DANIELA HOYOS BENJUMEA

SYSTEMATIC REVIEW OF THE GENUS *Mesus* CHEVROLAT, 1858 (CARABIDAE: SCARITINAE: CLIVININI)

LAVRAS - MG

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Profa. Dra. Letícia Maria Vieira
Orientadora
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APROVADA em 17 de julho de 2023.

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2023

I dedicate this dissertation in memory of my mother, Fabiola Benjumea Giraldo, the first person who believed that I would become a scientist.

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“Haz de tu vida un sueño, y de tu sueño una realidad”

Antoine de Saint-Exupéry

RESUMO GERAL

A presente dissertação foi construída em um capítulo. “Taxonomical revision and cladistic analyses of Neotropical genus *Mesus* Chevrolat 1858” teve como objetivo revisar taxonomica e sistematicamente o gênero *Mesus* Chevrolat 1858. Após a revisão taxonômica do gênero, reconhece-se 12 espécies. O gênero *Mesus* e as espécies já descritas *Mesus rugatifrons* Chevrolat 1858, *Mesus gigas* Reichardt 1974, *Mesus mesus* Reichardt 1974, *Mesus nanus* Reichardt 1974, *Mesus pseudogigas* Vieira & Bello 2004 e *Mesus hornburgi* Dostal 2016 foram redescritas. Seis novas espécies foram descritas: *Mesus chevrolati* sp.nov., *Mesus ayri* sp.nov., *Mesus garciae* sp.nov., *Mesus casariae* sp.nov., *Mesus reichardti* sp.nov. e *Mesus campaneri* sp.nov. As espécies novas foram determinadas a partir da análise e descrição de caracteres morfológicos externos, das genitálias masculinas e femininas e análise de medidas morfométricas lineares. Foram disponibilizadas chaves de identificação das espécies do gênero, fotografias, mapas de distribuição e ilustrações. Finalmente, testou-se a monofilia do gênero *Mesus* e as relações filogenéticas entre as espécies. Foi realizada uma análise cladística do gênero a partir de uma matriz construída com 18 espécies e 20 caracteres embasados na morfologia externa do adulto. Para testar a monofilia foram selecionadas as espécies da subtribo Clivinina (*Whiteheadiana minor* (Putzeys, 1866), *Paraclivina fassati* (Kult, 1947), *Ancus depressifrons* (Putzeys, 1866), *Oxydrepanus minimus* (Putzeys, 1866), *Semiclivina (uroclivina) berguri* (Dostal, 2011), *Pyramoides oblongicollis* (Putzeys, 1861)) como grupo interno e uma espécie da subtribo Ardistomina (*Ardistomis ferrerai* (Balkenohl, Pellegrini & Zampaulo, 2018)) como grupo externo. A análise resultou em uma única árvore com as pesagens iguais e outra com as pesagens implícitas, confirmando a monofilia do *Mesus* nas duas hipóteses. Até o momento existiam poucas informações disponíveis sobre os dois gêneros estudados, sendo que as relações filogenéticas dos gêneros Neotropicais ainda são debatidas pelos especialistas. Portanto, o estudo desenvolvido nesta dissertação contribui com o conhecimento da biodiversidade e da história evolutiva da carabidofauna da região Neotropical.

Palavras-chave: Invertebrados. Taxonomia. Gêneros endêmicos. Carabídeos. Coleoptera.

ABSTRACT

This dissertation comprises a Taxonomical revision and cladistic analyses of Neotropical genus *Mesus* Chevrolat 1858, aimed to undertake a taxonomic and systematic revision of the genus *Mesus* Chevrolat 1858. After the taxonomic review of the genus, 12 species were recognized. The genus *Mesus* and the previously described species *Mesus rugatifrons* Chevrolat 1858, *Mesus gigas* Reichardt 1974, *Mesus mesus* Reichardt 1974, *Mesus nanus* Reichardt 1974, *Mesus pseudogigas* Vieira & Bello 2004, and *Mesus hornburgi* Dostal 2016 were redescribed. Six new species were described: *Mesus chevrolati* sp.nov., *Mesus ayri* sp.nov., *Mesus garciae* sp.nov., *Mesus casariae* sp.nov., *Mesus reichardti* sp.nov., and *Mesus campaneri* sp.nov. The new species were identified based on the analysis and description of external morphological characters, male and female genitalia, and linear morphometric measurements. Identification keys, photographs, distribution maps, and illustrations of the species were provided. Finally, the monophyly of the genus *Mesus* and the phylogenetic relationships among the species were tested. A cladistic analysis of the genus was performed using a matrix consisting of 18 species and 2 characters derived from the external morphology of the adult, as well as the female and male genitalia. To assess monophyly, two species from the subtribe Clivinina (*Whiteheadiana minor* (Putzeys, 1866), *Paraclivina fassati* (Kult, 1947), *Ancus depressifrons* (Putzeys, 1866), *Oxydrepanus minimus* (Putzeys, 1866), *Semiclivina (uroclivina) berguri* (Dostal, 2011), *Pyramoides oblongicollis* (Putzeys, 1861)) were selected as an internal group, and one species from the subtribe Forcipatorina (*Ardistomis ferrerai* (Balkenohl, Pellegrini & Zampaulo, 2018)) served as the external group. The analysis yielded two hypotheses: one with equal weighting and the other with implicit weighting, both confirming the monophyly of *Mesus.* Until now, limited information was available on the two studied genera, and the phylogenetic relationships of Neotropical genera remain a topic of debate among experts. Therefore, this dissertation contributes to the knowledge of biodiversity and the evolutionary history of the carabid fauna in the Neotropical region.

Keywords: Invertebrates. Taxonomy. Endemic genera. Carabids. Coleoptera.

SUMÁRIO

1.1 GENERAL INTRODUCTION

1.2 Overview of Carabidae

The family Carabidae Latreille, 1802, commonly known as "Ground Beetles," is one of the most diverse beetle families worldwide, with approximately 40,686 described species (LÖVEI; SUNDERLAND, 1996). Carabidae represents almost 90% of the extant adephagan diversity (BEUTEL et al., 2020) and plays a crucial role in ecology and conservation. These beetles can be distinguished by the presence of six abdominal ventrites, the division of the first visible ventrite of the abdomen by the hind coxae, pygidial defense glands in adults, and liquid-feeding mouthparts in larvae (LAWRENCE; BRITTON, 1991), despite its morphological variation, these characters are stable.

Ground beetles exhibit a variety of morphological features that set them apart from other terrestrial beetles. The larvae exhibit a campodeiform morphology, characterized by well-developed legs, antennae, and mandibles. Conversely, the other hand, adult range in size from 0.7 to 90.2 mm and possess prominent mandibles, palps, long slender legs, striate elytra, tactile setae arranged in punctures, an antenna-cleaning organ, and antennae with dense pubescence (CROWSON, 1981; LAWRENCE; BRITTON, 1991). These morphological adaptations have played a significant role in their development in various behaviors and successful adaptation to different habitats.

Carabidae exhibits a wide range of habits, ensuring their successful adaptation to ecosystems worldwide. The larvae are active, have limited mobility, and primarily feed on live prey, carrion, or seeds (LÖVEI; SUNDERLAND, 1996; LUFF, 1987). Some species, such as certain Lebiini, Brachinitae, and Peleciini, have ectoparasitic larvae that prey on beetle pupae, insect egg clutches, or young millipedes (LINDROTH, 1971). The adults, in turn, are fast-running, night-active, generalist predators that feed on a wide range of prey, including insects, insect eggs, spiders, and other small arthropods (ERWIN; MICHELI; CHABOO, 2015). However, some carabids have specialized feeding habits; for instance, some species of Peleciini and Promecognathini tribes specialize in hunting millipedes, while Cychrini and Licinini

tribes are snail hunters. *Notiophilus*, *Loricera*, and *Leistus* primarily feed on Collembola. Additionally, Paussini and Pseudomorphini establish symbiotic relationships with ants, with the former consuming ant workers and brood, while the larvae of the *Pseudomorpha* genus rely on ant workers for nourishment. Moreover, certain carabids belonging to the Harpalini and Zabrini tribes have adopted an herbivorous diet, consuming seeds (ERWIN; MICHELI; CHABOO, 2015). These feeding habits make Carabidae an interesting group of beetles, and their behavior, morphological and physiology are significant functional traits.

Ground beetles exhibit diverse wing development and physiological changes that influence their dispersal and behavior. Some species possess well-developed hind wings, enabling them to be excellent flyers and dispersers, which explains their presence on remote oceanic islands (ERWIN; MICHELI; CHABOO, 2015; LÖVEI; SUNDERLAND, 1996). Conversely, other species are flightless, with wings reduced to varying degrees or completely brachypterous. Many of these flightless species inhabit higher altitudes in mountains across all continents (NILSSON; PETTERSON; LEMDAHL, 1993). They can also be found in subterranean ecosystems, such as Brazilian caves, where neotropical endemics and troglobitic brachypterous species of the genera *Coarazuphium* Gnaspini, Vanin & Godoy 1998 and *Perigona* Laporte, 1835 are present (PELLEGRINI; FERREIRA, 2011a; PELLEGRINI; FERREIRA, 2011b, 2014, 2017; PELLEGRINI et al., 2020; PELLEGRINI; BICHUETTE; VIEIRA, 2021; PELLEGRINI; FERREIRA; VIEIRA, 2022). Flightless carabids are rarely found at lower altitudes, although some exceptions, such as certain species of *Pelecium* Kirby, 1819, and *Asklepia* Liebke, 1938, exist (ERWIN; MICHELI; CHABOO, 2015).

Several carabids have highly effective defense glands associated with the "bombarding" mechanism, which allows them to release volatile substances through a small opening in front of ventrite IX. The increased number of exposed segments allows flexibility of the abdomen, enabling precise targeting of the jet of volatile substance to a specific target (EISNER, 1958). This behavior is mainly observed in Brachininae "bombardier beetles", some Galeritini, and Helluonini (REICHARDT, 1971; REICHARTD, 1974).

Finally, Carabidae comprises numerous species with diverse morphological and physiological adaptations that enable them to inhabit a wide range of ecological niches. They have a global distribution, except for Antarctica, and can be found in various microhabitats such as subsoil, treetops, seashores, cracks in intertidal rocks,

high mountain glacier margins, and caves (troglobites). Additionally, they inhabit most soil surface habitats, particularly soil-water interfaces (ERWIN; MICHELI; CHABOO, 2015).

1.2 Evolutionary, systematics history and comments about Carabidae and Clivinini

The term ‘Adephaga’ originates from the Greek word ‘adephagos’ meaning ‘gluttonous’ or ‘greedy’, referring to the predatory habits of adults and larvae of most species (BOUSQUET, 2012). In accordance with this meaning, one of the suborders of Coleoptera ‘Adephaga’, is named 'Adephaga,' which has a controversial systematic history due to its unstable position in certain families (BOUSQUET, 2012; PIETRO BRANDMAYR, 2021). According to Beutel et al. (2019), this suborder comprises more than 45,000 described species and is represented by two groups: Hydradephaga (Meruidae, Noteridae, Aspidytidae, Amphizoidae, Hygrobiidae, Dytiscidae, Gyrinidae) and Geadephaga (Trachypachidae, Carabidae). However, the same taxa have been considered as a partition (subfamily, supertribe, tribe) within Carabidae, such as Rhysodinae (or Rhysodini), Cicindelinae (-itae, -ini), Paussinae, by several authors, even in recent works (BAEHR M, 1979; BAEHR; WILL, 2019; BELL R.T., 1967; BELL R.T.; BELL J.R., 1962; BOUSQUET, 2012; CASALE; STURANI; VIGNA TAGLIANTI, 1982; DARLINGTON, 1890; DI GIULIO et al., 2003; ERWIN T.L., 1985; LIEBHERR J.K.; ILL K.W., 1998; REICHARDT, 1977). Furthermore, the position of tiger beetles is still debated, whether as Cicindelidae of family rank (DURAN; GOUGH, 2020; LÓPEZ-LÓPEZ; VOGLER, 2017) or as Cicindelinae within Carabidae (GOUGH et al., 2019). These works require further research and expanded taxon sampling to resolve the controversial systematic and evolutionary history of Carabidae (BRANDMAYR, 2021).

Before delving into the evolutionary history of Carabidae, it is important to consider one of the evolutionary hypotheses proposed by Mckenna et al. (2015) for Coleoptera. Based on molecular data, they presented a tentative timeline of Coleoptera evolution. According to their study, the separation of "Coleopterida" from neuropteroid taxa occurred during the middle Permian period, and the split between Polyphaga and the Archostemata + Mixophaga + Adephaga complex took place at the

end of the same period. During the lower Triassic period, Adephaga diverged onto a new evolutionary path, and at the end of the Triassic or the beginning of the Jurassic period, a significant split between Hydro and Geadephaga occurred. As part of Geadephaga, Carabidae is an ancient lineage that originated in the early Jurassic period, approximately 200 million years ago (PONOMARENKO, 1977). Regarding the ancestral habitat of Adephaga, whether it was terrestrial or aquatic, the intermediate hypothesis proposed by Erwin remains valid (BRANDMAYR, 2021). This hypothesis suggests that the ancestral habitat was a waterside environment, specifically shores rich in animal biomass, from which both directions into inland waters and subaerial ecosystems may have originated (ERWIN, 1981).

Over the years, many authors have published findings on carabid fossils and the evolution of the carabid body. One recent work by Brandmayr (2021) focuses on the evolutionary history of Carabidae. The author compiled relevant data on carabid fossils, spanning from the Permian to the Pleistocene. Notably, the oldest carabid fossil, Cicindelini *Oxycheilopsis cretacicus* from Brazil (CASSOLA; WERNER, 2004), represents the earliest known carabid fossil. There was a significant diversification of modern carabids in the Eocene, and the appearance of Scaritinae in the Carboniferous, Eocene, Miocene, and Pleistocene periods. Regarding the evolution of the carabid body, Brandmayr (2021) emphasizes the limited knowledge of the morphology of adult and larval beetles, particularly in Scaritinae (Clivinini). Additionally, some species of Clivinini exhibit subterranean adaptations, enabling them to inhabit caves due to their small size and short legs, which allow them to maneuver through the deep soil pores. These findings highlight the need for further research to increase our understanding of the evolution and adaptations of ground beetles, particularly within the Clivinini tribe.

1.3 Carabidae and Clivinini in South America

Carabidae, widely regarded as one of the most extensively studied insect lineages within Coleoptera, has attracted the attention of numerous researchers worldwide, particularly in studies focusing ecological, morphological, taxonomic, and

phylogenetic (PEARSON; CASSOLA, 2007; ROIG-JUÑENT; DOMÍNGUEZ, 2001). However, the focus of these studies has predominantly centered around the Holarctic and Palearctic regions, leaving the Neotropical region understudied. In 1977, the posthumous work of Hans Reichardt on Neotropical Carabid genera was published, which has proven highly influential in several South American countries (ROIG-JUÑENT, 2021). Subsequent taxonomic research efforts have further contributed to the advancement of our knowledge on the family, with significant contributions from Argentina (ROIG, 1998; ROIG-JUÑENT, 2021), Colombia (MARTÍNEZ, 2005), Mexico (SHPELEY; BALL, 2000), Venezuela (PERRAULT, 1988), Ecuador (MORET, 1989), and Peru (ERWIN, 1991).

Scaritinae Bonelli, 1810 comprises 125 genera and over 1850 described species globally (LORENZ, 2005). Within the Neotropical region, four tribes have been identified: Clivinini, Dyschiriini, Scaritini, and Salcediini (HOGAN, 2012) each of these tribes has received significant contributions over time, with notable taxonomic research conducted by Bulirsch (2009), Reichardt (1974), Adis (1981), and Baehr (2002) pertaining to Dyschiriini, Salcediini, and Scaritini, respectively. Despite substantial research on Neotropical Scaritinae, which holds taxonomic and systematic importance, further comprehensive and robust studies are still needed, particularly in understanding the taxa within the Clivinini tribe.

Clivinini Rafinesque, 1815, a tribe found in the Holarctic and Neotropical regions, has a distribution extending from the United States to Argentina (Martínez, 2005). Comprising predatory and generalist ground beetles (HOGAN, 2012) this tribe encompasses 78 genera (ANICHTCHENKO et al., 2007–2023), with 30 recorded in the Neotropical region. These genera are distributed among four subtribes: Ardistomina, Clivinina, Forcipatorina, and Schizogeina (DOSTAL; VIEIRA, 2018; PERRAULT, 1994). The taxonomic contributions to the Clivinini tribe in the Neotropical region primarily derive from original descriptions made by naturalists in the 18th and 19th centuries, with many of the genera housed in Natural Museums in Paris and London. In the 20th century, scientist Hans Reichardt (1974) made significant contributions to the identification of ground beetles at the Museum of Zoology (MZSP). His work included the description of three species of the genus *Mesus* (*M. gigas* Reichardt, 1974; *M. nanus* Reichardt, 1974; and *M. mesus* Reichardt, 1974). Following Reichardt's premature death, his remarkable contribution to

Neotropical carabidology, "A synopsis of the Neotropical genera of the family Carabidae" (REICHARDT, 1977), was published. This work presented the initial keys for identifying Clivinini genera (then included within Scaritini) in South America and provided discussions on character-based groupings within the tribe. Furthermore, Perrault (1994) acknowledges Reichardt's taxonomic and phylogenetic contributions to the Forcipatorina and Clivinina subtribes.

Continuing these efforts, numerous descriptions of new Clivinini taxa have been presented in recent years. Vieira & Bello (2004) described the species *M. pseudogigas* Vieira & Bello, 2004 from Brazil. Valdés (2009) described seven species of the genus *Ardistomis* Putzeys, 1846 and provided the first comprehensive species listing of the genus in the Neotropical region. Dostal (2011) commented on the revised status of the genus *Semiclivina* (Kult, 1947) and introduced two new species, *S. bergeri* Dostal, 2011, and *S. schmidi* Dostal, 2011, along with the new subgenus *Uroclivina*. Valdés (2012) conducted a revision of the genus *Semiardistomis* Kult, 1950, thereby contributing to our knowledge of the Ardistomina subtribe. Dostal (2016) expanded upon the description of the genus *Mesus* with the addition of the new species *M. hornburgi* Dostal, 2016. In 2017, Alexander Dostal compiled phylogenetic information on Scaritinae, which influenced the classification of the Clivinini tribe. Dostal also described the new subtribes Schizogeina Dostal, 2017, and Sparostesina Dostal, 2017. Within the Schizogeina subtribe, a new genus, *Baehrogenius* Dostal, 2017, was described, along with its two species, *B. martini* Dostal, 2017, and *B. tricarinatus* Dostal, 2017. Identification keys for these taxa were also provided. Another recent contribution to the tribe is a key for identifying Clivinini in the Neotropical region, which proposes a new subgenus and two species of *Oxydrepanus* Putzeys, 1866, authored by Dostal & Vieira (2018). Lastly, Balkenohl et al. (2018) described the species *Ardistomis ferrerai* Balkenohl et al., 2018, discovered in a cave in Pará, Brazil. Despite these significant contributions, our knowledge of the taxonomy and phylogeny of Clivinini remains incomplete.

