

# The cuckoo bees of the genus *Epeolus* Latreille, 1802 (Hymenoptera, Apidae) from the Middle East and North Africa with descriptions of two new species

Petr Bogusch<sup>1</sup>

<sup>1</sup> Department of Biology, Faculty of Science, University of Hradec Králové, Rokytanského 62, CZ-500 03 Hradec Králové, Czech Republic

Corresponding author: Petr Bogusch ([bogusch.petr@gmail.com](mailto:bogusch.petr@gmail.com))

---

Academic editor: Maksim Proshchalykin | Received 6 April 2021 | Accepted 3 May 2021 | Published 24 August 2021

<http://zoobank.org/4E9D0FF6-6086-4824-B30F-352A8398CA75>

---

**Citation:** Bogusch P (2021) The cuckoo bees of the genus *Epeolus* Latreille, 1802 (Hymenoptera, Apidae) from the Middle East and North Africa with descriptions of two new species. In: Proshchalykin MYu, Gokhman VE (Eds) Hymenoptera studies through space and time: A collection of papers dedicated to the 75<sup>th</sup> anniversary of Arkady S. Lelej. Journal of Hymenoptera Research 84: 45–68. <https://doi.org/10.3897/jhr.84.67049>

---

## Abstract

*Epeolus* is one of the more species-rich genera of cuckoo bees globally. Seventeen species are known from Europe, and 23 species have been recorded from various countries in the Middle East and North Africa. *Epeolus iranicus* **sp. nov.** and *E. priesneri* **sp. nov.** are newly described in this study, and *E. senaxensis* Radoszkowski, 1893, **stat. nov.**, previously a subspecies of *E. transitorius* Eversmann, 1852, is regarded as a valid species and a lectotype is designated. The first records of *E. ibericus* and *E. intermedius* from North Africa are given, and the distribution of *E. fallax* in North Africa is confirmed. This study compiles known distributional records of the species of this genus from the studied region and provides an overview of the known species richness in the studied countries. Based on available records, Turkey (14 species), Morocco (11) and Iran (9) host the highest numbers of species of *Epeolus*, whereas in four countries only a single species has been recorded, and the presence of this genus in seven countries has yet to be confirmed.

## Keywords

Distribution, Iran, Morocco, taxonomy, Turkey

## Introduction

Cuckoo bees form an ecological group with representatives in three families, Halictidae, Megachilidae, and Apidae, characterised by their cleptoparasitic lifestyle. Female cuckoo bees do not forage or build their own nests but instead lay eggs within the nests of host bee species (Batra 1984; Michener 2007; Westrich 2018). Most species of cuckoo bees belong to the family Apidae, in which the subfamily Nomadinae forms the most species-rich group in most of the world (Michener 2007; Bossert et al. 2019). *Epeolus* Latreille, 1802 represents one of the more speciose genera of cleptoparasitic Nomadinae in the old world (Bogusch and Hadrava 2018). The species are sexually monomorphic in general, smaller or middle-sized (4–10 mm in total body length), and robust with a slightly conical metasoma. Their integument colouration is largely black, although in some species parts of the body are largely red or reddish brown, and almost all species possess bands and spots of white or yellowish tomentum on various parts of the body (Onuferko 2017; Bogusch and Hadrava 2018; Westrich 2018; Onuferko et al. 2019). Bees of the genus *Colletes* Latreille, 1802 are the only known hosts of *Epeolus*, and most species of *Epeolus* have been associated with only one species of *Colletes*; only some usually common and widespread species intrude nests of more *Colletes* hosts (Onuferko 2017; Bogusch and Hadrava 2018).

The genus has been the focus of several taxonomic and evolutionary studies in recent years. Onuferko (2017, 2018, 2019) published several revisions of *Epeolus* in the New World, as well as a phylogenetic and biogeographic study of the whole genus (Onuferko et al. 2019) and several other brief surveys on the ecology and ethology of this genus. Eardley (1990) revised the species in sub-Saharan but not North Africa. Bogusch and Hadrava (2018) reviewed and provided a key to the European species, Bogusch (2018) described three new species from east parts of Turkey and listed all the species known from this country and Bogusch (2019) described a new species from India and listed the species known from this country. Before the present study, it was not known how many species and which species of *Epeolus* occur in the Middle East and North Africa, or how numerous and common they are in the countries in which they occur.

This study is a compilation of *Epeolus* records based on specimens deposited in museum collections in Europe, USA and Morocco, as well as specimens from private collections. Warncke's notes on the distribution of bees of the genus *Epeolus* are also included herein. This is the first overview of bees of this genus from the Middle East and North Africa except for the comprehensive study of bees of Morocco (Lhomme et al. 2020). The objective of the present study is to provide a checklist of the species in the region, which includes two new species and a subspecies elevated to species level.

## Materials and methods

Specimens of *Epeolus* from the following countries were examined: Algeria, Egypt, Libya, Morocco, Tunisia (= North Africa) and Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates,

and Yemen (= The Asian Part of the Middle East). The records are based on personally examined dry, pinned specimens housed in the following collections:

- BMNH** The Natural History Museum, London, United Kingdom (curator Joseph Monks);
- ISZP** Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Krakow, Poland (curator Lukasz Przybyłowicz);
- KUBC** Kansas University Biodiversity Collection (curator Michael S. Engel);
- MSIE** research collection of Mohammed Shebl, Suez University, Ismailia, Egypt;
- NHMB** Natural History Museum, Berlin, Germany (curator Michael Ohl);
- NHMC** Natural History Museum, Copenhagen, Denmark (curator Lars Vilhelmsen);
- OLML** Oberösterreichisches Landesmuseum, Linz, Austria (curator Martin Schwarz);
- UTMS** University of Tartu Museum, Tartu, Estonia (curator Villu Soon).

Several records are adopted from unpublished notes of Klaus Warncke (cited as “K. Warncke, unpublished hand-written data”) and from published sources. The records are sorted first alphabetically according to the country, then alphabetically according to the locality, and then records from the same locality chronologically. Undated records are presented at the end of the appropriate section. The records from Turkey published by Bogusch (2018) are not repeated here but have been incorporated into the map presented herein (see below).

The lists of synonymies are not presented in detail, for most species, see Bogusch and Hadrava (2018), the other species not included by these authors usually do not have synonyms. The map with numbers of species for each country was created using QGIS 3.6. Descriptions of new species are based on type material. Morphological terms were adopted from Michener (2007) and Rightmyer (2008), and I use the abbreviations T for tergum, S for sternum, and F for flagellomere, with corresponding numbers (with 1 being the most basal subdivision and the maximum number being the most apical). Morphology was studied using standard dissecting microscopes. The photos and measurements were taken using Keyence VHX digital microscope. Only type specimens of newly described species and of *E. seraxensis* (which was put as a separate species) were imaged.

## Taxonomy

### *Epeolus alpinus* Friese, 1893

Synonyms (detailed in Bogusch and Hadrava (2018)): *Epeolus glacialis* Alfken, 1913, *E. montanus* Bischoff, 1930, *E. pilosus* Bischoff, 1930.

**Published records.** Northern Europe and higher altitudes in central and Southern Europe (Bogusch and Hadrava 2018), Turkey (Bogusch 2018), occurs also in Siberia (Bischoff 1930; Levchenko et al. 2017).

**Material examined. Iran:** Elbrus, 7 km south of Chalus, 2400 m n. m., 12.VII.1977, (2 ♂), A. W. Ebmer; idem, 25.VII.1977, (1 ♀), J. Gusenleitner; idem, (1 ♀), A. W. Ebmer; Shahpasand, Tilabad, 16.VII.1977, (1 ♀), A. W. Ebmer [all P. Bogusch det.] (OLML).

### *Epeolus aureovestitus* Dours, 1873

**Published records.** Portugal and Spain, North Africa, holotype from Algeria (Bogusch and Hadrava 2018). Lhomme et al. (2020) published a record from Morocco (Marrakesh-Safi).

**Material examined. Algeria:** Biskra, date, collector and number of specimens unknown, (K. Warncke, unpublished hand-written data). **Morocco:** Taroudant, Oued Souss, 24.VI.1974, (1 ♀), K. M. Guichard, G. E. Else [M. Schwarz det.] (BMNH); Tizi-n-Test, 30.VI.1987, (1 ♀), M. Schwarz [P. Bogusch det.] (OLML). **Tunisia:** Hamman Lif, date and collector unknown, (1 ♂); Kathairia, Wiese, south of Tabarka, 23.VI.1994, (1 ♂), L. Hauser [both P. Bogusch det.] (OLML).

### *Epeolus bischoffi* (Mavromoustakis, 1954)

**Published records. Holotype** from Israel, recorded also from Cyprus, Jordan, Lebanon, Syria and Turkey (Bogusch and Hadrava 2018).

**Material examined. Cyprus:** Akrotiri bay, 1.VII.1933, (1 ♀), 20.VII.1933, (1 ♂), 12.VII.1943, (1 ♂), 20.VII.1943, (1 ♀); Salamis, 18.VI.1957, (1 ♂); Zakaki, 23.VI.1949, (1 ♂) G. Mavromoustakis leg. [all G. Mavromoustakis det.] (KUBC). **Israel:** Amitai, 31.III.1952, (1 ♀), collector unknown; Jerusalem, 29.III.1940, (1 ♂), Bytinski-Salu leg. (OLML); Kefa Awda, 13.III.2012, (1 ♂), O. Afik [all P. Bogusch det.] (OLML). **Jordan:** Amman, 22.III.1995, (1 ♀), collector unknown, [all P. Bogusch det.] (OLML).

### *Epeolus collaris* Pérez, 1884

**Published records.** North Africa, Morocco, Algeria, and Tunisia (Bogusch and Hadrava 2018). Lhomme et al. (2020) published additional records from Morocco (Souss-Massa; Drâa-Tafilelet; Fès-Meknès; Béni Mellal-Khénifra).

