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A checklist of chiggers (Trombidiformes: Trombiculidae and Leeuwenhoekiidae) of Panama

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Original research

ABSTRACT

An updated checklist of chiggers from the family Trombiculidae and Leeuwenhoekiidae is presented, with 81 species in 38 genera parasitizing different terrestrial vertebrate hosts in Panama. The depository for all Panamanian records, including new localities and host-associations records for the species *Blankaartia sinnamaryi* (Floch and Fauran, 1956), *Eutrombicula tinami* (Oudemans, 1910), *Eutrombicula goeldii* (Oudemans, 1910), *Hooperella vesperuginis* (Brennan and Jones, 1960), and *Pseudoschoengastia bulbifera* Brennan, 1960 were provided.

Keywords chigger mites; parasitism; vertebrates; Panama

Introduction

The first chigger described from Panama was *Odontacarus dentatus* (Ewing, 1925), originally described as *Trombicula dentata* Ewing, 1925 (Ewing 1925b). Eighteen years later, Fairchild (1943) published a list with eight species followed by Wharton and Fuller (1952) world list of chiggers, assigning five genera and ten species to Panama. In 1961, Brennan and Jones (1961b) described: *Aniatrus* Brennan and Jones, 1961; *Polylopadium* Brennan and Jones, 1961; and *Vanidicus* Brennan and Jones, 1961 and including description of 17 new species. Soon after, Brennan and Yunker (1966) compiled a catalog for Panama, which recorded 76 species organized in 29 genera. In contrast, a key of chigger genera prepared by Brennan and Goff (1977a), identified 87 genera for the Nearctic and Neotropical regions, with only 25 assigned to Panama.

Compared to other countries in South and Central America, only Venezuela has the most significant diversity of chiggers, having 136 species in 38 genera (Brennan and Reed 1975). Among the countries that have a great diversity in this region with a compiled checklist were Brazil (63 species – Jacinavicius *et al.* 2018), Chile (25 species – de Silva-de la Fuente *et al.* 2020), and Peru (37 species – Brennan and Jones 1961) stand out, but still having a smaller number of species of chiggers when compared to Panama or Venezuela.

Here, we provide an updated checklist of Panamanian chiggers, the data on the distribution of these chiggers outside the country, and also, we provided the most recent taxonomic positions

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for some of these chigger species, as well as, corrected some host names. Besides that, we included new host associations and locality records for five species of chiggers.

Material and methods

The checklist is arranged in alphabetical order, following the format proposed by Jacinavicius *et al.* (2018), starting with: Genus - valid name of the genus, author, date, and page; Species - valid name of the species, author, date, page, type locality, type host, and type depository, in parenthesis are the typifications. The list below are the abbreviations of the Collections/Institutes used in this checklist:

- **AMNH** USA, New York, American Museum of National History;
- **CSULB** USA, California, Long Beach, California State University, Chigger Research Laboratory Collection;
- **FMNH** USA, Illinois, Chicago, Field Museum of Natural History Chicago (cited in original description as CNHM);
- **IBSP** Brazil, São Paulo, São Paulo, Acari Collection of the Instituto Butantan;
- **LACM** USA, California, Los Angeles, Natural History Museum of Los Angeles County;
- **MCZC** USA, Massachusetts, Cambridge, Harvard University, Museum of Comparative Zoology;
- **MNHN** France, Paris, Muséum National d'Histoire Naturelle;
- **NHMUK** United Kingdom, London, South Kensington, The Natural History Museum [formerly British Museum (Natural History)] (cited in original description as BMNH or BM);
- **OSAL** USA, Ohio, Columbus, Ohio State University Acarology Laboratory;
- **RMNH** Netherlands, South Holland, Leiden, Naturalis Biodiversity Centre [formerly Rijksmuseum van Natuurlijke Historie];
- **SAM** Australia, South Australia, Adelaide, South Australian Museum;
- **UNAM** Mexico, Mexico City, Universidad Nacional Autónoma de México;
- **USNM** USA, Washington D.C., National Museum of Natural History, [formerly United States National Museum] which is the Acari Collection is housed at the Systematic Entomology Laboratory (BARC-USDA-ARS), cited in original descriptions as NMNH.

The type locality is updated to the present day, as well as, it is as accurate as possible, for more details and old names of these localities, look for the original description, which is placed right after the type locality of each species.

All records in the "Panama records" section, were taken from literature. In some of these studies, the host species have not been separated by locality. So, for these cases, we also chose not to separate species by locality, followed by the new records for the country, when available. The new records are based on the material deposited in the IBSP collection. When the species were also reported outside Panamanian territory, they were registered in the section "Other records". Dissertations and theses were not considered in this checklist. The "type depository" section is based on literature, either by the original description or by type catalogs such as those made by Hernandes *et al.* (2011) and Bassini-Silva *et al.* (2021). Besides that, according the type catalog made by Bassini-Silva *et al.* (2021), the Bernice Pauahi Bishop Museum (BPBM) and Rocky Mountain Laboratory (RML) collections are now housed in the USNM. Then in

the "type depository" section, USNM is considered the collection in which the specimens are deposited. For the hosts, we are using the update host-list made by Bassini-Silva *et al.* (2021).

The species *Trombicula cavernarum* Ewing, 1933 and *Trombicula trifurca* Ewing, 1933 were not considered in this checklist because only the post-larval stages are known. The species *Colicus exhumatus* Brennan, 1970 was also not considered in this checklist given the dubious identification made by Brennan (1970b), as well as *Microtrombicula sturnirae* Webb and Loomis, 1971 due the fact that there are no details of collection data recorded from Panama, possible misspelling listed in Webb and Loomis (1977). In these two cases, we decided to put the species as *Species inquirenda.* Regarding to the genera *Trombicula* and *Euschoengastia*, we keep the species with its original genus designation. For these species, a systematic review is needed, including types examination. Unfortunately, this is not the task of the present checklist.

Appendix 1 provides a list of Panamanian chiggers with their respective hosts and Appendix 2 provides a list of hosts with their respective chiggers' species.

Checklist of larval chigger species recorded from Panama (in alphabetical order)

Family LEEUWENHOEKIIDAE Womersley, 1944

Genus *Odontacarus* Ewing, 1929: 188

Odontacarus chiapanensis (Hoffmann, 1948): 179

Type locality: Mexico, Chiapas State, La Esperanza (Hoffmann 1948). **Type host**: *Cuniculus paca* (L., 1766) (Rodentia: Cuniculidae). **Type depository**: UNAM (holotype and paratypes). **Panama records**. Brennan and Yunker (1966) reported this species from *Proechimys semispinosus* Tomes, 1860 (Rodentia: Echimyidae) in Almirante, Bocas del Toro Province. **Other records**. Mexico (Hoffmann 1948; Loomis 1969; Estébanes-González and Cervantes 2005).

Odontacarus dentatus (Ewing, 1925b): 257

Type localities: USA, Texas, Sonora; and Panama, Panama Province, Balboa (Ewing 1925b). **Type host**: *Odocoileus virginianus* Zimmermann, 1780 (Artiodactyla: Cervidae) and *Sigmodon* sp. (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratype). **Panama records**. Only known from the type data. **Other record**. USA (Ewing 1925b).

Odontacarus fieldi Brennan and Jones, 1961b: 105

Type locality: Panama, Panama Province (Brennan and Jones 1961b). **Type host**: *Sigmodon hispidus* Say and Ord, 1825 (Rodentia: Cricetidae) and *Zygodontomys brevicauda* J.A. Allen and Chapman, 1893 (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratype). **Panama records**. Brennan and Yunker (1966) reported *O. fieldi* parasitizing two birds, *Neomorphus geoffroyi salvini* (Sclater, 1866) (Cuculiformes: Cuculidae) and *Odontophorus erythrops* Gould, 1859 (Galliformes: Odontophoridae), a marsupial, *Didelphis marsupialis* L., 1758 (Didelphimorphia: Didelphidae), five rodents, *Heteromys adspersus* (= *Liomys adspersus*) (Peters, 1874) (Rodentia: Heteromyidae), *P. semispinosus* (Rodentia: Echimyidae), *Sciurus granatensis* Humboldt, 1811 (Rodentia: Sciuridae), *S. hispidus* and *Z. brevicauda* (Rodentia: Cricetidae), and a feline, *Leopardus pardalis* (= *Felis pardalis*) (L., 1758) (Carnivora: Felidae), from the Summit Botanical Gardens and Miraflores lock, Panama City, Panama Province, Cerro Pierre, Darién Province, Campana, West Panama Province, Bastimentos Island, Bocas del Toro Province and Cerro Hoya National Park, Los Santos Province.

Genus *Sasacarus* Brennan and Jones, 1959: 8

Sasacarus furmani furmani (Hoffmann, 1954): 17

Type locality: Mexico, Oaxaca State, Monte Albán (Hoffmann 1954). **Type host**: *Baiomys musculus* (Merriam, 1892) (Rodentia: Cricetidae). **Type depository**: USNM (holotype) and UNAM (paratype). **Panama records**. This species was found on a marsupial and two rodents, *D. marsupialis* (Didelphimorphia: Didelphidae), *P. semispinosus* (Rodentia: Echimyidae) and *Heteromys desmarestianus* Gray, 1868 (Rodentia: Heteromyidae) at three localities in Bocas del Toro Province, Panama Province, including Cerro Azul and Piña, Colón Province (Brennan and Yunker 1966). **Other records**. Mexico (Hoffmann 1954).

Sasacarus furmani panamensis Reed and Brennan, 1974: 31

Type locality: Panama, Colón Province, Piña (Reed and Brennan 1974). **Type host**: *Proechimys semispinosus* Tomes, 1860 (Rodentia: Echimyidae) and *Tylomys watsoni* Thomas, 1899 (Rodentia: Cricetidae). **Type depository**: USNM (holotypes and paratypes) and FMNH (paratypes). **Panama records**. Only known from the type series.

Sasacarus panamense Goff, 1987: 105

Type locality: Panama, Chiriquí Province, Santa Clara (Goff 1987). **Type host**: *Cryptotis nigrescens* (J.A. Allen, 1895) (Eulipotyphla: Soricidae). **Type depository**: USNM (holotype and paratypes). **Panama records**. Only known from the type series.

Genus *Vargatula* Brennan and Yunker, 1966: 224

Vargatula hispida Brennan and Yunker, 1966: 225

Type locality: Panama, Panama Province, Paraíso (Brennan and Yunker 1966). **Type host**: *Dasypus novemcinctus* L., 1758 (Cingulata: Dasypodidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes) and NHMUK (paratypes). **Panama records**. Only known from the type series.

Family TROMBICULIDAE Ewing, 1944

Genus *Aitkenius* Brennan, 1970c: 1694

Aitkenius cunctatus (Brennan and Jones, 1961b): 108

Type locality: Panama, Panama Province, Cerro Azul (Brennan and Jones 1961b). **Type host**: *Transandinomys talamancae* (= *Oryzomys talamancae*) (J.A. Allen, 1901) (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes) and FMNH (paratypes). **Panama records**. Only known from the type series.

