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The Bees of Costa Rica and its Representation in two National Collections

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Review Article

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Abstract

For decades, scientific studies related to wildlife have been little reviewed for national inventories, with birds and mammals being the only faunal groups that have official lists and specific numbers. Although it is true that species of insects and other invertebrates appear constantly, this is not an excuse for not having official lists of species reported for science. In this review, a total of 507 were found for Costa Rica, 7 of Andrenidae, 299 of Apidae, 30 of Colletidae, 106 of Halictidae and 65 of Megachilidae. Any other species outside of this list that has been found, collected in Costa Rican territory and is not on this list is a new report.

Keywords: Bumble Bees; Carpenter Bees; Cucu Bees; Stingless Bees; Oil Bees; Orchid Bees; Solitary Bees

Abbreviations

MNCR: National Museum of Costa Rica; MIUCR: Insect Museum of the Faculty of Agronomy of the University of Costa Rica.

Introduction

The question that the public always asks us biologists is about the number of species, whether from a particular place or in general for science; however, this question always takes us off base because we only have inaccurate estimates that leave the public with doubts. At the National Museum of Costa Rica (MNCR) there is a consultation portal to which the public has access, in order to establish an interaction between society and science, but these questions about exact numbers are often not correctly addressed, and the reason is very simple: unlike other groups, such as ornithologists, who keep exact lists that they update and review annually, in Costa Rica there is no society, institution or group that keeps these numbers for the bee group.

This work responds to the need expressed by many bee lovers in Costa Rica, who although they are not scientists, seek a checklist and an updated count. Likewise, for the research group, this represents an exact and quantitative check list with which to refer.

Methodology

To generate the official list, it was necessary to review the scientific literature that mentioned data on location and distribution, namely the following texts were considered: Timberlake PH [1], Friese H [2], Moure [3], Friese [4], Sánchez-Ocampo [5], Snelling [6], Crawford [7], Snelling, et al. [8], Thiele [9], Ayala, et al. [10], Cockerell [11], LaBerge [12], Urban [13], Lutz, et al. [14], Rebêlo, et al. [15], Moure, et al. [16], Cresson [17], Tiberlake [18], Sánchez-Ocampo

[19], Sánchez-Ocampo [20], Camargo, et al. [21], Wille, et al. [22], Wille, et al. [23], Roubik, et al. [24], Wille [25], Onuferko [26], Rightmyer [27], Schrottky [28], Shanks [29], Smith [30], Friese [31], Dusmet, et al. [32], Friese [33], Michener, et al. [34], Engel, et al. [35], Engel [36], Engel [37], Engel, et al. [38], Engel [39], Engel [40], Engel [41], Hanson, et al. [42], Smith-Pardo [43], Brosi, et al. [44], Moure [45], Vachal [46], Roberts [47], Roberts RB, et al. [48], Crawford [49], Strand [50], McGinley RJ [51], McGinley RJ [52], Dumesh [53], Eickwort, et al. [54], Schwarz HF [55], Urban D [56], Urban D [57], Cockerell [58], Mitchell TB [59], Rocha-Filho, et al. [60], Rocha-Filho, et al. [61], Snelling [62], Mitchell TB [63] and Titus [64], Hinojosa-Días, et al. [65], Eltz, et al. [66].

After generating the list of species, the collections of the National Museum of Costa Rica (MNCR) and the Insect Museum of the Faculty of Agronomy of the University of Costa Rica (MIUCR) were reviewed in order to verify whether there were any species that had not been previously reported for the country. The review of the specimens from both museums was done manually, corroborating drawer by drawer the identification of the specimens present in both collections identified at the species level.

The following numerical indicators are used in the list to identify the species that meet these conditions:

- 1 ([1]) is given to the new reports for Costa Rica, made between 2023 and 2024 including this article.
- 2 ([2]) to the species whose distribution range includes Costa Rica, but the collection of a specimen of that species in national territory has not been officially reported (through a scientific publication), but it is not ruled out that there are specimens in other collections.
- 3 ([3]) is given to the species that up to the date of this publication are considered endemic to Costa Rica, because they have not yet been officially reported in another country, but again, this may be due to the fact that they have not yet been published.
- Species represented in the MNCR collection are marked with a 4 ([4]) and those represented in MIUCR with a 5 ([5]).

Results

A total of 507 species reported in the scientific literature were found, to which at least four new species of the genus Euglossa will be added in the near future, which are currently being described, and are not incorporated into the final list because they are not published.

Due to the existence of many taxonomic nomenclatures and divisions in use, especially for Apidae, the nomenclature of Michener CD [67] is used below, with the exception of the species of the tribe Meliponini, for which the nomenclature of Engel MS, et al. [68] is used:

National Bee Inventory

A. **Andrenidae**

1. *Andrena (Callandrena) discreta* Smith, 1879
2. *Calliopsis (Calliopsis) hondurasica* Cockerell, 1949
3. *Heterosarus parvulus* (Friese, 1916)
4. *Heterosarus setiger* Timberlake, 1977
5. *Pseudopanurgus carinulatus* (Moure, 1999)
6. *Pseudopanurgus costaricensis* (Friese, 1921)
7. *Pterosarus bidentis* (Cockerell, 1896)