Dostal (2017) acknowledges the absence of a consensus regarding the definitive delimitation of taxa within the subfamily Scaritinae, which poses challenges in establishing sufficient phylogenetic support for classifying its tribes and subtribes. This lack of consensus directly impacts our understanding of the tribe Clivinini. In their study, the author compared nine different phylogenetic hypotheses proposed by

other researchers for Scaritinae. Dostal (2017) supports the proposal in which the subtribe Forcipatorina is reinstated as the tribe Forcipatorini. Consequently, the taxonomic key proposed for Clivinini genera does not include Forcipatorina (DOSTAL; VIEIRA, 2018). Despite several phylogenetic proposals concerning Clivinini, many questions remain unanswered, particularly regarding the inclusion of Forcipatorina within Clivinini. This uncertainty casts doubt on Dostal's (2017) proposition. Evidently, taxonomic studies focused on the tribe Clivinini are limited in the Neotropical region, particularly concerning specific species within the subtribes Forcipatorina and Clivinina.

The placement of genera within Clivinini has been a subject of debate among specialists. Reichardt (1974) discussed the systematic positions of the genera *Oxygnathus*, *Scolyptus*, *Mesus*, and *Antroforceps*, emphasizing the need for appropriate criteria to differentiate their subtribes. This discussion arose following the description of the genus *Basilweskyana*, which belongs to *Clivina* but shares similarities with several species classified under *Stratiotes*. Perrault (1994) subsequently addressed this discussion in the study of the genera *Mesus*, *Stratiotes*, *Whitheadiana*, and *Kutianella* within Clivinini, contributing to our taxonomic and systematic understanding of the Clivinina and Forcipatorina subtribes. However, the systematic position of Clivinini remains a topic of ongoing discussion (DOSTAL, 2017). Hence, there is a pressing need for a comprehensive systematic revision that incorporates a morphological study to consider additional characters not previously examined by Perrault (1994), in order to advance our understanding of the systematics of these groups.

1.3 Cladistics

Utilizing cladistic analyses, it is possible to infer the phylogeny from either morphological or molecular data, yielding a cladogram that adheres to phylogenetic principles (STEVENS, 1991). This process involves several sequential steps. The initial stage entails the careful selection of the study group, with the overarching goal of establishing its monophyletic nature. This group should encompass terminal taxa

that are monophyletic or, in some cases, paraphyletic at most. In studies conducted at lower taxonomic levels, where all taxa are incorporated. Simultaneously, several characters are examined across both the study group and its outgroup. The first criterion for inclusion is their potential for recognition across different taxa, contingent on the principle of similarity (STEVENS, 1991). These characters are subsequently categorized into distinct states, and their polarization is determined (MADDISON, 1984). The ensuing analysis involves employing a singular algorithm or a spectrum of algorithms within software platforms like Winclada or TNT. Following the generation and evaluation of phylogenetic trees, plausible hypotheses based on these trees are proposed.

In this sense, Phylogenetic analyses enable the reconstruction of the tree of life, providing insights into the relationships between groups and facilitating inferences about the evolutionary history of taxa (KJER, 2016). Even smaller-scale studies can be conducted to elucidate relationships at various hierarchical levels (KJER, 2016). Thus, according to Henning, phylogenetic classifications are based on accepting monophyletic groups, which are supported by synapomorphies, to establish robust hypotheses (KJER, 2016; SANTOS, 2008; WHEELER, 2012) In this context, systematic studies play a crucial role in organizing smaller taxa within Carabidae, particularly in cases where systematics and taxonomic knowledge are still limited, such as the Neotropical genus *Mesus* Chevrolat 1858.

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Systematic revision of the Neotropical genus *Mesus* Chevrolat 1858 (Carabidae: Clivinini)

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Abstract

The systematics of Neotropical genera belonging to the Clivinini tribe are poorly understood. To date, no phylogenetic hypothesis has been proposed for the Neotropical genus *Mesus* Chevrolat 1858. The objective of this study was to establish the first phylogenetic hypothesis using morphological data and present a taxonomic revision for *Mesus*. Analyses employing equal weights and implied weights were conducted, with the latter yielding better results. The results supported the monophyly of *Mesus*, with the presence of three synapomorphies. The genus and its previously known six species were redescribed. Additionally, six new species were described for the first time: *Mesus chevrolati* Benjumea and Vieira sp. nov., *Mesus ayri* Benjumea and Vieira sp. nov., *Mesus garciae* Benjumea and Vieira sp. nov., *Mesus casariae* Benjumea and Vieira sp. nov., *Mesus reichardti* Benjumea and Vieira sp. nov., and *Mesus campaneri* Benjumea and Vieira sp. nov. A new identification key for the species within the genus, along with photographs, a distribution map, and illustrations of male and female genitalia, were provided. Overall, this study significantly contributes to our understanding of Neotropical Clivinini systematics, emphasizing the natural grouping of *Mesus* and offering new taxonomic information that enhances our knowledge of the biodiversity and evolutionary history of Neotropical Clivinini.

Keywords

Clivinina, Coleoptera, Scaritinae, Ground beetles

1. Introduction

Carabidae has been extensively investigated by researchers worldwide, particularly in the fields of ecology, morphology, taxonomy, and phylogenetics (Pearson and Cassola 2007; Roig-Juñent and Domínguez 2001). However, the majority of these studies have focused primarily on the Holarctic and Palearctic regions, resulting in a scarcity of research efforts within the Neotropical region (Reichard 1997), especially in terms of taxonomy and systematics of tribes like Clivinini (Dostal 2017; Dostal and Vieira 2018). Ground beetles, a constituent of the Carabidae family, represent nearly 90% of the diversity within the Adephagan lineage (Beutel et al. 2020), and the systematic classification of Adephaga, which includes Carabidae, has been subject to ongoing debates and instability within specific families (Bousquet 2012; Brandmayr 2021). Thus, Beutel et al. (2019) categorized the Adephaga lineage into two groups: Hydradephaga as paraphyletic group (Meruidae, Noteridae, Aspidytidae, Amphizoidae, Hygrobiidae, Dytiscidae, Gyrinidae) and Geadephaga (Trachypachidae, Carabidae).

As part of Geadephaga, Carabidae has faced challenges in its systematic history due to the limited data available in both morphological and molecular systematic studies. To address these controversies, researchers need to adopt a more comprehensive approach that involves expanding taxon sampling (Brandmayr 2021). One strategy for gathering additional data to support future research in Carabidae systematics involves conducting phylogenetic investigations of lesser-studied taxa within this family. An illustrative example is Clivinini Rafinesque, 1815. This tribe exhibits a scarcity of taxonomic knowledge, relying primarily on original descriptions and limited taxonomical revisions. Some genera within this tribe underwent taxonomical revisions during the 19th century. Nevertheless, the tribe has increased in newly described species in the 21st century, exemplified by *Mesus* Chevrolat, 1858.

The Neotropical genus *Mesus* was introduced as a new taxon by Chevrolat (1858) with the monotypic species *Mesus rugatifrons* Chevrolat 1858 from Montevideo, Uruguay. Afterward, Reichardt (1974) conducted the first revision of the genus and described three new Brazilian species: *Mesus mesus* Reichardt 1974, *Mesus gigas* Reichardt 1974, and *Mesus nanus* Reichardt 1974. Reichardt also redescribed the species *Mesus rugatifrons*, with a new record for Paraguay, and placed the genus within Clivinina. The placement of *Mesus* within Clivinina was confirmed by Perrault (1994) through cladistic analyses of Clivinina and Forcipatorina, although in the recent Neotropical Clivinini key by Dostal and Vieira (2018), this genus is not included in Clivinina. Since Reichardt's revision, only two additional works have contributed to the knowledge of *Mesus*: *Mesus pseudogigas* Vieira and Bello 2004 from Mato Grosso do Sul and *Mesus hornburgi* Dostal 2016 from Venezuela. Prior to these works, only six species were documented.

Given the lack of comprehensive studies on the genus since Reichardt's revision, there is a pressing need for a new revision to enhance the systematic knowledge of *Mesus*. The objective of this study is to conduct a taxonomic and systematic revision of *Mesus*, with the aim of providing a deeper understanding of the taxonomy and classification of its species and contributing to the knowledge of Neotropical and endemic carabids within the Clivinini tribe.

2. Methods

2.1. *Examined material*

This work is based on the revision of 71 specimens loaned from the depositories institutions listed above.

2.2. Depositories

MZUSP – Museu de Zoologia da Universidade de São Paulo, São Paulo, SP, Brazil; **MNRJ** – Museu Nacional, Rio de Janeiro, RJ, Brazil; **MPEG** – Museu Paraense Emílio Goeldi, Belém, PR, Brazil; **CEMT** – Coleção Entomológica da Universidade Federal do Mato Grosso, Cuiabá, MT, Brazil and **CEUFLA** – Coleção Entomológica da Universidade Federal de Lavras, Lavras, MG, Brazil.

2.3. Dissection

Male and female genitalia were dissected using the modified procedures outlined by Liebherr and Will (1998). Subsequently, they were immersed in 10% potassium hydroxide (KOH) solution for 24 hours. Following this, the female reproductive tract was stained for approximately 30 minutes using a mixture of chlorazol black diluted in 70% ethanol. Finally, both the female and male genitalia were preserved in polyethylene genitalia vials containing glycerol.

2.4. Measurements

All measurements are in mm and were taken using a stereo microscope Leica M205, with the program Leica Application Suite auto-handing. Measures follow Dostal and Vieira (2018) propose: **L**= total length (from apex of mandible to apex of elytra), **W**= maximum width of elytra; **HW**= head width; **HL**= head length (from apex of mandible to anterior margin of pronotum); **H–LW**= length – width – index of head (length: width); **PL**= pronotum length (middle region); **PW**= maximum width of pronotum; **P–LW**= length – width – index of pronotum (length: width); **EL**= Elyta length, **EW**= Elytra width; **E–LW**= length – width – index of both elytra (length: width); **AL**= abdomen length; **AW**= abdomen width; **A–LW**= length – width – index of both abdomen (length: width).

2.5. Photographs and ilustrations

The photographs were obtained with a Zeiss Axio Scope A1 microscope equipped with phase contrast, DIC, and Axiocam 105 Color camera and all images were prepared and grouped on plates processed in Adobe Photoshop 2021. Illustrations were made using Adobe Illustrator 2023.

2.6. Identification key

The initial identification key for *Mesus* species was developed by H. Reichardt (1974). Subsequently, an updated version of the key was provided by Vieira and Bello (2004) upon the description of *M. pseudogigas*. The most recent key for *Mesus* species was created by Dostal (2016). Following the current revision, the key has been further updated to incorporate new information. The *Mesus* species key was constructed based on an analysis of external internal morphology.

2.7. Distributional records and maps

Localities were taken from the labels or original descriptions of the species. Coordinates were searched using Google Earth Pro. Maps were made with QGIS 3.32.0 (QGIS Development Team 2023).

2.8. Morphological characters and terminology

The terminology adopted for the description was based on the morphological characters following, Perrault (1994) and Balkenohl (2017) for external morphology, and most terms used to describe the female and male genitalia are found in Deuve (1993) and Balkenohl (2017) as follows: Male genitalia: **rp**= right paramere; **lp**= left paramere; **mla**= median lobe of the aedeagus. Female genitalia: **gs**= gonostylus; **bc**= bursa copulatrix; **sp**= spermatheca; **lt**= laterotergite; **mt**= mediotergite of abdominal segment IX.

2.9. Phylogenetics analysis

Phylogenetic relationships were inferred with all recognized species within the genus *Mesus* Chevrolat 1858 and the described species presented in this work as an ingroup. In addition, closely related species as, *Whiteheadiana minor* (Putzeys, 1866), *Paraclivina fassati* (Kult, 1947), *Ancus depressifrons* (Putzeys, 1866), *Oxydrepanus minimus* (Putzeys, 1866), *Semiclivina (uroclivina) berguri* (Dostal, 2011), *Pyramoides oblongicollis* (Putzeys, 1861) were included in the analyses. The inclusion of these taxa in the analyses as part of the ingroup was necessary as a means to test the monophyly of *Mesus*. For tree rooting, the outgroup method (Farris 1982; Nixon and carpenter 1993) was employed. *Ardistomis ferrerai* (Balkenohl, Pellegrini & Zampaulo, 2018) was used as the outgroup, meaning that all trees were rooted between it and the remaining terminals.

2.10. Character circumscription

Character circumscription followed established methodologies for morphological cladistic analyses, incorporating principles such as topological correspondence between observed structures, similarity, hierarchical organization, and character-state independence between characters (Rieppel and Kearney 2002). In certain instances, contingent character construction was utilized, as described by Forey and Kitching (2000), and also discussed by Lee and Bryant (1999) and Strong and Lipscomb (1999). This approach was particularly applicable when assessing the presence or absence of structures and their potential variations in shape. A multistate character delimitation scheme was employed in cases where more than two states were observed. The character matrix was constructed in WinClada-Asado ver. 1.89 (Nixon 2004). All characters were treated as nonadditive. Those terminals with unobserved states were scored "-" and those with inapplicable states were scored "-" (Table 1).

2.11. ***Cladistic analysis***

Two weighting schemes were applied to the characters: equal weights and implied weights (Goloboff 1993, Goloboff et al. 2008). The software TNT ver. 1.5 (Goloboff and Catalano 2016) was used to conduct searches for the most parsimonious trees, employing the New Technology algorithms. Parameters were as follows: *Sectorial Search* (Goloboff 1999) in default mode; 100 iterations of *Ratchet* (Nixon 1999) with the perturbation phase adjusted to 8 for both up-weighting and down-weighting; 20 cycles of *Drift* (Goloboff 1999); and 10 rounds of *Tree Fusing* (Goloboff 1999). This procedure was repeated until the minimum length was hit 100 times and was applied to both weighting schemes. Random seed was set to 0.

This study used a TNT script (propk.run) written by Salvador Arias to calculate the appropriate value for the constant k (for details *see* Goloboff et al. 2008). The script returned a value of k = 1.992188 for our data set, which was then employed.

The cladograms recovered with the software TNT were manipulated and edited with WinClada-Asado ver. 1.89 (Nixon 2004). In the figures 4 and 5, unique changes are represented by black

rectangles, and homoplasies are represented by white rectangles in all cladograms. Only unambiguous character states are shown.

3. Results

3.1. Phylogeny

The character circumscription based on the examined specimens is provided below. A total of 20 characters were included, derived from the external morphology of adults. The character matrix can be found in Table 1.

Head

0. Apex of mandible: 0. Rounded (Fig. 1.5); 1. Slightly acute (Fig. Fig. 1.3); 2. Acute (Fig. 1.7).
1. Mandible: 0. Falcate; 1. Flat (Fig. 1.1-1.12).
2. Shape of the anterior margin of labrum: 0. Triangular (Fig. 1.10); 1. Rounded (Fig. 1.2); 2. Concaved.
3. Number of setae of labrum: 0. 2; 1. 3 (Fig. 1.1-1.12); 2. More than 4.
4. Supraorbital projection: 0. Absent; 1. Present (Fig. 1.1-1.12).
5. Shape of supra-orbital projection: 0. Triangle (Fig. 1.5); 1. Rounded (Fig. 1.11); 2. Sinuous (Fig. 1.1).
6. Supra-ocular projection: 0. Reaching outer margin of eye (Fig. 1.5); 1. Not reaching outer margin of eye (Fig. 1.1).
7. Clypeal surface: 0. flat; 1. Raised (Fig. 1.1-1.12).
8. Shape of clypeal elevation: 0. Rounded (Fig. 1.2); 1. Trapezoidal (Fig. 1.6).
9. Transverse clypeal sulcus: 0. Present (Fig. 1.1-1.12); 1. Absent.
10. Shape of transverse clypeal sulcus: 0. Straight (Fig. 1.1); 1. Convex (Fig. 1.7); 2. Concave (Fig. 1.12).
11. Carinae of frons: 0. Absent; 1. Present (Fig. 1.1-1.12).
12. Extension of carinae of frons: 0. Covering all frons (Fig. 1.7-1.12); 1. Covering laterally (Fig. 1.1-1.6).
13. Carinae of frons: 0. Reaching anterior part of frons (Fig. 1.4); 1. No reaching anterior part of frons (Fig. 1.2).
14. Shape of carinae of frons: 0. Thin (Fig. 1.10); 1. Medium (Fig. 1.6); 2. Broad (Fig. 1.11-1.12).
15. Middle of frons: 0. Carinae (Fig. 1.9); 1. Rugae (Fig. 1.3); 2. Smooth (Fig. 1.1); 3. Punctuated (Fig. 1.4).
16. Anterior part of frons: 0. Rugae (Fig. 1.1); 1. Punctuated (Fig. 1.5); 2. Smooth (Fig. 1.6).
17. Anterior margin of clypeus: 0. Straight (Fig. 1.8); 1. Sinuous (Fig. 1.5); 2. Concave.
18. Lateral lobes of mentum: 0. Rounded; 1. Truncated; 2. Acute.
19. Number of setae of ligula: 0. without setae; 1. with one seta; 2. with two setae.

Thorax

20. Median line of pronotum: 0. Reaching anterior margin of pronotum (Fig. 1.11); 1. Ending (Fig. 1.1) before of margin of pronotum.

Equal weighting versus implied weighting

The analyses conducted using equal weights produced five equally parsimonious cladograms, and the strict consensus topology is presented in Figure 4. However, for optimal phylogenetic inferences, it is recommended to employ differential weighting schemes in parsimony analyses (Hermes et al., 2014; Barbosa, 2021). For a comprehensive discussion on the benefits of character weighting in morphological data sets, refer to Goloboff et al. (2008).

Mesus monophyly

The implied weighting analysis retrieved one most parsimonious cladogram with k= 1.992188; best score= 6.36229; consistency index (CI)= 56; and retention index (RI)= 70. The monophyly of *Mesus* is firmly established and is confirmed herein due to terminals from two other genera being included in the analyses (Fig. 5). Three synapomorphies support *Mesus* as a monophyletic group, which are of significant importance for distinguishing the genus (CI= 100): Flat mandible (Char. 0-1), rounded shape of anterior margin of labrum (char. 2-1), and three setae on labrum (char. 3-1) (Fig. 5).

Phylogenetic relationships within Mesus

The phylogenetic relationships among the major clades within *Mesus* are demonstrated in Figure 5. This analysis revealed the presence of two primary clades: "Clade 1" and "Clade 2".

Clade 1 is supported by one homoplastic transformation and one synapomorphy: Median line reaching anterior margin of pronotum (char. 20-0) and extension of carinae covering all frons (char. 12-0). Between clade 1 *Mesus reichardti* sp.nov. is the sister group of (*Mesus casariae* sp.nov + M*esus rugatifrons* + (*Mesus ayri* sp.nov. + *Mesus garciae* sp.nov.)

In clade 2 is supported by one homoplastic transformation and one synapomorphy: Anterior part of frons punctuated (char. 16-1) and shape of carinae of frons medium (char. 14-1). This clade represents a polytomy.

3.2. Taxonomy

Mesus Chevrolat, 1858

Mesus Chevrolat, 1858: 317.

Type species: *Mesus rugatifrons* Chevrolat, 1858

Twelve species are known in this genus from South America.

