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A checklist of Rutelinae MacLeay, 1819 (Coleoptera, Melolonthidae) of Bahia, Brazil

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Abstract: A list of species of Rutelinae from Bahia state, Northeastern Brazil, is presented. The list is based on specimens deposited in Brazilian collections. The list includes 4 tribes, 23 genera, 101 species and 17 subspecies. The genera *Byrsopolis* Burmeister, 1844, *Pseudodorysthetus* Soula, 2008 and *Trizogeniates* Ohaus, 1917 are recorded for the first time in Bahia and Northeastern Brazil. Thirty species are newly recorded in Bahia: *Areoda espiritosantensis* Ohaus, 1905, *B. laticollis Burmeister, 1855*, *Bolax flavolineata* (Mannerheim, 1829), *Chlorota abdominalis* Ohaus, 1926, *C. espiritosantensis* Ohaus, 1912, *Dorysthetus espiritosantensis* Ohaus, 1905, *D. fulgidus* (Waterhouse, 1881), *Leucothyreus acanthurus* Ohaus, 1917, *L. albopilosus* Ohaus, 1917, *L. campestris* Burmeister, 1855, *L. cayapo* Ohaus, 1931, *L. duplopunctatus* Frey, 1976, *L. eligius* Ohaus, 1918, *L. fluminensis* Ohaus, 1918, *L. iridipennis* Ohaus, 1917, *L. lucipetens* Ohaus, 1931, *L. occipitalis* Ohaus, 1931, *L. pallefactus* Ohaus, 1924, *L. paulista* Ohaus, 1917, *L. punctulatus* Blanchard, 1851, *L. suturalis* Laporte, 1840, *L. trochantericus* Ohaus, 1917, *L. verticalis* Ohaus, 1924, *Macraspis cincta* (Drury, 1872), *Paranomala tricostulata* (Ohaus, 1897), *P. violacea* (Burmeister, 1844), *Pseudodorysthetus calcaratus* (Spinola, 1835), and *Trizogeniates planipennis* Ohaus, 1917. *Pelidnota unicolor unicolor* (Drury, 1778) is recorded for the first time in Bahia. Fourteen species are identified and will be described in subsequent papers: 10 of *Leucothyreus* MacLeay, 1819, 2 of *Lobogeniates* Ohaus, 1917 and 1 species of *Byrsopolis* Burmeister, 1844 and *Pelidnota* MacLeay, 1819. Rutelini is the richest tribe with 16 genera and 49 species. The information presented in the list generates an important set of knowledge regarding the diversity of Rutelinae of Bahia and Brazil and provides the basis for conducting future research within the group.

Keywords: *new records, Northeastern Brazil, species list.*

Um checklist dos Rutelinae MacLeay, 1819 (Coleoptera, Melolonthidae) da Bahia, Brasil

Resumo: É apresentada uma lista de espécies de Rutelinae do estado da Bahia, Nordeste do Brasil. A lista é baseada em espécimes depositados em coleções brasileiras. A lista inclui quatro tribos, 23 gêneros, 101 espécies e 17 subespécies. É feito o primeiro registro para a Bahia e região Nordeste dos gêneros *Byrsopolis* Burmeister, 1844, *Pseudodorysthetus* Soula, 2008 e *Trizogeniates* Ohaus, 1917. Trinta espécies de Rutelinae foram registradas pela primeira vez para a Bahia e região Nordeste: *Areoda espiritosantensis* Ohaus, 1905, *B. laticollis Burmeister, 1855*, *Bolax flavolineata* (Mannerheim, 1829), *Chlorota abdominalis* Ohaus, 1926, *C. espiritosantensis* Ohaus, 1912, *Dorysthetus espiritosantensis* Ohaus, 1905, *D. fulgidus* (Waterhouse, 1881), *Leucothyreus acanthurus* Ohaus, 1917, *L. albopilosus* Ohaus, 1917, *L. campestris* Burmeister, 1855, *L. cayapo* Ohaus, 1931, *L. duplopunctatus* Frey, 1976, *L. eligius* Ohaus, 1918, *L. fluminensis* Ohaus, 1918, *L. iridipennis* Ohaus, 1917, *L. lucipetens* Ohaus, 1931, *L. occipitalis* Ohaus, 1931, *L. pallefactus* Ohaus, 1924, *L. paulista* Ohaus, 1917, *L. punctulatus* Blanchard, 1851, *L. suturalis* Laporte, 1840, *L. trochantericus* Ohaus, 1917, *L. verticalis* Ohaus, 1924, *Macraspis cincta* (Drury, 1872), *Paranomala tricostulata* (Ohaus, 1897), *P. violacea* (Burmeister, 1844), *Pseudodorysthetus calcaratus* (Spinola, 1835) e *Trizogeniates planipennis* Ohaus, 1917. Foi feito o primeiro registro de *Pelidnota unicolor unicolor* (Drury, 1778) para a Bahia. Foram identificadas 14 espécies, que serão descritas em trabalhos posteriores: dez de *Leucothyreus* MacLeay, 1819, duas de *Lobogeniates* Ohaus, 1917 e uma de *Byrsopolis* Burmeister, 1844 e *Pelidnota* MacLeay, 1819. A tribo Rutelini apresenta a maior riqueza com 16 gêneros e 49 espécies. Os resultados aqui apresentados têm importantes informações para o conhecimento de Rutelinae, no estado da Bahia e no Brasil, e servirão de base para a realização de futuras pesquisas com o grupo.

Palavras-chave: *lista de espécies, novos registros, Região Nordeste do Brasil.*

Introduction

According to Kohlmann & Morón (2003) Scarabaeoidea is represented by three families: Lucanidae, Passalidae and Scarabaeidae, with this last family divided into two informal categories, "Laparosticti" (with spiracles positioned on the pleural membrane) and "Pleurosticti" (with spiracles positioned on the superior part of the abdominal ventrite). The scarabaeids include two feeding groups: coprophagous consisting of subfamilies Aphodiinae and Scarabaeinae ("Laparosticti") and the phytophagous consisting of subfamilies Cetoniinae, Dynastinae, Melolonthinae and Rutelinae ("Pleurosticti") (Lawrence & Newton 1995). Cherman & Morón (2014) recently considered the six phytophagous subfamilies in Melolonthidae (Euchirinae, Dynastinae, Hopliinae, Melolonthinae, Rutelinae and Sericinae). This paper follows the classification of Cherman & Morón (2014).

Rutelinae is the second largest subfamily of Melolonthidae according to the number of species, with approximately 4,197 species described in the world but with the greatest richness in the tropics (Hardy 1991, Jameson 2002, Ratcliffe & Jameson 2005, Krajcik 2008, Jameson & Ratcliffe 2011, Morón & Ramírez-Ponce 2012). Melolonthinae is the richest subfamily of Melolonthidae, with about 11,000 known species (Evans 2002). Seven tribes are currently recognized in Rutelinae: Adoretini, Alvarengiini, Anatistini, Anomalini, Anoplognathini, Geniatini and Rutelini (Bouchard et al. 2011).