B. **Apidae**

1. *Aglaomelissa duckei* (Friese, 1906)
2. *Apis mellifera* Linnaeus, 1758[4]
3. *Bombus (Fervidobombus) digressus* Milliron, 1962
4. *Bombus (Fervidobombus) mexicanus* Cresson, 1878
5. *Bombus (Fervidobombus) pullatus* Franklin, 1913
6. *Bombus (Fervidobombus) weisi* Friese, 1903
7. *Bombus (Pyrobombus) ephippiatus* Say, 1837
8. *Bombus (Robustobombus) volucelloides* Gribodo, 1892
9. *Centris (Acritocentris) agilis* Smith, 1874
10. *Centris (Aphemisia) agiloides* Snelling, 1984
11. *Centris (Aphemisia) plumipes* Smith, 1854[1,4]
12. *Centris (Aphemisia) scutellata* Friese, 1900
13. *Centris (Centris) adani* Cockerell, 1949[4]
14. *Centris (Centris) aethiocesta* Snelling, 1984[4]
15. *Centris (Centris) aethyctera* Snelling, 1974[4,5]
16. *Centris (Centris) flavifrons* (Fabricius, 1775)[1,5]
17. *Centris (Centris) flavofasciata* Friese, 1899[1,5]
18. *Centris (Centris) obscurior* Michener, 1954[4]
19. *Centris (Centris) varia* (Erichson, 1849)[4,5]
20. *Centris (Hemisiella) facialis* Mocsáry, 1899[4]
21. *Centris (Hemisiella) nitida* Smith, 1874[4]
22. *Centris (Hemisiella) trigonoides* Lepeletier, 1841[4]
23. *Centris (Hemisiella) vittata* Lepeletier, 1841[4]
24. *Centris (Heterocentris) analis* (Fabricius, 1804)[4]
25. *Centris (Heterocentris) bicornuta* Mocsáry, 1899[1,4]
26. *Centris (Heterocentris) difformis* Smith, 1854
27. *Centris (Heterocentris) labrosa* Friese, 1899[4]
28. *Centris (Heterocentris) terminata* Smith, 1874[1]
29. *Centris (Melanocentris) erubescens* Friese, 1925
30. *Centris (Melanocentris) melanochlaena* Smith, 1874[4]
31. *Centris (Ptilocentris) festiva* Smith, 1854[4]
32. *Centris (Trachina) fuscata* Lepeletier, 1841
33. *Centris (Trachina) heithausi* Snelling, 1974
34. *Centris (Trachina) labiata* Friese, 1904
35. *Centris (Trachina) longimana* Fabricius, 1804[4]
36. *Centris (Trachina) proxima* Friese, 1899
37. *Centris (Trachina) similis* (Fabricius, 1804)[4]
38. *Centris (Trachina) vidua* Mocsáry, 1899
39. *Centris (Trichocentris) atripes* Mocsáry, 1899
40. *Centris (Xanthemisia) bicolor* Lepeletier, 1841
41. *Centris (Xanthemisia) carolae* Snelling, 1966
42. *Centris (Xanthemisia) lutea* Friese, 1899[4]

43. *Cephalotrigona zexmeniae* (Cockerell, 1912)[4,5]
44. *Ceratina alpestre* Friese, 1910
45. *Ceratina (Calloceratina) chloris* (Fabricius, 1804)
46. *Ceratina (Calloceratina) currani* Schwarz, 1934
47. *Ceratina (Calloceratina) dimidiata* Friese, 1910
48. *Ceratina (Calloceratina) eximia* Smith, 1862
49. *Ceratina (Ceratinula) aenescens* Friese, 1916
50. *Ceratina (Ceratinula) auriviridis* Smith, 1907
51. *Ceratina (Ceratinula) buscki* Cockerell, 1919[1]
52. *Ceratina (Ceratinula) fumipennis* Friese, 1916[3]
53. *Ceratina (Ceratinula) rectangulifera* Schwarz & Michener, 1954
54. *Ceratina (Ceratinula) singularis* Friese, 1916[3]
55. *Ceratina (Ceratinula) trimaculata* Friese, 1916
56. *Ceratina (Crewella) aeneiceps* Friese, 1916[3]
57. *Ceratina (Crewella) claripennis* Friese, 1916[3]
58. *Ceratina virescens* Friese, 1910
59. *Ceratina (Zadontomerus) abdominalis* Smith, 1907[3]
60. *Ceratina (Zadontomerus) ignara* Cresson, 1878
61. *Ceratina (Zadontomerus) nigriventris* Friese, 1916
62. *Coelioxoides punctipennis* Cresson, 1878
63. *Ctenioschelus chalcodes* Thiele, 2005
64. *Ctenioschelus goryi* (Romand, 1840)
65. *Deltoptila costaricensis* (Friese, 1916)
66. *Dolichotrigona schulthessi* (Friese, 1900)[4]
67. *Epeolus luteipennis* Friese, 1916
68. *Epicharis (Epicharis) angulosa* Snelling, 1984[4]
69. *Epicharis (Epicharis) bova* Snelling, 1984
70. *Epicharis (Epicharis) elegans* Smith, 1861
71. *Epicharis (Epicharis) rustica* (Olivier, 1789)
72. *Epicharis (Epicharoides) albofasciata* Smith, 1874
73. *Epicharis (Epicharoides) maculata* Smith, 1874[4]
74. *Epicharis (Hoplepicharis) fasciata* Lepeletier & Serville, 1828
75. *Epicharis (Hoplepicharis) lunulata* Mocsáry, 1898[4]
76. *Epicharis (Parepicharis) metatarsalis* Friese, 1899
77. *Eufriesea anisochlora* (Kimsey, 1977)[1,4]
78. *Eufriesea chrysopyga* (Mocsáry, 1898)
79. *Eufriesea coerulescens* (Lepeletier, 1841)
80. *Eufriesea concava* (Friese, 1899)[4,5]
81. *Eufriesea corusca* (Kimsey, 1977)[1,4]
82. *Eufriesea lucifera* Kimsey, 1977
83. *Eufriesea mexicana* (Mocsáry, 1897)[4]
84. *Eufriesea macroglossa* (Moure, 1965)[4]
85. *Eufriesea mussitans* (Fabricius, 1787)[2,4]
86. *Eufriesea nigrescens* (Friese, 1923)
87. *Eufriesea ornata* (Mocsáry, 1896)
88. *Eufriesea pallida* (Kimsey, 1977)[1,4]
89. *Eufriesea pulchra* (Smith, 1854)
90. *Eufriesea purpurata* (Mocsáry, 1896)
91. *Eufriesea rufocauda* (Kimsey, 1977)[1,4]
92. *Eufriesea rugosa* (Friese, 1899)
93. *Eufriesea schmidtiana* (Friese, 1925)[4,5]
94. *Eufriesea surinamensis* (Linnaeus, 1758)[4]
95. *Euglossa (Dasystilbe) obrima* (Hinojosa-Díaz, Melo and Engel, 2011)
96. *Euglossa (Euglossa) alleni* Moure, 1968
97. *Euglossa (Euglossa) azureoviridis* Friese, 1930[4]
98. *Euglossa (Euglossa) championi* Cheesman, 1929[4,5]
99. *Euglossa (Euglossa) cognata* Moure, 1970[2,4]
100. *Euglossa (Euglossa) cordata* (Linnaeus, 1758)
101. *Euglossa (Euglossa) cybelia* Moure, 1968[4,5]
102. *Euglossa (Euglossa) deceptrix* Moure, 1968[1,2,4,5]
103. *Euglossa (Euglossa) despecta* Moure, 1968[1,4]
104. *Euglossa (Euglossa) dilemma* Bembé & Eltz, 2011
105. *Euglossa (Euglossa) dissimula* Dressler, 1978[1,4]
106. *Euglossa (Euglossa) erythrochlora* Moure, 1968[2,4,5]
107. *Euglossa (Euglossa) hansoni* Moure, 1965[1,4,5]
108. *Euglossa (Euglossa) hemichlora* Cockerell, 1917
109. *Euglossa (Euglossa) heterosticta* Moure, 1968[4]
110. *Euglossa (Euglossa) igniventris* Friese, 1925[4,5]
111. *Euglossa (Euglossa) maculilabris* Moure, 1968[4,5]
112. *Euglossa (Euglossa) micans* Dressler, 1978
113. *Euglossa (Euglossa) milenae* Bembé, 2007
114. *Euglossa (Euglossa) mixta* Friese, 1899 [4,5]
115. *Euglossa (Euglossa) purpurea* Friese, 1899[4,5]
116. *Euglossa (Euglossa) townsendi* Cockerell, 1904[1,4]
117. *Euglossa (Euglossa) tridentata* Moure, 1970[4,5]
118. *Euglossa (Euglossa) variabilis* Friese, 1899[4,5]
119. *Euglossa (Euglossa) viridissima* Friese, 1899[4,5]
120. *Euglossa (Euglossella) cyanura* Cockerell, 1917[4]
121. *Euglossa (Glossura) allosticta* Moure, 1969[1,2,4,5]
122. *Euglossa (Glossura) asarophora* Moure & Sakagami, 1969[1,4,5]
123. *Euglossa (Glossura) flammea* Moure, 1969[4,5]
124. *Euglossa (Glossura) ignita* Smith, 1874[5]
125. *Euglossa (Glossura) imperialis* Cockerell, 1922[4,5]
126. *Euglossa (Glossurella) bursigera* Moure, 1970[1,4,5]
127. *Euglossa (Glossurella) crassipunctata* Moure, 1968[1,4]
128. *Euglossa (Glossurella) dodsoni* Moure, 1965[4,5]
129. *Euglossa (Glossurella) gorgonensis* Cheesman, 1929[4,5]
130. *Euglossa (Glossurella) oleolucens* Dressler, 1978[4]
131. *Euglossa (Glossurella) sapphirina* Moure, 1968[4,5]
132. *Euglossa (Glossurella) turbinifex* Dressler, 1978[1,4]
133. *Eulaema (Apeulaema) cingulata* (Fabricius, 1804)[4,5]
134. *Eulaema (Apeulaema) nigrita* Lepeletier, 1841[4,5]
135. *Eulaema (Apeulaema) polychroma* (Mocsáry, 1899)[4,5]
136. *Eulaema (Apeulaema) speciosa* (Mocsáry, 1897)[4,5]
137. *Eulaema* (*Eulaema*) *bombiformis* (Packard, 1869)[4,5]
138. *Eulaema (Eulaema) leucopyga* Friese, 1898[4]
139. *Eulaema (Eulaema) luteola* Moure, 1967[4]
140. *Eulaema (Eulaema) meriana* (Olivier, 1789)[4,5]
141. *Eulaema (Eulaema) quadrifasciata* (Friese, 1903)
142. *Eulaema (Eulaema) seabrai* Moure, 1960[4,5]
143. *Eulaema (Eulaema) terminata* Smith, 1874
144. *Exaerete dentata* (Linnaeus, 1758)[4]
145. *Exaerete frontalis* (Guérin, 1844)[1,4]
146. *Exaerete smaragdina* (Guérin, 1844)[4,5]

