

# Psocids (Psocoptera)

## Chapter 13.2

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### Abstract

Among the 231 species of Psocoptera present in Europe, 49 (21.2%) are considered to be of alien origin. They include 29 exotic introduced species and 20 cryptogenic species. Most of the exotic species originated from tropical and subtropical areas, essentially from Africa. Many of them are food pests, moving along with stored products. Thirty-nine of these species occur in buildings in Europe.

### Keywords

Psocoptera, psocids, domestic, stored products, alien, Europe

### 13.2.1 Introduction

Psocoptera (commonly called psocids) are one of the smaller orders of paraneopteran insects. Many species are arboreal, but a few are more usually found on low vegetation or in litter. All feed on microflora and organic debris. Some are found in nests of birds and mammals, within aggregations of other insects or associated with human habitations. The head of these usually soft bodied pterygote insects (with a body length of 0.67 mm to 8 mm) is globulous with an usually prominent clypeus and projecting eyes, long and filiform antennae and biting mouthparts, the laciniae being characteristic for the order. Adults have usually four wings with simple venation. However, many species are brachypterous, micropterous or apterous (Lienhard 1998, Lienhard and Smithers 2002, Mockford 1993, New 2005).

### 13.2.2 Taxonomy of Psocoptera species alien to Europe

According to Lienhard (1998) (Lienhard 1998) a total of 231 species in 25 families of psocopterans are present in Europe. Forty-nine of these are not native, 29 as aliens to Europe and 20 as cryptogenic, globally accounting for 21,2% of the total psocopteran fauna in Europe (Figure 13.2.1). They are included in 12 families: Lepidopsocidae (5), Trogiidae (4), Psoquillidae (3) and Psyllipsocidae (5) belonging to the suborder Trogiomorpha; Liposcelididae (14) and Pachytroctidae (2) belonging to the suborder Troctomorpha; and Caeciliusidae (1), Ectopsocidae (10), Elipsocidae (1), Lachesillidae (2), Peripsocidae (1) and Psocidae (1) belonging to the suborder Psocomorpha. Details for each family are as follows.

**Lepidopsocidae:** Adult wings of lepidopsocids, which belong to the family group Atropetae, are generally pointed apically when fully developed. Body and forewings are generally covered with scales, but occasionally with dense setae Mockford 1993. The five species found in Europe are all alien.

**Trogiidae:** Species in this family, which belongs to the family group Atropetae, are apterous, micropterous or brachelytropterous. Body and forewings lack scales and dense setae. Four of the 19 species found in Europe are cryptogenic (21%). These four species are brachelytropterous, presenting short, leathery winglets similar to short elytra. Their habitats are associated with humans, e.g. within buildings and glasshouses (Lienhard 1998, Mockford 1993).

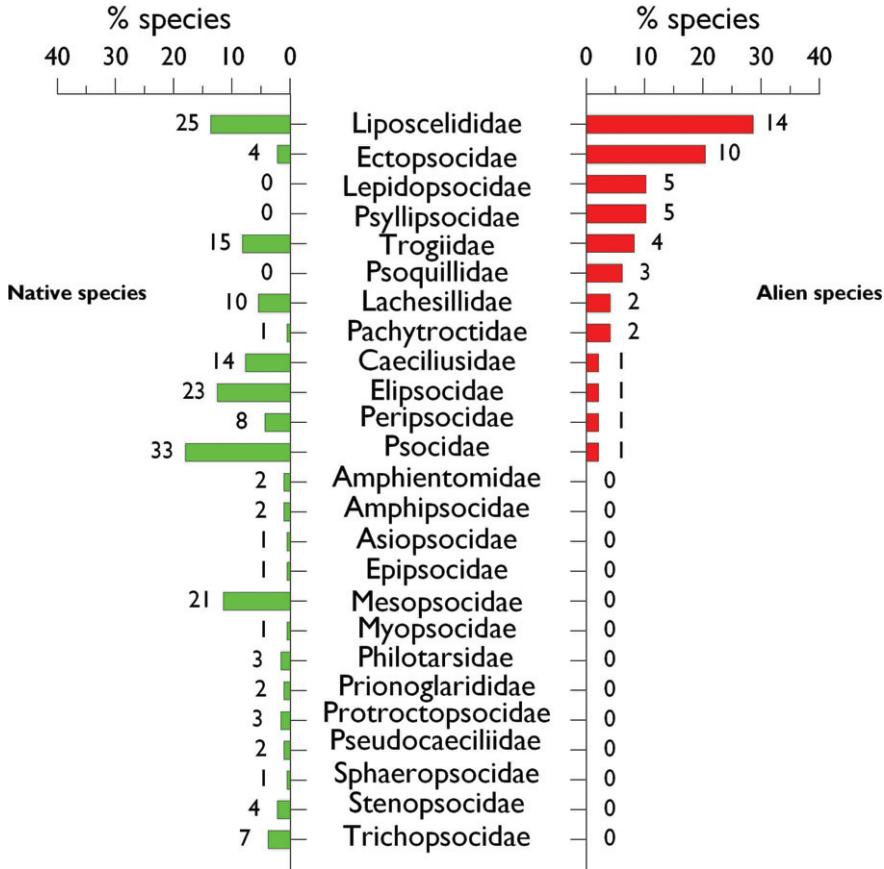
**Psoquillidae:** Body and forewings of species in this family, which also belongs to the family group Atropetae, do not bear scales. The three species currently found in Europe are not believed to be native, two of them being with certainty of alien origin and the third cryptogenic. All occur within buildings in Europe.