**Material examined. Algeria:** Bone, collector and date unknown, (1 ♂) (OLML); “Mus. Drews“, collector and date unknown, (1 ♀) (NHMC). **Morocco:** High Atlas, Agaionar, 1500 m n. m., 10.VII.1975, (1 ♂), A. W. Ebmer; Asri, 10.–14.VII.1932, (1 ♀), A. Nadiq; Azrou, 24.VII.1920, (1 ♂), collector unknown; Azrou, Moyen, 12.IX.1935, (1 ♀), Naef; Beni Mellal, 10 km north of Imirchil, 30.VIII.1992, (1 ♀), K. Warncke; Bône, date and collector unknown, (1 ♀); Ez Zahra, 15 km south of Tunis, 30.VII.1969, (1 ♂, 1 ♀), R. Desculli de Chenau; Immonzer, 28.VI.1947, (1 ♂),

Naef; Ifrane, 22.–24.VII.1932, (1 ♀), collector unknown; 17 km N Tounfite, 1600 m n. m., (1 ♀), date unknown, K. Warncke [all P. Bogusch det.] (OLML). **Tunisia:** Ez Zahra, 15 km south of Tunis, VII.1969, (1 ♂, 1 ♀), K. Warncke [K. Warncke det.] (OLML); Ghar El Melh, east of Bizerte, 25.V.1999, (1 ♂), O. Niehuis [P. Bogusch det.] (OLML).

### *Epeolus cruciger* (Panzer, 1799)

Synonyms (detailed in Bogusch and Hadrava (2018)): *Epeolus rufipes* Thomson, 1870, *E. similis* Höppner, 1899, *E. cruciger* var. *elegans* Müller, 1921, *E. cruciger* var. *rufiventris* Müller, 1921, *E. marginatus* Bischoff, 1930.

**Published records.** Widely distributed in Europe from south to north, however, it is very rare or regionally extinct in most parts of Central and Eastern Europe, while in the southwest and Western Europe it is quite widespread. It also occurs in the Middle East (Turkey and Iran), Caucasus and Siberia (Bogusch 2018; Bogusch and Hadrava 2018). K. Warncke (unpublished data) reported this species also from the following localities in Turkey: Antakya, Bursa, Konya, Tuzlucz/Kars, 20 km north of Yuksekova. Bogusch (2018) recorded known localities from Turkey.

**Material examined. Iran:** Bayne-Teheran, 6.IX.1955, (1 ♀), collector unknown; Elburz, 50 km north of Vana, 12.–13.VII.1965, (1 ♀), Giordani Soika [both P. Bogusch det.] (OLML). **Syria:** Ras al Basit, 19.V.1995, (1 ♂), K. Deneš. [P. Bogusch det.] (OLML). **Turkey:** 20 km south of Van, 5.VII.1997, (1 ♂), M. Halada [P. Bogusch det.] (OLML).

### *Epeolus eriwanensis* Bischoff, 1930

**Published records.** Rare species occurring in the Middle East, known from Egypt, Turkey, Syria, Armenia, and Iran, male described from a specimen from Turkey (Bogusch and Hadrava 2018). Bogusch (2018) recorded known localities from Turkey.

### *Epeolus fallax* Morawitz, 1872

Synonyms (detailed in Bogusch and Hadrava (2018)): *Epeolus giannellii* Gribodo, 1894, *E. speculifer* Pérez, 1895.

**Published records.** Southern and Central Europe: France, Germany, Italy, Portugal, and Spain (Bogusch and Hadrava 2018). The same authors supposed this species to be endemic in Europe. Alfken (1914) reported this species from Algeria, however without any details. Species *E. gianelli* Gribodo, 1894, which was synonymised with

this species, was described from Algeria (Bogusch and Hadrava 2018). Lhomme et al. (2020) published records from Morocco (Fès-Meknès; Marrakech-Safi).

**Material examined. Algeria:** locality, date and collector unknown, (1 ♂) (OLML); Boghari, (1 ♂), collector unknown [P. Bogusch det.] (OLML). **Tunisia:** Jendouba, 16.V.1973, (1 ♀), J. Gusenleitner; idem, 11.VII.1979, (1 ♂), A. W. Ebmer [P. Bogusch det.] (OLML); Tunis, date unknown, (1 ♀), E. Graeffe [D. B. Baker and M. S. Engel det.] (KUBC).

### *Epeolus fasciatus* Friese, 1895

**Published records.** Southern and Central Europe, but recent records are known only from France and Spain (Bogusch and Hadrava 2018). Pesenko (1974) reported this species also from Russia – Rostov Province. Recorded also from Turkey and the Middle East (Alfken 1935; Pesenko 1974; Bogusch 2018).

### *Epeolus flavociliatus* Friese, 1899

Synonyms (detailed in Bogusch and Hadrava (2018)): *Epeolus laevigatus* Bischoff, 1930, *E. berlandi* Benoist, 1943.

**Published records.** North Africa, Turkey, and Spain – Canary Islands. Specimens from the Canary Islands differ from the North African populations and represent probably a separate species (necessary to confirm by molecular studies) (Bogusch and Hadrava 2018). Bischoff (1930) reported this species from Algeria (Mascara). Lhomme et al. (2020) published records from Morocco (Fès-Meknès; Marrakech-Safi; Drâa-Tafilalet; Souss-Massa).

**Material examined. Algeria:** Biskra, 27.V.1948, (1 ♂), 30.V.1948, (1 ♀), Naef, [P. Bogusch det.] (OLML); idem, 26.V.1948, (1 ♀), J. de Beaumont (KUBC); Moktadeh, V.2005, (1 ♀), M. Halada [all P. Bogusch det.] (OLML). **Egypt:** Abu Roasch, 26.III.1958, (1 ♀), 6.V.1958, (1 ♂), 17.V.1958, (1 ♂, 1 ♀), W. Pulawski; Amarna, 17.–18.III.1958, (1 ♂), W. Pulawski [D. B. Baker det.] (KUBC); Cairo, VII.1937, (1 ♂), A. Mochi; idem, 9.–20.V.1978, (1 ♀), K. Guichard; Fayed, date and collector unknown, (1 ♀); idem, IV.1943, (2 ♂♂), collector unknown; idem, date unknown, (1 ♂), H. Priesner, [all P. Bogusch det.] (OLML); idem, 21.III.1948, (1 ♀), 13.V.1948, (1 ♀), 30.V.1948, (1 ♀), 30.X.1948, (1 ♂), D. B. Baker [D. B. Baker det.] (KUBC); Fayoum, 29.IV.1935, (3 ♀), H. Priesner [P. Bogusch det.] (OLML); idem, 29.IV.1935, (1 ♀), A. Mochi [D. B. Baker det.] (KUBC); Gebel el Asfar, 28.IV.1937, (1 ♂), 29.V.1937, (1 ♀), A. Mochi; Giza, 1.V.1981, (2 ♂), K. Guichard, 30.IV.1958, (1 ♂, 1 ♀), W. Pulawski [D. B. Baker det.] (KUBC); Hehran, 23.III.1931, (1 ♂), collector unknown [P. Bogusch det.] (OLML); Helwan (Wadi Hof), 16.V.1937, (1 ♀), A. Mochi [D. B. Baker det.] (KUBC); Hizramech, 11.VI.1954, (1 ♂), collector unknown; Ismailia, 16.IV.1933, (1 ♀), C. Koch [all P. Bogusch det.] (OLML);

Luxor, 31.I.1958, (1 ♂), W. Pulawski; Meadi, 13.III.1958, (4 ♂, 2 ♀), W. Pulawski [all D. B. Baker det.] (KUBC); 40 km east of Meadi, 29.V.1991, (1 ♀), A. Mochi; Quattamia Road, 2.V.1992, (1 ♂), A. Mochi [all P. Bogusch det.] (OLML); Ras Sedr, Southern Sinai, 13.IV.2019, (1 ♂, 1 ♀), M. Shebl [M. Shebl det.] (MSIE); Saqqara, 27.IV.1958, (1 ♀), W. Pulawski [D. B. Baker det.] (KUBC); Sidi Salem, 4.VI.1972, (3 ♂, 7 ♀), J. Gusenleitner; Sucr Ahmed, 11.V.2011, (1 ♂), M. Shebl [M. Shebl det.] (OLML); Wadi Degla, Cairo, 21.IV.1990, (1 ♀), 1.VI.1990, (1 ♀), C. Roche [D. B. Baker det.] (KUBM); Wadi Degla, 4.V.1990, (1 ♀), A. Mochi; Wadi Hof, 15.VI.1960, (1 ♀), H. Priesner [P. Bogusch det.] (OLML). **Iran:** Bandar Lengeh, 23.III.1965, (2 ♀), collector unknown [P. Bogusch det.] (OLML). **Jordan:** Wadi Rum, Al Ghal env., 3.IV.2013, (2 ♂, 3 ♀), M. Snížek [P. Bogusch det.] (OLML). **Morocco:** Ait-Saoun, 55 km near Agde, 10.V.1992, (1 ♀), M. Hradský; Amonguer, 50 km west of Rich, 23.V.1995, (1 ♂), M. Halada; 15 km south of Assa, 17.–18.IV.1995, (5 ♂, 3 ♀), M. Halada; Atlas, Route Midelf-Aouli, 29.V.1947, (1 ♀), Naef; Beni-Bassia, 21.V.1995, (1 ♀); 20 km west of Boudnik, 9.IV.1995, (1 ♀), both M. Halada; El Rashida-Goulmina, 22.IV.2017, (1 ♂, 2 ♀), M. Snížek [all P. Bogusch det.] (OLML); Errachidia, 3.VI.1985, (1 ♀), K. Guichard [D. B. Baker det.] (KUBC); 30 km near Foug Zguid, 30.III.1996, (1 ♀), K. Warncke; 40 km south of Guercif, 15.–17.IV.1995, (3 ♂, 2 ♀), M. Halada; Meknes, 31.V.1964, (1 ♀), collector unknown; 10 km north of Mhamid, 21.–22.IV.1995, (2 ♀), M. Halada; Mhamid env., 16.V.1997, (1 ♀), K. Deneš; 30 km east of Midelt, 13.V.1995, (10 ♂, 5 ♀); 20 km north of Missouri, 14.V.1995, (3 ♂, 3 ♀), all M. Halada; Risani (Bisanri), 19.V.1987, (2 ♂), M. Kraus; Taba, 29.III.1986, (1 ♂), Naef [all P. Bogusch det.] (OLML); Tizi-n-Talrhemt, 4.6.1985, (1 ♂), K. Guichard [D. B. Baker det.] (KUBM); 5 km south of Zagora, 24.–25.IV.1995, (3 ♀), M. Halada [P. Bogusch det.] (OLML). **Tunisia:** Bliditti, 29.III.2008, (1 ♂, 1 ♀), P. Bogusch; Mefta, 14.IV.1981, (1 ♂), Schnee; 31.V.1994, (1 ♂), S. Bečvář; Tatouine, 11.IV.2001, (1 ♂, 1 ♀), M. Halada; Tozeur, 24.–28.III.1978, (1 ♀), K. Guichard; idem, 7.IV.2001, (1 ♀), M. Halada [all P. Bogusch det.] (OLML). **UAE:** Abu Dhabi International Airport, 3.IV.1991, (1 ♂), I. Hammer [P. Bogusch det.] (KUBC); Dhabi Al Wathba, 15.II.2015, (3 ♀), Saji and Harten [P. Bogusch det.] (OLML).