147. *Exomalopsis (Exomalopsis) aequalis* Timberlake, 1980
148. *Exomalopsis (Exomalopsis) analis* Spinola, 1853
149. *Exomalopsis (Exomalopsis) badioventris* Timberlake, 1980
150. *Exomalopsis (Exomalopsis) compta* Timberlake, 1980[2]
151. *Exomalopsis (Exomalopsis) digressa* Timberlake, 1980
152. *Exomalopsis (Exomalopsis) fumipennis* Timberlake, 1980
153. *Exomalopsis (Exomalopsis) mellipes* Cresson, 1878
154. *Exomalopsis (Exomalopsis) otomita* Cresson, 1878
155. *Exomalopsis (Exomalopsis) planiceps* Smith, 1879
156. *Exomalopsis (Exomalopsis) pulchella* Cresson, 1865
157. *Exomalopsis (Exomalopsis) robertsi* Timberlake, 1980
158. *Exomalopsis (Exomalopsis) similis* Cresson, 1865
159. *Exomalopsis (Exomalopsis) subtilis* Timberlake, 1980
160. *Exomalopsis (Exomalopsis) tepaneca* Cresson, 1878
161. *Frieseomelitta nigra* (Cresson, 1878)
162. *Frieseomelitta paupera* (Provancher, 1888)[4]
163. *Gaesischia (Gaesischiana) exul* Michener, LaBerge & Moure, 195[1]
164. *Geotrigona chiriquiensis* (Schwarz, 1951)
165. *Geotrigona lutzi* Camargo & Moure, 1996[4]
166. *Leiopodus lacertinus* Smith, 1854
167. *Lestrimelitta danuncia* Oliveira & Marchi, 2005[4]
168. *Lestrimelitta mourei* Oliveira & Marchi, 2005
169. *Lophopedia apicalis* (Cresson, 1878)
170. *Lophopedia klugi* (Friese, 1899)
171. *Lophopedia pygmaea* (Schrottky, 1902)
172. *Melipona (Melikerria) beecheii* Bennett, 1831[4,5]
173. *Melipona (Melipona) yucatanica* Camargo, Moure & Roubik, 1988[5]
174. *Melissodes (Ecplectica) nigroaenea* (Smith, 1854)
175. *Melissodes (Eumelissodes) persimilis* Cockerell, 1949[1]
176. *Melissodes (Melissodes) tepaneca* Cresson, 1878
177. *Melipona (Meliponiella) carrikeri* Cockerell, 1919[4]
178. *Melipona (Michmelia) costaricensis* Cockerell, 1919[4]
179. *Melipona (Michmelia) panamica* Cockerell, 1912
180. *Melipona (Michmelia) fallax* Camargo & Pedro, 2008[4]
181. *Melitoma marginella* (Cresson, 1872)[1]
182. *Melitoma nudicauda* Cockerell, 1949
183. *Melitoma segmentaria* (Fabricius, 1804)
184. *Meliwillea bivea* Roubik, Lobo & Camargo, 1997[3,4]
185. *Mesoplia decorata* (Smith, 1854)[2]
186. *Mesoplia rufipes* (Perty, 1833)[1]
187. *Mesocheira bicolor* (Fabricius, 1804)
188. *Mesoplia rufipes* (Perty, 1833)[1.5]
189. *Mesoplia sapphirina* Melo & Rocha-Filho, 2011
190. *Monoeca mexicana* (Radoszkowski, 1884)
191. *Monoeca pyropyga* (Friese, 1925)
192. *Nannotrigona mellaria* (Smith, 1862)[4,5]
193. *Nannotrigona perilampoides* (Cresson, 1878)[4,5]
194. *Nasutopedia* morena Aguiar, 2018
195. *Nogueirapis costaricana* Ayala & Engel, 2014[3]
196. *Nogueirapis mirandula* (Cockerell, 1917)[4,5]
197. *Nomada confusa* Schwarz & Gusenleitner, 2004
198. *Nomada costaricensis* Schrottky, 1920[3,5]
199. *Nomada flavescens* Friese, 1916[3]
200. *Nomada nigrescens* Friese, 1921
201. *Nomada rugicollis* Friese, 1916
202. *Nomada xanthopus* Friese, 1921[3]
203. *Osiris atriventris* Friese, 1930[1]
204. *Osiris barrocoloradensis* Schwarz, 1934
205. *Osiris boliviensis* Friese, 1930
206. *Osiris fasciatus* (Radoszkowski, 1884)[1]
207. *Osiris marginatus* Cresson, 1878
208. *Osiris mourei* Michener, 1954
209. *Osiris panamensis* Cockerell, 1919
210. *Osiris stenolobus* Shanks, 1986
211. *Osiris tarsatus* Smith, 1879
212. *Oxytrigona daemoniaca* Camargo, 1984[4]
213. *Oxytrigona mellicolor* (Packard, 1869)[4,5]
214. *Paratetrapedia albilabris* (Friese, 1916)[3]
215. *Paratetrapedia bifrons* Aguiar & Melo, 2011
216. *Paratetrapedia calcarata* (Cresson, 1878)
217. *Paratetrapedia chocoensis* Aguiar & Melo, 2011
218. *Paratetrapedia connexa* (Vachal, 1909)
219. *Paratetrapedia flavescens* Aguiar & Melo, 2011
220. *Paratetrapedia moesta* (Cresson, 1878)
221. *Paratrigona guatemalensis* (Schwarz, 1938)[5]
222. *Paratrigona lophocoryphe* Moure, 1963[4,5]
223. *Paratrigona opaca* (Cockerell, 1917)[4,5]
224. *Paratrigona ornaticeps* (Schwarz, 1938)[4,5]
225. *Partamona grandipennis* (Schwarz, 1951)[4,5]
226. *Partamona musarum* (Cockerell, 1917)[4,5]
227. *Partamona orizabaensis (Strand, 1919)*[4]
228. *Peponapis apiculata* (Cresson, 1878)
229. *Peponapis crassidentata* (Cockerell, 1949)[5]
230. *Peponapis fervens* (Smith, 1879)
231. *Peponapis limitaris* (Cockerell, 1906)[5]
232. *Peponapis parkeri* Ayala & Griswold, 2012
233. *Peponapis utahensis* (Cockerell, 1905)[5]
234. *Plebeia franki* (Friese, 1900)
235. *Plebeia frontalis* (Friese, 1911)[4]
236. *Plebeia jatiformis* (Cockerell, 1912)[4,5]
237. *Plebeia mínima* Gribodo, 1893[4]
238. *Plebeia pulchra* Ayala, 1999[4]
239. *Plebeia tica* (Wille, 1969)[5]
240. *Ptilotrigona occidentalis* (Schulz, 1904)[4]
241. *Rhathymus acutiventris* Friese, 1906
242. *Scaptotrigona luteipennis* (Friese, 1902)[4,5]
243. *Scaptotrigona mexicana* (Guérin, 1844)[5]
244. *Scaptotrigona panamensis* (Cockerell, 1913)
245. *Scaptotrigona pectoralis* (Dalla Torre, 1896)[5]
246. *Scaptotrigona subobscuripennis* (Schwarz, 1951)[4,5]
247. *Scaptotrigona wheeleri* (Cockerell, 1913)
248. *Scaura argyrea* (Cockerell, 1912)[4]
249. *Tetragona perangulata* (Cockerell, 1917)[4]
250. *Tetragona ziegleri* (Friese, 1900)[4]

