

Diptera

Chapter 10

Marcela Skuhrová¹, Michel Martinez², Alain Roques³

1 *Bitovská 1227/9, 140 00 Praha 4, Czech Republic* **2** *INRA Centre de Biologie pour la Gestion des Populations (CBGP), Campus International de Baillarguet, 34988 Montferrier-sur-Lez, France* **3** *INRA UR633 Zoologie Forestière, 2163 Av. Pomme de pin, 45075 Orléans, France*

Corresponding authors: *Marcela Skuhrová* (skuhrava@quick.cz), *Michel Martinez* (martinez@supagro.inra.fr), *Alain Roques* (alain.roques@orleans.inra.fr)

Academic editor: *David Roy* | Received 4 February 2010 | Accepted 24 May 2010 | Published 6 July 2010

Citation: Skuhrová M et al. (2010) Diptera. Chapter 10. In: Roques A et al. (Eds) Alien terrestrial arthropods of Europe. BioRisk 4(2): 553–602. doi: [10.3897/biorisk.4.53](https://doi.org/10.3897/biorisk.4.53)

Abstract

Of the 19,400 native species and 125 families forming the European diptera fauna, 98 species (less than 0.5%) in 22 families are alien to Europe. These aliens constitute 66 species (18 families) of the suborder Brachycera and 32 species (4 families) of the suborder Nematocera. By family in this category, there are 23 Cecidomyiidae species, 18 Drosophilidae, nine Phoridae, eight Tachinidae and seven Culicidae. Another 32 fly species belonging to five families are considered to be alien in Europe. These invasives native to other European countries are composed of 14 species of Cecidomyiidae, seven Syrphidae, five Culicidae and three species each of Anthomyiidae and Tephritidae. The date of the first record in Europe is known for 84 alien species. Arrivals of alien species of Diptera have accelerated rapidly since the second half of the 20th century. North America appears to be the dominant contributor of the alien flies. The majority of alien Diptera were introduced into or within Europe unintentionally, with only three predators released intentionally for biological control. Alien Diptera are predominantly phytophagous (35.6%), while a lesser portion are zoophagous (28.6%) or detritivorous /mycetophagous (29.6%). Ecological impacts on native fauna and flora have not been documented for any of the alien species established in Europe. However, 14 alien species have economic impacts on crops.

Keywords

alien, Europe, Diptera

10.1 Introduction

Diptera is one of the largest insect orders, with a worldwide distribution. The order includes 172 to 179 families (depending on authors) with about 132,000 species described which probably underestimates the actual fauna by at least a half. About 19,400 native species and 125 families have been recorded in Europe (Fauna Europaea). The alien entomofauna is comparatively very limited with only 98 species observed to date, i.e. less than 0.5% of the total dipteran fauna in Europe.

Commonly called true flies, mosquitoes, midges, deer- and horseflies and houseflies feature among the most familiar Diptera. Flies are not only abundant in popular perception but also have particular veterinary and medical importance for vectoring diseases and as pests of agriculture, forestry and husbandry. However, some species are useful to man as parasitoids and predators of insect pests and as plant pollinators. Generally, adults are minute to small, soft-bodied insects with a highly mobile head, large compound eyes, antennae of variable size and structure, and sucking mouthparts. They have only one pair of functional wings, the second pair being changed into small head-like bodies called halteres. Legs are usually long, with five-segmented tarsi. Adults are usually very active and are found in all major habitats. They are often associated with flowers and with decaying organic matter, but females of some groups are blood-sucking. Larvae are eruciform and legless in most species. They develop mainly in moist or wet habitats such as soil, mud, decaying organic matter, and in plant or animal tissues. Only a small proportion of larvae is truly aquatic. The majority are liquid-feeders or microphagous.

10.2. Taxonomy of the Diptera species alien to Europe

The 98 species of Diptera alien to Europe belong to 22 different families (Table 10.1), which all have native representatives. A larger number of aliens belong to the suborder Brachycera (66 species and 18 families) than to the suborder Nematocera (32 species and 4 families). However, this apparently large diversity is confusing. More than 40% of the alien species are either midges (Cecidomyiidae- 23 species) or fruit flies and their relatives (Drosophilidae- 18 species). The other 20 families show less than 10 species each (Figure 10.1). The arrival of these alien species has largely modified the composition of some families such as Braulidae and Drosophilidae where at present aliens respectively account for 33.3% and 14.8% of the total fauna observed in Europe. However, the native entomofauna includes 103 additional families for which no alien species has yet been recorded in Europe, especially for some ecologically and economically- important groups such as Chironomidae, Syrphidae, Asilidae, Tipulidae and Anthomyiidae. The alien dipterans belong to the following families:

Suborder Brachycera

Agromyzidae. All species in the family are phytophagous, including a number of serious pests of cultivated plants. Larvae live in plant tissues, usually forming characteristic galleries as mines. Most larvae live in the parenchyma of leaves, or mine stems, few attack fruits and seeds. The majority of the species are monophagous, some of them are widely polyphagous, attacking different plants of several families. To date, only five alien species have been observed in Europe relatively to 903 recorded native species (Fauna Europaea). However, the alien fauna includes three species of *Liriomyza* (*L. chinensis*, *L. huidobrensis* - see factsheet 14.23, and *L. trifolii*) which are highly damaging to vegetable crops (Arzone 1979, Martinez 1982, Trouvé et al. 1991).

Braulidae. Larvae live as commensals within cells of honey-bee nests (*Apis* species). They feed on pollen, honey and organic debris. Adults are “food-parasites” of adult bees, attaching themselves to the body of the queen or rarely to a worker. They feed on liquids from the mouth of the bees. There is only one genus present in Europe, *Braula*, which includes one alien species, *B. schmitzi* (Dobson 1999), and two native species.

Calliphoridae. This is a key family for human health. Adults are potential vectors of bacteria, viruses, protozoaires and helminthes because they actively search for and sit on feces, fresh and cooked meat, fish, dairy products, and wounds. Larvae are parasitoids or predators of living snails, or feed on blood of nestling birds. A few species are obligate producers of *myiasis* in various animals. Only one alien species, *Chrysomya albiceps* (Mercier 1927), has been observed in Europe compared to 112 native species.

Canacidae (=Tethinidae). Most species are strictly associated with salty habitats (*halobionts*), e.g. coastal salt marshes, seashore wrack, sandy beaches, shores of inland salt lakes, alkaline springs etc, and only a few species are also known from habitats that are apparently without increased salinity (forests, meadows, deserts). Some species have been reared from deposits of seaweed. There is only one alien species, *Pelomyia occidentalis* (Irwin et al. 2001), compared to a total of 39 native species.

Ceratopogonidae. Biting adults of this family are potential vectors of major animal diseases. In particular, *Culicoides* species transmit bluetongue orbivirus between ruminant hosts. A species of Afro-Asian origin, *C. imicola* Kieffer, has been considered as the main agent of the recent outbreaks of bluetongue disease in Europe although some native species could also be involved (e.g., *C. pulicarius* L. and *C. newsteadi* Austen complexes (Purse et al. 2007)). However, it seems that the most likely mode of incursion of *C. imicola* in Europe was via passive transport on the wind as aerial plankton“ (Mellor et al. 2008, Purse et al. 2007). Thus, this species was not considered in this chapter.

Dolichopodidae. Adults and larvae of most species are predaceous and feed on soft-bodied invertebrates. They occupy all terrestrial habitats from coastal beaches to high elevations, but they generally prefer humid areas. Larvae are mostly found in moist soils or in the litter layer while a few others depend on sap runs and tree rot holes for their development. There is only one alien species, *Micropygus vagans* (Chandler 2004), in comparison to 790 native species in Europe.

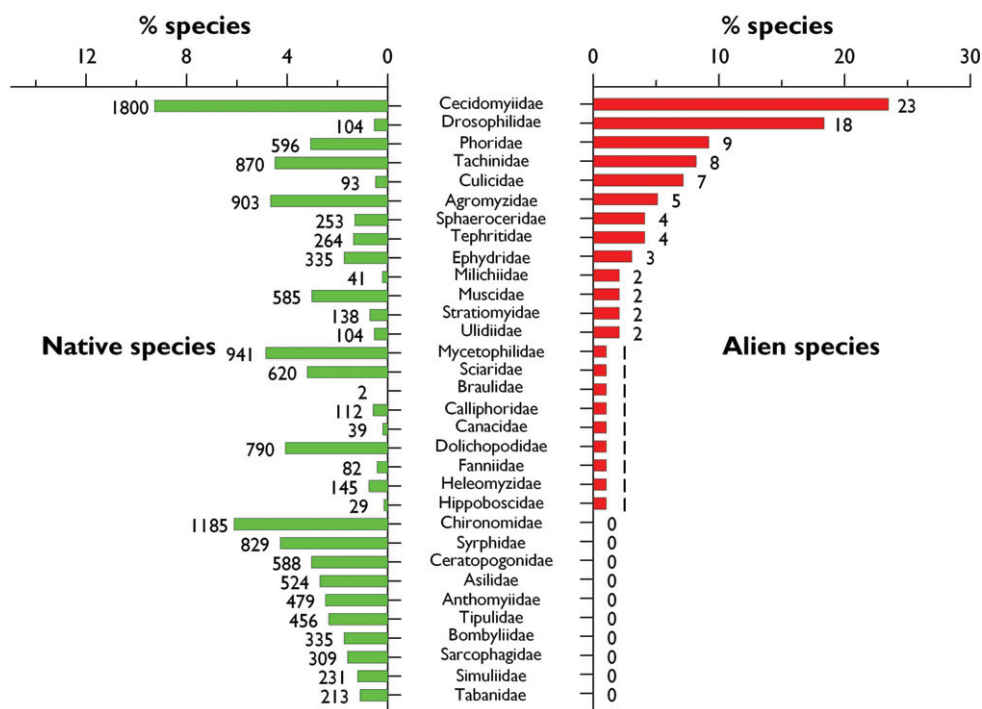


Figure 10.1. Relative importance of the families of Diptera in the alien and native entomofauna in Europe. Families are presented in a decreasing order based on the number of alien species. Species alien to Europe include cryptogenic species. Only the most important families of native species (> 50 spp.) have been considered. The number over each bar indicates the number of species observed per family.

Drosophilidae. Species in this family show very diverse biological habits. The larvae of most species develop in fermenting substrates, but some mine living plants. Some species are used as important laboratory animals. *Drosophilids* occur in all terrestrial habitats, from lowlands up to alpine meadows. They may be found near the habitats of their insect hosts or preys (mealybugs, bees, wood-boring beetles), around toadstools (Polyporales) and in the flower heads of thistles. Aliens include 18 species in the genera *Drosophila* (8 species) (Bächli et al. 2002, Grassi et al. 2009), *Chymomyza* (4 species) (Band 1994, Carles-Tolra and Andersen 2002, Perju 1959, Trent Band et al. 2005), *Zaprionus* (3 species) (Chassagnard and Kraaijeveld 1991, Monclus 1976, Tsacas et al. 1977), *Scaptomyza* (2 species) (Nicolini Aldini 2005, Nicolini Aldini and Baviera 2002) and *Dettopsomyia* (1 species) (Prevosti 1976) compared to 104 native species.

Ephydriidae. Adults are usually associated with moist substrates, especially shores, marshes and wet meadows. Some develop in decomposing matter or excrement, other are leaf miners or parasitoids. Aquatic and semiaquatic habitats are typical of the family. A total of 335 native species occur in Europe with only three alien species - in the genera *Elephantinosoma*, *Placopsidella* and *Psilopa* (Gatt and Ebejer 2003).

Fanniidae. Species inhabit forests, rarely open landscape and wetlands. Larvae are generally saprophagous and mostly feed on decaying organic matter as human or animal faeces, decaying material in gardens, and rotting leaf litter. Some species have been reared from fungi, others occur in bird nests, burrows of vertebrates, and nests of social Hymenoptera. There is only one alien species, *Fannia pusio* (Carles-Tolra and Andersen 2002), compared to 82 native species.

Heleomyzidae. Larvae develop in sporocarps of fungi or live in association with mycelia in forest soil, some are necrophagous or saprophagous. There is only one alien species, *Prosopanthrum flavifrons* (Ismay and Smith 1994) compared to 145 native species.

Hippoboscidae. Adults are bloodsucking ectoparasites of birds and mammals. Females of all species are macrolarviparous, i.e. retaining the larva in the uterus to the end of the third instar. There is only one alien species, *Crataerina melbae* (Popov 1995), compared to 29 native species.

Milichiidae. Larvae are saprophagous and develop in decaying vegetation, wood detritus, in nests of birds, ants (myrmecophilous species) and of other social insects, but also in excrements, carrion, dead insects and snails. Adults of some species are commensals or *kleptoparasites* of predatory insects and spiders. There are two alien species, in the genus *Desmometopa* (Roháček (2006b)), compared to 41 native species.

Muscidae. Larvae develop in various kinds of decaying organic matter, often showing facultative or even obligatory carnivorous behaviour. Larvae of some species appear to be predaceous during their entire larval life. Adults feed on nectar or plant sap, sometimes also on decaying liquids and some species are predaceous. Some species are adapted to anthropogenically-altered ecosystems. Blood-sucking species are of medical and veterinary importance, being vectors of some diseases. There are two alien species, the sorghum pest *Athrerigona soccata* (Vercambre et al. 2000), and a predator of house flies, *Hydrotaea aenescens* (Rozkošný 2006, Saccà 1964), compared to 585 native species.

Phoridae. Adults are found in all types of terrestrial habitats, particularly in forests and meadows but also in steppe-like and xerothermic sites. Food preferences of larvae appear to be remarkably different. Most species are *polysaprophagous* with different degrees of specialisation. Parasitic species are often found in the nests of ants and termites. Some fungus breeders feed on the fungi but others are obligate predators or parasitoids of other fungus feeders such as larval Sciaridae. There are nine alien species in the genera *Megaselia* (three species) (Campobasso et al. 2004, Disney 2008, Disney and Durska 1999), *Chonocephalus* (two species) (Disney 1980, Disney 2002), *Dohrniphora* (two species) (Disney 2002, Disney 2004), *Hypocerides* (one species) (Disney 2004), and *Puliciphora* (one species) (Disney 1983) in comparison to a total of 596 native species.

Sphaeroceridae. Larvae and adults are saprophagous. Larvae develop in diverse organic matter and feed as saprophages on microorganisms destroying rotting plants, dung, carrion or fungi and also on the decomposed liquid substances. Adults occur in all habitats that contain the breeding media of the larvae, preferably in damp places. A few polyphagous species are *synanthropic*, living near human habitats. Many copro-

phagous species develop in dung heaps near stables or in pastures. There are four alien species, belonging to the genera *Thoracochaeta* (two species feeding on seaweeds) (Roháček and Marshall 2000), *Coproica* (one species) (Carles-Tolra and Andersen 2002), and *Trachypella* (one species) (Roháček (2006a)), in comparison to a total of 253 native species.

Stratiomyidae. Terrestrial and aquatic larvae of this family live as scavengers. Adults feed on nectar of flowers, exploiting a wide range of flowering plants, especially umbels alongside water margins but also in open sunny places. There are two alien species, the scavenger *Hermetia illucens* (Venturi 1956), which has been used to control house fly, and a soldier fly, *Exaireta spinigera* (Lapeyre and Dauphin 2008), compared to a total of 138 native species.

Tachinidae. Larvae live as endoparasitoids of arthropod larvae. Many species are parasitoids of important pests of agricultural crops and forest trees and are regarded as economically beneficial. Aliens include 8 species of different genera (*Blepharipa*, *Catharosia*, *Clytiomya*, *Phasia*, *Leucostoma*, *Sturmia*, *Trichopoda* and *Zeuxia*) (Carles-Tolra and Andersen 2002, Cerretti 2001, Clemons 2001, Colazza et al. 1996, Vaňhara et al. Tschorsnig 2006) in comparison to a total of ca. 870 native species.

Tephritidae. So called “fruit flies” because larvae of most species inhabit the fruits or other seed-bearing organs of flowering plants. Larvae are phytophagous, some being leaf miners and stem-borers and others developing in roots. Many species are associated with Asteraceae. Adults feed on pollen and nectar. Some species are pests but others are used as biological control agents of weeds. Aliens include 4 species in the genus *Rhagoletis* (3 species) (Duso 1991, Lampe et al. 2005, Merz 1991) and the major fruit pest *Ceratitidis capitata* (see factsheet 14.28) in comparison to a total of 264 native species.

Ulidiidae. The biology and immature stages are largely unknown. Adults occur in dry, sunny habitats, such as steppe meadows, and thin steppe forests. Larvae are mostly saprophagous and develop in rotting matter, under bark or in dung but a few seem to be phytophagous. Adults live in marshland habitats, woodland areas, sandy, salty or steppe meadows. They are often observed on flowers, shrub leaves, tree trunks, and on excrement and manure heaps. There are only two aliens, compared to a total of 106 native species, *Euxesta pechumani*, living on carrion and dung (Delage 1969) and *Euxesta notata* living on bulbs (such as onions) and sometimes considered as a pest (Martinez, unpublished).

Suborder Nematocera

Cecidomyiidae. Larvae of gall midges are either phytophagous, zoophagous or mycophagous. Phytophagous species cause galls on various parts of their host plants (hence the common name “gall midges”) but some larvae live free in flower heads or in the stems without making galls, or in conifer cones, or are associated with cambium layers of various trees. Some gall-causing species are serious pests of cultivated plants and forest trees. The zoophagous larvae are predators of the larvae of other gall

midges, aphids, mites, coccids, and other arthropods and some of them are used for biological control of pests. Larvae of several species are endoparasites of aphids, psyllids and tingids. This is the dominant group of aliens in Diptera with 23 species (see Table 10.1 for references) but altogether 1800 native midge species are known to occur in Europe.

Culicidae. Larvae develop in water. Females of most species are haematophagous and feed by sucking the blood of vertebrates, whereas males may feed on flower nectar. Adults may transmit various disease pathogens, viz. viruses, malaria and filarioses. Most Culicidae are distributed in tropical and subtropical areas of the world. Whereas the European native fauna only includes 93 species within this family, seven alien species have established in Europe: two species belonging to the genus *Aedes* (the Asian tiger mosquito, *A. albopictus*- see factsheet 14.27, and the Asian rock pool mosquito, *A. japonicus* (Schaffner et al. 2009)); three Asian species of the genus *Culex* (Adhami 1987, Ramos et al. 1998, Samanidou and Harbach 2003) and two species of *Ochlerotatus* (Romi et al. 1999, Schaffner et al. 2001). *Aedes aegypti*, the vector of yellow fever which has been present in Europe for a long time, now seems to be extinct; no exotic species of *Anopheles* has yet established (Schaffner et al. 2001).

Mycetophilidae. Larvae are mycophagous, feeding on the mycelia or fruit bodies of various fungi or myxomycetes. Adults fly in the undergrowth of forests, on meadows and steppe habitats. There is only one alien species, *Leia arsona* (Halstead 2004) compared to a total of ca. 950 native species.