Genus *Alexfainia* Yunker and Jones, 1961: 995

Alexfainia chilonycteris Yunker and Jones, 1961: 995

Type locality: Panama, Panama Province (Yunker and Jones 1961). **Type host**: *Pteronotus rubiginosus* (= *Chilonycteris rubiginosa*) (Wagner, 1843) (Chiroptera: Mormoopidae). **Type depository**: USNM (holotype and paratypes), NHMUK (paratypes), OSAL (paratypes) and FMNH (paratypes). **Panama records**. Yunker and Jones (1961) reported this species from *Carollia perspicillata* (L., 1758) (Chiroptera: Phyllostomidae), in the Chilibrillo caves, Chilibre, Panama Province. Brennan and Yunker (1966) reported this species on two additional bat species, *Pteronotus parnellii* Gray, 1843 (Chiroptera: Mormoopidae) from Paraíso and Lake Alajuela, Panama Province and *C. perspicillata* (Chiroptera: Phyllostomidae) from Pacora, Panama Province.

Genus *Aniatrus* Brennan and Jones, 1961b: 105

Aniatrus bifax Brennan and Jones, 1961b: 106

Type locality: Panama, Panama Province, Panama City (Brennan and Jones 1961b). **Type host**: *Dasypus novemcinctus* L., 1758 (Cingulata: Dasypodidae). **Type depository**: USNM (holotype). **Panama records**. Brennan and Yunker (1966) reported this species from *D. novemcinctus* (Cingulata: Dasypodidae) in Pedro Miguel River, Panama City and Paraíso, Panama Province.

Genus *Beamerella* Brennan, 1958: 71

Beamerella acutascuta Brennan, 1958: 72

Type locality: Trinidad and Tobago, Tamara Hill Cave (Brennan 1958). **Type host**: *Pteronotus rubiginosus* (= *Chilonycteris rubiginosa*) (Wagner, 1843) (Chiroptera: Mormoopidae). **Type depository**: USNM (holotype), NHMUK (paratypes) and MNHN (paratypes). **Panama records**. This species was found parasitizing *C. perspicillata* (Chiroptera: Phyllostomidae) in Los Santos Province, *Micronycteris megalotis* (Gray, 1842) (Chiroptera: Phyllostomidae) and *Saccopteryx bilineata* (Temminck, 1838) (Chiroptera: Emballonuridae) in Pacora, Panama Province (Brennan and Yunker 1966). **Other records**. Bolivia (Brennan 1970a), Colombia (Brennan and Jones 1960; Marinkelle and Grose 1981), Costa Rica (Webb and Loomis 1977), Cuba (Daniel and Stekolnikov 2003a), French Guiana (Brennan and Bronswijk 1975), Mexico (Webb and Loomis 1977), Nicaragua (Webb and Loomis 1977), Surinam (Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan 1958; Brennan and Jones 1960), USA (Brennan 1965), and Venezuela (Brennan and Reed 1975).

Genus *Blix* Brennan and Yunker, 1966: 228

Blix cabassoi Brennan and Yunker, 1966: 229

Type locality: Panama, Panama Province, Gamboa (Brennan and Yunker 1966). **Type host**: *Cabassous centralis* (Miller, 1899) (Cingulata: Chlamyphoridae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes) and NHMUK (paratypes). **Panama records**. Only known from the type series.

Genus *Blankaartia* Oudemans, 1910: 123

Blankaartia alleei (Ewing, 1926): 111

Type locality: Panama, Panama Province, Barro Colorado Island (Ewing 1926). **Type host**: collected from the soil without host information. **Type depository**: USNM (holotype). **Panama records**. This species was described from an adult collected in Barro Coloroado Island by Ewing (1926) without a description of larvae. Only years later, Michener (1946a) obtained the larvae from several hosts (listed above) and reared them in the laboratory, obtaining all the other stages that had not yet been described. The larvae of *B. alleei* were collected from seventeen birds, *Spatula discors* (= *Anas discors*) (L., 1766) (Anseriformes: Anatidae), *Piaya cayana* (L., 1766) (Cuculiformes: Cuculidae), *Crotophaga ani* L., 1758 (Cuculiformes: Cuculidae), *Gallus gallus* (L., 1758) (Galliformes: Phasianidae), *Porphyrio martinicus* (= *Porphyrula martinica*) (L., 1766) (Gruiformes: Rallidae), *Amblycercus holosericeus* (Deppe, 1830) (Passeriformes: Icteridae), *Thamnophilus doliatus* L., 1764 (Passeriformes: Thamnophilidae), *Saltator atriceps* (Lesson, 1832) (Passeriformes: Thraupidae), *Cantorchilus leucotis* (= *Thryothorus leucotis*) (Lafresnaye, 1845) (Passeriformes: Troglodytidae), *Tyrannus melancholicus* Vieillot, 1819, *Myiozetetes cayanensis* (L., 1766), *Myiozetetes similis* (Spix, 1825), *Myiarchus ferox* (Gmelin, 1789) (Passeriformes: Tyrannidae), *Egretta caerulea* (= *Florida caerulea*) L., 1758, *Ardea alba* (= *Casmerodius albus*) (L., 1758) (Pelecaniformes: Ardeidae), *Anhinga anhinga* (L., 1766) (Suliformes: Anhingidae), *Trogon massena* Gould, 1838 (Trogoniformes: Trogonidae) and a

rabbit, *Sylvilagus brasiliensis* (= *Sylvilagus gabbi*) L., 1758 (Lagomorpha: Leporidae), from Gamboa, Panama Province and Santa Rosa, Colón Province. In addition, Brennan and Yunker (1966) reported this species from *Hydrochoerus hydrochaeris* (L., 1766) (Rodentia: Caviidae), in Cerro Pierre, Darién Province. **Other record**. Surinam (Brennan and Bronswijk 1975).

Blankaartia arremonops (Brennan and Jones, 1961b): 114

Type locality: Panama, Panama Province (Brennan and Jones 1961b). **Type host**: *Arremonops conirostris* (Bonaparte, 1850) (Passeriformes: Passerellidae). **Type depository**: USNM (holotype). **Panama records**. Only known from the type series.

Blankaartia attenuata (Michener, 1946a): 440

Type locality: Panama, Panama Province (Michener 1946a). **Type host**: collected from the soil without host information. **Type depository**: AMNH (holotype, allotype and paratypes), USNM (paratypes), MCZC (paratypes). **Panama records**. Larvae were obtained by rearing, without hosts information (Michener 1946a). Only known from the type series.

Blankaartia marui Brennan and Yunker, 1966: 249

Type locality: Panama, Panama Province, Cerro Azul (Brennan and Yunker 1966). **Type host**: *Nycticorax nycticorax* (L., 1758) (Pelecaniformes: Ardeidae). **Type depository**: USNM (holotype and paratypes). **Panama records**. Only known from the type series.

Blankaartia sinnamaryi (Floch and Fauran, 1956): 3

Type locality: French Guiana, Sinnamary commune (Floch and Fauran 1956). **Type host**: *Homo sapiens* L., 1758 (Primates: Hominidae). **Type depository**: MNHN (syntypes). **Panama records**. Brennan and Yunker (1966) reported this species from twenty six birds, *Antrostomus rufus* (= *Caprimulgus rufus*) (Boddaert, 1783), *Nyctidromus albicollis* (Gmelin, 1789) (Caprimulgiformes: Caprimulgidae), *Baryphthengus ruficapillus* (Vieillot, 1818) (Coraciiformes: Momotidae), *Aramides cajaneus* (Müller, 1776) (Gruiformes: Rallidae), *Piranga rubra* (L., 1758) (Passeriformes: Cardinalidae), *Xiphorhynchus guttatus* (Lichtenstein, 1820) (Passeriformes: Dendrocolaptidae), *Dendrocincla homochroa* (Sclater, 1859), *Sclerurus guatemalensis* (Hartlaub, 1844) (Passeriformes: Furnariidae), *Icterus mesomelas* (Wagler, 1829) (Passeriformes: Icteridae), *Dumetella carolinensis* (L., 1766) (Passeriformes: Mimidae), *Geothlypis formosus* (= *Oporornis formosus*) (Wilson, 1811), *Geothlypis semifiava* Sclater, 1860 (Passeriformes: Parulidae), *Microbates cinereiventris* (Sclater, 1855) (Passeriformes: Polioptilidae), *Dysithamnus mentalis* (Temminck, 1823), *Taraba major* (Vieillot, 1816) (Passeriformes: Thamnophilidae), *Sporophila corvina* (= *Sporophila aurita*) (Sclater, 1860) (Passeriformes: Thraupidae), *Catharus mexicanus* (Bonaparte, 1856), *Catharus ustulatus* (= *Hylocichla ustulata*) (Nuttall, 1840) (Passeriformes: Turdidae), *M. ferox*, *Myiozetetes* sp. (Passeriformes: Tyrannidae), *Bucco* sp. (Piciformes: Bucconidae), *Monasa morphoeus* (Hahn and Küster, 1823), *Megascops guatemalae* (= *Otus guatemalae*) (Sharpe, 1875), *Strix virgata* (= *Ciccaba virgata*) (Cassin, 1850) (Strigiformes: Strigidae), *A. anhinga* (Suliformes: Anhingidae) and *T. massena* (Trogoniformes: Trogonidae), and a bat, *Phyllostomus hastatus* (Pallas, 1767) (Chiroptera: Phyllostomidae), from Pacora and Panama City, Panama Province, Nuevo Emperador, West Panama Province, Almirante, Bocas del Toro Province and Coiba Island, Veraguas Province. **New records**. 2 larvae (IBSP 12528), Barro Colorado Island, Panama Province, 5 Nov. 2007, *Catharus ustulatus* (Passeriformes: Turdidae); 2 larvae (IBSP 12539), same locality, 4 Nov. 2007, *Baryphthengus martii* (Coraciiformes: Momotidae). **Other records**. Brazil (Bassini-Silva *et al.* 2017), Colombia (Marinkelle and Grose 1981), Costa Rica (Arnold 1970; Stekolnikov *et al.* 2007), Cuba (Daniel and Stekolnikov 2003a), French Guyane (Floch and Fauran 1956), Jamaica (Brennan 1953), Peru (Brennan and Jones 1961a), Surinam (Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960), USA (Brennan 1965; Spalding *et al.* 1997), and Venezuela (Brennan and Reed 1975).

Blankaartia velascoi (Boshell and Kerr, 1942): 9

Type locality: Colombia, Meta Department, Restrepo (Boshell and Kerr 1942). **Type host**: collected from the soil without host information. **Type depository**: USNM (syntypes) and NHMUK (syntypes). **Panama records**. This species was described from an adult by Boshell and Kerr (1942), but Michener (1946a) described the larva. This same author found larvae specimens of *B. velascoi* parasitizing thirty birds, *Amazilia tzacatl* (de la Llave, 1833) (Caprimulgiformes: Trochilidae), *C. ani* (Cuculiformes: Cuculidae), *Falco sparverius* L., 1758 (Falconiformes: Falconidae), *G. gallus* (Galliformes: Phasianidae), *Habia gutturalis* (Sclater, 1854) (Passeriformes: Cardinalidae), *X. guttatus* (Passeriformes: Dendrocolaptidae), *A. holosericeus* (Passeriformes: Icteridae), *Setophaga* sp. (Passeriformes: Parulidae), *A. conirostris* (Passeriformes: Passerellidae), *Manacus vitellinus* (Gould, 1843) (Passeriformes: Pipridae), *T. doliatus*, *Myrmeciza longipes* (Swainson, 1825) (Passeriformes: Thamnophilidae), *Saltator albicollis* Vieillot, 1817, *S. atriceps*, *S. corvina* (= *S. aurita*) (Passeriformes: Thraupidae), *C. leucotis* (= *T. leucotis*), *Cantorchilus modestus* (= *Thryothorus modestus*) (Cabanis, 1861), *Troglodytes musculus* (Naumann, 1823) (Passeriformes: Troglodytidae), *Contopus cinereus* (= *Myiochanes cinereus*) (von Spix, 1825), *Elaenia flavogaster* (Thunberg, 1822), *Empidonax* sp., *T. melancholicus*, *M. cayanensis*, *M. similis*, *M. ferox*, *Myiozetetes granadensis* Lawrence, 1862, *Philohydor lictor* (= *Pitangus lictor*) (Lichtenstein, 1823) (Passeriformes: Tyrannidae), *Pachysylvia aurantiifrons* (= *Hylophilus aurantiifrons*) (Lawrence, 1862) (Passeriformes: Vireonidae), *Notharchus pectoralis* (Gray, 1846) (Piciformes: Bucconidae), *Melanerpes rubricapillus* (= *Centurus subelegans*) (Cabanis, 1862) (Piciformes: Picidae) and a rabbit, *S. brasiliensis* (= *S. gabbi*) (Lagomorpha: Leporidae), in several localities of the Panama Province and Santa Rosa, Colón Province. **Other records**. Colombia (Boshell and Kerr 1942).

