Journal of Insect Biodiversity and Systematics
ISSN: 2423-8112
2026 | 12 (04), 759–772
Website: https://jibs.modares.ac.ir
Contents list: https://www.biotaxa.org/jibs
https://doi.org/10.48311/jibs.12.04.759

Original Article

A contribution to the knowledge of wild bees (Hymenoptera: Apoidea) from Georgia (Sakartvelo), with twenty-four new country records

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https://zoobank.org/urn:lsid:zoobank.org:8A1152A8-948F-49EC-AA5A-3341BD26218C

Academic Editor
Ali Asghar Talebi

Received
June 29, 2026

Revised
September 04, 2026

Accepted
September 17, 2026

Published online
September 26, 2026

ABSTRACT. An intensive survey of wild bees (Hymenoptera; Apoidea, Apiformes) was conducted during the summer of 2022 in the vicinity of Tbilisi, Eastern Georgia. Sampling was carried out across a range of habitats representing different phytocenoses at elevations between 735 to 1,310 meters above sea level. A total of 57 species of wild bees belonging to 23 genera and six families were identified. Of these, 24 species are recorded from Georgia for the first time. These findings contribute to a better understanding of the diversity and distribution of the wild bees in the region, and provide valuable baseline data for future taxonomic, faunistic, and conservation studies.

KEYWORDS: Apiformes, Bees, Caucasus, Faunistics, Pollinators, Taxonomy

Citation: Chubinidze, M., Ljubomirov, T., Murvanidze, M. & Japoshvili, G. (2026) A contribution to the knowledge of wild bees (Hymenoptera: Apoidea) from Georgia (Sakartvelo), with twenty-four new country records. *Journal of Insect Biodiversity and Systematics*, 12 (04), 759–772.

INTRODUCTION

Bees (Hymenoptera: Apoidea: Apiformes) are a diverse and ecologically important group of pollinator insects, with more than 20,400 described species worldwide (Michener 2007; Engel et al. 2020). They play a fundamental role in the pollination of both agricultural and wild flowering plants, thereby sustaining agricultural productivity and maintaining the structure and functioning of natural ecosystems. The decline of bee populations is now widely recognized as one of the major challenges to ecosystem health and food security (Kevan & Viana 2003; Thakur 2012). Their decreasing number significantly reduces not only the productivity of agricultural crops, but also the process of pollination and reproduction for the majority of flowering plants growing in natural ecosystems. Global concern about the decline in abundance and biomass of pollinator bees and bumblebees has been expressed several times and is acknowledged as one of the global ecological problems (Kevan & Viana 2003).

Georgia lies within the Caucasus Ecoregion, one of the world's biodiversity hotspots, characterized by exceptional species richness, high levels of endemism, and remarkable landscape heterogeneity (Williams et al. 2006; IUCN 2016; Antropov et al. 2017). Despite this biological significance, the wild bee fauna of Georgia remains insufficiently studied. Studies of the bees in Georgia were conducted intensively during the 1980s by Skhirtladze (1981, 1988), with additional contributions published later (Skhirtladze 2004, 2008). According to the most recent data, the bee fauna of Georgia comprises 413 species belonging to 46

ISSN 2423-8112 – **Published by** Tarbiat Modares University | **Owner** The Entomological Society of Iran

genera and six families (Kirkitadze & Japoshvili 2015; Kirkitadze et al. 2017; Japoshvili & Ljubomirov, 2023; Tarkhnishvili et al. 2025). However, the latest checklist of Georgian wild bees (Kirkitadze & Japoshvili 2015) emphasized the limited investigations in the eastern part of the country, despite this area being distinguished by considerable environmental heterogeneity and ecosystem diversity (Akhalkatsi & Tarkhnishvili 2012; Gagnidze & Davitadze 2010; Maruashvili 1964).

The present study aims to help fill this knowledge gap by documenting the wild bee fauna of the diverse arid habitats surrounding Tbilisi in eastern Georgia. In addition to providing new faunistic data, the study expands the known distribution of several species and contributes to a more comprehensive understanding of the diversity and composition of the Georgian bee fauna.

MATERIALS AND METHODS

The material for the present study was collected during July 2022. Field surveys were conducted in different types of habitats with different phytocenoses at elevations ranging from 735 to 1,310 m above sea level. Adult wild bees were collected using sweeping nets close to the soil surface, as well as directly from flowering host plants. Collected bees were preserved in 96% alcohol containers, labeled with collection locality, geographic coordinates, elevation, collection date, and host plant information, when available. All specimens examined in the present study were collected by the first author (M. Chubinidze). As a next step, specimens were mounted and identified to species level using the taxonomic keys of Medvedev (1978), Michener (2007), and Michez et al. (2019), among others. Sampling was conducted at five locations in the vicinity of Tbilisi, with two sampling sites selected at different elevations within each locality:

KIKETI *(i)* 1092 m a.s.l., 41°39'03"N 44°39'41"E; *(ii)* 1255 m a.s.l. 41°39'45"N 44°39'00"E; secondary steppe and forest formations.

KOJORI *(i)* 1310 m a.s.l., 41°39'34"N 44°41'26"E; *(ii)* 1195 m a.s.l., 41°39'11"N 44°42'33"E; mesophilic forest, roadsides and meadows.

