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Arthropoda Compilation Data

Hexapoda Yearbook (Arthropoda: Mandibulata: Pancrustacea) Brazil 2020: the first annual production survey of new Brazilian species

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Abstract. This paper provided a list of all new Brazilian Hexapoda species described in 2020. Furthermore, based on the information extracted by this list, we tackled additional questions regarding the taxa, the specialists involved in the species descriptions as well as the journals in which those papers have been published. We recorded a total of 680 new Brazilian species of Hexapoda described in 2020, classified in 245 genera, 112 families and 18 orders. These 680 species were published in a total of 219 articles comprising 423 different authors residing in 27 countries. Only 30% of these authors are women, which demonstrates an inequality regarding sexes. In relation to the number of authors by species, the majority of the new species had two authors and the maximum of authors by species was five. We also found inequalities in the production of described species regarding the regions of Brazil, with Southeast and South leading. The top 10 institutions regarding productions of new species have four in the Southeast, two at South and with one ate North Region being the outlier of this pattern. Out of the total 219 published articles, Zootaxa dominated with 322 described species in 95 articles. The average impact factor was of 1.4 with only seven articles being published in Impact Factors above 3, indicating a hardship on publishing taxonomic articles in high-impact journals. The highlight of this paper is that it is unprecedent, as no annual record of Hexapoda species described was ever made in previous years to Brazil.

Keywords: Biodiversity; insects; neotropics; taxonomist; taxonomy.

The class Hexapoda, included in Pancrustacea clade (=Tetraconata) and subphylum Mandibulata is generally known as insects. It was traditionally subdivided into Entognatha (Diplura, Collembola, and Protura), which are arthropods with mouthparts retracted within the head, and Ectognatha (Insecta), which are true insects with exposed mouthparts. Despite being traditionally recognized as insects by the general public, the Entognatha is a distinct group of arthropods separated from true insects. This traditional subdivision of the Hexapoda is not supported by phylogenomic analyses, which indicates the paraphyly of 'Entognatha', with collembolans and proturans forming a clade and proturans being the sister group of Insecta (Ectognatha) forming another (Giribet & Edgecombe 2019, 2020).

Currently, there are around 1,000,000 Hexapoda species formally named and described Rafael *et al*. (2012). While more conservative estimations indicate that there are around four million insect species yet to be described (Stork *et al*. 2015), bolder estimations suggest about 29 million unknown insect species (Erwin 1982). Considering the numbers above, it is clear that the Hexapoda diversity overcomes the diversity of all other remaining known organisms (Brusca *et al*. 2018).

In the scenario created between what is known and what is unknown in terms of insect diversity, Brazil rises as one of the world's main characters with around 89.317 insect species described into its territory, representing up to 9% of the global insect diversity (Boeger *et al.* 2022). Brazil has a total of 8.5 million km² territorial range, with most of it included in the tropical region and part in the subtropical. This vast territory houses a complex mosaic of ecosystems, with unique biomes in the world (such as Caatinga and Atlantic Rainforest). Therefore, it is not surprising that Brazil also houses the largest insect diversity on Earth, with experts conservatively estimating the existence of at least 400.070 insect species within the Brazilian territory. In other words, this means that we currently know less than 30% of the real hexapod diversity (Rafael *et al*. 2012).

Rafael *et al*. (2009) and Aguiar *et al*. (2009) estimated that Brazil might have around 500.000 insect species and that the annual mean number of new described species per Brazilian entomologist was close to three species/year (or about 100 species throughout their productive lives). Back then, Rafael *et al*. (2009) considered a total of 140 Brazilian specialists in Insecta. Based on the estimations above, it would take approximately a thousand years for these 140 authors to formally describe the 500.000 unknown insect species. The number of authors back then in Brazil from Rafael *et al*. (2009) were acquired at Marques & Lamas (2006), which listed 115 specialists binded to research institutions and 24 specialist doctors without any binding. Furthermore, the authors pointed out that 13 Hexapoda orders lacked specialists in Brazil at that time.

At present time, there are no updates of the data provided more than 10 years ago by Marques & Lamas (2006), Aguiar *et al*. (2009) and Rafael *et al*. (2009), both to know how many species are being published per year or how many Hexapoda specialists are currently working in Brazil. If we consider that the abovementioned 140 specialists are still working and the annual mean of three species, then it is possible to estimate that around 420 species are being described to Brazil every year. However, every year entomologists from outside Brazil publish new Brazilian species with or without the collaboration of authors living in Brazil, as shown by our results. Hence, inferring the annual number of described insect species in Brazil based solely on Aguiar *et al*. (2009) may significantly differ from what the authors proposed.

Based on the fact that the first step for proper conservation is to know the species to then conserve them, thus it is fundamental to describe and map the biodiversity (Margules & Pressey 2000). In this context, it is clear that Brazil has a key role in the matter of conservation, as a megadiverse country. Thus, as abovementioned, the need for more precise numbers and estimations is urgent, to assess how well and how fast we are advancing on the task of uncovering unknown species. This updated data is crucial, as it influences public policies on the resources to be invested in training new specialists, as to how much is needed for supporting specialists already established. Through more precise numbers, it will be possible to properly infer how long we still need to accomplish the humongous mission of cataloging the Hexapoda fauna of Brazil.

Taking everything exposed into account, this paper aimed to count and list all the new species of Brazilian Hexapoda published during the year of 2020. Furthermore, addicional data found during the production of the list and are also discussed, such as: who are the specialists that are describing the Brazilian Hexapoda diversity; if there was any inequality in terms of production when different areas of Brazil are considered; what was the percentage of authors residing in and outside Brazil? How was the international cooperation on the species authorship? What was the role of women in this species list? Is there inequality in the establishment of authorship of species between Brazilian regions and Brazilian states? Which institutions most contributed to the description of new taxa; what journals and their impact factor these new species are being published in? Based only on 2020 production, how long will it take to reach a level of knowledge closer to the real Brazilian diversity of Hexapoda as a whole and individually to each order?

The highlight of this paper is its originality, as this kind of production tracking what has never been done before to the Brazilian Hexapoda. This is the first Hexapoda yearbook of new species of Brazil, but certainly not the last, as the authors of this paper intend to keep a regular annual sampling of new species published in Brazil.

MATERIAL AND METHODS

The initial Search tool forgive the new species sampling was the Taxonomic Catalog of the Brazilian Fauna (TCBF) (Boeger *et al*. 2022). This online catalog results from the effort of over

500 Zoology researchers based on different areas of Brazil, dealing with the many areas of Zoology and has been online since 2015. Aside the TCBF, another thirteen catalogs were used for different Hexapoda orders: Alonso-Zarazaga *et al* (2020) (Coleoptera: Curculionoidea), AntWeb (2021) (Hymenoptera: Formicidae), Bezark (2021) (Coleoptera: Cerambycidae), Cigliano *et al*. (2021) (Orthoptera), Dellapé & Henry (2021) (Hemiptera: Lygaeoidea), Evenhuis & Pape (2021) (Diptera), Monné (2021a, 2021b) (Coleoptera: Cerambycidae), Paulson *et al*. (2021) (Odonata), PCAT (2021) (Diptera: Phoridae), Pulawski (2021) (Hymenoptera: Sphecidae) and Tavakilian & Chevillotte (2021) (Coleoptera: Cerambycidae).

Complementary searches for new published species were also carried out within the following indexers: Google Scholar, Web of Science, Scopus, ZooBank and Zoological Records. Searches used keywords to each taxonomic group plus "new species", "Brazil" and "2020". Further investigations were made at two indexers of curriculum, one international called ResearchGate (https://www.researchgate.net/) and a Brazilian one called Lattes Platform (https://lattes.cnpq.br/). Final searches were made at the main taxonomic journals that publish Hexapoda new species.

Information on the filiation and sex from of the authors were acquired directly from the paper in which the new species was published. Sex of authors: considering their first name and when there was a doubt we searched for their CV and photos. All author analyzes were restricted to its corresponding species authorship. In many cases, the species author does not reflect the paper authorship, which was not considered for the analyzes.

The sampling was restricted to the Brazilian new species of Hexapoda. New records of species to Brazil or species that acquired authorship and 2020 date due to secondary homonym issues were not included in this paper. All graphs were performed in R (R Development Core Team 2020). In this list, the names of orders, families, genera, and species are presented in alphabetical order.

The orders Blattodea, which includes the former "Blattaria" and "Isoptera", as well as Psocodea, which includes the old "Phthiraptera" and "Psocoptera", had the older name of the order in quotation marks following the current name (e.g., Blattodea "Isoptera") (Yoshizawa & Lienhard 2010; Evangelista *et al.* 2019; Giribet & Edgecombe 2019). We decided to indicate the former name as a didactic resource and we are aware that these orders (Isoptera, Blattaria, Phthiraptera e Psocoptera) are considered to be artificial groups.

RESULTS AND DISCUSSION

A total of 680 new Brazilian species of Hexapoda were described in 2020, which are distributed among 245 genera, 112 families and 18 orders. These new species were published in a total of 219 papers (Alencar & Azevedo 2020; Almeida *et al.* 2020a, 2020b; Alvarado 2020; Alves *et al.* 2020; Ament *et al.* 2020; Amorim *et al.* 2020; Antunes & Takiya 2020; Araujo & Bravo 2020; Ávila Júnior *et al*. 2020; Baker & Haraty 2020; Barbosa *et al.* 2020; Barbut 2020; Barros *et al.* 2020a, 2020b; Bravo *et al.* 2020; Becker 2020a, 2020b, 2020c; Bellini *et al.* 2020a, 2020b; Benetti *et al.* 2020a, 2020b; Bevilaqua & Fonseca 2020; Biffi 2020, Biffi & Geiser 2020; Braga & Ferreira-Jr 2020; Brown *et al.* 2020; Burckhardt & Queiroz 2020; Busanello *et al*. 2020; Camacho *et al.* 2020; Camargo *et al*. 2020; Camargos *et al.* 2020; Campaner & Will 2020; Campos *et al.* 2020; Caron *et al.* 2020; Carvalho *et al.* 2020; Casadei-Ferreira *et al.* 2020; Castro *et al.* 2020; Castro-Huertas *et al.* 2020; Castro-Souza *et al.* 2020a, 2020b; Caterino & Tishechkin 2020; Cegolin *et al.* 2020; Chaul 2020; Cipola *et al.* 2020; Clarkson *et al.* 2020; Constantini *et al.* 2020; Costa *et al.* 2020; Curletti 2020; Dantas *et al*. 2020; Darby 2020; Desidério *et al.* 2020a, 2020b; De-Souza *et al.* 2020a; 2020b; Dias *et al.* 2020; Dios & Nihei 2020; Disney *et al.* 2020; Domahovski 2020; Domahovski & Cavichioli 2020; Domahovski *et al.* 2020; Duarte & Grossi 2020a, 2020b; Fachin *et al.* 2020; Ferrerira *et al.* 2020; Ferreira & Silveira 2020; Ferro & Marshall 2020; Fianco *et al.* 2020a, 2020b; Fogaça *et al.* 2020a, 2020b; Freitas *et al.* 2020; Gadella *et al.* 2020; Gama-Neto & Passos 2020; Gama-Neto *et al.* 2020; Garcia-Aldrete & Silva-Neto 2020; Garcia *et al.* 2020a, 2020b; Gil-Santana *et al.* 2020; Gonzales *et al.* 2020; Grey & Smith 2020; Gualdrón-Diaz & Gorayeb 2020; Guidoti *et al.* 2020; Haxaire & Mielke 2020; Heleodoro & Rafael 2020; Heller *et al.* 2020; Henriques-Oliveira *et al.* 2020; Heraty & Baker 2020; Higa & Penteado-Dias 2020; Hugo *et al.* 2020; Jouault *et al.* 2020; Junta *et al.* 2020; Krein *et al.* 2020; Kuwahara & Marshall 2020; Ladino & Feitosa 2020; Lemes *et al.* 2020a, 2020b; Lepeco & Gonçalves 2020a, 2020b; Lima *et al.* 2020a; 2020b; Limeira-de-Oliveira *et al.* 2020a, 2020b; Machado *et al.* 2021; Marcineiro & Lattke 2020; Marek 2020a, 2020b; Marigo *et al.* 2020; Marshall 2020; Martins *et al.* 2020; Medeiros & Vanin 2020; Medeiros & Grossi 2020; Medeiros *et al.* 2020; Mendes & Rafael 2020; Mendes *et al.* 2020; Menezes *et al.* 2020a; 2020b; Mielke *et al.* 2020a, 2020b; Migliore *et al.* 2020a, 2020b; Moctezuma *et al.* 2020; Monné *et al.* 2020; Moreno *et al.* 2020; Muzón & Lozano 2020; Nakahara *et al*. 2020; Nascimento *et al*. 2020a; 2020b; 2020c; Nogueira *et al.* 2020; Nunes & Vaz-de-Mello 2020; Nunes *et al.* 2020; Oliveira & Penteado-Dias 2020; Oliveira *et al.* 2020a, 2020b; 2020c; Opitz 2020a, 2020b; Pacheco & Vaz-de-Mello 2020; Pádua & Kloss 2020; Pádua *et al.* 2020; Paiero & Marshall 2020; Palacio *et al.* 2020; Parizotto & Melo 2020; Pecci-Maddalena & Lopes-Andrade 2020; Pellegrini *et al.* 2020; Pereira-Silva *et al.* 2020; Perioto *et al*. 2020; Perkins & Ribera 2020; Petrov & Flechtmann 2020; Pinto & Silva 2020; Pinto & Araujo 2020; Policena *et al.* 2020; Polizei *et al.* 2020a, 2020b; Prandi *et al.* 2020; Proença & Maia 2020; Pujol-Luz 2020; Queiroz *et al.* 2020; Quintas *et al.* 2020a, 2020b; Rech & Linzmeir 2020; Rendón-Mera *et al.* 2020; Riccardi 2020; Riccardi *et al.* 2020; Rivera *et al.* 2020; Rocha & Cancello 2020; Rodrigues *et al.* 2020; Rosa & Melo 2020; Roza & Mermudes 2020; Rossini & Vaz-de-Mello 2020; Sá *et al.* 2020; Saguiah & Tavares 2020; Salgado-Neto *et al.* 2020; Salvatierra 2020; Sanborn 2020; Santarém *et al.* 2020; Santis *et al.* 2020; Santos 2020; Santos *et al.* 2020; Santos-Junior *et al.* 2020; Santos-Silva *et al.* 2020; Saraiva *et al.* 2020; Scheffrahn & Vasconcellos 2020; Shaw *et al.* 2020; Shimabukuro *et al.* 2020; Shimbori *et al.* 2020; Short *et al.* 2020; Siewert *et al.* 2020; Silva & Lopes 2020; Silva *et al.* 2020; Skelley & Vaz-de-Mello 2020; Smith & Short 2020; Soares & Capellari 2020; Soares *et al.* 2020; Souza-Gonçalves & Lopes-Andrade 2020; Souza-Gonçalves *et al.* 2020; St Laurent & Becker 2020a; Stonis *et al.* 2020; Supeleto *et al.* 2020a, 2020b, 2020c; Tavares 2020; Thöny 2020; Urso-Guimarães *et al*. 2020; Valois *et al*. 2020; Vaz-de-Mello *et al*. 2020; Vaz *et al.* 2020a, 2020b; Vieira *et al*. 2020; Vilela *et al.* 2020; Weirauch *et al*. 2020; Wolski *et al*. 2020; Yakovlev *et al.* 2020a, 2020b; Zeppelini *et al*. 2021; Zilberman 2020; Zilberman & Fontes 2020).