Mesus; Reichardt 1974:78-84 (Taxonomical revision of the genus), Vieira & Bello 2004:243-244 (Description of the species *M. pseudogigas*), Dostal 2016:58-62 (Description of the species *M. hornburgi*).

Differential diagnosis:

Mesus Chevrolat, 1858 differs in several external characters from other genera of Clivinina: Labrum with three setae and lateral margin with flat setae on each side. Clypeus with

trapezoidal-like or rounded-like elevation in middle, between two clypeal setigerous punctures; supra-orbital projection well developed with variable shape (triangular, rounded or sinuous). Frons separated of clypeus by transverse clypeal sulcus, clypeus with labrum not fused; two pair of supra-ocular setae; gena not developed behind eyes; frons with carinae. Mandibles flat, slightly concaved, long and rounded at the apex, or slightly acute apically and slightly curved at base.

Description of the genus:

Pedunculated body; color black to piceous reddish-brown; body length 5.0-19.2 mm. ***Head*** slightly longer than width and narrower than pronotum; lateral margin with flat setae laterally. Clypeus with trapezoidal or rounded-like elevation, between two clypeal setigerous punctures, wings, and supraorbital projection well developed with variable shape. Frons separated of clypeus by a transverse clypeal sulcus; with longitudinal carinae, variable in sculpture; supra-orbital carinae with two setae laterally; eyes prominent; gena not developed behind eyes; submoliniform antennas, scapus glabrous, longer and slightly wider than antennomeres; pedicellus with single seta at base, antennomeres 3-11 pubescent. Mandibles Asymmetric, long, flat, dorsally concave, and slightly curved at base. Maxilla with well-developed galea and lacinia, maxillary palpi shorter than first and penultimate palpi together, first one swollen; Labium with well-developed triangular ligula with two apical setae, labial palpi with four segments, penultimate segment with two setae. Mentum with medial tooth bifid, small and moderately long than lateral lobes, with one pair of setae at base; truncated or rounded lateral lobes, middle of posterior part with two circular foveae large each one with seta distantly; complete transverse suture between mentum and submentum. Submentum shorter than mentum with one pair of setae distantly. Gula parallel and wide, diverging posteriorly. ***Thorax.*** Prothorax subquadrate, parallel side and constricted posteriorly, reflexed lateral margin, rounded posterior angle, with anterior and posterior setigerous punctures, deeply impress anterior transverse line forming a trapezoid; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculated with scutellum wider anteriorly. ***Elytra***. Longer than wide, strongly convex, curved laterally and lengthened; humeri rounded; reflexed and smooth lateral margin, lateral channel with row of setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval. ***Legs.*** Profemur and mesofemur swollen, and metafemur slender; protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender and slightly flat in dorsal and ventral view with two longitudinal rows of spines. Flar metatibia with external spines and two tibial spurs at distal margin. ***Abdomen.*** with six visible ventrites; ventrites III–VI transversely bordered anteriorly; ventrites III–V each with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae.

Distribution: South America: Argentina, Brazil, Paraguay, Uruguay, Venezuela (Fig. 9).

***Mesus chevrolati* Benjumea & Vieira sp. nov.**

Fig. 1.1, 6.1

Material examined

Holotype

BRAZIL • 1 ♂ Mato Grosso, Jacaré, Pq. Nac. Xingu; nov.1961; Alvarenga & Bokermann leg; MZSP48047.

Paratype

BRAZIL • 1 ♂; same data as for holotype; MZSP48056.

Differential diagnosis. *M. chevrolati* sp. nov. differs from the other species by its trapezoidal and reticulated clypeal elevation, reticulation nearer in the anterior part, and wings of clypeus; frons with five longitudinal, lateral carinae, and middle shiny.

Description. Total length (L= 9.89), width, from widest region of elytra (W= 2.11). **Color.** Reddish to dark brown. ***Head*:** (Fig. 1.1). (HL= 2.29, HW= 1.79) slightly longer than width (HL/HW= 1.27); slightly narrower than pronotum. Labrum rounded with three setigerous punctures, two laterally and one in middle, lateral margin with ten flat setae on each side. Clypeus with slightly sinuous anterior margin; surface shiny with reticulation; in middle, with trapezoidal-like raised elevation and reticulated surface, between two clypeal setigerous punctures; rectangle wings; supraorbital projection with small and sinuous, not reaching eye level; reflexed and rounded transverse clypeal sulcus and straight facial sulcus. Frons with five longitudinal carinae laterally (including supraorbital carina), anterior part with reticulation, posterior part glabrous; supraorbital carina on each side with two setae. Genae with isodiametric ventrally microsculpture. Eyes normal developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas at base middle; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Head ventrally. Mouthparts with mandiblesasymmetric, long, flat, slightly acute apically, slightly concaved, with carina on external margin and broad at base, right mandible with terebral ridge and one tooth; left mandible with terebral ridge and one prominent tooth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi shorter than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular, truncate at apex, with two long apical setae; labial palpi with four segments, penultimate segment with two setae. Mentum bordered, surface smooth and shiny with spots dark brown; with medial tooth bifid, small and slightly rounded, moderately longer than lateral lobes, with one pair of setae at base; truncated lateral lobes, middle of posterior part with two circular large foveae each one with seta distantly; complete transverse suture between mentum and submentum. Submentum shorter than mentum with one pair of setae distantly. Gula (GL= 0.75, GW= 0.45) is parallel, smooth, and shiny. ***Thorax:*** (Fig 1.1) Prothorax (PL= 2.37, PW= 2.05) subquadrate, parallel–sided and constricted posteriorly; surface of disc smooth, shiny and rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures, anterior transverse line deeply impressed forming a trapezoid, and median line deeply impressed not reaching anterior margin of pronotum; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculate with scutellum wider anteriorly. Prosternum smooth and shiny.

Proepisternum with scattered micropunctuation laterally; Prosternal process overtaking and with carina. Proepimerum with reticulation. Mesoesternum smooth and shiny. Mesepimerum punctuated. Metaesternum smooth, shiny and scattered punctuated laterally. Metepisternum with wrinkles. Elytra longer than wide (EL= 4.91, EW= 2.11), strongly convex, curved laterally and lengthened; humeri rounded; smooth and reflexed lateral margin, lateral channel with row of setigerous punctures, interrupted in basal third of elytra; shiny and smooth surface, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; stria straight, distinctly punctured in its whole length, striae 1–4 and 6 free at base, striae 5–7 joining together at base, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5–6 joining together at apex. ***Legs:*** Coxae. Procoxa, mesocoxa, and metacoxa smooth and shiny; with distal seta. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with single seta on basal upper margin. Profemur swollen with two setae on lower margin and one seta on distal upper margin; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen, upper margin with one row of setae with 12 short setae; flexor side and extensor side asetose. Metafemur slender, with single seta on lower margin proximally. Protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. first tarsi longer than 2–5 tarsi, with row of spines at distal margin. ***Abdomen:*** (AL= 3.32, AW= 2.05). Sternum smooth, with six visible ventrites; ventrites III–VI transversely bordered anteriorly; ventrites III–V each with pair with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two widely separated apical setae. ***Female genitalia:*** (Fig. 3.1) Ovipositor with slender, straight, and slightly curved in the middle, base dilated with sinuous internal margin sinuous and pair of setae near the external margin, internal and external margins smooth and slightly rounded apex. Reproductive tract with bursa copulatrix elongated and short spermatheca with slightly acute apex. ***Male genitalia:*** (Fig. 2.1) Median lobe acute anteriorly, apex short, and acute, phallobase straight, endophalus slightly sclerotized. Parameres subequal in length; rp with 5 apical setae, longitudinally inserted, lp with 4 setae.

Etymology. The specific epithet *Mesus chevrolati* sp. nov. is in honor of Auguste Chevrolat one of the biggest coleopterologist of the XIX century who was the person who described the genus *Mesus*.

Distribution. Only known from Brazil: Mato Grosso (Jacaré) (Fig. 9).

Habitat. The labels indicate that the exemplars were collected in the Xingu National Park, a protection unit of the Amazon Domain.

Remarks. Despite any mention of the collection methods used to gather *M. chevrolati* sp. nov., it might be collected with the light trap or handle.

Variation.

***Mesus mesus* Reichardt, 1974**

Figs. 1.2, 6.2

Material examined

Holotype

BRAZIL • 1 ♀, Roraima, Surumu; sept. 1966. M. Alvarenga & F.M. Oliveira leg; MZSP00046 (Fig. 8.1).

Paratype

BRAZIL • 1 ♂; same data as for holotype ; MZSP11976 • 1 ♀ ; same data as for holotype ; Rio Branco ; oct. 1958 ; P. J. Silva leg ;1 MZSP11975.

Differential diagnosis. *M. mesus* and *M. campaneri* are similar by carinae not reaching the anterior part of frons, but differ from the rest of species by surface of anterior part and wings of clypeus shiny and smooth; frons punctuated anteriorly, dull middle, five, lateral carinae; lateral lobes of mentum rounded and phallobase of aedeagus concaved.

Description. Total length, (L= 9.45), width, (W= 2.15). **Color.** Reddish brown to Dark brown and shiny. ***Head:*** (Fig. 1.2). (HL=2.16) slightly longer than width (HW=1.79); slightly narrower than pronotum. Labrum rounded and with three setigerous punctures, two laterally and one in middle, lateral margin with seven flat setae on each side. Clypeus with anterior margin sinuous; surface shiny, smooth, and dark brown spots; in middle, with shiny rounded raised elevation between two clypeal setigerous punctures; quadrangular wings, sinuous supra-orbital projection, not reaching eye level. Transverse clypeal sulcus straight and facial sulcus sinuous. Frons with posterior part with five (including supra-orbital carina) longitudinal, irregular carinae on each side, middle and anterior part of frons with slightly irregular rugosity and dull, anterior part with punctuation; supra-orbital carina with two supra-orbital setae on each side. Genae with microsculpture isodiametric ventrally. Eyes normally developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas in base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Neck widely likewise posterior part of head. Head ventrally**.** Mouthparts with mandibles asymmetric, long, slightly flat, slightly rounded apex, broad at base and slightly concaved. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments, well developed; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular with two long apical setae; labial palpi with four segments, penultimate segment with single seta. Mentum bordered, surface smooth, shiny, and dark brown spots; with medial tooth bifid and rounded, moderately longer than lateral lobes, with one pair of setae at base; rounded lateral lobes; middle of posterior part with two large foveae, each one with seta distantly; complete transverse sinuous suture between mentum and submentum. Submentum shorter than mentum with one pair of setae. Gula (GL=0.87, GW=0.28) parallel, smooth and shiny. ***Thorax:*** (Fig. 1.2) Prothorax (PL=2.14, PW=2.06) subquadrate, parallel-sided and constricted posteriorly; surface of disc smooth and chinny and rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures, pronotal, anterior transverse and median line deeply impressed, anterior line forming a trapezoid, with one spot in middle; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculated with

scutellum wider anteriorly. Prosternum smooth and shiny. Proepisternum with scattered micropunctuation and wrinkles on sides; prosternal process overtaking procoxae. Proepimerum with rugosity. Mesoesternum with wrinkles and microscultures laterally. Mesepimerum smooth and shiny. Metaesternum. smooth and shiny. Metepisternum. with wrinkles. Elytra. longer than wide (EL= 5.05, EW=1.21), strongly convex, curved laterally and lengthened; humeri rounded; reflexed and smooth lateral margin, lateral channel with punctuations and few setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; stria straight, distinctly punctured in ir whole length, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5–6 joining together at apex; stria 7 starts after humeri. ***Legs:*** Coxae**.** Procoxa, mesocoxa and metacoxa smooth, shiny, and glabrous; with distal with distal seta. Trochanter. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with pair of setae on middle and basal upper margin. Profemur swollen with two setae on lower margin and single seta on distal upper margin, surface smooth and shiny; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen, flexor side and extensor side asetose. Metafemur slightly swollen, proximally with single seta on lower margin. Protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. Tarsomeres. first tarsi longer than 2–5 tarsi, with row of spines at distal margin. ***Abdomen:*** (AL=3.63, AW=2.10). Sternum smooth, with six visible ventrites; ventrites IV–VI transversely bordered anteriorly; ventrites III–V each with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae widely separated; last ventrite with wrinkles. ***Female genitalia***: (Fig. 3.2). Ovipositor with coxostylus slender, curved at middle, base slightly dilated with internal margin and external sinuous, with large setae at base and middle externally and a seta at internal margin, internal and external margin smooth and curved rounded apex. Reproductive tract with bursa copulatrix elongated and large spermatheca with acute apex. ***Male genitalia:*** (Fig. 2.2) Median lobe slightly arcute at base, apex short and slightly rounded, phallobase straight, endophallus with pubescent. Parameres subequal in length;rp with four apical setae, longitudinally inserted, wider than lp with two setae.

Distribution. Known from Brazil: Roraima (Surumu) (Fig. 9).

Biologia. Possibly this species and other *Mesus* are nocturnal or crepuscular, based on the collection method.

Remarks. Exemplars were collected with the light trap, and paratypes are part of another species.

Variation. Unknown.

***Mesus campaneri* Benjumea & Vieira sp.nov.**

Figs. 1.3, 6.3

Material examined

Holotype

BRAZIL • 1 ♀; Ceará Quixadá; 1989/1991; P. Eymard leg. MZSP48047.

Paratype

BRAZIL • 1 ♀ same data as for holotype; MZSP48056.

Differential diagnosis. *Mesus campaneri* sp. nov. is different from the other species of *Mesus* by frons with four longitudinal, lateral carinae, few irregular wrinkles in the middles and external margin of coxostylus curved and crenulated.

Description. Total length, (L= 6.97), width, from widest region of elytra (W= 1.545). **Color.** dark brown. ***Head:*** (Fig. 1.3*)*. (HL=1.62, HW=1.32) slightly longer than width (HL/HW=1.22); slightly narrower than pronotum. Labrum rounded with three setigerous punctures, two laterally and one in middle, lateral margin with nine flat setae on each side. Clypeus with anterior margin slightly sinuous; surface with reticulation; in middle, with rounded raised elevation, between two clypeal setigerous punctures; triangle wings; small and sinuous supraorbital projection, not reaching eye level; rounded transverse clypeal sulcus and straight facial sulcus. Frons with five longitudinal carinae laterally (including supra-orbital carina), anterior part with few reticulations, posterior part smooth; supra-orbital carina with two setae each side. Genae with microsculpture isodiametric ventrally. Eyes normally developed. Antennawith scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas at base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Head ventrally**.** Mouthparts withmandibles asymmetric, long, flat, slightly acute apically, slightly concaved, with carina on external margin and broad at base, right mandible with terebral ridge and one tooth; left mandible with terebral ridge and one prominent tooth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular, with two long apical setae; labial palpi with four segments, penultimate segment with two setae. Mentum bordered, surface shiny with spots dark brown; with medial tooth bifid, small and slightly rounded, moderately longer than lateral lobes, with one pair of setae at base; truncated lateral lobes, middle of posterior part with two circular large foveae each one with seta distantly; complete sinuous transverse suture between mentum and submentum. Submentumshorter than mentum with one pair of setae distantly. Gula (GL=0.43, GW=0.24) parallel, smooth and shiny. ***Thorax:*** (Fig. 1.3*)* Prothorax (PL=1.68, PW=1.53) subquadrate, parallel–sided and constricted posteriorly; surface of disc smooth, shiny and rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures, anterior transverse line deeply impressed forming a trapezoid, and median line deeply impressed not reaching anterior margin of pronotum; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculate with scutellum wider anteriorly. Prosternum smooth and shiny. Proepisternum with scattered micropunctuation laterally; prosternal process overtaking and with carina. Proepimerum with reticulation. Mesoesternum smooth and shiny. Mesepimerum punctuated. Metaesternum smooth, shiny and scattered punctuation laterally. Metepisternum with wrinkles. Elytra longer than wide (EL=3.64, EW=1.54), strongly convex, curved laterally and lengthened; humeri rounded; reflexed and smooth lateral margin, lateral channel with row of setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; stria straight, distinctly punctured in their whole length, striae

1–4 and 6 free at base, striae 5–7 joining together at base, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5– 6joining together at apex. ***Legs:*** Coxae. Procoxa, mesocoxa and metacoxa smooth and shiny; with distal seta. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with single seta on basal upper margin. Profemurswollen with two setae on lower margin and one seta on distal upper margin; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen, upper margin with one row of setae with 12 short setae; flexor side and extensor side asetose. Metafemur. Slender, with single seta on lower margin proximally. Protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae, and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. first tarsi longer than 2–5 tarsi, with row of spines at distal margin. ***Abdomen:*** (AL=2.49, AW=1.46). Sternum smooth, with six visible ventrites; ventrites III–VI transversely bordered anteriorly; ventrites III–V each with pair with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae widely separated. ***Female genitalia:*** (Fig. 3.3). Ovipositor with coxostylus slender, curved at middle, base slightly dilated, internal margin curved and smooth, external margin curved and crenulated, with large setae near to base and slightly rounded apex. Reproductive tract with bursa copulatrix elongated and large thin spermatheca with slightly rounded apex. ***Male genitalia:*** Unknown.

Etymology. It is an honor of the expert Carlos Campaner who dedicated the last three decades to the MZUSP Coleoptera collection assistance. C. Campaner described Curculionidae species and also an exquisite Pterostichini, *Lobobrachus cleidecostae* Campaner and Will, 2020.

Habitat. Unknown.

Distribution. Known from Brazil: Ceará (Quixadá) (Fig. 9).

Remarks. As suggested to *M. chevrolati* sp. nov., *Mesus campaneri* sp. nov. might be collected with the light trap or handle.

Variation. Unknown.

***Mesus nanus* Reichardt, 1974**

Figs. 1.7, 6.4

Material examined

Holotype

BRAZIL • 1 ♂; Bahia Bonfim, Vila Nova; 1908; E. Garbe leg; MZSP00047 (Fig. 8.3).

Differential diagnosis. *M. nanus* is similar by the convex shape of transverse clypeal sulcus as other species of gigas group but differs from other species by frons with parallel carinae covering all the extension, but not reaching the posterior part, carinae of middle irregular and reaching the anterior part and median line of pronotum reaching the anterior line of pronotum.