TKHINVALI *(i)* 735 m a.s.l., 41°44'38"N 44°41'26"E; *(ii)* 802 m a.s.l., 41°44'29"N 44°41'29"E; steppe formations.

TSAVKISI *(i)* 952 m a.s.l., 41°40'23"N 44°44'04"E; *(ii)* 1014 m a.s.l., 41°39'46"N 44°44'35"E; Open arid forest and meadow phytocenosis.

TSKNETI *(i)* 997 m a.s.l., 41°41'34"N 44°41'40"E; *(ii)* 1027 m a.s.l., 41°41'06"N 44°40'59"E; forest and meadow phytocenosis.

Photographs of specimens were taken using an Axiocam 208 color digital camera installed on a ZEISS Stemi 508 stereomicroscope. The zoogeographical distribution of the recorded species follows GBIF (2023) and Antropov et al. (2017). All voucher specimens are deposited in the Entomological Collection of Ivane Javakhishvili Tbilisi State University (TSU), Tbilisi, Georgia. New records for Georgia are marked with one asterisk (*).

RESULTS

Order Hymenoptera Linnaeus, 1758

Superfamily Apoidea Latreille, 1802

Family Andrenidae Latreille, 1802

Genus *Andrena* Fabricius, 1775

***Andrena atrata* Friese, 1887 *** (Fig. 1A)

Material examined. 1♀, Tskneti, 1027 m a.s.l., 28.vii.2022.

General distribution. Western Palaearctic.

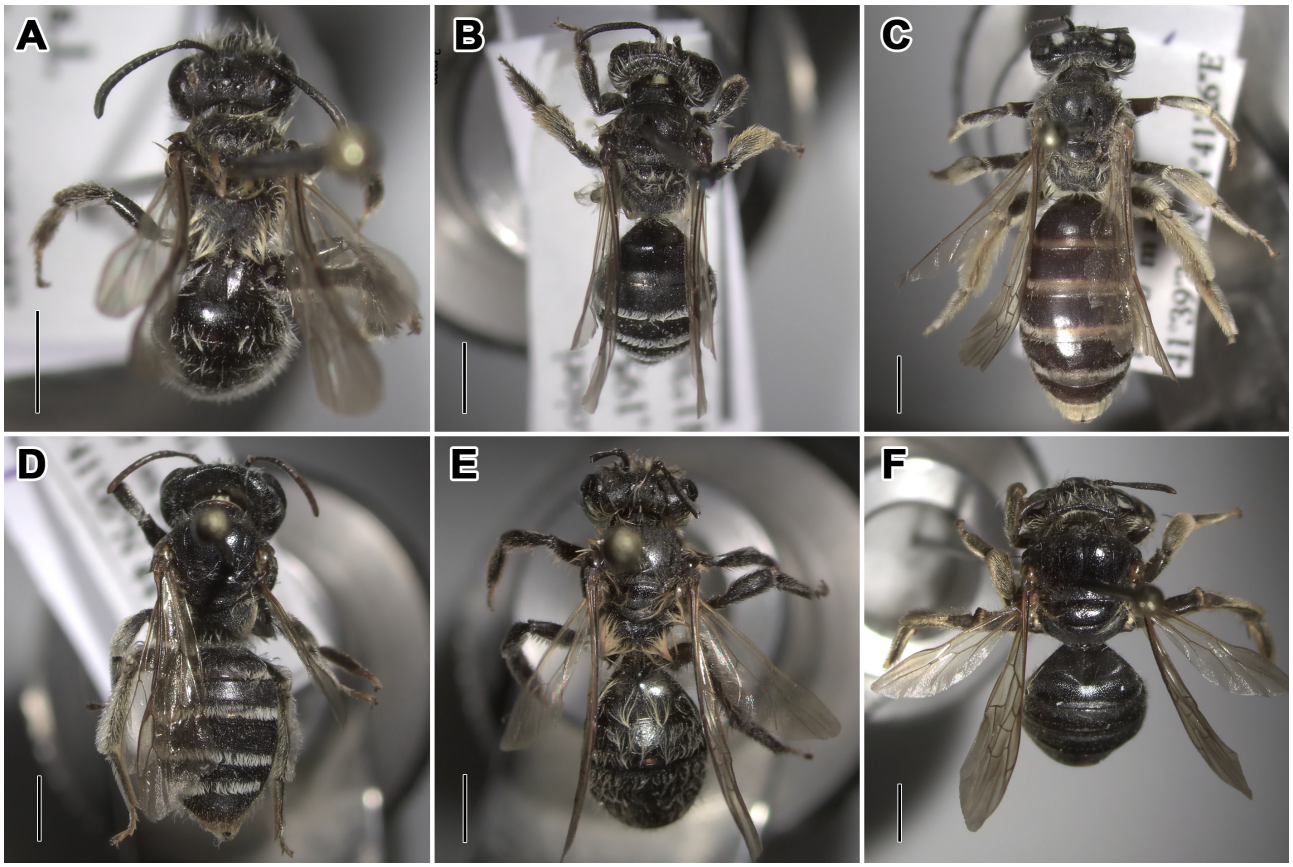

Figure 1. Habitus of wild bee species (Hymenoptera: Apoidea) recorded from Georgia. **A.** *Andrena atrata* Friese, 1887; **B.** *Andrena gravida* Imhoff, 1832; **C.** *Andrena elegans* Giraud, 1863; **D.** *Andrena variabilis* F. Smith, 1853; **E.** *Andrena varians* (W. Kirby, 1802); **F.** *Melitturga praestans* Giraud, 1861.