List of new Brazilian Hexapoda species published in 2020

Blattodea: "Blattaria"

Blaberidae Saussure

1 - *Poeciloderrhis angelus* Silva & Lopes

2 - *Poeciloderrhis mangaratibensis* Silva & Lopes

3 - *Poeciloderrhis marombensis* Silva & Lopes

Blatodea: "Isoptera"

Kalotermitidae Froggatt

4 - *Tauritermes bandeirai* Scheffrahn & Vasconcellos

Termitidae Latreille

5 - *Amitermes bandeirai* Rocha & Cancello

6 - *Dissimulitermes invisibilis* Constantini & Cancello

7 - *Rustitermes boteroi* Constantini Castro & Scheffrahn

Coleoptera

Buprestidae Leach

8 - *Agrilus* (*Agrilus*) *bahianus* Curletti

9 - *Agrilus* (*Agrilus*) *cleidecostae* Curletti

10 - *Agrilus* (*Agrilus*) *crucifer* Curletti

11 - *Agrilus* (*Agrilus*) *luanae* Curletti

12 - *Agrilus* (*Agrilus*) *gigii* Curletti

13 - *Agrilus* (*Agrilus*) *verticis* Curletti

14 - *Brachys cleidecostae* Migliore, Casari & Paiola

15 - *Cylindromorphoides ferrugifrons* Migliore, Biffi & Curletti

16 - *Eurynodes gemmatus* Migliore, Biffi & Curletti

17 - *Eurynodes capillatus* Migliore, Biffi & Curletti

18 - *Taphroceroides brasiliensis* Migliore, Biffi & Curletti

19 - *Taphroceroides brunneus* Migliore, Biffi & Curletti

20 - *Taphrocerus anthracinus* Marek

21 - *Taphrocerus chrudimskyi* Marek

22 - *Taphrocerus conformis* Marek

23 - *Taphrocerus cuprescens* Marek

24 - *Taphrocerus davidi* Marek

25 - *Taphrocerus henryi* Marek

26 - *Taphrocerus hyacinthus* Marek

27 - *Taphrocerus likaveci* Marek

28 - *Taphrocerus obsoletus* Marek

29 - *Taphrocerus stephani* Marek

30 - *Taphrocerus svihliki* Marek

Cantharidae Thomson

31 - *Lobetus angustapicalis* Biffi

32 - *Lobetus bilobatus* Biffi

33 - *Lobetus constantini* Biffi

34 - *Peltariosilis brancuccii* Biffi & Geiser

35 - *Peltariosilis brunneoapicalis* Biffi & Geiser

36 - *Peltariosilis cleidecostae* Biffi & Geiser

37 - *Peltariosilis diversicollis* Biffi & Geiser

38 - *Peltariosilis flavicornis* Biffi & Geiser

39 - *Peltariosilis gracilicornis* Biffi & Geiser

40 - *Peltariosilis major* Biffi & Geiser

41 - *Peltariosilis orientalis* Biffi & Geiser

42 - *Peltariosilis parviscutellaris* Biffi & Geiser

Carabidae Latreille

43 - *Coarazuphium lundi* Pellegrini, Ferreira, Zampaulo & Vieira

44 - *Lobobrachus cleidecostae* Campaner & Will

Cerambycidae Latreille

45 - *Adesmus culiki* Santos-Silva, Botero, Nascimento & Santos

46 - *Iquiracetima venturai* Santos-Silva, Botero, Nascimento & Santos

47 - *Pseudobeta casariae* Nascimento, Nearns, Botero, Santos-Silva & Martins

48 - *Pseudocriopsis abare* Monné, Souza, Mello & Monné

49 - *Trichonius w-notatus* Nascimento, Nearns, Botero, antos-Silva & Martins

50 - *Xenofrea mariae* Nascimento, Nearns, Botero, Santos-Silva & Martins

51 - *Xenofrea simplicioi* Santos-Silva, Botero, Nascimento & Santos

52 - *Xylergates quinquetuberculatus* Nascimento, Nearns, Botero, Santos-Silva & Martins

Chrysomelidae Latreille

53 - *Laselva cleidae* Rech & Linzmeier

Ciidae Leach

54 - *Ceracis ascetonotum* Souza-Gonçalves & Lopes-Andrade

55 - *Hadreule mineira* Souza-Gonçalves, Lopes-Andrade & Lawrence

56 - *Hadreule vivianae* Souza-Gonçalves, Lopes-Andrade & Lawrence

Cleridae Latreille

57 - *Axina adelosa* Opitz

58 - *Axina atmis* Opitz

59 - *Axina bahia* Opitz

60 - *Axina chiasta* Opitz

61 - *Axina furcula* Opitz

62 - *Axina ignota* Opitz

63 - *Axina klisis* Opitz

64 - *Axina lobispinula* Opitz

65 - *Axina luzia* Opitz

66 - *Axina macilenta* Opitz

67 - *Axina minas* Opitz

68 - *Axina oligocheia* Opitz

69 - *Axina orcastomata* Opitz

70 - *Axina ordinis* Opitz

71 - *Axina pallidioccabus* Opitz

72 - *Axina piperata* Opitz

73 - *Axina pollex* Opitz

74 - *Axina polycaula* Opitz

75 - *Axina rio* Opitz

76 - *Axina schenklingi* Opitz

77 - *Axina spina* Opitz

78 - *Axina trinalis* Opitz

79 - *Axina villa* Opitz

80 - *Axina vista* Opitz

81 - *Enoclerus minas* Opitz

Curculionidae Latreille

82 - *Anchylorhynchus chrysomeloides* De Medeiros & Vanin

83 - *Anchylorhynchus goiano* De Medeiros & Vanin

84 - *Anchylorhynchus imitator* De Medeiros & Vanin

85 - *Anchylorhynchus latipes* De Medeiros & Vanin

86 - *Anchylorhynchus multisquamis* De Medeiros & Vanin

87 - *Anchylorhynchus rectus* De Medeiros & Vanin

88 - *Chramesus unespi* Petrov & Flechtmann

89 - *Stenocyphus costae* Del Rio & Lanteri

Dytiscidae Leach

90 - *Hydaticus aequalis* Benetti, Gustafson, Hamada & Short

91 - *Hydrodessus ducke* Benetti, Michat & Hamada

92 - *Laccodytes costae* Braga & Ferreira-Jr.