Description. Total length (L= 8.50), width (W= 1.87). **Color.** Reddish brown and shiny ***Head:*** (Fig. 1.7) (HL= 1.91; HW= 1.60) slightly longer than width; slightly narrower than pronotum. Labrum rounded and with three setigerous punctures, two laterally and one in middle, lateral margin with eight flat setae on each side. Clypeus with anterior margin sinuous, surface shiny, with short and irregular smalls wrinkles; in middle, with shiny rounded raised elevation between two clypeal setigerous punctures; quadrangular wings, with small wrinkles on surface; small and rounded supra-orbital projection, not reaching eye level; transverse clypeal sulcus and facial sulcus rounded. Frons with posterior part with 14 longitudinal, parallel and well defined carinae covering all frons (including supra-orbital carina), carinae of middle of posterior area of frons not reaching posterior margin of head, anterior part of frons with strong irregular strias with small size, not reaching anterior margin of head; supra-orbital carina with two supra-orbital setae on each side. Genae with microsculpture isodiametric ventrally. Eyes normally developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas at base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Head ventrally. Mouthparts with mandibles**.** assymetric, long, slightly flat, slightly acute apex, broad at base, right mandible with terebral ridge and one small tooth and left mandible with terebral ridge and one prominent tooth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments, well developed; stipes with four setae maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular with two long apical setae; labial palpi with four segments, penultimate segment with single seta. Mentum bordered, surface smooth, shiny and dark brown spots; with medial tooth bifid, small and rounded, moderately long than lateral lobes, with one pair of setae at base; slightly rounded lateral lobes; middle of posterior part with two foveae large each one with seta distantly; complete transverse suture between mentum and submentum. Submentum shorter than mentum with one pair of setae. Gula (GL=0.64, GW= 0.26) parallel, smooth and shiny. ***Thorax:*** (Fig. 1.7) Prothorax (PL= 1.93, PW= 1.79) subquadrate, parallel–sided and constricted posteriorly; surface of disc with microsculture and some rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures and pronotal, anterior transverse and median line deeply impressed, anterior transverse line forming a trapezoid, median line reaching anterior margin of pronotum; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculated with scutellum wider anteriorly. Prosternum smooth and shiny. Proepisternum with scattered micropunctuation and wrinkles on sides; Prosternal process overtaking procoxae. Proepimerum with rugosity. Mesoesternum with wrinkles and micro sculptures on sides. Mesepimerum smooth and shiny. Metaesternum shiny and with two rows of rugosity in middle. Metepisternum with wrinkles. Elytra longer than wide (EL= 4.30, EW= 1.87), strongly convex, curved laterally and lengthened; humeri rounded; reflexed lateral margin smooth, lateral channel with punctuations and few setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; stria straight, distinctly punctured in their whole length, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5–6 joining together at apex; stria 7 starts after humeri. ***Legs:*** Procoxa, mesocoxa and metacoxa smooth, shiny and glabrous; with distal with distal seta. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with single seta on basal upper margin. Profemur swollen with two setae on lower margin and single seta on distal upper margin, surface with wrinkles; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen, upper margin with two rows of setae, one row with 13 setae and inner one with 12 short setae;

flexor side and extensor side asetose. Metafemur slightly swollen, with single seta on lower margin proximally. Protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. First tarsi longer than 2–5 tarsi, with row of spines at distal margin. ***Abdomen:*** (AL= 2.82, AW= 1.83) Sternum smooth, with six visible ventrites; ventrites III–VI transversely bordered anteriorly; ventrites III-V each with pair of paramedian setae, basal margin of ventrite VI with two apical setae widely separated; last ventrite with scattered punctuation. ***Female genitalia:*** Unknown. ***Male genitalia:*** Median lobe slightly acute anteriorly, apex rounded. Parameres subequal in length; rp with four apical setae, longitudinally inserted, wider than left paramere lp with four setae (description based on Reichardt illustrations) (Reichardt 1974).

Distribution. Known from Brazil: Bahia (Bonfim) (Fig. 9).

Habitat. Not mentioned in the original description.

Remarks. Paratypes are not the same species as the holotype. In this review, the holotype remained as *Mesus nanus* primary material. The paratypes were repositioned to *Mesus reichardti* sp. n. described above.

Variation. Not mentioned in the original description.

***Mesus hornburgi* Dostal, 2016**

Figs. 1.4, 6.5

Type material

Holotype

VENEZUELA • 1 ♂; Edo, Apure, Los Ljanos, Sta. Juana, Rio Capanarapu, 07°01'34" N 67°33'55" W, 60m; 20 oct. 2005; M. Hornburg leg.

Paratype

VENEZUELA • 1 ♀ San Fernando de Apure; 5 oct. 1897; L. Laglaize.

Differential diagnosis. *M. hornburgi* belongs to the "gigas group" of species that present supraocular projection with triangular shape. *M. hornburgi* differs from the other species by presenting a slightly acute mandible, five longitudinal, parallel and well define carinae laterally and apex of aedeagus slightly rounded.

Description. Total length (L= 7.96), width (W= 1.79). **Color.** Unicolorous piceous-brown; middle and hind legs, antennae, and mouthparts except mandibles lighter, reddish-brown ***Head:*** (Fig. 1.4) Slightly longer than width; slightly narrower than pronotum. Labrum rounded and with three setigerous punctures, two laterally and one in middle, lateral margin with eight flat setae on each side. Clypeus anterior margin sinuous, surface smooth and shiny, with short and irregular smalls wrinkles; in middle, with shiny trapezoidal raised elevation between two

clypeal setigerous punctures; rectangular wings, with small reticulation on surface; triangular supra-orbital projection, not reaching eye level; rounded transverse clypeal sulcus and straight facial sulcus. Frons with Posterior part with five longitudinal, parallel and well define carinae laterally (including supra-orbital carina), anterior third part irregularly punctured and rugose, posterior third smooth in middle; supra-orbital carina with two supra-orbital setae on each side. Genae with microsculpture isodiametric ventrally. Eyes normally developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen; antennomeres 3–11 pubescent and submoliniform, with shiny areas in base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Head ventrally. Mouthparts with mandibles assymetric, long, slightly flat, slightly acute apex, equal in width, broad at base, right mandible with terebral ridge and one small tooth and left mandible with terebral ridge and one prominent tooth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments, well developed; stipes with four setae maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular with two long apical setae; labial palpi with four segments, penultimate segment with single seta. Mentum bordered, surface smooth; with medial small tooth bifid, moderately longer than lateral lobes, with one pair of setae at base; truncated lateral lobes; middle of posterior part with two foveae large each one with seta distantly; complete transverse suture between mentum and submentum. Submentum shorter than mentum with one pair of setae. Gula parallel, smooth and microreticulated anteriorly. ***Thorax:*** (Fig. 1.4) Prothorax (PL=1.77, PW=1.72) subquadrate, parallel–sided, hardly longer than wide (P-LW =1.03) and constricted posteriorly; surface of disc glossy and some rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures and pronotal, anterior transverse and median line deeply impressed, anterior transverse line crenulated and forming a trapezoid, median line reaching anterior margin of pronotum; lateral channel distinctly broader, extending from anterior setigerous puncture to posterior setigerous puncture. Mesothorax pedunculated with scutellum wider anteriorly. Prosternum smooth and shiny. Proepisternum broad, shiny, with isodiametric reticulation; Prosternal process overtaking procoxae. Proepimerum with rugosity. Elytra longer than wide (E-LW=2.34), strongly convex, curved laterally and lengthened; humeri rounded; reflexed lateral margin; lateral channel with punctuations and few setigerous punctures, umbilical pores in interval 9, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; stria straight, distinctly punctured in their whole length, intervals 6–7 carinated at humerus, interval 8 small and carinated at base; striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5–6 joining together at apex; stria 7 starts after humeri. ***Legs:*** Procoxa, mesocoxa and metacoxa smooth, shiny and glabrous with distal with distal seta. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with single seta on basal upper margin. Profemur. swollen with two setae on lower margin and single seta on distal upper margin, surface with wrinkles; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen, upper margin with two rows of setae, one row with 13 setae and inner one with 12 short setae; flexor side and extensor side asetose. Metafemur slightly swollen, with single seta on lower margin proximally. Protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. First tarsi longer than 2–5 tarsi,

with row of spines at distal margin, claws simple and in middle of claws with single seta. ***Abdomen:*** (AL= 2.82, AW= 1.83) Sternum smooth and shiny, with six visible ventrites; ventrites III–VI transversely bordered anteriorly; ventrites III-V each with pair of paramedian setae. basal margin of ventrite VI with two apical setae widely separated; last ventrite in middle with scattered punctuation. ***Female genitalia:*** External margin of coxostylus curved and smooth. Stylomere 2 long and slender, at base about twice as wide as the apex, slightly clavate; apex rounded, below middle with two large setae on ventral side, apical margin with two short setae (Dostal 2016). ***Male genitalia:*** Median lobe of aedeagus slightly curved, dorsally open in distal two thirds; distal half dorso-ventrally flattened, ligula-like; apical part triangular, tip narrowly rounded in ventral aspect. Internal sac basally with sclerotized, slender Y-shaped basal sclerite, distally with a field of dense hairs. Parameres long and slender, evenly narrowed towards apex. Left paramere slightly wider than right one. Both parameres with two apical setae (Dostal 2016).

Distribution. Known from Venezuela: Apure (San Fernando de Apure) (Fig. 9).

Habitat. Not mentioned in the original description.

Remarks. Description adapted from the original description by Dostal, 2016 (including sizes and photos taken from Dostal 2016).

Variation. Not mentioned in the original description.

***Mesus gigas* Reichardt, 1974**

Figs. 1.5, 6.6

Material examined

Holotype

BRAZIL • 1 ♀; Mato Grosso, Barra do Tapirapé; dec. 1960; B. Malkin leg. MZSP00110 (Fig. 8.1).

Differential diagnosis. *M. gigas* is distinguished from other species of the genus by its large size, flat mandible, rounded apex, lateral triangular supraorbital projection reaching exceeding the margin of the eye, and sculpture of the anterior part of frons.

Description. Total length, (L= 19.25), width, (W= 4.24). **Color.** Dark brown. ***Head:*** (Fig. 1.5). (HL= 4.85; HW= 3.88) slightly longer than width (HL/HW= 1.25); slightly narrower than pronotum. Labrum rounded and with three setigerous punctures, two laterally and one in middle, lateral margin with 14 flat setae on each side. Clypeus with anterior margin sinuous, surface shiny, with short and irregular small wrinkles; in middle, with shiny rounded-like raised elevation between two clypeal setigerous punctures; triangular wings, with carinae and wrinkles on surface; supra-orbital projection as well define triangle, reaching eye level; transverse clypeal sulcus rounded and facial sulcus straight. Frons posterior part with ten longitudinal, parallel carinae on each side (including supra-orbital carina), middle area of frons without rugosity posteriorlly, anterior part of frons limiting with clypeus, with spare wrinkles and punctuations on surface; supra-orbital carina on each side with two setae. Genae with microsculpture isodiametric ventrally. Eyes normally developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas at base; antennomere 11 with shape drop–

like apices. Neck widely likewise posterior part of head. Head ventrally. Mouthparts with mandibles asymmetric, long, flat, rounded apically, broad at base and slightly concaved, right mandible with rugosity at base, with terebral ridge and one longer tooth; left mandible with terebral ridge, rugosity at base and two teeth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments, well developed; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular, truncate at apex, with two long apical setae; labial palpi with four segments, penultimate segment with single seta. Mentum bordered, surface smooth and shiny, with medial tooth bifid, small and rounded, moderately long than lateral lobes, with one pair of setae at base; truncated lateral lobes; middle of posterior part with two large foveae, each one with seta distantly; complete transverse suture between mentum and submentum. Submentum smooth and shorter than mentum with one pair of setae. Gula (GL=1.55, GW=0.58) parallel, smooth and shiny. ***Thorax:*** (Fig. 1.5) Prothorax (PL= 4.04, PW= 4.08) subquadrate, parallel–sided and constricted posteriorly; surface of disc with micro scultures and rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures and anterior transverse line and median line deeply impressed; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculate with scutellum wider anteriorly. Prosternum with micro reticulation. Proepisternum with scattered micropunctuation and wrinkles on sides; Prosternal process overtaking procoxae. Proepimerum with rugosity. Procoxal cavities closed posteriorly. Mesoesternum with wrinkles and micro sculptures on sides. Mesepimerum smooth and shiny. Metaesternum smooth and laterally with punctuation. Metepisternum with wrinkles. Elytra longer than wide (EL=10.98, EW=4.24), strongly convex; humeri rounded; lateral margin smooth, lateral channel with punctuations and few setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole present and scutellar pore at apical base of first interval; elytron with seven distinct striae; striae straight, distinctly punctured in their whole length, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5–6 joining together at apex; stria 7 starts after humeri; penultimate outer interval of elytron in apical view not carinate; subapical sinuation of elytron weak. ***Legs:*** Procoxa, mesocoxa and metacoxa smooth, shiny and glabrous; with distal seta. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with single seta on basal upper margin. Profemur swollen with two setae on lower margin and one seta on distal upper margin, surface with wrinkles; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen, upper margin with two rows of setae, one row with 13 setae and inner one with 12 short setae; flexor side and extensor side asetose. Metafemur slightly swollen, with single seta on lower margin proximally. Protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. First tarsi longer than 2–5 tarsi, with row of spines at distal margin, claws simple and in middle of claws with single seta. ***Abdomen:*** (AL=7.18, AW=4.45) Sternum smooth, with six visible ventrites; ventrites IV–VI transversely bordered anteriorly; ventrites III–V each with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae widely separated; last ventrite with wrinkles posteriorly. ***Female genitalia:*** Unknown. ***Male genitalia:*** Unknown.

Distribution. Known from Brazil: Mato Grosso (Barra do Tapirapé) (Fig. 9).

Habitat. Not mentioned in the original description.

Remarks. This is the largest species in the genus. The paratype material (1 female) was transferred to the species *Mesus pseudogigas*.

Variation. There are no variations.

***Mesus pseudogigas* Vieira & Bello, 2004**

Figs. 1.6, 6.7

Material examined

Holotype

BRAZIL • 1 ♀; Mato Grosso, Corumbá Passo do Lontra; may. 2003; L. M. Vieira Leg. MZSP11978 (Fig. 8.4).

Paratype

BRAZIL • 1 ♀; same data as for holotype; feb. 1999; J. Raizer Leg; MZSP11978.

Other material

BRAZIL • 1 ♂ Mato Grosso, Poconé; 26 apr. 1998; Arm. Lum. Acuri leg; CEMT • 2 ♂ ♀ same collection data as for preceding 28 feb. 1998; CEMT • 2 ♀ same collection data as for preceding; 29 jan. 1998 • 2 ♀ ♀ same collection data as for preceding; 29 dec.1997; Arm. Lum. Mata • 3 ♀ same collection data as for preceding; 29 jan. 1998; Arm. Lum. Acuri • 1 ♂ same collection data as for preceding; 23 jun 1992; Arm. Lum. Mata; CEMT •1 ♂ Mato Grosso Rod. Transpantaneira; 22 nov 1982; Márcio Zanito and W. Overal leg; (MPEG01052522, MPEG01052525, MPEG01052524, MPEG01052521, MPEG01052523) •1 ♂ Sesc Pantanal; 14 may. 2002; Armadilha Luminosa; CEMT •1 ♂ same collection data as for preceding; 03 aug. 2003; Armadilha Pano; CEMT • 1 ♀ same collection data as for preceding; 15 jul. 2004; Armadilha Luminosa; CEMT• 1 ♂ Chapada dos Guimarães; 26 mar. 2001; Mizajabi, RD leg; CEMT •1 ♂ Itapurá; 07 may. 1998; Mizajabi, RD leg; CEMT •1 ♂ Nossa Senhora do Livramento, Faz. Ximbur; 10 apr. 1989; Carla A. Alvez leg; CEMT •1 ♂ Mato Grosso do Sul: Passo do Lontra, Corumba; feb 2001; J. Raizer Leg; CEUFLA •1 ♂ Miranda, apr.1946; MZSP48055 • 1 ♀; Mato Grosso, Barra do Tapirapé; dec. 1953; Valette leg. MZSP (M. gigas paratype)

Differential diagnosis. *M. pseudogigas* is similar to *M. giga*s by the triangular supraocular projection and mandible with rounded apex, and differs by the small blunt triangle not reaching eye level, trapezoidal shape of clypeal elevation with shiny and smooth surface, Middle and anterior part of frons shiny and smooth and aedeagus short and rounded.

Description. Total length (L= 13.43), width (W= 2.92). **Color.** Dark brown to brownish and shiny. ***Head:*** (Fig. 1.6) (HL= 3.00; HW= 2.46) slightly longer than width (HL/HW= 1.21); slightly narrower than pronotum. Labrum rounded and with three setigerous punctures, two laterally and one in middle, lateral margin with eight flat setae on each side. Clypeus with anterior margin sinuous, surface shiny, with short and irregular smalls wrinkles; in middle, with shiny trapezoidal raised elevation between two clypeal setigerous punctures; small wings, shiny and triangular, with carinated surface; supra-orbital projection as small blunt triangle, not

reaching eye level; transverse clypeal sulcus rounded and reflexed, and facial sulcus straight and reflexed. Frons with posterior part with nine longitudinal, parallel carinae on each side (including supra-orbital carina), median pair thicker, not well defined; anterior area glabrous; supra-orbital carina on each side with two setae. Genae with microsculpture isodiametric ventrally. Eyes normally developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas in base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Head ventrally. Mouthparts with mandibles asymmetric, long, flat, rounded apically, broad at base and slightly concaved, right mandible with rugosity at base, terebral ridge and one prominent tooth; left mandible with terebral ridge, five parallel carinae, and one prominent tooth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular, truncate at apex, with two long apical setae; labial palpi with four segments, penultimate segment with single seta. Mentum bordered, surface smooth and shiny; with medial tooth bifid, small and rounded, long than lateral lobes moderately, with one pair of setae at base; truncated lateral lobes, middle of posterior part with two large foveae, each one with seta distantly; complete transverse suture between mentum and submentum. Submentum shorter than mentum with one pair of setae. Gula (GL=0.84, GW=0.75) parallel, smooth and shiny. ***Thorax*****:** (Fig. 1.6). Prothorax (PL=2.88, PW=2.71) subquadrate, parallel–sided and constricted posteriorly; surface of disc smooth and shiny, with rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures and pronotal, anterior transverse and median line deeply impressed, anterior line forming a trapezoid, median line reaching anterior margin of pronotum; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculate with scutellum wider anteriorly. Prosternum glabrous, smooth and shiny; anterior part with wrinkles. Proepisternum with scattered micropunctuation on sides; prosternal process overtaking procoxae. Proepimerum with rugosity. Mesoesternum glabrous, smooth and shiny. Mesepimerum labrous, smooth and shiny. Metaesternum. with micro sculpture and scattered punctuation on sides; middle glabrous, smooth and shiny Metepisternum with wrinkles. Elytra longer than wide (EL= 6.95, EW=2.92), strongly convex, curved laterally and lengthened; humeri rounded; smooth and reflexed lateral margin, lateral channel with row of setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; stria straight, punctured distinctly in their whole length, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5–6 joining together at apex; stria 7 starts after humeri. ***Legs:*** Procoxa, mesocoxa and metacoxa smooth, shiny and glabrous; with distal seta. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with single seta on basal upper margin. Profemur swollen with two setae on lower margin and one seta on distal upper margin; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen, upper margin with two rows of setae, one row with 14 setae and inner one with 12 short setae; flexor side and extensor side asetose. Metafemur slender proximally with single seta on lower margin. Protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. First tarsi

longer than 2–5 tarsi, with row of spines at distal margin. ***Abdomen:*** (AL=5.11, AW=2.63) Sternum smooth, with six visible ventrites; ventrites III–VI transversely bordered anteriorly; ventrites III–V each with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae widely separated; last ventrite with wrinkles anteriorly. ***Female genitalia:*** (Fig. 3.4) Ovipositor with coxostylus slender, slightly curved at apex, base slightly dilated, internal and external margin curved and smooth, with large setae near at base and very slightly curved apex, acute apex. Reproductive tract. Not observed. ***Male genitalia:*** (Fig. 2. 3) Median lobe slightly arcuate at middle, apex short and rounded, phallobase straight, endophallus with pubescent. Parameres subequal in length; rp with four apical setae, longitudinally inserted, wider than lp with two setae.