Blankaartia wetmorei Brennan and Yunker, 1966: 250

Type locality: Panama, Panama Province (Brennan and Yunker 1966). **Type host**: *Nyctanassa violacea* (L., 1758) (Pelecaniformes: Ardeidae). **Type depository**: USNM (holotype and paratypes). **Panama records**. Only known from the type series.

Genus *Boshkerria* Fauran, 1959: 3

Boshkerria punctata (Boshell and Kerr, 1942): 15

Type locality: Colombia, Santander Department, Landázuri (Boshell and Kerr 1942). **Type host**: *Cuniculus paca* (= *Agouti paca*) (L., 1766) (Rodentia: Cuniculidae). **Type depository**: USNM (syntypes). **Panama records**. This species was reported from *Hoplomys gymnurus* (Thomas, 1897) (Rodentia: Echimyidae) in Piña, Colón Province and Bocas del Toro Province (Brennan and Yunker 1966). **Other records**. Colombia (Boshell and Kerr 1942), Peru (Brennan and Jones 1961a), Surinam (Brennan 1970b; Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960), Venezuela (Brennan and Reed 1975).

Genus *Colicus* Brennan, 1970d: 271

Colicus dyscrita (Brennan and Jones, 1961b): 107

Type locality: Panama, Panama Province, Soberanía National Park (Brennan and Jones 1961b). **Type host**: *Heteromys adspersus* (= *Liomys adspersus*) (Peters, 1874) (Rodentia: Heteromyidae). **Type depository**: USNM (holotype and paratypes), NHMUK (paratypes), SAM (paratypes) and FMNH (paratypes). **Panama records**. Brennan and Jones (1961b) reported this species from five rodents in three families including, *H. adspersus* (= *L. adspersus*) (Rodentia: Heteromyidae), in Curundu, Panama City, Panama Province, two cricetid rodents, *S. hispidus* (Rodentia: Cricetidae) and *T. talamancae* (= *O. talamancae*) (Rodentia: Cricetidae), from Soberanía National Park, Panama Province, the last host species cited and *Melanomys caliginosus* (= *Oryzomys caliginosus*) (Tomes, 1860) (Rodentia: Cricetidae), from Cerro Azul,

Panama Province and a echimyid rodent, *P. semispinosus* (Rodentia: Echimyidae), from Bocas del Toro Province. Brennan and Yunker (1966) reported this species from the marsupial, *D. marsupialis* (Didelphimorphia: Didelphidae) and five rodents, *H. desmarestianus* (Rodentia: Heteromyidae), *H. adspersus* (= *L. adspersus*) (Rodentia: Heteromyidae), *H. gymnurus* (Rodentia: Echimyidae), *Hylaeamys megacephalus* (= *Oryzomys capito*) (Fischer, 1814) (Rodentia: Cricetidae) and *T. watsoni* (Rodentia: Cricetidae) from Cerro Azul, Summit Botanical Gardens, Culebra Cut and Miraflores lock, Panama City, Panama Province and Piña, Colón Province.

Colicus colombiae (Boshell and Kerr, 1942): 16

Type locality: Colombia, Meta department, Restrepo (Boshell and Kerr 1942). **Type host**: *Proechimys chrysaeolus* (Thomas, 1898) (Rodentia: Echimyidae). **Type depository**: USNM (lectotype) and MCZC (paralectotypes). **Panama records**. This species was found on *Carollia subrufa* (Hahn, 1905) (Chiroptera: Phyllostomidae) in Cerro Pierre, Darién Province and Bocas del Toro Province (Brennan and Yunker 1966). **Other records**. Colombia (Boshell and Kerr 1942), Peru (Brennan and Jones 1961a), Trinidad and Tobago (Brennan and Jones 1960; Brennan 1967), Venezuela (Brennan and Reed 1975).

Colicus liomys (Brennan and Jones, 1961b): 121

Type locality: Panama, Panama Province, Panama City, Curundu and Corozal (Brennan and Jones 1961b). **Type host**: *Heteromys adspersus* (= *Liomys adspersus*) (Peters, 1874) (Rodentia: Heteromyidae). **Type depository**: USNM (holotype). **Panama records**. In addition to the types, Brennan and Yunker (1966) reported this species again from *H. adspersus* (= *L. adspersus*) (Rodentia: Heteromyidae) in El Corte Culebra, Panama Province.

Genus *Cordiseta* Hoffmann, 1954: 26

Cordiseta mexicana (Hoffmann, 1954): 27

Type locality: Mexico, Chiapas State (Hoffmann 1954). **Type host**: *Neotoma mexicana* (= *Neotoma ferruginea*) Baird, 1855 (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratype) and CSULB (paratype). **Panama records**. Brennan and Yunker (1966) reported this species from two cricetid rodents, *Scotinomys teguina* Alston, 1877 (Rodentia: Cricetidae) and *Peromyscus mexicanus* (= *Peromyscus nudipes*) (Saussure, 1860) (Rodentia: Cricetidae) in Cerro Punta, Chiriquí Province. **Other records**. Mexico (Hoffmann, 1954; Loomis, 1969).

Genus *Crotiscus* Ewing, 1944: 102

Crotiscus desdentatus (Boshell and Kerr, 1942): 11;

Type locality: Colombia, Santander Department, Landázuri (Boshell and Kerr 1942). **Type host**: *Proechimys chrysaeolus* (Thomas, 1898) (Rodentia: Echimyidae). **Type depository**: USNM (syntypes) and NHMUK (syntypes). **Panama records**. Brennan and Yunker (1966) reported *Crotiscus desdentatus* from two marsupials, *D. marsupialis* and *Philander opossum* L., 1758 (Didelphimorphia: Didelphidae) and five rodents, *H. desmarestianus* (Rodentia: Heteromyidae), *H. gymnurus*, *P. semispinosus* (Rodentia: Echimyidae), *Sigmodontomys alfari* (= *Nectomys alfari*) J.A. Allen, 1897 and *S. hispidus* (Rodentia: Cricetidae) from localities in the following four province: Panama Province, Piña, Colón Province, Campana, West Panama Province and Almirante, Bastimentos Island and Cayo Agua Island, Bocas del Toro Province. **Other records**. Colombia (Boshell and Kerr 1942; Brennan 1957; Brennan 1968), Trinidad and Tobago (Brennan 1957; Brennan and Jones 1960), Venezuela (Brennan 1957; Brennan and Reed 1975).

Genus *Crotonasis* Brennan and Yunker, 1966: 230

Crotonasis fissa Brennan and Yunker, 1966: 231

Type locality: Panama, Panama Province, Panama City, Summit Botanical Gardens (Brennan and Yunker 1966). **Type host**: *Heteromys adspersus* (= *Liomys adspersus*) (Peters, 1874) (Rodentia: Heteromyidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes) and NHMUK (paratypes). **Panama records**. Only known from the type series.

Genus *Euschoengastia* sensu lato Ewing, 1938: 293

Euschoengastia enhebra (Brennan and Yunker, 1966): 233

Type locality: Panama, Colón Province, Piña (Brennan and Yunker 1966). **Type host**: *Tylomys watsoni* Thomas, 1899 (Rodentia: Cricetidae). **Type depository**: USNM (holotype). **Panama records**. Only known from the type series.

Euschoengastia libertatis (Brennan and Dalmat, 1960): 189

Type locality: Guatemala, Chimaltenango department, Acatenango (Brennan and Dalmat 1960). **Type host: "**unidentified rat" (Rodentia). **Type depository**: USNM (holotype and paratypes), NHMUK (paratypes), SAM (paratypes) and FMNH (paratypes). **Panama records**. This species was also reported from *P. mexicanus* (= *P. nudipes*) (Rodentia: Cricetidae) in Chiriquí Province (Brennan and Yunker 1966). **Other records**. Guatemala (Brennan and Dalmat 1960).

Euschoengastia spissa (Brennan and Jones, 1961b): 109

Type locality: Panama, Chiriquí Province (Brennan and Jones 1961b). **Type host**: *Peromyscus mexicanus* (= *Peromyscus nudipes*) (Saussure, 1860) (Rodentia: Cricetidae). **Type depository**: USNM (holotype). **Panama records**. Only known from the type series.

Genus *Eutrombicula* Ewing, 1938: 293

Eutrombicula alfreddugesi (Oudemans, 1910): 84

Type locality: Mexico (Oudemans 1910). **Type host**: *Homo sapiens* L., 1758 (Primates: Hominidae). **Type depository**: RMNH (holotype). **Panama records**. Brennan and Yunker (1966) reported this species from eight reptiles, two birds and 24 mammals. The reptiles included, three colubrid snakes, *Oxybelis* sp. (Squamata: Colubridae), *Pseustes poecilonotus* (Günther, 1858) (Squamata: Colubridae) and *Spilotes pullatus* (L., 1758) (Squamata: Colubridae), four lizards, *Ameiva bifrontata* Cope, 1862 (Squamata: Teiidae), *Holcosus undulatus* (= *Ameiva undulata*) (Wiegmann, 1834) (Squamata: Teiidae), *Anolis* sp. (Squamata: Dactyloidae), *Sceloporus* sp. (Squamata: Phrynosomatidae), and an unidentified lizard. The birds were, *O. erythrops* (Galliformes: Odontophoridae) and *T. major* (Passeriformes: Thamnophilidae). Mammalian hosts included a coati, *Nasua nasua* (L., 1766) (Carnivora: Procyonidae), wild pig, *Pecari tajacu* (= *Tayassu tajacu*) (L., 1758) (Cetartiodactyla: Tayassuidae), three marsupials, *D. marsupialis*, *Marmosa robinsoni* Bangs, 1898 and *P. opossum* (Didelphimorphia: Didelphidae), a rabbit, *S. brasiliensis* (Lagomorpha: Leporidae), two primates, *Aotus trivirgatus* (Humboldt, 1812) (Primates: Aotidae) and *Saguinus geoffroyi* (Pucheran, 1845) (Primates: Callitrichidae) and sixteen rodents, *H. hydrochaeris* (Rodentia: Caviidae), *C. paca* (= *A. paca*) (Rodentia: Cuniculidae), *P. semispinosus* (Rodentia: Echimyidae), *Coendou quichua* (= *Coendou rothschildi*) Thomas, 1899 (Rodentia: Erethizontidae), *H. desmarestianus* (Rodentia: Heteromyidae), *Isthmomys flavidus* (= *P. flavidus*) (Bangs, 1902), *Handleyomys alfaroi* (= *O. alfaroi*) (J.A. Allen, 1891), *H. megacephalus* (= *O. capito*), *Oryzomys* sp., *P. mexicanus* (= *P. nudipes*), *Reithrodontomys mexicanus* (Saussure, 1860), *S. teguina*, *Scotinomys xerampelinus* Bangs, 1902, *S. hispidus*, *Z. brevicauda* (Rodentia: Cricetidae) and *S. granatensis* (Rodentia: Sciuridae), all from the

