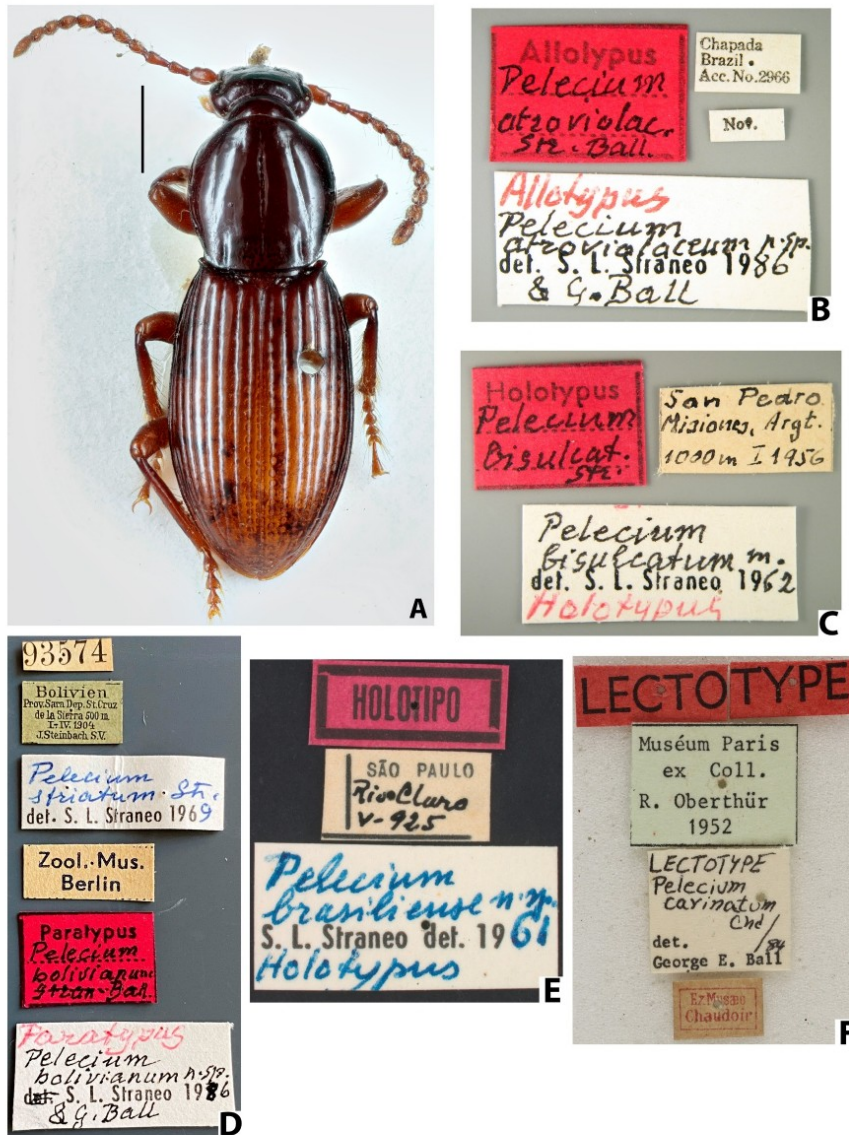


**Fig. 18.** Types of *Pelecium* Kirby, 1817, dorsal view. **A.** *Pelecium punctatostriatum* Straneo, 1970, paratype (MCSN), photograph by Michele Zilioli. **B.** *Pelecium punctatum* Straneo, 1953, holotype (MCSN), photograph by Michele Zilioli. **C.** *Pelecium renati* Straneo, 1953, holotype (MCSN), photograph by Michele Zilioli. **D.** *Pelecium rotundipenne* Schaum, 1860, lectotype (MUB), photograph by Bernd Jaeger. Scale bars: 1 mm.



**Fig. 19.** Types of *Pelecium*, Kirby, 1817, dorsal view. **A.** *Pelecium rotundipenne* Schaum, 1860, paralectotype (MUB), photograph by Bernd Jaeger. **B.** *Pelecium semistriatum* Straneo & Ball, 1989, allotype (MCSN), photograph by Michele Zilioli. **C.** *Pelecium striatipenne* Chaudoir, 1866, holotype (MNHN), photograph by Azadeh Taghavian. **D.** *Pelecium striatum* Straneo, 1955, holotype (MCSN), photograph by Michele Zilioli. Scale bars: 1 mm.





**Fig. 20.** Types and labels of type specimens of species of *Pelecium* Kirby, 1817. **A.** *Pelecium tenellum* Schaum, 1860, holotype (MUB), photograph by Bernd Jaeger. **B.** *Pelecium atrovioleaceum* Straneo & Ball, 1989, allotype (MCSN), dorsal view, photograph by Michele Zilioli. **C.** *Pelecium bisulcatum* Straneo, 1970, holotype (MCSN), photograph by Michele Zilioli. **D.** *Pelecium bolivianum* Straneo & Ball, 1989, paratype (MUB), photograph by Bernd Jaeger. **E.** *Pelecium brasiliense* Straneo, 1962, holotype (MZSP), photograph by Guilherme Ide. **F.** *Pelecium carinatum* Chaudoir, 1846, lectotype (MNHN), junior synonym of *Pelecium cyanipes* Kirby, 1817, photograph by Azadeh Taghavian. Scale bar: 1 mm.



**Fig. 21.** Labels of type specimens of some species of *Pelecium* Kirby, 1817. **A.** *Pelecium cyanipes* Kirby, 1817, holotype (BMNH), photograph by Keita Matsumoto. **B.** *Pelecium drakei* Quedenfeldt, 1890, lectotype (MUB), photograph by Bernd Jaeger. **C.** *Pelecium fulgidum* Straneo, 1962, holotype (MCSN), photograph by Michele Zilioli. **D.** *Pelecium fulgidum*, allotype (MCSN), photograph by Michele Zilioli. **E.** *Pelecium helenae* Straneo & Ball, 1989, holotype (MZSP), photograph by Guilherme Ide. **F.** *Pelecium helenae*, paratype (MCSN), photograph by Michele Zilioli. **G.** *Pelecium helenae*, allotype (MCSN), photograph by Michele Zilioli. **H.** *Pelecium laeve* Chaudoir, 1854, holotype (MNHN), photograph by Azadeh Taghavian. **I.** *Pelecium longicollis* Straneo, 1953, allotype (MCSN), photograph by Michele Zilioli. **J.** *Pelecium negrei* Straneo, 1962, holotype (MCSN), photograph by Michele Zilioli.





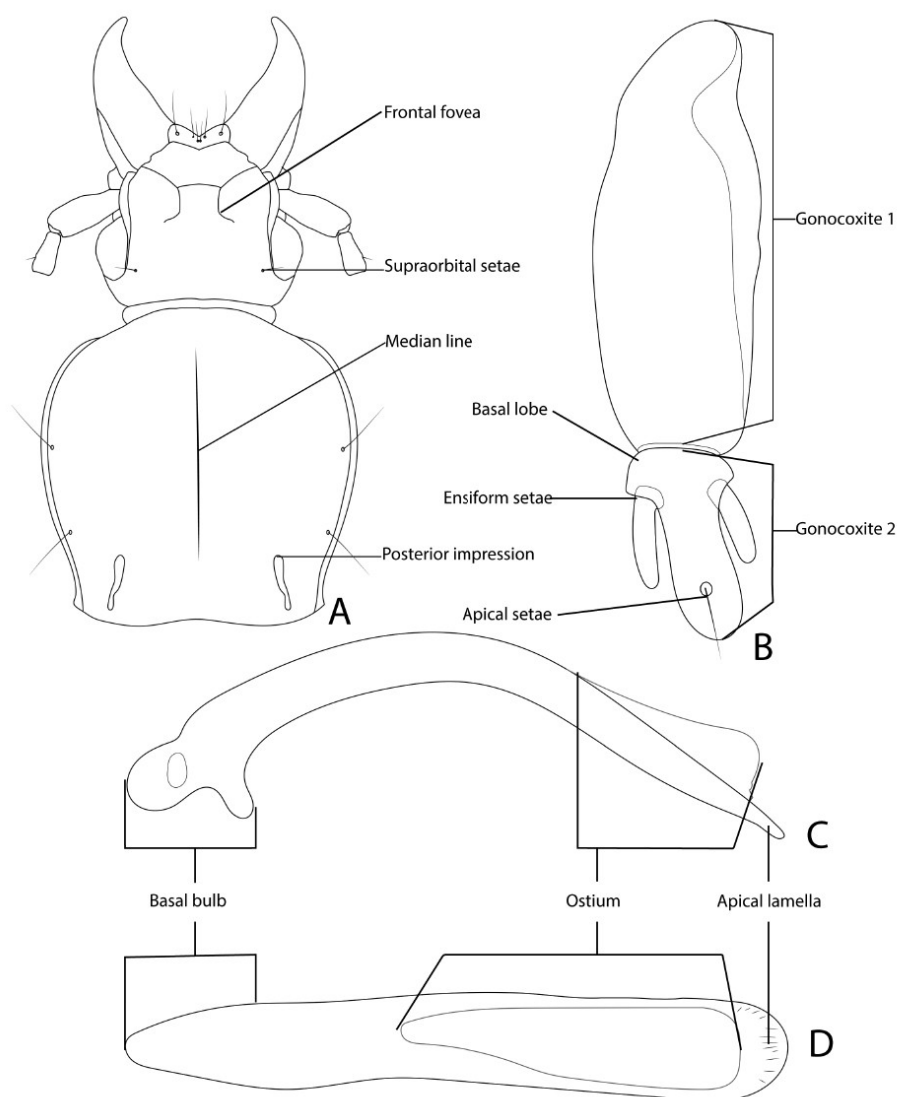
**Fig. 22.** Labels of type specimens of some species of *Pelecium* Kirby, 1817. **A.** *Pelecium nicki* Straneo, 1955, holotype (MCSN), photograph by Azadeh Taghavian. **B.** *Pelecium nicki*, paratype (MCSN), photograph by Azadeh Taghavian. **C.** *Pelecium obtusum* Straneo, 1953, holotype (MCSN), photograph by Azadeh Taghavian. **D.** *Pelecium paulae* Straneo & Ball, 1989, holotype (MCSN), photograph by Azadeh Taghavian. **E.** *Pelecium politum* Schaum, 1860, syntype (MUB), junior synonym of *Pelecium laeve* Chaudoir, 1854, photograph by Bernd Jaeger. **F.** *Pelecium punctatostriatum* Straneo, 1970, paratype (MCSN), photograph by Azadeh Taghavian. **G.** *Pelecium punctatum* Straneo, 1953, holotype (MCSN), photograph by Azadeh Taghavian. **H.** *Pelecium renati* Straneo, 1953, holotype (MCSN), photograph by Azadeh Taghavian. **I.** *Pelecium rotundipenne* Schaum, 1860, lectotype (MUB), photograph by Bernd Jaeger. **J.** *Pelecium rotundipenne*, paralectotype (MUB), photograph by Bernd Jaeger. **K.** *Pelecium semistriatum* Straneo & Ball, 1989, allotype (MCSN), photograph by Azadeh Taghavian.