### *Epeolus ibericus* Bogusch, 2018

**Published records.** Europe – Portugal and Spain (Bogusch and Hadrava 2018).

**Material examined.** **Morocco:** Tanger, “Mus. Drews”, (1 ♀), date and collector unknown [P. Bogusch det.] (NHMC).

### *Epeolus intermedius* Pérez, 1884

**Published records.** Europe – France, Italy, Portugal, Spain (Bogusch and Hadrava 2018).

**Material examined. Morocco:** Tanger, “Mus. Drews”, (1 ♀), date and collector unknown [P. Bogusch det.] (NHMC).

***Epeolus iranicus* sp. nov.**

<http://zoobank.org/24E0CE05-DBF1-4308-913F-4FDDB5639F90>

Figure 1

**Material examined. Holotype:** ♀, Iran: Bazuft, Kuhre-Sefid, 1900, Escalera leg. (OLML).

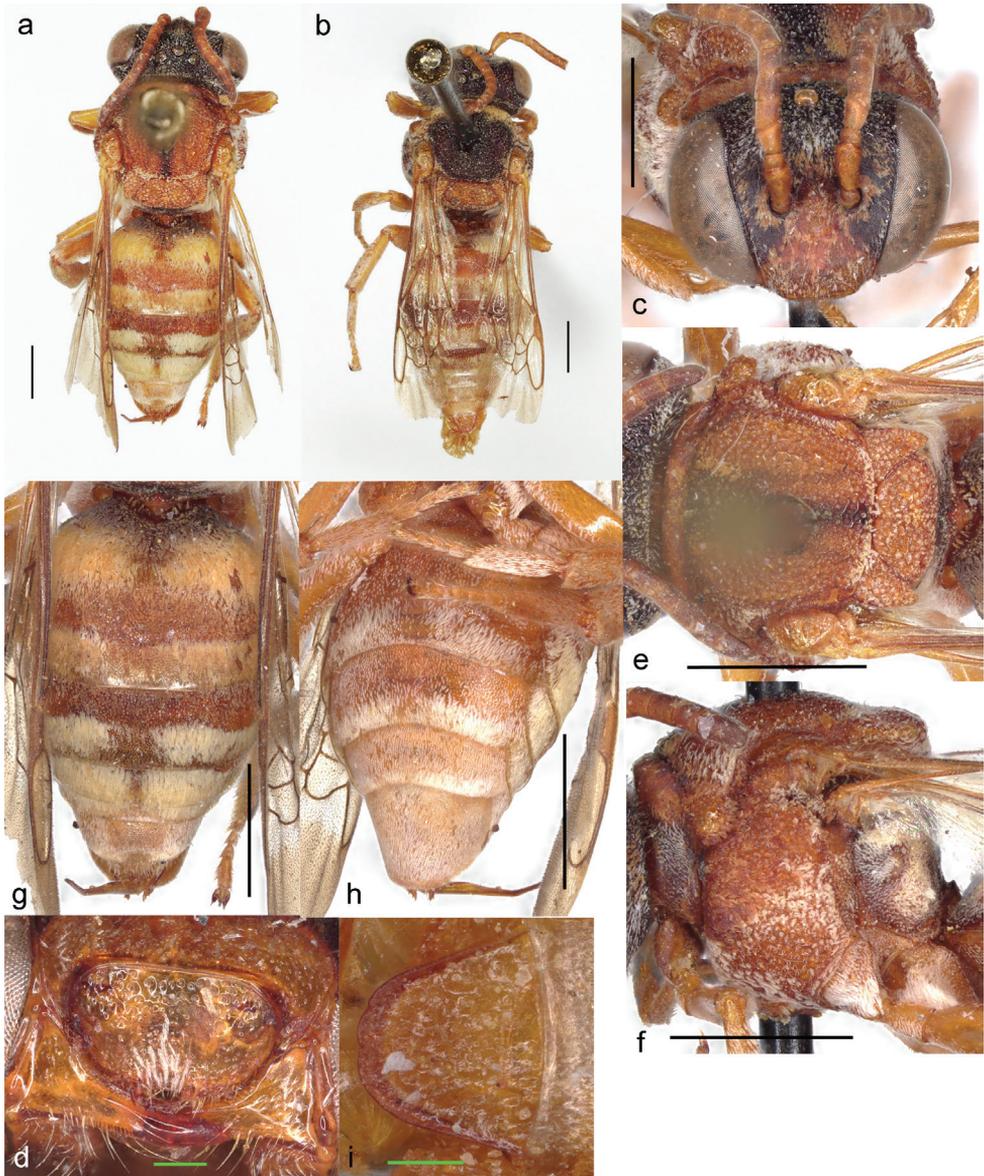
**Paratypes:** 2 ♂, 1 ♀ with the same labels as holotype (BMNH); Kerman, 10 km W Rafsanjan, 26.5.1978, 1 ♂, K. Warncke leg. and det. (OLML).

**Differential diagnosis.** This species is most similar to *E. transitorius* and *E. seraxensis*, and all three species are characterised by the presence of apical (as opposed to submedial) labral tubercles (Figs 1d and 3d) and yellowish to reddish antennal segments, especially F1 and F2 (Figs 1c and 3c). The body is reddish in colour except the frons, vertex and the middle part of mesoscutum in females and entire mesoscutum in males, which are black (Fig. 1a and 1b). *Epeolus iranicus* differs from *E. seraxensis* as follows: *E. iranicus* has sparser tomentum on the body, which does not cover the entire clypeus, frons, and mesopleura, shorter F1, and broken bands on the metasomal terga. Additionally, the frons is densely punctate but with shiny interspaces. The shape of male pygidium is much narrower with no emargination in the middle and differs from that of *E. seraxensis* (Figs 1i and 3i). From *E. transitorius*, this species differs as follows: in *E. iranicus* most of body is brownish or reddish in colour (in *E. transitorius* it is mostly black), on most parts of body the punctation is sparser, and the metasomal terga and sterna are smooth and shiny.

**Description. Female.** Body length: 7.7 mm (Fig. 1a).

**Head.** Length to width ratio = 1.3 (Fig. 1c). Mandible light reddish, mandibular apex and preapical tooth dark brown. Labrum light reddish, semi-transparent, shiny, coarsely and sparsely punctate, apically with pair of small teeth separated by medial shallow emargination, apex with prominent whitish hair, with sides convex (Fig. 1d). Clypeus reddish, matt and with very fine and dense punctation, interspaces smaller than puncture diameters. Clypeus entirely covered by whitish tomentum. Frons black with basal part from clypeus to antennal tubercles reddish, with dense whitish hair around antennal socket, and with well-developed and sharp frontal keel. Vertex black, with sparse punctures, interspaces shiny and slightly greater than puncture diameters. Antenna reddish with flagellomeres dorsally partly brownish. Flagellomeres slightly longer than wide (L/W ratio = 1.05–1.1), F2 longer than other flagellomeres (L/W ratio = 1.35) (Fig. 1c).

**Mesosoma.** Pronotum reddish-brown and entirely obscured by whitish tomentum. Mesoscutum reddish with wide black medial line and whitish tomentum laterally. Punctation coarse and dense, interspaces narrower than puncture diameters but shiny. Mesoscutellum reddish, round, densely and coarsely punctate, punctures twice as large as on mesoscutum, axillar tooth (free portion of axilla) long and acute but



**Figure 1.** *Epeolus iranicus* sp. nov. **a, c-h** holotype, female **b, i** paratype, male **a, b** habitus, dorsal view **c** head, frontal view **d** labrum, frontal view **e** mesosoma, dorsal view **f** mesopleuron, lateral view **g** metasoma, dorsal view **h** ventral view **i** pygidium, dorsal view. Scale bars: 1.0 mm (**a-c, e-h**); 0.1 mm (**d, i**).

slightly shorter than mesoscutellum. Mesoscutellum with posterior margin extending over propodeum (Fig. 1e). Propodeum brownish, very finely sculptured, matt, and laterally with whitish tomentum. Mesopleuron reddish, partly obscured with dense whitish tomentum, coarsely and densely punctate, with interspaces shiny and smaller than puncture diameters (but ill visible under the tomentum) (Fig. 1f). Wings brownish

with dark brown venation. Legs light reddish or orange, partly covered by whitish tomentum, only tarsal claws brown, tibial spurs on middle and hind legs yellow.