251. *Tetragonisca angustula* (Latreille, 1811)[4,5]
252. *Tetragonisca buchwaldi* (Friese, 1925)[4]
253. *Tetraloniella cacuminis* LaBerge, 2001
254. *Tetraloniella donata* (Cresson, 1878)
255. *Tetraloniella flavifasciata* (Cockerell, 1949)
256. *Tetraloniella fulvotecta* (Cockerell, 1949)*
257. *Tetraloniella perconcinna* (Cockerell, 1949)
258. *Tetrapedia diversipes* Klug, 1810
259. *Thalestria spinosa* (Fabricius, 1804)
260. *Thygater (Thygater) aethiops* (Smith, 1854)
261. *Thygater (Thygater) analis* (Lepeletier, 1841)
262. *Thygater (Thygater) cockerelli* (Crawford, 1906)
263. *Thygater* (*Thygater*) *crawfordi* Urban, 1967
264. *Thygater* (*Thygater*) *rubricata* (Smith, 1879)
265. *Trigona cilipes* (Fabricius, 1804)[4,5]
266. *Trigona corvina* Cockerell, 1913 [4,5]
267. *Trigona ferricauda* Cockerell, 1917[4,5]
268. *Trigona fulviventris* Guérin, 1844[4,5]
269. *Trigona fuscipennis* Friese, 1900[5]
270. *Trigona muzoensis* Schwarz, 1948[4]
271. *Trigona necrophaga* Camargo & Roubik, 1991[4]
272. *Trigona nigerrima* Cresson, 1878[4,5]
273. *Trigona silvestriana* (Vachal, 1908)[4]
274. *Trigonisca atomaria* (Cockerell, 1917)[5]
275. *Trigonisca discolor* (Wille, 1965)[4,5]
276. *Triepeolus antiguensis* Cockerell, 1949
277. *Triepeolus aztecus* (Cresson, 1878)
278. *Triepeolus cameroni* (Meade-Waldo, 1913)
279. *Triepeolus epeolurus* Rightmyer, 2004
280. *Triepeolus flavigradus* Rightmyer, 2008
281. *Triepeolus metatarsalis* (Friese, 1921)[3]
282. *Triepeolus osiriformis* (Schrottky, 1910)
283. *Triepeolus parkeri* Rightmyer, 2008[3]
284. *Triepeolus zacatecus* (Cresson, 1878)
285. *Trophocleptria fumipennis* (Say, 1837)
286. *Trophocleptria schraderi* Michener, 1954[3]
287. *Xenoglossa gabbii* (Cresson, 1878)[5]
288. *Xylocopa (Calloxylocopa) tenuata* Smith, 1874[5]
289. *Xylocopa (Megaxylocopa) fimbriata* Fabricius, 1804[4]
290. *Xylocopa (Megaxylocopa) frontalis* (Olivier, 1789)[4]
291. *Xylocopa (Megaxylocopa) nautlana* Cockerell, 1904[4]
292. *Xylocopa (Neoxylocopa) gualanensis* Cockerell, 1912[4,5]
293. *Xylocopa (Notoxylocopa) tabaniformis* Smith, 1854[4,5]
294. *Xylocopa (Schonnherria) barbatella* Cockerell, 1931[4]
295. *Xylocopa (Schonnherria) lateralis* Say, 1837[4]
296. *Xylocopa (Schonnherria) muscaria* (Fabricius, 1775)
297. *Xylocopa (Schonnherria) subvirescens* Cresson, 1879[4,5]
298. *Xylocopa (Schonnherria) viridis* Smith, 1854
299. *Xylocopa (Stenoxylocopa) strandi* Dusmet & Alonso, 1924[4]