93 - *Platynectes* (*Platynectes*) *bicolor* Short, Benetti & Gustafson

Elmidae Curtis

94 - *Austrolimnius cleidecostae* Polizei, Costa & Bispo

95 - *Hexacylloepus barrae* Polizei, Barclay & Bispo

96 - *Hexacylloepus calori* Polizei, Barclay & Bispo

97 - *Hexacylloepus casariae* Polizei, Barclay & Bispo

98 - *Hexacylloepus froehlichi* Polizei, Barclay & Bispo

99 - *Hexacylloepus geiseri* Polizei, Barclay & Bispo

100 - *Hexacylloepus grandis* Polizei, Barclay & Bispo

101 - *Hexacylloepus iassu* Polizei, Barclay & Bispo

102 - *Hexacylloepus keitai* Polizei, Barclay & Bispo

103 - *Hexacylloepus maierae* Polizei, Barclay & Bispo

104 - *Hexacylloepus manauara* Polizei, Barclay & Bispo

105 - *Hexacylloepus metapa* Polizei, Barclay & Bispo

106 - *Hexacylloepus phalluspinosus* Polizei, Barclay & Bispo

107 - *Hexacylloepus shorti* Polizei, Barclay & Bispo

108 - *Hexacylloepus taylorae* Polizei, Barclay & Bispo

109 - *Hexacylloepus thoracica* Polizei, Barclay & Bispo

110 - *Hexacylloepus tibialis* Polizei, Barclay & Bispo

111 - *Hexacylloepus ubirajarai* Polizei, Barclay & Bispo

112 - *Hexacylloepus zanini* Polizei, Barclay & Bispo

113 - *Macrelmis rodrigoi* Almeida, Fernandes & Boldrini

Erotylidae Latreille

114 - *Mycomystes nigriventris* Pecci-Maddalena & Lopes-Andrade

Histeridae Gyllenhal

115 - *Phelister almeidae* Caterino & Tishechkin

116 - *Phelister annulatus* Caterino & Tishechkin

117 - *Phelister arcuatus* Caterino & Tishechkin

118 - *Phelister asperatus* Caterino & Tishechkin

119 - *Phelister blairoides* Caterino & Tishechkin

120 - *Phelister chicomendesi* Caterino & Tishechkin

121 - *Phelister curvipes* Caterino & Tishechkin

122 - *Phelister erwini* Caterino & Tishechkin

123 - *Phelister fimbriatus* Caterino & Tishechkin

124 - *Phelister fraternus* Caterino & Tishechkin

125 - *Phelister geminus* Caterino & Tishechkin

126 - *Phelister globosus* Caterino & Tishechkin

127 - *Phelister gregarius* Caterino & Tishechkin

128 - *Phelister matatlantica* Caterino & Tishechkin

129 - *Phelister microdens* Caterino & Tishechkin

130 - *Phelister miscellus* Caterino & Tishechkin

131 - *Phelister morbidus* Caterino & Tishechkin

132 - *Phelister parana* Caterino & Tishechkin

133 - *Phelister pervagatus* Caterino & Tishechkin

134 - *Phelister praesignis* Caterino & Tishechkin

135 - *Phelister rio* Caterino & Tishechkin

136 - *Phelister serratus* Caterino & Tishechkin

137 - *Phelister sphaericus* Caterino & Tishechkin

138 - *Phelister stellans* Caterino & Tishechkin

139 - *Phelister umens* Caterino & Tishechkin

140 - *Phelister vazdemelloi* Caterino & Tishechkin

141 - *Phelister vilavelha* Caterino & Tishechkin

Hydraenidae Mulsant

142 - *Adelphydraena amazonica* Perkins & Ribera

143 - *Hydraena josefinae* Benetti, Valladares, Delgado & Hamada

144 - *Hydraena pernambucana* Benetti, Valladares, Delgado & Hamada

Hydrophilidae Leach

145 - *Cercyon* (*Cercyon*) *curi* Clarkson, Mise & Almeida

146 - *Chasmogenus acuminatus* Smith & Short

147 - *Chasmogenus cajuina* Alves, Clarkson & Lima

148 - *Chasmogenus ignotus* Smith & Short

149 - *Chasmogenus pandus* Smith & Short

Jurasaidae Rosa, Costa, Klamp & Kundrata

150 - *Jurasai digitusdei* Rosa, Costa, Klamp & Kundrata

151 - *Jurasai itajubense* Rosa, Costa, Klamp & Kundrata

152 - *Tujamita plenalatum* Rosa, Costa, Klamp & Kundrata

Lampyridae Latreille

153 - *Psilocladus costae* Vaz, Silveira & Rosa

Lycidae Laporte

154 - *Currhaeus nigroapicalis* Nascimento, Bressan & Bocakova

155 - *Currhaeus paranaensis* Nascimento, Bressan & Bocakova

156 - *Currhaeus polegattoi* Nascimento, Bressan & Bocakova

157 - *Currhaeus ruschii* Nascimento, Bressan & Bocakova

158 - *Currhaeus striatus* Nascimento, Bressan & Bocakova

159 - *Xenolycus costae* Ferreira & Silveira

Melolonthidae Leach

160 - *Bothynus araya* Duarte & Grossi

161 - *Bothynus condacki* Duarte & Grossi

162 - *Chlorota cleidecostae* Medeiros & Grossi

163 - *Megasoma hyperion* Prandi, Grossi & Vaz-de-Mello

164 - *Ovomanonychus inajae* Costa, Cherman & Ianuzzi

165 - *Ovomanonychus striatus* Costa, Cherman & Ianuzzi

166 - *Podischnus cleidecostae* Duarte & Grossi

167 - *Podischnus limeirai* Duarte & Grossi

Passalidae Leach

168 - *Passalus cleidecostae* Bevilaqua & Fonseca

169 - *Passalus deuterocerus* Bevilaqua & Fonseca

Phengodidae LeConte

170 - *Cleidella picea* Roza & Mermudes

171 - *Cleidella silveirai* Roza & Mermudes

Ptiliidae Erichson

172 - *Cissidium amazonicum* Darby

173 - *Cissidium angusi* Darby

174 - *Cissidium bomjesus* Darby

175 - *Cissidium dybasi* Darby

176 - *Cissidium flavum* Darby

177 - *Cissidium ibicarense* Darby

178 - *Cissidium orami* Darby

179 - *Cissidium plaumanni* Darby

180 - *Cissidium sueae* Darby

Scarabaeidae Latreille

181 - *Aphotaenius elegans* Skelley & Vaz-de-Mello

182 - *Aphotaenius gaucho* Skelley & Vaz-de-Mello

183 - *Canthon cleidecostae* Vaz-de-Mello, Nunes & Costa-Silva

184 - *Canthon* (*Pseudepilissus*) *arriagadai* Vieria, Vaz-de-Mello & Silva

185 - *Canthon* (*Pseudepilissus*) *bonaerensis* Vieria, Vaz-de-Mello & Silva

186 - *Canthon* (*Pseudepilissus*) *vidaurrei* Vieria, Vaz-de-Mello & Silva

187 - *Canthon* (*Pseudepilissus*) *ziggy* Vieria, Vaz-de-Mello & Silva

188 - *Dichotomius* (*Cephagonus*) *asenjoi* Nunes & Vaz-de-Mello

189 - *Dichotomius* (*Cephagonus*) *baiano* Nunes & Vaz-de-Mello

190 - *Dichotomius* (*Cephagonus*) *barbarae* Nunes & Vaz-de-Mello

191 - *Dichotomius* (*Cephagonus*) *blancoi* Nunes & Vaz-de-Mello

192 - *Dichotomius* (*Cephagonus*) *candango* Nunes & Vaz-de-Mello

193 - *Dichotomius* (*Cephagonus*) *emas* Nunes & Vaz-de-Mello

194 - *Dichotomius* (*Cephagonus*) *fernandosilvai* Nunes & Vaz-de-Mello

195 - *Dichotomius* (*Cephagonus*) *filgueirasi* Nunes & Vaz-de-Mello

196 - *Dichotomius* (*Cephagonus*) *frizzasae* Nunes & Vaz-de-Mello

197 - *Dichotomius* (*Cephagonus*) *furtadoi* Nunes & Vaz-de-Mello

198 - *Dichotomius* (*Cephagonus*) *gardneri* Nunes & Vaz-de-Mello

199 - *Dichotomius* (*Cephagonus*) *itatiaiaensis* Nunes & Vaz-de-Mello

200 - *Dichotomius* (*Cephagonus*) *lucianomourai* Nunes & Vaz-de-Mello

201 - *Dichotomius* (*Cephagonus*) *marcoscarvalhoi* Nunes & Vaz-de-Mello

202 - *Dichotomius* (*Cephagonus*) *paschoali* Nunes & Vaz-de-Mello 180

203 - *Dichotomius* (*Cephagonus*) *ricardosilvai* Nunes & Vaz-de-Mello

204 - *Dichotomius* (*Cephagonus*) *rondoniaensis* Nunes & Vaz-de-Mello

205 - *Dichotomius* (*Cephagonus*) *tissianiae* Nunes & Vaz-de-Mello

206 - *Dichotomius* (*Cephagonus*) *vargasae* Nunes & Vaz-de-Mello

207 - *Dichotomius* (*Dichotomius*) *gandinii* Rossini & Vaz-de-Mello

208 - *Dichotomius* (*Selenocopris*) *valoisae* Silva, Moura, Araújo & de Moura

209 - *Onthophagus istmenus* Moctezuma, Sánchez-Huerta & Halffter

210 - *Paracanthon arnaudi* Pacheco & Vaz-de-Mello

211 - *Paracanthon belloi* Pacheco & Vaz-de-Mello

212 - *Paracanthon felipei* Pacheco & Vaz-de-Mello

213 - *Paracanthon genieri* Pacheco & Vaz-de-Mello

214 - *Paracanthon grossiorum* Pacheco & Vaz-de-Mello

215 - *Paracanthon laevinotus* Pacheco & Vaz-de-Mello

216 - *Paracanthon lopesandradei* Pacheco & Vaz-de-Mello

217 - *Paracanthon marinezae* Pacheco & Vaz-de-Mello

218 - *Paracanthon millerorum* Pacheco & Vaz-de-Mello

219 - *Paracanthon monteiroorum* Pacheco & Vaz-de-Mello

220 - *Paracanthon muriloi* Pacheco & Vaz-de-Mello

221 - *Paracanthon ocellatopunctatus* Pacheco & Vaz-de-Mello

222 - *Scatonomus canhedoae* Valois, Vaz-de-Mello & Silva

223 - *Scatonomus mitzae* Valois, Vaz-de-Mello & Silva

Staphylinidae Latreille

224 - *Cavifronexus papaveroi* Zilberman

225 - *Corotoca pseudomelantho* Zilberman

226 - *Corotoca hitchensi* Zilberman

227 - *Diochus cleidecostae* Caron & Navarro

228 - *Fonsechellus heterosetosus* Zilberman & Fontes

229 - *Oecidiophilus cleidecostae* Zilberman & Fontes

230 - *Pseudastenus amazonicus* Irmler

231 - *Pseudastenus ferrugineus* Busanello & Caron

232 - *Pseudastenus oculatus* Irmler

233 - *Pseudastenus ribeirocostae* Busanello & Caron

234 - *Pseudastenus schubarti* Irmler

Tenebrionidae Latreille

235 - *Hypogena akuma* Grey & Smith

236 - *Hypogena hirsuta* Grey & Smith

Collembola

Dicyrtomidae Börner

237 - *Ptenothrix dalii* Zeppelini, Ferreira & Oliveira

Entomobryidae Tömösvary

238 - *Entomobrya barbata* Siqueira & Bellini

239 - *Entomobrya juneae* Santos, Santos-Costa & Bellini

240 - *Pseudosinella acantholabrata* Cipola

241 - *Pseudosinella alfanjeunguiculata* Bellini, Cipola & Souza

242 - *Pseudosinella aphelabiata* Bellini, Cipola & Souza

243 - *Pseudosinella brumadinhoensis* Cipola

244 - *Pseudosinella cearenses* Oliveira, Brito & Cipola

245 - *Pseudosinella chimerambigua* Oliveira, Lima & Cipola

246 - *Pseudosinella diamantinensis* Bellini, Cipola & Souza

247 - *Pseudosinella keni* Cipola

248 - *Pseudosinella labiociliata* Cipola

249 - *Pseudosinella labruspinata* Cipola

250 - *Pseudosinella macrolignicephala* Oliveira, Lima & Cipola

251 - *Pseudosinella marianensis* Bellini, Cipola & Souza

252 - *Pseudosinella mitodentunguilata* Bellini, Cipola & Souza

253 - *Pseudosinella neriae* Bellini, Cipola & Souza

254 - *Pseudosinella paraenses* Cipola

255 - *Pseudosinella parambigua* Oliveira, Lima & Cipola

256 - *Pseudosinella phyllunguiculata* Oliveira, Lima & Cipola

257 - *Pseudosinella prelabruscervata* Oliveira, Lima & Cipola

258 - *Pseudosinella pusilla* Oliveira, Brito & Cipola

259 - *Pseudosinella serpentinensis* Cipola

260 - *Pseudosinella spurimarianensis* Bellini, Cipola & Souza

261 - *Pseudosinella taurina* Cipola

262 - *Pseudosinella unimacrochaetosa* Cipola

263 - *Seira pietata* Oliveira, Ferreira & Zeppelini

Neanuridae Börner

264 - *Neotropiella arretada* Paz, Bellini & Queiroz

Orchesellidae Börner

265 - *Capbrya brasiliensis* Nunes, Santos-Costa & Bellini

266 - *Dicranocentrus abestado* Siqueira, Bellini & Cipola

Sminthuridae Lubbock

267 - *Keratosminthurus tapigu* Zeppelini, Brito & Lima

268 - *Keratosminthurus calamitosus* Zeppelini, Brito & Lima

Diptera

Atelestidae Hennig

269 - *Alavesia leukoprosopa* Amorim, Riccardi & Rafael

Austroleptidae Nagatomi

270 - *Austroleptis camposgerais* Fachin, Santos & Amorim

Cecidomyiidae Newman

271 - *Bruggmanniella miconia* Garcia, Lamas & Urso-Guimarães

272 - *Bruggmanniella miconiae* Carvalho-Fernandes, Maia & Rodrigues

273 - *Bruggmanniella notatae* Rodrigues & Maia

274 - *Bruggmanniella sideroxyli* Rodrigues & Maia

275 - *Cerciplanus cipo* Garcia & Urso-Guimarães

276 - *Cerciplanus tocantinensis* Garcia & Urso-Guimarães

277 - *Clinodiplosis cecropiae* Proença & Maia

278 - *Diadiplosis saccharum* Urso-Guimarães

Ceratopogonidae Newman

279 - *Downeshelea avizi* Santarém, Borkent & Felippe-Bauer

280 - *Downeshelea bahiana* Santarém, Borkent & Felippe-Bauer

281 - *Downeshelea divergentis* Santarém, Borkent & Felippe-Bauer

282 - *Downeshelea spatha* Santarém, Borkent & Felippe-Bauer

283 - *Downeshelea venus* Santarém, Borkent & Felippe-Bauer

Chironomidae Newman

284 - *Diplosmittia trifida* Shimabukuro, Lamas & Pinho

285 - *Pentaneura herbeti* Dantas, Pinheiro & Hamada

286 - *Polypedilum* (*Asheum*) *mayrahu* Pinho & Silva

287 - *Polypedilum* (*Asheum*) *sofiae* Pinho & Silva

288 - *Telmatogeton yamaguchiae* Marigo, Lamas & Fusari

Chloropidae Rondani

289 - *Chaethippus carioca* Riccardi

290 - *Chaethippus maculatus* Riccardi

291 - *Chaethippus notatus* Riccardi

292 - *Metashiphonella amorimi* Riccardi, Bazyar & Ismay

Culicidae Meigen

293 - *Culex* (*Melanoconion*) *columnaris* Sá & Hutchings

294 - *Culex* (*Melanoconion*) *comptus* Sá & Sallum

295 - *Culex* (*Melanoconion*) *longisetosus* Sá & Sallum

296 - *Culex* (*Melanoconion*) *longistylus* Sá & Sallum

297 - *Culex* (*Melanoconion*) *spinifer* Sá & Sallum

Dolichopodidae Latreille

298 - *Pseudosympycnus bickeli* Soares & Capellari

299 - *Pseudosympycnus latitibia* Soares & Capellari

300 - *Pseudosympycnus maroaga* Soares & Capellari

301 - *Pseudosympycnus robinsoni* Soares & Capellari

302 - *Pseudosympycnus sehnali* Soares & Capellari

Micropezidae Blanchard

303 - *Micropeza chiroptera* Soares, Barros & Ale-Rocha

304 - *Paragrallomyia brasiliensis* Ferro & Marshall

305 - *Paragrallomyia quaternaria* Ferro & Marshall

306 - *Systellapha digifurca* Marshall

307 - *Systellapha ornatifemur* Marshall

Muscidae Latreille

308 - *Cordiluroides albitarsata* Fogaça, Couri, Vieira-Araújo & de Carvalho

309 - *Neodexiopsis hirsuta* Fogaça, Gomes & de Carvalho

Odiniidae Hendel

310 - *Pauximyia oliveirai* Limeira-de-Oliveira, Marques, Gaimari & Rafael

311 - *Pauximyia vidali* Limeira-de-Oliveira, Marques, Gaimari & Rafael

312 - *Umbodinia bella* Limeira-de-Oliveira, Marques, Gaimari & Rafael

Phoridae Curtis

313 - *Apocephalus adlaevigata* Disney

314 - *Apocephalus holohyalinus* Disney

315 - *Apocephalus juniori* Disney

316 - *Apocephalus oliveirai* Disney

317 - *Apocephalus polysetae* Disney

318 - *Apocephalus silvai* Disney

319 - *Coniceromyia bellatula* Ament, Kung & Brown

320 - *Coniceromyia brachypoda* Ament, Kung & Brown

321 - *Coniceromyia circulata* Ament, Kung & Brown

322 - *Coniceromyia dasypoda* Ament, Kung & Brown

323 - *Coniceromyia diffusa* Ament, Kung & Brown

324 - *Coniceromyia hadrochaeta* Ament, Kung & Brown

325 - *Coniceromyia inflata* Ament, Kung & Brown

326 - *Coniceromyia litopoda* Ament, Kung & Brown

327 - *Coniceromyia memorialis* Ament, Kung & Brown

328 - *Coniceromyia niemeyeri* Ament, Kung & Brown

329 - *Coniceromyia trilobata* Ament, Kung & Brown

330 - *Eibesfeldtphora necattae* Disney

331 - *Megaselia gurupiensis* Disney

Psychodidae Newman

332 - *Australopericoma onofrei* Araújo & Bravo

333 - *Australopericoma xavierae* Araújo & Bravo

334 - *Tonnoira igrapiunensis* Bravo, Vilarinho & Araújo

Rhagionidae Samouelle, 1819

335 - *Chrysopilus kafkai* Cegolin & Santos

Sarcophagidae Macquart

336 - *Dexosarcophaga klycyae* De-Souza, Souza, Soares & Carvalho-Filho

337 - *Dexosarcophaga salgada* De-Souza, Souza, Soares & Carvalho-Filho

338 - *Oxysarcodexia ariozanoi* Souza, Pape & Thyssen

339 - *Oxysarcodexia digitata* Menezes, Santos & Mello-Patiu

Simuliidae Newman

340 - *Simulium* (*Trichogamia*) *itajara* Nascimento, Hamada & Pepinelli

Sphaeroceridae Macquart

341 - *Chespiritos coronatus* Kuwahara & Marshall

342 - *Chespiritos ventrisetis* Kuwahara & Marshall

343 - *Rudolfina exuberata* Paiero & Marshall

Stratiomyidae Latreille

344 - *Chiromyza raccai* Pujol-Luz

Tabanidae Latreille

345 - *Esenbeckia* (*Esenbeckia*) *auribrunnea* Gualdrón-Díaz & Gorayeb

Tachinidae Robineau-Desvoidy

346 - *Cryptocladocera arnaudi* Santis & Álvarez-Garcia

347 - *Trichopoda* (*Galactomyia*) *auricauda* Dios & Nihei

348 - *Trichopoda* (*Galactomyia*) *castannea* Dios & Nihei

349 - *Trichopoda* (*Galactomyia*) *curvicercus* Dios & Nihei

350 - *Trichopoda* (*Galactomyia*) *dupuisi* Dios & Nihei

351 - *Trichopoda* (*Galactomyia*) *goiana* Dios & Nihei

352 - *Trichopoda* (*Galactomyia*) *splendida* Dios & Nihei

353 - *Trichopoda* (*Galactomyia*) *tenebrosa* Dios & Nihei

354 - *Trichopoda* (*Galactomyia*) *urucurytuba* Dios & Nihei

355 - *Trichopoda* (*Trichopoda*) *sabroskyi* Dios & Nihei

Embioptera

Archembiidae Ross

356 - *Pararhagadochir castaneus* Salvatierra

Ephemeroptera

Baetidae Leach

357 - *Apobaetis biancae* Boldrini

358 - *Apobaetis jacobusi* Cruz, Boldrini & Hamada

359 - *Macuxi tunamore* Cruz, Salles, Hamada & Falcão

360 - *Rivudiva inma* Salles & Nieto

361 - *Rivudiva oonirikoperi* Cruz

Leptohyphidae Edmunds & Traver

362 - *Tricorythopsis nupem* Araújo & Dias

Leptophlebiidae Banks

363 - *Bessierus riobranco* Cruz, Gonçalves, Mariano & Hamada

364 - *Diamantina ulmeri* Salles, Domínguez & Nascimento

365 - *Miroculis niltoi* Oliveira, Campos & Calor

366 - *Thraulodes marianoi* Silva, Salles & Pinto

367 - *Traverella excelsior* Nascimento & Lima

Oligoneuriidae Ulmer

368 - *Incogemina nubila* Storari, Rodrigues, Saraiva & Salles

Hemiptera

Cicadellidae Van Duzee

369 - *Balacha ancora* Quintas, Takiya, Cavichioli & Mejdalani

370 - *Balacha nigroflava* Quintas, Takiya, Cavichioli & Mejdalani

371 - *Bertawolia grazielia* Domahovski

372 - *Bertawolia lata* Domahovski

373 - *Cavichiana alpina* Quintas, Takiya, Côrte & Mejdalani

374 - *Delongiana baiana* Domahovski, Gonçalves, Takiya & Cavichioli

375 - *Delongiana ramosa* Domahovski, Gonçalves, Takiya & Cavichioli

376 - *Momoria albohabena* Domahovski

377 - *Polana* (*Varpulana*) *agualimpa* Domahovski & Cavichioli

378 - *Polana* (*Varpulana*) *feitosai* Domahovski & Cavichioli

379 - *Polana* (*Varpulana*) *recurva* Domahovski & Cavichioli

380 - *Regalana jamari* Domahovski, Gonçalves, Takiya & Cavichioli

381 - *Regalana madeira* Domahovski, Gonçalves, Takiya & Cavichioli

Cicadidae Latreille

382 - *Calyria uncinata* Sanborn

383 - *Herrera chelappendicula* Sanborn

Miridae Hahn

384 - *Valdasus favrei* Wolski, Chérot & Carpintero

385 - *Valdasus flavinotum* Wolski, Chérot & Carpintero

Pentatomidae Leach

386 - *Chimerocoris luridus* Barros, Barão & Grazia

387 - *Parahypatropis occultata* Barros, Barão & Grazia

388 - *Parahypatropis similis* Barros, Barão & Grazia

389 - *Prolatucoris mandibulatus* Barros, Brugnera & Grazia

390 - *Sibaria amazonica* Krein, Rider & Grazia

391 - *Triunfus carvalhoi* Barros, Barão & Grazia

392 - *Triunfus incarnatus* Barros, Barão & Grazia

Psyllidae Latreiller

393 - *Acanthococcus papaveroi* Gonzalez, Claps & Juarez

394 - *Colophorina bororo* Burckhardt & Queiroz

395 - *Colophorina guarani* Burckhardt & Queiroz

396 - *Colophorina tapuio* Burckkardt & Queiroz

397 - *Colophorina tupi* Burckhardt & Queiroz

398 - *Jataiba basifistula* Burckhardt & Queiroz

399 - *Jataiba cearensis* Burckhardt & Queiroz

400 - *Jataiba cognata* Burckhardt & Queiroz

401 - *Jataiba hymenaeae* Burckhardt & Queiroz

402 - *Jataiba incisa* Burckhardt & Queiroz

403 - *Jataiba uncigera* Burckhardt & Queiroz

404 - *Mitrapsylla adusta* Burckhardt & Queiroz

405 - *Mitrapsylla aeschynomenis* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

406 - *Mitrapsylla amazonica* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

407 - *Mitrapsylla andirae* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

408 - *Mitrapsylla aurantia* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

409 - *Mitrapsylla brevigenis* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

410 - *Mitrapsylla borealis* Burckhardt & Queiroz

411 - *Mitrapsylla cassiae* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

412 - *Mitrapsylla clavata* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

413 - *Mitrapsylla compta* Burckhardt & Queiroz

414 - *Mitrapsylla copaiferae* Burckhardt & Queiroz

415 - *Mitrapsylla cujabensis* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

416 - *Mitrapsylla cuspidata* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

417 - *Mitrapsylla didyma* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

418 - *Mitrapsylla domahovskii* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

419 - *Mitrapsylla fumipennis* Burckhardt & Queiroz

420 - *Mitrapsylla gloriae* Burckhardt & Queiroz

421 - *Mitrapsylla halbertae* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

422 - *Mitrapsylla hamata* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

423 - *Mitrapsylla holocalycis* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

424 - *Mitrapsylla itacoatiara* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

425 - *Mitrapsylla machaerii* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

426 - *Mitrapsylla melanothorax* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

427 - *Mitrapsylla ochra* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

428 - *Mitrapsylla pallida* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

429 - *Mitrapsylla periandrae* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

430 - *Mitrapsylla pterodontis* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

431 - *Mitrapsylla pterogynis* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

432 - *Mitrapsylla repens* Burckhardt & Queiroz

433 - *Mitrapsylla securicola* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

434 - *Mitrapsylla soror* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

435 - *Mitrapsylla truncata* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