**Metasoma.** Metasoma entirely reddish. T1 finely and sparsely punctate, interspaces shiny and larger than puncture diameters. T1 with lateral spots of whitish tomentum at the base and near the apex, T2–T4 with apical bands of tomentum, which are broken in the middle. T2–T4 densely but finely punctate with shiny interspaces and ill-developed depressions. T5 shiny with very fine and dense punctation, whitish tomentum on sides, pseudopygidial area short, with silvery pubescence (Fig. 1g). T6 reddish with slightly curved apex, bearing wide reddish pygidial plate, with long yellowish hair. S2 finely and sparsely punctate; interspaces wider than puncture diameters. Other sterna more finely and densely punctate. S5 wide and straight (see from side) (Fig. 1h). Processes on sides of S6 normal, with short projections, reddish.

**Male.** Body length: 7.6 mm (Fig. 1b).

**Head.** Length to width ratio = 1.2. Mandible light reddish, mandibular apex and preapical tooth dark brown. Labrum similar to that of female. Clypeus reddish, matt and with very fine and dense punctation, interspaces smaller than puncture diameters. Clypeus entirely covered by whitish tomentum. Frons black with basal part from clypeus to antennal tubercles reddish, with dense whitish hair around antennal socket, and with well-developed and sharp frontal keel. Vertex black, with sparse punctures, interspaces shiny and slightly greater than puncture diameters. Antenna reddish with flagellomeres dorsally partly brownish. Flagellomeres slightly shorter than wide (L/W ratio = 0.9), F3 a little longer than other flagellomeres (L/W ratio = 1.05), F2 longer (L/W ratio = 1.3).

**Mesosoma.** Pronotum black and entirely obscured by whitish tomentum. Mesoscutum black and with whitish tomentum laterally. Punctation coarse and dense, interspaces narrower than puncture diameters but shiny. Mesoscutellum reddish, round, densely and coarsely punctate, punctures slightly larger than on the mesoscutum, axillar tooth (free portion of axilla) long and acute but slightly shorter than mesoscutellum. Mesoscutellum with posterior margin extending over propodeum. Propodeum brownish, very finely sculptured, matt, and laterally with whitish tomentum. Mesopleuron reddish, partly obscured with dense whitish tomentum, coarsely and densely punctate, with interspaces shiny and smaller than puncture diameters (but ill visible under tomentum). Wings brownish with dark brown venation. Legs light reddish or orange, partly covered by whitish tomentum, only tarsal claws brown, tibial spurs on middle and hind legs yellow.

**Metasoma.** Metasoma entirely reddish. T1 finely and sparsely punctate, interspaces shiny and larger than puncture diameters. T1 with lateral spots of whitish tomentum at the base and near the apex, T2–T4 with apical bands of tomentum, which are broken in the middle. T2–T4 densely but finely punctate with shiny interspaces and ill-developed depressions. T5 shiny with very fine and dense punctation, whitish tomentum on sides, pseudopygidial area short, with silver pubescence. T6 reddish, bearing reddish pygidial plate, with long yellowish hair (Fig. 1i). S2–S3 finely punctate with interspaces larger than puncture diameter, with white tomentum on apex, S4–S5 with prominent thick yellowish hair on apex.

**Etymology.** All known specimens were collected in Iran: *iranicus* (-a, -um).

**Ecology.** Host and floral associations are unknown.

**Distribution.** Recently known only from two nearby localities in Iran and several specimens from other localities (however, not properly localised) from the same country.

### *Epeolus laevifrons* Bischoff, 1930

**Published records.** North Africa – Morocco, Algeria, and Turkey. It was recorded usually in mountains (High Atlas Mts.). The holotype from “Laussitz”, which means the region on border between Germany and Poland looks very similar to the specimens from Morocco and probably was wrongly labelled (Bogusch and Hadrava 2018). Lhomme et al. (2020) published an additional record from Morocco (Marrakech-Safi).

**Material examined. Morocco:** Oukaimeden, 8.VII.1975, (6 ♀), J. Gusenleitner leg., (2 ♀), A. W. Ebmer; 11.VII.1975, (1 ♂, 1 ♀), J. Gusenleitner [all P. Bogusch det.] (OLML); idem, 24.VII.1985, (1 ♀), K. Guichard [P. Bogusch det.] (KUBC); idem, 12.V.2015, (1 ♂, 1 ♀), V. Soon [P. Bogusch det.] (UTME); idem, 25.–27. VI.1987, (4 ♂, 22 ♀), M. Schwarz; idem, 25.VI.1988, (1 ♀), J. Schmidt [all P. Bogusch det.] (OLML).

### *Epeolus priesneri* sp. nov.

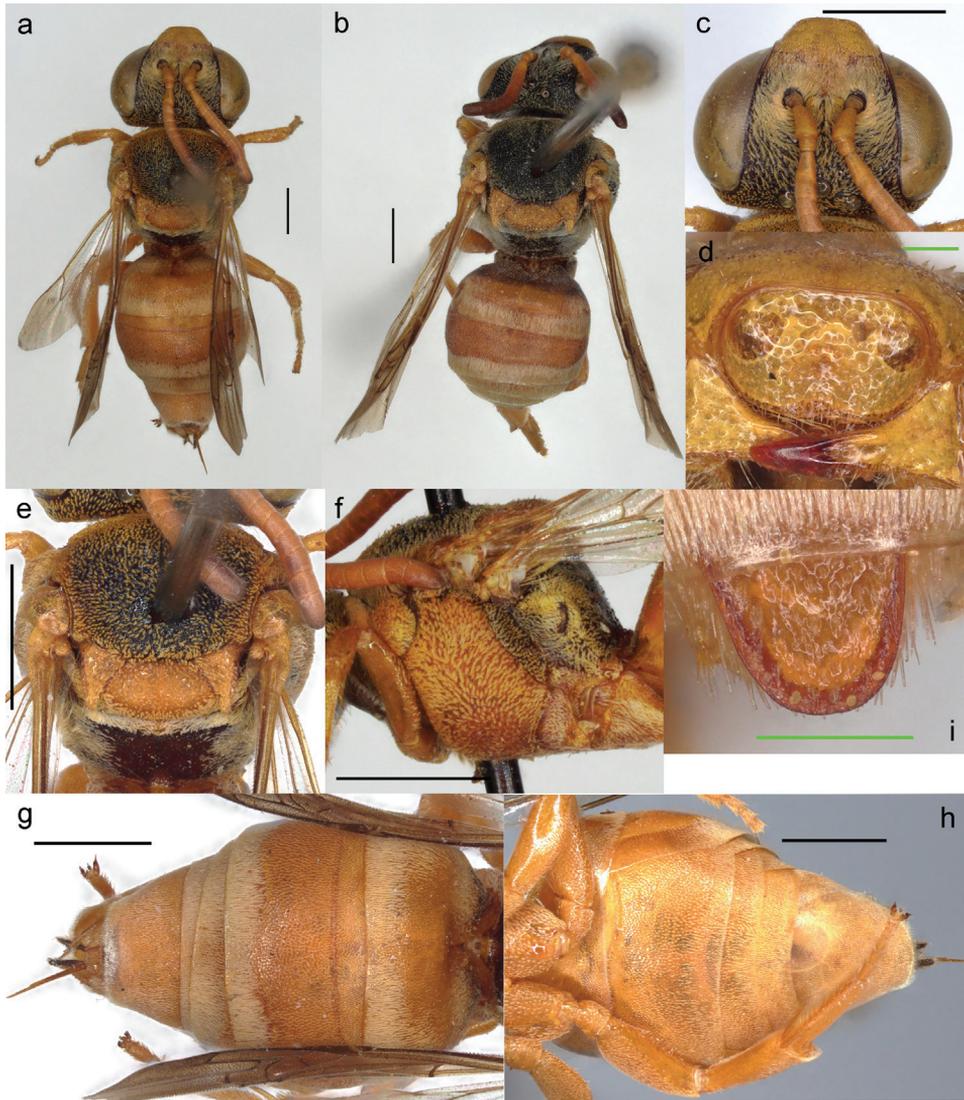
<http://zoobank.org/06083783-AEA3-43F2-A281-8EFA39156E9C>

Figure 2

**Material examined. Holotype:** ♀, Egypt: Gebel Elba, date unknown, H. Priesner leg. (KUBC).

**Paratypes: Chad:** Tibesti, Zouar, 11.3.1953, (1 ♂), K. M. Guichard leg. (KUBC); **Morocco:** 20 km east of Agdz, 20.4.1995, (1 ♀), M. Halada leg. (OLML); Road Nr. 110 between Er Rashida and Goulmina, 22.4.2017, (1 ♀), M. Snížek leg. (OLML).

**Differential diagnosis.** This species is probably closely related to *E. flavociliatus*, with which it shares the following morphological features: very small labral tubercles positioned near the apex, flat and shiny labrum (Fig. 2d), complete apical bands on the metasomal terga and elongate axillar spines (Fig. 2a). Both males and females of *E. priesneri* can be easily identified by the yellow clypeus (Fig. 2c), which is unique among the species of *Epeolus* from North Africa and the Middle East. *Epeolus priesneri* can be separated from *E. flavociliatus* by the densely punctate mesoscutellum (in *E. flavociliatus* the mesoscutellum is sparsely punctate), from both *E. subrufescens* and *E. aureovestitus*, which are both sometimes similarly coloured (Fig. 2c), by the position and size of labral tubercles (which are larger and more submedial in position in *E. aureovestitus* and *E. subrufescens*), from *E. subrufescens* also by the shape of mesoscutellum, and from also *E. aureovestitus* by the uninterrupted metasomal bands (interrupted in *E. aureovestitus*).



**Figure 2.** *Epeolus priesneri* sp. nov. **a, c–h** holotype, female **b, i** paratype, male **a, b** habitus, dorsal view **c** head, frontal view **d** labrum, frontal view **e** mesosoma, dorsal view **f** mesopleuron, lateral view **g** metasoma, dorsal view **h** ventral view **i** pygidium, dorsal view. Scale bars: 1.0 mm (**a–c, e–h**); 0.1 mm (**d, i**).

