

Annotated catalog of the order Strepsiptera of the World

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ABSTRACT

An annotated taxonomic and nomenclatural catalogue of the insect order Strepsiptera is presented. Known distributions and host associations are given as they are currently known. As of this publication, there are 627 valid species, 28 of which are known only from fossils. The misspelling of *Viridipromontorius* as *Viridopromontorius* n. syn. (Roy and Niladri, 2016) is corrected to include *Viridipromontorius aequus* n. comb. *Caenocholax pierci* is moved to the genus *Myrmecolax* and becomes *Myrmecolax pierci* (Chattopadhyay and Chaudhuri, 1980) n. comb. *Stichotrema trinadadensis* Guenther, 1949) n. comb. is moved from *Stichotrema* to *Myrmecolax*. *Halictophagus boharti* Abdulla, 1974 n. stat. was previously a junior synonym of *Halictophagus variatus* due to its being an invalid renaming of a homonym. The following species are reinstated as valid: *Pseudoxenos andradei* Luna de Carvalho, 1953; *Pseudoxenos atlanticus* Luna de Carvalho, 1969 n. stat.; *Pseudoxenos corcyricus* Saunders, 1872; *Pseudoxenos klugii* (Saunders, 1852); *Pseudoxenos lusitanicus* Luna de Carvalho, 1960; *Pseudoxenos schaumii* Saunders, 1872; *Pseudoxenos seyrigi* Monod, 1926; *Stylops aburanae* Kifune and Maeta, 1990 n. stat.; *Stylops aino* Kifune and Maeta, 1990 n. stat.; *Stylops alfkeni* Hofeneder, 1939 n. stat.; *Stylops bimaculatae* Perkins, 1918 n. stat.; *Stylops bisalicedis* Pierce, 1918 n. stat.; *Stylops championi* Pierce, 1918 n. stat.; *Stylops collinus* Kifune and Maeta, 1990 n. stat.; *Stylops dentatae* Kifune and Maeta, 1990 n. stat.; *Stylops dominiquei* Pierce, 1909 n. stat.; *Stylops duboisi* Bohart, 1937 n. stat.; *Stylops duriensis* Luna de Carvalho, 1974 n. stat.; *Stylops esteponensis* Luna de Carvalho, 1974 n. stat.; *Stylops flavipedis* Hofeneder, 1923 n. stat.; *Stylops fukuensis* Kifune, 1991 n. stat.; *Stylops giganteus* Luna de Carvalho, 1974 n. stat.; *Stylops hirashimai* Kifune and Maeta, 1990 n. stat.; *Stylops izumoensis* Kifune and Maeta, 1990 n. stat.; *Stylops krygeri* Pierce, 1918 n. stat.; *Stylops mandibularis* Pierce, 1911 n. stat.; *Stylops medionitans* Pierce, 1919 n. stat.; *Stylops moestae* Pierce, 1918 n. stat.; *Stylops muelleri* Borchert, 1971 n. stat.; *Stylops neonanae* Pierce 1918 n. stat.; *Stylops nipponicus* Kifune and Maeta, 1990 n. stat.; *Stylops nitidae* Pasteels 1954 n. stat.; *Stylops nitidiusculae* Poluszyński 1927 n. stat.; *Stylops oblongulus* Kifune and Hirashima, 1985 n. stat.; *Stylops oklahomae* Pierce, 1909 n. stat.; *Stylops orientis* Kifune and Maeta, 1990 n. stat.; *Stylops pacificus* Bohart, 1936 n. stat.; *Stylops perkinsi* Pasteels 1949 n. stat.; *Stylops salicifloris* Pierce, 1909 n. stat.; *Stylops subcircularis* Kifune and Maeta, 1990 n. stat.; *Stylops swenki* Pierce 1909 n. stat.; *Stylops truncatoides* Kifune and Hirashima, 1985 n. stat. *Stylops truncatus* Kifune and Hirashima, 1985 n. stat.; *Xenos myrapetrus* (Trois, 1988).

**Keywords:** Twisted-wing parasites, host, taxonomy, distribution, checklist

## INTRODUCTION

In recent years, a large amount of attention has been given to the phylogeny of the Strepsiptera (Kinzelbach 1990, Kukalova-Peck and Lawrence 1993, Whiting and Kathirithamby 1995, Whiting et al. 1997, Wheeler et al. 2001, Friedrich 2010, Longhorn et al. 2010, Beutel et al. 2011), however there has been no recent update on organizing the species in Strepsiptera and producing a catalog of species that comprise this poorly known order. The phylogeny of this group has been of much confusion since its discovery. The first naming of a strepsipteran (*Xenos vesparum*) was in 1793 by Petrus Rossius (Rossius 1793), who placed the species in Hymenoptera. Latreille (1809) transferred *X. vesparum* to Diptera in the tribe Phthiromyae. Kirby (1802) named a second strepsipteran (*Stylops melittae*) but did not associate it with *X. vesparum* but then later associated the two species as belonging to the same group and erected the order Strepsiptera for their placement, stating that the new order would follow Coleoptera in his system of arrangement of insects (Kirby 1813). However, there was little consensus, even initially, of the relationship of this group of insects to other orders. Lamarck (1817) included the strepsipteran species in the family Rhipidoptera that was placed in Diptera. Swainson and Shuckard (1840) then placed the strepsipteran species in the family Stylopidae within the Order Neuroptera. For the next century, these species were treated by some authors as the separate order Strepsiptera (Pierce 1908, 1936, 1964); as a superfamily of Coleoptera (Arnett 1960); as a subfamily in Coleoptera (Lameere 1900); or a family of Coleoptera (Crowson 1954, 1960). There now appears to be no disagreement with the Strepsiptera being a monophyletic order most closely related to Coleoptera (Niehuis et al. 2012).

Only two publications have attempted to catalog all species of Strepsiptera since the time of Saunders (1872). Three additional papers reviewed the taxonomy of the entire order but did not catalog species. Pierce (1909) produced the first compilation of species in the order. In this work he documented 109 species in 37 genera in eight families. These species were also reported by Pierce (1911) in *Genera Insectorum*. Thirty-two years later, Bohart (1941) published a new revision of Strepsiptera that

separated the order into seven families and 20 genera, synonymizing many of the genera that Pierce (1909, 1914, 1918) had erected. While Bohart named new species and addressed all species in North America in his revision, he did not catalog all species in the order. Kifune and Maeta (1965) proposed to make a list of all described species of Strepsiptera and began with publishing their Part I, with a list of species in the genus *Pseudoxenos* (currently split into *Pseudoxenos* and *Paraxenos*). Unfortunately, no other parts were published. Kinzelbach (1971a) produced the most comprehensive treatment of the order and cataloged all species known at that time. This monograph placed 363 species into 33 genera and 9 families. Kinzelbach (1978) followed this work by a more comprehensive work on European species but did not extend this work to other parts of the World. In this latter work, he provided extensive distributions and host lists while synonymizing many species. Kathirithamby (1989a) reviewed the order and addressed all known families and genera but did not catalog the species. The number of valid species has nearly doubled since the Kinzelbach treatise causing the need for the current catalog. Additionally, a complete catalog has not been produced that also included known host distributions and bibliographical references for each species.

Knowledge of strepsipteran species continues to be very limited. Many species are known only from males collected in traps and other species are known only from a holotype male specimen (Cook 2014a). The obvious reason for this situation is that the adult male is the only free-living macroscopic (although still small) form except in the primitive family Mengerillidae (Cook 2007). Adult males having an extremely short lifespan of just a couple of hours further causes this perceived rarity (Cook 2014a). The definition of what constitutes a species has also complicated our knowledge of the number and identity of strepsipteran species. The species concept of Pierce (1908, 1909, 1911, 1914, 1918) considered a strepsipteran species as host-specific. Species and genera were erected because of their host association, and strepsipteran species and genera were strictly aligned with their host's taxonomy, even if almost no morphological difference was noted. This meant that a strepsipteran species could be defined by the species of host it utilized for

development. Contrary to Pierce, Bohart (1941) used morphology to define species boundaries and host associations were generally disregarded as criteria to define species. The result of this was the synonymy of many of Pierce's genera and species. Kinzelbach (1978) took the concept of Bohart further and viewed many European Strepsipteran species as being highly variable and capable of parasitizing a wide host range. This created even more synonyms, at least in his European treatment of the order. Unfortunately, all of these species concepts lacked large numbers of specimens upon which to base decisions, and there was little biological data to influence species delineation. An obvious solution to this problem was provided with the advent of modern genetic techniques, but the taxonomy of the group still suffers because what we know of most valid species consist of small numbers of very old specimens, many of which are permanently slide-mounted. Specimens are simply not available for the use of modern tools to help define species boundaries. A large amount of work needs to be completed to better define species, and a large number of new species almost certainly remain to be discovered. Currently, strepsipteran specimens are rarely collected, but when found they usually cannot be placed in a known species and are obviously new to science (personal observation). The fact that almost any new collection represents a new species suggests a giant amount of diversity still to be discovered.

Since the first strepsipteran was described in 1793, there has been a relatively slow, steady naming of species with the exception of a small number of years when large monographs were published. Figure 1 shows the dates when species that are currently considered valid were named. This data does not account for species that were described but later synonymized. In the first 50 years after the first strepsipteran description only nine species were named that are still valid. The next 60 years also produced small increases, with 11 more of our current species added. It took over a century to accumulate the first 20 valid species. However, in the first decade of the 20<sup>th</sup> century substantial increases occurred and 56 currently valid species were added. Pierce's (1909) monograph alone accounted for 35 of these species. The next 20 years added 71 species (1910-1930), and the following 20 years similarly added 44

species (1931-1950). From 1951 to 1960, there was an increase in the rate of species discovery without the influence of any large monograph. During this period 62 species were added. During the next three decades species discovery steadily increased from 54, to 87, to 96 and then decreased to 52 and 20 in the next two decades respectively. Since the end of 2010 there have been 29 new species named. This trend might suggest a species accumulation showing that we are starting to find a substantial proportion of the species of Strepsiptera. However, this is almost certainly a reflection of active researchers and not a reflection of our knowledge of the entire strepsipteran diversity. It is still the case that nearly any strepsipteran specimen newly collected constitutes a new species. There is simply a need for more researchers.

As with many groups, the taxonomy of the Strepsiptera has been largely influenced by a small number of researchers. There have been 119 authors that have contributed as a sole author or contributed partly to the naming of the 626 currently valid species. Seventeen authors have contributed to the naming of at least 10 species that are currently considered as valid (Table 1).

For this catalog I have used the most recent view of the organization of the order into subfamilies and genera. This organization is based primarily on the morphological phylogeny by Pohl and Beutel (2005) and the molecular phylogeny of McMahon et al. (2011), although new descriptions of fossil species that are not included in the phylogenies have added to this list. Both extant and extinct species are included in this catalog. I have not included listings of any proposed subfamilies or subgenera. There are very few of these latter taxonomic groupings and none are based on our current phylogenetic knowledge, so they appear too tentative for this catalog.

The catalog includes information at both the family, genus, and species level. Each family has its authority and all synonyms listed but I have not included every usage of the names in taxonomic publications, only the first use of each name. For each family there is also a short synopsis on history of the major taxonomic changes in the group as well as general characters that define the family and any keys or checklists that have been previously published. At the genus level, the same type of

Table 1. Authors who described the most species of Strepsiptera and the years that they were active working on Strepsiptera based on the years of their publications on this group.

Author	Species Described	Years Active
Kifune, T.	101	1952-1998
Pierce, W. D.	85	1904-1964
Luna de Carvalho, E.	71	1950-2007
Hirashima, Y.	59	1979-1989
Kathirithamby, J.	54	1977-still active
Bohart, R. M.	37	1934-1978
Kinzelbach, R.	34	1966-still active
Kogan, M.	25	1958-still active
Pasteels, J.	20	1949-1958
Maeta, Y.	18	1963-2007
Oliveira, S. J.	18	1959-1966
Perkins, R. C. L.	16	1888-1924
Fox, J.	13	1964-1968
Pohl, H.	12	1991-still active
Cook, J. L.	11	1996-still active
Brethes, J.	10	1923
Hofeneder, H.	10	1910-1950

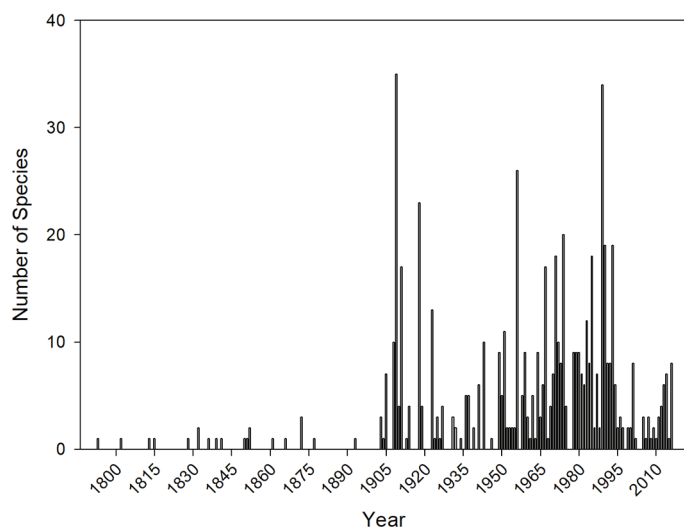


Figure 1. Dates of publication of currently valid species of Strepsiptera.

information is supplied as was done for the family. At the species level, information is given for all synonyms, host information, known distribution that has been published, location of the type, bibliographic information on any other information that is known about the species, and any notes to help users of the catalog understand the status of the species and why decisions have been made. The references cited is not a complete bibliography for the order but it contains a large proportion of everything that has been published in the scientific literature concerning the order Strepsiptera.

### Catalog

#### Order Strepsiptera Kirby, 1813

- = Phthiromyae Latreille, 1809 (tribe in Diptera)
- = Rhipidoptera Lamark, 1816 (family in Diptera)
- = Rhipiptera, Latreille, 1817 (order)
- = Rhipiptera Leach, 1817 (order)
- = Strepsiptera Gegenbaur, 1827 (family in Neuroptera)
- = Stylopidae Stephens, 1829 (family in Coleoptera)
- = Stylopidae Shuckard 1840 (family in Neuroptera)
- = Stylopites Newman, 1845 (tribe in Coleoptera)
- = Stylopides Lacordaire, 1859 (family in Coleoptera)
- = Stylopidae Saunders, 1872 (family in Coleoptera)
- = Strepsiptera Sharp, 1881 (family in Coleoptera, Heteromera)
- = Strepsiptera Brauer, 1885 (family in Coleoptera, Malacodermata)
- = Stylopininae Lameere, 1900 (subfamily in Melandryidae (Coleoptera))
- = Xenidae Semenov, 1902 (family in Coleoptera, Tenebrionoidea)
- = Strepsiptera Pierce, 1908 (redefined as an Order)
- = Stylopidae Crowson, 1954 (family in Coleoptera)
- = Stylopoidea Arnett, 1960 (superfamily in Coleoptera)

Family **Bahiaxenidae** Bravo, Pohl, Silva-Neto and Beutel, 2009: 615

The family Bahiaxenidae was established by Bravo et al (2009) for a single male collected in Bahia, Brazil. Bravo et al. (2009) justified this new family based on a cladistics analysis using morphological data. All other extant strepsipterans exhibit the loss of the 8<sup>th</sup> antennomere and a greatly reduced labrum,

both of which are found in Bahiaxenidae, which appears to be a primitive state for Strepsiptera. This analysis established Bahiaxenidae as a sister group to all other extant families of Strepsiptera. Bravo et al. (2009) suggested that the taxon has survived in Quaternary sand dunes of the São Francisco River area. No additional specimens are yet known for this family.

Genus **Bahiaxenos** Bravo, Pohl, Silva-Neto and Beutel, 2009: 616.

*Type species* — *Bahiaxenos relictus* Bravo

*Bahiaxenos* is a monotypic genus that is represented by only one specimen, the holotype of *Bahiaxenos relictus*. This is the only genus of extant strepsipterans with eight antennomeres, a condition found elsewhere only in the extinct Protoxenidae and *Cretostylops*. Since the species was described from a museum specimen, nothing is known about its natural history.

***Bahiaxenos relictus*** Bravo, Pohl, Silva-Neto and Beutel, 2009: 617

*Host* — unknown

*Specimens described* — Male

*Distribution* — Bahia, Brazil

*Type* — Museu de Zoologia da Universidade Estadual de Feira de Santana

Family **Bohartillidae** Kinzelbach, 1969a: 92

Kinzelbach (1969a) erected the family Bohartillidae based on two specimens that he named *Bohartilla megalognatha*. While *B. megalognatha* is extant, two subsequent species were added to the family that are known only from fossil specimens found in amber. All members of the family appear to be New World in distribution; however, only seven specimens representing three species are known (Cook, 2015a). No females or larvae are known from this family and except for the current distribution, there is no additional knowledge.

Genus *Bohartilla* Kinzelbach, 1969a: 92

*Type species* — *Bohartilla megalognatha*, Kinzelbach, 1969a

The genus *Bohartilla* was erected as a monotypic genus for *Bohartilla megalognatha* Kinzelbach (1969), with the description based on two specimens from Honduras. Two additional specimens of *B. megalognatha* were reported from the Panama Canal Zone (Kathirithamby and Grimaldi, 1993) and the Dominican Republic by Cook (2015). Each of the species known from Dominican Amber were described from one specimen each. Nothing is known about the natural history or hosts for members of this family.

*Bohartilla joachimscheveni* Kinzelbach and Pohl  
1994: 65

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dominican amber

*Type* — holotype in collection of J. Scheven, Hagen-Hohenlimburg

*Other references* — Pohl and Kinzelbach 1995a [identification of second specimen, which was earlier thought to be *B. megalognatha* by Kathirithamby and Grimaldi (1993)]

*Bohartilla kinzelbachi* Kathirithamby and  
Grimaldi 1993: 33

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dominican amber

*Type* — holotype in American Museum of Natural History (AMNH DR-10-6)

*Bohartilla megalognatha* Kinzelbach 1969a: 92

*Host* — unknown

*Specimens described* — Male

*Distribution* — Honduras (type locality), Dominican Republic, Panama

*Type* — holotype and paratype in Bohart Museum, University of California, Davis

*Other references* — Cook (2015a) [distribution],

Kathirithamby and Grimaldi (1993) [distribution]

Family **Corioxenidae** Kinzelbach, 1971a

= Mengeidae Pierce, 1909 (in part)

= Callipharixenidae Blair, 1936 (in part)

= Corioxeninae Kinzelbach, 1970a

Kinzelbach (1971a) elevated the subfamily Corioxeninae to family status from its previous placement in Callipharixenidae. Previous to the creation of the family Callipharixenidae, species now in Corioxenidae were included as part of Mengeidae (Pierce, 1908). At the time of Kinzelbach's (1971a) establishment of Corioxenidae, the family included the genera *Corioxenos*, *Loania*, *Triozocera*, and *Dundoxenos* (which was considered as part of *Triozocera* by Kinzelbach). Since this time, ten additional genera have been named and placed in Corioxenidae. Corioxenidae is a sister group of the remaining Stylopodia (all extant Strepsiptera except Bahixenidae and Menginillidae) (Pohl and Beutel (2005)). Autapomorphic characters of the Corioxenidae include the female oriented with its ventral side towards the host, a distinct separation of the thorax and head of the adult female, the adult female with rudimentary ommatidia and the genital aperture of the female on abdominal segment seven (Kathirithamby, 1989). Pohl and Beutel (2008) also noted a unique fissure-shaped birth opening on the ventral side of the thorax, which is also used for copulation. Males have either four or five tarsal segments, a long coronal suture, a shortened CuA<sub>1</sub> wing vein, and a straight aedeagus. This family is greatly in need of a phylogeny to sort out relationships and reconcile genera. The species have been put into several subfamilies (Kinzelbach, 1971a; Miyamoto and Kifune, 1984; Luna de Carvalho 1985, 1990; Kathirithamby, 1989) but these placements have been of convenience based on a limited number of characters and without any phylogenetic perspective. There are also many undescribed species awaiting naming and logical placement within the family (personal observation). The most recent key to species is provided by Cook and Tribull (2013).

Genus *Australoxenos* Kathirithamby,  
1990: 472

= Genus "A" Kathirithamby 1989a: 72

*Type species* — *Australoxenos yetmaniensis*  
Kathirithamby, 1990

The genus *Australoxenos* was established by Kathirithamby (1990) for a new species from Australia. The description of this species and genus is based on a single male and thus nothing is known of the female, larva, host, or natural history. This same specimen was listed as "genus A" in a previous publication (Kathirithamby, 1989). The combination of characters upon which the genus is based include a lack of mandibles, but with long palps; absence of projections of tarsal segments I and II; and having a  $CuA_1$  wing vein longer than half  $CuA_2$  and  $CuP$  as long as  $CuA_1$ .

*Australoxenos yetmaniensis* Kathirithamby,  
1990: 472

*Host* — unknown

*Specimens described* — Male

*Distribution* — New South Wales, Australia

*Type* — Australian National Insect Collection,  
Australian National Insect Collection

Genus *Blissoxenos* Miyamoto and Kifune, 1984:  
137

*Type species* — *Blissoxenos esakii* Miyamoto  
and Kifune, 1984

The genus *Blissoxenos* was established by Miyamoto and Kifune (1984) to hold a new species parasitizing species of Blissidae in Japan. This genus is separated from others in the family by having a seven-segmented antennae, with the seventh segment originating from the middle of the sixth segment. Members of the genus have four tarsal segments, tarsal claws absent, a one-segmented palp and hind wings with a single detached radial vein. Miyamoto and Kifune suggested that this genus is most closely related to *Corioxenos*. This is the only strepsipteran that use members of Blissidae as hosts. The genus is currently known only from Japan.

*Blissoxenos esakii* Miyamoto and Kifune,  
1984: 137

*Hosts* — *Dimorphopterus japonicus* (Hidaka,  
1959), *Iphicrates spinicaput* (Scott, 1874),  
*Macropes obnubilus* (Distant, 1883)  
(Blissidae)

*Specimens described* — Male, female, larva  
*Distribution* — Japan

*Type* — holotype in Kyushu University (holotype  
No. 2408); 12 paratypes (including  
allotype)

*Other references* — Nakase and Kato 2011  
[biology, natural history]

Genus *Corioxenos* Blair, 1936: 113

*Type species* — *Corioxenos antestiae* Blair, 1936

Blair (1936) erected the genus *Corioxenos* for a new species described from Tanganyika. Members of the genus have seven antennal segments with flabella on the third and fourth segments, although Blair (1936) originally considered the antennae as five-jointed and this interpretation was repeated by Baliga (1967) and Luna de Carvalho (1956). Kinzelbach (1971a) correctly diagnosed the antennae as seven segmented, which was also found in a later species by Cook (2001). Tarsi are four-segmented, a state which was misidentified as three in the description of *Corioxenos raoi* (Baliga, 1967). The hind wings have two detached radial veins. Members of the genus are found in India, Mexico, several countries in Africa, and one species has been introduced into Dominica. All known hosts are in Pentatomidae (Hemiptera).

*Corioxenos acucyrtophallus* Cook, 2001: 397

*Host* — unknown

*Specimens described* — Male

*Distribution* — Chiapas Mexico

*Type* — El Colegio de la Frontera Sur (ECOSUR)

***Corioxenos antestiae*** Blair, 1936: 113

*Hosts:* *Antestia cincticollis* (Schaum, 1853) *Antestia facetus* (Germar, 1838), *Antestiopsis facetoides* (Kirkpatrick, 1937), *Antestia falsa* (Schouteden, 1912), *Antestia intricata* (Ghesquière & Carayon, 1948) *Antestia trivialis* (Stål, 1876), *Aegaleus bechuana* (Kirby, 1900), *Antestiopsis facetoides* (Kirkpatrick), *A. ghesquierei* Carayon, 1954, *Pentatoma lineaticollis* (Stål, 1853) (all in Pentatomidae)

*Specimens described* — Male, Female, larvae

*Distribution* — Tanganyika (type locality), Dominica (imported), Kenya, Ethiopia, Ruanda, Tanzania, Uganda

*Type* — British Museum, Natural History

*Other references* — Cooper 1938 [anatomy]; Fox 1968 [distribution]; Greathead 1966 [biological control]; Kirkpatrick 1937a [vision, behavior], 1937b [effects on *Host*]; Luna de Carvalho 1956 [distribution], 1978 [distribution, review]

***Corioxenos raoi*** Baliga, 1967: 389

*Host* — *Antestiopsis cruciata* (Fabricius, 1775) (Pentatomidae)

*Specimens described* — Male, Female, larvae

*Distribution* — south India

*Type* — Commonwealth Institute of Biological Control, Bangalore, India

Genus ***Dundoxenos*** Luna de Carvalho, 1956: 28

=*Triozocera* Kinzelbach, 1980 (in part)

*Type species* — *Dundoxenos vilhenai* Luna de Carvalho, 1956

Luna de Carvalho (1956) described the genus *Dundoxenos* as being similar to *Triozocera* except having an antenna similar to *Corioxenos*. The main similarity of *Dundoxenos* and *Triozocera* is that both have five-segmented tarsi and tarsal claws are present. At the time of the establishment of *Dundoxenos*, *Corioxenos* was considered to have five-segmented antennae, which is the case for *Dundoxenos*; however, it was later determined that *Corioxenos* actually has seven antennal segments

(Kinzelbach, 1971a). Thus, *Dundoxenos* is the only genus of Corioxenidae with a five-segmented antennae making this an autapomorphy of the genus, but this autapomorphy has been questioned by Pohl et al. (1996) who found that *D. vilhenai* might have weak subdivisions in segment five that are not observed in other *Dundoxenos*. A second difference between *Triozocera* and *Dundoxenos* is that female *Triozocera* have five genital tubes while those of *Dundoxenos* have four. Since the original description of the then monotypic *Dundoxenos vilhenai*, three additional species have been named, one of which was later synonymized. The host is known for two of the three species, both utilizing members of the family Cydnidae (Hemiptera). The known distribution of members of this family is currently entirely African but the species are widely separated in Jordan, Cape Verde and Angola.

***Dundoxenos breviphlebos*** Pohl, Katbeh-Bader and Schneider, 1996: 114

*Host* — unknown

*Specimens described* — Male

*Distribution* — Jordan

*Type* — holotype and paratypes in Hessisches landesmuseum, Darmstadt, Germany HLMD-Strep, paratypes reported in collection of H. Pohl

***Dundoxenos kinzelbachi*** Luna de Carvalho, 1985: 67

*Host* — *Aethus lindbergi* Wagner (Cydnidae)

*Specimens described* — Male, female

*Distribution* — Republic of Cape Verde, Macronesia

*Type* — holotype and paratypes in collections of Van Harten, Kinzelbach, and Luna de Carvalho (Luna de Carvalho collection now at Sam Houston State University, location of other specimens uncertain)

*Other references* — Luna de Carvalho 1990 [female and larva description]



***Dundoxenos vilhenai*** Luna de Carvalho, 1956: 28

=*Dundoxenos cordatus* Ryn-Tournel, 1971: 24

*Host* — *Aethus indicus* (Westwood) (Cydniidae)

*Specimens described* — Male, female, larva

*Distribution* — Dundo, Angola (type locality); Democratic Republic of Congo, Senegal

*Type* — holotype, 10 paratypes (including allotype) in Museu Real do Congo Belga

*Other references* — Abdul-Nour 2002 [distribution], Luna de Carvalho 1973a [distribution], 1985 [synonymy of *D. cordatus*]

Genus ***Eocenoxenos*** Henderickx and Bosselaers, 2013

*Type species* — *Eocenoxenos palintropos* Henderickx and Bosselaers, 2013

The genus *Eocenoxenos* was established by Henderickx and Gosselaers (2013) to include a specimen from Baltic amber. This monotypic genus was stated to be most closely related to *Dundoxenos* and *Triozocera* because it has five tarsomeres. *Eocenoxenos* also has antennae that generally resemble the form of other corioxenid genera, although *Eocenoxenos* has an eight-segmented antennae. The genus is therefore recognized by a unique set of characters that include the eight-segmented antennae, with flabella on III-VI and segment VII resembling a flabellum; mandibles absent, five tarsomeres, tarsal claws absent, and abdominal segment IX ventrally elongated to hold a straight aedeagus. The genus is known from a single male specimen in amber. The host and life history are unknown.

***Eocenoxenos palintropos*** Henderickx and Bosselaers, 2013

*Host* — unknown

*Specimens described* — Male

*Distribution* — Baltic amber

*Type* — Royal Belgian Institute of natural Sciences – Entomology, Brussels IG 32.287

Genus ***Floridoxenos*** Kathirithamby and Peck, 1994: 128

*Type species* — *Floridoxenos monroensis* Kathirithamby & Peck, 1994

*Floridoxenos* was established by Kathirithamby and Peck (1994) for a new species found in Florida, USA. The genus was based on containing the family characters for Corioxenidae but having long flabella on antennal segments three through six. Kathirithamby and Peck suggested that it was most similar to *Blissoxenos* except for the difference in antennal segments and the lack of a projection on the first tarsal segment found in *Blissoxenos*. The genus also has four tarsal segments, absence of tarsal claws, and two unattached radial veins. Since the only known specimens of this genus were collected from light traps, nothing is known of its host, female, larva, or natural history.

***Floridoxenos monroensis*** Kathirithamby and Peck, 1994: 128

*Host* — unknown

*Specimens described* — Male

*Distribution* — Florida, United States

*Type* — Canadian Museum of Nature, Ottawa, Ont.

Genus ***Loania*** Kinzelbach, 1970a: 100

= *Perissozocera* Johnson 1976: 580

*Type species* — *Loania canadensis* Kinzelbach, 1970a

The genus *Loania* was erected by Kinzelbach (1970a) to house a new species found parasitizing a species of *Kleidocerys* in the family Cymidae (still listed by some as Lygaeidae but there is justification for using the new family designation). Johnson (1976) erected the genus *Perissozocera* for what he considered a new species but Miyamoto and Kifune (1984) synonymized this species with *Loania canadensis*, thus also making the genus a junior synonym. *Loania* differs from other Corioxenidae by having a unique combination of characters including

a six-segmented antennae with flabella on segments III-IV, well developed stout maxillary palps, four-segmented tarsi, tarsal claws absent, and no detached radial veins in the hind wing.

*Loania canadensis* Kinzelbach, 1970a: 100

= *Perissozocera cryophila* Johnson, 1976: 581

*Host* — *Kleidocerys* cf. *resedae* (Panzer) (Lygaeidae)

*Specimens described* — Male, female

*Distribution* — Ontario, Canada (type locality); Georgia and Kentucky, United States

*Type* — Bohart Museum, University of California, Davis (holotype, paratype), Natural History Museum, Senckenberg, Frankfurt (3 paratypes: SMF C 14173, SMF C 14174, SMF C 14175)

*Other references* — Johnson 1976[distribution]; Miyamoto and Kifune, 1984 [taxonomy]

Genus *Malagasyxenos* Cook and Tribull, 2013: 316

*Type species* — *Malagasyxenos gymnostoma* Cook and Tribull, 2013

The genus *Malgasyxenos* was established by Cook and Tribull (2013) to house a new species represented by three specimens from Madagascar. Morphologically *Malagasyxenos* most closely resembles *Foridoxenos* in having seven antennal segments and flabella on segments III-VI, but differs in having no visible mouthparts. Having no external mouthparts makes *Malagasyxenos* distinct from all other strepsipterans but other characters place it clearly in Corioxenidae. The genus is currently known only from Madagascar. Since the species is based entirely on males that were collected in a trap, nothing is known of its biology, ecology, host, or description of females or larvae.

*Malagasyxenos gymnostoma* Cook and Tribull, 2013: 317

*Host* — unknown

*Specimens described* — Male

*Distribution* — Madagascar

*Type* — holotype in California Academy of Sciences

Genus *Malayaxenos* Kifune, 1981: 323

*Type species* — *Malayaxenos kitaokai* Kifune, 1981

Kifune (1981) erected the genus *Malayaxenos* based on a single male specimen representing a new species from West Malaya. *Malayaxenos* is most similar to *Triozocera* and *Dundoxenos* in having a six-segmented antennae with flabella on segments III-IV and a similar hind wing venation. *Malayaxenos* differs by having tarsi with four segments and absence of tarsal claws as opposed to five segments and presence of tarsal claws as is found in *Triozocera* and *Dundoxenos*. This genus is known only from males of three species and females and larvae from a single species. The only known host is in the family Lygaeidae. Distribution of members of *Malayaxenos* includes West Malaysia, India and Saudi Arabia.

*Malayaxenos capillipenis* Mazumdar and Mitra, 2011: 7

*Host* — unknown

*Specimens described* — Male

*Distribution* — India

*Type* — holotype and paratype in the collection of S. Mitra, Department of Zoology, University of Burdwan, India: to be deposited in National Zoological Collections, Kolkata

*Malayaxenos kitaokai* Kifune, 1981: 323

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sabah, West Malaysia

*Type* — holotype in Entomological Laboratory, Faculty of Agriculture, Kyushu University

*Malayaxenos trapezonoti* Pohl and Melber, 1996: 173

*Hosts* — *Trapezonotus arenarius* (Linnaeus), *Trapezonotus desertus* Seidenstücker (Lygaeidae)

*Specimens described* — Male, female, larva

*Distribution* — Germany

*Type* — Forschungsinstitut Senckenberg, Frankfurt Germany (holo*Type* — SMF C 14176; paratypes: SMF C 14177, SMF C 14178, SMF C 14179, SMF C 14180)

*Other references* — Melber and Pohl 1997 [biology and ecology]

Genus *Mufagaa* Kinzelbach, 1980: 161

*Type species* — *Mufagaa talhouki* Kinzelbach 1980

Kinzelbach (1980) established the genus *Mufagaa* to hold a new species named from a single male specimen from Saudi Arabia. The genus is characterized by a unique set of characters that include a seven-segmented antennae, a  $CuA_1$  more than two-thirds the length of  $CuA_2$ , and  $CuP$  half the length of  $CuA_1$ . An apparent character of *Mufagaa* is its very large eyes with a relatively small number of large ommatidia that cover most of the head of the male. There is no information on the female, larva, biology or natural history of *Mufagaa*.

*Mufagaa talhouki* Kinzelbach, 1980: 162

*Host* — unknown

*Specimens described* — Male

*Distribution* — Saudi Arabia

*Type* — holotype in Naturhistorischen Museum Basel, paratypes in Collection of the Ministry of Agriculture, Riyadh and Naturmuseum Senckenberg, Frankfurt

Genus *Proceroxenos* Pohl, Kabeh-Bader and Schneider, 1996: 110

*Type species* — *Proceroxenos jordanicus* Pohl, Katbeh-Bader & Schneider 1996

The genus *Proceroxenos* was erected by Pohl et al. (1996) for a new species based on a single specimen from Jordan. This genus appears most closely associated with *Uniclavus* due to their both having a single claw following the terminal segment of a five segmented tarsus and flabella on the third and fourth antennal segments. *Proceroxenos* differs

by having a five-segmented antennae and hind wing vein  $CuA_1$  that is less than one fourth as long as  $CuA_2$  compared to the seven-segmented antennae and  $CuA_1$  that is half as long as  $CuA_2$  found in *Uniclavus*. The hind wing of *Proceroxenos* has two detached radial veins, a maxilla with a stout basal segment and long palpus, and an aedeagus that is somewhat s-shaped. Only the male is known and nothing is known of its host or natural history.

*Proceroxenos jordanicus* Pohl, Katbeh-Bader and Schneider 1996: 112

*Host* — unknown

*Specimens described* — Male

*Distribution* — Jordan

*Type* — holotype in Hessisches Landesmuseum, Darmstadt, Germany no. HLMD-Strep. 1/HT

Genus *Triozocera* Pierce, 1909: 490

= *Trioxocera* Pierce, 1909 (spelling emended by Pierce 1911: 490, by Bohart 1941)

= *Triozocera* Pierce, 1911 (by Bohart 1941)

*Type species*: *Triozocera mexicana* Pierce, 1909

The genus *Triozocera* was established by Pierce (1909) for a single new species from Vera Cruz, Mexico. The original description of the genus included typographical errors where the genus name was spelled as *Trioxocera*. Pierce (1911) later corrected the error with permission from the International Rules Committee to amend the spelling to the intended *Triozocera*. The original description of the type species also was problematic because it was based on characters that turned out to not be useful to define and differentiate the genus. The genus is currently defined by having seven-segmented antennae with flabella on the third and fourth segments and a female with five genital tubes, which appears to definitively separate it from *Dundoxenos*, which has four. All known hosts are in the hemipteran family Cydnidae, which provides an additional association with the genus *Dundoxenos*. Species in *Triozocera* are found on all continents except Europe and Antarctica.

***Triozocera africana*** Luna de Carvalho, 1956: 24

*Hosts* — *Macroscytus reflexus* Signoret (reported and misspelled as *Macroscytus acutus* Signoret by Luna de Carvalho (1978); *Macroscytus acutus* was synonymized with *M. reflexus* by Lis (2000))

*Specimens described* — Male, female

*Distribution* — Dundo, Angola

*Type* — holotype at Museu Real do Congo Belga, paratype at Museu do Dundo

*Other references* — Luna de Carvalho 1967 [natural history]

***Triozocera bedfordiensis*** Kathirithamby, 1990: 479

*Host* — unknown

*Specimens described* — Male

*Distribution* — Western Australia, Australia

*Type* — holotype and paratypes at Australian National Insect Collection

***Triozocera boharti*** Luna de Carvalho, 1967: 18

= *Triozocera mexicana* as reported by Luna de Carvalho 1956: 23

*Host* — unknown

*Specimens described* — Male

*Distribution* — Philippines

*Type* — holotype in Museu do Dundo, paratypes at Sam Houston State University

*Other references* — Kifune and Hirashima 1989 [distribution]

***Triozocera buehrheimi*** Kogan and Cook, 2014: 49

*Host* — unknown

*Specimens described* — Male

*Distribution* — Amazonas, Brazil

*Type* — holotype and paratypes in INPA Manaus, Brazil

***Triozocera ceylonensis*** Kifune and Hirashima, 1983a: 159

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sri Lanka

*Type* — holotype and paratypes in U. S. National Museum of Natural History

***Triozocera cooloolaensis*** Kathirithamby, 1990: 477

*Host* — unknown

*Specimens described* — Male

*Distribution* — Australia (Queensland)

*Type* — Queensland Museum

***Triozocera couturieri*** Abdul-Nour, 2002: 201

*Host* — unknown

*Specimens described* — Male

*Distribution* — Senegal

*Type* — holotype and paratypes in National Museum of Natural History, Paris

***Triozocera curvimaxillaria*** Kathirithamby, 1990: 475

*Host* — unknown

*Specimens described* — Male

*Distribution* — New South Wales, Australia

*Type* — holotype and paratypes in New South Wales Department of Agriculture Scientific Collections Trust

***Triozocera dundoana*** Luna de Carvalho, 1956: 23

*Hosts* — *Plonisa tartarea* Stål (reported by Luna de Carvalho as *P. tartareus* Signoret but is probably *P. tartarea*)

*Specimens described* — Male, female

*Distribution* — Angola

*Type* — holotype at Museu Real do Congo Belga, paratypes at Museu do Dundo and collection of Luna de Carvalho (now at Sam Houston State University)  
*Other references* — Luna de Carvalho 1967 [morphology], 1978 [host]

- Triozocera endrodyi*** Luna de Carvalho, 1973a: 20  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Ghana  
*Type* — holotype in Hungarian Natural History Museum
- Triozocera eurychilus*** Pascarella and Cook, 2018: 11  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Costa Rica  
*Type* — holotype at University of Costa Rica
- Triozocera gigantea*** Luna de Carvalho, 1956: 24  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Angola  
*Type* — holotype at Museu Real do Congo Belga
- Triozocera innisfailensis*** Kathirithamby, 1990: 477  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Australia (Queensland)  
*Type* — holotype at Queensland Museum, paratypes at Australian National Insect Collection, Queensland Museum; and Hope Entomology Collections, University Museum, Oxford
- Triozocera katherinensis*** Kathirithamby, 1990: 478  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Australia (Northern Territory)  
*Type* — holotype and paratypes in Australian National Insect Collection
- Triozocera macroscyti*** Esaki and Miyamoto, 1958: 373  
 = *Triozocera macrocysti* Luna de Carvalho, 1967 (misspelling in key)
- Host* — *Macroscytus japonensis* Scott (Cydnidae)  
*Specimens described* — Male, female, pupa, larva  
*Distribution* — Kyushu, Japan  
*Type* — unknown location  
*Other references* — Kifune and Machita 1994 [distribution]
- Triozocera maxi*** Fox and Fox, 1964a: 403  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Liberia; Guinea-Bissau, Nigeria  
*Type* — holotype at Liberian Institute for the American Foundation for Tropical Medicine, Liberia; paratypes at Carnegie Museum  
*Other references* — Luna de Carvalho 1978 [distribution], 1997 [distribution]
- Triozocera mexicana*** Pierce, 1909: 86  
 = *Triozocera texana* Pierce, 1911 (in part) (synonymized by Bohart 1941) (reinstated by Luna de Carvalho 1967) (synonymized by Kinzelbach (1971a)) (*T. texana* reinstated by Kifune and Hirashima (1979) but not accepted in subsequent publications). Both *T. mexicana* and *T. texana* are now valid species and it is uncertain which is being reported in the publications listed below)  
 = *Triozocera paulistana* Kogan, 1958 (synonymized by Kinzelbach (1971a)) (reinstated by Kogan and Cook (2014))
- Host* — *Pangaeus bilineatus* (Say) (this *Host* association is possibly incorrect, see Cook (2015b))  
*Specimens described* — Male, female  
*Distribution* — Mexico (Veracruz (type locality) (Pierce 1909); Oaxaca (Johnson & Morrison 1979)) (Pierce 1909), Reports for United States are likely either *T. texana* or *T. vernalis* reported from Texas (Pierce 1911b, Bohart 1941, Johnson 1973); Mississippi (Khalaf 1969); Louisiana (Khalaf 1968); Florida (Meadows 1967); Kentucky (Johnson & Sperka 1972); Georgia (Johnson 1973); Kansas, Arizona, New Mexico (Johnson & Morrison 1979); Oklahoma (Shepard 1979); Alabama (Jones et al. 1980)); Cuba (Luna de Carvalho 1967 (probably not *T. mexicana* see Cook 2015b)),

*Type* — U. S. National Museum Cat. No. 10080

*Other references* — Cook 2015b [discussion of distribution, taxonomy], Johnson 1973 [possible *Host*], Kogan and Cook 2014 [taxonomic comparison], Luna de Carvalho 1956, 1967 [taxonomic discussion], Pierce 1919 [additional description]

*Notes* — Cook (2015b) suggests that due to misidentifications, *T. mexicana* probably does not occur in the United States. This makes the *Host* association and nearly all the distribution reports inaccurate except for those by Pierce (1909).

***Triozocera minor*** Miyamoto and Kifune, 1984: 145

*Host* — *Geotomus pygmaeus* (Dallas)

*Specimens described* — Male, female, larva

*Distribution* — Japan

*Type* — holotype No. 2409, Entomology Laboratory, Faculty of Agriculture, Kyushu, paratypes (including allotype) at same depository

***Triozocera moorookensis*** Kathirithamby, 1990: 476

*Host* — unknown

*Specimens described* — Male

*Distribution* — Australia (Queensland)

*Type* — holotype and paratypes in Australian National Insect Collection

***Triozocera papuana*** Kogan and Oliveira, 1964: 459

*Host* — unknown

*Specimens described* — Male

*Distribution* — New Guinea (type locality), Australia, Solomon Islands

*Type* — holotype in American Museum of Natural History, paratypes in Instituto Oswaldo Cruz, Rio de Janeiro, Brasil

*Other references* — Kifune and Hirashima 1989 [distribution]

***Triozocera paradisea*** Kifune and Hirashima, 1989: 13

*Host* — unknown

*Specimens described* — Male

*Distribution* — New Guinea

*Type* — type and paratypes at Bishop Museum

***Triozocera paulistana*** Kogan, 1958: 422

*Host* — unknown

*Specimens described* — Male

*Distribution* — Brazil

*Type* — location unknown

*Other references* — Kifune and Brailovsky 1987 [distribution], Kogan and Cook 2014 [taxonomic comparison]

*Notes* — Kinzelbach (1971a) synonymized *T. paulistana* with *T. mexicana* then *T. paulistana* was reinstated by Kogan and Cook (2014)

***Triozocera pugiopennis*** Chaudhuri and Gupta, 1979: 135

= *Triozocera pugiopennis* Chadhuri and Gupta 1979 (unjustified emendation)

*Host* — unknown

*Specimens described* — Male

*Distribution* — India (West Bengal)

*Type* — holotype and paratype in National Collections of Insects at the Zoological Survey of India, Calcutta, paratypes in U. S. National Museum, Washington

*Notes* — Chadhuri and Gupta (1979) named this species *T. pugiopennis*, using that spelling exclusively throughout their paper. Chadhuri et al. (1983) proposed to change the name to *T. pugiopennis* because they felt that the original spelling did not reflect the intent of the naming of the species. However, since the original spelling was consistent and there are many species names using the spelling “*pennis*” the emendation is not warranted and the original spelling should be retained.

***Triozocera rydalmereiensis*** Kathirithamby, 1990: 474

*Host* — unknown

*Specimens described* — Male

*Distribution* — Australia (New South Wales)

*Type* — holotype in New South Wales Department of Agriculture Scientific Collections

Trust (NSWDA), paratypes in NSWDA and Australian National Insect Collection

*Triozocera siamensis* Kifune and Hirashima, 1979: 62

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Thailand (type locality), Indonesia, Laos, Malaysia, West Malaysia, Laos  
*Type* — holotype No. 2153 and paratypes, Entomology Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka Kyushu  
*Other references* — Kifune 1981 [distribution], 1995 [distribution]; Kifune & Hirashima 1989 [distribution]

*Triozocera tecpanensis* Brailovsky and Márquez 1974: 106

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Guerrero, Mexico  
*Type* — holotype and paratypes Universidad Nacional Autónoma de Mexico (UNAM) (lost, personal communication with H. Brailovsky)  
*Other references* — Kifune and Brailovsky 1991 [distribution], Kogan and Cook 2014 [taxonomic comparison]

*Triozocera texana* Pierce, 1911: 491

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — United States, Texas (type locality), Mississippi, South Carolina, Virginia  
*Type* — U. S. National Museum Cat. No. 13713  
*Other references* — Cook 2015b [taxonomic discussion], Kifune and Brailovsky 1987 [taxonomic discussion], Luna de Carvalho 1967 [taxonomic discussion], Pierce 1919 [additional description]  
*Notes* — Bohart (1941) placed *T. texana* as a junior synonym of *T. mexicana* but *T. texana* was reinstated by Cook (2015b). The placing of nearly all *Triozocera* specimens in the United States as *T. mexicana* between these dates makes the distribution of United States *Triozocera* uncertain.

*Triozocera vernalis* Kifune and Brailovsky, 1987: 132

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Puebla, Jalisco, Mexico (type locality); United States (Georgia, Louisiana, South Carolina)

*Type* — holotype Universidad Nacional Autónoma de Mexico (UNAM) (lost, personal communication Brailovsky 2012)

*Other references* — Cook 2015b [reinstated as species, distribution], Kifune and Brailovsky 1991 [distribution], Kogan and Cook 2014 [taxonomic comparison], Reeves and Cook 2005 [distribution]

Genus *Uniclavus* Kathirithamby, 1989a: 72

*Type species* — *Uniclavus zambezensis* Kathirithamby, 1989a

The genus *Uniclavus* was established by Kathirithamby (1989) for a new species represented by a single male specimen from Zimbabwe. The genus is defined by a unique set of characters including the presence of a single tarsal claw following each terminal tarsus, a seven-segmented antennae with flabella on the third and fourth segments, four tarsal segments, and a hind wing with one detached radial vein. The genus is currently known only from Zimbabwe. Nothing is known of females, larva, or the ecology of members of the genus.

*Uniclavus zambezensis* Kathirithamby, 1989a: 72

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Zimbabwe  
*Type* — holotype at Hope Museum Oxford No. 10.1/1

Genus *Viridipromontorius* Luna de Carvalho, 1985: 68

= *Viridipromontorius* Roy and Niladri, 2016 **new synonym**

*Type species* — *Viridipromontorius vanharteni* Luna de Carvalho, 1985

Luna de Carvalho (1985) erected the genus *Viridipromontorius* based on the characters of three male specimens from Cape Verde. The genus is defined by a unique suite of characters that include a five-segmented antennae with flabella on the third and fourth segments, four tarsal segments, tarsal claws absent, and one detached radial vein. Females and larvae are unknown, as is the host although Luna de Carvalho suggested that he thought the *Host* would be hemipteran. Nothing is known of its ecology or natural history. Roy and Niladri (2016) misspelled the genus as *Viridopromontorius* for *V. aequus* and *V. vanharteni*, and this becomes a junior synonym of *Viridipromontorius*. Distribution of *Viridipromontorius* includes Republic of Cape Verde and India.

***Viridipromontorius aequus* (Roy and Niladri, 2016)  
new combination**

= *Viridopromontorius aequus* Roy and Niladri, 2016a: 568 (misspelling)

*Host* — unknown

*Specimens described* — Male

*Distribution* — West Bengal, India

*Type* — holotype and paratype in National Zoological Collections, Kolkata, India

*Notes* — Roy and Niladri (2016) misspelled the genus where this species was clearly intended to be placed. The misspelled genus name was included throughout the paper, including the mention of the previously described *V. vanharteni*. The misspelled *Viridopromontorius* is therefore an unauthorized emendation and becomes a junior synonym of *Viridipromontorius*.