Adult ruteline are phytophagous, playing an important ecological role in pollination of some plant species. Larvae are saprophytophagus and contribute directly to the decomposition of dead organic matter deposited in forests and in the nutrient cycle (Hardy 1991, Morón et al., 1997, Paucar-Cabrera 2003), while some species feed on roots and sometimes become pests (Ritcher 1958, Jameson et al. 2003, Jameson & Howkins 2005). In Brazil, *Paranomala testaceipennis* (Blanchard, 1851) was recorded in agricultural crops and pasture areas in Mato Grosso do Sul (Rodriguez-del-Bosque 1996, 1998, Rodrigues et al. 2008); *Leucothyreus albopilosus* Ohaus, 1917 was recorded on *Eucalyptus citriodora* (Hook, 1848); *L. dorsalis* Blanchard, 1850 was associated to the roots of *Acrocomia aculeata* (Jacq) Lodd. ex Mart. (Arecaceae) from Mato Grosso do Sul (Puker et al. 2009, Pereira et al. 2013).

In the Neotropical Region, approximately 1,337 species of Rutelinae were recorded (Morón 1990, 2004, Jameson 2008, Soula 2011, Filippini et al. 2016, Ferreira et al. 2017, Howkins 2017, Moore et al., 2017, Seidel et al. 2017, Sierra 2017), while 436 are from Brazil (Grossi & Vaz-de-Mello 2016, Ferreira et al. 2017). Grossi & Vaz-de-Mello (2016) also included 104 subspecies and 58 genera in their list from Brazil. Only one inventory of Rutelinae is known from Bahia State (Viana et al. 2001), which was performed with light traps in Cruz das Almas municipality (approximately 12°40'S–39°06'W). The authors recorded species of four genera: *Paranomala* Casey, 1915 (Anomalini), *Geniates* Kirby, 1819 *Leucothyreus* MacLeay, 1819 (Geniatini) and *Pelidnota* MacLeay (Rutelini), however, only one species was named and identified, *Pelidnota fulva* Blanchard, which is very probably a misidentified species, as this taxon occurs in another geographical region, according to the last revision (Soula 2009).

The most recent information on the diversity of the species from Bahia is scattered among 17 papers (Jameson 1996, Jameson & Hawkins 2005, Jameson & Ratcliffe 2011, Krajcik 2008, Machatschke 1972, Soula 2002a, b, 2003, 2005, 2006, 2008, 2009, 2010, 2011, Ratcliffe & Jameson 1989, Viana et al. 2001, Ferreira et al. 2017) and includes 61 species and nine subspecies in 20 genera of the tribes Anatistini, Anomalini, Geniatini and Rutelini.

In this paper, we present an updated species list of Rutelinae from Bahia that are deposited in seven collections in South, Southeast and Northeast of Brazil. Information about the geographic distribution of the species listed is also provided. The data presented here gather important information that adds new knowledge about the diversity of Rutelinae in Brazil and the Neotropical region and serves as a basis for conducting future research with the group.

Material and Methods

Bahia is one of the biggest states of Brazil (Figure 1) with an area of 564.733,177 km^2 (Instituto Brasileiro de Geografia e Estatística–IBGE 2013), which represents 37.7% of all the Northeastern territory (Bahia 2013). The vegetation, climate, and altitudinal range are heterogeneous, with the presence of three Brazilian Biomes (Caatinga, Atlantic Forest and Cerrado), ecosystems of restingas, mangroves, campos rupestres, and ecotones between the biomes, rainforests, semi-deciduous forest and high montane vegetation, among others (Bahia 2013).

The collections visited for this study were (acronyms according to Evenhuis (2009) have been used when available): CEIOC – Entomological Collection of Instituto Oswaldo Cruz, Rio de Janeiro, Brazil; CERPE – Entomological Collection of Universidade Federal Rural de Pernambuco, Recife, Pernambuco, Brazil; DZUP – Entomological Collection Pe. J. S. Moure, Department of Zoology, Universidade Federal do Paraná, Curitiba, Paraná, Brazil; EPGC – Everardo and Paschoal Grossi Collection, Nova Friburgo, Rio de Janeiro, Brazil; MNRJ – National Museum, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil; MZFS – Collection Prof. Johann Becker, Museum of Zoology of Universidade Estadual de Feira de Santana, Bahia, Brazil; and MHNBA/MZUFBA – Entomological Collection of Museum of Natural History/ Zoology of Bahia State/Universidade Federal da Bahia, Salvador, Bahia, Brazil.

The species identification was based on Frey (1976), Ohaus (1905, 1912, 1913, 1917, 1918a, 1918b, 1924, 1926, 1928, 1930, 1931), Soula (1998, 2006, 2009, 2010, 2011), and by comparison with the studied collections.

For the study of male genitalia, each specimen was immersed in boiling water for approximately two to four minutes and the genitalia removed, then studied under a stereomicroscope, glued in a triangle, and pinned just below the specimen.

The geographical coordinates, when not available on the label of the specimen, were obtained by the geoLoc tool on the speciesLink online data platform (http://splink.cria.org.br/geoloc), using the IBGE as a source for the data recovery. The geographical records were plotted on the map of Bahia using QGIS version 2.10.1. The final artwork for the map of geographical records and richness of genera and species by tribe was executed using Abobe Photoshop CS6®.

The information transcribed from the labels of the examined material usually adhered to the following pattern: COUNTRY, *State*: ("Locality"; "additional information"); (Geographic Coordinates), Data, Collector. (ACRONYM OF THE MUSEUM# register number).

Results and Discussion

A total of 1,495 specimens, of 20 genera, 79 species and 12 subspecies of the tribes Anomalini, Anatistini, Geniatini and Rutelini were examined. Before the current study, 23 genera, 101 species and 17 subspecies of Rutelinae from Bahia (Table 1) had been reported. With this study, 32 species, 11 subspecies and the genera *Anticheiroides* Soula, 1998, *Oplognathus* MacLeay, 1819 and *Parhoplognathus* Ohaus, 1930, cited from Bahia in the literature by Machatschke (1972), Soula (1998, 2008), and Moore et al. (2017) respectively were not found in the collections studied (Table 1).

The genera *Byrsopolis* Burmeister, 1844, *Pseudodorysthetus* Soula, 2008 and *Trizogeniates* Ohaus, 1917 were first recorded for Bahia and the Northeast region. Thirty species of Rutelinae were recorded for the first time in Bahia and Northeastern Brazil: *Areoda espiritosantensis* Ohaus, 1905, *Byrsopolis* aff. *castanea* Burmeister, 1844, *Bolax flavolineata* (Mannerheim, 1829), *Chlorota abdominalis* Ohaus, 1926, *C. espiritosantensis* Ohaus,

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Table 1. List of species and subspecies of Rutelinae from Bahia state, Northeast – Brazil adding the literature data with the results presented in this study and, geographic distribution.