following localities: Culebra Cut, Curundu, Miraflores lock, Pacora, Pedro Miguel River and Summit Botanical Gardens, Panama City, Panama Province, Campana and Nuevo Emperador, West Panama Province, Parita, Herrera Province, Cerro Pierre, Darién Province, Achiote, Cerro Azul, Galeta Point and Piña, Colón Province, Almirante, Bocas del Toro Province, Cerro Hoya National Park and El Hato, Los Santos Province and Bambito, Boquete and Cerro Punta, Chiriquí Province. **Other records**. Brazil (Fonseca 1932; Carvalho *et al.* 2006; Delfino *et al.* 2011; Menezes *et al.* 2011; Faccini *et al.* 2017), Bolivia (Brennan 1970a), Costa Rica (Arnold 1970; Webb and Loomis 1977), Cuba (Daniel and Stekolnikov 2004), Guatemala (Brennan and Dalmat 1960), Mexico (Oudemans 1910; Wharton 1938; Pearse *et al.* 1936; Hoffmann 1949; Jenkins 1949; Loomis 1969; Loomis and Spath 1969; Webb and Loomis 1977; Estébanes-González and Cervantes 2005), Puerto Rico (Kurta *et al.* 2007), Surinam (Brennan 1970b; Brennan and Bronswijk 1975; Brennan and Lukoschus 1971), Trinidad and Tobago (Brennan and Jones 1960), USA (Wolfenbarger 1952; Brennan and White 1960; Rohani and Cromroy 1979), Venezuela (Brennan and Reed 1974; 1975).

Eutrombicula batatas (Linnaeus, 1758): 617

Type locality: Surinam (Linnaeus 1758). **Type host**: unknown host. **Type depository**: NHMUK. **Panama records**. Ewing (1933) reported this species from a human in Aguas Buenas, Panama Province. Michener (1946a, b) found this species in the soil from localities in Panama and Colón Provinces. In Santa Rosa, Colón Province, he also found *E. batatas* on dogs and some farm animals, including goats, cattle and chickens. In addition, Michener (1946a, b) found *E. batatas* on an unidentified rat, a rabbit, *S. brasiliensis* (= *S. gabbi*) (Lagomorpha: Leporidae), eight birds, *Columbina talpacoti* (= *Chaemepelia rufipennis*) (Temminck, 1809) (Columbiformes: Columbidae), *C. ani*, *Tapera naevia* (L., 1766) (Cuculiformes: Cuculidae), *A. cajaneus* (= *Aramides cajanea*) (Gruiformes: Rallidae), *T. musculus* (Passeriformes: Troglodytidae), *C. cinereus* (= *M. cinereus*), *T. melancholicus* (Passeriformes: Tyrannidae) and *E. caerulea* (= *F. caerulea*) (Pelecaniformes: Ardeidae). He also, reported human bites. Twenty years later, Brennan and Yunker (1966), reported this species from seven species of birds, *Buteogallus urubitinga* (= *Hypomorphnus urubitinga*) (Gmelin, 1788) (Accipitriformes: Accipitridae), *N. albicollis* (Caprimulgiformes: Caprimulgidae), *C. ani* (Cuculiformes: Cuculidae), *Caracara plancus* (Miller, 1777) (Falconiformes: Falconidae), *G. gallus* (Galliformes: Phasianidae), *C. mexicanus* (Passeriformes: Turdidae) and *Myiozetetes* sp. (Passeriformes: Tyrannidae), a cervid, *Mazama americana* (Erxleben, 1777) (Cetartiodactyla: Cervidae), four rodents, *H. hydrochaeris* (Rodentia: Caviidae), *S. hispidus*, *Reithrodontomys* sp., and *Z. brevicauda* (Rodentia: Cricetidae), and humans from Curundu, Gatún, Pacora and Tocumen, Panama City, Panama Province, Nuevo Emperador, West Panama Province, Almirante, Bocas del Toro Province, El Hato, Los Santos Province and Achiote, Colón Province (Brennan and Yunker 1966). **Other records**. Argentina (Brennan and Jones 1964), Brazil (Ewing 1925a; Bequaert 1926; Confalonieri and De Carvalho 1973; Confalonieri and Benez 1976; Faccini *et al.* 2017), Bolivia (Brennan 1970a), Colombia (Boshell and Kerr 1942), Costa Rica (Arnold 1970), Curaçao (Brennan 1967), French Guiana (Floch and Abonnenc 1941), Guatemala (Brennan and Dalmat 1960), Jamaica (Brennan 1953, 1967), Mexico (Linnaeus 1758; Islas 1943; Loomis 1969; Estébanes-González and Cervantes 2005), Paraguay (Goff and Whitaker 1984), Puerto Rico (Ewing 1943), Surinam (Linnaeus 1758; van Thiel 1930; van Thiel and van Ommeren 1940; Brennan and Lukoschus 1971; Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960), USA (Ewing 1943; Wolfenbarger 1952; Brennan and White 1960; Bennett and Loomis 1980), Venezuela (Brennan and Reed 1974, 1975).

Eutrombicula goeldii (Oudemans, 1910): 84

Type locality: Brazil (Oudemans 1910). **Type host**: *Dasyprocta aguti* L., 1766 (Rodentia: Dasyproctidae). **Type depository**: RMNH (holotype). **Panama records**. Brennan and

Yunker (1966) reported this species from four reptiles and four birds. The reptiles include, one colubrid snake, *P. poecilonotus* (Squamata: Colubridae), and three lizards, *A. bifrontata* (Squamata: Teiidae), *Holcosus festivus* (= *Ameiva festiva*) (Lichtenstein and Martens, 1856) (Squamata: Teiidae) and *H. undulatus* (= *A. undulata*) (Squamata: Teiidae). The birds include, *Momotus momota* (L., 1766) (Coraciiformes: Momotidae), *Neomorphus geoffroyi* (Temminck, 1820) (Cuculiformes: Cuculidae), *Cyphorhinus phaeocephalus* Sclater, 1860 (Passeriformes: Troglodytidae) and *Malacoptila panamensis* Lafresnaye, 1847 (Piciformes: Bucconidae). The same authors reported *E. goeldii* from twenty-seven mammals, including a coati, *N. nasua* (Carnivora: Procyonidae), a feline, *L. pardalis* (= *F. pardalis*) (Carnivora: Felidae), a tatu, *D. novemcinctus* (Cingulata: Dasypodidae), five marsupials, *D. marsupialis*, *Marmosa mexicana* Merriam, 1897, *M. robinsoni*, *Metachirus nudicaudatus* (É. Geoffroy, 1803) and *P. opossum* (Didelphimorphia: Didelphidae), an unidentified bat, a rabbit, *S. brasiliensis* (Lagomorpha: Leporidae), two primates, *A. trivirgatus* (Primates: Aotidae) and *S. geoffroyi* (Primates: Callitrichidae) and fifteen rodents, *P. semispinosus* (Rodentia: Echimyidae), *H. gymnurus* (Rodentia: Echimyidae), *C. quichua* (= *C. rothschildi*) (Rodentia: Erethizontidae), *H. adspersus* (= *L. adspersus*), *Heteromys australis* Thomas, 1901, *H. desmarestianus* (Rodentia: Heteromyidae), *S. granatensis* (Rodentia: Sciuridae), *Microsciurus alfari* (J.A. Allen, 1895) (Rodentia: Sciuridae), *Dasyprocta punctata* Gray, 1842 (Rodentia: Dasyproctidae), *Rattus rattus* L., 1758 (Rodentia; Muridae), *S hispidus*, *M. caliginosus* (= *O. caliginosus*), *H. megacephalus* (= *O. capito*), *S. alfari* (= *N. alfari*) and *Z. brevicauda* (Rodentia: Cricetidae) from Ancón Hill, Culebra Cut, Miraflores lock, Pedro Miguel River and Summit Botanical Gardens, Panama City and Barro Colorado Island, Panama Province, Capira, Capira Province, Campana, El Guayabito and Nuevo Emperador, West Panama Province, Achiote, Cerro Azul, Galeta Point and Pinã, Colón Province, Cerro Pierre, Darién Province, Divisa and Parita, Herrera Province, Cerro Hoya National Park, Los Santos Province, Almirante, Bastimentos Island, Cayo Agua Island and Escudo de Veraguas Island, Bocas del Toro Province, Coiba Island, Veraguas Province, and some localities in the Chiriquí Province. **New records**. 4 larvae (IBSP 12523), Barro Colorado Island, Panama Province, 8 Feb. 2007, *Baryphthengus martii* (Coraciiformes: Momotidae); 2 larvae (IBSP 12524), same locality, 2 Mar. 2007, *Leptotila cassini* (Columbiformes: Columbidae); 4 larvae (IBSP 12526), same locality, 4 Mar. 2007, *Thamnophilus atrinucha* (Passeriformes: Thamnophilidae); 1 larva (IBSP 12527B), same locality, 3 Nov. 2007, *Catharus ustulatus* (Passeriformes: Turdidae); 3 larvae (IBSP 12537), same locality, 10 Feb. 2007, *Malacoptila panamensis* (Piciformes: Bucconidae); 1 larva (IBSP 12538), same locality, 2 Mar. 2007, *Poliocrania exsul* (Passeriformes: Thamnophilidae); 1 larva (IBSP 12529) Santa Rosa, Colón Province, 3 Feb. 2010, *Didelphis marsupialis* (Didelphimorphia: Didelphidae); 1 larva (IBSP 12530), same locality and host, 2 Feb. 2010; 1 larva (IBSP 12531), same locality and host, 2 Mar. 2010; 1 larva (IBSP 12532), same locality and host, 2 Apr. 2010; 5 larvae (IBSP 12534), Metropolitan Natural Park, Panama City, Panama Province, 5 Sep. 2012, *Proechimys semispinosus* (Rodentia: Echimyidae). **Other records**. Brazil (Oudemans 1910), Bolivia (Brennan 1970a), Colombia (Boshell and Kerr 1942; Brennan 1968), Costa Rica (Arnold 1970), Dominica (Brennan 1967), Surinam (Brennan 1970b; Brennan and Lukoschus 1971, Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960), Venezuela (Brennan and Reed 1974, 1975).

Eutrombicula tinami (Oudemans, 1910): 84

Type locality: Brazil (Oudemans 1910). **Type host**: *Crypturellus noctivagus* (= *Crypturus noctivagus*) (Wied, 1820) (Tinamiformes: Tinamidae). **Type depository**: RMNH (holotype). **Panama records**. Brennan and Lukoschus (1971) recorded this species from the rodent, *P. semispinosus* (Rodentia: Echimyidae), in Galeta Point, Colón Province. **New records**. 1 larva (IBSP 12525), Barro Colorado Island, Panama Province, 3 Mar. 2007, *Poliocrania exsul* (Passeriformes: Thamnophilidae); 5 larvae (IBSP 12527A), same locality, 3 Nov. 2007, *Catharus ustulatus* (Passeriformes: Turdidae); 1 larva (IBSP 12533A), Santa Rosa, Colón

Province, 4 Feb. 2010, *Sigmodon hirsutus* (Rodentia: Cricetidae). **Other records**. Brazil (Oudemans 1910; Jacinavicius *et al.* 2018; Bassini-Silva *et al.* 2019), Surinam (Brennan and Lukoschus 1971), Venezuela (Brennan and Reed 1974; 1975).