***Viridipromontorius vanharteni* Luna de  
Carvalho, 1985: 68**

*Host* — unknown

*Specimens described* — Male

*Distribution* — Republic of Cape Verde

*Type* — holotype location unknown, one paratype at Sam Houston State University

*Other references* — Cook and Tribull 2013 [additional specimens]

Family **Cretostylopidae** Kathirithamby and Engel, 2014: 387

When the genus *Cretostylops* was established, it was not incorporated into a family but was listed by Grimaldi et al. (2005) as *Family incertae sedis*. Kathirithamby and Engel (2014) proposed the family Cretostylopidae to hold the previously described *Cretostylops engeli*. *Cretostylops* is a sister group to *Protoxenos*, *Protoxenos* being basal (Pohl and Beutel, 2005; Bravo et al., 2009, Hünefeld et al., 2011). This basal clade of *Protoxenos* and *Cretostylops* is a sister group to all other Strepsiptera. Cretostylopidae is defined by having eight-segmented antennae with flabella on segments III-VIII, base of antennae between eyes, ommatidia small and not separated by hairs, Galeal lobe of maxillary palp absent, and protrochanter and profemur not fused. The state of having the protrochanter and profemur free is not found in any other Strepsiptera. The family is only known from Cretaceous amber of northern Myanmar. The family is represented by one specimen of *Cretostylops engeli*.

Genus ***Cretostylops*** Grimaldi and Kathirithamby, 2005 (published in Grimaldi et al. 2005: 3)

*Type species* — *Cretostylops engeli* Grimaldi and Kathirithamby, 2005

The genus *Cretostylops* was established by Grimaldi and Kathirithamby based on a single male specimen in Cretaceous amber from Myanmar. The genus is currently based on characters that establish the family Cretostylopidae. Nothing is known of the female, larva, host, ecology, or natural history for this genus and species.

***Cretostylops engeli*** Grimaldi and Kathirithamby, 2005 (published in Grimaldi et al. 2005: 6)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Cretaceous amber from Myanmar



*Type* — holotype at American Museum of Natural History (Bu 1558)

*Notes* — Grimaldi et al (2005) [further description, taxonomy]

Family **Elenchidae** Perkins, 1905: 98

=Elechinae Perkins, 1905: 98

= Elenchoidea Pierce, 1908: 76

= Elechinae Ulrich, 1930

= Dienelenchinae Kinzelbach, 1971a

Perkins (1905) established the subfamily Elenchinae to include all strepsipterans with two tarsal segments per leg. He supported the classification of the Strepsiptera as the family Stylopidae within the Coleoptera but commented that the then subfamilies could at some time be elevated to family status. In recognizing the Strepsiptera as a separate order, Pierce (1908) elevated the subfamily Elechinae to Elechidae. Pierce (1908) also erected the superfamily Elenchoidea but in his classification there were no other superfamilies created and the designation appears unnecessary. The primary character that currently separates Elenchidae from all other Strepsiptera is their having two tarsal segments on each leg in the male. Males of Elenchidae also have a reduced wing venation compared to other Strepsiptera.

Genus **Colacina** Westwood, 1877: 186

*Type species* — *Colacina insidiator* Westwood, 1877

The placement of the genus *Colacina* is in question and might not belong in the family Elenchidae. Westwood (1877) named the only known species in this family for a female parasitizing a species in *Epورا* (Hemiptera: Tropiduchidae). The original inclusion in the family is based completely on the classification of its host. However, since that initial placement, a species of *Halictophagus* was described that has a species of Tropiduchidae as a host. Kinzelbach (1971a) placed *Colacina* under Elenchidae but at the same time designated it as *incertus sedis*. Bohart (1943a) tentatively placed the

only known species of *Colacina* in *Halictophagus*, but recognized that the systematic position of the species was questionable. The species and thus the family is only known from the male cephalotheca and more material is needed to determine the exact taxonomic placement of the species. However, until additional material is available, *C. insidiator* should remain in the genus where it was described, even though it is likely that this genus will eventually be synonymized.

***Colacina insidiator*** Westwood, 1877: 186

*Host* — *Epورا Subtilis* Walker 1857 (Tropiduchidae)

*Specimens described* — Male cephalotheca

*Distribution* — Borneo and Sarawak, Malaysia

*Type* — no type designated

*Other references* — Bohart, 1943a [classification]

Genus **Deinelenchus** Perkins, 1905: 107

= *Elenchus* (in part by Bohart 1941: 152)

*Type species* — *Deinelenchus australensis* Perkins, 1905

The genus *Deinelenchus* was established by Perkins (1905) for a new species from Australia. The description was initially based on a female but its difference from other members of Elenchidae was confirmed with the incorporation of the adult male. *Deinelenchus* is defined by having a hook-shaped aedeagus, antennal segments III and IV distinctly separated by a joint, long mandibles that do not cross, CuP of hind wing absent, and a weakly sclerotized head. The antennae appears as either four- or five-segmented. The general state is probably to have a five segmented antennae but in at least one species, segments IV and V appear to be fused. Distribution of the known species includes Australia, New Guinea, Malaysia, and Nigeria. Hosts are only known for one species, *D. australensis*, that is reported to utilize species of several families of Auchenorrhyncha (Hemiptera). Except for *D. australensis*, no other species have females, larva or hosts known.

***Deinelenchus australensis*** Perkins, 1905: 107

*Hosts* — *Platybrachus maculipennis* (Le Guillou), *Dardus abbreviatus* (Guérin-Méneville) (Hemiptera: Eurybrachyidae); *Siphanta hebes* (Walker), *Dworena hyacintha* (Kirkaldy), *Euryphantia cinerascens* Kirkaldy, *Colgar* sp., *Dascalina* sp. (Hemiptera: Flatidae); *Hasta hastata* Kirkaldy (Dictyopharidae)

*Specimens described* — Male, female

*Distribution* — Queensland, Australia

*Type* — Type in Koebele collection (No. 2254), now in United States National Museum

*Other references* — Kathirithamby 1989b [redescription, life history]

***Deinelenchus berrimahensis*** Kathirithamby, 1989b: 188

*Host* — unknown

*Specimens described* — Male

*Distribution* — Northern Territory, Australia

*Type* — holotype and paratypes in Australian National Insect Collection, paratype in Hope Entomological Collections, Oxford University

***Deinelenchus deviatu*** Kinzelbach, 1971a: 155

*Host* — unknown

*Specimens described* — Male

*Distribution* — Finschhafen, New Guinea

*Type* — holotype at Bohart Museum of Entomology, UC Davis

*Other references* — Kifune and Hirashima, 1989 [additional specimen]

***Deinelenchus hamifer*** Kinzelbach, 1971a: 155

*Host* — unknown

*Specimens described* — Male

*Distribution* — Finschhafen, New Guinea

*Type* — holotype at California Academy of Sciences

*Other references* — Kifune and Hirashima, 1989 [additional specimen]

***Deinelenchus nigeriensis*** Luna de Carvalho, 1972a: 13

*Host* — unknown

*Specimens described* — Male

*Distribution* — Nigeria

*Type* — holotype at Dundo Museum, paratype at Sam Houston State University (originally Luna de Carvalho collection)

***Deinelenchus sabahensis*** Kathirithamby, 1993a: 190

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sabah, Malaysia

*Type* — holotype at Zoological Museum, Lund, Sweden

Genus ***Elencholax*** Kinzelbach, 1971a: 156

*Type species* — *Elencholax noonadanae* Kinzelbach, 1971a

Kinzelbach (1971a) erected the genus *Elencholax* for two new species, one each from New Guinean and the Philippines. The new genus is based on having a short fourth antennal segment following a third segment with the only flabellum on the antennae and a head capsule and mandibles that are heavily sclerotized. Additional characters of *Elencholax* include a hook-shaped aedeagus and absence of a CuP vein. The latter characters are shared with *Deinelenchus*, which is likely closely related. The genus is known from only two specimens, the male holotypes of the two species. Nothing else is known of species in this genus.

***Elencholax bismarckarum*** Kinzelbach, 1971a: 156

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dyaul Sumuna, Bismarck Archipelago, Papua New Guinea

*Type* — holotype at Universitets Zoologiske Museum, København (0253)

*Elencholax noonadanae* Kinzelbach, 1971a: 156

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Balabac, Philippines  
*Type* — holotype at Universitets Zoologiske Museum, København (0240)

Genus *Elenchus* Curtis, 1831: 385

=*Mecynocera* Pierce, 1908: 81  
 =*Elenchoides* Pierce 1909: 167  
 =*Liburnelenchus* Pierce, 1918: 481  
 =*Elenchinus* Pierce, 1918: 481  
 =*Pseudelenchus* Ogloblin, 1925: 173  
 =*Sogatelenchus* Pierce, 1961: 467

*Type species* — *Stylops walkeri* Curtis, 1831 (= *Elenchus tenuicornis* (Kirby, 1815))

The genus *Elenchus* was erected by Curtis (1831), designating *Elenchus walker* as the type species. Pierce (1908, 1909, 1918) later erected genera that are all synonyms of *Elenchus* based on his concept that strepsipteran genera should be aligned with host genera. Thus, when he recognized a species using a different host genus, it would be put into a corresponding strepsipteran genus. Bohart (1941) recognized that this was not a sound classification methodology and relied upon related morphology to bring these species into *Elenchus*. However, Pierce (1961) continued to establish new genera based on his classification methodology. The genus *Elenchus* is recognized by having two tarsal segments on each leg, an aedeagus without a hook, short mandibles, and having a four segmented antennae with flabellum on the third segment. The genus is cosmopolitan in distribution and all known hosts are in the Hemipteran family Delphacidae.

*Elenchus butzei* Brailovsky, 1981: 374

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Veracruz, Mexico  
*Type* — holotype in Instituto de Biología de la Universidad Nacional Autónoma de México

*Elenchus delicatus* Santis and de Sureda, 1993: 61

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Chile  
*Type* — holotype in Nelson O. Hichins collection (current location unknown)

*Elenchus eastopi* Fox, 1967a: 45

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Tanzania, Kenya  
*Type* — holotype in Museum of Natural History (no. 1995-237)  
*Other references* — Luna de Carvalho 1978 [taxonomy]

*Elenchus falcipennis* Luna de Carvalho, 1956: 39

*Hosts* — *Triambus bridwelli* (Muir), *Nilaparvata angolensis* Synave (Delphacidae)  
*Specimens described* — Male  
*Distribution* — Angola, Democratic Republic of Congo, South Africa  
*Type* — holotype in Museu Real do Congo Belga, Tervuren  
*Other references* — Luna de Carvalho 1978 [morphology]; Pasteels 1958 [distribution], Synave 1959 [Host]

*Elenchus globulosus* Trois, 1982a: 120

*Host* — *Liburnia* sp. (Delphacidae)  
*Specimens described* — Male, female  
*Distribution* — Rio Grande do Sul, Brazil  
*Type* — holotype in Collection of Entomologia de Faculdade de Agronomia, Universidade Federal do Rio Grande do Sul, Porto Alegre

*Elenchus japonicus* (Esaki and Hashimoto, 1931)

= *Elenchinus japonicus* Esaki and Hashimoto, 1931: 41 (by Bohart 1941)  
 = *Elenchus yasumatsui* Kifune and Hirashima, 1975: 146 (by Kathirithamby 1994a)

*Hosts* — *Nilaparvata oryzae* (Matsumura),

*Sogatella furcifera* (Horváth), *Sogatella longifurcifera* (Esaki and Ishihara), *Sogatella panicicola* (Ishihara), *Delphacodes striatella* (Fallén), *Laodelphax striatellus* (Fallén), *Nilaparvata lugens* (Stål) (Delphacidae)

*Specimens described* — Male, female

*Distribution* — Japan (type location), Bonin Islands, China, India, Philippines, Sri Lanka, Thailand

*Type* — unknown

*Other references* — Carcupino et al. 1998 [spermatogenesis]; Esaki and Hahimoto 1931 [host], 1932 [host], 1940 [life history]; Gu et al. 1994 [development]; Gurr et al. [host]; Hirashima and Kifune 1978a [distribution]; Kathirithamby 1979 [effect on host], 1982 [life history], 1993c [host], 1994a [distribution]; Kathirithamby et al. 1992 [sperm structure]; 1993 [sperm structure]; Kifune 1982 [distribution]; Kifune & Hirashima 1975 [description, distribution], Kifune & Maeta 1986 [host]; Maeta et al. 2007 [biology]; Matsumota et al. 2011 [taxonomy]; Noda et al. [*Wolbachia* infection]; Yano & Kifune 1994.

*Notes* — Kathirithamby(1993c) concluded that *E. yasumatsui* was a synonym of *E. japonicus* and then formally synonymized the species in a later publication (Kathirithamby 1994a)

***Elenchus koebeli* (Pierce, 1908)**

= *Mecynocera koebelei* Pierce, 1908: 81

= *Liburnelenchus koebelei* (Pierce, 1908) (by Pierce 1918)

= *Liburnelenchus heidemanni* Pierce, 1918: 481

= *Elenchus heidemanni* Pierce, 1918: 481

*Hosts* — *Liburnia campestris* Van Duzee, *Delphacodes lutulenta* (Van Duzee), *Prokelisia marginata* (Van Duzee), *Prokelisia dolus* Wilson, *Megamelanus* sp., *Nesosydne olipor* Fennah, *Nesosydne alcmaeon* Fennah (Delphacidae)

*Specimens described* — Male

*Distribution* — USA (type locality), Costa Rica; Santa Cruz, Galapagos Islands; Ecuador; Nicaragua

*Type* — holotype at United States National Museum (No. 9028).

*Other references* — Abedrabbo et al. 1990 [distribution]; Bohart 1941 [taxonomy] Hogue

and Miller 1981 [distribution], James and Strong 2018 [distribution, natural history]; Johnson and Morrison 1979 [distribution], Khalaf, 1968 [distribution], 1969 [distribution]; Maes and Kathirithamby 1993 [distribution], Peck and Peck 1989 [distribution], Pierce 1909 [description], 1918 [morphology]; Stiling et al. 1991a [parasitism rate], 1991b [parasitism rate]

*Notes* — Pierce (1908, 1918) erected three genera (*Mecynocera*, *Liburnelenchus*, and *Elenchus*) of strepsipterans parasitizing species in different genera of Delphacidae based on his assumption that strepsipteran species were host specific. He then erected genera based on the strepsipteran being a parasite of a different genus of host. Pierce (1918) then gave the same specific epithet to two species in two of the genera he erected. Bohart (1941) made these three genera junior synonyms of *Elenchus*, which made the two species named after Heidemann synonyms as well as homonyms.

***Elenchus leptodelphaxi* Luna de Carvalho, 1978a: 63**

*Host* — *Leptodelphax* sp. (Delphacidae)

*Specimens described* — Cephalotheca of Male

*Distribution* — Angola

*Type* — holotype and paratypes at Museu do Dundo

***Elenchus lindbergi* Luna de Carvalho, 1985: 72**

*Host* — *Calligypona propinqua* (Fieber) (Delphacidae)

*Specimens described* — Male, female

*Distribution* — Republic of Cape Verde

*Type* — holotype in Van Harten collection, paratypes in collection of author (now at Sam Houston State University) and Kinzelbach collection. Location of holotype uncertain.

***Elenchus maorianus* Gourlay, 1953: 5**

*Host* — unknown

*Specimens described* — Male

*Distribution* — Stephen's Island, New Zealand

*Type* — holotype reported in Cawthron Institute (this organization does not now mention having a

collection), paratype in collection of author. Current location of all types is uncertain

***Elenchus melanias*** Perkins, 1910: 667

= *Elenchus melanias silvestris* Perkins, 1910: 667 (by Kinzelbach 1971a)

*Host* — Delphacidae species  
*Specimens described* — Male  
*Distribution* — Hawaii  
*Type* — unknown

***Elenchus mexicanus*** (Pierce, 1961)

= *Sogatelenchus mexicanus* Pierce, 1961: 470 (by Bohart 1941)

*Host* — *Tagosodes cubana* (Crawford) (Delphacidae)  
*Specimens described* — Male, female, larva  
*Distribution* — Vera Cruz, Mexico  
*Type* — holotype in Los Angeles County Museum, paratypes at Los Angeles County Museum, Instituto nacional de Investigaciones Agrícolas, Mexico, and United States National Museum

***Elenchus perkinsi*** (Pierce, 1909)

= *Elenchoides perkinsi* Pierce, 1909: 167

*Host* — *Perkinsiella vitiensis* Kirkaldy (Delphacidae)  
*Specimens described* — Male  
*Distribution* — Fiji  
*Type* — unknown  
*Other references* — Kifune and Hirashima 1989 [distribution]

***Elenchus perkinsianus*** Kifune and Hirashima, 1989: 26

*Host* — *Liburnia* sp. (Delphacidae)  
*Specimens described* — Male  
*Distribution* — Queensland, Australia  
*Type* — holotype in Bishop Museum

***Elenchus solomonensis*** (Fox, 1967a)

= *Elenchinus solomonensis* Fox 1967a: 46 (by Kinzelbach 1971a)

*Host* — *Sogatella longifurcifera* (Esaki and Ishihara) (Delphacidae)  
*Specimens described* — Male  
*Distribution* — Guadalcanal, Solomon Islands  
*Type* — holotype in Natural History Museum, London

***Elenchus spangleri*** (Fox, 1968)

= *Pseudelenchus spangleri* Fox, 1968: 239 (by Kinzelbach 1971a)

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Dominican Republic, Bermuda  
*Type* — holotype in United States National Museum (No. 70069)  
*Other references* — Hilburn 1990 [distribution]

***Elenchus templetonii*** Westwood, 1836: 173

*Host* — *Numata muii* (Kirkaldy), *Metadelphax propinqua* (Fieber), *Perkinsiella saccharicida* Kirkaldy (Delphacidae)  
*Specimens described* — Male, female, larva  
*Distribution* — Mauritius  
*Type* — unknown  
*Other references* — Luna de Carvalho 1978 [redescription], Williams 1957 [life history]

***Elenchus tenuicornis*** (Kirby, 1815)

= *Stylops tenuicornis* Kirby, 1815: 233 (by Curtis 1831)  
= *Elenchus walker* Curtis, 1831: 385  
= *Elenchus walkeri* Curtis, 1831 (misspelled by Pierce 1908)  
= *Elenchus delphacophilus* Ahlberg, 1925: 79 (by Kinzelbach 1971a)  
= *Elenchus carpathicus* Ogloblin, 1925: 173 (by Kinzelbach 1971a)  
= *Elenchus dubius* Ogloblin, 1926: 139 (by Kinzelbach 1971a)  
= *Elenchus forcipatus* Ogloblin, 1926: 140 (by Kinzelbach 1971a)  
= *Elenchus lugubrinus* Ogloblin, 1926: 141 (by Kinzelbach 1971a)  
= *Elenchus chlorionae* Lindberg, 1939: 68 (by Kinzelbach 1971a)

*Hosts* — *Javesella dubia* (Kirschbaum), *Javesella pellucida* (Fabricius), *Chloriona unicolor* (Herrich-Schäffer), *Chloriona smaragdula* Fieber, *Calligypona propinqua* (Fieber), *Liburnia forcipata* Scott, *Conomelus anceps* (Germar), *Delphacodes lugubrina* (Boheman), *Euconomelus lepidus* (Boheman), *Hyledelphax elegantulus* (Boheman), *Scottianella dalei* (Scott), *Dicranotropis hamata* (Boheman), *Ribautodelphax angulosus* (Ribaut), and *Liburnia* sp. [possibly other *Calligypona* see Baumert & Behrisch 1957; possibly *Muellerianella brevipennis* (Boheman)(= *Liburnia brevipennis*) see Hansen 1892; possibly *Criomorphus bicarinatus* (Herrich-Schäffer), *Criomorphus borealis* (Sahlberg), *Javesella discolor* (Boheman) (= *Calligypona discolor*), *Ribautodelphax collina* (Boheman) (= *Calligypona collina*), *Xanthodelphax flaveola* (Flor) (= *Calligypona flaveola*), *Xanthodelphax stramineus* (Stål) (= *Calligypona straminea*) see Kontkanen 1950]; *Stenocranus minutus* (Fabricius) (Delphacidae)

*Specimens described* — Male, female

*Distribution* — England (type locality?), Belgium, Czech Republic, France, Germany, Ireland, Mozambique, Russia, Norway, Yemen

*Type* — It is presumed that the species was described from England, but no type was designated

*Other references* — Andersen and Fjellber 1975 [distribution]; Baumert 1957 [life history, anatomy], 1959 [life history, anatomy]; Büning 1998 [oogenesis]; Carcupino et al. 1998 [spermatogenesis]; Cocquempot 2016 [distribution]; Dessart 1988 [distribution]; Doms 1982 [distribution]; Eaton 1892 [morphology]; Emmrich [host]; Green 1902 [observation]; Hassan 1939 [life history, host]; Haghebaert 1986 [host]; Haupt 1933 [effect on host]; Hope et al. 1835 [distribution]; Kathirithamby 1977 [host, effect on host], 1983 [eclosion]; Kathirithamby and Luke 1990 [eclosion]; Kathirithamby et al. 1984 [molting], 1993 [sperm structure]; Lauterer 1980 [distribution]; Lindberg 1960 [effect on host]; Luna de Carvalho 1992 [taxonomy, morphology]; O'Conner 1990 [distribution]; Olmi 1998 [distribution]; Perkins 1906 [natural history]; Pierce 1909 [taxonomy, morphology]; Pohl 1993 [variability]; Prior 1976 [accidental *Host*]; Raatikainen 1966 [effect on *Host*], 1967 [life history], 1972 [dispersal]; Raatikainen &

Heikinheimo 1974; Rothschild 1966 [biological control]; Saunders 1892 [host]; Smith & Kathirithamby 1984 [anatomy]; Waloff 1975 [*Host*]

***Elenchus toyaphagus*** Luna de Carvalho, 1978: 66

*Host* — *Toya* sp. (Delphacidae)

*Specimens described* — Male cephalotheca

*Distribution* — Angola

*Type* — holotype at Museu do Dundo

***Elenchus varleyi*** Kathirithamby, 1989b: 177

*Host* — *Toya dryope* (Kirkaldy), *Sogatella kolophon* (Kirkaldy) (Delphacidae)

*Specimens described* — Male, female

*Distribution* — Queensland, New South Wales, and Northern Territory, Australia

*Type* — holotype in Australian National Insect Collection, paratypes at Australian National Insect Collection and Hope Entomological Collections

Genus ***Protoelencholax*** Kinzelbach, 1979a: 5

*Type species* — *Protelencholax schleei* Kinzelbach, 1979a

The genus *Protoelencholax* was established by Kinzelbach (1979a) for a single male specimen in Dominican amber. It was placed in Elenchidae primarily based on its having two tarsal segments. The antennae have five antennal segments but it is apparent that what is seen as the third antennal segment includes what would be a fourth segment that is fused and unrecognizable as a separate segment. The aedeagus is hook-shaped, mandibles are long and crossed, and the hind wing has both MA and Cup present. The genus is still known only from the single holotype of *P. schleei*.

***Protelencholax schleei*** Kinzelbach, 1979a: 6

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dominican amber

*Type* — holotype at Staatlichen Museum für Naturkunde (Inventarnummer Do-7-K-1)

*Other references* — Kinzelbach and Pohl 1994

[discussion]

Family **Halictophagidae** Perkins, 1905

- = Halictophaginae Perkins, 1905
- = Halictophagoidea Pierce, 1908
- = Halictophagidae Pierce, 1908
- = Dioxoceridae Pierce, 1908
- = Diozoceridae Pierce, 1911

Perkins (1905) erected the subfamily Halictophaginae to include the previously described *Halictophagus curtisii* and five new species of *Halictophagus*, all of which he separated from other known strepsipteran species. In placing Strepsiptera at the ordinal level, Pierce (1908) raised the subfamily to Halictophagidae. Pierce also created Diozoceridae (misspelled by the printer as Dioxoceridae) for species that he felt should not be combined because of host differences. Diozoceridae was later combined with Halictophagidae by Bohart (1941). Halictophagidae are characterized by having a fourth antennal segment longer than wide, short mandibles that do not cross, a reduced maxilla, tarsi with three segments, and an adult female with a dorso-ventrally flattened cephalothorax. The antennae can be either six or seven segmented. The location of flabella is variable and is important for defining genera. Species of Halictophagidae have often been placed as a sister group to Corioxenidae due the reduction in mandibles but this appears to be a convergent state. The family Halictophagidae has a larger host range than any other strepsipteran family and includes hosts in Orthoptera, Blattodea, Hemiptera, and Diptera.

Genus ***Blattodeaphagus*** Kathirithamby, 1989a: 79

= *Blattodeaphagus* Kathirithamby, 1989a: 79 (incorrect spelling)

*Type species* — *Blattodeaphagus beckmani* Kathirithamby, 1989a

The genus *Blattodeaphagus* was established by Kathirithamby (1989a) for a new species based

on females and male cephalotheca found in a host in the family Blattidae (Blattodea). The genus was placed in the family Halictophagidae because of the flattened shape of the female cephalothorax and male cephalotheca with broad maxillary bases. Riek (1970) had previously noted two species of Blattodea parasitized by strepsipterans but made no descriptions of new species. A second species was later described from Japan, extending the known distribution of this genus. Males are unknown, and nothing is known of the host biology and ecology except its host association.

***Blattodeaphagus beckmani*** Kathirithamby, 1989a: 79

= *Blattophagus beckmani* Kathirithamby, 1989a: 79 (incorrect spelling)

*Host* — *Melanozosteria castanea* (Brunner) (Blattidae)

*Specimens described* — Female, larva

*Distribution* — New South Wales and Western Australia, Australia

*Type* — holotype and paratypes in Australian National Insect Collection

*Other references* — Kathirithamby 1992a [discussion]

***Blattodeaphagus iriomotensis*** Kathirithamby and Kifune, 1994: 217

*Host* — *Megamareta pallidiola* (Shiraki) (Ectobiidae)

*Specimens described* — Female, larva

*Distribution* — Ryukyu Islands, Japan

*Type* — holotype and paratypes in Museum of Comparative Zoology, Harvard

Genus ***Callipharixenos*** Pierce, 1918: 431

= *Chrysocorixenos* Pierce, 1918: 432 (by Bohart 1941)

*Type species* — *Callipharixenos muiri* Pierce, 1918

*Other references* — Blair 1936 [systematics]

The genus *Callopharixenos* was established by

Pierce (1918) for a new species, *C. muiri*, represented by three females extracted from *Calliphara billiardieri* (Scutelleridae). The genus *Callipharixenos* was the first strepsipteran known to use Scutelleridae as a host and this also prompted Pierce (1918) to create a new family, Callipharixenidae, for the new genus *Callipharixenos*. Callipharixenidae was also used to house a second species that was described later in the same publication. Because Pierce thought that Strepsiptera genera should coincide with host genera, he placed this second species in the genus *Chrysocorixenos* based on the species, *Chrysocorixenos siamensis*, being hosted by *Chrysocoris grandis*. Callipharixenidae was maintained as a family by Pohl and Beutel (2005) but Kathirithamby et al. (2012) revised the status to be a subfamily, Callipharixeninae, in the family Halictophagidae. The phylogenetic placement and taxonomic status of this group may not be fully resolved. Only females are known for the genus *Callipharixenos* and Kathirithamby et al. (2012) speculated that *C. philippines* may be parthenogenic, which, if true, could be the case of other species in this genus. The genus is defined by having an elongate, flattened cephalothorax in which the mesothorax and metathorax are distinctly differentiated with each having spiracles present. Females have five unpaired median tubules, and the brood canal is located in the anterior third of the cephalothorax.

***Callipharixenos muiri*** Pierce, 1918: 431

*Host* — *Calliphara billiardieri* (Fabricius) (Scutelleridae)

*Specimens described* — Female, larva

*Distribution* — Ambon (Ambonia), Indonesia

*Type* — holotype in United States National Museum (no. 21436)

*Other references* — Luna de Carvalho 1981a [larval characters]

***Callipharixenos philippines*** Kathirithamby and McMahon, 2012 (in Kathirithamby et al. 2012: 22)

*Host* — *Idioscopus chypealis* (Lethierry), *Idioscopus niveosparus* Lethierry (Cicadellidae)

*Specimens described* — Female

*Distribution* — Philippines

*Type* — holotype and paratype at University of the Philippines Los Banos Museum of Natural History

*Other references* — Soe et al. 2014 [biology], Soe et al. 2015 [biology]

***Callipharixenos siamensis*** (Pierce, 1918: 433)

= *Chrysocorixenos siamensis* Pierce, 1918: 433 (by Kinzelbach, 1971a)

*Host* — *Eucoryssus grandis* (Thunberg) (Scutelleridae)

*Specimens described* — Female

*Distribution* — Thailand

*Type* — holotype at United States National Museum, (no. 21437)

Genus ***Coriophagus*** Kinzelbach, 1971b: 8

= *Halictophagus* (in part) Bohart 1962: 91

*Type species* — *Coriophagus zanzibarae* (Bohart, 1962)

The genus *Coriophagus* was established by Kinzelbach (1971b) to hold the species that Bohart (1962) named *Halictophagus zanzibarae*. Both *Halictophagus* and *Coriophagus* have seven-segmented antennae with flabella on segments III – VI, which is not found in any other genus of Halictophagidae. However, *Coriophagus* has a head capsule with robust, easily recognizable sclerites and sclerotized mandibles while *Halictophagus* has a simplified head capsule and mandibles that are weakly sclerotized. Another distinct difference between the two genera is found in host associations in which *Coriophagus* are parasites of Heteroptera and *Halictophagus* parasitize several families in Auchenorrhyncha. However, most hosts of *Coriophagus* remain unknown.

***Coriophagus adebratti*** Kathirithamby, 1993a: 180

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sabah, Malaysia

*Type* — holotype at Zoological Museum, Lund,



Sweden

***Coriophagus borneensis*** Kathirithamby, 1993a: 182

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sabah, Malaysia

*Type* — holotype at Zoological Museum, Lund, Sweden

***Coriophagus casui*** Cowley, 1984: 351

*Host* — unknown

*Specimens described* — Male

*Distribution* — New Zealand

*Type* — holotype in Insect Reference Collection, University of Auckland

***Coriophagus calcaneus*** Roy and Hazra, 2016b: 582

*Host* — unknown

*Specimens described* — Male

*Distribution* — India

*Type* — holotype in University of Budwan, to be deposited in National Zoological Collections, Kolkata, India

***Coriophagus gressittorum*** Kifune and Hirashima, 1989: 14

*Host* — unknown

*Specimens described* — Male

*Distribution* — Guadalcanal, Solomon Islands

*Type* — holotype at Bishop Museum

***Coriophagus jennyae*** Kogan, 2012: 83

*Host* — unknown

*Specimens described* — Male

*Distribution* — Coari, Amazonas, Brazil

*Type* — holotype at Instituto Nacional de Pesquisas da Amazonia, Manaus, Brazil (note: portion of slides of dissected type are lost)

***Coriophagus latimanus*** Luna de Carvalho, 1972b: 114

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dundo, Angola

*Type* — holotype in Luna de Carvalho collection (current location unknown)

*Notes* — Much of the Luna de Carvalho collection is now permanently housed at Sam Houston State University, however the holotype of *C. latimanus* was not with that collection when it was transferred from the family of Eduardo Luna de Carvalho. The holotype is presumed to be lost.

***Coriophagus lockerbiensis*** Kathirithamby, 1992a: 188

*Host* — unknown

*Specimens described* — Male

*Distribution* — Queensland, Australia

*Type* — holotype in University of Queensland Entomology Department, paratypes in Australian National Insect Collection and Hope Entomological Collection

***Coriophagus maai*** Kifune and Hirashima, 1989: 16

*Host* — unknown

*Specimens described* — Male

*Distribution* — New Guinea

*Type* — holotype at Bishop Museum

***Coriophagus medleri*** Luna de Carvalho, 1972a: 11

*Host* — unknown

*Specimens described* — Male

*Distribution* — Nigeria

*Type* — holotype in Museu do Dundo (transferred permanently with the Luna de Carvalho collection to Sam Houston State University), paratypes in Museu do Dundo (now at Sam Houston State University) and American Museum of Natural History.

***Coriophagus monteithi*** Kathirithamby, 1992a: 190

*Host* — unknown

*Specimens described* — Male

*Distribution* — Queensland, Australia

*Type* — holotype in University of Queensland Entomology Department, paratypes in Australian National Insect Collection and Hope Entomological

## Collection

***Coriophagus rieki*** Kinzelbach, 1971a

*Host* — *Poecilometis strigatus* (Westwood)  
(Pentatomidae)

*Specimens described* — Male, larva

*Distribution* — Canberra, Australian Capital Territory, Australia

*Type* — holotype in collection of author (current location uncertain)

*Other references* — Kathirithamby 1992a [larva]

***Coriophagus solomonensis*** Kinzelbach, 1971a: 150

*Host* — Pentatomidae

*Specimens described* — Female, larva

*Distribution* — Solomon Islands

*Type* — in Bohart collection, University of California, Davis

***Coriophagus zanzibarae*** (Bohart, 1962)

= *Halictophagus zanzibarae* Bohart, 1962: 91

*Host* — *Pseudotheraptus wayi* Brown (Coreiidae)

*Specimens described* — Male, female, larva

*Distribution* — Tanzania

*Type* — holotype in Natural History Museum, London, paratypes in Natural History Museum, London; U. S. National Museum; California Academy of Sciences; Bohart collection, University of California, Davis

Genus ***Dipterophagus*** Drew and Allwood,  
1985: 130

*Type species* — *Dipterophagus daci* Drew and Allwood, 1985

Drew and Allwood (1985) erected the genus *Dipterophagus* for the first strepsipterans found to use the order Diptera as a host. Along with establishing a new genus, the family Dipterophagidae was also proposed, although Kathirithamby (1989) placed this genus within the family Halictophagidae, converting Dipterophagidae to the subfamily Dipterophaginae. Allwood and Drew (1996) attempted to reinstate this group as a family but that action was not supported

in the phylogeny by Pohl and Beutel (2005) who maintained it as part of the Halictophagidae. Only one described species in this genus is currently known. However, McAlpine (2001) and Philip (1949) reported the dipteran families Platystomatidae and Tabanidae respectively to be parasitized by strepsipterans, but it is unknown if these would be members of *Dipterophagus*. *Dipterophagus* is characterized by having antennae with a single flabella on the third segment and having segments VI and VII fused to make the antennae six-segments. The male head capsule is hardened into distinct sclerites and the hind wing is lacking  $R_5$ . The female has genital openings on segments IV-VI.

***Dipterophagus daci*** Drew and Allwood,  
1985: 130

*Hosts* — *Bactrocera abscondita* (Drew and Hancock), *Bactrocera aeroginosa* (Drew and Hancock), *Bactrocera aquilonis* (May), *Bactrocera breviaculeus* (Hardy), *Bactrocera cacuminatus* (Hering), *Bactrocera decurtans* (May), *Bactrocera frauenfeldi* (Schiner), *Bactrocera froggatti* (Bezzi), *Bactrocera jarvisi* (Tryon), *Bactrocera mayi* (Hardy), *Bactrocera musae* (Tryon), *Bactrocera neohumeralis* (Hardy), *Bactrocera perkinsi* (Drew and Hancock), *Bactrocera peninsularis* (Drew and Hancock), *Bactrocera tenuifascia* (May), *Bactrocera tryoni* (Froggatt), *Bactrocera umbrosa* (Fabricius), *Dacus aequalis* Coquillet, *Dacus bellulus* Drew and Hancock (Tephritidae)

*Specimens described* — Male, female, larva

*Distribution* — Queensland and Northern Territory, Australia; Solomon Islands

*Type* — holotype in Queensland Museum, paratypes in Australian National Insect Collection and Queensland Museum

*Other references* — Allwood and Drew 1996 [host, natural history], Kathirithamby 1989a [further description, classification], Kathirithamby and Taylor 2005 [classification]

Genus ***Halictophagus*** Curtis, 1832: 433

= *Bruesia* Perkins, 1905: 102 (by Bohart 1941)

= *Megalechthurus* Perkins, 1905: 106 (by Bohart 1941)

= *Pentacladocera* Pierce, 1908: 80 (by Bohart 1941)

- = *Pentoxocera* Pierce, 1908: 80 (by Bohart 1941)
- = *Dioxocera* Pierce, 1908: 81 (by Bohart 1941)
- = *Agalliaphagus* Pierce, 1908: 83 (by Bohart 1941)
- = *Anthericomma* Pierce, 1908: 84 (by Bohart 1941)
- = *Neocholax* Pierce, 1909: 160 (by Bohart 1941)
- = *Pentagrammaphila* Pierce, 1909: 169 (by Bohart 1941)
- = *Diozocera* Pierce, 1911: 504 (by Bohart 1941)
- = *Pentozocera* Pierce, 1911: 504 (by Bohart 1941)
- = *Pentozoe* Pierce, 1911: 504 (by Bohart 1941)
- = *Tettigoxenos* Jeannel, 1913: 4 (by Bohart 1941)
- = *Pyrilloxenos* Pierce, 1914: 128 (by Bohart 1941)
- = *Dacyrtocara* Pierce, 1918: 473 (by Bohart 1941)
- = *Cyrtocaraxenos* Pierce, 1918: 475 (by Bohart 1941)
- = *Indoxenos* Subramanian, 1927: 132 (by Bohart 1941)
- = *Oedicystis* Hofeneder, 1927: 377 (by Bohart 1941)
- = *Pseudopatella* Bohart, 1937a: 102 (by Bohart 1941)
- = *Membracixenos* Pierce, 1952: 5 (by Kinzelbach 1971a)

*Type species* — *Halictophagus curtisii* (Curtis, 1832)

Dale (in Curtis, 1832) described *Halictophagus curtisii* as the first species in the genus and thought that it was a parasite of the bee genus *Halictus*, hence the reason for the name. Perkins (1905) decided that members of this genus were all parasites of Homoptera (all in the portion of Hemiptera that is now Auchenorrhyncha) but he also created *Bruesia* and *Megalechthurus*, parasites of other Auchenorrhyncha and these genera were later synonymized with *Halictophagus*. Pierce (1908, 1909, 1911, 1914, 1918, 1952) erected many genera that were later synonymized with *Halictophagus* based on his idea that a strepsipteran genus should correspond with a host genus. Along with other synonymized genera, there have been 20 genera named that are now synonymized under *Halictophagus*. *Halictophagus* is currently the second largest genus of Strepsiptera but it is likely that when more species are known, it will become the largest. Male *Halictophagus* have 7-segmented antennae with flabella on segments III-VI, mandibles that are short and often sclerotized, and reduced maxillae. The head capsule of male *Halictophagus* lack recognizable sclerites and all have 3-segmented tarsi. The adult female of *Halictophagus* has a head that makes up half to two thirds the cephalothorax and a first abdominal segment that is usually pigmented. The number of genital apertures on

the abdomen of the adult female vary from one to three, and rarely four. Hosts are in several families of the hemipteran suborder Auchenorrhynca. Keys to species have been published by Bohart (1943) for North America, Kinzelbach (1978) for Palaearctic species, and Luna de Carvalho (1972b, 1978a) and Riek (1975) for African species. An early key to females of *Halictophagus* was published by Yang (1964).

***Halictophagus abdominalis*** Kathirithamby,  
1993a: 184

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sabah (Sipitang), Malaysia

*Type* — holotype in Zoological Museum, Lund, Sweden

***Halictophagus acerbus*** Mazumdar and Chaudhuri,  
1997: 221

*Host* — unknown

*Specimens described* — Male

*Distribution* — India (West Bengal)

*Type* — holotype at University of Burdwan

***Halictophagus acutus*** Bohart, 1943a: 352

*Host* — *Draeculacephala mollipes* (Say), *D. minerva* Ball (Cicadellidae)

*Specimens described* — Male, female, larva

*Distribution* — USA (Tennessee, type locality), Georgia, Kentucky, Louisiana, New Mexico, Pennsylvania; Mexico (Atzacapozalco).

*Type* — holotype United States National Museum, paratypes (including allotype) at United States National Museum, California Academy of Sciences, collection of author (now at Bohart Museum, University of California, Davis)

*Other references* — Johnson and Morrison 1979 [distribution]

***Halictophagus agalliae*** Abdul-Nour, 1970: 342

*Hosts* — *Anaceratagallia laevis* (Ribaut, 1935) (= *Agallia laevis* in *H. agalliae* description), *Agallia consobrina* Curtis, 1833 (Cicadellidae)

*Specimens described* — Male, female

*Distribution* — France (type locality), Andora, Germany

*Type* — holotype and paratype (allotype) at Centre de Recherches du Midi, laboratoire de Zoologie, Montpellier, paratypes in collection of the author (current location uncertain)

*Other references* — Kinzelbach 1978 [distribution, description], Luna de Carvalho 1997 [distribution], Pohl and Melba 1996 [distribution]

***Halictophagus americanus*** Perkins, 1905: 105

= *Agalliaphagus americanus* (Perkins, 1905) (by Pierce 1908)

= *Agalliaphagus uhleri* Pierce, 1918: 479 (by Bohart 1941)

*Hosts* — *Ceratagallia accola* Oman; *C. californica* (Baker); *C. curta* Oman; *C. fuscascripta* Oman; *C. helveola* Oman; *C. sanguinolenta* (Provancher); *C. uhleri* (Van Duzee); *C. quadripunctata* (Provancher)? (reported as *C. 4-notata* by Perkins, *C. vastitatis* (Oman); *Circulifer tenellus* (Baker, 1896) (Cicadellidae)

*Specimens described* — Male, Female

*Distribution* — USA (Ohio (type locality), Arizona, California, Colorado, Georgia, Idaho, Kansas, Maryland, Missouri, Oregon, Utah)

*Type* — holotype in United States National Museum

*Other references* — Bohart 1943a [*Host*, distribution]

*Notes* — Pierce (1908) erected the genus *Agalliaphagus* and defined it as the genus for all strepsipterans that parasitized the leafhopper genus *Agallia*, moving *H. americanus* into the new genus. Pierce (1819) later described *A. uhleri* into this same genus and had previously (Pierce 1909) named another species *Pentagrammaphila uhleri*, which would later be moved to the genus *Halictophagus* by Bohart (1943). Bohart made *A. uhleri* a junior synonym of *H. americanus*, leaving the name *H. uhleri* available when he transferred that species from *Pentagrammaphila*.

***Halictophagus ancyllophallus*** Kifune and Hirashima, 1989: 17

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sarmi, New Guinea

*Type* — holotype in Bishop Museum

***Halictophagus angustipes*** Kifune and Hirashima, 1989: 24

*Host* — unknown

*Specimens described* — Male

*Distribution* — N. Borneo, Malaysia

*Type* — holotype in Bishop Museum

***Halictophagus antennalis*** Kathirithamby, 1993a: 186

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sabah, Malaysia

*Type* — holotype and paratypes in Zoological Museum, Lund, Sweden

***Halictophagus aphrophorae*** Yang, 1999: 186

*Host* — *Aphrophora* sp. (Cercopidae)

*Specimens described* — Male

*Distribution* — Fujian Province, China

*Type* — holotype in Insect Collections of China Agricultural University

***Halictophagus ararensis*** Trois, 1988: 466

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sao Paulo, Brazil

*Type* — holotype in Coleção do Centro de Taxonomia de Arthropodes do Instituto do Álcool e do Açúcar, Araras, SP, Brazil

***Halictophagus australiensis*** Perkins, 1905: 103

= *Pentoxocera australensis* (Perkins, 1905) (by Pierce 1908)

= *Pentozocera australensis* (Perkins, 1905) (by Pierce 1918)

= *Halictophagus australensis* Perkins, 1905 (by Bohart, 1943a)

= *Halictophagus spectrus* Yang 1964: 81 (by Kathirithamby 1992a)

= *Halictophagus helleri* Kinzelbach, 1971d: 2 (by Hirashima and Kifune 1978a)

*Hosts* — *Cofana spectra* (Distant), *Cofana unimaculata* (Signoret) *Conoquinula coeruleopennis* (Fabricius) (Cicadellidae)

*Specimens described* — Male, female

*Distribution* — Australia (Queensland) (type locality); Borneo, Malaysia; Szechuan, China, Japan, Mozambique, Sri Lanka

*Type* — holotype in United States National Museum

*Other references* — Barrion and Lister 1983 [*Host*], 1987 [*Host*]; Chandra 1979 [biological control], Chaudhuri and Mazumdar 2000 [biology, natural history]; Hirashima and Kifune 1978a [distribution]; Kathirithamby 1992a [distribution, description], 1994a [distribution]; Kifune and Hirashima 1984 [distribution]; Olmi 1998 [distribution]; Oyediran et al. 2000 [*Host*]; Yang 1964 [identification]

***Halictophagus barberi*** (Pierce, 1908)

= *Anthericomma barberi* Pierce, 1908: 84 (by Bohart 1941)

*Host* — unknown

*Specimens described* — Male

*Distribution* — New Mexico, USA

*Type* — holotype in United States National Museum

*Other references* — Bohart 1943a [description]

***Halictophagus besucheti*** Luna de Carvalho, 1978b: 355

*Host* — unknown

*Specimens described* — Male

*Distribution* — Brazil (Nova Teutonia)

*Type* — holotype in Muséum d'Histoire naturelle de Genève

***Halictophagus bidentatus*** Bohart, 1941: 147

*Hosts* — *Athysanella utahne* Osborne, *A. texana* Osborne, *Athysanella* sp., *Limotettix frigidus* (Ball), *Flexamia flexulosus* (Ball), *F. pictus* (Osborne), *Flexamia* sp., *Graminella mohri* Delong, *Parabolocratius* sp., *Psammotettix striatus* (Linnaeus) (reported as *Deltocephalus affinis*) (Gillette and Baker) (Cicadellidae)

*Specimens described* — Male, female

*Distribution* — Utah, USA (type locality); USA (Alabama, Arkansas, Arizona, North Carolina, South Carolina, Georgia, Louisiana, Maryland, Mississippi, Oklahoma, Tennessee, Texas); Canada (Saskatchewan)

*Type* — holotype and paratype (allotype) in United States National Museum, paratypes in California Academy of Science and collection of author (now in Bohart Museum, University of California, Davis)

*Other references* — Baldrige and Blocker 1980 [*Host*], Bohart 1943a [*Host*]

***Halictophagus bipunctatus*** Yang, 1955: 332

= *Tettigoxenos orientalis* Esaki and Hashimoto, 1932: 26 (in part)

= *Halictophagus orientalis* (Esaki and Hashimoto, 1932) (in part) (by Bohart 1941 to

*Halictophagus*, by Hirashima and Kifune 1985 as synonym)

= *Halictophagus munroei* Hirashima and Kifune, 1978a: 54 (by Hirashima and Kifune, 1985)

*Hosts* — *Nephotettix nigropictus* (Stål), *N. virescens* (Distant) (= *N. bipunctatus* (Fabricius), name previously occupied), *N. cincticeps* (Uhler) (Cicadellidae)

*Specimens described* — Male, female, cephalotheca

*Distribution* — China (Kwantung (type locality), Fujian, Jiangzi, Guandong, Kiangsi, Kiangsu, Henan, Honan, Hupeh, Szechuwan, Fukien); Japan (Honshu, Kyushu, Okinawa); Borneo, Malaysia; Luzon, Philippines; Thailand

*Type* — holotype in Department of Plant Protection of Peking Agricultural University; *H. munroei* type in Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka

*Other references* — Barrion and Litsinger

1987 [*Host*], Chandra 1979 [biological control], Hirashima et al. 1979 [*Host*], Kifune and Hirashima 1984 [distribution], Yang 1964 [identification]

***Halictophagus brevipenis*** Kifune and Hirashima, 1989: 20

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Samoa  
*Type* — holotype in Bishop Museum

***Halictophagus calcaratus*** Pasteels, 1958: 298

*Host* — *Molopopterus theae* Theron (Cicadellidae)  
*Specimens described* — Male, female  
*Distribution* — Pretoria, South Africa  
*Type* — holotype lost in route from Pretoria Museum to Luna de Carvalho (Luna de Carvalho 1978), paratypes in Pretoria Museum and Musée Royal du Congo Belge  
*Other references* — Kathirithamby et al. 2010b [female description, *Host*], Luna de Carvalho 1978a [taxonomy]

***Halictophagus callosus*** Bohart, 1943a: 350

*Host* — *Idiocerus* sp. (Cicadellidae)  
*Specimens described* — Female, larva  
*Distribution* — Washington, USA  
*Type* — holotype in United States National Museum, paratypes in California Academy of Science and collection of author (now in Bohart Museum, University of California, Davis)

***Halictophagus chantaneeae*** Kifune and Hirashima, 1983b: 167

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Thailand  
*Type* — holotype No. 2427 in Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka

***Halictophagus chilensis*** Hofmann, 1965: 36

*Host* — unknown species of Cicadellidae  
*Specimens described* — Male, Female  
*Distribution* — Chile  
*Type* — holotype in Instituto de Investigaciones Agropecuarias, Chile  
*Other references* — Carcupino et al. 1993 [sperm structure]

***Halictophagus chinensis*** Bohart 1943a: 357

*Host* — *Bothrogonia ferruginea* (Fabricius) (Cicadellidae)  
*Specimens described* — Male, female  
*Distribution* — China (S. Kiangsi (type locality), E. Kwantung)  
*Type* — holotype in United States National Museum, paratypes in California Academy of Sciences and collection of author (now in Bohart Museum, University of California, Davis)  
*Other references* — Yang 1964 [identification]

***Halictophagus clodoceras*** (Jeannel, 1913)

= *Tettigoxenos clodoceras* Jeannel 1913: 5 (by Bohart 1941)

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Kenya, Tanzania  
*Type* — holotype in Musée National d'Histoire Naturelle, Paris  
*Other references* — Luna de Carvalho 1978a [distribution], Bohart 1943 [discussion]

***Halictophagus compactus*** (Pierce, 1914)

= *Pyriloxenos compactus* Pierce, 1914: 129 (by Bohart 1941)

*Hosts* — *Pyrilla abberans* (Kirby), *P. perpusilla* (Walker) (Lophopidae), *Idioscopus clypealis* (Lethierry), *Amritodus atkinsoni* (Lethierry) (Cicadellidae)  
*Specimens described* — Male, female  
*Distribution* — Bihar, India  
*Type* — holotype in United States National

Museum, No. 18814; paratype stated by author to be in his collection, but its current location is unknown

*Other references* — Bohart 1943a [discussion], Rahman 1941 [*Host*, natural history]

***Halictophagus curtisi*** Curtis, 1832: 433

*Host* — *Eupelix cuspidata* (Fabricius) (Cicadellidae)

*Specimens described* — Male, Female?