**Description. Female.** Body length: 7.5 mm (Fig. 2a).

**Head.** Length to width ratio = 1.3. Mandible yellow, mandibular apex and preapical tooth dark brown (Fig. 2c). Labrum yellow, semitransparent, shiny, coarsely and sparsely punctate, subapically with pair of small teeth separated by medial shallow emargination, sides convex (Fig. 2d). Clypeus yellow, shiny and with very fine and dense punctation in the middle, interspaces smaller or similar as puncture diameter. Lateral parts of clypeus with punctation of similar size but very sparse with large

interspaces. Face with yellow base at clypeus, then to interorbital tubercle black, with dense whitish hair around antennal socket, and with well-developed frontal keel. Vertex with fine and sparse punctures, interspaces shiny and greater than puncture diameters. Gena with a prominent, lamella-like preoccipital carina. Antenna reddish, only scape, pedicel and F1 completely yellow, last two flagellomeres with brownish colour partly. Flagellomeres slightly shorter than wide ( $L/W$  ratio = 0.9), F2 a little longer than other flagellomeres ( $L/W$  ratio = 1) (Fig. 2c).

**Mesosoma.** Pronotum reddish-brown and entirely obscured by yellowish tomentum. Mesoscutum black with yellowish tomentum, with dense punctation, interspaces narrower than puncture diameters. Mesoscutellum reddish, round, densely and coarsely punctate, punctures slightly larger than on the mesoscutum, axillar tooth (free portion of axilla) long and acute, slightly longer than mesoscutellum. Mesoscutellum with posterior margin extending over propodeum (Fig. 2e). Propodeum black, very finely sculptured on the top, the rest shiny, and laterally with yellowish tomentum. Mesopleuron reddish, entirely obscured with dense yellowish tomentum, coarsely and densely punctate, with interspaces shiny and similar in size to puncture diameters (but ill visible under the tomentum) (Fig. 2f). Wings brownish with dark brown venation. Legs light reddish or orange, tibial spurs on middle and hind legs yellow.

**Metasoma.** Metasoma entirely reddish. T1 finely and sparsely punctate, interspaces shiny and larger than puncture diameters. T1–T4 with entire bands of tomentum. T2–T4 densely but finely punctate with shiny interspaces and ill-developed depressions. T5 shiny with very fine and dense punctation, whitish tomentum on sides, pseudopygidial area short, with silver pubescence (Fig. 2f). T6 reddish with slightly curved apex, bearing reddish pygidial plate, which is not very wide, with long brownish hair. S2 coarsely and densely punctate, interspaces narrower than puncture diameters or similar in width. Other sterna more finely and densely punctate. S5 wide and straight (see from side) (Fig. 2g). Processes on sides of S6 normal, with short projections, reddish.

**Male.** Body length: 7 mm (Fig. 2b).

**Head.** Length to width ratio = 1.27. Mandible yellow, mandibular apex and preapical tooth dark brown. Labrum similar to that of female. Clypeus yellow, shiny and with very fine and dense punctation in the middle, interspaces smaller or similar as puncture diameter. Lateral parts of clypeus with punctation of similar size but very sparse with large interspaces. Frons black, with dense whitish hair around antennal socket, and with well-developed frontal keel. Vertex with fine and sparse punctures, interspaces shiny and greater than puncture diameters. Antenna reddish, only scape, pedicel and F1 completely yellow, last four flagellomeres darker, brownish. Flagellomeres slightly shorter than wide ( $L/W$  ratio = 0.85), F2 longer than other flagellomeres ( $L/W$  ratio = 1.4).

**Mesosoma.** Pronotum black and entirely obscured by yellowish tomentum. Mesoscutum black with yellowish tomentum, with dense punctation, interspaces narrower than puncture diameters. Mesoscutellum reddish, round, densely and coarsely punctate, punctures slightly larger than on the mesoscutum, axillar tooth (free portion of axilla) long and acute, slightly longer than mesoscutellum. Mesoscutellum with posterior margin extending over propodeum. Propodeum black, very finely sculptured

and shiny in the middle, and laterally with yellowish tomentum. Mesopleuron black with reddish macula in the middle, entirely obscured with dense yellowish tomentum, coarsely and densely punctate, with interspaces shiny and similar in size to puncture diameters. Wings brownish with dark brown venation. Legs light reddish or orange, only coxae black, tibial spurs on middle and hind legs yellow.

**Metasoma.** Metasoma reddish except base of T1. T1 finely and sparsely punctate, interspaces shiny and larger than puncture diameters. T1–T6 with entire bands of tomentum. T2–T4 densely but finely punctate with shiny interspaces and ill-developed depressions. T7 (pygidium) reddish with large punctures (Fig. 2i). S2 finely and densely punctate, interspaces narrower than puncture diameters or similar in width. Other sterna more finely and densely punctate. S2–S3 with white tomentum on apex, S4–S5 with prominent thick yellowish hair on apex.

**Etymology.** The species is named in dedication to Hermann Priesner (1891–1974), Austrian entomologist, specialist on Heteroptera and Thysanoptera, and the person who collected the holotype. The epithet *priesneri* is masculine and declined in the genitive case.

**Ecology.** Host and floral associations are unknown.

**Distribution.** Only four specimens were found in collections, two from Morocco, one from Egypt and Chad (Tibesti Mts.). The species probably occurs in North Africa and in Sahara, distribution south of the Sahara and in the nearest countries in Asia and South Europe is likely but yet unconfirmed.

### *Epeolus productuloides* Bogusch, 2018

**Published records.** Turkey (Bogusch 2018).

### *Epeolus productulus* Bischoff, 1930

**Published records.** Europe – Bulgaria, France, Greece, Italy, Portugal, Russia (Volgograd), Spain, Switzerland, the Middle East (Bogusch and Hadrava 2018). Bogusch (2018) reported the species from Turkey.

**Material examined. Turkey:** Nemrut, 7.–8.VI.1992, (1 ♀), M. Hradský; Karadut env., 1.6.2001, (1 ♂, 1 ♀), K. Deneš [all P. Bogusch det.] (OLML).

### *Epeolus schummeli* Schilling, 1849

Synonyms (detailed in Bogusch and Hadrava (2018)): *Epeolus ruthenicus* Radoszkowski, 1891.

**Published records.** Southern and Central Europe, where the species is rare. Recorded also in the Middle East (Bogusch and Hadrava 2018). Known from Turkey, where it

is locally numerous (Bogusch 2018). K. Warncke (unpublished records) reported this species from Turkey: Konya, Urgup/Nevsehir, and Alfken (1935) from Ankara.

**Material examined. Turkey:** Kazan-Kizilcahaman, 30.VI.1976, (1 ♂), Desmirer de Chenal; idem, 21.–22.VI.1965, (1 ♂), Holzschuh [M. Schwarz det.]; Sultan Daglari, Yalvaz env., 5.VII.1993, (1 ♀), K. Deneš [all P. Bogusch det.] (OLML).

***Epeolus seraxensis* Radoszkowski, 1893, stat. nov.**

Figure 3

*Epeolus transitorius* var. *seraxensis* Radoszkowski, 1893: 54–55 (syntypes: ♀♀, ♂♂, Serax, Turkmenistan, NHMB, ISZP).

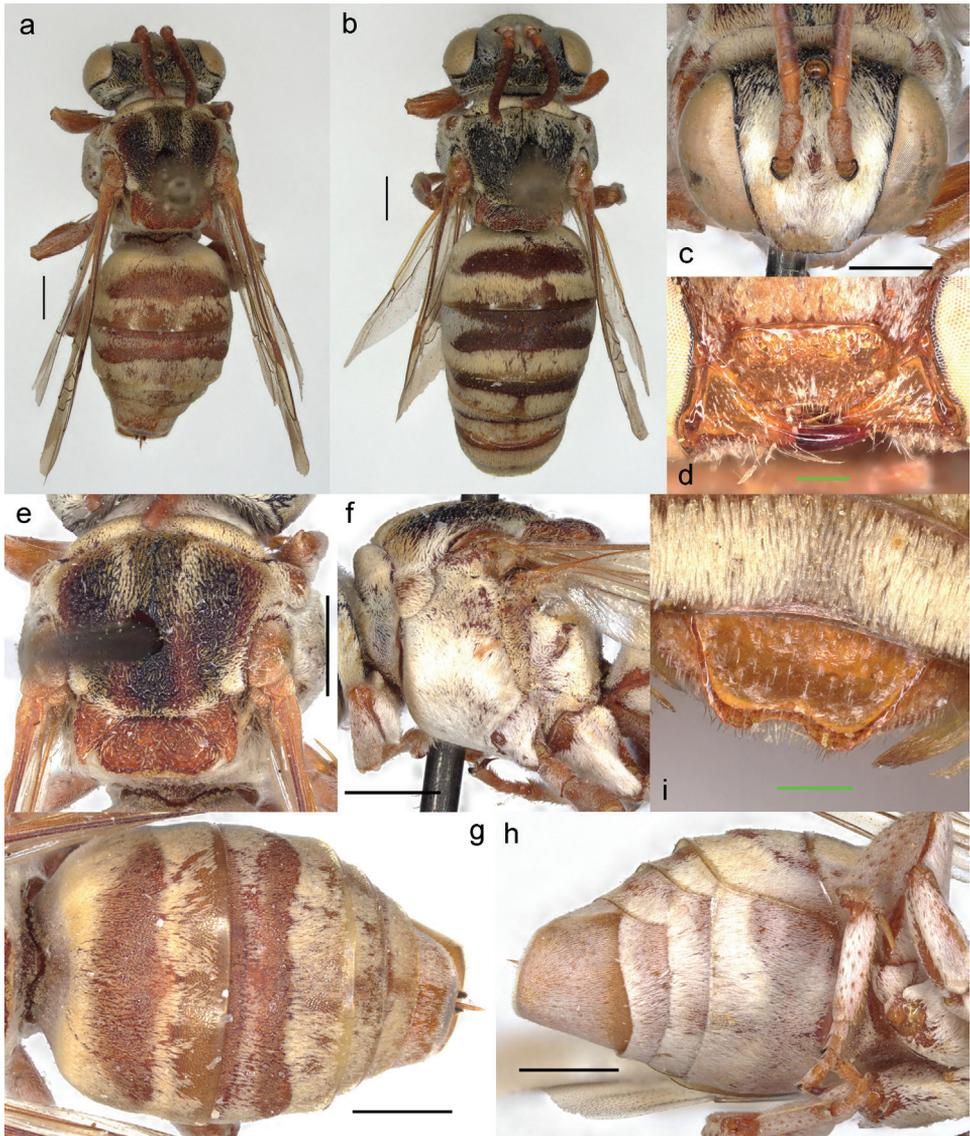
**Material examined. Syntypes:** Turkmenistan, Serax, date unknown, (1 ♂, 1 ♀), Radoszkowski's collection (NHMB), examined. The female is **designated here** as a lectotype.