***Andrena bicolor* Fabricius, 1775**

Material examined. 1♀, Tkhinvali, 735 m a.s.l., 26.vii.2022; 1♀, Kojori, 1310 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

***Andrena braunsiana* Friese, 1887**

Material examined. 1♀, Tkhinvali, 735 m a.s.l., 26.vii.2022.

General distribution. Western Palaearctic.

***Andrena gravida* Imhoff, 1832 *** (Fig. 1B)

Material examined. 2♀♀, Kiketi, 1255 m a.s.l., 23.vii.2022; Kojori, 1310 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

***Andrena elegans* Giraud, 1863 *** (Fig. 1C)

Material examined. 1♀, Kojori, 1310 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

***Andrena labiata* Fabricius, 1781**

Material examined. 1♀, Tskneti, 1027 m a.s.l., 28.vii.2022.

General distribution. Western Palaearctic.

***Andrena thoracica* (Fabricius, 1775)**
Material examined. 1♀, Kojori, 1195 m a.s.l., 21.vii.2022; 1♀, 1310 m a.s.l., 21.vii.2022.
General distribution. Western Palaearctic.

***Andrena variabilis* F. Smith, 1853 *** (Fig. 1D)
Material examined. 3♀♀, Tsavkisi, 1014 m a.s.l., 25.vii.2022; 1♀, Tskneti, 1027 m a.s.l., 28.vii.2022.
General distribution. Western Palaearctic.

***Andrena varians* (W. Kirby, 1802) *** (Fig. 1E)
Material examined. 1♀, Tskneti, 1027 m a.s.l., 28.vii.2022.
General distribution. Western Palaearctic.

Genus *Melitturga* Latreille, 1809

***Melitturga clavicornis* (Latreille 1808)**
Material examined. 1♀, Tkhinvali, 735 m a.s.l., 26.vii.2022.
General distribution. Western Palaearctic.

***Melitturga praestans* Giraud, 1861 *** (Fig. 1F)
Material examined. 1♀, Tsavkisi, 1014 m a.s.l., 25.vii.2022.
General distribution. Western Palaearctic.

Genus *Panurginus* Nylander, 1848

***Panurginus herzi* F. Morawitz, 1891 *** (Fig. 2A)
Material examined. 2♀♀, Tkhinvali, 802 m a.s.l., 26.vii.2022; 1♂, Kojori, 1310 m a.s.l., 25.vi.2022.
General distribution. Western Palaearctic.

***Panurginus labiatus* (Eversmann, 1852)**
Material examined. 2♂♂, Tskneti, 997 m a.s.l., 28.vii.2022.
General distribution. Western Palaearctic.

***Panurginus lactipennis* Friese, 1897 *** (Fig. 2B)
Material examined. 1♂, Tskneti, 997 m a.s.l., 28.vii.2022.
General distribution. Western Palaearctic.

***Panurginus sculpturatus* F. Morawitz, 1872 *** (Fig. 2C)
Material examined. 1♀, Kojori, 1195 m a.s.l., 21.vii.2022.
General distribution. Western Palaearctic.

Family Apidae Latreille, 1802
Genus *Amegilla* Friese, 1897

***Amegilla velocissima* (Fedtschenko, 1875) *** (Fig. 2D)
Material examined. 1♀, Tkhinvali, 735 m a.s.l., 26.vii.2022.
General distribution. Western Palaearctic.