Sciaridae. Larvae are mostly free living in the upper soil layer of nearly all terrestrial habitats. Some species develop inside plant stems, leaves or decaying wood. They feed on fungal mycelia or decomposing plant tissue. There is only one alien species, *Bradysia difformis* (White et al. 2000), compared to a total of 629 native species.

10.3.Temporal trends of introduction in Europe of alien Diptera

The date of the first record in Europe is more or less precisely known for 84 (ie., 86%) of the alien species of Diptera, whilst it remains unknown for the other 14 species (Table 10.1). Considering, cautiously, this first record in Europe as a proxy, the arrival of alien dipterans showed a significant, exponential acceleration since the second half of the 20th century (Figure 10.2). The mean number of new records per year increased from 0.25 during 1900–1950 to 2.2 during 2000–2008. In parallel, an increasing diversification of the dipteran families involved in the arrivals was observed.

Only a few aliens, mostly Cecidomyiidae, were newly recorded during the 19th century. Probably originating from the subtropics, the midge *Feltiella acarisuga* was first found and described in France in 1827 (Vallot 1827). It was subsequently discovered in several other European countries to be finally introduced intentionally in a large part of the world as a biological control agent for red spider mites in greenhouses. Four more alien dipterans, of which three midges and one fruit fly, were subsequently recorded during the second half of the 19th century, each showing different patterns of

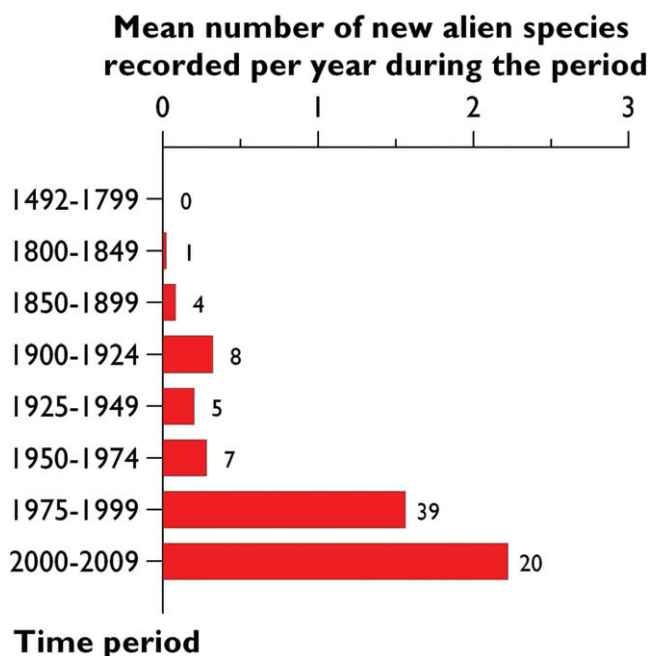


Figure 10.2. Temporal changes in the mean number of records per year of dipteran species alien to Europe from 1800 to 2009. The number over each bar indicates the absolute number of species newly recorded per time period.

expansion in Europe. *Contarinia quinquenota* (Cecidomyiidae), developing in flower buds of *Hemerocallis fulva* (Liliaceae), was first found in Austria in 1885 (Löw 1888 and subsequently in 11 other countries. *Clinodiplosis cattleyae* (Cecidomyiidae), which forms conspicuous swellings on the aerial roots of *Cattleya* species (Orchidaceae), was first observed in England in 1885 but later only in France (Molliard 1902). *Orseolia cynodontis* (Cecidomyiidae) was first observed in 1892 in Italy (Massalongo 1892) and then in three other countries. The fruit fly *Ceratitis capitata* (Tephritidae) was discovered in Italy in 1873 and subsequently in 15 other European countries.

The first half of the 20th century saw the arrival of 13 more alien dipterans of which six are Cecidomyiidae, five Drosophilidae, one Calliphoridae and one Stratiomyidae. Two of these species have not shown any expansion in Europe. A cecidomyiid from tropical Asia, *Procontarinia matteiana*, was only first observed in 1906 within the Botanical Garden of Palermo (Sicily), galling leaves of a plant imported from India, *Mangifera indica* (Anacardiaceae) (Kieffer and Cecconi 1906). According to recent information, the host plant has subsequently died out; this alien midge may be considered as extinct in Europe. Discovered in England in 1913, a North American midge, *Rhopalomyia grossulariae*, causing galls on *Ribes grossularia* (Grossulariaceae), has not been found anywhere else since that time (Theobald 1913). On the contrary, an other North American midge, *Janetiella siskiyou* (= *Craneiobia lawsonianae*), which develops in cones of *Chamaecyperis lawsoniana* (Cupressaceae), was first observed in the Netherlands

in 1931 (Meijere 1935) and subsequently in 10 further countries. A gall midge of Asian origin, *Rhopalomyia chrysanthemi*, damaging leaves of cultivated *Chrysanthemum* (Asteraceae), was observed in France and Denmark in 1935 (Bovien 1935) and subsequently found in greenhouses of eight more countries. An other Asian midge, *Stenodiplosis panici*, developing in inflorescences of *Panicum miliaceum* (Poaceae), was discovered in southern Russia in 1926 (Dombrovskaja 1936) and then in four other countries. The African predatory midge, *Dicrodiplosis pseudococci*, attacking the scale *Plano-coccus citri* (Pseudococcidae) was found in Italy in 1914 (Felt 1914) and then in Spain. Five *Drosophila* species of unknown origin were first found in Great Britain in 1900 and then in several countries of northern and central Europe. The cryptogenic *Chrysomyia albiceps* (Calliphoridae) was recorded in 1927 in France (Mercier 1927) and later expanded to most of southwestern and central Europe. Finally, a Stratiomyidae, *Hermetia illucens*, was first discovered in Malta in 1936 but subsequently spread to 6 more countries (Venturi 1956).

The second half of the 20th century consisted of two distinct periods of invasion of alien dipteran species. From 1950 to 1974, only seven new alien species (i.e. 0.2 species per year on the average) were recorded. They belong to families Cecidomyiidae (*Contarinia citri* (Genduso 1963) and *Stenodiplosis sorghicola* (Starostin et al. 1987), both of African origin), Dolichopodidae (*Micropygus vagans* found in Great Britain in 1970 (Chandler 2004)), Muscidae (a north American predator of house fly, *Hydrotaea aenese-cens* (Saccà 1964)), and Sciaridae (*Bradysia difformis* recorded from Great Britain in 1965 (White et al. 2000) and subsequently found in Northern Europe). In contrast, a total of 39 alien species were subsequently observed in Europe from 1975 to 1999 (i.e. 1.6 species per year on the average). These later invasions involved a much larger number of dipteran families than previously. By order of importance, families include Drosophilidae (eight species), Cecidomyiidae (six species), Culicidae (six species among which the tiger mosquito, *Aedes albopictus*, arrived in 1979 in Albania (Adhami 1987)), Phoridae (five species, including the mushroom pest *Megaselia tamilnaduensis* in 1999 (Disney and Durska 1999)), Tachinidae (three species), Tephritidae (three species of *Rhagoletis* fruit pests), Agromyzidae (three species among which the crop pests *Liriomyza trifolii* in 1979 (Aguilar & Martínez 1979) and *L. huidobrensis* in 1989 (Trouvé et al. 1991)), and one species in the families Braulidae, Heleomyzidae, Hippoboscidae, Muscidae, and Mycetophilidae. Since 2000, alien dipterans were observed in Europe at a proportionally higher rate, with 20 species newly recorded from 2000 to 2009, i.e. an average of 2.2 species per year. In addition to families already represented by alien species such as Phoridae (four species) (Disney 2002, Disney 2004), Cecidomyiidae (four species among which the quickly spreading *Obolodiplosis robiniae* galling *Robinia pseudoacacia* (Duso C and Skuhrava 2003) - see factsheet 14.26) (Calvo et al. 2006, Gagné 2004, Harris and Goffau 2003), Drosophilidae (three species), Agromyzidae (two species) (Bella et al 2007, Süss 2001), Culicidae (Schaffner et al. 2003), Stratiomyidae (Lapeyre and Dauphin 2008) and Ulidiidae (one species each) (Martinez, unpublished), representatives of two new families were observed: Ephydriidae shore flies (three species mostly linked to poultry dung) (Gatt and Ebejer 2003) and Canacidae (one species) (Irwin et al. 2001).

10. 4. Biogeographic patterns of the dipteran species alien to Europe

10.4.1. Origin of alien species

A region, or more simply a continent, of origin could be traced for only 78 of the 98 dipteran species alien to Europe, i.e. in ca. 80% of the species. However, in a number of cases, the origin of the dipteran species could only be assumed from that of its host. Several species of Cecidomyiidae illustrate the difficulties and uncertainties in assigning origins. Some species were found and described for the first time in Europe but it is likely that they are non-native and introduced together with their host. For example, the Asian origin of a gall midge *Procontarinia matteiana*, first described in Sicily (Kieffer and Cecconi 1906), and the African origin of *Orseolia cynodontis*, another gall maker on *Cynodon dactylon* (Poaceae), first discovered at Verona (Italy) (Massalongo 1892), were assumed from the source of their host plants, imported from India and North Africa, respectively. Similarly, that of *Dicrodiplosis pseudococci*, a predator midge of a scale, *Planococcus citri* (Pseudococcidae), also discovered in Sicily (Felt 1914), was assumed from the subtropical and tropical origin of its insect prey. The cases of *Rhopalomyia grossulariae* and *Dasineura gibsoni* are even more complex. The larvae of *Rhopalomyia grossulariae* which develop in enlarged, deformed leaf buds of *Ribes uva-crispa* (Grossulariaceae) were first discovered in Ohio (USA) and were later found in Great Britain (Theobald 1913); specimens of *Dasineura gibsoni* were described developing in flower heads of *Cirsium arvense* (Asteraceae) in Ottawa, Canada (Gagné 1989), before being also found in Great Britain (Harris 1976). Both species were thus considered to be native of the Nearctic, and then introduced to Europe. However, both host plants are not Nearctic species but *archaeophytes* of Eurasian origin. Therefore, *R. grossulariae* as well as *D. gibsoni* might also be of such origin. However, neither larvae nor adults of these two species have been discovered in continental Europe until now. Further genetic studies may contribute to tracking the exact origin of such species.

In contrast to the general trend observed for arthropods and insects, North America appears to be the dominant contributor of the alien dipteran fauna, with almost one-third of the species originating from this continent, far beyond Asia whilst a significant percentage of species came from Africa (Figure 10.3).

The 30 alien species originating from North America consists of Cecidomyiidae (10 species), Drosophilidae (6 species), Sphaeroceridae (3 species), Tephritidae (3 species; the fruit fly pests *Rhagoletis completa*, *R. cingulata* and *R. indifferens*), Ulidiidae (2 species), and Agromyzidae, Canacidae, Culicidae, Muscidae, Stratiomyidae, and Tachinidae (one species each). The insects originate from various part of this large continent; for example *Janetiella siskiyou* (Gagné 1972) and *Resseliella conicola* (Gagné 1989, Skuhrava et al. 2006) developing in cones of *Abies* and other conifers (Pinaceae) from the northwestern region whereas *Obolodiplosis robiniae* and *Dasineura gleditsiae* (Gagné 1989) developing in leaflet galls on *Gleditsia triacanthos* (Fabaceae) arrived from the northeast.

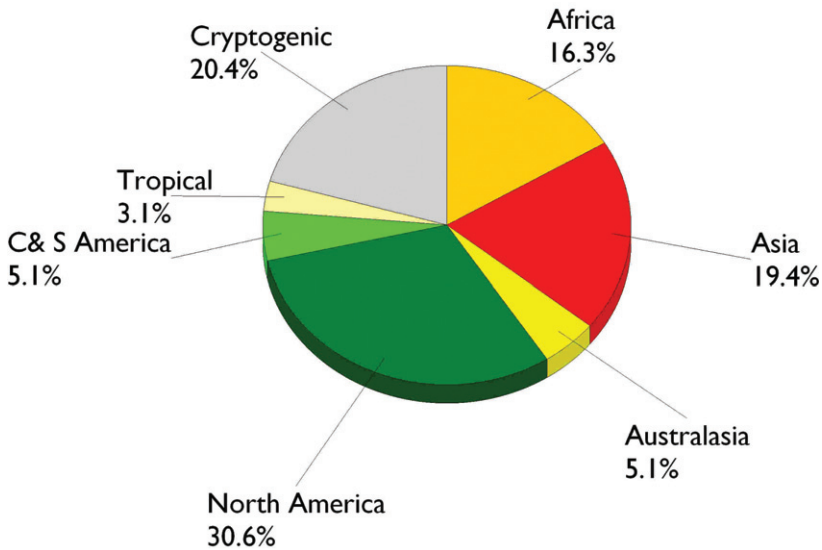


Figure 10.3. Origin of the 98 species of Diptera alien to Europe.

The 19 dipteran species coming from Asia consists of six species of Cecidomyiidae, five species of Culicidae, two species of Agromyzidae, Phoridae and Tachinidae, and one species of Drosophilidae and Ephydriidae. Most species originate from the temperate, eastern Asia such as *Contarinia quinquenotata* damaging flower buds of *Hemerocallis fulva* (Liliaceae), *Epidiplosis filifera*, a predator of the coccid scale *Ceratoplates floridensis* on citrus fruits (Nijveldt 1965), and probably *Rhopalomyia chrysanthemi* (Cecidomyiidae) (Barnes 1948) whilst *Cerodontha unisetiorbita* (Agromyzidae) (Süss 2001), *Aedes japonicus* (Culicidae) (Schaffner et al. 2009) and *Drosophila curvispina* (Drosophilidae) (Bächli et al. 2002) originate from Japan. However, tropical Asia, mainly India, has also contributed to the alien entomofauna, having supplied *Aedes albopictus* (Eritja et al. 2005), *Culex tritaeniorhynchus* (Samanidou and Harbach 2003), *C. vishnui* (Culicidae) (Adhami 1987), *Placopsidella phaenota* (Ephydriidae) (Gatt and Ebejer 2003), *Procontarinia matteiana* (Kieffer and Cecconi 1906), *Horidiplosis ficifolii* (Cecidomyiidae), causing leaf galls on *Ficus benjamina* (Moraceae) (Harris and Goffau 2003), and *Megaselia tamilnaduensis* (Phoridae) (Disney and Durska 1999). A few species came from Middle East (*Leucostoma edentata*; Tachinidae) (Chassagnard and Kraaijeveld 1991) and Western Asia (*Ochlerotatus subdiversus*; Culicidae) (Schaffner et al. 2001).

The 16 species coming from Africa consist of Cecidomyiidae (five species), Drosophilidae (three *Zaprionus* species), Phoridae (three species), Ephydriidae (two species), and one species of Tephritidae (*Ceratitis capitata*), Culicidae and Mycetophilidae. In addition to the species mentioned above (*D. pseudococci* and *O. cynodontis*), midges include *Stenodiplosis sorghicola* associated with *Sorghum* (Poaceae), and *Contarinia citri* developing in flower buds of *Citrus* sp. (Rutaceae), which probably originates from Mauritius. The Phoridae species came from tropical Africa.

Five alien dipteran species of different families are known to originate from Central and South America. They include *Clinodiplosis cattleyae* (Cecidomyiidae) from Brazil (Gagné 1994), *Liriomyza huidobrensis* (Agromyzidae) from South America (Trouvé et al. 1991) before having been introduced in Central America, Asia and Africa, *Fannia pusio* (Fanniidae) (Hill et al. 2005), *Prosopanthrum flavifrons* (Heleomyzidae) (Ismay and Smith 1994), and the recently- arrived, *Phytoliriomyza jacarandae* (Agromyzidae) (Bella et al 2007).

Another 5 dipteran species originate from Australasia, viz. *Micropygus vagans* (Dolichopodidae) from New Zealand (Chandler 2004), *Megaselia gregaria* (Phoridae) from Tasmania (Disney 2002), *Coproica rufifrons* (Sphaeroceridae) from Papua-New Guinea (Carles-Tolra and Andersen 2002), *Exaireta spinigera* (Stratiomyidae) from Australia (Lapeyre and Dauphin 2008), and *Dohrniphora cornuta* (Phoridae) from Australasia (Disney 2002).

Three other dipteran species are only known to originate from the tropical and subtropical parts of the world. They include *Dettopsomyia nigrovittata* (Drosophilidae), which has been found only once in Canary islands (Prevosti 1976), *Puliciphora borinquenensis* (Phoridae), found only once in Great Britain (Disney 1983) and *Megaselia scalaris* (Phoridae), a saprophagous species which may be dangerous to human health and has largely spread in western and central Europe (Disney 2008).

10.4.2. Distribution of alien species in Europe

Alien dipteran species and families are not evenly distributed throughout Europe. Large differences exist between countries in the number of alien species present within each territory (Figure 10.4). As for the other arthropod groups, it may reflect differences in sampling intensity and in the number of local taxonomists specialized in these families.

The number of alien dipterans is significantly and positively correlated with the country surface area (after log-transformation; $P = 0.0282$). Indeed, Great Britain hosts the largest number of aliens (36 species of 11 families), followed by continental Spain (33 species; 17 families), continental France (29 species; 13 families) and continental Italy (28 species; 11 families). However, the family diversity is similar in three countries of Central Europe of much smaller size, the Czech Republic, Switzerland, and Slovakia which host each 11 families of alien dipterans for ca. 20 species. Although the western and southern countries seem to host more aliens (Figure 10. 4), the number of species per country relatively to their size is not correlated with longitude ($P = 0.4106$) nor with latitude ($P = 0.3896$). The European islands host proportionally more alien dipterans than continental countries relatively to their size (Kruskal- Wallis test on the number of aliens per km²; $P = 0.0098$). Thus, 14 alien species of 10 families were found in the small island of Malta occupying 316 km² in the Mediterranean Sea.