**Psyllipsocidae:** This family belongs to the family group Psocatropetae. The five species found in Europe (100%) are either alien (Baz 1990) or cryptogenic species (Baz 1988). All are usually found in buildings and glasshouses in Europe.

**Liposcelididae:** These psocids belong to the family group Nanopsocetae. They are characterised by a flattened body and antennae with secondary annulations on their flagellum. Fourteen species out of the 39 (36%) found in Europe are either aliens (Broadhead 1950) or cryptogenic species (Broadhead 1954b). They include exclusively apterous species, all of which being occur in buildings.

**Pachytroctidae:** The body shape of the species of this family, which belongs to the family group Nanopsocetae, is not flattened dorsoventrally and the basal flagellar segments are not secondarily annulated (New 2005). Only three species live in Europe, and two of them are not natives (67%).

**Caeciliusidae:** This family belongs to the family group Caeciliusetae and to the superfamily Caecilioidea. The species are characterised by the presence of at least one, or more commonly two or three, ventral abdominal vesicles (Mockford 1993). The family was once named Caeciliidae, but the latter name was changed because of homonymy with a family of amphibians (Lienhard 1998). Only one species out of the 15 (7%) found in Europe is cryptogenic. *Lacroxiella martini*, is only known by the two syntypes collected by Lacroix in 1918 in a french military hospital (Lacroix 1919).

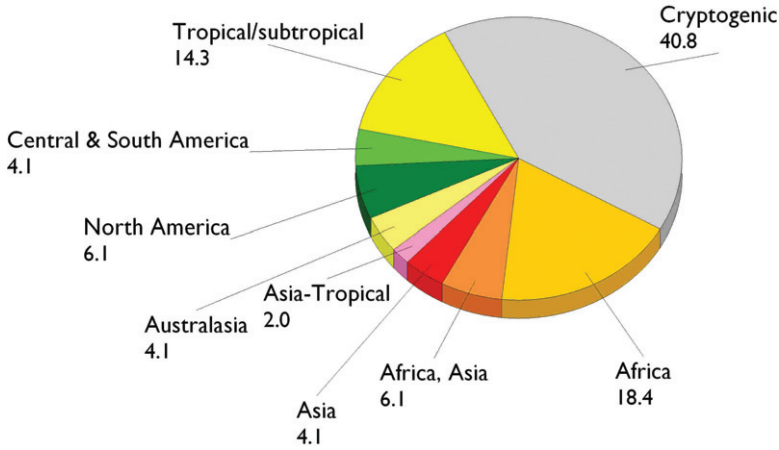


**Figure 13.2.1.** Taxonomic overview of the Psocoptera species alien to Europe compared to the native fauna. Species alien to Europe include cryptogenic species. Families are listed in a decreasing order based on the number of alien species. The number over each bar indicates the number of species observed per family.

**Lachesillidae:** These psocids belong to the family groupe Homilopsocidea. The species have an *areola postica*\* in their forewings characterized by a very sparse and short ciliation on its veins and margin. The *lacinial*\* tip of the Lachesillidae is slender and *bicuspid*\* (Lienhard 1998, Mockford 1993). Two species out of the 12 found in Europe are aliens (17%).

**Ectopsocidae:** Members of this family, which belongs to the family group Homilopsocidea, are characterised by the absence of an areola postica in their wings such as in the family Peripsocidae. Ten out of the 14 species found in Europe (71%) are either alien (Broadhead 1950) or cryptogenic species (Baz 1988). Six of these species are found occurring within buildings, either regularly (Baz 1990) or sometimes (Baz 1990), compared to only one of the 4 native species.

**Peripsocidae:** Species of this family, which also belongs to the family group Homilopsocidea, are also characterised by their absence of an areola postica in their wings. *Peripsocus bivari* is the only alien among nine species found in Europe (11%).