Distribution. Known from Brazil: Mato Grosso do Sul (Corumbá, Miranda), Mato Grosso (Nossa Senhora do Livramento, Poconé, Sorriso) (Fig. 9).

Habitat. The holotype was collected in the light and the paratype was collected with a pitfall trap. Both sites are located near riparian forests, which may indicate the habitat of this species (Vieira & Bello, 2004). Labels from additional material examined indicate other exemplars collected by light trap, so this species and other *Mesus* may be nocturnal or crepuscular.

Remarks: Collected at light trap and by pitfall trap.

Variation. Variation was observed in the size of the 28 specimens (see measurements), 6-7 frons carinae, last ventrite with or without carinae, teeth of bifid mentum rounded or quadrangular, 1-2 teeth of right mandible.

Mesus rugatifrons Chevrolat, 1858

Figs. 1.8, 6.8

Material examined

Type material. (Types “Environs de Montévideo”; material not located) (Reichardt, 1974)

Other material

URUGUAY • 1 ♂; Rocha, La Pedrera; 12 ene. 2019; M. L. Monné leg; MNRJ–ENT7–36789 • 1 ♀; same collection data as for preceding; MNRJ–ENT7–36791 • 1 ♀; Montevideo; same collection data as for preceding; MZSP54767, MZSP54756 • 1 ♀ same collection data as for preceding; MZSP48048 • 2 ♀ Canelones, Atlantida; 22 dic.1932 MZSP54757, MZSP48049

Differential diagnosis. *M. rugatifrons* is different from the other species by the head with flat shape, clypeus with rounded and punctuated elevation, anterior margin of clypeus straight sinuous and irregular carinae covering all frons but not reaching posterior part, and apex of aedeagus acute and straight.

Description. Total length, (L= 6.32), width, (W= 1.49). **Color.** Reddish to dark brown. ***Head:*** (Fig. 1.8). (HL= 1.60; HW= 1.23) slightly longer than width (HL/HW= 1.30); slightly narrower than pronotum. Labrum rounded triangle with three setigerous punctures, two laterally and one in middle, lateral margin with ten flat setae on each side. Clypeus with anterior margin sligtlhy sinuous; surface shiny and with reticulation; in middle, with shiny rounded and punctuated surface, raised elevation between two clypeal setigerous punctures; rectangle wings; rounded

supra-orbital projection, not reaching eye level; reflexed rounded transverse clypeal sulcus and facial sulcus straight. Frons with posterior part with four longitudinal and irregular carinae laterally (including supra-orbital carina), anterior part with irregular striae not reaching posterior part, posterior part glabrous; supra-orbital carina on each side with two setae. Genae with micro sculpture isodiametric ventrally. Eyes. Normally developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas in base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Head ventrally. Mouthparts with mandibles asymmetric, long, flat, slightly acute apically, slightly concaved, with carina on external margin and broad at base, right mandible with terebral ridge and two teeth; left mandible with terebral ridge and one prominent tooth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular, truncate at apex, with two long apical setae; labial palpi with four segments, penultimate segment with two setae. Mentum bordered, surface smooth and shiny with spots dark brown; with medial tooth bifid, small and slightly rounded, moderately long than lateral lobes, with one pair of setae at base; truncated lateral lobes, middle of posterior part with two circular large foveae each one with seta distantly; complete transverse suture between mentum and submentum. Submentum shorter than mentum with one pair of setae distantly. Gula (GL=0.43, GW=0.29) parallel, smooth and shiny. ***Thorax:*** (Fig. 1.8) Prothorax (PL=1.49, PW=1.46) subquadrate, parallel–sided and constricted posteriorly; surface of disc smooth and shiny, with some rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures and pronotal, anterior transverse line deeply impress forming a trapezoid, with setigerous punctuation in middle, and median line deeply impressed reaching de anterior margin of pronotum; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculate with scutellum wider anteriorly. Prosternum smooth and shiny. Proepisternum with scattered micro punctuation on sides; Prosternal process overtaking procoxae. Proepimerum with punctuation. Mesoesternum smooth and shiny. Mesepimerum Punctuated. Metaesternum smooth, shiny and scattered punctuation on sides. Metepisternum with wrinkles. Elytra longer than wide (EL=3.25, EW=1.49), strongly convex, curved laterally and lengthened; humeri rounded; reflexed lateral margin smooth, lateral channel with row of setigerous punctures, ending before humeri; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; stria straight, distinctly punctured in their whole length, striae 1–5 free at base, striae 6–7 joining together at base, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5–6 joining together at apex. ***Legs:*** Procoxa, mesocoxa and metacoxa smooth and shiny; with distal seta. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with singular seta on basal upper margin. Profemur swollen with two setae on lower margin and one seta on distal upper margin; flexor side of protibial asetose, extensor side smooth. Mesofemur**.** slightly swollen, upper margin with one row of setae with nine short setae; flexor side and extensor side asetose. Metafemur slender, with single seta on lower margin proximally. Protibia barely flat,

with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. First tarsi longer than 2–5 tarsi, with row of spines at distal margin, claws simple and in middle of claws with single seta. ***Abdomen:*** (AL=2.23, AW=1.33) Sternum smooth, with six visible ventrites; ventrites III–VI transversely bordered anteriorly; ventrites III–V each with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae widely separated; last ventrite punctuated. ***Female genitalia:*** (Fig. 3.5) Ovipositor with coxostylus slender, curved at middle, base dilated, with internal and external margin straight and smooth, with two large setae near to base and rounded apex. Reproductive tract. Unknown. ***Male genitalia:*** (Fig. 2.4). Median lobe arcuate at middle, with acute and straight apex, phallobase straight. Parameres subequal in length; rp with nine apical setae, longitudinally inserted, wider than lp with two setae.

Distribution. Known from Uruguay: Montevideo, Rocha (La Pedrera) and Canelones (Atlantida) (Fig. 9).

Habitat. Not mentioned in the original description.

Remarks. Holotype does not locate, the original illustration by Chevrolat is part of the figures section, redescription and identification of exemplars were based on Chevrolat's original description and Reichardt's comments.

Variation. Variation was observed in the size of the 5 specimens (see measurements)

***Mesus ayri* Benjumea & Vieira sp.nov.**

Figs. 1.9, 6.9

Material examined

Holotype

ARGENTINA • 1 ♀; Santa fé; oct. 1949; G.H. Nick leg. MZSP54761.

Paratype

ARGENTINA • 1 ♀ same data as for holotype; MZSP48052.

Differential diagnosis. *M. ayri* sp. nov. differs from the other species by reflexed and straight transverse clypeal sulcus, frons with 15 longitudinal and well define thin carinae covering all frons extending from posterior to anterior part of frons, mentum with slightly quadrangular medial bifid tooth and mandibles with slightly rounded apex.

Description. (L=6.61), (W=1.47). **Color.** Reddish to dark brown. ***Head:*** (Fig. 1.9). (HL=1.45; HW=1.22) slightly longer than width (HL/HW=1.18); slightly narrower than pronotum. Labrum rounded with three setigerous punctures, two laterally and one in middle, lateral margin

with 10 flat setae on each side. Clypeus with anterior margin straight; surface shiny with reticulation; in middle, with rounded raised elevation with rounded border and surface shiny, between two clypeal setigerous punctures; rectangle wings; supra-ocular projection as semicircle, not reaching eye level; reflexed, straight transverse clypeal sulcus and facial sulcus. Frons with 15 longitudinal carinae covering all frons (including supra-orbital carina); supra-orbital carina on each side with two setae. Genae with isodiametric micro sculpture ventrally. Eyes normally developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas at base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Head ventrally. Mouthparts with mandibles asymmetric, long, flat, slightly rounded apically, slightly concave, with carina and broad at base, right mandible with terebral ridge and one tooth; left mandible with terebral ridge and one prominent tooth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium**.** Prementum with glossal sclerite of ligula triangular, with two long apical setae; labial palpi with four segments, penultimate segment with one seta. Mentum. Bordered, surface reticulated, with medial tooth bifid, small and slightly quadrangular, moderately longer than lateral lobes, with one pair of setae at base; truncated lateral lobes, middle of posterior part with two circular foveae large each one with seta distantly; complete transverse suture between mentum and submentum. Submentum shorter than mentum with one pair of setae distantly. Gula (GL=0.43, GW=0.29) parallel, smooth and shiny. ***Thorax:*** (Fig. 1.9). Prothorax. (PL=1.6, PW=1.38) subquadrate, parallel–sided and constricted posteriorly; surface of disc smooth and shiny, with some rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures, anterior transverse line deeply impressed forming a trapezoid, and median line deeply impressed not reaching anterior margin of pronotum; lateral channel distinctly broader starting anterior setigerous puncture and ending before posterior setigerous puncture. Mesothorax pedunculate with scutellum wider anteriorly. Prosternum smooth and shiny. Proepisternum with micro punctuation; Prosternal process overtaking procoxae. Proepimerum with reticulation. Mesoesternum smooth and shiny. Mesepimerum punctuated. Metaesternum smooth, sand strongly punctuated on sides. Metepisternum with punctuation. Elytra longer than wide (EL=3.36, EW=1.47), strongly convex, curved laterally and lengthened; humeri rounded; reflexed and smooth lateral margin, lateral channel with row of setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; stria straight, distinctly punctured in their whole length, striae 1–5 free at base, striae 6–7 joining together at base, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5– 6 joining together at apex. ***Legs:*** Procoxa, mesocoxa and metacoxa smooth and shiny; with distal seta. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with single seta on basal upper margin. Profemur swollen with two setae on lower margin and one seta on distal upper margin; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen, upper margin with one row of setae with 10 short setae; flexor side and extensor side asetose. Metafemur slender, with single seta on lower margin proximally. Protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on

distal margin. Tarsomeres. first tarsi longer than 2–5 tarsi. ***Abdomen:*** (AL=2.24, AW=1.35). Sternum smooth, with six visible ventrites; ventrites III–VI transversely bordered anteriorly; ventrites III–V each with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae widely separated, last ventrite with rugosity. ***Female genitalia:*** (Fig 3.6). Ovipositor with coxostylus slender, slightly curved at middle, base dilated, with internal and external margin curved and smooth, with large setae at base, middle part with setae externally and pair setae at middle internal margin and slightly rounded apex. Reproductive tract with bursa copulatrix elongated and short spermatheca with acute apex. ***Male genitalia****:* (Fig. 2.5). Median lobe slightly arcuate at middle, short and acute apex, straight phallobase straight, endophallus with row of small teeth. Parameres subequal in length; rp with four apical setae, longitudinally inserted, wider than lp with three setae.

Etymology. The specific epithet honors the Brazilian coleopterologist Ayr de Moura Bello, one of the authors of *M. pseudogigas*. A. M. Bello has been contributing to several research projects in Brazil and training undergraduate and graduate students in beetle identification.

Distribution. Known from Argentina: Santa Fé (Fig. 9).

Habitat. Unknown.

Remarks. As suggested to other *Mesus species, M. ayri* sp. nov. might be collected with the light trap or handle.

Variation. Variation was observed in the tooth shape of the right mandible.

***Mesus garciae* Benjumea & Vieira sp.nov**

Figs. 1.10, 6.10

Material examined

Holotype

ARGENTINA 1 ♂; Entre Rios, Pronunciamiento; nov. 1962; MZSP48051.

Paratype

ARGENTINA 1 ♀; R.A.Bs. Aires, Acassuso; jan. 1957; F.H. Walz leg; MZSP48051.

Other material

ARGENTINA • 4 Formosa, Laguna Blanca, Monros; mar. 1948; MZSP54758, MZSP54759, MZSP54765, MZSP54766 • 1 Formosa, Ciudad; dec. 1949; A. Martinez leg.; MZSP54760 • 2 Santa fé, feb. 1954; MZSP54763, MZSP54764 • 1 ♂ Choco-Maidana; sep.1947; MZSP54762 • BRAZIL • 1 ♀ Mato Grosso, Poconé, Pantanal; 21 jun. 1984; Diana de Lima; CEUFLA • PARAGUAY •2 ♂ ♀ Boqueron; nov. 1950; M. Estigarribia A. Martinez. Leg. MZSP54769, MZSP48054 • URUGUAY • 2 ♂ Rivera, Sierra de la Aurora, Arroyo de la Aurora; 12/26 jan. 1971; de noche a la luz, M.A.Monné, M.Moratorio, C.S.Morey y G.Wibmer; MZSP48053, MZSP4768.

Differential diagnosis. *M. garciae* sp. nov. is different from all species of genus by the triangular labrum shape, well-defined trapezoidal-like raised elevation with reflexed margin and surface reticulated and all frons with irregular and thin carinae from the posterior to anterior

part; aedeagus with median lobe arcuate at apex, rounded apex, curved phallobase, endophallus with pubescence.

Description. Total length, (L=6.88), width (W=1.46). **Color.** Reddish to dark brown. ***Head:*** (Fig. 1.10) (HL=1.46, HW=1.25) slightly longer than width (HL/HW=1.16); slightly narrower than pronotum. Labrum triangular with three setigerous punctures, two laterally and one in middle, lateral margin with 11 flat setae on each side. Clypeus with anterior margin straight, surface shiny and reticulated, in middle, with rounded-like raised elevation with reflexed margin and surface reticulated, between two clypeal setigerous punctures; rectangle wings; rounded supra-orbital projection, not reaching eye level; transverse clypeal sulcus and facial sulcus straight. Frons with irregular and thin carinae covering all frons (including supra-orbital carina); supra-orbital carina on each side with two setae. Genae with micro sculpture isodiametric ventrally. Eyes normally developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas at base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Mouthparts with mandibles asymmetric, flat, slightly rounded apically, slightly concave, with carina on external margin and broad at base, right mandible with terebral ridge and one tooth; left mandible with terebral ridge and one prominent tooth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular, truncate at apex, with two long apical setae; labial palpi with four segments, penultimate segment with one seta. Mentum bordered, with surface smooth and shiny with spots dark brown; with medial tooth bifid, small and slightly rounded, moderately longer than lateral lobes, with one pair of setae at base; truncated lateral lobes, middle of posterior part with two circular large foveae each one with seta distantly; complete transverse suture between mentum and submentum. Submentum shorter than mentum with one pair of setae distantly. Gula (GL=0.50, GW=0.23) parallel, smooth and shiny. ***Thorax:*** (Fig. 1.10) Prothorax (PL=1.51, PW=1.43) subquadrate, parallel–sided and constricted posteriorly; surface of disc smooth, shiny and rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures, anterior transverse line deeply impressed forming a trapezoid, and median line deeply impressed not reaching anterior margin of pronotum; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculate with scutellum wider anteriorly. Prosternum smooth and shiny. Proepisternum with scattered micropunctuation on sides; prosternal process overtaking. Proepimerum with reticulation. Mesoesternum with rugose. Mesepimerum punctuated. Metaesternum smooth, shiny and scattered punctuation on sides. Metepisternum with wrinkles. Elytra longer than wide (EL=3.28, EW=1.46), strongly convex, curved laterally and lengthened; humeri rounded; reflexed and smooth lateral margin, lateral channel with row of setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; stria straight, distinctly punctured in their whole length, striae 1–5 free at base, striae 6–7 joining together at base, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5– 6 joining together at apex. ***Legs:*** Procoxa shiny, mesocoxa and metacoxa smooth and shiny with one setigerous puncture proximally and other distantly. Protrochanter with two setae on distal upper margin, mesotrochanter with single seta on distal lower margin, and metatrochanter with single seta on basal upper margin. Profemur swollen with two setae on lower margin and two setae on distal upper margin; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen, upper margin with one row of setae with 11 short setae; flexor side and extensor side asetose. Metafemur slender, with single seta on lower margin proximally. Protibia barely flat,

with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. First tarsi longer than 2–5 tarsi, with row of spines at distal margin. ***Abdomen:*** (AL=2.38, AW=1.33) Sternum punctuated, with six visible ventrites; ventrites III–VI transversely bordered anteriorly; ventrites III–V each with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae widely separated. ***Female genitalia****:* (Fig. 3.7) Ovipositor. with coxostylus slender, straight, base slightly dilated externally, with internal and external margin straight and smooth, with large and short setae near to base and rounded apex. Reproductive tract with bursa copulatrix elongated and larger spermatheca with acute apex. ***Male genitalia:*** (Fig. 2.6) Median lobe arcuate at apex, rounded apex, curved phallobase, endophallus with pubescence. Parameres subequal in length; rp with four apical setae, longitudinally inserted, lp with two setae.

Etymology. The specific epithet honors the enthusiastic Colombian biologist Andrea Lorena García Hernández, curator at the Colección de Insectos de la Universidad del Quindío (CIUQ) in recognition of her passion for teaching entomology and insect taxonomy, the contribution of knowledge of the insects in the department of Quindio, Colombia and to encourage her students to be better and kindly people and scientist.

Distribution. Known from Argentina: Entre Rios (Pronunciamiento), Buenos Aires (Acassuso), Formosa (Laguna blanca), Santa fé, Provincia chaco. Brazil: Mato Grosso (Paconé). Paraguay: Boquerón and Uruguay: Rivera (Sierra Aurora) (Fig. 9).

Habitat. Unknown.

Remarks. Collected with light traps.

Variation. Variation was observed in the size between specimens (see measurements).

Mesus casariae **Benjumea & Vieira sp.nov.**

Figs. 1.11, 6.11

Material examined

Holotype

BRAZIL 1 ♀; Sergipe, Aracaju; 1954; P. Melo; MZSP11973.

Paratype

BRAZIL 1 ♀; R. G. Norte, Natal; aug. -oct. 1954; MZSP.

Differential diagnosis. *M. casariae* sp. nov. and *M. reichardti* sp. nov. are similar by the shape of carinae broad and median line of pronotum reaching anterior margin of pronotum, but differs by clypeus with anterior margin straight, surface of rounded elevation of clypeus reticulated and transverse clypeal sulcus and facial sulcus straight.