Most alien dipterans still have a very restricted distribution. More than 30% of the species (30 species) have been observed in only one country such as *Culex deserticola* (Culicidae) and *Dohrniphora papuana* (Phoridae) as yet only recorded from Spain

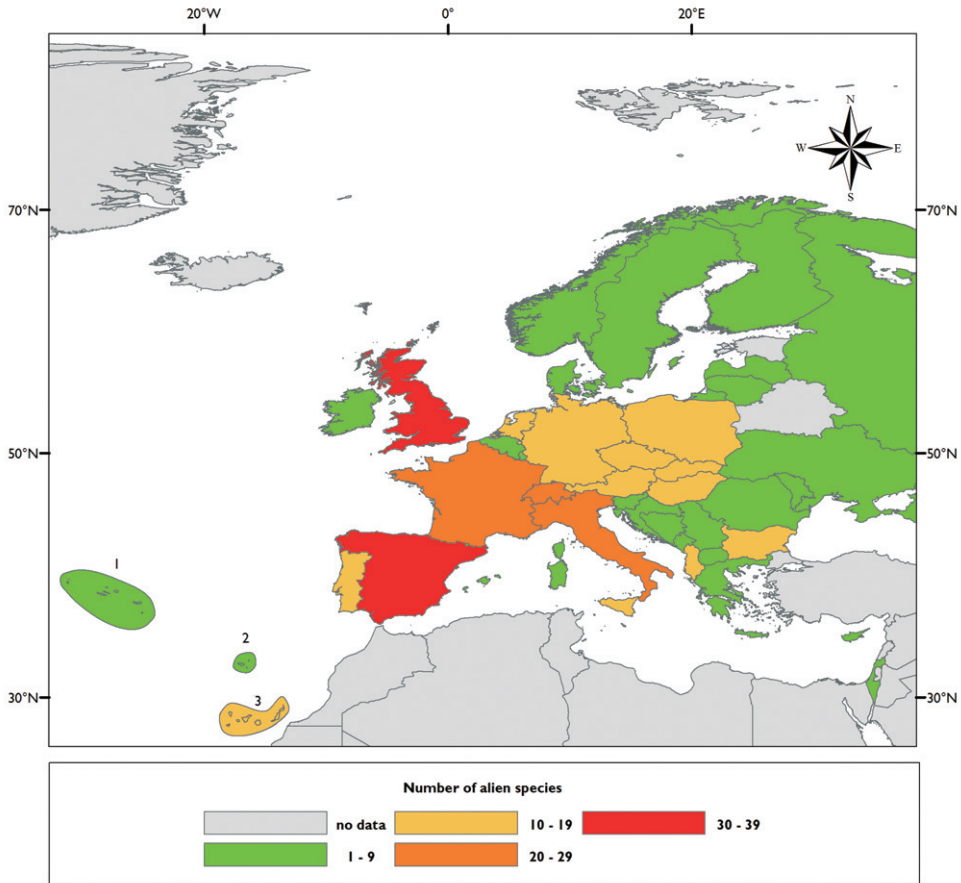


Figure 10.4. Comparative colonization of continental European countries and islands by dipteran species alien to Europe. Archipelago: **1** Azores **2** Madeira **3** Canary islands.

(Disney 2004, Eritja et al. 2000, Ramos et al. 1998), *Chymomyza wirthi* (Drosophilidae) in Great Britain (Gibbs 1994), *Placopsidella phaenota* (Ephydriidae) in Malta (Gatt and Ebejer 2003), and *Exaireta spinigera* (Stratiomyidae) in France (Lapeyre and Dauphin 2008). Another 17 species are present in only two, often nearby, countries such as *Cerodontha unisetiorbita* (Agromyzidae) found in Italy and Albania (Süss 2001), *Drosophila suzukii* (Drosophilidae) in Spain and Italy (EPPO 2010) and *Culex tritaeniorhynchus* (Culicidae) in Albania (Adhami 1987) and Greece (Samanidou and Harbach 2003). No alien Diptera is present in more than 24 of the 65 countries and large islands of Europe. Only 9 species have been introduced or have expanded in 15 countries or more. Most are plant pests such as the agromyzid leaf miners *Liriomyza huidobrensis* (24 countries) (EPPO 2006, Fauna Europaea) and *L. trifolii* (22 countries) (Fauna Europaea), a midge *Obolodiplosis robiniae* (20 countries) (Glavendekić et al. 2009), and a fruit fly *Ceratitis capitata* (20 countries) (Fauna Europaea). The Tiger mosquito, *Aedes albopictus*, and the predator midge, *Feltiella acarisuga* are also

present in 13 and 21 countries, respectively. In most cases, it is not known whether the species has expanded naturally once established in a country or if the extended distribution corresponds to repeated introductions from abroad. However, very patchy distributions probably result from independent introductions. Thus, *Hypocerides nearcticus* (Phoridae) was found in Spain and Sweden (Disney 2004), and *Coproica rufifrons* (Sphaeroceridae) in Malta and in the Canary islands (Carles-Tolra and Andersen 2002). In contrast, the occurrence of an alien species within a whole geographic region is likely to proceed, at least partly, from natural dispersion such as for *Pelomyia occidentalis* (Canacidae) which is currently present throughout Central Europe (Czech Republic, Germany, Hungary, Poland and Slovakia) (Roháček (2006a), Roháček (2006c)). Some other species are known to combine both methods of dispersal. *Aedes albopictus* was introduced independently by human activity in Albania, France, Italy, Netherlands but probably spread naturally along the Adriatic coast (see map on factsheet 14.27). The honeylocust gall midge, *Obolodiplosis robiniae*, also spread very rapidly throughout Europe (Glavendekić et al. 2009). Four years after its discovery in Italy in 2003, it occupied a large area from southern England in the west to eastern Ukraine in the east and from northern Germany to southern Italy (see map on factsheet 14.26).

Dipterans alien *in* Europe, i.e. originating from one part of Europe and introduced through human activity in an other part, are a matter of debate because it is often difficult to discriminate between a natural expansion, an introduction, or simply a lack of previous information regarding the actual species' native range. Table 10.2 present some of these species. They include species of Mediterranean origin, likely to have been introduced with their Mediterranean hosts in more northern countries, for example *Monarthropalpus flavus*, a gall-maker of common box (*Buxus sempervirens*) in Central-European countries. In addition, the date of first record is likely to differ largely from the date of arrival for a few species specifically associated with *archaeophyte* plants. For instance, two gall midges, *Contarinia pisi* and *C. lentis*, specifically galling plants in the family Fabaceae, *Pisum sativum* and *Lens culinaris* respectively, have been recorded in Europe only rather recently, although their host plants have been introduced for cultivation since the prehistoric times, probably from the Mediterranean region or the Middle East. Other species followed their host plant introduced from continental Europe to islands on which the plant was absent. Dipterans specifically related to larch such as several species of *Strobilomyia* larch cone flies (Anthomyiidae) (Ackland 1965; Roques, unpubl.) and a larch gall midge, *Dasineura kellneri* (Hill et al. 2005) or to spruce (a spruce cone gall midge, *Kaltenbachiola strobi*) (Hill et al. 2005) are thus considered to be alien *in* Great Britain.

10.5. Main pathways of introduction to Europe of alien dipteran species

Intentional introductions represent a much smaller proportion of alien arrivals in Diptera than the average in arthropods in general (3.1% vs. 10%). Only three dipteran

predators of different families were introduced intentionally for biological control and have subsequently become established. Two of them, *Hydrotaea aenescens* (Muscidae) and *Hermetia illucens* (Stratiomyidae), were released from North America to control house flies in poultry farms and stables (Saccà 1964). The third species, *Feltiella acarisuga* (Cecidomyiidae), is a cryptogenic species of cosmopolitan distribution preying exclusively on tetranychid red spider mites. Larvae and adults were found in several countries of Europe, in northern Africa, Asia, North America, Australia and New Zealand. It has been intentionally released, mostly in glasshouses, in Italy, Denmark and Poland, to protect crops.

Similarly, as for the other taxa, trying to identify pathways for the remaining 97% of accidental introductions is not a straightforward task. In a number of cases, it however could be inferred from the species biology, for that of the plant/animal host or from repeated interceptions with merchandise at borders. Thus, eggs and larvae of the Asian tiger mosquito, *Aedes albopictus*, and those of the Asian rock pool mosquito, *A. japonicus*, have been shown to be imported as stowaway through the trade of second-hand tyres (Reiter 1998, Schaffner et al. 2009). Larvae of *A. albopictus* were also found inside bags watering “lucky bamboos” (*Dracaena senderiana*) for horticultural markets. Larvae, such as these of *Liriomyza* spp., that are leaf-miners of vegetable crops, are regularly intercepted at borders along with agriculture imports, as well as fruits infested by larvae of *Ceratitis capitata* and *Rhagoletis* spp.

More generally, pathways can be hypothesized for about a half of the 95 alien Diptera which were accidentally introduced. Horticultural and ornamental trade is probably the most significant pathway, with a total of 30 species more or less closely associated. *Horidiplosis ficifolii*, a midge causing leaf galls on *Ficus benjamina* (Moraceae) was probably imported with infected fig plants in containers from South-eastern Asia (Taiwan) as well as the midge *Asphondylia buddleia*, developing in swollen aborted flowers of *Buddleia racemosa* (Scrophulariaceae), from El Salvador to southern France (Beguinot 1999). A similar process is likely to have occurred for the agromyzids *Cerodontha unisetiorbita* with *Phyllostachys* bamboos imported from south Asia (Süss 2001), and *Phytoliriomyza jacarandae* developing on ornamental blue Jacaranda trees (*Jacaranda mimosifolia*) introduced to Sicily and mainland Italy (Bella et al. 2007). Some other gall midges are assumed to have been transported to Europe with seedlings of plants for planting as very small larvae hidden in undeveloped plant organs, as for example *Oboodiplosis robiniae*, *Dasineura gleditchiae*, *Dasineura oxycoccana* and *Prodidiplosis vaccinii*, the two last species developing in bud galls of cultivated species of *Vaccinium* (Ericaceae) in North America (Gagné 1989). Orchid trade was probably responsible for the transport of the midge *Clinodiplosis cattleyae* whereas cone and seed trade can be assumed as the vector of a seed midge, *Janetiella siskiyoi*, infesting *Chamaecyparis lawsoniana* (A. Murr.) Parl. and a cone midge, *Resseliella conicola* on *Picea sitchensis* (Bong.) Carrière.

Comparatively few species (10) have larvae that appear to be associated with the trade of vegetable crops (the agromyzids *L. huidobrensis* and *L. trifolii* with a large number of different crops; *L. chinensis* with *Allium*; the cecidomyiids *Stenodiplosis pa-*

nici with *Panicum* and *S. sorghicola* with *Sorghum*) and fruit crops (the midge *Contarinia citri* with *Citrus*, and the tephritids *Ceratitis capitata*, *Rhagoletis completa*, *R. cingulata* and *R. indifferens*). The movement of stored products seems responsible for the introduction of another 10 species, mostly drosophilids but also several species associated with the mushroom trade such as the phorids *Megaselia tamilnaduensis* (Disney and Durska 1999) and *M. scalaris* (Disney 2008) and the mycetophilid *Leia arsona* (Halstead 2004). Movement of compost is the probable pathway for two species of Stratiomyidae, *Exaireta spinigera* (Lapeyre and Dauphin 2008) and *Hermetia illuscens* (Venturi 1956). Finally, three species are associated with animal husbandry such as *Crataerina melbae* (Hippoboscidae) (Popov 1995) and *Chonocephalus depressus* (Phoridae) (Disney 2002).

10.6. Ecosystems and habitats invaded in Europe by alien dipteran species

Alien dipterans predominantly exhibit phytophagous habits (35 species- 35.6%). However, zoophagous and detritivorous/mycetophagous species each represent nearly one-third of aliens (28.6% and 29.6%, respectively) whilst the feeding habits remains unknown for ca. 2% of the species. Leaves constitute the most important feeding niche for the alien phytophagous species (24 species), far beyond fruits (10 species including cones and seeds). Leaves are exploited by “true” leaf miners (agromyzids and cecidomyiids) and by gall-makers (cecidomyiids) but not by external feeders.

About 85 % of the alien Diptera seem to have firmly established in their new European environment and its habitats. However, there is little evidence of the establishment status of the 15 % remaining species which have been recorded only once or twice. Nearly 65% (64.1%) of the alien Dipteran species established in Europe are only present in man-made habitats, essentially around and in buildings, in agricultural lands, parks and gardens and glasshouses (Figure 10.5). This proportion is not significantly different from the average value observed for all arthropods. In addition, 16 of the 35 phytophagous aliens (45.7%) remain strictly related to their original, exotic plants used as ornamentals at the vicinity of human habitations such as *Cerodontha unisetiorbita* on bamboo, *Dasineura gleditschiae* on *Gleditsia*, *Asphondylia buddleia* on *Buddleia*, *Obolodiplosis robiniae* on honey locust *Robinia pseudoacacia*. Woodlands and forests have been colonized by a few alien species (11.7 %). The remaining species occur quite equally in diverse natural and semi-natural habitats, viz. in coastal areas, inland surface waters, mires and bogs, grasslands, and heathlands.

10.7. Ecological and economic impact of alien dipteran species

Like most insects, alien dipteran species are better known for their economic and sanitary impact than for their ecological impact. Indeed, ecological impacts on native fauna and flora are not documented at all for any of the species established in Europe. Nega-

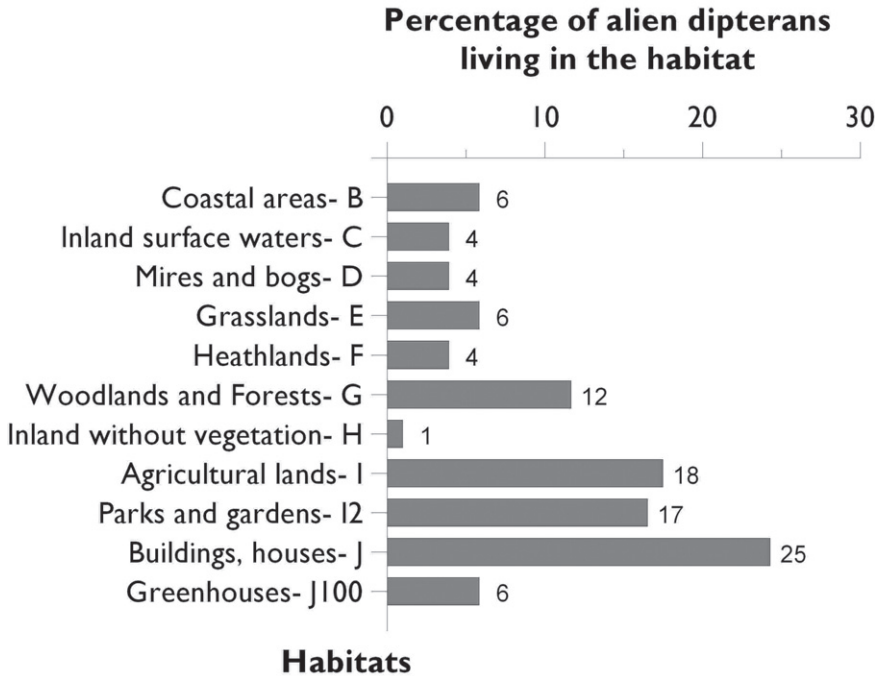


Figure 10.5. Main European habitats colonized by the established alien species of Diptera. The number over each bar indicates the absolute number of alien dipterans recorded per habitat. Note that a species may have colonized several habitats.

tive economic impacts on crops have been recorded for a total of 14 species. They include the agromyzid leaf miners *Liriomyza trifolii* and, more especially, *L. huidobrensis*, whose larvae mine a wide range of vegetables and ornamental plants in glasshouses in a large part of Europe but also outdoors in the Mediterranean basin (see factsheet 14.23, 14.24). Of economic importance are also the tephritid fruit flies. *Ceratitis capitata* damage fruits of many host plants and has a large impact on fruit crops, especially citrus fruits and peach, all over the Mediterranean basin but also in some countries of central Europe (see factsheet 14.28). Other fruit flies in the genus *Rhagoletis*, affect cherry (*R. cingulata* and *R. indifferens*) (Lampe et al. 2005, Merz 1991) and walnut crops (*R. completa*) (Duso 1991, Merz 1991) in Western Europe. The recently introduced *Drosophila suzukii* is also a fruit pest (EPPO 2010). Some mycetophagous species have a local impact on cultivated mushrooms (*Megaselia tamilnaduensis*, *Megaselia gregaria*, and *Bradysia difformis*) (Disney 2008, Disney and Durska 1999, White et al. 2000). Two other species of midges, *Stenodiplosis panici* and *Stenodiplosis sorghicola* developing in inflorescences of *Panicum* and *Sorghum*, respectively, may become economic pests in the future if the development conditions become more suitable for outbreaks.

Positive impacts are considered for the 3 dipteran species deliberately introduced to Europe for biological control of house flies and tetranychid mites (see 10.5). However, their possible ecological impact on the native, non-target fauna is not documented.

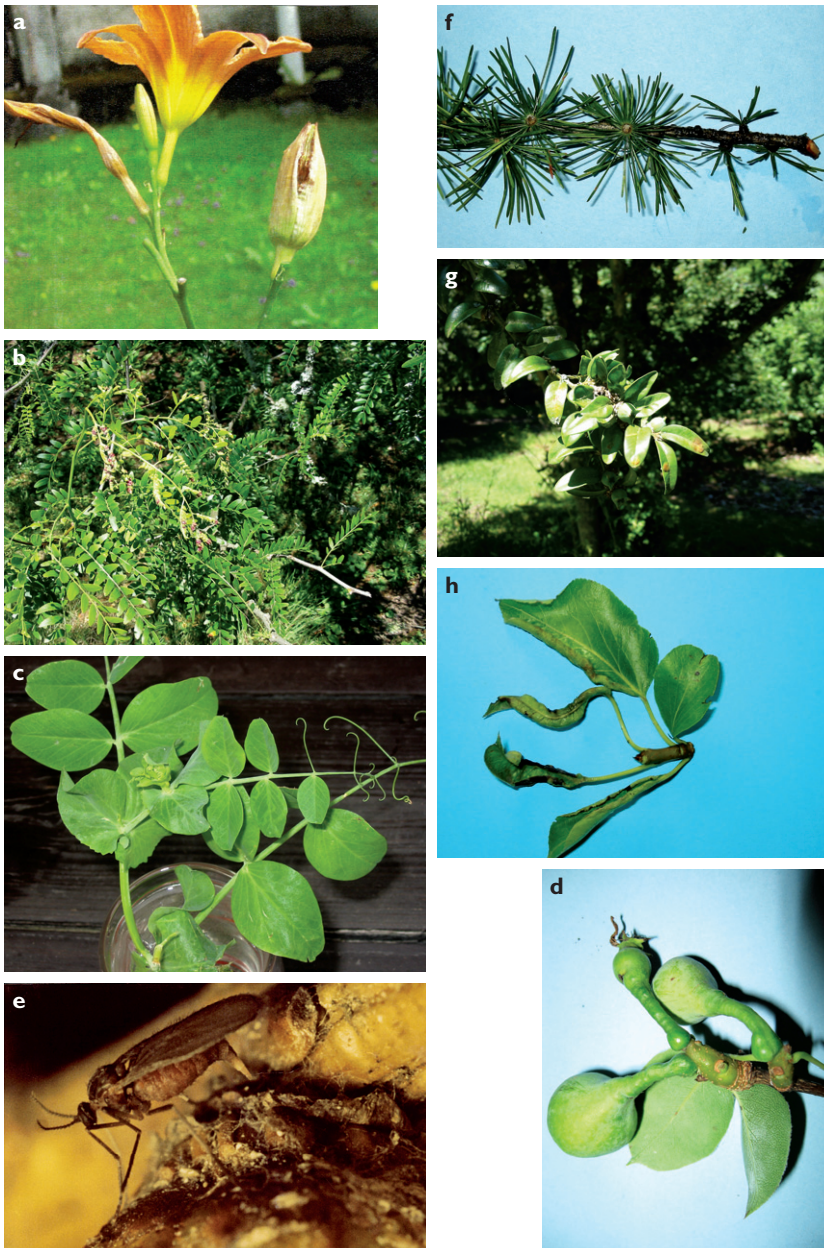


Figure 10.6. Some alien midges and their damage. **a** Unopened and swollen flower bud (right) of *Hemerocallis fulva* caused by larvae of *Contarinia quinquenotata* **b** leaflets of *Gleditsia triacanthos* changed into galls by larvae of *Dasineura gleditchiae* **c** Leaf bud gall on *Pisum sativum* caused by larvae of *Contarinia pisi* **d** Fruits of *Pyrus communis* heavily deformed by larvae of *Contarinia pyrivora* **e** female of *Dasineura kellneri* sitting on the bud of *Larix decidua* and laying eggs **f** Swollen buds of *Larix decidua* capped with resin caused by larvae of *Dasineura kellneri* **g** Galls in form of indistinct shallow blisters apparent on both sides of the leaf of *Buxus sempervirens*, caused by larvae of *Monarthropalpus flavus* **h** Rolled leaf margins of *Pyrus communis* caused by galls of *Dasineura pyri*.