**Figure 13.2.2.** Geographic origin of the Psocoptera species alien to Europe. Numbers indicate the relative proportion of alien species originating from a given region.

**Elipsocidae:** Veins and wing margins of species in this family, which also belongs to the family group Homilopsocidea, bear setae but the hindwing marginal setae are limited to the radial fork (New 2005). *Propocus pulchripennis*, occurring out-of-doors in France, Great Britain and Madeira, is the only alien among 24 species found in Europe (4%). The native range of this widespread species is the coastal regions of sub-tropical countries (Lienhard 1998, Lienhard and Smithers 2002).

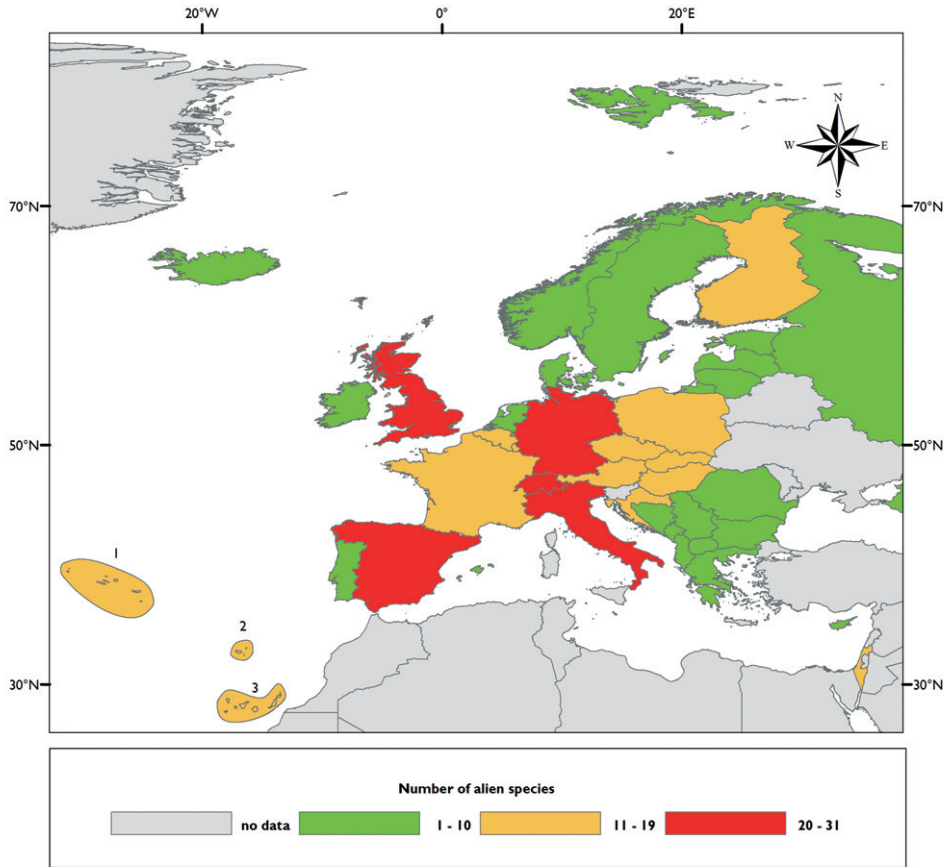
**Psocidae:** This family belongs to the family group Psocetae. Its members are easily recognised by their wing venation, where the areola postica is fused to the M-vein. The Psocidae fauna of Europe includes 34 species but *Trichadenotecnum innuptum* is the only alien among them (3%).

### 13.2.3 Temporal trends of introduction in Europe of alien psocids

The cryptogenic species *Trogium pulsatorium* was already known as *Termes pulsatorium* in the 10th edition of *Systema Naturae* by Linnaeus in 1758 (Linnaeus 1958). From 1850 to 1874, three other cryptogenic species and the alien *Psoquilla marginepunctata* were recorded from Europe. One alien and one cryptogenic species followed in 1899. In the 20th century, seven species on our list were recorded for the first time in Europe from 1900 to 1924, 18 from 1925 to 1949, seven from 1950 to 1974 and finally ten from 1975 to 1999. In the 21st century, no new alien has arrived in Europe to date.

### 13.2.4 Biogeographic patterns of the Psocoptera species alien to Europe

The distribution status is only known for 29 species out of 49, 40.8% being thus considered as cryptogenic. Figure 13.2.2 details the probable regions of origin. Most



**Figure 13.2.3.** Colonization of continental European countries and main European islands by the Psocoptera species alien to Europe. Archipelago: **1** Azores **2** Madeira **3** Canary islands.

species appear to originate from Africa (9 species, 18.4 %), far beyond the other continents but for seven species (14.3%) we only know that they arrived from tropical and subtropical regions. Central and Western Europe appear to be more colonized by alien psocids (Figure 13.2.3).