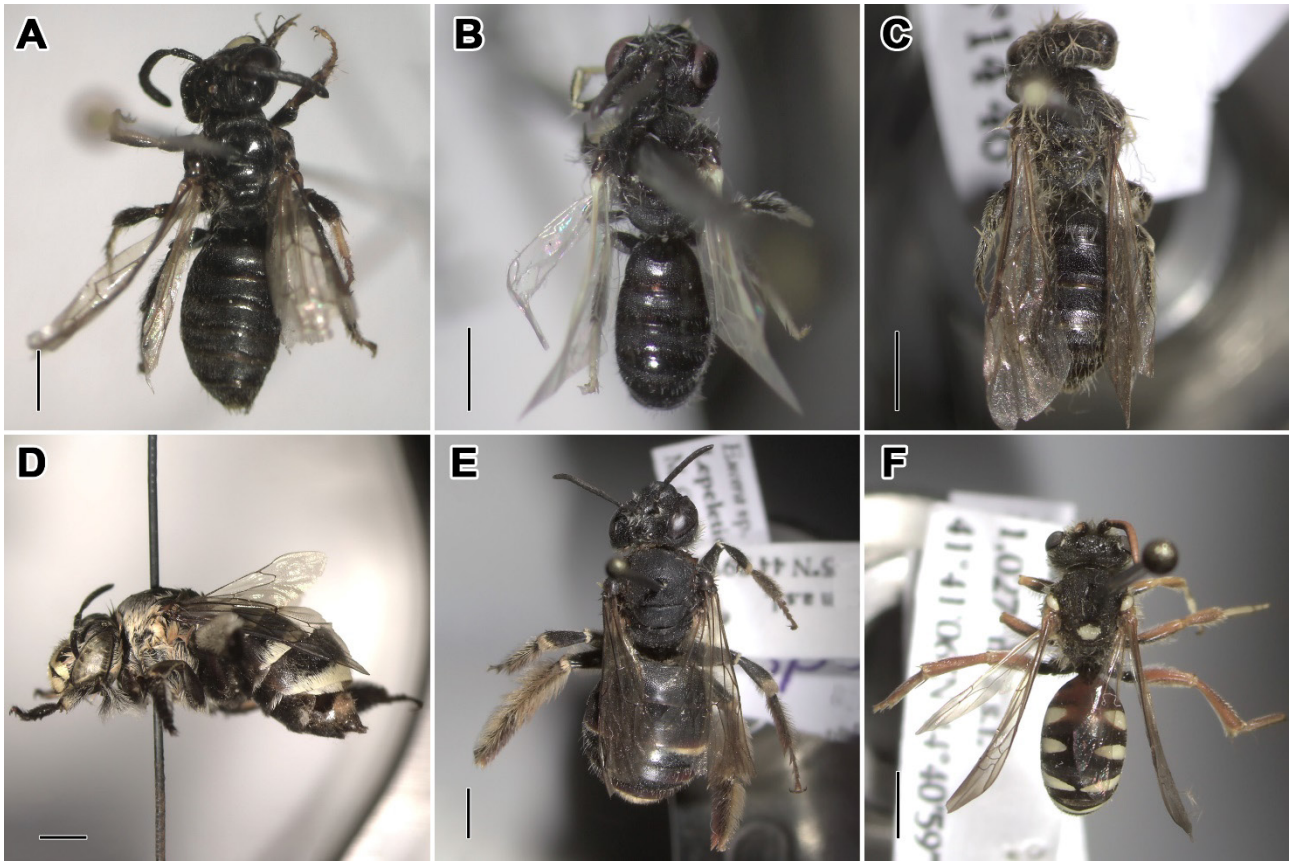

Figure 2. Habitus of wild bee species (Hymenoptera: Apoidea) recorded from Georgia. **A.** *Panurginus herzi* F. Morawitz, 1891; **B.** *Panurginus lactipennis* Friese, 1897; **C.** *Panurginus sculpturatus* F. Morawitz, 1872; **D.** *Amegilla velocissima* (Fedtschenko, 1875); **E.** *Eucera nigrilabris* Lepeletier de Saint-Fargeau, 1841; **F.** *Nomada lucidula* Schwarz, 1967.

Genus *Bombus* Latreille, 1802

Bombus hortorum (Linnaeus, 1761)

Material examined. 1♀, Kojori, 1195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Bombus pascuorum (Scopoli, 1763)

Material examined. 2♀♀, Kiketi, 1.092 m a.s.l., 23.vii.2022; 1♂, Tsavkisi, 952 m a.s.l., 25.vii.2022; 1♀, Kojori, 1195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Bombus terrestris (Linnaeus, 1758)

Material examined. 2♀♀, Tsavkisi, 952 m a.s.l., 25.vii.2022.

General distribution. Western Palaearctic.

Genus *Eucera* Scopoli, 1770

Eucera clypeata Erichson, 1835

Material examined. 1♀, Tkhinvali, 735 m a.s.l., 26.vii.2022.

General distribution. Western Palaearctic.

***Eucera nigrilabris* Lepeletier de Saint-Fargeau, 1841 *** (Fig. 2E)

Material examined. 1♀, Kiketi, 1092 m a.s.l., 23.vii.2022.

General distribution. Western Palaearctic.

Genus *Nomada* Scopoli, 1770

***Nomada lucidula* Schwarz, 1967 *** (Fig. 2F)

Material examined. 1♂, Tskneti, 1027 m a.s.l., 28.vii.2022.

General distribution. Western Palaearctic.

Genus *Xylocopa* (Latreille, 1802)

***Xylocopa iris* (Christ, 1791)**

Material examined. 1♂, Tskneti, 997 m a.s.l., 28.vii.2022.

General distribution. Western Palaearctic.

***Xylocopa valga* (Gerstaecker, 1872)**

Material examined. 3♀♀, Tkhinvali, 735 m a.s.l., 26.vii.2022; Tsavkisi, 1014 m a.s.l., 25.vii.2022; Kiketi, 1,092 m a.s.l., 23.vii.2022.

General distribution. Western Palaearctic.

***Xylocopa violacea* (Linnaeus, 1758)**

Material examined. 2♂♂, Tkhinvali, 802 m a.s.l., 26.vii.2022; 2♂♂, Kojori, 1310 m - 1.195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Family Colletidae Lepeletier de Saint-Fargeau, 1841

Genus *Hylaeus* Fabricius, 1793

***Hylaeus hyalinatus* F. Smith, 1842**

Material examined. 1♂, Kojori, 1310 m a.s.l., 21.vii.2022; 1♀, Kojori, 1195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

***Hylaeus leptocephalus* (F. Morawitz, 1870) *** (Fig. 3A)

Material examined. 1♀, Kiketi, 1092 m a.s.l., 23.vii.2022.

