

A checklist of the Scarabaeoidea (Coleoptera) of Panama

BRETT C. RATCLIFFE

Systematics Research Collections, W436 Nebraska Hall, University of Nebraska State Museum, Lincoln, NE 68588-0514, U.S.A.
E-mail: bratcliffe1@unl.edu

Abstract

The 541 species of Scarabaeoidea known to occur in Panama are listed. Synonymies are included when present. Names placed in new synonymy are *Pelidnota hirsutiphallica* Ratcliffe and Jameson (= *P. pubes* Ohaus) and *Bolax vittatus* Casey (= *B. magnus* Bates). All taxa are accompanied by an abbreviated reference to the original literature citation wherein they were described. A list of provinces in Panama in which each species is known to occur is also provided.

Key words: Coleoptera, Scarabaeoidea, Panama, checklist

Introduction

The Scarabaeoidea is a large, diverse, cosmopolitan group of beetles. It has about 35,000 species known and almost 200 new species are being described each year. Scarabaeoids have diversified into most habitats, and they are fungivores, herbivores, necrophages, coprophages, saprophages, and carnivores. Even though they are prominent members of the entomofauna, they are still poorly known taxonomically. The first attempt at an identification manual for the Central American Scarabaeoidea was written by Bates (1886-1890) in the *Biologia Centrali-Americana* series. Since that time, nothing of a comprehensive nature has ever been written. The selected insect groups treated in Quintero and Aiello's (1992) *Insects of Panama and Mesoamerica* are only the tip of a very large iceberg, and the volume covered only the Passalidae out of all the scarabaeoids.

This is the first checklist devoted exclusively to the all the scarabaeoid beetles of Panama. It was compiled (with specimen verification wherever possible rather than simply taken at face value from catalogs) from traditional sources such as the *Coleopterorum Catalogus*, Blackwelder's (1944) checklist of the Coleoptera of Mexico, Central America, the West Indies, and South America, and Blackwelder and Arnett's (1974) checklist of the

beetles of Canada, the United States, Mexico, Central America, and the West Indies. In addition, all the recent papers and monographs covering certain specific taxa were consulted up to April 2002 (for example, Howden 1964 for Geotrupidae; Howden 1968 for Trichiinae; Howden and Young 1981 for Scarabaeinae; Howden and Gill 2000 for Ceratocanthinae; Hardy 1975 for *Pelidnota*; Morón 1990 and Hawks 2001 for *Chrysina* (= *Plusiotis*); Jameson 1998 for *Rutela*; Soula 1998 for Anticheirina; Ratcliffe in press for Dynastinae). Lastly, records from my collecting in Panama over the last 25 years are included along with those of colleagues who have also conducted extensive research and collecting there.

This list has shortcomings, however, because some groups (principally Passalidae, Ceratocanthidae, Aphodiinae, Melolonthinae, and *Anomala*) have not been comprehensively reviewed. Under these circumstances, new species await description while the names of some other species will undoubtedly be placed in synonymy. In Passalidae, for example, Reyes-Castillo and Castillo (1992) reported 25 species in Panama, but there may be as many as 55 species (A. Gillogly, personal communication 2000). Of those 30 additional species, about half are range extensions while the other half represent new species. My studies of the Dynastinae of Panama have also revealed a number of new species, some of which are now awaiting publication. In spite of the efforts of a few scientists, Panama has not yet been adequately surveyed for scarabaeoids. While scarab beetles remain a popular group to collect and study, there are still not enough systematists studying scarabs to resolve all the problems of taxonomy and classification . . . let alone to address the questions dealing with phylogenetic relationships, biogeography, and the basic biology of most of the species.

Panama is a relatively small country with a great amount of physiographic diversity that contributes directly to the richness of its biota. Like most Latin American countries, it is also undergoing increasingly intense land development where pristine areas are succumbing to "development." Contrast our lack of surveys and knowledge of the biota that exists in Panama with the rapidly disappearing tropical forests there, and it becomes clear that additional research is needed . . . and quickly if we are not to lose forever those species now in peril of having their habitats eliminated.

The National Research Council's Committee on Research Priorities in Tropical Biology recommended that emphasis on collecting be given to tropical areas because of their great biological diversity, high levels of endemism, and the rate at which tropical forests are being converted to other purposes (National Research Council 1980). It seems that resolutions by professional biological societies (Entomological Society of America, Coleopterists Society, Association of Systematics Collections, the 1992 "Earth Summit" held in Rio, Association of Tropical Biology, etc.) are made almost every year that support the efforts of national and international organizations in funding comprehensive biological surveys and the production of electronic databases, identification manuals, and monographs. Collection of new material and inventories of existing collections are needed in

order to explore and catalog biotic diversity and to facilitate further research. These are very different, but complimentary, components of biotic surveys. Insects, by virtue of their diversity and abundance, are critical to the success of maintaining any natural habitat. Too often, however, they are not considered in the management scheme of any threatened area. "Insects are major connectors between different species in their habitat, including species that have long been in the eye of the conservation community. By consuming large quantities of plants and plant parts on the one hand, and by being consumed in enormous amounts by vertebrates on the other hand, insects in great part determine the structural relationship between larger organisms. Those of you who wish to see vertebrates in tomorrow's national parks need to give serious consideration to the place of insects in the food and competition webs leading to those vertebrates" (Janzen 1987).

Approximately 20% of all species on Earth could be lost in the next few decades. More alarming than the mammal and bird losses, however, will be the extinction of large numbers of insects, plants, and fish . . . many of them never even described or studied. At least half of these losses will result from tropical deforestation (Anonymous 1974, 1981; National Science Board 1989; Wilson 1992). The efficient and sane use of natural resources depends on accurate and detailed ecological knowledge. The major deterrent to these ecological studies, however, is the severe lack of taxonomic data that is the fundamental building block for all subsequent studies. In order to arrive at a sound view of ecology in tropical forests, we must first identify and catalog the fauna. This is an urgent task now requiring quick action (Alberch 1993). The growing recognition of the importance to humankind of tropical forests and the mounting concern for their future is now well known. The pace of basic research in the tropics must be accelerated, and failure to do so will eventually limit our capability to contribute solutions to impending scientific and human problems.

In Panama, the Scarabaeoidea is represented by 8 families. The largest family, Scarabaeidae, has 8 subfamilies with 122 genera and about 483 species represented in Panama. Among the larger subfamilies of Scarabaeidae, there are 36 species of Aphodiinae, 133 species of Scarabaeinae, a surprisingly low 50 species of Melolonthinae, 116 species of Rutelinae, 126 species of Dynastinae, and 24 species of Cetoniinae. In Panama there are now 152 genera and 541 species of Scarabaeoidea. This number *will* increase in the future.