SPECIES/SUBSPECIES	DISTRIBUTION
ANOMALINI Streubel, 1839 **Anomalina** Streubel, 1839 ***Paranomala*** Casey, 1915	
Paranomala chromicolor (Burmeister, 1855)	Brazil (Bahia and Pará) (Machatschke 1972, Grossi & Vaz-de-Mello 2016)
Paranomala foveiceps (Ohaus, 1897)	Brazil (Bahia) (Machatschke 1972, Krajcik 2008, Grossi & Vaz-de-Mello 2016)
Paranomala inconstans (Burmeister, 1844)	Mexico, Central and South America, in Brazil (Bahia and Rio de Janeiro) (Machatschke 1972, Krajcik 2008, Grossi & Vaz-de-Mello 2016 and present study)
Paranomala tricostulata (Ohaus, 1897)	Brazil (Amazonas, Bahia (new occurrence register)) and Colombia (Mozo) (Ohaus 1897)
Paranomala undulata undulata (Melsheimer, 1844)	North, Central and South America (Machatschke 1972, Krajcik 2008, Grossi & Vaz-de-Mello 2016 and present study)
Paranomala undulata varians (Burmeister, 1844)	North America (Mexico), Brazil (Machatschke 1972, Krajcik 2008 and present study)
Paranomala violacea (Burmeister, 1844)	Brazil (Bahia (new occurrence register), Espírito Santo, Santa Catarina) (Machatschke 1972, Krajcik 2008, Grossi & Vaz-de-Mello 2016)
RUTELINI MacLeay, 1819 **Anticheirina Lacordaire, 1856** ***Anticheiroides*** Soula, 1998	
Anticheiroides inauratus bahianus Soula, 1998	Brazil (Bahia) (Soula 1998)
Chlorota Burmeister, 1844	
Chlorota abdominalis Ohaus, 1926	Brazil (Amazonas, Bahia (new occurrence register)) (Soula 2002a, b)
Chlorota aulica Burmeister, 1844	Argentina, Bolivia, Brazil (Alagoas to Pernambuco, Bahia, Espírito Santo, São Paulo), Colombia, Costa Rica, Equador, Guatemala, French Guiana, Honduras, Mexico, Nicaragua, Panama, Peru, Suryname, Venezuela (Soula, (Soula 2002a, b and present study)
Chlorota espiritosantensis Ohaus, 1912	Brazil (Bahia (new occurrence register), Espírito Santo) (Soula 2002a, b)
Chlorota paulistana Ohaus, 1912	Brazil (Bahia, São Paulo, Rio de Janeiro, Espírito Santo, Minas Gerais) (Soula 2002a and present study)
Dorysthetus Blanchard, 1845	
Dorysthetus espiritosantensis Ohaus, 1905	Brazil (Bahia (new occurrence register), Espírito Santo) (Soula 2003)
Dorysthetus fulgidus (Waterhouse, 1881)	Brazil (Amazonas, Bahia (new occurrence register)), Colombia, Equador, Peru (Machatschke 1972, Soula 1998, 2003)
Dorysthetus taeniatus taeniatus (Perty, 1830)	Brazil (Bahia, Minas Gerais, Goiás) (Machatschke 1972, Soula 1998, 2003)
Lagochile Hoffmannsegg, 1817	
Lagochile amazona unipunctata (Ohaus, 1914)	Brazil (Bahia to Ceará) (Machatschke 1972, Soula 2005 and present study)
Lagochile badia (Perty, 1830)	Brazil (Bahia, Goiás, Minas Gerais, São Paulo) (Machatschke 1972, Soula 2005)
Lagochile bipunctata (MacLeay, 1819)	Argentina, Brazil (Bahia (Atlantic Forest), Espírito Santo, Rio de Janeiro) (Machatschke 1972, Soula 2005)
Lagochile emarginata (Gyllenhal, 1817)	Brazil (Bahia, Rio de Janeiro), occurs in mountains areas in the North at the Bahia state to Paraguay Southwest, frequent in Brazilian Atlantic Forest to Argentina (Soula 2005 and present study)
Lagochile emarginata nitida (Burmeister, 1844)	Brazil (Bahia) (Machatschke 1972, Soula 2005)
Lagochile glandicolor (Burmeister, 1855)	Brazil (Amazonas, Bahia) (Soula 2005)
Lagochile obscurata (Ohaus, 1905)	Brazil (Bahia), Colombia, French Guiana, Venezuela (Soula 2006)
Lagochile obscurata debahia Soula, 2006	Brazil (Bahia) (Soula 2006)
Lagochile sparsa litoralis Ohaus, 1903	Brazil (Bahia, Ceará, São Paulo) (Soula 2005 and present study)
Macraspis MacLeay, 1819	
Macraspis chrysis (Linnaeus, 1764)	Brazil (Bahia to Santa Catarina), Colombia, Costa Rica, North of the Argentina to Mexico and, to Paraguay, Peru to Bolivia, Nicaragua (Soula 1998)
Macraspis cincta (Drury, 1782)	Brazil (Bahia (new occurrence register), Espírito Santo, Rio de Janeiro, São Paulo) (Soula 1998, 2003)
Macraspis festiva Burmeister, 1844	Bolivia, Brazil, Peruvian Amazon to Equador, and Paraguay, Venezuela (Soula 1998, Soula 2003)
Macraspis morio Burmeister, 1844	Argentina, Brazil, Colombia, Venezuela (Soula 2003 and present study)
Macraspis nitidissima Burmeister, 1844	Brazil (Bahia) (Soula 1998)
Macraspis pseudochrysis pseudochrysis Landin, 1956	Brazil (Bahia), French Guiana, Guyana, Peruvian Amazon and Venezuela (Soula 1998)
Macraspis viridis (Thunberg, 1822)	Brazil (Bahia), Colombia (Machatschke 1972 and present study)
Paramacraspis Ohaus, 1915	
Paramacraspis hemichlora (Laporte, 1840)	Brazil (Bahia, Espírito Santo) (Soula 2002a, 2003 and present study)
Pseudodorysthetus Soula, 1998 (new occurrence register)	
Pseudodorysthetus calcaratus (Spínola, 1835)	Brazil (Bahia (new occurrence register), Rio de Janeiro) (Soula 1998, 2003)
Areodina Burmeister, 1844 ***Areoda*** MacLeay, 1819	
Areoda espiritosantensis Ohaus, 1905	Brazil (Bahia (new occurrence register), Minas Gerais, Rio de Janeiro, São Paulo) (Ratcliffe & Jameson 1989)
Areoda leachii MacLeay, 1819	Brazil (Bahia, Espírito Santo, Rio de Janeiro, São Paulo) (Ratcliffe & Jameson 1989 and present study)

Table 1. Continued...