*Distribution* — England, Sweden, Belgium, Denmark

*Type* — no type material designated

*Other references* — Bohart 1943a [discussion]; Crowson 1974 [female?], Kinzelbach 1978 [distribution, discussion], Haghebaert 1993 [distribution], Nielsen and Oyre [distribution]

*Notes* — Curtis (1832) described this species but ascribed the authorship to Dale, who presumably was writing a manuscript to describe the species (Bohart 1943a).

***Halictophagus desantisi*** (Remes Lenicov, 1970)

= *Membracixenos desantisi* Remes Lenicov, 1970: 36 (by Bohart 1941)

*Host* — *Ceresa* sp. (Membracidae)

*Specimens described* — Male, female, larva, pupa

*Distribution* — Argentina (Formosa, La Pampa, Misiones, Santa Fe, Tucuman)

*Type* — holotype and allotype and paratypes in Museo de la Plata, Argentina (Type #337)

*Other references* — Remes Lenicov and Teson 1975 [re-description]

***Halictophagus dominicus*** Cook, 2013: 574

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dominican Republic

*Type* — holotype in Carnegie Museum of Natural History, paratypes in Carnegie Museum of Natural History and Sam Houston State University

***Halictophagus elongatus*** Kifune and Hirashima, 1989: 22

*Host* — unknown

*Specimens described* — Male

*Distribution* — Luang Prabang, Laos

*Type* — holotype in Bishop Museum

***Halictophagus endrodyi*** Luna de Carvalho, 1973a: 26

*Host* — unknown

*Specimens described* — Male

*Distribution* — Ghana

*Type* — holotype No. 313 in Hungarian Natural History Museum

*Other references* — Luna de Carvalho 1978a [description]

***Halictophagus eurycephalus*** Kifune and Hirashima, 1989: 23

*Host* — unknown

*Specimens described* — Male

*Distribution* — New Guinea

*Type* — holotype in Bishop Museum

***Halictophagus euryscelis*** Tribull and Cook, 2011: 72

*Host* — unknown

*Specimens described* — Male

*Distribution* — Madagascar

*Type* — holotype in California Academy of Sciences

***Halictophagus forthoodiensis*** Kathirithamby and Taylor, 2005: 2

*Host* — unknown

*Specimens described* — Male

*Distribution* — USA (Texas)

*Type* — holotype in Hope Entomological Museum, Oxford

***Halictophagus fulmeki*** (Hofeneder, 1927)

= *Oedicystis fulmeki* Hofeneder, 1927: 377 (by Bohart 1941)

*Hosts* — *Idioscopus clypealis* (Lethierry) (*I. clypealis* Lethierry), *I. niveosparus* Lethierry, *Bakera nigrobilineata* Melichar (Cicadellidae)

*Specimens described* — Male, female

*Distribution* — Sumatra (type locality), Indonesia, Philippines

*Type* — not designated

*Other references* — Kathirithamby et al. 2012 [distribution], Soe et al. 2014 [biology, *Host*]

*Notes* — Bohart (1943a) thought that this species could be the same as *H. membraciphaga* because the aedeagus appears to be morphologically similar.

***Halictophagus ghanensis*** Luna de Carvalho, 1973: 22

*Host* — unknown

*Specimens described* — Male

*Distribution* — Ghana

*Type* — holotype in Hungarian Natural History Museum (no. 324)

*Other references* — Luna de Carvalho 1978 [figure]

***Halictophagus gioachinlunai*** Luna de Carvalho, 1990: 209

*Host* — unknown

*Specimens described* — Male

*Distribution* — Cape Verde Islands

*Type* — holotype and paratypes in Luna de Carvalho Collection (now at Sam Houston State University)

***Halictophagus gressitti*** Bohart, 1943a: 357

*Hosts* — *Tituria chinensis* Distant; *Petaloccephala* sp. (Cicadellidae)

*Specimens described* — Female, male cephalotheca

*Distribution* — Hainan, China (type locality); Hong Kong

*Type* — holotype in United States National Museum, paratypes in California Academy of Sciences and collection of the author (now at Bohart Museum, University of California Davis)

*Other references* — Miyamota & Kifune 1997

[distribution], Yang 1964 [identification]

***Halictophagus griveaudi*** (Paulian, 1959)

= *Tettigoxenos griveaudi* Paulian, 1959: 2 (by Kinzelbach 1971a)

*Host* — *Bourgoinrana rubescens* (Synave)? (reported as *Amberana rugescens* Synave, which is not a valid species but *A. rubescens* could have been misspelled and this species was later transferred to *Bourgoinrana*) (Cercopidae)

*Specimens described* — Male, female

*Distribution* — Madagascar

*Type* — location unknown

*Notes* — Paulian (1959) placed this species in *Tettigoxenos*, apparently not knowing that the genus became a junior synonym of *Halictophagus* (Bohart 1941). There was no mention by Paulian that he was resurrecting the genus *Tettigoxenos*.

***Halictophagus haydari*** Abdul-Nour, 1985: 71

*Host* — *Anaceratagilla laevis* (Ribaut) (named as *Agilla laevis* in *H. haydari* description), (Cicadellidae)

*Specimens described* — Male, female

*Distribution* — Lebanon

*Type* — holotype and paratype (allotype) in Museum d'Histoire naturelle de Paris, paratypes in the collection of the author (current location unknown)

*Other references* — Abdul-Nour 2001 [description]

***Halictophagus henriquei*** Luna de Carvalho, 1972: 116

*Hosts* — *Kolla spectra* (Distant), *K. albida* (Walker) (Cicadellidae)

*Specimens described* — Male, cephalotheca

*Distribution* — Angola

*Type* — holotype in Museu do Dundo

*Other references* — Luna de Carvalho 1978 [description]



- Halictophagus hirashimai*** Kathirithamby, 1993a: 187  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Sabah (Sipitang), Malaysia  
*Type* — holotype and paratype at Zoological Museum, Lund, Sweden
- Halictophagus indicus*** Bohart, 1943a: 356  
 = *Pyriloxenos compactus* (misidentification by Subramaniam, 1922 who thought his specimens probably belonged to *P. compactus* Pierce, 1914)  
*Host* — *Idiocerus niveosparsus* Lethierry, *I. atkinsoni* Lethierry, *I. clypealis* Lethierry (Cicadellidae)  
*Specimens described* — Male, female  
*Distribution* — Mysore, India  
*Type* — holotype in United States National Museum, paratypes in California Academy of Sciences and collection of author (now in Bohart Museum, University of California. Davis)
- Halictophagus inouei*** Nakase, 2016: 265  
*Host* — *Cacopsylla swida* Inoue, 2004; *Cacopsylla yukawai* Inoue, 2004 (Psyllidae) Male, female  
*Distribution* — Japan  
*Host* — holotype in National Museum of Nature and Science, Tokyo; paratypes in National Museum of Nature and Science, Tokyo
- Halictophagus insularum*** (Pierce, 1908)  
 = *Dioxocera insularum* Pierce, 1908: 81 (Bohart 1941)  
 = *Diozocera insularum* Pierce, 1911: 504 (by Bohart 1941)  
 = *Diozocera insularum vincenti* Pierce, 1941: 4 (by Bohart 1943a)  
 = *Diozocera argentinae* Pierce, 1941: 5 (by Bohart 1943a)  
 = *Diozocera comstocki* Pierce, 1941: 6 (by Bohart 1943a)  
 = *Diozocera comstocki elsegundinis* Pierce, 1941: 10 (by Bohart 1943a)  
*Hosts* — *Xerophloea viridis* (Fabricius); *X. vanduzeei* Lawson; *Dorycephalus platyrhynchus* Osborn; *Dorycephalus* sp. (Cicadellidae)  
*Specimens described* — Male, female  
*Distribution* — Granada (type locality), Argentina, USA (California, Utah)  
*Type* — holotype and paratype (allotype) in United States National Museum  
*Other references* — Baldrige and Blocker 1980 [host], Bohart 1943a [host, distribution], Pierce 1909 [taxonomy]
- Halictophagus iriomotensis*** Hirashima and Kifune, 1978b: 59  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Irimote Island, Okinawa, Japan  
*Type* — holotype in Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka (type no. 2087)
- Halictophagus irwini*** Riek, 1975: 466  
*Host* — *Afrosteles distans* (Linnavuori) (Cicadellidae)  
*Specimens described* — Male, female  
*Distribution* — Natal, South Africa  
*Host* — holotype at Natal Museum
- Halictophagus jacobsoni*** De Meijere, 1908: 186  
 = *Neocholax jacobsoni* (De Meijere, 1908) (moved to *Neocholax* by Pierce 1909, reinstated to *Halictophagus* by Bohart 1941).  
*Host* — *Ossoides lineatus* Bierman (Tropiduchidae)  
*Specimens described* — Male, female, larva  
*Distribution* — Indonesia (Java)  
*Type* — no type material designated  
*Other references* — Terry 1910 [flight time], De Meijere 1911 [discussion], Bohart 1943a [description]
- Halictophagus javanensis*** (Pierce, 1918)  
 = *Cyrtocaraxenos javanensis* Pierce, 1918: 475 (by Bohart 1941)

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — : Java, Indonesia (type locality), Leyte, Philippines  
*Type* — holotype at United States National Museum (no. 21454)  
*Other references* — Bohart 1943a [discussion], Kifune and Hirashima 1989 [distribution]

***Halictophagus jordani*** (Pierce, 1952)

= *Membracixenos jordani* Pierce, 1952: 5 (by Bohart 1941)

*Host* — *Ceresa festina* (Say) (Membracidae)  
*Specimens described* — Male, female, cephalotheca, larva  
*Distribution* — Texas, USA (type locality), Louisiana, USA  
*Type* — locality unknown

***Halictophagus kamandulophagus*** Luna de Carvalho, 1978a: 58

*Host* — unknown  
*Specimens described* — Female  
*Distribution* — Angola  
*Type* — location unknown

***Halictophagus kinzelbachi*** Luna de Carvalho, 1973a: 28

*Host* — (Cercopoidae)  
*Specimens described* — Male, female, larva  
*Distribution* — Democratic Republic of the Congo  
*Type* — Holotype and paratypes (including allotype) in Hungarian Natural History Museum  
*Other references* — Luna de Carvalho 1978 [description]

***Halictophagus kuhnetti*** Hofeneder, 1949: 155

*Host* — *Dictyophara europaea* (Linnaeus, 1767) (Dictyopharidae)  
*Specimens described* — Male, female  
*Distribution* — Croatia  
*Type* — location unknown  
*Other references* — Hofeneder 1950

[description], Kinzelbach 1978 [discussion]

***Halictophagus languedoci*** Abdul-Nour 1969: 363

*Host* — *Acrocephalus sagittarius* Ribaut, *Adarus taurus* Ribaut, *Goldeus haepago* Ribaut, *Jassargus obusivalvis* (Kirschbaum), *Psmmotettix* sp. (Cicadellidae)

*Specimens described* — Male, female, larva  
*Distribution* — France

*Type* — holotype and paratype (allotype) at Centre de Recherches Agronomiques du Midi, paratypes at Centre de Recherches Agronomiques du Midi, collection of author (current location unknown), and Museum d'Histoire Naturelle de Paris

*Other references* — Abdul-Noir 1970 [description], Kinzelbach 1978 [discussion]

***Halictophagus lappidae*** Oliveira and Kogan, 1960: 183

*Host* — *Lappida armata* Melichar (Dictyopharidae)

*Specimens described* — Female  
*Distribution* — Para, Brazil

*Type* — holotype at Instituto Oswaldo Cruz, Brazil

*Other references* — Trois 1988 [re-description]

***Halictophagus libetarioi*** Barron and Litsinger, 1989: 185

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindanao, Philippines

*Type* — holotype at International Rice Research Institute, Los Banos, Laguna, Philippines

***Halictophagus longipennis*** Kifune, 1981: 327

*Host* — unknown

*Specimens described* — Male

*Distribution* — Malaysia (Parak)

*Type* — holotype at Kyushu University

***Halictophagus lopesi*** Oliveira and Kogan,  
1959: 227

*Host* — *Nersia florens* Stål (Dictyopharidae)

*Specimens described* — Male, female, larva

*Distribution* — Brazil (Bahia)

*Type* — holotype and paratype (allotype) in Lopes collection (current location unknown), paratypes in Instituto Oswaldo Cruz

*Other references* — Oliveira and Kogan 1960 [larva description], Trois 1988 [re-description]

***Halictophagus mackayi*** (Bohart, 1937a)

= *Pseudopatella mackayi* Bohart, 1937a: 103 (by Bohart 1941)

*Hosts* — *Aconura* sp., *Athysanella acuticauda* Baker, *Psammotettix affinis* (Gillette and Baker) (= *Deltocephalus affinis*), *Endria inimicus* (Say), *Fleximia pectinata* (Osborn and Ball), *F. prairiana* DeLong, *F. reflexa* (Osborne and Ball), *Flexamia* spp., *Gramminella mohri* DeLong, *Sorhoanus uhleri* (Oman), *Macrosteles fascifrons* (Stål), *Messamia coloradensis* (Gillette and Baker), *Laevicephalus* sp., *Paraphlepsius irroratus* (Say), *Stirellus bicolor* (Van Duzee), *Diplocolenus configuratus* (Uhler) (= *Latalus configuratus* Uhler) (Cicadellidae)

*Specimens described* — Male, female, larva

*Distribution* — Saskatchewan, Canada (type locality); Kansas, USA

*Type* — holotype male and paratype (allotype female) at California Academy of Science, location of other paratypes unknown

*Other references* — Abdul-Nour 1969 [taxonomy], 1970 [host]; Baldrige and Blocker 1980 [host]; Bohart 1941 [host, 1943a [host]

***Halictophagus macrostelesi*** Abdul-Nour, 2001: 40

*Host* — *Macrosteles ramosus* Ribaut (Cicadellidae)

*Specimens described* — Male, female

*Distribution* — Lebanon

*Type* — Holotype and paratypes in Muséum National d'Histoire naturelle

***Halictophagus malayanus*** Kifune, 1981: 325

*Host* — unknown

*Specimens described* — Male

*Distribution* — Perak, Malaysia

*Type* — holotype at Kyushu University, Japan

***Halictophagus membraciphaga***

(Subramanian, 1927)

= *Indoxenos membraciphaga* Subramanian, 1927: 132 (by Bohart 1941)

*Host* — *Otinotus pallescens* Distant (Membracidae)

*Specimens described* — Male, female, larva

*Distribution* — Mysore, India

*Type* — unknown

*Other references* — Bohart 1943a [discussion]

***Halictophagus minimus*** Kifune and Hirashima,  
1983: 163

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sri Lanka (type locality); Sitipang, Sabah, Malaysia

*Type* — holotype in United States National Museum

*Other references* — Kathirithamby 1994a [distribution]

***Halictophagus minutus*** Kathirithamby, 1992a: 176

*Host* — Cicadellidae

*Specimens described* — Female, partial male, cephalotheca

*Distribution* — Queensland Australia

*Type* — holotype in Australian National Insect Collection, paratypes in Australian National Insect Collection and Hope Entomological Collections, Oxford

***Halictophagus moorookensis*** Kathirithamby,  
1992a: 178

*Host* — *Putoniessa nigra* (Walker) (Cicadellidae)

*Specimens described* — Male, female,

cephalotheca

*Distribution* — Queensland, Australia

*Type* — holotype and paratype (allotype) in Australian National Insect Collection, other paratypes in Australian National Insect Collection and Hope Entomological Collection, Oxford

***Halictophagus naulti*** Kathirithamby and Moya-Raygoza, 2000: 1039

*Host* — *Dalbulus maidis* (DeLong and Wolcott) (Cicadellidae)

*Specimens described* — Male, female

*Distribution* — Morelos, Mexico

*Type* — holotype in Hope Entomological Collection, Oxford, paratypes in Hope Entomological Collection and Colección Entomológica, C.U.C.B.A., Universidad de Guadalajara, Mexico

***Halictophagus obtusae*** Bohart, 1943a: 346

*Host* — *Oncometopia obtusa* (Fabricius) (Cicadellidae)

*Specimens described* — Female

*Distribution* — Costa Rica

*Type* — holotype in United States National Museum, paratype in collection of author (now in Bohart Museum, University of California, Davis)

***Halictophagus omani*** Bohart, 1943a: 345

*Hosts*: *Cuerna costalis* (Fabricius) (reported as *Oncometopia lateralis*), *Aceratagallia* sp. (Cicadellidae)

*Specimens described* — Male, female, larva

*Distribution* — Arkansas, USA (type locality), USA (Arizona, California, Georgia, Florida, Kansas, Louisiana, New Mexico, Tennessee, Texas)

*Type* — holotype at United States National Museum, paratypes in United States National Museum, California Academy of Sciences, University of Kansas, and collection of author (now at Bohart Museum, University of California, Davis)

*Other references* — Baldrige and Blocker 1980 [host]

***Halictophagus oncometopiae*** (Pierce, 1918)

= *Dacyrtocara oncometopiae* Pierce, 1918: 473 (by Bohart 1941)

= *Dacyrtocara undata* Pierce, 1918: 474 (by Bohart 1943a)

*Host* — *Oncometopia orbona* (Fabricius) = *O. undata* (Cicadellidae)

*Specimens described* — Male, female

*Distribution* — Georgia, USA (type locality), USA (Alabama, Arkansas, Florida, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas)

*Type* — holotype in United States National Museum (no. 21452), Type of *D. undata* in United States National Museum (no. 21453)

*Other references* — Bohart 1941 [*Host*], 1943 [distribution]

***Halictophagus orientalis***

(Esaki and Hashimoto, 1931)

= *Tettigoxenos orientalis* Esaki and Hashimoto, 1931: 48 (by Bohart 1941)

*Host* — *Hecalus prasinus* (Matsumura) (Cicadellidae)

*Specimens described* — Male

*Distribution* — Japan

*Type* — holotype at Kyushu University, Japan

*Other references* — Esaki 1933 [biology]

***Halictophagus palmae*** Kathirithamby and Ponnamma, 2000: 101

*Host* — *Proutista moesta* (Westwood) (Derbidae)  
*Specimens described* — Male, female, cephalotheca

*Distribution* — India (Palode, Kerela)

*Type* — holotype and paratypes in Hope Entomological Collections, Oxford

***Halictophagus paradeniya*** (Pierce, 1911)

= *Pentoxoe paradeniya* Pierce, 1911: 505 (by Bohart 1941)

*Host* — *Hecalus arcuata* (Motschulsky) (Cicadellidae)

*Specimens described* — Male, female  
*Distribution* — Sri Lanka  
*Type* — holotype male in United States National Museum  
*Other references* — Bohart 1943a [discussion]

***Halictophagus phaeodes*** Perkins, 1905: 103

= *Pentoxocera phaeodes* (Perkins, 1905) (moved to *Pentoxocera* by Pierce 1908, reinstated to *Halictophagus* by Bohart 1941)  
 = *Pentoxocera phaeodes* (Perkins, 1905) (revised due to misspelling to *Pentoxocera* by Pierce 1911, reinstated to *Halictophagus* by Bohart 1941)

*Hosts* — *Exitianus plebeius* (Kirkaldy), *Hecalus* sp. (Cicadellidae)

*Specimens described* — Male, female, cephalotheca

*Distribution* — Queensland, Australia

*Type* — holotype in United States National Museum

*Other references* — Kathirithamby 1992a [description]

***Halictophagus philaroniae*** Bohart, 1946: 202

*Host* — *Philaenarcys bilineata* (Say) (= *Philarnonia bilineata* (Say) (Cercopidae)

*Specimens described* — Male, female, cephalotheca

*Distribution* — Nebraska, USA

*Type* — holotype and paratype in United States National Museum

***Halictophagus piperi*** Bohart, 1943a: 358

*Host* — *Cicadella longa* Wall (not a current name, thus identity unknown)

*Specimens described* — Male, female, cephalotheca, larva

*Distribution* — Philippines

*Type* — Holotype and paratype (allotype) in U. S. National Museum?

*Paratypes* — California Academy of Sciences and collection of author ( now in Bohart Museum, UC Davis)

***Halictophagus placula*** (Remes Lenicov and Tesón, 1975)

= *Membracixenos placula* Remes Lenicov and Tesón 1975: 66 (by Kathirithamby 1992)

*Hosts* — *Curtara mystica* (Spangberg) (= *Prairiana mystica*), *Prairiana* (*Curtara* ?) sp. (Cicadellidae)

*Specimens described* — Male, female, cephalotheca, larva

*Distribution* — Buenos Aires and Tucumán, Argentina

*Type* — holotype and paratype (allotype) in United States National Museum, paratypes in Museo de La Plata no. 3547

*Notes* — Remes Lenicov and Tesón (1975) placed this species in the genus *Membracixenos*, previously erected by Pierce, not recognizing that *Membracixenos* had been made a junior synonym of *Halictophagus* by Kinzelbach (1971). Remes Lenicov and Tesón (1975) made no comment on using this genus except that they were placing it in the genus established by Pierce (1952). Kathirithamby (1992) rightly placed the species in *Halictophagus* within a checklist of the species of that genus but did comment on its synonymy.

***Halictophagus pontifex*** Fox, 1967a: 42

*Hosts* — *Poophilus costalis* (Walker), *P. grisescens* (Schaum), *P. latiusculus* Stål, *P. conspersus* (Walker), *P. terrenus* (Walker), *Clovia quadrispinosa* Synave, *Clovia centralis* Distant, *C. peragrans* (Stål) (Aphrophoridae)

*Specimens described* — Male; female, larva

*Distribution* — Uganda

*Type* — holotype in Natural History Museum, London

*Other references* — Greathead 1968 [description], 1970 [host]; Luna de Carvalho 1978 [discussion]

***Halictophagus prominens*** Roy and Hazra, 2016b: 585

*Host* — unknown

*Specimens described* — Male

- Distribution* — India  
*Type* — holotype in Universtiy of Burdwan collection, India, to be deposited in National Zoological Collections, Kolkata, India
- Halictophagus radialis*** Kifune and Hirashima, 1983a: 162
- Host* — unknown  
*Specimens described* — Male  
*Distribution* — Sri Lanka  
*Type* — holotype in United States National Museum
- Halictophagus recurvatus*** Yang, 1964: 80
- Host* — Typhlocybinae (Cicadellidae)  
*Specimens described* — Female, larva, male cephalotheca  
*Distribution* — Kwangung, China  
*Type* — holotype in South China Agricultural College
- Halictophagus regina*** Fox, 1967a: 43
- Host* — listed as *T. spectra*, probably *Cofana spectra* (Distant)  
*Specimens described* — Male  
*Distribution* — Uganda  
*Type* — holotype in Museum of Natural History, London  
*Other references* — Greathead 1968 [description]
- Halictophagus samoanus*** Kifune and Hirashima, 1989: 19
- Host* — unknown  
*Specimens described* — Male  
*Distribution* — Afimalu, Samoa  
*Type* — holotype and paratype in Bishop Museum
- Halictophagus sararwakensis*** Kathirithamby, 1993: 188
- Host* — unknown  
*Specimens described* — Male  
*Distribution* — Sipitang, Sabah, Malaysia
- Type* — holotype in Canadian National Collection
- Halictophagus scheveni*** Kinzelbach, 1972a: 2
- Host* — *Anchon limbatum* Schmidt, 1911 (Membracidae)  
*Specimens described* — Female  
*Distribution* — Bukoba, Tanzania  
*Type* — holotype at Staatliches Museum für Naturkunde in Stuttgart
- Halictophagus schwarzi*** Perkins, 1905: 104
- = *Pentacladocera schwarzii* (Perkins, 1905) (moved to *Pentacladocera* by Pierce 1908, reinstated to *Halictophagus* by Bohart 1941)
- Host* — *Agallia* sp. (Cicadellidae)  
*Specimens described* — Male, female, cephalotheca  
*Distribution* — Australia (New South Wales, Queensland)  
*Type* — holotype in United States National Museum  
*Other references* — Kathirithamby 1992a [description], Bohart 1943a [discussion]
- Halictophagus serratus*** Bohart, 1943a: 351
- Host* — *Agillia constricta* (Van Duzee) (Cicadellidae)  
*Specimens described* — Male, female  
*Distribution* — New Jersey, USA (type locality); USA (Louisiana, Tennessee)  
*Type* — holotype and paratype (allotype) in U. S. National Museum; paratypes in United States National Museum, Harvard Museum of Comparative Zoology, California Academy of Science, collection of author (now in Bohart Museum, University of California, Davis)
- Halictophagus shepardii*** Barrion and Litsinger, 1989: 184
- Host* — *Hecalus porrectus* (Walker) (= *Hecalus viridis* (Distant)) (Cicadellidae)  
*Specimens described* — Male, female  
*Distribution* — Philippines

*Type* — holotype in International Rice Research Institute, Los Banos, Laguna, Philippines

***Halictophagus silwoodensis*** Waloff, 1981: 105

*Host* — *Ulopa reticulata* (Fabricius) (Cicadellidae)

*Specimens described* — Male, female

*Distribution* — England (type locality), Belgium, Finland, France; Germany, Scotland, Netherlands

*Type* — holotype and paratypes in Natural History Museum, London

*Other references* — Bland 1998 [distribution], Cocquempot 2016, Henderickx 2008 [distribution], Melber 1989 [distribution], Smit 2007 [distribution]

***Halictophagus sodeni*** Hofeneder, 1949: 157

*Host* — *Tettigonia albida* (Walker) (Cicadellidae)  
*Specimens described* — Male, female, cephalotheca

*Distribution* — Sri Lanka

*Type* — no type designated

*Other references* — Hofeneder 1950 [description], Kifune and Hirashima 1980 [identification]

***Halictophagus steffani*** Kinzelbach, 1971: 154

*Host* — unknown

*Specimens described* — Male

*Distribution* — Philippines

*Type* — holotype in Universitets Zoologiske Museum, København (0244)

***Halictophagus stellatus*** Yang, 1964: 81

*Host* — Cicadellidae (Jassinae)

*Specimens described* — Male, female

*Distribution* — Kwantung, China

*Type* — holotype in South China Agricultural College, Guangzhou

***Halictophagus stenocrani*** Kifune, 1986a: 495

*Host* — *Stenocranus minutus* (Fabricius) (Delphacidae)

*Specimens described* — Male

*Distribution* — Shimane, Japan

*Type* — holotype in Entomological Laboratory, Faculty of Agriculture, Kyushu University, Japan

***Halictophagus stenodes*** Perkins, 1905: 104

= *Pentoxocera stenodes* (Perkins, 1905) (moved to *Pentoxocera* by Pierce 1908, reinstated to *Halictophagus* by Bohart 1941)

= *Pentoxocera stenodes* (Perkins, 1905) (revised due to misspelling to *Pentoxocera* by Pierce 1911, reinstated to *Halictophagus* by Bohart 1941)

*Host* — *Paradorydium menalus* Kirkaldy (Delphacidae)

*Specimens described* — Male

*Distribution* — Queensland, Australia

*Type* — unknown

***Halictophagus tenebrosus*** Chaudhuri, Gosh and Das Gupta, 1983: 23

*Host* — unknown

*Specimens described* — Male

*Distribution* — West Bengal, India

*Type* — holotype in University of Burdwan, Entomology, India

***Halictophagus tettigometrae*** Silvestri 1934: 366

*Hosts* — *Tettigometra concolor* Fieber, *T. impressifrons* Mulsant and Rey, *T. impressopunctata* Dufour, *T. leucophaea* (Preysslner (= *T. obliqua* (Panzer, *T. picta* Fieber (Tettigometridae)

*Specimens described* — Male, female, cephalotheca, larva

*Distribution* — Italy

*Type* — holotype in Facoltà Agraria di Portici, Università di Napoli

*Other references* — Kinzelbach 1978 [discussion], Silvestri 1941a [biology, natural history]

***Halictophagus thaiiae*** Kifune, 1983b: 165

*Host* — *Thaia oryzivora* Ghauri (Cicadellidae)

*Specimens described* — Male

*Distribution* — Chiang Rai, Thailand

*Type* — holotype and paratype in Entomology & Zoology Division, Department of Agriculture Bankhen, Bangkok, Thailand

***Halictophagus thaianus*** Yang, 1999: 186

*Host* — *Thaia oryzivora* Ghauri (= *Thaia katoi* (Dworakowska))

*Specimens described* — Female

*Distribution* — Yunan, China

*Type* — holotype in Insect Collections of China Agricultural University

***Halictophagus thoracicus*** Kifune and Hirashima, 1989: 23

*Host* — unknown

*Specimens described* — Male

*Distribution* — North Borneo, Malaysia

*Type* — holotype in Bishop Museum

***Halictophagus trigonodontos*** Cook, 2013: 570

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dominican Republic

*Type* — holotype and paratypes in Carnegie Museum of Natural History

***Halictophagus tryoni*** (Perkins, 1905)

= *Megalechthrus tryoni* Perkins, 1905 (Bohart 1943a)

*Hosts* — *Platybrachys decemmacula* (Walker), *P. maculipennis* (Le Guillou), *Dardus abbreviatus* (Guérin-Meneville) (Eurybrachyidae); *Colgar peracutum* (Walker) (Flatidae)

*Specimens described* — Female, cephalotheca

*Distribution* — Queensland, Australia

*Type* — holotype location unknown, paratypes in United States National Museum

*Other references* — Kathirithamby 1992a [cephalotheca description]

*Notes* — Bohart (1943a) stated that this species should possibly be with members of the genus *Stenocranophilus*. If it is in the same genus as the species now in *Stenocranophilus*, the genus name *Megalechthrus* would have priority.

***Halictophagus uhleri*** (Pierce, 1909)

= *Pentagrammaphila uhleri* Pierce, 1909: 169 (by Bohart 1941)

*Hosts* — *Pentagramma vittifrons* (Uhler) (Delphacidae); *Paraphlepsius irroratus* (Say) (Cicadellidae)

*Specimens described* — Female

*Distribution* — USA (North Dakota, South Dakota, Kansas) (type locality uncertain)

*Type* — holotype at U.S. National Museum no. 12317

*Notes* — Bohart made *Agalliaphagus uhleri* a junior synonym of *H. americanus*, leaving the name *H. uhleri* available when he transferred that species from *Pentagrammaphila*.

***Halictophagus urucui*** Kogan, 2012: 81

*Host* — unknown

*Specimens described* — Male

*Distribution* — Amazonas, Brazil

*Type* — holotype in Instituto Nacional de Pesquisas da Amazonia, Manaus, Brazil

***Halictophagus variatus*** Kinzelbach, 1971a: 154

= *Pentoxocera schwarzi* Pierce, 1909: 159 (renaming of junior homonym by Kinzelbach 1971a)

= *Pentoxocera schwarzi* Pierce, 1911: 475 (renaming for spelling correction by Pierce 1911, renaming of junior homonym by Kinzelbach 1971a)

= *Halictophagus* (?) sp. Bohart, 1943a: 359 (renaming of junior homonym by Kinzelbach 1971a)

= *Halictophagus boharti* Abdullah, 1974 (unjustified renaming of homonym)

*Host* — *Diedrocephala sanguinolenta* (Coquibar) (Cicadellidae)

*Specimens described* — Cephalotheca

*Distribution* — Guatemala

*Type* — holotype at United States National Museum no. 12316

*Other references* — Pierce, 1909 [description], 1918 [description]

*Notes* — Pierce (1909) named this species as *Pentoxocera schwarzi* based on a Cephalotheca, and



later (Pierce 1911) corrected the misspelling of the generic name. Bohart 1941 made *Pentoxocera* and its misspelling, *Pentozocera*, junior synonyms of *Halictophagus*. This then would make Pierce's *H. schwarzi* a junior homonym of *H. schwarzi* Perkins, 1905. Bohart (1941) did not comment on this species when he synonymized the genus with *Halictophagus* but later (Bohart 1943a) questioned whether this species should be included in *Halictophagus* until mature forms were found. Bohart (1943a) did not change the name of the species but commented that if it remained in *Halictophagus*, it would be a junior homonym. Kinzelbach (1971a) renamed the species *H. variatus* due its status as a junior homonym. Abdullah (1974) later also renamed the species as *H. boharti*, which now is recognized as a junior synonym of *H. variatus*.

***Halictophagus yaeyamanus*** Kifune and Hirashima, 1984: 77

*Host* — unknown

*Specimens described* — Male

*Distribution* — Iriomoter Island, Japan (type locality), Japan (Yaeyama Islands, Okinawa)

*Type* — holotype in Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka Type No. 2452

Genus ***Stenocranophilus*** Pierce, 1914: 126

= *Muirixenos* Pierce, 1918: 472 (by Bohart 1941)

= *Delphacixenos* Pierce, 1918: 475 (by Bohart 1941)

The genus *Stenocranophilus* was established by Pierce (1914) for a new species using the delphacid genus *Stenocranus* as a host. Pierce (1918) subsequently named three additional species that are currently in *Stenocranophilus* but he placed one in a genus named *Delphacixenos* and the other two in his genus *Muirixenos* based on their having hosts in genera other than *Stenocranus*. Bohart (1941) argued that having a different host genus did not necessarily put the parasitic species in a different genus and showed that all of these species should be combined into one genus, with *Stenocranophilus* having priority. Members of *Stenocranophilus* are

characterized as having an elongate antennae, with a long flabellum on the fifth segment, a hooked aedeagus, short stout mandibles, and a terminal palpal segment that is cylindrical. All species whose hosts are known parasitize species of Delphacidae. Species are known from the Nearctic, Palearctic, and Indonesia.

***Stenocranophilus anomalocerus*** (Pierce, 1918)

= *Delphacixenos anomalocerus* Pierce, 1918: 476 (by Bohart 1941)

*Hosts* — *Delphax striatella* Fallén, *Javesella pellucida* (Fabricius) (= *Calligypoa marginata*), *Laodelphax striatellus* (Fallén) (Delphacidae)

*Specimens described* — Male, female

*Distribution* — Poltava, Ukraine (formerly in Russia as reported by Peirce 1918) (type locality); Canada

*Type* — holotype in United States National Museum (no. 21455)

*Other references* — Bohart 1941 [discussion], Ogloblin 1925 [female], Mochida and Okada 1973 [host], Ulrich 1930 [host]

***Stenocranophilus canadensis*** Kinzelbach, 1971a: 154

*Host* — unknown

*Specimens described* — Male

*Distribution* — Saskatchewan, Canada

*Type* — holotype in Bohart Collection (now at University of California, Davis)

***Stenocranophilus dicranotropidis*** (Pierce, 1918)

= *Muirixenos dicranotropidis* Pierce, 1918: 472 (by Bohart 1941)

*Host* — *Dicranotropis muiri* (Kirkaldy) (Delphacidae)

*Specimens described* — Male

*Distribution* — Java, Indonesia

*Type* — holotype at United States National Museum (no. 21450)

***Stenocranophilus perkinsiellae*** (Pierce, 1918)

= *Muirixenos perkinsiellae* Pierce 1918: 472 (by Bohart 1941)

*Host* — *Perkinsiella saccharicida* Kirkaldy (Delphacidae)

*Specimens described* — Male

*Distribution* — Java, Indonesia

*Type* — holotype at United States National Museum (no. 21451)

***Stenocranophilus quadratus*** Pierce, 1914: 127

*Host* — *Stenocranus saccharivorus* (Westwood) (Delphacidae)

*Specimens described* — Male, female

*Distribution* — Puerto Rico (type locality), Czech Republic, Venezuela,

*Type* — holotype at United States National Museum (no. 18813)

*Other references* — Batelka 1997 [distribution], Kinzelbach 1971a [distribution], Metcalfe 1972 [biological control]

Genus ***Tridactylophagus*** Subramaniam, 1932: 43

= *Tridactyloxenos* Yang, 1964: 608

The genus *Tridactylophagus* was created by Subramaniam (1932) for a new species from India that was found to parasitize a species in the genus *Tridactylus*. Yang (1964) named two new species that both parasitize the same host, in the same geographic region, placing one in *Tridactylophagus* and erecting a new genus, *Tridactyloxenos*, for the other. However, only relatively minor variations in the two species were shown and Kinzelbach (1971a) synonymized the genus *Tridactyloxenos* with *Tridactylophagus*. The total number of species in this genus is now 11. Males of *Tridactylophagus* have seven-segmented antenna with a flabellum only on segment III, three tarsal segments, short mandibles that are easily distinguished from other members of the family Halictophagidae, a hook-shaped aedeagus, and a MA<sub>1</sub> wing vein. Females have four genital pores. All known hosts of *Tridactylophagus* species are in the family Tridactylidae, with six of

the 11 species having a known hosts association. The distribution of members of *Tridactylophagus* includes the Indian subcontinent, southeast Europe, Australia, the Philippines, Japan, and China. A key to males and females of *Tridactylophagus* species was provided by Kifune and Hirashima (1980). A more recent key to males was given by Maxumdar and Chaudhuri (1999).

***Tridactylophagus aduncus*** Maxumdar and Chaudhuri, 1999: 13

*Host* — unknown

*Specimens described* — Male

*Distribution* — West Bengal, India

*Type* — holotype in Burdwan University Entomology (no. 219)

***Tridactylophagus buttonensis*** Kathirithamby, 1992a: 169

*Host* — unknown

*Specimens described* — Male

*Distribution* — Western Australia

*Type* — holotype in Australian National Insect Collection, paratypes in Australian National Insect Collection and Oxford University

***Tridactylophagus canberraensis*** Kathirithamby, 1992a: 170

*Host* — unknown

*Specimens described* — Male

*Distribution* — Australian Capital Territory

*Type* — holotype in Australian National Collection, paratypes in Australian National Collection and Oxford University

***Tridactylophagus carinatus*** Maxumdar and Chaudhuri, 1999: 14

*Host* — unknown

Male

*Distribution* — West Bengal, India

*Type* — holotype in Burdwan University Entomology Collection (no. 219)

***Tridactylophagus ceylonensis*** Kifune and  
Hirashima, 1980: 156

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Sri Lanka  
*Type* — holotype at United States National  
Museum  
*Other references* — Kifune and Hirashima 1983a  
[additional specimens]

***Tridactylophagus coniferus*** (Yang, 1964)

= *Tridactylophenos coniferus* Yang, 1964: 608 (by  
Kinzelbach 1971a)

*Host* — *Tridactylus japonicus* Shiraki  
(Tridactylidae)  
*Specimens described* — Male, female, larva  
*Distribution* — China (type locality), India  
*Type* — unknown  
*Other references* — Maxumdar and Chaudhuri  
1999 [distribution]

***Tridactylophagus etoi*** Nakase and Kato, 2013a: 227

*Host* — *Xya japonica* (Haan) (Tridactylidae)  
*Specimens described* — Female  
*Distribution* — Japan  
*Type* — holotype at National Museum of Nature  
and Science, Tokyo, paratypes in Kyoto University  
Museum

***Tridactylophagus harzi*** Kinzelbach, 1971a: 151

*Host* — *Tridactylus variegatus* (Latreille)  
(Tridactylidae)  
*Specimens described* — Male, female, larva  
*Distribution* — Albania  
*Type* — holotype in Naturhistorisches Museum  
Wien  
*Other references* — Kinzelbach 1978  
[description]

***Tridactylophagus maculatus*** Chaudhuri, Gosh, and  
Das Gupta, 1983: 26

*Host* — unknown

*Specimens described* — Male  
*Distribution* — West Bengal, India  
*Type* — holotype in Burdwan University  
Entomology (no. 107)

***Tridactylophagus mysorensis*** Subramaniam,  
1932: 44

*Host* — *Tridactylus* sp. (Trydactylidae)  
*Specimens described* — Male, female, larva  
*Distribution* — India  
*Type* — type not designated

***Tridactylophagus orientalis*** (Chaudhuri and Das  
Gupta, 1979)

= *Halictophagus orientalis* Chaudhuri and Das Gupta  
1979: 133 (by Maxumdar and Chaudhuri 1999)  
= *Halictophagus kifunei* Chaudhuri and Das Gupta 1979:  
28 (replacement name by Chaudhuri et al. 1983, name  
synonymized by Maxumdar and Chaudhuri 1999)

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — West Bengal, India  
*Type* — holotype and paratypes in Burdwan  
University National Collection, Entomology  
Collection, Zoological Survey of India, Calcutta (no.  
25)

*Other references* — Maxumdar and Chaudhuri  
1999

*Notes* — Chaudhuri and Das Gupta (1979)  
first named this species *Halictophagus orientalis*,  
which was a preoccupied name that was changed to  
*H. kifunei* by Chaudhuri et al. (1983). When  
Maxumdar and Chaudhuri moved this species to  
*Tridactylophagus*, the original specific epithet was  
reinstated making the species name *T. orientalis*.

***Tridactylophagus similis*** Kinzelbach, 1971a

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Philippines  
*Type* — holotype in Bohart collection (now at  
University of California, Davis)

***Tridactylophagus sinensis*** Yang 1964: 607

*Host* — *Tridactylus japonicus* Shiraki  
(Tridactylidae)

*Specimens described* — Male, female, larva

*Distribution* — China

*Type* — unknown

***Tridactylophagus tartari*** Bechet, 1972: 99

*Host* — *Bruntridactylus tartarus* (Saussure)  
(Tridactylidae)

*Specimens described* — Female

*Distribution* — Romania

*Type* — location unknown

Family **Kinzelbachillidae** Pohl and Beutel,  
2016: 288

The family Kinzelbachillidae was erected for a single male specimen from Burmese amber that was described as *Kinzelbachilla ellenbergeri*. This family was distinguished by Pohl and Beutel (2016) due to its being considered close to the presumptive base of the strepsipteran phylogeny. The specimen has a head that is fully sclerotized with a coronal suture and small ommatidia separated by chitinous ridges without hairs. A striking difference from more derived strepsipterans is the presence of eight antennal segments. The specimen has robust mandibles and a strongly developed galea. Tarsi are five-segmented. Only one species in the family represented by the holotype male is known. In their phylogenetic analysis Pohl and Beutel (2016) gave evidence that this is part of the stem group of the Strepsiptera, with *Protoxenos* being the only known genus that appears more primitive.

Genus ***Kinzelbachilla*** Pohl and Beutel, 2016: 289

*Type species* — *Kinzelbachilla ellenbergeri* Pohl and Beutel, 2016

***Kinzelbachilla ellenbergeri*** Pohl and Beutel,  
2016: 290

*Host* — unknown

*Specimens described* — Male

*Distribution* — Burmese amber

*Type* — holotype in Phyletisches Museum, Jena, Germany

*Notes* — Besides the characters listed above, Pohl and Beutel (2016) provide a thorough description of the new genus and species.

Family **Lychnocolacidae** Kathirithamby and Engel,  
2014 (by first use)

All species currently placed in the family Lychnocolacidae are in the genus *Lychnocolax* and at the time of their naming were considered to be in the family Myrmecolacidae. In a molecular phylogeny of the strepsiptera, McMahon et al. (2011) found that *Lychnocolax* was more closely related to Stylopidae and Xenidae than to Myrmecolacidae and they suggested that this genus should be removed from Myrmecolacidae. However, the first use of Lychnocolacidae was when Kathirithamby and Engel (2014) used the name in their revised key to families of Strepsiptera. Morphologically Lychnocolacidae resembles Myrmecolacidae except that it has a CuA<sub>2</sub> wing vein not present in Myrmecolacidae.

Genus ***Lychnocolax*** Bohart, 1951: 95

*Type species* — *Lychnocolax mindanao* Bohart, 1951

Bohart (1951) established the genus *Lychnocolax* for five new species in a study of the Myrmecolacidae of the Philippines. The genus was differentiated from members of Myrmecolacidae by having two vannal veins (CuA veins) and a relatively longer scutellum and shorter prescutum. Other morphological characters resemble the Myrmecolacidae in which there are seven-segmented antennae with a flabellum on the third segment and a four segmented tarsus. The genus currently appears to have an Old World tropical and subtropical distribution. Keys have been provided and updated by Luna de Carvalho (1956, 1967, 1978).

***Lychnocolax aerius*** Kifune and Hirashima,  
1989: 34

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Pahang, West Malaysia  
*Type* — holotype in Bishop Museum

***Lychnocolax champloni*** Luna de Carvalho,  
1967: 38

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Caxiaxia, Angola  
*Type* — holotype in Museu do Dundo  
*Other references* — Luna de Carvalho 1978

[discussion]

***Lychnocolax chinensis*** Kifune and Hirashima,  
1989: 36

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Hong Kong  
*Type* — holotype in Bishop Museum

***Lychnocolax drysdalensis*** Kathirithamby  
1993b: 862

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Western Australia and Northern Territory, Australia  
*Type* — holotype in Australian National Insect Collection, paratypes in Australian National Insect Collection and Hope Entomological Collections

***Lychnocolax henricarvalhoensis*** Luna de Carvalho,  
1967: 40

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Lunda, Angola  
*Type* — holotype in Museu do Dundo, paratypes in Museu Real da Africa Central and collection of the author (now at Sam Houston State University)  
*Other references* — Luna de Carvalho 1978

[discussion]

***Lychnocolax hispanicus*** Kathirithamby and  
Kifune, 1991: 189

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Zaragoza Province, Spain  
*Type* — holotype in Hope Entomological Collections, paratypes in Hope Entomological Collections and Instituto de Entomologia, Madrid, Spain

***Lychnocolax insularis*** Kifune and Hirashima,  
1989: 32

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Sohano, Solomon Islands (type locality); Baining, New Britain  
*Type* — holotype and paratype in Bishop Museum

***Lychnocolax lundensis*** Luna de Carvalho, 1956: 52

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Dundo, Angola  
*Type* — holotype in Museu Real do Congo Belga  
*Other references* — Luna de Carvalho 1967 [additional specimens], 1978 [discussion]

***Lychnocolax maxillaris*** Kathirithamby, 1993b: 864

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Queensland, Australia  
*Type* — holotype in Australian National Insect Collection

***Lychnocolax mindanao*** Bohart, 1951: 98

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Mindanao, Philippine Islands (type locality); Bismark Islands, New Ireland; Irian Jaya, New Guinea; Koror, Palau Islands; Trengganu, Malaysia

*Type* — holotype and paratypes in Chicago Museum of Natural History

*Other references* — Kifune and Hirashima 1989 [distribution]

***Lychnocolax mindoro*** Bohart 1951: 97

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindoro (type locality), Dimaniang, Busunga, and Calamianes, Philippine Islands

*Type* — holotype in California Academy of Sciences, paratypes in California Academy of Sciences, Chicago Museum of Natural History, and U.S. National Museum

***Lychnocolax neobritannicus*** Kifune and Hirashima, 1989: 33

*Host* — unknown

*Specimens described* — Male

*Distribution* — Baining, New Britain

*Type* — holotype in Bishop Museum

***Lychnocolax nigriensis*** Kifune, 1987: 502

*Host* — unknown

*Specimens described* — Male

*Distribution* — Ife, Nigeria

*Type* — holotype in Entomology Laboratory, Kyushu University (no. 2598)

***Lychnocolax novaeguineae*** Kifune and Hirashima, 1989: 29

*Host* — unknown

*Specimens described* — Male

*Distribution* — New Guinea

*Type* — holotype in Bishop Museum

***Lychnocolax orientalis*** Kifune, 1981: 328

*Host* — unknown

*Specimens described* — Male

*Distribution* — Ipoh and Perak, Malaysia (type locality); Buka Island and Gagan, Solomon Islands New South Wales, Australia

*Type* — holotype in Entomology Laboratory, Kyushu University (no. 2234)

*Other references* — Kathirithamby 1993b [distribution], Kifune and Hirashima 1989 [distribution]

***Lychnocolax ovatus*** Bohart, 1951: 101

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindanao, Philippine Islands (type locality); Northern Territory, Australia; Sabah and Tawau District, North Borneo

*Type* — holotype in Chicago Museum of Natural History, paratypes in Chicago Museum of Natural History and collection of author (now at University of California, Davis)

*Other references* — Kathirithamby 1993b [distribution], Kifune and Hirashima 1989 [distribution]

***Lychnocolax palpalis*** Bohart, 1951: 102

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindanao, Philippine Islands

*Type* — holotype in Chicago Museum of Natural History

***Lychnocolax postorbis*** Bohart, 1951: 100

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindanao, Philippine Islands (type locality); Perak, West Malaysia, Sabah, North Borneo

*Type* — holotype in Chicago Museum of Natural History, paratypes in Chicago Museum of Natural History, California Academy of Sciences, and collection of author (now at University of California, Davis)

*Other references* — Kifune 1981 [distribution], Kifune and Hirashima 1989 [distribution]

***Lychnocolax redinhai*** Luna de Carvalho, 1956: 51

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dundo, Angola (type locality); Lubumbashi, Democratic Republic of Congo; Kwadaso, Ghana

*Type* — holotype in Museu Real do Congo Bega, paratypes in Museu do Dundo and collection of the author (now at Sam Houston State University)

*Other references* — Luna de Carvalho 1978 [discussion]

***Lychnocolax similis*** Chaudhuri, Gosh and Das  
Gupta, 1983: 25

*Host* — unknown

*Specimens described* — Male

*Distribution* — Arunachal Pradesh, India

*Type* — holotype in Burdwan University Entomology Collection (no. 108), paratypes in Burdwan University Entomology

*Other references* — Mazumdar and Chaudhuri 2004

***Lychnocolax simplex*** Kifune and Hirashima,  
1989: 35

*Host* — unknown

*Specimens described* — Male

*Distribution* — Vietiane Province, Laos

*Type* — holotype in Bishop Museum

***Lychnocolax solomon*** Kifune and Hirashima,  
1989: 31

*Host* — unknown

*Specimens described* — Male

*Distribution* — Guadalcanal, Solomon Islands

*Type* — holotype in Bishop Museum

***Lychnocolax vietnamicus*** Kifune and Hirashima,  
1989: 36

*Host* — unknown

*Specimens described* — Male

*Distribution* — Karyu Danar, Viet Nam

*Type* — holotype in Bishop Museum

Family **Mengeidae** Pierce, 1908

Pierce (1909) erected the family Mengeidae

to place a fossil species that had been originally named by Menge in 1866. Later, Hofeneder (1910) combined this species with those in his subgenus *Mengenillinae*, but it was again separated into its own family by Kinzelbach (1972b) who suggested that it was a sister group to the extant Mengeillidae. The phylogeny produced by Pohl and Beutel (2005) suggests that Mengeidae is a sister group of all extant Strepsiptera. Mengeidae is defined by having a free labium with labial palps, dicondylic mandibles, metacoxae that are loosely integrated in to the metathorax (may have been moveable). The veination of the hind wing is similar to Mengeillidae. Members of this family are only known from Baltic amber.