### 13.2.5 Pathways of introduction in Europe of alien psocids, invaded habitats and known impacts

The main pathway of introduction is trade. *Lachesilla pacifica* is probably dispersed by wind. Most aliens and cryptogenic species are found in warehouses in stored products. Many of them are food pests. Forty species (88.9 %) are associated with buildings in Europe.



**Figure 13.2.4.** Alien psocids. **a** *Ectopsocus briggsi* McLachlan, 1899 (Credit: Tom Murray 2008) **b** *Liposcelis bostrychophila* Badonnel, 1931 (Credit: Joyce Gross 2006).

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**Table 13.2.1.1.** List and main characteristics of the Psocoptera species alien to Europe. Status: A: Alien to Europe; C: cryptogenic species. Country codes abbreviations refer to ISO 3166 (see Appendix I). Habitat abbreviations refer to EUNIS (see Appendix II). Last update 31/ 12/ 2009

| Family<br>Species                                  | Status | Native range          | 1st record<br>in Europe | Invaded countries                                                                                                                      | Habitat    | References                                                                                      |
|----------------------------------------------------|--------|-----------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------|
| <b>Caeciliusidae</b>                               |        |                       |                         |                                                                                                                                        |            |                                                                                                 |
| <i>Lacroixiella martini</i><br>(Lacroix, 1919)     | C      | Unknown               | 1918, FR                | FR                                                                                                                                     | U          | Lacroix (1919), Lienhard (1998), Lienhard and Smithers (2002)                                   |
| <b>Ecopsocidae</b>                                 |        |                       |                         |                                                                                                                                        |            |                                                                                                 |
| <i>Ecopsocus cryptomeriae</i><br>(Enderlein, 1907) | A      | Asia                  | 1955, RU                | AT, CH, DE, HR, HU, IL, IT, RU, YU                                                                                                     | G, I, J, X | Danks (1955), Lienhard (1998), Lienhard and Smithers (2002), Lienhard (2002)–(2009)             |
| <i>Ecopsocus axillaris</i><br>(Smithers, 1969)     | A      | ?Australia            | 1991, IE                | GB, IE                                                                                                                                 | G          | Lienhard (1998), Lienhard and Smithers (2002)                                                   |
| <i>Ecopsocus braggi</i><br>McLachlan, 1899         | C      | Unknown               | 1899, GB                | AT, BE, CH, CY, CZ, DE, EE, ES, ES-CAN, FI, FR, GB, GR, HR, HU, IE, IL, IT, LU, ME, MK, NL, NO, PT, PT-AZO, PT-MAD, PL, RS, RU, SE, YU | G, I, X    | Lienhard (1998), Lienhard and Smithers (2002), Lienhard (2002)–(2009), McLachlan (1899)         |
| <i>Ecopsocus maindroni</i><br>Badonnel, 1935       | A      | Tropical, subtropical | 1954, GB                | GB, IT                                                                                                                                 | J          | Broadhead (1954b), Lienhard (1998), Lienhard and Smithers (2002)                                |
| <i>Ecopsocus meridionalis</i><br>Ribaga, 1904      | C      | Unknown               | 1904, IT                | AT, CH, CY, CZ, DE, ES, ES-CAN, FR, GR, HR, HU, IE, IL, IT, LU, ME, MK, MT, RO, RS, YU                                                 | J, X       | Lienhard (1998), Lienhard and Smithers (2002), Lienhard (2002)–(2009), Ribaga (1904)            |
| <i>Ecopsocus pumilis</i> (Banks, 1920)             | A      | Africa, Asia          | 1984, PT-AZO            | CH, PT-AZO                                                                                                                             | J          | Lienhard (1994), Lienhard (1998), Lienhard and Smithers (2002), Mockford (1993)                 |
| <i>Ecopsocus richardsi</i><br>(Pearman, 1929)      | A      | Africa, Asia          | 1929, GB                | CH, GB, PT-AZO                                                                                                                         | J          | Lienhard and Smithers (2002), Pearman (1929)                                                    |
| <i>Ecopsocus rileyae</i> Schmidt & Thornton, 1993  | A      | Australia             | 1992, PT-MAD            | PT-MAD                                                                                                                                 | G          | Lienhard (1996, 1998), Lienhard and Smithers (2002)                                             |
| <i>Ecopsocus strauschi</i><br>Enderlein, 1906      | A      | ?Africa               | 1906, ES-CAN            | ES, ES-CAN, IT, PT-AZO, PT-MAD                                                                                                         | J          | Enderlein (1906), Lienhard (1998), Lienhard and Smithers (2002)                                 |
| <i>Ecopsocus titschacki</i> Jentsch, 1939          | A      | C. & S. America       | 1928, DE                | DE, ES                                                                                                                                 | G, J       | Jentsch (1939), Lienhard (1998), Lienhard and Smithers (2002)                                   |
| <b>Elipsocidae</b>                                 |        |                       |                         |                                                                                                                                        |            |                                                                                                 |
| <i>Propocus pulchripennis</i><br>(Perkins, 1899)   | A      | Tropical, subtropical | 1981, PT-MAD            | FR, GB, PT-MAD                                                                                                                         | X          | Baz (1990), Bigot (1982), Lienhard (1998), Lienhard and Smithers (2002), Lienhard (2002)–(2009) |
| <b>Lachesillidae</b>                               |        |                       |                         |                                                                                                                                        |            |                                                                                                 |
| <i>Lachesilla pacifica</i><br>Chapman, 1930        | A      | North America         | 1986, CH                | CH, FR                                                                                                                                 | G          | Lienhard (1998), Lienhard and Smithers (2002)                                                   |