SPECIES/SUBSPECIES	DISTRIBUTION
Byrsopolis Burmeister, 1844 (new occurrence register)	
B. laticollis Burmeister, 1855	Brazil (Bahia (new occurrence register), Rio de Janeiro) (Machatschke 1972)
Byrsopolis sp. nov.	Brazil (Bahia)
Oplognathus MacLeay, 1819	
Oplognathus bahianus Ohaus, 1912	Brazil (Bahia) (Machatschke 1972)
Pelidnotina Burmeister, 1844 ***Chalcoplethis*** Burmeister, 1844	
Chalcoplethis kirbii kirbii (Gray, 1832)	Brazil (Bahia, Espírito Santo, Paraná, Rio Grande do Sul) (Gray 1832, Burmeister 1844, Blanchard 1851, Harold 1869, Ohaus 1918, 1934, Blackwelder 1944, Machatschke 1972, Hardy 1975, Soula 2006, Krajcik 2008, Moore et al. 2017 and present study), Costa Rica (Hardy 1975, Moore et al. 2017), Paraguay (Cororó) (Moore et al. 2017)
Homonyx Guérin-Méneville, 1839	
Homonyx bahianus Ohaus, 1913	Brazil (Bahia) (Ohaus 1913, 1918, 1934, Machatschke 1972, Krajcik 2008, Soula 2010, Moore et al. 2017 and present study)
Parhoplognathus Ohaus, 1915	
Parhoplognathus rubripennis Ohaus, 1930	Brazil (Bahia) (Soula 2008, Moore et al. 2017)
Pelidnota MacLeay, 1819	
Pelidnota alliacea (Germar, 1824)	Brazil (Bahia, Espírito Santo, Santa Catarina) (Olivier 1789, 1802, Laporte 1840, Burmeister 1844, Blanchard 1851, Ohaus 1908, 1918, 1934, Blackwelder 1944, Machatschke 1972, Krajcik 2008, Soula 2009, Ferreira et al. 2017, Moore et al. 2017 and present study)
Pelidnota bahiana bahiana Ohaus, 1905	Brazil (Bahia) (Soula 2006, Moore et al. 2017)
Pelidnota beckeri Ferreira, Almeida & Bravo, 2017	Brazil (Bahia) (Ferreira et al. 2017 and present study)
Pelidnota burmeisteri burmeisteri Burmeister, 1844	Brazil (Bahia, Minas Gerais) (Machatschke 1972, Soula 2009, Moore et al. 2017 and present study)
Pelidnota chalcothorax Perty, 1830	Brazil (Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) (Perty 1830, Laporte 1840, Burmeister 1844, 1855, Blanchard 1851, Ohaus 1918a, 1918b, 1934, Blackwelder 1944, Machatschke 1972, Krajcik 2008, Soula 2009, Moore et al. 2017 and present study)
Pelidnota courtini Soula, 2009	Brazil (Bahia, Minas Gerais) (Soula 2009, Moore et al. 2017 and present study)
Pelidnota crassipes Ohaus, 1905	Argentina (Misiones) (Ohaus 1905, 1918, 1934, Blackwelder 1944, Machatschke 1972, Soula 2006, Krajcik 2008, Moore et al. 2017, Ferreira et al. 2017), Bolivia (Ohaus 1918, 1934, Blackwelder 1944, Moore et al. 2017, Ferreira et al. 2017), Brazil (Bahia, Minas Gerais, Goiás, Mato Grosso (Soula 2006, Moore et al. 2017, Ferreira et al. 2017 and present study), Paraguay (Asunción) (Ohaus 1905, 1918, 1934, Blackwelder 1944, Machatschke 1972, Soula 2006, Moore et al. 2017, Ferreira et al. 2017).
Pelidnota cyanipes (Kirby, 1819)	Argentina (Misiones) (Gutiérrez 1951, Soula 2009, Moore et al. 2017), Brazil (Pará, Bahia, Rio de Janeiro, Rio Grande do Sul) (Laporte 1840, Burmeister 1844, 1855, Blanchard 1851, Ohaus, 1908a, 1918b, 1934, Blackwelder 1944, Machatschke 1972, Krajcik 2008, Soula 2009, Moore et al. 2017 and present study)
Pelidnota cyanitarsis (Gory, 1833)	Brazil (Bahia, Minas Gerais, Pará)) (Guérin-Méneville 1834, Burmeister 1844, Blanchard 1851, Ohaus 1918, 1934, Blackwelder 1944, Machatschke 1972, Krajcik 2008, Soula 2009, Moore et al. 2017 and present study)
Pelidnota cuprea (Germar, 1824)	Argentina (Soula 2006, Moore et al. 2017), Bolivia (Soula 2006, Moore et al. 2017), Brazil (Bahia, Goiás, Rio de Janeiro, Rio Grande do Sul, Santa Catarina) (Germar 1824, Perty 1830, Burmeister 1844, Blanchard 1851, Ohaus 1913, 1918, 1934, Blackwelder 1944, Machatschke 1972, Soula 2006, Krajcik 2008, Moore et al. 2017 and present study), Paraguay (Ohaus 1913, 1918, 1934, Machatschke 1972, Soula 2006, Moore et al. 2017)
Pelidnota ebenina (Blanchard, 1842)	Argentina (Soula 2006, Moore et al. 2017), Brazil (Pará, Bahia) (Ohaus 1908, 1918, 1934, Blackwelder 1944, Machatschke 1972, Soula 2006, Krajcik 2008, Moore et al. 2017 and present study), Bolivia (Santa Cruz) (Blanchard 1851, Ohaus 1918, 1934, Blackwelder 1944, Machatschke 1972, Soula 2006, Krajcik 2008, Moore et al. 2017)
Pelidnota fulva Blanchard, 1851	Bolivia (Chuquisaca) (Blanchard 1851, Burmeister 1855, Ohaus 1918, 1934, Blackwelder 1944, Machatschke 1972, Krajcik 2008, Soula 2009, Moore et al. 2017), Brazil (Bahia, Minas Gerais, Mato Grosso do Sul) (Burmeister 1855, Ohaus 1908, Rodrigues & da Silva Falco 2011, Rodrigues et al. 2012, Garcia et al. 2013, Moore et al. 2017)
Pelidnota glaberrima septentrionalis (Soula, 2006)	Brazil (Bahia) (Soula 2006, Moore et al. 2017 and present study)
Pelidnota gracilis debahia (Soula, 2006)	Brazil (Bahia) (Soula 2006, Moore et al. 2017 and present study)
Pelidnota instabilis Ohaus, 1912	Brazil (Bahia, Espírito Santo, Rio de Janeiro, São Paulo (Ohaus 1912, 1918, 1934, Blackwelder 1944, Machatschke 1972, Soula 2006, Krajcik 2008, Moore et al. 2017, Ferreira et al. 2017 and present study)
Pelidnota lagoi Soula, 2011	Brazil (Bahia, Goiás) (Soula 2011, Moore et al. 2017, Ferreira et al. 2017 and present study)
Pelidnota liturella liturella (Kirby, 1818)	Argentina (Misiones) (Soula 2006, Moore et al. 2017), Brazil (Bahia, Goiás, Espírito Santo, Minas Gerais, Rio de Janeiro, Paraná, Santa Catarina, Rio Grande do Sul) (Burmeister 1844, 1855, Blanchard 1851, Ohaus 1908, 1918, 1929, 1934, Machatschke 1972, Soula 2006, Krajcik 2008, Moore et al. 2017 and present study)
Pelidnota ludovici Ohaus, 1905	Brazil (Bahia, Espírito Santo) (Machatschke 1972, Soula 2009, Moore et al. 2017 and present study).