Genus ***Mengea*** Grote, 1886: 100

= *Triaena* Menge, 1866: 3 (name preoccupied)

*Type species* — *Mengea tertiaria* (Menge, 1866)

Menge (1886) described a fossil species as *Triaena tertiaria* but unfortunately the name *Triaena* was preoccupied by *Triaena* Hübner, a subgenus of *Apatela* (Lepidoptera). This unavailable name was recognized by Grote (1866) who changed the name of the fossil species to *Mengea*. Currently, both *Triaena* and *Apatela* are junior synonyms of *Acronicta* Ochsenheimer (Noctuidae), and Grote's replacement name *Mengea* is still valid. Besides the nomenclatural problems, the original description was insufficient and a complete description was not made until the work of Ulrich (1927), and even this needed to be amended by additional descriptive work by Keilbach (1939). The combination of these works gives a relatively good description of the genus and of *M. tertiaria*. A second species, also from Baltic amber was named by Kulicka (1979).

***Mengea tertiaria*** (Menge, 1866)

= *Triaena tertiaria* Menge, 1866: 3

*Host* — unknown

*Specimens described* — Male

*Distribution* — Baltic amber

*Type* — holotype deposited in Danziger

Naturundemuseum (specimen lost)

*Other references* — Hünefeld et al. 2011 [genital morphology], Keilbach 1939 [description], Kinzelbach and Pohl 1994 [review], Pohl et al. 2010 [anatomy], Ulrich 1927 [description]

*Mengea mengei* Kulicka, 1979: 109

*Host* — unknown

*Specimens described* — Male

*Distribution* — Baltic amber

*Type* — holotype in Polish Academy of Sciences Museum of the Earth, Warsaw (no. 13561)

Family **Mengenillidae** Hofeneder, 1910a: 45

Hofeneder (1910) proposed the family Mengenillidae when naming a new strepsipteran species from Algeria and recognizing that it was different enough from *Mengea* to include it in a separate family. Ulrich (1930) later placed the species in *Mengea*, *Mengenilla*, *Eoxenos* and *Triozoceros* all into Mengeidae, a classification that was maintained in the revision by Bohart (1941). However, Kinzelbach (1971a) reinstated the family Mengenillidae to hold both *Mengenilla* and *Eoxenos* and soon after included the new genus *Congoxenos* (Kinzelbach 1972b). Luna de Carvelo later added the genera *Yemengenilla* (Luna de Carvalho 1992) and *Trilineatoxenos* (Luna de Carvalho 2007). Mengenillidae includes the only extant species whose adult males and females are free-living. Additional male characters that define the family include five-segmented tarsi, a prementum fused to the hypopharynx, a rounded head capsule, presence of abdominal stigmata, six-segmented antennae, and a straight aedeagus. Females have only one genital opening.

Genus *Congoxenos* Kinzelbach, 1972b: 406

*Type species* — *Congoxenos stami* Kinzelbach, 1972b.

Kinzelbach (1972b) created the genus *Congoxenos* for a new species from central Africa. The genus is characterized by males with a six-

segmented antennae with flabella on the third and fourth segments, a strongly membranized and soft head capsule, a thin prementum and a reduced number of ommatidia. A second species was proposed by Luna de Carvalho (1982) for triungulins found parasitizing silverfish in South Africa. However, the inclusion of this species appears based only on its using a silverfish for a *Host* and occurring in Africa. No other reason is known for its placement in this genus and it is likely that the species could be misplaced in this genus.

*Congoxenos mendesi* Luna de Carvalho, 1982: 1

*Host* — *Zygentoma*

*Specimens described* — Larva

*Distribution* — South Africa

*Type Species* — Holotype and paratype in Polish Academy of Sciences

*Congoxenos stami* Kinzelbach, 1972b: 406

*Host* — unknown

*Specimens described* — Male

*Distribution* — Lubumbashi, Democratic Republic of Congo (type locality); Republic of Guinea-Bissau

*Type Species* — Holotype and paratype in Senckenberg Museum

*Other references* — Luna de Carvalho 2007[distribution]

Genus *Eoxenos* de Peyerimhoff, 1919: 162

= *Iberoxenos* Bolívar y Pieltain, 1926: 6

*Type Species* — *Eoxenos laboulbenei* de Peyerimhoff, 1919

Laboulbène (1874) first reported on what would become this genus but did not attempt to classify the specimens. The same or similar insects were later observed by de Peyerimhoff who erected a new genus and species (de Peyerimhoff 1919). Bolívar y Pieltain (1926), apparently unaware of de Peyerimhoff's description, established *Iberoxenos* for what he thought was a new species but this was later discovered to be the same as the previously



described species of *Eoxenos* (Parker and Smith 1933, 1934). This genus is characterized by having a six-segmented antennae with flabella on the third and fourth segments and a heavily sclerotized head capsule.

*Eoxenos laboulbenei* de Peyerimhoff, 1919: 162

= *Iberoxenos primitivus* Bolivar and Pieltain, 1926: 9

*Host* — *Tricholepisma aurea* (Dufour),  
*Neoasterolepisma wasmanni* (Moniez),  
*Neoasterolepisma crassipes* (Escherich)  
(Lepismatidae)

*Specimens described* — Male, female, larva

*Distribution* — France, Portugal, Spain

*Type species* — unknown

*Other references* — Bolivar Y Pieltain 1940 [description, natural history]; Carpentier 1939 [larva, natural history]; Delgado et al. 2014 [parasitoid]; Doufuss and Theodoridès 1951 [nematode parasite]; Kinzelbach 1970b [discussion]; Laboulbène 1874 [discovery]; Luna de Carvalho 1953 [discussion], 1960 [discussion], 1979 [re-description]; Nardi et al. 2013 [sperm structure]; Parker and Smith 1933 [natural history], 1934 [natural history]; Silvestri 1941b [re-description, natural history]; Troeger et al. 2019 [female morphology]

Genus *Mengenilla* Hofeneder, 1910a: 34

= *Austrostylops* Lea, 1910: 514 (by Silvestri 1946)

= *Tetrozocera* Pierce, 1918: 428 (by Silvestri 1933)

= *Eoxenos* de Peyerimhoff, 1919: 162 (in part) (by Silvestri 1933)

= *Mengenillopsis* Hofeneder, 1926: 56 (by Silvestri 1943)

*Type species* — *Mengenilla chobauti* Hofeneder, 1910a

Hofeneder (1910) described the genus *Mengenilla* to include a new species from Algeria. Published in the same year was Lea's (1910) description of the genus *Austrostylops*, although Hofeneder's description was published first and had priority. It is interesting that Lea had collected his specimens in 1895 but did not describe them for 15 years. Pierce (1918) erected the genus *Tetrozocera*

for a proposed new species, which later became a synonym of *M. chobauti*. Hofeneder (1926, 1928) also described two new species in a separate genus, *Mengenillopsis*, that later became synonyms of *M. chobauti*. Male *Mengenilla* are characterized by having six-segmented antennae with flabella on segments III-V; vertex, frons and clypeus fused to form one sclerite; robust mandibles; five-segmented tarsi that lack sensory spots; tarsal claws; and aedeagus relatively straight. Females have three or four segmented antennae; two to three segmented tarsi; tarsal claws present; and a single genital pore on the seventh abdominal segment. Keys to the genus were given by Kinzelbach (1979) and Kifune and Hirashima (1980). A key and review of the genus was provided by Cook (2007).

*Mengenilla arabica* Kinzelbach, 1979b: 331

*Host* — unknown

*Specimens described* — Male

*Distribution* — Saudi Arabia (type locality), Kuwait

*Type* — holotype in Naturhistorisches Museum Basel (Bearbeitungs – Nr. 1187)

*Other references* — Al-Houty 1989 [distribution], Cook 2007 [discussion]

*Mengenilla australiensis* Kifune and Hirashima, 1983: 157

*Host* — unknown

*Specimens described* — Male

*Distribution* — Northern Territory, Australia

*Type* — holotype in United States National Museum

*Other references* — Cook 2007 [discussion], McMahon et al. 2009 [genome]

*Mengenilla chobauti* Hofeneder, 1910a: 34

= *Tetrozocera sanchii* Pierce, 1918: 429 (by Kinzelbach 1970b)

= *Mengenillopsis theryi* Hofeneder, 1926: 56 (by Kinzelbach 1970b)

= *Mengenillopsis mauretana* Hofeneder, 1928a: 195 (by Kinzelbach 1970b)

= *quaesita* Silvestri, 1933: 2 (by Kinzelbach 1970b)

= *spinulosa* Silvestri, 1940: 614 (by Kinzelbach 1970b)

= *nigritula* Silvestri, 1941c: 58 (by Kinzelbach 1970b)  
 = *subnigrescens* Silvestri, 1941c: 58 (by Kinzelbach 1970b)

= *laevigata* Silvestri, 1941c: 58 (by Kinzelbach 1970b)  
 = *nigritula quadriarticulata* Luna de Carvalho, 1953: 2 (by Kinzelbach 1970b)

*Host* — *Ctenolepisma ciliata* (Dufour) (Zygentoma)

*Specimens described* — Male, female, larva

*Distribution* — Algeria (type locality) Andalusia, Italy, Malta, Morocco, Portugal, Sardinia, Tunisia

*Type* — holotype in collection of A. Chobaut (now in Muséum d'Histoire Naturelle, Paris)

*Other references* — Cook 2007 [discussion], Kinzelbach 1970b [distribution, discussion], Luna de Carvalho [re-description], Osswald et al 2010 [thorax morphology], Schembri 1984 [distribution], Silvestri 1941c [discussion]

*Notes* — Kinzelbach (1970b) synonymized all European species in the genus *Mengenilla*, eight previously described species, with *M. chobauti* stating that he considered the differences to be variation within the species. However, Cook (2007) pointed out that taken as a whole, this amounted to a large amount of variation and that at least some of these species would likely be reinstated with additional data. It will likely require genetic data to make sense of this situation, but until then these species should remain as synonyms of *M. chobauti*.

***Mengenilla gracilipes* (Lea, 1910)**

= *Austrostylops gracilipes* Lea, 1910: 515 (by Silvestri 1946)

*Host* — unknown

*Specimens described* — Male

*Distribution* — W. Australia

*Type* — type not designated

*Other references* — Cook 2007 [discussion], Pierce 1918, Silvestri 1946

***Mengenilla kaszabi* Kinzelbach, 1970b: 227**

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mongolia

*Type* — holotype in Ungarischen Naturwissenschaftlichen Museum, Budapest

*Other references* — Cook 2007 [discussion]

***Mengenilla leucomma* Cook, 2007: 234**

*Host* — unknown

*Specimens described* — Male

*Distribution* — Madagascar

*Type* — holotype in California Academy of Sciences

***Mengenilla marikovskii* Medvedev, 1970: 199**

*Host* — unknown

*Specimens described* — Male

*Distribution* — Southeastern Kazakhstan

*Type* — holotype in Zoological Institute, USSR Academy of Sciences, Leningrad

*Other references* — Cook 2007 [discussion]

***Mengenilla mendesi* Luna de Carvalho, 2007: 15**

*Host* — unknown

*Specimens described* — Male

*Distribution* — Tombali Prov., Republic of Guinea-Bissau

*Type* — holotype in Entomoteca do Instituto de Investigacao Cientifica Tropical em Lisboa

*Other references* — Cook 2007 [discussion]

***Mengenilla moldrzyki* Pohl, Niehuis, Gloyna, Misof and Beutel, 2012: 83**

*Host* — unknown

*Specimens described* — Male, female

*Distribution* — Tunisia

*Type* — holotype in Senchenberg Deutsches Entomologisches Institut, Munchenberg, Germany

*Other references* — Beutel and Pohl [head morphology], Koeth et al. 2012 [thorax anatomy and morphology], Pohl et al. 2013 [sperm structure], Tang et al. 2015 [genetics]

***Mengenilla orientalis* Kifune and Hirashima, 1980: 144**

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sri Lanka

*Type* — holotype in United States National

Museum

*Other references* — Cook 2007 [discussion]

***Mengenilla parvula*** Silvestri, 1941: 58

*Host* — *Ctenolepisma michaelsoni* Escherich (Zygentoma)

*Specimens described* — Male, female, larva

*Distribution* — Sicily

*Type* — unknown

*Other references* — Cook 2007 [discussion], Kinzelbach 1969c [nematode parasite]

***Mengenilla sinensis*** Miyamoto, 1960: 37

*Host* — unknown

*Specimens described* — Male

*Distribution* — North China

*Type* — holotype in Kyushu University, Fukuoka, Japan

*Other references* — Cook 2007 [discussion]

Genus ***Trilineatoxenos*** Luna de Carvalho, 2007: 14

*Type species* — *Trilineatoxenos bivari* Luna de Carvalho, 2007

The genus *Trilineatoxenos* was created by Luna de Carvalho (2007) for a single species from Guinea-Bissau that was described as new. The genus was defined by a unique set of characters that include three light lines on the thorax; short mandibles, palps and antennae; aedeagus lacking a terminal hook but slightly bent distally; and a six-segmented antennae with flabella on segments III-V.

***Trilineatoxenos bivari*** Luna de Carvalho 2007: 14

*Host* — unknown

*Specimens described* — Male

*Distribution* — Tombali Province, Republic of Guinea-Bissau

*Type* — holotype in Entomoteca do Instituto de Investigacao Cientifica Tropical em Lisboa

Genus ***Yemengenilla*** Luna de Carvalho, 1992: 19

*Type species* — *Yemengenilla vanharteni* Luna

de Carvalho, 1992

Luna de Carvalho (1992) established the genus *Yemengenilla* for a new species represented by a single specimen from Yemen. The characteristics of the genus were given as having wing venation similar to *Loania* (Corioxenidae) but with other characters similar to *Mengenilla* (Mengenillidae). This genus and species could easily fit into *Mengenilla* with future analysis.

***Yemengenilla vanharteni*** Luna de Carvalho, 1992: 19

*Host* — unknown

*Specimens described* — Male

*Distribution* — Yemen

*Type* — holotype in collection of the author (now at Sam Houston State University)

Family **Myrmecolacidae** Saunders, 1872

= Myrmecolacides Saunders, 1872: 34

= Myrmecolacidae Pierce 1908: 77

= Stichotrematoidea Hofeneder 1910b: 49 (by Luna de Carvalho 1959)

= Stichotrematidae Hofeneder 1910b: 49 (by Luna de Carvalho 1959)

Saunders (1872) established the first internal classification of the Strepsiptera when he produced an early monograph of the order, although only a small number of species were known at the time. Within this work, he established the subfamily Myrmecolacides to hold the genus *Myrmecolax*. Pierce (1908) elevated this group to a family and modified the name to Myrmecolacidae. Hofeneder (1910) added the family Stichotrematidae for female strepsipterans parasitizing Orthoptera and suggested that the Myrmecolacidae could be the males of his newly erected group, thus he placed both in the superfamily Stichotrematoidea. Luna de Carvalho (1959) showed that the suspicions of Hofeneder were correct when he found aedeagi attached to the cephalothorax of female *Stichotrema dallatorreanum*. The two families were synonymized by Kinzelbach (1972a). Characters of the Myrmecolacidae include males

with four tarsal segments, seven antennal segments and a flabellum on the third segment. All known hosts of males are ants (Hymenoptera: Formicidae) and females use Orthopteroidea as hosts. This usage of different hosts, known as heteronomy, is only known in the strepsipteran family Myrmecolacidae and a small group of parasitic Hymenoptera.

Genus *Caenocholax* Pierce, 1909: 88

*Type species* — *Caenocholax fenyesei* Pierce, 1909

The genus *Caenocholax* was established by Pierce (1910) for a new species of Myrmecolacidae that had a shield-like plate at the end of the aedeagus. This shield is often accompanied by lateral spines. Like *Stichotrema*, the hind wing has a single CuA vein and a single detached radial vein between R<sub>1</sub> and R<sub>4</sub>.

*Caenocholax barkleyi* Antell and Kathirithamby, 2016: 168

*Host* — unknown

*Specimens described* — Male

*Distribution* — Green River Formation, Colorado, USA

*Type* — holotype in Peabody Museum of Natural History

*Caenocholax broadzinski* Kathirithamby and Grimaldi, 1993: 36

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dominican amber

*Type* — holotype (AMNH DR-10-3) and paratype (AMNH DR-10-5) in American Museum of Natural History

*Caenocholax dominicensis* Kathirithamby and Grimaldi, 1993: 36

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dominican amber

*Type* — holotype in Peabody Museum of Natural

History

*Caenocholax fenyesei* Pierce, 1909: 89

= *Caenocholax brasiliensis* (Oliveira and Kogan, 1959: 221)

*Subspecies* — *Caenocholax fenyesei waloffi* Kathirithamby and Johnston, 2003: 56; *Caenocholax fenyesei texensis* Kathirithamby and Johnston, 2003: 56

*Hosts* — Male: *Camponotus planatus* Roger; *Camponotus punctulatus cruentas* Santschi; *Crematogaster laeviuscula* Mayr; *Dolichoderus bispinosus* (Oliver), *Myrmelachista zeledoni* Emery; *Pheidole fallax jelskii* Mayr; *Pheidole radoszkowskyi* Mayr; *Solenopsis invicta* Buren; Female: *Hapithus agitator* Uhler; *Macroanaxipha macilenta* (Saussure)

*Specimens described* — Male, female, larva

*Distribution* — Mexico (type locality), Argentina, Australia, Bahamas, Belize, Chile, Costa Rica, Cuba, Ecuador mainland, Galapagos Islands, Guatemala, Guyana, Nicaragua, Panama, Trinidad, United States southeast, and Venezuela

*Type* — holotype in United States National Museum (no. 10081)

*Other references* — Bohart 1941 [description, discussion]; Cook et al. 1997 [distribution, ecology], 1998 [larva, development], 2004 [distribution, *Host* association]; Cook 2000 [development], 2009 [host association, morphology]; Derr and Cook 2005 [antennal morphology]; Frost 1962 [distribution], 1963 [distribution]; Genaro and Peck 1995 [distribution]; Gillespie et al. 2005 [genetics]; Halbert et al. 2001 [host association]; Hayward et al. 2007 [cryptic species]; Johnson and Morrison 1979 [distribution]; Johnston et al. 2004 [genome]; Jones et al. 1980 [distribution]; Kathirithamby 1992b [distribution]; Kathirithamby and Hughs 2002 [host]; Kathirithamby and Johnston 1992 [re-description, host], 2003 [host, cryptic species]; Kathirithamby and Peck 1994 [distribution]; Kathirithamby et al. 2007b [host], 2007c [cryptic species], 2009 [host, distribution], 2010 [host]; Khlaf 1968 [distribution], 1969 [distribution]; Kifune 1979b [distribution]; Kifune and Brailovsky 1997 [distribution]; Maes and Kathirithamby 1993 [distribution]; Meadows 1967 [distribution]; Ogloblin 1939 [host, larva];

Reynoso-Velasco 2010 [distribution]; Teson and Remes Lenicov 1979

*Notes* — *Caenocholax fenyesei* is likely a species complex (Kathirithamby et al. 2007, Cook 2009) whose morphological and genetic boundaries are still uncertain.

*Caenocholax groehni* Kathirithamby and Hendrickx 2008: 150

*Host* — unknown

*Specimens described* — Male

*Distribution* Baltic amber

*Type* — holotype in Geologisch-Paläontologisches Institut und Museum, Hamburg (GPIH 4495)

*Caenocholax palusaxux* Antell and Kathirithamby, 2016: 169

*Host* — unknown

*Specimens described* — Male

*Distribution* — Green River Formation, Colorado, USA

*Type* — holotype in Peabody Museum of Natural History

Genus *Kronomyrmecolax* Wang, Kathirithamby and Engel 2015: 1308

*Type species* — *Kronomyrmecolax fushunicus* Wang, Kathirithamby and Engel 2015

Wang et al. (2015) established the genus *Kronomyrmecolax* to hold a fossil specimen found in Eocene amber from northeast China. This genus appears most similar to *Palaeomyrmecolax*, in that both have R<sub>2</sub> and R<sub>3</sub> hind wing veins and a relatively short antenna. However, *Kronomyrmecolax* lacks a CuP vein. *Kronomyrmecolax* is characterized by having a relatively short flabellum on the third antennal segment and a shortened apical antennal segment. Unfortunately, many characters are difficult to distinguish in the holotype, which is the only specimen known for the genus.

*Kronomyrmecolax fushunicus* Wang, Kathirithamby and Engel 2015: 1309

*Host* — unknown

*Specimens described* — Male

*Distribution* — Fushun amber

*Type* — holotype in Nanjing Institute of Geology and Paleontology, Nanjing, China

Genus *Myrmecolax* Westwood, 1861: 418

= *Parastylops* De Meijere, 1908: 188 (by Kogan 1965)

= *Afrostylops* Fox and Fox, 1964b: 754 (by Kogan 1964b)

*Type species* — *Myrmecolax nietneri* Westwood, 1861

The genus *Myrmecolax* was erected by Westwood to house a new species described in 1861. The genus *Parastylops* was established by De Meijere (1908) for a new species because of a mistake in diagnosing the antenna as having six segments, but he later corrected the error (De Meijere 1911) without recognizing the synonymy with *Myrmecolax*. Unfortunately, Pierce (1911) was unaware or failed to incorporate this change in his subsequent publications. Bohart (1941) finally clarified that *Parastylops* should be considered a synonym of *Myrmecolax*. Fox and Fox (1964) made a similar mistake in missing a small fourth antennal segment when they erected the genus *Afrostylops* thinking that it had six instead of seven antennal segments. Kogan (1964b) recognized the mistake and synonymized *Afrostylops* with *Myrmecolax*. *Myrmecolax* is known primarily by characters of the male and only two species have a known associated female. The main characters for recognition of *Myrmecolax* include a seven-segmented antennae with a flabellum on the third segment; two detached radial veins in the hind wing; and four segmented tarsi; and tarsal claws absent. A key to species of the World is provided by Luna de Carvalho (1959) and Kifune and Hirashima (1979). Luna de Carvalho (1978) added a key to African species and Roy and Hazra (2017) provided a key to Oriental species.

- Myrmecolax arcuatus*** Lu and Liu, 2014: 390  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Cuizhou Prov., China  
*Type* — holotype in Entomological Museum, China Agricultural University, Beijing, China
- Myrmecolax bifurcatus*** Kathirithamby, 1993b: 866  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Northern Territory and Queensland, Australia  
*Type* — holotype in Australian National Insect Collection
- Myrmecolax blickenstaffi*** Fox, 1967b: 2  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Suakoko, Liberia  
*Type* — holotype in United States National Museum (no. 69561)  
*Other references* — Luna de Carvalho 1978a [discussion]
- Myrmecolax borgmeieri*** Hofeneder, 1949: 153  
*Host* — *Eciton dulcium* Forel, 1912  
*Specimens described* — Male  
*Distribution* — Cordoba, Argentina  
*Type* — unknown.
- Myrmecolax chantaneae*** Kifune and Hirashima, 1979: 65  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — San Pa Tong Rice Exp. Station, Thailand; Sabah, Malaysia  
*Type* — holotype in Entomological Laboratory, Kyushu University (no. 2154), paratypes in Entomological Laboratory, Kyushu University  
*Other references* — Kathirithamby 1993a [distribution]
- Myrmecolax comparilis*** Roy and Hazra, 2017: 335  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — India  
*Type* — holotype in National Zoological Collections, Kolkata, India  
***Myrmecolax congoensis*** Silvestri, 1939: 2  
= *Myrmecolax lundensis* Luna de Carvalho, 1959: 140 (by Luna de Carvalho 1973a)  
= *Myrmecolax pseudolundensis* Luna de Carvalho, 1959: 140 (by Luna de Carvalho 1973a)  
= *Myrmecolax afurcifer* Luna de Carvalho, 1959: 141 (by Luna de Carvalho 1973a)  
= *Afrostyleps lunai* Fox and Fox, 1964b: 755 (moved to *Myrmecolax* by Kogan 1964b, synonym of *M. congoensis* by Kifune 1987)  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Democratic Republic of Congo (type locality); Angola; Suakoko, Ghana; Nigeria; Liberia  
*Type* — holotype at Historiae Naturalis Royal. Musei Belgium  
*Other references* — Kifune 1987 [distribution]; Luna de Carvalho 1959 [additional specimens], 1967 [additional specimens], 1972a [description], 1978a [discussion]
- Myrmecolax culionensis*** Bohart, 1951: 92  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Calamianes, Philippine Islands  
*Type* — holotype in Chicago Museum of Natural Science
- Myrmecolax danielssoni*** Kathirithamby, 1994b: 552  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Sabah, Malaysia  
*Type* — holotype in Zoological Museum, Lund, Sweden

***Myrmecolax flagellatus*** (De Meijere, 1908)

= *Parastyllops flagellatus* De Meijere 1908: 189 (by Kogan 1965)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Semarang, Java, Indonesia

*Type* — holotype in Ungarischen Nationalmuseums in Budapest

***Myrmecolax furcatus*** Bohart, 1951: 90

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindanao and Busuanga, Philippine Islands (type locality); Queensland, Australia; Sarawak, Malaysia

*Type* — holotype in Chicago Museum of Natural History, paratypes in California Academy of Sciences, Chicago Museum of Natural History, and U.S. National Museum (1 paratype from Luna de Carvalho collection at Sam Houston State University)

*Other references* — Kathirithamby 1993b [distribution], Kifune and Hirashima 1989, Kinzelbach 1971a

***Myrmecolax genitalis*** Kifune and Hirashima, 1989: 38

*Host* — unknown

*Specimens described* — Male

*Distribution* — Syaboury, Laos (type locality); Pahang, W. Malaysia

*Type* — holotype in Bishop Museum

***Myrmecolax glaesi*** Kinzelbach, 1983: 31

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dominican amber

*Type* — holotype in Sammlung des Geologisch-Paläontologischen Instituts der Universität Hamburg (Nr. 1232)

*Other references* — Kinzelbach and Pohl 1994 [discussion]

***Myrmecolax incautus*** Oliveira and Kogan, 1959: 227

*Host* — *Pachycondyla apicalis* (Latrielle), *Pachycondyla verenae* Forel; Female host *Stagmatoptera* sp. (Mantodea)

*Specimens described* — Male, female, larva

*Distribution* — Minas Gerais, Brazil; French Guiana

*Type* — holotype in Instituto Oswaldo Cruz

*Other references* — Kathirithamby et al. 2010b [female, distribution], Luna de Carvalho 1978, Oliveira and Kogan 1963 [description, distribution]

***Myrmecolax kpelle*** Fox, 1967b: 8

*Host* — unknown

*Specimens described* — Male

*Distribution* — Suakoko, Liberia

*Type* — holotype in United States National Museum (no. 69565)

*Other references* — Luna de Carvalho 1978a [discussion]

***Myrmecolax leleupi*** Pasteels, 1956: 117

*Host* — unknown

*Specimens described* — Male

*Distribution* — Democratic Republic of Congo (type locality); Angola; Ghana; Sudan

*Type* — holotype in Musee Royal du Congo

*Other references* — Luna de Carvalho 1959 [discussion], 1967 [additional specimens], 1978a [discussion]

***Myrmecolax liberiensis*** Fox 1967b: 3

*Host* — unknown

*Specimens described* — Male

*Distribution* — Suakoko, Liberia

*Type* — holotype in United States National Museum (no. 69562)

***Myrmecolax longipalpis*** Kogan and Oliveira, 1964: 465

*Host* — unknown

*Specimens described* — Male

*Distribution* — Normandy Island, Papua New Guinea

*Type* — Holotype in L. J. Brass Collection, U.S. National Museum

*Other references* — Luna de Carvalho 1978a [discussion]

*Myrmecolax longipes* Luna de Carvalho 1972a: 14

*Host* — unknown

*Specimens described* — Male

*Distribution* — Nigeria

*Type* — holotype in Museu do Dundo

*Other references* — Luna de Carvalho 1978a

*Myrmecolax malayensis* Kathirithamby, 1993a: 193

*Host* — unknown

*Specimens described* — Male

*Distribution* — Sabah, Malaysia

*Type* — holotype in Zoological Museum, Lund, Sweden

*Myrmecolax mano* Fox 1967b: 5

*Host* — unknown

*Specimens described* — Male

*Distribution* — Suakoko, Liberia

*Type* — holotype in United States National Museum (no. 69563)

*Myrmecolax mymecinus* Kifune, 1987: 504

*Host* — unknown

*Specimens described* — Male

*Distribution* — Nigeria

*Type* — holotype in Entomology Laboratory, Kyushu University (no. 2599), paratypes at Entomology Laboratory, Kyushu University

*Myrmecolax nietneri* Westwood, 1861: 418

*Host* — first reported as *Formica* sp. (*Camponotus maculates-mitis* group)

*Specimens described* — Male

*Distribution* — Sri Lanka

*Type* — no type designated

*Other references* — Dover 1927 [distribution], Pierce 1909, 1911, 1918

*Myrmecolax odontognathus* Kogan and Oliveira, 1964: 462

*Host* — unknown

*Specimens described* — Male

*Distribution* — Peria Creek, Kwagiro River, Papua, New Guinea (type locality); Santa Ysabel, Nggela, and Guadacanal, Solomon Islands; New Britain; Papua, Irian Jaya, and Biak Island, New Guinea; Luzon, Philippine Islands; Sabah and Sarawak, Malaysia

*Type* — holotype in United States National Museum

*Other references* — Kathirithamby 1994b [distribution], Kifune and Hirashima 1989 [distribution]

*Myrmecolax ogloblini* Luna de Carvalho 1973b: 2

= *Mantidoxenos argentium* Ogloblin 1939 (not described)

*Host* — Male host reported as *Camponotus punctulatus cruentatus* Forel (not a valid name but is likely *Camponotus punctulatus cruentus* Santschi); Female host reported as *Acanthiotespis maculatus* (Saussure) (not a valid species)

*Specimens described* — Male, female, 1<sup>st</sup> larva

*Distribution* — Misiones, Argentina

*Type* — Museu de La Plata, paratypes from Luna de Carvalho collection at Sam Houston State University

*Myrmecolax pachygnathus* Lu and Liu, 2014: 386

*Host* — unknown

*Specimens described* — Male

*Distribution* — Guizhou Prov., China

*Type* — holotype in Entomological Museum, China Agricultural University, Beijing, China

*Myrmecolax parva* Fox, 1967b:6

*Host* — unknown

*Specimens described* — Male



*Distribution* — Suakoko, Liberia

*Type* — holotype in United States National Museum (no. 69564), paratypes at United States National Museum

*Other references* — Luna de Carvalho 1978a [discussion]

***Myrmecolax philippinensis*** Bohart, 1941: 120

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindanao, Philippine Islands

*Type* — holotype in United States National Museum

*Other references* — Bohart 1951

***Myrmecolax pierci*** (Chattopadhyay and Chaudhuri, 1980) **n. comb.**

= *Caenocholax pierci* Chattopadhyay and Chaudhuri 1980: 490

*Host* — unknown

*Specimens described* — Male

*Distribution* — West Bengal, India

*Type* — holotype in Burdwan University Entomology (no. 90)

*Notes* — Chattopadhyay and Chaudhuri (1980) placed this species in *Caenocholax* but it is obvious from the description that it should be in *Myrmecolax*. The aedeagus is without lateral projections that produce a shield, and there are two detached radial veins and a single cubital vein in the hind wing. These are cardinal characters for *Myrmecolax* and therefore the new status is herein designated.

***Myrmecolax plantipes*** (Chaudhuri, Das Gupta, and Chatterjee, 1978)

= *Parastylops plantipes* Chaudhuri, Das Gupta and Chatterjee, 1978: 387 (by Chaudhuri et al. 1983)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Arunachal Pradesh, India

*Type* — holotype in Burdwan University Entomology (no. 54)

***Myrmecolax rossi*** Bohart, 1951: 51

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindora, Calamianes, and Mindanao, Philippine Islands (type locality); Perak, Malaysia; Perupuk, Sumatra Lantau, Hong Kong; Queensland Northern Territory, and Western Australia, Australia

*Type* — holotype in California Academy of Sciences, paratypes California Academy of Sciences, Chicago Museum of Natural History, United States National Museum, and Bohart Collection (Bohart Museum, now at University of California, Davis and paratype from Luna de Carvalho collection via Bohart collection at Sam Houston State University)

*Other references* — Kathirithamby 1993b [distribution]; Kifune 1981 [distribution], 1983b [distribution]; Kifune and Hirashima 1989 [distribution]; Kinzelbach 1971a

***Myrmecolax vardoni*** Paulian, 1959: 4

*Specimens described* — Male

*Distribution* — Madagascar

*Type* — holotype in Museum d'Histoire naturelle de Paris

*Other references* — Luna de Carvalho 1978a [discussion]

Genus ***Palaeomyrmecolax*** Kulicka, 2001: 7

*Type species* — *Palaeomyrmecolax succineus* Kulicka, 2001

Kulicka (2001) erected the genus *Palaeomyrmecolax* for three new species found in Baltic amber. The genus is only known from males in Baltic amber. Characters of *Palaeomyrmecolax* include long narrow maxillae with a palp that is sharp distally; a seven-segmented antennae with the seventh segment more than three times as long as the sixth and a flabellum on the third segment that reaches the end of the seventh segment; a hook-shaped aedeagus; and a hind wing with R<sub>2</sub> distally thickened and MA<sub>1</sub> absent.

***Palaeomyrmecolax giecewiczii*** Kulicka, 2001: 9*Host* — unknown*Specimens described* — Male*Distribution* — Baltic amber*Type* — holotype in Museum of the Earth, Polish Academy of Sciences (inv. No. 15119)***Palaeomyrmecolax gracilis*** Kulicka, 2001: 10*Host* — unknown*Specimens described* — Male*Distribution* — Baltic amber*Type* — holotype in Museum of the Earth, Polish Academy of Sciences (inv. No. 19593)***Palaeomyrmecolax neotropicallis*** (Kogan and Poinar, 2010)= *Stylops neotropicallis* Kogan and Poinar, 2010: 228 (by Kogan et al. 2015)*Host* — unknown*Specimens described* — Male*Distribution* — Dominican amber*Type* — holotype in George Poinar collection, Corvallis, Oregon*Other references* — Kogan et al. 2015 [revision]***Palaeomyrmecolax succineus*** Kulicka, 2001: 7*Host* — unknown*Specimens described* — Male*Distribution* — Baltic amber*Type* — holotype in Museum of the Earth, Polish Academy of Sciences (inv. No. 16321)Genus ***Stichotrema*** Hofeneder, 1910b= *Caenocholax* Pierce, 1909: 88 (in part) (by Kinzelbach 1971a)= *Mantidoxenos* Ogloblin, 1939: 1277 (in part) (by Kinzelbach 1972a)= *Rhipidocolax* Bohart, 1951: 94 (by Luna de Carvalho 1959)*Type species* — *Stichotrema dallatorreanum* Hofeneder, 1910

Hofeneder (1910b) established the genus

*Stichotrema* for a female strepsipteran parasitizing a longhorn grasshopper. The first males described that would become members of *Stichotrema* were placed in either the genus *Caenocholax* or the genus *Rhipidocolax*. *Caenocholax* held those species with a single detached radial vein in the hind wing and *Rhipidocolax* included those without a detached radial vein. Luna de Carvalho recognized that these males should be in the genus *Stichotrema* when the first association was made with a male and female of the genus, and since *Stichotrema* had priority, it became the genus of the previously described males in *Caenocholax* and *Rhipidocolax*, except for *C. fenyesi*, which remained in its original genus due to its uniquely shaped aedeagus. A second genus, *Mantidoxenos*, was inferred for a female that was later synonymized by Kinzelbach (1972a) into *Stichotrema*. Males of *Stichotrema* have the characters of the family and are further characterized by having an aedeagus that is hooked but has no lateral spines and a hind wing with one or no detached radial vein. A key to Australian species is provided by Kathirithamby (1993b); a key to species of Africa is given by Luna de Carvalho (1978a); a key to Oriental species was provided by Roy and Hazra (2017); and a key to species of the World is given by Lund de Carvalho (1959), as part of *Caenocholax*, and Kifune and Hirashima (1980).

***Stichotrema acutipennis*** (Kogan and Oliveira, 1964)= *Caenocholax* (*Rhipidocolax*) *acutipennis* Kogan and Oliveira, 1964: 467 (by Kinzelbach 1971a)= *Caenocholax* (*Rhipidocolax*) *acutipennis* Kogan and Oliveira, 1964: 467 (by Kinzelbach 1971a)= *Stichotrema acutipennis* (Kogan and Oliveirs, 1964) (in Kinzelbach 1971a corrected by Kifune and Hirashima 1983)*Host* — unknown*Specimens described* — Male*Distribution* — Papua and Irian Jaya, New Guinea (type locality); Sabah, Borneo; North Borneo; Sri Lanka; Queensland, Australia*Type* — holotype in American Museum of Natural History*Other references* — Kathirithamby 1993b [discussion, distribution]; Kifune and Hirashima 1983 [distribution discussion], 1989 [distribution];

Luna de Carvalho 1972

*Notes* — Kogan and Oliveira treated Bohart's genus *Rhipidocolax* as a subgenus of *Caenocholax* and first designated this species as *Caenocholax (Rhipidocolax) acutipennis*. However, this was the only time the specific epithet was *acutipennis* where in the rest of the description it was named *acutipenis*. Kinzelbach (1971a) moved this species to the genus *Stichotrema*, retaining the first spelling of *acutipennis*. Kifune and Hirashima (1983) noted the spelling discrepancies and adopted the latter, which was allowed as the correct name referring to the original meaning according to Article 32 of the International Code of Zoological nomenclature. Luna de Carvalho (1973c) proposed that *S. acutipenis* was the male of *S. dallatorreanum* but this was refuted by Kifune and Hirashima (1989).

***Stichotrema ambiguum*** Kifune and Hirashima, 1980: 148

*Host* — unknown

*Specimens described* — Male

*Distribution* — Koslanda, Sri Lanka

*Type* — holotype in United States National Museum

***Stichotrema angolensis*** (Luna de Carvalho, 1956)

= *Caenocholax angolensis* Luna de Carvalho, 1956: 47 (by Kinzelbach 1971a)

= *Stichotrema boharti* cited in Luna De Carvalho 1972b (by Luna de Carvalho 1978a)

*Host* — *Crematogaster* sp.

*Specimens described* — Male

*Distribution* — Dundo, Angola; Lubumbashi, Democratic Republic of Congo

*Type* — holotype in collection of the author (now at Sam Houston State University)

*Other references* — Luna de Carvalho 1972b [distribution], 1978a [discussion]

*Notes* — Luna de Carvalho (1972b) placed a larval male and cephalotheca as members of *Stichotrema boharti* but later moved these specimens to *S. angolensis* (Luna de Carvalho 1978a).

***Stichotrema anomalum*** (Luna de Carvalho, 1959)

= *Caenocholax anomalus* Luna de Carvalho, 1959: 151 (by Kinzelbach 1971a)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dundo, Angola

*Type* — Museu Real do Congo Belga

*Other references* — Luna de Carvalho 1978

***Stichotrema asahinai*** Hirashima and Kifune 1974a: 76

*Host* — *Mecopoda elongata* (Linneaus, 1758)

*Specimens described* — Female, 1<sup>st</sup> instar

*Distribution* — Okinawa

*Type* — holotype in Kyushu University (no. 2032), paratypes Kyushu University

*Other references* — Hirashima and Kifune 1974b [description], Honda 1977 [redescription, larva]

***Stichotrema barrosmachadoi*** (Luna de Carvalho, 1956)

= *Caenocholax barrosmachadoi* Luna de Carvalho, 1956: 45 (by Kinzelbach 1971a)

= *Caenocholax vilhenai* Luna de Carvalho, 1956: 46 (moved to *Stichotrema* by Kinzelbach 1971a)

= *Stichotrema vilhenai* (Luna de Carvalho, 1956) (by Luna de Carvalho 1978)

= *Mantidoxenos* of Angola in Luna de Carvalho, 1967 (synonymized with *Stichotrema* by Kinzelbach 1971a, made synonym of *S. barrosmachadoi* by Luna de Carvalho 1978a)

*Host* — Male host — *Crematogaster* sp.; Female host *Sphodromantis lineola pinguis* Roy

*Specimens described* — Male, female, larvae

*Distribution* — Dundo, Mussungue, and Lusamba, Angola

*Type* — holotype in Museu Real do Congo Belga

*Other references* — Luna de Carvalho 1959 [additional specimens], 1972b [larva], 1978

*Notes* — *Caenocholax barrosmachadoi* was named for male specimens (Luna de Carvalho 1956) that were later associated with female specimens named as *C. vilhenai* (Luna de Carvalho 1972). At that time, this became the only myrmecolacid species

where both male and female were known. Luna de Carvalho (1967) noted a larva from a mantid that he suggested was related to a species first placed in *Mantidoxenos* by Ogloblin (1939) (later transferred to *Myrmecolax*). Kinzelbach placed *Mantidoxenos* in *Stichotrema* however the origin of *Mantidoxenos* was *M. argentinum*, which had not been formally described and was later described and given the name *Myrmecolax ogloblini*. Luna de Carvalho (1978a) later placed this larva as a member of *S. barrosmachadoi*.

***Stichotrema bassa*** (Fox, 1967b)

= *Caenocholax bassa* Fox, 1967b: 10 (by Kinzelbach 1971a)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Suakoko, Liberia

*Type* — holotype in United States National Museum (no. 69566), paratypes in United States National Museum

*Other references* — Luna de Carvalho 1978 [discussion]

***Stichotrema beckeri*** (Oliveira and Kogan, 1959)

= *Caenocholax beckeri* Oliveira & Kogan, 1959: 224 (by Kinzelbach 1971a)

= *Caenocholax wygodzinski* Oliveira and Kogan, 1959: 225 (moved to *Stichotrema* by Kinzelbach 1971a)

= *Stichotrema wygodzinski* (Oliveira and Kogan, 1959) (by Luna de Carvalho 1978b)

= *Stichotrema* aff. *beckeri* Kinzelbach, 1983

*Host* — *Camponotus crassus* Mayr; *Camponotus punctulatus cruenta* Santschi; *Pseudomyrmex acanthobia virgo* Santschi; *Solenopsis richteri* Forel

*Specimens described* — Male

*Distribution* — Brazil (type locality); Argentina; French Guyana; Florida USA; Dominican amber

*Type* — holotype in Instituto Oswaldo Cruz

*Other references* — Kinzelbach 1983 [discussion]; Luna de Carvalho 1978b [description], 1981b [distribution]; Teson and Remes Lenicov 1979

***Stichotrema boharti*** (Luna de Carvalho, 1956)

= *Rhipidocolax boharti* Luna de Carvalho, 1956 (moved to *Caenocholax* by Luna de Carvalho 1959)

= *Caenocholax boharti* (Luna de Carvalho, 1956 (by Bohart 1959))

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dundo, Angola; Ghana

*Type* — holotype in Museu Real do Congo Belga

*Other references* — Luna de Carvalho 1973a [distribution], 1978a

*Notes* — Luna de Carvalho (1956) originally placed this species in *Rhipidocolax* but then synonymized *Rhipidocolax* under *Caenocholax*, making *R. pasteelsi* then *C. pasteelsi* (Luna de Carvalho 1959). Kinzelbach (1971a) later moved this species to the genus *Stichotrema*.

***Stichotrema capito*** Kifune and Hirashima, 1989: 42

*Host* — unknown

*Specimens described* — Male

*Distribution* — Fiji

*Type* — holotype in Bishop Museum

***Stichotrema carnatus*** Cook, 2016: 66

*Host* — unknown

*Specimens described*: Male

*Distribution* — Costa Rica

*Type* — holotype in Strickland Entomological Museum, Department of Biological Sciences, University of Alberta; paratypes in Strickland Entomological Museum, Department of Biological Sciences, University of Alberta and Sam Houston State University

***Stichotrema ceylonense*** Kifune and Hirashima, 1980: 147

*Host* — unknown

*Specimens described* — Male

*Distribution* — Koslanda, Sri Lanka; Sabah, Borneo, Malaysia

*Type* — holotype and paratype in United States National Museum

*Other references* — Kathirithamby 1993a [distribution]

***Stichotrema dallatorreanum*** Hofeneder, 1910: 47  
*Host* — *Sexava nubilis* (Stål); *Segestidae novaeguineae* (Brancsik); *Segestidea decorates* Redtenbacher; *Segestidea defoliaria defoliaria* (Uvarov)

*Specimens described* — Female

*Distribution* — Papua New Guinea

*Type* — holotype in Senchenbergishen Museum in Frankfurt

*Other references* — Douroupi et al. 2001 [chorion chemistry, host interaction]; Kathirithamby 1998 [host association], 2000 [morphology], 2001 [larval host interaction]; Kathirithamby et al. 1998 [biological control agent], 2001 [host association] 2003 [host association]; Maeta et al. 1997 [reproduction]; Solulu et al. 1998 [biological control]; Young 1987a [life history, host association], 1987b [host association]

*Notes* — Luna de Carvalho (1973c) proposed that *S. acutipenis* be synonymized with *S. dallatorreanum* due to his thinking that these were the male and female respectively of the same species. A convincing argument was made by Kifune and Hirashima (1989) to not accept this synonymy and therefore the two species remain separate.

***Stichotrema davao*** (Bohart, 1951)

= *Caenocholax davao* Bohart, 1951: 93 (by Kinzelbach 1971a)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindanao, Philippine Islands (type locality); Sabah, Borneo, Malaysia

*Type* — holotype in Chicago Museum of Natural History, paratype in collection of author (now at University of California, Davis)

*Other references* — Kathirithamby 1993a [distribution]

***Stichotrema dominicanum*** Kinzelbach and Pohl, 1994: 64

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dominican amber

*Type* — holotype in collection of J. Scheven, Hagen-Hohenlimburg

***Stichotrema eocaenicum*** (Haupt, 1950)

= *Pseudococcites eocaenicus* Haupt, 1950: 47

*Host* — unknown

*Specimens described* — Larva

*Distribution* — Eocene brown coal

*Type* — unknown

*Other references* — Kinzelbach and Lutz 1985 [description, discussion], Kinzelbach and Pohl 1994 [discussion]

***Stichotrema ferenczi*** Luna de Carvalho, 1973a: 50

*Host* — unknown

*Specimens described* — Male

*Distribution* — Kwadaso, Ghana

*Type* — holotype in Hungarian Museum of Natural History, paratype in collection of author (now at Sam Houston State University)

*Other references* — Luna de Carvalho 1978a [discussion]

***Stichotrema fijiense*** Kifune and Hirashima, 1989: 40

*Host* — unknown

*Specimens described* — Male

*Distribution* — Fiji

*Type* — holotype in Bishop Museum

***Stichotrema foxe*** Luna de Carvalho, 1972a: 7

*Host* — unknown

*Specimens described* — Male

*Distribution* — Ife, Nigeria; Kumasi (type locality), Kwadaso, Ghana

*Type* — holotype in Museu do Dundo, paratypes in the American Museum of Natural History and collection of author (now at Sam Houston State University)

*Other references* — Luna de Carvalho 1973a [distribution], 1978a [discussion]

***Stichotrema gressitti*** Kifune and Hirashima, 1989:  
46

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — New Guinea  
*Type* — holotype in Bishop Museum

***Stichotrema goliass*** (Luna de Carvalho, 1956)

= *Rhipidocolax goliass* Luna de Carvalho, 1956: 49 (moved to *Caenocholax* by Luna de Carvalho 1959)  
= *Caenocholax goliass* (Luna de Carvalho, 1959) (by Kinzelbach 1971a)  
= *Caenocholax lindbergi* Luna de Carvalho 1959: 150

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Dundo, Angola (type locality); Macenta, Guinea; Lubumbashi, Democratic Republic of Congo; Kwadaso, Ghana  
*Type* — holotype in collection of author (now at Sam Houston State University)  
*Other references* — Luna de Carvalho 1973a [distribution], 1978 [discussion]

***Stichotrema harleyi*** (Fox, 1967b)

= *Caenocholax harleyi* Fox, 1967b: 11 (by Kinzelbach 1971a)

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Suakoko, Liberia  
*Type* — holotype in United States National Museum (no. 69567)  
*Other references* — Luna de Carvalho 1978a [discussion]

***Stichotrema hoberlandti*** (Luna de Carvalho, 1956)

= *Rhipidocolax hoberlandti* Luna de Carvalho, 1956: 48 (Moved to *Caenocholax* by Luna de Carvalho 1959)  
= *Caenocholax hoberlandti* (Luna de Carvalho, 1956) (by Kinzelbach 1971a)

*Host* — unknown  
*Specimens described* — Male

*Distribution* — Dundo, Angola

*Type* — holotype in Museu Real do Congo Belga  
*Other references* — Luna de Carvalho 1978a [discussion]

*Notes* — Luna de Carvalho (1956) originally placed this species in *Rhipidocolax* but then synonymized *Rhipidocolax* under *Caenocholax*, making *R. pasteelsi* then *C. pasteelsi* (Luna de Carvalho 1959). Kinzelbach (1971a) later moved this species to the genus *Stichotrema*.