| Family                                               | Status | Native range          | 1st record in Europe | Invaded countries                                                                                                                     | Habitat | References                                                                                                  |
|------------------------------------------------------|--------|-----------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------|
| <i>Species</i>                                       |        |                       |                      |                                                                                                                                       |         |                                                                                                             |
| <i>Lachesilla tectorum</i><br>Badonnel, 1931         | A      | Tropical, subtropical | 1992, PT-MAD         | ES-CAN, PT-MAD                                                                                                                        | G, I, X | Lienhard (1998), Lienhard and Smithers (2002)                                                               |
| <b>Lepidosociidae</b>                                |        |                       |                      |                                                                                                                                       |         |                                                                                                             |
| <i>Echmepsteryx madagascariensis</i> (Kolbe, 1885)   | A      | Tropical, subtropical | 1938, DE             | DE                                                                                                                                    | J       | Eichler (1938), Lienhard (1998), Lienhard and Smithers (2002)                                               |
| <i>Lepolepis bicolor</i> Broadhead, 1955             | A      | Africa, Asia          | 1945, GB             | GB                                                                                                                                    | J       | Broadhead (1955), Lienhard (1998), Lienhard and Smithers (2002)                                             |
| <i>Nepticulomima sakuntala</i> Enderlein, 1906       | A      | Asia, tropical        | 1954, GB             | GB                                                                                                                                    | J       | Broadhead (1954b), Lienhard (1998), Lienhard and Smithers (2002)                                            |
| <i>Pteroxanimum kelloggi</i> (Ribaga, 1905)          | A      | North America         | 1916, GB             | FR, GB, IE, PT-MAD                                                                                                                    | J, X    | Harrison (1916), Lienhard (1998), Mockford (1993)                                                           |
| <i>Soa flaviterminata</i> Enderlein, 1906            | A      | Tropical, subtropical | 1930, DE             | DE, GB                                                                                                                                | J       | Lienhard (1998), Lienhard and Smithers (2002), Selys-Longchamps (1872)                                      |
| <b>Liposcelididae</b>                                |        |                       |                      |                                                                                                                                       |         |                                                                                                             |
| <i>Belaphotroctes ghesquiereti</i><br>Badonnel, 1949 | A      | ?Africa               | 1993, ES-CAN         | ES-CAN                                                                                                                                | J       | Lienhard (1996)                                                                                             |
| <i>Embiidopocus minor</i> (Pearman, 1931)            | A      | Africa                | 1931, GB             | GB                                                                                                                                    | J       | Lienhard (1998), Lienhard and Smithers (2002), Pearman (1931b)                                              |
| <i>Liposcelis albothoracica</i><br>Broadhead, 1955   | A      | Africa                | 1955, GB             | GB                                                                                                                                    | J       | Broadhead (1955), Lienhard (1998), Lienhard and Smithers (2002)                                             |
| <i>Liposcelis bostrychophila</i><br>Badonnel, 1931   | C      | Unknown               | 1943, FR             | AT, BE, CH, CY, CZ, DE, ES, ES-CAN, FI, FR, GB, GR, HR, HU, IE, IL, IT, LU, MK, MT, NL, NO, PT, PT-IL, PT-MAD, PL, RO, RS, SE, SE, YU | J       | Badonnel (1943), Lienhard (1998), Lienhard and Smithers (2002)                                              |
| <i>Liposcelis brunnea</i><br>Morschulsky, 1852       | C      | Unknown               | 1852, RU             | AT, BE, CH, CY, CZ, DE, ES, ES-CAN, FI, FR, GB, GR, HR, IT, LU, MK, NO, PL, PT, RO, RS, SE, RU, YU                                    | J       | Broadhead (1950), Lienhard (1998), Lienhard and Smithers (2002), Lienhard (2002)–(2009), Morschulsky (1852) |
| <i>Liposcelis corrudens</i> (Heymons, 1909)          | C      | Unknown               | 1909, DE             | AT, BE, CH, CY, CZ, DE, ES, FI, FR, GB, GR, HR, HU, IE, IT, LU, MK, MT, NL, NO, PL, PT, PT-AZO, PT-MAD, RO, RS, SE, SE, YU            | G, J    | Heymons (1909), Lienhard (1998), Lienhard and Smithers (2002)                                               |