After each species in the checklist, the provinces (Fig. 1) are listed in which it is known to occur. Many species lack an indication of province or have only a partial listing of provinces because there is either (1) only a country record, (b) there is no recent literature listing localities, or (c) the locality data is known by me to exist only in collections that have not yet been studied. It was not possible to survey all the collections containing scarabs from Panama to gather distributional data; that would be a huge task since most collections are not yet electronically databased. The designation of "CANAL ZONE" is used, even though it is now part of Panama province, because all of the material cited from

this area used that designation when collected (and are so labeled) and because it does more precisely delimit *where* in the otherwise large province of Panama the material was collected. The designation of “Canal Zone” is, today, a historical artifact, and its use is meant only to better place a species geographically.

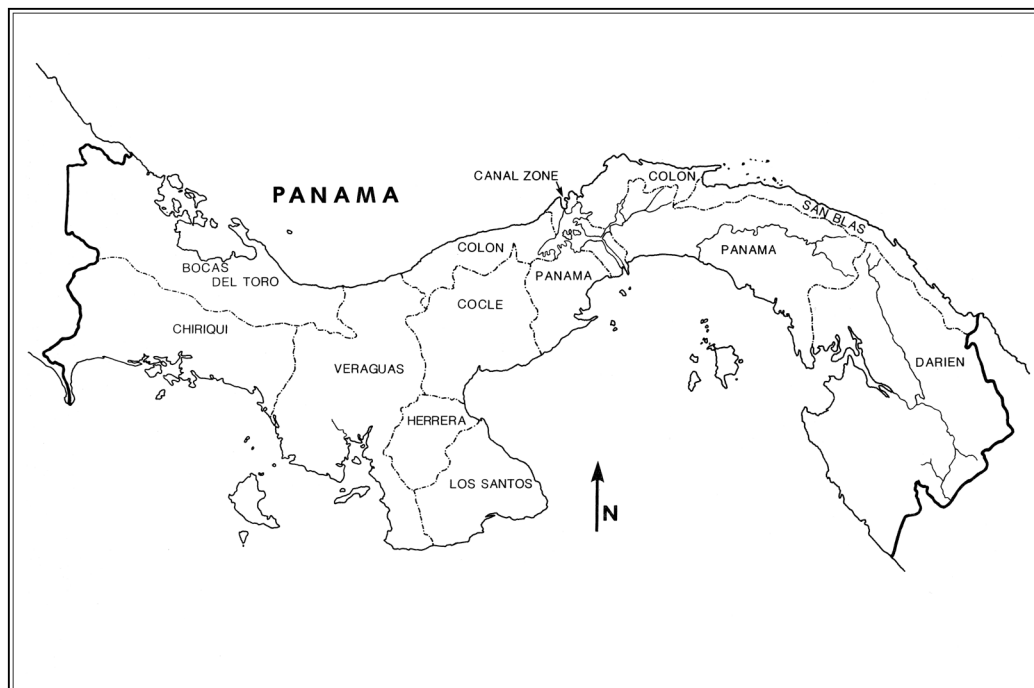


FIGURE 1. Map of Panama showing provinces.

Synonymies (in italics) for genera and species are provided for the taxon and are not limited to those described from Panama. Passalids are a notable exception (see remarks there) because the status of many taxa is changing rapidly. For certain large, cosmopolitan genera (*e.g.*, *Aphodius*, *Onthophagus*, *Anomala*), only the New World synonyms are provided; to do otherwise would create a very long list of names proposed for European and/or Asian taxa. A complete listing of non-New World generic synonyms is not the purpose of this work. Subspecies are provided, again for the taxon, and not limited to those occurring just in Panama. An appendix is provided wherein are listed the names of journals and books (many older and obscure) that may help the reader find literature. These were not completely spelled-out in the main body of the checklist in order to save space.

The primary audience for this checklist consists of systematists studying scarabaeoids, collections managers responsible for organizing collections, resource managers in parks and reserves in Panama, biogeographers needing lists of taxa for their analyses, a few applied entomologists needing information on occurrence or nomenclature, and Latin American students and teachers wanting to know more about their biota.

LUCANIDAE

AESALINAE

AESALINI

AESALUS Fabricius 1801. Syst. Eleuth. 2: 274.

neotropicalis Bates (or near). Biol. Cent.-Amer. 2 (2): 2. Chiriqui.

LUCANINAE

LUCANINI

CANTHAROLETHRUS Thomson 1862. Ann. Soc. Ent. France (4) 2: 411.

luxeri Buquet 1843. Bull. Soc. Ent. France 1843: 51. Bocas del Toro, Chiriqui.

reichei Hope 1843. Proc. Ent. Soc. London 1843.: 95.

georgius Thomson 1862. Ann. Soc. Ent. France (4) 2: 412.

PASSALIDAE

Synonymies are not provided for passalids because the taxonomy is currently in a state of extreme flux, especially given that the fauna in Panama is probably twice as large as reported in this list. Many generic and species synonyms listed in catalogs are being removed from synonymy or transferred to other genera.

PASSALINAE

PASSALINI

PASSALUS Fabricius 1792. Ent. Syst. 1: 24.

beneshi Hincks 1950. Ann. Mag. Nat. Hist. (ser. 12) 3: 1041.

caelatus Erichson 1847. Arch. Natur. 13: 112. Bocas del Toro, Chiriqui.

clypeoneleus (Kuwert 1891). Deutsche Ent. Zeit. 1: 180. Chiriqui.

cuneatus Hincks 1950. Ann. Mag. Nat. Hist. (ser. 12) 3: 1043. Chiriqui.

incertus Percheron 1841. Mag. Zool. 11: 27.

interruptus (L. 1758). Syst. Nat. 1: 354. Colón.

interstitialis Eschscholtz 1829. Mem. Soc. Imp. Nat. Moscou 7:18. Bocas del Toro, Panama.

maillei Percheron 1841. Mag. Zool. Insect: 31. Coclé.

punctatostriatus Percheron 1835. Monogr. Passalid.: 78. Chiriqui.

punctiger LePeletier and Serville 1825. Encyc. Method. 10: 20. Canal Zone, Chiriqui, Colón, Panama.

spiniger (Bates 1886). Biol. Cent.-Amer. 2 (2): 15. Panama.

PAXILLUS MacLeay 1819. *Horae Ent.* 1: 105.

leachi MacLeay 1819. *Hor. Ent.* 1: 106. Canal Zone, Panama.