**Fig. 23.** Labels of type specimens of some species of *Pelecium* Kirby, 1817. **A.** *Pelecium striatipenne* Chaudoir, 1866, holotype (MNHN), photograph by Azadeh Taghavian. **B.** *Pelecium striatum* Straneo, 1955, holotype (MCSN), photograph by Azadeh Taghavian. **C.** *Pelecium tenellum* Schaum, 1860, holotype (MUB), photograph by Bernd Jaeger.

## Discussion

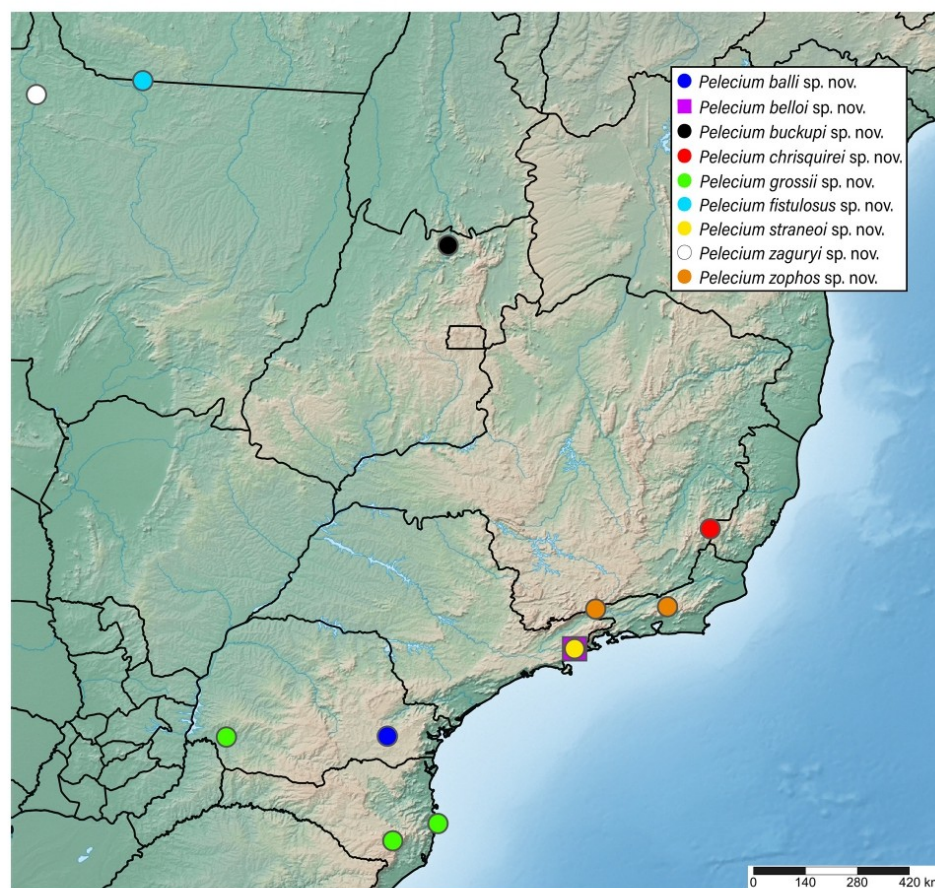
The Brazilian *Pelecium* are known mostly from the Cerrado and the Atlantic Forest biomes, but they have representatives in all the six Brazilian biomes (Amazon, Caatinga, Cerrado, Atlantic Forest, Pampa and Pantanal). This can be explained by either an actual diversification and predominance in the Atlantic Forest and Cerrado, or it could be a result of collection bias due to a comparatively greater collection effort in the Atlantic Forest and Cerrado biomes. The species described here were collected in the Cerrado (*P. buckupi* sp. nov. and *P. fistulosus* sp. nov. of the *P. punctatostriatum* species group; and *P. zaguryi* sp. nov. from the *P. rotundipenne* species group) and the Atlantic Forest (*P. chrissquirei* sp. nov., *P. balli* sp. nov. and *P. straneo* sp. nov. of the *P. rotundipenne* species group; *P. bello* sp. nov. of the *P. laeve* species group; and *P. grossii* sp. nov. and *P. zophos* of the *P. violaceum* species group), and they all fit the known geographic distributions of their respective species groups. These new species have narrow geographic distributions, which may be a consequence of a low collection effort for *Pelecium* in Brazil, a low population density, and/or cryptic habits of the species. Just a few described species of *Pelecium* have wide geographical distributions, such as *P. violaceum*, *P. foveicollis*, *P. bisulcatum* and *P. besckii*. The others are mostly restricted to small areas, in some cases forest remnants or protected areas, suggesting that these species of *Pelecium* may be subject to a high extinction risk due to habitat change or loss (Lande 1999). All new records of *P. bolivianum*, *P. helenae* and *P. striatum* are from biogeographical dominions in which these species were previously recorded. There is one record of *P. helenae* from North Brazil, clashing with other records in the Southeast. The northernmost record, in the Brazilian biogeographic subregion, is about 2400 km distant from the closest southeastern record, in the Chacoan subregion, making a natural dispersion unlikely due to the flightlessness of species of *Pelecium*, and the lack of evidence of phoretic behavior or other extreme dispersal strategies in species of the genus. A similar situation happens with *P. violaceum*, with one record in North Brazil clashing with records from northern Argentina, Paraguay, Bolivia and Central-West Brazil, but in this case the unexpected



**Fig. 24.** Contour drawing of the general morphology of the genus *Pelecium* Kirby, 1817, indicating selected parts cited in the descriptions. **A.** Dorsal view of head and pronotum. **B.** Female gonocoxites. **C.** Male median lobe in ventral view. **D.** Male median lobe in left lateral view.



record is about 1500 km distant from the other records. Specimens of *P. violaceum* are comparatively larger (median overall length: *P. violaceum* 18 mm; *P. helenae* 14.5 mm), which would suggest a better dispersal ability of *P. violaceum* due to body length. Nevertheless, other large species with the same overall length as *P. violaceum* (*P. punctatum*, *P. longicollis* and *P. brasiliensis*) are restricted to small areas, and three species with wide geographical distributions (*P. foveicollis*, *P. bisulcatum* and *P. besckii*) have a shorter median overall length than *P. helenae*, which is 10 mm long. Thus, body length seems not to be correlated with dispersal ability in species of *Pelecium*. We observed a variation in the median lobe and tergite IX of male *P. violaceum*, suggesting it could be a species complex rather than a single species, and thus its wide distribution would actually be the sum of narrowly distributed species that are morphologically very similar. To ensure that, and identify which morphological variation corresponds to true *P. violaceum*, a careful examination of the holotype is necessary. Straneo & Ball (1989) did not



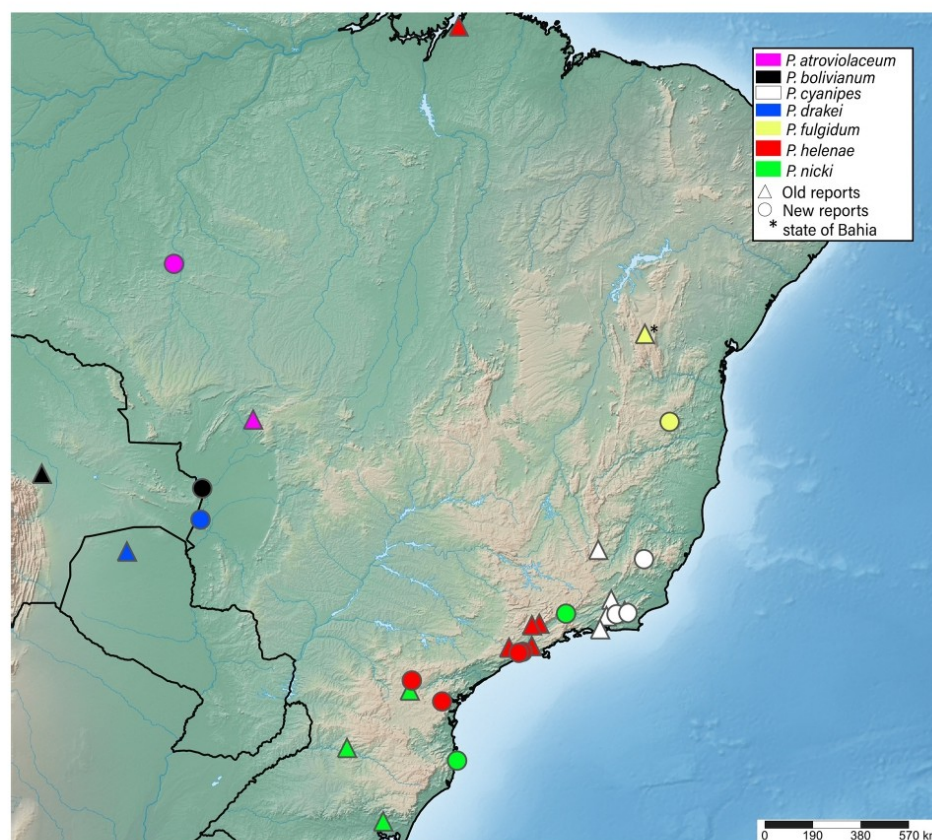
**Fig. 25.** Map of Brazil highlighting the Southeast and South Region and part of the Central-West Region, showing the type localities of *Pelecium balli* sp. nov., *P. belloii* sp. nov., *P. buckupi* sp. nov., *P. chrisquirei* sp. nov., *P. fistulosus* sp. nov., *P. grossii* sp. nov., *P. straneoii* sp. nov., *P. zaguryi* sp. nov. and *P. zophos* sp. nov.



examine the holotype and did not report where the type series is located. We were also unsuccessful in locating the type series.

Our observations and comparisons of structures of the male terminalia show some useful characteristics to differentiate species of *Pelecium*, such as: length of apical lamella and ostium, and latero-apical broadening of the median lobe; and shape of tergite IX and its apical projections. The parameres and the basal bulb of the median lobe are quite homogenous and we have not observed good diagnostic features. Female terminalia are more homogenous than those of the male, but there is some variation in the shape of gonocoxite 2 and in the length of the ensiform setae, which deserves more observations and comparisons.