Genus *Farrellioides* Vercammen-Grandjean, 1960: 469

Farrellioides panamensis (Ewing, 1925b): 259

Type locality: Panama, Panama Province, Balboa (Ewing 1925b). **Type host**: *Sigmodon hispidus* Say and Ord, 1825 (Rodentia: Cricetidae). **Type depository**: USNM (syntypes). **Panama records**. In addition to the type data, this species was reported from two unidentified rats in Gatuncillo, Colón Province by Brennan and Yunker (1966). These same authors also reported for *F. panamensis* the following hosts, a phyllostomid bat, *Dermanura tolteca* (= *Artibeus toltecus*) Saussure, 1860 (Chiroptera: Phyllostomidae), two marsupials, *D. marsupialis* and *M. robinsoni* (Didelphimorphia: Didelphidae) and ten rodents, *H. gymnurus*, *P. semispinosus* (Rodentia: Echimyidae), *C. quichua* (= *C. rothschildi*) (Rodentia: Erethizontidae), *H. adspersus* (= *L. adspersus*), *H. australis* (Rodentia: Heteromyidae), *H. megacephalus* (= *O. capito*), *M. caliginosus* (= *O. caliginosus*), *S. hispidus*, *Transandinomys bolivaris* (= *Oryzomys bombycinus*) (J.A. Allen, 1901) and *Z. brevicauda* (Rodentia: Cricetidae) from Gamboa, Summit Botanical Gardens in Panama Province, and Pedro Miguel River and Almirante in Bocas del Toro Province. **Other records**. Mexico (Brennan 1966; Loomis 1969; Estébanes-González and Cervantes 2005).

Genus *Hoffmannina* Brennan and Jones, 1959: 8

Hoffmannina handleyi Brennan and Jones, 1961b: 111

Type locality: Panama, Chiriquí Province (Brennan and Jones 1961b). **Type host**: *Peromyscus mexicanus* (= *Peromyscus nudipes*) (Saussure, 1860) (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. This species was found on five rodents, *H. desmarestianus* (Rodentia: Heteromyidae), *Peromyscus* sp., *Reithrodontomys* sp., *R. mexicanus* and *S. teguina* (Rodentia: Cricetidae) from Chiriquí Province (Brennan and Jones, 1961b). Brennan and Yunker (1966) reported *H. handleyi* on a marsupial, *D. marsupialis* (Didelphimorphia: Didelphidae) and two rodents, *P. mexicanus* (= *P. nudipes*) and *Reithrodontomys* sp. (Rodentia: Cricetidae) from the same province. **Other records**. Colombia (Brennan, 1968).

Hoffmannina libita Brennan and Goff, 1977b: 911

Type locality: Panama, Chiriquí Province Boquete (Brennan and Goff 1977b). **Type host**: *Reithrodontomys sumichrasti* (Saussure, 1861) (Rodentia: Cricetidae) and *Peromyscus mexicanus* (= *Peromyscus nudipes*) (Saussure, 1860) (Rodentia: Cricetidae). **Type depository**: USNM (holotypes and paratypes). **Panama records**. Only known from the type series.

Hoffmannina suriana (Hoffmann, 1954): 23

Type locality: Mexico, Chiapas State, Cañón del Sumidero (Hoffmann 1954). **Type host**: *Peromyscus mexicanus* (= *Peromyscus nudipes*) (Saussure, 1860) (Rodentia: Cricetidae). **Type depository**: USNM (holotype) and UNAM (paratypes). **Panama records**. Brennan and Yunker (1966) reported this species from four rodents, *P. mexicanus* (= *P. nudipes*), *Reithrodontomys creper* Bangs, 1902, *R. sumichrasti* and *S. xerampelinus* (Rodentia: Cricetidae), from Boquete, Chiriquí Province. **Other records**. Mexico (Hoffmann 1954; Loomis 1969; Estébanes-González and Cervantes 2005).

Genus *Hooperella* Vercammen-Grandjean, 1967: 853

Hooperella saccopteryx (Brennan and Jones, 1960): 530

Type locality: Trinidad and Tobago, Pointe-à-Pierre city, Guaracara (Brennan and Jones 1960). **Type host**: *Saccopteryx bilineata* (Temminck, 1838) (Chiroptera: Emballonuridae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. This species reported from *S. bilineata* (Chiroptera: Emballonuridae) in Pacora, Panama and Bocas del Toro Provinces (Brennan and Jones 1960; Brennan and Yunker 1966). **Other records**. Bolivia (Brennan 1970a), Colombia (Brennan and Jones 1960; Marinkelle and Grose 1981), Costa Rica (Webb and Loomis 1977), Mexico (Loomis 1969; Webb and Loomis 1977), Peru (Brennan and Jones 1960; Brennan and Jones 1961a), Surinam (Brennan 1970b; Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960), Venezuela (Brennan and Reed 1975).

Hooperella vesperuginis (Brennan and Jones, 1960): 533

Type locality: Trinidad and Tobago, Port of Spain city, Belmont (Brennan and Jones 1960). **Type host**: *Artibeus jamaicensis* Leach, 1821 (Chiroptera: Phyllostomidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. Brennan and Jones (1960) reported this species from *Carollia* sp. (Chiroptera: Phyllostomidae) from Barro Colorado Island, Panama Province. Years later, Brennan and Yunker (1966) reported this species from four phyllostomid bats, *C. perspicillata* (Chiroptera: Phyllostomidae) from Summit Botanical Gardens, Panama City and in Barro Colorado Island, Panama Province, *Glossophaga soricina* (Pallas, 1766) (Chiroptera: Phyllostomidae) from Bocas del Toro Province and in Cerro Hoya National Park, Los Santos Province, *Vampyrum spectrum* (L., 1758) (Chiroptera: Phyllostomidae) from Bocas del Toro Province, and an unidentified bat from Los Santos Province. **New records**. 1 larva (IBSP 12541), Coiba Island, Veraguas Province, 04 Dec. 2012, *Glossophaga soricina* (Chiroptera: Phyllostomidae). **Other records**. Bolivia (Brennan 1970a), Colombia (Marinkelle and Grose 1981), Mexico (Loomis 1969; Webb and Loomis 1977), Nicaragua (Webb and Loomis 1977), Surinam (Brennan and Lukoschus 1971; Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960; Brennan 1967), Venezuela (Brennan and Reed 1975).

Genus *Intercutestrix* Brennan and Yunker, 1966: 237

Intercutestrix tryssa (Brennan and Jones, 1961b): 189

Type locality: Peru, Cuzco Province, Quince Mil (Brennan and Jones 1961b). **Type host**: *Proechimys simonsi* (= *Proechimys hendeei*) (Thomas, 1900) (Rodentia: Echimyidae). **Type depository**: FMNH (holotype). **Panama records**. This species was reported on four rodents, *P. semispinosus* (Rodentia: Echimyidae) in Panama Province and Piña, Colón Province, *M. caliginosus* (= *O. caliginosus*) (Rodentia: Cricetidae) from Cerro Azul, Panama Province, *T. watsoni* and *H. megacephalus* (= *O. capito*) (Rodentia: Cricetidae) in Piña, Colón Province (Brennan and Yunker 1966). **Other records**. Colombia (Brennan 1968) and Peru (Brennan and Jones 1961a).

Genus *Kymocta* Yunker and Brennan, 1962: 572

Kymocta chironectes (Yunker and Brennan, 1962): 574

Type locality: Panama, Panama Province, Pedro Miguel (Yunker and Brennan 1962). **Type host**: *Chironectes minimus* (Zimmermann, 1780) (Didelphimorphia: Didelphidae). **Type depository**: USNM (holotype and paratype). **Panama records**. Only known from the type series.

Kymocta teratarsalis Yunker and Brennan, 1962: 574

Type locality: Panama, Colón Province, Piña (Yunker and Brennan 1962). **Type host**: *Heteromys desmarestianus* Gray, 1868 (Rodentia: Heteromyidae), *Hoplomys gymnurus* (Thomas, 1897) (Rodentia: Echimyidae) and *Tylomys* sp. (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes), NHMUK (paratypes), SAM (paratypes) and FMNH (paratypes). **Panama records**. Only known from the type series.

Genus *Loomisia* Brennan and Reed, 1972: 796

Loomisia desmodus (Brennan and Dalmat, 1960): 188

Type locality: Guatemala, Chimaltenango department, Yepocapa (Brennan and Dalmat 1960). **Type host**: *Desmodus rotundus* (É. Geoffroy, 1810) (Chiroptera: Phyllostomidae). **Type depository**: USNM (holotype and paratypes) and NHMUK (paratypes). **Records from Panama**. This species was reported from four bats, *Carollia castanea* H. Allen, 1890 (Chiroptera: Phyllostomidae) from Cerro Hoya National Park, Los Santos Province, *M. megalotis* (Chiroptera: Phyllostomidae) from Fuerte Kobbe, Panama Province, *G. soricina* and *C. subrufa* (Chiroptera: Phyllostomidae) from Bocas del Toro Province and one emballonurid bat, *S. bilineata* (Chiroptera: Emballonuridae) from Chepo, Panama Province and El Valle de Antón, Coclé Province (Brennan and Yunker 1966). **Other records**. Bahamas (Brennan 1967), Colombia (Brennan and Reed 1972), Costa Rica (Webb and Loomis 1977), Guatemala (Brennan and Dalmat 1960), Mexico (Loomis 1969; Webb and Loomis 1977; Colín-Martínez *et al.* 2018), Nicaragua (Webb and Loomis 1977), Surinam (Brennan and Lukoschus 1971; Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Dalmat 1960; Brennan and Jones 1960), Venezuela (Brennan and Reed 1972; 1975).

Genus *Microtrombicula* Ewing, 1950: 297

Microtrombicula boneti (Hoffmann, 1952): 81

Type locality: Mexico, Tamaulipas State (Hoffmann 1952). **Type host**: *Mormoops megalophylla* (Peters, 1864) (Chiroptera: Mormoopidae). **Type depository**: UNAM (holotype and paratypes) and USNM (paratypes). **Panama records**. This species was found parasitizing *Pteronotus gymnonotus* (= *Pteronotus suapurensis*) Wagner, 1843 (Chiroptera: Mormoopidae) in the Chilibrillo caves, Chilibre, Panama Province (Brennan and Yunker 1966). **Other records**. Bahamas (Brennan 1967), Costa Rica (Webb and Loomis 1971), Cuba (Daniel and Stekolnikov 2003b), Curaçao (Brennan 1967), Puerto Rico (Kurta *et al.* 2007), Mexico (Webb and Loomis 1971; Webb and Loomis 1977), Trinidad and Tobago (Brennan and Jones 1960), USA (Brennan and White 1960; Webb and Loomis 1971), Venezuela (Brennan and Reed 1975).

