

Mites (Acari) associated with Silphinae (Coleoptera: Staphylinidae): a worldwide review

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ASBTRACT: The associations between mites and species belongs to the subfamily Silphinae (Coleoptera) are summarised. A total of 82 species of mites belonging to 37 genera were found on 63 insect host species belonging to 13 genera. The mites belong to the Astigmata (13 species), Ixodida (1), Mesostigmata (62) and Trombidiformes (6). Among Mesostigmata, most species were in the Macrochelidae (17) and (Parasitidae (17) and among Astigmata in the Histiosomatidae (8). The largest number of mite species were collected from *Nicrophorus vespillo* (26 species), *N. humator* (23), *N. vespilloides* (22), *Oiceoptoma thoracicum* (22), *N. investigator* (16), *N. interruptus* (14) and *Necrodes littoralis* (13). From the largest number of host species, the following mite species were collected: *P. carabi* (sensu lato) (36 host species), *P. necrophori* (20), *P. subterraneus* (14), *M. glaber* (12), *Alliphis necrophilus* (10) and *M. muscadomesticae* (9). The mite fauna collected from Nicrophorini and Silphini is clearly different. Fifty-six species of mites were found on 38 species of Nicrophorini. 27 species found only on Nicrophorini. Forty-four species of mites were collected from 25 species of Silphini. Twenty-four species of mites were found only on Silphini. The largest number of mite species on hosts were found in Poland (35 species), Great Britain (14), Netherlands (12), Spain (11), Slovakia (10), and Germany (9). Five species of mites overlooked in the work on the relationships of mites with Passalidae (2023) and three species of mites overlooked in the work on the relationships of mites with Geotrupidae (2024) are presented.

Keywords: Hosts, geographic distribution, mites, Nicrophorini, Silphini

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INTRODUCTION

The family Silphidae has recently been included as a subfamily Silphinae Latreille, 1806 to the family Staphylinidae Latreille, 1802. It is a small subfamily containing approximately 189 species (Sikes et al., 2024). Most Silphinae are determined scavengers; they can also feed on faeces, plant debris and fungi. Some species are predators. Relationships of mites with species from this subfamily, except Europe and North America, are poorly known. For example, the associations of mites with Silphinae is completely unknown in Africa, so far. Of the 189 known species of Silphinae, only 63 species were found to have mites (37.3%) belonging to 13 genera (15 genera are known). A lot of information about the relationships between mites and Silphinae is contained in the papers of Yoder (1972), Hyatt (1980), Athias-Binche et al. (1993), Schwarz et al. (1998), Maśán (1999), Haitlinger and Łupicki (2012), Knee et al. (2012), Knee (2017), Canitz et al. (2022) and others. The best-known families of mites associated with Silphinae are Eviphididae, Histiosomatidae, Macrochelidae and Parasitidae. This paper presents the current state of knowledge about the relationships between mites and Silphinae.

Moreover, in two papers discussing the relationships of mites and Pseudoscorpionida with Passalidae and Geotrupidae several species were overlooked (Haitlinger 2023, 2024). In the current paper these omissions were corrected (Schweizer, 1922; Wiśniewski and Hirschmann, 1992; Flechtman and Baggio, 1993, 1997; Koffler and Schmölzer, 2000; Marchenko, 2002; Ács and Kontschan, 2014).

MATERIALS AND METHODS

The list of mites associated with Silphinae was prepared based on literature data. Information about the association of mites with Silphinae was obtained using citations in reviewed paper. In addition, literature was searched on the internet. Mites and their hosts are listed in alphabetical order in the tables. The tables show the relationships of mites with hosts separately for each family. The summary table also presents the total set of mites found on each host species.

RESULTS AND DISCUSSION

Astigmata Canestrini, 1891

Acaridae Latreille, 1802

Acaridae is a large family that contains about 500 species and 80 genera (O'Connor, 2009). So far only four species have been found on Silphinae (Appendix I: Tables 1, 3). Acaridae were rarely found on Silphinae and were found on one or two host species. Only *Viedebanttia schmitzi* Oudemans, 1929 was found on four host species (Scheucher, 1957; Klimov, 1998b; Maśán, 1999; O'Connor, 2009; Haitlinger and Łupicki, 2012).

Algophagidae Fain, 1974

A small family containing 17 species belonging to 8 genera (Beron, 2021). Only *Hericia georgei* Michael, 1903 (25 deu-

tonymphs) was found on *Oiceoptoma thoracicum* Linnaeus, 1758 in Poland (Haitlinger, 2004). Species from this family are likely accidental associates of Silphinae beetles.

Histiostomatidae Berlese, 1897

This family contains 522 species and 58 genera (Beron, 2021) but mites were found on only eight species of Silphinae (Appendix I: Tables 1, 3) (Scheucher, 1957; Ignatowicz, 1974; Hyatt, 1990; Haitlinger, 1991, 2004, 2008; Kurosa and Tagami, 2006; OConnor, 2009; Haitlinger and Łupicki, 2012). From this extensive family, very few species appear on Silphinae, but three species of them: *Pelzneria necrophori* (Dujardin, 1849) (found on six host species), *P. crenulata* (Oudemans, 1903) and *Spinanoetus pelznerae* Scheucher, 1957 (both found on five host species) are relatively common.

Ixodida Leach, 1815

Ixodidae C. L. Koch 1844

So far, 682 species belonging to 14 genera have been described (Beaulieu et al., 2011). Only *Ixodes ricinus* (Linnaeus, 1758) was found in Spain on *Nicrophorus vespilloides* Herbst, 1783 (Appendix I: Tables 1, 3) (Saloña-Bordas et al., 2015). Species from this family are only very exceptionally found in association with Silphinae.

Mesostigmata Canestrini 1891

Ameroseiidae Evans, 1961

This family contains 138 species and 12 genera (Maśán, 2017). Only one species *Ameroseius* sp. was found on *O. thoracicum* in Poland (Appendix I: Tables 1, 3) (Haitlinger, 2004). Species from this family are exceptionally found on Silphinae.

Ascidae Oudemans, 1905

This family contains 372 species and 17 genera (Moraes et al., 2016). Only undetermined *Lasioseius* was found on *Nicrophorus vespillo* (Linnaeus, 1758) in France (Theodorides, 1955a, b, 1960) (Appendix I: Tables 1, 3). Species from this family are exceptionally found on Silphinae.

Dinychidae Berlese, 1916

This small family contains 34 species and one genus (Beaulieu et al., 2011). Species from this family do not appear on insects. Only one species *Dinychus perforatus* Kramer, 1886 was found on *Phosphuga atrata* (Linnaeus, 1758) in Poland (Appendix I: Tables 1, 3) (Haitlinger, 2004).

Eviphididae Berlese, 1913

This family contains about 130 species in 21 genera (Mousavi et al., 2021). Only five species were found on Silphinae (Appendix I: Tables 1, 3) (Christie, 1983a; Hyatt, 1990; Gu and Bai, 1997; Schwarz et al., 1998; Haitlinger, 2004, 2008; Maśán and Halliday, 2010; Haitlinger and Łupicki, 2012; Pérez-Martinez and Moraza, 2022). Two species, *Alliphis necrophilus* (Christie, 1983) (10 host species) and *A. halleri* G. Canestrini and R. Canestrini, 1881 (8

host species), are collected from the largest number of the host species.

Halolaelapidae Karg, 1965

This family contains 80 species and four genera (Beaulieu et al., 2011). Only *Halodarcia carabidophila* Evans and Fain, 1995 was found on *Necrodes littoralis* (Linnaeus, 1758) and *Halolaelaps octoclavatus* (Vitzthum, 1920) were found on *Nicrophorus interruptus* Stephens, 1830 and *Thanatophilus rugosus* (Linnaeus, 1758) (Trach, 2016, Pérez-Martinez and Moraza, 2022).

Haemogamasidae Oudemans, 1939

A small family with 78 species and five genera (Beaulieu et al., 2011). Only *Haemogamasus nidi* Michael, 1892 was found on *Oiceoptoma thoracicum* in Poland (Haitlinger, 2004). On Silphinae, species from this family appear accidentally.

Laelapidae Canestrini, 1891

This family contains 1520 species and 146 genera (Trach and Joharchi, 2018). Species from this family are found exceptionally on Silphinae. Only five species were collected from three host species (Appendix I: Tables 1, 3) (Koffler and Schmölder, 2000; Haitlinger, 20008; Haitlinger and Łupicki, 2012; Bai et al., 2013).

Macrochelidae Vitzthum, 1930

This family contains about 500 species and 23 genera (Porta et al., 2020). 17 species of Macrochelidae were found on 27 species of hosts (Appendix I: Tables 1, 3) (Ishikawa, 1968; Takaku, 1997; Schwarz et al., 1998; Maśán, 2004; Haitlinger, 2004, 2008; Hartini and Takaku, 2006; Niogret et al., 2006; Perotti and Braig, 2009; Salmane and Telnov, 2009; Haitlinger and Łupicki, 2012; Arriaga-Jimenez et al., 2014; Alzevedo, 2017; Knee, 2017; Kamaruzaman et al., 2018; Pérez-Martinez and Moraza, 2022). The species most numerous and most frequently found on Silphinae are: *Macrocheles glaber* (Müller, 1860) (found on 12 host species), *M. muscadomesticae* (Scopoli, 1772) (9 host species), *M. nataliae* Bregetova and Koroleva, 1960 (6), *M. merdarius* (Berlese, 1889) (5) and *M. pratum* Knee, 2017 (5). The most species of mites were found on *Nicrophorus humator* (Gleditsch, 1767) (4 species) and *N. vespillo* (4).

Neothrombiidae Feider, 1959

This small family contains 28 species and 17 genera (Tashakor et al., 2013). Only four species were found on Silphinae (Fain, 1972; Haitlinger, 2001).

Ologamasidae Ryke, 1962

This family contains 467 species and 44 genera (Castilho et al., 2016). Only one species of the genus *Stylochirus* G. Canestrini and R. Canestrini, 1882 was found on Silphinae: *S. fimetarius* (Müller, 1860). It was found on seven host species (Appendix I: Tables 1, 3) (Maśán, 1994; Andreev, 1988; Haitlinger, 2008; Haitlinger and Łupicki 2012).

Parasitidae Oudemans, 1901

This family contains 426 species and 35 genera (Beaulieu et al., 2011). Seventeen species from three genera were found on 49 host species (Appendix I: Tables 1, 3) (Oudemans, 1902; Theodorides, 1960; Springett, 1968; Brown and Wilson, 1992; Yoder, 1972; Hyatt, 1980, 1990; Korn, 1983; Menke and Miller, 1985; Vinnik, 1993; Takaku et al., 1994; Schwarz and Walzl, 1996; Schwarz et al., 1998; Maśán, 1999; Haitlinger, 2004, 2008; Grossman and Smith, 2008; Salmane and Telnov, 2009; Haitlinger and Łupicki, 2012; Garcia-Guerrero et al., 2014; Schedwill et al., 2018; Saloña-Bordas and Perotti, 2019; Canitz et al., 2022; Pérez-Martínez and Moraza, 2022). From the largest number of host species *Poecilochirus carabi* G. Canestrini and R. Canestrini, 1882 sensu lato (35 host species), *P. necrophori* Vitzthum, 1930 (20), *P. subterraneus* (Müller, 1860) (14), *P. davydovae* (Hyatt, 1980) (9) and *P. austroasiaticus* Vitzthum, 1930 (8) were collected. The most species of Parasitidae were found on *Nirophorus vespillo* (10 species), *N. humator* (9) and *Oiceoptoma thoracicum* (7).

Rhodacaridae Evans, 1957

This family contains 148 species and 15 genera (Castilho et al., 2012). From Silphinae only unidentified Rhodacaridae were collected (Hyatt, 1990; Takaku et al., 1994).

Trematuridae Berlese, 1917

This family contains 401 species and 13 genera (Beaulieu et al., 2011). Only *Trichouropoda ovalis* (C. L. Koch, 1839) was found on Silphinae (Haitlinger and Łupicki, 2012; Siepel et al., 2018). Species from this family occur exceptionally on Silphinae.

Urodinychidae Berlese, 1917

This family contains about 267 species belonging to 13 genera (Beaulieu et al., 2011). Only *Uroobovella nova* (Oudemans, 1902) and *U. katmanduana* Wiśniewski and Hirschmann, 1991 were collected from nine host species and *Uroobovella* sp. from 14 host species (Appendix I: Tables 1, 3) (Wiśniewski and Hirschmann, 1991; Haitlinger, 2004, 2008; Haitlinger and Łupicki, 2012; Knee et al., 2012; Siepel et al., 2018).

Uropodidae Kramer, 1881

This family contains 281 species and 9 genera (Beaulieu et al., 2011). Only *Uropoda orbicularis* (Müller, 1776) was found on eight host species (Appendix I: Tables 1, 3) (Chmielewski, 1977; Gwiazdowicz, 2000; Bajerlein and Błoszyk, 2004; Haitlinger and Łupicki, 2012).

Trombidiformes Reuter, 1909

Caraboacaridae Mahunka, 1970

This small family contains eight species and three genera (Katlav and Hajiyanbar, 2015). Only *Caraboacarus stammeri* Krczal, 1959 was found on *Ablattaria laevigata* (Fabricius, 1775) (Trach and Khaustov, 2012).

Podapolipidae Ewing, 1922

This family contains 239 species and 30 genera (Zhang et al., 2011). Only three species of the genus *Silphopolipus* Kurosa, Khaustov and Husband, 2004 have been found in association with Silphinae (Appendix I: Tables 1, 3) (Kurosa et al., 2004).