**Other material. Iran:** Anaesthal, date unknown, (1 ♂), Ritter; Ghezir (Gherir), 4.X.1975, (1 ♀), collector unknown; 30 km west of Karaj, 19.VII.1975, (1 ♂, 3 ♀), 15 km south of Karaj, 21.VII.1975, (1 ♀), P. F. Torchio [all P. Bogusch det.] (OLML). **Israel:** Arad, 500 m n. m., 24.V.1975, (1 ♀), K. M. Guichard [M. Schwarz det.] (BMNH).

**Differential diagnosis.** This species is probably closely related to *E. transitorius* and *E. iranicus*, and all three species are characterised by the presence of apical (as opposed to submedial) labral tubercles (Fig. 3d) and yellowish to reddish antennal segments, especially F1 and F2 (Fig. 3c). The body is reddish in colour except the head and mesoscutum in both sexes, which are black. *Epeolus seraxensis* can be separated from *E. iranicus* by the denser tomentum on the body, which covers entire clypeus, frons, mesopleura and legs (Fig. 3a, b), and by the longer F1 (Figs 1c and 3c for comparison), and unbroken bands on the metasomal terga. The body construction in both sexes is more robust and similar to that of *E. transitorius*. The frons is densely punctate but with shiny interspaces (Fig. 3c). The male pygidium is wide and emarginated on the apical part, different from that of *E. iranicus* (Figs 1i and 3i). From *E. transitorius*, this species differs as follows: in *E. seraxensis* the metasomal bands are uninterrupted and most of body is brownish in colour and covered with whitish tomentum. The length of F1 in both sexes and shape of male pygidium support the treatment of *E. seraxensis* as a separate species. It is also close to *Epeolus laticauda* Bischoff, 1930 by dense tomentum on sterna, unbroken tergal bands, wide and bilobed pygidial plate (but in *E. seraxensis* wider and more distinctly bilobed). In *E. laticauda* labral tubercles are positioned very close to apex, not on the apical margin as in *E. seraxensis*.

**Description. Female.** Body length: 9 mm (Fig. 3a).

**Head.** Length to width ratio = 1.3. Mandible light reddish, mandibular apex and preapical tooth dark brown (Fig. 3c). Labrum light reddish, semitransparent, shiny, coarsely and sparsely punctate, apically with pair of small teeth separated by medial shallow emargination, apex with prominent whitish hair, with sides convex (Fig. 3d).



**Figure 3.** *Epeolus seraxensis* stat. nov. **a, c–h** lectotype, female **b, i** syntype, male **a, b** habitus, dorsal view **c** head, frontal view **d** labrum, frontal view **e** mesosoma, dorsal view **f** mesopleuron, lateral view **g** metasoma, dorsal view **h** ventral views **i** pygidium, dorsal view. Scale bars: 1.0 mm (**a–c, e–h**); 0.1 mm (**d, i**).

Clypeus reddish, matt and with very fine and dense punctation, interspaces smaller than puncture diameters. Clypeus entirely covered by whitish tomentum. Face black with basal part from clypeus to antennal tubercles reddish, with dense whitish hair around antennal socket, and with well-developed and sharp frontal keel. Vertex black, with dense punctures, interspaces shiny and smaller than puncture diameters. Antenna reddish with flagellomeres dorsally partly brownish. Flagellomeres slightly longer than wide ( $L/W$  ratio = 1.2), F2 longer than other flagellomeres ( $L/W$  ratio = 1.7) (Fig. 3c).

**Mesosoma.** Pronotum reddish-brown and entirely obscured by whitish tomentum. Mesoscutum black, reddish only laterally, with whitish tomentum laterally and white paramedian bands reaching from the base somewhere behind the middle part of mesoscutum. Punctuation coarse and dense, interspaces narrower than puncture diameters but shiny. Mesoscutellum reddish, round, densely and coarsely punctate, punctures twice as larger as on mesoscutum, axillar tooth (free portion of axilla) long and acute but slightly shorter than mesoscutellum. Mesoscutellum with posterior margin extending over propodeum (Fig. 3e). Propodeum reddish, very finely sculptured, matt, dorsally and laterally with whitish tomentum. Mesopleuron reddish, entirely obscured with dense whitish tomentum, coarsely and densely punctate, with interspaces shiny and smaller than puncture diameters (but ill visible under the tomentum) (Fig. 3f). Wings brownish with dark brown venation. Legs light reddish or orange, on dorsal side entirely covered by whitish tomentum, only tarsal claws brown, tibial spurs on middle and hind legs yellow.

**Metasoma.** Metasoma entirely reddish. T1 finely and sparsely punctate, interspaces shiny and larger than puncture diameters. T1 with whitish tomentum at the base and an unbroken apical band, T2–T4 with unbroken apical bands of tomentum. T2–T4 densely but finely punctate with shiny interspaces and well-developed depressions. T5 shiny with very fine and dense punctuation, whitish tomentum on sides, pseudopygidial area short, with silver pubescence (Fig. 3g). T6 reddish with slightly curved apex, bearing wide reddish pygidial plate, with long yellowish hair. S2 finely and sparsely punctate, interspaces wider than puncture diameters. Other sterna more finely and densely punctate. S2–S4 entirely covered by whitish tomentum. S5 wide and straight (see from side) (Fig. 3h). Processes on sides of S6 normal, with short projections, reddish.

**Male.** Body length: 10 mm (Fig. 3b).

**Head.** Length to width ratio = 1.25. Mandible light reddish, mandibular apex and preapical tooth dark brown. Labrum similar to that of female. Clypeus reddish, matt and with very fine and dense punctuation, interspaces smaller than puncture diameters. Clypeus entirely covered by whitish tomentum. Frons black with basal part from clypeus to antennal tubercles reddish, with dense whitish hair around antennal socket, and with well-developed and sharp frontal keel. Vertex black, with dense punctures, interspaces shiny and smaller than puncture diameters. Antenna reddish with flagellomeres dorsally partly brownish. Flagellomeres slightly shorter than wide (L/W ratio = 0.95), F2 longer than other flagellomeres (L/W ratio = 1.4).

**Mesosoma.** Pronotum reddish-brown with black line in the middle, and entirely obscured by whitish tomentum. Mesoscutum black, with whitish tomentum laterally and ill-developed white paramedian bands reaching from the base to the middle part of mesoscutum. Punctuation coarse and dense, interspaces narrower than puncture diameters but shiny. Mesoscutellum reddish, round, densely and coarsely punctate, punctures twice as large as on mesoscutum, axillar tooth (free portion of axilla) long and acute but slightly shorter than mesoscutellum. Mesoscutellum with posterior margin extending over propodeum. Propodeum black, very finely sculptured, matt, dorsally and laterally with whitish tomentum. Mesopleuron black, entirely obscured with dense whitish tomentum, coarsely and densely punctate, with interspaces shiny and smaller than

puncture diameters (but ill visible under the tomentum). Wings brownish with dark brown venation. Legs light reddish or orange, on dorsal side entirely covered by whitish tomentum, only tarsal claws brown, tibial spurs on middle and hind legs yellow.

**Metasoma.** Metasoma dark brown. T1 finely and sparsely punctate, interspaces shiny and larger than puncture diameters. T1 with whitish tomentum at the base and an unbroken apical band, T2 with C-shaped pattern of whitish tomentum on each side, apically connecting into an unbroken apical band. T3–T6 with unbroken apical bands of tomentum. T2–T5 densely but finely punctate with shiny interspaces and well-developed depressions. T7 reddish, bearing reddish wide and apically bilobed pygidial plate, with long brown hair on basal part (Fig. 3i). S2–S3 finely punctate with interspaces larger than puncture diameter, with white tomentum on apex, S4–S5 with prominent thick yellowish hair on apex.

**Distribution.** Turkmenistan (type location), in the Middle East currently reported from Iran and Israel.

### *Epeolus subrufescens* Saunders, 1908

Synonyms (detailed in Bogusch and Hadrava (2018)): *Epeolus diodontus* Cockerell, 1934.

**Published records.** Known from the Middle East and North Africa: Algeria, Egypt, Iran, Jordan, Libya, Sudan, Syria, Turkey, and UAE, (Bogusch and Hadrava 2018).