Some other alien predators which have been accidentally introduced such as *Dicrodiplosis pseudococci* and *Epidiplosis filifera*, may be used for biological control of coccids in the future.

A total of 7 alien dipterans may have a sanitary impact on human and animal health. Six of the 7 introduced species of mosquitoes in the family Culicidae are capable of transmitting diseases through female bites (Taylor et al. 2006). The most important one, *Aedes albopictus*, is now established along the Mediterranean coast from south eastern France to northern Greece and is the vector of Chykungunya disease as well as many arboviruses, avian plasmodia and dog heartworm filariasis (see factsheet 14.27). Other alien culicids may be vectors of the West Nile virus (*Aedes japonicus* (Schaffner et al. 2009), *Culex tritaeniorhynchus*, *C. vishnui*, *O. atropalpus*), Japanese encephalitis (*A. japonicus*, *C. tritaeniorhynchus*) and Sindbis virus (*C. tritaeniorhynchus*). In addition, a detritivorous phorid, the scuttle fly *Megaselia scalaris*, may be a cause of allergies whilst it is reported in tropical areas to cause wound and intestinal myiasis in humans (Disney 2008).

Besides their measurable economic impact, some other alien dipterans may have an aesthetic impact because their outbreaks drastically changes the foliage of ornamental species in town parks and private gardens, even if the damage occurs on exotic, introduced trees. Such aesthetic impact has been observed for three midges at least, *Dasineura gleditchiae* causing galls on leaflets of *Gleditsia triacanthos* (Dini-Papanastasi and Skarmoutsos 2001), *Obolodiplosis robiniae* causing galls on leaf margins of *Robinia pseudoacacia* (Glavendekić et al. 2009, Skuhravá et al. 2007), and *Contarinia quinquenotata* preventing flowering of *Hemerocallis fulva* in gardens (Halstead and Harris 1990).

References

- Aartsen van B (2001) *Rhagoletis indifferens*, een nieuwe boorvlieg voor de Nederlandse fauna (Diptera: Tephritidae). *Nederlandse Faunistische Mededelingen* 14: 19–22.
- Ackland DM (1965) Two new british species of Anthomyiidae (Diptera) with taxonomic notes on related species. *Entomologist's Monthly Magazine* 100: 136–144.
- Aczél M (1944) Die Linsenblütengallmücke (*Contarinia lentis* n. sp.), ein neuer Linsenschädling. *Nővé-nyegészségügyi Evy* 1941–1943: 127–171.
- Adhami J (1987). Mushkonjat (Diptera: Culicidae) te Shqipërise, tribu Culicini (in Albanian). *Revista Mjekësore* (1–2) 82–95.
- Adhami J, Murati N (1987) [Presence of the mosquito *Aedes albopictus* in Albania] (in Albanian, French summary). *Revista Mjekësore* 1: 13–16.
- Aguilar J d', Martínez M (1979) Sur la présence en France de *Liriomyza trifolii* Burgess. *Bulletin de la Société Entomologique de France* 84, 143–146.
- Ambrus B (1958) [Állatföldrajzi vizsgálatok Sopron és környékének gubacsfajánján] (In Hungarian) (Zoogeographical bearings of the gall-nuts in Sopron and its surroundings). *Állattani Közlemények* 46: 159–175.

- Andreadis TG, Anderson JF, Munstermann LE, Wolfe RJ, Florin DA (2001) Discovery, Distribution, and Abundance of the Newly Introduced Mosquito *Ochlerotatus japonicus* (Diptera: Culicidae) in Connecticut, USA. *Journal of Medical Entomology* 38: 774–779.
- Arzone A (1979) Lagromizide neartico *Liriomyza trifolii* (Burgess) nuovo nemico di Gerbera in Italia. *Informatore Fitopatologico* 29: 3–6.
- Bächli G (2004) 43. Diptera, Drosophilidae. In: Cerretti P, Hardersen S, Mason F, Nardi G, Tisato M, Zapparoli M (Eds) *Invertebrati di una foresta della Pianura Padana, Bosco della Fontana, Secondo contributo. Conservazione Habitat Invertebrati*, 3. Verona: Cierre Grafica Editore. 304 pp.
- Bächli G, Vilela CR, Haring F (2002) Four new species of West Palearctic Drosophilidae (Diptera). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 75, 299–333
- Balas G (1943) Gubacsok Komárom megyéből III. (Zoocecidien aus dem Komitate Komárom (Ungarn) III. *Botanikai Közlemények* 40: 286–290.
- Ball SG, Morris RKA (2000) Provisional atlas of British hoverflies (Diptera, Syrphidae). Huntingdon, UK: Biological Records Centre. 168 pp.
- Band HT (1994) *Chymomyza procnemoides* Wheeler (Diptera: Drosophilidae): Will it Succeed as a Biological Invader? *Global Ecology and Biogeography Letters* 4: 65–68.
- Barnes HF (1948) *Gall Midges of Economic Importance. Vol. 4. Gall midges of ornamental plants and shrubs*. London: Crosby Lockwood and Son. 165 pp.
- Bathon H (2007) Die Robinien-Gallmücke *Obolodiplosis robiniae* (Haldeman) (Diptera: Cecidomyiidae) in Deutschland. *Hessische Faunistische Briefe* 26: 51–55.
- Baudyš E (1947) [The sixth contribution to the zoocecidiological investigations of Moravia and Silesia] (in Czech, English abstract). *Sborník Vysoké školy zemědělské Brno* 1947: 1–55.
- Beguinet J (1999) Présence d'un Asphondylia (Diptera, Cecidomyiidae), gallicole sur fleurs de Buddleja, nouveau pour la France. *Bulletin de la Société Linnéenne de Bordeaux* 27: 81–86.
- Behr L (1949) Auch Pflanzen werden krebbskrank. *Natur und Technik* 3: 184–188.
- Bella S, Mazzeo G, Süß L (2007) First record for the European fauna of *Phytoliriomyza jacarandae* Steyskal & Spencer, 1978 (Diptera Agromyzidae) leafminer of *Jacaranda mimosifolia* D. Don. (Bignoniaceae). *Bollettino di Zoologia Agraria e di Bachicoltura Ser II* 39: 75–78.
- Berest ZL, Titar VM (2007) Robinieva krajova galicija (*Obolodiplosis robiniae*) (Diptera, Cecidomyiidae), mozlivist podalsogo rozsiroennja arealu v Ukraini. *Karantin i Zashch Roslin* 7: 24–26.
- Beschovski V, Karadjova O (1996) The South American leafminer *Liriomyza huidobrensis* Blanch. (Diptera: Agromyzidae) - a new pest in Bulgarian greenhouses. *Acta Entomologica Bulgarica* 2: 5–11.
- Beschovski V, Langourov M (1997) Contribution to the study of the distribution of Phoridae species in the Balkan Peninsula. *Acta zoologica bulgarica*, 49: 43–47.
- Blauvelt WE (1939) Rose midge investigations. *American Rose Annual* 1939: 114–117.
- Bolchi Serini G, Volonté L (1985) *Dasineura gleditchiae* (Osten Sacken), Cecidomide nuovo per l'Italia (Diptera, Cecidomyiidae). *Bollettino di Zoologia agraria e di Bachicoltura Ser. II* 18: 185–189.
- Bosio G, Bogetti C, Brussino G, Gremo F, Scarpelli F (1998) [*Dasineura oxycoccana*, a new pest of blueberry (*Vaccinium corymbosum*) in Italy] (in Italian). *Informatore Fitopatologico* 11: 36–41.
- Bourel B, Tournel G, Hédouin V, Gosset D (2004) Entomofauna of buried bodies in northern France. *International Journal of Legal Medicine* 118: 215–20.
- Bovien P (1935) Chrysanthemum-galmyggen (*Diarthronomyia hypogaea* F. Löw). *Gartner Tidende* 1: 5–6.

- Bozicic B (1987) Mountain fauna and geographical analysis of mosquitoes (Diptera, Culicidae) inhabiting the area from Pannonian depression to the Adriatic sea (Yugoslavia). *Biologia Gallo-hellenica* 13: 141–144.
- Buhr H (1939) Pflanzengallen Mecklenburgs IV. *Archiv der Freunde der Naturgeschichte Mecklenburgs NF* 14: 29–70.
- Calvo D, Molina JM, Skuhrová M (2006) *Prodiplosis vaccinii* an introduced pest of blueberries in southwestern Spain. *Acta Horticulturae (ISHS)* 715: 519–524.
- Campobasso CP, Henry R, Disney L, Introna F (2004) A Case of *Megaselia scalaris* (Loew) (Dipt., Phoridae) breeding in a human corpse. *Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology* 5: 5731.
- Carles-Tolra M, Andersen H (2002). *Catálogo de los Diptera de España, Portugal y Andorra*. Monografías de la Sociedade Entomológica Aragonesa vol. 8. Saragoza: Sociedad Entomológica Aragonesa. 323 pp.
- Cerný M (2006) *Liriomyza huidobrensis*. In: Mlíkovský J, Stýblo P (Eds) *Nepůvodní druhy fauny a flóry České republiky [Alien species in fauna and flora of the Czech Republic]*. Praha: ČSOP, pp. 331–332.
- Cerný M, Vála M (2006) Agromyzidae Fallén, 1810. In Jedlička L, Stloukalová V, Kúdela M (Eds) *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. <http://zoology.fns.uniba.sk/diptera>.
- Cerretti P (2001) Note su Tachinidi nuovi per la fauna italiana (Diptera Tachinidae). *Bollettino della Società Entomologica Italiana* 133(2): 153–166.
- Chandler P (2004) An Irish invasion. *Stowaways* 4: 14–15.
- Chandler P (Ed) 1 (1998) *Checklists of insects of the British Isles*. Handbooks for the identification of British insects (New Series) 12, Part 1 Diptera. London: Royal Entomological Society. 234 pp.
- Chassagnard MT, Kraaijeveld AR (1991) The occurrence of *Zaprionus* sensu stricto in the Palearctic region (Diptera: Drosophilidae). *Annales de la Société Entomologique de France* 27: 495–496.
- Clemons L (2001) *Phasia (Phasia) barbifrons* (Girschner, 1887) (Diptera, Tachinidae), a possibly overlooked species new to Britain. *Dipterists Digest* (second series) 8: 3–5.
- Clemons L (2009) *Chymomyza amoena* (Loew, 1862) (Diptera, Drosophilidae) new to Britain. *Dipterists Digest* (second series) 16: 21–25.
- Colazza S, Giangiuliani G, Bin F (1996) Fortuitous introduction and successful establishment of *Trichopoda pennipes* F., adult parasitoid of *Nezara viridula* (L.). *Biological Control* 6: 409–411.
- Coutin R (1965) Une Cécidomyie des fleurs de lentille nouvelle en France. *Phytoma* 170: 19–21.
- Coutin R (1969) Récente extension mondiale et présence de la Cécidomyie du Sorgho (*Contarinia sorghicola* Coq (1898) en France méridionale (Dipt. Cecidomyiidae). *Bulletin de la Société Entomologique de France* 74: 13–20.
- Coutin R (1976) Une Cécidomyie nouvelle en France, ravageur des graines du Cypres de Lawson *Janeitiella siskiyoi* Felt, 1917 (= *Craneiobia lawsonianae* De Meijere, 1935) (Dipt. Cecidomyiidae). *Bulletin de la Société Entomologique de France* 81: 2–8.
- Csóka G (2006) Az akác-gubacs szúnyog *Obolodiplosis robiniae* (Haldeman 1847) megjelenése Magyarországon. *Növényvédelem* 42: 663–664.
- Dalla Pozza G., Majori G (1992) First record of *Aedes albopictus* establishment in Italy. *Journal of the American Mosquito Control Association* 8: 318–320.

- Dauphin P (1991) Sur la présence en France de *Dasineura gleditschiae* (Diptera, Cecidomyiidae), gallicole sur *Gleditsia triacanthos* (Fabacées, Caesalpinoïdées). *Bulletin de la Société Linnéenne de Bordeaux* 19: 126.
- Delage A (1969) *Euxesta nitidiventris* Löw, Diptère du Jardin des Plantes. *Annales de la Société d'Horticulture et d'Histoire Naturelle de l'Hérault* 109: 2.
- Dewaele P, Leclercq M, Disney RHL (2000) Entomologie et médecine légale: les Phorides (Diptères) sur cadavres humains. Observation inédite. *Journal de Médecine Légale Droit Médical* 43: 569–72.
- Dimitrova B, Pencheva A (2004) *Dasineura gleditschiae* (Diptera: Cecidomyiidae) – a new pest of honeylocust in Bulgaria. *Forestry Ideas* 10: 64–69.
- Dini-Papanastasi O, Skarmoutsos G (2001) Relative susceptibility of ten honeylocust (*Gleditsia triacanthos* L.) clones to attack by the honeylocust pod gall midge (*Dasineura gleditschiae* Osten Sacken) in Northern Greece. *Proceedings International Conference Forest Research: a challenge for an integrated European approach (2001–08–27/09–01, Thessaloniki, GR)*, 333–336.
- Disney RHL (1980), An exotic scuttle fly, *Chonocephalus heymonsi* Stobbe (Diptera, Phoridae), from Middlesex. *Entomologist's monthly Magazine* 116: 207–212.
- Disney RHL (1983) *Scuttle Flies: Diptera, Phoridae (except Megaselia)*. Handbooks for the Identification of British Insects 10 (6). London : Royal Entomological Society. 81 pp.
- Disney RHL (1991) The aquatic Phoridae (Diptera). *Entomologica Scandinavica* 22: 171–191.
- Disney RHL (1994) *Scuttle Flies: The Phoridae*. London: Chapman & Hall. 467 pp.
- Disney RHL (2002) Revisionary notes on *Chonocephalus* Wandolleck (Diptera. Phoridae) with keys to species of the Holarctic Region. *Zootaxa* 60: 1–36.
- Disney RHL (2004) Two exotic tramp species of Scuttle Fly (Dipt., Phoridae) recorded in Spain. *Entomologist's Monthly Magazine* 140: 307–308.
- Disney RHL (2008) Natural History of the Scuttle Fly, *Megaselia scalaris*. *Annual Review of Entomology* 53: 39–60.
- Disney RHL, Durska E. (1999) A new subspecies of a scuttle fly (Diptera: Phoridae) that feeds on oyster mushrooms (*Pleurotus ostreatus*) in Poland. *Fragmenta Faunistica* 42: 127–132.
- Dittrich R (1913) 4. Fortsetzung des Nachtrages zum Verzeichnisse der Schlessischen Gallen. *Jahresbericht der Schlesischen Gesellschaft für vaterlandische Cultur* 91: 98–129.
- Dobson JR (1999) A 'bee-louse' *Braula schmitzi* Orosi-Pal (Diptera: Braulidae) new to the British Isles, and the status of *Braula* spp. in England and Wales. *British Journal of Entomology and Natural History* 11: 139–148.
- Docters van Leeuwen WM (1957) *Gallenboek*. Zutphen: WJ Thieme. 332 pp.
- Dombrowskaja E (1936) [On the Cecidomyiid fauna of the Kamennaja Steppe, USSR] (In Russian, English summary). *Trudy Instituta Zoologii, Akademiya Nauk Leningrad* 3: 409–428.
- Duso C (1991) Sulla comparsa in Italia di un Tefritide nearctico del nocce: *Rhagoletis completa* Cresson (Diptera, Tephritidae). *Bollettino di Zoologia Agraria e di Bachicoltura* 23: 203–209.
- Duso C, Fontana P, Tirello P (2005) Diffusione in Italia e in Europa di *Obolodiplosis robiniae* (Haldeman), dittero cecidomiide nearctico dannoso a *Robinia pseudoacacia*. *Informatore fitopatologico* 5: 30–33.
- Duso C, Skuhra M (2003) First record of *Obolodiplosis robiniae* (Haldeman) (Diptera Cecidomyiidae) galling leaves of *Robinia pseudoacacia* L. (Fabaceae) in Italy and Europe. *Frustula entomologica* 25: 117–122.

- EPPO (2002) List of biological control agents widely used in the EPPO region. *EPPO Bulletin* 32: 447–461.
- EPPO (2004) Occurrence of *Rhagoletis completa* in Germany. *EPPO Reporting Service* 9: 2004/133.
- EPPO (2006) Distribution maps for quarantine pests. *Liriomyza huidobrensis*
- EPPO (2007) First outbreak of *Rhagoletis cingulata* in Slovenia. *EPPO Reporting Service* 8: 2007/148.
- EPPO (2008) *Dasineura gleditchiae* (Diptera: Cecidomyiidae): une espèce envahissante en Europe. *EPPO Reporting Service* 11: 2008/224.
- EPPO (2010) First record of *Drosophila suzukii* in Italy: addition to the EPPO Alert List. *EPPO Reporting Service* 1: 2010/007.
- Eritja R, Aranda C, Padrós J, Goula M, Lucientes J, Escosa R, Marquès E, Cáceres F (2000) An annotated checklist and bibliography of the mosquitoes of Spain (Diptera: Culicidae). *European Mosquito Bulletin*. 8: 10–18.
- Eritja R, Escosa R, Lucientes J, Marques E, Molina R, Roiz D, Ruiz S (2005) Worldwide invasion of vector mosquitoes: present European distribution and challenges for Spain. *Biological Invasions* 7 (1): 87–97.
- Estal P, Soria S, Vinuela E (1998) Nota de la presencia en España de *Dasineura gleditchiae* (Osten Sacken), sobre acacia de tres espinas. *Boletín de Sanidad Vegetal Plagas* 24: 225–230.
- Fauna Europaea. <http://www.faunaeur.org/>.
- Felt EP (1914) *Acaroletes pseudococci* n. sp. *Journal of Economic Entomology* 6: 148–149.
- Fiedler Z (2005) [A predatory midge *Therodiplosis persicae*, a factor supporting effectiveness of *Phytoseiulus persimilis* (Athias-Henriot) in reduction of *Tetranychus urticae* (Koch) on tomato plants in the greenhouse] (in Polish). *Progress in Plant Protection* 45: 650–654.
- Fimiani P (1989) The Mediterranean region. In: Robinson AS, Hooper G (Eds) *Fruit Flies: their Biology, Natural Enemies and Control*. New York: Elsevier, 37–50.
- Forsius I (1922) Sammanställning av i Finland hittills anträffade Cecidomyider. *Notulae Entomologicae* 2: 52–57.
- Gagné RJ (1972) *Craneiobia lawsonianae* De Meijere, new synonym of *Janetiella siskiyou* Felt (Cecidomyiidae: Diptera). *Proceedings of the Entomological Society of Washington* 74: 128.
- Gagné RJ (1989) *The Plant-feeding Gall Midges of North America*. Ithaca, London: Comstock Publishing Associates, Cornell University Press. 356 pp.
- Gagné RJ (1994) *The Gall Midges of the Neotropical Region*. Ithaca, London: Comstock Publishing Associates, Cornell University Press. 352 pp.
- Gagné RJ (2004) A Catalog of the Cecidomyiidae (Diptera) of the World. *Memoirs of the Entomological Society of Washington* 25: 1–408.
- Gatt P, Ebejer MJ (2003) The Ephydriidae (Diptera: Brachycera, Muscomorpha) of the Maltese Islands. *Studia Dipterologica* 10: 199–214.
- Gederaas L, Salvesen I, Viken Å (Eds) (2007). Norwegian Black List – Ecological Risk Analysis of Alien Species. Artsdatabanken, Norway.
- Genduso P (1963) Un Cecidomide dannoso alla Zagara dei limoni, nuovo per la Sicilia e per la fauna mediterranea (*Contarinia citri* Barnes). *Bollettino dell'Istituto di Entomologia Agraria di Palermo* 31: 65–73.