Pygmephoridae Cross, 1965

This family contains 350 species and 30 genera (Vazquez-Rojas et al., 2015). Only *Bakerdania microphori* Kurosa, 1999 was found on Silphinae (Kurosa, 1999).

Trombiculidae Ewing, 1929

This large family contains 2734 species and 154 genera (Nielsen et al., 2021). Only *Hirsutiella zachvatkini* (Schluger, 1948) was found on *Oiceoptoma thoracicum* and *Phosphuga atrata* (Haitlinger, 2004). The presence of Trombiculidae on insects in general is accidental.

Distribution

Asia

The associations between mites and Silphinae in Asia are still poorly known. Mites on Silphinae were found in 12 countries in Asia. A total of 21 species of mites belonging to 11 genera were collected from 17 species of Silphinae belonging to 6 genera. Among them 17 species belong to eight families of Mesostigmata (Macrochelidae 5 species, Parasitidae 4, Eviphididae 2, Neothrombiidae 2, Laelapidae 1, Ologamasidae 1, Rhodacaridae 1, Trematuridae 1). Two species belong to two families of Astigmata (Histiostomatidae 1, Acaridae 1) and two species belong to two families of Trombidiformes (Podapolipidae 1, Pygmephoridae 1) (Appendix I: Table 2). From Silphinae the largest number of mite species were collected in Japan (11), Russia (8) and China (4). Most mite species were collected from *Nicrophorus quadripunctatus* (Kraatz, 1877) (6 species), *N. concolor* Kraatz, 1877 (5), *Silpha perforata* Gebler, 1832 (4) and *N. japonicus* (Harold, 1877) (2) (Appendix I: Tables 2, 3) (Ishikawa, 1968; Andreev, 1988; Takaku et al., 1994; Takaku, 1997; Klimov, 1998a,b; Kurosa, 1999; Hartini and Takaku, 2006; Kurosa and Tagami, 2006; Maśán and Halliday, 2010; Knee et al., 2012; Bala and Singh, 2019; Canitz et al., 2022).

America

Central America

In Central America, research on the relationships between mites and Silphinae is in the initial phase. Information comes from Costa Rica and Mexico. Three mite species were collected from three host species (Appendix I: Table 2) (O'Connor, 2009; Arriaga-Jimenez et al., 2014; Garcia-Guerrero et al., 2014).

North America

The relationships of the mites with Silphinae in North America have been studied by Brown and Wilson (1992, 1994), Yoder (1972), Menke and Miller (1985), Wilson and

Kollenberg (1987), DeLong and Chedwick (1999), Grossman and Smith (2008), OConnor (2009), Knee et al. (2012), Knee (2017) and Canitz et al. (2022). Fifteen species of mites were found on 19 host species. Most species belonged to Macrochelidae (6) and Parasitidae (5) (Appendix I: Table 2). The most species of mites were found on *Nicrophorus carolinus* Linnaeus, 1771 (6 species), *N. marginatus* Fabricius, 1801 (5), *N. orbicollis* (Say, 1825) (4) and *N. tomentosus* (Weber, 1801) (4). *Poecilochirus necrophori* (8 host species), *P. carabi* (7) and *Macrocheles pratense* (5) were collected from the largest number of host species.

South America

Information about the relationships of mites with Silphinae is given in Canitz et al. (2022). So far only *Poecilochirus carabi* (sensu lato) has been found on *Nicrophorus didymus* (Brullé, 1836) in Ecuador.

Europe

The association between mites and Silphinae is in Europe well studied: Oudemans (1902), Theodorides (1955a, b, 1960), Scheucher (1957), Springett (1968), Hyatt (1980, 1990), Wiśniewski (1982), Christie (1983a), Fain (1992), Athias-Binche et al. (1993), Maśán (1994, 1999, 2004), Schwarz and Walzl (1996), Schwarz et al. (1998), Bajerlein and Błoszyk (2004), Haitlinger (2004, 2008), Niogret et al. (2006), Perotti and Braig (2009), Salmane and Telnov (2009), Maśán and Halliday (2010), Haitlinger and Łupicki (2012), Trach and Khaustov (2012), Saloña-Bordas and Perotti (2014, 2019), Saloña-Bordas et al. (2015), Trach (2016), Kamaruzaman et al. (2018), Siepel et al. (2018, 2023), Beron (2021), Canitz et al. (2022), Perez-Martinez and Moraza (2022). Fifty-seven species of mites were collected from 20 species of Silphinae (Appendix I: Table 2). Among them, 42 species belong to 15 Mesostigmata families [Parasitidae (13 species), Macrochelidae (8), Eviphididae (3), Laelapidae (3), Halolaelapidae (2), Neothrombiidae (2), Rhodacaridae (2), Trematuridae (2), Ameroseiidae (1), Ascidae (1), Dinychidae (1), Haemogamasidae (1), Ologamasidae (1), Urodynychidae (1) Uropodidae (1)]. 10 species belong to three Astigmata families [Histiotomatidae (7), Acaridae (2), Algophagidae (1)], four species belong to three Trombidiformes families [Podapolipidae (2), Carabacaridae (1), Trombiculidae (11)] and one species belong to one Ixodida family [Ixodidae (1)]. Of the Silphinae, most species of mites were collected on Silphinae in Poland (35 mite species from 15 host species), Great Britain (14 vs. 8), Spain (12 vs. 6), Netherlands (12 vs. 5), Slovakia (10 vs. 5), and Germany (9 vs. 8). Most mite species were collected from *Oiceoptoma thoracicum* (23), *Nicrophorus humator* (21), *N. vespilloides* (20) and *N. vespillo* (20). The largest number of host species collected was: *Poecilochirus carabi* (14 host species), *P. necrophori* (10), *P. subterraneus* (10), *Macrocheles glaber* (10), *Alliphis necrophilus* (7), *Uroobovella nova* (7) and *Alliphis halleri* (5).

Oceania

In Oceania, the relationships between mites and Silphinae are very poorly known. Only *Macrocheles agilis* Halliday,

2000 was found on *Ptomaphila lacrymosa* (Schreibers, 1802) in Australia and Indonesia (Papua New Guinea) and *P. perlata* Kraatz, 1876 and *Diamesus osculans* (Vigors, 1825) in Indonesia (Papua New Guinea) and *Poecilochirus carabi* was found on *Nicrophorus kieticus* Mroczkowski, 1959 (Appendix I: Table 2) (Hartini and Takaku, 2006; Azevedo, 2017).

CONCLUSIONS

The relationship between mites and Silphinae is well known only in Europe and relatively well in North America. So far, there is no information from Africa, and only limited information available from Central America, South America and Oceania. So these relationships are poorly known in Asia. Silphinae contain 189 species but the mites were found on only 62 species belonging to 13 genera. 82 mite species belonging to 37 genera were found on 63 host species (Appendix I: Table 1). Mites belonging to 23 families were found on Silphinae, but only in two families a relatively large number of species were found on the hosts: Macrochelidae (17) and Parasitidae (17). Most often, one or two species from other families were recorded except Histiotomatidae (8 species), Eviphididae (5), Laelapidae (5), Acaridae (4), Neothrombiidae (4) and Podapolipidae (3). The following mite species were found on the largest number of hosts: *Poecilochirus carabi* (sensu lato) (34 host species), *P. necrophori* (20), *P. subterraneus* (14), *P. davydovae* (9), *P. austroasiaticus* (8) (Parasitidae), *Macrocheles glaber* (12), *M. muscadomesticae* (9), *M. nataliae* (6), *M. merdarius* (5), *M. pratense* (5) (Macrochelidae), *Alliphis necrophilus* (10), *A. halleri* (8) (Eviphididae), *Uroobovella nova* (9) (Urodynychidae), *Uropoda orbicularis* (8) (Uropodidae), *Stylochirus fimetarius* (7) (Ologamasidae), *Pelzneria necrophori* (8), *P. crenulata* (5), *Spinanoetus pelznerae* (5) (Histiotomatidae) (Appendix I: Table 3). Some species of mites show specificity at the genus level: *Pelzneria necrophori*, *Alliphis phoreticus*, *Macrocheles pratense*, *M. willowae* are related to the genus *Nicrophorus*. The following species can only be considered related to Silphinae: *Silphopolipus eidelbergi* Kurosa, Khaustov and Husband, 2009, *S. nicrophori* Kurosa, Khaustov and Husband, 2009, *S. obscurae* Kurosa, Khaustov and Husband, 2009 (Podapolipidae), *Neosilphitrombium annabellae* Haitlinger, 2001, *N. gratum* Fain, 1972, *Silphitrombium furculigerum* Fain, 1972 and *Vagatothrombium lissae* Haitlinger, 2001. Species belonging to families: Acaridae, Algophagidae, Ameroseiidae, Ascidae, Carabacaridae, Dinychidae, Halolaelapidae, Haemogamasidae, Laelapidae, Ologamasidae, Pygmephoridae, Trombiculidae appear on Silphinae accidentally. The most numerous species represented in the collections Macrochelidae and Parasitidae constitute 3.4 % and 4% of the species known in these families, respectively. The highest percentage of species found in Silphinae it is 14.3% for Neothrombiidae (this is due to the small number of species in this family) and 4.6% for Eviphididae. The largest number of mite species was collected from *Nicrophorus vespillo* (26 species), *N. humator* (23), *N. vespilloides* (22), *O. thoracicum* (22), *N. investigator* (16), *N. interruptus* (14) and *Necrodes littoralis* (13).

The subfamily contains two tribes: Nicrophorini and Silphini. The mites collected from these tribes differ significantly. 56 species of mites were found on 37 species of Nicrophorini. 28 species found only on Nicrophorini: *Viedebantia schmitzi* Oudemans, 1929 (Acaridae), *Anoetus* sp., *Anoetus neglectus*, *Histiostoma sapromyzae* (Dufour, 1839), *Pelzneria necrophori* (Dujardin, 1849), *P. problematica* Mahunka, 1967, *P. uncinata* Kurosa and Tagami, 2006 (Histiostomatidae), *Ixodes ricinus* (Linnaeus, 1758) (Ixodidae), *Lasioseius* sp. (Ascidae), *Alliphis phoreticus*, *Alloseius pratensis*, *Eviphis ostrinus* (C. L. Koch, 1836) (Eviphididae), *Macrocheles cooremani* (Turk, 1948), *M. kaiju* Knee, 2017, *M. limue* Samšić, 1962, *M. praedefimatorum* K. Richards and L. Richards, 1977, *M. pratum* Knee, 2017, *M. vespillo* Berlese, 1918, *M. willowae* Knee, 2017, *Neopodocinum meridionalis* (Sellnick, 1931) (Macrochelidae), *Parasitellus fucorum* DeGeer, 1778, *Parasitus beta* Oudemans and Voigts, 1904, *P. fimetorum* Berlese, 1904, *P. vespillonum* Oudemans, 1902, *Poecilochirus monospinosus* Wise, Hennessey and Axtell, 1988, *P. pilosula* Banks, 1904, *P. silphaphila* Yoder, 1972 (Parasitidae), *Silphopolipus nicrophori* Kurosa, Khaustov and Husband, 2009 (Podapolipidae), *Bakerdania nicrophori* Kurosa, 1999 (Pygmephoridae). 44 species of mites were collected from 25 species of Silphini. 19 species of mites were found only on Silphini: *Acarus farris* (Oudemans, 1905), *Schwiebea longibursata* Fain and Wauthy, 1979, *S. nova* (Oudemans, 1906) (Acaridae), *Hericia georgei* Michael, 1903 (Algophagidae), *Spinanoetus weingertnerae* Scheucher, 1957 (Histiostomatidae), *Ameroseius* sp. (Ameroseiidae), *Dinychus perforatus* Kramer, 1886 (Dinychidae), *Halodarcia carabidophila* Evans and Fain, 1995 (Halolaepidae), *Haemogamasus nidi* Michael, 1892 (Haemogamasidae), *Hypoaspis grandiporus* Hirschmann, Bernhard, Greim and Götz, 1969 (Laelapidae), *Macrocheles agilis* Halliday, 2000, *M. krantzi* Evans and Hyatt, 1963, *M. kurosai* Takaku, 1997 (Macrochelidae), *Poecilochirus armatus* Trägårdh, 1912, *P. belovae* Davydova, 1975 (Parasitidae), *Caraboacarus stammeri* Krczal, 1959 (Caraboacaridae), *Silphopolipus eidelbergi* Kurosa, Khaustov and Husband, 2009, *S. obscurae* Kurosa, Khaustov and Husband, 2009 (Podapolipidae), *Hirsutiella zachvatkini* (Schluger, 1948) (Trombiculidae).