436 - *Mitrapsylla villosi* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

437 - *Mitrapsylla viridis* Burckhardt & Queiroz

438 - *Mitrapsylla xanthoptera* Rendón-Mera, Burckhardt, Cavichioli & Queiroz

439 - *Platycorypha amazonica* Burckhardt & Queiroz

440 - *Platycorypha atrifrons* Burckhardt & Queiroz

441 - *Platycorypha cultrata* Burckhardt & Queiroz

442 - *Platycorypha leptopeus* Burckhardt & Queiroz

443 - *Platycorypha pinnata* Burckhardt & Queiroz

444 - *Platycorypha pycnopeus* Burckhardt & Queiroz

445 - *Platycorypha rostrata* Burckhardt & Queiroz

446 - *Platycorypha scalprata* Burckhardt & Queiroz

Reduviidae Latreille

447 - *Ghilianella dilatata* Castro-Huertas & Forero

448 - *Ghilianella gilsantanai* Castro-Huertas & Forero

449 - *Ghilianella goliath* Castro-Huertas & Forero

450 - *Ghilianella scimitarra* Castro-Huertas & Forero

451 - *Ghilianella urbanoi* Castro-Huertas & Forero

452 - *Ghilianella weirauchae* Castro-Huertas & Forero

453 - *Quasitagalis afonsoi* Gil-Santana, Oliveira & Zampaulo

Schizopteridae Reuter

454 - *Caucanannus novissimis* Weirauch, Knyshov & Hoey-Chamberlain

455 - *Voragocoris weirauchae* Almeida, Carvalho-Filho, Knyshov & Fernandes

Tingidae Laporte

456 - *Thaumamannia insolita* Guidoti, Montemayor, Campos & Guilbert

457 - *Thaumamannia urucuana* Guidoti, Montemayor, Campos & Guilbert

Hymenoptera

Apidae Latreille

458 - *Ceratina* (*Ceratinula*) *fioreseana* Oliveira

459 - *Nogueirapis batistai* Nogueira

460 - *Nogueirapis rosariae* Nogueira

461 - *Paratrigona intermedia* Oliveira, Madella-Auricchio & Freitas

Bethylidae Forster

462 - *Apenesia bifiela* Alencar & Azevedo

463 - *Apenesia colombela* Alencar & Azevedo

464 - *Apenesia juliela* Alencar & Azevedo

465 - *Apenesia kelsiela* Alencar & Azevedo

Braconidae Nees

466 - *Aleiodes bahiensis* Shimbori & Shaw

467 - *Aleiodes barrosi* Shimbori & Shaw

468 - *Aleiodes brevicarina* Shimbori & Shaw

469 - *Aleiodes coariensis* Shimbori & Shaw

470 - *Aleiodes goiasensis* Shimbori & Shaw

471 - *Aleiodes gonodontivorus* Shaw & Shimbori

472 - *Aleiodes hyalinus* Shimbori & Shaw

473 - *Aleiodes joaquimi* Shimbori & Shaw

474 - *Aleiodes maculosus* Shimbori & Shaw

475 - *Aleiodes ovatus* Shimbori & Shaw

476 - *Aleiodes taurus* Shimbori & Penteado-Dias

477 - *Caputlenis capixaba* Gadelha & Zaldívar-Riverón

478 - *Caputrugosus glebecafejedi* Gadelha & Zaldívar-Riverón

479 - *Diolcogaster choi* Whitfield & Salgado-Neto

480 - *Idiasta rupina* Oliveira & Penteado-Dias

481 - *Nealiolus chayohtli* Wengrat & Shimbori

482 - *Nealiolus jaboticaba* Shimbori & Wengrat

483 - *Rhacalysia ampla* Oliveira & Penteado-Dias

484 - *Rhacalysia jatai* Oliveira & Penteado-Dias

485 - *Rhacalysia monteiroi* Oliveira & Penteado-Dias

Chalcididae Fabricius

486 - *Chalcis boi* Saguiah & Tavares

487 - *Chalcis danunciae* Saguiah & Tavares

488 - *Chalcis intervalensis* Saguiah & Tavares

489 - *Chalcis periotoi* Saguiah & Tavares

Crabronidae Latreille

490 - *Psenulus amazonicus* Rosa & Melo

491 - *Psenulus brasiliensis* Rosa & Melo

492 - *Psenulus flavipes* Rosa & Melo

493 - *Psenulus rafaeli* Rosa & Melo

494 - *Psenulus silveirai* Rosa & Melo

Dryinidae Haliday

495 - *Anteon elianeae* Martins

496 - *Gonatopus josei* Martins

497 - *Gonatopus meloi* Martins

498 - *Gonatopus pinhalensis* Martins

499 - *Gonatopus taquarensis* Martins

Eucharitidae Walker

500 - *Orasema brachycephala* Baker & Heraty

501 - *Orasema peckorum* Heraty & Baker

502 - *Orasema roppai* Baker & Heraty

503 - *Orasema spyrogaster* Baker & Heraty

Eurytomidae Walker

504 - *Rileya priscillae* Perioto & Lara

Formicidae Latreille

505 - *Discothyrea bobi* Chaul

506 - *Gnamptogenys latistriata* Camacho, Franco & Feitosa

507 - *Gnamptogenys lenis* Camacho, Franco & Feitosa

508 - *Gnamptogenys rugimala* Marcineiro & Lattke

509 - *Pheidole abakyta* Casadei-Ferreira, Economo & Feitosa

510 - *Pheidole abaticanga* Casadei-Ferreira, Economo & Feitosa

511 - *Pheidole cangussu* Casadei-Ferreira, Economo & Feitosa

512 - *Pheidole curupira* Casadei-Ferreira, Economo & Feitosa

513 - *Pheidole mapinguari* Casadei-Ferreira, Economo & Feitosa

514 - *Pheidole obapara* Casadei-Ferreira, Economo & Feitosa

515 - *Prionopelta dubia* Ladino & Feitosa

516 - *Prionopelta menininha* Ladino & Feitosa

517 - *Prionopelta minuta* Ladino & Feitosa

Halictidae Thomson

518 - *Augochlora* (*Augochlora*) *atlantica* Lepeco & Gonçalves

519 - *Augochlora* (*Augochlora*) *australis* Lepeco & Gonçalves

520 - *Augochlora* (*Augochlora*) *genalis* Lepeco & Gonçalves

521 - *Augochlora* (*Augochlora*) *helena* Lepeco & Gonçalves

522 - *Augochlora* (*Augochlora*) *hestia* Lepeco & Gonçalves

523 - *Augochlora* (*Augochlora*) *hirsuta* Lepeco & Gonçalves

524 - *Augochlora* (*Augochlora*) *laevicarinata* Lepeco & Gonçalves

525 - *Augochlora* (*Augochlora*) *scabrata* Lepeco & Gonçalves

526 - *Augochlora* (*Oxystoglossella*) *bipunctata* Lepeco & Gonçalves

527 - *Augochlora* (*Oxystoglossella*) *mendax* Lepeco & Gonçalves

528 - *Augochlora* (*Oxystoglossella*) *modica* Lepeco & Gonçalves

529 - *Augochlora* (*Oxystoglossella*) *tenax* Lepeco & Gonçalves

Ichneumonidae Latreille

530 - *Acrosnemus occultus* Supeleto, Aguiar & Santos

531 - *Acrotaphus amajari* Pádua

532 - *Acrotaphus amazonicus* Pádua & Sääksjärvi

533 - *Acrotaphus bodoquenaensis* Pádua

534 - *Acrotaphus dolichopus* Pádua

535 - *Acrotaphus homeofranklini* Pádua

536 - *Acrotaphus jackiechani* Pádua & Sääksjärvi

537 - *Acrotaphus japi* Higa & Penteado-Dias

538 - *Acrotaphus micrus* Pádua

539 - *Acrotaphus monotaenius* Pádua

540 - *Acrotaphus pseudoamazonicus* Pádua & Sääksjärvi

541 - *Acrotaphus pseudomexicanus* Pádua

542 - *Acrotaphus wagnerianae* Pádua

543 - *Acrotaphus zampieronae* Pádua

544 - *Boethella jatai* Ferreira, Onody, Penteado-Dias & Bennett

545 - *Cestrus itatiensis* Supeleto, Santos & Aguiar

546 - *Cryptoxenodon metamorphus* Supeleto, Santos & Aguiar

547 - *Pantisarthrus communis* Camargo & Penteado-Dias

548 - *Pantisarthrus flavocingulatus* Camargo & Penteado-Dias

549 - *Pantisarthrus paraitinga* Camargo & Penteado-Dias

550 - *Polysphincta jundiai* Higa & Penteado-Dias

551 - *Polysphincta soaresi* Higa & Penteado-Dias

552 - *Synosis nigra* Alvarado

553 - *Synosis zezei* Alvarado

Megachilidae Latreille

554 - *Rhynostelis chrysogaster* Parizotto & Melo

555 - *Rhynostelis plesiognatha* Parizotto & Melo

Siricidae Billberg

556 - *Cratosirex sennlaubi* Jouault & Nel

Vespidae Laicharting

557 - *Montezumia termitophila* Hermes & Garcete-Barrett

558 - *Protopolybia djaneteae* Santos & Silveira

559 - *Protopolybia eldinaris* Santos & Silveira

Lepidoptera

Cossidae Hodges

560 - *Dolecta akhmatovae* Naydenov, Yakovlev, Penco & Sinyaev

561 - *Dolecta saltykovishchedrini* Naydenov, Yakovlev, Penco & Sinyaev

562 - *Dolecta stanyukovichi* Naydenov, Yakovlev, Penco & Sinyaev

563 - *Dolecta tolstoyi* Naydenov, Yakovlev, Penco & Sinyaev

564 - *Klagesiana amazoniensis* Yakovlev, Naydenov & Penco

Euteliidae Grote

565 - *Eutelia amazonia* Barbut

566 - *Eutelia brasiliensis* Barbut

567 - *Eutelia duartei* Barbut

568 - *Eutelia mielkei* Barbut

Hesperiidae Latreille

569 - *Enosis ester* Lemes, Mielke & Casagrande

570 - *Panca puri* Medeiros, Mielke & Casagrande

571 - *Panca xavante* Medeiros, Mielke & Casagrande

572 - *Pheraeus guandu* Saraiva, Carneiro, Mielke & Casagrande

573 - *Telemiades amazonica* Siewert, Mielke & Casagrande

574 - *Telemiades atlantiope* Siewert, Mielke & Casagrande

575 - *Telemiades cryptus* Siewert, Mielke & Casagrande

576 - *Telemiades dawkinsi* Siewert, Mielke & Casagrande

577 - *Telemiades moa* Siewert, Mielke & Casagrande

578 - *Telemiades pallidus* Siewert, Mielke & Casagrande

579 - *Telemiades pseudotrenda* Siewert, Mielke & Casagrande

580 - *Telemiades quammeni* Siewert, Mielke & Casagrande

Mimallonidae Burmeister

581 - *Cicinnus litoralis* St Laurent & Becker

582 - *Mimallodes anaemicus* St Laurent & Becker

Noctuidae Latreille

583 - *Marilopteryx bicolorata* Thöny

584 - *Marilopteryx brasiliensis* Thöny

585 - *Marilopteryx intergrisea* Thöny

Notodontidae Stephens

586 - *Arhacia imitata* Becker

587 - *Eustema argentata* Becker

588 - *Nycterotis lineata* Becker

Nymphalidae Rafinesque

589 - *Actinote keithbrowni* Freitas, Francini & Mielke

590 - *Carminda surpresa* Barbosa, Aguiar, Rosa, Zacca & Freitas

591 - *Scriptor sphenophorus* Nakahara & Lamas

Riodinidae Grote

592 - *Aricoris emeryi* Callaghan, Lemes & Kaminski

593 - *Symmachia atlantica* Dias, Dolibaina & Mielke

594 - *Symmachia uirassu* Dolibaina, Dias & Mielke

Saturniidae Boisduval

595 - *Catacantha zemaria* Mielke, Ciseki & Naumann

596 - *Hylesia dellerbai* Mielke, Joerke, Miranda & Costa

597 - *Periphoba campisi* Mielke, Ciseki & Naumann

Sphingidae Latreille

598 - *Protambulyx pearsoni* Haxaire & Mielke

Tischeriidae Spuler

599 - *Paratischeria braziliensis* Diškus & Stonis

Tortricidae Latreille

600 - *Cosmorrhyncha albistrigulana* Brown & Razowski

601 - *Cosmorrhyncha macrospina* Brown & Razowski

602 - *Cosmorrhyncha parintina* Brown & Razowski

Mantodea

Vatidae Stal

603 - *Vates phoenix* Rivera, Herculano, Lanna, Cavalcante & Teixeira

Neuroptera

Kalligrammatidae Handlirsch

604 - *Makarkinia irmae* Machado, Freitas & Ribeiro

Odonata

Coenagrionidae Kirby

605 - *Forcepsioneura lopii* Pinto & Araújo

606 - *Forcepsioneura machadorum* Vilela, Venâncio & Santos

607 - *Negragrion sagma* Muzón & Lozano

Heteragrionidae Rácenis

608 - *Heteragrion itacolomii* Ávila-Jr, Lencioni & Carneiro

Libellulidae Rambur

609 - *Erythrodiplax nataliae* Del Palacio, Muzón, Juen, Ferreira & Batista

Orthoptera

Gryllidae Laicharting

610 - *Tafalisca duckeana* Campos, Souza-Dias & Nihei

611 - *Tafalisca vestigialis* Campos, Souza-Dias & Nihei

612 - *Veredatrypa fusca* Campos, Souza-Dias & Nihei

613 - *Veredatrypa rosai* Campos, Souza-Dias & Nihei

614 - *Veredatrypa seca* Campos, Souza-Dias & Nihei

Phalangopsidae Blanchard

615 - *Endecous* (*Endecous*) *painensis* Castro-Souza, Pereira Junta & Lopes Ferreira

616 - *Endecous* (*Pedroecous*) *didymus* Castro-Souza, Zefa &

Lopes Ferreira

617 - *Endecous* (*Pedroecous*) *troglobius* Castro-Souza, Zefa & Lopes Ferreira

618 - *Phalangopsis araguaia* Pereira Junta, Castro-Souza & Lopes Ferreira

619 - *Phalangopsis ferratilis* Pereira Junta, Castro-Souza & Lopes Ferreira

620 - *Phalangopsis kyju* Pereira Junta, Castro-Souza & Lopes Ferreira

621 - *Phalangopsis kysuia* Pereira Junta, Castro-Souza & Lopes Ferreira

622 - *Phalangopsis quartzitica* Pereira Junta, Castro-Souza & Lopes Ferreira

Tettigoniidae Krauss

623 - *Acropsis solimoesensis* Mendes & Rafael

624 - *Anaulacomera* (*Bovicercora*) *almadaensis* Heller

625 - *Boroseiyla ipixuna* Mendes, Chamorro-Rengifo & Rafael

626 - *Boroseiyla porangatu* Mendes, Chamorro-Rengifo & Rafael

627 - *Boroseiyla tupeba* Mendes, Chamorro-Rengifo & Rafael

628 - *Caauara aspera* Mendes, Chamorro-Rengifo & Rafael

629 - *Caauara cabocla* Mendes, Chamorro-Rengifo & Rafael

630 - *Caauara guerere* Mendes, Chamorro-Rengifo & Rafael

631 - *Caauara pinima* Mendes, Chamorro-Rengifo & Rafael

632 - *Caauara taboca* Mendes, Chamorro-Rengifo & Rafael

633 - *Caauara tinga* Mendes, Chamorro-Rengifo & Rafael

634 - *Caauara tipiti* Mendes, Chamorro-Rengifo & Rafael

635 - *Caauara tucupi* Mendes, Chamorro-Rengifo & Rafael

636 - *Caauara tupuna* Mendes, Chamorro-Rengifo & Rafael

637 - *Capiguara albertoi* Mendes, Chamorro-Rengifo & Rafael

638 - *Capiguara trimaculata* Mendes, Chamorro-Rengifo & Rafael

639 - *Hyalipenna tetralineata* Mendes, Chamorro-Rengifo & Rafael

640 - *Machima itatiaia* Antunes & Takiya

641 - *Phylloptera jaci* Fianco, Szinwelski & Faria

642 - *Tuaia panacarica* Mendes, Chamorro-Rengifo & Rafael

643 - *Tuaia poranga* Mendes, Chamorro-Rengifo & Rafael

644 - *Wuyjugu pizai* Tavares

645 - *Xenicola brauni* Fianco, Engelking & Faria

Phasmatodea

Prisopodidae

646 - *Dinelytron betinho* Heleodoro & Rafael

647 - *Dinelytron leukommatos* Heleodoro & Rafael

648 - *Dinelytron museunacional* Heleodoro & Rafael

649 - *Dinelytron ramusculus* Heleodoro & Rafael

650 - *Dinelytron trimaculatus* Heleodoro & Rafael

651 - *Prisopus atrobrunneus* Heleodoro & Rafael

652 - *Prisopus brunnescens* Heleodoro & Rafael

653 - *Prisopus caatingaensis* Heleodoro & Rafael

Plecoptera

Perlidae Latreille

654 - *Anacroneuria leccii* Carvalho, Almeida & Lima

655 - *Macrogynoplax quadrispina* Menezes, Boldrini & Novaes

Psocodea: "Psocoptera"