- Georgiou GP (1977) *The insects and mites of Cyprus*. Athens, Greece: Benaki Phytopathological Institute. 347 pp.
- Gerson U, Neubauer I (1976) The citrus blossom midge, *Contarinia citri* Barnes (Diptera: Cecidomyiidae), in Israel. *Phytoparasitica* 4: 163–172.
- Gibbs D (1994), *Chymomyza wirthi* Wheeler, 1954 (Drosophilidae) in Essex: a surprising addition to the British list. *Dipterists Digest (Second Series)* 1: 31–33.
- Gjaerum HB (1949) Krysantemum-gallmyggen funnet i Norge! *Saertrykk av Gartneryrket* 46: 963–964.
- Glavendekić M, Mihajlović L, Petanović R (2007) Introduction and spread of invasive mites and insects in Serbia and Montenegro. In: *Plant protection and plant health in Europe: introduction and spread of invasive species*. BCPC Conference, Humbolt University, Germany, June 2005, 229–230.
- Glavendekić M, Roques A, Mihajlović L (2009) An ALARM Case study: The Rapid Colonization of an Introduced Tree, Black Locust by an Invasive North-American Midge and Its Parasitoids. In: Settele J et al. (Eds) *Atlas of Biodiversity Risks - from Europe to the globe, from stories to maps*. Pensoft, Sofia & Moscow. www.pensoftonline.net/alarm-atlas-info, in press.
- Grassi A, Palmieri L, Giongo L (2009) *Drosophila (Sophophora) suzukii* (Matsumura). New pest of small fruit crops in Trentino. *Terra Trentina* 10: 19–23.
- Gregor F, Rozkošný R (2006) Muscidae Latreille, 1802. In Jedlička L, Stloukalová V, Kúdela M (Eds) Checklist of Diptera of the Czech Republic and Slovakia. Electronic version 1. <http://zoology.fns.uniba.sk/diptera>.
- Haenni JP. Personal communication. 14/12/2009 - Häflinger E (1945) Die Chrysanthemum-Gallmücke, ein für die Schweiz neuer Schädling. *Mitt. Biol. Lab. IR Geigy, Basel, Gärtnermeister* 50: 1–7.
- Halstead AJ (2004) *Leia arsona* Hutson (Diptera, Mycetophilidae) found again in Britain *Dipterists Digest second series* 11: 98.
- Halstead AJ, Harris KM (1990) First British record of a gall midge pest of day lily (*Hemerocallis fulva* L.). *British Journal of Entomology* 3: 1–2.
- Harris KM (1976) Cecidomyiidae. In Kloet GS, Hincks WD (Eds) *A check list of British insects. Diptera and Siphonaptera*. London: Royal Entomological Society, 32–42.
- Harris KM (2004) New records of Cecidomyiidae (Diptera) in Britain. *Dipterists Digest* 11: 33–40.
- Harris KM, Goffau LJW (2003) *Horidiplosis ficifolii*, a new species of gall midge (Diptera: Cecidomyiidae) damaging ornamental fig plants, *Ficus benjamina* L. *Tijdschrift voor Entomologie* 146: 301–306.
- Heller K, Menzel F (2006) Sciaridae In Jedlička L, Stloukalová V, Kúdela M (Eds) *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. <http://zoology.fns.uniba.sk/diptera>.
- Hellqvist S (1994). Biology of *Synacra* sp. (Hym., Diapriidae), a parasitoid of *Bradysia paupera* (Dipt., Sciaridae) in Swedish greenhouses. *Journal of Applied Entomology* 117: 491–497.
- Hill M, Baker R, Broad G, Chandler PJ, Copp GH, Ellis J, Jones D, Hoyland C, Laing I, Longshaw Moore N, Parrott D, Pearman D, Preston C, Smith RM, Waters R (2005) *Audit of non-native species in England*. Peterborough, UK: Report to English Nature N°662.
- Houard C (1902) Sur quelques zoocécidies nouvelles ou peu connues, recueillies en France. *Marcellia* 1: 35–49.
- Hrubík P (1999) [The first occurrence of the midge *Dasineura gleditchiae* (Diptera: Cecidomyiidae) in Slovakia] (in Slovakian, English abstract). *Entomofauna Carpathica* 11: 6–8.
- Irwin AG, Cole JH, Ely WA (2001) *Pelomyia occidentalis* Williston (Dip.: Tethinidae) new to Britain and Germany. *The Entomologist's Record and Journal of Variation* 113: 153–156.

- Ismay J, Smith D (1994) *Prosopanthrum flavifrons* (Tonnoir & Malloch) (Diptera, Heleomyzidae) new to Britain and the northern hemisphere. *Dipterists Digest Second Series* 1: 1–5.
- Janežič F (1972) Prispevek k poznavanju šisk (zoocecidijev) na rastlinah v Slovenii. I. *Zbornik Biotheniške fakultete Ljubljana* 19: 87–99.
- Jones R.A (2004) *Tephritis praecox* (Loew) (Diptera, Tephritidae) established in Britain. *Dipterists Digest second series* 11: 16.
- Juhásová G, Hrubík P (1984) *Choroby a škodcovia cudzokrajných drevín na Slovensku*. Bratislava : Veda, Acta Dendrobiologica. 165 pp.
- Kabos WJ, van Aartsen B (1984). De Nederlandse boorvliegen (Tephritidae) en prachtvliegen (Otitidae). – Wetenschappelijke Mededelingen van de Koninklijke Nederlandse Natuur historische. *Vereniging* 163: 1–52.
- Kahrer A, Skuhrová M (2000) Erstnachweis von *Feltiella acarisuga* (Vallot, 1827) (Diptera, Cecidomyiidae) in Österreich. *Pflanzenschutzberichte* 59: 49–50.
- Kapuscinski S (1948) Nowe dla fauny Polski muchowki i blonkowki szkodniki owoców i nasion drzew i krzewów. *Kosmos Series A* 65: 159–168.
- Kieffer JJ (1898) Synopse des Cécidomyies d'Europe et d'Algerie. *Bulletin de la Société d'Histoire Naturelle de Metz* 2: 1–64.
- Kieffer JJ, Cecconi G (1906) Un nuovo dittero galligeno su foglie di *Mangifera indica*. *Marcellia* 5: 135–136.
- Kinkorová J (2006) *Ceratitis capitata*. In Mlíkovský J, Stýblo P (Eds) *Nepůvodní druhy fauny a flóry České republiky [Alien species in fauna and flora of the Czech Republic]*. Praha: ČSOP, 320.
- Klobučar A, Merdić E, Benić N, Baklaić Ž, Krčmar S (2006) First record of *Aedes albopictus* in Croatia. *Journal of the American Mosquito Control Association* 22: 147–148.
- Krištal OP (1947) (The significance of free-growing vegetation as a food base for multiplication of flies injuring the basic cereal crops) (in Ukrainian). *Zbirnik prac kanivskogo biogeograficeskogo zapovednika* 1: 3–76.
- Krištal OP (1959) Cecidomyiidae. In: *Komachi – škidniki silskogospodarskich roslin v umovach lisostepu ta polissja Ukraini*. Kiev: Kievskij Universitet, 83–84.
- Kubík Š (2006) Calliphoridae Brauer & Bergenstamm, 1889. In: Jedlička L, Stloukalová V, Kúdela M (Eds) *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. Available at [<http://zoology.fns.uniba.sk/diptera>].
- Kutter H, Winterhalter W (1933) Untersuchungen über die Erbsenschädlinge im St. Gallischen Rheintale während der Jahre 1931 und 1932. *Landwirtschaftliche Jahrbücher Schweiz* 47: 273–338.
- Labanowski G, Soika G (1997) New and lesser known pests occurring on ornamental trees and shrubs. *Progress in Plant Protection* 37: 218–223.
- Laguette M, Dauphin P (2007) Présence en France d'*Obolodiplosis robiniae* (Haldeman) (Diptera, Cecidomyiidae), gallicole sur *Robinia pseudoacacia* L. (Fabaceae). *Bulletin de la Société Linnéenne de Bordeaux* 142: 291–296.
- Lambinon J, Schneider N, Feitz F (2001) Contribution à la connaissance des galles de Diptères (Insecta, Diptera) du Luxembourg. *Bulletin de la Société des Naturalistes luxembourgeois* 1: 51–76.
- Lampe I, Burghause F, Krauthausen HJ (2005) Lampe I, Burghause F, Krauthausen HJ (2005) Introduction and distribution of the American Eastern Cherry Fruit Fly, *Rhagoletis cingulata*, in the Rhine

- Valley, Germany. *Proceedings of the BCPC Symposium on 'Introduction and spread of invasive species'*, Berlin, June 2005, 135–140.
- Langourov M (2004) In: Penev L, Niemela J, Kotze D, Chipev N (Eds) 2004. Ecology of the City of Sofia. Species and Communities in an Urban Environment. Sofia-Moscow: Pensoft.
- Lapeyre, Dauphin (2008) Présence en France d' *Exaireta spinigera* (Wiedemann) (Diptera Stratiomyidae). *Bulletin de la Société Linnéenne de Bordeaux* 143: 257–258.
- List of UK Diptera. <http://www.eimagesite.net/s1/gst/run.cgi?action=page;p=L65>
- Loew H (1850) *Dipterologische Beiträge. IV. Die Gallmücken*. Programm K.1850. Friedrich-Wilhelms-Gymnasiums zu Posen Poland. 40 pp.
- Löw F (1888) Mitteilungen über neue und bekannte Cecidomyiden. *Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien* 38: 231–246.
- Máca J (2006) Diptera – Dvokřídli. In: Mlíkovský J, Stýblo P (Eds) *Nepůvodní druhy fauny a flóry České republiky [Alien species in fauna and flora of the Czech Republic]*. Praha: ČSOP, 317–335.
- Máca J (2006) Drosophilidae Rondani, 1856. In: Jedlička L, Stloukalová V, Kúdela M (Eds) *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. <http://zoology.fns.uniba.sk/diptera>.
- Mamaev BM, Krivosheina EP (1965) Ličinki gallic (Diptera, Cecidomyiidae). Moskva: Nauka, 276 pp.
- Mamaeva CP (1969) Fauna gallic Moskovskoj oblasti. *Učonye zapiski Moskovskogo ordena trudovogo krasnogo знамени gosudarstvennyj pedagogičeskij institut imeni V.I. Lenina* 362: 37–57.
- Mariani M, Beccari F (1964) Prime osservazioni intorno alla presenza di *Contarinia sorghicola* Coquillett in Italia. *Rivista di Agricoltura Subtropicale e Tropicale* 58: 362–370.
- Martinez M (1982) Contribution à l'étude des Agromyzidae de France (Dipt.) (2ème note). *Liriomyza nietzkei* Spencer et *Liriomyza chinensis* (Kato), deux espèces d'importance économique présentes en France. *Bulletin de la Société entomologique de France* 87: 302–308.
- Martinez M, unpublished records.
- Martinovic M, Bjegovic P (1949) [Some diseases and pests established in P.R. Serbia in 1949] (in Serbian with English summary). *Zaštita bilja Beograd* 2: 59–68.
- Massalongo C (1892) Due nuovi entomocecidii scoperti sulla *Diplachnes serotina* Link. e *Cynodon dactylon* Pers. Dall Doft. *Bullettino della Società botanica italiana*: 31–33.
- Massalongo C (1902) Di un nuovo genere di Ditteri galligeni. *Marcellia* 1: 54–59.
- McCrae AWR (1967) Infestation of emulsion paint by the fly *Megaselia scalaris* (Loew) (Dipt., Phoridae). *Entomologist's monthly Magazine* 107: 241–243.
- Meijere JCH (1911) Über zwei schädliche Cecidomyiden *Contarinia ribis* Kieff. und *piscicola* n. sp. und über die Erbse bewohnende Dipteren. *Tijdschrift voor Entomologie* 54: 180–194.
- Meijere JCH (1935) Über *Craneiobia lawsonianae* de Meij., eine Gallmücke aus den Früchten von *Chamaecyparis lawsoniana* (Dipt. Itonididae). *Tijdschrift voor Entomologie* 78: 129–133.
- Meijere JCH (1939) Naamlijst van Nederlandsche Diptera. *Tijdschrift Entomologie* 82: 137–174.
- Mellor PS, Carpenter S, Harrup L, Baylis M, Mertens PPC (2008). Bluetongue in Europe and the Mediterranean Basin: History of occurrence prior to 2006. *Preventive Veterinary Medicine* 87: 4–20.
- Mercier L (1927) Présence de *Chrysomya albiceps* Wied. (Mouche du ver épineux de la laine des moutons australiens) sur la Côte du Calvados. *Comptes- rendus Académie des Sciences de France*, 795–797.
- Merz B (1991) *Rhagoletis completa* and *Rhagoletis indifferens*, two North American fruit-flies of economic importance, new to Europe. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 64, 55–57.

- Meyer H, Jaschhof M (1999) Cecidomyiidae, pp.18–32. In: Schumann H, Bährmann R, Stark A (Eds) *Entomofauna Germanica 2. Checkliste der Dipteren Deutschlands*. Studia Dipterologica, Supplement 2, 1–354.
- Miller F (1956) *Zemědělská entomologie*. Praha: Nakladatelství Československé akademie věd. 1056 pp.
- Miller PL (1979) Intraspecific phorid phoresy. *Entomologist's monthly Magazine* 114: 211–14
- Mocek B (2006) Phoridae Latreille, 1796. In: Jedlička L, Stloukalová V, Kúdela M (Eds) *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. <http://zoology.fns.uniba.sk/diptera>
- Moesz G (1938) Magyarország gubacsai. (Die Gallen Ungarns). *Botanikai Közlemények* 35: 97–206.
- Molliard M (1902) La galle du *Cecidomyia cattleyae* n. sp. *Marcellia* 1: 165–170.
- Monclus M (1976) Distribucion y Ecologia de Drosophilidos en Espana II. Especies de Drosophila de la Islas Canarias, con la description de una nueva especie. *Boletín de la Real Sociedad Española de Historia Natural (Biología)* 74: 197–213.
- Natzkova V, Karajova O (1990) Efektivnost na nyakoi preparati spryamo imagoto I larvite na *Liriomyza trifolii* Burg. i *Liriomyza bryoniae* Klalt (Diptera: Agromyzidae). *Plant Science* 7: 96–101.
- Neuenschwander P (1984) Erster Nachweis der Olivenfliege *Dacus oleae* (Gmel.) (Dipt. Tephritidae) in der Schweiz. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 57: 286.
- Nicoli Aldini R (2005). *Scaptomyza (Parascaptomyza) adusta* (Loew, 1862) (Diptera Drosophilidae). *Bollettino della Societa Entomologica Italiana* 137: 62–63.
- Nicoli Aldini R, Baviera C (2002) Note sui ditteri che frequentano le colture di spinacio con segnalazione in Italia del drosofilide nearctico *Scaptomyza adusta* (Loew). *Arti XIX Congresso nazionale Italiano Entomologia*, Catania, June 2002, 759–763.
- Nijveldt W (1965) A new coccid-eating gall midge from Israel. *Entomologische Berichten* 25: 41–43.
- Nijveldt W (1980) Nieuwe galmuggen voor de Nederlandse fauna (VII). *Entomologische Berichten* 40: 53–56.
- Pakalniškis S, Bernotienė R, Lutovinovas E, Petrašiūnas A, Podėnas S, Rimšaitė J, Sæther OA, Spungis V (2006) *Checklist of Lithuanian Diptera. New and rare for Lithuania insect species 18*. Vilnius: Lithuanian Entomological Society. 159 pp.
- Papp L (1992) Drosophilid assemblages in mountain creek valleys in Hungary (Diptera: Drosophilidae). *I Folia Entomology Hungary* 53: 139–153.
- Patsoula E, Samanidou-Voyadjoglou A, Spanakos G, Kremastinou J, Nasioulas G, Vakalis NC (2006) Molecular and morphological characterization of *Aedes albopictus* in northwestern Greece and differentiation from *Aedes cretinus* and *Aedes aegypti*. *Journal of Medical Entomology* 43: 40–54.
- Perju T (1959) Contributii la cunoasterea faunei galicole la plantele de cultura din familiile Leguminosae si Cruciferae. *Lucrari stiintifice* 15: 205–210.
- Peyrek B (1960) Experiments with *Ceratitis capitata* in Slovensko primorje region in 1959. *Biljna zaštita* 3: 66–70.
- Pileckis S, Vengeliauskaite A (1977) [Cecidomyiidae] (in Lithuanian). *Agricultural Entomology* Vilnius, 52–53, 107–108.
- Popov A (1995) *Crataerina melbae* (Rond.) neu fur die Balkanhalbinsel (Diptera) Hippoboscidae. *Acta Entomologica Bulgarica* 1: 21–22.
- Prell H (1916) Das Springen der Gallmückenlarven. *Zeitschrift für wissenschaftliche Insektenbiologie* 12: 145–148.