General distribution. Western Palaearctic.

Family Halictidae Thomson, 1869

Genus *Halictus* Latreille, 1804

***Halictus patellatus* F. Morawitz, 1873**

Material examined. 1♀, Kiketi, 1255 m a.s.l., 23.vii.2022; 1♀, Kojori, 1195 m a.s.l., 21.vii.2022; 1♀, Tsavkisi, 952 m a.s.l., 25.vii.2022.

General distribution. Western Palaearctic.

***Halictus quadricinctus* (Fabricius, 1776)**

Material examined. 1♀. Tkhinvali, 802 m a.s.l., 26.vii.2022.

General distribution. Western Palaearctic.

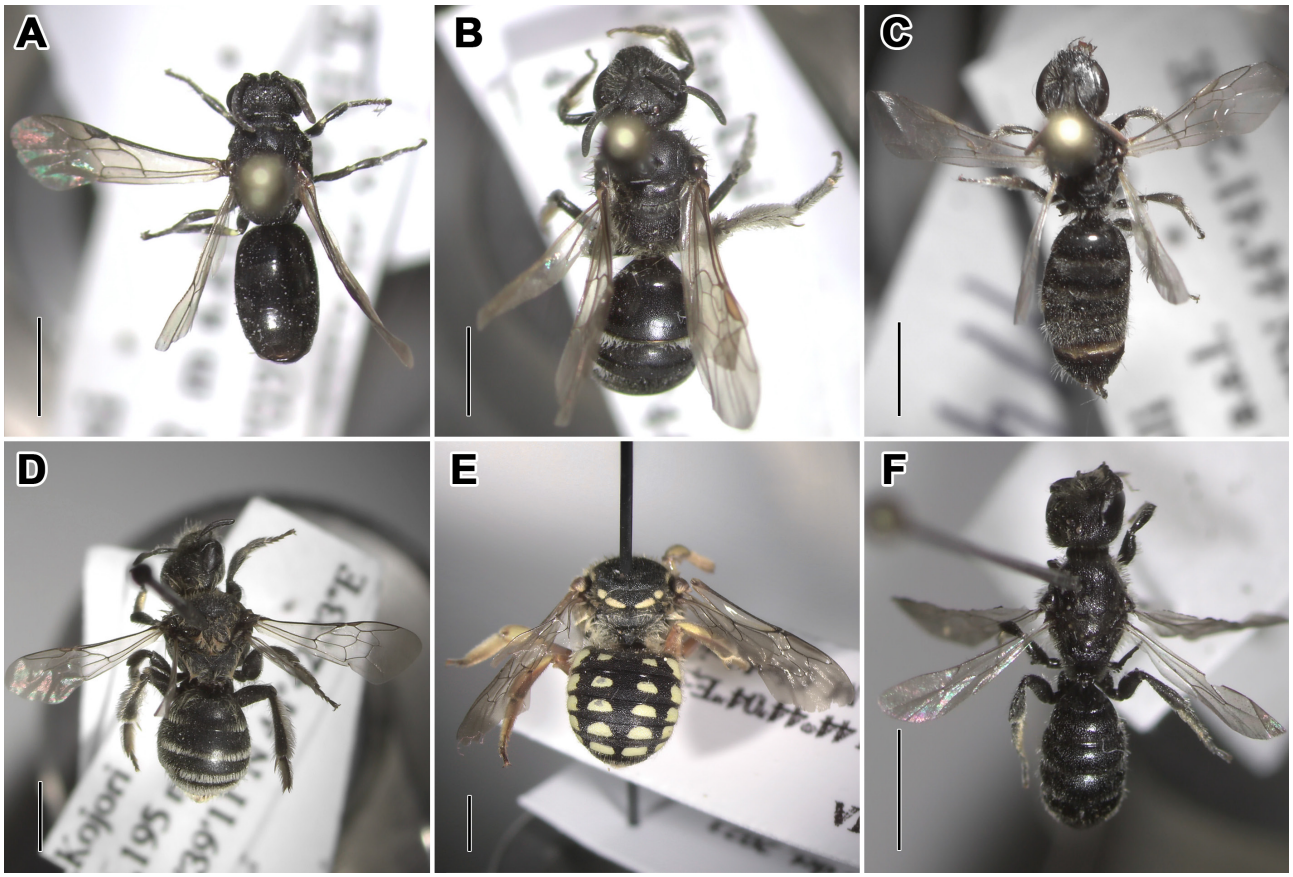

Figure 3. Habitus of wild bee species (Hymenoptera: Apoidea) recorded from Georgia. **A.** *Hylaeus leptocephalus* (F. Morawitz, 1870); B. *Lasioglossum caspicum* (F. Morawitz, 1873); **C.** *Lasioglossum lineare* (Schenck, 1868); **D.** *Rophites algirus* Perez, 1895; **E.** *Anthidium loti* Perris, 1852; **F.** *Chelostoma distinctum* (Stoeckhert, 1929).

Halictus resurgens Nurse, 1903

Material examined. 4♀♀, Tsavkisi, 952 m a.s.l., 25.vii.2022; 1♀, Tsavkisi, 1014 m a.s.l., 25.vii.2022; 2♀♀, Kojori, 1310 m a.s.l., 21.vii.2022; 1♂, Kiketi, 1255 m a.s.l., 23.vii.2022.