Table 1. Continued...

SPECIES/SUBSPECIES	DISTRIBUTION
Pelidnota pallidipennis F. Bates, 1904	Brazil (Pernambuco, Bahia, Goiás, Minas Gerais, São Paulo, Mato Grosso) (Bates 1904, Ohaus 1918, 1934, Guimarães 1944, Blackwelder 1944, Machatschke 1972, Krajcik 2008, Soula 2009, Moore et al. 2017)
Pelidnota rugulosa rugulosa Burmeister, 1844	Brazil (Bahia, Rio de Janeiro, São Paulo) (Burmeister 1844, 1855, Blanchard 1851, Ohaus 1918, 1934, Blackwelder 1944, Machatschke 1972, Soula 2006, Krajcik 2008, Moore et al. 2017, Ferreira et al. 2017 and present study)
Pelidnota semiaurata semiaurata Burmeister, 1844	Brazil (Bahia, Rio de Janeiro (INPA), Rio Grande do Sol, Santa Catarina (Ohaus 1918, 1934, Machatschke 1972, Krajcik 2008, Soula 2009, Moore et al. 2017, Ferreira et al. 2017 and present study)
Pelidnota sericeicollis (Frey, 1976)	Brazil (Bahia (Encruzilhada)) (Frey 1976, Soula 2006, Krajcik 2008, Moore et al. 2017 and present study)
Pelidnota sikorskii (Soula, 2006)	Brazil (Bahia (Povoado de Cachimbo)) (Soula 2006, Moore et al. 2017 and present study)
Pelidnota sordida (Germar, 1824)	Argentina (Ohaus 1918, 1934, Blackwelder 1944, Machatschke 1972, Moore et al. 2017), Brazil (Bahia, Goiás, Minas Gerais, Rio de Janeiro, São Paulo, Paraná) (Burmeister 1844, 1855, Ohaus 1908, 1918a, 1934b, Guimarães 1944, Blackwelder 1944, Machatschke 1972, Krajcik 2008, Soula 2009, Moore et al. 2017 and present study), Paraguay (Ohaus 1918, 1934, Blackwelder 1944, Machatschke 1972, Moore et al. 2017)
Pelidnota sumptuosa (Vigors, 1825)	Brazil (Pará, Bahia, Goiás, Minas Gerais, São Paulo, Mato Grosso) (Vigors 1825, Burmeister 1844, 1855, Blanchard 1851, Ohaus 1918, 1934, Blackwelder 1944, Machatschke 1972, Krajcik 2008, Soula 2009), Colombia (Caquetá, Meta) (Restrepo-Giraldo et al. 2003, Soula 2009, Pardo-Locarno et al. 2011), Paraguay (Soula 2009, Moore et al. 2017)
Pelidnota unicolor unicolor (Drury, 1778)	Brazil (Pernambuco, Bahia (new occurrence register), Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Santa Catarina) (Herbst 1790, Laporte 1840, Burmeister 1844, Blanchard 1851, Harold 1869, Ohaus 1908, 1913, 1918, 1934, Guimarães 1944, Machatschke 1972, Krajcik 2008, Soula 2009, Moore et al. 2017), Peru (Ratcliffe et al. 2015, Moore et al. 2017)
Pelidnota xanthospila (Germar, 1824)	Brazil (Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo, Santa Catarina) (Laporte 1840, Burmeister 1844, Blanchard 1851, Ohaus, 1918, 1934, Machatschke 1972, Soula 2006, Krajcik 2008, Moore et al. 2017 and present study)
Pelidnota sp. nov.	Brazil (Bahia)
Rutelina MacLeay, 1819	
Cnemida Kirby, 1827	
Cnemida lacerata (Germar, 1824)	Brazil (Bahia, Distrito Federal (Brasília), Espirito Santo (Santa Leopoldina, Parati - Rolândia), Rio de Janeiro (Corcovado), Santa Catarina (Nova Teutônia - 271 l', 52023', Corupá, Joinville, Blumenau)) (Machatschke 1972, Jameson 1996)
Cnemida retusa (Fabricius, 1801)	Brazil (Bahia (Lençóis, Mucuri), Amapá (Porto Santana, Serro do Navio), Acre (Rio Humaits), Amazonas (Tefé, Manaus, Manacapurú, BR 319 km 275, Rio Javari, São Paulo do Olivença, Rio Tonantins, Rio Juruá, Fonte Boa), Espírito Santo (Linhares, Linhares, (P.N. Sooretama), Santa Leopoldina), Goiás (Jataí, Rio Verde, Trindade), Mato Grosso (Chapada dos Guimarães, Gleba Arinos, Reserva Humboldt (10°11'S–59°48'W)); Mato Grosso do Sul (Corumbá, Urucum), Minas Gerais, Pará, (Obidos, Obidos (Canta Galo), Colônia Rio Branco, Mocajuba, Est. Cruz Alta (Rio Trombetas), Santarém, Itaituba, Ilha de Marajó, Cameta, Mosquiero (Rio de Pará)), Amazonas (Faro); Rio de Janeiro (Jurujuba, Corcovado), Rondônia (Porto Velho (Rio Madeira), Ouro Preto do Oeste)), Bolivia (Beni, Villa Bella, Chuquisaca, El Palmar, Cochabamba, Rio Chapare), Colombia, Equador (Imbabura Pastaza, Rio Cururay), French Guiana (Cayenne, Cayenne, Roches de Kourou, Gourdonville, Charvein, Passoura (stream)), Guyana (West Berbice, Blairmont, Mazaruni-Potaro, Kartabu), Peru (Cuzco, Rio Vilcanota, Junin, 3–7 km SSW San Martin de Pangoa, Loreto, Ucayali R. Yarina Cocha, Rio Napo, Iquitos, Pucallpa (5 mi radius), Chambireyaci nr. Yurimaguas, Yurimaguas, San Martin, Mayobambo, Tarapoto), Suryname (Para, Dist. 13 Zanderij Area), Venezuela (Bolivar, Rio Caura, Distrito Federal, Caracas) (Jameson 1996 and present study)
Rutela Latreille, 1802	
Rutela histrio Sahlberg, 1823	Bolivia (Beni, Santa Cruz), Brazil (Amazonas, Bahia (Povoado de Cachimbo), Espírito Santo, Pará, Minas Gerais, Rio de Janeiro)), Colombia (Caqueta, Huila, Putumay), Equador (Loja, Morona-Santiago, Napo, Pastaza, Zamora, Chinchipe), French Guiana (Cayenne, Saint Laurent Du Moroni), Guyana (Mazaruni-Potaro), Paraguay, Peru (Amazonas, Junin, Hunaco, Lima, Loreto, Madre de Dios, Martin), Suryname, Venezuela (Bolivar, Monagas) (Jameson 1997 and present study)
ANATISTINI Lacordaire, 1856	
Spodochlamys Burmeister, 1855	
Spodochlamys caesarea Burmeister, 1855	Brazil (Bahia, Pará and São Paulo), French Guiana (Cayenne) and Trinidad (Machatschke 1972, Jameson & Ratcliffe 2011, Ohaus 1918a and present study)
GENIATINI MacLeay, 1819	
Bolax Fisher von Waldheim, 1829	
Bolax audiberti Soula, 2011	Brazil (Bahia) (Soula 2011)
Bolax flavolineata (Mannerheim, 1829)	Brazil (Bahia (new occurrence register), Minas Gerais, Rio de Janeiro, São Paulo) (Jameson & Hawkins 2005)
Bolax sulcicollis (Germar, 1824)	Brazil (Bahia, Espírito Santo) (Machatschke 1972, Jameson & Hawkins 2005, Soula 2011)
Bolax sulcipennis Ohaus, 1928	Brazil (Bahia) (Machatschke 1972, Jameson & Hawkins 2005, Soula 2011)