Lachesillidae Pearman

656 - *Lachesilla oriximinaensis* García Aldrete & Silva-Neto

Ptiloneuridae Roesler

657 - *Brasineura calori* Lima, Silva-Neto, García Aldrete & Bravo

658 - *Brasineura morrense* Lima, Silva-Neto, García Aldrete & Bravo

Thysanoptera

Thripidae Stephens

659 - *Caliothrips cangaceiro* Lima, O'Donnell & Miyasato

Trichoptera

Hydropsychidae Curtis

660 - *Macrostemum scharfi* Pereira & Calor

661 - *Smicridea* (*Smicridea*) *mocidade* Desidério & Rázuri-Gonzales

662 - *Smicridea* (*Smicridea*) *santosi* Desidério & Rázuri-Gonzales

663 - *Smicridea* (*Smicridea*) *tepequensis* Desidério & Rázuri-Gonzales

Hydroptilidae Stephens

664 - *Acostatrichia araca* Santos & Pes

665 - *Flintiella serrana* Gama-Neto, Ribeiro & Passos

666 - *Flintiella triaena* Gama-Neto, Ribeiro & Passos

667 - *Neotrichia anaua* Gama-Neto & Passos

668 - *Neotrichia cauame* Gama-Neto & Passos

669 - *Neotrichia mucajai* Gama-Neto & Passos

670 - *Neotrichia quitauau* Gama-Neto & Passos

671 - *Neotrichia xereuini* Gama-Neto & Passos

Leptoceridae Leach

672 - *Atanatolica bandeira* Henriques-Oliveira, Dumas & Nessimian

673 - *Triplectides nessimiani* Desidério & Pes

Odontoceridae Wallengren

674 - *Marilia cabocla* Camargos, Pes & Hamada

675 - *Marilia caipira* Camargos, Pes & Hamada

676 - *Marilia cunhaporanga* Camargos, Pes & Hamada

677 - *Marilia manicorei* Camargos, Pes & Hamada

678 - *Marilia muelleri* Camargos, Pes & Hamada

Philopotamidae Stephens

679 - *Chimarra* (*Chimarra*) *potiguar* Queiroz, Dias & Calor

Polycentropodidae Ulmer

680 - *Cernotina longa* Moreno & Desidério

Besides the 680 new species, five new subspecies of Lepidoptera were also described in 2020, namely: *Emeryus argulus magnum* Zacca, Casagrande & Mielke, *Napeogenes inachia grazielae* Freitas, *Paryphthimoides terrestris araguaianus* Zacca, Casagrande & Mielke, *Paryphthimoides terrestris grevei* Zacca, Casagrande & Mielke and *Paryphthimoides terrestris muyrakytan* Zacca, Casagrande & Mielke (Freitas 2020; Zacca *et al*. 2020a, 2020b)

The order with most described species was Coleoptera, with 229 species, followed by Hymenoptera (102 spp), Hemiptera (89 spp), Diptera (87 spp), Lepidoptera (43 spp), Orthoptera (36 spp), Collembola (32 spp), Trichoptera (21 spp), Ephemeroptera (12 spp), Phasmatodea (8 spp), Odonata (5 spp), Blattodea: "Isoptera" (4 spp), Blattodea "Blattaria" (3 spp), Psocodea: "Psocoptera" (3 spp), Plecoptera (2 spp) and Embioptera, Mantodea, Neuroptera and Thysanoptera with a single new species each (Figure 1).

The new species number dominance of Coleoptera was repeated when comparing new species per Hexapoda families, with five coleoptera families among the top 10 families with highest number of new species described. Scarabaeidae was placed second with 43 new species, behind Psyllidae (Hemiptera) with 54 new species (Figure 2).

Currently, a total of 30 Hexapoda orders are considered as valid, taking in account the fusion of the old Isoptera and Blattaria (Blattodea), Psocoptera and Phthiraptera (Psocodea), as well as the newest proposition of fusion of Mecoptera and Siphonaptera, in which the latter was considered to be an infraorder of Mecoptera (Giribet & Edgecombe 2019; Tihelka *et al*. 2020). Brazil has 27 of the 30 Hexapoda orders occurring in its national territory, with only Grylloblattaria and Raphidioptera (which occur in temperate regions of the northern hemisphere) and Mantophasmatodea (occurring in deserts of Southern Africa) being absent (Rafael *et al*. 2012).

In 2020, nine Hexapoda orders which are present in Brazil did not have new described species: Diplura, Protura, Archaeognatha, Zygentoma, Dermaptera, Zoraptera, Megaloptera, Mecoptera and Strepsiptera. This fact may be explained by the absence of taxonomists working with these orders residing in Brazil, such as the case of Diplura, Protura, Archaeognatha, Zygentoma and Strepsiptera. For other orders, such as Dermaptera, there is only one specialist which has been recently graduated and still has not found a permanent job (information extracted from Lattes platform, with search subject being Hexapoda order).

In the previous sampling of active Hexapoda taxonomists living in Brazil made by Marques & Lamas (2006), it was pointed out that 15 (13 if we consider the current fusion of old orders) orders occurring in Brazil lacked specialists at the time: Trichoptera, Siphonaptera, Archaeognatha, Dermaptera, Diplura, Embioptera, Mecoptera, Phasmatodea, Phthiraptera, Protura, Psocoptera, Strepsiptera, Thysanoptera, Zygentoma and Zoraptera. The number of orders lacking specialists and working in Brazil was reduced to five, a notorious advance between 2006 and 2020. However, public policies to invest in human resources in the form of new taxonomists and permanent jobs are still urgent, for both orphan Hexapoda orders as for the remaining orders which already have a specialist but are in need of a renewal of human resource, including several megadiverse orders which have infra-ordinal orphan groups, such as Diptera, Coleoptera, Hymenoptera, Lepidoptera and Hemiptera.

The 680 new species of 2020 were published by a total of 423 different authors, out of which around 30% (128) were females and 70% (295) were males (Figure 3A). In relation to the total number of species authorship, the discrepancy is even higher, 74% (1176) male authorships and 26% (411) female (Figure 3B). This difference between females and males in the production of new Brazilian species in 2020 corroborates other results which have been found in other countries, such as in Walker (2020) and Evangelista *et al*. (2020) for the USA. In Brazil, data show that females are under-represented in the scientific production of ecology and zoology papers, regardless of their many subareas, with around 30% out of the total production being made by females (Salerno *et al*. 2019).

Hipólito *et al*. (2021) analyzed 12 graduate entomology programs in Brazil and numbered the existence of 235 male permanent professors against only 87 female professors. Furthermore, by detailing the data, Hipólito *et al*. (2021) evidenced a higher proportion of females in relation to males developing entomological researches at the level of graduation and masters, shifting to a more similar proportion at the level of doctorate and postdoc. Ramalho *et al*. (2020) analyzed 5,833 papers about ants (Hymenoptera: Formicidae) that were published between 1990 and 2018 and found that most of the first and last authors of these papers were males, with females representing only 35.59% of the first authors and 22.9% last authors. Globally, there are several unfortunate reasons that lead to this scenario of inequality between sexes are complex, with several socio-psychological and cultural factors rooted in patriarchal societies that maintain prejudice against women (Astegiano *et al*. 2019; Shannon *et al*. 2019). Unfortunately, our results also corroborate this scenario of inequality between sexes in the academy.

In relation to the number of authors by each new species, we found that 289 new species had two authors, followed by 196 which had three authors, 122 with one author, 66 with four authors and seven with five authors (Figure 4). The numbers of authors per article have been increasing a lot in the many areas of science throughout the past few decades and the reasons for this phenom are variable and controversial (Bebber *et al*. 2014; Poulin & Presswell 2016). The capability of doing a task, such as the arduous taxonomic task of describing unknown species prior to their extinction, may be assessed indirectly by the number of persons that are performing this task. Following this logic, it is expected that with the higher number of authors per species described, the higher is the taxonomic capability of doing these descriptions. However, this logic does not necessarily reflect the reality if most of the people assigned to species description are only aiding in small parts of the whole. The authorship inflation in the taxonomic

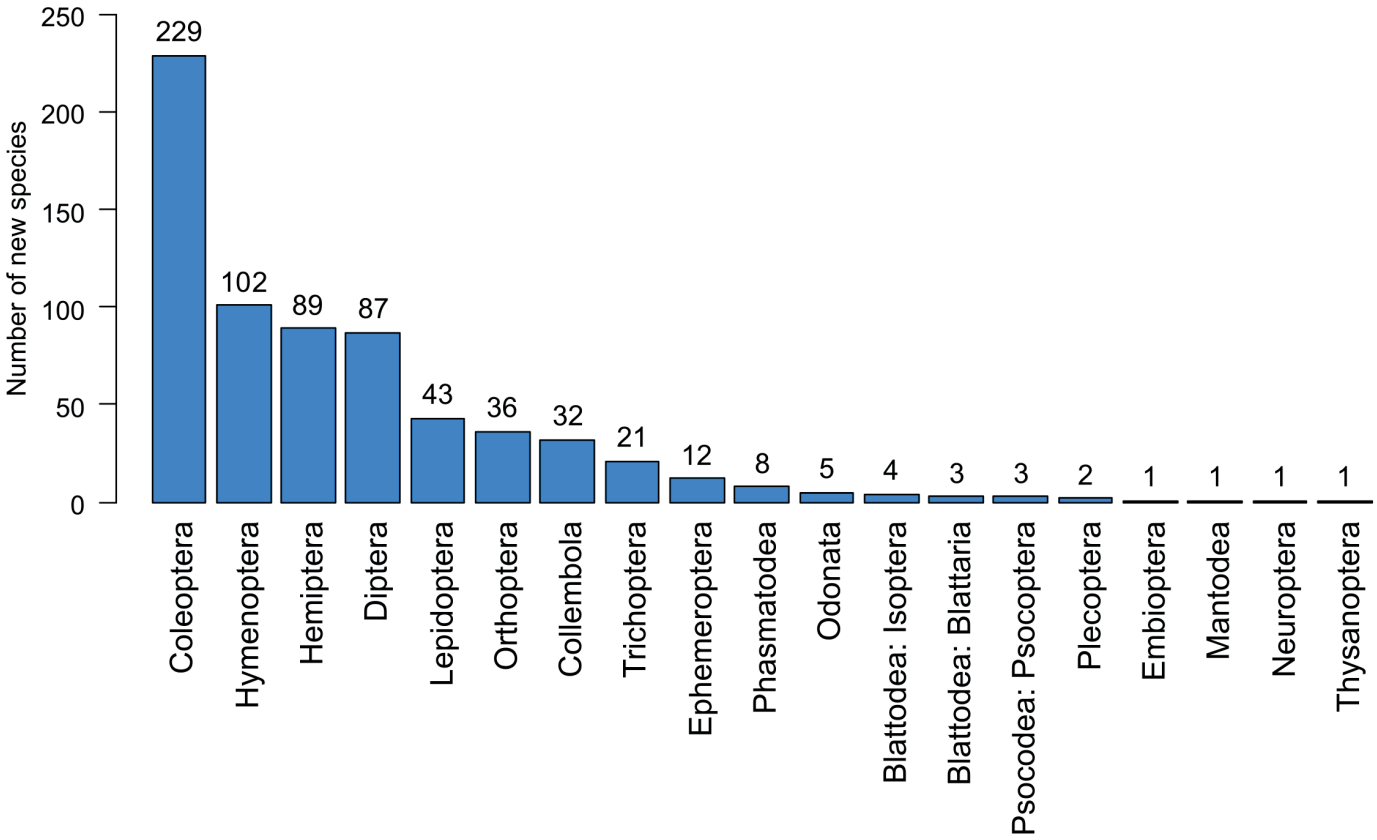

Figure 1. Number of Brazilian Hexapoda species described in 2020 distributed by Order.

may be attributed to the participation of undergrad students, laboratory employees and several crew members in the papers, which does not necessarily represent an increase in the number of specialists working with taxonomy (Bebber *et al*. 2014).

Poulin & Presswell (2016) argued that a higher number of authors in taxonomy is associated with the improvement in the species description quality. Therefore, the authorship inflation in taxonomy provides a more integrative taxonomy, with a higher number of collaborations between authors several sources of complementary data are used to enrich species characterization, such as the usage of molecular, scanning electron microscopy and biogeography data. Thus, as discussed above by the authors, the authorship inflation does not necessarily correlate with the increase of taxonomists number or with the enhancement of the taxonomic capability. The authorship inflation has been generating several debates among the scientific community. Scientific journals have been commonly requiring the disclosure on each member contribution in a given submitted manuscript. Furthermore, it is increasingly common, as observed in many articles with new insect species described in 2020, the assignment of solely the taxonomic specialist as the authors of the species, separating it from the remaining authors of the paper, directly linked to what Poulin & Presswell (2016) argued about the authorial collaboration by non-taxonomists. Another point that we are rising here is the authorship inflation of species is also connected to a higher interaction between researchers in a global live due to the internet, which certainly contributes to a significant increasing in the number of collaborations between specialists and therefore coauthors.

Our data revealed authors of the new species residing in 27 different countries, with 73% (309) being residents in Brazil (Figure 5). If all the 309 authors residing in Brazil would be regarded as taxonomists of the referred published group, then we would have an increase of about 220% of total specialists residing in Brazil in relation to the sampling made by Marques & Lamas (2006) and reaffirmed by Rafael *et al*. (2009). Considering the number of authors retrieved here and the inference made by Aguiar *et al*. (2009) that one taxonomist describes a mean of three new species per year, then we would expect 927 new species described by the authors residing inside Brazil and the number would increase to 1,269 with the aid of authors residing outside Brazil. However, the average of Brazilian species per author was 1.6 in 2020.

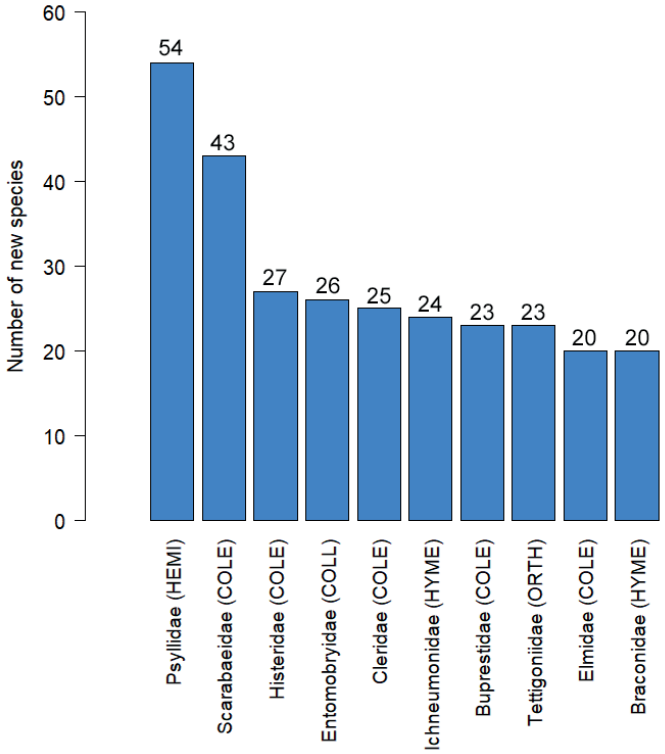

Figure 2. Number of Brazilian Hexapoda species described in 2020 by the top 10 ranked families in regard to total number of described species. Abbreviations: COLE: Coleoptera, COLL: Collembola, HEMI: Hemiptera, HYME: Hymenoptera and ORTH: Orthoptera.

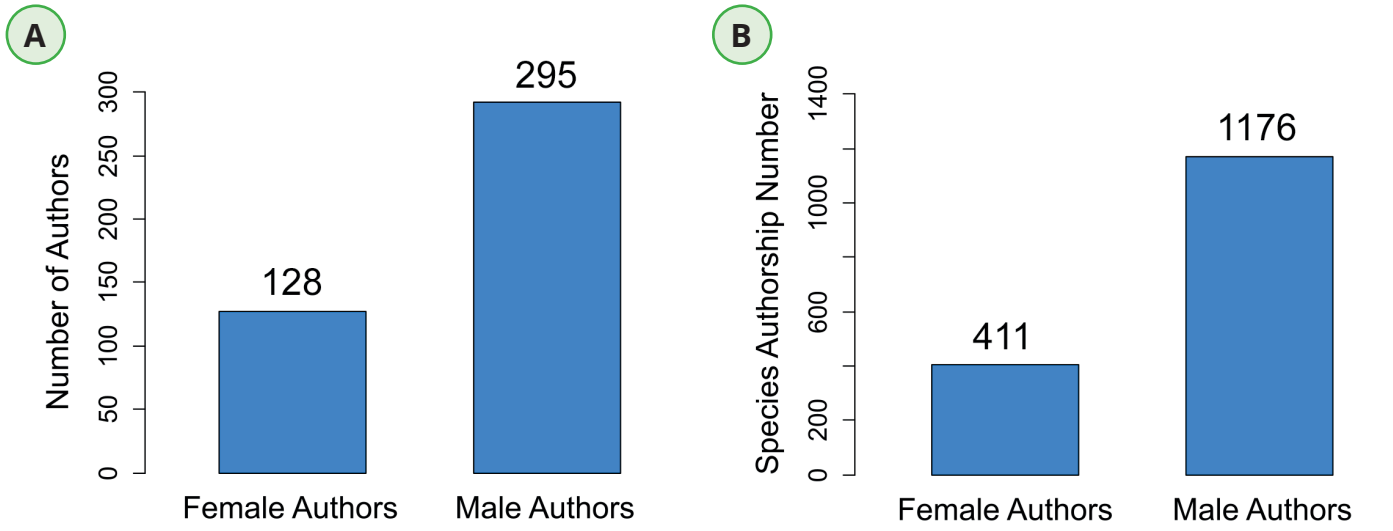

Figure 3. 3A. Number of authors of Brazilian Hexapoda species described in 2020 distributed by sex. **3B.** Number of authorships of Brazilian Hexapoda species described in 2020 distributed by sex.