Microtrombicula carmenae Brennan and Jones, 1960: 513

Type locality: Trinidad and Tobago, Port of Spain city, Emperor Valley Zoo (Brennan and Jones 1960). **Type host**: *Phyllostomus discolor* Wagner, 1843 (Chiroptera: Phyllostomidae);**Type depository**: USNM (holotype and paratypes) and NHMUK (paratypes). **Panama records**. This species was reported from three bats, *A. jamaicensis* (Chiroptera: Phyllostomidae) from Bocas del Toro Province, *P. hastatus* (Chiroptera: Phyllostomidae) from Pacora, Panama Province and *Sturnira ludovici* Anthony, 1924 (Chiroptera: Phyllostomidae), from Bambito, Chiriquí Province (Brennan and Yunker 1966). In addition, *M. carmenae* was reported on a phyllostomid bat, *P. hastatus* (Chiroptera: Phyllostomidae) from Pacora, Panama Province by Webb and Loomis (1971). **Other records**. Colombia (Marinkelle and Grose 1981), Costa Rica (Webb and Loomis 1971), Nicaragua (Webb and Loomis 1971), Surinam (Brennan and Bronswijk 1975), Mexico (Webb and Loomis 1971; Colín-Martínez *et al.* 2018), Puerto Rico (Kurta *et al.* 2007), Trinidad and Tobago (Brennan and Jones 1960; Webb and Loomis), Venezuela (Brennan and Reed 1975).

Microtrombicula tragulata (Brennan and Jones, 1961b): 110

Type locality: Panama, Panama Province, Barro Colorado Island (Brennan and Jones 1961b). **Type host**: *Nasua narica* (L., 1766) (Carnivora: Procyonidae). **Type depository**: USNM (holotype and paratypes) and FMNH (paratypes). **Panama records**. In addition to the type data, Brennan and Yunker (1966) reported *M. tragulata* from a marsupial, *D. marsupialis* (Didelphimorphia: Didelphidae), from Piña, Colón Province and a porcupine, *C. quichua* (= *C. rothschildi*) (Rodentia: Erethizontidae), from Pedro Miguel River, Panama Province. **Other records**. Bolivia (Brennan 1970a), Mexico (Webb and Loomis 1970), Nicaragua (Webb and Loomis 1970), Surinam (Brennan and Lukoschus 1971), Venezuela (Brennan and Reed 1975).

Genus *Myotrombicula* Womersley and Heaslip, 1943: 99

Myotrombicula munozi (Brennan and Yunker, 1966): 227

Type locality: Panama, Coclé Province, Penonomé (Brennan and Yunker 1966). **Type host**: *Pteronotus personatus* (= *Pteronotus psilotis*) (Wagner, 1843) (Chiroptera: Mormoopidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes) and NHMUK (paratypes). **Panama records**. Only known from the type series.

Genus *Myxacarus* Brennan and Yunker, 1966: 238

Myxacarus oscillatus Brennan and Yunker, 1966: 239

Type locality: Panama, Panama Province, Panama City, Summit Botanical Gardens (Brennan and Yunker 1966). **Type host**: *Proechimys semispinosus* Tomes, 1860 (Rodentia: Echimyidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes) and NHMUK (paratypes). **Panama records**. In addition to the type data, some paratypes were found on a tatu, *D. novemcinctus* (Cingulata: Dasypodidae), from Paraíso, Panama Province, a marsupial, *M. nudicaudatus* (Didelphimorphia: Didelphidae), from Cerro Azul, Panama Province and two rodents, *H. gymnurus* (Rodentia: Echimyidae) and *H. megacephalus* (= *O. capito*) (Rodentia: Cricetidae), from Piña, Colón Province (Brennan and Yunker 1966).

Genus *Neoschoengastia* Ewing, 1929: 187

Neoschoengastia electron Brennan and Yunker, 1966: 240

Type locality: Panama, Panama Province (Brennan and Yunker 1966). **Type host**: *Electron platyrhynchum* (Leadbeater, 1829) (Coraciiformes: Momotidae). **Type depository**: USNM (holotype). **Panama records**. Only known from the type series.

Genus *Neotrombicula* Hirst, 1915:76

Neotrombicula dunni (Ewing, 1931): 12

Type locality: Panama, Chiriquí Province (Ewing 1931). **Type host**: *Dasyprocta punctata* Gray, 1842 (Rodentia: Dasyproctidae). **Type depository**: USNM (lectotype). **Panama records**. In addition to the type data, Ewing (1931) reported this species parasitizing *N. narica* (Carnivora: Procyonidae) at the type locality. Additional host records includes four birds, *Leptotila cassinii* Lawrence, 1867 (Columbiformes: Columbidae), *N. geoffroyi salvini* (Cuculiformes: Cuculidae), *O. erythrops* (Galliformes: Odontophoridae), *M. cinereiventris* (Passeriformes: Polioptilidae), a pig, *P. tajacu* (= *T. tajacu*) (Cetartiodactyla: Tayassuidae), a feline, *L. pardalis* (= *F. pardalis*) (Carnivora: Felidae), a coati, *N. nasua* (Carnivora: Procyonidae), a phyllostomid bat, *Vampyressa pusilla* (Wagner, 1843) (Chiroptera: Phyllostomidae), a tatu, *D. novemcinctus* (Cingulata: Dasypodidae), four marsupials, *D. marsupialis*, *M. robinsoni*, *M. nudicaudatus* and *P. opossum* (Didelphimorphia: Didelphidae), a rabbit, *S. brasiliensis* (Lagomorpha: Leporidae), twelve rodents, *H. megacephalus* (= *O. capito*), *M. caliginosus* (=

O. caliginosus), *I. flavidus* (= *P. flavidus*), *P. mexicanus* (= *P. nudipes*), *S. hispidus* (Rodentia: Cricetidae), *D. punctata* (Rodentia: Dasyproctidae), *H. gymnurus*, *P. semispinosus* (Rodentia: Echimyidae), *H. australis*, *H. desmarestianus* (Rodentia: Heteromyidae), *M. alfari* and *S. granatensis* (Rodentia: Sciuridae) and a sloth, *Bradypus variegatus* Schinz, 1825 (Pilosa: Bradypodidae), from Culebra Cut, Miraflores lock, Quarry Heights and Summit Botanical Gardens, Panama City, Barro Colorado Island and Paraíso, Panama Province, Galeta Point and Piña, Colón Province, Cerro Hoya National Park, Los Santos Province, Cerro Azul and Piña, Colón Province, Campana, West Panama Province, Cerro Pierre, Darién Province and some localities in Bocas del Toro Province and Chiriquí Provinces (Brennan and Yunker 1966). **Other records**. Bolivia (Brennan 1970a), Colombia (Boshell and Kerr 1942; Brennan 1968), French Guiana (Floch and Abonnenc 1941, Floch and Fauran 1957), Peru (Brennan and Jones 1961a), Surinam (Brennan and Bronswijk 1975), Trinidad Tobago (Brennan and Jones 1960), Venezuela (Brennan and Reed 1975).

Genus *Parascoschoengastia* Vercammen-Grandjean 1960: 469

Parascoschoengastia megastyrax (Brennan and Jones, 1960): 506

Type locality: Trinidad and Tobago, Sangre Grande City, Caigual (Brennan and Jones 1960). **Type host**: *Desmodus rotundus* (É. Geoffroy, 1810) (Chiroptera: Phyllostomidae). **Type depository**: USNM (holotype and paratypes), NHMUK (paratypes) and FMNH (paratypes). **Panama records**. Brennan and Yunker (1966) reported this species from two bats, *C. perspicillata* (Chiroptera: Phyllostomidae), from Panama Province, and an unidentified bat from Los Santos Province. In addition, the authors reported, a marsupial host, *D. marsupialis* (Didelphimorphia: Didelphidae), from Piña, Colón Province. **Other records**. Surinam (Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960), Venezuela (Brennan and Reed 1975).

Parascoschoengastia nuniezi (Hoffmann, 1944): 221

Type locality: Mexico, Federal district, Mexico City (Hoffmann 1944). **Type host**: *Homo sapiens* L., 1758 (Primates: Hominidae). **Type depository**: UNAM (holotype and paratypes). **Panama records**. Brennan and Yunker (1966) reported this species from two marsupial species, *D. marsupialis* and *P. opossum* (Didelphimorphia: Didelphidae) from Panama Province. **Other records**. Guatemala (Brennan and Dalmat 1960) and Mexico (Hoffmann 1944).

Genus *Parasecia* Loomis, 1966: 191

Parasecia longicalcar (Brennan and Jones, 1960): 517

Type locality: Trinidad and Tobago, Sangre Grande city, Melajo Reserve Forest (Brennan and Jones 1960). **Type host**: *Amazona amazonica* (L., 1766) (Psittaciformes: Psittacidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. This species was found on a bat, *V. spectrum* (Chiroptera: Phyllostomidae), from Bocas del Toro Province, an unidentified of bat from Las Palmitas, Los Santos Province, a marsupial, *D. marsupialis* (Didelphimorphia: Didelphidae), from Summit Botanical Gardens, Panama City, Panama Province; and a porcupine, *C. quichua* (= *C. rothschildi*) (Rodentia: Erethizontidae), from Pedro Miguel River, Panama Province (Brennan and Yunker 1966). **Other records**. Mexico (Colín-Martínez *et al.* 2018), Surinam (Brennan 1969; Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960; Brennan 1967), Venezuela (Brennan and Reed 1975).

Parasecia manueli (Brennan and Jones, 1960): 520

Type locality: Trinidad and Tobago, Saint Andrew County (Brennan and Jones 1960). **Type host**: *Zygodontomys brevicauda* J.A. Allen and Chapman, 1893 (Rodentia: Cricetidae). **Type**

depository: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. This species was found on two marsupials, *D. marsupialis* and *M. robinsoni* (Didelphimorphia: Didelphidae) from Piña, Colón and Panama Provinces, respectively, and a sciurid rodent, *S. granatensis* (Rodentia: Sciuridae), from Cerro Punta, Chiriquí Province (Brennan and Yunker 1966). **Other records**. Colombia (Brennan 1968), Costa Rica (Webb and Loomis 1977), Cuba (Daniel and Stekolnikov 2003a), Peru (Brennan and Jones 1961a), Surinam (Brennan and Lukoschus 1971; Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960), Venezuela (Brennan and Reed 1975).

Parasecia soucouyanti (Brennan and Yunker, 1966): 256

Type locality: Panama, Chiriquí Province, Cerro Punta (Brennan and Yunker 1966). **Type host**: *Sturnira ludovici* Anthony, 1924 (Chiroptera: Phyllostomidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes) and NHMUK (paratypes). **Panama records**. In addition to the type host data, this species was found on *Myotis* sp. (Chiroptera: Vespertilionidae), collected at the same locality as the type series (Brennan and Yunker 1966). **Other records**. Mexico (Colín-Martínez *et al* 2018) and Venezuela (Brennan and Reed 1975).

Genus *Perates* Brennan and Dalmat, 1960: 186

Perates anophthalma Hoffmann, 1960: 103

Type locality: Mexico, Mexico State, Tonatico (Hoffmann 1960). **Type host**: *Desmodus rotundus* (É. Geoffroy, 1810) (Chiroptera: Phyllostomidae). **Type depository**: UNAM (holotypes and paratypes). **Panama records**. This species was found on a mormoopid bat, *P. parnellii* (Chiroptera: Mormoopidae) in the Chilibrillo caves, Chilibre, Panama Province (Brennan and Yunker 1966). **Other records**. Bahamas (Brennan 1967), Mexico (Hoffmann 1960; Loomis 1969; Webb and Loomis 1977), Puerto Rico (Kurta *et al.* 2007), Trinidad and Tobago (Brennan and Jones 1960).