***Stichotrema jeyasothiae*** Kathirithamby, 2001: 194  
(in Kathirithamby et al. 2001)

*Host* — *Phyllophorella subinermis* Karny, 1924  
*Specimens described* — Female, 1<sup>st</sup> instar  
*Distribution* — West New Britain, Papua New Guinea  
*Type* — holotype and paratypes in Oxford University Museum of Natural History

***Stichotrema kaszabi*** Luna de Carvalho, 1973a: 46

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Kumasi, Ghana  
*Type* — holotype in Hungarian Museum of Natural History, paratypes in American Museum of Natural History and the collection of the author (now at Sam Houston State University)  
*Other references* — Luna de Carvalho 1978a [discussion]

***Stichotrema kathirithambyi*** Cook, 2014b: 67

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Dominican Republic  
*Type* — holotype in Carnegie Museum of Natural History

***Stichotrema krombeini*** Kifune and Hirashima, 1980: 149

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Koslanda, Sri Lanka (type locality); Sabah, Borneo, Malaysia

- Type* — holotype at United States National Museum [distribution]  
*Other references* — Kathirithamby 1993a [distribution]
- Stichotrema kuranda*** Kathirithamby, 1993b: 870  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Queensland, Australia  
*Type* — holotype in Australian National Insect Collection
- Stichotrema laticeps*** Kifune and Hirashima, 1989: 43  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — New Ireland  
*Type* — holotype in Bishop Museum
- Stichotrema longiflagellatum*** Kathirithamby, 1993a: 196  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Sabah, Borneo, Malaysia  
*Type* — holotype in Zoological Museum, Lund, Sweden
- Stichotrema malayanum*** Kifune, 1981: 331  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Perak, West Malaysia; Sabah, Borneo, Malaysia  
*Type* — Kyushu University no. 2235  
*Other references* — Kathirithamby 1993a [distribution]
- Stichotrema mendolong*** Kathirithamby, 1993a: 197  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Sabah, Borneo, Malaysia  
*Type* — holotype in Zoological Museum, Lund, Sweden  
*Other references* — Kathirithamby 1994b
- [distribution]  
***Stichotrema mexicanum*** Kifune and Brailovsky, 1987: 135  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Veracruz, Mexico  
*Type* — holotype deposited in Universidad Nacional Autónoma de México (now lost)
- Stichotrema minae*** Makhan and Ezzatpanah 2011: 1  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Suriname  
*Type* — holotype and paratypes reported to be deposited in University of Suriname, Department of Entomology (never deposited)  
*Other references* — Cook 2014  
*Notes* — Cook (2014) stated that the description of this species is inadequate and from the minimal description that was given, it is most likely not even is the genus *Stichotrema*. This inadequate description likely will leave this species as *nomen dubium*.
- Stichotrema minor*** Kifune and Hirashima, 1980: 152  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Koslanda, Sri Lanka  
*Type* — holotype in United States National Museum
- Stichotrema nasutum*** (Lund de Carvalho, 1967) = *Caenocholax nasutus* Luna de Carvalho, 1967: 35 (by Kinzelbach 1971a)  
*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Dundo, Angola  
*Type* — holotype in Museu do Dundo  
*Other references* — Luna de Carvalho 1978a [discussion]  
*Notes* — When moving this species to

*Stichotrema*, Kinzelbach (1971a) also changed the spelling of the specific epithet for gender agreement.

***Stichotrema pasteelsi*** (Luna de Carvalho, 1956)

- = *Rhipidocolax pasteelsi* Luna de Carvalho, 1956: 48 (placed in *Caenocholax* by Luna de Carvalho 1959)  
 = *Caenocholax pasteelsi* (Luna de Carvalho, 1956) (in Luna de Carvalho, 1959, moved by Kinzelbach 1971a to *Stichotrema*)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dundo, Angola

*Type* — holotype in Museu real do Congo Belga, paratypes in Museu do Dundo and collection of author (now at Sam Houston State University)

*Other references* — Luna de Carvalho 1959 [additional specimens], 1978a [discussion]

*Notes* — Luna de Carvalho (1956) originally placed this species in *Rhipidocolax* but then synonymized *Rhipidocolax* under *Caenocholax*, making *R. pasteelsi* then *C. pasteelsi* (Luna de Carvalho 1959). Kinzelbach (1971a) later moved this species to the genus *Stichotrema*.

***Stichotrema rectipennis*** Luna de Carvalho, 1973a:

42

*Host* — unknown

*Specimens described* — Male

*Distribution* — Kwadaso, Ghana

*Type* — holotype in Hungarian Museum of Natural History, paratype in collection of the author (now at Sam Houston State University)

*Other references* — Luna de Carvalho 1978a [discussion]

***Stichotrema retrorsum*** (Bohart, 1951)

- = *Rhipidocolax retrorsus* Bohart, 1951: 94 (moved to *Caenocholax* by Luna de Carvalho 1959)  
 = *Caenocholax retrorsus* (Bohart, 1951) (by Kinzelbach 1971a)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Mindanao, Philippine Islands (type locality); Perak, West Malaysia Siptang, Sabah, Borneo, North Borneo, Malaysia

*Type* — holotype in Chicago Museum of Natural History, metatype in Chicago Museum of Natural History

*Other references* — Kathirithamby 1993a [distribution], Kifune 1981 [distribution, discussion], Kifune and Hirashima 1989 [distribution]

*Note* — A spelling change was made from *retorsus* to *retrorsum* by Kinzelbach (1971a) due to gender agreement.

***Stichotrema rhipidocolaxoides***

(Luna de Carvalho, 1959)

- = *Caenocholax rhipidocolaxoides* Luna de Carvalho, 1959: 147 (by Kinzelbach 1971a)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Dundo, Angola (type locality); Kwadaso, Ghana; Lubumbashi, Democratic Republic of Congo

*Type* — holotype in Museu Real do Congo Belga, paratypes in Museu do Dundo and collection of author (now at Sam Houston State University)

*Other references* — Luna de Carvalho 1973a [distribution], 1978b [drawing]

***Stichotrema robertsoni*** Kathirithamby, 1991: 11

*Host* — *Pheidole* sp.

*Specimens described* — Male

*Distribution* — Natal, South Africa

*Type* — holotype in South African Museum

***Stichotrema sagax*** Roy and Hazra, 2017: 338

*Host* — unknown

*Specimens described* — Male

*Distribution* — North Borneo, Malaysia

*Type* — holotype in Bishop Museum

***Stichotrema silvaticum*** Kifune and Hirashima, 1989: 44

*Host* — unknown

*Specimens described* — Male

*Distribution* — India

*Type* — holotype and paratype in National



Zoological Collections, Kolkata, India

***Stichotrema simile*** Kifune and Hirashima, 1980:  
150

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Koslanda, Sri Lanka; Sabah, Borneo, Malaysia  
*Type* — holotype in United States National Museum, paratypes in United States National Museum and Kyushu University  
*Other references* — Kathirithamby 1993a [distribution]

***Stichotrema szekessyi*** (Luna de Carvalho, 1959)

= *Caenocholax szekessyi* Luna de Carvalho, 1959:  
148 (by Kinzelbach 1972a)

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Dundo, Angola (type locality); Kumasi and Kwadaso, Ghana  
*Type* — holotype in Museu Real do Congo Belga, paratypes in Museu do Dundo and author's collection (now at Sam Houston State University)  
*Other references* — Luna de Carvalho 1973a [distribution], 1978 [discussion]

***Stichotrema triangulum*** Pohl and Kinzelbach,  
1995a: 199

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Baltic amber  
*Type* — holotype in collection of F. Kernegger, Hamburg (current location unknown)  
*Notes* — Engel et al. 2016 placed this species under *Palaeomyrmecolax* within a table but made no comment about revising it into this new genus. Until it is formally synonymized, *S. triangulum* should remain in *Stichotrema*.

***Stichotrema trilobulatum*** Brailovsky, 1974

= *Stichotrema triblobulata* Brailovsky. 1974: 169

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Mexico  
*Type* — holotype deposited in Universidad Nacional Autónoma de México (now lost)  
*Other references* — Kifune and Brailovsky 1987 [distribution, discussion]  
*Notes* — The spelling of the specific epithet was changed by Kifune and Brailovsky for gender agreement.

***Stichotrema trinidadensis*** (Guenther, 1949)  
**n comb.**

= *Caenocholax trinidadensis* Guenther, 1949: 49 (moved to *Myrmecolax* by Kinzelbach 1971a)  
= *Myrmecolax trinidadensis* (Guenther, 1949)

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Trinidad  
*Type* — holotype in Museo Mat. Pragensi and British Museum  
*Notes* — Kinzelbach (1971a) synonymized most of the species that were previously in *Caenocholax* with *Stichotrema* although he moved *C. trinidadensis* into *Myrmecolax*. From Guenther's (1949) figures, it is clear that it should have been moved to *Stichotrema*.

***Stichotrema waterhousi*** Kathirithamby, 2001 (in  
Kathirithamby et al. 2001)

*Host* — *Paracaedicia* sp. (Tettigoniidae)  
*Specimens described* — Female and 1<sup>st</sup> instar  
*Distribution* — West New Britain and Oro, Papua New Guinea  
*Type* — holotype and paratypes in Oxford University Museum of Natural History

***Stichotrema webbiense*** Kathirithamby, 1993b: 871

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Queensland, Australia  
*Type* — holotype in Australian National Insect Collection

***Stichotrema weitschati*** Kinzelbach and Pohl,  
1994: 60

*Host* — unknown

*Specimens described* — Male

*Distribution* — Baltic amber

*Type* — holotype in Hamburg Museum (no. SGPIHM 3117)

*Other references* — Pohl and Kinzelbach 1995a [discussion]

*Notes* — Engel et al. 2016 placed this species under *Palaeomyrmecolax* within a table but made no comment about revising it into this new genus. Until it is formally synonymized, *S. weitschati* should remain in *Stichotrema*.

***Stichotrema yasumatsui*** Kifune, 1983b: 84

*Host* — *Euscyrthus* sp.

*Specimens described* — Female, 1<sup>st</sup> instar

*Distribution* — Thailand

*Type* — holotype in Department of Agriculture, Bangkok, Thailand, paratypes in Department of Agriculture, Bangkok, Thailand and Kyushu University, Japan

Family **Phthanoxenidae** Engel and Huang, 2016:  
161

Engel and Huang (2016) established the family Phthanoxenidae for a new species discovered in Cretaceous amber. Only the male is known. Characteristics of the family include having an eight-segmented antennae with flabellum on segments III-VII; antennal bases anterior and between eyes; long sclerotized mandibles; with three detached radial veins, two MA veins and two CuA veins in the hind wing; and five-segmented tarsi.

Genus ***Phthanoxenos*** Engel and Huang, 2016: 163

*Type Species* — *Phthanoxenos nervosus* Engel and Huang, 2016

Being that the genus *Phthanoxenos* includes the only species in the family Phthanoxenidae, its characters are defined by the characters of the family.

The only known specimen is in Cretaceous amber.

***Phthanoxenos nervosus*** Engel and Huang, 2016:  
163 (in Engel et al. 2016)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Myanmar Cretaceous amber

*Type* — holotype in Chinese Academy of Sciences

Family **Protoxenidae** Pohl, Beutel and Kinzelbach,  
2005: 59

Pohl et al. (2005) erected the family Protoxenidae for a new species represented by a male found in Baltic amber. The family is characterized by having eight antennal segments with flabella on segments III-VII; a free and prominent labrum; long slender five-segmented tarsi; hind wings with two detached radial veins, three MA veins, and two CuA veins; and a coronal suture.

Genus ***Protoxenos*** Pohl, Beutel and Kinzelbach,  
2005: 60

*Type species* — *Protoxenos janzeni* Pohl, Beutel and Kinzelbach, 2005

Only a single species is known from this genus and family, thus the characters of the genus *Protoxenos* follow those of the family. The family is known only from Baltic amber.

***Protoxenos janzeni*** Pohl, Beutel and Kinzelbach,  
2005: 60

*Host* — unknown

*Specimens described* — Male

*Distribution* — Baltic amber

*Type* — holotype in Hessisches Landesmuseum Darmstadt, Department of Zoology (HLMD-Strep-11-HT) inclusion in amber

Family **Stylopidae** Kirby, 1813: 100

= Stylopidae Saunders, 1872: 1

= Stylopinæ Perkins, 1905: 98

= Stylopidae Pierce, 1908: 77  
 = Hylechthridae Pierce, 1908: 78  
 = Crawfordinae Pierce, 1908: 78  
 = Halictoxeninae Pierce, 1908: 82  
 = Hylechthridae Pierce, 1918: 457  
 = Stylopidae (in part) Ulrich, 1930: 11  
 = Stylopinae Ulrich, 1930: 11  
 = Hylechthrii Ulrich, 1930: 11

The family Stylopidae has the longest standing of any Strepsiptera family and as such has at times included more than its current taxa. Kirby (1813) placed all Strepsiptera known at that time to this group but characters of the family were not well defined. Saunders (1872) more thoroughly defined the family and created the subfamilies Xenides and Pseudoxenides, which would later be synonymized back into a general Stylopidae, but are now into the family Xenidae. Many previous reviews of the taxonomy of Stylopidae list Xenides and Pseudoxenides as synonyms of Stylopidae but they actually do not belong to the family as it is currently defined. Perkins (1905) considered the Strepsiptera as the family Stylopidae within Coleoptera and established the subfamily Stylopinae for all strepsipterans with four-segmented antennae, making it a more encompassing group than the modern Stylopidae. Pierce (1908) considered the Strepsiptera as a separate order and divided what was previously Stylopinae into the families Stylopidae, Hylechthridae, and Xenidae. What Pierce considered Stylopidae and Hylechthridae are now in Stylopidae as are the subfamilies Crawfordinae and Halictoxeninae that he included in Xenidae. Pierce (1918) established the family Hylechthridae to hold the genus *Hylechthrus*. Ulrich (1930) defined the order Strepsiptera as having two families, Mengeidae and Stylopidae and placed those in the modern Stylopidae in the tribes Stylopini and Hylechthrii. Characters that define the current Stylopidae are antennal segments that are broad and flat; four-segmented tarsi; and a female thorax that is not shortened. All hosts of Stylopidae are bees in various hymenopteran families as is listed under the genera.

Genus *Crawfordia* Pierce, 1908: 82

= *Xenos* Pierce, 1904: 167 (in part)

= *Xenoides* Pierce, 1909: 153

*Type species* — *Crawfordia pulvinipes* (Pierce, 1904)

Pierce (1908) erected the genus *Crawfordia* and the subfamily Crawfordinae to hold a species that he had previously described as *Xenos pulvinipes* (Pierce 1904). Pierce (1909) also established the genus *Xenoides* as a synonym citing that he had previously used the name in correspondence. While his correspondence should not count as a previous publication to establish *Xenoides* as a recognized name, his usage in the 1909 revision of the order does arguably establish it. Pierce (1908) listed the characters for male *Crawfordia* to include an aedeagus that arises from the apex of the abdomen and quickly dilates into a bent inflated vesicle before narrowing apically; lack of detached radial veins in the hind wing; four-segmented antennae; four segmented tarsi; and a three-segmented maxillae. Having only four antennal segments would place this genus in Xenidae but other characteristics suggest that it is in Stylopidae, and Bohart (1941) commented that there is still some uncertainty about its placement. The males described by Pierce (1904) were in the author's collection and their current location is unknown. The head of the female is completely fused to the thorax and it exhibits a prominent dark basal band and triangular mandibles. The female abdomen has three genital openings. All hosts of *Crawfordia* species are in the family Andrenidae.

*Crawfordia acincta* Kogan, 1989: 284

*Host* — *Psaenythia philanthoides* Gerstäcker, *Psaenythia annulata* Gerstäcker (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Mendoza, Argentina

*Type* — holotype in Instituto Oswaldo Cruz

*Crawfordia californica* Pierce, 1918: 460

*Host* — *Pseudopanurgus californicus* (Cresson) (listed by Pierce as *Panurginus californicus*, Cresson (Andrenidae)

*Specimens described* — Female

*Distribution* — California, USA

*Type* — type not designated

*Notes* — Pierce (1918) provided a minimal description of *C. californica*, which is based solely on its known *Host*. This could be considered *nomen nudem* in a future revision of the genus, which was suggested by Bohart (1941).

***Crawfordia cockerelli*** Pierce, 1909: 155

*Host* — *Pseudopanurgus boylei* (Cockrell) (listed by Pierce as *Panurginus ornatipes*, Cresson presuming *P. boylei* was a junior synonym of *P. Onatipes*) (Andrenidae)

*Specimens described* — Female

*Distribution* — Nevada, New Mexico, USA

*Type* — holotype in United States National Museum (no. 10113)

***Crawfordia labiata*** Ogloblin, 1924: 116

*Host* — *Panurginus labiatus* (Ebersmann), *P. annulatus* (Sichel), *P. turcomanicus* Popov (*P. brullei bytinski* is a junior synonym), *P. corpanus* Warncke, *P. lactipennis* Friese (Andrenidae)

*Specimens described* — Female

*Distribution* — Poland

*Type* — unknown

*Other references* — Kinzelbach 1978 [discussion]

***Crawfordia labrosiformidis*** Pierce, 1918: 460

*Host* — *Pseudopanurgus labrosiformis* (Robertson) (Andrenidae)

*Specimens described* — Female

*Distribution* — Illinois

*Type* — type not designated

*Notes* — Pierce (1918) provided a minimal description of *C. labrosiformidis*, which is based solely on its known *Host*. This could be considered *nomen nudem* in a revision of the genus, which was previously suggested by Bohart (1941).

***Crawfordia lopesi*** Kogan, 1989: 281

*Host* — *Psaenythia bergii* Holmberg (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Minas Gerais, Brazil

*Type* — holotype in Instituto Oswaldo Cruz

***Crawfordia pulvinipes*** (Pierce, 1904)

= *Xenos pulvinipes* Pierce, 1904: 167

= *Xenoides pulvinipes* Pierce, 1905, in correspondence

= *Crawfordia pulvinipes* (Pierce, 1904) (by Pierce 1908)

= *Crawfordia rudbeckiae* Pierce, 1911: 497 (by Bohart 1941)

= *Crawfordia labrosi* Pierce, 1911: 497 (by Bohart 1941)

*Host* — *Pseudopanurgus innuptus* (Cockrell), *P. labrosus* (Robertson), *P. rudbeckiae* (Robertson), *P. solidaginis* (Robertson) (Andrenidae)

*Specimens described* — Female, larva, male

*Distribution* — Nebraska, Illinois

*Type* — in Author's collection (current location unknown)

*Other references* — Bohart 1941 [discussion], Kinzelbach 1972 [discussion, *Host*], Pierce 1909 [description]

*Notes* — Bohart (1941) placed *C. rudbeckiae* and *C. labrosi* as junior synonyms of *C. pulvinipes* noting that he viewed the types and two specimens borrowed from the Museum of Comparative Zoology. No other comment was made on why these species were designated synonyms.

***Crawfordia warnckeii*** Kinzelbach, 1970c: 29

*Host* — *Panurgus pici* Pérez, *P. canescens* Latreille, *P. dentipes* Latreille, *P. calceatus* Pérez, *P. catulus* Warncke, *P. posticus* Warncke (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Tunisia, Algeria, Morocco, Israel

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen (0367)

*Other references* — Kinzelbach 1978 [discussion]

Genus ***Eurystylops*** Bohart, 1943b: 12

= *Pseudostylops* Bohart, 1941: 134 (by Bohart 1943b)

*Type species* — *Eurystylops desertorum* (Bohart, 1941)

Bohart (1941) proposed the name *Pseudostylops* for a new species parasitizing a bee in the genus *Halictoides* and noted that a previous bee reported as stylitized by Friese could also fall under this genus, although that strepsipteran was undescribed. Unfortunately, *Pseudostylops* was preoccupied by a genus of fossil mammals, which caused the genus to be renamed *Eurystylops* (Bohart 1943b). This genus is only known from females whose characters include a cephalothorax that is significantly wider than those in *Stylops* and having five genital tubes. All known species of *Eurystylops* use members of the family Halictidae as hosts.

***Eurystylops conanthalicti*** Kinzelbach, 1971: 165

*Host* — *Conanthalictus* sp.

*Specimens described* — Female

*Distribution* — California, USA

*Type* — holotype in Bohart collection (now at University of California, Davis)

***Eurystylops desertorum*** (Bohart, 1941)

= *Pseudostylops desertorum* Bohart, 1941: 12 (by Bohart 1943b)

*Host* — *Dufourea boregoensis* (Michener) (Halictidae)

*Specimens described* — Female

*Distribution* — California, USA

*Type* — holotype in California Academy of Sciences

*Note* — Bohart (1943b) renamed the genus *Pseudostylops* because he had discovered that the name was previously occupied by a genus of fossil mammals.

***Eurystylops oenipontana*** Hofeneder, 1949: 119

*Host* — *Dufourea inermis* (Nylander), *D. dentiventris* (Nylander) (Halictidae)

*Specimens described* — Female

*Distribution* — Austria, Switzerland

*Type* — holotype in Friese collection (current location unknown)

***Eurystylops sierrensis*** Bohart, 1978 (in Bohart and Irwin 1978: 101)

*Host* — *Dufourea trochantera* Bohart (Halictidae)

*Specimens described* — Female

*Distribution* — California, USA

*Type* — holotype in University of California, Davis

***Eurystylops tetonensis*** Bohart, 1943: 13

*Host* — *Dufourea maura* (Cresson) (Halictidae)

*Specimens described* — Female

*Distribution* — Wyoming, USA

*Type* — holotype in California Academy of Sciences, paratypes in collection of the author (now at University of California, Davis)

Genus ***Halictoxenus*** Pierce, 1909: 147

= *Apractelytra* Pierce, 1909: 151 (by Bohart 1941)

= *Halictostylops* Pierce, 1909: 21 (by Bohart 1941)

= *Halictophilus* Pierce, 1909: 151 (by Bohart 1941)

= *Augochlorophilus* Pierce, 1911: 22 (by Bohart 1941)

= *Halictoxenus* Perkins, 1918a (misspelling)

*Type species* — *Halictoxenus jonesi* Pierce, 1908

Pierce (1908) included the genus names *Halictoxenus* and *Apractelytra* in keys within the subfamily Xeninae but did not provide any description of the genera with these names, leaving them *nomen nudum* at that time. If these had been described in the 1908 paper, *Apractelytra* would have priority as it was mentioned first. In a later paper, Pierce (1909) presented a description of his previously mentioned genera, thus establishing the taxa at that time. In this same paper (Pierce 1909) *Halictoxenus* had priority since it was described first. Pierce (1909) also described the subgenera *Halictophilus* and *Halictylops* within *Halictoxenus*. Pierce (1911) later described an additional subgenus, *Augochlorophilus*, to *Halictoxenus*. Bohart (1941) listed all of the subgenera as synonyms of *Halictoxenus* but since *Halictostylops*, *Halictophilus*, and *Augochlorophilus*

were never considered to be at the level of genus, it is not appropriate to synonymize them under *Halictoxenos*. At this time, no one has addressed the validity of the subgenera so they remain as proposed. The antennae of *Halictoxenos* appears more like members of Xenidae, although it is slimmer. Characters of male *Halictoxenos* include having mandibles with a detached tip; postfrons wide relative to Xenidae; and an aedeagus with an enlarged and laterally elongated base. Female *Halictoxenos* have a cephalothorax that is relatively sharply pointed. All species in *Halictoxenos* parasitize Halictidae. A key to *Halictoxenos* from Japan is given by Kifune et al. (1982) and Kifune (1991a). Pohl and Kinzelbach (1995) give a key to Afrotropical species.

***Halictoxenos aneckei*** Pasteels, 1958: 296

*Host* — unknown

*Specimens described* — Male

*Distribution* — South Africa

*Type* — holotype in National Insect Collection, Pretoria

*Other references* — Luna de Carvalho, 1974

***Halictoxenos arnoldi*** (Perkins, 1918a)

= *Halictoxenus arnoldi* Perkins, 1918a: 107 (misspelling)

*Host* — *Lasioglossum xanthopus* (Kirby) (Halictidae)

Female

*Distribution* — England (type locality), Czech Republic, Germany, Hungary and Turkey

*Type* — no type designated

*Other references* — Straka et al. 2006 [distribution]

***Halictoxenos borealis*** Kifune, Hirashima and Maeta, 1982: 153

*Host* — *Lasioglossum apristum* (Vachal) (Halictidae)

*Specimens described* — Male, female

*Distribution* — Japan

*Type* — holotype (Type no. 2380) and paratypes in Kyushu University, Japan

***Halictoxenos crawfordi*** Pierce, 1909: 147

= *Halictoxenos graenicheri* Pierce, 1909: 147 (by Bohart 1941)

= *Halictoxenos graeinicheri* Pierce, 1909: 147 (by Bohart 1941)

= *Halictoxenos zephyr* Pierce, 1909: 147 (by Bohart 1941)

= *Halictoxenos versati* Pierce, 1909: 147 (by Bohart 1941)

= *Halictoxenos sparsi* Pierce, 1909: 147 (by Bohart 1941)

*Host* — *Lasioglossum bruneri* (Crawford), *L. albipenne* (Robertson), *L. zephyrum* (Smith), *L. versatum* (Robertson), *L. imitatum* (Smith) (= *Halictus sparsi* reported by Pierce 1909) (Halictidae)

*Specimens described* — Male, female

*Distribution* — Nebraska, USA (type locality); USA (Wisconsin, Oklahoma)

*Type* — holotype in United States National Museum (no. 10106)

*Other references* — Jones et al. 1980 [distribution]

*Notes* — Pierce (1909) defined *H. crawfordi* and all its current synonyms based on their having a different host species. The only other information in their descriptions was a table of measurements and a table of ratios between structures. Bohart (1941) viewed the types of these proposed species along with an additional series of specimens and considered the differences to be within the range of variation. He concluded that they should all be considered the same species. New data, most likely in the form of genetic analysis could better clarify this situation but until that study is completed, they should remain as subjective junior synonyms.

***Halictoxenos cupreolae*** Trois, 1982b: 92

*Host* — *Augochloropsis cupreola* (Cockerell) (Halictidae)

*Specimens described* — Female

*Distribution* — Rio de Janeiro, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

***Halictoxenos duplicis*** Kifune, 1991a: 370

*Host* — *Lasioglossum duplex* (Dalla Torre) (Halictidae)

*Specimens described* — Female

*Distribution* — Japan  
*Type* — holotype (Type no. 2802) in Kyushu University, Japan

***Halictoxenos evylaei*** Kifune, 1991a: 369

*Host* — *Lasioglossum calceatum* (Scopoli), *L. albipes* (Fabricius) (Halictidae)  
*Specimens described* — Female  
*Distribution* — Japan, Okinawa  
*Type* — holotype (Type no. 2801) in Kyushu University, Japan  
*Other references* — Kifune and Maeta 2006 [distribution]

***Halictoxenos hayekae*** Luna de Carvalho, 1974: 33

*Host* — unknown  
*Specimens described* — Male  
*Distribution* — Kenya  
*Type* — holotype in Museum of Natural History (C.I.E. Collection A.3982)  
*Other references* — Luna de Carvalho 1979

***Halictoxenos hondonis*** Kifune, 1991a: 368

*Host* — *Lasioglossum exiliceps* (Vachal), *L. laeviventre* (Pérez) (Halictidae)  
*Specimens described* — Female  
*Distribution* — Japan  
*Type* — holotype (Type no. 2800) and paratypes at Kyushu University, Japan

***Halictoxenos japonicus*** Kifune, Hirashima and Maeta, 1982:155

= *Halictoxenos mirabilis* Kifune, Hirashima and Maeta, 1982: 158 (by Kifune and Maeta 2006)

*Host* — *Halictus aerarius* Smith (Halictidae)  
*Specimens described* — Male, female  
*Distribution* — Japan  
*Type* — holotype (Type no. 2381) and paratypes at Kyushu University, Japan  
*Other references* — Kifune 1991a [additional specimen], Kifune & Maeta 2006

***Halictoxenos jonesi*** Pierce, 1908: 82

*Host* — *Lasioglossum imitatum* (Smith) (= *Halictus sparus* as reported in Pierce 1908), *L. zephyrum* (Smith) (Halictidae)  
*Specimens described* — Male, female  
*Distribution* — Louisiana, Texas  
*Type* — holotype (no. 12669) in United States National Museum  
*Other references* — Batra 1965 [natural history], Bohart 1941  
*Notes* — Pierce (1908) described this species based on its host but later (Pierce 1909) provided a more detailed description. Bohart (1941) thought that it likely that *H. jonesi* is the male that corresponds with the female named *H. crawfordi* but since positive evidence was not available, no synonymy was proposed.

***Halictoxenos knereri*** Pohl and Kinzelbach, 1995b: 73

*Host* — *Halictus africanus* Friese, *H. jucundus* Smith (Halictidae)  
*Specimens described* — Male, female, larva  
*Distribution* — South Africa  
*Type* — holotype in South Africa National Collection of Insects, Pretoria

***Halictoxenos latifemoralis*** Kifune, Hirashima and Maeta, 1982: 152

*Host* — *Lasioglossum trispine* (Vachal) (Halictidae)  
*Specimens described* — Male, female  
*Distribution* — Japan  
*Type* — holotype (Type no. 2379) and paratypes at Kyushu University, Japan

***Halictoxenos manilae*** Pierce, 1909: 151

*Host* — *Lasioglossum albescens* (Smith) (= *Halictus manilae* reported by Pierce, 1909) (Halictidae)  
*Specimens described* — Female  
*Distribution* — Philippine Islands  
*Type* — holotype (no. 10112) in United States National Museum

***Halictoxenos nambui*** Kifune, 1991a: 367

*Host* — *Lasioglossum occidens* (Smith)  
(Halictidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (Type no. 2799) and paratypes  
in Kyushu University, Japan

***Halictoxenos nymphaeari*** Pierce, 1911: 496

*Host* — *Lasioglossum oceanicum* (Cockrell) (= *Chloralictus nymphaeorum* reported by Pierce 1911)  
(Halictidae)

*Specimens described* — Female

*Distribution* — Illinois

*Type* — holotype (no. 13694) in United States  
National Museum

***Halictoxenos proditus*** Trois, 1982b: 93

*Host* — *Augochloropsis* sp. (Halictidae)

*Specimens described* — Female

*Distribution* — Mato Grosso do Sul, Brazil

*Type* — holotype in Instituto Oswaldo Cruz,  
Brazil

***Halictoxenos robbii*** Pierce, 1909: 151

*Host* — *Lasioglossum halictoides* (Smith) (?=  
*Halictus robbii* listed in Pierce 1909) (Halictidae)

*Specimens described* — Female

*Distribution* — Philippine Islands

*Type* — holotype (no. 10111) in United States  
National Museum

***Halictoxenos schwarzi*** (Pierce, 1908)

= *Apractelytra schwarzi* Pierce 1908: 83 (by Bohart 1941)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Washington, D.C.

*Type* — holotype (no. 9827) in United States  
National Museum

***Halictoxenos spencei*** (Nassonov, 1893)

= *Halictoxenos spencii* Nassonov, 1893: 18 (spelling  
changed by Kinzelbach 1969)

= *Halictophagus curtisi* Nassonov, 1893 in Hofeneder  
1910: IV (by Hofeneder and  
Fulmek 1943)

= *Halictoxenos cylindrici* Perkins, 1918a: 75 (by  
Kinzelbach 1969)

= *Halictoxenos calceati* Noskiewicz and Poluszyński,  
1924: 2 (by Kinzelbach 1969)

= *Halictoxenos puncticollis* Noskiewicz and Poluszyński,  
1924: 182 (by Kinzelbach  
1978)

= *Halictoxenos nitidiusculus* Ogloblin, 1925: 116 (by  
Kinzelbach 1978)

= *Halictoxenos nassonovi* Ogloblin, 1925: 116 (by  
Kinzelbach 1978)

*Hosts* — *Lasioglossum calceatum* (Scopoli),  
*L. fulvicorne* (Kirby), *L. nigrum* (Viereck), *L.*  
*nitidiusculum* (Kirby), *L. punctatissimum* (Schenck),  
*L. parvulum* (Schenck), *L. convexiusculum*  
(Schenck), *L. villosulum* (Kirby), *L. pygmaeum*  
(Schenck), *L. limbellum* (Morawitz), *L. sabulosum*  
(Warncke), *L. sexstrigatum* (Schenck) (Halictidae)

*Specimens described* — Male, female, larva

*Distribution* — England (type locality), Austria,  
Belgium, Canary Islands, Czech Republic, Denmark,  
Finland, France, Greece, Ireland, Italy, Norway,  
Poland, Russia,

Slovakia, Spain, Turkey, Ukraine

*Type* — unknown

*Other references* — Kinzelbach 1978  
[distribution], Pekkarinen and Raatikainen  
1973 [natural history], Ronayne and O'Connor  
[distribution], Straka et al. 2006 [distribution], Ulrich  
1933 [description]

*Notes* — Nassonov (1893) named this species  
*H. spencii*, however the spelling was changed to *H.*  
*spencei* by Kinzelbach (1969b) and spelled this way  
in subsequent papers. Thus, the subsequent spelling  
is preserved in accordance with ICZN (1999), Art.  
33.3.1. The name *H. nassonovi* is puzzling. Ogloblin  
(1925) mentioned a species as *Halictophagus*  
*nassonovi* Pierce that was described by Nassonov in  
1893. This appears to refer to *H. spencei* (described  
by Nassonov in 1893 as *H. spencii*) since no other  
explanation can be found. It is therefore included as



a synonym.

***Halictoxenos tumulorum*** Perkins, 1918a: 75

= *Halictoxenos sajo*i Noskiewicz and Poluszyński, 1924: 184 (by Kinzelbach 1978)

= *Halictoxenos rubicundi* Noskiewicz and Poluszyński, 1924: 186 (by Kinzelbach 1978)

= *Halictoxenos simplicis* Noskiewicz and Poluszyński, 1935: 54 (by Kinzelbach 1978)

= *Halictoxenos ulrichi* Hofeneder, 1939: 190 (by Kinzelbach 1978)

*Hosts* — *Halictus tumulorum* (Linnaeus), *H. sajo*i Blüthgen, *H. simplex* Blüthgen, *H. kessleri* Bramson (Halictidae)

*Specimens described* — Male, female

*Distribution* — Italy (type locality), Austria, Canary Islands, Czech Republic, Great Britain, Finland, France, Germany, Hungary, Ireland, Italy, Netherlands, Orth Africa, Portugal, Russia, Slovakia, Turkey, Ukraine, Belgium

*Type* — no type designated

*Other references* — Bruge 1999 [distribution], Kuhlmann 1998 [natural history], Pekkarinen and Raatikainen 1973 [natural history], Ronayne and O'Connor 2006 [distribution], Straka et al. 2006 [distribution]

***Halictoxenos viridulae*** Pierce, 1911: 496

*Host* — *Augochloropsis metallica* (Fabricius, 1793) (= *Augochlora viridula* Smith reported by Pierce 1911) (Halictidae)

*Specimens described* — Female

*Distribution* — Illinois, USA

*Type* — holotype (no. 13695) in United States National Museum

Genus ***Hylechurus*** Saunders, 1850: 17

= *Hylechthrus* Saunders, 1875: 71

= *Hylechthrus* Pierce, 1908: 82

*Type species* — *Hylechthrus rubi* Saunders, 1850

Saunders (1850) established the genus *Hylechurus* for two new species parasitizing bees in the genus *Hylaeus*, however Kinzelbach (1971e) later determined that these strepsipterans were a

single species. The males of *Hylechthrus* are still only known from Sanuder's description. These males are characterized by having five-segmented antennae and a relatively large postlumbium, but other characters are similar to *Halictoxenos*. The female is defined by having a cephalothorax broader than long with a broadly rounded apex and head completely fused to the thorax. The female has two genital openings. All species are parasites of bees in the family Colletidae. Kinzelbach (1971e) provided a revision of the genus.

***Hylechthrus californicus*** Bohart, 1941: 140

*Hosts* — *Hylaeus coloradensis* (Cockerell), *H. episcopalis* (Cockerell), *H. mesillae* (Cockerell), *H. curvicularinatus* (Cameron), *H. cribratus* (Birdwell) (Colletidae)

*Specimens described* — Female, larva

*Distribution* — California, USA (type locality); USA (Arizona, Colorado)

*Type* — holotype and paratype in California Academy of Science

*Other references* — Kinzelbach 1971e [description, discussion]

***Hylechthrus rubi*** Saunders, 1850: 57

= *Hylechthrus quercus* Saunders, 1850: 58 (by Kinzelbach 1971e)

= *Hylechthrus sieboldii* Saunders, 1852: 142 (by Kinzelbach 1971e)

= *Hylechthrus rubi* var. *pustulatus* Saunders, 1872: 30 (by Kinzelbach 1971e)

*Hosts* — *Hylaeus rubicola* Saunders, *H. gibbus* Saunders, *H. versicolor* Saunders, *H. punctulatissimus* Smith, *H. punctatus* (Brullé), *H. signatus* (Panzer), *H. sinuatus* (Schenck), *H. pictipes* Nylander, *H. brevicornis* Nylander, *H. clypearis* (Schenck), *H. variegatus* (Fabricius), *H. communis* Nylander, *H. albonotatus* (Walker) (= *Prosopis kluge* reported by Kinzelbach 1971a) (Colletidae)

*Specimens described* — Male, female, larva

*Distribution* — Albania, Bulgaria, Germany, Israel, Italy, Russia, Spain, Turkey, Yugoslavia

*Type* — holotype not designated

*Other references* — Friese 1911 [*Host*], Kinzelbach 1971e [description, *Host*, discussion]

*Hylecthrus taiwan* Kinzelbach, 1971e: 206

*Host* — *Hylecthrus* sp. (Colletidae)

*Specimens described* — Female

*Distribution* — Taiwan

*Type* — holotype in Bohart collection, now at University of California, Davis

Genus *Jantarostylops* Kulicka, 2001: 13

*Type species* — *Jantarostylops kinzelbachi* Kulicka, 2001

Kulicka (2001) established the genus *Jantarostylops* to hold a new species, *J. kinzelbachi*, represented by a single male specimen from Baltic amber. Characters of *Jantarostylops* include a six-segmented antennae with a flabellum on the third segment and the first five segments about equal in size; eyes with a relatively small number of facets (12-15); long maxillary palp; hook-shaped aedeagus; and hind wing with two detached radial veins and a single MA vein.

*Jantarostylops kinzelbachi* Kulicka, 2001: 13

*Host* — unknown

*Specimens described* — Male

*Distribution* — Baltic amber

*Type* — holotype (no. 18139) in Museum of the Earth, Polish Academy of Sciences, Warsaw

*Other references* — Kogan and Poinar 2010 [discussion]

Genus *Kinzelbachus* Özdikmen, 2009: 609

= *Ulrichia* Kinzelbach, 1971a: 170

*Type species* — *Kinzelbachus friesei* (Hofeneder, 1949)

Kinzelbach (1972b) erected the genus *Ulrichia* to transfer a species described by Hofeneder (1949) from *Sylops*. However, *Ulrichia* was a name preoccupied by a fossil ostrocod, leading Özdikmen to create the genus *Kinzelbachus* to hold this species. *Kinzelbachus* remains a monotypic genus that is only known by its female and larva. Characters that

define *Kinzelbachus* include a brood opening that is much further towards the apex than in *Stylops*, giving it a short labium and metathoracic spiracles that are clearly visible.

*Kinzelbachus friesei* (Hofeneder, 1949)

= *Stylops friesei* Hofeneder, 1949: 121 (by Kinzelbach 1971a)

= *Ulrichia friesei* (Hofeneder, 1949) (by Özdikmen, 2009)

*Host* — *Melitturga clavicornis* (Latrielle, 1808) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Hungary, France, Azerbaijan, Georgia, Turkey

*Type* — holotype in Ulrich collection, Berlin (current location unknown)

*Other references* — Kinzelbach 1978 [discussion]

*Notes* — Hofeneder (1949) placed this species in *Stylops* because he thought appeared morphologically closer to that genus than to the other sytlopid genera, *Hylectrus* and *Eyrystylops*. Kinzelbach 1971a moved the species to a new genus named *Ulrichia* which was later discovered to be preoccupied in Ostrocooda. When this was recognized, Özdikmen established the new genus *Kinzelbachus* to accommodate this species.

Genus *Melittostylops* Kinzelbach, 1971a: 170

*Type species* — *Melittostylops hesperapium* Kinzelbach, 1972a

Kinzelbach (1971a) established the genus *Melittostylops* for a new species based on females parasitizing Melittidae from Mexico. Characters of the female that define the genus include a cephalothorax that is wider than long, vestigial remnants of legs apparent, as are metathoracic spiracles; and a simple mandible. Larvae have been described by Kinzelbach (1971a) but males remain unknown.

***Melittostylops hesperapium*** Kinzelbach, 1971a:  
170

*Host* — *Hesperapis rhodocera* (Cockrell),  
*H. leucura* Cockrell (Melittidae)

*Specimens described* — Female, larva

*Distribution* — Mexico (Chihuahua, Baja), USA  
(New Mexico)

*Type* — holotype in Bohart Collection (now at  
University of California, Davis)

Genus ***Rozenia*** Straka, Jůzová and Batelka, 2014: 34

*Type species* — *Rozenia calliopsidis* Straka,  
Jůzová and Batelka, 2014

Straka et al. (2014) erected the genus *Rozenia* for three new species based on females that were discovered parasitizing Andrenidae. The females of this genus are distinct in having only four abdominal segments. Males remain unknown. A key to the genus was also provided by Straka et al. (2014)

***Rozenia calliopsidis*** Straka, Jůzová and Batelka,  
2014: 36

*Host* — *Calliopsis trifasciata* (Spinola), *C. mendocina* (Jørgensen) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Chile (type locality), Argentina

*Type* — holotype and paratypes in American  
Museum of Natural History

***Rozenia peruana*** Straka, Jůzová and Batelka,  
2014: 40

*Host* — *Acamptopoeum vagans* (Cockerell)  
(Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Peru

*Type* — holotype in American Museum of  
Natural History

***Rozenia platicephala*** Straka, Jůzová and Batelka,  
2014: 42

*Host* — *Acamptopoeum submetallicum* (Spinola)  
(Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Chile (type locality), Argentina  
*Type* — holotype and paratypes in American  
Museum of Natural History

Genus ***Stylops*** Kirby, 1802

= *Prostylops* Pierce, 1918: 455 (by Bohart 1936)

= *Katastylops* Pierce, 1918: 454 (by Bohart 1941)

= *Neostylops* Pierce, 1918: 455 (by Bohart 1941)

= *Afrostylops* Fox and Fox, 1964b:754 (in part) (by  
Kinzelbach 1971a)

*Type species* — *Stylops melittae* Kirby, 1802

Kirby (1802) established the genus *Stylops* for the first known strepsipteran species. Pierce (1918) later created a new genus, *Neostylops*, because of differences in the relationship of the scutum, prescutum and scutellum as compared to *Stylops*. However, Bohart (1936) made the case that these differences were not significant enough for a separate genus. Pierce (1918) also created the subgenera *Prostylops* and *Katastylops* that were not supported by Bohart (1941). Fox and Fox (1964) placed two new species in a new genus, *Afrostylops*, to hold a new species, which ultimately was moved to *Myrmecolax*, and a species previously described in *Stylops*. Kinzelbach (1971a) later moved the latter species back to the genus *Stylops*. The genus *Stylops* is primarily defined by characters of the male, which include having a six-segmented antenna with a flabellum on the third segment; four segmented tarsi; tarsal claws absent; a large postlumbium; and a scutellum that is as long or longer than the prescutum. Female *Stylops* have five genital openings and a brood passage running along the side of the head. All known hosts of species in this genus are in the family Andrenidae. Keys to the genus in North America are given by Bohart (1936, 1937b, 1941) and Pierce (1918). Keys for Japan are provided by Kifune and Hirashima (1985) and Kifune 1991b. Keys for Palearctic species are given by Luna de Carvalho (1972c). A key to species of Portugal is provided by Luna de Carvalho (1979). A key to species in Great Britain was given by Perkins 1918b. A checklist of world species was given by Straka et al. (2015a).

***Stylops aburanae* Kifune and Maeta, 1990: 98 n. stat.**

*Host*—*Stylops aburana* Hirashima (Andrenidae)

*Specimens described*—Female

*Distribution*—Japan

*Type*—holotype (no. 2777) in Kyushu University, Japan

*Notes*—This species was proposed as junior subjective synonym of *S. japonicus* by Straka et al. (2015a) but its DNA sequence was not available for comparisons and it does not share a host with *S. japonicus*. Therefore, until additional data is provided, it should remain a separate species.

***Stylops advarians* Pierce, 1909: 97**

*Host*—*Andrena vicinoides* Viereck (Andrenidae)

*Specimens described*—Female

*Distribution*—British Columbia, Canada

*Type*—holotype (no. 10082) in United States National Museum

***Stylops aino* Kifune and Maeta, 1990: 99 n. stat.**

*Hosts*—*Andrena rosae* Panzer (= *A. sachalinensis* Yatsumatsu), *A. nudigastroides* Yasumatsu (= *Andrena p.* Hirashima) (Andrenidae)

*Specimens described*—Female

*Distribution*—Japan (type locality), Korea

*Type*—holotype (no. 2779) in Kyushu University, Japan

*Other references*—Kifune 1991 [host], Kifune et al. 1994 [host]

*Notes*—This species was proposed as junior subjective synonym of *S. yamatonis* by Straka et al. (2015a) but it a DNA sequence was not available for comparisons and it does not share a host with *S. yamatonis*. Therefore, until additional data is provided, it should remain a separate species.

***Stylops alfkeni* Hofeneder, 1939: 187 n. stat**

*Host*—*Andrena similis* Smith (Andrenidae)

*Specimens described*—Male, female

*Distribution*—Germany (type locality), Cyprus, Great Britain, Hungary, Italy, Netherlands, Spain, Switzerland, Yugoslavia

*Type*—no type designated

*Notes*—This species was proposed to be junior synonym of *S. melittae* by Kinzelbach, 1978, but viewed as separate from *S. melittae* by Straka et al. 2015a, who proposed it as a supposed junior subjective synonym of *S. thwaitesi*. There appears to be insufficient justification for either proposed synonymy.

***Stylops analis* Perkins, 1918b:73**

*Host*—probably *Andrena ventralis* Imhoff (see Straka et al. 2015a) (Andrenidae)

*Specimens described*—Female

*Distribution*—Great Britain, Austria

*Type*—holotype in Museum of Natural History, London

*Other references*—Zettel 2018 [distribution]

*Notes*—This species was proposed to be junior synonym of *S. melittae* by Kinzelbach, 1978 but viewed as separate from *S. melittae* and reinstated by Straka et al. 2015a.

***Stylops andrenaphilus* Luna de Carvalho, 1974: 331**

*Host*—*Andrena dorsata* (Kirby) (= *A. propinqua* Schenck) (Andrenidae)

*Specimens described*—Female

*Distribution*—Spain (type locality), France, Germany, Great Britain, Hungary, Yugoslavia

*Type*—holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany paratype in author's collection (now at Sam Houston State University)

*Note*—This species was proposed to be junior synonym of *S. melittae* by Kinzelbach, 1978 but viewed as separate from *S. melittae* and reinstated by Straka et al. 2015a.

***Stylops apicalis* Bohart, 1937b:54**

*Host*—*Andrena saccata* Viereck (Andrenidae)

*Specimens described*—Female

*Distribution*—USA, California (type locality), Oregon

*Type* — holotype in California Academy of Sciences

*Other references* — Bohart 1941 [discussion]

***Stylops ater* Reichert, 1914: 151**

*Host* — unknown

*Specimens described* — Male, female

*Distribution* — uncertain

*Type* — no type designated

*Notes* — Reichert erected the name *S. ater* for figures published in a Lexicon (Anonymous 1898 a,b). *Stichotrema ater* was later considered an incorrect spelling of *S. aterrimus* (Hofeneder and Fulmek 1943) or a junior synonym of *S. aterrimus*. Straka et al. (2015a) document the history of the name and provide reasoning that this is a valid species; and they suggested that in could be the same as *S. krygeri*, which Kinzelbach (1978) speculated might be the species *Hosted* by *Andrena vaga*. However, Straka et al. (2015a) pointed out that the female specimen description of *S. krygeri* does not match that of *S. ater*. *Stichotrema ater* is a valid name by ICZN rules and should remain until further justifications are presented.

Straka et al. (2015a) listed *S. ovinae* under *S. ater* and at the same time as *nomen nudem*. They also suggested that *S. muelleri* is a supposed junior synonym of *S. ater*. Adequate justifications were not provided for these nomenclatural changes (Straka et al. 2015a), therefore these species are not now listed as synonyms of *S.*

*ater*. At this time, no host can be accurately attributed to *S. ater*. Since figures are relatively good for *S. ater*, it is reasonable to think that the *Host* and identity of *S. ater* could be clarified with new material.