Knowledge of relationships between Silphinae and mites in the different regions of the world varies significantly. Europe is best explored. Mites of Silphinae have been found in 16 countries. Most species of mites collected on Silphinae were found in Poland (35 species), Great Britain (14), Spain (12), Netherlands (11), Slovakia (10) and Germany (9). In Europe, 58 species of mites were collected from 18 species of Silphinae (Appendix I: Table 2). Twenty-two species of mites were found on *Nicrophorus vespillo* (26), *Oiceoptoma thoracicum* (23), *N. humator* (23), *N. vespilloides* (22), *N. investigator* (16), *N. interruptus* (14) and *Thanatophilus rugosus* (9). *Poecilochirus carabi* (sensu lato) was found on the largest number of hosts (34 host species), then *Poecilochirus necrophori* (20), *P. subterraneus* (14), *Macrocheles glaber* (12), *Uroobovella nova* (10), *P. davydovae* (9), *P. austroasiaticus* (8) and *Pelzneria necrophori* (6). The faunal composition of mites on hosts from the same area is very similar. However, it can differ significantly in quantitative relations. For example, in Poland with six species of Silphinae it looks like this: *O. thoracicum*

(20 species), *N. vespilloides* (17), *N. vespillo* (14), *N. humator* (13), *N. investigator* (12), *N. interruptus* (11). Almost identical is the mite fauna on *N. vespillo* and *N. vespilloides*. On *N. vespillo*, *Laelaps agilis*, *L. jettmari* and *Pelzneria crenulata* are missing and *N. vespilloides* lacks *Trichouropoda* sp. The species mentioned occur on the Silphinae by chance. In Poland the dominant species on *N. vespilloides* are *P. carabi* (the mean intensity of invasion 7.8), *Pelzneria necrophori* (6.5), *P. davydovae* (1.9), in *N. vespillo* (0.2), *Alliphis necrophilus* (0.3) and *P. subterraneus* (0.3). The dominant species on *N. vespillo* are: *P. carabi* (5.9), *Pelzneria necrophori* (4.6), *Alliphis necrophilus* (1.2), *Uropoda orbicularis* (1.0, in *N. vespilloides* 0.3), *Uroobovella nova* (0.7, in *N. vespilloides* 0.2), *Macrocheles nataliae* (0.6, in *N. vespilloides* 0.03), *P. subterraneus* (0.6). *Nicrophorus humator* differs from *N. vespillo* and *N. vespilloides* in the presence of five species: *Alliphis halleri*, *Anoetus* sp., *Eviphis ostrinus*, *Neopodocinum meridionalis* and *Acaridae* undet. The dominant species on *N. humator* are: *Pelzneria necrophori* (97.8), *P. carabi* (4.8), *A. halleri* (3.0), *Uroobovella nova* (7). *Nicrophorus investigator* and *N. interruptus* differs from the three above-mentioned host species in poorer mite fauna and *N. investigator* by the presence of *Oodinychus ovalis*. The dominant species in *N. investigator* are: *Pelzneria necrophori* (6.7) *P. carabi* (4.5) and *P. subterraneus* (1.8) and on *N. interruptus* are: *P. carabi* (7.9), *Pelzneria necrophori* (1.6), *P. davydovae* (0.8) and *P. subterraneus* (0.7). From the mite fauna of the mentioned host species, the mite fauna determined for *O. thoracicum* differs most. As many as ten species of mites were not found on the above-mentioned host species (*Alliphis necrophilus*, *Ameroseius* sp., *Haemogamasus nidi*, *Hericia georgei*, *Hirsutiella zachvatkini*, *Parasitus coleoptratorum*, *Pelzneria crenulata*, *Poecilochirus austroasiaticus*, *P. mrciaki*, *Spinanoetus pelznerae*, *S. weingaertnerae*). The dominant species on *O. thoracicum* are: *Pelzneria crenulata* (3.9), *Poecilochirus austroasiaticus* (0.5), *P. carabi* (0.3) and *Spinanoetus pelznerae* (0.3). These host species also differ in the mean intensity of invasion: *N. humator* (12.3), *N. vespilloides* (17.6), *N. vespillo* (16.5), *N. investigator* (13.2), *N. interruptus* (11.9), *O. thoracicum* (5.8), *Silpha carinata* (0.8), *Thanatophilus rugosus* (0.5), *Phosphuga atrata* (0.3), *S. obscura* (0.2), *T. sinuatus* (0.2). Note the extremely high index for *N. humator* and relatively high indexes for species of the genus *Nicrophorus* and low or very low for species from other genera (Haitlinger, 2004, Haitlinger and Łupicki, 2012). High indicators are mainly due to the very numerous presence of two species: *P. carabi* and *Pelzneria necrophori*. Mean intensity of invasion is extremely high in *N. humator* but also for some other species of Silphinae it is high. Fauna of mites on hosts collected from distant areas may differ significantly in quality and quantity. Appendix II: Table 5 compares the mean intensity of invasion of several Silphinae species from Germany and Poland. The German list does not include three species collected in Poland (*Pelzneria necrophori*, *Poecilochirus davydovae*, *Uropoda orbicularis*) (Schwarz et al., 1998). Draw attention to the large differences in the mean intensity of invasion. These indicators are much higher than in the Polish comparison and show that Silphinae of Germany were inhabited in much greater numbers by mites than in Poland. In many papers it was stated that *P. carabi* is more related to *N. vespilloides*

and *P. necrophori* to *N. vespillo* (Schwarz et al., 1998). *Poecilochirus necrophori* was not found on *N. vespillo* and *N. vespilloides* in Poland. While the dominant species on *N. humator*, *N. vespillo*, *N. vespilloides*, *N. investigator* was *Pelzneria necrophori*. From 58 *N. humator* specimens, 5674 *P. necrophori* specimens were collected (Haitlinger, 2004).

In Asia only 18 species of mites belonging to 11 genera were collected from 17 species of Silphinae belonging to 6 genera. This area is poorly explored. Associations of mites with Silphinae have been reported only in 12 countries. Even in the best-studied Japan, only 11 species of mites were found on Silphinae. *P. carabi* was found on the largest number of hosts (13 host species).

Notes

In studies by Haitlinger (2023, 2024) on the relationships of arthropods mainly mites) with Passalidae and Geotrupidae some important information was omitted. This includes the omission of several overlooked species of mites or species described after his publications (Appendix I: Table 4). It are given below.

Passalidae

1. An undetermined species of Trouessartia was found in Brazil on undetermined Passalidae (Flechtmann and Baggio, 1997). This is the only known case of the presence of species from the Trouessartidae Gaud, 1957 family on Passalidae.
2. *Dermanyssus gallinae* (DeGeer, 1778) found in Brazil on *Passalus punctiger* Lepeletier and Serville, 1825 (Flechtmann and Baggio, 1993). This is the only known case of the presence of species from the Dermanyssidae Kolenati, 1859 family on Passalidae.
3. *Aponomma cinctum* Neumann, 1901 found in Australia on *Aulacocyclus kaupi* MacLeay, 1871 (Flechtmann and Baggio, 1993). This is the second case of the presence of a species from the family Ixodidae C. L.Koch, 1844 on Passalidae.
4. *Euzerconiella ghanae* Wiśniewski and Hirschmann, 1992 found in Ghana on unidentified Passalidae (Wiśniewski and Hirschmann, 1992). It is the only species of this genus found on Passalidae.
5. *Nenteria* sp., *Polyaspis patavinus* Berlese, 1881, *Uropoda orbicularis*, *Uropoda* sp., *Uroobovella californiana*, all species found on *Passalus punctatostratus* Percheron, 1835 in Mexico (Cano-Martinez and Villegas-Guzmán, 2014). *P. patavinus* is the only species of the family Polyaspididae Berlese, 1913 found on Passalidae.

Geotrupidae

1. *Macrocheles terreus* (Canestrini and Fanzago, 1877) found in Switzerland on *Geotrupes* sp. (Schweizer, 1922). A species found on insects exceptionally.

2. In Austria *Macrocheles glaber* and *Oodinychus ovalis* (as *Trichouropoda ovalis*) were found on *Anoplotrupes stercorosus* and *Macrocheles* sp., *Polyaspis patavianus* Berlese, 1881 (Polyaspididae) and *O. ovalis* were found on *Geotrupes stercorarius* (Kofler and Schmölzer, 2000). This is the only known report of *P. patavianus* on Geotrupidae.
3. In Kuril Islands (Russia), *Parasitus celer* Koch, 1835 was found on *Geotrupes armatus* Boucomont, 1905 (Marchenko, 2002). This is the only known report from this host.
4. Hungary, *Neopodocinum meridionalis* was collected from *Trypocopriss vernalis* (Ács and Kontschán, 2014).
5. Australia, *Athyreacarus australiensis* Khaustov and Frolov, 2025, *A. squamosus* Khaustov and Frolov, 2025 both from *Australobolbus pseudobscurus* Howden, 1992 and *A. rotundatus* (Hope, 1841); *A. aequalis* Khaustov and Frolov, 2025 from *Neoahytyreus lobus* Howden, 1985 in Bolivia; *Proathyracarus argentinensis* Khaustov and Frolov, 2025 from *Zefevazia rosascostai* Martinez, 1954 In Argentina (Khaustov and Frolov, 2025).
6. Netherlands, *Saintdideria sexclavata* (Oudemans, 1903) was found on *Anoplotrupes stercorosus* (Ryke, 1961).

Update 409 species of arthropods were found on 170 species of Passalidae and 175 mites species were found on 83 species of Geotrupidae.

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Conflict of interest

The author declares no conflict of interest

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APPENDIX I. Overview of Silphinae-associated mite records and overlooked taxa

Table 1. List of Silphinae species and their mites.

Hosts	Mite species	Countries	References
Nicrophorini Kirby, 1837			
<i>Nicrophorus americanus</i> (Olivier, 1790)	Parasitidae: <i>Poecilochirus necrophori</i> Vitzthum, 1930	USA	Yoder (1972)
<i>N. antennatus</i> (Reitter, 1884)	Parasitidae: <i>P. carabi</i> G. Canestrini and R. Canestrini, 1882	Czechia	Canitz et al. (2022)
<i>N. apo</i> (Arnett, 1950)	Parasitidae: <i>P. carabi</i>	Philippines	Canitz et al. (2022)
<i>N. carolinus</i> (Linnaeus, 1771) (<i>Silpha carolina</i>)	Mrochelidae: <i>M. kaiju</i> Knee, 2017, <i>M. vespillo</i> Berlese, 1918, <i>M. willowae</i> Knee, 2017, <i>Macrocheles</i> sp., Parasitidae: <i>Poecilochirus carabi</i> , <i>P. monospinosus</i> Wise, Hennessey and Axtell, 1988, <i>Poecilochirus</i> sp. Urodinychidae: <i>Uroobovella</i> sp., Uropodidae: <i>Uropoda orbicularis</i>	USA	Perotti and Braig (2009), Knee et al. (2012), Azevedo (2017), Knee (2017), Canitz et al. (2022)
<i>N. charon</i> Sikes and Magde, 2006	Parasitidae: <i>Poecilochirus</i> sp.	Indonesia (Sulawesi)	Canitz et al. (2022)
<i>N. concolor</i> Kraatz, 1877	Histiostomatidae: <i>Pelzneria uncinata</i> Kurosa and Tagami, 2006, <i>Pelzneria</i> sp., Macrochelidae: <i>Macrocheles muscadomesticae</i> (Scopoli, 1772), Parasitidae: <i>Poecilochirus carabi</i> , Pygmephoridae: <i>Bakerdania nicrophori</i> Kurosa, 1999	China, Japan, Russia, South Korea, Taiwan	Ishikawa (1968), Takaku (1997), Kurosa (1999), Kurosa and Tagami (2006), Canitz et al. (2022)
<i>N. defodiens</i> Mannerheim, 1846	Macrochelidae: <i>M. willowae</i> , Parasitidae: <i>Poecilochirus carabi</i> G. Canestrini and R. Canestrini, 1882, Urodinychidae: <i>Uroobovella</i> sp.	Canada, USA	Brown and Wilson (1992, 1994), Knee et al. (2012), Knee (2017), Canitz et al. (2022)
<i>N. didymus</i> Brullé, 1836	Parasitidae: <i>Poecilochirus carabi</i>	Ecuador	Canitz et al. (2022)
<i>N. germanicus</i> Linnaeus, 1758	Histiostomatidae: <i>Pelzneria problematica</i> Mahunka, 1967, Eviphididae: <i>A. halleri</i> G. Canestrini and R. Canestrini, 1881, Macrochelidae: <i>M. glaber</i> , <i>M. muscadomesticae</i> [<i>M. marginatus</i> (Herman, 1804)], Parasitidae: <i>Parasitellus fucorum</i> De Geer, 1778, <i>Parasitellus coleoptratorum</i> (Linnaeus, 1758), <i>P. fimetorum</i> Berlese, 1904, <i>P. fucorum</i> , <i>Poecilochirus subterraneus</i> Müller, 1859, Urodinychidae: <i>Uroobovella nova</i> (Oudemans, 1902) (<i>N. oseius novus</i>)	Hungary, Netherlands, Poland	Oudemans (1902), Mahunka (1968), Wiśniewski (1982), Athias-Binche et al. (1993)
<i>N. guttula</i> Motschulsky, 1845	Macrochelidae: <i>M. pratense</i> Knee, 2017, Urodinychidae: <i>Uroobovella</i> sp.	Canada	Knee et al. (2012), Knee (2017)
<i>N. hebes</i> Kirby, 1837	Parasitidae: <i>P. carabi</i>	Canada, USA	Canitz et al. (2022)
<i>N. humator</i> (Gleditsch, 1767)	Acaridae undet., Histiostomatidae: <i>Anoetus neglectus</i> Oudemans, 1902, <i>Anoetus</i> sp., <i>Pelzneria necrophori</i> (Dujardin, 1849), Eviphididae: <i>Aliphis halleri</i> , <i>A. necrophilus</i> (Christie, 1983) (<i>A. yinchuanensis</i> Gu and Bai, 1997, <i>A. brevisternalis</i> Ma and Wang, 1998), <i>Eviphis ostrinus</i> (C. L. Koch, 1836), Halolaelapidae: <i>Halolaelaps</i> sp.	Austria, Belgium, China, France, Germany, Great Britain, Netherlands, Poland, Slovakia	Voigts and Oudemans (1905), Cooreman (1943), Turk and Turk (1952), Theodorides (1955a, b, 1960), Ryke (1961), Springett (1968), Hyatt (1980, 1990), Wiśniewski (1982), Christie (1983b), Korn (1983), Haitlinger