General distribution. Western Palaearctic.

Halictus sexcinctus (Fabricius, 1775)

Material examined. 2♂♂, Kiketi, 1255 m a.s.l., 23.vii.2022.

General distribution. Western Palaearctic.

Halictus simplex Blüthgen, 1923

Material examined. 1♀, Kiketi, 1255 m a.s.l., 23.vii.2022.

General distribution. Western Palaearctic.

Genus *Lasioglossum* Curtis, 1833

Lasioglossum caspicum (F. Morawitz, 1873) * (Fig. 3B)

Material examined. 1♀, Tsavkisi, 952 m a.s.l., 25.vii.2022; 1♀, Kiketi, 1255 m a.s.l., 23.vii.2022.

General distribution. Western Palaearctic.

***Lasioglossum discum* (F. Smith, 1853)**

Material examined. 1♀, Kojori, 1310 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

***Lasioglossum leavigatum* (W. Kirby, 1802)**

Material examined. 2♂♂, Kiketi, 1092 m a.s.l., 23.vii.2022.

General distribution. Western Palaearctic.

***Lasioglossum lineare* (Schenck, 1868) *** (Fig. 3C)

Material examined. 1♀, Tkhinvali, 735 m a.s.l., 26.vii.2022.

General distribution. Western Palaearctic.

Comment. The record reported by Astafurova et al. (2024) is not supported by the original publication or by any voucher specimen.

***Lasioglossum marginatum* (Brullé, 1833)**

Material examined. 1♀, Tskneti, 1027 m a.s.l., 28.vii.2022; 8♀♀, Tskneti, 997 m a.s.l., 28.vii.2022; 1♀. Tsavkisi, 952 m a.s.l., 25.vii.2022; 1♀. Kiketi, 1092 m a.s.l., 23.vii.2022; 1♀, Tkhinvali, 735 m a.s.l., 26.vii.2022.

General distribution. Western Palaearctic.

Genus *Pseudoapis* W. Kirby, 1900

***Pseudoapis diversipes* (Latreille, 1806)**

Material examined. 1♂, Tsavkisi, 952 m a.s.l., 25.vii.2022.

General distribution. Western Palaearctic.

Genus *Rophites* Spinola, 1807

Rophites algirus* Perez, 1895 (Fig. 3D)

Material examined. 1♀, Tkhinvali, 735 m a.s.l., 26.vii.2022.

General distribution. Western Palaearctic.

Family Megachilidae Latreille, 1802

Genus *Anthidium* Fabricius, 1805

***Anthidium loti* Perris, 1852 *** (Fig. 3E)

Material examined. 1♀, Tsavkisi, 952 m a.s.l., 25.vii.2022.

General distribution. Western Palaearctic.

***Anthidium manicatum* (Linnaeus, 1758)**

Material examined. 1♂, Kojori, 1310 m a.s.l., 25.vii.2022.

General distribution. Western Palaearctic.

Genus *Trachusa* Panzer, 1804

***Trachusa byssina* (Panzer, 1798)**

Material examined. 1♂, Kojori, 1195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Genus *Lithurgus* Berthold, 1827

Lithurgus chrysurus Fonscolombe, 1834

Material examined. 1♀, Kiketi, 1255 m a.s.l., 23.vii.2022; 1♀.1♂, Tsavkisi, 1014 m a.s.l., 25.vii.2022; 1♀, Tsavkisi, 952 m a.s.l., 25.vii.2022; 1♀, Kojori, 1310 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Genus *Coelioxys* Latreille, 1809

Coelioxys afra Lepeletier de Saint-Fargeau, 1841

Material examined. 1♀, Tkhinvali, 802 m a.s.l., 26.vii.2022.

General distribution. Western Palaearctic.

Coelioxys echinata A. Förster, 1853 * (Fig. 4A)

Material examined. 1♀, Kojori, 1195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Coelioxys elongatus Lepeletier de Saint-Fargeau, 1841 * (Fig. 4B)

Material examined. 1♀, Kojori, 1195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Genus *Megachile* Latreille, 1802

Megachile leachella Curtis, 1828

Material examined. 1♀, Tsavkisi, 1014 m a.s.l., 25.vii.2022.

General distribution. Western Palaearctic.

Megachile octosignata Nylander, 1852

Material examined. 1♀, Kiketi, 1255 m a.s.l., 23.vii.2022.

General distribution. Western Palaearctic.

Megachile versicolor F. Smith, 1844 * (Fig. 4E)

Material examined. 1♀, Tsavkisi, 952 m a.s.l., 25.vii.2022; 1♀, Kojori, 1310 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Genus *Chelostoma* Latreille, 1809

Chelostoma distinctum (Stoeckhert, 1929) * (Fig. 3F)

Material examined. 1♂, Kojori, 1310 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Chelostoma florisomne (Linnaeus, 1758)

Material examined. 1♀, Tsavkisi, 1014 m a.s.l., 25.vii.2022; 1♀, Kojori, 1310 m. a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