- Prevosti A (1976) Cariotipo de *Drosophila guanche* Monchls y. *Dettopsomyia nigrovittata* Malloc. *Boletín de la Real Sociedad Española de Historia Natural* 74: 215–217
- Purse BV, McCormick BJJ, Mellor PS et al. (2007) Incriminating bluetongue virus vectors with climate envelope models. *Journal of Applied Ecology* 44: 1231–1242.
- Ramos HC, Lucientes J, Blasco-Zumeta J, Osácar JJ, Ribeiro H (1998) A new mosquito record for Spain (Diptera: Culicidae). *Abstracts of the XIth European SOVE meeting, Acta Parasitológica Portuguesa* 5, 2.1.
- Reiter P (1998) *Aedes albopictus* and the world trade in used tires, 1988–1995: the shape of the things to come? *Journal of the American Mosquito Control Association* 14: 83–94.
- Roberti D (1955) I simbionti degli acari fitofagi. I. Therodiplosis persicae Kieffer. *Annali della Facoltà di Agraria* 51: 66–85.
- Roháček J (2006a) *Desmometra microps*; *Trachypella straminea*; *Pelomyia occidentalis*. In: Mlíkovský J, Stýblo P (Eds) *Nepůvodní druhy fauny a flóry České republiky [Alien species in fauna and flora of the Czech Republic]*. Praha: ČSOP, 321, 334.
- Roháček J (2006b) Milichiidae Schiner, 1862. In: Jedlička L, Stloukalová V, Kúdela M (Eds) *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. <http://zoology.fns.uniba.sk/diptera>.
- Roháček J (2006c) Tethinidae Hendel, 1916. In: Jedlička L, Stloukalová V, Kúdela M (Eds) *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. <http://zoology.fns.uniba.sk/diptera>.
- Roháček J (2006d) Ulidiidae Macquart, 1835. In: Jedlička L, Stloukalová V, Kúdela M (Eds) *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. <http://zoology.fns.uniba.sk/diptera>.
- Roháček J, Marshall SA (2000) A world revision of the seaweed fly genus *Thoracochaeta* Duda (Diptera: Sphaeroceridae: Limosininae). Part 2: Palearctic species. *Studia Dipterologica* 7: 313–372.
- Roll E, Dayan T, Simberloff D (2007) Non-indigenous species in Israel and adjacent areas. *Biological Invasions* 9: 629–643.
- Roman N, Ionescu M (1967) Contributiuni la cunoasterea zoocecidiorilor din Transilvania. *Contributii botanice Universitatea „Babes Bolyai” din Cluj, Gradina Botanica*: 373–379.
- Romi R (1995) History and updating of the spread of *Aedes albopictus* in Italy. *Parassitologia* 37: 99–103.
- Romi R, Di Luca M, Majori G (1999) Current status of *Aedes albopictus* and *Aedes atropalpus* in Italy. *Journal of the American Mosquito Control Association* 15: 425–427.
- Roques A (1983) *Les insectes ravageurs des cônes et graines de conifères en France*. Versailles : INRA, Service des Publications. 135 pp.
- Roques A, unpublished records.
- Roskam H, Aa H, As B, Bijkerk J, Ellis W, Moraal L (2008) Massaal voorkomen van *Obolodiplosis robiniae* (Diptera: Cecidomyiidae), een nieuwe galmugsoort voor Nederland. [Explosive occurrence of *robiniae* (Diptera: Cecidomyiidae), a gall midge species new for the Dutch fauna]. *Entomologische Berichten* 68: 27–28.
- Rozkošný R (2006) *Hydrotaea aenescens*. In: Mlíkovský J, Stýblo P (Eds) *Nepůvodní druhy fauny a flóry České republiky [Alien species in fauna and flora of the Czech Republic]*. Praha: ČSOP.
- Ryberg O (1941) Buxbomsgallmygga, en för Sverige ny skadegöra. *Växtskyddsutöiser Stockholm* 4: 61–64.
- Sabatini A, Raineri V, Trovato G, Coluzzi M (1990) *Aedes albopictus* in Italia e possibile diffusione della specie nell'area del mediterraneo. *Parassitologia*, 32: 301–304.
- Saccà G (1964) Nota sulla presenza di *Ophyra aenescens* Wied. (Diptera Muscidae). *Rivista di Parassitologia*, 25: 295–296.

- Samanidou A, Harbach RE (2003) *Culex (Culex) tritaeniorhynchus* Giles, a newly discovered potential vector of arboviruses in Greece. *European Mosquito Bulletin* 16: 15–17.
- Schaffner F, Angel G, Geoffroy B, Hervy JP, Rhaiem A, Brunhes J (2001) *Les moustiques d'Europe/ The mosquitoes of Europe*. Institut de Recherche pour le Développement, EID Méditerranée. CD-ROM.
- Schaffner F, Chouin S, Guilloteau J (2003) First record of *Ochlerotatus (Finlaya) japonicus japonicus* (Theobald, 1901) in metropolitan France. *Journal of the American Mosquito Control Association* 19: 1–5.
- Schaffner F, Kaufmann C, Hegglin D, Mathis A (2009) The invasive mosquito *Aedes japonicus* in Central Europe. *Medical and Veterinary Entomology* 23: 448–451.
- Schøyen TH (1926) Beretning om skadeinsekter og plantesygdomme i land-og havebruget 1924 og 1925 [Report on the noxious insects and plant diseases of the field and the orchard in 1924 and 1925. *Årsberetning off. Foranst. Landbr. Frem:* 8.
- Seljak G (2004) [Appearance and incidence of harmful organisms on plants in the Primorska region (Slovenia) in 2003] (in Slovenian). *The annual report to the national Phytosanitary administration of the Republic of Slovenia*: 1–16.
- Seljak G, Zežlina I (1999) Appearance and distribution of walnut husk fly (*Rhagoletis completa* Cresson) in Slovenia. *Drustvo za Varstvo Rastlin Slovenije*: 231–238.
- Simova-Tošić D, Skuhrová M (1995) The occurrence and biology of *Dasineura gleditchiae* (Osten Sacken) (Cecidomyiidae, Diptera) in Serbia. *Acta of the Society of Zoology of Bohemia* 59: 121–126.
- Simova-Tošić D (2008) Second contribution to knowledge of gall midges (Diptera: Cecidomyiidae) of Serbia. *Bulletin of the Natural History Museum Belgrade* 1: 229–242.
- Simova-Tošić D, Skuhrová M, Skuhrový V (1996) Gall midges (Diptera: Cecidomyiidae) of Slovenia. *Scopolia* 36: 1–23.
- Simova-Tošić D, Skuhrová M, Skuhrový V (2000) Gall midges (Diptera: Cecidomyiidae) of Serbia. *Acta Entomologica Serbica* 5: 47–93.
- Sinacori A, Mineo N (1997) Two new host plants of *Prays citri* and *Contarinia* sp. (?) *citri*. *Informatore Fitopatologico* 47: 13–15.
- Siscaro G, Longo S, Lizzio S (1999) Ruolo degli entomofagi di *Aonidiella aurantii* (Maskell) (Homoptera, Diaspidae) in agrumeti siciliani. *Phytophaga Palermo* 9 (Suppl.): 41–52.
- Sivell D, Phillips DS (1999) Local Biodiversity Action Plans- Technical Information on Species. III: Invertebrate Animals. *Scottish Natural Heritage Review* 5: 1–104.
- Skrzypczynska M, Nijveldt WC, Grijpma P (1993) Differentiation between the larvae of *Resseliella piceae* and *R. skuhravyorum* (Diptera: Cecidomyiidae). *Entomologische Berichte* 53: 176–179.
- Skuhrová M (1975) Gallmücken der Slowakei (Cecidomyiidae, Diptera). II. Die Gallmücken der Südwest-, Nordwest- und Ostslowakei. *Biologické Práce* 21: 1–126.
- Skuhrová M (1979) Bejlomorky středních Čech (Cecidomyiidae, Diptera). *Bohemia centralis* 8: 125–165.
- Skuhrová M (1989) Cecidomyiidae. In Čepelák J (ed) *Diptera Slovenska* 3. Bratislava: Veda, 184.
- Skuhrová M (2004) Faunistic records from the Czech and Slovak Republics: Diptera. Cecidomyiidae. Dipterologica bohemoslovaca, Vol. 11. *Folia Faculty of Sciences Natural University Masaryk Brun Biol* 109: 321–346.
- Skuhrová M (2006) *Dasineura gleditchiae*; *Janetiella siskiyoi*; *Obolodiplosis robiniae*. In: Mlíkovský J, Stýblo P (Eds) *Nepůvodní druhy fauny a flóry České republiky [Alien species in fauna and flora of the Czech Republic]*. Praha: ČSOP, 320, 330, 333.

- Skuhrová M (2008) Cecidomyiidae In: Borges PAV, Abreu C, Aguiar AMF, Carvalho P, Jardim R, Melo I, Oliveira P, Sérgio C, Serrano ARM, Vieira P (Eds) *A list of the terrestrial fungi, flora and fauna of Madeira and Selvagens archipelagos*. Funchal and Angra do Heroísmo: Direcção Regional do Ambiente da Madeira and Universidade dos Açores, 264–265, 329.
- Skuhrová M, unpublished records.
- Skuhrová M, Skuhrový V (1960) Bejlomorky [Gallmücken]. Praha: ČSAZV. 270 pp.
- Skuhrová M, Skuhrový V (2004a) Gall midges (Diptera: Cecidomyiidae) of Cyprus. *Dipterologica boemoslovaca* 11. *Folia Faculty of Sciences Natural University Masaryk Brun Biol* 109: 265–283.
- Skuhrová M, Skuhrový V (2004b) Bejlomorka akátová – nový invazní druh hmyzu na trnovníku akátu. [*Obolodiplosis robiniae*, a new invasive insect species on *Robinia pseudoacacia*]. *Lesnická práce* 83: 520.
- Skuhrová M, Skuhrový V (2009) Gall midges (Diptera: Cecidomyiidae) of Austria. Annotated list of species and zoogeographical analysis. – Gallmücken (Diptera: Cecidomyiidae) von Österreich. Kommentierte Artenlist und zoogeographische Analysis. *Studia Dipterologica* 15 (2008): 49–150.
- Skuhrová M, Skuhrový V (in preparation) Gall midges (Diptera: Cecidomyiidae) of Norway.
- Skuhrová M, Skuhrový V, Blasco-Zumeta J, Pujade J (2006) Gall midges (Diptera: Cecidomyiidae) of the Iberian Peninsula. 2. Zoogeographical analysis of the gall midge fauna. *Boletín de la Asociación Española de Entomología* 30: 93–159.
- Skuhrová M, Skuhrový V, Csóka (2007) The invasive spread of the gall midge *Obolodiplosis robiniae* in Europe. *Cecidology* 22: 84–90.
- Skuhrová M, Skuhrový V, Dauphin P, Coutin R (2005) Gall midges of France (Diptera: Cecidomyiidae). *Mémoires de la Société Linnéenne de Bordeaux* 5: 1–212.
- Skuhrová M, Skuhrový V, Dončev K, Dimitrova BD (1991) Gall midges (Cecidomyiidae, Diptera) of Bulgaria. I. Faunistic researches in the 1978–1987 period. *Acta Zoologica Bulgarica* 42: 3–26.
- Skuhrova M, Skuhrový V, Jörgensen J (2006) Gall midges (Diptera: Cecidomyiidae) of Denmark. *Entomologiske Meddelelser* (special issue) 74: 1–94.
- Skuhrová M, Skuhrový V, Massa B (2007) Gall midges (Diptera Cecidomyiidae) of Sicily. *Naturalista Siciliano* 31: 261–309.
- Skuhrová M, Skuhrový V, Neacsu P (1972) Verbreitung der Gallmücken in Rumänien (Diptera, Cecidomyiidae). *Deutsche Entomologische Zeitschrift* 19: 375–392.
- Skuhrová M, Skuhrový V, Skrzypczyńska M, Szadziwski R (2008) Pryszczarki (Cecidomyiidae, Diptera) Polski. [Gall midges (Cecidomyiidae, Diptera) of Poland]. *Annals of the Upper Silesian Museum in Bytom, Entomology* 16: 5–160.
- Solinas M (1971) Adattamenti morfologici nel capo delle larve di ditteri Cecidomiidi a regime dietico specializzato. *Atti VIII Congresso Nazionale Italiano di Entomologia*: 70–92.
- Spungis V (1977) Faunističeskije materialy po gallicam Latvii. *Latvijas Entomologs* 20: 57–67.
- Spungis VV (1988) Dopolnenije k faune gallic (Diptera, Cecidomyiidae) Latvii. *Latvijas Entomologs* 31: 50–57.
- Spungis V (2003) A checklist of Latvian Cecidomyiinae (Diptera, Cecidomyiidae) with notes on new records. *Latvijas Entomologs* 40: 5–11.
- Starostin SP, Borisenko LA, Silaev AI, (1987) Do not allow yield losses in millet and sorghum. *Zashchita Rastenii (Moscow)* 10: 12–13.
- Stelter H (1978) Über neue und weniger bekannte Pflanzengallen. *Archiv der Freunde der Naturgeschichte in Mecklenburg* 18: 69–75.

- Steyrer G, Cech TL, Fürst A, Krehan H, Krenmayer W, Kristöfel F, Perny BE, Schaffer H, Stagl WG, Tomiczek C (2002) Forest protection situation 2001 in Austria - surveys and diagnosis of the BFW and documentation of forest damaging factors 2002. *Forstschutz Aktuell* 28. 66 pp.
- Stubbs AE, Falk SJ (2002) British Hoverflies an Illustrated Identification Guide. 2nd edition revised and updated by Ball SG, Stubbs AE, McLean IFG, Morris RKA, Falk SJ, Hawkins RD. 469 pp.
- Suire J (1935) Sur quelques parasites des chrysanthemes. *Bulletin de la Société d'Histoire Naturelle de l'Herault*, 11 pp.
- Šuligoj B (2005) Tigrasti komarji napadajo [Tiger mosquitoes are attacking], Delo, 07.09.2005.
- Suma P, Russo A, Longo S (2007) *Horidiplosis ficifolii* (Diptera Cecidomyiidae) infestante su Ficus ornamentali in Sicilia. *Atti XXI Congresso Nazionale Italiano di Entomologia*, Campobasso, June 2007, 230.
- Süss L (1991) Prima segnalazione in Italia di *Liriomyza huidobrensis* (Blanchard) (Diptera Agromyzidae). *Bollettino di Zoologia agraria e di Bachicoltura series H* 23: 197–202.
- Süss L (2001) *Cerodontha (Poemyza) unisetiorbita* Zlobin (Diptera Agromyzidae) nuova per l'Europa. *Bollettino di Zoologia agraria e di Bachicoltura Series II* 33: 73–77.
- Szadziewski R (1991): Cecidomyiidae. In: Razowski J (Ed) *Wykaz zwierząt Polski [Checklist of Animals of Poland]*. Vol. 2. Wrocław, Warszawa, Kraków: Ossolineum, 122–130.
- Szeőke K (2006) [First report about the occurrence of American eastern cherry fruit fly (*Rhagoletis cingulata* Loew.) in Hungary.] (in Hungarian). *Növényvédelem* 42: 470
- Taylor MA, Jackson V, Zimmer I, Huntley S, Tomlinson A, Grant R (2006). *Qualitative Veterinary Risk Assessment: Introduction of Exotic Diseases (other than Rabies) in the UK*. Sand Hutton, York: Central Science Laboratory, Veterinary Surveillance Team. 49 pp.
- Theobald FV 1911): Report on Economic Zoology for the year ending September 30th, 1911. *The Journal of the South-Eastern Agricultural College Wye, Kent* 20: 89–244.
- Theobald FV (1913): Report on Economic Zoology for the Year ending September 30th, 1913. *The Journal of the South-Eastern Agricultural College Wye, Kent* 22: 193–350.
- Trent Band H, Bächli G, Neal Band R (2005) Behavioral constancy for interspecies dependency enables Nearctic *Chymomyza amoena* (Loew) (Diptera: Drosophilidae) to spread in orchards and forests in Central and Southern Europe. *Biological Invasions* 7: 509–53.
- Trouvé C, Martinez M, Phalip M, Martin C (1991) Un nouveau ravageur en Europe, la mouche mineuse sud-américaine. *Phytoma* 429: 42–46.
- Tsacas L, David J, Allemand R, Pasteur G, Chassagnard MT, Derridj S (1977) Biologie évolutive du genre *Zaprionus* recherches sur le complexe spécifique de *Z. tuberculatus* (Dipt. Drosophilidae). *Annales de la Société Entomologique de France (N.S.)* 13: 391–415.
- Tullgren A (1917) Skadedjur i Sverige åren 1912–1916. *Meddelanden från centralanstalten för försöksväsendet på jordbruksområdet Stockholm* 152: 1–104.
- Urbanelli S, Bellini R, Carrieri M, Sallicandro P, Celli G (2000) Population structure of *Aedes albopictus* Skuse: the mosquito which is colonizing Mediterranean countries. *Heredity* 84: 331–337.
- Vacante V, Firullo V (1985) Observations on the population dynamics of *Phytoseiulus persimilis* A. H. (Acarina: Phytoseiidae) on roses in cold greenhouses in the Ragusa Province in Sicily. *Mededelingen Faculteit Landbouwwetenschappen Rijksuniversiteit Gent* 48: 263–271.
- Vallot JN (1827) Compte rendu des travaux de l'Académie des Sciences, Arts et Belles-Lettres de Dijon. *Mémoires de l'Académie des Sciences, Arts et Belles-Lettres de Dijon*: 39–112.

- Vaňhara J., Tschorsnig HP (2006) Tachinidae Robineau-Desvoidy, 1830. In: Jedlička L, Stloukalová V, Kúdela M (Eds) *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 1. <http://zoology.fns.uniba.sk/diptera>.
- Van Rossem G, Burger HC, Bund CF (1976) Schadelijke insekten in 1975. *Entomologische Berichten* 36: 85–87.
- Vappula NA (1965) Pests of cultivated plants in Finland. *Annales Agriculturae Fenniae* 19: 1–239.
- Venturi F (1956) Notulae dipterologicae. X. Specie nuove per l'Italia. *Bollettino della Società Entomologica Italiana* 86: 56–58.
- Vercambre B, Martinez M, Vidal A, Fourrier N, Dufort B, Chanterau J (2000) *Atherigona soccata*, ravageur du sorgho. Première citation de cette mouche en France métropolitaine. *Phytoma- Défense des végétaux* 528: 41–42.
- Vimmer A (1931) *Muší rody v Československé republice [Fly genera in the Czech Republic]*. Praha. 379 pp.
- Wahlgren E (1944) Cecidiologiskar anteckningar V. *Entomologisk tidskrift* 65: 50–121.
- Wahlgren E (1951) Cecidiologiska anteckningar VI. *Entomologisk tidskrift* 72: 84–156.
- Wehrmaker A (2007) The black locust gall midge *Obolodiplosis robiniae* (Diptera: Cecidomyiidae) already widespread in southwestern Germany in 2006. *Cecidology* 22: 57–59.
- Wermelinger B, Skuhřavá M (2007) First record of the gall midge *Obolodiplosis robiniae* (Haldeman) (Diptera: Cecidomyiidae) and its associated parasitoid *Platygaster robiniae* Buhl & Duso (Hymenoptera: Platygasteridae) in Switzerland. *Mitteilungen der schweizerischen entomologischen Gesellschaft*. 80: 217–221.
- White PF, Smith JE, Menzel F (2000). Distribution of Sciaridae (Dipt.) species infesting commercial mushroom farms in Britain. *Entomologist's Monthly Magazine* 136: 207–209.
- Whittington AE (2002) *Terellia fuscicornis* (Loew, 1844) (Dipt., Tephritidae) new to Britain. *Entomologist's Monthly Magazine* 138: 119 – 120.
- Zúbrik M, Kunca A, Vakula J (2007) Invázne nepovodné druhy hmyzu a húb na Slovensku a ochrana Európskeho priestoru zabezpečovaná “EPPO“. In: Kunca A (Ed) *Aktuálne problémy v ochrane lesa*. Zvolen: Národné Lesnícke Centrum, 83–88.
- Zwart P, Disney RHL, de Batist P, Mutschmann F (2005) The phorid “scuttle fly” (*Megaselia scalaris*) a threat to zoological collections and especially to amphibians? *The Bulletin of the British Veterinary Zoological Society* 5: 27–30.