PTICHOPUS Kaup 1869. *Col. Hefte* 5: 27.

angulatus (Percheron 1835). *Monogr. Passalid.*: 84. Canal Zone, Chiriqui, Panama.

PROCULINI

ODONTOTAENIUS Kuwert 1896. *Novit. Zool.* 3: 220.

striatopunctatus (Percheron 1835). *Monogr. Passalid.*: 101. Bocas del Toro, Canal Zone, Colón, Panama.

OILEUS Kaup 1869. *Col. Hefte* 5: 3.

sargi (Kaup 1871). *Berlin. Ent. Zeit.* 15: 119. Chiriqui.

PETREJOIDES Kuwert 1896. *Novit. Zool.* 3: 221.

panamae Schuster 1991. *Florid. Ent.* 74: 422. Chiriqui.

subrecticornis (Kuwert 1897). *Novit. Zool.* 4: 296. Panama.

tenuis Kuwert 1897. *Novit. Zool.* 5: 290. Chiriqui.

POPILIUS Kaup 1871. *Berlin. Ent. Zeit.* 15: 75.

eclipticus (Truqui 1857). *Rev. Mag. Zool.* 9: 261. Chiriqui.

erotylus Reyes-Castillo and Castillo 1992. *Insects Panama and Mesoamerica*: 366. Canal Zone, Panama, San Blas.

PUBLIUS Kaup 1871. *Berlin. Ent. Zeit.* 15: 70.

sp. Chiriqui.

SPURIUS Kaup 1871. *Berlin. Ent. Zeit.* 15: 75.

bicornis (Truqui 1857). *Rev. Mag. Zool.* 9: 262. Chiriqui.

VERRES Kaup 1871. *Berlin. Ent. Zeit.* 15: 114.

cavicollis Bates 1886. *Biol. Cent.-Amer.* 2 (2): 24. Colón, Darien, Panama.

deficiens Kuwert 1898. *Deutsche Ent. Zeit.* 1891: 175. Bocas del Toro, Chiriqui.

hageni Kaup 1871. *Berlin. Ent. Zeit.* 15: 116. Bocas del Toro, Chiriqui, Darien, Panama.

sternbergianus Zang 1905. *Deutsche Ent. Zeit.* 2: 315. Canal Zone, Colón.

cavicollis Bates 1886. *Biol. Cent.-Amer.* 2 (2): 24. Colón, Darien, Panama.

VETURIUS Kaup 1871. *Berlin. Ent. Zeit.* 15: 110.

cirratus Bates 1886. *Biol. Cent.-Amer.* 2 (2): 23. Chiriqui.

platyrhinus (Westwood 1845). *Cat. Lucanoid Col.* 28. Chiriqui, Colón.

sinuaticollis Kuwert 1890. *Deutsche Ent. Zeit.* 1: 99. Coclé.

tuberculifrons Kuwert 1891. *Deutsche Ent. Zeit.* 1: 174. Chiriqui.

OCHODAEIDAE

OCHODAEUS Dejean 1821. Cat. Col., p. 56.

Codocera Eschscholtz 1818. Mem. Acad. Imp. Sci. St. Peters. 6: 451.

Psephus Kirby and Spence 1828. Intro. Ent., p. 678.

Stomphax Fischer 1823. Ent. Imper. Russ. 2: 158.

pollicaris Bates 1887. Biol. Cent.-Amer. 2 (2): 158. Chiriqui.

HYBOSORIDAE

ANAIDES Westwood 1846. Trans. Ent. Soc. London 4:167.

fussulatus Westwood 1846. Trans. Ent. Soc. London 4: 168. Canal Zone, Panama.

simplicicollis Bates 1887. Biol. Cent.-Amer. 2 (2): 118. Bocas de Toro, Chiriqui.

CHAETODUS Westwood 1846. Trans. Ent. Soc. London 4: 165.

irregularis Westwood 1846. Trans. Ent. Soc. London 4: 166. Canal Zone, Chiriqui, Panama.

COILODES Westwood 1846. Trans. Ent. Soc. London 4: 163.

Coelodes Lacordaire 1856. Gen. Col. 3: 135.

castaneus Westwood 1846. Trans. Ent. Soc. London 4: 165. Canal Zone, Chiriqui, Panama.

DICRAEODON Erichson 1847. Arch. Natur. 13: 104.

Aparolaus Bates 1887. Biol. Cent.-Amer. 2 (2): 129.

fimbriatus (Bates 1887). Biol. Cent.-Amer. 2 (2): 129. Chiriqui.

punctatum Arrow 1911. Ann. Mag. Nat. Hist. 7: 396. Chiriqui, Darién

CRYPTOGENIUS Westwood 1846. Trans. Ent. Soc. London 4: 169.

miersianus Westwood 1846. Trans. Ent. Soc. London 4: 171. Chiriqui?

CERATOCANTHIDAE

CERATOCANTHINAE

CERATOCANTHUS White 1842. Trans. Ent. Soc. London 3: 93.

Acanthocerus MacLeay 1819. Horae Ent. 1: 136.

Sphaeromorphus Germar 1843. Zeit. Ent. 4: 111.

eulampros Bates 1887. Biol. Cent.-Amer. 2 (2): 126. Chiriqui.
 humeralis Erichson 1843. *In* Germar, Zeit. Ent. 4: 116. Chiriqui.
 relucens Bates 1887. Biol. Cent.-Amer. 2 (2): 127. Chiriqui.
 rotundicollis Bates 1887. Biol. Cent.-Amer. 2 (2): 128. Chiriqui.

GERMAROSTES Paulian 1982. Mem. Mus. Nat. Hist. (n.s.)(ser. A, Zool). 124: 13.
 subgenus *Haroldostes* Paulian 1982. Mem. Mus. Nat. Hist. (ser. A, Zool). 124: 44.
 bidens (Bates 1887). Biol. Cent.-Amer. 2 (2): 123. Chiriqui.
 bugabensis (Arrow 1903). Trans. Ent. Soc. London 1903: 519.
 globosus (Say 1835). Boston J. Nat. Hist. 1: 179. Chiriqui.
 macleayi (Perty 1830). Del. Animal. Art, p. 43.
 metallicus (Harold 1874). Col. Hefte 12: 45. Chiriqui.
 nitens (Guérin-Méneville 1839). Rev. Zool. 1839: 299. Chiriqui.
 acutipes (Arrow) 1903. Trans. Ent. Soc. London 1903: 519.
 viridipennis (Bates 1887). Biol. Cent.-Amer. 2 (2): 124. Chiriqui.

