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Description and biology of *Euborellia arcanum* sp. nov., an alien earwig occupying greenhouses in Germany and Austria (Dermaptera: Anisolabididae)

DANILO MATZKE[1] & PETR KOCAREK[2,3]

[1]*PHYLLODROM e.V. - Rainforest Museum Leipzig, 04158 Leipzig-Wiederitzsch Delitzscher Landstr.55, Germany. E-mail: danilo.matzke@arcor.de*
[2]*Faculty of Science, University of Ostrava, CZ-710 00 Ostrava, Czech Republic. E-mail: petr.kocarek@osu.cz*
[3]*Corresponding author*

Abstract

Greenhouses in botanical or zoological gardens are home to dozens of species of invertebrates that were introduced alongside plants or potting soil. Our study presents the description of an alien species of earwig, *Euborellia arcanum* **sp. nov.**, found in tropical greenhouses in Leipzig and Potsdam (Germany) and in Vienna (Austria), including information about its biology in breeding culture. The species was most likely introduced into Europe by way of plants or plant matter from Florida, but the region of its natural habitat is unknown. The sequence of the mitochondrial gene cytochrome c oxidase subunit I (COI) was also evaluated and added to GenBank as a DNA barcode for further identification.

Key words: Dermaptera, Anisolabididae, *Euborellia*, alien species, taxonomy, biology, nymphal development, description, new species, Germany, Austria, Europe

Introduction

Greenhouses in botanical or zoological gardens are home to dozens of invertebrate species that were introduced into the environment along with plants or potting soil. These invertebrates, which can survive for multiple generations, generally come from tropical or subtropical areas and often spread to other greenhouses through the transfer of plant material or soil (Weidner 1974).

There are approximately 2000 species grouped in eleven families of earwigs in the world (Kocarek *et al.* 2013). Only a few of them, however, are synanthropes. These are mostly of tropical origin and spread with goods transported by land, ship or air (Nishikawa & Kusui 2008). In Europe, four alien species have been identified as occurring in the wild and in greenhouses and other buildings with constant temperature. These are the oviparous species *Nala lividipes* (Dufour, 1828), *Euborellia annulata* (Fabricius, 1787) (syn. *E. stali* (Dohrn, 1864)), and *E. annulipes* (Lucas, 1847), and the ovoviviparous species *Marava arachidis* (Yersin, 1860) (Harz & Kaltenbach 1976, Kocarek 2009, Rasplus & Roques 2010, Kocarek *et al.* 2015). *Euborellia annulipes* has been imported into many countries and can now be considered one of the most widely distributed member of the Dermaptera (Koppenhöfer 1994).

During research on the invertebrate fauna of Gondwanaland in the Leipzig Zoo, an unknown species of *Euborellia* sp. was discovered, and a subsequent search of greenhouses in Germany and Austria resulted in the detection of the same earwig species in Biosphere Potsdam and in a tropical house in Schönbrunn (Vienna). A detailed study of the male genital armature confirmed that it was an undescribed species. We describe the species here, including information about its biology in breeding culture. The mitochondrial gene Cytochrome C Oxidase subunit I (COI) was evaluated and added to GenBank as a DNA barcode for further identification.

Material and methods

Nomenclature and morphological terminology follow those used by Steinmann (1989b). Specimens of the new

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