***Stylops aterrimus* Newport, 1851**

= *Stylops trimmerana* Smith, 1857: 118. (by Pierce 1908)

= *Neostylops trimmerana* Pierce 1919:456 (by Bohart 1936)

= *Stylops aterrima* Ulrich 1930: 14 (incorrect gender agreement)

= *Stylops niger* Beneden, 1875: 222. (by Kinzelbach 1971a)

= *Stylops trimmeranea* Kinzelbach 1978: 133 (by Straka et al. 2015)

*Host* — *Andrena trimmerana* (Kirby), *A. carantonica* Pérez (Andrenidae)

*Specimens described* — Female

*Distribution* — England, Austria

*Type* — no type designated

*Other references* — Boyd 1936 [distribution], Perkins 1918b [discussion], Pierce 1909 [discussion], Zettel 2018 [distribution, *Host*]

*Notes* — Straka et al. (2015a) include *S. spencii* and *S. perkinsi* under *S. aterrimus* but it is not designated in their paper as a proposed synonym and no other publication record is known for designating this synonym. *Stylops niger* is listed by Straka et al. (2015a) as *nomen nudem* but also listed under *S. aterrimus*, presumably crediting Kinzelbach (1978) for the synonym, although Kinzelbach (1971a) had made this designation earlier. Straka et al. (2015a) proposed *S. dominiquei* and *S. bimaculatae* as supposed new junior synonyms but did not provide adequate justification to synonymize the species.

***Stylops bimaculatae* Perkins, 1918b: 71 n. stat.**

*Host* — *Andrena bimaculata* (Kirby) (Andrenidae)

*Specimens described* — Female

*Distribution* — Great Britain, Switzerland, Germany, Hungary, Italy, Czech Republic, Poland

*Type* — unknown

*Notes* — *Stylops bimaculatae* was made a junior synonym of *S. melittae* by Kinzelbach 1987 and later made a supposed junior synonym of *S. aterrimus* by Straka et al. (2015a). Straka et al. (2015a) made a compelling reason why all European *Stylops* should not be synonymized with *S. melittae* but did not provide compelling evidence to synonymize it with *S. aterrimus*. These species utilize different hostspecies and have no supporting DNA evidence for combining them. Therefore, *S. bimaculatae* remains a valid species until more evidence is available.

***Stylops bipunctatae* Pierce, 1909: 98**

*Host* — *Andrena miserabilis* Cresson (= *Andrena bipunctata* Cresson) (Andrenidae)

*Specimens described* — Female

*Distribution* — Indiana, USA (type locality), USA (Alabama, Nebraska, Wisconsin)

*Type* — holotype(no. 10083) in United States National Museum

*Other references* — Bohart 1941 [discussion], Jones and Jones 1981b [variation], Jones et al. 1980 [distribution]

*Notes* — Straka et al. (2015a) suggested that *S. oklahomae* Pierce, 1909 might be a junior synonym of *S. bipunctatae* but did not provide reason for this possible change. These two species have separate hosts and a different known geographical distribution and should remain as separate species.

***Stylops bisaligidis* Pierce, 1918: 446 n. stat.**

= *Stylops diabolae* Pierce, 1918: 454 (by Bohart 1941)

*Host* — *Andrena bisaligidis* Viereck (Andrenidae)

*Specimens described* — Female

*Distribution* — Alabama, USA (type locality); North Dakota, USA

*Type* — holotype (no. 21441) at United States National Museum

*Other references* — Bohart 1941 [discussion]

*Notes* — Kinzelbach (1971a) listed *S. bisaligidis* as both a valid species and a subspecies of *S. championi*, but provided no discussion on its status. Straka et al. (2015a) listed *S. bisaligidis* as a proposed junior synonym of *S. subcandidae* but gave no justification of this change. Genetic data is known for *S. subcandidae* but not for *S. bisaligidis*. Hosts of these two species are different and their known distributions are widely separated. Thus, without additional evidence, they should remain separate species.

***Stylops borcherti* Luna de Carvalho, 1974: 349**

*Host* — *Andrena albopunctata* (Rossi) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Spain (type locality), Belgium, Denmark, France, Hungary, Italy, Israel, Yugoslavia

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany; paratype in Luna de Carvalho collection (now at Sam Houston State University)

*Notes* — Kinzelbach (1978) made *S. borcherti* a junior synonym of *S. melittae* but later Straka et

al. (2015a) argued it should be reinstated as a valid species, but they also suggested that it could be a synonym of *S. ater* or *S. melittae* without providing more information. There is no DNA information known for *S. borcherti* to base conclusions, and this species should remain as valid unless other data is provided.

***Stylops borealis* Kifune and Hirashima, 1985: 53**

*Host* — *Andrena ezoensis* Hirashima, *Andrena ovatula* (Kirby) (Andrenidae)

*Specimens described* — Male, female

*Distribution* — Japan

*Type* — holotype (no. 2529) at Kyushu University, Japan

*Other references* — Kifune and Maeta 1990 [distribution]

*Notes* — This species was not included in the preliminary world checklist of *Stylops* by Straka et al. (2015a).

***Stylops bruneri* Pierce, 1909: 98**

= *Stylops nasoni* Pierce, 1909: 104. (Bohart 1941)

= *Stylops andreoides* Pierce, 1911: 493. (Bohart 1941)

= *Stylops salictariae* Pierce, 1919: 449. (Bohart 1941)

*Hosts* — *Andrena salictaria* Robertson; *A. illinoiensis* Robertson; *A. andreoides* (Cresson) (Andrenidae)

*Specimens described* — Female

*Distribution* — Nebraska, USA (type locality); USA (Colorado, Georgia, Illinois)

*Type* — holotype (no. 10084) at United States National Museum

*Other reference* — Bohart (1941) [discussion]

*Notes* — Straka et al. (2015a) proposed *S. neonanae* and *S. duboisi* as junior synonyms of *S. bruneri* based on sharing closely related *Host* species. However, no DNA or morphological data exists for this synonymy and while the hosts are both in the subgenus, *Micrandrena*, they are separate *Host* species. Unless additional evidence for synonymy is documented, these species should remain separate.

***Stylops californicus*** Pierce, 1908: 99

= *Stylops californica* Pierce, 1908: 99 (gender agreement)

*Host* — *Andrena subtilis* Smith (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — California, USA

*Type* — holotype (no. 10085) at United States National Museum

***Stylops championi*** Pierce, 1918: 440 n. stat.

*Host* — *Andrena* sp.

*Specimens described* — Male

*Distribution* — Great Britain

*Type* — holotype (no. 21438) in United States National Museum

*Notes* — *Stylops championi* has a confusing history in previous revisions. Bohart (1941) did not include this species in his revision of the order. Kinzelbach (1971a) listed the name as a valid species and placed *S. bisaligidis* as its junior synonym but also listed *S. bisaligidis* as a separate valid species. Kinzelbach (1978) later made *S. championi* a junior synonym of *S. melittae*. Straka et al. (2015a) listed *S. championi* as a supposed junior synonym of *S. thwaitesi* presumably based on the possibility that the hosts are the same or closely related (the exact species of the host of *S. championi* is only known to genus), as well as both being found in Great Britain. However, no DNA data is known for *S. championi* and evidence has not been presented on the morphology being similar enough to suggest the proposed synonymies. Therefore, *S. championi* should be considered valid unless new data suggests otherwise.

***Stylops childreni*** Gray, 1832: 684

= *Stylops vicinae* Pierce, 1909: 110 (by Straka et al. 2015)

*Hosts* — *Andrena vicina* Smith (= *Andrena victim* Smith), *A. barbilabris* (Kirby) (= *A. placida* Smith) (Andrenidae)

*Specimens described* — Male, female

*Distribution* — Nova Scotia, Canada (type locality); USA (Maryland, Massachusetts, New Hampshire)

*Type* — holotype in Museum of Natural History, London

*Other citations* — Packard 1864, Bohart 1941 [discussion], Pierce 1909 [discussion]

*Notes* — Straka et al (2015) proposed *S. vicinae* as a supposed junior synonym of *S. childreni*. Since both of these are reported to have the same host and were from the same geographical region, it appears that the synonymy should be upheld. Straka et al. (2015a) also included *S. dunning* as *S. childreni*. Bohart (1941) designated *S. dunning* as *nomen nudem*. Since the only mention by Pierce (1919) of *S. dunning* is in a table giving cephalothorax width, it is logical to maintain Bohart's *nomen nudem* designation but it does not support listing it as a synonym of *S. childreni* as was suggested by Straka et al (2015).

***Stylops circularis*** Kifune and Hirashima, 1985:50

*Host* — *Andrena sasakii* Cockerel (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2526) in Kyushu University, Japan

*Notes* — Straka et al (2015) proposed *S. orientalis* and *S. hirashimai* as supposed junior synonyms of *S. circularis* presumably based on them all having hosts in the same subgenus and all being from Japan. However, no DNA or morphological evidence for this synonymy was presented and until further evidence supports the synonymy, each should remain as valid species.

***Stylops claytoniae*** Pierce, 1909: 99

= *Stylops imitatrix* Pierce, 1909: 104. (by Pierce 1911)

= *Stylops vierecki* Pierce, 1909: 110. (by Pierce 1911)

*Host* — *Andrena imitatrix* Cresson (= *Andrena claytoniae*) (Andrenidae)

*Specimens described* — Female

*Distribution* — Georgia, USA (type locality), USA (Alabama, Illinois, Oklahoma, Texas)

*Type* — holotype (no. 10086) at United States National Museum

*Other references* — Bohart 1941 [discussion], Jones et al. 1980 [distribution]

***Stylops collinus*** Kifune and Maeta, 1990: 98 **n. stat.**

*Host* — *Andrena nawai* Cockerell (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2776) in Kyushu University, Japan

*Notes* — *Stylops collinus* was proposed as a supposed junior synonym of *S. japonicus* by Straka et al. (2015a) presumably because their host species are closely related and both being from the subgenus *Andrena*. Since no other justification was provided; these should remain as valid species unless other evidence is discovered.

***Stylops cornii*** Pierce, 1909: 100

= *Stylops graenicheri* Pierce, 1909: 103. (by Bohart 1941)

= *Stylops solidulae* Pierce, 1909: 107 (by Straka et al. 2015a)

= *Neostylops solidulae* Pierce 1919: 457 (moved to *Stylops* by Bohart 1941)

*Hosts* — *Andrena commoda* Smith, *A. nivalis* Smith (= *Stylops solidula* Viereck) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Wisconsin, USA (type locality); Washington, USA

*Type* — holotype (no. 10087) United States National Museum

*Other reference* — Bohart (1941) [discussion]

*Notes* — Pierce (1909) separated *S. cornii* and *S. graenicheri* based on his species concept that Strepsiptera were host specific. Bohart synonymized *S. graenicheri* with *S. cornii* by recognizing that there was essentially no morphological differences between these species that came from the exact same geographic region. The two Host species are closely related and from the same subgenus, *Melandrena*, and supports the idea the idea that some strepsipterans have a narrow host range but are not always host specific. Straka et al. (2015a) also included *S. solidulae* as a supposed synonym of *S. cornii*. When Pierce (1909) named *S. solidulae*, its host was listed as *Andrena solidula* Viereck, 1904, which has since been synonymized with *A. nivalis*. The distribution of *S. solidulae* and *S. cornii* are geographically widely separated but it appears

logical that with a common host that is widespread and little morphological variation, that these are the same species and the synonymy by Straka et al. should be recognized.

***Stylops crawfordi*** Pierce, 1909: 100

= *Neostylops crawfordi* Pierce 1919: 456 (by Bohart 1941)

*Hosts* — *Andrena crawfordi* Viereck, *A. sitilae* Viereck, *A. senticulosa* LaBerge (Andrenidae)

*Specimens described* — Male, female

*Distribution* — Texas, USA

*Type* — holotype no. 10088) at United States National Museum Other citations: Bohart 1941 [discussion], Jones and Jones 1981a [distribution, ecology]

*Notes* — Straka et al. (2015a) proposed that *S. swenki* and its junior synonym, *S. asteridis*, be placed as supposed junior synonyms of *S. crawfordi*, presumably based on their having *Hosts* in the subgenus *Callandrena*. No DNA or morphological similarities are cited as evidence. Since these species are geographically separated and have different host species, along with no other evidence for their synonymy, they should be maintained as separate species unless other evidence is found for their inclusion.

***Stylops cressoni*** Pierce, 1909: 102

*Host* — *Andrena cressonii* Robertson (note: the *Host* name was misspelled by Pierce 1909) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Maine, USA

*Type* — holotype (no. 10089) in United States National Museum

***Stylops cuneiformis*** Bohart, 1936: 16

*Host* — *Andrena* sp. (Andrenidae)

*Specimens described* — Male

*Distribution* — California, USA

*Type* — holotype in California Academy of Sciences

*Other reference* — Bohart (1941) [discussion]



***Stylops dali*** Curtis, 1828: plate 226

= *Stylops dalei* Kinzelbach 1978: 121(misspelling)

*Host* — *Andrena labialis* (Kirby). (Andrenidae)

*Specimens described* — Male, female

*Distribution* — Great Britain

*Type* — no types designated

*Other references* — Pierce 1909 [discussion]

*Notes* — Kinzelbach (1978) synonymized *S. dali* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for reinstating these species until there is additional evidence.

***Stylops dentatae*** Kifune and Maeta, 1990: 99  
**n. stat.**

*Host* — *Andrena dentata* Smith (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2778) in Kyushu University, Japan

*Notes* — Straka et al. listed *S. dentatae* as a supposed junior synonym of *S. yamatonis* presumably based solely on their hosts being in the same subgenus and both being from Japan. Until molecular or morphological evidence is identified for their synonymy, they should remain as separate species.

***Stylops deserticola*** Medvedev, 1970: 200

= *Stylops desertorum* Medvedev, 1970: 201 (changed by Kinzelbach 1971a for gender agreement)

*Host* — *Andrena fuscata* Erichson (Andrenidae)

*Specimens described* — Male, Female

*Distribution* — Kazakhstan

*Type* — holotype in Zoological Museum, Leningrad, Russia

***Stylops dinizi*** Luna de Carvalho, 1974: 343

*Host* — *Andrena incisa* Eversmann

*Specimens described* — Female, larva

*Distribution* — Spain

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany

***Stylops dominiquei*** Pierce, 1909: 102 **n. stat.**

*Host* — *Andrena agilissima* (Scopoli) (= *Andrena flossae* Panzer) (Andrenidae)

*Specimens described* — Male, female, larva

*Distribution* — France (type locality), Spain, Portugal

*Type* — unknown

*Other references* — Luna de Carvalho 1972c [discussion], 1979 [discussion]

*Notes* — Kinzelbach (1978) synonymized *S. dominiquei* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for reinstating these species until there is additional evidence and then placed *S. dominiquei* as a supposed junior synonym of *S. aterrimus* although DNA evidence was not available for *S. dominiquei* nor was morphological evidence provided. Unless other evidence is identified for a synonymy, *S. dominiquei* should remain as a valid species.

***Stylops duboisi*** Bohart, 1937b: 52 **n. stat.**

*Host* — *Andrena* sp. (Andrenidae)

*Specimens described* — Male, female

*Distribution* — California

*Type* — holotype in California Academy of Sciences

*Notes* — Bohart did not list this species in his 1941 revision of the Strepsiptera although he named the species in 1937. No reason is given for its exclusion and it was likely an oversight. Kinzelbach (1971a) also failed to include *S. duboisi*. Straka et al. (2015a) listed *S. duboisi* as a supposed junior synonym of *S. bruneri*, reasoning that it should be a synonym by host association. Bohart (1937b) listed the *Host* as *Andrena (Micrandrena)* sp. and this species and other species synonymized by Straka et al. (2015a) under *S. bruneri* are in this subgenus. However, *Micrandrena* is a very speciose group of bees and more evidence is needed to group and strepsipteran parasites from this group into a single species. Straka et al. (2015a) cited DNA evidence of *Stylops* parasitizing *Micrandrena* in the west and east Palearctic regions being different enough to justify separate species and there is no reason to think that the same is not true for the Nearctic.

***Stylops duriensis*** Luna de Carvalho, 1974: 321  
n. stat.

*Host* — *Andrena tenuistriata* Pérez (note: *Host* name misspelled by Luna de Carvalho) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Portugal (type locality), Algeria, Spain, Tunisia

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany;

paratype in Luna de Carvalho collection (now at Sam Houston State University)

*Other references* — Luna de Carvalho 1979 [discussion, larva]

*Notes* — Kinzelbach (1978) synonymized *S. duriensis* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for reinstating these species until there is additional evidence and then placed *S. duriensis* as a supposed junior synonym of *S. spreta* providing as evidence that DNA of the species for which they had data from continental Europe differed by less than 2%. However, DNA from *S. spreta* was not included in that analysis. Therefore, *S. spreta* should remain a valid species unless more evidence is found to support its synonymy.

***Stylops elongatus*** Bohart, 1937b:53

= *Stylops elongata* Bohart, 1937b:53 (name changed by Kinzelbach 1971a for gender agreement)

*Hosts* — *Andrena blaisdelli* Cockerell, *A. oenotherae* Timberlake (Andrenidae)

*Specimens described* — Male, female

*Distribution* — California

*Type* — holotype in California Academy of Sciences

*Other references* — Bohart 1941 [discussion]

***Stylops erigeniae*** Pierce, 1919: 446

*Host* — *Andrena erigeniae* Robertson (Andrenidae)

*Specimens described* — Female

*Distribution* — Illinois

*Type* — holotype (no. 21442) in United States National Museum

*Notes* — This species was not listed by Kinzelbach (1971a).

***Stylops esteponensis*** Luna de Carvalho, 1974: 194  
n. stat.

*Host* — *Andrena livens* Pérez (Andrenidae)

*Specimens described* — Female

*Distribution* — Spain

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany

*Notes* — Kinzelbach (1978) synonymized *S. esteponensis* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species with *S. melittae* but synonymized *S. esteponensis* as a subjective junior synonym of *S. maxillaris* although they commented that no DNA sequence is known from strepsipterans with hosts in the subgenus *Chlorandrena*, which includes *S. esteponensis* and *S. maxillaris*. Unless significant evidence is found for synonymy of these species, *S. esteponensis* should be considered a valid species.

***Stylops flavipedis*** Hofeneder, 1923: 132 n. stat.

= *Neostylops flavipedis* Hofeneder 1925: 195 (by Bohart 1941)

*Host* — *Andrena flavipes* Panzer

*Specimens described* — Male, female

*Distribution* — Austria (type locality), Germany, Denmark, France, Great Britain, Hungary, Italy, Israel, Morocco, Portugal, Russia

*Type* — holotype in Naturhistorisches Museum, Wien, Germany

*Other references* — Luna de Carvalho 1969 [discussion], 1972c [discussion], 1979 [discussion]

*Notes* — Kinzelbach (1978) synonymized *S. flavipedis* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species with *S. melittae* but maintained the synonymy of *S. flavipedis* as a subjective junior synonym of *S. melittae* presumably based on their hosts being closely related, although they are in different subgenera. Unless significant evidence is found for synonymy of these species, *S. flavipedis* should be considered a valid species.

***Stylops fukuensis*** Kifune, 1991b: 155**n. stat.***Host* — *Andrena miyamotoi* Hirashima (Andrenidae)*Specimens described* — Female*Distribution* — Japan*Type* — holotype (no. 2797) in Kyushu University, Japan*Notes* — Straka et al. (2015a) proposed *S. fukuensis* as a subjective junior synonym of *S. yamatonis* but gave no evidence for their association. No morphological or genetic evidence is mentioned. They have different hosts but are both known from Japan. Unless further evidence is identified, *S. fukuensis* should be considered a valid species.***Stylops giganteus*** Luna de Carvalho, 1974: 352**n. stat.***Hosts* — *Andrena thoracica* (Fabricius), *A. soror* Dours (Andrenidae)*Specimens described* — Female*Distribution* — Spain (type locality), Austria, Switzerland, France, Greece, Hungary*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, München, Germany*Notes* — Kinzelbach (1978) synonymized *S. giganteus* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species with *S. melittae* but then synonymized *S. giganteus* as a subjective junior synonym of *S. melittae*. However, *S. giganteus* was not represented in their DNA evidence, nor did they supply morphological evidence. These two species both utilize hosts in the subgenus *Melandrena*, which is a large diverse subgenus. There is no reason to believe that only one strepsipteran species uses hosts from this group. Unless significant evidence is found for synonymy of these species, *S. giganteus* should be considered a valid species.***Stylops gwynanai*** Noskiewicz and Poluszyński, 1927: 1098= *Stylops gwynanai**Host* — *Andrena bicolor* Fabricius (= *Andrena gwynana* Kirby) (Andrenidae)*Specimens described* — Female, larva*Distribution* — Austria, Czech Republic, Germany, Spain, France, Great Britain, Hungary, Italy, Portugal*Type* — no type designated*Other references* — Luna de Carvalho 1972c [discussion]*Notes* — Kinzelbach (1978) synonymized *S. gwynanai* and all European *Stylops* species with *S. melittae*, however Straka et al. (2015a) made a logical argument for not synonymizing these species.***Stylops hammella*** Perkins, 1918b:71= *Stylops hammellae* Kinzelbach 1978: 122 (by Straka et al. 2015a)*Host* — *Andrena chrysoceles* (Kirby) (Andrenidae)*Specimens described* — Female*Distribution* — Great Britain, Switzerland, Germany, France, Hungary*Type* — no type designated*Notes* — Kinzelbach (1978) listed this species as *S. hammellae*, which becomes a synonym because of its unjustified emendation (Straka et al. 2015a). Kinzelbach (1978) also synonymized *S. hammella* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species with *S. melittae*. Straka et al. (2015) also included *S. nitidiusculae* as a supposed junior synonym of *S. hammella* presumably based on their having *Hosts* in the subgenus *Notandrena*, however these species should remain separate unless more molecular or morphological data supports the synonymy of these species.***Stylops hartfordensis*** Pierce, 1909: 103= *Stylops nasoni* Pierce, 1909: 104 (by Bohart 1941)*Host* — *Andrena nasoni* Robertson (= *Andrena hartfordensis* Cockerell) (Andrenidae)*Specimens described* — Female*Distribution* — Georgia, USA (type locality), Pennsylvania, USA

*Type* — holotype (no. 10091) in United States National Museum

*Notes* — Pierce (1909) named *S. hartfordensis* and *S. nasoni* primarily based on their occurring in different host species. The descriptions of the holotypes of *S. hartfordensis* and *S. nasoni* are relatively similar in measurements but differ slightly morphologically in some aspects. However, the host of *S. hartfordi* was later made a junior synonym of the host of *S. nasoni*. Bohart (1941) synonymized these species under *S. bruneri* but did not provide reasoning for the synonym except for noting that he had examined the holotypes. Straka et al. (2015a) reinstated *S. hartfordensis* and *S. nasoni* due to the fact that their host species is significantly genetically separate from the host of *S. burnuri*. Since *S. hartfordensis* has precedence due to the rules of priority, the name of *S. nasoni* is a junior synonym. Because *S. hartfordensis* and *S. nasoni* share the same host species and their morphological differences appear in the realm of what could be variation within a species, they should remain synonyms unless new data is found for separating them.

***Stylops heterocingulata*** Bohart, 1937b: 55

= *Stylops heterocingulatus* (Bohart 1937b (corrected for gender agreement by Bohart 1941)

*Hosts* — *Andrena pensilis* Timberlake, *A. angustitarsata* Viereck (= *Andrena opaciventris* Cockrell) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — California, USA (type locality); Oregon, USA

*Type* — holotype in California Academy of Sciences

*Other reference* — Bohart (1941) [discussion]

***Stylops hippotes*** Pierce, 1909: 103

*Host* — *Andrena hippotes* Robertson (Andrenidae)

*Specimens described* — Female

*Distribution* — Ohio, USA (type locality); Alabama, USA

*Type* — holotype (no. 10092) in United States

National Museum

*Other references* — Jones et al. 1980

*Notes* — Straka et al. (2015a) proposed the *S. salicifloris* and its synonym, *S. centroclarus*, was a supposed junior synonym of *S. hippotes* based on their hosts being in the subgenus *Trachandrena* but no other justification was given. Since these *Stylops* species are in distinctly different host species and their geographical range is widely separated, they should both remain as valid species unless there is additional justification to separate them.

***Stylops hirashimai*** Kifune and Maeta, 1990: 102  
**n. stat.**

= *Stylops hirashinai* Kifune and Maeta, 1990: 102 (incorrect spelling)

*Host* — *Andrena parathoracica* Hirashima (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2781) in Kyushu University, Japan

*Notes* — Straka et al. (2015) proposed *S. hirashimai* as a supposed junior synonym of *S. circularis* presumably only based on their hosts both being in the subgenus *Melandrena*. Unless additional data is discovered to support this synonymy, the species should remain separate.

***Stylops ibericus*** Luna de Carvalho, 1969: 7

*Host* — *Andrena nigroviridula* Dours (Andrenidae)

*Specimens described* — Female

*Distribution* — Spain (type locality), Portugal

*Type* — holotype in Museu de Coimbra, Portugal

*Other references* — Luna de Carvalho 1972c [discussion], 1979 [discussion]

*Notes* — Kinzelbach (1978) synonymized *S. ibericus* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. ibericus* should remain as a valid species unless additional data is found.

***Stylops izumoensis*** Kifune and Maeta, 1990: 102  
n. stat.

*Host* — *Andrena opacifovea* Hirashima  
(Andrenidae)

*Specimens described* — Male, female

*Distribution* — Japan

*Type* — holotype (no. 2782) in Kyushu  
University, Japan

*Other references* — Kifune 1991b [male  
description]

*Notes* — Straka et al. (2015a) listed *S. izumoensis*  
as a supposed junior synonym of *S. yamatonis*  
presumably based solely on their hosts being closely  
related and both being from Japan. Until molecular  
or morphological evidence is identified for their  
synonymy, they should remain as separate species.

***Stylops japonicus*** Kifune and Hirashima, 1985: 46

*Hosts* — *Andrena benefica* Hirashima, *A.*  
*sakagamii* Tadauchi, Hirashima and Matsumura  
(Andrenidae)

*Specimens described* — Female

*Distribution* — Japan (type locality), Korea

*Type* — holotype (no. 2522) in Kyushu  
University, Japan

*Other references* — Kifune and Maeta 1990  
[distribution], Kifune 1991b [host], Kifune et al.  
1994 [host]

*Notes* — Straka et al. (2015) proposed *S.*  
*truncates*, *S. oblongulus*, *S. truncatoides*, *S. collinus*  
and *S. aburanae* as supposed junior synonyms of  
*S. japonicus* presumably based on their hosts being  
in the subgenus *Andrena*. Unless additional data is  
discovered to support this synonymy, these species  
should remain as separate valid species.

***Stylops kaguyae*** Kifune and Hirashima, 1985: 51

*Hosts* — *Andrena kaguyae* Hirashima; *A.*  
*minutula* (Kirby); *A. hikosana* Hirashima, *A.*  
*komachi* Hirashima (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan (type locality), Korea

*Type* — holotype (no. 2528) in Kyushu  
University, Japan

*Other references* — Kifune and Maeta 1990

[distribution], Kifune 1991 [distribution], Kifune et  
al. 1994 [host]

***Stylops kinzelbachi*** Luna de Carvalho, 1974: 327

*Host* — *Andrena orbitalis* Morawitz  
(Andrenidae)

*Specimens described* — Female

*Distribution* — Spain

*Type* — holotype in Zoologische Sammlung des  
Bayerischen Staates, Munchen, Germany

*Notes* — Kinzelbach (1978) synonymized *S.*  
*kinzelbachi* and all European *Stylops* species with  
*S. melittae*. Straka et al. (2015a) made a logical  
argument for not synonymizing these species and *S.*  
*kinzelbachi* should remain as a valid species unless  
additional data is found.

***Stylops krygeri*** Pierce, 1918: 445 n. stat.

*Host* — *Andrena vaga* Panzer (Pierce (1918)  
reported *Halictus zonulus* Smith to be the host  
(now = *Lasioglossum zonulum* (Smith, 1848), then  
Kinzelbach thought the host to be *A. vaga*)

*Specimens described* — Female

*Distribution* — Denmark

*Type* — holotype (no. 21440) in United States  
National Museum

*Notes* — Kinzelbach (1978) synonymized *S.*  
*krygeri* and all European *Stylops* species with  
*S. melittae* but also mentioned that it may be the same  
as an unidentified species reported from *A. vaga*.  
Straka et al. (2015a) made a logical argument for  
not synonymizing these species but then suggested  
that *S. krygeri* was a supposed synonym of *S. ater*  
based on having the same host. However, they noted  
that the description of the female does not match that  
of *S. ater*. This uncertainty suggests that *S. krygeri*  
should remain as a valid species until a further study  
can be completed.

***Stylops leechi*** Bohart, 1941: 128

*Host* — *Andrena vicinoides* Viereck (= *Andrena*  
*advarians* Viereck) (Andrenidae)

*Specimens described* — Male, Female

*Distribution* — British Columbia,  
Canada

*Type* — holotype in Canadian National Collection, paratypes in California Academy of Sciences and Luna de Carvalho collection (now at Sam Houston State University)

***Stylops liliputanus*** Luna de Carvalho, 1974:

*Hosts* — *Andrena astrella* Warncke; *A. hystrix* Schmiedeknecht; *Andrena montarca* Warncke (misspelled as *A. montarco* by Luna de Carvalho); *A. bayona* Warncke; *A. exigua* Erichson; *A. munutuloides* Perkins (Andrenidae)

*Specimens described* — Male, female, larva

*Distribution* — Spain

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany

paratype in Luna de Carvalho collection (now at Sam Houston State University)

*Notes* — Straka et al. (2015a) comment that all reported hosts except that of the holotype seem unlikely due to genetic differences between the host species reported by Luna de Carvalho (1974). Thus, specimens from these other hosts could constitute cryptic species. Kinzelbach (1978) synonymized *S. liliputanus* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and proposed that it be reinstated.

***Stylops lusohispanicus*** Luna de Carvalho,  
1974: 317

*Host* — *Andrena verticalis* Pérez (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Portugal (type locality), France, Spain, Turkey

*Other references* — Luna de Carvalho 1979 [discussion]

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany paratype in Luna de Carvalho collection (now at Sam Houston State University)

*Notes* — Kinzelbach (1978) synonymized *S. lusohispanicus* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. lushispanicus* should remain as a valid species unless additional evidence is presented.

***Stylops madrilensis*** Luna de Carvalho, 1974: 337

*Host* — *Andrena vetula* Lepeletier (Andrenidae)

*Specimens described* — Male, female, larva

*Distribution* — Spain (type locality), Portugal

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany paratype in Luna de Carvalho collection (now at Sam Houston State University)

*Notes* — Kinzelbach (1978) synonymized *S. madrilensis* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. madrilensis* should remain as a valid species unless additional evidence is found.

***Stylops mandibularis*** Pierce, 1911: 494 **n. stat.**

= *Stylops sinuatus* Pierce, 1918 (by Bohart 1941)

*Host* — *Andrena mandibularis* Robertson (Andrenidae)

*Specimens described* — Female

*Distribution* — Illinois, USA

*Type* — holotype (no. 13691) in United States National Museum

*Other references* — Bohart 1941 [discussion]

*Notes* — Straka et al. (2015a) listed *S. mandibularis* as a supposed junior synonym of *S. advarians* presumably based solely on their host

***Stylops maxillaris*** Pasteels, 1949: 194

*Host* — *Andrena humilis* Imhoff (Andrenidae)

*Specimens described* — Male, female

*Distribution* — Belgium (type locality), Germany, Denmark, France

*Type* — holotype in Institut Royal des Sciences Naturelles, Bruxelles, Belgium; paratype in Luna de Carvalho collection (now at Sam Houston State University)

*Notes* — Kinzelbach (1978) synonymized *S. maxillaris* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species but then suggested that *S. esteponensis* was a supposed junior synonym of *S. maxillaris* presumably based on having hosts in the subgenus *Chlorandrena*.

Unless other evidence is available, *S. maxillaris* and *S. esteponensis* should remain as a valid species.

***Stylops medionitans* Pierce, 1919: 450 n. stat.**

*Host* — *Andrena medionitens* Cockerell (Andrenidae)

*Specimens described* — Female

*Distribution* — Colorado, USA (type locality); USA (California, Oregon)

*Type* — holotype (no. 21444) in United States National Museum

*Other references* — Bohart 1936 [description, discussion], Bohart 1941 [discussion]

*Notes* — Pierce (1919) used a misspelling of the host to name this species. By his naming method, the host would have logically been named *S. medionitens*, however his name *S. medionitans* remains the valid spelling. Straka et al. (2015) proposed *S. medionitans* as a supposed junior synonym of *S. subcandidae* presumably based on their having hosts in closely related subgenera. Since these species utilize different hosts and are geographically separated they should remain as separate species unless additional evidence for this synonymy is presented.

***Stylops melittae* Kirby, 1802: 113**

= *Stylops kirbii* Leach, 1815: 135 (by Pierce 1909)

= *Stylops haworthi* Stephens, 1829a, b: 403 (by Pierce 1909)

= *Stylops spencii* Pickering, 1836: 168 (by Pasteels 1949)

= *Stylops melittai* Luna de Carvalho 1974: 341 (misspelling)

= *Stylops kirbyi* Kinzelbach, 1978: 125 (misspelling)

*Hosts* — *Andrena nigroaenea* (Kirby); *A. haemorrhoea* (Fabricius); *A. hattorfiana* (Fabricius); *A. barbilabris* (Kirby); *A. cineraria* (Linnaeus); *A. proxima* (Kirby); *Andrena gravida* Imhoff (Andrenidae)

*Specimens described* — Male, female, larva

*Distribution* — Great Britain, Austria, Switzerland, Czech Republic, Germany, France, Hungary, Italy, Spain, Belgium

*Type* — type not designated

*Other references* — Beljavsky 1936 [*Host* relationship], Bleidorn and Benne [distribution, abundance], Brandt 1882 [nervous system anatomy], Kinzelbach 1978; Luna de Carvalho

1960 [discussion], 1972 [discussion]; O'Conner and Ronayne 2007 [distribution]; Paxton and Pohl 1999 [host], Perkins 1918b [discussion]; Pierce 1909 [discussion], 1918 [discussion]; Tolasch et al. 2012 [pheromone], Ulrich 1964 [larva], Zettel 2018 [distribution, hosts]

*Notes* — Kinzelbach (1978) synonymized all European *Stylops* species with *S. melittae* however Straka et al. (2015a) made a logical argument for not synonymizing these species except for the valid synonymies previous to Kinzelbach (1978). *Stylops spencii* as described by Pickering (1836) was synonymized by Pasteels (1949) based primarily on evidence from Perkins (1918). The problem occurred because the host of Pickering's (1836) specimen was labelled as *A. tibialis* but in fact was not that species. However, *A. tibialis* does host a strepsipteran that Pasteels later named *S. perkinsi*. The location of specimens of Pickering's *S. spencii* is unknown and while they are likely *S. melittae*, they could as easily be considered *nomen nudem*. Either scenario leaves the species designated as *S. spencii* as an unoccupied species name but it is currently being left as a synonym of *S. melittae* in case a specimen is found.

***Stylops moestae* Pierce, 1918: 443 n. stat.**

*Host* — *Andrena frigida* Smith (= *Andrena moesta* Smith) (Andrenidae)

*Specimens described* — Female

*Distribution* — Washington, USA

*Type* — holotype (no. 21439) in United States National Museum

*Notes* — Straka et al. (2015) proposed *S. moestae* as a supposed junior synonym of *S. advarians* presumably based on their both having hosts in the subgenus *Andrena*. Since these species utilize different hosts and there is no other evidence except that their hosts are closely related, they should remain as separate species unless additional molecular or morphological evidence for this synonymy is provided.

***Stylops moniliaphagus* Luna de Carvalho, 1974: 332**

*Host* — *Andrena monilia* Warncke (note misspelled by Luna de Carvalho) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Spain

*Type* — holotype in Zoologischen Instituts der Freien, Universität Berlin, Germany

*Notes* — Kinzelbach (1978) synonymized *S. moniliaphagus* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species, and *S. moniliaphagus* should remain as a valid species unless additional evidence is found.

***Stylops montanus*** Kifune and Maeta, 1990: 103

*Host* — *Andrena mitakensis* Hirashima (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2784) in Kyushu University, Japan

***Stylops muelleri*** Borchert, 1971: 18 **n. stat.**

= *Stylops ovinae* Noskiewicz and Poluszyński 1927 (by Kinzelbach 1978, but see notes below)

*Host* — *Andrena vaga* Panzer (Andrenidae)

*Specimens described* — Male, female, larva

*Distribution* — Germany (type locality), Poland, Denmark

*Type* — holotype in Zoologischen Instituts der Freien, Universität Berlin, Germany

*Other references* — Fraulob et al. 2015 [development]; Jensen 1971 [distribution], Knauth et al. 2016 [head anatomy]; Lagoutte et al. 2013 [pheromone]; Lowe et al. 2016 [female morphology]; Peinert et al. 2016 [reproduction, evolution]

*Notes* — *Stylops ovinae* was a preliminary name given to the strepsipteran parasite of *Andrena vaga* by Noskiewicz and Poluszyński (1927), who did not describe the species. Thus, Pasteels (1954) considered this an unoccupied name. While *S. ovinae* is then designated as *nomen nudum*, it is likely that the species mentioned by Noskiewicz and Poluszyński is actually the same as *S. muelleri* due to their both having *A. vaga* as a *Host*. Kinzelbach (1978) synonymized both *S. muelleri* and *S. ovinae*, and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not

synonymizing these species based on the criteria of Kinzelbach (1978) but then synonymized them with *S. ater*. However, the host of *S. ater* is not known, although it is assumed to have the same host by Straka et al. (2015a). Until there is additional evidence for synonymizing *S. muelleri*, it should remain as a valid species.

***Stylops multiplicatae*** Pierce, 1909: 104

= *Stylops grandior* Pierce, 1919: 451 (by Straka et al. 2015a)

*Host* — *Andrena miranda* Smith (= *Andrena multiplicata* Cockerell) (= *A. grandior multiplicatiformis* Viereck) (Andrenidae)

*Specimens described* — Female

*Distribution* — Wisconsin, USA (type locality); Montana, USA

*Type* — holotype (no. 10094) in United States National Museum

*Notes* — Straka et al. (2015a) proposed *S. grandior* as a junior subjective synonym of *S. multiplicatae*. Morphological difference between *S. multiplicatae* and *S. grandior* appears to be within what could be expected due to variation within a species and they utilize the same host species. When Pierce (1919) named *S. grandior*, its host was *A. grandior*, which became a junior synonym of *A. miranda*. It appears that the proposed synonymy is justified.

***Stylops murotai*** Kifune, 1991b: 157

*Host* — *Andrena takachihoi* Hirashima (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2798) in Kyushu University, Japan

***Stylops nassonowi*** Pierce, 1909: 105

= *Stylops melittae* Nasonow, 1893: plate 1, figs. 1-7

= *Stylops savignyi* Hofeneder, 1924: 254 (by Statka et al. 2015b)

= *Stylops nassanowi* Luna de Carvalho, 1974: 345 (incorrect spelling)



*Hosts* — *Andrena pilipes* Fabricius (= *A. carbonaria*), *A. corax* Warncke, *A. cyanomicans* Pérez, *A. sayignyi* Spinola (Andrenidae) Specimens described. Female, larva

*Distribution* — Egypt (type locality); Germany?

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, München, Germany

*Other references* — Saunders 1872; Pérez 1886; Friese 1891; Luna de Carvalho 1972 [discussion], 1979 [discussion, larva]

*Notes* — Pierce (1909) described *S. nassonowi* from a figure drawn by Nasonow (1893) of specimens from Egypt and Germany. However, the specimen from Germany cannot be certainly assigned to the same species. Kinzelbach (1978) synonymized *S. nassonowi* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species. Straka et al. (2015b) synonymized *S. sayignyi* with *S. nassonowi*.

***Stylops neonanae* Pierce 1918: 454 n. stat.**

*Host* — *Andrena neonana* Viereck (Andrenidae)

*Specimens described* — Female

*Distribution* — Georgia, USA

*Type* — holotype in Philadelphia Academy of Sciences, USA

*Notes* — Straka et al. (2015a) proposed *S. neonanae* as a supposed junior synonym of *S. bruneri* presumably based on their hosts being closely related. These species should remain as separate species unless additional molecular or morphological evidence for the strepsipterans is presented as closely related host can have different parasites.

***Stylops nevinsoni* Perkins, 1918b: 71**

*Hosts* — *Andrena synadelpha* Perkins; *A. helvola* (Linnaeus) (Andrenidae)

*Specimens described* — Female

*Distribution* — Great Britain, Austria

*Type* — type not designated

*Other Notes* — Zettel 2018 [distribution, host]

*Notes* — Straka et al (2015) proposed *S. transversa* as a supposed junior synonym of *S. nevinsoni* presumably based on their having hosts in the subgenus *Andrena*. Since these species utilize

different hosts and there is no other evidence except that their hosts are closely related they should remain as separate species unless additional molecular or morphological evidence for the strepsipteran species is presented.

***Stylops nipponicus* Kifune and Maeta, 1990: 103 n. stat.**

*Host* — *Andrena nippon* Tadauchi and Hirashima (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2783) in Kyushu University, Japan

*Notes* — Straka et al (2015) proposed *S. nipponicus* as a supposed junior synonym of *S. yamatonis* presumably based on their having hosts that are closely related. Since these species utilize different hosts and there is no other evidence except that their hosts are closely related, they should remain as separate species unless additional molecular or morphological evidence for the strepsipteran species is presented.

***Stylops nitidae* Pasteels 1954: 352 n. stat.**

*Host* — *Andrena nitida* (Müller) (Andrenidae)

*Specimens described* — Female

*Distribution* — Switzerland

*Type* — holotype and paratype in Musée Zoologique de Lausanne, Switzerland

*Note* — Kinzelbach (1978) synonymized *S. nitidae* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species for reasons specified by Kinzelbach but then proposed *S. nitidae* as a supposed junior synonym of *S. melittae*, presumably based on their hosts being closely related. Since they provided no evidence based on morphology or genetics of the strepsipteran *S. nitidae*, it should remain as a valid species unless additional evidence is found.

***Stylops nitidiusculae* Poluszyński 1927: 95 n. stat.**

= *Stylops nitidiusculai* Luna de Carvalho, 1974 (misspelling)

*Host* — *Stylops nitidiuscula* Schenck (Andrenidae)

*Specimens described* — Male, Female

*Distribution* — Ukraine (type locality), Spain

*Type* — type specimens in Muzeum im. Dzieduszykich, Lwów, Ukraine

*Other references* — Luna de Carvalho, 1974 [distribution]

*Notes*— Kinzelbach (1978) synonymized *S. nitidiusculae* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species but then suggested that *S. nitidiusculae* was a supposed junior synonym of *S. hammella* presumably based on both having hosts in the subgenus *Notandrena*. Unless other evidence is available, *S. hammella* and *S. nitidiusculae* should remain as separate valid species.

***Stylops nubeculae*** Pierce 1909: 105

*Host* — *Andrena nubecula* Smith (Andrenidae)

*Specimens described* — Female

*Distribution* — Colorado, USA

*Type* — holotype (no. 10096) in United States National Museum

***Stylops nuda*** Pierce, 1911: 495

*Host* — *Andrena nuda* Robertson (Andrenidae)

*Specimens described* — Female

*Distribution* — Illinois, USA

*Type* — holotype (no. 13692) in United States National Museum

*Other reference* — Bohart (1941) [discussion]

***Stylops obenbergeri*** Ogloblin 1923: 45

*Host* — *Andrena* sp.

*Specimens described* — Male, female

*Distribution* — Czech Republic

*Type* — holotype in National museum Prague, Czech Republic

*Other references* — Ulrich 1964

*Notes*— Kinzelbach (1978) synonymized *S. obenbergeri* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical

argument for not synonymizing these species and *S. obenbergeri* should remain as a valid species unless additional evidence is found.

***Stylops oblongulus*** Kifune and Hirashima, 1985: 47  
**n. stat.**

*Host* — *Andrena longitibialis* Hirashima

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2524) in Kyushu University, Japan

*Other references* — Kifune and Maeta 1990 [distribution]

*Notes* — Straka et al. (2015a) proposed *S. oblongulus* as a supposed junior synonym of *S. japonicus* presumably based on their having hosts that are closely related and in the subgenus *Andrena*. Since these species utilize different hosts and there is no other evidence except that their hosts are closely related, they should remain as separate species unless additional molecular or morphological evidence for the strepsipteran species is presented.

***Stylops obsoletus*** Luna de Carvalho, 1974: 324

*Host* — *Andrena distinguenda* Schenck (= *Andrena obsoleta* Pérez) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Spain (type locality), Greece, Austria

*Other Notes* — Zettel 2018 [distribution]

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany; paratype in Luna de Carvalho collection (now at Sam Houston State University)

*Notes* — Kinzelbach (1978) synonymized *S. obsoletus* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. obsoletus* should remain as a valid species unless additional evidence is found.

***Stylops oklahomae*** Pierce, 1909: 110 **n. stat.**

*Host* — *Andrena texana* Cresson (Andrenidae)

*Specimens described* — Female

*Distribution* — Oklahoma, USA

*Type* — holotype (no. 10105) in United States National Museum

*Notes* — Straka et al. (2015a) listed *S. oklahomae* as a supposed junior synonym of *S. bipunctatae* presumably based solely on their hosts being in the subgenus *Larandrena*. However, these species utilize different host species that appear to be geographically separated so unless molecular or morphological evidence is identified for their synonymy, they should remain as separate species.

***Stylops orientis* Kifune and Maeta, 1990: 101 n. stat.**

*Host* — *Andrena watasei* Cockerell (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2780) in Kyushu University, Japan

*Notes* — Straka et al. (2015a) proposed *S. orientis* as a supposed junior synonym of *S. circularis* presumably based on their having hosts that are in the subgenus *Melandrena*. Since these species utilize different hosts and there is no other evidence except that their hosts are closely related, they should remain as separate species unless additional molecular or morphological evidence for the strepsipteran species is presented.

***Stylops pacificus* Bohart, 1936: 15 n. stat.**

= *Stylops pacifica* Bohart, 1941: 128 (spelling changed by Kinzelbach 1971 for gender agreement)

*Hosts* — *Andrena caerulea* Smith (= *A. complexa* Viereck), *A. suavis* Timberlake, *A. cuneilabris* Viereck, *Panurginus melanocephalus* (Cockerell) (Andrenidae)

*Specimens described* — Male, female, larva

*Distribution* — California, USA (type locality); Oregon, USA

*Type* — holotype in California Academy of Sciences

*Other references* — Linsley and MacSwain 1957 [natural history], MacCarthy 1991 [eye structure], Slifer 1977 [antenna]

*Notes* — Straka et al. (2015a) listed *S. pacificus* as a supposed junior synonym of *S. polemonii* based solely on their hosts being in the same *Euandrena*.

However, these species utilize different *Host* species that appear to be geographically separated so unless molecular or morphological evidence is identified for their synonymy, they should remain as separate species.

***Stylops packardi* Pierce, 1909: 105**

*Host* — *Andrena barbilabris* (Kirby) (= *A. placida* Smith) (Andrenidae)

*Specimens described* — Male

*Distribution* — Massachusetts, USA

*Type* — holotype (no. 10092) in United States National Museum

***Stylops paracuellus* Luna de Carvalho, 1974: 339**

*Host* — *Andrena tunetana* Schmiedeknecht (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Spain (type locality), Morocco, Turkey

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany; paratype in Luna de Carvalho collection (now at Sam Houston State University)

*Notes* — Kinzelbach (1978) synonymized *S. paracuellus* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. paracuellus* should remain as a valid species unless additional evidence is found.

***Stylops pasteelsi* Luna de Carvalho, 1974:326**

*Host* — *Andrena ramlehiana* Pérez (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Spain

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany

*Notes* — Kinzelbach (1978) synonymized *S. pasteelsi* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. pasteelsi* should remain as a valid species unless additional evidence is found. Straka et al. (2015a) noted that the hosts identification is likely incorrect since *A. ramlehiana* is known only from the Near

East and no members of the subgenus *Melittoides* is known from Spain.

***Stylops perkinsi*** Pasteels 1949: 188 **n. stat.**

= *Stylops spencii* Perkins 1918b: 71 (by Pasteels 1949)

*Hosts* — *Andrena tibialis* (Kirby), *A. carantonica* Pérez (= *A. jacobi* Perkins) (Andrenidae)

*Specimens described* — Male, female

*Distribution* — Great Britain (type locality), Belgium, Spain, Germany, France, Hungary

*Type* — holotype and paratypes in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany

*Other references* — Boyd 1936, Luna de Carvalho 1972, Kinzelbach 1978

*Notes* — Kinzelbach (1978) synonymized *S. perkinsi* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species but then suggested that *S. perkinsi* was a supposed junior synonym of *S. aterrimus* presumably based on having hosts that are closely related. Unless other evidence is available, *S. hammella* and *S. nitidiusculae* should remain as separate valid species.

***Stylops pilipedis*** Pierce, 1911: 495

*Host* — *Andrena pilipes* Fabricius (Andrenidae)

*Specimens described* — Female

*Distribution* — China

*Type* — holotype (no. 13693) in United States National Museum

***Stylops polemonii*** Pierce 1909: 106

*Host* — *Andrena polemonii* Robertson (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Colorado, USA

*Type* — holotype (no. 10097) in United States National Museum

*Notes* — Bohart (1941) did not include this species in his North American species review. Straka et al. (2015a) listed *S. pacificus* as a supposed junior synonym of *S. polemonii* based solely on both their hosts being in the subgenus *Euandrena*. However,

these species utilize different host species that appear to be geographically separated, so unless molecular or morphological evidence is identified for their synonymy, they should remain as separate species.

***Stylops praecocis*** Luna de Carvalho, 1974: 329  
(published in Luna de Carvalho 1972c)

*Host* — *Andrena praecox* (Scopoli) (Andrenidae)

*Specimens described* Female

*Distribution* — Spain

*Type* — type not designated

*Notes* — Noskiewicz and Poluszyński (1927) listed *S. praecocis* as a preliminary name for a species parasitizing *A. praecox* but did not describe the species. This led Pasteels (1954) to declare *A. praecocis* as *nomen nudem*. Luna de Carvalho (1974) later described a species from the same *Host* species using the Noskiewicz and Poluszyński name *A. praecocis* making the likely assumption that it represented the same strepsipteran species. Straka et al. (2015a) also included another species, *S. nycthemerae* (declared *nomen nudem* with the same reasoning as *S. praecocis* by Pasteels (1954)), as a supposed synonym of *S. praecocis* based on their having closely related hosts in the subgenus *Andrena*. Since the reported host species are different (*S. nycthemerae* was reported to parasitize *A. nycthemerae* Imhoff, 1868) there is not sufficient evidence to deem the two strepsipterans the same species. *Stylops nycthemerae* should remain considered *nomen nudem*.