TROGIDAE

TROGINAE

OMORGUS Erichson 1847. Arch. Natur. 13: 111.
 suberosus (Fabricius 1775). Syst. Ent., p. 31.
 crenatus (Olivier 1789). Entomolog. Histor.: 7.
 gibbus (Olivier 1789). Entomolog. Histor.: 13.
 ovatus (Palisot de Beauvois 1805). Insect. Afr. et Amer. 1: 175.
 denticulatus (Palisot de Beauvois 1805). Insect. Afr. et Amer. 1: 176.
 alternatus (Say 1835). Boston J. Nat. Hist. 1: 179.
 punctatus LeConte 1854. Proc. Acad. Nat. Sci. Phil. 7: 215.
 nobilis Wollaston 1867. Coleop. Hesp., p. 93.
 tricolor Blackburn 1904. Trans. Roy. Soc. S. Australia 28: 296.
 manilensis Schultze 1915. Philippine J. Sci. D10: 271.
 torressalai Baguena 1959. Eos 35: 212.

POLYNONCUS Burmeister 1876. Stettin Ent. Zeit. 37: 264.
 gemmingeri (Harold 1872). Col. Hefte 9: 134.

TROX Fabricius 1775. Syst. Ent., p. 31.
 Pseudotrox Robinson 1948. Notul. Nat. 211: 1.
 scaber (L. 1767). Syst. Nat. 12, p. 573.
 barbosus (von Laicharting 1781). Verz. Beschr. Tyrol. Insect. 1: 31.

- arenarius* (Fabricius 1787). Mant. Insect. 1: 18.
arenosus (Gmelin 1790). Syst. Nat., p. 1586.
hispidus (Paykull 1798). Fauna Suecica 1: 81.
trisulcatus (Curtis 1845). Trans. Linn. Soc. London 19: 446.
nipponensis (Lewis 1895). Ann. Mag. Nat. Hist. 16 (6): 387.

GEOTRUPIDAE

BOLBOCERATINAE

BOLBOCERATINI

BOLBELASMUS Boucomont 1911. Ann. Soc. Ent. France 79: 335.

Kolbeus Boucomont 1911. Ann. Soc. Ent. France 79: 335.

arcuatus (Bates 1887). Biol. Cent.-Amer. 2 (2): 111. Canal Zone, Coclé.

ATHYREINI

ATHYREUS MacLeay 1819. Horae Ent. 1: 123.

championi (Bates 1887). Biol. Cent.-Amer. 2 (2): 108. Canal Zone, Chiriqui.

NEOATHYREUS Howden and Martínez 1963. Can. Ent. 95: 350.

excavatus (Laporte 1840). Hist. Nat. Anim. Articul. 2: 103. Canal Zone, Panama.

quadridentatus Howden 1964. Mem. Ent. Soc. Canada 39: 17.

isthmus Howden 1999. Coleop. Bull. 53: 351. Coclé, Panama.

lanei (Martínez 1952). Mis. Est. Pat. Reg. Argentina 23: 110. Canal Zone, Panama.

mexicanus (Klug 1845). Abh. Preuss. Akad. Wiss. 1843: 29. Canal Zone, Chiriqui.

panamensis (Robinson 1946). Trans. Amer. Ent. Soc. 72: 57. Canal Zone, Chiriqui.

planatus Howden 1964. Mem. Ent. Soc. Canada 39: 22. Canal Zone.

tridenticeps (Bates 1887). Biol. Cent.-Amer. 2 (2): 109. Chiriqui.

SCARABAEIDAE

APHODIINAE

APHODIINI

APHODIUS Illiger 1798. In Kugelann, Verzeich-Kafer, p. 115. See Dellacasa 1988

(Mem. Soc. Ent. Ital. 66) for lengthy synonymy.

ataeniodes Hinton 1938. Rev. Ent. 8: 123.

chapini Hinton 1934. Stylops 3: 189.

erythrinus Bates 1887. Biol. Cent.-Amer. 2 (2): 89. Chiriqui.

guatemalensis chiriquinus Bates 1887. Biol. Cent.-Amer. 2 (2): 89. Chiriqui.

lividus (Olivier 1789). Entomolog. Histor.: 86. Bocas del Toro.

See Ratcliffe 1991: 49 for lengthy synonymy.

sallei Harold 1863. Berlin Ent. Zeit. 7: 331. Bocas del Toro, Chiriqui.

xanthus Bates 1887. Biol. Cent.-Amer. 2 (2): 90. Chiriqui.

DIDACTYLIA d'D'Orbigny 1896. Abeille 28: 247.

panamensis (Harold 1859). Berlin Ent. Zeit. 3: 212. Chiriqui.

OXYOMUS Laporte 1840. Hist. Nat. Insectes 2: 98.

Xenoheptalaucas Hinton 1934. Ann. Ent. Soc. Amer. 27: 613.

tricostatus Harold 1869. Col. Hefte 5: 101.

carinator Hinton 1934. Ann. Ent. Soc. Amer. 27: 613.

EUPARIINI

ATAENIUS Harold 1867. Col. Hefte 2: 100.

aequalis Harold 1880. Stettin Ent. Zeit. 41:40. Canal Zone.

capitosus Harold 1867. Col. Hefte 2: 83. Chiriqui.

carinator Harold 1874. Col. Hefte 12: 20. Chiriqui.

communis Hinton 1936. Ann. Mag. Nat. Hist. 17: 421.

cribrithorax Bates 1887. Biol. Cent.-Amer. 2 (2): 95. Chiriqui.

glabriventris A. Schmidt 1911. Societas Ent. 26:52. Panama.

gracilis (Melsheimer 1845). Proc. Acad. Nat. Sci. Phil. 2: 137. Canal Zone.

imbricatus (Melsheimer 1844). Proc. Acad. Nat. Sci. Phil. 2: 136. Bocas del Toro, Canal Zone, Chiriqui, Colón.

sordidus Harold 1869. Col. Hefte 3: 103.

liogaster Bates 1887. Biol. Cent.-Amer. 2 (2): 94. Bocas del Toro.

orbicularis Schmidt 1914. Denkschr. Kais. Akad. Wiss. 89: 697.

panamensis Hinton 1936. Ann. Mag. Nat. Hist. 17: 425.

perforatus Harold 1867. Col. Hefte 1: 83. Chiriqui.

perpolitus Schmidt 1917. Arch. Natur. 82: 105.

polyglyptus intermedius Bates 1887. Biol. Cent.-Amer. 2 (2): 100. Chiriqui.

scutellaris Harold 1867. Col. Hefte 1: 82.

strigicauda Bates 1887. Biol. Cent.-Amer. 2 (2): 96. Bocas del Toro, Canal Zone, Chiriqui, Colón.