C. **Colletidae**

1. *Chilicola (Anoediscelis) ashmeadi* (Crawford, 1906)[5]
2. *Colletes bruneri* Swenk, 1904[3]
3. *Colletes costaricensis* Friese, 1916
4. *Colletes niger* Swenk, 1904
5. *Colletes nigrior* Michener, 1954[2]
6. *Colletes spilopterus* Cockerell, 1917
7. *Crawfordapis crawfordi* (Cockerell, 1919)
8. *Crawfordapis luctuosa* (Smith, 1861)[1,4]
9. *Hylaeus (Hylaeana) costaricensis* (Friese, 1916)[3]
10. *Hylaeus (Hylaeana) panamensis* Michener, 1954[2]
11. *Hylaeus (Hylaeana) rufoclypeatus* (Friese, 1916)
12. *Hylaeus (Hylaeana) trivittatus* (Friese, 1916)[3]
13. *Hylaeus (Hylaeopsis) callosulus* Meade-Waldo, 1923[3]
14. *Hylaeus (Hylaeopsis) gualanicus* (Cockerell, 1912)
15. *Hylaeus (Hylaeopsis) maculosus* (Friese, 1921)[3]
16. *Hylaeus (Hylaeopsis) opaciventris* (Friese, 1925)[3]
17. *Hylaeus (Hylaeopsis) titanius* (Friese, 1925)[3]
18. *Ptiloglossa buchwaldi* Friese, 1908
19. *Ptiloglossa costaricana* Moure, 1945[3,4,5]
20. *Ptiloglossa eximia* (Smith, 1861)[1,4]
21. *Ptiloglossa fulvopilosa* (Cameron, 1903)[2]
22. *Ptiloglossa guinnae* Roberts, 1971[3]
23. *Ptiloglossa hoplopoda* Moure, 1989[1,4]
24. *Ptiloglossa mayarum* Cockerell, 1912[2,5]
25. *Ptiloglossa mexicana* (Cresson, 1878)[2,4]
26. *Ptiloglossa rugata* Moure, 1945[1,4]
27. *Ptiloglossa thoracica* (Fox, 1895)[1,4]
28. *Rhynchocolletes brevipes* (Friese, 1922)[3]
29. *Zikanapis* inbio (Michener, Engel & Ayala, 2003)[3]
30. *Zikanapis rozenorum* (Michener, Engel & Ayala, 2003)[3,4]

D. **Halictidae**

1. *Agapostemon (Agapostemon) aenigma* Roberts, 1972
2. *Agapostemon (Agapostemon) cockerelli* Crawford, 1901[5]
3. *Agapostemon (Agapostemon) texanus* Cresson, 1872
4. *Agapostemon (Notagapostemon) atrocaeruleus* Friese, 1916[5]
5. *Agapostemon (Notagapostemon) intermedius* Roberts, 1972
6. *Agapostemon (Notagapostemon) leunculus* (Vachal, 1903)
7. *Agapostemon (Notagapostemon) nasutus* Smith, 1853[5]
8. *Agapostemonoides hurdi* Roberts & Brooks, 1987[4]
9. *Andinaugochlora centralpina* Engel & Smith-Pardo, 2004[3]
10. *Augochlora (Augochlora) albiceps* Friese, 1925
11. *Augochlora (Augochlora) caerulescens* Friese, 1921
12. *Augochlora (Augochlora) esox* (Vachal, 1911) [2]
13. *Augochlora (Augochlora) foxiana* Cockerell, 1900[2]
14. *Augochlora (Augochlora) glabricollis* Friese, 1916
15. *Augochlora (Augochlora) hallinani* Michener, 1954
16. *Augochlora (Augochlora) nigrocyanea* Cockerell, 1897[2]
17. *Augochlora (Augochlora) obscuriceps* Friese, 1925[3]
18. *Augochlora (Augochlora) quiriguensis* Cockerell, 1913[2]
19. *Augochlora (Augochlora) sidaefoliae* Cockerell, 1913