	(= <i>Saintdidieria</i> Oudemans, 1939), Laelapidae: <i>Hypioaspis aculeifer</i> (G. Canestrini, 1884), Macrochelidae: <i>Macrocheles cooremani</i> (Turk, 1948), <i>M. glaber</i> (Müller, 1860), <i>M. nataliae</i> Bregetova and Koroleva, 1960, <i>Macrocheles</i> sp., <i>Neopodocinum meridionalis</i> (Sellnick, 1931), Ologamasiidae: <i>Stylochirus fimetarius</i> (Müller, 1860) (<i>Iphidosoma fimetarium</i>), Parasitidae: <i>Parasitus beta</i> Oudemans and Voigts, 1904, <i>P. coleoptratorum</i> , <i>P. fimetorum</i> , <i>Poecilochirus austroasiaticus</i> Vitzthum, 1930, <i>P. carabi</i> , <i>P. davydovae</i> Hyatt, 1980, <i>P. mrciaki</i> Mašán, 1999, <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>U. nova</i>		(2004, 2008), Hyatt and Emberson (1988), Athias-Binche et al. (1993), Mašán (1994, 2003), Gu and Bai (1997), Ma and Wang (1998), Schwarz et al. (1998), Kofler and Schmölzer (2000), Protti and Braig (2009), Mašán and Halliday (2010), Azevedo (2017), Keum et al. (2016), Kamaruzaman et al. (2018), Siepel et al. (2018), Beron (2021), Canitz et al. (2022), Sun and Kilner (2024)
<i>N. hybridus</i> Hatch and Angell, 1925	Macrochelidae: <i>M. pratum</i> , Parasitidae: <i>P. carabi</i>	Canada	Knee (2017), Canitz et al. (2022)
<i>N. insularis</i> Grouvelle, 1893	Parasitidae: <i>Poecilochirus</i> sp.	Indonesia (Bali)	Canitz et al. (2022)
<i>N. interruptus</i> Stephens, 1830 (syn. <i>N. fossor</i> Erichson, 1837)	Acaridae: <i>Viedebanttia schmitzi</i> Oudemans, 1929, Histiostomatidae: <i>Pelzneria necrophori</i> , <i>Spinanoetus pelznerae</i> Scheucher, 1957, Eviphididae: <i>Alliphis necrophilus</i> , <i>A. phoreticus</i> Mašán, 1994, <i>Alloseius pratensis</i> (Karg, 1965) (= <i>Alliphis montanus</i> Koroleva, 1968), <i>A. rotundianalis</i> Mašán, 1994, <i>Scarabaspis altaicus</i> Skljär, 1999), Halolaelapidae: <i>Halolaelaps octoclavatus</i> (Vitzthum, 1920), Macrochelidae: <i>M. glaber</i> , <i>M. merdarius</i> (Berlese, 1889), <i>M. nataliae</i> , Parasitidae: <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>U. nova</i> , Uropodidae undet.	Germany, Great Britain, Poland, Spain	Scheucher (1957), Starzyk (1967), Hyatt (1990), Haitlinger (1991, 2008), Haitlinger and Łupicki (2012), Salona-Bordas and Perotti (2014), Beron (2021), Pérez-Martinez and Moraza (2022), Sun and Kilner (2024)
<i>N. investigator</i> Zetterstedt, 1824	Acaridae: <i>Viedebanttia schmitzi</i> , Histiostomatidae: <i>Pelzneria crenulata</i> , <i>P. necrophori</i> , Eviphididae: <i>Alliphis necrophilus</i> , Macrochelidae: <i>M. cooremani</i> , <i>M. glaber</i> , <i>M. nataliae</i> , Parasitidae: <i>Parasitus coleoptratorum</i> , <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp., Trematuridae: <i>Oodinychus ovalis</i> (C. L. Koch, 1839) (<i>Trichouropoda ovalis</i>), Urodinychidae: <i>Uroobovella nova</i> , Uropodidae: <i>Uropoda orbicularis</i> (Müller, 1876)	Belgium, France, Germany, Great Britain, Ireland, Japan, Poland, USA (Alaska)	Cooreman (1943), Turk and Turk (1952), Theodorides (1955a, b, 1960), Springett (1968), Hyatt (1980, 1990), Korn (1983), Hyatt and Emberson (1988), Schwarz et al. (1998), Athias-Binche et al. (1993), Haitlinger (2008), Grossman and Smith (2008), Haitlinger and Łupicki (2012), Azevedo (2017), Canitz et al. (2022), Sun and Kilner (2024)
<i>N. japonicus</i> Harold, 1877	Eviphididae: <i>Alliphis necrophilus</i> , Macrochelidae: <i>M. muscadomesticae</i> , Parasitidae: <i>Poecilochirus carabi</i>	China, Japan	Ishikawa (1968), Ma (1996), Gu and Bai (1997), Mašán and Halliday (2010), Keum et al. (2016), Canitz et al. (2022)
<i>N. kieticus</i> Mroczkowski, 1959	Parasitidae: <i>Poecilochirus carabi</i>	Solomon Islands	Canitz et al. (2022)

<i>N. lunatus</i> Fischer von Waldheim, 1842	Parasitidae: <i>P. carabi</i>	Kazakhstan	Canitz et al. (2022)
<i>N. maculifrons</i> Kraatz, 1877	Eviphididae: <i>Alliphis necrophilus</i> , Parasitidae: <i>P. carabi</i>	Japan, Russia (Kuril Islands)	Takaku et al. (1994), Marchenko (2002), Mašán and Halliday (2010), Keum et al. (2016)
<i>N. marginatus</i> Fabricius, 1801	Macrochelidae: <i>M. glaber</i> , <i>M. pratum</i> , Parasitidae: <i>Poecilochirus necrophori</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>Uroobovella</i> sp., <i>Uropoda orbicularis</i>	Canada, Mexico, USA	Yoder (1972), Knee et al. (2012), Garcia-Guerrero et al. (2014), Knee (2017), Kamaruzaman et al. (2018)
<i>N. melissae</i> Sikes and Madge, 2006	Parasitidae: <i>P. carabi</i>	India	Canitz et al. (2022)
<i>N. morio</i> Gebler, 1817	Parasitidae: <i>Poecilochirus carabi</i>	Russia	Canitz et al. (2022)
<i>N. nepalensis</i> Hope, 1831	Parasitidae: <i>Poecilochirus carabi</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>Uroobovella</i> sp.	China, India, Taiwan	Knee et al. (2012), Canitz et al. (2022)
<i>N. nigrita</i> Mannerheim, 1843	Parasitidae: <i>Poecilochirus pilosula</i> Banks, 1904, <i>P. subterraneus</i> , <i>Poecilochirus</i> sp.	USA	Menke and Miller (1985), Sikes (1996), Perotti and Braig (2009), Canitz et al. (2022)
<i>N. obscurus</i> Kirby, 1837	Macrochelidae: <i>M. glaber</i> , <i>M. pratum</i> , Urodinychidae: <i>Uroobovella</i> sp.	Canada, ?	Knee et al. (2012), Knee (2017), Kamaruzaman et al. (2018)
<i>N. orbicollis</i> Say, 1825	Macrochelidae: <i>M. willowae</i> , <i>M. praedafimetorum</i> K. Richards and L. Richards, 1977, <i>Macrocheles</i> sp., Parasitidae: <i>Poecilochirus carabi</i> , <i>P. necrophori</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>Uroobovella</i> sp.	Canada, USA	Yoder (1972), Brown and Wilson 1992, 1994), Knee et al. (2012), Knee (2017), Canitz et al. (2022)
<i>N. pustulatus</i> Herschel, 1807	Histiostomatidae: <i>Pelzneria crenulata</i> , Macrochelidae: <i>M. pratum</i> , Parasitidae: <i>Poecilochirus carabi</i> , <i>P. monospinosus</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , Urodinychidae: <i>Uroobovella</i> sp.	Russia, USA	Yoder (1972), Klimov (1998a), Knee et al. (2012), Knee (2017), Canitz et al. (2022)
<i>N. quadripunctatus</i> Kraatz, 1877	Eviphididae: <i>A. halleri</i> , <i>A. necrophilus</i> , Ologamasidae: <i>S. fimetarius</i> , Macrochelidae: <i>M. nataliae</i> , Parasitidae: <i>Poecilochirus carabi</i> , <i>P. necrophori</i> , Podapolipidae: <i>Silphopolipus nicrophori</i> Kurosa, Khaustov and Husband, 2009, Urodinychidae: <i>Uroobovella</i> sp.	Japan, Russia	Ishikawa (1968), Andreev (1988), Takaku et al. (1994), Kurosa et al. (2004), Perotti and Braig (2009), Mašán and Halliday (2010), Knee et al. (2012), Keum et al. (2016), Canitz et al. (2022)
<i>N. sayi</i> Laporte, 1849	Parasitidae: <i>Poecilochirus carabi</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>Uroobovella</i> sp.	Canada, USA	Brown and Wilson (1992, 1994), Knee et al. (2012), Canitz et al. (2022)
<i>N. schawalleri</i> Sikes and Madge, 2006	Parasitidae: <i>Poecilochirus</i> sp.	China	Canitz et al. (2022)
<i>N. sepultor</i> (Charpentier, 1825)	Histiostomatidae: <i>Pelzneria necrophori</i> , Parasitidae: <i>Poecilochirus carabi</i> , <i>P. subterraneus</i> , Urodinychidae: <i>Uroobovella nova</i>	Poland	Wiśniewski (1982), Athias-Binche et al. (1993), Haitlinger and Łupicki (2012)
<i>N. sinensis</i> Ji, 2012	Parasitidae: <i>P. carabi</i>	China	Canitz et al. (2022)
<i>N. smefarka</i> Háva, Schneider and Ružička, 1999	Parasitidae: <i>P. carabi</i>	China	Canitz et al. (2022)
<i>N. tomentosus</i> Weber, 1801	Parasitidae: <i>Poecilochirus carabi</i> , <i>P. necrophori</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>Uroobovella</i> sp., Uropodiidae: <i>Uropoda orbicularis</i>	USA	Yoder (1972), Brown and Wilson (1992, 1994), Knee et al. (2012), Canitz et al. (2022)

<i>N. vespillo</i> (Linnaeus, 1758)	Acaridae: <i>Viedebantia schmitzi</i> , Histiostomatidae: <i>Pelzneria necrophori</i> , Ascidae: <i>Lasioseius</i> sp., Eviphididae: <i>A. halleri</i> , <i>A. necrophilus</i> , <i>A. phoreticus</i> , Macrochelidae: <i>M. cooremani</i> , <i>M. glaber</i> , <i>M. cf. glaber</i> , <i>M. merdarius</i> , <i>M. muscadomesticae</i> , <i>M. nataliae</i> , <i>Macrocheles</i> sp., Ologamasidae: <i>S. fimetarius</i> , Parasitidae: <i>Parasitellus fucorum</i> , <i>Parasitus coleoptratorum</i> , <i>P. fimetorum</i> , <i>P. vespillonum</i> Oudemans, 1902, <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. necrophori</i> , <i>P. sexclavatus</i> Skljär, 2002, <i>P. subterraneus</i> , <i>Poecilochirus</i> sp., Trematuridae: <i>Trichouropoda</i> sp., Urodinychidae: <i>Uroobovella nova</i> , <i>Uroobovella</i> sp., Uropodidae: <i>Uropoda orbicularis</i>	Austria, Belgium, China, France, Germany, Great Britain, Latvia, Netherlands, Poland, Slovakia, Türkiye, Ukraine	Oudemans (1902), Voigts and Oudemans (1905), Cooreman (1943), Neumann and Sellnick (1950), Turk and Turk (1952), Theodorides (1955a, b, 1960), Wiśniewski (1982), Hyatt and Emberson (1988), Hyatt (1990), Haitlinger (1991, 2008), Athias-Binche et al. (1993), Korn (1983), Mašán (1994, 1999a,b), Ma (1996, 2003), Schwarz and Walzl (1996), Baker and Schwarz (1997), Kofler and Schmölzer (2000), Schwarz et al. (1998), Skljär (2002), Fenda and Mašán (2009), Perotti and Braig (2009), Salmane and Telnov (2009), Haitlinger and Łupicki (2012), Knee et al. (2012), Azevedo (2017), Keum et al. (2016), Knee (2017), Nehring et al. (2017), Siepel et al. (2018), Ondrejková et al. (2021), Saloña-Bordas et al. (2023)
<i>N. vespilloides</i> Herbst, 1783	Acaridae: <i>Viedebantia schmitzi</i> , Histiostomatidae: <i>Pelzneria crenulata</i> , <i>P. necrophori</i> , Eviphididae: <i>A. halleri</i> , <i>A. necrophilus</i> Christie, 1983, <i>A. phoreticus</i> Mašán, 1994, Ixodidae: <i>Ixodes ricinus</i> (Linnaeus, 1758), Laelapidae: <i>Laelaps agilis</i> C. L. Koch, 1836, <i>L. jettmari</i> Vitzthum, 1930, Macrochelidae: <i>M. glaber</i> , <i>M. limue</i> Samšić, 1962, <i>M. lisae</i> Niogret and Nicot, 2007, <i>M. nataliae</i> , Ologamasidae: <i>Stylochirus fimetarius</i> , Parasitidae: <i>P. austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. mrciaki</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>Uroobovella nova</i> , <i>Uroobovella</i> sp., Uropodidae: <i>Uropoda orbicularis</i>	Austria, Belgium, Czechia, France, Germany, Great Britain, Latvia, Netherlands, Poland, Russia, Spain, USA	Schedwill et al. (2018), Cooreman (1943), Theodorides (1955a, b, 1960), Samšić (1957), Yoder (1972), Ignatowicz (1974), Hyatt (1980, 1990), Wiśniewski (1982), Christie (1983a,b), Korn (1983), Haitlinger (1991, 2008), Athias-Binche et al. (1993), Schwarz and Walzl (1996), Baker and Schwarz (1997), Klimov (1998a), Schwarz et al. (1998), Kofler and Schmölzer (2000), Niogret et al. (2006, 2007), Perotti and Braig (2009), Salmane and Telnov (2009), Haitlinger and Łupicki (2012), Knee et al. (2012), Saloña-Bordas et al. (2015), Keum et al. (2016), Nehring et al. (2017), Siepel et al. (2018), Schedwill et al. (2020), Saloña-Bordas and Perotti (2021), Canitz et al. (2022), Pérez-Martinez and Moraza (2022), Sun et al. (2024), Sun and Kilner (2024), Bajerlein et al. (2025)
<i>N. vestigator</i> (Herschel, 1807)	Parasitidae: <i>P. subterraneus</i>	Netherlands	Oudemans (1902)