BATESIANA Chalumeau 1983. Bull. Mens. Soc. Linn. Lyon 52: 143.

tuberculata Bates 1887. Biol. Cent.-Amer. 2 (2): 94. Canal Zone.

EUPARIA LePeletier and Serville 1828. Encyc. Method. 10: 357.

castanea LePeletier and Serville 1828. Encyc. Method. 10: 357.

mirabilis (Balthasar 1945). Cas. Ceskoslov. Spol. Ent. 42:108. Canal Zone.

EUPARIXOIDES Hinton 1936. Univ. Calif. Publ. Ent. 6: 275.

cribrata Hinton 1936. Univ. Calif. Publ. Ent. 6: 275.

LOMANOXOIDES Stebnicka 1999. Rev. Suisse Zool. 106: 293.

nigrolineatus (Hinton 1938). Rev. Ent. 8: 126. Canal Zone.

PASSALIOLLA Balthasar 1945. Cas. Ceskoslov. Spol. Ent. 42:104.

cossonoides (Bates 1887). Biol. Cent.-Amer. 2: 93. Canal Zone, Chiriqui.

SAPROSITES Redtenbacher 1858. Fauna Aust. Kafer, p. 436.

cossonoides Bates 1887. Biol. Cent.-Amer. 2 (2): 93. Chiriqui.

parallelus Harold 1867. Col. Hefte 1: 81. Chiriqui.

RHYPARIINI

RHYPARUS Westwood 1843. Proc. Ent. Soc. London 1848. 93.

blantoni Cartwright and Woodruff 1969. Smith. Contr. Zool. 21: 13. Bocas del Toro.

suspiciosus Cartwright and Woodruff 1969. Smith. Contr. Zool. 21: 15. Chiriqui.

TERMITODIUS Wasmann 1894. Kritisch. Verz. Myrmekoph. Termitoph. Arthr.13: 220.

near coronatus Wasmann 1894. Kriitisch. Verz. Myrmekoph. Termitoph. Arthr.13: 220. Colón, Panama.

perigrinus Hinton 1934. Rev. Ent. 4: 340. Colón.

SCARABAEINAE

EURYSTERNINI

EURYSTERNUS Dalman 1824. Ephem. Ent., p. 8.

Aeschrotes LePeletier and Serville 1828. Encyc. Method., p. 357.

caribaeus (Herbst 1789). Natursys. Käfer 2: 300. Canal Zone, Chiriqui.

foedus (Guérin-Méneville 1844). Règne Anim., p. 76. Bocas del Toro, Canal Zone, Panama.

claudicans Kirsch 1870. Berlin Ent. Zeit. 14: 360.

magnus Laporte 1840. Hist. Nat. Anim. Articul. 2: 93. Bocas del Toro, Chiriqui.

mexicanus Harold 1869. Ann. Soc. Ent. France (ser. 4) 9: 505. Bocas del Toro, Canal Zone, Coclé, Panama.

plebejus Harold 1880. Stett. Ent. Zeit. 41: 14. Canal Zone, Coclé, Colon, Panama.

velutinus Bates 1887. Biol. Cent.-Amer. 2 (2): 39. Chiriqui, Panama.

CANTHONINI

AGAMOPUS Bates 1887. Biol. Cent.-Amer. 2 (2): 42.

lampros Bates 1887. Biol. Cent.-Amer. 2 (2): 42. Canal Zone, Chiriqui, Panama.

CANTHON Hoffmannsegg 1817. Zool. Mag. 1: 38.

Coprobius Latreille 1829. Crust., Arach., Insect. 1: 535.

Coeloschelis Reiche 1841. Rev. Zool. 1841: 213.

Paedohyboma Kolbe 1893. Stettin Ent. Zeit. 54: 191.

Glaphyrocantthon Martínez 1948. An. Soc. Cient. Argent. 146: 41.

Peltecanthon Pereira 1953. Dusenía 4: 396.

Nesocantthon Pereira and Martínez 1956. Rev. Bras. Ent. 6: 105.

Goniocantthon Pereira and Martínez 1956. Rev. Bras. Ent. 6: 109.

Geocantthon Pereira and Martínez 1956. Rev. Bras. Ent. 6: 134.

Boreocantthon Halffter 1958. Ciencia 17: 208-209.

Canthomoechus Pereira and Martínez 1959. Acta Zool. Iilloana 17: 156.

Trichocantthon Pereira and Martínez 1959. Acta Zool. Iilloana 17: 171.

aberrans (Harold 1868). Berlin Ent. Zeit. 12: 8. Chiriqui.

aequinoctialis Harold 1868. Berl. Ent. Zeitsch. 12: 79. Canal Zone, Chiriqui.

angustatus Harold 1867. Col. Hefte 1: 79. Canal Zone, Colón.

caelius Bates 1887. Biol. Cent.-Amer. 2 (2): 29.

championi Bates 1887. Biol. Cent.-Amer. 2 (2): 31. Chiriqui.

cyanellus sallei Harold 1863. Ann. Soc. Ent. France (ser. 4) 3: 174. Bocas del Toro, Canal Zone, Colón, Darien, Panama.

triangularis Schmidt 1920. Arch. Natur. 86, Abt. A (9): 124.

deyrollei Harold 1868. Berlin Ent. Zeit. 12: 132.

euryscelis Bates 1887. Biol. Cent.-Amer. 2 (2): 28. Chiriqui.

femoralis (Chevrolat 1834). Coleop. Mex., p. 110.

hartmanni Howden and Gill 1987. Coleop. Bull. 41: 204. Chiriqui.

indigaceus chevrolati Harold 1868. Berlin Ent. Zeit. 12: 119. Canal Zone.

juvencus Harold 1868. Berlin Ent. Zeit. 12: 111. Canal Zone, Colón, Panama.

raripilis Bates 1887. Biol. Cent.-Amer. 2 (2): 30.

lamprimus Bates 1887. Biol. Cent.-Amer. 2 (2): 29. Canal Zone, Coclé, Colón, Panama.

litoratus (Germar 1813). Mag. Ent. 1: 117. Chiriqui, Coclé.

quadripunstulatus Guérin-Méneville 1855. Verh. Zool.-Bot. Ges. Wien 5: 587.

meridionalis Martínez, Halffter, and Halffter 1964. Acta Zool. Mex. 7: 32. Canal Zone, Panama.

moniliatus Bates 1887. Biol. Cent.-Amer., Coleop. 2: 27. Canal Zone, Panama.