Description. Total length, (L=9.94), width (W=2.14). **Color.** Dark brown and shiny; antennae and legs reddish brown. ***Head:*** (Fig. 1.11) (HL=2.32; HW=1.69) slightly longer than width (HL/HW=1.37); slightly narrower than pronotum. Labrum with rounded and with three setigerous punctures, two laterally and one in middle, lateral margin with seven flat setae on each side. Clypeus with anterior margin straight, surface shiny and smooth; in middle, with shiny rounded raised elevation between two clypeal setigerous punctures; rectangular wings, with smooth surface; rounded supra-orbital projection, not reaching eye level; transverse clypeal sulcus straight and reflexed margined, and facial sulcus rounded and reflexed margined. Frons posterior part with 14 (including supra-orbital carina) longitudinal, parallel, and well-defined carinae covering all frons; supra-orbital carina on each side with two setae. Genae with microsculpture isodiametric ventrally. Eyes normally developed. Antenna scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas in base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Head ventrally mouthparts with mandibles asymmetric, long, flat, slightly acute apex, slightly broad, slightly concaved and with carina on external margin at base, right mandible with terebral ridge and one tooth; left mandible with terebral ridge and one prominent tooth. Maxillawith lacinia setose along inner margin and apex acute; galea with two slender segments, well developed; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi shorter than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular with two long apical setae; labial palpi with four segments, penultimate segment with single seta. Mentum bordered, surface smooth and shiny; with medial tooth bifid, small and rounded, moderately long than lateral lobes, with one pair of setae at base; truncated lateral lobes; middle of posterior part with two large foveae, each one with seta distantly; complete transverse suture between mentum and submentum. Submentum smooth and shorter than mentum with one pair of setae. Gula (GL=0.60, GW=0.29) parallel, smooth and shiny. ***Thorax:*** (Fig. 1.11) Prothorax**.** (PL=2.26, PW=2.01) subquadrate, parallel–sided and constricted posteriorly; surface of disc shiny with reticulation and rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures; anterior transverse line and median line deeply impressed, anterior transverse line forming a trapezoid, median line reaching anterior margin of pronotum; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculated with scutellum wider anteriorly. Prosternum with micro reticulation. Proepisternum with dense micropunctuation on sides; prosternal process overtaking procoxae. Proepimerum with rugosity. Procoxal cavities. Posteriorly closed. Mesoesternum with wrinkles and microsculturates laterally. Mesepimerum whit wrinkles. Metaesternum smooth and shiny. Metepisternum with wrinkles. Epipleura with punctuation in anterior part. Elytra longer than wide (EL=5.08, EW=2.14), strongly convex; humeri rounded; smooth and reflexed lateral margin, lateral channel with punctuations and few setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole and scutellar pore at apical base of first interval; elytron with seven distinct striae; striae straight, distinctly punctured in their whole length, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5–6 joining together at apex; stria 7 starts after humeri; penultimate outer interval of elytron in apical view not carinate; subapical sinuation of elytron weak. ***Legs:*** Procoxa, mesocoxa and metacoxa smooth, shiny and glabrous; with distal seta. Protrochanter with two setae on distal upper margin, mesotrochanter with two setae on distal upper margin, and metatrochanter with two setae on middle and basal upper margin. Profemur swollen with two setae on lower margin and one seta on distal upper margin, surface smooth and shiny; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen. Metafemur slightly swollen, proximally with single seta on lower margin. Protibia barely flat, with outer apical

prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. First tarsi longer than 2–5 tarsi, with row of spines at distal margin, claws simple and in middle of claws with single seta. ***Abdomen:*** (AL=3.42, AW=1.93). Sternum smooth, with six visible ventrites; ventrites IV–VI transversely bordered anteriorly; ventrites III–V each with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae widely separated; last ventrite with carina. ***Female genitalia*****:** Unknown. ***Male genitalia:*** Unknown.

Etymology. The specific epithet honors the coleopterist Dr. Sonia Casari, curator of Coleoptera at Museu de Zoologia Universidade de São Paulo (MZSP) in recognition of her contribution to the knowledge of Neotropical Coleoptera.

Distribution. Known from Brazil: Sergipe (Aracaju) and Rio Grande do Norte (Natal) (Fig. 9).

Habitat. Unknown.

Remarks. This species was the only paratype of *Mesus nanus* Reichardt 1974.

Variation. Unknown.

***Mesus reichardti* Benjumea & Vieira sp.nov.**

Figs. 1.12, 6.12

Material examined

Holotype

BRAZIL • 1 ♂; Pará Tucurui, Rio Tocantis, BAGAGEM; 30 jun. 1984; W. L. Overal leg; MPEG01052526**.**

Paratype

BRAZIL • 2 ♀; same data as for holotype; 02 jul. 1984; B. Mascarenhas; MPEG010525527

Differential diagnosis. *M. reichardti* sp. nov. differs from all species of *Mesus* by the transverse clypeal and facial sulcus concave and reflexed margined and all frons with eleven longitudinal, parallel, and well define carina, and prothorax with a fovea in the middle of trapezoid, apex of aedeagus arcuate and slightly curved

Description. Total length, (L= 7.24), width (W= 1.68). **Color.** Dark brown to reddish and shiny; antennae and legs light brown to reddish. ***Head:*** (Fig. 1.12). (HL= 1.51; HW= 1.39) slightly longer than width (HL/HW= 1.08); slightly narrower than pronotum. Labrum rounded and with three setigerous punctures, two laterally and one in middle, lateral margin with nine flat setae on each side. Clypeus with anterior margin sinuous, surface shiny and smooth, in middle, with shiny rounded raised elevation between two clypeal setigerous punctures; rectangular wings, with rugose on surface; supraorbital projection with small rounded lateral expansion, not reaching eye level; reflexed and concaved transverse clypeal sulcus and facial

sulcus. Frons with posterior part with eleven longitudinal, parallel, and well define carinae covering all frons (including supra-orbital carina), middle part of frons shiny and anterior part with reticulation; supra-orbital carina on each side with two setae. Genae with microsculpture isodiametric ventrally. Eyes normally developed. Antenna with scapus longer than antennomeres; anterior part of pedicellus swollen with single seta at base; antennomeres 3–11 pubescent and submoliniform, with shiny areas in base; antennomere 11 with shape drop–like apices. Neck widely likewise posterior part of head. Head ventrally. Mouthparts with mandibles asymmetric, long, flat, rounded at apex, slightly broad with carina on external margin and concaved at base; right mandible with one tooth; left mandible with one prominent tooth. Maxilla with lacinia setose along inner margin and apex acute; galea with two slender segments, well developed; stipes with four setae; maxillary palpi with variable size, terminal maxillary palpi short than first and penultimate palpi together, first one swollen. Labium. Prementum with glossal sclerite of ligula triangular with two long apical setae; labial palpi with four segments, penultimate segment with single seta. Mentum bordered, surface smooth and shiny, with medial tooth bifid, small and rounded, moderately long than lateral lobes, with one pair of setae at base; truncated lateral lobes; middle of posterior part with two large foveae, each one with seta distantly; complete transverse suture between mentum and submentum. Submentum smooth and shorter than mentum with one pair of setae. Gula (GL=0.51, GW=0.39) parallel, smooth and shiny. **Thorax:** (Fig. 1.12) Prothorax (PL=1.65, PW=1.46) subquadrate, parallel–sided and constricted posteriorly; surface of disc smooth and shiny with rugose at base; reflexed lateral margin, posterior angle rounded, with anterior and posterior setigerous punctures, anterior transverse line and median line deeply impressed, anterior transverse line forming a trapezoid, median line reaching anterior margin of pronotum, forming a fovea in the middle of trapezoid; lateral channel distinctly broader, extending from anterior setigerous puncture to just before posterior setigerous puncture. Mesothorax pedunculate with scutellum wider anteriorly. Prosternum with middle shiny. Proepisternum with dense micropunctuation on sides; prosternal process overtaking procoxae. Proepimerum shiny. Procoxal cavities closed posteriorly. Mesoesternum shiny and smooth in middle and with punctuation laterally. Mesepimerum smooth. Metaesternum smooth and shiny. Metepisternum with wrinkles. Epipleura with punctuation in anterior part. Elytra longer than wide (EL= 3.90, EW= 1.68), strongly convex; humeri rounded; smooth and reflexed lateral margin, lateral channel with punctuations and few setigerous punctures, interrupted in basal third of elytra; surface shiny and smooth, with pair of four dorsal setigerous punctures in 3rd stria; with scutellar striole present and scutellar pore at apical base of first interval; elytron with seven distinct striae; striae straight, distinctly punctured in their whole length, striae 1–2–3 free at base and stria 6–7 joining together and starts after humeri, striae 1–2 joining together at apex, striae 3–4 joining together before striae 1–2 at apex, striae 5–6 joining together at apex; striae 5–6 joining together at base; subapical sinuation of elytron weak. ***Legs:*** Procoxa with rugae, mesocoxa and metacoxa smooth and shiny; with distal seta. Trochanter protrochanter with two setae on distal upper margin, mesotrochanter with one seta on distal upper margin, and metatrochanter glabrous. Profemur swollen with two setae on lower margin and one seta on distal upper margin, surface smooth and shiny; flexor side of protibial asetose, extensor side smooth. Mesofemur slightly swollen with single seta on middle-lower margin. Metafemur slightly swollen, proximally with single seta on lower margin. Protibia barely flat, with outer apical prolongation of protibial in anterior view, with spines and a cleaning incision in distal part of flexor side; with spurs apical and subapical, antennal cleaner emarginate; outer distal margin of protibial with four triangular, latero-ventrally oriented teeth, teeth slightly rounded at apex. Mesotibia slender, slightly flat, in dorsal and ventral view with two longitudinal rows of spines, one spur on distal margin of tibiae and two tibial spurs on distal margin. Metatibia flat with spines externally and two tibial spurs on distal margin. First tarsi longer than 2–5 tarsi, with row of spines at distal margin,

claws simple and in middle with single seta. ***Abdomen:*** (AL= 2.55, AW= 1.47) sternum smooth, with six visible ventrites; ventrites IV–VI transversely bordered anteriorly; ventrites III–V each with pair of paramedian setae. In both sexes, basal margin of ventrite VI with two apical setae widely separated; last ventrite with rugose. ***Female genitalia:*** (Fig. 3.8) Ovipositor with coxostylus slender, slightly curved at apex, base slightly dilated externally, internal and external margin straight and smooth, with large setae near to middle and slightly rounded apex. Reproductive tract with bursa copulatrix elongated and spermatheca slightly wide, and larger than bursa copulatrix with acute apex. ***Male genitalia:*** (Fig. 2.7) Median lobe arcute at middle, acute and slightly curved apex, straight phallobase, endophallus with pubescence. Parameres subequal in length; rp with three apical setae, longitudinally inserted, wider than lp with three setae.

Etymology. The specific epithet honors the enthusiastic carabidologist Hans Reichardt who made the first and great contribution to the knowledge of neotropical Carabidae.

Distribution. Known from Brazil: Pará (Tucurui, Rio Tocantins) (Fig. 9).

Habitat. Unknown.

Remarks. As suggested to other species of *Mesus* they might be collected with the light trap or handle.

Variation. Variation was observed in the size between specimens.

Key for species of *Mesus* Chevrolat, 1858

1 Frons with 4-5 lateral longitudinal carinae; supraocular projection rounded…….....2
1’ Frons with more than 5 lateral longitudinal carinae; supraocular projection triangular.....4
2 Clypeal elevation trapezoidal and reticulated; supraorbital projection sinuous; frons with few transversal rugosity anteriorly and shiny in the middle. Brazil (Mato Grosso: Jacaré) ……..……...…...***M.chevrolati* sp.nov.**
2’ Clypeal elevation with different shape……..…….……..…….. 3
3 Lateral lobes of mentum rounded; clypeus and wings of clypeus shiny and smooth; frons punctuated anteriorly and dull at middle; phallobase of aedeagus concaved. Brazil (Roraima: Surumu) ……..……. ***M. mesus* Reichardt, 1974**
3’ Lateral lobes of mentum truncated; frons with four longitudinal carinae laterally and few irregular rugosities at middle; external margin of the coxostylus curved and granulated. Brazil (Ceará: Quixadá) …….……..……...…***M. campaneri* sp.nov.**
4 Supra ocular projection reaching outer margin of eye; mandible flat and rounded apex; sculptured frons anteriorly; large size. Brazil (Mato Grosso: Barra do Tapirapé)……..***M. gigas* Reichardt, 1974**
4’ Supra ocular projection not reaching outer margin of eye…….……...……. 5
5 Frons smooth and shiny anteriorly; trapezoidal and shiny clypeal elevation; mandible flat and rounded apex; aedagous apex shorted and rounded. Brazil (Mato Grosso do Sul: Corumbá, Miranda; Mato Grosso: Nossa Senhora do Livramento, Poconé, Sorriso) .....…… ***M. pseudogigas* Vieira & Bello, 2004**
5’ Frons with anterior part with rugosity and punctuation; slightly acute mandible; five longitudinal, parallel and well-defined carinae; apex of aedagous slightly rounded. Venezuela (Apure) …….…… ***M. hornburgi* Dostal, 2016**
6 Frons partially covered with irregular rugosity……..…..…….7

6’Frons completely covered with broad carinae ...……..……..……8
7 Clypeal elevation rounded and with punctuation; anterior margin of clypeus straight, flat head; anterior margin of clypeus slightly sinuous; apex of aedeagus acute and straight. Uruguay (Montevideo, Rocha, Canelones).…….. ***M. rugatifrons*** **Chevrolat, 1858**
7’Clypeal elevation rounded and smooth; anterior margin of clypeus sinuous; head slightly convex; frons with 14 longitudinal, parallel and well define carinae not reaching the posterior part at middle. Brazil (Bahia) …….. ***M. nanus*** **Reichardt, 1974**
8 Labrum rounded; frons with carinae thin and slightly curved; mentum with slightly quadrangular medial bifid tooth; margin of clypeus straight; male genitalia with median lobe slightly arcuteca at middle and short and acute apex. Argentina (Santa fé)…….…… ***M. ayri*** **sp.nov.**
8’ Labrum triangular; carinae of the frons very thin and irregular; clypeal elevation trapezoidal with reticulation and reflexed margin; aedeagus with median lobe arcute at apex, rounded apex, curved phallobase and pubescent endophallus. Argentina (Entre Rios, Buenos Aires, Formosa, Santa fé, Provincia chaco), Brazil (Mato Grosso: Poconé), Paraguay (Boquerón), Uruguay (Rivera).....….....…….. ***M. garciae*** **sp.nov.**
9 Supra ocular projection rounded; clypeus with anterior margin straight; clypeal and facial sulcus straight; clypeal surface shiny and smooth; clypeal elevation rounded; median line of thorax reaching anterior margin of pronotum. Brazil (Sergipe: Aracaju, Rio grande do Norte: Natal) .....…….. ***M. casariae*** **sp.nov.**
9’ Supra ocular projection sinuous; anterior margin of clypeus sinuous; clypeal and facial sulcus concave; apex of aedeagus acute and slightly curved; frons with eleven longitudinal, parallel, and well-defined carina; prothorax with a fovea in the middle of the trapezoid. Brazil (Pará: Tucurui, Rio Tocantins) ..……..…..……***M. reichardti*** **sp.nov.**

4. Discussion

The cladistic results have confirmed the initial hypothesis of *Mesus* being a monophyletic genus based on three synapomorphies. Firstly, the presence of a flat mandible (Char. 0-1), this character was mentioned by Reichardt (1974) and treated by Dostal (2016) as mandibles almost equal in width for the description of species of the genus. Secondly, the rounded shape of anterior margin of labrum (char. 2-1) and three setae on labrum (char. 3-1) are characters mentioned by Reichardt (1974) in his description of the genus. Also, Perrault (1994) considers the number of setae to separate *Mesus* of other genera into Clivinina. These synapomorphies support the hypothesis of *Mesus* as a monophyletic group. This highlights the importance of detailed phylogenetic studies for understanding Neotropical Carabidae genera that have not been extensively studied.

The analysis also provides additional characters that support species recognition and assist in their delimitation. Some of these characters were not considered in the original species descriptions but are important for distinguishing species. For instance, *Mesus nanus* has carinae in the middle of frons (char. 15-0), anterior part of frons rugae (char. 16-0) and the median line of the pronotum reaches the anterior margin of the pronotum (char. 20-0). In the case of *Mesus pseudogigas*, the clypeal elevation has a trapezoidal shape (char. 8-1). Other characters mentioned in the original descriptions were confirmed, such as the ocular expansion of *Mesus gigas* reaching the outer margin of the eye (char. 6-0). This character, established by Reichardt (1974) as diagnostic for *Mesus gigas*, was also used in the *Mesus* key to differentiate it from *Mesus pseudogigas* (Vieira and Bello 2004).

The Neotropical genus *Mesus* is distributed from Venezuela to the northern region of Argentina (Fig. 8). Some species are restricted to the northern part of South America, such as *Mesus hornburgi* in Venezuela (Apure) (Dostal 2016), *Mesus mesus* in Roraima (Reichardt 1974), and *Mesus reichardti* sp. nov. in Pará and Tucurui, in the northern region of Brazil. Other species are found in the northeastern part of Brazil, including *Mesus campaneri* sp. nov. in Ceará and *Mesus casariae* sp. nov. in Rio Grande do Norte and Sergipe. Additionally, species have been recorded in the central-western region of Brazil, such as *Mesus gigas* in Mato Grosso (Reichardt 1974) and *Mesus pseudogigas* in Mato Grosso do Sul (Vieira and Bello 2004), with new records from Mato Grosso. *Mesus chevrolati* sp. nov. and one record of *Mesus garciae* sp. nov. have also been found in Mato Grosso. In the southern part of South America, species such as *Mesus ayri* sp. nov. have been recorded in Argentina, *Mesus garciae* sp. nov. in Argentina, Paraguay, and Uruguay, and *Mesus rugatifrons* in Uruguay (Chevrolat 1858). It is worth noting that after this revision, it was discovered that the species designated by Reichardt as *Mesus rugatifrons* actually correspond to the new species *Mesus ayri* sp. nov. and *Mesus garciae* sp. nov.

5. **Conclusion**

The phylogenetic analysis confirms the monophyly of *Mesus*. Following the taxonomic revision of the genus, a total of 12 species are recognized. The genus *Mesus*, along with the previously known species, is redescribed in detail. Additionally, six new species are described for the first time. This comprehensive study provides updated identification keys for distinguishing the species within the genus, high-quality photographs, new distribution records for *Mesus pseudogigas*, a distribution map encompassing all species, and illustrations of male and female genitalia. Consequently, this research represents a significant contribution to the advancement of our understanding of the taxonomic and systematic aspects of the *Mesus* genus. Moreover, it addresses taxonomic gaps within the Carabidae family, thereby enhancing our knowledge of Neotropical biodiversity.

6. Competing interests

The authors have declared that no competing interests exist.

7. Acknowledgments

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Figure 1. Head and thorax: 1. *M. chevrolati* sp.nov. 2. *M. mesus* 3. *M. campaneri* sp.nov. 4. *M. hornburgi* 5. *M. gigas* 6. *M. pseudogigas* 7. *M. nanus* 8. *M. rugatifrons* 9. *M. ayri* sp.nov. 10. *M. garciae* sp.nov. 11. *M. casariae* sp.nov. 12. *M. reichardti* sp.nov. lm: labrum, amc: anterior margin of clypeus, cp: clipeo, ecp: clypeal elevation, wc: wings, sp: supraocular plate, soe: supraocular expansion, fs: facial sulcus, tcs: transversal clypeal sulcus.