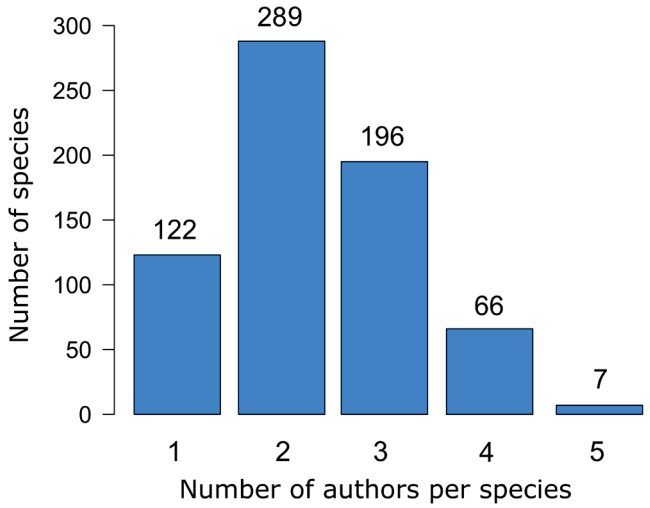

Figure 4. Number of Brazilian Hexapoda species described in 2020 distributed by its respective number of authors.

A total of 326 species were described exclusively by Brazilian residents, whilst 134 were exclusively published by authors residing outside Brazil and 220 were published in partnerships between Brazilian residents and authors residing outside Brazil (Figure 6A). A more detailed analysis regarding the nationality of authorship by Hexapoda orders showed that only five orders had part of the species described exclusively by authors residing outside Brazil, with dominance of Coleoptera, with around 37% of the total species described, followed by Lepidoptera, Diptera, Hemiptera and Hymenoptera (Figure 6B). The total absence of authors residing outside Brazil, be as authors or coauthors, occurred only in four orders (Embioptera, Neuroptera, Phasmatodea e Plecoptera) and in cockroaches (Figure 6B), totalizing 15 species. This also demonstrates a big cooperative impact of authors residing outside Brazil in the description of new species in 2020.

The participation of authors residing outside Brazil in species description has been proven to fundamental according to our results, however it is needed to pay attention to the deposit location of the type material, as many foreign museums are having hardships in loan material to Brazil or even have policies of not loaning. This has become a critical issue to the taxonomic revisions made by Brazilian specialists and a hindrance in the formation of young Brazilian specialists (Rafael *et al*. 2009). Since 1969, the Brazilian legislation regulates that the final deposition of Brazilian species, in which the law requires that all primary types and half of secondary types to be deposited in National territory (Brasil 1969). However, several researchers have not been abiding by this law, in many cases by total ignorance of it. We did not perform a sampling of depositary location of type material, although we could notice with a quick check that some species published exclusively by authors residing outside Brazil in 2020 were deposited outside Brazil, such as in the case of the Hemiptera *Axina atmis*. The type material of this species is restricted to the holotype collected in 1974 in the Brazilian state of Bahia and the final deposition location is Florida State Collection of Arthropods, Division of Plant Industry, United States of America. Rafael *et al*. (2009) recommended the creation of a Brazilian committee of supervision for Consulting foreign institutions about the type material collected in Brazil after 1969 and negotiate their return to Brazil. However, this referred committee was never created and the deposition problem remain until present days.

Brazil is divided in 26 States plus a Federal District. By analyzing the number of species authorship produced per each Brazilian State (accounting only authors residing in Brazil), we found out that Southern and Southeastern States dominated the number of new species in 2020, in special in decreasing order the states of São Paulo, Paraná, Rio de Janeiro and Minas Gerais (Figure 7). Other States that appear outstanding in number of authorships of described species is Mato Grosso at the Midwest region and the Amazonas at the North region, with the latter placing third among total number of authorships and being an outlier of the South-Southeast axis of publication (Figure 7). Only the Brazilian states of Acre and Amapá had no authors in 2020 (Figure 7). Marques & Lamas (2006) analyzed the total number of Hexapoda publications in Brazil between the years of 2000-2005 and found 863 articles with the following distribution by Brazilian states: São Paulo (309 articles), Minas Gerais (150 articles), Rio de Janeiro (120 articles), Paraná (72 articles), Distrito Federal (40 articles), Amazonas (32 articles). Although the year of 2020 is only a time glimpse, it has reflected the same tendency found in 2006 by the abovementioned authors, with some modifications in the ranking of number of Hexapoda articles produced, but maintaining the South and Southeastern region as the focus of this production. In 2020, the Amazonas placed third and the Mato Grosso shifted from 10th to fifth place. Furthermore, Marques & Lamas (2006) also pointed out that the South region and Southeast region also dominated the number of citations with 77% of the total citations of Hexapod articles published between 2000/2005 (see Table 8 in Marques & Lamas 2006).

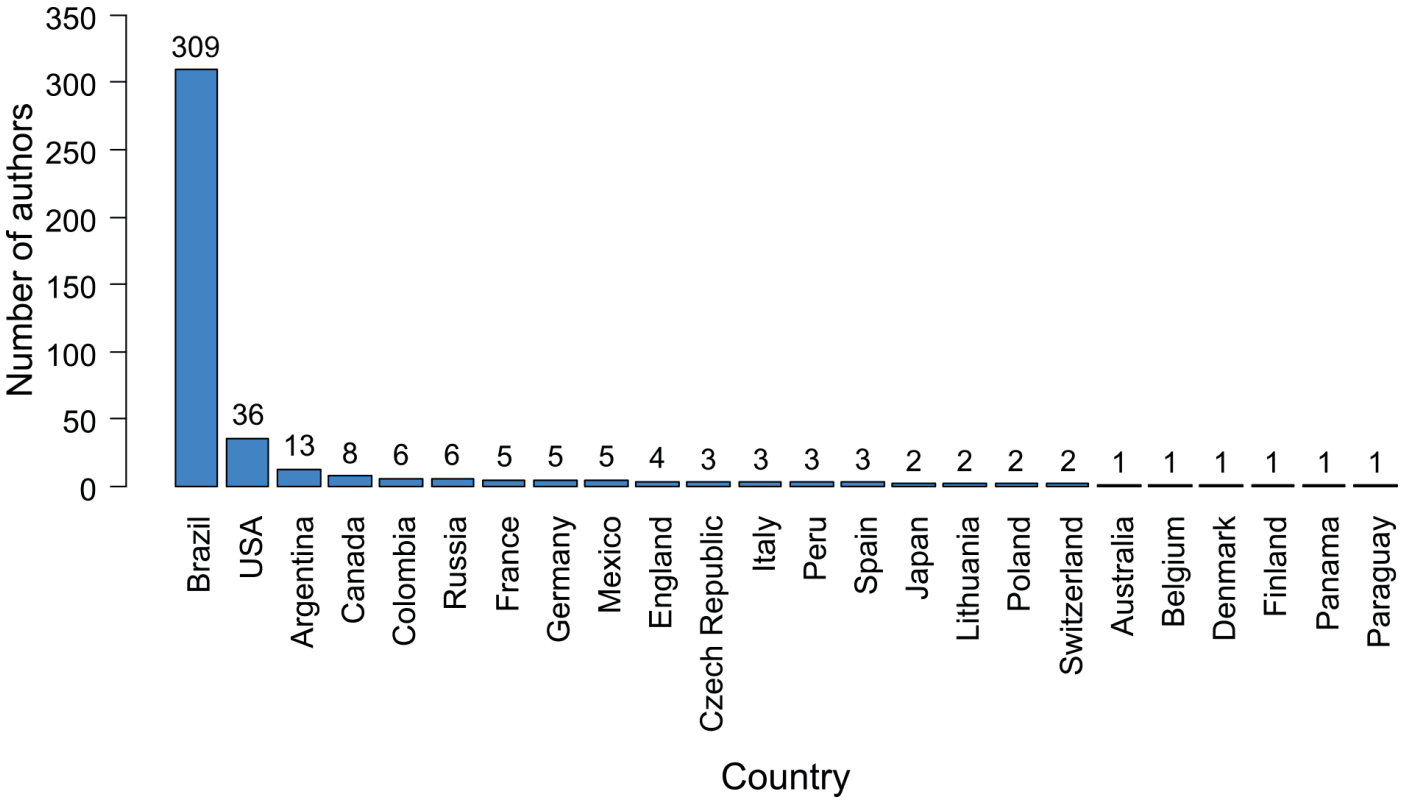

Figure 5. Number of authors of Brazilian Hexapoda species described in 2020 distributed by countries in which they reside.

By refining the authorship fixation in 2020 by Brazilian institutions, we could detail and better understand the ranking of authorship production by Brazilian States per regions. Among the top 10, four are housed at Southeast region (*Universidade de São Paulo* (USP), *Universidade Federal do Rio de Janeiro* (UFRJ), *Universidade Federal de Lavras* (UFLA) and *Universidade Federal do Espiríto Santo* (UFES)) and two at South region (*Universidade Federal do Paraná* (UFPR) and *Universidade Federal do Rio Grande do Sul* (UFRGS)) (Figure 8), demonstrating the focus on South/Southeast abovementioned. The USP (Southeast, São Paulo) leads the rank with 181 authorships, followed by the UFPR (South, Paraná) with 167 authorships, *Instituto Nacional de Pesquisas da Amazônia*/INPA (North, Manaus) with 149 authorships, UFRJ (Southeast, Rio de Janeiro) with 78 authorships and placing fifth the *Universidade Federal do Mato Grosso*/UFMT (Midwest, Mato Grosso) with 74 authorships (Figure 8). The *Empresa Brasileira de Pesquisa Agropecuária*/EMBRAPA appears at sixth place, although it is a national institution with several headquarters throughout Brazil and for that reason, we did not consider it from any State or Region of Brazil. Among the top 10, only one institution represents the northeast of Brazil, the *Universidade Federal do Rio Grande do Norte* (UFRN) with 26 authorships.

Another interesting data comes from USP and UFRJ. Both Universities have several campi spread among different cities of each respective State, meaning that there more than one group of research working with Hexapoda. However, if probe into the 181 authorships of the USP, 85 of them were prevenient from the *Museu de Zoologia* da USP (MZSP) campus, while 40 out of the 78 authorships of the UFRJ came

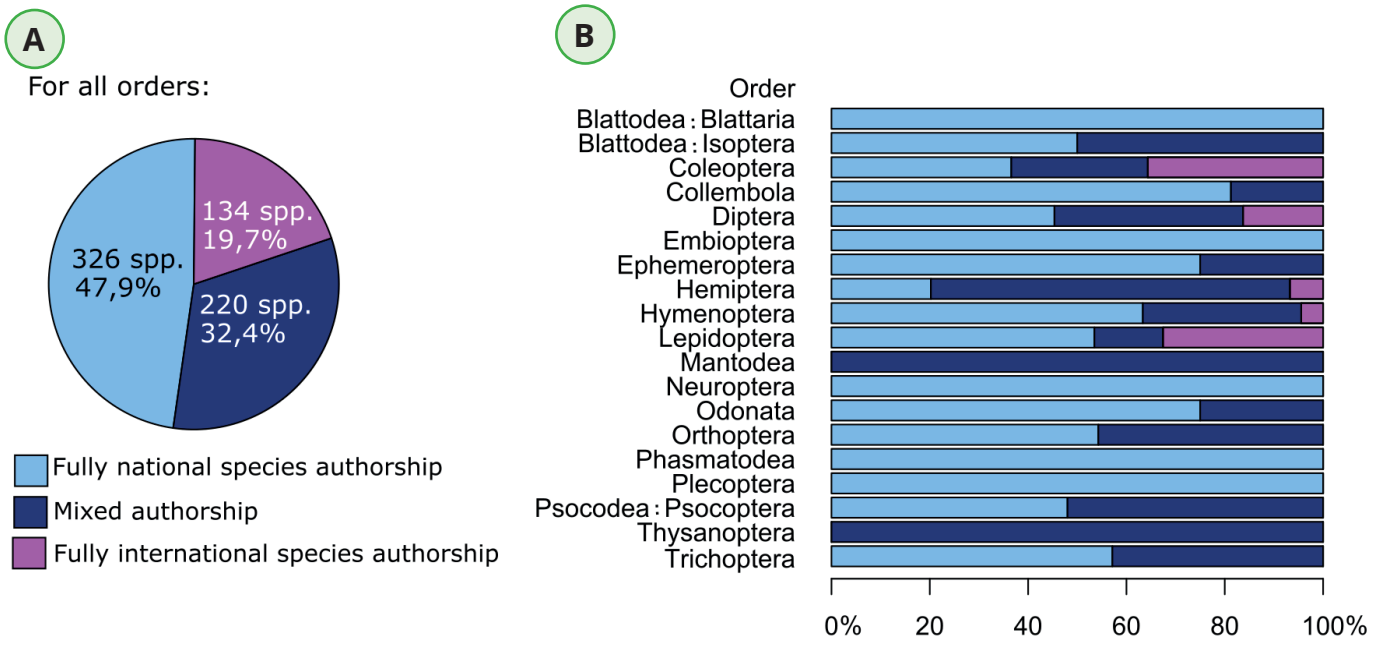

Figure 6. 6A. Number of new Brazilian Hexapoda species described in 2020 by authors or coauthors fixed in Brazil or outside it. **6B**. Percentage of new Brazilian Hexapoda species described in 2020 by order in relation to author residence in/out of Brazil.

from the *Museu Nacional* campus of the UFRJ, demonstrating a big importance and large positive correlation between entomological collections and museums with the taxonomic production of Hexapoda in 2020. The MZSP only has five Hexapoda taxonomists hired with stable jobs, what would mean a production of 17 authorships by each researcher if we consider de production of 2020 (85 authorships / 5 researchers), a mean way higher than that inferred by Aguiar *et al*. (2009) of three species per year. However, this assumption does not take in account that there are species which share authorship among the MZSP researchers and that a large portion of the MZSP production is made by postgrad students of the entomology course (masters, doctorship and post doctoral), which are mentored by these five researchers and therefore are also indirect results.

Another curious data found by Marques & Lamas (2006) was that the geographical distribution of the taxonomists (not only for Hexapoda) living in Brazil is unequal, mostly focused on the Southeastern region (47.7% of the researchers) and South (20.7%), followed by Northeast (14.2%), North (13.3%) and then Midwest (4.1%). Currently, there is no update on the data presented above, however there are several congruences between our data and several from Marques & Lamas (2006) and thus we infer that this regional distribution of researchers still exists and that this possibly explains the difference of authorship productions among Brazilian States and Regions. Hipólito *et al*. (2021) by gathering data from master dissertations and doctoral thesis from all areas of entomology (not only taxonomy) from all graduation courses across Brazil that are recognized by the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES) between 1987 and 2019, mentioned that a large part of the production was done by persons living at the Southeast, corresponding around 33% of the total production. Our results were congruent with both studies regarding the most productive region in terms of describing Brazilian insect species.