Some large gaps in the taxonomy and natural history of *Pelecium* persist. The morphology of the male terminalia is unknown for 15 species, and that of the female terminalia for 13 species. It would be

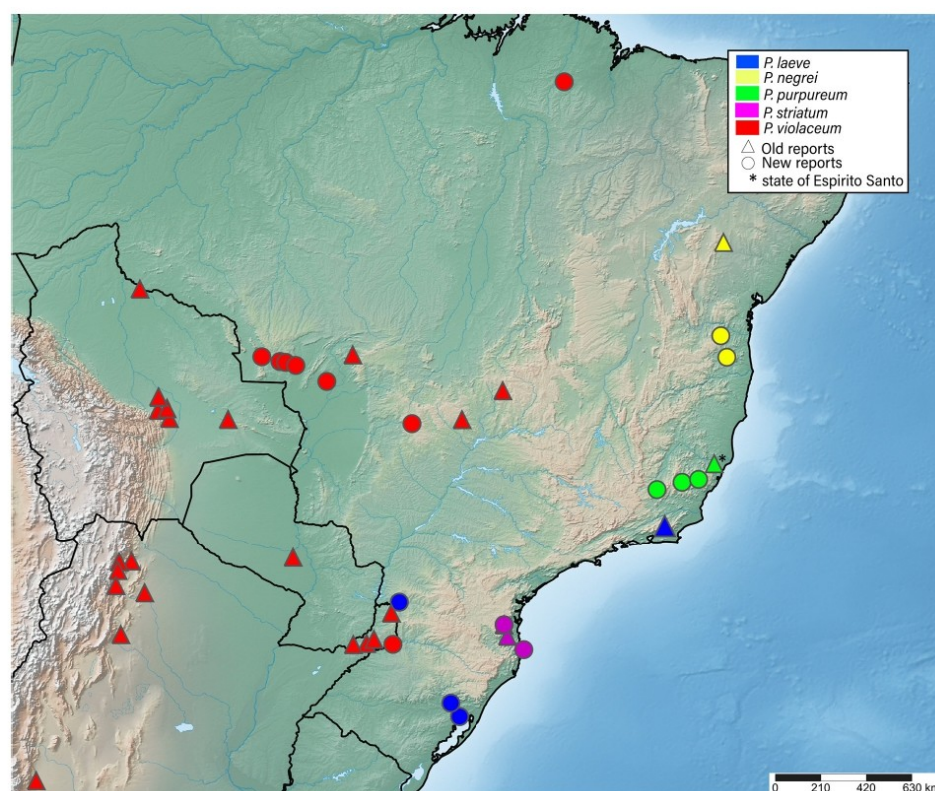


**Fig. 26.** Map highlighting part of South America with the known occurrences, including new records, of *Pelecium atrovioleaceum* Straneo & Ball, 1989, *P. bolivianum* Straneo & Ball, 1989, *P. cyanipes* Kirby, 1817, *P. drakei* Quedenfeldt, 1890, *P. fulgidum* Straneo, 1962, *P. helenae* Straneo & Ball, 1989 and *P. nicki* Straneo, 1955.

important to more thoroughly study the morphology of male and female abdominal terminalia, especially considering their membranous parts, which may possess more characters of taxonomic and phylogenetic significance. Behavior and life history of species of *Pelecium* are virtually unknown. There are a few old observations and reports, making it difficult to implement specific strategies to sample these beetles in the field, and to breed them under laboratory conditions. The presumed limited dispersal ability caused by the flightlessness of species of *Pelecium*, together with the apparent low density of their populations, make these organisms of great interest for ecological and conservation studies.

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**Fig. 27.** Map highlighting part of South America with the known occurrences, including new records, of *Pelecium laeve* Chaudoir, 1854, *P. negrei* Straneo, 1962, *P. purpureum* Straneo, 1955, *P. striatum* Straneo, 1955 and *P. violaceum* Brullé, 1838.



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### **III. CAPÍTULO 2**

## **Comparative morphology of the metendosternite in Harpalinae (Coleoptera: Carabidae)**

# **Comparative morphology of the metendosternite in Harpalinae (Coleoptera: Carabidae)**

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**Este artigo está em fase de refinamento da escrita, está em uma formatação não específica e deverá ser submetido à revista Neotropical Entomology**

## **Abstract**

Harpalinae is the most diverse subfamily of Carabidae with almost 20,000 described species, classified into 50 tribes. They exhibit a great morphological and behavior variation and can be found all around the globe in various habitats. Phylogenetic relationships in Harpalinae are well studied and its monophyly is confirmed, but doubts remain on the relationships of some tribes, such as Oodini, Chlaeini, Panagaeini and mainly Peleciini. Morphological studies in Harpalinae mainly address male and female terminalia and are mostly descriptive. To understand the evolution of such a diverse and structurally complex taxon as Harpalinae, studies of character systems are necessary so that they can be used in subsequent phylogenetic analyses. Comparative morphological studies of the metendosternite of Coleoptera are scarce in the scientific literature and virtually nonexistent for Carabidae. Here, we conduct a comparative morphological study of the metendosternite in Harpalinae. To conduct this study, 64 adult specimens of 29 species were examined, including 23 tribes of Harpalinae and one Brachinini to enable comparisons with a close related group. A total of 12 characters with potential phylogenetic value were recognized.

**Key words:** Beetles, character system, evolution, phylogeny, systematics.



## Introduction

Carabidae is one of the most diverse families of Coleoptera with around 37,700 described species subdivided into 21 subfamilies (Bouchard *et al.* 2011; Duran & Gough 2020), of which Harpalinae is the most diverse with almost 20,000 described species, classified into 50 tribes (Bouchard *et al.* 2011). Harpalines exhibit great morphological variation, from an elongate body in the genus *Agra* Fabricius, 1801 and *Leptotrachelus* Latreille, 1829 (Fig. 2F) to a drastically flattened in *Mormolyce* Hagenbach, 1825 and *Catapiesis* Solier, 1835 (Fig. 1H) and an ant-like body in *Ega* Laporte de Castelnau, 1835 (Fig. 2Q). Harpalines are mostly solitary predators, but other feeding habits such as granivory and herbivory are also reported (Martinez 2005, Reichardt 1977). They can be found all around the globe and in various habitats such as tree canopy, deep caves, sandy and muddy terrains, and living together with ants (Martinez 2005).

Phylogenetic relationships in Harpalinae are well studied and its monophyly is confirmed from molecular (Maddison *et al.* 1999, Ober 2002, Ober & Maddison 2008) and morphological approaches (Jannel 1941, 1942). But doubts remain on the relationships of some tribes, such as Oodini, Chlaeini, Panagaeini and Peleciini (Ober 2002, Ober & Maddison 2008), because these enigmatic taxa were not consistently associated with any clade across data sets and analysis method due to low taxon sampling.

Detailed morphological studies delimiting phylogenetic character systems tend to address only external parts, leaving aside internal structures. Studies like those by Doyen (1966) and McHugh *et al.* (1997), providing detailed morphological descriptions of *Tenebrio molitor* Linnaeus and *Megalodacne heros* (Say), respectively, are scarce. But even these studies, however comprehensive they are, do not delimit character systems in ways that can be easily included in matrices for phylogenetic analyses. Broader studies, which analyze a large number of taxa and characters (e.g. Dressler & Beutel 2010, Lawrence *et al.* 2011), often include important characters for understanding the phylogenetic relationships of large taxa as superfamilies and suborders, but that do not solve problems in more inclusive taxa, such as subfamilies and tribes. Therefore, studies of character systems within a more inclusive taxon are extremely important,

such as, those of Kamiński et al. (2022) who analyzed the female terminalia in Sepidiini (Tenebrionidae) and Gnaspini et al. (2017) who analyzed the tarsal setae in Leiodidae.

Morphological studies in Harpalinae mainly address male and female terminalia and are mostly descriptive (e.g. Hunting 2008, Liebherr & Will 1998, 2015, Ortuño et al. 2003). When they delimit morphological characters, they end up limiting themselves to the more traditional ones (e.g. Straneo & Ball 1989). To understand the evolution of such a diverse and structurally complex taxon as Harpalinae, studies of character systems are necessary so that they can be used in subsequent phylogenetic analyses.

The endosternite called “metendosternite”, commonly referred to as the “metafurca”, is formed by the invagination of the true metasternum and serves as an attachment for several muscles (Lawrence et al. 2011). The first comprehensive studies about the metendosternite was made by Crowson (1938, 1944) focusing on describing, comparing and distinguishing several basic types of metendosternites from different major taxa within Coleoptera. Subsequently, Doyen (1966) and McHugh *et al.* (1997) provide detailed descriptions of the metendosternite of *Tenebrio molitor* and *Megalodacne heros*, respectively. Lawrence et al. (2011), Hübler & Klass (2013) and Pecci-Maddalena *et al.* (2021) explore the morphology of the metendosternite in a phylogenetic approach, the first being a phylogenetic analysis of Coleoptera based on morphological characters of adults and larvae; the other two focusing on the morphology of the metendosternite within Chrysomelinae and Erotylidae, respectively.

Comparative morphological studies of the metendosternite of Coleoptera, especially those of more inclusive taxa, are scarce in the scientific literature and virtually nonexistent for Carabidae. The main objective of this paper is to explore this character system (the metendosternite), to provide characters for improving the character matrix of Harpalinae for future phylogenetic analyses.

## **Material and Methods**

To conduct this study, 64 adult specimens of 29 species were examined (Figs 1–2), including 23 tribes of Harpalinae and one Brachinini (Brachininae) as an outgroup. The classification of Carabidae is based on Bouchard et al. (2011). We used the phylogenetic framework proposed by Ober & Maddison (2008), which is currently the most accepted Harpaline phylogeny. The list of species examined here, and the suprageneric taxa they represent, is provided in Table 1. The same table includes the species of the corresponding suprageneric taxa in Ober & Maddison (2008).

The specimens and metendosternites were examined under a Zeiss Stemi 508 stereomicroscope and photographed under a Zeiss Discovery V20 stereomicroscope equipped with a Zeiss AxioCam 506 color digital camera. Photo stacking was done in the Helicon Focus software. For dissection, each specimen was placed in a container with warm water for a day for relaxing tissues, then the parts of interest were placed in KOH for a few hours to remove the soft tissues and then placed in a solution of 10% acetic acid for a few minutes to neutralize the KOH. The metendosternites were measured in photos.

The terminology adopted here is based on large works that describe this structure of species from different families of Coleoptera (Crowson 1944, Lawrence et al. 2011) and in works describing in more inclusive taxa (Hübler & Klaus 2013, Pecci-Maddalena *et al.* 2021) and even a single species (Doyen 1966, McHugh *et al.* 1997). Below is a list of the main terms and their definitions, and these are represented in Fig. 3. When the definition is based in a previous work they are cited.

**Anterior tendons insertion:** Fissure in the anterior margin of furcal arms anchoring the anterior tendon (Pecci-Maddalena & Lopes-Andrade 2017).

**Crux:** Crossing-point of the two ventral flanges of the metendosternite (Crowson 1944).

**Stalk central sclerotization:** Dorsal sclerotized portion of the stalk ventral longitudinal flange (Pecci-Maddalena & Lopes-Andrade 2017).

**First insertion:** Most basal sclerotization in the metendosternite stalk, where it begins to connect with the metasternite.

**Furcal arms:** Two stems resulting from the bifurcation in the stalk apex (Crowson 1944).

**Lateral tendons insertion:** Fissure in the posterior margin of furcal arms anchoring the anterior tendon.

**Second insertion:** Medial sclerotization point in the metendosternite stalk, where it finishes to connect with metasterno.