***Stylops risleri*** Kinzelbach, 1967: 37

*Host* — *Andrena lineolata* Warncke

*Specimens described* — Female

*Distribution* — Teneriffe, Canary Islands

*Type* — holotype in Zoologisches Museum Helsinki, Finland

*Notes* — Kinzelbach (1978) synonymized *S. risleri* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. risleri* should remain as a valid species unless additional evidence is found.

***Stylops ruthenicus*** Schkaff, 1925: 13

= *Afrostylops ruthenicus* (Schkaff, 1925) (by Fox and Fox 1964)

*Host* — unknown

*Specimens described* Male

*Distribution* — Ukraine

*Type* — no type designated

*Notes* — Fox and Fox (1964) moved *S. ruthenicus* into the genus *Afrostylops*. Kinzelbach (1971a) found the type species of *Afrostylops* to belong to *Myrmecolax* and also determined that *S. ruthenicus* should be placed in *Stylops*. Kinzelbach (1978) later synonymized *S. ruthenicus* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species. Therefore, *S. ruthenicus* should remain as a valid species unless other evidence is provided for its synonymy.

***Stylops salicifloris*** Pierce, 1909: 106 n. stat.

= *Stylops centroclarus* Bohart, 1937 (by Bohart 1941)

*Hosts* — *Andrena salicifloris* Cockerell; *A. quintiliformis* Viereck, *Andrena* sp. near *marioides*; *A. cleodora* (Viereck), *A. hippotes* Robertson (Andrenidae)

*Specimens described* — Male, female, larva

*Distribution* — Washington, USA (type locality); California, USA

*Type* — holotype (no. 10098) in United States National Museum

*Other references* — Bohart 1941 [discussion]

*Notes* — Straka et al. (2015a) listed *S. salicifloris* as a supposed junior synonym of *S. hippotes* based solely on their hosts being in the subgenus *Trachandrena*. However, these species utilize different hosts species that appear to be geographically separated so unless molecular or morphological evidence is identified for their synonymy, they should remain as separate species.

***Stylops salmancanus*** Luna de Carvalho 1974: 322

*Host* — *Andrena hedikae* Jaeger (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Spain (type locality), Hungary

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany

*Notes* — Kinzelbach (1978) synonymized *S. salmancanus* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. salmancanus* should remain as a valid species unless additional evidence is found.

***Stylops shannoni*** (Pierce, 1919): 457

= *Neostylops shannoni* Pierce, 1919: 457 (by Bohart 1941)

*Host* — unknown

*Specimens described* — Male

*Distribution* — Maryland, USA; British Columbia, Canada

*Type* — holotype (no. 21448) in United States National Museum

*Other references* — Bohart (1941) [discussion], Kenner [distribution]

*Notes* — Kenner (2002) reported *Andrena hippotes* Robertson, 1895 as a hosts of *S. shannoni* based on specimens collected in British Columbia, Canada. If this identification is correct, it could mean that *S. shannoni* is a junior synonym of *S. hippotes*. However, this possible synonymy has not been formalized and there is some doubt due to our current knowledge of these specimens. Until a more thorough study of these species, they should remain as separate species.

***Stylops sparsipilosae*** Pierce, 1909: 108

*Host* — unknown (Andrenidae)

*Specimens described* — Female

*Distribution* — Maine, USA

*Type* — holotype (no. 10100) in United States National Museum

*Notes* — Pierce (1909) listed *Andrena sparsipilosa* Viereck as the *Host* of *S. sparsipilosae*.

However, *A. sparsipilosa* was designated *nomen nudem* by Krombein et al. (1979) so the host of *S. sparsipilosae* is an unknown species in Andrenidae.

***Stylops spreta*** Perkins 1918b: 73

= *Stylops spretae* Ulrich 1930: 15 (misspelling)

= *Stylops spretus* Luna de Carvalho 1974: 321 (unjustified)

emendation)

*Hosts* — *Andrena spreta* Pérez; *A. semilaevis* Pérez (= *A. saundersella* Perkins); *A. minutula* (Kirby); *A. minutuloides* Perkins; *A. subopaca* Nylander (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Great Britain (type locality), Spain, Austria

*Type* — unknown

*Other references* — Zettel 2018 [distribution, host]

*Notes* — Kinzelbach (1978) synonymized *S. spreta* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. spreta* should remain as a valid species unless additional evidence is found. Straka et al. (2015a) also proposed that *S. parvulae* Noskiewicz and Poluszyński, 1927 and *S. duriensis* be considered synonyms of *S. spreta*. *Stylops parvulae* was made *nomen nudem* by Pasteels (1954). Straka et al. (2015) based the synonymy on the hosts reported by Noskiewicz and Poluszyński (1927), *Andrena minutula* (Kirby, 1802), being in the subgenus *Micrandrena* and closely related to the known hosts of *S. spreta*. However, there is no other evidence that these strepsipterans are the same species. *Stylops parvulae* and *S. duriensis* should not be considered synonyms of *S. spreta* unless more substantial evidence links these strepsipteran specimens.

***Stylops subcandidae* Pierce, 1909: 108**

*Host* — *Andrena candida* Smith, 1879 (= *A. subcandida* Viereck) (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — California, USA

*Type* — holotype (no. 10101) in United States National Museum

*Notes* — Straka et al. (2015a) listed *S. bisalicidis* (including its synonym, *S. diabola*) and *S. medionitans* as supposed junior synonyms of *S. subcandidae* based solely on their hosts being in the subgenus *Thysandrena*. However, these species utilize different hosts species that appear to be geographically separated so unless molecular or morphological evidence is identified for their

synonymy, they should remain as separate species.

***Stylops subcircularis* Kifune and Maeta, 1990: 104 n. stat.**

*Hosts* — *Andrena japonica* (Smith), *A. fukaii* Cockerell (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2785) in Kyushu University, Japan

*Notes* — Straka et al. (2015a) listed *S. subcircularis* as a supposed junior synonym of *S. yamatonis* based solely on their hosts being in genetically closely related subgenera. However, these species utilize different host species and unless additional evidence is identified for the strepsipteran species, they should remain as separate species.

***Stylops swenki* Pierce 1909: 108 n. stat.**

= *Stylops asteridis* Pierce 1911: 494 (by Bohart 1941)

*Hosts* — *Andrena asteris* Robertson; *Adrena* sp. near *lincolnella* Cockerell (Andrenidae)

*Specimens described* — Female, larva

*Distribution* — Nebraska, USA (type locality); USA (Illinois, Pennsylvania)

*Type* — holotype (no. 10102) in United States National Museum

Other reference — Bohart (1941) [discussion]

*Notes* — Straka et al. (2015a) listed *S. swenki* (including its synonym, *S. asteridis*) as a supposed junior synonym of *S. crawfordi* based solely on their hosts being in the subgenus *Callandrena*. However, these species utilize different hosts species and unless molecular or morphological evidence for the strepsipteran species is identified for their synonymy, they should remain as separate species.

***Stylops thwaitesi* Perkins, 1918b: 70**

= *Stylops* sp. Thwaites, 1841: 342 (by Thwaites 1842)

= *Stylops thwaiti* Saunders, 1872: 23 (*nomen nudem* by Pasteels 1949)

= *Stylops wilkellae* Perkins, 1918b: 70 (by Pasteels 1954)

= *Styhlops twaithei* Pasteels, 1954: 349 (misspelling)

= *Stylops albofasciatae* Günther, 1957: 412 (by Pasteels 1954)

= *Stylops thwaittei* Luna de Carvalho, 1969: 8 (misspelling)

*Hosts* — *Andrena ovatula* (Kirby) (= *A. convexiscula* Kirby), *A. wilkella* (Kirby) (Andrenidae)

*Specimens described* — Male, female

*Distribution* — Great Britain (type locality), Austria, Switzerland, Germany, Spain, Portugal, France, Hungary, Italy, Netherlands, Finland, Russia, Yugoslavia

*Type* — type not designated

*Other references* — Luna de Carvalho 1969 [discussion], 1972c [discussion], 1979 [discussion]; Pasteels 1954 [female]; Perkins 1908b [discussion]; Pierce 1909 [discussion]

*Notes* — *Stylops thwaitesi* has a complicated taxonomic history. Thwaites (1841, 1842) reported a *Stylops* that parasitized *Andrena convexiscula* (later synonymized with *A. ovatula*) which was later recognized as the hosts of what became *S. thwaitesi*, which makes it likely that these are the same strepsipteran species. Saunders (1872) then labelled the strepsipterans that parasitize *A. convexiscula* as *S. thwaittei* in recognition of Thwaites' discovery, but he did not formally describe the species. This caused Pasteels (1949) to declare *S. thwaittei* as *nomen nudem*. Perkins (1918b) gave a brief description of what he thought was the strepsipteran mentioned by Thwaites (1841, 1842) and Saunders (1872). Perkins brief description was from a hosts reported as *A. afzeliella* (now a synonym of *A. ovatula*), which was given the name *S. thwaitesi*, commenting that his spelling would be a correction of the previous spellings. Perkins effort represents the first formal description of this species, although his description is still very minimal. Perkins (1918b) also named *S. wilkellae* for specimens previously recorded under *S. melittae*, which he stated was "extremely similar" to *S. thwaitesi* but used *A. wilkella* as a *Host*. These species were later synonymized by Pasteels (1954). Günther (1957) named *S. albofasciatae* for specimens parasitizing *A. albofasciata*, which was later synonymized with *A. ovatula*, the *Host* of *S. thwaitesi*. *Stylops albofasciatae* became a junior synonym of *S. thwaitesi*. Kinzelbach (1978) synonymized *S. thwaitesi* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a

logical argument for not synonymizing these species but then suggested that *S. alfkeni* and *S. borealis* were supposed junior synonyms of *S. thwaitesi* based on having *Hosts* that are in the subgenus *Taeniandrena*. However, there is no other evidence that these strepsipterans are the same species. Unless other evidence that the strepsipteran species are the same, *S. thwaitesi*, *S. alfkeni* and *S. borealis* should remain as separate species.

***Stylops timberlakei* Bohart, 1936: 14**

*Host* — *Andrena macrocephala* Cockerell (Andrenidae)

*Specimens described* — Male, female

*Distribution* — California, USA

*Type* — holotype in California Academy of Sciences

***Stylops transversa* Pasteels, 1949: 191**

= *Stylops transversus* Pasteels, 1949 (unjustified emendation by Kinzelbach 1972)

*Hosts* — *Andrena albifrons* (Forster) (= *A. armata* Panzer = *A. fluva* Schrank), *A. clarkella* (Kirby) (Andrenidae)

*Specimens described* — Male, female

*Distribution* — Belgium (type locality), Germany, Switzerland, France, Great Britain, Netherlands, Yugoslavia

*Type* — holotype in Institut Royal des Sciences Naturelles, Bruxelles, Belgium

*Notes* — Kinzelbach (1978) synonymized *S. transversa* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species but then suggested that *S. transversa* was a supposed junior synonym of *S. nevinsoni* presumably based on having hosts in the subgenus *Andrena* and being closely related. Unless other evidence suggests that the strepsipteran species are the same, *S. transversa* and *S. nevinsoni* should remain as separate species.

***Stylops truncatoides* Kifune and Hirashima, 1985:  
50 n. stat.**

*Host* — *Andrena lapponicas* Zetterstedt (= *A.*

*shirozui* Hirashima) (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2525) in Kyushu University, Japan

*Other references* — Kifune and Maeta 1990 [distribution]

*Notes* — Straka et al. (2015a) listed *S. truncatoides* as a supposed junior synonym of *S. japonicus* based solely on their hosts being in the subgenus *Andrena*. However, these species utilize different host species and unless molecular or morphological evidence for the strepsipteran species is identified for their synonymy, they should remain as separate species.

***Stylops truncatus*** Kifune and Hirashima, 1985: 46  
n. sp.

*Host* — *Andrena maukensis* Matsumura (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2523) in Kyushu University, Japan

*Notes* — Straka et al. (2015a) listed *S. truncatus* as a supposed junior synonym of *S. japonicus* based solely on their *Hosts* being in the subgenus *Andrena*. However, these species utilize different host species and unless molecular or morphological evidence for the strepsipteran species is identified for their synonymy, they should remain as separate species.

***Stylops valerianae*** Kifune and Hirashima 1985: 55

*Host* — *Andrena valeriana* Hirashima (Andrenidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2530) in Kyushu University, Japan

*Other references* — Kifune and Maeta 1990 [distribution]

***Stylops vandykei*** Bohart 1936: 11

*Hosts* — *Andrena pertristis* Cockerell (= *A. carliniformis* Viereck and Cockerell); *A.*

*perimelas* Cockrell (Andrenidae)

*Specimens described* — Male, female, larva

*Distribution* — California, USA (type locality); Oregon, USA

*Type* — holotype in California Academy of Sciences

*Other references* — Bohart 1941 [discussion]

***Stylops ventricosae*** Pierce, 1909: 109

*Host* — *Andrena ventricosa* Dours (Andrenidae)

*Specimens described* — Female

*Distribution* — Hungary

*Type* — no type designated

*Note* — This species was described from a drawing made by Nasonow (1893) that was labelled as *S. melittae*. Friese (1893) also recorded a strepsipteran form that reported host. Unfortunately, no specimens are known for these records. Since no other strepsipteran is known from this host and there is a description by Pierce (1909), the species remains valid and waiting for additional information. Kinzelbach (1978) synonymized *S. ventricosae* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. ventricosae* should remain as a valid species unless additional evidence is found.

***Stylops warnckeii*** Luna de Carvalho, 1974: 325

*Host* — *Andrena pandosa* Warncke (Andrenidae)

*Specimens described* — Female, Larva

*Distribution* — Spain

*Type* — holotype in Zoologische Sammlung des Bayerischen Staates, Munchen, Germany

*Notes* — Kinzelbach (1978) synonymized *S. warnckeii* and all European *Stylops* species with *S. melittae*. Straka et al. (2015a) made a logical argument for not synonymizing these species and *S. warnckeii* should remain as a valid species unless additional evidence is found.

***Stylops yamatonis*** Kifune and Hirashima, 1985: 51

*Hosts* — *Andrena yamato* Tadauchi and Hirashima, *A. kerriae* Hirashima (Andrenidae)

*Specimens described* — Male, female



*Distribution* — Japan (type locality), Korea

*Type* — holotype (no. 2527) in Kyushu University, Japan

*Other references* — Kifune and Maeta 1990 [male description, distribution], Kifune 1991 [distribution], Kifune et al. 1994 [*Host*]

*Notes* — Straka et al. (2015a) listed *S. dentatae*, *S. aino*, *S. izumoensis*, *S. nipponicus*, *S. subcircularis*, and *S. fukuensis* as supposed junior synonyms of *S. yamatonis* based solely on their hosts being closely related by genetic similarity. However, these species utilize different hosts species and unless molecular or morphological evidence for the strepsipteran species is identified for their synonymy, they should remain as separate species.

#### Family Xenidae Saunders, 1872: 20

= Xenides Saunders, 1872: 20

= Pseudoxenides Saunders 1872: 20

= Xenidae Pierce 1908: 78

Xenidae has fluctuated between being a family or a subfamily but is currently recognized as a family separate from Stylopidae. Saunders (1872) was first to divide these strepsipterans into taxonomic groupings when he created the subfamilies Xenides and Pseudoxenides, both of which eventually became part of Xenidae. Pierce (1909) was the first to use the name Xenidae as a family designation within the Strepsiptera. The family Xenidae was then reduced to subfamily status by Kinzelbach (1971a) when he incorporated Xeninae and Stylopiniae as subfamilies of Stylopidae. Pohl (2002) re-established Xenidae in his phylogeny that found it was a sister group to Sylopidae + Myrmecolacidae, making the previous Stylopidae paraphyletic. The autapomorphic characters of the Xenidae are currently known primarily from the first instar larvae. The molecular phylogeny by McMahon et al. (2011) does not support the sister relationship of Myrmecolacidae and Stylopidae but instead makes Xenidae and Sylopidae sister groups, thus leaving the possibility that these families could again be combined into one family. The currently accepted classification is to maintain them as separate families until further studies sort this out. All hosts of Xenidae are in the hymenopteran families Vespidae and Sphecidae.

Genus *Paragiozenos* Ogloblin, 1923: 46

*Type species* — *Paragiozenos brachypterus* Ogloblin, 1923

*Paragiozenos* is a monotypic genus that was established by Ogloblin (1923) for a new species parasitizing a member of the subfamily Masarinae (Vespidae). Males of this genus have antennae shorter than the width of the head and four antennal segments. Hind wings of the male have one detached radial vein and a single Ma. The wings are relatively small in relation to the body. The female cephalothorax is as broad as long.

*Paragiozenos brachypterus* Ogloblin, 1923: 46

*Host* — *Paragia* sp.

*Specimens described* — Male, female

*Distribution* — Australia

*Type* — holotype in National Museum, Prague, Czech Republic

*Other references* — Hofeneder 1928b [natural history]

Genus *Paraxenos* Saunders, 1872: 45

= *Eupathocera* Pierce, 1908: 79 (by Bohart 1937c)

= *Ophthalmochlus* Pierce, 1908:79 (by Bohart 1937c)

= *Homilops* Pierce, 1908: 80 (by Bohart 1937c)

= *Sceliphronchthrus* Pierce, 1909: 141 (by Bohart 1937c)

= *Tachytixenos* Pierce, 1911: 501 (by Bohart 1937c)

= *Isodontiaphila* Pierce, 1918: 265 (by Bohart 1937c)

= *Pseudoxenos* (in part) Bohart, 1937: 133 (by Kinzelbach 1971a)

= *Bembicixenos* Kinzelbach, 1971b (by Kinzelbach 1971a)

*Type species* — *Paraxenos erberi* Saunders, 1872

*Notes* — Bohart (1937c) placed *Eupathocera*, *Ophthalmochlus*, *Homilops*, *Sceliphronchthrus*, *Tachytixenos*, and *Isodontiaphila* into the genus *Pseudoxenos* and these genera were later moved to the resurrected genus *Paraxenos* by Kinzelbach 1971a. Prior to this action, Kinzelbach (1971b) listed *Bembicixenos* as a genus in a table.

Saunders (1872) created the genus *Paraxenos*

for a new species that parasitized a wasp in the subfamily Bembicinae (currently in the family Crabronidae) and also placed Templeton's (1841) *Xenos westwoodii* in this genus. Pierce (1908, 1909, 1911, 1918) named several additional species that are now in this genus but created the genera *Eupathocera*, *Ophthalmochlus*, *Homilops*, *Sceliphronechthrus*, *Tachytixoxenos*, and *Isodontiaphila* based on his assumption that a new genus of Strepsiptera should be established if it utilized a different genus of hosts species. This was somewhat corrected by Bohart (1937, 1941) by making them synonyms but he also made *Paraxenos* a junior synonym of *Pseudoxenos*. Thus, he moved the above genera created by Pierce (1908, 1909, 1911, 1911) into *Pseudoxenos*. Kinzelbach (1971a) later revised this group, again separating *Paraxenos* and *Pseudoxenos*. The genus *Paraxenos* has males with four antennal segments; a thin sclerotized prementum separate from the mouthfield sclerites; postfrons relatively wide and not separated from the vertex plates; and a hindwing with a CuP vein. All known hosts of *Paraxenos* are in the hymenopteran family Sphecidae. A key to species parasitic on *Bembix* is given by Kifune and Hirashima (1987).

***Paraxenos abbotti*** (Pierce 1909)

= *Homilops abbotti* Pierce 1909: 147 (by Bohart 1937c)  
= *Pseudoxenos abbotti* (Pierce 1909) (by Kinzelbach 1971a)

*Host* — *Sphex* sp. (listed by Pierce as *Proterosphex*, now a junior synonym of *Sphex*) (Sphecidae)

*Specimens described* — Female

*Distribution* — Thailand

*Type* — holotype (no. 12668) in United States National Museum

***Paraxenos altozambeziensis*** (Luna de Carvalho, 1959)

= *Pseudoxenos altozambeziensis* Luna de Carvalho, 1959: 136 (by Kinzelbach 1971a)

*Host* — *Ammophila* sp. (Sphecidae)

*Specimens described* — Female, larva

*Distribution* — Angola

*Type* — holotype in Museu Real do Congo Belga (The Royal Museum of Central Africa), Brussels, Belgium

***Paraxenos argentinus*** (Brèthes, 1923)

= *Ophthalmochlus argentinus* Brèthes, 1923: 14 (by Bohart 1937c)

= *Pseudoxenos argentinus* (Brèthes, 1923) (by Kinzelbach 1971a)

*Host* — *Prionyx thomae* (Fabricius) (= *Proterosphex platensis* Brèthes reported by Brèthes) (Sphecidae)

*Specimens described* — Female

*Distribution* — Argentina

*Type* — holotype (no. 10.1/1) in Hope Museum, Oxford, England

***Paraxenos astrolabensis*** (Székessy, 1956)

= *Pseudoxenos astrolabensis* Székessy, 1956: 144 (by Kinzelbach 1971a)

*Host* — *Sphex cognatus* Smith (= *Sphex formosus* F. Smith) (Sphecidae)

*Specimens described* — Female

*Distribution* — New Britain

*Type* — holotype in Ungarisches Naturwissenschaftliches Museum, Budapest, Hungary

***Paraxenos auripedis*** (Pierce, 1911)

= *Ophthalmochlus auripedis* Pierce, 1911: 503 (by Bohart 1937c)

= *Pseudoxenos auripedis* (Pierce, 1911) (by Kinzelbach 1971a)

*Host* — *Isodontia auripes* (Fernald) (Sphecidae)

*Specimens described* — Female

*Distribution* — Maryland, USA

*Type* — holotype (no. 13711) in United States National Museum

- Paraxenos australiensis*** Kifune and Hirashima, 1987: 157  
*Host* — *Bembix musca* Handlirsch (Sphecidae)  
*Specimens described* — Female  
*Distribution* — Queensland, Australia  
*Type* — holotype in United States National Museum
- Paraxenos beaumonti*** (Pasteels, 1951)  
 = *Pseudoxenos beaumonti* Pasteels, 1951: 76 (by Kinzelbach 1971a)  
*Host* — *Stizus marthae* Handlirsch (Sphecidae)  
*Specimens described* — Male  
*Distribution* — Algeria  
*Type* — holotype in Musee Zoologique de Lausanne, Switzerland  
*Other references* — Santori 1994
- Paraxenos bucki*** Trois, 1984a: 16  
*Host* — *Ammophila* sp. (Sphecidae)  
*Specimens described* — Female  
*Distribution* — Rio Grande do Sul, Brazil  
*Type* — holotype in the collection of Faculdade de Agronomia, Universidade Federal do Sul, Porto Alegre, Brazil
- Paraxenos biroi*** (Székessy, 1956)  
 = *Pseudoxenos biroi* Székessy, 1956: 147 (by Kinzelbach 1971a)  
*Host* — *Bembecinus antipodum* (Handlirsch) (Sphecidae)  
*Specimens described* — Male  
*Distribution* — New Guinea  
*Type* — holotype in Ungarisches Naturwissenschaftliches Museum, Budapest, Hungary
- Paraxenos crassidens*** (Pasteels, 1954)  
 = *Pseudoxenos crassidens* Pasteels 1954: 353 (by Kinzelbach 1971a)  
*Host* — *Bembecinus tridens* (Fabricius) (Sphecidae)
- Specimens described* — Female  
*Distribution* — Switzerland, Italy, France  
*Type* — holotype in Musee Zoologique de Lausanne, Switzerland
- Paraxenos doriae*** (Luna de Carvalho, 1956)  
 = *Pseudoxenos doriae* Luna de Carvalho, 1954: 41 (by Kinzelbach 1971a)  
*Host* — *Sphex nigrohirtum* Kohl (= *Chlorion* sp. reported by Luna de Carvalho) (Sphecidae)  
*Specimens described* — Female  
*Distribution* — Angola  
*Type* — holotype in Museu do Dundo, Angola; paratype in Luna de Carvalho collection (now at Sam Houston State University)
- Paraxenos duryi*** (Pierce, 1908)  
 = *Ophthalmochlus duryi* Pierce, 1908: 42 (by Bohart 1937c)  
 = *Pseudoxenos duryi* (Pierce, 1908) (by Kinzelbach 1971a)  
*Host* — *Prionyx atratus* (Lepeletier) (Sphecidae)  
*Specimens described* — Male  
*Distribution* — Ohio, USA  
*Type* — holotype in Charles Drury collection (current location unknown)
- Paraxenos erberi*** Saunders, 1872: 45  
 = *Pseudoxenos beaumonti* Pasteels, 1951: 76 (by Kinzelbach 1978)  
 = *Pseudoxenos crassidens* Pasteels, 1954: 353 (by Kinzelbach 1978)  
*Hosts* — *Bembecinus hungaricus* (Frivaldsky), *B. peregrinus* (Smith), *B. tridens* (Fabricius), *Bembecinus* sp., *Stizus marthae* Handlirsch (Sphecidae)  
*Specimens described* — Male, female  
*Distribution* — Greece (type locality), Algeria, Bosnia and Herzegovina, France, Hungary, Italy, Russia, Switzerland  
*Type* — holotype in Ungarisches Naturwissenschaftliches Museum, Budapest,

## Hungary

*Other references* — Batelka and Straka 2005 [distribution], Kinzelbach 1978 [host, distribution]

*Notes* — Kinzelbach 1978 synonymized *P. beumonti* and *P. crassidens* with *P. erberi* with little explanation except suggesting that the species limits are poorly known despite having a large number of specimens. There is a need for further investigation to determine these species limits. Until further evidence, the species will remain as most recently designated by Kinzelbach (1978).

***Paraxenos erimae*** (Székessy, 1956)

= *Pseudoxenos erimae* Székessy, 1956: 146 (by Kinzelbach 1971a)

*Host* — *Sphex fumicatus* Christ (= *S. metallicus* cited by Székessy 1956) (Sphecidae)

*Specimens described* — Female

*Distribution* — New Guinea

*Type* — holotype in Ungarisches Naturwissenschaftliches Museum, Budapest, Hungary

***Paraxenos esakii*** (Hirashima and Kifune, 1962)

= *Pseudoxenos esakii* Hirashima and Kifune, 1962: 175 (by Kinzelbach 1972)

*Host* — *Isodontia nigella* (Smith); *I. maidli* (Yasumatsu) (Sphecidae)

*Specimens described* — Male, female

*Distribution* — Japan

*Type* — holotype and paratypes in Entomological Laboratory, Kyushu University, Japan

*Other references* — Kifune 1988 [distribution], Kifune and Tano 1985 [*Host*, distribution]

***Paraxenos fasciati*** (Pierce, 1909)

= *Sceliphronchthrus fasciati* Pierce, 1909: 142 (by Bohart 1937c)

= *Pseudoxenos fasciati* (Pierce, 1909) (by Kinzelbach 1971a)

*Host* — *Sceliphron fasciatum* (Lepelletier de Saint Fargeau) (Sphecidae)

*Specimens described* — Female

*Distribution* — Dominican Republic

*Type* — holotype (no. 10128) in United States National Museum

***Paraxenos fuliginosi*** (Brèthes, 1923)

= *Ophthalmochlus fuliginosi* Brèthes, 1923: 11 (by Bohart 1937c)

= *Pseudoxenos fuliginosi* (Brèthes, 1923) (by Kinzelbach 1971a)

*Host* — *Sphex servillei* Lepelletier de Saint Fargeau (= *Proterosphex fuliginosus* Dahlbom reported in Brèthes 1923) (Sphecidae)

*Specimens described* — Female

*Distribution* — Tucumán, Argentina

*Type* — type not designated

***Paraxenos gigas*** (Pasteels, 1950)

= *Pseudoxenos gigas* Pasteels, 1950: 290 (by Kinzelbach 1971a)

*Host* — *Sphex schoutedeni* Kohl (= *Chlorion schoutedini* reported by Pasteels) (Sphecidae)

*Specimens described* — Female

*Distribution* — Democratic Republic of Congo

*Type* — holotype in Museu Real do Congo Belga (The Royal Musuem of Central Africa), Brussels, Belgium

***Paraxenos hofenederi*** (Pasteels, 1956)

= *Pseudoxenos* sp. Hofeneder 1949: 147 (by Pasteels 1959)

= *Pseudoxenos hofenederi* Pasteels 1956: 111 (by Kinzelbach 1978)

*Hosts* — *Stizus biclypeatus* (Christ), *S. bizonatus* Spinola, *S. ruficornis* (Forster) (= *S. distinguendus* as reported), *S. rufiventris* Radoszkowski, *Sphecius nigricornis*

(Dufour) (Sphecidae)

*Specimens described* — Male, female

*Distribution* — Cyprus (type locality), Algeria, Egypt, Greece, India, Jordan, Senegal, Tajikistan

*Type* — holotype in Museum of Natural History, London

*Other references* — Batelka and Straka 2005 [distribution], Kinzelbach 1978 [*Host*, distribution]

*Notes* — Pastells (1956) matched the species

he described with the cephalotheca and female cephalothorax reported by Hofeneder (1949) and felt that they represented the same species.

***Paraxenos hofenederianus*** Luna de Carvalho, 1978a: 95

*Host* — *Stizus distinguendus* Handlirsch (Sphecidae)

*Specimens described* — Female

*Distribution* — Senegal

*Type* — holotype in Natural History Museum, Wien, Germany

***Paraxenos hungaricus*** (Székessy, 1955)

= *Pseudoxenos hungaricus* Székessy, 1955: 281 (by Kinzelbach 1978)

*Hosts* — *Bembex oculata* Panzer, *B. rostrata* (Linnaeus) (Sphecidae)

*Specimens described* — Female

*Distribution* — Hungary (type locality), Spain

*Type* — holotype in Ungarisches Naturwissenschaftliches Museum, Budapest, Hungary

*Other references* — Kinzelbach 1978 [distribution, host]

***Paraxenos inclusus*** (Oliveira and Kogan, 1963)

= *Pseudoxenus inclusus* Oliveira and Kogan, 1963: 351 (by Kinzelbach 1971a)

*Host* — *Ammophila* sp. (Sphecidae)

*Specimens described* — Female, larva

*Distribution* — Espírito Santo, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

***Paraxenos indicus*** (Pierce 1911)

= *Tachyzenos indicus* Pierce 1911: 502 (by Bohart 1937c)

= *Pseudoxenos indicus* (Pierce 1911) (by Kinzelbach 1971a)

= *Pseudoxenos* sp. Hofeneder 1949: 148 (by Kinzelbach 1978)

*Hosts* — *Tachytes vicinus* Cameron; *T. maculicornis* Saunders; *T. modestus* Smith; *T.*

*vischnu* Cameron; *T. xenoferus* Rohwer; *Tachytes* sp. (Sphecidae)

*Specimens described* — Male, female

*Distribution* — India (type locality), Algeria, China, Denmark, Sri Lanka

*Type* — holotype (no. 13729) in United States National Museum, paratype in Los Angeles County Museum, USA

*Other references* — Kifune 1997 [*Host*, distribution], Kinzelbach 1978 [*Host*, distribution]

*Notes* — Kinzelbach recognized that the female strepsipteran labeled as *Pseudoxenos* sp. by Hofeneder (1949) from Algeria was likely *P. indicus*.

***Paraxenos krombeini*** Kifune and Hirashima, 1987: 155

*Host* — *Bembix orientalis* Handlirsch (Sphecidae)

*Specimens described* — Female

*Distribution* — Sri Lanka

*Type* — holotype in Australian National Insect Collection

***Paraxenos kurosawai*** Kifune, 1984a: 87

*Host* — *Sphex madasummae* van der Vecht

*Specimens described* — Female, larva

*Distribution* — Philippines

*Type* — holotype and paratype in National Science Museum (Nat. Hist.), Tokyo, Japan

***Paraxenos laetum*** (Ogloblin, 1926)

= *Sceliphronchthrus laetum* Ogloblin 1926: 133 (by Bohart 1937c)

= *Pseudoxenos laetum* (Ogloblin 1926) (by Kinzelbach 1971a)

*Host* — *Sceliphron laetum* (Smith) (Sphecidae)

*Specimens described* — Female, larva

*Distribution* — New Guinea (type locality), Queensland Australia

*Type* — no type designated

***Paraxenos luctuosae*** (Pierce, 1911)

= *Eupathocera luctuosae* Pierce 1911: 502 (by Bohart

1937a)  
 = *Pseudoxenos lucuosae* (Pierce 1911) (by Kinzelbach 1971a)

*Host* — *Sphex luctuosus* Smith (Sphecidae)

*Specimens described* — Female

*Distribution* — Colorado, USA

*Type* — holotype (no. 13708) in United States National Museum

***Paraxenos lugubris* (Pierce, 1908)**

= *Eupathocera lugubris* Pierce 1908: 83 (by Bohart 1937c)

= *Eupathocera pruinosae* Pierce 1909: 143 (by Bohart 1937c)

= *Eupathocera pictipennis* Pierce 1911: 502 (by Bohart 1937c)

= *Eupathocera vulgairdis* Pierce 1911: 503 (by Bohart 1937c)

= *Pseudoxenos lugubris* (Pierce 1908) (by Kinzelbach 1971a)

*Hosts* — *Ammophila extremitata* Cresson, *A. gracilis* Lepeletier de Saint Fargeau (= *Sphex fragilis* cited by Pierce), *A. pruinosae* Cresson, *A. pictipennis* Walsh, *A. kennedyi* (Murray 1938) (= *A. vulgaris* cited by Pierce 1911), *A. fernaldi* (Murray), *A. aberti* Haldeman (= *Sphex transversus* Ferdanand reported by Bohart 1941), *A. nasalis* Provancher (= *Sphex craspedotus* Ferdinand and *S. nasalis* (Provancher) reported by Bohart 1941), *A. breviceps* F. Smith (= *Sphex breviceps* reported by Bohart 1941), *Eremnophila aureonotata* (Cameron) (= *Sphex aureonotatus* (Cameron) reported by Bohart 1941), *A. arvensis* Lepeletier de Saint Fargeau (= *Sphex arvensis* (Dahlb.) reported by Bohart 1941), *A. urnaria* Dahlbom (= *Sphex urnarius* (Dahlborn) reported by Bohart 1941) (Sphecidae)

*Specimens described* — Male, female, larva

*Distribution* — Ohio, USA (type locality): USA (Colorado, Illinois, Iowa)

*Type* — holotype in Charles Drury collection (current location unknown)

*Other references* — Bohart 1941 [revision, host], Kathirithamby et al. 2012 [natural history, larva]

*Notes* — Pierce (1908) established this species name 1908 without a full description and listed its host as *Sphex* (*Ammophila*) *extremiatus* but when he later fully described the species (Pierce 1909)

he listed the host as *Sphex fragilis*, which is now a synonym of *Ammophila gracilis*, without an explanation of the change in host species. The type specimens were listed as being in the collection of Mr. Dury and the current location of these specimens is unknown, making it uncertain as to the host of the type species.

***Paraxenos mendozae* Brèthes, 1923: 13**

= *Ophthalmochlus mendozae* Brèthes, 1923: 13 (by Bohart 1937c)

= *Pseudoxenos mendozae* (Brèthes, 1923) (by Kinzelbach 1971a)

*Host* — *Prionyx neoxenus* (Kohl) (= *Priononyx neoxenus melanogaster* reported by Brèthes) (Sphecidae)

*Specimens described* — Female

*Distribution* — Mendoza, Argentina

*Type* — no type designated

***Paraxenos nagatomii* Kifune, 1985 (in Kifune and Yamane 1985: 49)**

*Host* — *Bembecinus bimaculatus* (Matsumura and Uchida) (Sphecidae)

*Specimens described* — Male, female, larva

*Distribution* — Japan, Okinawa

*Type* — holotype (no. 2450) and paratype (allotype) in Kyushu University, Japan

*Other references* — Maeta and Sugiura 1995 [distribution, natural history], Maeta et al. 1999 [natural history]

***Paraxenos novaeguineae* (Székessy, 1956)**

= *Pseudoxenos novaeguineae* Székessy 1956: 147 (by Kinzelbach 1978)

*Host* — *Bembecinus gazagnairei* (Handlirsch) (Sphecidae)

*Specimens described* — Male, female

*Distribution* — New Guinea

*Type* — holotype in Ungarisches Naturwissenschaftliches Museum, Budapest, Hungary

***Paraxenos occidentalis*** Kifune and Hirashima,  
1987: 156

*Host* — *Bembix atrifrons* Smith (Sphecidae)  
*Specimens described* — Female  
*Distribution* — Western Australia  
*Type* — holotype in United States National  
Museum

***Paraxenos orientalis*** Kifune, 1985 (in Kifune and  
Yamane 1985: 52)

*Host* — *Sceliphron madraspatanum formosanum*  
van der Vecht (Sphecidae)  
*Specimens described* — Male, female  
*Distribution* — Okinawa, Japan  
*Type* — holotype in Entomological Laboratory,  
Faculty of Agriculture, Kyushu University, Japan  
*Other references* — Kifune 1988 [male  
description]

***Paraxenos piercei*** (Brèthes, 1923)

= *Ophthalmochlus piercei* Brèthes 1923: 12 (by Bohart  
1937c)  
= *Pseudoxenos piercei* (Brèthes, 1923) (by Kinzelbach  
1971a)

*Host* — *Isodontia costipennis* (Spinola)  
(Sphecidae)  
*Specimens described* — Female  
*Distribution* — La Roja, Argentina  
*Type* — no type designated

***Paraxenos polli*** (Pasteels, 1956)

= *Pseudoxenos polli* Pasteels, 1956: 109 (by Kinzelbach  
1971a)

*Host* — *Nysson braunsii* Handlirsch (Sphecidae)  
*Specimens described* — Male  
*Distribution* — Democratic Republic of Congo  
*Type* — type not designated

***Paraxenos reticulatus*** Luna de Carvalho, 1972b:  
136

= *Pseudoxenos* sp. Luna de Carvalho, 1967: 33 (by Luna  
de Carvalho 1972b)

*Host* — *Sphex tomentosus* Fabricius (= *S.*  
*tuberculatum* cited by Luna de Carvalho) (Sphecidae)  
*Specimens described* — Male, female  
*Distribution* — Angola  
*Type* — holotype in Museu do Dundo, Angola  
*Notes* — Luna de Carvalho (1967) documented  
a cephalotheca in a specimen of *Sphex tomentosus* (= *Sphex tuberculatum* cited by Luna de Carvalho) but left the strepsipteran undescribed until he later (Luna de Carvalho 1972b) found a male and female from the same host species and concluded that they were the same species.

***Paraxenos rieki*** (Pasteels 1956)

= *Pseudoxenos rieki* Pasteels 1956: 113 (by Kinzelbach  
1978)

*Host* — *Stizus basalis* Guérin-Méneville  
(Sphecidae)  
*Specimens described* — Male  
*Distribution* — Mali  
*Type* — holotype in Museum of Natural History,  
London

***Paraxenos simplex*** (Székessy, 1956)

= *Pseudoxenos simplex* Székessy 1956: 145 (by Kinzelbach  
1978)

*Host* — *Isodontia prasinia* (Guérin-Méneville)  
(= *Sphex simplex* Kohl) (Stylopidae)  
*Specimens described* — Female  
*Distribution* — New Guinea  
*Type* — holotype in Ungarisches  
Naturwissenschaftliches Museum, Budapest,  
Hungary

***Paraxenos sinuatus*** (Pasteels 1956)

= *Pseudoxenos sinuatus* Pasteels 1956: 115 (by  
Kinzelbach 1971a)

*Host* — *Ammophila punctaticeps* (Arnold)  
(Sphecidae)  
*Specimens described* — Male, female  
*Distribution* — Democratic Republic of Congo  
*Type* — holotype in Museu Real do Congo Belga

(The Royal Musuem of Central Africa), Brussels, Belgium

***Paraxenos sphecidarum*** (Siebold, 1839)

- = *Xenos* sp. Dufour, 1837: 19 (by Siebold 1839)
- = *Xenos sphecidarum* Siebold, 1839: 72 (by Saunders 1872)
- = *Paraxenos sieboldii* Saunders, 1872: 41 (by Saunders 1872)
- = *Eupathocera sphecidarum* (Dufour, 1837) (by Pierce 1908)
- = *Eupathocera sieboldi* (Saunders, 1872) (by Pierce 1909)
- = *Pseudoxenos sphecidarum* (Dufour, 1937) (by Bohart 1937c)
- = *Paraxenos sphecidarum* (Dufour, 1837) (by Kinzelbach 1978)

*Hosts* — *Podalonia affinis* (Kirby); *P. dispar* (Taschenberg,) (= *Ammophila dispar* reported as host); *P. ebenina* (Spinola); (*P. hirsute* (Scopoli); *P. nigrohirta* (Kohl); *P. tydei* le Guillou); *Ammophila apicalis* Guérin-Méneville; *A. campestris* Latreille; *A. heydeni* Dahlbom; *A. holosericea* (Fabricius); *A. nasuta* Lepeletier de Saint Fargeau; *A. pubescens* Curtis; *A. sabulosa* (Linnaeus); *Ammophila* spp.; *Eremochares dives* (Brullé); *Prionyx kirbii* (Vander Linden (= *Sphex albisectus* reported as host); *Prionyx viduatus* (Christ); *Prionyx niveatus* (Dufour); (Sphecidae)

*Specimens described* — Male, female

*Distribution* — Albania, Austria, Croatia, Egypt, France, Germany, Great Brittan, Greece, Italy, Lebanon, Morocco, Portugal, Russia, Spain, Syria, Switzerland, Tajikistan, Turkestan,

*Type* — no type designated

*Other references* — Kinzelbach 1978 [host, distribution], Siebold 1839

*Notes* — Dufour (1837) documented a strepsipteran thought to be in the genus *Xenos* utilizing *Sphex sabulosa* (= *Ammophila sabulosa* (Linnaeus)) as a host. Siebold (1839) described this species, establishing it as *Xenos sphecidarum*. Since Dufour did not use the name *X. sphecidarum* or describe the species, the author should be Siebold. In erecting the genus *Paraxenos*, Saunders (1872) established this species as *P. sieboldii* while acknowledging the previous name of *X. sphecidarum*,

which he labeled as a synonym even though the latter name had priority. Pierce (1908) erected the genus *Eupathocera* for species using *Ammophila* as hosts, which was then a subgenus of *Sphex*, as a host; and he designated *E. lugubris* as the type species of *Eupathocera* but recognizing that the previously described *X. sphecidarum* and possibly *P. sieboldii* belonged in his newly erected genus.

Bohart (1937c) synonymized *Eupathocera* with *Pseudoxenos* but did not specifically mention *P. sphecidarum* as he was dealing primarily with North American species. Kifune and Maeta (1965) maintained this species in *Pseudoxenos*, which at the time included *Paraxenos* as a junior synonym. Kinzelbach (1978) reinstated the genus *Paraxenos* but mistakenly still recognized Dufour as the authority.

***Paraxenos striati*** (Brèthes, 1923)

- = *Ophthalmochlus striati* Brèthes, 1923: 10 (by Bohart 1937c)
- = *Pseudoxenos striati* (Brèthes, 1923) (by Kinzelbach 1971a)

*Host* — *Priononyx striatus* Smith (Sphecidae)

*Specimens described*: Female

*Distribution* — Córdoba, Argentina

*Type* — no type designated

***Paraxenos taschenbergi*** (Brèthes, 1923)

- = *Ophthalmochlus taschenbergi* Brèthes, 1923: 9 (By Bohart 1937c)
- = *Pseudoxenos taschenbergi* (Brèthes, 1923) (by Kinzelbach 1971a)

*Host* — *Prionyx pumilio* (Taschenberg) (Sphecidae)

*Specimens described* — Female

*Distribution* — Mendoza, Argentina

*Type* — no type designated

***Paraxenos teres*** (Pasteels, 1950)

- = *Pseudoxenos teres* Pasteels 1950: 289 (by Kinzelbach 1978)

*Host* — *Ammophila beniniensis* (Palisot de



Beauvois), *A. ferrugineipes* Lepeletier de Saint Fargeau (= *Sphex bonae-spei ferrugineipes* reported by Pasteels)

(Sphecidae)

*Specimens described* — Male

*Distribution* — Democratic Republic of Congo

*Type* — holotype in Museu Real do Congo Belga (The Royal Musuem of Central Africa), Brussels, Belgium

*Paraxenos vanderiisti* (Pasteels, 1952)

= *Pseudoxenos vanderiisti* Pasteels, 1952: 9 (by Kinzelbach 1978)

*Host* — *Isodontia pelopoeiformis* (Dahlbom) (Sphecidae)

*Specimens described* — Female, larva

*Distribution* — Democratic Republic of Congo

*Type* — holotype in Museu Real do Congo Belga (The Royal Musuem of Central Africa), Brussels, Belgium

*Paraxenos westwoodii* (Templeton, 1841)

= *Xenos westwoodii* Templeton, 1841: 53 (by Heyden 1867)

= *Xenos westwoodi* (Templeton, 1841) (by Heyden 1867)

= *Xenos smithii* Heyden 1867: 398 (by Saunders 1872)

= *Paraxenos westwoodii* Templeton, 1838) (by Saunders 1872)

= *Homilops westwoodi* (Templeton, 1838) (by Pierce 1908)

= *Homilops bishoppi* Pierce, 1909: 146 (by Bohart 1937c)

= *Homilops ashmeadi* Pierce, 1909: 146 (by Bohart 1937c)

= *Pseudoxenos bishoppi* (Pierce 1909) (by Kinzelbach 1971a)

= *Pseudoxenos ashmeadi* (Pierce, 1909) (by Kinzelbach 1971a)

= *Paraxenos westwoodi* (Templeton, 1841) (by Kinzelbach 1971a: 164)

*Host* — *Sphex ichneumoneus* (Linnaeus) (= *Sphex auricapillus* Templeton reposted by Heyden 1867) (Sphecidae)

*Specimens described* — Female, larva

*Distribution* — Brazil (type locality); Dominican Republic; Texas, USA

*Type* — no type designated.

*Other references* — Miller et al. 2009 [natural history]

*Notes* — Subsequent to Templeton's (1841) description, all mentions of this species have listed the specific epithet as *westwoodi*, except Saunders (1872) when he erected the genus *Paraxenos*. The description by Templeton lists the epithet as *Westwoodii*. The capitalization of the epithet is not allowed by modern rules of nomenclature but even though the logical spelling might have one "i" as an ending, Templeton clearly ended the epithet with "ii", which is allowed under articles 31.1.1 and 31.1.2 and is to be preserved (article 32.2) (ICZN 1999). The correct name should be *P. westwoodii*. Pierce (1908) placed *P. westwoodii* into the newly erected genus *Homilops* and omitted and "i" at the end of the specific epithet as well as listing the date of publication as 1838. The description by Templeton was read publically in 1838 but not published until 1841, making the latter the proper date for the species name. Bohart (1937c) made *Homilops* a synonym of *Pseudoxenos* but did not specifically list the names *P. bishoppi* or *P. ashmeadi*. Kinzelbach (1971a) placed these two species in the genus *Paraxenos* and synonymized them under the incorrectly spelled *P. westwoodi*, which included the corrected date of description as 1841.

Genus *Pseudoxenos* Saunders, 1872: 44

= *Leionotoxenos* Pierce, 1909: 137 (by Bohart 1937c)

= *Monobiaphila* Pierce, 1909: 139 (by Bohart 1937c)

= *Montezumiaphila* Bréthes, 1923: 45 (by Bohart 1937c)

= *Macroxenos* Schultze, 1925: 238 (by Bohart 1937c)

*Type species* — *Pseudoxenos schaumii* Saunders, 1872

Saunders (1872) established the genus *Pseudoxenos* for two species he named *Pseudoxenos schaumii* and *Pseudoxenos heydenii* that were parasites of the genus *Odynerus* (Vespidae). However, these two species were later synonymized, leaving the first name presented, *P. schaumii*, as the valid name. Pierce (1909) created two genera for similar species that were utilizing hosts of different genera from his belief that a different host genus warranted a different strepsipteran genus. Bréthes (1923) and Schultze (1925) followed Pierce's lead

and named two additional genera for new species before Bohart (1937c) synonymized these genera under *Pseudoxenos*. The genus is characterized by having males with four antennal segments, a partially sclerotized prementum that is part of the mouthfield sclerites, postfrons relatively narrow and separated from the vertex plates, and a hindwing with a CuP vein. All are parasites of the family Vespidae. A World checklist of *Pseudoxenos* is given by Kifune and Maeta (1965) but this list also includes species that are now in *Paraxenos*.

***Pseudoxenos andradei*** Luna de Carvalho, 1953: 3  
**n. stat.**

= *Pseudoxenos heydeni* (Saunders, 1852) (in part) (by Kinzelbach 1978)

*Host* — *Ancistrocerus biphaleratus triphaleratus* (Saussure, 1856) (reported by Luna de Carvalho as *Ancistrocerus triphaleratus* Serville) (Vespidae)

*Specimens described* — Female

*Distribution* — Portugal (type locality), Germany

*Type* — holotype and paratypes not specified in paper, now at Sam Houston State University

*Other citations* — Hofeneder and Fulmek 1943

*Notes* — Luna de Carvalho (1953) did not designate a type repository for *P. andradei* but when his collection was transferred to Sam Houston State University there were slides labeled as the holotype and paratype of *P. andradei*. The host name was misspelled in the description by Luna de Carvalho. Kinzelbach (1978) proposed *P. andradei* to be a junior synonym of *P. heydenii* based on the idea that all European species of *Pseusozenos* constituted one highly variable species and that some of the variation was actually artifacts of their preservation. However, the actual extent of variation within and between species in European *Pseudoxenos* has not yet been discovered and the fact that they have different host species that also occur in several host genera makes the synonymy questionable. Unless other evidence is presented, *P. andradei* should be considered a valid species separate from *P. heydenii*.