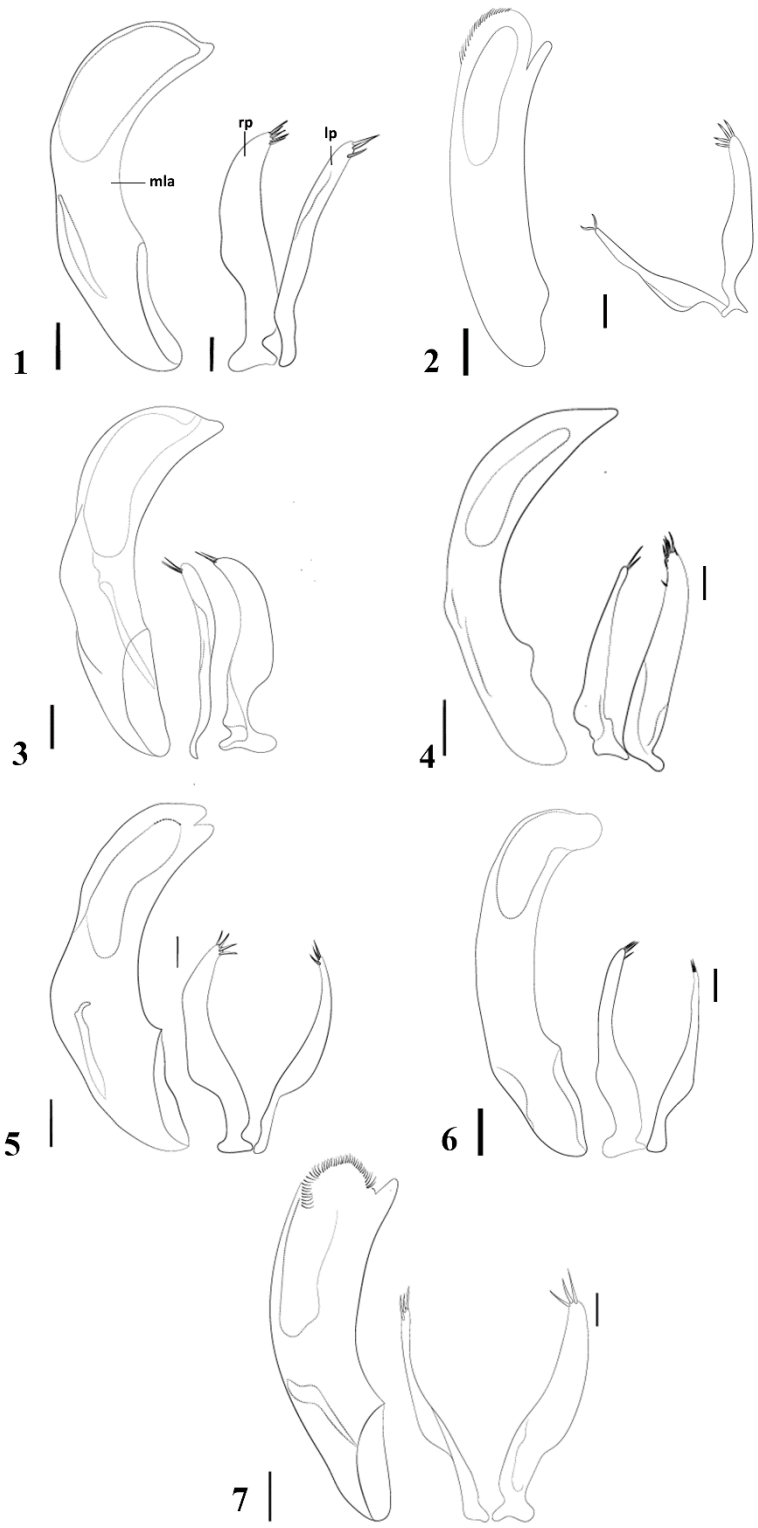
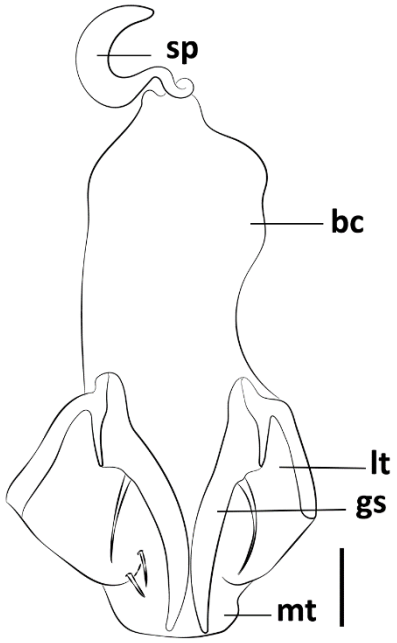


Figure 2. Male ganitalia (aedeagus and parameres): 1. *M. chevrolati sp.nov.* 2. *M. mesus* 3. *M. pseudogigas* 4. *M. rugatifrons* 5. M. ayri sp.nov 6. *M. garciae* sp.nov. 7. *M. reichardti* sp.nov. rp= right paramere; lp= left paramere; mla= median lobe of the aedeagus.



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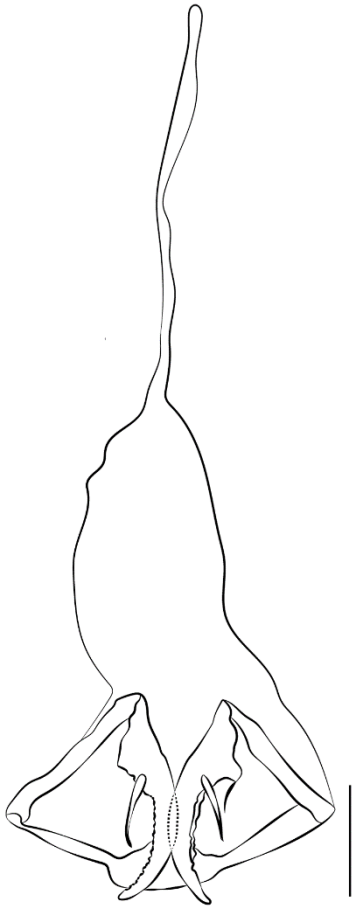

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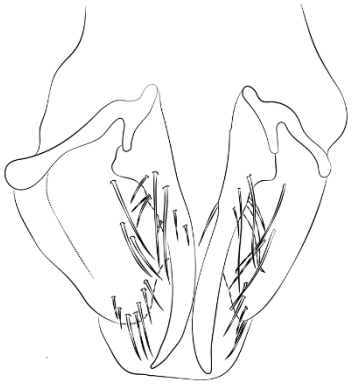

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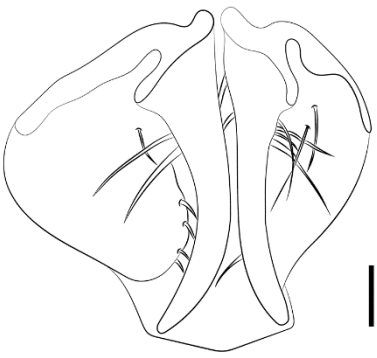

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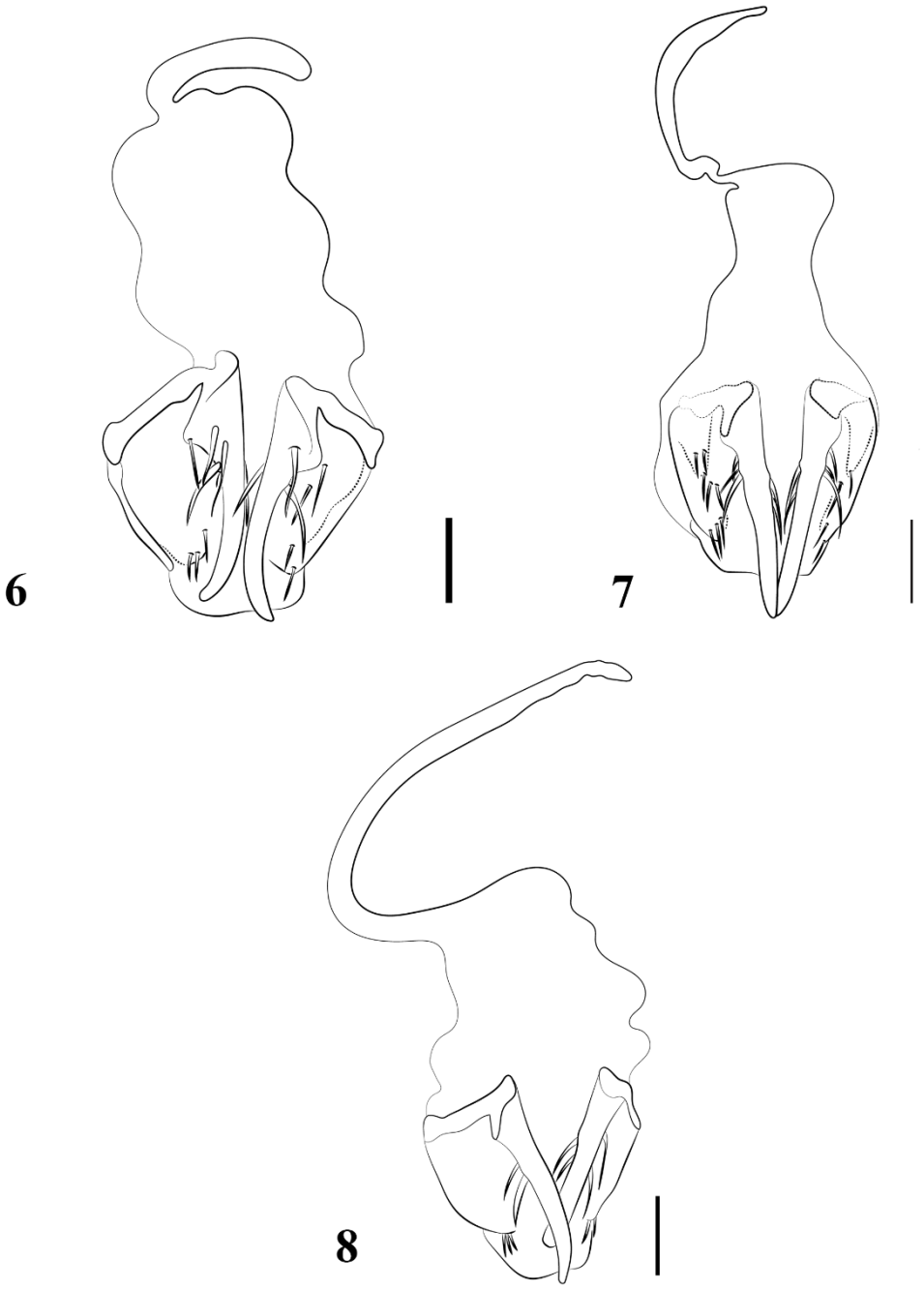

Figure 3. Female genitalia: 1. *M. chevrolati* sp.nov. 2. *M. mesus* 3. *M. campaneri* 4. *M. pseudogigas* 4. *M. rugatifrons* 5. *M. ayri* sp.nov 6. *M. garciae* sp.nov. 7. *M. reichardti* sp.nov. gs= gonostylus; bc= bursa copulatrix; sp= spermatheca; lt= laterotergite; mt= mediotergite of abdominal segment IX.

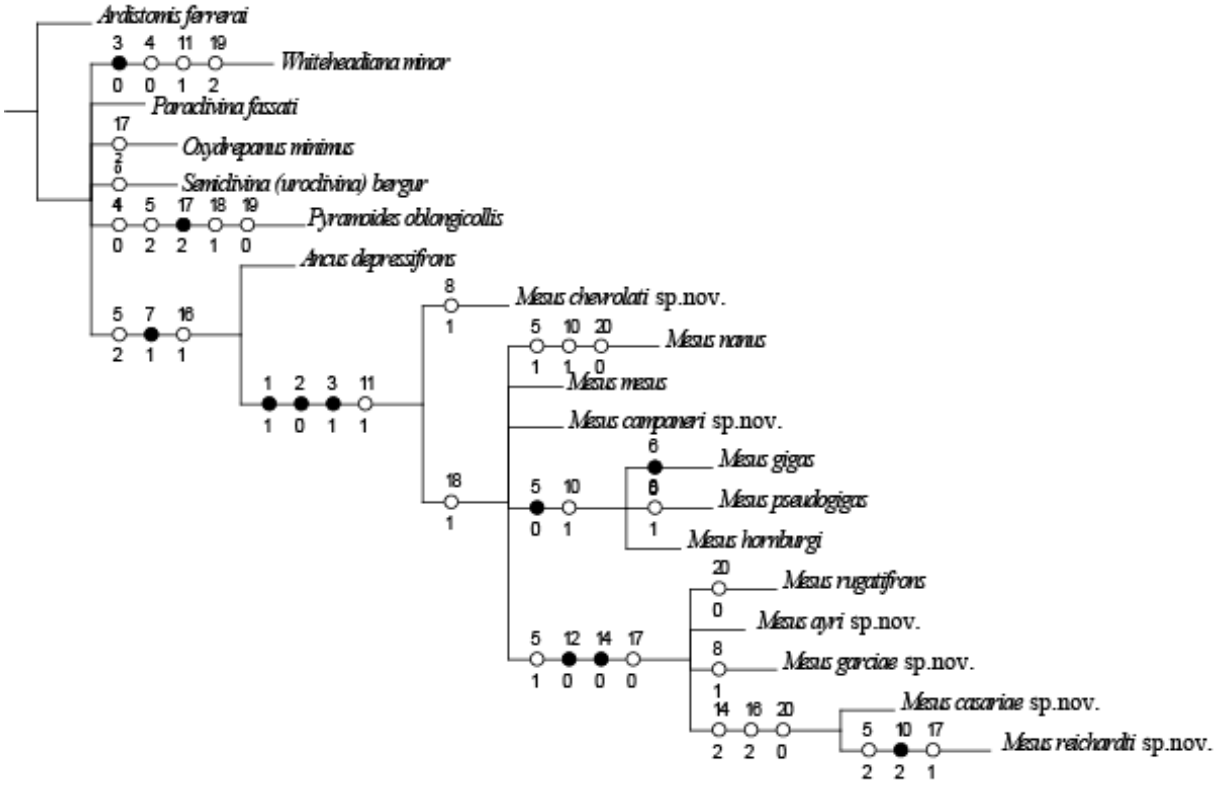

Figure 4. Strict consensus of 4 equally parsimonious trees with equal weights.

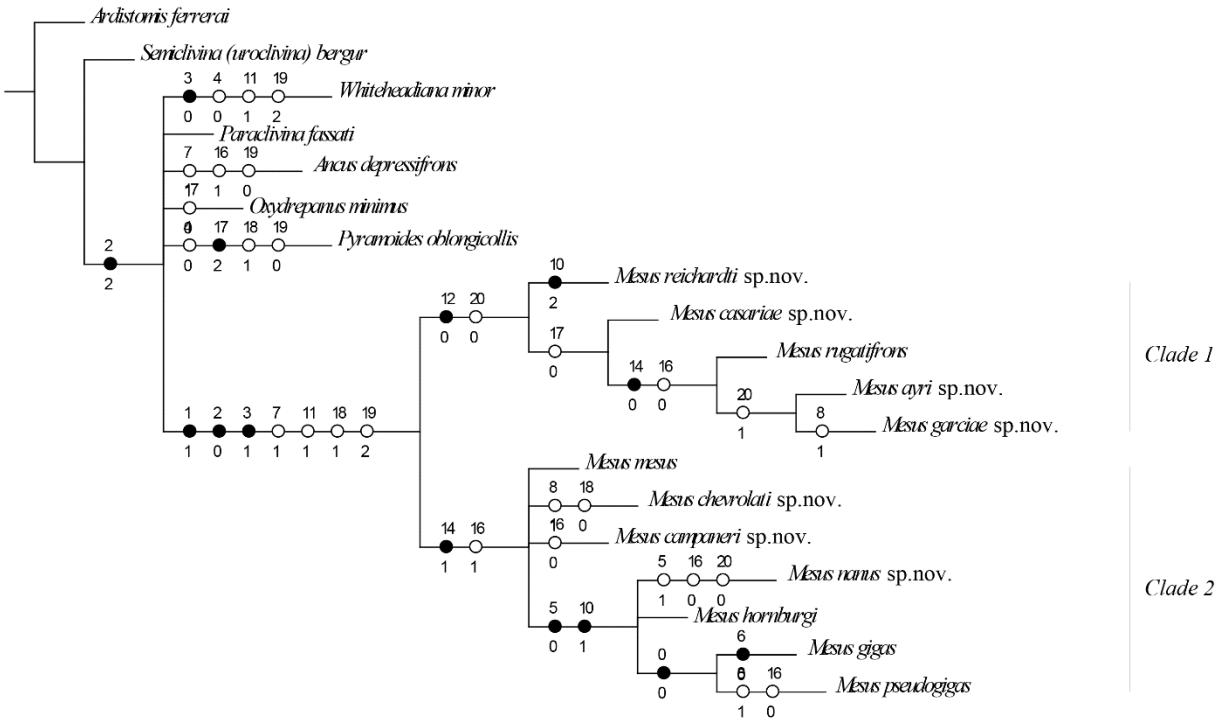

Figure 5. Cladogram obtain under implied weighting of the characters (k= 1.9921188).

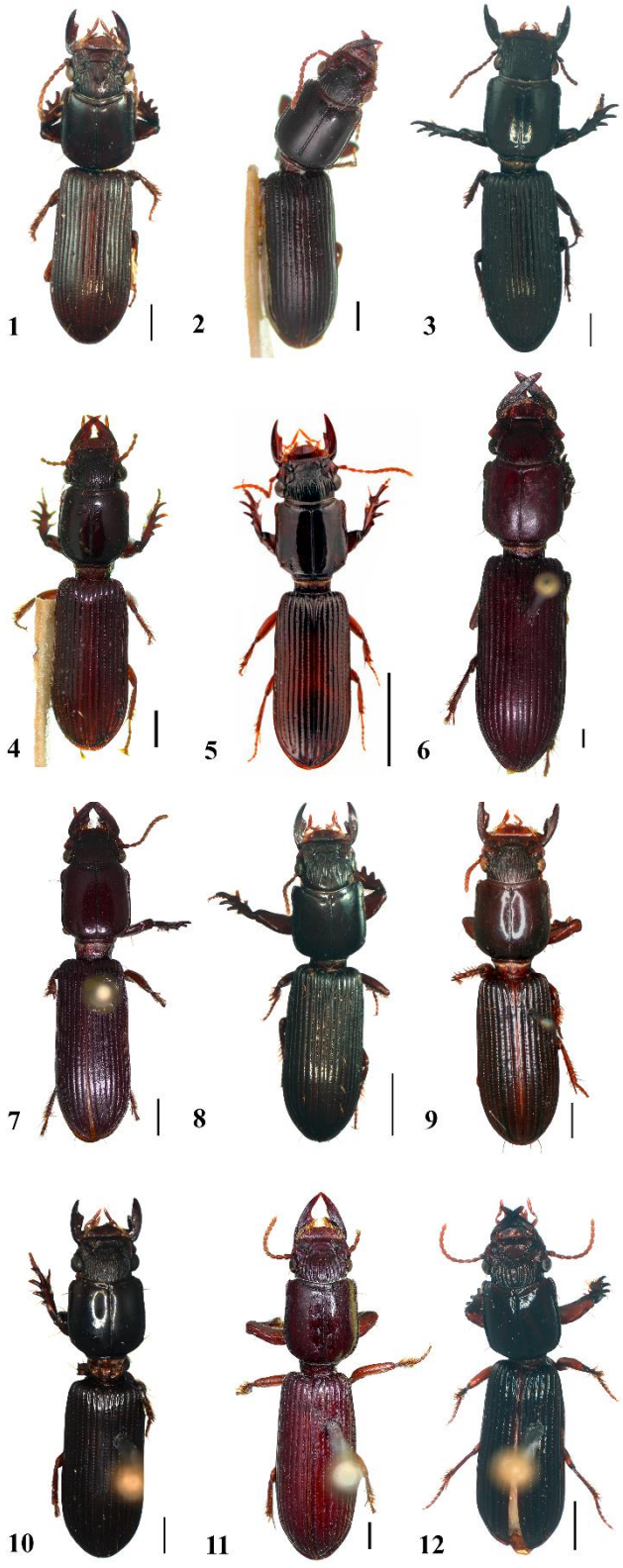

Figure 6. Habitus: 1. *M. chevrolati* sp.nov. 2. *M. mesus* 3. *M. campaneri* sp.nov. 4. *M. nanus* 5. *M. hornburgi* 6. *M. gigas* 7. *M. pseudogigas* 8. *M. rugatifrons* 9. *M. ayri* sp.nov. 10. *M. garciae* sp.nov. 11. *M. casariae* sp.nov. 12. *M. reichardti* sp.nov.