**Material examined.** **Algeria:** Biskra, 24.IV.1897, (1 ♀), collector unknown [P. Bogusch det.] (BMNH). **Egypt:** Dahshur, 16.V.1958, (1 ♂, 1 ♀), W. Pulawski; Serapeum (Md. el Sharqiya), 4.VII.1949, (1 ♀), 22.V.1949, (1 ♂), 27.V.1949, (3 ♂, 1 ♀), 26.IX.1949, (1 ♀), D. B. Baker [all D. B. Baker det.] (KUBC). **Iran:** prov. Garm-sarc, Semran, Eyoaneh, Kalateh-Hoseinabad, 2.VI.2005, (1 ♂), O. Berg [P. Bogusch det.] (OLML). **Morocco:** Tanger, „Mus. Drews“, (1 ♀), date and collector unknown [P. Bogusch det.] (NHMC). **Oman:** Al Wusta, Wadi Rawnah, 14.IV.2013, (2 ♂, 3 ♀), K. Deneš; El Aiun, Saguia el Hanra, 24.X.1943, (1 ♂), collector unknown [all P. Bogusch det.] (OLML). **Palestine:** Negev, III.1919, (1 ♀), collector unknown [P. Bogusch det.] (OLML). **Syria:** Al-Muharram env., 7.VI.2000, (2 ♂), K. Deneš; Homs al Muhamam env., 7.VI.2000, (1 ♀), K. Deneš; Palmyra, 6.VI.2000, (1 ♂), K. Deneš; north of Raqqa, Rasafa ar, 5.VI.2000, (2 ♀), K. Deneš [all P. Bogusch det.] (OLML). **UAE:** Abu Dhabi, 13.IV.1988, (1 ♀), I. L. Hammer [D. B. Baker det.] (BMNH); Abu Dhabi International Airport, 3.IV.1991, (1 ♀), I. Hammer; Al Ain (I'con), 8.IV.1993, (1 ♀), I. Hammer [all P. Bogusch det.] (KUBC); Hatta, 14.IV.1990, (1 ♀), I. L. Hammer [D. B. Baker det.] (BMNH); Jebel Hafit, 18.III.2009, (1 ♂), E. Scheuchl [P. Bogusch det.] (OLML); Liwa, 22.IX.1985, (1 ♀), J. N. B. Brown [D. B. Baker det.] (BMNH); idem, 17.I.1986, (1 ♂), 23.III.1990, (1 ♂, 1 ♀), I. Hammer; Suweihan road, 24.III.1987, (2 ♂), 9.IV.1988, (1 ♀), I. Hammer [D. B. Baker det.] (KUBC); idem, 12.IV.1988, (1 ♂), I. L. Hammer [D. B. Baker det.] (BMNH).

***Epeolus transitorius* Eversmann, 1852**

Synonyms (detailed in Bogusch and Hadrava (2018)): *Epeolus julliani* Pérez, 1884.

**Published records.** South and Central Europe, the Middle East and North Africa (known from Cyprus, Egypt, Jordan, Morocco, Syria, and Turkey), Russia (to the Urals) (Levchenko et al. 2017), Iran: Shakhuh/Elburs (Popov 1967), Turkmenistan (Bischoff 1930), Uzbekistan (Morawitz 1875), and Kazakhstan (Bogusch and Hadrava 2018). In most of the distribution range quite common and numerous (Bogusch 2018). Lhomme et al. (2020) published records from Morocco (Marrakech-Safi; Drâa-Tafilet).

**Material examined. Cyprus:** Akrotiri bay, 12.VII.1943, (1 ♂, 3 ♀), 18.VII.1965, (1 ♀), 19.VII.1933, (1 ♀), 10.VII.1943, (1 ♂); Enkomi, 20.VI.1947, (1 ♂, 1 ♀), collector unknown [all P. Bogusch det.] (OLML). **Iran:** coastal plain between Chalus and Shahsavār, 1.–4.VI.1965, 19 ex., 11.–12.VI.1965, 14 ex., 17.VI.1965, 1 ex., 21.–22.VI.1965, 12 ex., 24.VI.1965, 2 ex., 27.VI.1965, 6 ex., 30.VI.1965, 2 ex., 6.VIII.1965, 1 ex., 13.VIII.1965, 8 ex., 22.–23.VIII.1965, 2 ex., 3.IX.1965, 2 ex., 7.–9.IX.1965, 13 ex., 14.IX.1965, 4 ex., 23.–25.IX.1965, 6 ex., 27.IX.1965, 3 ex., 30.X.1965, 1 ex., 19.V.1966, 1 ex., 22.V.1966, 1 ex., 27.V.1966, 4 ex., 29.V.1966, 2 ex., 31.V.1966, 2 ex., 1.–2.VI.1966, 2 ex., 9.VI.1966, 2 ex., 11.VI.1966, 1 ex., 20.VI.1966, 2 ex., 24.VI.1966, 1 ex., 28.–29.VI.1966, 3 ex., 30.IX.1966, 1 ex., 5.–6.X.1966, 4 ex., 2.–3.VI.1967, 19 ex., 7.–9.VI.1967, 26 ex., 11.–14.VI.1967, 24 ex., 20.VI.1967, 3 ex., 22.VI.1967, 1 ex., 27.VI.1967, 2 ex., 14.VII.1967, 1 ex., 24.VII.1967, 1 ex., 1.VIII.1967, 1 ex., 5.VIII.1967, 1 ex., 22.–23.VIII.1967, 3 ex., 26.VIII.1967, 1 ex., 29.–30.VIII.1967, 2 ex., 26.–27.IX.1967, 2 ex., 29.X.1967, 1 ex., all D. B. Baker [all D. B. Baker det.] (KUBC). **Turkey:** Didim, 26.V.1986, (2 ♂), K. Guichard [D. B. Baker det.] (KUBC); Mersin/Içel, Tanyeri/Erzinçan, Konya (K. Warncke, unpublished hand-written data); Nemrut, Karadut, 2.VII.1993, (1 ♂), K. Deneš [P. Bogusch det.] (OLML).

***Epeolus turcicus* Bogusch, 2018**

**Published records.** Turkey (Bogusch 2018).

***Epeolus variegatus* (Linnaeus, 1758)**

Synonyms (detailed in Bogusch and Hadrava (2018)): *Apis murcaria* Christ, 1791, *A. festiva* Christ, 1791, *Epeolus pictus* Nylander, 1848, *E. productus* Thomson, 1870

**Published records.** Widely distributed across Europe (Scheuchl 2000; Amiet et al. 2007; Bogusch and Hadrava 2018). Its distribution extends to the Middle East and

North Africa, and probably further into Asia. Lhomme et al. (2020) published a record from Morocco (Marrakech-Safi).

**Material examined. Iran:** Elburs, 25.VII.1977, (2 ♂), J. Gusenleitner [P. Bogusch det.] (OLML); 75 km south of Chalus, 25.VII.1977, (3 ♂), 13.VII.1979, (1 ♂); Polur-fö, 21.VII.1977, (1 ♂); Puloun, 11.VII.1965, (1 ♀), K. Warncke [all P. Bogusch det.] (OLML). **Morocco:** High Atlas, Tichka Pass Süd, 13.VII.1975, (1 ♀), A. W. Ebmer; Oukameiden, 28.VI.1987, (1 ♀), M. Schwarz; Pass north-east of Mesnrie, 3.VIII.1987, (1 ♀), M. Schwarz [all P. Bogusch det.] (OLML). **Turkey:** Avanos/Kirşekur, 20 km north of Yukşekova/Hakkari, collector and date unknown [P. Bogusch det.] (OLML).

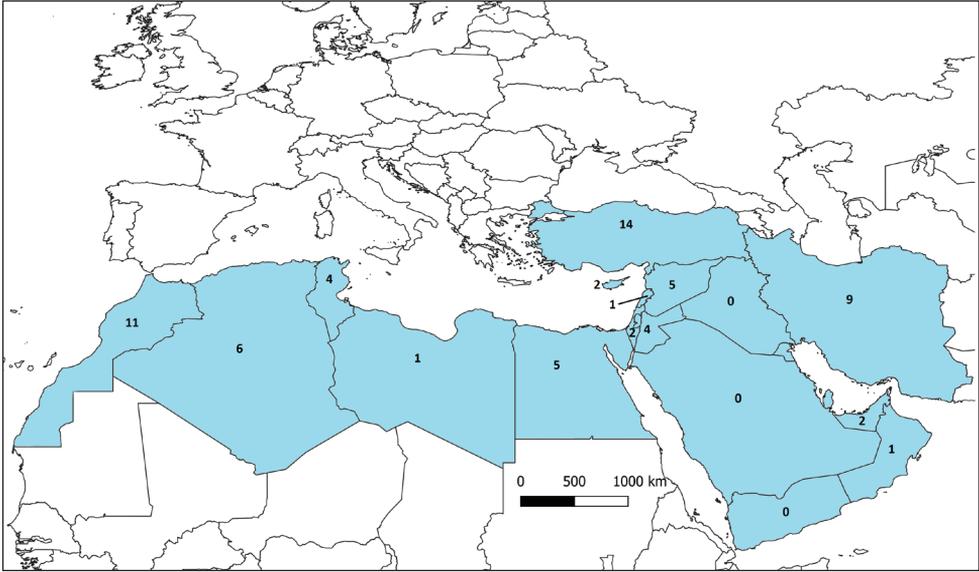
### *Epeolus warnckei* Bogusch, 2018

**Published records.** Turkey (Bogusch 2018).

## Discussion

In total, 23 species of the genus *Epeolus* are known to occur in the studied region. With *Triepeolus tristis* (Smith, 1854) known from Turkey, 24 species of the tribe Epeolini occur in the Middle East and North Africa. Of these species, several are widely distributed in the whole or in most of the region (e.g. *E. subrufescens* and *E. variegatus*) while others have more restricted distributions. For example, several species occur in North Africa only (*E. collaris*, *E. priesneri* sp. nov.) and several are known from both sides of the Mediterranean (Southwestern Europe and North Africa) (*E. aureovestitus*, *E. fallax*, *E. ibericus*, *E. intermedius*). Other species occur only in Asia (*E. bischoffi*, *E. eriwanensis*, *E. iranicus* sp. nov.), including three species known from only one country (Turkey: *E. productuloides*, *E. turcicus*, *E. warnckei*). Several species widely distributed in Europe also occur in the Middle East – *E. cruciger*, *E. schummeli*, *E. transitorius* and *E. variegatus*. Regarding the number of records, *E. flavociliatus* is probably the most common and numerous species (recorded from seven countries) in the region, especially in North Africa. Another species, *E. subrufescens*, was recorded in nine countries, but represented by far fewer specimens. Most of the records presented in this study support the previously known distribution records of the species. Records of *E. ibericus* and *E. intermedius* from Morocco are the first finds of both species outside of Europe.