20. *Augochlora (Augochlora) smaragdina* Friese, 1916
21. *Augochlora (Oxystoglossella) antonita* Michener, 1954
22. *Augochlora (Oxystoglossella) aurifera* Cockerell, 1897[2]
23. *Augochlora (Oxystoglossella) cordiaefloris* Cockerell, 1907
24. *Augochlora (Oxystoglossella) cymatoides* (Vachal, 1911)[2]
25. *Augochlora (Oxystoglossella) ectasis* (Vachal, 1911)
26. *Augochlora (Oxystoglossella) fulgidana* Friese, 1925[3]
27. *Augochlora (Oxystoglossella) fulvilabris* Friese, 1916[3]
28. *Augochlora (Oxystoglossella) morrae* Strand, 1910
29. *Augochlora (Oxystoglossella) nominata* Michener, 1954
30. *Augochlora (Oxystoglossella) thalia* Smith, 1879
31. *Augochlorella comis* (Vachal, 1911)
32. *Augochlorella neglectula* (Cockerell, 1897)[2]
33. *Augochlorella pomoniella* (Cockerell, 1915)
34. *Augochloropsis auriventris* (Friese, 1921)
35. *Augochloropsis cyanescens* (Friese, 1916)[3]
36. *Augochloropsis ignita* (Smith, 1861)[2,5]
37. *Augochloropsis johannae* (Friese, 1916)[3]
38. *Augochloropsis metallica* (Fabricius, 1793)[5]
39. *Augochloropsis pallitarsis* (Friese, 1916)[3]
40. *Austrosphecodes costaricensis* (Friese, 1916)
41. *Caenaugochlora (Caenaugochlora) costaricensis* (Friese, 1916)[3]
42. *Caenaugochlora (Caenaugochlora) elisabethae* Engel, 1997[4]
43. *Caenaugochlora (Caenaugochlora) gemmella* (Cockerell, 1912)
44. *Caenaugochlora (Caenaugochlora) leoi* Engel, 2014[3]
45. *Caenaugochlora (Ctenaugochlora) beethoveni* Engel, 1996[3]
46. *Caenaugochlora (Ctenaugochlora) donnae* Engel, 1996
47. *Caenaugochlora (Ctenaugochlora) perviridis* Engel & Gonçalves, 2010
48. *Chlerogella anthonoma* Engel, 2009[3]
49. *Chlerogella kellieae* Engel, 2009[3]
50. *Chlerogella pinocchio* Engel, 2009[3]
51. *Dialictus aeneiventris* (Friese, 1916)[3]
52. *Dialictus aeneus* (Friese, 1916)
53. *Dialictus atrazureus* Moure and Hurd, 1987
54. *Dialictus chalybaeus* (Friese, 1916)
55. *Dialictus chrysonotus* (Ellis, 1914)
56. *Dialictus cinereus* (Friese, 1916)[3]
57. *Dialictus costaricensis* Crawford, 1906
58. *Dialictus cupreicollis* (Friese, 1916)
59. *Dialictus figueresi* (Wcislo, 1990)[3,4]
60. *Dialictus indistinctus* (Crawford, 1906)[3]
61. *Dialictus lustricollis* Moure and Hurd, 1987
62. *Dialictus nigroaeneus* (Friese, 1916)[3]
63. *Dialictus obscurior* (Friese, 1925)[3]
64. *Dialictus obscuripes* (Friese, 1916)[3]
65. *Dialictus rufoaeneus* (Friese, 1925)[3]
66. *Dialictus sudus* (Vachal, 1904)
67. *Dialictus surrubresensis* (Strand, 1921)[3]
68. *Dialictus umbripennis* (Ellis, 1913)
69. *Dinagapostemon costaricensis* Roberts & Brooks, 1987[3]
70. *Dinagapostemon orestes* Roberts & Brooks, 1987
71. *Eickwortia alexanderi* McGinley, 1999[3]
72. *Eickwortia eickworti* McGinley, 1986
73. *Evylaeus biciliatum* (Friese, 1916)
74. *Evylaeus pseudopectoralis* (Cockerell, 1896)
75. *Habralictus metallicus* (Friese, 1916)[3]
76. *Halictus (Halictus) ligatus* Say, 1837[4]
77. *Halictus (Pachyceble) hesperus* Smith, 1862[5]
78. *Halictus (Pachyceble) lutescens* Friese, 1921[4]
79. *Lasioglossum amnestum* Moure and Hurd, 1987
80. *Lasioglossum costale* (Vachal, 1904)
81. *Lasioglossum crocoturum* (Vachal, 1904)
82. *Lasioglossum katyae* McGinley, 1986
83. *Lasioglossum uyacicola* (Cockerell, 1949)
84. *Megalopta amoena* (Spinola, 1853)[1,4]
85. *Megalopta atra* Engel, 2006[4]
86. *Megalopta byroni* Engel, Brooks & Yanega, 1997[1,4]
87. *Megalopta genalis* Meade-Waldo, 19162[1,4]
88. *Megaloptina chibchani* (Engel, 2013)
89. *Mexalictus (Mexalictus) hansoni* Dumesh, 2013
90. *Microsphecodes kathleenae* (Eickwort, 1972)
91. *Neocorynura centroamericana* Smith-Pardo, 2005
92. *Neocorynura cribrita* Smith-Pardo, 2005
93. *Neocorynura fumipennis* (Friese, 1916)
94. *Neocorynura monozona* (Friese, 1916)[3]
95. *Neocorynura pubescens* (Friese, 1916)[5]
96. *Neocorynura tica* Smith-Pardo, 2006[3]
97. *Neocorynura unicincta* (Friese, 1916)
98. *Pereirapis semiaurata* (Spinola, 1853)[1,4]
99. *Pseudaugochlora graminea* (Fabricius, 1804)[5]
100. *Pseudaugochlora sordicutis* (Vachal, 1904)
101. *Ptilocleptis tomentosa* Michener, 1978
102. *Rhinetula denticrus* Friese, 1922[4]
103. *Sphecodes aeneiceps* Friese, 1916[3]
104. *Sphecodes clypeatus* Friese, 1916[3]
105. *Temnosoma smaragdinum* Smith, 1879
106. *Xenochlora ianthina* (Smith, 1861)[1,4]