Perates insessus Brennan and Dalmat, 1960: 187

Type locality: Guatemala, Escuintla Department, San Luis (Brennan and Dalmat 1960). **Type host**: *Pteronotus rubiginosus* (= *Chilonycteris rubiginosa*) (Wagner, 1843) (Chiroptera: Mormoopidae). **Type depository**: FMNH (holotype) and USNM (paratypes). **Panama records**. This species was found parasitizing on a mormoopid bat, *P. personatus* (= *P. psilotis*) (Chiroptera: Mormoopidae), from Penonomé, Coclé Province (Brennan and Yunker 1966). **Other records**. Guatemala (Brennan and Dalmat 1960).

Perates monops (Brennan and Jones, 1960): 524

Type locality: Trinidad and Tobago, Sangre Grande city, Guaico Tamana (Brennan and Jones 1960). **Type host**: *Mormoops megalophylla* (Peters, 1864) (Chiroptera: Mormoopidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. Brennan and Yunker (1966) found this species on two bats, *Myotis nigricans* (Schinz, 1821) (Chiroptera: Vespertilionidae), from Cerro Punta, Chiriquí Province and *P. personatus* (= *P. psilotis*) (Chiroptera: Mormoopidae), from Penonomé, Coclé Province. These authors also reported *P. monops* from an unidentified bat collected in Penonomé, Coclé Province (Brennan and Yunker, 1966). **Other records**. Colombia (Marinkelle and Grose 1981), Cuba (Daniel and Stekolnikov 2003a), Puerto Rico (Kurta *et al.* 2007), Trinidad and Tobago (Brennan and Jones 1960), Venezuela (Brennan and Reed 1975).

Genus *Perissopalla* Brennan and White, 1960: 346

Perissopalla precaria (Brennan and Dalmat, 1960): 190

Type locality: Guatemala Chimaltenango department, Yepocapa (Brennan and Dalmat 1960). **Type host**: *Desmodus rotundus* (É. Geoffroy, 1810) (Chiroptera: Phyllostomidae). **Type depository**: USNM (holotype and paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. Brennan and Yunker (1966) reported *P. precaria* from a phyllostomid bat, *M. megalotis* (Chiroptera: Phyllostomidae) from Pacora, Panama Province. **Other records**. Guatemala (Brennan and Dalmat 1960), Mexico (Loomis 1969; Colín-Martínez *et al.* 2018), Venezuela (Brennan and Reed 1975).

Genus *Polylopadium* Brennan and Jones, 1961b: 112

Polylopadium confirmatum Brennan and Yunker, 1966: 242

Type locality: Panama, Bocas del Toro Province (Brennan and Yunker 1966). **Type host**: *Melanomys caliginosus* (= *Oryzomys caliginosus*) (Tomes, 1860) (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes). **Panama records**. Only known from the type series.

Polylopadium kramisi Brennan and Jones, 1961b: 112

Type locality: Panama, Panama Province, Panama City, Summit Botanical Gardens (Brennan and Jones 1961b). **Type host**: *Heteromys adspersus* (= *Liomys adspersus*) (Peters, 1874) (Rodentia: Heteromyidae). **Type depository**: USNM (holotype and paratypes), NHMUK (paratypes), FMNH (paratypes) and SAM (paratypes). **Panama records**. In addition to the type data, Brennan and Jones (1961b) reported this species from three rodents, *H. adspersus* (= *L. adspersus*) (Rodentia: Heteromyidae) from Summit Botanical Gardens and Curundu, Panama City and Soberanía National Park, Panama Province, *P. semispinosus* (Rodentia: Echimyidae), without informations about locality, and *Peromyscus* sp. (Rodentia: Cricetidae), from Chiriquí Province (Brennan and Jones 1961b). Brennan and Yunker (1966) reported *P. kramisi* on a cricetid rodent, *H. adspersus* (= *L. adspersus*) (Rodentia: Heteromyidae), from Summit Botanical Gardens and Curundu, Panama City, Panama Province.

Genus *Pseudoschoengastia* Lipovsky, 1951: 95

Pseudoschoengastia abditiva Brennan, 1960: 482

Type locality: Panama, Panama Province, Cerro Azul (Brennan 1960). **Type host**: *Transandinomys talamancae* (= *Oryzomys talamancae*) (J.A. Allen, 1901) (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes) and FMNH (paratypes). **Panama records**. Only known from the type series. **Other records**. Costa Rica (Geest and Loomis 1968).

Pseudoschoengastia bulbifera Brennan, 1960: 483

Type locality: Panama, Panama Province (Brennan 1960). **Type host**: *Sigmodon hispidus* Say and Ord, 1825 (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes), NHMUK (paratypes), SAM (paratypes) and FMNH (paratypes). **Panama records**. In addition to type host, Brennan (1960) reported this species from an unidentified opossum and an echimyid rodent, *P. semispinosus* (Rodentia: Echimyidae), from Galeta Point, Colón Province, two marsupials, *M. robinsoni* and *P. opossum* (Didelphimorphia: Didelphidae), and four rodents, *P. semispinosus* (Rodentia: Echimyidae), *M. caliginosus* (= *O. caliginosus*), *T. talamancae* (= *O. talamancae*) and *Z. brevicauda* (= *Z. cherriei*) (Rodentia: Cricetidae), from Cerro Azul, Panama Province, three rodents, *H. adspersus* (= *L. adspersus*) (Rodentia: Heteromyidae), *T. talamancae* (= *O. talamancae*) and *Z. brevicauda* (Rodentia: Cricetidae), from Soberanía National Park, Panama Province and a marsupial, *M. robinsoni* (Didelphimorphia: Didelphidae),

and a cricetid rodent, *S. hispidus* (Rodentia: Cricetidae), from Summit Botanical Gardens, Panama City, Panama Province. Brennan and Yunker (1966) reported *P. bulbifera* from a lizard, *Sceloporus* sp. (Squamata: Phrynosomatidae), a small shrew, *Cryptotis* sp. (Eulipotyphla: Soricidae), a bat, *S. ludovici* (Chiroptera: Phyllostomidae), a small monkey, *S. geoffroyi* (Primates: Callitrichidae), four marsupials, *D. marsupialis*, *M. mexicana*, *M. robinsoni* and *P. opossum* (Didelphimorphia: Didelphidae) and eighteen rodents, *H. gymnurus*, *P. semispinosus* (Rodentia: Echimyidae), *H. adspersus* (= *L. adspersus*), *H. australis, H. desmarestianus* (Rodentia: Heteromyidae), *H. alfaroi* (= *O. alfaroi*), *H. megacephalus* (= *O. capito*), *M. caliginosus* (= *O. caliginosus*), *Nephelomys albigularis* (= *Oryzomys albigularis*) (Tomes, 1860), *Oryzomys* sp., *Peromyscus* sp., *P. mexicanus* (= *P. nudipes*), *Reithrodontomys* sp., *S. hispidus*, *S. alfari* (= *Nectomys alfari*), *S. xerampelinus*, *T. bolivaris* (= *O. bombycinus*) and *Z. brevicauda* (Rodentia: Cricetidae) from Culebra Cut, Miraflores lock and Summit Botanical Gardens, Panama City, Panama Province, Cerro Azul and Piña, Colón Province, Bastimentos Island, Bocas del Toro Province, Cerro Pierre, Darién Province, El Hato, Los Santos Province and Bambito, Boquete and Cerro Punta, Chiriquí Province. **New records**. 4 larvae (IBSP 12540), Barro Colorado Island, Panama Province, 19 Nov. 2007, *Transandinomys talamancae* (= *Oryzomys talamancae*) (Rodentia: Cricetidae). **Other records**. Colombia (Brennan 1968), Costa Rica (Geest and Loomis 1968), Venezuela (Brennan and Reed 1975).

Pseudoschoengastia dasypi Brennan and Yunker, 1966: 245

Type locality: Panama, Panama Province, Paraíso (Brennan and Yunker 1966). **Type host**: *Dasypus novemcinctus* L., 1758 (Cingulata: Dasypodidae). **Type depository**: USNM (holotype and paratypes). **Panama records**. Only known from the type series.

Pseudoschoengastia disparunguis Goff, 1982: 12

Type locality: Panama, Bocas del Toro Province (Goff 1982). **Type host**: *Heteromys desmarestianus* Gray, 1868 (Rodentia: Heteromyidae). **Type depository**: USNM (holotype and paratypes). **Panama records**. Only known from the type series.

Pseudoschoengastia finitima Brennan and Yunker, 1966: 245

Type locality: Panama, Colón Province, Piña (Brennan and Yunker 1966). **Type host**: *Heteromys desmarestianus* Gray, 1868 (Rodentia: Heteromyidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes) and NHMUK (paratypes). **Panama records**. Only known from the type series. **Other records**. Costa Rica (Geest and Loomis 1968).

Pseudoschoengastia zona Brennan, 1960: 490

Type locality: Panama, Panama Province, Panama City, Curundu (Brennan 1960). **Type host**: *Heteromys adspersus* (= *Liomys adspersus*) (Peters, 1874) (Rodentia: Heteromyidae). **Type depository**: USNM (holotype) and FMNH (paratypes). **Panama records**. In addition to type host data, Brennan (1960) reported this species from three rodents, *H. adspersus* (= *L. adspersus*) (Rodentia: Heteromyidae) from Corozal and Summit Botanical Gardens, Panama City, and Soberanía National Park, Panama Province, *S. hispidus* (Rodentia: Cricetidae) from Soberanía National Park, Panama Province and *Tylomys panamensis* (Gray, 1873) (Rodentia: Cricetidae) from El Valle de Antón, Coclé Province. Brennan and Yunker (1966) reported *P. zona* from three rodents, *H. adspersus* (= *L. adspersus*) (Rodentia: Heteromyidae) from Nuevo Emperador, West Panama Province and Summit Botanical Gardens, Panama City, Panama Province, *H. australis* (Rodentia: Heteromyidae) from Cerro Pierre, Darién Province and *M. caliginosus* (= *O. caliginosus*) (Rodentia: Cricetidae) from Bocas del Toro Province. **Other records**. Costa Rica (Geest and Loomis 1968).

Genus *Speleocola* Lipovsky, 1952: 132

Speleocola secunda Brennan and Jones, 1960: 509

Type locality: Trinidad and Tobago, Saint Patrick County (Brennan and Jones 1960). **Type host**: *Micronycteris hirsuta* (Peters, 1869) (Chiroptera: Phyllostomidae). **Type depository**: USNM (holotype and paratypes nº 34034), FMNH (paratypes), NMHUK (paratypes) and SAM (paratypes). **Panama records**. This species was found on the porcupine, *C. quichua* (= *C. rothschildi*) (Rodentia: Erethizontidae) from Pedro Miguel River, Panama Province (Brennan and Yunker 1966). **Other records**. Costa Rica (Loomis and Webb 1969), Nicaragua (Webb and Loomis 1977; Loomis and Webb 1969), Mexico (Loomis and Davis 1965; Loomis 1969; Loomis and Webb 1969), Surinam (Brennan and Lukoschus 1971; Brennan and Bronswijk 1975), Trinidad and Tobago (Brennan and Jones 1960; Loomis and Webb 1969), Venezuela (Brennan 1967; Brennan and Reed 1975).