Table 1. Continued...

SPECIES/SUBSPECIES	DISTRIBUTION
Geniates Kirby, 1819	
Geniates immaculatus Camerano, 1878	Brazil (Jameson & Hawkins 2005 and present study)
Geniates verticalis Burmeister, 1844	Brazil (Jameson & Hawkins 2005 and present study)
Leucothyreus MacLeay, 1819	
Leucothyreus acanthurus Ohaus, 1917	Brazil (Bahia (new occurrence register) and Espírito Santo) (Jameson & Hawkins 2005)
Leucothyreus albopilosus Ohaus, 1917	Brazil (Acre, Bahia (new occurrence register), Espírito Santo, Mato Grosso, Rio de Janeiro, São Paulo) (Jameson & Hawkins 2005)
Leucothyreus campestris Burmeister, 1855	Brazil (Bahia (new occurrence register), Minas Gerais) (Jameson & Hawkins 2005)
Leucothyreus cayapo Ohaus, 1931	Brazil (Bahia (new occurrence register), Goiás) (Jameson & Hawkins 2005)
Leucothyreus duplopunctatus Frey, 1976	Brazil (Bahia (new occurrence register), Mato Grosso) (Jameson & Hawkins 2005)
Leucothyreus eligius Ohaus, 1918	Brazil (Bahia (new occurrence register), Minas Gerais, Rio de Janeiro, São Paulo) (Jameson & Hawkins 2005)
Leucothyreus flavipes (Eschscholtz, 1822)	Brazil, Paraguay, Uruguay (Jameson & Hawkins 2005 and present study)
Leucothyreus fluminensis Ohaus, 1918	Brazil (Bahia (new occurrence register) and Rio de Janeiro) (Machatschke 1972, Jameson & Hawkins 2005)
Leucothyreus garbei Ohaus, 1931	Brazil (Bahia) (Machatschke 1972, Jameson & Hawkins 2005 and present study)
Leucothyreus iridipennis Ohaus, 1917	Brazil (Bahia (new occurrence register), Espírito Santo, Santa Catarina) (Jameson & Hawkins 2005)
Leucothyreus kulzeri Frey, 1976	Brazil (Bahia) (Jameson & Hawkins 2005)
Leucothyreus lucipetens Ohaus, 1931	Brazil (Bahia (new occurrence register), Rio de Janeiro) (Jameson & Hawkins 2005)
Leucothyreus occipitalis Ohaus, 1931	Brazil (Bahia (new occurrence register), Rio de Janeiro) (Jameson & Hawkins 2005)
Leucothyreus opacus (Perty, 1832)	Brazil (Jameson & Hawkins 2005 and present study)
Leucothyreus pallefactus Ohaus, 1924	Brazil (Bahia (new occurrence register), Santa Catarina) (Jameson & Hawkins 2005)
Leucothyreus pallidus Ohaus, 1918	Brazil (Bahia) (Jameson & Hawkins 2005)
Leucothyreus paulista Ohaus, 1917	Brazil (Bahia (new occurrence register), São Paulo) (Jameson & Hawkins 2005)
Leucothyreus punctulatus Blanchard, 1851	Brazil (Bahia (new occurrence register), Rio de Janeiro) (Jameson & Hawkins 2005)
Leucothyreus severinus Ohaus, 1918	Brazil (Bahia) (Jameson & Hawkins 2005)
Leucothyreus similis Frey, 1976	Brazil (Bahia) (Jameson & Hawkins 2005 and present study)
Leucothyreus spinifer Ohaus, 1918	Argentina (Salta), Brazil (Bahia, Minas Gerais, Rio de Janeiro), Paraguay (San Pedro) (Jameson & Hawkins 2005 and present study)
Leucothyreus subcupreus Blanchard, 1851	Brazil (Bahia) (Jameson & Hawkins 2005)
Leucothyreus suturalis Laporte, 1840	Brazil (Bahia (new occurrence register), Espírito Santo, Santa Catarina) (Jameson & Hawkins 2005)
Leucothyreus trochantericus Ohaus, 1917	Brazil (Bahia (new occurrence register), Rio de Janeiro) (Jameson & Hawkins 2005)
Leucothyreus verticalis Ohaus, 1924	Brazil (Bahia (new occurrence register), Espírito Santo) (Jameson & Hawkins 2005)
Leucothyreus sp. 1	Brazil (Bahia (Vitória da Conquista))
Leucothyreus sp. 2	Brazil (Bahia (Mucugê))
Leucothyreus sp. 3	Brazil (Bahia (Santa Terezinha))
Leucothyreus sp. 4	Brazil (Bahia (Maracás))
Leucothyreus sp. 5	Brazil (Bahia (Mucugê, Santa Terezinha, Salvador, Sauípe, Senhor do Bonfim))
Leucothyreus sp. 6	Brazil (Bahia (Mucugê, Lençóis, Palmeiras))
Leucothyreus sp. 7	Brazil (Bahia (Paulo Afonso))
Leucothyreus sp. 8	Brazil (Bahia (Feira de Santana, Maracás, Morro do Chapéu, Mucugê, Paulo Afonso, Santa Terezinha, Sauípe, Vitória da Conquista))
Leucothyreus sp. 9	Brazil (Bahia (Igrapiúna, Ituberá, Santa Terezinha, Porto Seguro))
Leucothyreus sp. 10	Brazil (Bahia (Maracás))
Lobogeniates Ohaus, 1917	
Lobogeniates alvinus Ohaus, 1931	Brazil (Bahia) (Machatschke 1972, Jameson & Hawkins 2005 and present study)
Lobogeniates nigricans Ohaus, 1917	Brazil (Bahia (Povoado Cachimbo)) (Jameson & Hawkins 2005)
Lobogeniates sp. 1	Brazil (Bahia (Santa Terezinha))
Lobogeniates sp. 2	Brazil (Bahia (Santa Terezinha))
Lobogeniates sp. 3	Brazil (Bahia (Ituberá))
Lobogeniates sp. 4	Brazil (Bahia (Ituberá))
Trizogeniates Ohaus 1917 (new occurrence register)	
Trizogeniates planipennis Ohaus, 1917	Brazil (Bahia (new occurrence register), Espírito Santo, Minas Gerais, Rio Grande do Sul, Rio de Janeiro, Santa Catarina, São Paulo), Peru (Jameson & Hawkins 2005)