<i>Nicrophorus</i> sp.	Histiostomatidae: <i>Histiostoma sapromyzarum</i> (Dufour, 1839), <i>Pelzneria necrophori</i> , <i>Pelzneria</i> sp., Eviphididae: <i>A. halleri</i> , <i>A. necrophilus</i> , Macrochelidae: <i>M. merdarius</i> , Parasitidae: <i>Parasitus coleoptratorum</i> , <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. necrophori</i> , <i>P. sexclavatus</i> , <i>P. silphaphila</i> Yoder, 1972, <i>P. sinensis</i> , <i>P. smefarka</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>Uroobovella nova</i> , Uropodidae: <i>Uropoda orbicularis</i>	Austria, China, Czechia, France, Germany, Great Britain, India, Indonesia, Japan, Latvia, Netherlands, Poland, Russia, South Korea, USA	Turk and Turk (1952), Springett (1968), Micherdziński (1969), Yoder (1972), Wiśniewski (1982), Christie (1983a,b), Andreev (1988), Haitlinger (1991, 2004, 2008), Athias-Binche et al. (1993), Brown and Wilson (1994), Schwarz et al. (1998), De Jong and Chedwick (1999), Gwiazdowicz (2000), Marchenko (2002), Sklyar (2002), Perotti and Braig (2009), Salmane and Telnov (2009), OConnor (2009), Keum et al. (2016), Ondrejková et al. (2021), Canitz et al. (2022)
Silphini Latreille, 1806			
<i>Ablattaria laevigata</i> (Fabricius, 1775)	Caraboacaridae: <i>Caraboacarus stammeri</i> Krczal, 1959	Ukraine	Trach and Khaustov (2012)
<i>Damaeus osculans</i> (Vigors, 1825)	Macrochelidae: <i>M. agilis</i> Halliday, 2000	Indonesia (Papua New Guinea)	Hartini and Takaku (2006), Perotti and Braig (2009)
<i>Eusilpha kurosawai</i> Takaku, 1997	Macrochelidae: <i>M. krantzi</i> Evans and Hyatt, 1963, <i>M. kurosai</i> Takaku, 1997	Japan	Takaku (1997), Perotti and Braig (2009), Azevedo (2017)
<i>Heterosilpha ramosa</i> (Say, 1823)	Urodinychidae: <i>Uroobovella</i> sp.	USA	Knee et al. (2012)
<i>Necrodes asiaticus</i> Portevin, 1922	Acaridae: <i>Schwiebea longibursata</i> Fain and Wauthy, 1979	South Korea	Klimov (1998b)
<i>N. littoralis</i> (Linnaeus, 1758)	Histiostomatidae: <i>Pelzneria crenulata</i> (Oudemans, 1903), <i>Pelzneria</i> sp., <i>Spinanoetus pelznerae</i> , Halolaelapidae: <i>Halodarcia carabidophila</i> Evans and Fain, 1995, Macrochelidae: <i>Macrocheles</i> cf. <i>glaber</i> , <i>M. merdarius</i> (Berlese, 1889), <i>M. nataliae</i> , Parasitidae: <i>Poecilochirus belovae</i> Davydova, 1975 (<i>P. donatus</i> Vinnik, 1993), <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. mrciaki</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , Rhodacaridae: <i>Saintdideria</i> sp.	Great Britain, Poland, Slovakia, Spain, Sweden, Ukraine	Ryke (1961), Ignatowicz (1974), Hyatt (1990), Haitlinger (1991, 2004, 2008), Maśán (1999, 2003), Kamaruzaman et al. (2018), Perotti and Braig (2009), Saloñe-Bordas and Perotti (2014, 2019), Trach (2016), Siepel et al. (2023)
<i>N. surinamensis</i> (Fabricius, 1775)	Acaridae: <i>Acarus farris</i> (Oudemans, 1905), Parasitidae: <i>Poecilochirus necrophori</i> , <i>Poecilochirus</i> sp., Urodinychidae: <i>Uroobovella</i> sp.	USA	Yoder (1972), OConnor (2009), Perotti and Braig (2009), Knee et al. (2012)
<i>Necrodes</i> sp.	Histiostomatidae: <i>Spinanoetus</i> sp.	USA	OConnor (2009)
<i>Necrophila americana</i> (Linnaeus, 1758) (<i>Silpha americana</i>)	Parasitidae: <i>Poecilochirus carabi</i> , <i>P. necrophori</i>	USA	Yoder (1972), Brown and Wilson (1992)
<i>N. japonica</i> (Motschulsky, 1861) (<i>Silpha japonica</i>)	Rhodacaridae undet.	Japan	Takaku et al. (1994)
<i>Necrophila</i> sp. (<i>Eusilpha</i>)	Histiostomatidae: <i>Spinanoetus</i> sp.	USA	OConnor (2009)
<i>Oiceoptoma noveboracense</i> (Forster, 1771) (<i>Silpha noveboracensis</i>)	Histiostomatidae: <i>Spinanoetus</i> sp., Parasitidae: <i>Poecilochirus necrophori</i>	USA	Yoder (1972), OConnor (2009)

<i>O. thoracicum</i> Linnaeus, 1758 (<i>Silpha thoracica</i>)	Acaridae: <i>Schwiebea nova</i> (Oudemans, 1906), Algophagidae: <i>Hericia georgei</i> Michael, 1903, Histiostomatidae: <i>Histiostoma</i> sp., <i>Pelzneria crenulata</i> , <i>P. necrophori</i> , <i>Spinanoetus pelznerae</i> , <i>S. weingaertnerae</i> Scheucher, 1957, Ameroseiidae: <i>Ameroseius</i> sp., Eviphididae: <i>Alliphis necrophilus</i> , Haemogamasidae: <i>Haemogamasus nidi</i> Michael, 1892, Macrochelidae: <i>M. glaber</i> , <i>M. muscadomesticae</i> , Ologamasidae: <i>S. fimetarius</i> , Parasitidae: <i>Parasitus coleoptratorum</i> (Linnaeus, 1758), <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> Hyatt, 1980, <i>P. mrciaki</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , Urodinychidae: <i>Uroobovella nova</i> , Uropodidae: <i>Uropoda orbicularis</i> , Uropodidae undet., Trombiculidae: <i>Hirsutiella zachvatkini</i> (Schluger, 1948)	Austria, France, Germany, Great Britain, Latvia, Poland, Slovakia	Scheucher (1957), Theodorides (1960), Chmielewski (1977), Korn (1983), Hyatt (1980, 1990), Haitlinger (1991, 2004, 2008), Maśán (1999a, 2003), Kofler and Schmölzer (2000), Bajerlein and Błoszyk (2004), Fenda and Maśán (2009), Perotti and Braig (2009), Salmane and Telnov (2009), Kamaruzaman et al. (2018), Beron (2021)
<i>Oiceoptoma</i> sp.	Histiostomatidae: <i>Spinanoetus</i> sp.	USA	OConnor (2009)
<i>Oxelytrum discicolle</i> (Brullé, 1836)	Acaridae: <i>Acarus farris</i> (Oudemans, 1905)	Costa Rica	OConnor (2009)
<i>Phosphuga atrata</i> (Linnaeus, 1758)	Dinychidae: <i>Dinychus perforatus</i> Kramer, 1886, Parasitidae: <i>Poecilochirus belovae</i> , <i>P. carabi</i> , <i>P. sexclavatus</i> , Rhodacaridae undet., Trematuridae: <i>Oodinychus ovalis</i> , Trombiculidae: <i>Hirsutiella zachvatkini</i>	Japan, Netherlands, Poland, Ukraine	Takaku et al. (1994), Skljär (2002), Haitlinger (2004, 2008), Siepel et al. (2018)
<i>Phosphuga</i> sp.	Parasitidae: <i>P. sexclavatus</i>	?	Sklyar (2002)
<i>Ptomaphila lacrymosa</i> (Schreibers, 1802)	Macrochelidae: <i>M. agilis</i> , <i>M. muscadomesticae</i>	Australia	Hartini and Takaku (2006), Perotti and Braig (2009), Alzevedo, 2018, Kamaruzaman et al. (2018)
<i>P. perlata</i> Kraatz, 1876	Macrochelidae: <i>M. agilis</i>	Indonesia (Papua New Guinea)	Hartini and Takaku (2006), Perotti and Braig (2009)
<i>Silpha carinata</i> Herbst, 1783	Macrochelidae: <i>Macrocheles glaber</i> , Ologamasidae: <i>Stylochirus fimetarius</i> , Parasitidae: <i>Poecilochirus belovae</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. necrophori</i> , Podapolipidae: <i>Silphopolipus eidelbergi</i> Kurosa, Khaustov and Husband, 2009	Crimea, Poland, Ukraine	Vinnik (1993), Haitlinger (2004, 2008), Kurosa et al. (2004), Perotti and Braig (2009)
<i>S. obscura</i> Linnaeus, 1758	Eviphididae: <i>Alliphis halleri</i> , <i>A. necrophilus</i> , Macrochelidae: <i>M. glaber</i> , <i>M. muscadomesticae</i> , Ologamasidae: <i>Stylochirus fimetarius</i> , Parasitidae: <i>P. carabi</i> , <i>P. necrophori</i> , Podapolipidae: <i>Silphopolipus obscurae</i> Kurosa, Khaustov and Husband, 2009, Uropodidae: <i>U. orbicularis</i> , Uropodidae undet.	Mexico, Poland, Ukraine	Chmielewski (1977), Haitlinger (1991, 2004, 2008), Bajerlein and Błoszyk (2004), Kurosa et al. (2004), Arriaga-Jimenez et al. (2014), Kamaruzaman et al. (2018)
<i>S. perforata</i> Gebler, 1832	Macrochelidae: <i>M. glaber</i> , <i>M. moneronicus</i> Bregetova and Koroleva, 1960, Parasitidae: <i>P. carabi</i> , Rhodacaridae undet.	Japan, Russia (Kuril Islands)	Takaku et al. (1994), Marchenko (2002)
<i>S. tristis</i> Illiger, 1798	Parasitidae: <i>Poecilochirus necrophori</i>	Latvia	Salmane and Telnov (2009)

<i>Silpha</i> sp.	Laelapidae: <i>Hypoaspis grandiporus</i> Hirschmann, Bernhard, Greim and Götz, 1969, Parasitidae: <i>P. armatus</i> (Trägårdh, 1912) (<i>Gamasoides armatus</i>), <i>P. subterraneus</i> , Trematuriidae: <i>Oodinychus ovalis</i>	Poland, Russia (Kurul Islands, Sakhalin)	Marchenko (2002), Gwiazdowicz (2000), Haitlinger (2008), Haitlinger and Łupicki (2012)
<i>Thanatophilus coloradensis</i> (Wickham, 1902)	Parasitidae: <i>Poecilochirus</i> sp.	USA	De Jong and Chedwick (1999), Perotti and Braig (2009)
<i>T. lapponicus</i> (Herbst, 1793) (<i>Silpha lapponica</i>)	Parasitidae: <i>Poecilochirus</i> sp., Rhodacaridae undet.	Japan	Takaku et al. (1994), De Jong and Chedwick (1999), Perotti and Braig (2009)
<i>T. minutus</i> Kraatz, 1876	Parasitidae: <i>Poecilochirus</i> sp.	India	Bala and Singh (2019)
<i>T. ruficornis</i> (Küster, 1851)	Parasitidae: <i>Poecilochirus austroasiaticus</i> , <i>P. subterraneus</i>	Spain	González Medina et al. (2012), Pérez-Martinez and Moraza (2022)
<i>T. rugosus</i> (Linnaeus, 1758) (<i>Silpha rugosa</i>)	Histiostomatidae: <i>Spinanoetus pelznerae</i> , Halolaelapidae: <i>H. octoclavatus</i> , Macrochelidae: <i>M. glaber</i> , <i>M. merdarius</i> , <i>M. muscadomesticae</i> , Parasitidae: <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , Urodinychidae: <i>Uroobovella nova</i>	Germany, Great Britain, Poland, Slovakia, Spain	Scheucher (1957), Huatt (1980, 1990), Maśán (2003, 2009a), Haitlinger (2004, 2008), Fenda and Maśán (2009), Perotti and Braig (2009), Kamaruzaman et al. (2018), Beron (2021), Pérez-Martinez and Moraza (2022)
<i>T. sinuatus</i> (Fabricius, 1775) (<i>Silpha sinuata</i>)	Histiostomatidae: <i>S. pelznerae</i> , Eviphididae: <i>A. halleri</i> , Macrochelidae: <i>M. merdarius</i> , <i>M. muscadomesticae</i> , Parasitidae: <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. necrophori</i>	Germany, Poland, Spain	Scheucher (1957), Haitlinger (2004, 2008), Beron (2021), Pérez-Martinez and Moraza (2022)
<i>Thanatophilus</i> sp.	Histiostomatidae: <i>Spinanoetus</i> sp.	USA	OConnor (2009)
Silphinae undet.	Laelapidae: <i>Haemolaelaps jindaochaoui</i> Bai, Yan and Gao, 2013, Macrochelidae: <i>M. glaber</i> , Neothrombiidae: <i>Neosilphitrombium annabellae</i> Haitlinger, 2001, <i>N. gratum</i> Fain, 1972, <i>Silphitrombium furculigerum</i> Fain, 1972, <i>Vagatotrombium lissae</i> Haitlinger, 2001, Ologamasidae: <i>Stylochirus fimetarius</i> , Urodinychidae: <i>Uroobovella katmanduana</i> Wiśniewski and Hirschmann, 1991	Belgium, China, India, Latvia, Nepal, Poland, Russia (Kurul Islands, Sakhalin), Sri Lanka	Fain (1972), Wiśniewski and Hirschmann (1991), Schwarz et al. (1998), Haitlinger (2001, 2004), Marchenko (2002), Salmane and Telnov (2009), Bai et al. (2013), Felska et al. (2018)

Table 2. List of mites and their hosts by country.