E. **Megachilidae**

1. *Anthidium hallinani* Schwarz, 1933
2. *Anthodioctes calcaratus* (Friese, 1921)
3. *Anthodioctes costaricensis* Urban, 1999[3]
4. *Coelioxys (Acrocoelioxys) azteca* Cresson, 1878[4]
5. *Coelioxys (Acrocoelioxys) laevigata* Smith, 1854
6. *Coelioxys (Acrocoelioxys) otomita* Cresson, 1878
7. *Coelioxys (Acrocoelioxys) tolteca* Cresson, 1878[4]
8. *Coelioxys (Boreocoelioxys) pratti* Crawford, 1914
9. *Coelioxys (Boreocoelioxys) schmidti* Friese, 1916
10. *Coelioxys (Cyrtocoelioxys) burgdorfi* Cockerell, 19313[3]
11. *Coelioxys (Cyrtocoelioxys) chichimeca* Cresson, 18782
12. *Coelioxys (Glyptocoelioxys) chacoensis* Holmberg, 19032

13. *Coelioxys (Cyrtocoelioxys) costaricensis* Cockerell, 1914
14. *Coelioxys (Cyrtocoelioxys) sanguinicollis* Friese, 1921
15. *Coelioxys (Cyrtocoelioxys) sanguinosa* Cockerell, 1912
16. *Coelioxys (Glyptocoelioxys) mexicana* Cresson, 1878[4]
17. *Coelioxys (Neocoelioxys) albifrons* Friese, 1916
18. *Coelioxys (Neocoelioxys) praetextata* Haliday, 1836
19. *Coelioxys (Neocoelioxys) simillima* Smith, 1854
20. *Coelioxys (Platycoelioxys) alatiformis* Friese, 1921
21. *Coelioxys (Rhinocoelioxys) nasidens* Friese, 1921
22. *Coelioxys (Rhinocoelioxys) zapoteca* Cresson, 1878[4]
23. *Dolichostelis costaricensis* (Friese, 1921)
24. *Duckeanthidium thielei* Michener, 2002[3]
25. *Heriades (Neotrypetes) bruneri* Titus, 1904
26. *Hoplostelis bivittata* (Cresson, 1878)
27. *Hoplostelis gabrieli* Urban, 2003
28. *Hypanthidium costaricense* (Friese, 1916)
29. *Lithurgopsis planifrons* (Friese, 1908)
30. *Loyolanthidium apicale* (Cresson, 1878)
31. *Loyolanthidium bilobatum* (Friese, 1916)
32. *Megachile (Acentron) candida* Smith, 1879[2]
33. *Megachile (Acentron) candidella* Mitchell, 1930[2]
34. *Megachile (Acentron) costaricensis* Friese, 1916[3]
35. *Megachile aurorea* Friese, 1916
36. *Megachile (Austromegachile) antiqua* Mitchell, 1930[2]
37. *Megachile (Austromegachile) exaltata* Smith, 1853[1,5]
38. *Megachile (Austromegachile) habilis* Mitchell, 1930[2]
39. *Megachile brunneipennis* Friese, 1916
40. *Megachile (Chelostomoides) abacula* Cresson, 1878
41. *Megachile (Chelostomoides) axyx* (Snelling, 1990)[3]
42. *Megachile (Chelostomoides) otomita* Cresson, 1878
43. *Megachile (Chelostomoides) peruviana* Smith, 1879[2]
44. *Megachile (Chelostomoides) texensis* Mitchell, 1956
45. *Megachile (Chrysosarus) vestis* Mitchell, 1930
46. *Megachile clariceps* Friese, 1916
47. *Megachile (Cressoniella) boliviensis* Friese, 1916
48. *Megachile (Cressoniella) redondensis* Mitchell, 1930
49. *Megachile (Cressoniella) zapoteca* Cresson, 1878
50. *Megachile croceipennis* Friese, 1916
51. *Megachile joseana* Friese, 1916[3]
52. *Megachile (Leptorachis) friesei* Schrottky, 1902
53. *Megachile (Leptorachis) mexicana* Cresson, 1878[2]
54. *Megachile (Leptorachis) paulistana* Schrottky, 1902[2]
55. *Megachile (Leptorachis) schmidti* Friese, 1916
56. *Megachile (Moureapis) viator* Mitchell, 1930[3]
57. *Megachile (Neochelynia) alta* Mitchell, 1930[3]
58. *Megachile (Neochelynia) fumata* Mitchell, 1930
59. *Megachile (Sayapis) zaptlana* Cresson, 1878[2]
60. *Megachile (Tylomegachile) toluca* Cresson, 1878[1,5]
61. *Nananthidium gualanense* (Cockerell, 1912)
62. *Osmia (Diceratosmia) azteca* Cresson, 1878
63. *Osmia (Diceratosmia) costaricensis* Friese, 1925[3]
64. *Paranthidium gabbii* (Cresson, 1878)
65. *Rapanthidium vespoides* (Friese, 1925)

Discussion

Although this group of hymenoptera has very few national specialists, the total representation of species in official collections is quite low, so that the MNCR barely has a representation of 30% of the total species and the MIUCR with 13% (Figure 1).

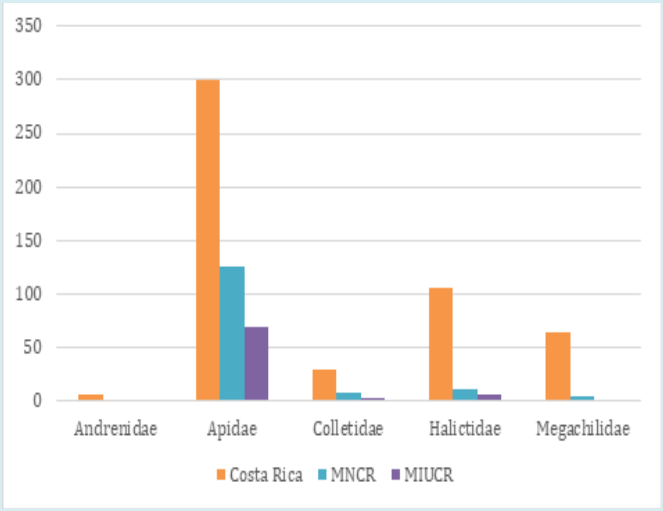

Figure 1: Representation of the Costa Rica bees in the two collections.