**Stalk:** Stem base of metendosternite (Doyen 1966).

**Vela:** Laminar expansion in the ventral face of the furcal arm (Lawrence et al. 2011).

**Ventrolateral process:** Laminar expansion in the furcal arms base. Anterior ridge facing furcal arms ventral surface and posterior ridge facing furcal arms dorsolateral surface (Lawrence et al. 2011). Similar to Lamina (Pecci-Maddalena & Lopes-Andrade 2017). Terminology in Lawrence et al. (2011) was chosen to better describe the structure.

All sclerotization marks (crux, stalk central sclerotization and second insertion) can be lightened in a prolonged time in KOH making difficult to identify their limits.

## Results

General description of the metendosternite in Harpalinae (Fig. 3): Stalk elongated, at least twice as long as wide, stalk central sclerotization well developed even in small and slightly sclerotized metendosternites. Furcal arms long, V shaped, laminae absent or barely protruding from arms, ventrolateral processes present in most cases, anterior processes absent, anterior tendons located on furcal arms apex. No difference was observed between the metendosternite of male and female within each species. The character matrix, for the characters and states listed below, is provided in Table 2.

## List of proposed characters and their states



**Character 1.** Stalk length: (0) six times or less longer than stalk medial width (Fig. 4A–B, 4E–F, 5A–F) ; (1) more than six times longer than stalk medial width (Fig. 4C–D). Character states were determined using the average stalk length of examined specimens. In order to obtain a more objective character separation, it would be necessary to conduct a morphometric study.

**Character 2.** Stalk central sclerotization, base: (0) reach stalk second insertion (Fig. 4A–F, 5C–F); (1) does not reach stalk second insertion (Fig. 5A–B).

**Character 3.** Stalk central sclerotization, apex: (0) does not cross (Fig. 4A–B, 4E–F, 5A–F); (1) cross the crux (Fig. 4C–D).

**Character 4.** Stalk lateral edge before second insertion: (0) divergent (Fig. 4A–B, 4E–F, 5A–F); (1) sides sub parallels (Fig. 4C–D).

**Character 5.** Stalk parts, length: (0) distance between first and second insertion smaller (Fig. 4C–F, 5C–F); (1) same length (Fig. 4A–B, 5A–B); (2) second insertion to crux smaller. Character state 0 is present in most studied specimens.

**Character 6.** Ventrolateral processes: (0) present (Fig. 4A–D); (1) absent (Fig. 4E–F, 5A–F).

**Character 7.** Ventrolateral processes length: (0) elongate (horizontal midline longer than the highest height) (Fig. 4C–D); (1) medium (horizontal midline equal to or nearly equal to the highest height); (2) short (horizontal midline shorter than the highest height) (Fig. 4A–B).

**Character 8.** Vela: (0) absent (Fig. 4A–D, 5A–D); (1) present (Fig. 4E–F).

**Character 9.** Anterior tendons insertion, position: (0) furcal arms apex, or near to the furcal arms apex (Fig. 4A–D, 5A–B, 5E–F); (1) furcal arms base, or near to the furcal arms base (Fig. 4E–F, 5C–D).

**Character 10.** Anterior tendons insertion, length: (0) short (equal to or shorter than the median portion of stalk) (Fig. 4C–F, 5A–F); (1) elongate (longer than the median portion of stalk) (Fig. 4A–B).

**Character 11.** Lateral tendons insertion, length: (0) elongate (longer than median portion of stalk) (Fig. 4C–D, 5A–B); (1) short (equal to or shorter than median portion of stalk) (Fig. 4A–B, 4E–F, 5C–F).

**Character 12.** Furcal arms, length: (0) four times or less longer than stalk medial width (Fig. 4A–B, 5A–F); (1) more than four times longer than stalk medial width (Fig. 4C–F).

## Discussion

Most of the characters observed here have never been studied in species of Harpalinae before. Characters 1, 6, 7, 8 and 9 were examined by Lawrence et al. (2011), but with a broad perspective approaching the order Coleoptera as a whole. They have sampled only two species of Harpalinae, both from the genus *Pterostichus* Bonelli (Pterostichini): *P. oblongopunctatus*, the same species we examined here; and an unnamed species of *Pterostichus* from Europe. There are no studies delimiting morphological characters from the metendosternite focusing on Harpalinae or Carabidae, and such characters are barely or not included in phylogenetic analysis of these taxa.

In the two genera we examined more than one species, *Brachygnathus* and *Pelecium*, no variation of the gross morphology of the metendosternite was observed. The two species of *Brachygnathus* have conspicuously different body shapes: *B. muticus* is elongate; and *B. oxygonus* is somewhat rounded. The two examined species of *Pelecium* have different size ranges: *P. nicki*, with a total length of 9.7–12.7 mm; and *P. violaceum*, with a total length of 15.1–22 mm. These are indications that the gross morphology of the metendosternite is very conservative within more inclusive taxa, especially within a genus. It would be important to examine more species of genera with great variation of size and shape of their species in order to confirm this observation. Another important observation is that there is no great difference between the metendosternite of males and females of the same species.

There are no unique characters state in Harpalinae compared to Brachininae. The most prominent differences between these two subfamilies are in characters 2:1 (stalk central sclerotization) where only Lebiini (*Eucheila flavilabris*) presents the same character state as Brachinini and character 5:1 (stalk parts length) where only Catapiesini and Helluonini present the same character state as Braquinini. These two characters state have the potential to be exclusive of Harpalinae, but it would be necessary to examine the metendosternite of more non-Harpalinae Carabidae to confirm these hypotheses.

Lebiini (*Eucheila flavilabris*) differs from all other harpalines in character 2:1. Compared to Cyclosomini, there are three characters (character 4:1, character 7:0 and character 10:0) bringing Lebiini (*Eucheila flavilabris*) closer to Lebiini (*Lebia*) in relation to Cyclosomini, differentiating the results of Ober & Maddison (2008). These character states may be exclusive for these lineages within Lebiini + Cyclosomini (Ober & Maddison 2008). To confirm this hypothesis, an analysis of beetles from other Lebiini + Cyclosomini lineages would be necessary.

In character 5 (Stalk parts length), only Galeritini presents character state 2. Among the Harpalinae, only the Catapiesini + Helluonini clade presents character state 1, corroborating Ober & Maddison (2008). These character states may be exclusive for these lineages.

The results for Panagaeini differ from Ober & Maddison (2008). The morphology of the metendosternite suggests a close relationship between Panagaeini, Peleciini and Pterostichini (*Eucroa*). But Ober & Maddison (2008) recovered them in a clade together with Oodini and Chalenini. This is probably due to different choices of terminal taxa for representing each

suprageneric taxa. *Brachygnathus* is an “outlier” genus within Panagaeini and it has been suggested that it could be a member of the Peleciini (Reichardt 1977).

Pterostichini (*Eucrhoa*) and Panagaeini presented all similar characters, and Peleciini differs only in character 12 (length of the furcal arm). This clade (Pterostichini (*Eucrhoa*) + Panagaeini + Peleciini) differentiates it from all other beetles analyzed in characters 8 (Vela) and 9 (Anterior tendons insertion, position). This may represent a phylogenetic proximity, since in Ober & Maddison (2008) Peleciini and Pterostichini are grouped in the same clade. These similarities could also be the result of an evolutionary convergence, as these beetles have reduced hind wings and cannot fly (Francia & Ball 2007, Garcete-Barrett 2001, Straneo & Ball 1989). This reduction in the hind wings could be enough to generate a structural change in the metendosternite, taking into account that it contains muscles involved in flight. Other apterous beetles analyzed showed less similarity with Pterostichini (*Euchroa*) and Panagaeini. Morionini presented 9 similar characters and Dercylini 5 similar characters. Those characters are variable among the examined beetles.

## Conclusions

The morphological study presented in this chapter is unprecedented for Harpalinae providing 12 phylogenetic characters to better compose a phylogenetic matrix of the subfamily. It also presents potential apomorphies for some lineages within Harpalinae and presents arguments for the approximation of the genus *Brachygnathus* to the Peleciini.

Due to the fragility and small size of the metendosternite, an invasive process is required for its extraction, making it challenging to examine it in individuals of species underrepresented in scientific collections. The metendosternite is a complex three-dimensional structure with various elongations and translucent parts, making its analysis and comparison a difficult task. For these reasons, the metendosternite is usually not examined in morphological descriptions and comparative works, leaving aside a structure that can contain information of taxonomic and phylogenetic importance. But we claim here that due to the amount of characters of the metendosternite that can be observed, it would be important to include an image or illustration of



this structure in taxonomic descriptions, at least in representative species within a genus, as we have done recently for the genus *Pelecium* (Orsetti & Lopes-Andrade 2024). Such simple addition of information in the literature would permit a broader comparison of the gross morphology of the metendosternite in Carabidae.