Countries	Silphinae	Mites
Asia		
China	<i>Nicrophorus concolor</i> <i>N. japonicus</i> <i>N. nepalensis</i> <i>N. schawalleri</i> <i>N. sinensis</i> <i>N. smefarka</i> <i>Nicrophorus</i> sp. Silphinae undet.	<i>Pelzneria uncinata</i> , <i>Pelzneria</i> sp., <i>Poecilochirus carabi</i> , <i>Poecilochirus</i> sp. <i>Alliphis necrophilus</i> , <i>P. carabi</i> <i>P. carabi</i> <i>Poecilochirus</i> sp. <i>P. carabi</i> <i>P. carabi</i> , <i>Poecilochirus</i> sp. <i>Poecilochirus</i> sp. <i>Haemolaelaps jindaochaoui</i>
India	<i>N. melissae</i> <i>N. nepalensis</i> <i>Nicrophorus</i> sp. <i>Thanatophilus minutus</i> Silphinae undet.	<i>P. arabi</i> <i>P. carabi</i> <i>Poecilochirus</i> sp. <i>Poecilochirus</i> sp. <i>Neosilphitrombium annabellae</i> , <i>Vagatotrombium lissae</i>
Indonesia (Bali, Sulawesi)	<i>Nicrophorus charon</i> <i>N. insularis</i> <i>Eusilpha kurosawai</i> <i>Necrophila japonica</i> <i>Nicrophorus concolor</i>	<i>Poecilochirus</i> sp. <i>Poecilochirus</i> sp. <i>Macrocheles krantzzi</i> , <i>M. kurosai</i> Rhodacaridae undet. <i>Bakerdania necrophori</i> , <i>Macrocheles muscadomesticae</i> , <i>Pelzneria uncinata</i> , <i>Pelzneria</i> sp., <i>Poecilochirus carabi</i>
Japan	<i>N. investigator</i> <i>N. maculifrons</i> <i>N. quadripunctatus</i> <i>Nicrophorus</i> sp. <i>Phosphuga atrata</i> <i>S. perforata</i>	<i>P. carabi</i> <i>A. necrophilus</i> , <i>P. carabi</i> <i>A. halleri</i> , <i>A. necrophilus</i> , <i>P. carabi</i> , <i>Silphopolipus necrophori</i> , <i>Uroobovella</i> sp. <i>Poecilochirus carabi</i> , <i>Poecilochirus</i> sp. Rhodacaridae undet. Rhodacaridae undet.
Kazakhstan	<i>N. lanatus</i>	<i>Poecilochirus carabi</i>
Nepal	Silphinae undet.	<i>Uroobovella katmanduana</i>
Philippines	<i>N. apo</i>	<i>P. carabi</i>
Russia	<i>N. maculifrons</i> <i>N. concolor</i> <i>N. quadripunctatus</i> <i>Nicrophorus</i> sp. <i>Silpha perforata</i> <i>Silpha</i> sp. Silphinae undet. Silphinae undet.	<i>P. carabi</i> <i>Pelzneria uncinata</i> <i>Poecilochirus necrophori</i> , <i>Stylochirus fimetarius</i> <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp. <i>M. glaber</i> , <i>M. moneronicus</i> , <i>P. carabi</i> <i>P. armatus</i> , <i>P. subterraneus</i> <i>Stylochirus fimetarius</i> <i>Neosilphitrombium annabellae</i>
Sri Lanka	Silphinae undet.	
South Korea	<i>Necrodes asiaticus</i> <i>Nicrophorus concolor</i> <i>Nicrophorus</i> sp.	<i>Schwiebea longibursata</i> <i>Pelzneria uncinata</i> <i>P. carabi</i>
Taiwan	<i>N. concolor</i>	<i>Pelzneria uncinata</i> , <i>Pelzneria</i> sp., <i>Poecilochirus</i> sp., <i>Uroobovella</i> sp.
Türkiye	<i>N. nepalensis</i> <i>N. vespillo</i>	<i>Poecilochirus carabi</i> <i>P. necrophori</i>
Europe		
Austria	<i>N. humator</i> <i>N. vespillo</i> <i>N. vespilloides</i> <i>Nicrophorus</i> sp. <i>O. thoracicum</i>	<i>Hypoaspis aculeifer</i> <i>Uroobovella nova</i> , <i>Uroobovella</i> sp., <i>P. necrophori</i> <i>P. carabi</i> , <i>P. necrophori</i> <i>Poecilochirus</i> sp. <i>M. glaber</i>
Belgium	<i>N. humator</i>	<i>Macrocheles cooremani</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>U. nova</i>

	<i>N. investigator</i> <i>N. vespillo</i>	<i>M. cooremani</i> , <i>P. necrophori</i> , <i>U. nova</i> <i>M. cooremani</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>U. nova</i>
	<i>N. vespilloides</i> Silphinae undet.	<i>P. necrophori</i> , <i>P. subterraneus</i> , <i>U. nova</i> <i>Neosilphitrombium gratum</i> , <i>Silphitrombium furculigerum</i>
Crimea	<i>Silpha carinata</i>	<i>Poecilochirus belovae</i>
Czechia	<i>N. antennatus</i> <i>N. vespilloides</i>	<i>P. carabi</i> <i>P. carabi</i>
France	<i>Nicrophorus</i> sp. <i>Nicrophorus humator</i> <i>N. investigator</i> <i>N. vespillo</i> <i>N. vespilloides</i>	<i>Poecilochirus</i> sp. <i>Macrocheles</i> sp., <i>P. necrophori</i> , <i>P. subterraneus</i> <i>P. necrophori</i> <i>Lasioseius</i> sp., <i>Macrocheles</i> sp., <i>U. nova</i> <i>Macrocheles lisae</i> , <i>U. nova</i> <i>P. carabi</i> , <i>P. necrophori</i> , <i>Poecilochirus</i> sp.
Germany	<i>Nicrophorus</i> sp. <i>Oiceoptoma thoracicum</i> <i>Nicrophorus humator</i>	<i>Histiostoma</i> sp. <i>Alliphis necrophilus</i> , <i>Anoetus neglectus</i> , <i>M. nataliae</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>U. nova</i> <i>Spinanoetus pleurae</i> <i>A. necrophilus</i> , <i>M. nataliae</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>U. nova</i> <i>A. necrophilus</i> , <i>M. merdarius</i> , <i>M. nataliae</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>U. nova</i> , <i>Uroobovella</i> sp.
	<i>N. interruptus</i> <i>N. investigator</i>	<i>A. necrophilus</i> , <i>M. nataliae</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>U. nova</i> <i>A. necrophilus</i> , <i>M. merdarius</i> , <i>M. nataliae</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>U. nova</i> , <i>Uroobovella</i> sp.
	<i>N. vespillo</i>	<i>A. necrophilus</i> , <i>M. nataliae</i> , <i>N. novus</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Uroobovella</i> sp.
	<i>N. vespilloides</i>	<i>A. necrophilus</i> , <i>M. nataliae</i> , <i>N. novus</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Uroobovella</i> sp.
	<i>Nicrophorus</i> sp.	<i>P. austroasiaticus</i> , <i>P. carabi</i> , <i>P. subterraneus</i> , <i>S. pelznerae</i>
	<i>Oiceoptoma thoracicum</i> <i>Thanatophilus rugosus</i>	<i>P. carabi</i> , <i>P. necrophori</i> , <i>Poecilochirus</i> sp. <i>P. austroasiaticus</i> , <i>P. carabi</i> , <i>P. subterraneus</i> , <i>S. pelznerae</i>
Great Britain	<i>T. sinuatus</i> <i>Nicrodes littoralis</i> <i>Nicrophorus humator</i>	<i>S. pelznerae</i> <i>Halolaelaps</i> sp. <i>A. halleri</i> , <i>A. necrophilus</i> , <i>Halolaelaps</i> sp., <i>M. glaber</i> , <i>M. nataliae</i> , <i>Parasitus beta</i> , <i>P. coleoptratorum</i> , <i>P. fimetorum</i> , <i>P. subterraneus</i> , <i>Pelzneria necrophori</i> , <i>Poecilochirus carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i>
	<i>N. interruptus</i> <i>N. investigator</i>	<i>P. carabi</i> , <i>P. subterraneus</i> , <i>Uropodidae</i> undet. <i>M. glaber</i> , <i>M. nataliae</i> , <i>Parasitus coleoptratorum</i> , <i>Pelzneria crenulata</i> , <i>P. necrophori</i> , <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i>
	<i>N. vespillo</i>	<i>A. halleri</i> , <i>M. nataliae</i> , <i>Pelzneria necrophori</i> , <i>Poecilochirus carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i>
	<i>N. vespilloides</i>	<i>A. halleri</i> , <i>A. necrophilus</i> , <i>M. nataliae</i> , <i>Pelzneria necrophori</i> , <i>Poecilochirus carabi</i> , <i>P. davydovae</i> , <i>P. subterraneus</i>
	<i>Nicrophorus</i> sp.	<i>A. halleri</i> , <i>A. necrophilus</i> , <i>Pelzneria necrophori</i> , <i>Poecilochirus carabi</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp.
	<i>Oiceoptoma thoracicum</i> <i>Thanatophilus rugosus</i>	<i>Pelzneria necrophori</i> , <i>Poecilochirus subterraneus</i> <i>P. austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> <i>Pelzneria problematica</i>
Hungary	<i>N. germanicus</i>	<i>P. necrophori</i>
Ireland	<i>N. investigator</i>	<i>M. glaber</i> , <i>P. davydovae</i> , <i>P. necrophori</i>
Latvia	<i>N. vespillo</i> <i>N. vespilloides</i> <i>Nicrophorus</i> sp. <i>O. thoracicum</i>	<i>M. glaber</i> <i>P. davydovae</i> , <i>P. necrophori</i> , <i>P. subterraneus</i>