We could say that the MIUCR collection is actually quite complete considering that it is a collection with an agronomic focus, and the most important groups and species are well represented, some even with many specimens. The only thing needed is digitalization to allow better management of the specimens and their geographic data, since it was not possible to generate a collection map because it did not have coordinate data, which makes extra work necessary to search for the locations.

It is important to emphasize that at least in the MNCR collection, there are many genera that have not yet been worked on, so the percentage of representation will increase as well as the records for the country, since this is not only the largest collection, but, having been born under the objective of a national inventory of species, with the former National Institute of Biodiversity (INBio), it has an important representation of almost the entire territory of Costa Rica (Figure 2).

The 35 genera of the MNCR that have not yet been fully worked on are the following: Centris Fabricius, 1804, Epeolus Latreille, 1802, Epicharis Klug, 1807, Florilegus Robertson, 1900, Gaesischia Michener, LaBerge & Moure,

1955, Melissodes Latreille, 1829, Melissoptila Holmberg, 1884, Melitoma Lepeletier & Serville, 1828, Monoeca Lepeletier & Serville, 1828, Odyneropsis Schrottky, 1902, Svastra Holmberg, 1884 and Thygater Holmberg, 1884.

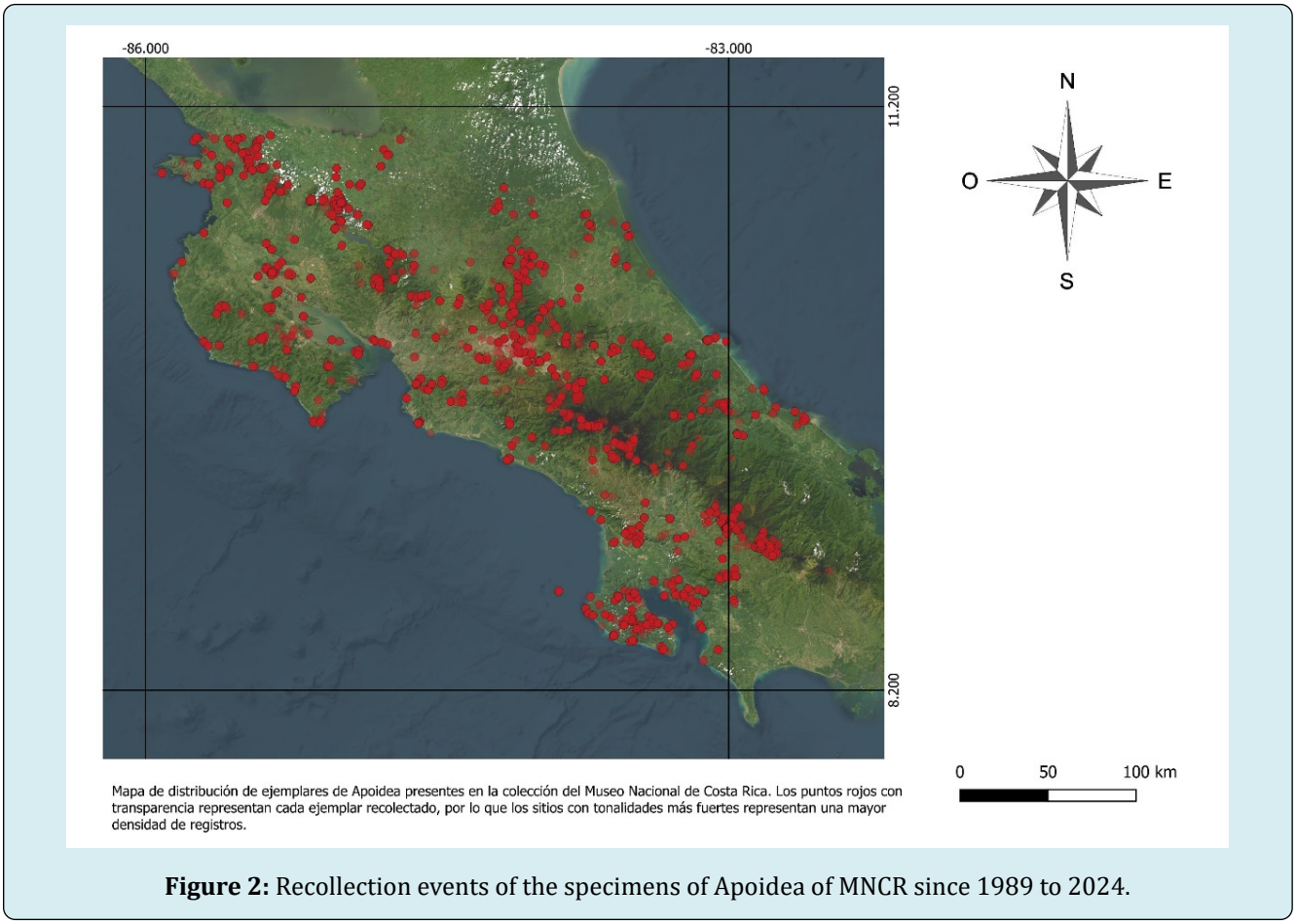

Figure 2: Recollection events of the specimens of Apoidea of MNCR since 1989 to 2024.

It is important to mention that the zoology collection of the School of Biology of the University of Costa Rica (ZBUCR) was not reviewed because it is in the digitalization phase, which will have public data until 2025, but it is a collection with very important data and specimens.

Conclusions

- Although a complete list of species was achieved, it is important to note that this is only a baseline reference, which includes exclusively the species officially reported in the literature, or those that have representatives in national collections.
- It is practically a given that there are many species that are not on this list, some of them are in the process of being described or may have been deposited and identified in foreign collections and not have been reported in scientific literature.
- There are many thesis projects, both national and international, in which it is possible that Costa Rican species have been described or identified and these results have not yet been published scientifically.
- The species represented in the MNCR and MIUCR collections will increase as work is done on the genera that are still uncurated due to a lack of specialists.

Acknowledgement

To the curator Andrés Arias for allowing the complete review of the MIUCR bee collection, and to Andrés Duarte for preparing and providing the collection map of the bee specimens in the MNCR collections.

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