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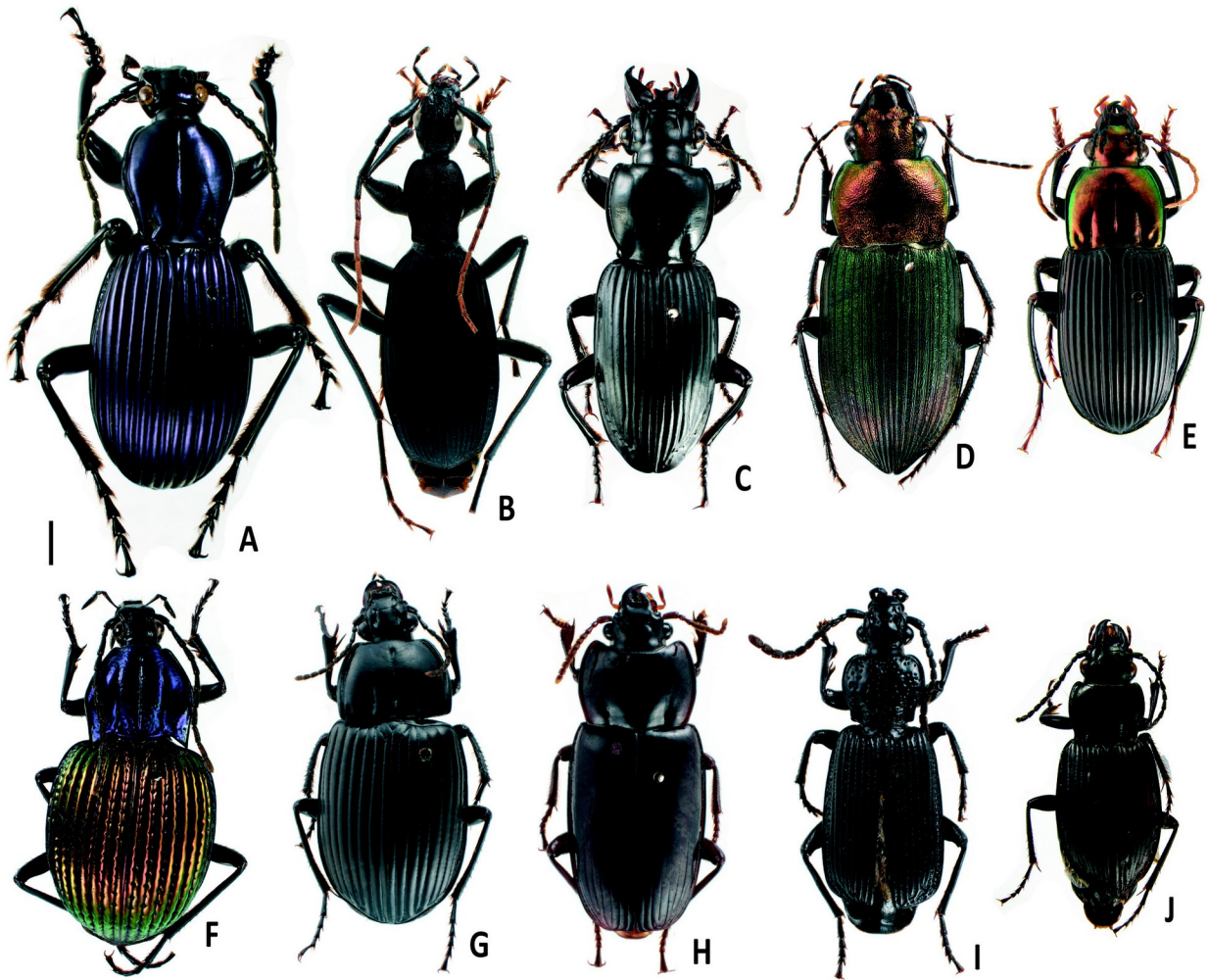
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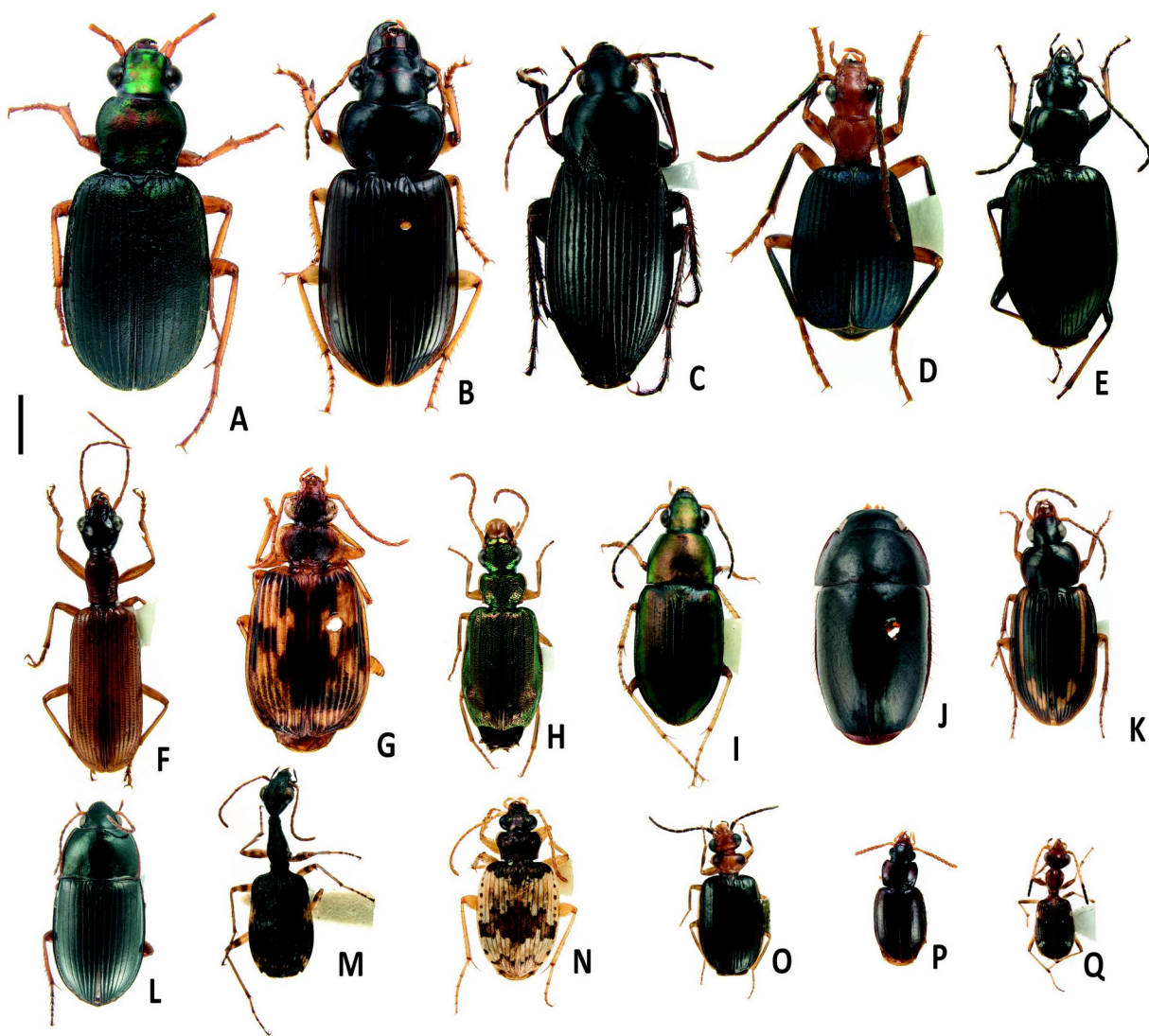
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## Figure captions

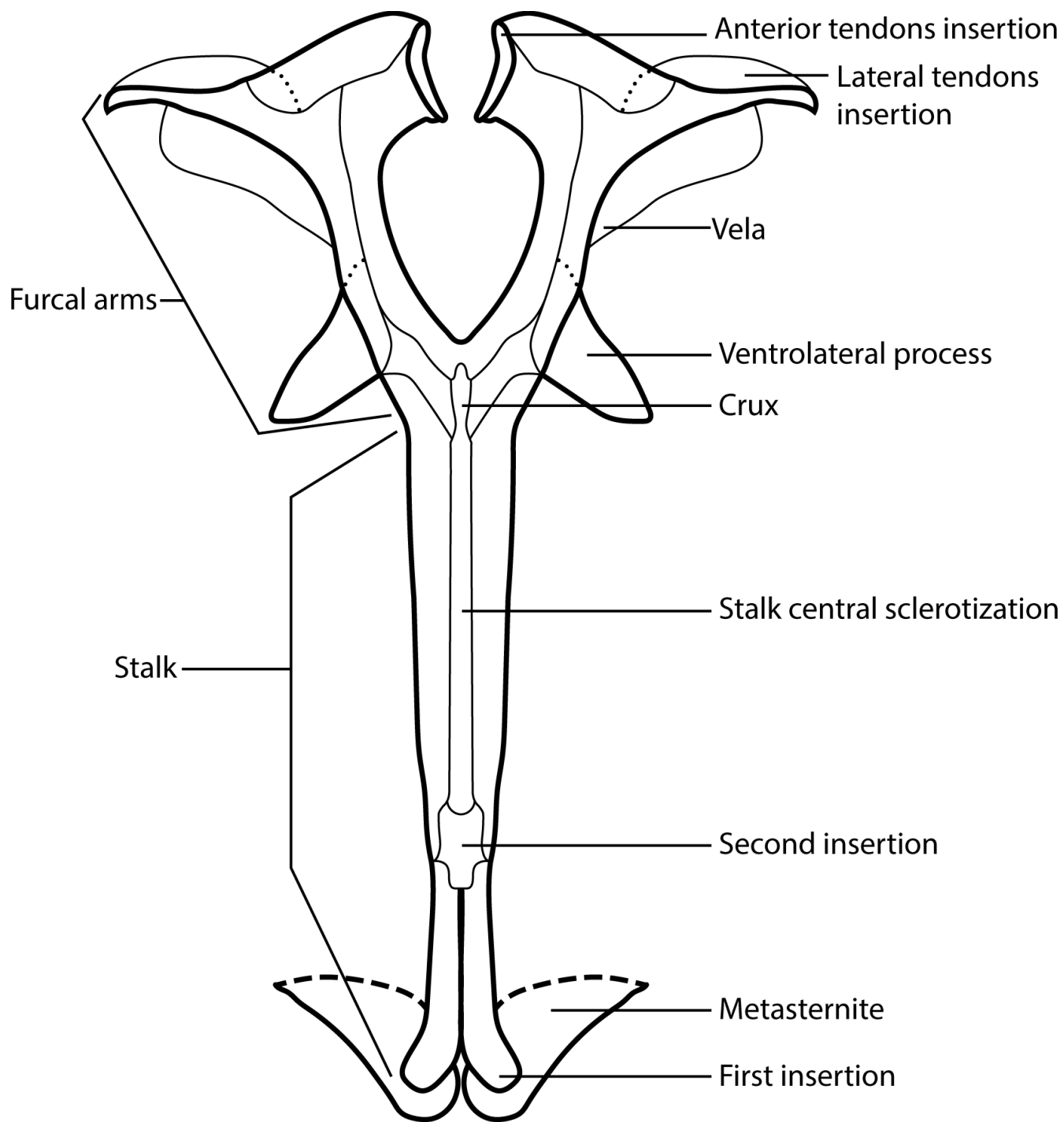


**FIGURE 1.** Harpalinae species examined. **A**, *Peleciium violaceum* (Peleciini). **B**, *Galerita stenodera* (Galeritini). **C**, *Morion brasiliensis* (Morionini). **D**, *Neulacorissus speciosus* (Harpalini). **E**, *Euchroa* sp. (Pterostichini). **F**, *Brachygnathus oxygonus* (Panagaeini). **G**, *Dercylus* sp. (Dercylini). **H**, *Catapiesis nitida* (Catapiesini). **I**, *Helluomorphoides nigerrimus* (Helluonini). **J**, *Pterostichus oblongopunctatus* (Pterostichini). Scale bar = 1mm.