Genus *Tecomatlana* Hoffmann, 1947: 453

Tecomatlana sandovali Hoffmann, 1947: 453

Type locality: Mexico, Puebla State, Tecomatlán (Hoffmann 1947). **Type host: "**unidentified bat" (Chiroptera). **Type depository**: UNAM (holotype and paratypes). **Panama records**. This species was found on *Peropteryx macrotis* (Wagner, 1843) (Chiroptera: Emballonuridae) in Buena Vista, Colón Province and unidentified bats (Chiroptera) in Quebrada Bonita, Colón Province (Brennan and Yunker 1966). **Other records**. Guatemala (Brennan and Dalmat 1960; Vercammen-Grandjean 1967), Mexico (Hoffmann 1947; Brennan and Dalmat 1960; Vercammen-Grandjean 1967; Loomis 1969; Webb and Loomis 1977), USA (Brennan and Dalmat 1960; Bradshaw and Ross 1961).

Genus *Trombicula sensu lato* Berlese, 1905: 155

Trombicula caccabulus Brennan and Jones, 1961b: 115

Type locality: Panama, Chiriquí Province (Brennan and Jones 1961b). **Type host**: *Peromyscus* sp. (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. In addition to type host, Brennan and Jones (1961b) reported this species from five cricetid rodents, *P. mexicanus* (= *P. nudipes*), *Oligoryzomys fulvescens* (= *Oryzomys fulvescens*) (Saussure, 1860), *Oryzomys* sp., *R. mexicanus* and *S. teguina* (Rodentia: Cricetidae) from Chiriquí Province. Brennan and Yunker (1966) reported *T. caccabulus* from two cricetid rodents, *P. mexicanus* (= *P. nudipes*) and *S. teguina* (Rodentia: Cricetidae) in Bambito and Cerro Punta, Chiriquí Province.

Trombicula chiriquensis Brennan and Jones, 1961b: 116

Type locality: Panama, Chiriquí Province (Brennan and Jones 1961b). **Type host**: *Scotinomys teguina* Alston, 1877 (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. In addition to type data, Brennan and Jones (1961b) reported this species from two cricetid rodents, *Peromyscus* sp. and *Reithrodontomys* sp. (Rodentia: Cricetidae), from Chiriquí Province. Brennan and Yunker (1966) reported *T. chiriquensis* on a cricetid rodent, *S. teguina* (Rodentia: Cricetidae) from Cerro Punta, Chiriquí Province.

Trombicula cribanus Brennan and Jones, 1961b: 117

Type locality: Panama, Panama Province, Cerro Azul (Brennan and Jones 1961b). **Type host**: *Proechimys semispinosus* Tomes, 1860 (Rodentia: Echimyidae). **Type depository**: USNM (holotype). **Panama records**. Only known from the type series.

Trombicula dasyproctae Ewing, 1937: 172

Type locality: Panama, Capira Province, Capira (Ewing 1937). **Type host**: *Dasyprocta punctata* Gray, 1842 (Rodentia: Dasyproctidae). **Type depository**: USNM (holotype and paratypes). **Panama records**. Only known from the type series.

Trombicula dicrura Brennan and Jones, 1961b: 118

Type locality: Panama, Chiriquí Province (Brennan and Jones 1961b). **Type host**: *Peromyscus mexicanus* (= *Peromyscus nudipes*) (Saussure, 1860) (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. In addition to type host, Brennan and Jones (1961b) reported this species from a heteromyid rodent, *H. desmarestianus* (Rodentia: Heteromyidae), five cricetid rodents, *Peromyscus* sp., *Oryzomys* sp., *S. teguina* (Rodentia: Cricetidae), *S. granatensis* and *Sciurus* sp. (Rodentia: Sciuridae), from Chiquirí Province and an echimyid rodent, *P. semispinosus* (Rodentia: Echimyidae), from Bocas del Toro Province. Brennan and Yunker (1966) reported this species from nine rodents, *P. mexicanus* (= *P. nudipes*), *R. creper*, *R. mexicanus*, *S. teguina*, *S xerampelinus* (Rodentia: Cricetidae), *C. quichua* (= *C. rothschildi*) (Rodentia: Erethizontidae), *H. desmarestianus* (Rodentia: Heteromyidae), *S. granatensis* (Rodentia: Sciuridae) and an unidentified rat from Pedro Miguel River, Panama City, Panama Province and Boquete and Cerro Punta, Chiriquí Province.

Trombicula keenani Brennan and Jones, 1961b: 119

Type locality: Panama, Chiriquí Province (Brennan and Jones 1961b). **Type host**: *Peromyscus mexicanus* (= *Peromyscus nudipes*) (Saussure, 1860) (Rodentia: Cricetidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. In addition to type host, Brennan and Jones (1961b) reported this species from seven cricetid rodents, *Peromyscus* sp., *O. fulvescens* (= *O. fulvescens*), *Oryzomys* sp., *R. mexicanus*, *S. teguina* (Rodentia: Cricetidae), *S. granatensis* and *Sciurus* sp. (Rodentia: Sciuridae) from Chiriquí Province and parasitizing the species *H. gymnurus* (Rodentia: Echimyidae) and *S. granatensis* (Rodentia: Sciuridae) from Piña, Colón Province. Brennan and Yunker (1966) reported this species from two marsupials, *D. marsupialis* and *P. opossum* (Didelphimorphia: Didelphidae) and nine rodents, *P. semispinosus* (Rodentia: Echimyidae), *Coendou mexicanus* Kerr, 1792 (Rodentia: Erethizontidae), *H. australis*, *H. desmarestianus* (Rodentia: Heteromyidae), *H. megacephalus* (= *O. capito*), *P. mexicanus* (= *P. nudipes*), *R. creper*, *R. mexicanus* and *S. teguina* (Rodentia: Cricetidae) from Piña, Colón Province, Cerro Pierre, Darién Province, El Hato, Los Santos Province and Bambito, Boquete and Cerro Punta, Chiriquí Province.

Trombicula pecari Brennan and Jones, 1960: 527

Type locality: Panama, Chiriquí Province (Brennan and Jones 1960). **Type host**: *Pecari tajacu* (= *Tayassu tajacu*) (L., 1758) (Cetartiodactyla: Tayassuidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes), NHMUK (paratypes) and SAM (paratypes). **Panama records**. In addition to the type host, Brennan and Jones (1960) reported this species from *B. variegatus* (Pilosa: Bradypodidae) in Chilibre, Panama Province. **Other records**. Trinidad and Tobago (Brennan and Jones 1960).

Trombicula tiptoni Brennan and Jones, 1961b: 122;

Type locality: Panama, Chiriquí Province (Brennan and Jones 1961b). **Type host**: *Peromyscus mexicanus* (= *Peromyscus nudipes*) (Saussure, 1860) (Rodentia: Cricetidae). **Type depository**: USNM (holotype). **Panama records**. In addition to type host, this species was reported from the rodent, *P. mexicanus* (= *P. nudipes*) (Rodentia: Cricetidae) in Boquete, Chiriquí Province (Brennan and Yunker 1966).

Genus *Vanidicus* Brennan and Jones, 1961b: 123

Vanidicus tricosus Brennan and Jones, 1961b: 123

Type locality: Panama, Panama Province, Panama City, Summit Botanical Gardens and Curundu (Brennan and Jones 1961b). **Type host**: *Heteromys adspersus* (= *Liomys adspersus*) (Peters, 1874) (Rodentia: Heteromyidae). **Type depository**: USNM (holotype and paratypes). **Panama records**. In addition to the type data, this species was reported from *H. adspersus* (= *L. adspersus*) (Rodentia: Heteromyidae) from Piña, Colón Province and *H. desmarestianus* (Rodentia: Heteromyidae) from Summit Botanical Gardens and Curundu, Panama City, Panama Province (Brennan and Yunker 1966). **Other records**. Colombia (Brennan 1968), Surinam (Brennan 1970b; Brennan and Bronswijk 1975), Venezuela (Brennan 1973).

Genus *Vergrandia* Yunker and Jones, 1961: 996

Vergrandia galei Yunker and Jones, 1961: 997

Type locality: Panama Province, Chilibre, Chilibrillo caves (Yunker and Jones 1961). **Type host**: *Pteronotus rubiginosus* (= *Chilonycteris rubiginosa*) (Wagner, 1843) (Chiroptera: Mormoopidae). **Type depository**: USNM (holotype and paratypes). **Panama records**. Only known from the type series.

Genus *Walchioides* Vercammen-Grandjean 1960: 469

Walchioides apista (Brennan and Yunker, 1966): 244

Type locality: Panama Province, Paraíso (Brennan and Yunker 1966). **Type host**: *Dasypus novemcinctus* L., 1758 (Cingulata: Dasypodidae). **Type depository**: USNM (holotype and paratypes), FMNH (paratypes) and NHMUK (paratypes). **Panama records**. Only known from the type series.

Walchioides mermeriza (Brennan and Yunker, 1966): 247

Type locality: Panama Province, Paraíso (Brennan and Yunker 1966). **Type host**: *Coendou quichua* (= *Coendou rothschildi*) Thomas, 1899 (Rodentia: Erethizontidae). **Type depository**: USNM (holotype). **Panama records**. Only known from the type series.

Species inquirenda

- *Colicus exhumatus* Brennan, 1970d
- *Microtrombicula sturnirae* Webb and Loomis, 1971

Concluding remarks

The chiggers of Panama are represented by seven species of Leeuwenhoekiidae Womersley, 1944 and 74 of Trombiculidae Ewing, 1944, for a total of 81 species in 38 genera parasitizing 185 different hosts.

Of the 81 chigger species, five were from new localities. *Blankaartia sinnamaryi*, *P. bulbifera,* and *E. tinami*, were new records from Barro Colorado Island (Panama Province). *Hooperella vesperuginis* was recorded from Coiba Island (Veraguas Province) for the first time. In addition, *E. goeldii* and *E. tinami* were recorded from Santa Rosa (Colón Province) for the first time along with an additional record of *E. goeldii* from the Metropolitan Natural Park, Panama City (Panama Province).

New Panamanian hosts include, *E. tinami* from two passerine birds [*P. exsul* (Thamnophilidae), *C. ustulatus* (Turdidae)] and the rodent *S. hirsutus* (Cricetidae) and *E. goeldii* from six different birds, one coraciiform [*B. martii* (Momotidae)], one columbiform [*L. cassini*

(Columbidae)], one galbuliform [*M. panamensis* (Bucconidae)], and three passerines, *T. atrinucha* (Thamnophilidae), *P. exsul* (Thamnophilidae), *C. ustulatus* (Turdidae), and two different mamals, a marsupial [*D. marsupialis* (Didelphidae)] and the rodent *P. semispinosus* (Echimyidae). Two birds in the ## Family Thamnophilidae (*P. exsul* and *T. atrinucha*) were found to be first time hosts for *E. goeldii* in Panama.

Of the 1710 terrestrial vertebrate species in Panama (IUCN, 2021), only 8% (144 species – five reptiles, 71 birds and 68 mammals), including humans, have been recorded as chigger hosts. Also, there are more 24 unidentified hosts (4 reptiles, 4 birds and 16 mammals) recorded. It is worth noting that there were no records of chiggers from Amphibia, and only three chigger species (*E. alfreddugesi*, *E. goeldii,* and *P. bulbifera*) were reported from reptiles in Panama. All other records were from the classes Aves and Mammalia species. Checklists are essential to understanding the biodiversity of a region and showing where future studies may be needed.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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