The 680 described species were published in 219 articles from 54 different journals (Figures 9, 10). Among these journals, 39 have Impact Factor (IF) and 15 do not have it (Figure 10). The IF varied between 0.438 to 5.133 (Figure 11) and represent a total of 560 species described in 177 articles (Figures 9, 10). The journals without IF, on the other hand, account for 120 described species distributed in 42 different articles (Figures 9, 10). The IF is one parameter to evaluate the importance a

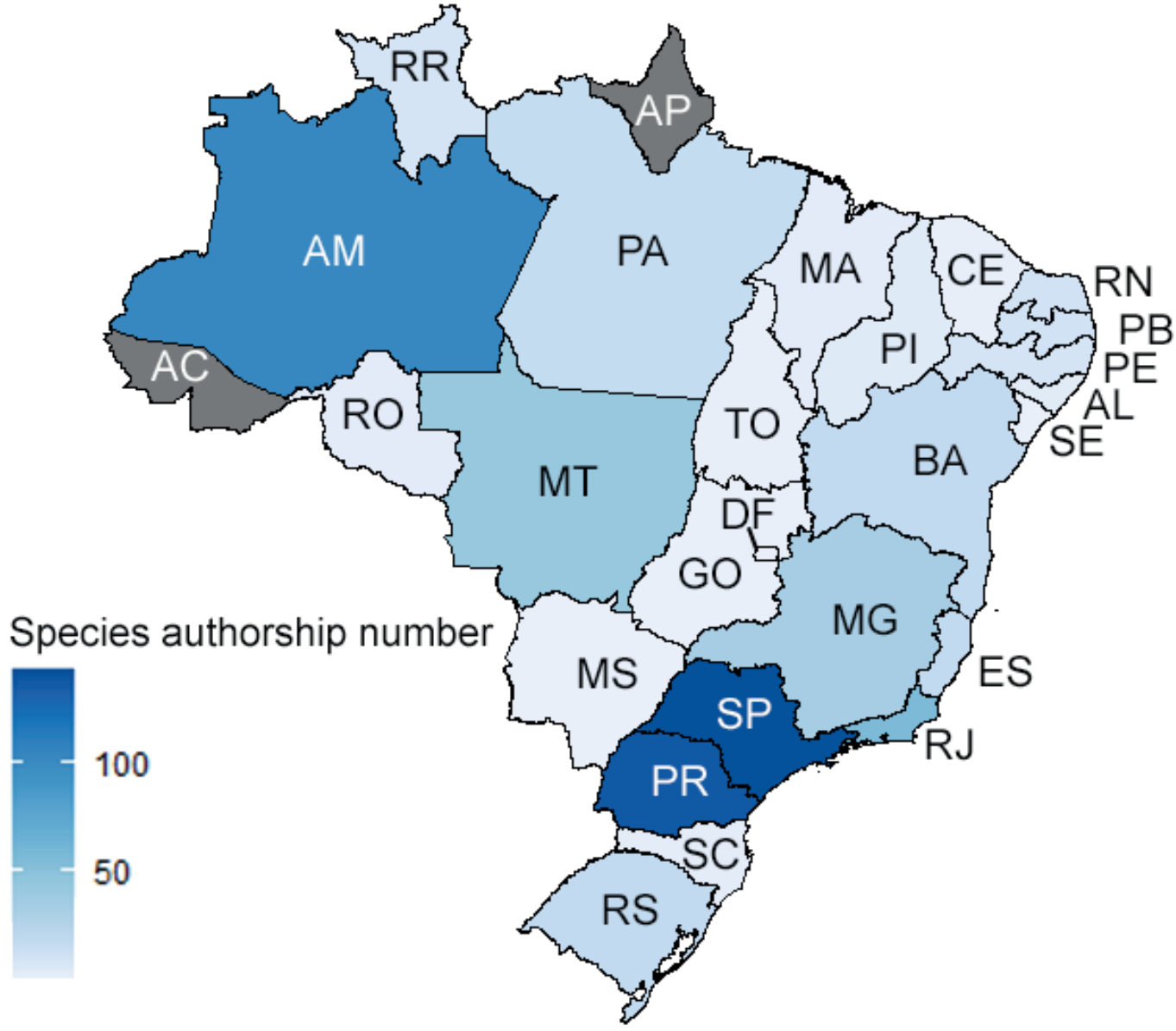

Figure 7. Number of Brazilian authorships of Hexapoda new species described in 2020 distributed by Brazilian States in which the authors reside. The darker the blue, the higher the number of authorships. States on gray mean no authorship for it. Abbreviations: AC- Acre, AM- Amazonas, RR- Roraima, RO-Rondônia, AP- Amapá, PA- Pará, TO- Tocantins, MT- Mato Grosso, MS- Mato Grosso do Sul, GO- Goiás, MA- Maranhão, PI- Piauí, CE- Ceará, RN- Rio Grande do Norte, PB- Paraíba, PE- Pernambuco, AL- Alagoas, SE- Sergipe, BA- Bahia, MG- Minas Gerais, ES- Espírito Santo, RJ- Rio de Janeiro, SP- São Paulo, PR- Paraná, SC- Santa Catarina e RS- Rio Grande do Sul.

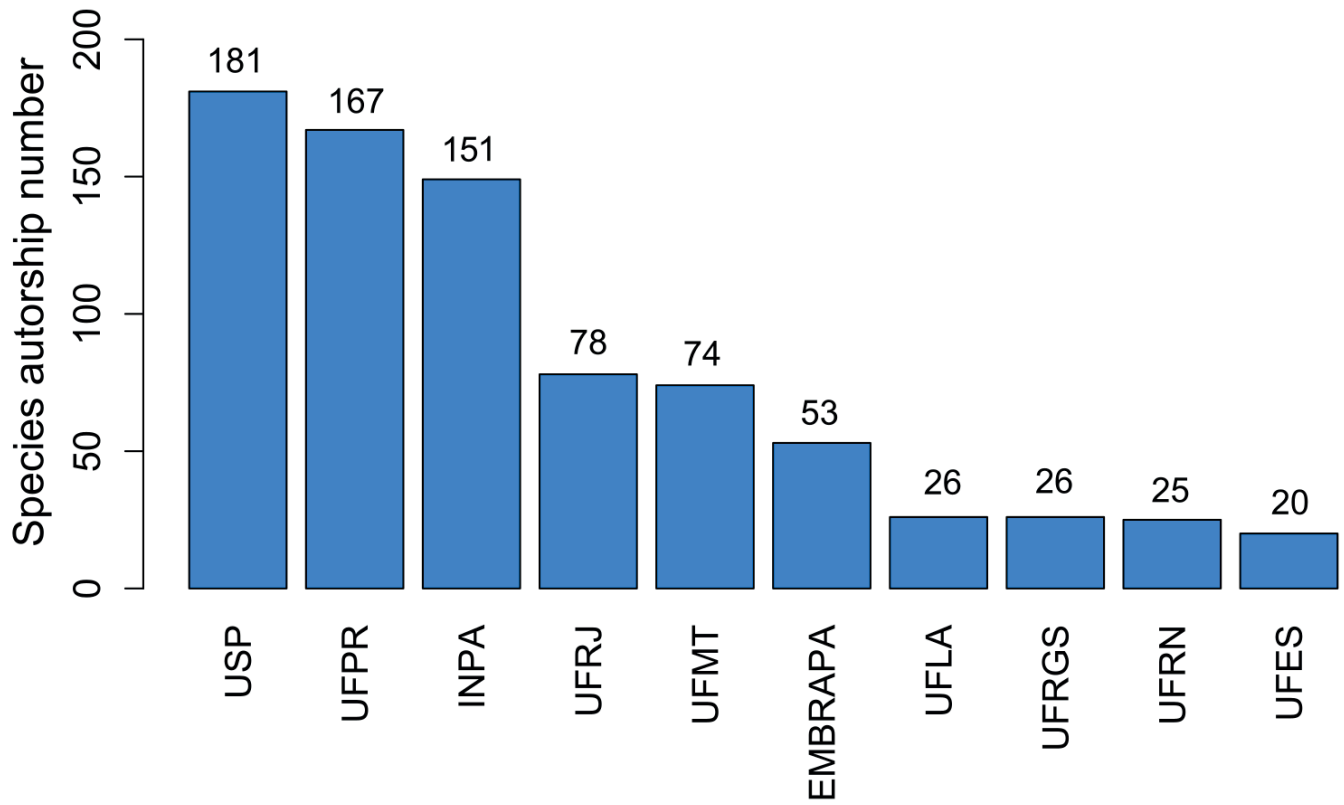

Figure 8. Number of Brazilian authorships of Hexapoda new species described in 2020 distributed by the top 10 Institutions on total number of described species in 2020. Abbreviations: EMBRAPA- *Empresa Brasileira de Pesquisa Agropecuária,* INPA- *Instituto Nacional de Pesquisas da Amazônia*, UFES- *Universidade Federal do Espiríto Santo*. UFLA- *Universidade Federal de Lavras*, UFMT- *Universidade Federal do Mato Grosso*, UFPR- *Universidade Federal do Paraná*, UFRJ- *Universidade Federal do Rio de Janeiro*, UFRGS- *Universidade Federal do Rio Grande do Sul*, UFRN- *Universidade Federal do Rio Grande do Norte*, USP- *Universidade de São Paulo*.

determined journal in its respective scientific field. In general terms, a high IF is related to the potential to impact a larger scientific community. However, as discussed below, the IF measure plays an obscure role in taxonomy.

Zootaxa (322 spp), ZooKeys (48 spp) and Papéis Avulsos de Zoologia (44 spp) dominate the total number of described species, representing 60.8% of all the Hexapoda species described in 2020 (Figure 9). Furthermore, the Zootaxa numbers represent 47.2% of all described species. Rafael *et al*. (2009) demonstrated that between 2001-2008, 886 (15.7%) out of 5,634 authors that published in Zootaxa were Brazilians; out of the 5,112 articles published in the same period, 820 (16%) had Brazilian authors, out of which 44.4% were from entomology.

Zootaxa is a scientific journal that works with an editorial policy that uses a hybrid model of publication, where the articles that are available in Open Access (OA) have the costs of their publications borne by the authors but are access is open to everyone, whilst the non-OA articles have the printing costs borne by the journal but are only available to journal subscribers. It is a widely recognized journal by the entirety of the zoo-taxonomist community, publishing new articles almost at a daily basis. In Zootaxa, there is also a possibility of publishing monographs, which are manuscripts with over 60 pages that besides receiving the traditional ISSN for articles, they also receive an ISBN, an index for books. Thus, 12 articles were published as Monographs in Zootaxa in 2020 (representing 13% of all Zootaxa published articles, totaling 1,155 published pages, dealing with 134 species). In other words, 41.6% of all species published in Zootaxa were published in 12 monographs. Despite having some advantages over other journals, we found that of the 95 articles published in Zootaxa, only two were published in the OA format (2.1% of the articles). Most likely, the fact that Zootaxa publishes articles at no cost to authors (non-OA articles), as well as the fact that it publishes extensive monographs (not available in several journals), may be important factors in the authors' choice when submitting articles of the taxonomic nature.

Controversially, Zootaxa was excluded from the JCR (Journal of Citations Report) in 2020 by Clarivate, on the argument that Zootaxa has a high number of self-citations (Clarivate Analytics 2020). However, after a brief time period filled with several appeals from the scientifical community, Clarivate reverted the decision of excluding Zootaxa and granted an IF of 0.949 (Oransky 2020). The importance of the IF has been widely questioned for articles dealing solely with taxonomy (Valdecasas *et al*. 2000; Ebach *et al*. 2011). Hoagland (1996) highlights the need of a more precise measurement of the intellectual production originated from taxonomy. Krell (2000) comments about the inapplicability of the IF in measure basic research on biodiversity, claiming that it is impossible to classify the taxonomic journals as more or less important than articles dealing with ecology. Furthermore, the decreasing number of purely taxonomic works in journals, associated with bad-practices of other areas of biological sciences which do not cite taxonomic works "correctly", result in a worrisome underestimation of the impact that taxonomy has over other areas of biology (Zeppelini *et al*. 2021).

Although it is recommended that author and year should be mentioned in the first text mention of a species name in a scientific work, the reference of the description of the species is often not included in the cited literature section. This way, a lot of taxonomic works end up underestimated in terms of citation, what consequentially does not influence (positively) the IF of the journals that publish these species. Vink *et al*. (2012) argue that the inclusion of full taxonomic references would increase the manuscript length in about a page in a half for most articles. Besides, for articles dealing with long

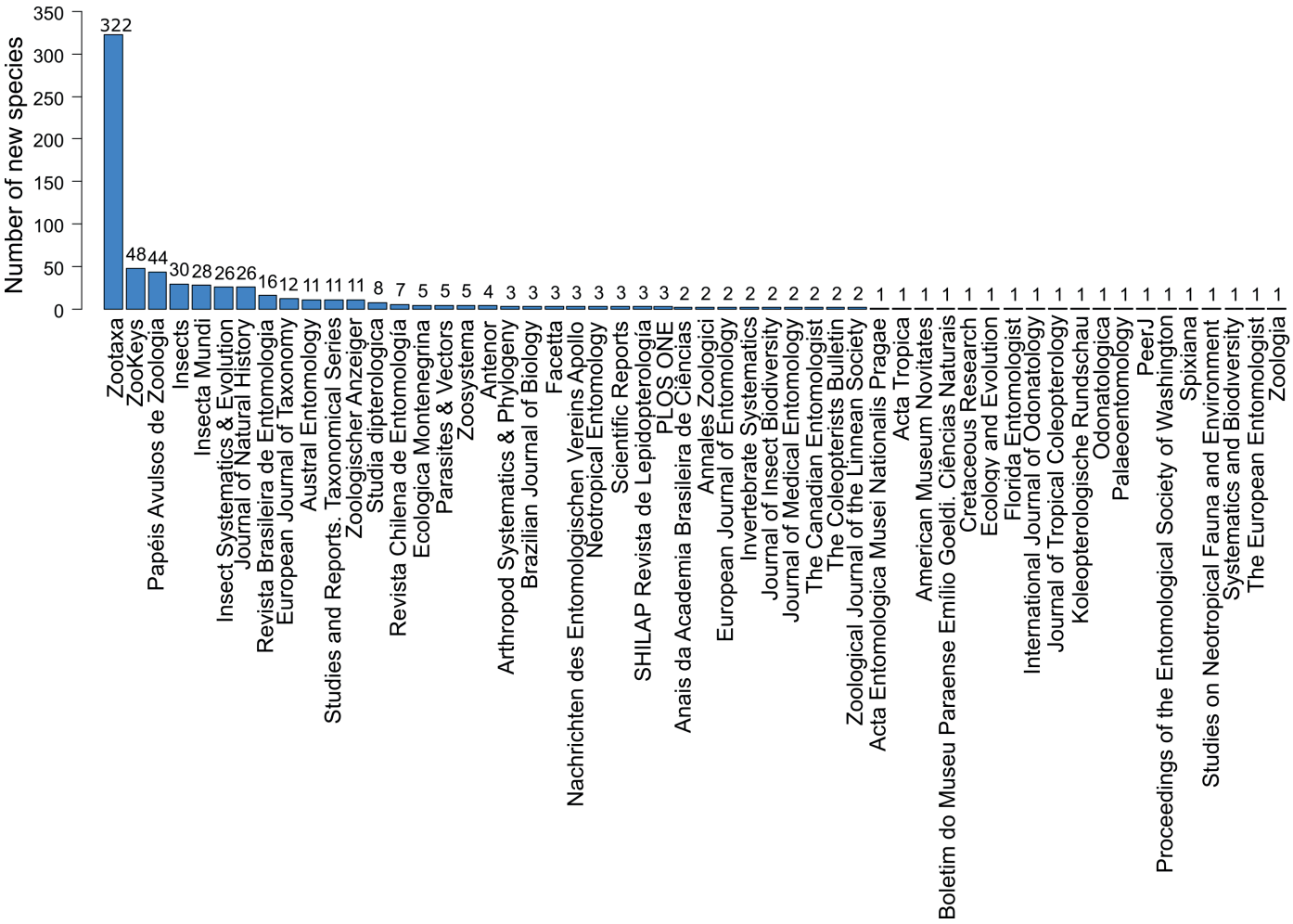

Figure 9. Number of new Brazilian Hexapoda species described in 2020 by journal where it was described.

species lists there are other ways of relating these references, such as the case of adding them in the supplementary material of the article (Zeppelini *et al*. 2021).

We verified that a journal having an IF might not be 100% determinant over author choices while searching for a journal, as the Papéis Avulsos de Zoologia (PAZ), a journal not indexed at WOS's database and hence without IF, placed third among the top 3 number of published articles and number of described species (Figures 9, 10). Other factors influenced the authors to choose this journal, such as the fact that PAZ is OA and does not have publication costs for the authors, being fully supported by funds of the Brazilian government (via USP).

In Figure 11, we verified that the mean IF of journals which published new species during the analyzed time period was of 1.4. This might be evidence of a sad reality for taxonomists: new species are hard to publish in journals with high IF. From all articles analyzed, only seven (totaling 14 published species) were published in journals with IF higher than three. Out of the seven abovementioned articles, five also involved phylogenies besides taxonomy (Garcia *et al*. 2020a; Guidoti *et al*. 2020; Policena *et al*. 2020; Supeleto *et al*. 2020b; Vaz *et al*. 2020a), one of them dealt with morphological and molecular taxonomy of a single species of health importance (Nascimento *et al*. 2020c), and another was a revision of several health important species (Sá *et al.* 2020). It is possible to notice that none of the seven articles published in journals with IF higher than three dealt solely with taxonomy, as they also had phylogeny or health importance among their subjects. In a certain way, the competitiveness of taxonomy is low when compared with other zoology areas (such as ecology, molecular, genetics and animal behavior). In those areas, authors have a higher chance of publishing in higher IF journals, as these areas are more likely to have citations.