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- TOMARUS** Erichson 1847. Arch. Natur. 13: 95.
Ligyris Burmeister 1847. Handb. Ent. 5: 542.
Ligyrodes Casey 1915. Mem. Coleop. 6: 178.
Euligyris Casey 1915. Mem. Coleop. 6: 185.
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AMBLYODUS Westwood 1878. Trans. Ent. Soc. London 1878: 32.
taurus Westwood 1878. Trans. Ent. Soc. London 1878: 32. Chiriqui, Panama.

AMBLYOPROCTUS Kolbe 1910. Ann. Soc. Ent. Belg. 54: 335.
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tricuspis Prell 1914. Ent. Mitt. 3: 220. Canal Zone, Coclé, Colón, Panama.

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 subsp. *meridionalis* Kolbe 1910. Ann. Soc. Ent. Belg. 54: 352.
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 texensis Casey 1915. Mem. Coleop. 6: 268.
 carolinae Casey 1915. Mem. Coleop. 6: 269.
 sulcifer Casey 1915. Mem. Coleop. 6: 269.
 floridanus Casey 1915. Mem. Coleop. 6: 270.
 clathratus Casey 1915. Mem. Coleop. 6: 271.
youngi Ratcliffe 1988. Coleop. Bull. 42: 53. Bocas del Toro, Coclé, Panama.

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curvicornis Burmeister 1847. Handb. Ent. 5: 282. Chiriqui, Los Santos, Panama.
 atra Sternberg 1904. Deutsche Ent. Zeit. 1904: 18.
 nigricollis Sternberg 1904. Deutsche Ent. Zeit. 1904: 18.
 trinidadensis Sternberg 1904. Deutsche Ent. Zeit. 1904: 18.

- SPODISTES** Burmeister 1847. Handb. Ent. 5: 286.
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 Theogenes Burmeister 1847. Handb. Ent. 5: 254.
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vulcan Verrill 1906. Amer. J. Sci. 21: 319.
argentatus Verrill 1907. Amer. J. Sci. 24: 305.
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Lyphontes Bruch 1910. Rev. Mus. La Plata 4: 73.
Megasominus Casey 1915. Mem. Coleop. 6: 261.
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argentinum Höhne 1923. Deutsche Ent. Zeit. 1923: 254.
elephas (Fabricius 1775). Syst. Ent. 1: 7.
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Latemnis Thomson 1880. Naturaliste 2: 268.

Cotinorrhina Schoch 1895. Mitt. Schwiez. Ent. Ges. 1: 25.

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polita Janson 1876. Cist. Ent. 133. Chiriqui.

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GUATEMALICA Meervoort van de Poll 1886. Notes Leiden Mus. 8: 138.

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GYMNETOSOMA Martínez 1949. An. Soc. Cient. Argenti. 147:

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radiata Wiedemann 1824. Analecta Ent., p. 8.

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penicrusta Voet 1779. Cat. Syst. Col., p. 10.
acuminata Herbst 1790. Natursyst. Käfer 3: 259.
spinosa Fischer 1823. Mem. Soc. Imp. Nat., Moscou 6: 259.
hamata Fauvel 1861. Bull. Soc. Linn. Normand. 5: 305.

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- EUPHORIA** Burmeister 1842. Handb. Ent. 3: 370.
Erirhipis Burmeister 1842. Handb. Ent. 3: 385.
Euphoriaspis Casey 1915. Mem. Coleop. 6: 298.
Erirhipidia Casey 1915. Mem. Coleop. 6: 300.
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Haplophoria Casey 1915. Mem. Coleop. 6: 300.
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 candezei Janson 1875. Cist. Ent. 1: 375. Chiriqui.
belti Sharp 1877. J. Linn. Soc. Zool. 13: 137.
 geminata (Chevrolat 1835). Coleop. Mex., p. 107.
 precaria Janson 1881. Cist. Ent. 2: 583. Chiriqui.
 steinheili Janson 1878. Cist. Ent. 2: 303. Chiriqui.

CREMASTOCHEILINI

- PARACYCLIDIUS** Howden 1971. Proc. Ent. Soc. Wash. 73: 226.
 bennetti Howden 1971. Proc. Ent. Soc. Wash. 73: 227. Canal Zone.

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- INCA** LePeletier and Serville 1828. Encyc. Method. 10: 380.
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- DIALITHUS** Parry 1849. Trans. Roy. Ent. Soc. London 5: 181.
 scintillans Howden 1972. Can. Ent. 104: 650. Panama.

GIESBERTIOLUS Howden 1988. *Coleop. Bull.* 42: 241.
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Appendix of journal abbreviations

- Abh. Preuss. Akad. Wiss. = Abhandlungen der k. preussische Akademie der Wissenschaften
- Acta Amaz. = Acta Amazonica
- Acta Zool. Acad. Sci. Hung. = Acta Zoologica Academiae Scientiarum Hungaricae
- Acta Zool. Iilloana = Acta Zoologica Iilloana
- Acta Zool. Mex. = Acta Zoologica Mexicana
- Achthund. Zwans. neue unbeschr. wirb. Thiere = Achthundert und zwanzig neue oder unbeschriebene bellose Thiere
- Amer. J. Sci. = American Journal of Science
- An. Mus. Buenos Aires = Anales del Museu Nacional de Buenos Aires
- An. Soc. Cient. Argent. = Anales de la Sociedad Científica Argentina
- Analecta Ent. = Analecta Entomologica ex Museo Regio Hafniae
- Anim. Nouv. Rares Recueill. = Animaux Nouveaux ou Rares Recueillis Pendant l'expédition . . .
- Ann. Ent. Soc. Amer. = Annals of the Entomological Society of America
- Ann. Hist. Nat. = Annus Historico Naturalis
- Ann. Hist.-Nat. Mus. Nat. Hung. = Annales Historico-Naturales Musei Nationalis Hungarici
- Ann. Mag. Nat. Hist. = Annals and Magazine of Natural History
- Ann. Soc. Ent. Belgique = Annales de la Société Entomologique de Belgique
- Ann. Soc. Ent. France = Annales de la Société Entomologique de France
- Arcana Nat. = Arcana Naturae
- Arch. Ent. = Archives Entomologiques
- Arch. Inst. Biol. = Archivos do Instituto Biológico
- Arch. Natur. = Archiv für Naturgeschichte
- Arq. Mus. Para. = Arquivos do Museo Paraense
- Beetles of the World = Beetles of the World (also as Les Coléoptères du Monde)
- Ber. Naturf. Ges. Augsb. = Bericht der Naturforschenden Gesellschaft Augsburg
- Berlin Ent. Zeit. = Berliner Entomologische Zeitschrift
- Biol. Cent.-Amer. = Biologia Centrali Americana
- Bol. Soc. Colom. Sci. = Boletín de la Sociedad Colombiana de Ciencias Naturales