Table 10.1. Diptera species alien to Europe. List and characteristics. 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 05/02/2010.

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
Agromyzidae								
<i>Cerodontha unisetiorbitalia</i> Zlobin, 1993	A	Phyto- phagous	Asia	2001, IT	AL, IT	I2	Bamboos	Süss (2001)
<i>Liriomyza chinensis</i> Kato, 1949	A	Phyto- phagous	Asia	1982, FR	FR	I1	<i>Allium</i> spp.	Martinez (1982)
<i>Liriomyza luidobrensis</i> (Blanchard, 1926)	A	Phyto- phagous	C. & S. America	1989, FR	AL, AT, BE, BG, CH, CY, CZ, ES, ES- CAN, FR, GR, GR-CRE, HU, HR, IL, IT, IT- SIC, MT, NL, PL, NO, PL, PT, RS	I1, I2, J100	Polyphagous leaf miner	Beschovski and Karadjova (1996), Carles- Tolra and Andersen (2002), Cerný (2006), Cerný and Vála (2006), EPPO (2006), Gederaas et al. (red.) (2007), Glavendekić et al. (2007), Roll et al. (2007), Süss (1991), Trouvé et al. (1991)
<i>Liriomyza trifolii</i> (Burgess, 1880)	A	Phyto- phagous	North America	1976, FR	AL, AT, BA, BE, CH, CY, ES, ES-CAN, FR, GR, HR, IT, IT-SAR, IT- SIC, IL, MT, NL, NO, PT, RO, RS, RU	I1	Polyphagous leaf miner	Aguilar & Martínez (1979), Arzone (1979), Carles-Tolra and Andersen (2002), Cerný and Vála (2006), EPPO (2006), Gederaas et al. (red.) (2007), Glavendekić et al. (2007), Máca (2006), Roll et al. (2007)
<i>Phyllorhynchus jacarandae</i> Steyskal & Spencer, 1978	A	Phyto- phagous	South America	2006, IT- SIC	IT-SIC, IT	I2	<i>Jacaranda mimosifolia</i>	Bella et al (2007)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
Braulidae								
<i>Braula schmitzi</i> Orosi Pal, 1939	C	Parasitic/ Predator	Cryptogenic	1998, GB	BG, ES, FR, GB, GR, IT, PT	E, J	Bees	Carles-Tolra and Andersen (2002), Dobson (1999)
Calliphoridae								
<i>Chrysomya albiceps</i> (Wiedemann, 1819)	C	Parasitic/ Predator	Cryptogenic	1927, FR	AT, BG, CH, ES, ES-BAL, ES-CAN, FR, HR, MT, PT- MAD, PT- AZO, SK	E	Cadavers	Carles-Tolra and Andersen (2002), Fauna Europaea, Kubík (2006), Mercier (1927)
Canacidae (= Tethinidae)								
<i>Pelomyia occidentalis</i> Williston, 1893	A	?	North America	2001	CZ, DE, HU, PL, SK	U	unknown	Irwin et al. (2001), Roháček (2006a), Roháček (2006c)
Cecidomyiidae								
<i>Asphondylia buddleia</i> Felt, 1935	A	Phyto- phagous	North America	1999, FR	FR	I2	<i>Buddleia racemosa</i>	Beguinot (1999), Gagné (1989), Skuhravá et al. (2005)
<i>Clinodiplosis cattlejae</i> (Molliard, 1903)	A	Phyto- phagous	C. & S. America	1885, GB	FR, GB	J, J100	<i>Cattleia</i> and other Orchidaceae	Barnes (1948), Gagné (1994), Molliard (1902), Skuhravá et al. (2005)
<i>Contarinia citri</i> Barnes, 1944	A	Phyto- phagous	Africa	1957, CY	AL, CY, IL, IT, IT-SIC	I	<i>Citrus</i> spp.	Genduso (1963), Georgiou (1977), Sinacori and Mineo (1997), Skuhravá and Skuhravý (2004a)
<i>Contarinia quinquenotata</i> (F. Löw, 1888)	A	Phyto- phagous	Asia (Temperate)	1885, AT	AT, BG, CZ, DE, F-COR, GB, HU, LV, NL, NO, PL, SE	I2, J6	<i>Hemerocallis fulva</i>	Balas (1943), Ditrlich (1913), Docters van Leeuwen (1957), Halstead and Harris (1990), Löw (1888), Miller (1956), Prell (1916), Skuhravá (1975), Skuhravá and Skuhravý (in prep.), Skuhravá et al. (1991), Spungis (1988), Wahlgren (1944)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Dasineura gibsoni</i> Felt, 1911	A	Phyto- phagous	North America	1976, GB	GB,	F4, I	<i>Cirsium</i>	Gagné (1989), Harris (1976)
<i>Dasineura gleditschiae</i> (Osten Sacken, 1866)	A	Phyto- phagous	North America	1975, NL	AL, AT, BG, CH, CZ, DE, DK, ES, FR, FR-COR, GB, GR, HU, IT, LU, NL, PL, RS, SK	I2	<i>Gleditschia triacanthos</i>	Bolchi Serini and Volonté (1985), Dauphin (1991), Dimitrova and Pencheva (2004), Dini-Papanastasi and Skarmoutsos (2001), EPP0 (2008), Estal et al. (1998), Halsread (2004), Hrubík (1999), Labanowski and Soika (1997), Lambinon et al. (2001), Meyer and Jaschhof (1999), Nijveldt (1980), Simova-Tošić (2008), Simova-Tošić et al. (2000), Skuhrová (2004), Skuhrová M (Unpublished), Skuhrava et al. (2006), Steyrer et al. (2002)
<i>Dasineura oxycoccana</i> (Smith, 1890)	A	Phyto- phagous	North America	1997, IT	AL, FR, IT, SI	FB	<i>Vaccinium spp.</i>	Bosto et al. (1998), Gagné (1989), Seljak (2004)
<i>Dicrodiplosis pseudococci</i> (Felt, 1914)	A	Predator	Africa	1914, IT- SIC	ES, IT-SIC	I	Scale, <i>Planococcus citri</i>	Carles-Tolra and Andersen (2002), Felt (1914), Solinas (1971)
<i>Epidiplosis filifera</i> (Nijveldt, 1965)	A	Predator	Eastern Asia	1965, IL	GB, IL, LV, PT-MAD	U	Scale (<i>Ceratoplates floridensis</i>)	Harris (2004), Nijveldt (1965), Skuhrová (2008), Skuhrová et al. (2006), Spungis (2003)
<i>Feltiella acarisuga</i> (Vallot, 1827)	C	Predator	Cryptogenic	1827, ?	AL, AT, BE, CH, CZ, DE, DK, ES, FI, FR, GB, IE, IT, IT-SIC, LT, LV, NL, NO, PL, RU, SE	I, J100	Mites (Tetra- nychidae)	EPP0 (2002), Fiedler (2005), Kahrer and Skuhrová (2000), Mamaev and Krivosheina (1965), Meijere (1939), Roberti (1955), Skuhrava et al. (2006), Spungis (2003), Vacante and Firullo (1985), Vallot (1827), Vimmer (1931)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Horidiplosis ficifolii</i> Harris, (2003)	A	Phyto- phagous	Asia (Tropical)	2001, NL?	DK, GB, IT- SIC, NL	X24	<i>Ficus benjamina</i>	Harris and Goffau (2003), Skuhrava et al. (2007), Suma et al. (2007)
<i>Janetiella siskiyoi</i> Felt, 1917	A	Phyto- phagous	North America	1931, NL	AL, CZ, DE, DK, FR, GB, IT, NL, PL, SK	I2	<i>Chamae- cyparis lawsoniana</i>	Coutin (1976), Gagné (1972), Harris (2004), Juhásová and Hrubík (1984), Kapuscinski (1948), Meijere (1935), Skuhravá (1979), Skuhrava et al. (2006), Stelter (1978)
<i>Lestodiplosis aonidiellae</i> Harris, 1968	A	Predator	Africa	1999, IT- SIC	IT-SIC	J100	Scale (<i>Aonidiella aurantii</i>)	Siscaro et al. (1999), Skuhrava et al. (2007)
<i>Obolodiplosis robiniae</i> (Haldeman, 1847)	A	Phyto- phagous	North America	2003, IT	AL, AT, BA, CH, CZ, DE, FR, FR-COR, GB, GR-ION, HR, HU, IT, MK, NL, PL, RS, SI, SK, UA	G, I2, H1	<i>Robinia pseudoacacia</i>	Bathon (2007), Berest and Titar (2007), Csóka (2006), Duso C et al. (2005), Duso C and Skuhrava (2003), Glavendekić et al. (2009), Laguerre and Dauphin (2007), Roskam et al. (2008), Simova- Tošić and Skuhravá (1995), Skuhravá M (Unpublished), Skuhravá and Skuhravý (2004b), Skuhravá (2007), Skuhrava et al. (2008), Wehrmaker (2007), Wermelinger and Skuhravá (2007), Zúbrik et al. (2007)
<i>Orseolia cynodontis</i> Kieffer & Massalongo, 1902	A	Phyto- phagous	Africa	1892, IT	FR, HU, IT, RO	E1	<i>Cynodon dactylon</i>	Houard (1902), Massalongo (1892), Moesz (1938), Roman and Ionescu (1967), Skuhrava et al. (1972)
<i>Procontarinia matteiana</i> Kieffer & Cecconi, 1906	A	Phyto- phagous	Asia (Tropical)	1906, IT- SIC	IT-SIC	I2	<i>Mangifera indica</i>	Kieffer and Cecconi (1906), Skuhrava et al. (2007)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Prodiptolosis vaccinii</i> (Felt, 1926)	A	Phyto- phagous	North America	2001, ES	ES	I2	<i>Vaccinium</i> spp.	Calvo et al. (2006), Skuhrová et al. (2006)
<i>Prodiptolosis violicola</i> (Coquillett, 1900)	A	Phyto- phagous	North America	2004, NL/ SE	NL, SE	I	<i>Viola</i> spp.	Gagné (2004)
<i>Resseliella conicola</i> (Foote, 1956)	A	Phyto- phagous	North America	1999, DK	DK	I2	<i>Picea</i> <i>sitchensis</i>	Skuhrava et al. (2006)
<i>Rhopalomyia</i> <i>chrysanthemi</i> (Ahlberg, 1939)	A	Phyto- phagous	Asia (Temperate)	1935, FR	BE, CH, DE, DK, FI, FR, GB, NO, PL, SE	X24, I2	<i>Chrysanthemum</i> (cultivated)	Barnes (1948), Behr (1949), Blauvelt (1939), Bovien (1935), Gjaerum (1949), Häflinger (1945), Skuhrava et al. (2006), Suire (1935), Szadziewski (1991), Vappula (1965), Wahlgren (1951)
<i>Rhopalomyia</i> <i>grossulariae</i> Felt, 1911	A	Phyto- phagous	North America	1913, GB	GB,	G1	<i>Ribes</i> <i>grossularia</i>	Barnes (1948), Theobald (1913)
<i>Stenodiplosis panici</i> Plotnikov, 1926	A	Phyto- phagous	Asia (Temperate)	1926, RU	BG, RS, RU, SI, UA	I	<i>Panicum</i> spp.	Dombrowskaja (1936), Janežič (1972), Krištal (1959), Martinovic and Bjegovic (1949), Simova-Tošić et al. (1996), Simova-Tošić et al. (2000), Skuhrová et al. (1991)
<i>Stenodiplosis sorghicola</i> (Coquillett, 1899)	A	Phyto- phagous	Africa	1964, IT	FR, GR, IT, RU	I	<i>Sorghum</i> spp.	Coutin (1969), Mariani and Beccari (1964), Skuhrová et al. (2005), Starostin et al. (1987)
Culicidae								
<i>Aedes albopictus</i> (Skuse, 1894)	A	Parasitic/ Predator	Asia (Tropical)	1979, AL	AL, CH, ES, FR, GR, GR- ION, HR, IL, IT, IT-SIC, ME, RS, SI	J6	Humans (biting)	Adhami and Murati (1987), Dalla Pozza and Majori (1992), Eritja et al. (2005), Klobučar et al. (2006), Patsoula et al. (2006), Reiter (1998), Romi (1995), Romi et al. (1999), Sabatini et al. (1990), Šuligoj (2005), Urbanelli et al. (2000)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Aedes japonicus</i> (Theobald, 1901)	A	Parasitic/ Predator	Asia (Temperate)	2000, FR	BE, CH, DE, FR	J6	Humans (biting)	Andreadis et al. (2001), Schaffner et al. (2003), Schaffner et al. (2009)
<i>Culex deserticola</i> Kirkpatrick, 1925	A	Parasitic/ Predator	Africa	1993, ES	ES	C1, D	Wild rabbits	Ertija et al. (2000), Ramos et al. (1998)
<i>Culex tritaeniorhynchus</i> Giles, 1901	A	Parasitic/ Predator	Asia (Tropical)	1987, AL	AL, GR	D6, C1	Humans (biting)	Adhami (1987), Samanidou and Harbach (2003)
<i>Culex vishnui</i> (Theobald, 1901)	A	Parasitic/ Predator	Asia (Tropical)	1987, AL	AL	C1, D	Humans (biting)	Adhami (1987)
<i>Ochlerotatus atropalpus</i> (Coquillett, 1902)	A	Parasitic/ Predator	North America	1996, IT	IT	J6	Humans (biting)	Romi et al. (1999)
<i>Ochlerotatus subdiversus</i> (Martini, 1926)	A	Parasitic/ Predator	Asia (Temperate)	1987, RS	RS	D	Humans (biting)	Bozicic (1987), Schaffner et al. (2001)
Dolichopodidae								
<i>Micropogon vagans</i> Parent, 1933	A	Parasitic/ Predator	Australasia	1970, IE	GB, IE	G, I2	Broadleaved woodlands	Chandler (2004)
Drosophilidae								
<i>Chymomyza amoena</i> (Loew, 1862)	A	Phyto- phagous, Detri- vorous	North America	1975, CZ	AT, CH, CZ, DE, ES, FR, GB, HU, LT, MO, NL, RO, RS, RU, SK, ES-CAN	G, I2, J1	Apple, fruits, nuts	Clemons (2009), Máca (2006), Máca (2006), Pakalniškis et al. (2006), Trent Band et al. (2005)
<i>Chymomyza procnemis</i> (Williston, 1896)	A	Detri- vorous	North America	2000, ES- CAN	ES-CAN	?	Unknown	Carles-Tolra and Andersen (2002)
<i>Chymomyza procnemoides</i> Wheeler, 1952	A	Detri- vorous	North America	1992, HU	HU	G	Unknown	Band (1994), Perju (1959)
<i>Chymomyza wirthi</i> Wheeler, 1954	A	Detri- vorous	North America	1994, GB	GB	B	Unknown	Gibbs (1994)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Detropomyia nigrovittata</i> (Malloch, 1924)	A	Detri- vorous	Tropical Subtropical	<1976, ES- CAN	ES-CAN		Unknown	Carles-Tolra and Andersen (2002), Prevosti (1976)
<i>Drosophila curvispina</i> Watabe & Toda, 1984	A	Detri- vorous	Asia	2002, CH	CH	G	Fungi (forest floor)	Bächli et al. (2002)
<i>Drosophila busckii</i> Coquillett, 1901	C	Detri- vorous	Cryptogenic	1900, GB	CZ, GB, LT, SK	G	Unknown	Hill et al. (2005), Máca (2006), Máca (2006), Pakalniškis et al. (2006)
<i>Drosophila hydei</i> Sturtevant, 1921	C	Detri- vorous	Cryptogenic	1900, GB	CZ, ES, ES- BAL, GB, LT, PT, PT-AZO, PT-MAD, SK	G	Unknown	Carles-Tolra and Andersen (2002), Hill et al. (2005), Máca (2006), Pakalniškis et al. (2006)
<i>Drosophila immigrans</i> Sturtevant, 1921	C	Detri- vorous	Cryptogenic	1900, GB	CZ, ES, ES- CAN, GB, LT, PT, PT-AZO, PT-MAD, SK	G	Fruits	Carles-Tolra and Andersen (2002), Hill et al. (2005), Máca (2006), Pakalniškis et al. (2006)
<i>Drosophila repleta</i> Wollaston, 1858	C	Detri- vorous	Cryptogenic	1900, GB	CZ, ES, ES- BAL, ES-CAN, GB, LT, PT, PT-AZO, PT- MAD, SK	G	Unknown	Carles-Tolra and Andersen (2002), Hill et al. (2005), Máca (2006), Pakalniškis et al. (2006)
<i>Drosophila melanogaster</i> Meigen, 1830	C	Detri- vorous	Cryptogenic	1900, GB	CZ, GB, IT, LT, PT, SK	G	Unknown	Bächli (2004), Hill et al. (2005), Máca (2006), Pakalniškis et al. (2006)
<i>Drosophila suzukii</i> (Matsamura, 1931)	C	Phyto- phagous	Cryptogenic	2009, IT	IT, SP	G	Fruits	EPPO (2010), Grassi et al. (2009)
<i>Drosophila tsigana</i> Burla & Gloor, 1952	C	Detri- vorous	Cryptogenic	?	AT, FR, HU, PT	G	Leaf miner	Fauna Europaea
<i>Scaptomyza adusta</i> (Loew, 1862)	A	Phyto- phagous	North America	1996	IT, GR, MT, ES-CAN, PT- AZO	I, J	Vegetables (Leaf miner)	Nicoli Aldini (2005), Nicoli Aldini and Baviera (2002)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Scaptomyza vittata</i> (Coquillett, 1895)	A	Phyto- phagous	North America	?	GB, SP- CAN	J100, I	Fruits	Carles-Tolra and Andersen (2002), Roll et al. (2007)
<i>Zaprionus ghesquieri</i> Collart, 1937	A	Phyto- phagous	Africa	1991, CY	CY		Fruits	Chassagnard and Kraaijeveld (1991)
<i>Zaprionus indianus</i> Gupta, 1970	A	Phyto- phagous	Africa	1976, ES- CAN	AT, ES-CAN, IL, IT		Fruits	Carles-Tolra and Andersen (2002), Monclus (1976), Roll et al. (2007)
<i>Zaprionus tuberculatus</i> Malloch, 1932	A	Phyto- phagous	Africa	1977, ES- CAN	CY, ES-CAN, IL, MT		Fruits	Carles-Tolra and Andersen (2002), Roll et al. (2007), Tsacas et al. (1977)
Ephydriidae								
<i>Elephantinosoma chnumi</i> Becker, 1903	A	Parasitic/ Predator	Africa	2003, MT	MT	B	Shore fly	Gatt and Ebejer (2003)
<i>Placopsidella phaenota</i> Mathis, 1986	A	Parasitic/ Predator	Asia	2003, MT	MT	B	Shore fly	Gatt and Ebejer (2003)
<i>Psilopa fratella</i> (Becker, 1903)	A	Parasitic/ Predator	Africa	2002, ES- CAN	ES-CAN, MT	B	Shore fly	Carles-Tolra and Andersen (2002), Gatt and Ebejer (2003)
Fanniidae								
<i>Fannia pusio</i> (Wiedemann, 1830)	A	Detri- vorous	C. & S. America	?	ES, FR, MT	J	Poultry dung	Carles-Tolra and Andersen (2002)
Heleomyzidae								
<i>Prospantrum flavifrons</i> Tonnoir & Malloch, 1927	A	Detri- vorous	C. & S. America	1991, GB	GB	J		Ismay and Smith (1994)
Hippoboscidae								
<i>Crataerina melbae</i> (Rondani, 1879)	A	Parasitic/ Predator	Cryptogenic	1990, DE	BG, CH, DE, ES, IT	J	Haemato- phagous on birds	Carles-Tolra and Andersen (2002), Popov (1995)
Milichidae								
<i>Desmometopa microps</i> Lamb, 1914	A	Parasitic/ Predator	Cryptogenic	?	CZ, SK, HU	J	Adults attack bees	Roháček (2006a), Roháček (2006b)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Desmometopa varipalpis</i> Malloch, 1927	A	Detri- vorous	Cryptogenic	?	FR, G, ES, CH	J	Biofilters, sewage filters, decaying vegetables and fruits	Carles-Tolra and Andersen (2002), Roháček (2006b)
Muscidae								
<i>Atherigona soccata</i> Rondani, 1871	C	Phyto- phagous	Cryptogenic	1998, FR	FR, GR, HU, IT, IT-SIC,	I1	Sorghum	Vercambre et al. (2000)
<i>Hydrotaea aenescens</i> (Wiedemann, 1830)	A	Parasitic/ Predator	North America	1964, IT	AT, CH, CZ, DE, ES, ES- CAN, FR, GB, IE, IT, IT-SAR, MT, PT, PT- AZO, SK	E, J	Predator of house fly	Carles-Tolra and Andersen (2002), Gregor and Rozkošný (2006), Rozkošný (2006), Saccà (1964)
Mycetophilidae								
<i>Leia arsona</i> Hutson, 1978	A	Detri- vorous	Africa	1978, GB	CH, ES-CAN, GB, MT, NL, PT-AZO, PT- MAD	I, J	Fungus gnat	Carles-Tolra and Andersen (2002), Halstead (2004)
Phoridae								
<i>Chonocephalus depressus</i> Meijere, 1912	A	Detri- vorous	Asia (Temperate)	2002, MT	MT	J	Ripe fruits	Disney (2002)
<i>Chonocephalus heymonsi</i> Stobbe, 1913	A	Detri- vorous	Africa	1981, GB	GB,	J100	Ripe fruits	Disney (1980), Disney (2002)
<i>Dohrniphora cornuta</i> (Bigot in de la Sagra, 1857)	A	Detri- vorous	Australasia	1997	AT, BG, BE, CY, CZ, DE, ES, ES-CAN, FR, GB, NL, PL, PT, PT-AZO, PT- MAD, SI, SK,	J	sapro- phagous	Beschovski and Langourov (1997), Carles- Tolra and Andersen (2002), Disney (1991), Disney (2002), Moeck (2006)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Dobrniphora papuana</i> Brues, 1905	A	Detri- vorous	Africa	2004, ES	ES	J6		Disney (2004)
<i>Hypocirides nearcticus</i> (Borgmeier, 1966)	A	Detri- vorous	Africa	2004, ES	ES, SE	U		Disney (2004)
<i>Megaselia gregaria</i> (Wood, 1910)	A	Detri- vorous	Australasia	2003	CZ, DE, DK, GB, NO, PL, PT, SE, SI, SK	J6, J1	Mushroom house	Carles-Tolra and Andersen (2002), Disney (2002), Mocek (2006)
<i>Megaselia scalaris</i> (Loew, 1866)	A	Detri- vorous, facul- tative predator/ parasite	Tropical, Subtropical	1994, ES	BE, BG, CH, DE, DK, ES, ES-CAN, FR, GB, IT, NL, PT-MAD	J6, J1	Decaying material, cadavers, myasis agent	Bourel et al (2004), Campobasso et al. (2004), Carles-Tolra and Andersen (2002), Dewaele et al. (2000), Disney (1994), Disney (2002), Disney (2008), Haenni Pers. comm. (2009), Langourov (2004), McCrae (1967), Miller (1979), Zwart et al. (2005)
<i>Megaselia</i> <i>tamilnaduensis</i> Disney in Mohan, Mohan & Disney, 1996	A	Detri- vorous	Asia (Tropical)	1999, PL	CH, PL	J	Cultivated oyster mushrooms (<i>Pleurotus</i>)	Disney and Durska (1999)
<i>Puliciphora</i> <i>boringuensis</i> Wheeler, 1900	A	Detri- vorous	Tropical, Subtropical	1983, GB	GB	J		Disney (1983)
Sciaridae								
<i>Bradysia difformis</i> Frey, 1948	C	Detri- vorous	Cryptogenic	1965, GB	ES, ES-CAN, GB, NO, SE, SK	J100, J1	Mushrooms; ornamentals in nurseries	Carles-Tolra and Andersen (2002), Heller and Menzel (2006), Hellqvist (1994), White et al. (2000)
Sphaeroceridae								
<i>Coproica rufifrons</i> Hayashi, 1991	A	Detri- vorous	Australasia	?	ES-CAN, MT	U	Animal dung; leaf litter	Carles-Tolra and Andersen (2002)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Thoracochaeta johnsoni</i> (Spuler, 1925)	A	Detri- vorous	North America	1999, GB	GB, IT	B	Seaweed	Roháček and Marshall (2000)
<i>Thoracochaeta seticosta</i> (Spuler, 1925)	A	Detri- vorous	North America	1999, GB	DK, GB, NO, SE	B	Seaweed	Roháček and Marshall (2000)
<i>Trachypella straminea</i> Roháček & Marshall, 1986	A	Detri- vorous	North America	?	AD, CY, CZ, ES, ES-CAN, GR-CRE, HU, MT, SK	U	Sapro- phagous	Carles-Tolra and Andersen (2002), Roháček (2006a)
Stratiomyidae								
<i>Exaeretia spinigera</i> (Wiedemann, 1830)	A	Detri- vorous	Australasia	2008, FR	FR	I	Compost, houses	Lapeyre and Dauphin (2008)
<i>Hermetia illucens</i> (Linnaeus, 1758)	A	Detri- vorous	North America	1936	CH, ES, ES- BAL, ES-CAN, FR, IT, MT, PT	J6	compost heaps, poultry, bee hives; used for control of house flies	Carles-Tolra and Andersen (2002), Venturi (1956)
Tachinidae								
<i>Blepharipa schineri</i> (Mesnil, 1939)	C	Parasitic/ Predator	Cryptogenic	?	AD, CZ, ES, GB, SK	?	Unknown	Carles-Tolra and Andersen (2002), Vanhara et al. Tschorsnig (2006)
<i>Catharosia pygmaea</i> (Fallén, 1815)	C	Parasitic/ Predator	Cryptogenic	?	AD, ES, GB, PT	?	Unknown	Carles-Tolra and Andersen (2002)
<i>Clytiomya continua</i> (Panzer, 1789)	C	Parasitic/ Predator	Cryptogenic	?	ES, GB	?	Unknown	Carles-Tolra and Andersen (2002)
<i>Phasia barbifrons</i> (Girschner, 1887)	C	Parasitic/ Predator	Cryptogenic	2001, GB	GB	?	Unknown	Clemons (2001)
<i>Leucostoma edenata</i> Kluger, 1978	A	Parasitic/ Predator	Asia	1995, IT	IT	?		Cerretti (2001)