Despite the IF and citing discrepancies with other scientific areas, taxonomy is of great strategic importance within the biological sciences. Taxonomy is based on the recognition of taxa, at specific or supra-specific levels, guiding the proposition of evolutionary interpretations for all organisms, from molecules to behavioral analyses; standardizes worldwide communication on taxa, providing unique names for each taxa across all known biodiversity; describes biodiversity; and provides the foundation for all decisions on environmental conservation (Rafael *et al*. 2009). The alienation about the importance of taxonomy as a basic science for countless other sciences is a huge mistake in times of great threats to natural biological resources, in which taxonomy is the most important tool for using and developing knowledge to combat the biodiversity crisis.

The lack of taxonomists, as well as funding for taxonomy as a strategic science, endangers the consumers of taxonomic products, which generally are non-taxonomists, but are consumers from the end of the chain, such as ecologists, conservationists or customhouse employees. As abovementioned and endorsed by Rafael *et al.* (2009), taxonomic articles should be measured in different ways, as IF is simply not fit to reflect the relevance of taxonomic contributions. The half-life index, which measures the average of how long an article keeps up being cited, associated with other indexes, is an option for a fairer evaluation of taxonomic works. It is a trade-off with low total amounts of citations, in contrast with works dealing with breakthrough novelties of new technologies or theories which have a high number of citations, but for a short period of time, as they are prone to be quickly replaced by new breakthroughs. Taxonomic works, on the other hand, keep being cited for hundreds of years.

Rafael *et al*. (2012) provided, in the preface, a table made by the respective specialists of the chapters of this book, with the

approximate numbers of species registered in Brazil for all orders of Hexapoda and also estimated what would be the real amount of species that should occur in Brazil in each one of the different orders. Diptera, for instance, has approximately 8,700 species recorded for Brazil, with estimations of over 60,000. Based on the estimations of Rafael *et al*. (2012) and

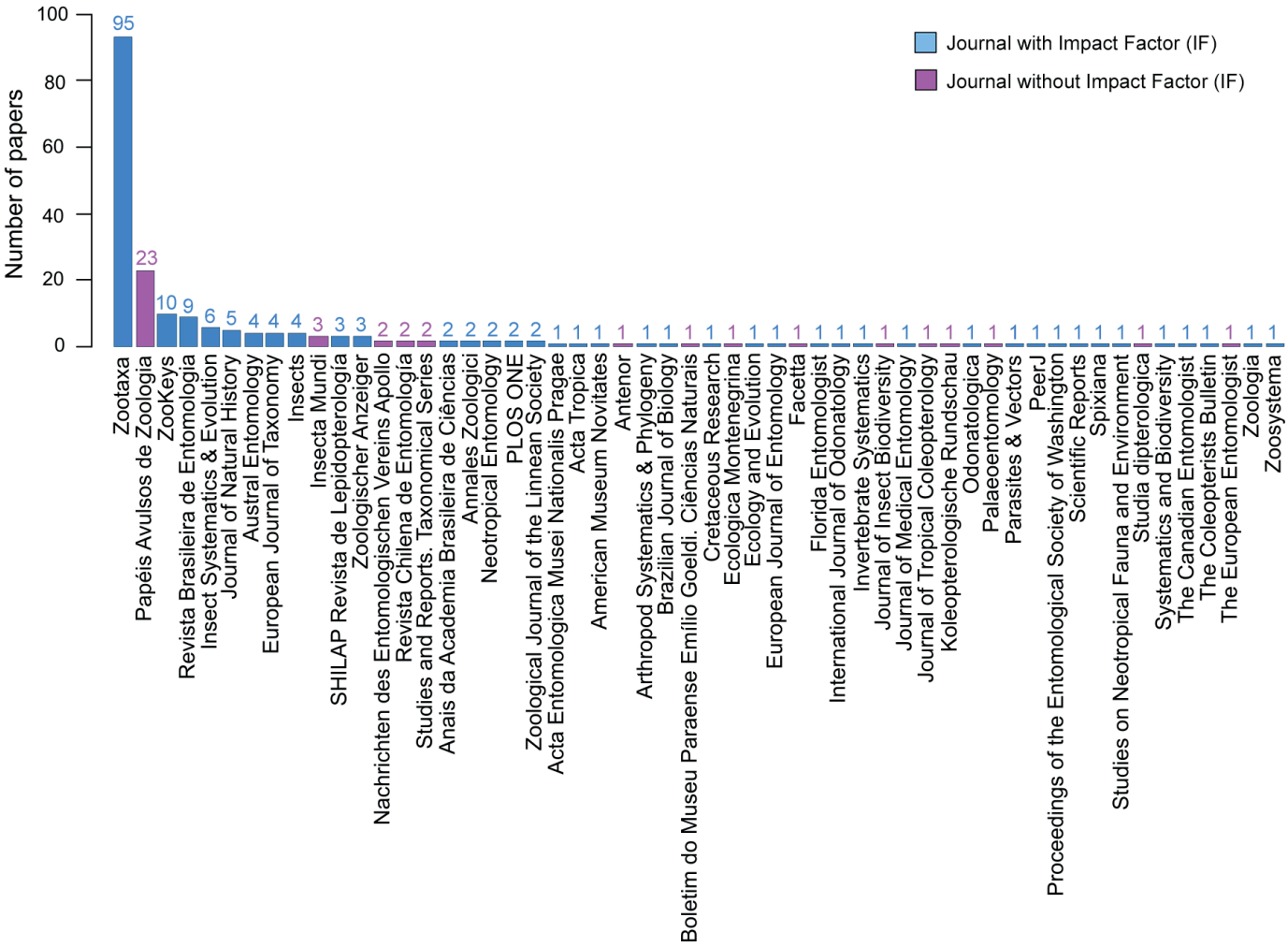

Figure 10. Number of articles contaning new Brazilian Hexapoda species described in 2020 distributed by journal where it was published.

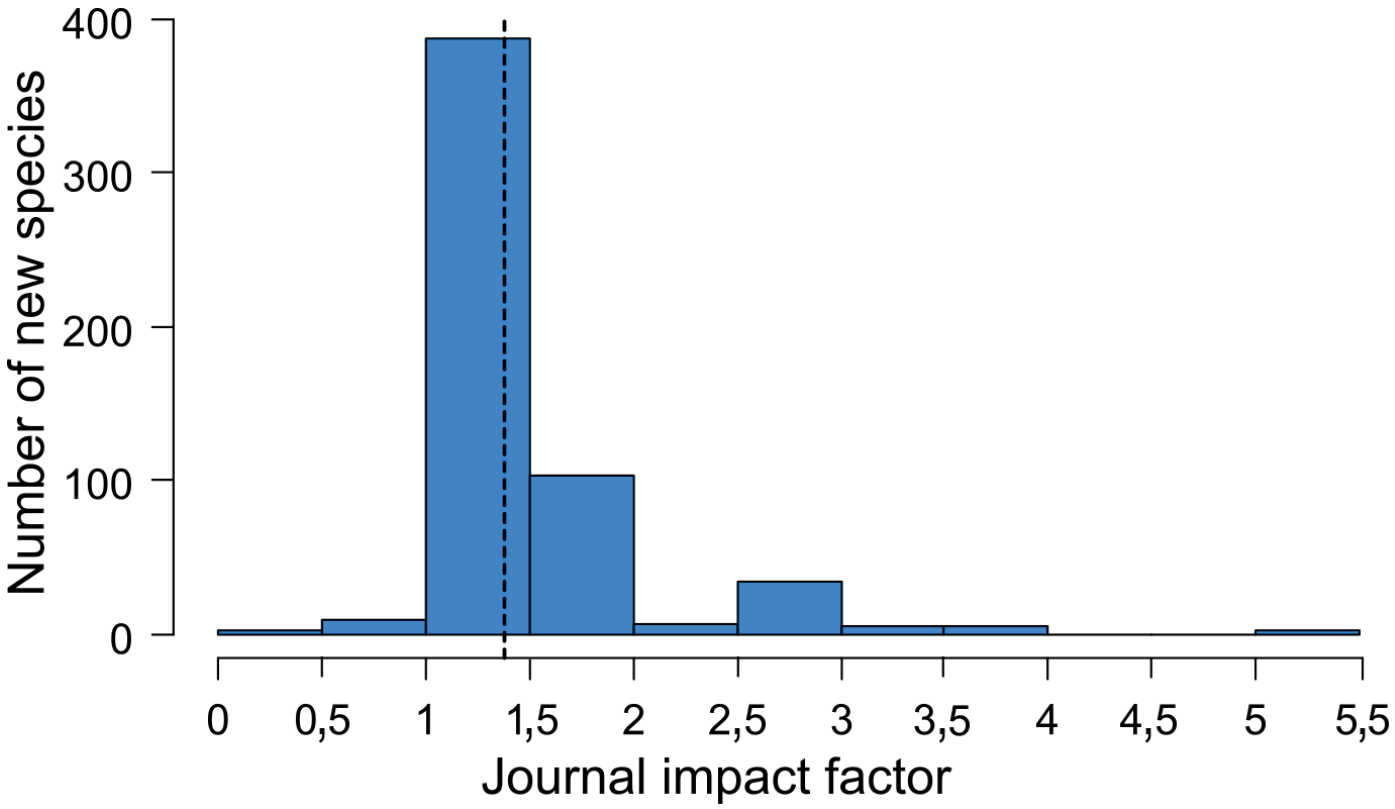

Figure 11. Number of new Brazilian Hexapoda species described in 2020 distributed by Impact Factor of the journals where these species were published. The dashed line represents the mean Impact Factor of all publications.

the updated data present at Boeger *et al*. (2022) of how many species are currently recorded in Brazil, we estimated how long would it take to completely describe all the species occurring in Brazil by Hexapoda order (considering the rhythm of publication recorded here for 2020 of orders which had at least one species described). In Orthoptera, for instance, it would take 89.7 years to completely describe the estimated 5,000 species (Figure 12). The calculus was made using the estimation minus the actual number of recorded species and the result divided by annual mean of 2020 of described species ((5,000 – 1,770) / 36 = 89.7).

Lepidoptera is the order that would take the longest period of time to completely have its species described (1,530 estimated years to cover the 80,000 estimated species). The estimations on Figure 12 are weak inferences made on a single year of Brazilian production, without taking into account new record of species. The more we produce annuaries of Brazilian Hexapoda species in the following years, the more accurate data we acquire and, hence improve the predictions provided on Figure 12.

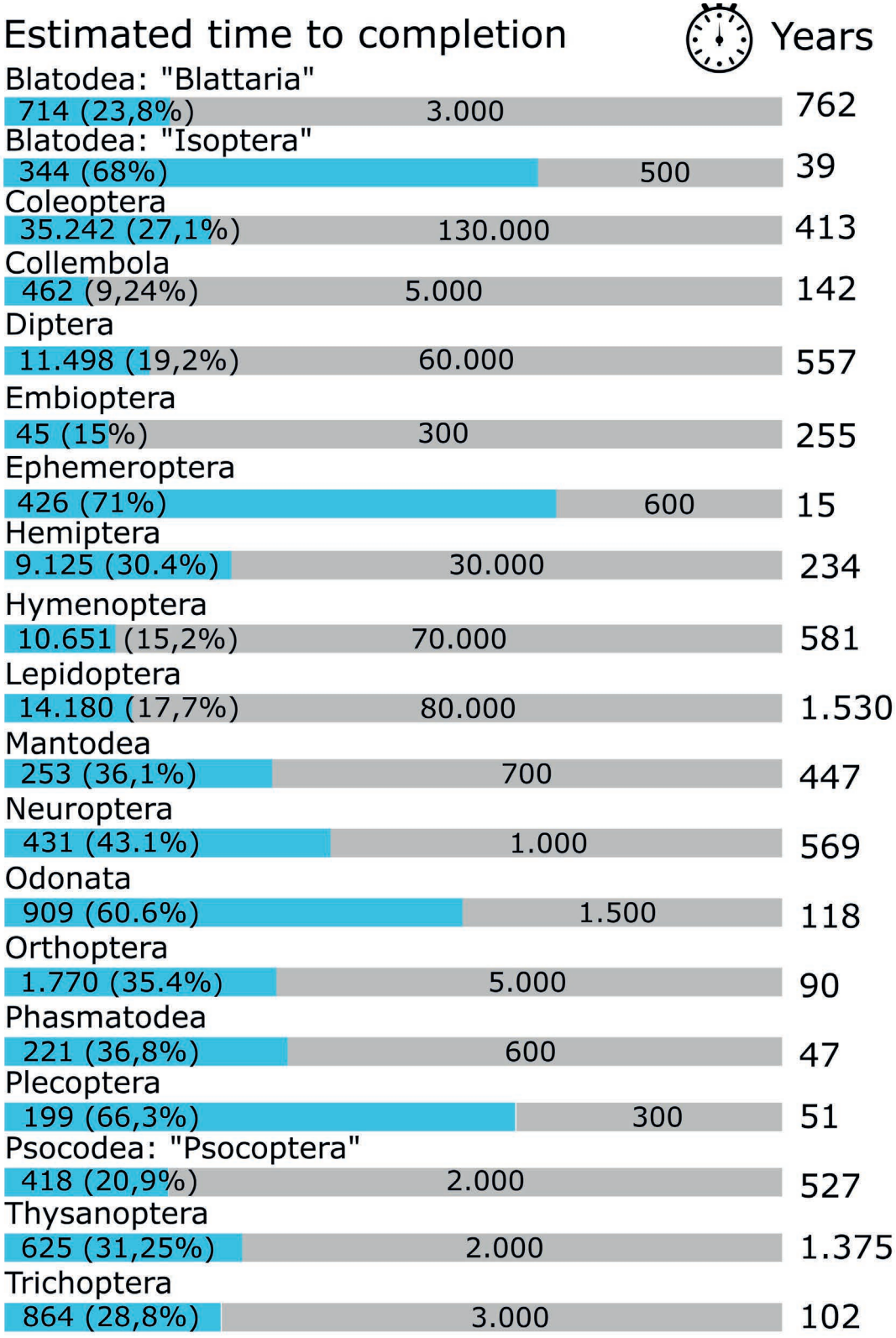

Figure 12. Infographic of estimated time to achieve full knowledge on the diversity of each Hexpoda Order in Brazil that had at least one species described in 2020. Numbers in blue are the number of recorded species in Boeger *et al*. (2022). Numbers in grey are the estimated number of species occurring in Brazil made by Rafael *et al*. (2012). Percentages in parenthesis are how much the number of recorded species by Boeger *et al*. (2022) represents the estimations made by Rafael *et al*. (2012).

Rafael *et al*. (2012) recorded 90,269 Hexapoda species in Brazil. Curiously, Boeger *et al*. (2022) with more precise numbers cite 89,317 recorded species. This means a downgrade of 1% in the total number of species recorded in Brazil throughout these ten years apart from each study. This difference may be explained by the combination of two factors: 1) several new synonymies were proposed as taxonomy advanced and 2) the records in Boeger *et al*. (2022) is an ongoing task, meaning that it is not yet finished and is constantly changing. Rafael *et al*. (2012) estimated a total of 400,700 Hexapoda species in Brazil. If we divided this number by the annual production of 2020 and consider that this number is close to the reality of how many species are produced in Brazil per year, then we would need 448 years to fully cover the estimated number of species made by Rafael *et al*. (2012).

The World was caught up on surprise by the Covid-19 pandemic which must have affected the species description process. How much this event affected the Brazilian production of new species is an open question that can only be answered with the production annuaries from previous years, such as for 2019 which is already in production by the present authors, and from upcoming of 2021 onwards. This way we will be able to measure the effects of natural events and public policies on the development of taxonomy in Brazil.

This work is an important and unprecedented contribution to the taxonomy of Brazilian Hexapoda, as it brings to light real and reliable figures on the Brazilian production of new species of Hexapoda in a given year, as well as all other analyzes extracted from these data in relation to the specialists who are behind this production and also on the journals in which these data are being published. With more precise and real numbers, such as the presented here and on the Taxonomic Catalog of Brazilian Fauna (Boeger *et al*. 2022), it is possible to make more precise decisions on public funding for taxonomy, aiming to diminish the abyss of the lack of knowledge about the Brazilian Hexapoda. Furthermore, the data provided here is able to promote several improvements for Brazilian taxonomy and taxonomists.

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