- Bonn Zool. Beitr. = Bonner Zoologische Beitrag
- Boston J. Nat. Hist. = Boston Journal of Natural History
- Bull. Amer. Mus. Nat. Hist. = Bulletin of the American Museum of Natural History
- Bull. Mens. Soc. Linn. Lyon = Bulletin Mensuel de la Société Linnéenne de Lyon
- Bull. Sci. Nat. = Bulletin, Sciences Nat
- Bull. Soc. Linn. Normand. = Bulletin de la Société Linnéenne de Normandie
- Bull. Soc. Ent. France = Bulletin de la Société Entomologique de France
- Bull. Soc. Imp. Nat. Moscou = Bulletin de la Société Impériale des Naturalistes de Moscou
- Bull. South. Calif. Acad. Sci. = Bulletin of the Southern California Academy of Sciences
- Bull. Univ. Nebr. St. Mus. = Bulletin of the University of Nebraska State Museum
- Bull. U. S. Nat. Mus. = Bulletin of the U. S. National Museum
- Caldasia = Caldasia
- Can. Ent. = Canadian Entomologist
- Can. J. Zool. = Canadian Journal of Zoology
- Cas. Ceskoslov. Spol. Ent. = Casopis Československé Společnosti Entomologické
- Cat. Col. = Catalogue des Coléoptères de la Collection de M. le Comte Dejean
- Cat. Coll. Ent. = Catalogue de la Collection Entomologique du Museum d'Histoire Naturelle de Paris
- Cat. Lucanoid Col. = A Catalogue of the Lucanoid Coleoptera in the Collection of the Rev. F. W. Hope
- Cat. Syst. Col. = Catalogus Systematicum Coleopterorum
- Cist. Ent. = Cistula Entomologica
- Col. Hefte = Coleopterische Hefte
- Coleop. Hesp. = Coleoptera Hesperidum, being an enumeration of the coleopterous insects of the Cape Verde Archipelago
- Col. Man. = The Coleopterist's Manual . . .
- Col. Rundschau = Coleopterologische Rundschau
- Coleop. Bull. = Coleopterists Bulletin
- Coleop. du Monde = Les Coléoptères du Monde (also as Beetles of the World)
- Coleop. Mex. = Coléoptères du Mexique

- Contr. Amer. Ent. Inst. = Contributions of the American Entomological Institute
- Crust., Arach., Insect. = Les Crustacés, les Arachnides et les Insectes, Distribués en Famille Naturelles, Ouvrage Formant les Tomes 4 et 5 de celui de M. le Baron Cuvier sur les Règne Animal.
- Del. Animal. = Delectus Animalium Articulatorum . . .
- Deutsche Ent. Zeit. = Deutsche Entomologische Zeitschrift
- Dynast. Herc. Pet. Ant.= Le Dynaste hercule dans les Petites Antilles
- Encyc. Method. = Encyclopedia Methodique
- Entomolog. Histor. = Entomologie, ou Histoire Naturelle des Insectes, avec leurs Caractères Gènériques et Spécifiques, leur Description, leur Synonymie, et leur Figure Enluminée. Coleoptères.
- Ent. Abh. = Entomologische Abhandlungen
- Ent. Arb. Mus. Frey = Entomologischen Arbeiten aus dem Museum G. Frey
- Ent. Blätter = Entomologische Blätter
- Ent. Imper. Russ. = Entomographia Imperii Russici . . .
- Ent. Mag. = The Entomological Magazine
- Ent. Mitt. = Entomologische Mitteilungen
- Ent. Month. Mag. = Entomologists Monthly Magazine
- Ent. Nach. = Entomologische Nachrichten
- Ent. News = Entomological News
- Ent. Syst. = Entomologica Systematica
- Ent. Use. Compend. = The Entomologists' Useful Compendium
- Ent. Zeitschr. = Entomologische Zeitschrift
- Entomograph. = Entomographien
- Ephem. Ent. = Ephemerides Entomologicae
- Exot. Käfer = Die exotischen Käfer in Wort und Bild
- Faun. Bor. Amer. = Fauna Boreali-Americana
- Fauna Aust. Käfer = Fauna Austriaca. Die Käfer.
- Fauna Insect. Fridrich. = Fauna Insectorum Fridrichsdalina
- Faune Emp. Franc. = Faune de l'Empire Française
- Florid. Ent. = The Florida Entomologist

- Fol. Ent. Hung. = Folia Entomologica Hungarica
- Fol. Zool. Hydro. = Folia Zoologica et Hydrobiologica
- Gen. Col. = Genera des Coléoptères
- Gen. Crust. et Insect. = Genera Curstaceorum et Insectorum . . .
- Gen. Insec. = Genera Insectorum
- Gen. Quaed. Insect. = Genera Quadam Insectorum . . .
- Gen. Spec. Meiner Cetonid. = Die Genera und Species meiner Cetonidensammlung
- G. Ital. Ent. = Giornale Italiano di Entomologia
- Handb. Ent. – Handbuch der Entomology
- Histoire Abrégée des Insectes . . . Histoire Abrégée des Insectes que se Trouvent aux Environs de Paris dans laquelle ces animaux sont rangés suivant un ordre méthodique, Vol. 1
- Hist. Nat. Anim. Art. = Histoire Naturelle des Animaux Articules . . .
- Hist. Nat. Col. Fr. Lamell. = Histoire Naturelle de Coléoptères de France, Lamellicornes.
- Hist. Nat. Crust. Insectes = Histoire Naturelle, Générale et Particulière, des Crustaces et des Insectes
- Hist. Nat. Anim. Articul. = Histoire Naturelle des Animaux Articulés
- Horae Ent. = Horae Entomologicae or Essays on the Annulose Animals, vol. 1
- Insect. Afr. et Amer. = Insectes Recueillis en Afrique et en Amérique
- Insect. Spec. Nov. = Insectorum Species Novae . . .
- Insectes Amer. Merid. = Insectes de l'Amérique Méridionale Recueillis par Alcide d'D'Orbigny
- Insects Panama and Mesoamerica = Insects of Panama and Mesoamerica
- Intro. Ent. = Introduction to Entomology
- J. Acad. Nat. Sci. Phil. = Journal of the Academy of Natural Sciences of Philadelphia
- J. Linn. Soc. London = Journal of the Linnean Society of London
- J. Linn. Soc. Zool. = Journal of the Linnean Society of Zoology
- Kongliga Svenska Freg. Eugen. Jorden Zool. = Kongliga Svenska Fregatten *Eugenie* res omkring Jorden . . . Zoologi
- Kritisch. Verz. Myrmekoph. Termitoph. Arthr. = Kritisches Verzeichniss der myrmekophilen und termitophilen Arthropoden
- Mag. Ent. = Magazin der Entomologie
- Mag. Ins. = Magazin für Insektenkunde