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1912, *Dorysthetus espiritosantensis* Ohaus, 1905, *D. fulgidus* (Waterhouse, 1881), *Leucothyreus acanthurus* Ohaus, 1917, *L. albopilosus* Ohaus, 1917, *L. campestris* Burmeister, 1855, *L. cayapo* Ohaus, 1931, *L. duplopunctatus* Frey, 1976, *L. eligius* Ohaus, 1918, *L. fluminensis* Ohaus, 1918, *L. iridipennis* Ohaus, 1917, *L. lucipetens* Ohaus, 1931, *L. occipitalis* Ohaus, 1931, *L. pallefactus* Ohaus, 1924, *L. paulista* Ohaus, 1917, *L. punctulatus* Blanchard, 1851, *L. suturalis* Laporte, 1840, *L. trochantericus* Ohaus, 1917, *L. verticalis* Ohaus, 1924, *Macraspis cincta* (Drury, 1872), *Paranomala tricostulata* (Ohaus, 1897), *P. violacea* (Burmeister, 1844), *Pseudodorysthetus calcaratus* (Spinola, 1835), and *Trizogeniates planipennis* Ohaus, 1917. The subspecies *Pelidnota unicolor unicolor* (Drury, 1778) was also a new record for Bahia state (Table 1). Gathering this information with the already existing, makes a total of 101 species, and 17 subspecies in 4 tribes and 23 genera (Table 1) only for Bahia. Rutelini presented the greatest richness, with 16 genera, 49 species and 16 subspecies. Geniatini is the second tribe in richness with 5 genera and 46 species (Table 1). Anomalini and Anatistini presented only 1 genera each – *Paranomala* Casey, 1915, with 5 species and 2 subspecies and *Spodochlamys* Burmeister, 1855, with only one species (Table 1).

The richest genera were *Leucothyreus* (Geniatini), with 25 species, and *Pelidnota* (Rutelini) with 19 species and 9 subspecies (Figure 2). *Leucothyreus*, with 164 species described (Jameson & Hawkins 2005), and *Pelidnota*, with 136 species and 60 valid subspecies (Moore et al. 2017, Ferreira et al. 2017), are the richest genera within Rutelinae.

There were recorded Ruteliane species in fifty-seven, taking into account the literature and the examined material, out of a total of 417 Bahian municipalities. Rutelini were found to occur in 41 localities, and Geniatini in 37 (Figure 1), which represents only 13.67% of the total amount of municipalities. Anomalini was recorded in only eight localities in the state and Anatistini only in the municipality of Cachoeira (Figure 1). Rutelini and Geniatini were recorded in all the Biomes, however Rutelini presented a concentration of records in areas of Atlantic Rain Forest near the coast. Geniatini had similar numbers of records in the Caatinga and in the Atlantic Forest (Figure 1). These findings could be attributed to the natural history of these tribes which immatures of Rutelini species occurs in dead wood

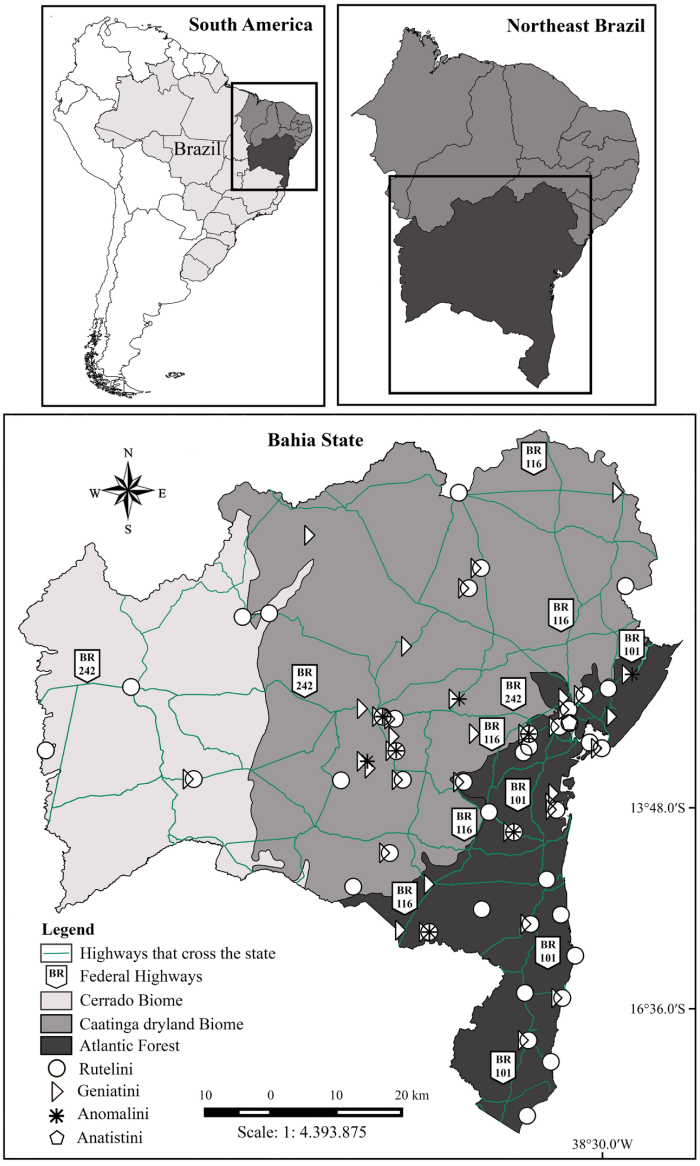

Figure 1. Location of the study area and geographic distribution records Rutelinae in the Bahia state.