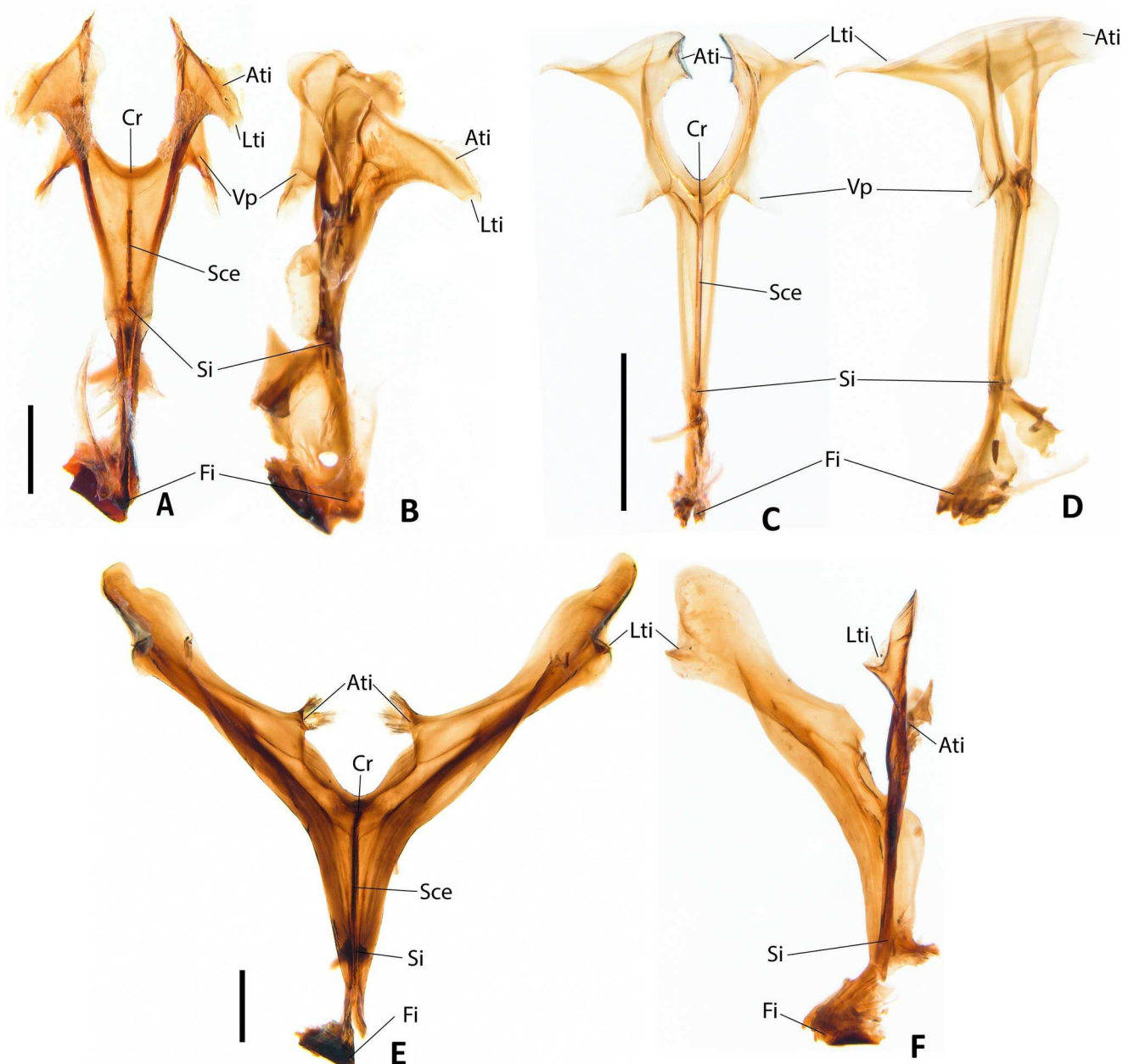




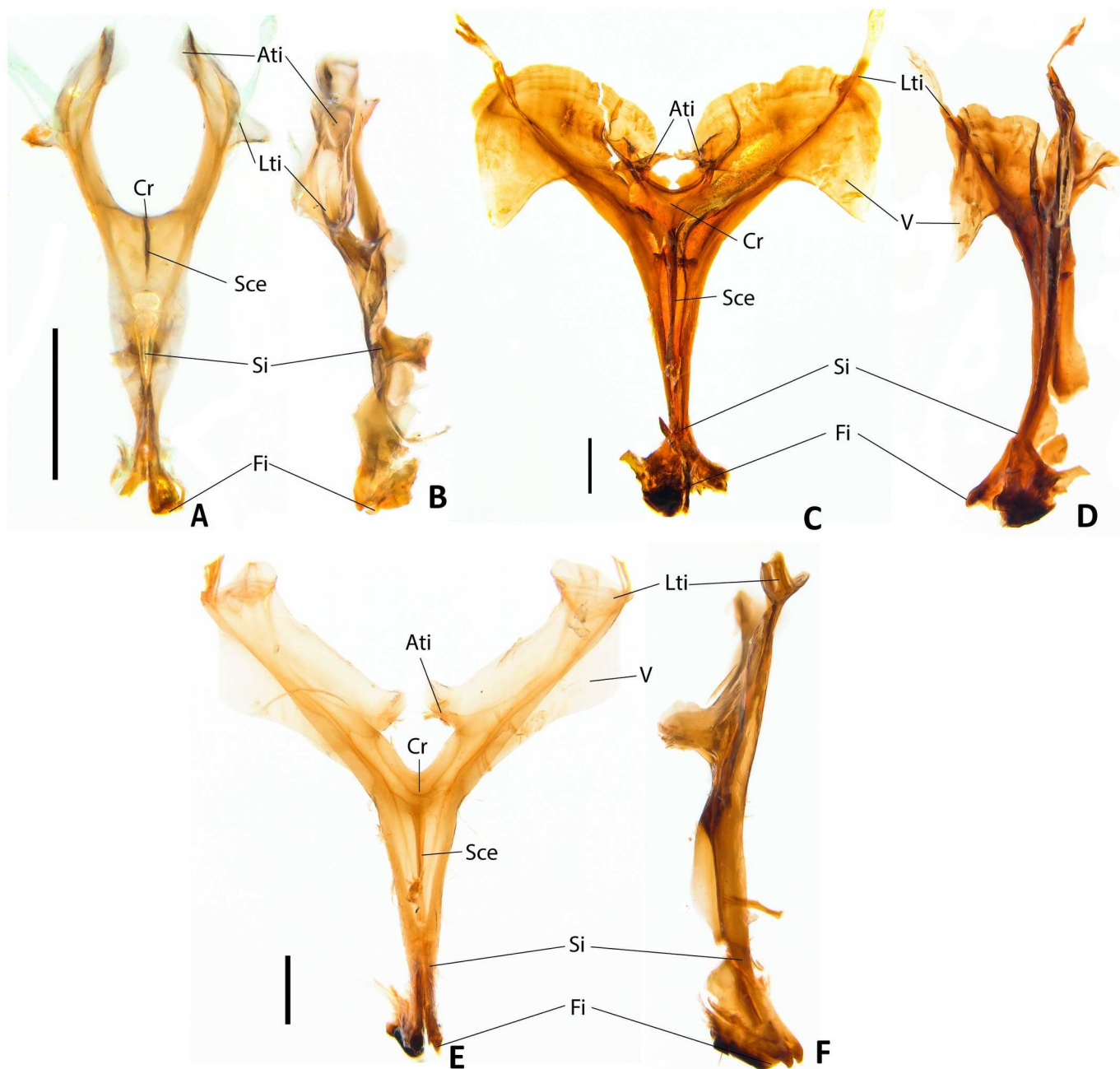
**FIGURE 2.** Carabidae species examined. **A**, *Claenius* sp. (Claeini). **B**, *Polpochila* sp. (Harpalini). **C**, *Calathus fuscipes* (Sphodrini). **D**, *Brachinus* sp. (Brachininae: Brachinini) **E**, *Incagonum* sp. (Platynini). **F**, *Leptotrachelus* sp. (Ctenodactylini). **G**, *Lebia* sp. (Lebiini). **H**, *Eucheila flavilabris* (Lebiini). **I**, *Stenocrepis* sp. (Oodini). **J**, *Notopseudomorpha* sp. (Pseudomorphini). **K**, *Loxandrus* sp. (Abacetini). **L**, *Amara familiaris* (Zabrinini). **M**, *Colliuris* sp. (Odacanthini). **N**, *Tetragonoderus pictus* (Cyclosomini). **O**, *Pentagonica media* (Pentagonicini). **P**, *Perigona* sp. (Perigonini). **Q**, *Ega* sp. (Lachnophorini). Scale bar = 1mm.



**FIGURE 3.** Outline of a hypothetical Harpalinae metendosternite, representing the main characters that can be observed in the structure.



**FIGURE 4.** Metendosternite in Harpalinae. **A–B**, *Catapiesis nitida* (Catapiesini). **C–D**, *Stenocreps* sp. (Oodini). **E–F**, *Euchroa* sp. (Pterostichini). **A, C, E**, Dorsal view. **B, D, F**, Lateral view. Cr, crux; Ati, anterior tendon insertion; Lti, lateral tendon insertion; Vp, ventrolateral process; Sce, stalk central esclerotization; Si, second insertion; Fi, first insertion. Scale bar = 0.5 mm.



**FIGURE 5.** Metendosternite in Harpalinae. **A–B**, *Brachinus* sp. (Brachininae: Brachinini). **C–D**, *Pelecium violaceums* (Pelecini). **E–F**, *Brachygnathus oxygonus* (Panagacini). **A, C, E**, Dorsal view. **B, D, F**, Lateral view. Cr, crux; Ati, anterior tendon insertion; Lti, lateral

tendon insertion; V, vela; Sce, stalk central esclerotization; Si, second insertion; Fi, first insertion. Scale bar = 0.5 mm.