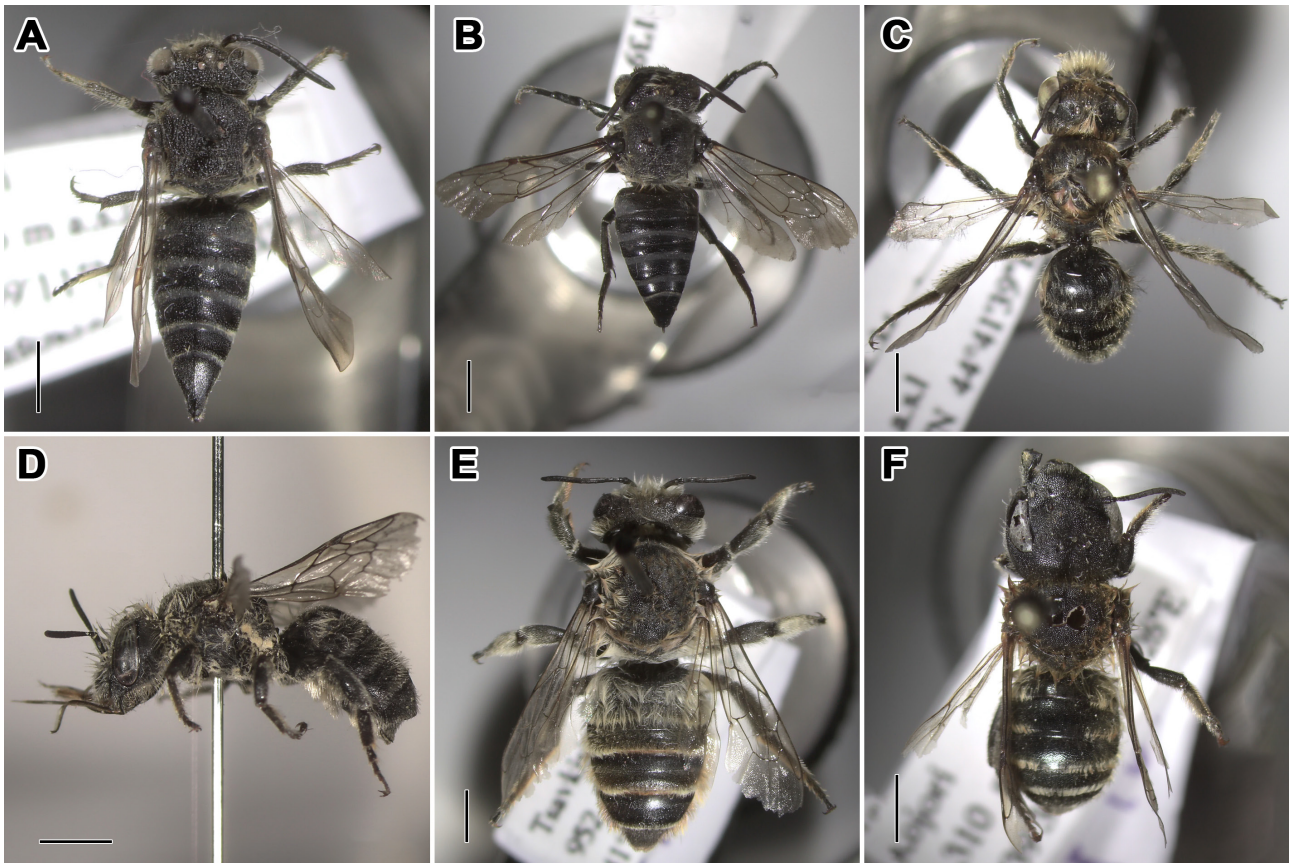

Figure 4. Habitus of wild bee species (Hymenoptera: Apoidea) recorded from Georgia. **A.** *Coelioxys echinata* Förster, 1853; **B.** *Coelioxys elongatus* epeletier de Saint-Fargeau, 1841; **C.** *Hoplitis adunca* (Panzer, 1798); **D.** *Hoplitis claviventris* (Thomson, 1872); **E.** *Megachile versicolor* F. Smith, 1844; **F.** *Osmia aurulenta* (Panzer, 1799).

Genus *Heriades* Spinola, 1807

Heriades truncorum (Linnaeus, 1758)

Material examined. 1♀,1♀, Kojori, 1310 m. a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Genus *Hoplitis* Klug, 1807

Hoplitis adunca (Panzer, 1798) * (Fig. 4C)

Material examined. 1♂, Kojori, 1195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Hoplitis claviventris (Thomson, 1872) * (Fig. 4D)

Material examined. 1 ♀, Kojori, 1195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Hoplitis leucomelana (W. Kirby, 1802)

Material examined. 1♀, Kojori, 1195 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Genus *Osmia* Panzer, 1806

***Osmia aurulenta* (Panzer, 1799) *** (Fig. 4F)

Material examined. 1♀, Kojori, 1310 m a.s.l., 21.vii.2022.

General distribution. Western Palaearctic.

Family Melittidae Schenck, 1866

Genus *Macropis* Panzer, 1809

***Macropis fulvipes* (Fabricius, 1804)**

Material examined. 1♀. Tkhinvali, 735 m a.s.l., 26.vii.2022.

General distribution. Western Palaearctic.