Netherlands	<i>Silpha tristis</i>	<i>M. glaber</i> , <i>P. davydovae</i> , <i>P. necrophori</i> , <i>P. subterraneus</i>
	Silphinae undet.	<i>P. necrophori</i>
	<i>Nicrophorus germanicus</i>	<i>M. glaber</i>
		<i>Alliphis halleri</i> , <i>Macrocheles glaber</i> , <i>M. muscadomesticae</i> , <i>Parasitellus fucorum</i> , <i>Parasitus coleoptratorum</i> , <i>P. fimetorum</i> , <i>Poecilochirus subterraneus</i>
	<i>N. humator</i>	<i>Uroobovella nova</i>
Poland		<i>M. muscadomesticae</i> , <i>Parasitus coleoptratorum</i> , <i>P. fimetorum</i> , <i>P. vespillonum</i> , <i>Poecilochirus subterraneus</i> , <i>U. nova</i>
	<i>N. vespillo</i>	<i>M. glaber</i> , <i>Parasitellus fucorum</i> , <i>Parasitus coleoptratorum</i> , <i>P. vespillonum</i> , <i>Poecilochirus necrophori</i> , <i>P. subterraneus</i> , <i>U. nova</i> , <i>Uroobovella</i> sp.
	<i>N. vespilloides</i>	<i>Oodinychus ovalis</i> , <i>P. necrophori</i> , <i>U. nova</i>
	<i>N. vestigator</i>	<i>P. subterraneus</i>
	<i>Nicrophorus</i> sp.	<i>P. carabi</i> , <i>P. necrophori</i> , <i>Poecilochirus</i> sp.
	<i>Phosphuga atrata</i>	<i>O. ovalis</i>
	<i>Nicrodes littoralis</i>	<i>Macrocheles merdarius</i> , <i>Pelzneria crenulata</i> , <i>Pelzneria</i> sp., <i>Poecilochirus belovae</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Uropodidae</i> undet.
	<i>Nicrophorus germanicus</i>	<i>Uroobovella nova</i>
	<i>N. humator</i>	<i>Acaridae</i> undet., <i>Alliphis halleri</i> , <i>A. necrophilus</i> , <i>Anoetus</i> sp., <i>Eviphis ostrinus</i> , <i>M. glaber</i> , <i>Neopodocinum meridionalis</i> , <i>Pelzneria necrophori</i> , <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp., <i>U. nova</i>
	<i>N. interruptus</i>	<i>A. necrophilus</i> , <i>A. phoreticus</i> , <i>M. glaber</i> , <i>M. nataliae</i> , <i>Pelzneria necrophori</i> , <i>Poecilochirus carabi</i> , <i>P. davydovae</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Stylochirus fimetarius</i> , <i>Viedebantia schmitzi</i>
	<i>N. investigator</i>	<i>A. necrophilus</i> , <i>M. glaber</i> , <i>M. nataliae</i> , <i>Pelzneria necrophori</i> , <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. subterraneus</i> , <i>Oodinychus ovalis</i> , <i>Uroobovella nova</i> , <i>Uropoda orbicularis</i> , <i>Viedebantia schmitzi</i>
	<i>N. sepultor</i>	<i>Pelzneria necrophori</i> , <i>Poecilochirus carabi</i> , <i>P. subterraneus</i> , <i>U. nova</i>
	<i>N. vespillo</i>	<i>A. necrophilus</i> , <i>A. phoreticus</i> , <i>M. glaber</i> , <i>M. nataliae</i> , <i>Pelzneria necrophori</i> , <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. subterraneus</i> , <i>Stylochirus fimetarius</i> , <i>Trichouropoda</i> sp., <i>U. nova</i> , <i>Uroobovella</i> sp., <i>Uropoda orbicularis</i> , <i>V. schmitzi</i>
	<i>N. vespilloides</i>	<i>A. necrophilus</i> , <i>A. phoreticus</i> , <i>Laelaps agilis</i> , <i>L. jettmari</i> , <i>M. glaber</i> , <i>M. nataliae</i> , <i>Pelzneria crenulata</i> , <i>P. necrophori</i> , <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Stylochirus fimetarius</i> , <i>Uroobovella nova</i> , <i>Uropoda orbicularis</i> , <i>V. schmitzi</i>
	<i>Nicrophorus</i> sp.	<i>A. halleri</i> , <i>Histiostoma sapromyzarum</i> , <i>Parasitus coleoptratorum</i> , <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. necrophori</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp., <i>Uroobovella nova</i> , <i>Uropoda orbicularis</i>
	<i>Oiceoptoma thoracicum</i>	<i>Ameroseius</i> sp., <i>Alliphis necrophilus</i> , <i>Haemogamasus nidi</i> , <i>Hericia georgei</i> , <i>Hirsutiella zachvatkini</i> , <i>M. glaber</i> , <i>Parasitus coleoptratorum</i> , <i>Pelzneria crenulata</i> , <i>P. necrophori</i> , <i>Poecilochirus austroasiaticus</i> , <i>P. carabi</i> , <i>P. davydovae</i> , <i>P. mrciaki</i> , <i>P.</i>

	<i>Phosphuga atrata</i>	<i>necrophori</i> , <i>P. subterraneus</i> , <i>Spinanoetus pelznerae</i> , <i>S. weingaertnerae</i> , <i>Stylochirus fimetarius</i> , <i>Uroobovella nova</i> , <i>Uropoda orbicularis</i> , <i>Uropodidae</i> undet.
	<i>Silpha carinata</i>	<i>Dinychus perforatus</i> , <i>Hirsutiella zachvatkini</i> , <i>Poecilochirus belovae</i> , <i>P. carabi</i>
	<i>S. obscura</i>	<i>M. glaber</i> , <i>P. belovae</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>Stylochirus fimetarius</i>
	<i>Silpha</i> sp.	<i>Alliphis halleri</i> , <i>A. necrophilus</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>S. fimetarius</i> , <i>U. orbicularis</i>
	<i>Thanatophilus rugosus</i>	<i>A. halleri</i> , <i>P. carabi</i> , <i>P. necrophori</i> , <i>S. pelznerae</i>
	<i>T. sinuatus</i>	<i>Hypoaspis grandiporus</i> , <i>Oodinychus ovalis</i>
		<i>P. austroasiaticus</i> , <i>P. carabi</i> , <i>Spinanoetus pelznerae</i> , <i>U. nova</i>
		<i>A. halleri</i> , <i>P. varabi</i> , <i>P. necrophori</i> , <i>S. pelznerae</i>
Russia	<i>N. morio</i>	<i>P. carabi</i>
Slovakia	<i>Necrodes littoralis</i>	<i>M. glaber</i> , <i>M. nataliae</i> , <i>P. mrciaki</i>
	<i>N. humator</i>	<i>A. necrophilus</i> , <i>M. nataliae</i> , <i>P. mrciaki</i>
	<i>N. vespillo</i>	<i>A. necrophilus</i> , <i>M. glaber</i> , <i>M. nataliae</i> , <i>P. davydovae</i> , <i>P. subterraneus</i>
	<i>Nicrophorus</i> sp.	<i>Sancassania</i> sp.
	<i>O. thoracicum</i>	<i>M. muscadomesticae</i> , <i>P. austroasiaticus</i> , <i>P. mrciaki</i> , <i>Schwiebea nova</i>
	<i>T. rugosus</i>	<i>M. muscadomesticae</i> , <i>P. austroasiaticus</i>
Spain	<i>Necrodes littoralis</i>	<i>Poecilochirus carabi</i> , <i>P. davydovae</i> , <i>P. mrciaki</i>
	<i>Nicrophorus interruptus</i>	<i>Alliphis necrophilus</i> , <i>Alloseius pratensis</i> , <i>Halolaelaps octoclavatus</i> , <i>Macrocheles merdarius</i> , <i>P. carabi</i> , <i>P. subterraneus</i>
	<i>N. vespilloides</i>	<i>Ixodes ricinus</i> , <i>P. mrciaki</i> , <i>P. subterraneus</i>
	<i>Thanatophilus ruficornis</i>	<i>P. austroasiaticus</i> , <i>P. subterraneus</i>
	<i>T. rugosus</i>	<i>H. octoclavatus</i> , <i>M. glaber</i> , <i>M. merdarius</i> , <i>P. austroasiaticus</i>
	<i>T. sinuatus</i>	<i>M. merdarius</i> , <i>M. muscadomesticae</i> , <i>P. austroasiaticus</i> , <i>P. carabi</i>
Sweden	<i>Necrodes littoralis</i>	<i>Spinanoetus pelznerae</i>
Ukraine	<i>Ablattaria laevigata</i>	<i>Caraboacarus stammeri</i>
	<i>Necrodes littoralis</i>	<i>Halodarcia carabidophila</i>
	<i>Nicrophorus vespillo</i>	<i>Poecilochirus sexclavatus</i>
	<i>Phosphuga atrata</i>	<i>P. sexclavatus</i>
	<i>Silpha carinata</i>	<i>Silphopolipus eidelbergi</i>
	<i>S. obscura</i>	<i>S. obscurae</i>
America		
Central America		
Costa Rica	<i>Oxelytrum disicole</i>	<i>Acarus farris</i>
Mexico	<i>N. marginatus</i>	<i>Poecilochirus</i> sp.
	<i>Silpha obscura</i>	<i>M. muscadomesticae</i>
North America		
Canada	<i>Nicrophorus defodiens</i>	<i>Macrocheles willowae</i> , <i>Uroobovella</i> sp.
	<i>N. guttula</i>	<i>M. pratum</i> , <i>Uroobovella</i> sp.
	<i>N. hebes</i>	<i>P. carabi</i>
	<i>N. hybridus</i>	<i>M. pratum</i> , <i>P. carabi</i> , <i>Poecilochirus</i> sp.
	<i>N. marginatus</i>	<i>M. glaber</i> , <i>M. pratum</i>
	<i>N. obscurus</i>	<i>M. glaber</i> , <i>M. pratum</i> , <i>Uroobovella</i> sp.
	<i>N. orbicollis</i>	<i>M. praedafimetorum</i> , <i>M. willowae</i> , <i>Uroobovella</i> sp.
	<i>N. sayi</i>	<i>P. carabi</i> , <i>P. subterraneus</i> , <i>Uroobovella</i> sp.
	<i>Nicrophorus</i> sp.	<i>Poecilochirus</i> sp.
USA (Alaska)	<i>Nicrophorus investigator</i>	<i>P. carabi</i>
USA	<i>Heterosilpha ramosa</i>	<i>Uroobovella</i> sp.
	<i>Necrophila americana</i>	<i>P. carabi</i> , <i>P. necrophori</i>

	<i>Necrodes surinamensis</i>	<i>Acaruos farris</i> , <i>P. necrophori</i> , <i>Uroobovella</i> sp.
	<i>Nicrophorus americanus</i>	<i>P. necrophori</i>
	<i>N. carolinus</i>	<i>M. kaiju</i> , <i>M. vespillo</i> , <i>M. willowae</i> , <i>Macrocheles</i> sp.
		<i>Poecilochirus monospinosus</i> , <i>Poecilochirus</i> sp.,
	<i>N. defodiens</i>	<i>Uroobovella</i> sp., <i>Uropoda orbicularis</i> .
		<i>M. willowae</i> , <i>P. carabi</i> , <i>Poecilochirus</i> sp., <i>Uroobovella</i> sp.
	<i>N. hebes</i>	<i>Poecilochirus</i> sp.
	<i>N. investigator</i>	<i>P. carabi</i> , <i>P. subterraneus</i> , <i>Poecilochirus</i> sp.
	<i>N. marginatus</i>	<i>M. pratum</i> , <i>P. necrophori</i> , <i>Uroobovella</i> sp., <i>Uropoda orbicularis</i>
		<i>Poecilochirus pilosula</i> , <i>Poecilochirus</i> sp.
	<i>N. nigrita</i>	<i>M. willowae</i> , <i>Macrocheles</i> sp., <i>P. carabi</i> , <i>P. necrophori</i> , <i>Uroobovella</i> sp.
	<i>N. orbicollis</i>	
	<i>N. pustulatus</i>	<i>M. pratum</i> , <i>P. monospinosus</i> , <i>P. necrophori</i> , <i>Uroobovella</i> sp.
	<i>N. sayi</i>	<i>P. carabi</i> , <i>P. subterraneus</i> , <i>Uroobovella</i> sp.
	<i>N. tomentosus</i>	<i>P. carabi</i> , <i>P. necrophori</i> ,
	<i>N. vespilloides</i>	<i>Poecilochirus</i> sp., <i>Uropoda orbicularis</i>
	<i>Nicrophorus</i> sp.	<i>P. necrophori</i> , <i>Poecilochirus</i> sp.
	<i>Oiceoptoma noveboracense</i>	<i>P. necrophori</i> , <i>Spinanoetus</i> sp.
	<i>Thanatophilus coloradensis</i>	<i>Poecilochirus</i> sp.
South America		
Ecuador	<i>N. didymus</i>	<i>Poecilochirus carabi</i>
Oceania		
Australia	<i>Ptomaphila lacrynosa</i>	<i>Macrocheles agilis</i>
Indonesia	<i>Diamesus osculans</i>	<i>M. agilis</i>
(Papua New Guinea)	<i>Ptomaphila lacrynosa</i>	<i>M. agilis</i>
	<i>P. perlata</i>	<i>M. agilis</i>
Solomon Islands	<i>Nicrophorus kieticus</i>	<i>P. carabi</i>

Table 3. List of mites and their hosts.

Astigmata	
Acaridae	
<i>Acarus farris</i>	<i>Necrodes surinamensis</i> , <i>Oxelytrum discicolle</i>
<i>Schwiebea longibursata</i>	<i>Necrodes asiaticus</i>
<i>S. nova</i>	<i>Oiceoptoma thoracicum</i>
<i>Viedebanttia schmitzi</i>	<i>N. interruptus</i> , <i>N. investigator</i> , <i>N. vespillo</i> , <i>N. vespilloides</i>
Acaridae undet.	<i>N. humator</i>
Algophagidae	
<i>Hericia georgei</i>	<i>O. thoracicum</i>
Histiostomatidae	
<i>Anoetus neglectus</i>	<i>N. humator</i>
<i>Anoetus</i> sp.	<i>N. humator</i>
<i>Histiostoma sapromyzae</i>	<i>Nicrophorus</i> sp.
<i>Histiostoma</i> sp.	<i>O. thoracicum</i>
<i>Pelzneria crenulata</i>	<i>Necrodes littoralis</i> , <i>Nicrophorus investigator</i> , <i>N. pustulatus</i> , <i>N. vespilloides</i> , <i>Oiceoptoma thoracicum</i>
<i>P. necrophori</i>	<i>N. humator</i> , <i>N. interruptus</i> , <i>N. investigator</i> , <i>N. sepultor</i> , <i>N. vespillo</i> , <i>N. vespilloides</i> , <i>Nicrophorus</i> sp.
<i>P. problematica</i>	<i>N. germanicus</i>
<i>P. uncinata</i>	<i>N. concolor</i>
<i>Pelzneria</i> sp.	<i>Necrodes littoralis</i> , <i>Nicrophorus</i> sp.
<i>Spinanoetus pelznerae</i>	<i>Necrodes littoralis</i> , <i>Nicrophorus interruptus</i> , <i>O. thoracicum</i> , <i>Thanatophilus rugosus</i> , <i>T. sinuatus</i>
<i>S. weingaertnerae</i>	<i>O. thoracicum</i>
<i>Spinanoetus</i> sp.	<i>Necrodes</i> sp., <i>Necrophila</i> sp., <i>Oiceoptoma noveboracense</i> , <i>Oiceoptoma</i> sp., <i>Thanatophilus</i> sp.
Ixodida	
Ixodidae	
<i>Ixodes ricinus</i>	<i>N. vespilloides</i>
Mesostigmata	
Ameroseiidae	
<i>Ameroseius</i> sp.	<i>O. thoracicum</i>
Ascidae	
<i>Lasioseius</i> sp.	<i>N. vespillo</i>
Dinychidae	
<i>Dinychus perforates</i>	<i>Phosphuga atrata</i>
Eviphididae	
<i>Alliphis halleri</i>	<i>N. germanicus</i> , <i>N. humator</i> , <i>N. interruptus</i> , <i>N. quadripunctatus</i> , <i>N. vespillo</i> , <i>N. vespilloides</i> , <i>Nicrophorus</i> sp., <i>Silpha obscura</i> , <i>T. sinuatus</i>
<i>A. necrophilus</i>	<i>N. humator</i> , <i>N. interruptus</i> , <i>N. investigator</i> , <i>N. japonicus</i> , <i>N. maculifrons</i> , <i>N. quadripunctatus</i> , <i>N. vespillo</i> , <i>N. vespilloides</i> , <i>Nicrophorus</i> sp., <i>O. thoracicum</i> , <i>Silpha obscura</i>
<i>A. phoreticus</i>	<i>N. vespillo</i> , <i>N. vespilloides</i>
<i>Alloseius pratensis</i>	<i>N. interruptus</i>
<i>Eviphis ostrinus</i>	<i>N. humator</i>
Halolaelapidae	
<i>Halodarcia carabidophila</i>	<i>Necrodes littoralis</i>
<i>Halolaelaps octoclavatus</i>	<i>N. interruptus</i> , <i>Thanatophilus rugosus</i>
<i>Halolaelaps</i> sp.	<i>N. littoralis</i> , <i>N. humator</i>
Haemogamasidae	
<i>Haemogamasus nidi</i>	<i>O. thoracicum</i>
Laelapidae	
<i>Haemolaelaps jindaochaoi</i>	Silphinae undet.
<i>Hypoaspis aculeifer</i>	<i>N. humator</i>
<i>H. grandiporus</i>	<i>Silpha</i> sp.
<i>Laelaps agilis</i>	<i>N. vespilloides</i>
<i>L. jettmari</i>	<i>N. vespilloides</i>