| Systematic Assignment           | Species used in this study                                               | Province                                 | Species in Ober <i>et al.</i> 2008                                     | Province                        |
|---------------------------------|--------------------------------------------------------------------------|------------------------------------------|------------------------------------------------------------------------|---------------------------------|
| Harpalinae: Abacetini           | <i>Loxandrus</i> sp.                                                     | Viçosa, Brazil                           | <i>Abacetus</i> sp.                                                    | Arsikere, India                 |
|                                 |                                                                          |                                          | Abacetine                                                              | Arsikere, India                 |
|                                 |                                                                          |                                          | <i>Adrimus</i> n. sp.                                                  | Sucumbios, Ecuador              |
|                                 |                                                                          |                                          | <i>Loxandrus</i> n. sp. nr. <i>amplithorax</i> Straneo                 | Sucumbios, Ecuador              |
|                                 |                                                                          |                                          | <i>Oxycrepis</i> ( <i>Stolonis</i> ) n. sp.                            | Napo, Ecuador                   |
| Harpalinae: Catapiesini         | <i>Catapiesis nitida</i> Solier, 1835                                    | Alto Caparaó, Brazil                     | <i>Catapiesis brasiliensis</i> Gray                                    | Napo, Ecuador                   |
| Harpalinae: Chlaeniini          | <i>Chlaenius</i> sp.                                                     | Viçosa, Brazil                           | <i>Chlaenius ruficauda</i> Chaudoir                                    | Santa Cruz, USA                 |
|                                 |                                                                          |                                          | <i>Chlaenius</i> ( <i>Lissauchenius</i> )                              | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>rufifemorialis bimaculatus</i> Dejean                               |                                 |
|                                 |                                                                          |                                          | <i>Chlaenius</i> ( <i>Callistomimus</i> ) sp.2                         | Nepalganj, Nepal                |
| Harpalinae: Ctenodactylini      | <i>Leptotrachelus</i> sp.                                                | Viçosa, Brazil                           | <i>Ctenodactyla batesii</i> Chaudoir                                   | Sucumbios, Ecuador              |
|                                 |                                                                          |                                          | <i>Ctenodactyla</i> sp.2                                               | Sucumbios, Ecuador              |
|                                 |                                                                          |                                          | <i>Leptotrachelus dorsalis</i> Fabricius                               | Granada, USA                    |
|                                 |                                                                          |                                          | <i>Plagiolum irinum</i> Solier                                         | Caitom, Chile                   |
|                                 |                                                                          |                                          | <i>Teukrus</i> nr. <i>Cruciatus</i> Bates                              | Sucumbios, Ecuador              |
| Harpalinae: Cyclosomini         | <i>Tetragonoderus pictus</i> (Perty, 1830)                               | Sem Peixe, Brazil                        | <i>Aephiidius</i> sp.                                                  | Barro Colorado Island, Panama   |
|                                 |                                                                          |                                          | <i>Anaulacus</i> ( <i>Macrancanthus</i> ) n. sp.                       | Alamos, Mexico                  |
|                                 |                                                                          |                                          | <i>Masoreus wetterhalli axillaris</i> Gyllenhal                        | Rabat, Morocco                  |
|                                 |                                                                          |                                          | <i>Tetragonoderus chalcus</i> Chaudoir                                 | El Calafate, Argentina          |
|                                 |                                                                          |                                          | <i>Tetragonoderus insignicollis</i> Chaudoir                           | St. Lucia, South Africa         |
|                                 |                                                                          |                                          | <i>Tetragonoderus latipennis</i> LeConte                               | Barro Colorado Island, Panama   |
|                                 |                                                                          |                                          | <i>Sarothrocrepis</i> sp.                                              | Wilsons Valley, Australia       |
|                                 |                                                                          |                                          |                                                                        |                                 |
| Harpalinae: Dercylini           | <i>Dercylus</i> ( <i>Dercylodes</i> ) sp.                                | Viçosa, Brazil                           | <i>Dercylus</i> sp.                                                    | Napo, Ecuador                   |
| Harpalinae: Galeritini          | <i>Galerita stenodera</i> Chaudoir, 1854                                 | Viçosa, Brazil                           | <i>Ancystroglossus</i> n. sp.                                          | Napo, Ecuador                   |
|                                 |                                                                          |                                          | Galeritine                                                             | Napo, Ecuador                   |
|                                 |                                                                          |                                          | <i>Galerita lecontei lecontei</i> Dejean                               | Gila, USA                       |
|                                 |                                                                          |                                          | <i>Planetes</i> sp.                                                    | Ersikere, India                 |
|                                 |                                                                          |                                          | <i>Planetes ruficollis</i> Nietner                                     | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>Trichognathus</i> sp.                                               | Napo, Ecuador                   |
| Harpalinae: Harpalini           | <i>Neoaulecorissus speciosus</i> (Dejean, 1829)<br><i>Polpochila</i> sp. | Belo Horizonte, Brazil<br>Viçosa, Brazil | <i>Bradycellus</i> sp.                                                 | Tucson, USA                     |
|                                 |                                                                          |                                          | Harpaline                                                              | Napo, Ecuador                   |
|                                 |                                                                          |                                          | <i>Lecanomerus niger</i> Darlington                                    | Queensland, Australia           |
|                                 |                                                                          |                                          | <i>Notiobia</i> sp.                                                    | Portezuelo, Mexico              |
|                                 |                                                                          |                                          | <i>Pelmatellus</i> sp.                                                 | Cerro de la Muerte, Costa Rica  |
|                                 |                                                                          |                                          | <i>Stenolophus</i> ( <i>Egadora</i> ) <i>quinquepustulata</i> Wiedmann | Pahang, Malaysia                |
| Harpalinae: Helluonini          | <i>Helluomorphoides nigerrimus</i> (Klug, 1834)                          | Alto Caparaó, Brazil                     | <i>Aenigma iridis</i> Newman                                           | Queensland, Australia           |
|                                 |                                                                          |                                          | <i>Dicranoglossus resplendens</i> Castelnau                            | Queensland, Australia           |
|                                 |                                                                          |                                          | <i>Gigadaema</i> sp.                                                   | Exmouth, Australia              |
|                                 |                                                                          |                                          | <i>Helluomorphoides latitarsis</i> Casey                               | Ash Creek, USA                  |
|                                 |                                                                          |                                          | <i>Helluomorphoides oculus</i> Bates                                   | Sucumbios, Ecuador              |
|                                 |                                                                          |                                          | <i>Macrocheilus</i> sp.                                                | Liuku, China                    |
|                                 |                                                                          |                                          | <i>Omphra</i> sp.                                                      | Arsikere, India                 |
| Harpalinae: Lachnophorini       | <i>Ega</i> sp.                                                           | Viçosa, Brazil                           | <i>Anchonoderus</i> sp.                                                | Heredia, Costa Rica             |
|                                 |                                                                          |                                          | <i>Aporesthus</i> nr. <i>anomalous</i> Bates                           | Sucumbios, Ecuador              |
|                                 |                                                                          |                                          | <i>Asklepia</i> n. sp.                                                 | Napo, Ecuador                   |
|                                 |                                                                          |                                          | <i>Calybe laetula</i> LeConte                                          | Gila, USA                       |
|                                 |                                                                          |                                          | <i>Euphorticus pubescens</i> Dejean                                    | Tucson, USA                     |
|                                 |                                                                          |                                          | <i>Lachnophorus elegantulus</i> Mannerheim                             | Gila, USA                       |
|                                 |                                                                          |                                          |                                                                        |                                 |
| Harpalinae: Lebiini: Pericalina | <i>Eucheila flavilabris</i> Dejean & Boisdual, 1829                      | Viçosa, Brazil                           | <i>Antimerina elegans</i> Alluaud                                      | Talatakely, Madagascar          |
|                                 |                                                                          |                                          | <i>Catascopus</i> sp.                                                  | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>Coptodera aerata</i> Dejean                                         | Granada, USA                    |
|                                 |                                                                          |                                          | <i>Coptodera erotyloides</i> Bates                                     | Pahang, Malaysia                |
|                                 |                                                                          |                                          | <i>Coptoptera apicalis</i> Péringuey                                   | Natal Prov., South Africa       |
|                                 |                                                                          |                                          | <i>Eurydera unicolor</i> Klug                                          | Talatakely, Madagascar          |
|                                 |                                                                          |                                          | <i>Inna breviformis</i> Chaudoir                                       | Napo, Ecuador                   |
|                                 |                                                                          |                                          | <i>Menarus testaceus</i> Jedlicka                                      | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>Mormolyce hagenbachii</i> Westwood                                  | Pahang, Malaysia                |
|                                 |                                                                          |                                          | <i>Pericalus quadrimaculata</i> MacLeay                                | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>Pericaline</i>                                                      | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>Philophaeus</i> sp.                                                 | New South Wales, Australia      |
|                                 |                                                                          |                                          | <i>Pristacrus laticollis</i> Gory & Castelnau                          | Talatakely, Madagascar          |
|                                 |                                                                          |                                          | <i>Serrimargo verrucifer</i> Chaudoir                                  | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>Somotrichus elevatus</i> Fabricius                                  | Santa Cruz, USA                 |
|                                 |                                                                          |                                          | <i>Stenognathus</i> ( <i>Pristolomus</i> ) <i>dentifer</i> Chaudoir    | Sucumbios, Ecuador              |
|                                 |                                                                          |                                          | <i>Stenotelus opacus</i> Bouchard                                      | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>Somotrichus elevatus</i> Fabricius                                  | Santa Cruz, USA                 |
|                                 |                                                                          |                                          | <i>Thysanotus apicalis</i> Alluaud                                     | Vohiparara, Madagascar          |
|                                 |                                                                          |                                          |                                                                        |                                 |
|                                 |                                                                          |                                          |                                                                        |                                 |
| Harpalinae: Lebiini: Lebiina    | <i>Lebia</i> sp.                                                         | Viçosa, Brazil                           | <i>Aspasiola</i> n. sp.                                                | Sucumbios, Ecuador              |
|                                 |                                                                          |                                          | <i>Arsinoe</i> nr. <i>egregia</i> Péringuey                            | Northern Province, South Africa |
|                                 |                                                                          |                                          | <i>Endynomena</i> sp.                                                  | Kallar Bridge, India            |
|                                 |                                                                          |                                          | <i>Hyboptera angulicollis</i> Chaudoir                                 | Sucumbios, Ecuador              |
|                                 |                                                                          |                                          | <i>Lachnoderma hirsutum</i> Bates                                      | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>Lebia pulchella</i> Dejean                                          | Santa Cruz, USA                 |
|                                 |                                                                          |                                          | <i>Lebia viridis</i> Dejean                                            | Santa Cruz, USA                 |
|                                 |                                                                          |                                          | <i>Lebia</i> sp.1                                                      | Napo, Ecuador                   |
|                                 |                                                                          |                                          | <i>Lebia</i> sp.2                                                      | Sabah, Malaysia                 |
|                                 |                                                                          |                                          | <i>Lebia</i> sp.3                                                      | Mpumalanga, South Africa        |
|                                 |                                                                          |                                          | <i>Lia quadrinotata</i> Chevrolat                                      | Alamos, Mexico                  |
|                                 |                                                                          |                                          | <i>Physodera</i> n. sp. nr. <i>bifenestrata</i> Heller                 | Sabah, Malaysia                 |
|                                 |                                                                          |                                          |                                                                        |                                 |
| Harpalinae: Morionini           | <i>Morion brasiliensis</i> Dejean, 1825                                  | Viçosa, Brazil                           | <i>Morion aridus</i> Allen                                             | Pima, USA                       |
|                                 |                                                                          |                                          | <i>Moriosomus seticolis</i> MacLeay                                    | Cotopaxi, Ecuador               |
| Harpalinae: Odacanthini         | <i>Colliuris</i> sp.                                                     | Viçosa, Brazil                           | <i>Actenonyx bembidioides</i> White                                    | Arrowtown, New Zealand          |
|                                 |                                                                          |                                          | <i>Clarencia</i> sp.                                                   | Queensland, Australia           |
|                                 |                                                                          |                                          | <i>Colliuris pensylvanica</i> Linné                                    | Graham, USA                     |