The numbers of species known from the studied countries vary from 0 to 14. The highest numbers of species were recorded in Turkey (14), Morocco (11) and Iran (9), while only one species was recorded in Lebanon, Libya, Oman, and Palestine. No species of *Epeolus* were recorded from Bahrain, Iraq, Kuwait, Qatar, Saudi Arabia and Yemen. The diversity of *Epeolus* in every country is the result of multiple factors. First, larger countries and countries with heterogeneous landscape (as Turkey, Morocco or Cyprus) are expected to host more species than countries, where the majority of the



**Figure 4.** Map of the study region with numbers of species of *Epeolus* known from each country.

landscape is covered by deserts (Saudi Arabia), or small countries (Bahrain, Kuwait). Second, the political situation in some countries makes impossible or exceedingly difficult to collect insects legally and safely, resulting in marked differences in the reported numbers of species between some neighbouring countries. Studied countries with the numbers of known species of *Epeolus* are shown in Fig. 4.

After three species described from Turkey (*E. productuloides*, *E. turcicus* and *E. warnckei* by Bogusch (2018) and one from Portugal and Spain (*E. ibericus* by Bogusch in Bogusch and Hadrava (2018)), two new species were described from the Middle East and North Africa in this study. First, *E. iranicus* was discovered in Iran and is in general appearance similar to *E. transitorius*. This species is certainly a new valid species and differs in more characters from the related *E. seraxensis* and *E. transitorius*. Four specimens of *E. priesneri* were discovered in two collections. This species is unique for the first sight with its completely red metasoma and yellow labrum and apex of clypeus. Regarding the distribution, it seems to occur inside and around Sahara. Last, *E. seraxensis* was put as a valid species, while it was described as a subspecies of *E. transitorius*. Its differences from *E. transitorius* and *E. iranicus* are large and thus it is necessary to regard *E. seraxensis* as a new species. However, the original description is incomplete and does not include photos or drawings of the specimens, the re-description of both sexes and photos of whole specimens and main characters are included in this study, as well as the lectotype is designated.

Further studies on *Epeolus* of the Middle East and North Africa are needed to bring additional information on the distribution of the species and on the changes in their distribution. Several specimens in collections of OLML from eastern part of Turkey are probably representatives of species new to science but the differences from related

species are minute and more material for further descriptions is needed. Last, most of *Epeolus* have unknown hosts, such as widely distributed species in Europe and/or the Middle East and North Africa (*E. flavociliatus*, *E. transitorius*). Finally, more information is needed about the ecology of the treated species (in terms of phenology and bee and floral host associations) to explain their distributions and identify which species are potentially more susceptible to habitat loss.

## Acknowledgements

I would like to thank to all owners and curators of collections, from which I could study material of *Epeolus* and to Yulia Astafurova (Saint Petersburg, Russia) and Thomas Onuferko (Toronto, Canada) for their helpful comments. Special thanks belong to Marc Taylor (London, UK) for help with specimens from BMNH and to Maxim Proshchalykin (Vladivostok, Russia) for their advice and initial feedback on this manuscript. The study was supported by the Specific Research Grant from University of Hradec Králové Nr. 2102/2020.

## References

- Alfken JD (1914) Beitrag zur Kenntnis der Bienenfauna von Algerien. Mémoires de la Société Entomologique Belgique 22: 185–237.
- Alfken JD (1935) Beitrag zur Kenntnis der Bienenfauna von Kleinasien. Entomologische Rundschau (Stuttgart) 52: 110–111, 129–132, 148–152, 153–162.
- Amiet F, Herrmann M, Müller A, Neumeyer R (2007) Apidae 5. *Ammobates*, *Ammobatoides*, *Anthophora*, *Biastes*, *Ceratina*, *Dasygoda*, *Epeoloides*, *Epeolus*, *Eucera*, *Macropis*, *Melecta*, *Melitta*, *Nomada*, *Pasites*, *Tetralonia*, *Thyreus*, *Xylocopa*. Fauna Helvetica 20. Centre suisse de cartographie de la faune (CSCF), Neuchâtel, 356 pp.
- Batra SWT (1984) Solitary bees. Scientific American 250: 86–93. <https://doi.org/10.1038/scientificamerican0284-120>
- Bischoff H (1930) Beitrag zur Kenntnis paläarktischer Arten der Gattung *Epeolus*. Deutsche entomologische Zeitschrift 1930: 1–15. <https://doi.org/10.1002/mmnd.193019300102>
- Bogusch P (2018) Three new species and new records of cuckoo bees of the genus *Epeolus* in Turkey (Hymenoptera: Apidae: Nomadinae). Acta Entomologica Musei Nationalis Pragae 58: 127–135. <https://doi.org/10.2478/aemnp-2018-0010>
- Bogusch P (2019) *Epeolus ladakhensis* sp. nov. – a new species of cuckoo bee from India. Oriental Insects 54: 265–272. <https://doi.org/10.1080/00305316.2019.1621227>
- Bogusch P, Hadrava J (2018) The bees of the genera *Epeolus* Latreille, 1802 and *Triepeolus* Robertson, 1901 (Hymenoptera: Apidae: Nomadinae: Epeolini) of Europe: taxonomy, identification key, distribution, and ecology. Zootaxa 4437(1): 1–60. <https://doi.org/10.11646/zootaxa.4437.1.1>

- Bossert S, Murray EA, Almeida EAB, Brady SG, Blaimer BB, Danforth BN (2019) Combining transcriptomes and ultraconserved elements to illuminate the phylogeny of Apidae. *Molecular Phylogenetics and Evolution* 130: 121–131. <https://doi.org/10.1016/j.ympev.2018.10.012>
- Eardley CD (1990) The genus *Epeolus* Latreille from subsaharan Africa (Hymenoptera: Anthophoridae). *Journal of Natural History* 25: 711–731. <https://doi.org/10.1080/00222939100770471>
- Levchenko TV, Byvaltsev AM, Proshchalykin MYu (2017) Family Apidae. In: Lelej AS, Proshchalykin MYu, Loktionov VM (Eds) Annotated catalog of the Hymenoptera of Russia. Volume I. Symphyta and Aculeata. Proceedings of the Zoological Institute RAS, Supplement 5: 300–332.
- Lhomme P, Michez D, Christmann S, Scheuchl E, El Abdouni I, Hamroud L, Ihsane O, Sentil A, Smaili MC, Schwarz M, Dathe HH, Straka J, Pauly A, Schmid-Egger C, Patiny S, Terzo M, Müller A, Praz C, Risch S, Kasperek M, Kuhlmann M, Wood TJ, Bogusch P, Ascher JS, Rasmont P (2020) The wild bees (Hymenoptera: Apoidea) of Morocco. *Zootaxa* 4892: 1–159. <https://doi.org/10.11646/zootaxa.4892.1.1>
- Michener CD (2007) *The Bees of the World* (2<sup>nd</sup> edn.). Johns Hopkins University Press, Baltimore, [xvi + [i] +] 953 pp. [+ 20 pls]
- Morawitz F (1875) A Travel to Turkestan by the Member-Founder of the Society A. P. Fedtschenko, accomplished from the Imperial Society of Naturalists, Anthropologists, and Ethnographers on a Commission from the General-Governor of Turkestan K. P. von Kaufmann (Issue 9). Vol. II. Zoogeographical Investigations. Pt. V. (Division 7). Bees (Mellifera). Pt. I [Apidae genuinae]. *Izvestiya Imperatorskogo Obshchestva Lyubiteley Estestvoznaniya, Antropologii i Ethnografii* 21(3): 1–160. [in Russian]
- Onuferko TM (2017) Cleptoparasitic Bees of the Genus *Epeolus* Latreille (Hymenoptera: Apidae) in Canada. *Canadian Journal of Arthropod Identification* 30: 1–62. <https://doi.org/10.3752/cjai.2017.30>
- Onuferko TM (2018) A revision of the cleptoparasitic bee genus *Epeolus* Latreille for Nearctic species, north of Mexico (Hymenoptera, Apidae). *ZooKeys* 755: 1–185. <https://doi.org/10.3897/zookeys.755.23939>
- Onuferko TM (2019) A review of the cleptoparasitic bee genus *Epeolus* Latreille, 1802 (Hymenoptera: Apidae) in the Caribbean, Central America and Mexico. *European Journal of Taxonomy* 563: 1–69. <https://doi.org/10.5852/ejt.2019.563>
- Onuferko TM, Bogusch P, Ferrari R, Packer L (2019) Phylogeny and biogeography of the cleptoparasitic bee genus *Epeolus* (Hymenoptera: Apidae) and cophylogenetic analysis with its host bee genus *Colletes* (Hymenoptera: Colletidae). *Molecular Phylogenetics and Evolution* 141: e106603. <https://doi.org/10.1016/j.ympev.2019.106603>
- Pesenko YA (1974) Contributions to the fauna and ecology of bees (Hymenoptera, Apoidea) in the Lower Don basin. Report IV. The family Anthophoridae. *Entomologicheskoe Obozrenie* 53: 324–333. [in Russian]
- Popov VB (1967) The bees (Hymenoptera, Apoidea) of Middle Asia and their associations with angiosperm plants. *Trudy Zoologicheskogo Instituta Akademii Nauk SSSR* 38: 11–329. [in Russian]

- Radoszkowski O (1893) Faune hyménoptérologique transcaspienne. (Suite et Fin). Horae Societatis Entomologicae Rossicae 27(1/2): 38–81.
- Rightmyer MG (2008) A review of the cleptoparasitic bee genus *Triepeolus* (Hymenoptera: Apidae). Part I. Zootaxa 1710: 1–170. <https://doi.org/10.11646/zootaxa.1710.1.1>
- Scheuchl E (2000) Illustrierte Bestimmungstabellen der Wildbienen Deutschlands und Österreichs. Band I. Anthophoridae. 2. erweiterte Auflage. Erwin Scheuchl, Velden, 158 pp.
- Westrich P (2018) Die Wildbienen Deutschlands. Eugen Ulmer, Stuttgart, 824 pp.