DISCUSSION

The present study was conducted in a poorly investigated part of the Caucasus biodiversity hotspot, covering predominantly arid and semi-arid landscapes of eastern Georgia. A total of 57 species of wild bees belonging to 23 genera and six families were recorded, including 24 species recorded from Georgia for the first time. The high proportion of new country records obtained during a relatively limited survey indicates that the wild bee fauna of Georgia remains substantially underdocumented. From a biogeographical perspective, the species newly recorded from Georgia in the present study are predominantly elements of the Western Palaearctic fauna. Although the geographical limits of the Western Palaearctic vary somewhat among authors, the Caucasus is included within the Western Palaearctic framework commonly applied to wild bees (Patiny et al. 2009). Thus, the new records reported here primarily represent extensions or additions to the documented distribution of Western Palaearctic species rather than biogeographically unexpected elements. A broader zoogeographical analysis of the entire Georgian wild bee fauna, however, is beyond the scope of the present study.

Among the newly recorded species, Andrenidae was the most species-rich family, with nine species, whereas Colletidae was represented by only one new country record. The relatively high number of previously unrecorded *Andrena* species may therefore reflect not only the diversity of the genus in Georgia but also the limited taxonomic and faunistic investigation of this group in the country. Species richness varied among the sampling localities. The highest number of species was recorded at Kojori (*ii*), where seven species were collected, whereas the lowest diversity was observed at Tkhinvali (*ii*), and Tskneti (*i*), with only one species recorded at each locality. Among the newly recorded species, the family Andrenidae was the most species-rich with nine species, whereas the family Colletidae was represented by a single newly recorded species. The results of the present study demonstrate that the majority of newly recorded species belong to the genus *Andrena*, reflecting its high diversity and the insufficient knowledge of this taxonomically challenging group in Georgia.

Although 425 wild bee species had previously been recorded from Georgia (Japoshvili & Ljubomirov 2023), the 24 new country records reported in the present study increase the known fauna to 449 species. The discovery of this number of additional species during a single survey demonstrates that the country's bee fauna remains incompletely documented. Further faunistic surveys, complemented by molecular studies, will be particularly important for resolving taxonomically challenging species groups and revealing additional diversity that may remain undetected using morphology alone. Further molecular studies would also be valuable for resolving the taxonomic status and improving species identification within taxonomically challenging groups.

Georgia's topographic complexity, broad elevational range, and diverse climatic and vegetation zones provide a wide variety of habitats and biogeographical conditions that are likely to support additional undocumented species. Further targeted surveys across different regions and habitats, together with continued taxonomic revision, are therefore needed to obtain a more complete understanding of the diversity and distribution of Georgian wild bees.

AUTHOR CONTRIBUTIONS

The authors confirm their contribution to the paper as follows: M. Chubinidze: Collection of specimens during the field excursion, laboratory processing, and partial taxonomic identification of species. T. Ljubomirov: Taxonomic identification of species and confirmation of some species; M. Murvanidze: leadership of field expeditions and laboratory work; G. Japoshvili: Coordination and leadership of field expeditions, taxonomic classification of species, and revision of scientific manuscripts.

FUNDING

This research was funded by Shota Rustaveli National Science Foundation of Georgia (Grant No. PHDF-22-713).

AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited in the Entomology Collection of the Tbilisi State University of Georgia.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study only included arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

GENERATIVE AI STATEMENT

No generative AI tools were used in the preparation of this paper.

ACKNOWLEDGMENTS

Our sincere thanks are extended to Tbilisi State University for its institutional support. We also gratefully acknowledge the Shota Rustaveli National Science Foundation of Georgia for funding this research. The authors also gratefully acknowledge the anonymous reviewers for their constructive comments and suggestions, which helped improve the manuscript.

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مطالعهٔ زنبورهای گرده‌افشان وحشی (Hymenoptera: Apoidea) گرجستان (ساکارت‌وِلُ)، با بیست و چهار گزارش جدید کشوری

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ویراستار علمی
علی‌اصغر طالبی

دریافت: ۰۸ تیر ۱۴۰۵
ویرایش: ۱۳ شهریور ۱۴۰۵
پذیرش: ۲۶ شهریور ۱۴۰۵
انتشار: ۰۴ مهر ۱۴۰۵

چکیـده: یک بررسی جامع از زنبورهای گرده‌افشان وحشی (Hymenoptera; Apoidea, Apiformes) در تابستان سال ۱۴۰۱ در اطراف تفلیس، شرق گرجستان انجام شد. نمونه‌برداری در مجموعه‌ای از زیستگاه‌ها که نمایانگر جوامع گیاهی مختلف در ارتفاعات بین ۷۳۵ تا ۱۳۱۰ متر بالاتر از سطح دریا بود، صورت گرفت. در مجموع ۵۷ گونه زنبور وحشی متعلق به ۲۳ جنس و شش خانواده شناسایی شد. از این تعداد، ۲۴ گونه برای اولین بار از گرجستان گزارش می‌شود. این یافته‌ها به درک بهتر تنوع و توزیع زنبورهای وحشی در منطقه کمک می‌کند و داده‌های پایه‌ای ارزشمندی برای مطالعات آینده در زمینه‌های تاکسونومی، فونوستیک و حفاظت فراهم می‌آورد.

واژگـان کلیدی: Apiformes، فونستیک، گرده‌افشان‌ها، قفقاز، زنبورهای گرده‌افشان، تاکسونومی