| Family                                          | Status | Native range          | 1st record in Europe | Invaded countries                                                                                                          | Habitat | References                                                                                              |
|-------------------------------------------------|--------|-----------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------|
| <i>Species</i>                                  |        |                       |                      |                                                                                                                            |         |                                                                                                         |
| <i>Liposcelis decolor</i> (Pearman, 1925)       | C      | Unknown               | 1925, GB             | AT, BE, CH, CY, CZ, DE, EE, ES, ES-CAN, FI, FR, GB, GR, HR, HU, IL, IT, LU, LV, MK, MT, NL, NO, PL, PT, PT-MAD, RO, SE, YU | J       | Broadhead (1950), Lienhard (1998), Lienhard and Smithers (2002), Pearman (1925)                         |
| <i>Liposcelis entomophila</i> (Enderlein, 1907) | C      | Unknown               | 1929, GB             | CH, CY, CZ, DE, ES, FI, GB, HR, IL, IT, PT, PT-AZO, YU                                                                     | J       | Broadhead (1950), Lienhard (1998), Lienhard and Smithers (2002), Lienhard (2002)–(2009), Pearman (1929) |
| <i>Liposcelis mendax</i> Pearman, 1946          | A      | Africa                | 1946, FR, GB         | CH, ES, ES-CAN, FR, GB, HR, IT, YU                                                                                         | J       | Broadhead (1950), Lienhard (1998), Lienhard and Smithers (2002), Lienhard (2002)–(2009), Pearman (1946) |
| <i>Liposcelis obscura</i> Broadhead, 1954       | A      | ?Africa               | 1954, GB             | GB                                                                                                                         | J       | Broadhead (1954a), Lienhard (1998), Lienhard and Smithers (2002)                                        |
| <i>Liposcelis pacta</i> Pearman, 1942           | C      | Unknown               | 1940, GB             | BE, CZ, ES, GB, HR, IT, YU                                                                                                 | J       | Broadhead (1950), Lienhard (1998), Lienhard and Smithers (2002), Lienhard (2002)–(2009), Pearman (1942) |
| <i>Liposcelis pactula</i> Broadhead, 1950       | C      | Unknown               | 1945, GB             | ES-CAN, GB, IT, PT-MAD                                                                                                     | G, J    | Broadhead (1950), Lienhard (1998), Lienhard and Smithers (2002)                                         |
| <i>Liposcelis pearmani</i> Lienhard, 1990       | A      | ?Asia                 | 1945, GB             | AT, CH, CZ, DE, ES, FI, FR, GB, HR, HU, IL, IT, LU, NL, YU                                                                 | J       | Broadhead (1950), Lienhard (1998), Lienhard (2002)–2010, Lienhard and Smithers (2002)                   |
| <i>Liposcelis pubescens</i> Broadhead, 1947     | C      | Unknown               | 1943, GB             | BE, CH, CZ, DE, GB, IT, LU, PT-AZO, YU                                                                                     | J       | Broadhead (1947), Broadhead (1950), Lienhard (1998), Lienhard and Smithers (2002)                       |
| <b>Pachytroctidae</b>                           |        |                       |                      |                                                                                                                            |         |                                                                                                         |
| <i>Nanopsocus oceanicus</i> Pearman, 1928       | A      | Tropical, subtropical | 1988, ES             | CY, ES, ES-CAN                                                                                                             | J       | Baz (1990), Lienhard (1998), Lienhard and Smithers (2002)                                               |
| <i>Tapinella castanea</i> Pearman, 1932         | C      | Unknown               | 1932, GB             | ES-CAN, GB                                                                                                                 | J       | Lienhard (1998), Lienhard and Smithers (2002), Lienhard (2002)–(2009), Pearman (1932)                   |
| <b>Peripsocidae</b>                             |        |                       |                      |                                                                                                                            |         |                                                                                                         |
| <i>Peripsocus bivari</i> Baz 1988               | A      | ?Africa               | 1979, PT-AZO         | ES-CAN, FR, PT-AZO, PT-MAD                                                                                                 | G, X    | Baz (1988), Lienhard (1996, 1998), Lienhard and Smithers (2002)                                         |
| <b>Psocidae</b>                                 |        |                       |                      |                                                                                                                            |         |                                                                                                         |
| <i>Trichadenotecnium inaptum</i> Betz, 1983     | A      | North America         | 1965, HU             | CH, HU, IT                                                                                                                 | G, X    | Lienhard (1986, 1998), Lienhard and Smithers (2002)                                                     |
| <b>Psoquillidae</b>                             |        |                       |                      |                                                                                                                            |         |                                                                                                         |
| <i>Psoquilla marginipunctata</i> Hagen, 1865    | A      | C. & S. America       | 1865, ?DE            | BE, CZ, ?DE, GB, IT, PT-AZO                                                                                                | G, J    | Günther (1974), Hagen (1865), Lienhard and Smithers (2002)                                              |

