



Alien True Bugs of Europe (Insecta: Hemiptera: Heteroptera)

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Abstract

This paper reviews the alien (non-native, non-indigenous, exotic) true bug (Heteroptera) species in Europe. Forty-two established alien Heteroptera are recognized, of which 12 species are alien to Europe (originating outside Europe: eight from North America, three from the Eastern Palaearctic, one from New Zealand), 24 species are alien within Europe (translocated within Europe), and six cryptogenic species are of unknown origin. Since 1990 an approximate arrival rate of 7 species per decade has been observed. A recent trend of increased introductions from North America to Europe is suggested. The most important pathway of alien Heteroptera is translocation as contaminants (49 %), usually with ornamental plants, followed by unintentional introduction through natural dispersal (unaided) across political borders within Europe (28 %), and translocation as stowaways within a transport vector (21 %). The taxonomic composition of the alien Heteroptera of Europe is dominated by Miridae (17 species, 40 %), Tingidae (8 species, 19 %), and Anthocoridae (5 species, 12 %), all of which are overrepresented compared to the native European Heteroptera fauna. More than half of the species are phytophagous (24 species, 57 %) and the advantage of trophic specialization in invasion success is discussed. Most species are currently known to occur in the Czech Republic (19 species) and Germany (17 species), followed by Western European countries (Belgium 15 sp., France and United Kingdom 14 sp. each, and Netherlands 13 sp.), resulting in an apparent (north)west–(south)east gradient probably reflecting horticultural tradition in Europe. No unambiguous

evidence exists so far for negative ecological or economical impacts, but more research is needed to investigate possible effects. Introductions of alien Heteroptera to and within Europe will increase, and deserve further consideration.

Key words: non-native, non-indigenous, exotic, Hemiptera, pathway, impact

Introduction

“It is unlikely to become established.” (Southwood & Leston 1959: 53 on *Nezara viridula* in Great Britain)

Heteroptera, or true bugs, is the most diverse group of paurometabolous insects with incomplete metamorphosis. There are about 40,000 described species worldwide and many more await description (Schuh & Slater 1995). The recent Catalogue of the Heteroptera of the Palaearctic Region lists approximately 3000 species for Europe (Aukema & Rieger 1995–2006). Heteroptera have sucking mouthparts and feed—depending on the species—as parasites, predators, or herbivores on different food sources, from blood or haemolymph to plant sap or the cytoplasm of fungi. Heteroptera—unique among insects—colonize almost the entire planet, including the surface of the ocean and Antarctica (Schuh & Slater 1995).

Investigations on the translocation of species beyond natural boundaries has gained increasing attention as the number of such alien species has increased during the past decades, particularly in insects (e.g., Nentwig 2007; Roques *et al.* 2008). Within the European Union-funded Framework Programme 6 Specific Targeted Research Project DAISIE (Delivering Alien Invasive Species Inventories for Europe (2005–2007)), an inventory of the alien (non-native, non-indigenous, exotic) species of Europe was completed and made available via the Internet (www.europe-aliens.org). However, the presence or absence of particular species in this list is not self-explanatory. The aim of the present paper, therefore, is to discuss the database entries, including short accounts of invasion histories and original references for the alien Heteroptera species of Europe. Every database is or should be a living document, and it is hoped that it will be possible to keep track of changes at regular intervals.

Material and methods

Species are considered alien *to* Europe if they originate from outside Europe and alien *in* Europe if they originate from within Europe, but were translocated elsewhere within Europe. Unambiguous evidence or at least reasonable assumptions must exist that the species was transported beyond the boundaries of its natural range by human activities. Consequently, European species considered to have spread as a consequence of favourable climatic conditions or migratory species are excluded. For the Heteroptera of Austria, it was recently shown that this set makes up a considerable part of the newly arrived species (Rabitsch 2008). However, for some species, it is not easy to separate the driving forces behind range expansions, and combinations of several factors probably count for most of the range expansions.

The following list of species is structured into four Categories:

Category 1: Species, that are alien to Europe (1a); of unknown origin, but probably not native (cryptogenic) (1b); and alien in Europe, i.e., translocated within Europe (1c).

Category 2: European continental species that are introduced to European islands.

Category 3: Alien species that are present only in greenhouses.

Category 4: Excluded species (Archaeozoa, Not established species).