- Mag. Zool. = Magasin de Zoologie
- Mant. Insect. = Mantissa Insectorum
- Mass. Ag. J. = Massachusetts Agricultural Journal
- Mem. Ent. Soc. Canada = Memoirs of the Entomological Society of Canada
- Mem. Ins. = Mémoires pour servir à la Histoire des Insectes
- Mem. Coleop. = Memoirs of the Coleoptera
- Mem. Acad. Imp. Sci. St. Peters. = Mémoires de l'Académie Impériale des Sciences de St.-Petersbourg
- Mem. Indian Mus. = Memoirs of the Indian Museum
- Mem. Mus. Nat. Hist. = Mémoires du Muséum d'Histoire Naturelle
- Mem. Soc. Ent. Ital. = Memorie della Società Entomologica Italiana
- Mem. Soc. Imp. Nat. Moscou = Mémoires de la Société Impériale des Naturalistes de Moscou
- Misc. Ent. = Miscellanea Entomologica
- Mis. Est. Pat. Reg. Argentina = Mision de Estudios de Patología Regional Argentina
- Mitt. Schweiz. Ent. Ges. = Mittheilungen der Schweizerischen Entomologischen Gesellschaft
- Monogr. Cetoines = Monographie de Cétoines et Genres Voisins, Forman, dans les Familles Naturelles de Latreille, la Division des Scarabées Méliophiles.
- Monogr. Passalid. = Monographie des Passales et des Genres . . .
- Mus. Lud. Ulr. = Museum Ludovicae Ulrica Reginae Svecorum . . .
- Nat. Insect. Deutschl. = Naturgeschichte der Insecten Deutschlands
- Naturaliste = Le Naturaliste
- Natursyst. Käfer = Natursystem aller bekannten in- und ausländischen Insekten . . . , Käfer
- Nomen. Zool. = Nomenclator Zoologicus
- Notes Leiden Mus. = Notes from the Leiden Museum
- Notul. Nat. = Notulae Naturae
- Nouv. Rev. Ent. = Nouvelle Review d'Entomologie
- Novit. Zool. = Novitates Zoologicae
- Observ. Ent. = Observationes Entomologicae . . .
- Philippine J. Sci. = Philippine Journal of Science

- Proc. Acad. Nat. Sci. Phil. = Proceedings of the Academy of Natural Sciences of Philadelphia
- Proc. Ent. Soc. London = Proceedings of the Entomological Society of London
- Proc. Ent. Soc. Wash. = Proceedings of the Entomological Society of Washington
- Proc. Roy. Phys. Soc. = Proceedings of the Royal Physical Society of Edinburgh
- Proc. USNM = Proceedings of the U. S. National Museum
- Proc. Zool. Soc. London = Proceedings of the Zoological Society of London
- Regne Anim. = Règne Animal by Cuvier
- Reichenb. = Reichenbachia
- Rev. Ent. = Revista de Entomologia
- Rev. Bras. Ent. = Revista Brasileira de Entomologia
- Rev. Franc. Ent. = Revue Française d'Entomologie
- Rev. Mus. La Plata = Revista del Museo de la Plata
- Rev. Mus. Paulista = Revista do Museu Paulista
- Rev. Suisse Zool. = Revue Suisse de Zoologie
- Rev. Zool. = Revue Zoologique
- Rev. Biol. Trop. = Revista de Biologia Tropical
- Sagra, Hist. Cuba = Sagra, Historie physique, politique et naturelle del'Ile de Cuba
- Schomb. Reise Brit. Guiana = Die Insekten in Schomburg's Reise in Guiana
- Sci. Nat. = Sciences Nat
- Senckenb. = Senckenbergiana
- Smith. Contr. Knowl. = Smithsonian Contributions to Knowledge
- Smith. Contr. Zool. = Smithsonian Contributions to Zoology
- Smith. Misc. Coll. = Smithsonian Miscellaneous Collections
- Societas Ent. = Societas Entomologica
- Spec. Insect. = Species Insectorum Spec.
- Stettin. Ent. Zeit. = Stettiner Entomologische Zeitung
- Stud. Ent. = Studi Entomologici
- Symb. Ent. = Symbolae Entomologicae
- Syn. Ins. = Synonymia Insectorum

- Syst. Eleuth. = Systema Eleutheratorum Syst. Eleuthr.
- Syst. Ent. = Systema Entomologiae
- Syst. Nat. = Systema Naturae
- Trans. Amer. Ent. Soc. = Transactions of the American Entomological Society
- Trans. Ent. Soc. London = Transactions of the Entomological Society of London
- Trans. Linn. Soc. London = Transactions of the Linnean Society of London
- Trans. Roy. Ent. Soc. London = Transactions of the Royal Entomological Society of London
- Trans. Roy. Soc. S. Australia = Transactions of the Royal Society of South Australia
- Trav. Andes, Suppl. = Supplementary Appendix to Travels Amongst the Great Andes of the Equator
- Treas. Nat. Hist. = Treasury of Natural History
- Typi Cetonid. = Typi Cetonidarum. . .
- Univ. Calif. Publ. Ent. = University of California Publications in Entomology
- Verh. Zool.-Bot. Ges. Wien = Verhandlungen der k. k. zoologische-botanischen Gesellschaft in Wien
- Verz. Beschr. Tyrol. Insect. = Verzeichniss und Beschreibung der Tyroler Insecten
- Verzeich-Kafer = Verzeichniss der Käfe Preussens . . .
- Voy. Coqu. = Voyage Autour du Monde. . . sur. . . la Coquille Voy. Coq.
- Voyage Humboldt and Bonpland = Voyage de Humboldt et Bonpland
- Zeitschr. Ent. = Zeitschrift für die Entomologie
- Zeitschr. Ges. Natw. = Zeitschrift für die Gesammten Naturwissenschaften
- Zeitung Zool. = Zeitung für Zoologie, Zootomie und Palaeozoologie
- Zool. J. = Zoological Journal
- Zool. Mag. = Zoologische Magazin
- Zool. Misc. = The Zoological Miscellany