| Family                                             | Status | Native range          | 1st record in Europe | Invaded countries                                                                                                                              | Habitat | References                                                                          |
|----------------------------------------------------|--------|-----------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------|
| <i>Species</i>                                     |        |                       |                      |                                                                                                                                                |         |                                                                                     |
| <i>Rhyposocus disparilis</i> (Pearman, 1931)       | A      | Africa                | 1931, GB             | GB                                                                                                                                             | J       | Lienhard (1998), Lienhard and Smithers (2002), 38                                   |
| <i>Rhyposocus peregrinus</i> (Pearman, 1929)       | C      | Unknown               | 1929, GB             | GB                                                                                                                                             | J       | Lienhard (1998), Lienhard and Smithers (2002), Pearman (1929)                       |
| <b>Psyllipocidae</b>                               |        |                       |                      |                                                                                                                                                |         |                                                                                     |
| <i>Dorypteryx domestica</i> (Smithers, 1958)       | A      | Africa                | 1973, CH             | AT, BA, BE, CH, CZ, DE, DK, ES, ES-CAN, FI, FR, GB, HR, HU, IE, IL, IT, LU, NO, PL, SE, SK, YU                                                 | J       | Lienhard (1977, 1998, 2002– 2010), Lienhard and Smithers (2002)                     |
| <i>Dorypteryx longipennis</i> Smithers, 1991       | C      | Unknown               | 1988, LU             | BE, CH, ES, IE, IT, LU, NL                                                                                                                     | J       | Lienhard (2002– 2010), Lienhard and Schneider (1993), Lienhard and Smithers (2002)  |
| <i>Dorypteryx pallida</i> Aaron, 1883              | C      | Unknown               | 1907, IT             | AT, BE, CH, CZ, DE, ES, FR, IT                                                                                                                 | J       | Lienhard (1998), Lienhard and Smithers (2002), Mockford (1993), Titschak (1930)     |
| <i>Procatropos lachlani</i> Ribaga, 1899           | A      | Tropical, subtropical | 1899, IT             | ES-CAN, IL, IT, PT-MAD                                                                                                                         | H, J    | Lienhard (1998), Lienhard and Smithers (2002), Ribaga (1904)                        |
| <i>Psyllipocus namburii</i> Selys-Longchamps, 1872 | C      | Unknown               | 1872, FR             | AT, BE, CH, CZ, DE, ES, ES-CAN, FI, FR, GB, GR, HR, HU, IE, IL, IT, LU, NL, NO, PL, PT, PT-AZO, PT-MAD, RO, RU, SE, YU                         | H, J    | Lienhard (1998, 2002– 2010), Lienhard and Smithers (2002), Selys- Longchamps (1872) |
| <b>Trogiidae</b>                                   |        |                       |                      |                                                                                                                                                |         |                                                                                     |
| <i>Lepinotus inquilinus</i> von Heyden, 1850       | C      | Unknown               | 1850, DE             | AT, BE, CH, CZ, DE, DK, ES, ES-BAL, ES-CAN, FI, FR, GB, GR, HR, HU, IS, IT, LU, NL, NO, PL, PT-AZO, PT-MAD, RO, RU, SE, YU                     | J       | Heyden (1850), Lienhard (1998), Lienhard and Smithers (2002)                        |
| <i>Lepinotus patruelis</i> Pearman, 1931           | C      | Unknown               | 1930, GB             | AT, BE, CH, CZ, DE, FI, FR, GB, IE, IT, LU, NO, PL, PT-AZO, SE                                                                                 | J       | Lienhard (1998), Lienhard and Smithers (2002), Pearman (1931a)                      |
| <i>Lepinotus reticulatus</i> Enderlein, 1905       | C      | Unknown               | 1905, DE             | AT, BE, CH, CY, CZ, DE, DK, ES, ES-CAN, FI, FR, GB, GR, HR, HU, IL, IS, IT, LU, MK, NL, PT, PT-AZO, PL, RO, RU, SE, YU                         | J       | Enderlein (1905), Lienhard (1998), Lienhard and Smithers (2002)                     |
| <i>Trogium pulsatorium</i> (Linnaeus, 1758)        | C      | Unknown               | 1758, Europe         | AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, ES-CAN, FI, FR, GB, GR, HR, HU, IE, IL, IS, IT, LT, LU, NL, NO, PL, PT-AZO, PT-MAD, RO, RU, SE, YU | J       | Lienhard (1998), Lienhard and Smithers (2002)                                       |