***Pseudoxenos arvensidis*** Pierce, 1911: 499

*Host* — *Euodynerus annulatus arvensis* (Saussure) (Vespidae)

*Specimens described* — Female

*Distribution* — Illinois, USA

*Type* — holotype (no. 13700) in United States National Museum

***Pseudoxenos atlanticus*** Luna de Carvalho, 1969: 5  
**n. stat.**

= *Pseudoxenos heydeni* (Luna de Carvalho, 1969) (in part) (by Kinzelbach 1978)

*Host* — *Odynerus* sp.

*Specimens described* — Female

*Distribution* — Madeira, Portugal

*Type* — holotype in Pasteels collection (current location unknown), paratype in Luna de Carvalho collection (now at Sam Houston State University)

*Notes* — Kinzelbach (1978) proposed *P. atlanticus* to be a junior synonym of *P. heydenii* based on the idea that all European species of *Pseusozenos* constituted one highly variable species and that some of the variation was actually artifacts of their preservation. However, the actual extent of variation within and between species in European *Pseudoxenos* has not yet been discovered. The host association of *P. atlanticus* does not help to decide if it should be synonymized because it was only identified to genus and the the location of the host has not been further identified, if it even still exists. Unless other evidence is presented, *P. atlanticus* should be considered a valid species separate from *P. heydenii*.

***Pseudoxenos bequaerti*** Luna de Carvalho, 1956: 40

*Host* — *Antepipona tropicalis* (Saussure) (Vespidae)

*Specimens described* — Male

*Distribution* — Angola

*Type* — holotype location unknown

*Other references* — Luna de Carvalho 1978a [discussion]

*Notes* — Luna de Carvalho (1956) designated a holotype in the original description but did not name

a depository. This specimens was not included in the transfer of his collection to Sam Houston State University and the current location of this specimen remains unknown.

***Pseudoxenos bidentatus*** Pasteels, 1950: 288

*Host* — *Eumenes melanosomus* Saussure (Vespidae)

*Specimens described* — Female

*Distribution* — Democratic Republic of Congo (type locality), Liberia

*Type* — holotype in Museu Real do Congo Belga (The Royal Musuem of Central Africa), Brussels, Belgium

*Other references* — Luna de Carvalho 1978a [discussion]

***Pseudoxenos bishoppi*** (Pierce, 1909)

= *Monobiaphila bishoppi* Pierce, 1909: 139 (by Bohart 1937c)

*Host* — *Monobia quadridens* (Linnaeus) (Vespidae)

*Specimens described* — Female

*Distribution* — Texas, USA

*Type* — holotype (no. 10122) in United States National Museum

***Pseudoxenos corcyricus*** (Saunders, 1872) **n. stat.**

= *Paraxenos corcyricus* Saunders, 1872: 46 (by Bohart 1941)

= *Pseudoxenos heydeni* (Saunders, 1872) (in part) (by Kinzelbach 1978)

*Hosts* — *Odynerus spinipes* (Linnaeus) or *O. rotundigaster* Saussure (Vespidae)

*Specimens described* — Female

*Distribution* — Great Britain

*Type* — no type designated

*Other references* — Blüthgen 1961 [*Host*], Kinzelbach 1978 [distribution, taxonomy]

*Notes* — Kinzelbach (1978) proposed *P. corcyricus* to be a junior synonym of *P. heydenii* based on the idea that all European species of *Pseuso Xenos* constituted one highly variable species

and that some of the variation was actually artifacts of their preservation. However, the actual extent of variation within and between species in European *Pseudoxenos* has not yet been discovered and the fact that they have different host species dispersed through several host genera makes the synonymy questionable. Unless other evidence is presented, *P. corcyricus* should be considered a valid species separate from *P. heydenii*. The host of *P. corcyricus* is in some question. Sanuders (1872) reported the host as *O. spinipes* but Blüthgen (1961) thought that the *Host* might have been misidentified and proposed that the actual host might be *O. rotundigaster*. However no actual specimens are available to determine which claim is correct. Bohart (1941) made *Paraxenos* a junior synonym of *Pseudoxenos*, thus transferring *Paraxenos corcyricus* to *Pseudoxenos*. When Kinzelbach (1971a) resurrected *Paraxenos*, he left *P. corcyricus* in *Pseudoxenos*, and based on the host being in Vespidae this appears to be correct.

***Pseudoxenos erynnidis*** Pierce, 1911: 499

*Host* — *Pachodynerus erynnis* (Lepeletier) (Vespidae)

*Specimens described* — Female

*Distribution* — Florida, USA

*Type* — holotype (no. 13701) in United States National Museum

*Other references* — Krombein 1967

***Pseudoxenos foraminati*** Pierce, 1911: 499

*Host* — *Euodynerus foraminatus* (Saussure) (Vespidae)

*Specimens described* — Female

*Distribution* — New Jearsey, USA

*Type* — holotype (no. 13702) in United States National Museum

***Pseudoxenos fundati*** Pierce 1911: 500

*Host* — *Stenodynerus propinquus* (Saussure) (= *Odynerus fundatus* reported by Pierce 1911) (Vespidae)

*Specimens described* — Female

*Distribution* — Illinois, USA

*Type* — holotype (no. 13703) in United States

National Museum

1937c)

***Pseudoxenos heydenii*** (Saunders, 1852)

= *Xenos heydenii* Saunders, 1852: 141 (by Kinzelbach 1971a)

*Host* — *Odontodynerus deflendus* (Saunders) (Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — Great Britain (type locality), Turkey, Mongolia

*Type* — no type designated

*Other references* — Kaszab 1977 [distribution], Kinzelbach 1978 [discussion], Luna de Carvalho 1979 [discussion], Hofeneder and Fulmek 1943

*Notes* — Kinzelbach (1978) proposed *P. klugii*, *P. schaumii*, *P. corcyricus*, *P. seyrigi*, *P. andradei*, *P. andradei*, *P. lusitaincus*, and *P. atlanticus* to be junior synonyms based on the idea that all European species of *Pseudoxenos* constituted one highly variable species and that some of the variation was actually artifacts of their preservation. While this is possible, it is also possible that all or several of these are distinct species. The species in question also are hosted by quite different host species and while Strepsiptera are not as host specific as was thought by Pierce (1908, 1909), they do not normally utilize a wide range of hosts from many genera. Straka et al. (2015a) made a similar argument to refute the synonymies by Kinzelbach in the strepsipteran genus *Stylops*. Unless more conclusive evidence is presented, the European *Pseudoxenos* species should remain as separate species.

***Pseudoxenos hirokoeae*** Kifune and Yamane, 1992: 343

*Host* — *Stenodynerus rufomaculatus* Yamane and Tano (Vespidae)

*Specimens described* — Female

*Distribution* — Japan

*Type* — holotype (no. 2872) in Kyushu University, Japan

***Pseudoxenos hookeri*** (Pierce, 1909)

= *Leionotoxenos hookeri* Pierce, 1909: 139 (by Bohart

*Hosts* — *Euodynerus annulatus* (Say) (= *Leionotus verus* reported by Pierce 1909), *E. foraminatus apokkensis* (Roberts) (Vespidae)

*Specimens described* — Female

*Distribution* — Texas, USA

*Type* — holotype (no. 10125) in United States National Museum

*Other references*: Krombein 1967

***Pseudoxenos huastecae*** Székessy, 1965: 477

*Host* — *Montezumia huasteca* Saussure (Vespidae)

*Specimens described* — Female

*Distribution* — Honduras

*Type* — holotype in San Pedro Sula collection, Honduras

***Pseudoxenos insularis*** Kifune, 1983c: 355

*Host* — *Pachodynerus cinerascens* (Fabricius) (Vespidae)

*Specimens described* — Female

*Distribution* — St. Croix, Virgin Islands

*Type* — holotype (no. 100691) in United States National Museum

***Pseudoxenos itatiaiae*** Trois, 1984b: 25

*Host* — *Eumenes* sp.

*Specimens described* — Female

*Distribution* — Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

***Pseudoxenos iwatai*** Esaki, 1931: 63

*Hosts* — *Oreumenes decorates* (Smith) (= *Eumenes japonica* Saussure cited by Esaki), *Anterhynchium flavomarginatum micado* (Kirsch), *Euodynerus nipanicus* (Schulthess) (= *Odynerus quadrifasciatus* reported by Maeta 1963), *Eumenes rubrofemoratus* Giordani Soika (Vespidae)

*Specimens described* — Male, female

*Distribution* — Japan

*Type* — holotype in Kyushu University, Japan

*Other references* — Maeta 1963 [biology, natural history], Maeta 1971 [biology, natural history, Maeta et al. 1997 [distribution], Maeta et al. 2001 [natural history], Takahashi et al. 1997 [natural history], Yamane and Kifune 1991 [host, distribution]

***Pseudoxenos jonesi* (Pierce, 1909)**

= *Leionotoxenos jonesi* Pierce, 1909: 138 (by Bohart 1937c)

*Host* — *Parancistrocerus vagus* (Saussure) (= *Leionotus colon* reported by Pierce 1909) (Vespidae)

*Specimens described* — Female

*Distribution* — USA (Louisiana, Texas)

*Type* — holotype (no. 10123) in United States National Museum

***Pseudoxenos klugii* (Saunders, 1852) n. stat.**

= *Xenos klugii* Saunders, 1852: 142 (by Saunders 1872)

= *Pseudoxenos klugi* Kinzelbach, 1971a: 162 (unjustified emendation)

= *Pseudoxenos heydeni* Kinzelbach, 1978 (in part)

*Host* — *Gymnomerus laevipes* (Shuckard) (= *Odynerus rubicola* reported by Saunders 1852) (Vespidae)

*Specimens described* — Male

*Distribution* — Greece (type locality), Turkey

*Type* — no type designated

*Notes* — Saunders (1852) ended the specific epithet with “ii”, which is allowed under articles 31.1.1 and 31.1.2 and is to be preserved (article 32.2) (ICZN 1999) and the correct name should be *P. klugii*. Kinzelbach (1978) proposed *P. klugii* to be a junior synonym of *P. heydenii* based on the idea that all European species of *Pseuso Xenos* constituted one highly variable species and that some of the variation was actually artifacts of their preservation. While this is possible, it is also possible that all or several of these are distinct species. The species in question also are hosted by different host species and should remain as separate species unless more compelling evidence is discovered.

***Pseudoxenos louisianae* (Pierce, 1909)**

= *Leionotoxenos louisianae* Pierce, 1909: 138 (by Bohart 1937c)

= *Pseudoxenos histrionis* Pierce, 1911: 500 (by Bohart 1941)

= *Pseudoxenos pedestridis* Pierce, 1911: 500 (by Bohart 1941)

*Hosts* — *Parancistrocerus vagus* (Saussure) (= *Leionotus vagans* reported by Pierce 1909), *P. histrionis* (Lepeletier), *P. pedestris* (Saussure) (Vespidae)

*Specimens described* — Female

*Distribution* — Louisiana, USA (type locality); USA (Nebraska, Florida, Illinois)

*Type* — holotype (no. 10124) in United States National Museum

*Other references* — Bohart 1941 [discussion]

*Notes* — Pierce (1909) erected the genus *Leionotoxenos* based on his concept that a strepsipteran genus is restricted to a given host genus. This idea was challenged

by (Bohart 1937c) who synonymized this genus with *Pseudoxenos*. As *hosts* were revised, it turns out that the host Pierce identified as *Leionotus vagans* is in the genus *Parancistrocerus*. Bohart (1941) made *P. histrionis* and *P. pedestridis* junior synonyms of *P. louisianae* based on having quadrate mandibles with a strongly hooked apical tooth on the mandible and similarities in the color of the thorax. These synonymized species also were identified from hosts that are in the same genus, although different species.

The similar important morphological characters make the synonymy likely but Bohart (1941) also commented that this designation is still somewhat uncertain and that the discovery of males is needed for conformation. Since the current material available for study suggests there are no differences, except different hosts, these synonymies should remain.

***Pseudoxenos lusitanicus* Luna de Carvalho, 1960: 2 n. stat.**

= *Pseudoxenos heydeni* Kinzelbach, 1978 (in part)

*Host* — *Ancistrocerus renimacula* (Leptleitier, 1841) (reported as *Ancistrocerus recinacula* by Luna de Carvalho) Male, female

*Distribution* — Portugal (type locality), Germany, Hungary, Turkey

*Type* — holotype and paratypes in Luna de Carvalho collection (now at Sam Houston State University)

*Other references* — Kinzelbach 1971a, Székessy 1959

*Notes* — Luna de Carvalho (1960) reported the *Host* as *Ancistroceros recincula* (Leptleittier), which was almost certainly a misspelling of *A. renimacula*. Kinzelbach (1978) proposed *P. lusitanicus* to be a junior synonym of *P. heydenii* based on the idea that all European species of *Pseudoxenos* constituted one highly variable species and that some of the variation was actually artifacts of their preservation. Much of this reasoning was based on most of these species being only known from females, which have limited morphological characters. However, the male and female of *P. lusitanicus* are known and there does not appear to be sufficient evidence at this time to synonymize *P. lusitanicus* with *P. heydenii*, especially since the hosts of these species are in different genera. Unless additional evidence is found to synonymize these species, they should remain as separate species.

***Pseudoxenos minor*** Kifune and Maeta, 1978: 416

*Host* — *Stenodynerus frauenfeldi* (Saussure) (Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — Japan

*Type* — holotype (no. 2084) and paratypes in Kyushu University, Japan, paratypes in collections of authors (current location unknown)

***Pseudoxenos neomexicanus*** Pierce, 1918: 463

*Host* — *Stenodynerus toas* (Cresson) (Vespidae)

*Specimens described* — Male

*Distribution* — New Mexico, USA

*Type* — holotype (no. 21449) in United States National Museum

***Pseudoxenos papuanus*** Székessy, 1956: 149

*Host* — *Odynerus floricola* (Saussure) (Vespidae)

*Specimens described* — Female

*Distribution* — New Guinea

*Type* — holotype in Ungarischen Naturwissenschaftlichen Museum, Budapest, Hungary

***Pseudoxenos piercei*** (Schultz, 1925)

= *Macroxenos piercei* Schultz, 1925: 238 (by Bohart 1937c)

= *Pseudoxenos schultzei* (Schultz, 1923) (in part) (replacement name by Kifune and Maeta 1965)

= *Pseudoxenos schultzei* (Schultz, 1925) (by Kifune and Maeta, 1965 (now unnecessary secondary homonym by Kifune and Tano 1991))

*Hosts* — *Rhynchium atrum* Saussure, *R. atrissimum* Becht (Vespidae)

*Specimens described* — Female

*Distribution* — Philippines

*Type* — no type designated

*Other references* — Kifune and Tano 1994 [host, distribution]

*Notes* — Bréthes (1923) first named a species as *Ophthalmochlus piercei* and subsequently (Schultz 1925) named an additional species *Macroxenos piercei*. Bohart (1937c) later made *Ophthalmochlus* and *Macroxenos* junior synonyms of *Pseudoxenos*. This made what was originally called *M. piercei* a junior homonym, which was recognized by Kifune and Maeta (1965) who established *Pseudoxenos shultzei* as a replacement name. Kinzelbach (1971a) reinstated *Paraxenos*, moving *Pseudoxenos piercei* (the original *O. peircei*) to *Paraxenos* but retaining *Pseudoxenos shultzei* (the original *M. piercei*). By ICZN rule 59.4, junior secondary homonym would then be rejected, making *Pseudoxenos. shultzei* a junior synonym of *Pseudoxenos piercei* (Kifune and Tano 1994).

***Pseudoxenos prolificum*** Teson and Remes Lenicov, 1979: 115

*Hosts* — *Hypodynerus vespiformis* (Halliday), *H. coarctatus* (Saussure), *Monobia cingulate* Bréthes (Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — Chile (type locality), Argentina

*Type* — holotype in Museo de la Plata, Argentina

***Pseudoxenos robertsoni*** Pierce, 1911: 501

*Host* — *Stenodynerus histrionalis* (Robertson) (Vespididae)

*Specimens described* — Female

*Distribution* — Illinois, USA

*Type* — holotype (no. 13706) in United States National Museum

***Pseudoxenos ropalidiae*** Kinzelbach, 1975: 69

*Hosts* — *Ropalidia fulvopruinosa* (Cameron), *R. marginata* (Lepelletier) (= *R. ferruginea* reported by Kinzelbach 1975), *R. variegata* (Smith) (Vespidae)

*Specimens described* — Male, female

*Distribution* — Papua New Guinea; Karachi, India; Java; Indonesia; Philippines

*Type* — Senckenberg Museum, Frankfurt, Germany

***Pseudoxenos rueppelli*** Kinzelbach, 1971: 69

*Hosts* — *Eumenes campaniformis* (Fabricius), *E. campiformis higletti* (Mead Waldo), *E. campaniformis rendalli* (Bingham), *E. maxillosus* (De Geer), Vespidae

*Specimens described* — Female, larva

*Distribution* — Ethiopia (type locality), Angola, Democratic Republic of Congo, Madagascar, Rhodesia, Senegal

*Type* — holotype (no. 0013) in Senckenbergian Museum, Frankfurt, Germany

*Other references* — Luna de Carvalho 1978a [discussion]

***Pseudoxenos schaumii*** Saunders, 1872: 44 **n. stat.**

= *Pseudoxenos schaumii* Kinzelbach, 1971a: 162 (unauthorized emendation)

= *Pseudoxenos heydeni* (Saunders, 1852) (in part) (by Kinzelbach, 1978)

*Hosts*: *Ancistrocerus parietum* (Linnaeus), *A. claripennis* Thomson, *A. gazella* (Panzer) (Vespidae)

*Specimens described* — Male

*Distribution* — most of Europe

*Type* — no type designated

Other citations: Crevecoeur 1949 [distribution], Smalian 1908, Pierce 1909, Hofeneder and Fulmek 1943, Luna de Carvalho 1950, Székessy 1954, Kinzelbach 1971a

*Notes* — Saunders (1872) ended the specific epithet with “ii”, which is allowed under

articles 31.1.1 and 31.1.2 and is to be preserved (article 32.2) (ICZN 1999). and the correct name should be *P. schaumii*. Kinzelbach (1978) proposed *P. schaumii* to be a junior synonym of *P. heydenii* based on the idea that all European species of *Pseudoxenos* constituted one highly variable species and that some of the variation was actually artifacts of their preservation. While this is possible, it is also possible that all or several of these are distinct species. The species in question are hosted by different species and should remain as separate species unless more compelling evidence is discovered.

***Pseudoxenos seyrigi*** Monod, 1925: 236 **n. stat.**

= *Pseudoxenos heydeni* (Saunders, 1852) (in part) (by Kinzelbach, 1978)

*Host* — *Odynerus crenatus* Lepelletier (Vespidae)

*Specimens described* — Male, female

*Distribution* — Spain

*Type* — holotype in Museum National d’Histoire Naturelle, Paris

*Other citations* — Székessy 1959 [host], Vandel [effect on host]

*Notes* — Kinzelbach (1978) proposed *P. seyrigi* to be a junior synonym of *P. heydenii* based on the idea that all European species of *Pseudoxenos* constituted one highly variable species and that some of the variation was actually artifacts of their preservation. While this is possible, it is also possible that all or several of these are distinct species. The species in question are hosted by different species, in different genera, and should remain as separate species unless more compelling evidence is discovered.

***Pseudoxenos tigridis*** Pierce, 1911: 501

*Host* — *Ancistrocerus adiabatus* (Saussure) (= *Odynerus tigris* reported by Pierce 1911) (Vespidae)

*Specimens described* — Female

*Distribution* — Illinois, USA

*Type* — holotype (no. 13707) in United States National Museum

*Other references* — Bohart 1941 [distribution]

***Pseudoxenos vigili*** (Bréthes, 1923)

= *Montezumiaphila vigili* Bréthes, 1923: 45 (by Bohart 1937c)

*Host* — *Montezumia vigili* Bréthes (name not valid but unsure of correct species) (Vespididae)

*Specimens described* — Female

*Distribution* — Cordoba, Argentina

*Type* — holotype not designated

Genus *Xenos* Rossius, 1793: 49

= *Schistosiphon* Pierce, 1908: 80 (by Bohart 1941)

= *Acroschismus* Pierce, 1908: 82 (by Bohart 1941)

= *Vespaexenos* Pierce, 1909: 133 (by Bohart 1941)

= *Belonogastrechthrus* Pierce, 1911: 498 (by Bohart 1941)

= *Clypoxenos* Bréthes, 1923: 45 (by Bohart 1941)

= *Brasixenos* Kogan and Oliveira, 1966: 358 (by Kinzelbach 1971a)

*Type species* — *Xenos vesparum* Rossius, 1793

The genus *Xenos* is the first named strepsipteran genus, although it took some time before the order Strepsiptera was proposed. The first description of *Xenos vesparum* by Rossi (or Rossius) (1793) was very brief and required later redescription but it established the first species name that would end up in Strepsiptera, being originally placed in Hymenoptera. By the time Kirby (1813) proposed Strepsiptera as an order, the species *Xenos peckii* had been added. Pierce (1908, 1909, 1911) established the genera *Schistosiphon*, *Acroschismus*, *Vespaexenos*, and *Belonogastrechthrus* but these genera were later synonymized with *Xenos* by Bohart (1941), as was the genus *Clypoxenos* that had been established by Bréthes (1923). However, Bohart questioned whether *Belonogastrechthrus* and *Clypoxenos* should actually be synonymized. Kogan and Oliveira (1966) thought that the genus *Clypoxenos* should still be valid but it did not fit the closely related species they discovered in Brazil and they created the genus *Brasixenos*. These were all considered

synonyms by Kinzelbach (1971a), leaving the genus in its current taxonomic state. *Xenos* is characterized by having males with a four segmented antennae, a postlumbium that is short and wide, and a complete  $R_1$  vein in the hindwing. The female has four genital tubes. All known host of species in *Xenos* are in the family Vespidae (Hymenoptera). A key to Neotropical species is given by Kathirithamby and Hughes 2006. A key to European species is provided by Kinzelbach 1978. A key to African species was given by Luna de Carvalho (1959).

***Xenos acinctus*** (Kogan and Oliviera, 1966)

= *Brasixenos acinctus* Kogan and Oliviera, 1966: 356 (by Kinzelbach 1971a)

*Host* — *Polybia* sp.

*Specimens described* — Female, larva

*Distribution* — Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

*Other references* — Trois 1988 [redescription]

*Notes* — Kogan and Oliviera (1966) erected the genus *Brasixenos* for seven species that all parasitize Polybiinae but stated that *Brasixenos* was closely related to *Xenos*. Kinzelbach (1971) made *Brasixenos* a junior synonym of *Xenos* and later Trois (1988) attempted to reinstate the genus *Brasixenos*. However, no author since this paper by Trois has recognized *Brasixenos* as a separate genus. The species that could be assigned to *Brasixenos* share several minor morphological characters different from the other known species of *Xenos* but a compelling case has not been made to recognize *Brasixenos*. Additional evidence, possibly provided by a much needed phylogeny of *Xenos*, could give enough support for the reinstatement of *Brasixenos* but until sufficient evidence is documented these species should remain in *Xenos*.

***Xenos afer*** Pasteels, 1950: 284

*Hosts* — *Polistes marginalis* (Fabricius), *P. tristis* Meade-Waldo (= *P. smithii tristis*), *P. africanus* Palisot de Beuvois (= *P. marginalis* v. *africanus* Palisot de Beuvois 1818) (Vespididae)

*Specimens described* — Male, female, larva



*Distribution* — Democratic Republic of Congo (type locality), Angola

*Type* — holotype in Museu Real do Congo Belga (The Royal Museum of Central Africa), Brussels, Belgium

*Other references* — Luna de Carvalho 1956 [distribution], 1972b [larva]

***Xenos americanus*** (Bréthes, 1923)

= *Clypoxenos americanus* Bréthes 1923: 46 (by Bohart 1941)

*Host* — *Mischocyttarus flavicans* Richards (= *Clypeopolybia duckei* Bréthes) (Vespidae)

*Specimens described* — Female

*Distribution* — Bolivia

*Type* — unknown

*Notes* — Bréthes (1923) established the genus *Clypoxenos* because it was hosted by a species that was at the time in the genus *Clypoxenos*. No reason was given for establishing the new genus and it is presumed that Bréthes did so because of the prevailing view of Pierce (1908, 1909, 1918) that strepsipteran species should be in separate genera if their hosts were in different genera. Bohart (1941) placed *Clypoxenos* as a supposed junior synonymy of *Xenos* but stated that he was not absolutely certain of this synonymy. Kinzelbach (1971a) treated *Clypoxenos* as a junior synonym but did not comment, thus suggesting that he agreed with Bohart's assumption. While there has still been no morphological or genetic argument presented for the synonymy of *Clypoxenos*, it is still likely that it is correct based on the original description.

***Xenos araujoi*** Oliveira and Kogan, 1962: 6

= *Brasixenos araujoi* (Oliveira and Kogan, 1962) (by Kinzelbach 1971a)

*Host* — *Apoica pallens* (Fabricius) (Vespidae)

*Specimens described* — Female, larva

*Distribution* — Amazonas, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

*Other references* — Trois 1988 [redescription]

*Notes* — Oliveira and Kogan (1962) described

this species in the genus *Xenos* but later (Kogan and Oliveira 1966) transferred it to their newly erected genus *Brasixenos*. Kinzelbach (1971a) made *Brasixenos* a junior synonym of *Xenos*, thus transferring this species back to *Xenos*. Trois (1988) later attempted to reinstate the genus *Brasixenos*, although no author since this paper by Trois has recognized *Brasixenos* as a separate genus. Additional evidence is needed to solve this problem, which has not been sufficiently addressed by any of these authors. Until a phylogeny or convincing morphological or genetic characters are found, this species should remain as it was originally described in the genus *Xenos*.

***Xenos argentinus*** Bréthes 1923: 43

*Host* — *Polistes cavapyta* Saussure (Vespidae)

*Specimens described* — Male, female

*Distribution* — Argentina

*Type* — holotype in Collection of Agricultural Entomology and Zoology of the Faculty of Agronomy, La Plata, Argentina

***Xenos bahiensis*** (Kogan and Oliveira, 1966)

= *Brasixenos bahiensis* Kogan and Oliveira 1966: 353 (by Kinzelbach 1971a)

*Host* — *Polybia ignobilis* (Haliday) (Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — Bahia, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

*Other references* — Trois 1984a [male description], Trois 1988 [redescription]

*Notes* — Kogan and Oliveira (1966) erected the genus *Brasixenos* for seven species that all parasitized the subfamily Polybiinae but stated that it was closely related to *Xenos*. Kinzelbach (1971a) made *Brasixenos* a junior synonym of *Xenos* and later Trois (1988) attempted to reinstate the genus *Brasixenos*. However, no author since the paper by Trois has recognized *Brasixenos* as a separate genus. The species that could be assigned to *Brasixenos* share several minor morphological characters different from the other known species of *Xenos* but a compelling case has not been made to recognize

*Brasixenos*. Additional evidence, possibly provided by a much needed phylogeny of *Xenos*, could give enough support for the reinstatement of *Brasixenos* but until sufficient evidence is documented these species should remain in *Xenos*.

***Xenos boharti*** Hofmann 1965: 35

*Host* — *Polistes peruvianus* Bequaert (= *Polistes versicolor* var. *peruvianus* Bequaert (Vespidae)

*Specimens described* — Female

*Distribution* — Chile

*Type* — holotype in Instituto de Investigaciones Agropecuarias, Chile

***Xenos bohlsi*** Hoffmann, 1914: 100

*Host* — *Polistes canadensis* (Linnaeus) (Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — Argentina, Brazil, Paraguay

*Type* — No type designated

*Other references* — Oliveira and Kogan 1962, Hofeneder and Fulmek 1943

***Xenos bonariensis*** Bréthes, 1923: 44

*Host* — *Polistes versicolor* (Oliver) (Vespidae)

*Specimens described* — Male, female

*Distribution* — Argentina (type locality), Brazil

*Type* — holotype in Collection of Agricultural Entomology and Zoology of the Faculty of Agronomy, La Plata, Argentina

*Other references* — Luna de Carvalho 1978b [description], Oliveira and Kogan 1962 [discussion]

***Xenos brasiliensis*** (Kogan and Oliviera, 1966)

= *Brasixenos brasiliensis* Kogan and Oliviera 1966: 355 (by Kinzelbach 1971a)

*Host* — *Polybia sericea* (Oliver) (Vespidae)

*Specimens described* — Female, Larva

*Distribution* — Rio de Janeiro, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

*Other references* — Trois 1988 [redescription]

*Notes* — Kogan and Oliviera (1966) erected

the genus *Brasixenos* for seven species that all parasitized the subfamily Polybiinae but stated that it was closely related to *Xenos*. Kinzelbach (1971) made *Brasixenos* a junior synonym of *Xenos* and later Trois (1988) attempted to reinstate the genus *Brasixenos*. However, no author since the paper by Trois has recognized *Brasixenos* as a separate genus. The species that could be assigned to *Brasixenos* share several minor morphological characters different from the other known species of *Xenos* but a compelling case has not been made to recognize *Brasixenos*. Additional evidence, possibly provided by a much needed phylogeny of *Xenos*, could give enough support for the reinstatement of *Brasixenos* but until sufficient evidence is documented these species should remain in *Xenos*.

***Xenos circularis*** Kifune and Maeta, 1985: 430

*Host* — *Polistes rothneyi gressitti* van der Vecht (Vespidae)

*Specimens described* — Female

*Distribution* — Taiwan

*Type* — holotype (no. 2478) in Kyushu University, Japan

***Xenos fluminensis*** (Kogan and Oliveira, 1966)

= *Brasixenos fluminensis* Kogan and Oliveira, 1966: 347 (by Kinzelbach 1971a)

*Host* — *Polybia ignobilis* (Haliday) (= *P. atra* Saussure) (Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — Rio de Janeiro, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

*Other references* — Trois 1988 [redescription]

*Notes* — Kogan and Oliviera (1966) erected the genus *Brasixenos* for seven species that all parasitized the subfamily Polybiinae but stated that it was closely related to *Xenos*. Kinzelbach (1971) made *Brasixenos* a junior synonym of *Xenos* and later Trois (1988) attempted to reinstate the genus *Brasixenos*. However, no author since the paper by Trois has recognized *Brasixenos* as a separate genus. The species that could be assigned to *Brasixenos*

share several minor morphological characters different from the other known species of *Xenos* but a compelling case has not been made to recognize *Brasixenos*. Additional evidence, possibly provided by a much needed phylogeny of *Xenos*, could give enough support for the reinstatement of *Brasixenos* but until sufficient evidence is documented these species should remain in *Xenos*.

***Xenos formosanus*** Kifune and Maeta, 1985: 426

*Host* — *Vespa velutina flavitarsus* Sonan (Vespidae)

*Specimens described* — Male, female

*Distribution* — Taiwan

*Type* — holotype (no. 2477) in Kyushu University, Japan

***Xenos hamiltoni*** Kathirithamby and Hughes, 2006: 37

*Host* — *Polistes carnifex* (Fabricius) (Vespidae)

*Specimens described* — Male

*Distribution* — Veracruz, Mexico

*Type* — holotype and paratypes in Universidad Nacional Autonoma de Mexico

***Xenos hebraei*** Kinzelbach, 1978: 69

*Host* — *Polistes olivaceus* (DeGeer) (= *P. hebraei* Fabricius) (Vespidae)

*Specimens described* — Female

*Distribution* — Iraq (type locality), India

*Type* — holotype and paratypes in Ungarisches Naturwissenschaftliches Museum, Budapest, Hungary

***Xenos hospitus*** Oliveira and Kogan, 1962: 7

*Host* — *Polistes versicolor* (Oliver) (= *P. versicolor vulgaris* Bequaert) (Vespidae)

*Specimens described* — Female, larva

*Distribution* — Santa Catarina, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

***Xenos hunteri*** (Pierce 1909)

= *Acroschismus hunteri* Pierce 1909: 130 (by Bohart 1941)

*Host* — *Polistes* near *minor* (Vespidae)

*Specimens described* — Male, female

*Distribution* — Texas, USA

*Type* — holotype in United States National Museum (no. 10115)

*Other references* — Cook and Mathison 1997 [discussion]

***Xenos indespectus*** Oliveira and Kogan 1962: 10

*Host* — *Polistes* sp. (Vespidae)

*Specimens described* — Male

*Distribution* — Sao Paulo, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

***Xenos iviei*** Kifune, 1983: 330

*Host* — *Polistes crinitus* (Felton) (Vespidae)

*Specimens described* — Male, Female

*Distribution* — St. Croix and St. Thomas, Virgin Islands

*Type* — holotype (no. 100690) in United States National Museum

***Xenos kifunei*** Cook and Mathison, 1997: 246

*Host* — *Polistes comanchus navajoe* Cresson (Vespidae)

*Specimens described* — Male, female

*Distribution* — Arizona, USA

*Type* — holotype and paratypes (including allotype) in United States National Museum

***Xenos minor*** Kinzelbach, 1971c: 278

*Host* — *Polistes associus* Kohl, *P. gallicus* (Linnaeus) (= *P. foederatus* Kohl) (Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — Croatia

*Type* — holotype in Naturmuseum Senckenberg, Frankfurt, Germany

***Xenos moutoni*** du Buysson, 1903: 175

- = *Vespaexenos moutoni* (du Buysson, 1903) (by Pierce 1909, returned to *Xenos* by Bohart 1941)  
 = *Vespaexenos crabronis* Pierce 1909: 134 (by Bohart 1941)  
 = *Vespaxenos buyssoni* Pierce 1909: 134 (by Bohart 1941)  
 = *Vespaexenos matsumurai* Szekessy 1965 (by Kinzelbach 1971a)

*Hosts* — *Vespa mandarinia* Smith, *V. analis* Fabricius (= *V. nigrans* du Buysson), *V. mandarinia magnifica* Smith, *V. mandarinia nobilis* Sonan, *V. crabro* Linnaeus, *V. ducalis* Smith, *V. simillima* Smith, *V. dybowskii* André (Vespidae)  
*Specimens described* — Male, female

*Distribution* — China (type locality), Taiwan, Japan

*Type* — holotype in French Museum of Natural History, Paris, France

*Other references* — du Buysson 1906 [discussion]; Kathirithamby et al. 1990 [anatomy]; Kifune and Maeta 1985 [distribution]; Makino 2001 [natural history], Makino et al. 2010 [effect on *Host*], 2011 [distribution]; Makino and Yamashita 1998 [natural history]; Mazzini et al. 1991 [sperm structure]; Nakase and Kato 2013b [taxonomy]; Nakase et al. 2016 [anatomy]; Sakamoto 1997 [distribution]; Tatsuta and Makino 2003

*Notes* — Bohart (1941) made *Vespaxenos* a junior synonym of *Xenos*, which in turn moved all species within *Vespaxenos* to *Xenos*. Székessy (1965) named *V. matsumurai* without addressing the revision by Bohart and it is presumed that he was unaware that *Vespaxenos* was not a valid genus. *Vespaxenos matsumurai* was listed as a junior synonym of *X. moutoni* by Kinzelbach (1971a). Kinzelbach (1971a) also made *X. crabronis* and *X. buyssoni* junior synonyms of *X. moutoni*. Using molecular analysis, Nakase and Kato (2013b) upheld the synonymy of *X. moutoni* and *X. buyssoni*. Nakase and Kato (2013b) were unable to obtain molecular data for *X. matsumurai* but stated that they viewed the morphology of the two species similar enough to uphold the synonymy. Utilization of the same host supports the synonymy of *X. crabronis* with *X. moutoni*.

***Xenos myrapetrus*** (Trois, 1988) n. stat.

- = *Brasixenos myrapetrus* Trois, 1988: 277

*Host* — *Polybia (Myrapetra) paulista* Ihering (Vespidae)

*Specimens described* — Male, female

*Distribution* — Sao Paulo, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

*Other references* — Kuto et al. 2004, 2018 [effect on *Host*], Trois 1988 [redescription]

*Notes* — Kinzelbach (1971) made *Brasixenos* a junior synonym of *Xenos* and later Trois (1988) attempted to reinstate the genus *Brasixenos* and named *B. myrapetrus*. However, no author since the paper by Trois has recognized *Brasixenos* as a separate genus. The species that could be assigned to *Brasixenos* share several minor morphological characters different from the other known species of *Xenos* but a compelling case has not been made to recognize *Brasixenos*. Kudo et al. (2004) treated this species as being in *Xenos* based on the name given to them by Kifune when he identified the strepsipteran for their study (Trois 1988) but did not discuss or state that this was a revised name. Based on current usage and lack of acceptance of the genus *Brasixenos*, this species should be placed in *Xenos*.

***Xenos niger*** Pasteels, 1950: 287

*Host* — *Polistes tenellus* Buysson (Vespidae)

*Specimens described* — Female, cephalotheca

*Distribution* — Democratic Republic of Congo

*Type* — holotype in Museu Real do Congo Belga (The Royal Museum of Central Africa), Brussels, Belgium

***Xenos nigrescens*** Brues, 1903: 247

- = *Acroschismus nigrescens* (Brues 1903) (by Pierce 1908, placed back in *Xenos* by Bohart 1941)

*Host* — *Polistes carolina* (Linnaeus)(Vespidae)

*Specimens described* — Male, female

*Distribution* — Texas, USA

*Type* — no types designated

*Other references* — Brues 1905 [natural history],  
Cook and Mathison 1997 [discussion]

***Xenos occidentalis*** (Kogan and Oliveira, 1966)

= *Brasixenos occidentalis* Kogan and Oliveira, 1966: 352  
(by Kinzelbach 1971a)

*Host* — *Polybia occidentalis* (Oliver) (Vespidae)

*Specimens described* — Male

*Distribution* — Brazil

*Type* — holotype in Instituto Oswaldo Cruz,  
Brazil

*Other references* — Trois 1988 [redescription]

*Notes* — Kogan and Oliviera (1966) erected the  
genus *Brasixenos* for seven species that parasitize  
wasps in subfamily Polybiinae but stated that  
*Brasixenos* is closely related to *Xenos*. Kinzelbach  
(1971a) made *Brasixenos* a junior synonym of *Xenos*  
and later Trois (1988) attempted to reinstate the genus  
*Brasixenos*. However, no author since the paper by  
Trois has recognized *Brasixenos* as a separate genus.  
The species that could be assigned to *Brasixenos*  
share several minor morphological characters  
different from the other known species of *Xenos* but  
a compelling case has not been made to recognize  
*Brasixenos*. Additional evidence, possibly provided  
by a much needed phylogeny of *Xenos* could give  
enough support for the reinstatement of *Brasixenos*  
but until sufficient evidence is documented these  
species should remain in *Xenos*.

***Xenos oxyodontes*** Nakase and Kato, 2013b: 333

*Hosts* — *Vespa simillima* Smith, *V. analis*  
Fabricius (Vespidae)

*Specimens described* — Male, Female

*Distribution* — Japan (type locality), South  
Korea

*Type* — holotype and paratypes in National  
Museum of Nature and Science, Tokyo, Japan;  
paratype in Kyoto University Museum, Kyoto, Japan

***Xenos pallidus*** Brues 1903: 246

= *Acroschismus hubbardi* Pierce, 1908: 84 (by Bohart  
1941)

= *Acroschismus pallidus* (Brues, 1903) (by Pierce 1909,

reinstated by Bohart 1941)

= *Acroschismus pallidus texensis* Pierce 1909: 127 (by  
Bohart 1941)

*Hosts* — *Polistes annularis* (Linnaeus) (= *Polistes canadensis annularis*), *P. vellicosus* Cresson  
(Vespidae)

*Specimens described* — Male, Female, Larva

*Distribution* — North America, East of the  
Rocky Mountains

*Type* — holotype not designated

*Other references* — Dunkle 1979 [natural  
history], Jones et al. 1980 [distribution]

*Notes* — Brues (1903) correctly placed this  
species in *Xenos*. Pierce (1908) later transferred it  
to the genus *Acroschismus*, which he established for  
all strepsipterans that parasitized wasps in the genus  
*Polistes*. Bohart (1941) made *Acroschismus* a junior  
synonym of *Xenos* and made *A. hubbardi* and *A.*  
*pallidus texensis* junior synonyms of *X. pallidus*.

***Xenos peckii*** Kirby, 1813: 100

= *Acroschismus wheeleri* Pierce 1908: 80 (by Bohart  
1941)

= *Acroschismus bruesi* Pierce 1909: 124 (by Bohart 1941)

= *Acroschismus pecosensis* Pierce 1909: 128 (by Bohart  
1941)

= *Acroschismus bowditchi* Pierce 1909: 130 (by Bohart  
1941)

= *Acroschismus texani* Pierce 1909: 132 (by Bohart 1941)

= *Acroschismus maximus* Pierce 1909: 132 (by Bohart  
1941)

= *Xenos auriferi* Pierce 1911: 498 (by Bohart 1941)

*Hosts* — *Polistes fuscatus* (Fabricius); *P.*  
*apachus* Saussure; *P. aurifer* Saussure; *P. metrica*  
Say; *P. flavus* Cresson; *P. carolina* (Linnaeus)  
(Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — North America, Hawaii

*Type* — no type designated

*Other references* — Bohart 1941 [taxonomy,  
discussion]; Brues 1903 [development]; Bushbeck  
2005 [eye development]; Buschbeck et al. 1999  
[vision], 2003 [vision, eye structure]; Dury  
1902 [host, distribution]; Hayward et al. 2005  
[physiology, phylogeny]; Hodges et al. 2003 [natural  
history]; Hrabar et al. 2014 [natural history], (2015)

[pheromone]; Hubbard 1892 [natural history]; James et al. 2016 [vision]; Jones et al. 1980 [distribution]; Kritsky et al. 1977 [morphology]; Leech 1966 [distribution]; Rieder and Nowogrodzki 1983 [embryology]; Schrader [reproduction]; Swezey 1929 [distribution]

*Notes* — Pierce (1908, 1909, 1911, 1918) described seven new species in the genus *Acroschismus*, which was made a junior synonym of *Xenos* by Bohart (1941). In the same publication, Bohart (1941) made all of these species junior synonyms of *X. peckii*. Bohart (1941) also listed *A. californicus* as *nomen nudem* and then listed it as a synonym of *X. peckii*. The designation of *nomen nudem* was correct since a name was listed without any form of description and Bohart supposed that it was a synonym of *X. peckii*. However, since there is no description it could just as easily be a synonym of a different species of *Xenos* as other species of this genus occur in North America. Therefore, the name *A. californicus* should not be included as a synonym of any individual species but should simply be considered *nomen nudem*.

***Xenos peruensis*** Kifune, 1979a: 408

*Host* — *Polistes lanio* (Fabricius) (Vespidae)  
*Specimens described* — Female, larva  
*Distribution* — Huánuco, Peru  
*Type* — holotype (no. 2134) in Kyushu University, Japan

***Xenos provesparum*** Kifune, 1986b: 84

*Hosts* — *Provespa anomala* (Saussure), *P. nocturna* van der Vecht (Vespidae)  
*Specimens described* — Male, female  
*Distribution* — Sumatra, Indonesia (type locality); Thailand  
*Type* — holotype (no. 2513) in Kyushu University, Japan  
*Other references* — Matsuura 1999 [effect on host], Kifune and Yamane 1998

***Xenos rostratus*** Trois, 1984: 24

*Host* — *Polistes billardieri biglumoides* Ducke, *P. billardieri ruficornis* Saussure

(Vespidae)

*Specimens described* — Female

*Distribution* — Brazil (type locality), Paraguay, Peru

*Type* — holotype and paratypes in Instituto Oswaldo Cruz, Brazil

***Xenos rubiginosi*** (Pierce, 1909)

= *Acroschismus rugibinosi* Pierce, 1909: 132 (by Bohart 1941)

*Host* — *Polistes carolina* (Linnaeus) (= *P. rubiginosus* Lepeletier) (Vespidae)

*Specimens described* — Female

*Distribution* — Louisiana, USA

*Type* — holotype (no. 10119) in United States National Museum

*Other references* — Cook and Mathison 1997 [discussion]

***Xenos stuckenbergi*** Pasteels, 1956: 441

*Host* — *Polistes marginalis* (Fabricius) (Vespidae)

*Specimens described* — Female

*Distribution* — South Africa

*Type* — holotype in Natal Museum, South Africa

***Xenos vesparum*** Rossius, 1793: 49

= *Xenos rossii* Kirby 1813: 116 (by Saunders 1872)  
 = *Xenos jurinei* Saunders 1872: 39 (by Kinzelbach 1971a)  
 = *Xenos rossii* var. *jurinei* Saunders 1872: 39 (by Kinzelbach 1971a)

*Hosts* — *Polistes gallicus* (Linnaeus), *P. nimpha* (Christ), *P. biglumis bimaculatus* (Geoffroy), *P. semenowi* (Morawitz), *P. dominulus* (Christ), *Vespula vulgaris* (Linnaeus) (= *Paravespula vulgaris*) (Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — Europe, North Africa

*Type* — type not designated

*Other references* — Beani 2006 [host manipulation]; Beani and Massolo 2007 [host manipulation]; Beani et al. 2004 [cuticle], 2005 [mating], 2011 [host manipulation], 2017 [*Host*

manipulation]; Bessonnat 1981 [discussion]; Brandt 1878 [anatomy]; Bruschini et al. 2004 [host manipulation]; Cappa et al. 2014 [host castration]; Carapelli et al. 2006 [genetics]; Carcupino et al. 1995 [sperm structure]; Chafino et al. 2018 [development]; Choe et al. 1999 [genetics]; Dallai et al. 2003 [sperm structure], 2004 [anatomy]; Dapporto et al. 2007 [host manipulation]; Drees 2012 [distribution]; Dubitzky 2001 [host manipulation]; Dufour 1837 [larvae]; Erezyilmaz et al. 2014 [genetics, development]; Geffre et al. 2017 [genetics, host manipulation]; Giusti et al. 2007 [anatomy, physiology]; Hofeneder 1930 [natural history]; Hughs and Kathirithamby 2005 [natural history]; Hughs et al. 2003 [natural history], 2004a [host manipulation], 2004b [natural history]; Jurine 1818 [natural history]; Kinzelbach 1978 [distribution, host], 1979c [*Host*, development]; Luna de Carvalho 1979 [discussion], 1981a [larva]; Maksimovic et al. 2007 [vision]; Manfredini et al. 2007a [effect on host], 2007b [immunity], 2010a [immunity], 2010b [host location], 2010c [effect on host], 2013 [host response]; Meinert 1896 [natural history]; Pierce 1909 [natural history]; Rabaud and Millot 1929 [natural history]; Pix et al. 1993 [flight], 2000 [flight]; Pohl 1991 [natural history]; Rabaud and Millot [effect on host]; Richter et al. 2017 [female morphology]; Rouget 1873 [natural history]; Růžička 1987 [morphology]; Saure 1994 [distribution]; Schneider 2002 [distribution]; Strambi and Strambi 1973 [development]; Strambi et al. 1982 [physiology]; Vannini et al. 2008 [natural history]

***Xenos vespularum*** Kifune and Maeta,  
1975: 447

*Hosts* — *Vespula flaviceps lewisii* Cameron, *V. flaviceps* (Smith), *V. shidai* Ishikawa, Yamane and Wagner (Vespidae)

*Specimens described* — Male, female

*Distribution* — Japan (type locality); Primorsky Krai, Russia

*Type* — holotype (no. 2037) in Kyushu University, Japan

*Other references* — Kifune and Yamane 1991, Nikase and Kato 2013b

***Xenos yamaneorum*** Kifune and Maeta,  
1985: 430

*Host* — *Polistes gigas* (Kirby) (Vespidae)

*Specimens described* — Female

*Distribution* — Taiwan

*Type* — holotype (no. 2479) in Kyushu University, Japan

***Xenos zavattarii*** (Pierce 1911)

= *Belonogastrechthrus zavattarii* Pierce, 1911: 498 (by Bohart 1941)

*Hosts* — *Belonogaster lateritia* Gerstaecker, *B. juncea* (Fabricius) (Vespidae)

*Specimens described* — Male, female, larva

*Distribution* — Uganda (type locality), Angola, Democratic Republic of Congo, Liberia

*Type* — holotype in United States National Museum

*Other references* — Kinzelbach 1978 [distribution, host], Luna de Carvalho 1956 [distribution], Pasteels 1950 [description, host], Salt and Bequaert 1929 [host], Székessy 1959

***Xenos zikani*** (Kogan and Oliveira, 1966)

= *Brasixenos zikani* Kogan and Oliveira, 1966: 350 (by Kinzelbach 1971a)

*Host* — *Polybia tinctipennis* Fox (Vespidae)

*Specimens described* — Male

*Distribution* — Rio de Janeiro, Brazil

*Type* — holotype in Instituto Oswaldo Cruz, Brazil

*Other references* — Trois 1988 [redescription]

*Notes* — Kogan and Oliviera (1966) erected the genus *Brasixenos* for seven species that parasitize wasps in subfamily Polybiinae but stated that *Brasixenos* was closely related to *Xenos*. Kinzelbach (1971) made *Brasixenos* a junior synonym of *Xenos* and later Trois (1988) attempted to reinstate the genus *Brasixenos*. However, no author since the paper by Trois has recognized *Brasixenos* as a separate genus. The species that could be assigned to *Brasixenos* share several minor morphological characters different from the other known species of *Xenos* but

a compelling case has not been made to recognize *Brasixenos*. Additional evidence, possibly provided by a much needed phylogeny of *Xenos*, could give enough support for the reinstatement of *Brasixenos* but until sufficient evidence is documented these species should remain in *Xenos*.

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