Macrochelidae

Macrocheles agilis

M. cooremani

M. glaber

M. cf. glaber

M. kaiju

M. krantzi

M. kurosai

M. limue

M. lisae

M. merdarius

M. muscadomesticae

M. nataliae

M. prraedefimatorium

M. partum

M. vespillo

M. willowae

Macrocheles sp.

Neopodocinum meridionalis

Neothrombiidae

Neosilphitrombium annabellae

N. gratum

Silphitrombium furculigerum

Vagatothrombium lissae

Ologamasidae

Stylochirus fimetarius

Parasitidae

Parasitellus fucorum

Parasitus beta

P. coleoptratorum

P. fimetorum

P. vespillonum

Poecilochirus armatus

P. austroasiaticus

P. belovae

P. carabi (sensu lato)

P. davydovae

P. monospinosus

P. mrciaki

P. necrophori

P. pilosula

P. sexclavatus

Damaseus osculans, *Ptomaphila lacrynosae*, *P. perlata*

N. humator, *N. investigator*, *N. vespillo*

N. humator, *N. interruptus*, *N. investigator*, *N. marginatus*, *N. obscurus*, *N. vespillo*, *N. vespilloides*, *O. thoracicum*, *Silpha carinata*, *S. obscura*, *S. perforata*, *Thanatophilus rugosus*, *Silphinae* undet.

Necrodes littoralis, *Nicrophorus vespillo*

N. carolinus

Eusilpha kurosawai

E. kurosawai

N. vespilloides

N. vespilloides

Necrodes littoralis, *Nicrophorus interruptus*, *N. vespillo*, *Nicrophorus* sp., *T. rugosus*, *T. sinuatus*

N. concolor, *N. germanicus*, *N. japonicus*, *N. vespillo*, *O. thoracicum*, *Ptomaphila lacrynosae*, *Silpha obscura*, *T. rugosus*, *T. sinuatus*

Necrodes littoralis, *Nicrophorus humator*, *N. interruptus*, *N. investigator*, *N. quadripunctatus*, *N. vespilloides*

N. orbicollis

N. guttula, *N. hybridus*, *N. marginatus*, *N. obscurus*, *N. pustulatus*

N. carolinus

N. carolinus, *N. defodiens*, *N. orbicollis*

N. carolinus, *N. humator*, *N. orbicollis*, *N. vespillo*

N. humator

Silphinae undet.

Silphinae undet.

Silphinae undet.

Silphinae undet.

N. humator, *N. quadripunctatus*, *N. vespillo*, *N. vespilloides*, *O. thoracicum*, *Silpha carinata*, *S. obscura*, *Silphinae* undet.

N. germanicus, *N. vespillo*

N. humator

N. germanicus, *N. humator*, *N. investigator*, *N. vespillo*, *Nicrophorus* sp., *O. thoracicum*

N. germanicus, *N. humator*, *N. vespillo*

N. vespillo

Silpha sp.

N. humator, *N. investigator*, *N. vespillo*, *N. vespilloides*, *Nicrophorus* sp., *O. thoracicum*, *Thanatophilus ruficornis*, *T. rugosus*, *T. sinuatus*

Necrodes littoralis, *Phosphuga atrata*, *Silpha carinata*

Necrodes littoralis, *Nicrophorus antennatus*, *N. apo*, *N. carolinus*, *N. concolor*, *N. defodiens*, *N. didymus*, *N. hebes*, *N. humator*, *N. interruptus*, *N. investigator*, *N. japonicus*, *N. kieticus*, *N. lanatus*, *N. maculifrons*, *N. melissae*, *N. morio*, *N. nepalensis*, *N. orbicollis*, *N. pustulatus*, *N. quadripunctatus*, *N. sepultor*, *N. sinensis*, *N. smefarka*, *N. tomentosus*, *N. vespillo*, *N. vespilloides*, *Nicrophorus* sp., *O. thoracicum*, *Phosphuga atrata*, *Silpha carinata*, *S. obscura*, *S. perforata*, *T. rugosus*, *T. sinuatus*

Necrodes littoralis, *Nicrophorus humator*, *N. interruptus*, *N. investigator*, *N. vespillo*, *N. vespilloides*, *Nicrophorus* sp., *O. thoracicum*, *Silpha carinata*, *T. rugosus*

N. carolinus, *N. pustulatus*

Necrodes littoralis, *Nicrophorus humator*, *N. vespilloides*, *O. thoracicum*

Necrodes littoralis, *N. surinamensis*, *Nicrophila americana*, *Nicrophorus americanus*, *N. humator*, *N. investigator*, *N. lunatus*, *N. marginatus*, *N. orbicollis*, *N. pustulatus*, *N. quadripunctatus*, *N. tomentosus*, *N. vespillo*, *N. vespilloides*, *Nicrophorus* sp., *Oiceoptoma noveboracense*, *O. thoracicum*, *Silpha carinata*, *S. obscura*, *S. tristis*, *T. sinuatus*

N. nigrita

N. vespillo, *Phosphuga atrata*

P. silphaphila
P. subterraneus

Poecilochirus sp.

Rhodacaridae

Rhodacaridae undet.

Trematuridae

Oodinychus ovalis
Trchouropoda sp.

Urodinychidae

Uroobovella nova

U. katmanduana

Uroobovella sp.

Uropodidae

Uropoda orbicularis

Uropodidae undet.

Trombidiformes

Caraboacaridae

Caraboacarus stammeri

Podapolipidae

Silphopolipus eidelbergi
S. nicrophori
S. obscurae

Pygmephoridae

Bakerdania nicrophori

Trombiculidae

Hirsutiella zachvatkini

Nicrophorus sp.

Necrodes littoralis, *Nicrophorus germanicus*, *N. humator*, *N. interruptus*, *N. investigator*, *N. nigrita*, *N. pustulatus*, *N. sayi*, *N. sepultor*, *N. vespillo*, *N. vespilloides*, *N. vestigator*, *Nicrophorus* sp., *O. thoracicum*, *Silpha* sp., *Thanatophilus ruficornis*

Necrodes surinamensis, *Nicrophorus didymus*, *N. humator*, *N. hybridus*, *N. insularis*, *N. marginatus*, *N. nepalensis*, *N. schwalleri*, *N. sinensis*, *N. smefarka*, *N. vespilloides*, *Nicrophorus* sp., *Thanatophilus coloradensis*, *T. lapponicus*, *T. minutus*

Phosphuga atrata, *Silpha perforata*, *Thanatophilus lapponicus*

N. investigator, *Phosphuga atrata*, *Silpha* sp.
N. vespillo

N. germanicus, *N. guttula*, *N. humator*, *N. investigator*, *N. sepultor*, *N. vespillo*, *N. vespilloides*, *Nicrophorus* sp., *O. thoracicum*, *T. rugosus*
Silphinae undet.

Heterosilpha ramosa, *Necrodes surinamensis*, *Nicrophorus carolinus*, *N. defodiens*, *N. marginatus*, *N. nepalensis*, *N. obscurus*, *N. orbicollis*, *N. pustulatus*, *N. quadripunctatus*, *N. sayi*, *N. tomentosus*, *N. vespillo*, *N. vespilloides*

N. carolinus, *N. investigator*, *N. marginatus*, *N. vespillo*, *N. vespilloides*, *N. tomentosus*, *Nicrophorus* sp., *O. thoracicum*, *Silpha obscura*
N. interruptus, *O. thoracicum*

Ablattaria laevigata

Silpha carinata
N. quadripunctatus
Silpha obscura

N. concolor

O. thoracicum, *Phosphuga atrata*

Table 4. A list of mite species omitted in Haitlinger’s papers (2023, 2024).

Hosts	Mite species	Countries	References
Passalidae			
Passalidae undet.	Trouessartidae: <i>Trouessartia</i> sp.	Brazil	Flechtmann and Baggio (1997)
<i>Passalus punctiger</i> Lepelletier and Audinet-Serville, 1825	Dermanyssidae: <i>Dermanyssus gallinae</i> (De Geer, 1778)	Brazil	Flechtmann and Baggio (1993)
<i>Aulacocyclus kaupi</i> MacLeay, 1871	Ixodidae: <i>Aponomma cinctum</i> Neumann, 1901	Australia	Flechtmann and Baggio (1993)
Passalidae undet.	Euzerconidae: <i>Euzerconiella ghanae</i> Wiśniewski and Hirschmann, 1992	Ghana	Wiśniewski and Hirschmann (1992)
Geotrupidae			
<i>Anoplotrupes stercorosus</i> (Scriba, 1791)	Halolaelapidae: <i>Halolaelaps sexclavata</i> (Oudemans, 1902) (= <i>Saintdidieria sexclavata</i>), Macrochelidae: <i>Macrocheles glaber</i> , Oudemans, 1903, Trematuridae: <i>Oodinychus ovalis</i> (C. L. Koch, 1839)	Austria, Netherlands	Ryke (1961), Kofler and Schmölzer (2000)
<i>G. spiniger</i> (Marsham, 1802)	<i>O. ovalis</i>	Austria	Kofler and Schmölzer (2000)
<i>G. stercorarius</i> (Linnaeus, 1758)	Macrochelidae: <i>Macrocheles</i> sp., Polyaspididae: <i>Polyaspis patavinus</i> Berlese, 1881, Trematuridae: <i>O. ovalis</i>	Austria	Kofler and Schmölzer (2000)
<i>Phelotrupes armatus</i> Boucomot, 1904 (<i>Geotrupes armatus</i>)	Parasitidae: <i>Parasitus celer</i> Koch, 1935	Russia (Kuril Islands)	Marchenko (2002)
<i>Trypocoprpris vernalis</i>	Macrochelidae: <i>Neopodocinum meridionalis</i> (Sellnick, 1931)	Hungary	Ács and Kontschán (2014)
<i>Geotrupes</i> sp.	Macrochelidae: <i>Macrocheles terreus</i> (Canestrini and Fanzago, 1877)	Switzerland	Schweizer (1922)

APPENDIX II. Intensity of mite infestation on *Nicrophorus* species

Table 5. Mean intensity of invasion some species of *Nicrophorus* by the most numerous mites found on them in Germany (G) (Schwarz et al., 1998) and Poland (P).

Mites	<i>N. vespilloides</i> mI	<i>N. vespillo</i>	<i>N. humator</i>	<i>N. investigator</i>
<i>Poecilochirus carabi</i>	G 15.3 P 7.8	G 4.6 P 5.9	G 13.0 P 4.8	G 23.5 P 4.5
<i>P. davydovae</i>	G – P 1.9	G – P 0.2	G – P 0.05	G – P 0.3
<i>P. necrophori</i>	G 1.9 P –	G 9.9 P –	G 3.3 P 1.3	G 7.1 P –
<i>P. subterraneus</i>	G – P 0.3	G 1.4 P 0.6	G 16.8 P 0.3	G 13.8 P 1.8
<i>Macrocheles nataliae</i>	G 6.4 P 0.03	G 3.0 P 0.6	G 1.3 P –	G 4.7 P 0.2
<i>Alliphis necrophilus</i>	G 3.1 P 0.3	G 5.6 P 1.2	G 4.7 P 0.5	G 1.8 P 0.01
<i>Urobovella nova</i>	G 5.0 P 0.2	G 3.7 P 0.7	G 18.5 P 2.7	G 2.4 P 0.03
<i>Uropoda orbicularis</i>	G – P 0.3	G – P 1.0	G – P –	G – P 0.06
<i>Pelzneria necrophori</i>	G – P 6.5	G – P 4.6	G – P 97.8	G – P 6.7