Figure 8. Type labels: 1. *Mesus gigas* Reichartd, 1974; 2. *Mesus mesus* Reichartd, 1974; 3. *Mesus nanus* Reichartd, 1974; 4. *Mesus pseudogigas* Vieira & Bello, 2004.

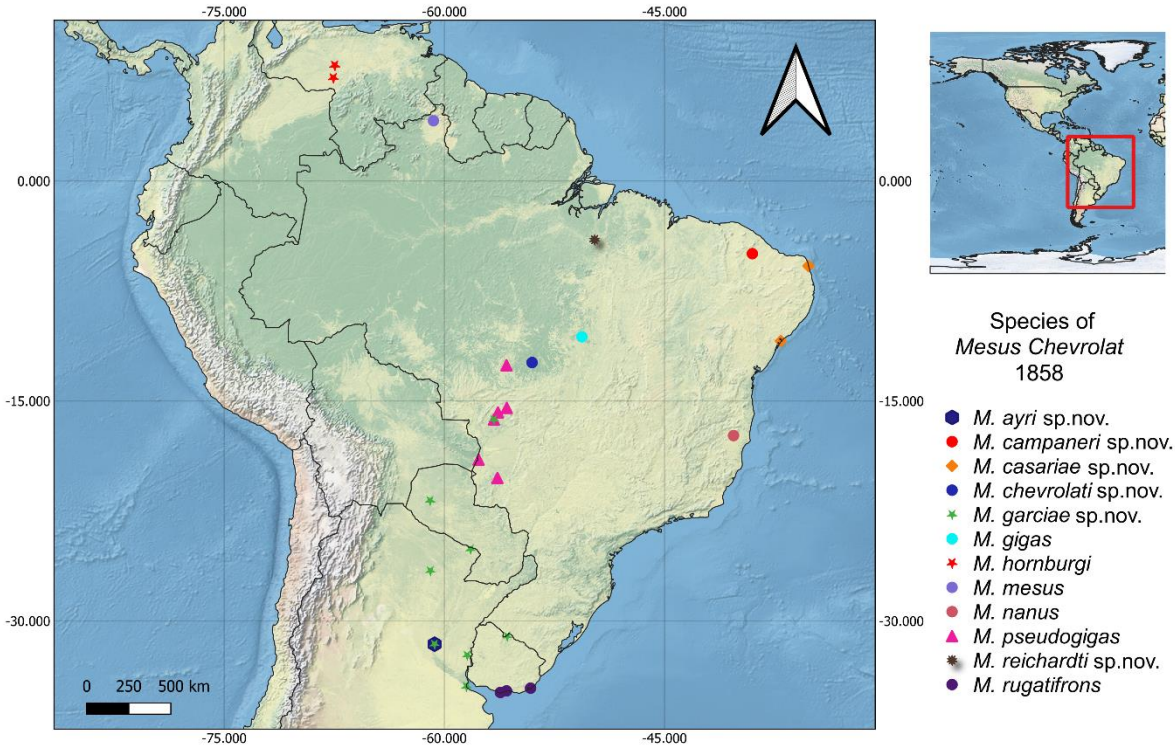

Figure 9. Distribution map of species of *Mesus* for the Neotropical region.

Table 1. Morphological data matrix constructed for the analyses; innaplicable states are indicated as –, unknown states as -

Terminals	**Characters**																				
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
Ardistomis ferrerai	2	0	1	2	0	-	-	0	-	-	-	0	-	-	-	2	2	-	0	-	1
Whiteheadiana minor	1	0	2	0	0	-	-	0	-	1	-	1	1	0	2	2	2	1	0	2	1
Paraclivina fassati	1	0	2	2	1	1	1	0	-	-	-	0	-	-	-	2	2	1	0	1	1
Ancus depressifrons	1	0	2	2	1	2	1	1	0	1	-	0	-	-	-	3	1	1	0	0	1
Oxydrepanus minimus	1	0	2	2	1	1	1	0	-	-	-	0	-	-	-	2	2	0	0	1	1
Semiclivina (uroclivina) bergur	1	0	1	2	1	1	1	0	-	0	0	0	-	-	-	2	2	1	0	1	1
Pyramoides oblongicollis	1	0	2	2	0	2	1	0	-	-	-	0	-	-	-	2	2	2	1	0	1
Mesus rugatifrons	1	1	0	1	1	1	1	1	0	0	0	1	0	0	0	1	0	0	1	2	0
Mesus gigas	0	1	0	1	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	2	1
Mesus nanus	1	1	0	1	1	1	1	1	0	0	1	1	1	0	1	0	0	1	1	2	0
Mesus mesus	1	1	0	1	1	2	1	1	0	0	0	1	1	1	1	1	1	1	1	2	1
Mesus pseudogigas	0	1	0	1	1	0	1	1	1	0	1	1	1	0	1	2	0	1	1	2	1
Mesus hornburgi	1	1	0	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	2	1
Mesus casariae sp.nov.	1	1	0	1	1	1	1	1	0	0	0	1	0	0	2	0	2	0	1	2	0
Mesus reichardti sp.nov.	1	1	0	1	1	2	1	1	0	0	2	1	0	0	2	0	2	1	1	2	0
Mesus chevrolati sp.nov.	1	1	0	1	1	2	1	1	1	0	0	1	1	0	1	2	1	1	0	2	1
Mesus ayri sp.nov.	1	1	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1	2	1
Mesus garciae sp.nov.	1	1	0	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	1	2	1
Mesus campaneri sp.nov.	1	1	0	1	1	2	1	1	0	0	0	1	1	1	1	1	0	1	1	2	1

Anex 1. Mesure of all species of *Mesus* examined.

Type	Colection	Species	L	W	HL	HW	H-LW	GL	GW	G-LW	PL	PW	P-LW	EL	EW	E-LW	AL	AW	A-LW
HT	MZSP	*M. ayri* sp. nov.	6.61	1.48	1.45	1.22	1.19	0.43	0.29	1.48	1.60	1.39	1.15	3.36	1.48	2.28	2.25	1.35	1.66
HT	MZSP	*M. casariae* sp.nov.	9.95	2.14	2.32	1.69	1.37	0.60	0.29	2.06	2.27	2.01	1.13	5.08	2.14	2.37	3.43	1.94	1.77
PT	MZSP	*M. casariae* sp.nov.	8.76	1.82	1.80	1.52	1.18	0.55	0.28	1.94	2.05	1.77	1.16	4.60	1.82	2.53	2.87	1.90	1.51
HT	MZSP	*M. chevrolati* sp.nov.	6.01	1.40	1.60	1.24	1.29	0.37	0.26	1.40	1.43	1.38	1.04	3.20	1.40	2.28	2.01	1.34	1.50
PT	MZSP	*M. chevrolati* sp.nov.	9.90	2.12	2.29	1.80	1.28	0.76	0.46	1.67	2.38	2.06	1.16	4.92	2.12	2.32	3.33	2.05	1.62
HT	MZSP	*M. garciae* sp.nov.	6.89	1.46	1.47	1.26	1.17	0.50	0.23	2.15	1.51	1.43	1.06	3.28	1.46	2.25	2.39	1.34	1.79
AM	MZSP	*M. garciae* sp.nov.	9.47	2.12	1.95	1.82	1.07	0.61	0.31	2.00	2.08	1.94	1.07	5.06	2.12	2.38	3.45	1.95	1.77
AM	MZSP	*M. garciae* sp.nov.	6.89	1.46	1.47	1.26	1.17	0.50	0.23	2.15	1.51	1.43	1.06	3.28	1.46	2.25	2.39	1.34	1.79
AM	MZSP	*M. garciae* sp.nov.	7.50	1.63	1.58	1.49	1.06	0.48	0.32	1.51	1.66	1.60	1.04	3.91	1.63	2.39	2.62	1.59	1.65
AM	MZSP	*M. garciae* sp.nov.	7.12	1.66	1.66	1.32	1.26	0.47	0.21	2.27	1.64	1.56	1.05	3.75	1.66	2.27	2.71	1.66	1.63
AM	MZSP	*M. garciae* sp.nov.	7.52	1.68	1.75	1.44	1.21	0.58	0.19	3.04	1.63	1.59	1.02	3.85	1.68	2.29	2.66	1.50	1.77
HT	MZSP	*M. gigas*	19.26	4.25	4.85	3.88	1.25	1.55	0.58	2.67	4.04	4.09	0.99	10.99	4.25	2.59	7.18	4.45	1.61
HT	DOSTAL	*M. hornburgi*	7.96	1.79	-	-	-	-	-	-	1.77	1.72	1.03	-	-	2.34	-	-	-
PT	DOSTAL	*M. hornburgi*	7.80	1.73	-	-	-	-	-	-	1.78	1.68	1.06	-	-	3.32	-	-	-
HT	MZSP	*M. mesus*	9.45	2.16	2.16	1.79	1.21	0.87	0.29	3.01	2.15	2.06	1.04	5.05	2.16	2.34	3.64	2.11	1.73
PT	MZSP	*M. mesus*	9.04	1.80	2.20	1.52	1.45	0.79	0.30	2.69	2.14	2.06	1.04	4.19	1.80	2.33	3.14	1.99	1.58
PT	MZSP	*M. mesus*	7.55	1.75	1.57	1.38	1.13	0.65	0.20	3.23	1.78	1.57	1.13	4.03	1.75	2.30	2.85	1.84	1.55
HT	MZSP	*M. nanus*	8.51	1.88	1.91	1.61	1.19	0.64	0.26	2.45	1.93	1.79	1.08	4.30	1.88	2.29	2.83	1.84	1.54
HT	MZSP	*M. pseudogigas*	13.44	2.92	3.00	2.47	1.22	0.84	0.75	1.13	2.88	2.72	1.06	6.95	2.92	2.38	5.12	2.63	1.95
PT	MZSP	*M. pseudogigas*	16.00	3.20	-	-		-	-		-	-		8.00	-		-	-	
AM	CEMT	*M. pseudogigas*	13.26	2.91	3.18	2.76	1.15	1.13	0.46	2.48	3.07	2.87	1.07	6.96	2.91	2.39	4.68	2.66	1.76
AM	CEMT	*M. pseudogigas*	13.07	2.82	3.29	2.63	1.25	0.81	0.49	1.65	3.03	2.76	1.10	6.68	2.82	2.37	2.96	1.75	1.69
AM	CEMT	*M. pseudogigas*	8.71	2.03	2.31	1.66	1.39	0.56	0.45	1.27	1.92	1.84	1.04	4.76	2.03	2.34	2.95	1.88	1.57
AM	CEMT	*M. pseudogigas*	14.75	3.13	4.16	2.95	1.41	1.24	0.62	2.00	3.11	2.92	1.06	7.33	3.13	2.34	5.09	2.84	1.79
AM	CEMT	*M. pseudogigas*	12.09	2.65	3.03	2.39	1.27	0.96	0.49	1.94	2.81	2.50	1.12	6.04	2.65	2.28	4.00	2.45	1.63
AM	CEMT	*M. pseudogigas*	15.87	3.43	3.75	3.09	1.21	1.09	0.86	1.26	3.53	3.36	1.05	8.10	3.43	2.36	5.85	3.85	1.52
AM	CEMT	*M. pseudogigas*	12.82	2.87	2.91	2.68	1.09	0.86	0.86	1.00	2.99	2.84	1.05	6.61	2.87	2.31	3.09	1.73	1.79
AM	CEMT	*M. pseudogigas*	13.98	3.18	3.32	2.89	1.15	0.99	0.52	1.90	3.03	3.13	0.97	7.57	3.18	2.38	4.89	3.13	1.57
AM	CEMT	*M. pseudogigas*	13.79	3.22	3.41	2.60	1.31	0.84	0.89	0.94	2.93	2.90	1.01	7.28	3.22	2.26	3.37	1.87	1.80
AM	CEMT	*M. pseudogigas*	15.02	3.20	3.87	2.90	1.34	0.87	0.89	0.98	3.27	3.16	1.04	7.73	3.20	2.42	3.87	2.01	1.93
AM	CEMT	*M. pseudogigas*	15.23	3.23	3.82	2.83	1.35	0.93	0.68	1.37	3.42	3.17	1.08	7.85	3.23	2.43	5.40	2.89	1.87
AM	CEMT	*M. pseudogigas*	17.00	3.56	4.02	3.20	1.26	1.19	0.83	1.43	3.66	3.43	1.06	8.75	3.56	2.46	3.56	2.23	1.60
AM	CEMT	*M. pseudogigas*	13.14	2.86	3.13	2.41	1.30	0.84	0.65	1.29	2.98	2.74	1.09	6.65	2.86	2.32	4.36	2.61	1.67
AM	CEMT	*M. pseudogigas*	12.36	2.68	3.12	2.44	1.27	0.93	0.42	2.23	2.82	2.65	1.07	6.11	2.68	2.28	4.12	2.47	1.67
AM	CEMT	*M. pseudogigas*	14.60	3.03	3.27	2.87	1.14	1.15	0.59	1.96	3.40	2.87	1.18	7.32	3.03	2.42	3.98	2.02	1.97
AM	CEMT	*M. pseudogigas*	14.40	3.13	3.72	2.89	1.29	1.08	0.74	1.47	3.24	3.01	1.07	7.50	3.13	2.40	3.18	1.93	1.65
AM	CEMT	*M. pseudogigas*	12.49	2.79	3.08	2.32	1.33	0.77	0.63	0.00	2.73	2.65	1.03	6.69	2.79	2.39	4.32	2.69	1.61
AM	CEMT	*M. pseudogigas*	10.95	2.46	2.62	2.17	1.21	0.85	0.53	1.59	2.38	2.34	1.01	5.67	2.46	2.31	3.66	2.35	1.55
AM	CEMT	*M. pseudogigas*	10.29	2.01	2.46	1.97	1.25	0.90	0.54	1.66	2.38	2.14	1.11	5.22	2.01	2.60	3.69	2.04	1.81
AM	CEUFLA	*M. pseudogigas*	14.08	3.04	3.63	2.69	1.35	1.11	0.83	1.34	3.26	2.89	1.13	7.08	3.04	2.33	4.74	2.80	1.69
AM	CEUFLA	*M. pseudogigas*	13.50	2.79	3.10	2.41	1.29	0.82	0.57	1.42	3.02	2.62	1.15	6.85	2.79	2.45	4.73	2.65	1.79
AM	CEUFLA	*M. pseudogigas*	12.09	2.57	2.93	2.39	1.22	1.01	0.78	1.30	2.78	2.57	1.08	6.43	2.57	2.50	4.24	2.40	1.77
AM	MPEG	*M. pseudogigas*	9.56	1.98	2.09	1.82	1.15	0.64	0.36	1.79	2.10	1.88	1.12	5.15	1.98	2.60	3.46	1.87	1.85
AM	MPEG	*M. pseudogigas*	9.12	1.97	1.99	1.83	1.09	0.66	0.45	1.45	2.02	1.90	1.07	4.69	1.97	2.38	3.22	1.80	1.79
AM	MPEG	*M. pseudogigas*	8.86	1.99	1.95	1.74	1.12	0.59	0.48	1.24	1.95	1.93	1.01	4.86	1.99	2.44	3.36	1.84	1.82
AM	MPEG	*M. pseudogigas*	8.75	1.93	2.00	1.71	1.17	0.55	0.40	1.36	1.99	1.95	1.02	4.82	1.93	2.49	3.34	1.81	1.85
AM	MPEG	*M. pseudogigas*	8.21	1.74	1.99	1.55	1.29	0.55	0.40	1.39	1.84	1.73	1.06	4.26	1.74	2.45	3.00	1.62	1.85
AM	MPEG	*M. pseudogigas*	9.12	2.02	1.65	1.77	0.93	0.55	0.36	1.54	2.11	1.93	1.09	4.86	2.02	2.41	3.51	1.84	1.91
HT	MPEG	*M. reichardti* sp.nov.	7.25	1.68	1.51	1.39	1.09	0.52	0.39	1.32	1.65	1.47	1.13	3.91	1.68	2.32	2.56	1.47	1.74
PT	MPEG	*M. reichardti* sp.nov.	6.87	1.56	1.33	1.44	0.92	0.51	0.33	1.55	1.60	1.50	1.07	3.85	1.56	2.47	2.55	1.47	1.73
PT	MPEG	*M. reichardti* sp.nov.	7.12	1.49	1.60	1.37	1.17	0.45	0.32	1.40	1.54	1.51	1.02	3.82	1.49	2.57	2.66	1.38	1.92
AM	MZSP	*M. rugatifrons*	9.25	2.16	2.16	1.70	1.27	0.59	0.33	1.81	2.15	2.02	1.06	4.71	2.16	2.18	3.50	1.92	1.82
AM	MZSP	*M. rugatifrons*	6.95	1.61	1.79	1.32	1.36	0.61	0.28	2.20	1.59	1.53	1.04	3.56	1.61	2.21	2.52	1.46	1.73
AM	MZSP	*M. rugatifrons*	7.72	1.77	1.85	1.44	1.28	0.52	0.26	1.99	1.83	1.71	1.07	3.95	1.77	2.23	2.81	1.64	1.71
AM	MNRJ	*M. rugatifrons*	6.33	1.50	1.61	1.24	1.30	0.43	0.30	1.46	1.50	1.46	1.03	3.25	1.50	2.17	2.23	1.33	1.67
AM	MNRJ	*M. rugatifrons*	7.32	1.65	1.76	1.34	1.32	0.44	0.31	1.42	1.68	1.59	1.05	3.77	1.65	2.28	2.65	1.53	1.73
HT	MZSP	*M.campaneri* sp.nov.	6.98	1.55	1.63	1.33	1.23	0.43	0.25	1.76	1.68	1.54	1.10	3.65	1.55	2.36	2.50	1.46	1.70
PT	MZSP	*M.campaneri* sp.nov.	5.06	1.21	0.99	1.23	0.81	0.37	0.34	1.08	1.09	1.09	1.00	2.82	1.21	2.32	1.87	1.11	1.68