Family Species	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
<i>Sturmia bella</i> (Meigen, 1824)	C	Parasitic/ Predator	Cryptogenic	?	ES, GB	I2, E5, FA	Danaid butterflies (<i>Ideopsis</i> , <i>Parantica</i>)	Carles-Tolra and Andersen (2002)
<i>Trichopoda pennipes</i> (Fabricius, 1781)	A	Parasitic/ Predator	North America	1989	AL, ES, FR, IT, IT-SIC	I	Squash bug; southern green stinkbug	Carles-Tolra and Andersen (2002), Colazza et al. (1996)
<i>Zeuxia zejana</i> Kolomiets, 1971	A	Parasitic/ Predator	Asia	1995, IT	IT	?	Unknown	Cerretti (2001)
Tephritidae								
<i>Ceratitis capitata</i> (Wiedemann, 1824)	A	Phyto- phagous	Africa	1873, IT	AL, AT, BG, CH, CZ, ES, ES-BAL, ES- CAN, FR, G, IL, IT, IT-SAR, IT-SIC, ME, PT, PT-AZO, PT-MAD, SI, SR	I	Fruits (poly- phagous)	Carles-Tolra and Andersen (2002), Kinkorová (2006), Peyrek (1960)
<i>Rhagoletis cingulata</i> Loew, 1862	A	Phyto- phagous	North America	1993, DE	DE, HU, NL, SI	G, I2	<i>Prunus</i> fruits (wild <i>P. avium</i> , <i>P. padus</i> , <i>P.</i> <i>serotina</i>)	van Aartsen (2001), EPPO (2007), Lampe et al. (2005), Szeőke (2006)
<i>Rhagoletis completa</i> Cresson, 1929	A	Phyto- phagous	North America	1991, IT	AL, CH, DE, FR, HR, IT, SI	I2	<i>Juglans</i> fruits	Duso (1991), EPPO (2004), Merz (1991), Seljak and Zežlina (1999)
<i>Rhagoletis indifferens</i> Curran, 1932	A	Phyto- phagous	North America	1983, CH	CH	I2	<i>Prunus</i> fruits (cultivated).	Merz (1991)

Family <i>Species</i>	Status	Regime	Native range	1st record in Europe and country	Invaded countries and islands	Habitat*	Hosts	References
Uliidiidae								
<i>Euxesta notata</i> (Wiedemann, 1830)	A	Detri- vorous, Phyto- phagous ?	North America	2009	FR	?	?	Martinez (Unpublished)
<i>Euxesta pechumani</i> Curran, 1938	A	Detri- vorous	North America	1969, FR	BG, CH, ES, FR, SK	E, I	Carri- on; dung	Carles-Tolra and Andersen (2002), Delage (1969), Fauna Europaea, Roháček (2006d)

Table 10.2. Diptera species alien *in* Europe. List and characteristics. Country codes abbreviations refer to ISO 3166 (see Appendix I). Habitat abbreviations refer to EUNIS (see Appendix II). Last update 05/02/2010.

Family <i>Species</i>	Regime	Native range	Invaded countries and islands	Habitat*	Hosts	References
Anthomyiidae						
<i>Strobilomyia infrequens</i> (Ackland, 1965)	Phyto- phagous	Alps	BE, DK, GB, NL	G	<i>Larix</i> spp.	Ackland (1965), Roques (Unpublished)
<i>Strobilomyia laricicola</i> (Karl, 1928)	Phyto- phagous	Alps	BE, GB, DK, NL	G	<i>Larix</i> spp.	Ackland (1965), Roques (Unpublished)
<i>Strobilomyia melania</i> (Ackland, 1965)	Phyto- phagous	Alps	BE, DK, NL, GB	G	<i>Larix</i> spp.	Ackland (1965), Roques (Unpublished)
Cecidomyiidae						
<i>Aphidoletes abietis</i> (Kieffer, 1896)	Predator	Central, South Europe	GB, LV, RU (?)	I, J100	<i>Adelges abietis</i> (Adelgidae)	Harris (1976), Mamaev and Krivosheina (1965), Pakalniškis et al. (2006)
<i>Asphondylia borzi</i> (S Stefani, 1898)	Phyto- phagous	Medi- terranean	GB	I	<i>Rhamnus alaternus</i>	Harris (1976), Hill et al. (2005)
<i>Contarinia lentis</i> Aczél, 1944	Phyto- phagous	Eastern Medi- terranean	BG, CZ, FR, HU, SK	I	<i>Lens culinaris</i>	Aczél (1944), Baudyš (1947), Coutin (1965), Skuhrová (1989), Skuhrová et al. (1991)
<i>Contarinia pisi</i> (Loew, 1850)	Phyto- phagous	Western Asia	AL, AT, BE, BG, CH, CZ, DE, DK, FI, FR, GB, HU, LT, LV, NL, NO, PL, RO, RS, RU, SE, SI, UA	I	<i>Pisum sativum</i>	Ambrus (1958), Buhr (1939), Forsius (1922), Kieffer (1898), Křišťal (1947), Kutter and Winterhalter (1933), Loew (1850), Mamaeva (1969), Meijere (1911), Pakalniškis et al. (2006), Perju (1959), Pileckis and Vengeliauskaite (1977), Schøyen (1926), Simova-Tošić et al. (1996), Simova-Tošić et al. (2000), Skuhrová and Skuhrový (1960), Skuhrová and Skuhrový (2009), Skuhrová et al. (2005), Skuhrová et al. (1991), Skuhrava et al. (2006), Spungis (1977), Theobald (1911), Tullgren (1917)

Family Species	Regime	Native range	Invaded countries and islands	Habitat*	Hosts	References
<i>Contarinia pyrivora</i> (Riley, 1886)	Phyto- phagous	Central, eastern Europe, southwest Asia	DK, GB, LV, NO, SE	I	<i>Pyrus communis</i>	Harris (1976), Máca (2006), Skuhravá and Skuhravý (in prep.), Skuhrava et al. (2006), Spungis (1977), Wahlgren (1944)
<i>Dasineura abietiperda</i> (Henschel, 1880)	Phyto- phagous	North-east Europe	GB, IT	G3	<i>Picea abies</i>	Harris (1976), Hill et al. (2005)
<i>Dasineura kelleri</i> (Henschel, 1875)	Phyto- phagous	Central Europe, Alps, Carpa- thians	GB	G3	<i>Larix decidua</i>	Harris (1976), Hill et al. (2005)
<i>Dasineura pyri</i> (Bouché, 1847)	Phyto- phagous	Central, eastern Europe, southwest Asia	DK, FI, GB, NO, SE	I	<i>Pyrus communis</i>	Forsius (1922), Harris (1976), Hill et al. (2005), Skuhrava et al. (2006), Wahlgren (1944)
<i>Dasineura rhododendri</i> (Kieffer, 1909)	Phyto- phagous	Central, south Europe, mountains	GB	I	<i>Rhodo- dendron ferrugineum</i>	Chandler (Ed) 1 (1998), Harris (1976)
<i>Kaltenbachiola strobi</i> (Winnertz, 1853)	Phyto- phagous	North-east Europe	GB, NL	G3	<i>Picea abies</i>	Harris (1976), Hill et al. (2005), Roques (Unpublished)
<i>Monarthropalpus flavus</i> (Schränk, 1776)	Phyto- phagous	Western Asia, southern Europe, Medi- terranean	AT, CH, CZ, DE, GB, HU, NL, PL, RO, SE, UA	I	<i>Buxus sempervirens</i>	Ambrus (1958), Docters van Leeuwen (1957), Harris (1976), Meyer and Jaschhof (1999), Ryberg (1941), Skuhravá and Skuhravý (1960), Skuhravá and Skuhravý (2009), Skuhrava et al. (1972), Skuhrava et al. (2008), Wahlgren (1944)
<i>Phyllobiotis cocciferae</i> (Tavares, 1901)	Phyto- phagous	Medi- terranean	GB	I	<i>Quercus ilex</i>	Chandler (Ed) 1 (1998), Harris (1976)

Family	Regime	Native range	Invaded countries and islands	Habitat*	Hosts	References
<i>Species</i>						
<i>Ressliella lavandulae</i> (Barnes, 1953)	Phytophagous	Mediterranean	DE	I	<i>Lavandula angustifolia</i>	Meyer and Jaschhof (1999)
<i>Ressliella skuhravorum</i> Skrzypczynska, 1975	Phytophagous	Central Europe, Alps, Carpathians	BE, DK, GB, NL	G3	<i>Larix decidua</i>	Roques (Unpublished), Skrzypczynska et al. (1993), Skuhrava et al. (2006)
Culicidae						
<i>Aedes vexans</i> (Meigen, 1830)	Parasitic/Predator	Continental Europe	GB	C1, D	Human (biting)	Taylor et al. (2006)
<i>Aedes cinereus</i> (Meigen 1818)	Parasitic/Predator	Continental Europe	GB	D, J	Human (biting), dog	Taylor et al. (2006)
<i>Culex territans</i> Walker, 1856	Parasitic/Predator	Eastern Europe	GB	D, J	Human (biting), dog	Taylor et al. (2006)
<i>Culex pipiens molestus</i> L., 1758	Parasitic/Predator	Continental Europe	GB	D, J	Human (biting), hot-blooded animals	Taylor et al. (2006)
Syrphidae						
<i>Chamaesyphus caledonicus</i> Collin, 1940	Parasitic/Predator	Continental Europe	GB		Aphids larval predator (pine forests)	Sivell and Phillips (1999)
				G3		

Family Species	Regime	Native range	Invaded countries and islands	Habitat*	Hosts	References
<i>Dasyrphus friuliensis</i> (van der Goot, 1960)	Parasitic/ Predator		GB		Aphid larval predator (spruce forests); Pollinator <i>Ranunculus</i> and Umbelli- ferae (Adult)	Stubbs and Falk (2002)
		Conti- nental Europe		G3		
<i>Didea intermedia</i> Loew, 1854	Parasitic/ Predator		GB		Aphid larval predator (<i>Schizo- lachnus pineti</i> ; pine forests)	Stubbs and Falk (2002)
		Conti- nental Europe		G3		
<i>Eriozona erratica</i> (Linnaeus, 1758)	Parasitic/ Predator	Conti- nental Europe	GB		Aphid larval predator (forests)	Ball and Morris (2000)
				G3		
<i>Eriozona syrphoides</i> (Fall�n, 1817)	Parasitic/ Predator		GB		Aphid larval predator (spruce and pine forests- larva); Pollinator of Hogweed (<i>Heracleum sphondylium</i>) (adult)	Ball and Morris (2000)
		Conti- nental Europe		G3		

Family Species	Regime	Native range	Invaded countries and islands	Habitat*	Hosts	References
<i>Merodon equestris</i> (Fabricius, 1794)	Parasitic/ Predator	Conti- nental Europe	GB	I2, G1	Narcissus and bluebell bulbs	Hill et al. (2005)
<i>Parasyrphus malinellus</i> (Collin, 1952)	Parasitic/ Predator	Conti- nental Europe	GB	G3	Aphid larval predator	Ball and Morris (2000)
Tephritidae						
<i>Bactrocera (Daculus)</i> <i>oleae</i> (Rossi, 1790)	Phyto- phagous	Medi- terranean	CH	I	<i>Olea</i>	Neuenschwander (1984)
<i>Tephritis praecox</i> (Loew, 1844)	Phyto- phagous	Conti- nental Europe	GB, NL		<i>Calendula arvensis</i> (flower heads)	Jones (2004), Kabos and van Aartsen (1984)
<i>Terellia fuscicornis</i> (Loew, 1844)	Phyto- phagous	Medi- terranean	GB	I2	Artichoke (flower head)	Whittington (2002)