**Table 13.2.2.** List and characteristics of the Psocoptera species alien *in* Europe. Country codes abbreviations refer to ISO 3166 (see appendix I). Habitat abbreviations refer to EUNIS (see appendix II). Last update 31/ 12/ 200

| Family<br><i>Species</i>                          | Native range                | Invaded countries<br>in Europe                                          | Habitat | References                                                                  |
|---------------------------------------------------|-----------------------------|-------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------|
| <b>Caeciliusidae</b>                              |                             |                                                                         |         |                                                                             |
| <i>Enderleinella obsoleta</i><br>(Stephens, 1836) | Central Europe              | BE, BG, DK, FI,<br>FR, GB, IE, IT, LU,<br>ME, MK, NL, NO,<br>RO, RU, SE | G       | Lienhard (1998), Lienhard<br>and Smithers (2002)                            |
| <b>Ectopsocidae</b>                               |                             |                                                                         |         |                                                                             |
| <i>Ectopsocus vachoni</i><br>Badonnel, 1945       | Mediterranean<br>region     | CH, GB                                                                  | G, J    | Lienhard (1998), Lienhard<br>and Smithers (2002)                            |
| <b>Lachesillidae</b>                              |                             |                                                                         |         |                                                                             |
| <i>Lachesilla greeni</i><br>(Pearman, 1933)       | Central Europe              | BE, ES, FR, GB, IT,<br>PT, PT-AZO, PT-<br>MAD, RO                       | G, H, J | Lienhard (1998), Lienhard<br>and Smithers (2002),<br>Lienhard (2002)–(2009) |
| <b>Liposcelididae</b>                             |                             |                                                                         |         |                                                                             |
| <i>Liposcelis rufa</i><br>Broadhead, 1950         | Mediterranean<br>region     | CH, GB, PL                                                              | G, J    | Lienhard (1998), Lienhard<br>and Smithers (2002)                            |
| <b>Peripsocidae</b>                               |                             |                                                                         |         |                                                                             |
| <i>Peripsocus milleri</i><br>(Tillyard, 1923)     | Atlantic coast of<br>Europe | IT, YU                                                                  | G, J    | Lienhard (1998), Lienhard<br>and Smithers (2002)                            |
| <i>Peripsocus parvulus</i><br>Kolbe, 1880         | Central Europe              | BE, ES, FI, FR,<br>GB, GR, HR, IL,<br>LU, NL, RO, RU,<br>SE, YU         | G       | Lienhard (1998), Lienhard<br>and Smithers (2002)                            |
| <b>Trichopsocidae</b>                             |                             |                                                                         |         |                                                                             |
| <i>Trichopsocus clarus</i><br>(Banks, 1908)       | Mediterranean<br>region     | CH, CZ, DE, FI,<br>GB, HU, IE, LT,<br>NL, PL, RU, SE                    | J, X    | Lienhard (1998), Lienhard<br>and Smithers (2002)                            |
| <i>Trichopsocus dali</i><br>(McLachlan, 1867)     | Mediterranean<br>region     | AT, BE, CH, CZ,<br>DE, GB, HU, LU,<br>PL, RU                            | G       | Lienhard (1998), Lienhard<br>and Smithers (2002)                            |
| <b>Trogiidae</b>                                  |                             |                                                                         |         |                                                                             |
| <i>Cerobasis annulata</i><br>(Hagen, 1865)        | Mediterranean<br>region     | AT, BE, CH, CZ,<br>DE, GB, LU, NL,<br>NO, PL, RU                        | G, J, X | Lienhard (1998), Lienhard<br>and Smithers (2002)                            |