|                            |                                                        |                                 |                                                 |                                   |
|----------------------------|--------------------------------------------------------|---------------------------------|-------------------------------------------------|-----------------------------------|
|                            |                                                        |                                 | <i>Colliuris (Eucolliuris) sp.2</i>             | Northern Prov., South Africa      |
|                            |                                                        |                                 | <i>Dicraspeda brunnea</i> Chaudoir              | Queensland, Australia             |
|                            |                                                        |                                 | <i>Laslocera sp.</i>                            | Northern Prov., South Africa      |
|                            |                                                        |                                 | <i>Ophionea ishii</i> Habu                      | Pahang, Malaysia                  |
|                            |                                                        |                                 | <i>Stenidia rugicollis</i> Fairmaire            | Vohiparara village, Madagascar    |
| Harpalinae: Oodini         | <i>Stenocrepis sp.</i>                                 | Viçosa, Brazil                  | <i>Adelopomorpha glabra</i>                     | New Caledonia                     |
|                            |                                                        |                                 | <i>Anatrichis sp.</i>                           | Cerro de la Muerte, Costa Rica    |
|                            |                                                        |                                 | <i>Oodes amaroides</i> Dejean                   | Baldwin Co., USA                  |
|                            |                                                        |                                 | <i>Oodes amaroides</i> Dejean                   | Baldwin Co., USA                  |
|                            |                                                        |                                 | <i>Oodine sp.1</i>                              | Sucumbios, Ecuador                |
|                            |                                                        |                                 | <i>Oodine sp.2</i>                              | Sucumbios, Ecuador                |
|                            |                                                        |                                 | <i>Oodine sp.3</i>                              | Mpumalanga, South Africa          |
| Harpalinae: Panagaeini     | <i>Brachygnathus muticus</i> Perty, 1830               | Urbano Sntos, Brazil            | <i>Craspedophorus rufipalpis</i> LaFerte        | Sabah, Malaysia                   |
|                            | <i>Brachygnathus oxignonus</i> Perty, 1830             | St. Antonio de Leverger, Brazil | <i>Microschemus sp.</i>                         | Mpumalanga, South Africa          |
|                            |                                                        |                                 | <i>Panagaeus sallei</i> Chaudoir                | Graham Co., USA                   |
|                            |                                                        |                                 | <i>Tefflus sp.</i>                              | Namunyak, Kenya                   |
| Harpalinae: Peleciini      | <i>Pelecium violaceum</i> Brullé, 1838                 | Indiavai, Brazil                | <i>Pelecium n. sp. nr. sulcipenne</i> Chaudoir  | Napo, Ecuador                     |
|                            | <i>Pelecium nick</i> Straneo, 1955                     | Florianópolis, Brazil           | <i>Eripus nitidus</i> Chaudoir                  | Vera Cruz, Mexico                 |
| Harpalinae: Pentagonicini  | <i>Pentagonica media</i> Liebke, 1939                  | Viçosa, Brazil                  | <i>Pentagonica roedingeri</i> Liebke            | Napo, Ecuador                     |
|                            |                                                        |                                 | <i>Pentagonica nr. blanda</i> Andrewes          | Sabah, Malaysia                   |
|                            |                                                        |                                 | <i>Scopodes sp.</i>                             | Lady Talbot, Australia            |
| Harpalinae: Perigonini     | <i>Perigona sp.</i>                                    | Viçosa, Brazil                  | <i>Diploharpus laevisimus</i> Chaudoir          | Napo, Ecuador                     |
|                            |                                                        |                                 | <i>Perigona nigriceps</i> Dejean                | Natchez, USA                      |
|                            |                                                        |                                 | <i>Perigona (Ripogena) bembidoides</i> Alluaud  | Antsiranana Province, Madagascar  |
| Harpalinae: Platynini      | <i>Incagonum sp.</i>                                   | Viçosa, Brazil                  | <i>Agonum extensicollis</i> Say                 | Pima Co., USA                     |
|                            |                                                        |                                 | <i>Dicranoncus quadridens</i> Motschulsky       | Sabah, Malaysia                   |
|                            |                                                        |                                 | <i>Euplynes limbipennis</i> Bates               | Sabah, Malaysia                   |
|                            |                                                        |                                 | <i>Glyptolenus sulcipennis</i> Chaudoir         | Sucumbios, Ecuador                |
|                            |                                                        |                                 | <i>Incagonum sp.</i>                            | Ushuaia, Argentina                |
|                            |                                                        |                                 | <i>Liagonum sp.</i>                             | Fianarantsoa Province, Madagascar |
|                            |                                                        |                                 | <i>Olisthopus micans</i> LeConte                | Wayne County, USA                 |
|                            |                                                        |                                 | <i>Platynus hypolithos</i> Say                  | Ithaca, USA                       |
|                            |                                                        |                                 | <i>Rhadine sp.</i>                              | Pima Co., USA                     |
| Harpalinae: Pseudomorphini | <i>Notopseudomorpha sp.</i>                            | Nova Friburgo, Brazil           | <i>Adelotopus bolitus</i> Castelnau             | Queensland, Australia             |
|                            |                                                        |                                 | <i>Pseudomorpha nr. angustata</i> Horn          | Willcox, USA                      |
|                            |                                                        |                                 | <i>Sphallomorpha sp.1</i>                       | Queensland, Australia             |
|                            |                                                        |                                 | <i>Sphallomorpha sp.2</i>                       | Queensland, Australia             |
| Harpalinae: Pterostichini  | <i>Euchroa sp.</i>                                     | Viçosa, Brazil                  | <i>Pterostichus melanarius</i> Illiger          | Alberta, Canada                   |
|                            | <i>Pterostichus oblongopunctatus</i> (Fabricius, 1787) | Lunna, Belarus                  | <i>Poecilus scitulus</i>                        | Pima Co., USA                     |
| Harpalinae: Sphodrini      | <i>Calathus fuscipes</i> Goeze, 1777                   | Lunna, Belarus                  | <i>Calathus ruficollis</i> Dejean               | Tumacocori, USA                   |
|                            |                                                        |                                 | <i>Synuchus dubius</i> LeConte                  | Pima Co., USA                     |
| Harpalinae: Zabrinini      | <i>Amara familiaris</i> (Duftschmid, 1812)             | Lunna, Belarus                  | <i>Amara apricaria</i> Paykull                  | Alberta, Canada                   |
|                            |                                                        |                                 | <i>Amara (Curtonotus) sp.</i>                   | Alberta, Canada                   |
| Brachininae: Brachinini    | <i>Brachinus sp.</i>                                   | Viçosa, Brazil                  | <i>Aptinus alpinus</i> Dejean & Boisdual        | Alpimarittmei, Italy              |
|                            |                                                        |                                 | <i>Aptinus displosor</i> Dufour                 | Cadix, Spain                      |
|                            |                                                        |                                 | <i>Brachinus (Metabrachinus) armiger</i> Dejean | Graaff Reinet, South Africa       |
|                            |                                                        |                                 | <i>Brachinus (Neobrachinus) hirsutus</i> Bates  | Pima Co., USA                     |
|                            |                                                        |                                 | <i>Pheropsophus aequinoctialis</i> Linné        | Santa Cruz de la Sierra, Bolivia  |
|                            |                                                        |                                 | <i>Pheropsophus sp.</i>                         | Arsikene, India                   |
|                            |                                                        |                                 | <i>Styphlodromus sp.</i>                        | Northern Prov., South Africa      |
|                            |                                                        |                                 | <i>Styphlomerus vittaticollis</i> Péringuey     | Fianarantsoa Province, Madagascar |

**TABLE 1.** List of species examined in this study and corresponding taxa in Ober & Maddison (2008).

**TABLE 2.** Characters and character states of metendosternite in the studied tribes.

| Systematic Assignment |                                      | Character set |   |   |   |   |   |   |   |   |    |    |    |
|-----------------------|--------------------------------------|---------------|---|---|---|---|---|---|---|---|----|----|----|
| Tribe                 | Species                              | 1             | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Abacetini             | <i>Loxandrus sp.</i>                 | 1             | 0 | 0 | 1 | 0 | 1 | x | 0 | 0 | 0  | 0  | 1  |
| Catapiesini           | <i>Catapiesis nitida</i>             | 0             | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 1  | 1  | 0  |
| Chlaeniini            | <i>Chlaenius sp.</i>                 | 1             | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0  | 1  | 1  |
| Ctenodactylini        | <i>Leptotrachelus sp.</i>            | 1             | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0  | 0  | 1  |
| Cyclosomini           | <i>Tetragonoderus pictus</i>         | 0             | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1  | 0  | 1  |
| Dercylini             | <i>Dercylus (Dercylodes) sp.</i>     | 1             | 0 | 0 | 1 | 0 | 1 | x | 0 | 0 | 1  | 0  | 0  |
| Galeritini            | <i>Galerita stenodera</i>            | 0             | 0 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0  | 1  | 0  |
| Harpalini             | <i>Neoaualacoryssus speciosus</i>    | 0             | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1  | 1  | 0  |
| Harpalini             | <i>Polpochila sp.</i>                | 1             | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0  | 1  | 0  |
| Helluonini            | <i>Helluomorphoides nigerrimus</i>   | 0             | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0  | 1  | 0  |
| Lachinophorini        | <i>Ega sp.</i>                       | 0             | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1  | 1  | 1  |
| Lebiini               | <i>Eucheila flavilabris</i>          | 1             | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0  | 0  | 1  |
| Lebiini               | <i>Lebia sp.</i>                     | 1             | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0  | 0  | 1  |
| Morionini             | <i>Morion brasiliensis</i>           | 0             | 0 | 0 | 0 | 0 | 1 | x | 0 | 0 | 0  | 0  | 0  |
| Odacanthini           | <i>Colliuris sp.</i>                 | 1             | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0  | 1  | 1  |
| Oodini                | <i>Stenocrepis sp.</i>               | 1             | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0  | 0  | 1  |
| Panagaeini            | <i>Brachygnathus muticus</i>         | 0             | 0 | 0 | 0 | 0 | 1 | x | 1 | 1 | 0  | 1  | 1  |
| Panagaeini            | <i>Brachygnathus oxigonus</i>        | 0             | 0 | 0 | 0 | 0 | 1 | x | 1 | 1 | 0  | 1  | 1  |
| Peleciini             | <i>Pelecium violaceum</i>            | 0             | 0 | 0 | 0 | 0 | 1 | x | 1 | 1 | 0  | 1  | 0  |
| Peleciini             | <i>Pelecium nick</i>                 | 0             | 0 | 0 | 0 | 0 | 1 | x | 1 | 1 | 0  | 1  | 0  |
| Pentagonicini         | <i>Pentagonica media</i>             | 1             | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0  | 0  | 1  |
| Perigonini            | <i>Perigona sp.</i>                  | 0             | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0  | 0  | 1  |
| Platynini             | <i>Incagonum sp.</i>                 | 1             | 0 | 0 | 1 | 0 | 1 | x | 0 | 0 | 0  | 0  | 0  |
| Pseudomorphini        | <i>Notopseudomorpha sp.</i>          | 0             | 0 | 0 | 0 | 0 | 1 | x | 0 | 0 | 0  | 0  | 0  |
| Pterostichini         | <i>Euchroa sp.</i>                   | 0             | 0 | 0 | 0 | 0 | 1 | x | 1 | 1 | 0  | 1  | 1  |
| Pterostichini         | <i>Pterostichus oblongopunctatus</i> | 0             | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1  | 0  | 0  |
| Sphodrini             | <i>Calathus fuscipes</i>             | 0             | 0 | 0 | 1 | 0 | 1 | x | 0 | 0 | 1  | 0  | 0  |
| Zabrini               | <i>Amara familiaris</i>              | 0             | 0 | 0 | 1 | 0 | 1 | x | 0 | 0 | 1  | 0  | 0  |
| Brachinini            | <i>Brachinus sp.</i>                 | 0             | 1 | 0 | 0 | 1 | 1 | x | 0 | 0 | 0  | 0  | 0  |

#### IV. CONCLUSÕES GERAIS

As contribuições taxonômicas e morfológicas apresentadas nessa tese são inéditas e de grande importância para o entendimento da evolução dos grupos estudados.

Foram descritas nove espécies do gênero *Pelecium* Kirby; foi feita uma descrição complementar e apresentado novos registros geográficos de 12 espécies de *Pelecium*; foi desenvolvido um estudo de morfologia comparada do metendosternito de Harpalinae onde foram identificados 12 caracteres filogenéticos.

