



Catalogue and identification key of the bee genus *Epeolus* Latreille, 1802 (Hymenoptera, Apidae) from the Palearctic region

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Abstract

Available information about bees of the genus *Epeolus* (Hymenoptera: Apidae) in the Palearctic region is summarized. Forty-eight species are currently known from this area. A new synonymy is proposed for *Epeolus tsushimensis* Cockerell, 1926=*E. japonicus* Bischoff, 1930, **syn. nov.** and a lectotype is designated for *E. fallax* Morawitz, 1872. The first illustrated key and an updated catalogue of all 48 species known from the Palearctic region are provided. Brief information about the history of the study and distribution patterns of these cleptoparasitic bees is also included.

Key words: Anthophila, cleptoparasites, taxonomy, new synonymy, lectotype

Introduction

In recent years, significant progress has been made towards a better knowledge of the species of *Epeolus* Latreille, 1802 (Hymenoptera: Apidae) from the Palearctic region and, more particularly from Europe (Bogusch & Hadrava 2018), North Africa and the Middle East (Bogusch 2021), Turkey (Bogusch 2018), Mongolia (Astafurova & Proshchalykin 2021b) and Central Asia (Astafurova & Proshchalykin 2021a, c, 2022a, b, 2023). Based on numerous literary sources and specimens from several collections, the present work aims to complement these studies by providing the first identification key and an updated catalogue of all 48 species known from the Palearctic region. It also provides for the establishment of a new synonymy, the consideration of a name as *nomen dubium* and the designation of a lectotype. This paper is a further step towards a better documentation of the species of *Epeolus* and their distribution patterns in the wider Palearctic region and adjacent areas. As studies in recent years have shown, a considerable number of undescribed species can be expected, particularly in the eastern, central and southern Palearctic regions, where relatively little material has been available for study.

Materials and methods

Morphological terminology follows that of Michener (1944, 2007) and Engel (2001).

The abbreviations F, T and S are used for flagellomere, metasomal tergum and metasomal sternum, respectively. The species are listed alphabetically.

The following abbreviations are used for museums: AINC—Agricultural Institute, Nicosia (Cyprus); CAS—California Academy of Sciences, San Francisco (USA); FMNH—Finnish Museum of Natural History, Helsinki (Finland); HNHM—Hungarian Natural History Museum Budapest (Hungary); KUNHM—Kansas University Biodiversity Collection, Lawrence (USA); KUFJ—Kyushu University, Fukuoka (Japan); MNHN—Muséum national d'Histoire naturelle, Paris (France); MSNG—Museo di Storia Naturale Genova (Italy); MSNN—Museum Scientiarum Naturalium Nivariense, Tenerife (Spain); NHMUK—Natural History Museum, London (United

authors have named and described 79 Palaearctic species (including one replacement name), of which 48 are now recognized as valid. The greatest contributions to the study of this genus in the Palaearctic region have been made by H. Bischoff, P. Bogusch, J. Pérez, J. Christ, H. Friese, Yu. Astafurova and M. Proshchalykin, who together account for about half of all proposed names, of which 70% are presently recognized as valid (Fig. 107). The majority of Palaearctic species were described in the genus *Epeolus* (71), with a further eight species originally assigned to the genera *Apis* (5), *Diepeolus* (1), *Nomada* (1), and *Oxybiastes* (1).

Most Palaearctic species in the genus *Epeolus* were described from Europe (mainly western Europe), Central Asia, North Africa and Russia (Fig. 108), and for Europe, North Africa and Russia every second name was subsequently synonymized. All ten species described from Central Asia are currently recognized as valid.

The history of research on the genus *Epeolus* can be divided into three main periods (Fig. 109). The first period is the beginning of its study (XVIII–XIX centuries); at that time, 29 taxa were described (14 of which are now valid), mainly from Europe, Northern Africa and Central Asia. The second period (XX century) is mainly associated with the works of H. Bischoff, J. Alfken and K. Yasumatsu. During this period, 33 taxa were described (17 of which are now valid), mainly from Europe, Japan and Korea.

Since the beginning of the XXI century, there has been a new surge of interest in the study of the genus *Epeolus*, mainly associated with the research of P. Bogusch and the authors of this paper. In a series of papers, 17 species of Palaearctic *Epeolus* have been described, a new synonymy has been established, the systematic status of some problematic taxa has been clarified, lectotypes have been designated and new data have been provided on the composition of some local faunas (Turkey, Mongolia, Central Asia, North Africa, Europe and others) and on the distribution of species within the Palaearctic as a whole.

The genus *Epeolus* is distributed throughout the Palaearctic region, but only four species have a most widespread Trans-Palaearctic or Euroasian range: *Epeolus alpinus*, *E. cruciger*, *E. tarsalis*, and *E. variegatus*. Most species occur in the Western Palaearctic, and only five species are known from the Eastern Palaearctic: *E. coreanus*, *E. ishikawai* (only Japan), *E. melectiformis*, *E. rasmonti*, *E. tsushimensis* (only Japan). Three species are widespread in the Western Palaearctic: *Epeolus julliani*, *E. transitorius*, and *E. productulus*. *Epeolus fasciatus* and *E. schummeli* occur in Europe and parts of Western Asia. Fourteen species are endemic to the Mediterranean region or widely distributed from the Mediterranean through the Middle East and the Caucasus: *E. aureovestitus*, *E. bischoffi*, *E. collaris*, *E. compar*, *E. erivanensis*, *E. fallax*, *E. flavociliatus*, *E. ibericus*, *E. intermedius*, *E. laevifrons*, *E. priesneri*, *E. siculus* (only Sicily), *E. sigillatus* (only Crete), and *E. subrufescens*. Thirteen species are Central Asian endemics or widely distributed from the Middle East and Caucasus to Central Asia and Mongolia: *E. albus*, *E. asiaticus*, *E. gorodkovi*, *E. kyzylkumicus*, *E. laticauda*, *E. mikhailovi*, *E. mongolicus*, *E. nudiventris*, *E. pesenkoi*, *E. rasnitsyni* (only Tajikistan), *E. ruficornis*, *E. seraxensis*, and *E. vinogradovi* (only Turkmenistan). The remaining species are endemic to various regions: *E. iranicus* (Iran), *E. ladakhensis* (Kashmir), *E. leleji* (Mongolia), *E. productuloides* (Turkey), *E. tibetanus* (Tibet mountains), *E. turcicus* (Turkey), and *E. warnckeii* (Turkey). Thus, a large number of endemic species characterizes the genus. Thirteen species have small, known ranges, mostly within mountainous regions.

Unlike other Epeolini, all *Epeolus* species are so far known to be cleptoparasites of species of *Colletes* Latreille, 1802 (Colletidae). However, for most *Epeolus* we do not know exactly which species of *Colletes* is/are the host(s). This is particularly true for Central Asian and Mongolian species, for which there is no information at all about their hosts or nesting habits. At the same time, the *Colletes* fauna of Central Asia and Mongolia is well studied and one of the richest in the Palaearctic, with a large number of endemic species (Kuhlmann & Proshchalykin 2013; Proshchalykin 2017). Comprehensive data on host-parasite relationships would require dedicated research, which is unlikely to be undertaken in the near future but should be the focus of future studies.

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