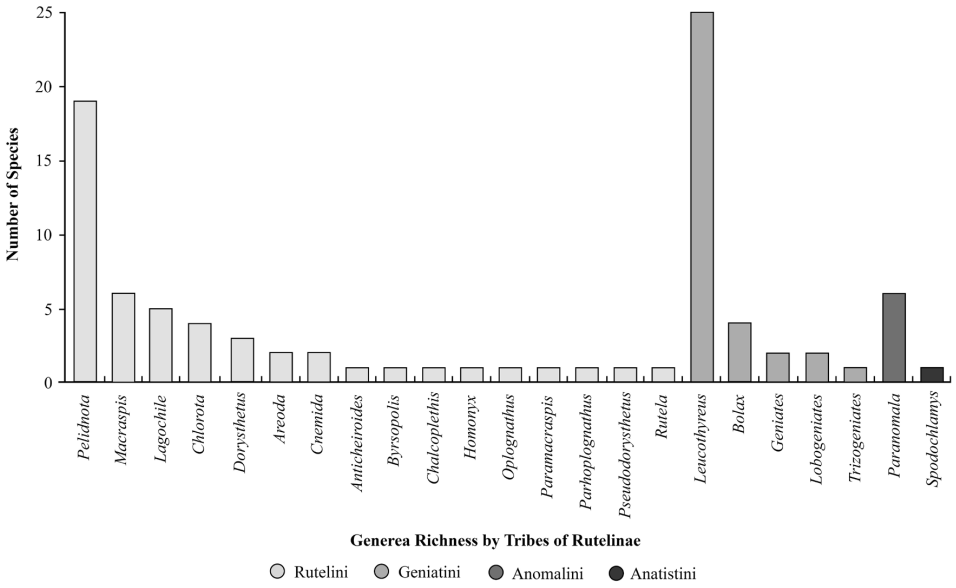

Figure 2. Species richness of Rutelinae from Bahia state, gathering the literature data with the results presented in this study.

(Albertoni et al. 2014), while Geniatini species develop mainly in the ground (Furhmann 2013).

The distribution of the Rutelinae species in Bahia has had, in part, direct correlation with the collection trips of the Projeto de Pesquisa em Biodiversidade do Semiárido (PPBio/Ministério da Ciência, Tecnologia, Inovações e Comunicações, MCTIC) since 2005. The ruteline specimens of PPBio Semiarido were deposited in the MZFS and these represent 72.8% (1,064 specimens) of all specimens examined in this study, with 68 species and 5 subspecies. However, although the PPBio has contributed significantly to expand the records of the Rutelinae from Bahia, there are still significant gaps to be explored in the state. The west, southwest and north regions of Bahia present the largest gaps (Figure 1). Certainly, there are many species to be discovered in these regions of the state, which demonstrates the need of a greater collection effort in the regions mentioned above (Oliveira et al. 2016). In addition to the mentioned issues, many of the subfamily distribution records in the state are located in areas near the highways that cross Bahia (Figure 1). Oliveira et al. (2016) report that species composition decreases as distance from access routes increases, and they suggest that collection localities distant from access routes could increase the possibility of new geographic records as well as records of new species. Most of the records for the south region of Bahia, in Belmonte, Barrolândia, Camacan, Itamaraju, Mucuri, Porto Seguro, Prado and Una, and two localities in the southern region: Encruzilhada and Cândido Sales, are the result of material deposited at MNRJ, CERPE and EPGC (Suplementary Material). Similarly, the collection points located in the north of the state are also from material deposited in MNRJ (examined material). The records for the southern region, Aracatu and Vitória da Conquista (examined material), are deposited in the MFS and were collected by the author.

Among the biomes present in Bahia, the Atlantic Forest has the highest representativity of Rutelinae records, with 32 localities of occurrence: Caatinga with 20 (with the largest collects gap in the southwest, and especially in the north of the state (Figure 1)) and the Cerrado, with only 5 points of records, representing the largest collects gap of all biomes (Figure 1). Atlantic Forest originally accounted for 1,300,000 km^2 throughout 17 Brazilian states, with 120 million people living in this biome. However, only 22% of the original cover remains, and only 8.5% is in well preserved protection areas, on fragments of over 100 hectares (MMA 2017). Caatinga covers 844,453 km^2, representing 11% of the national territory, and is present in nine states of Northeastern Brazil and in the north of Minas Gerais state (MMA 2017). The Caatinga and the Cerrado has been deforested in an accelerated way, especially in the last years, and 46% of the Caatinga total original cover has been deforested (Flores et al. 2012, MMA 2017). Cerrado has been historically transformed in extensive crop plantations in Brazil, causing an increasing reduction of the vegetal cover due to the progressive increase in agricultural economic activity in areas in its domain (Flores et al. 2012). This reduction in vegetal cover has, in turn, generated direct consequences for biodiversity loss (Queiroz 2009, MMA 2017). However, only 7.6% of the total area of the Caatinga is in the protection area, and only 1% of this area is designated as Units of Integral Protection (MMA 2017). In addition, approximately 30% of the Caatinga has already been altered due to human action, and especially due to agriculture. In view of these factors, there is a risk of the rapid loss of unique species in this biome (Araújo et al. 2005), many of which are yet unknown to science. The Cerrado biome presents the largest collects gap of Rutelinae in Bahia state. Cerrado covers 2,036,448 km^2 (representing 22% of the national territory), and is present in 12 Brazilian states. It is considered a hotspot of world biodiversity, with an extreme abundance of endemic species (MMA 2017). However, the Cerrado is the biome with the lowest percentage of areas of integral protection. Only 8.21% of the total territory is legally protected by Units of Conservation; of this total, 2.85% are Units of Conservation of Integral Protection and 5.36% are Units of Conservation of Sustainable Use, including Particular Reserve of Natural Heritage – RPPNs (0.07%) (MMA 2017). The findings presented above demonstrate the need to make more collects in the state, especially in Cerrado in the west region of the state, to enable a better understanding of the distribution, expanding the knowledge of the group.

With the results presented here there was an expressive increase, both in the richness of genera and species. After this study the number of genera increased to 23, with the new records of *Byrsopolis* Burmeister,

Pseudodorysthetus Soula and *Trizogeniates* Ohaus; new distributional records of 30 species and 1 subspecies from Bahia state, and with 14 species, that will be described in subsequent papers, 10 of *Leucothyreus* (according to the consultation with a researcher, Seidel M., who is conducting the review of the genus), 2 of *Lobogeniates* (a genus in process of review by ASF) and 1 of *Byrsopolis* and *Pelidnota*. With respect to the number of registered species of Rutelinae in Bahia, was increased in more than a half, reaching 101 species and 17 subspecies.

This increase in the number of registered Rutelinae species demonstrates the importance of conducting inventories for group knowledge. In addition, the distribution of the Rutelinae locality records in the Bahia state in only 57 registered municipalities, which is equivalent to 13.67% of the total municipalities in the state, plus the gaps seen in the most richest and poorly known biomes, emphasizes the imminent need for new studies involving the Rutelinae for a better knowledge of fauna, not only in the biomes of this state, but in Brazil as a whole.

Supplementary material

The following online material is available for this article:
Supplementary material

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Authors Contributions

André da Silva Ferreira: Contribution to data collection, contribution to data analysis and interpretation, contribution to manuscript preparation and contribution to critical revision, adding intellectual content.

Lúcia M. Almeida and Freddy Bravo: Contribution to critical revision, adding intellectual content.

Paschoal Coelho Grossi: Contribution to data collection, critical revision, adding intellectual content.

Conflicts of interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

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