

Apidological gleanings I: Mount Verena in the Sette Comuni Plateau (Hymenoptera, Apoidea, Anthophila)

Spigolature apidologiche I: il Monte Verena nell'Altopiano dei Sette Comuni (Imenotteri, Apoidea, Anthophila)

PAOLO FONTANA¹, LIVIA ZANOTELLI²

Riassunto - Vengono presentati i dati di alcune raccolte di campo effettuate a fine estate, tra la metà di agosto e l'inizio di settembre 2025, sul versante meridionale del Monte Verena, nell'Altopiano dei Sette Comuni in provincia di Vicenza (Veneto, Italia). I campionamenti, effettuati tra 1460 e 2000 m di quota, hanno permesso l'individuazione di 24 specie di Apoidea Anthophila e tra queste di ben 16 specie del genere *Bombus*. Il popolamento del Monte Verena sembra ben caratterizzato con alcune specie particolarmente presenti e abbondanti nella parte sommitale ed altre prevalentemente alle quote inferiori. Di particolare interesse risulta il ritrovamento di una popolazione di *Bombus* (*Megabombus*) *gerstaeckeri* Morawitz, 1882, una tra le specie del genere *Bombus* Latreille, 1802 più localizzate in Europa e particolarmente legata alle fioriture di varie specie del genere *Aconitum* L.. Dal punto di vista tassonomico gli Autori recepiscono la recente separazione a livello specifico tra *Bombus* (*Alpigenobombus*) *wurflenii* Radoszkowski, 1914 e *Bombus* (*Alpigenobombus*) *mastrucatus* Gerstaecker, 1869 e, adottando la suddivisione sottospecifica attuale, assegnano la popolazione del Monte Verena a *B. (Alpigenobombus) mastrucatus mastrucatus* Gerstaecker, 1869.

PAROLE CHIAVE: Apoidea Anthophila, *Bombus gerstaeckeri*, *B. mastrucatus*, *Aconitum*, Altopiano dei Sette Comuni, Monte Verena.

Abstract - Data are presented from some field collections conducted in late summer, between mid-August and early September 2025, on the southern slope of Mount Verena, in the Altopiano dei Sette Comuni in the province of Vicenza (Veneto region, Italy). The samplings, conducted between 1,460 and 2,000 m above sea level, identified 24 species of Apoidea Anthophila, including 16 species of the genus *Bombus*. The population of Mount Verena appears well-characterized, with some species particularly present and abundant at the summit and others predominantly at lower altitudes. Of particular interest is the discovery of a significant population of *Bombus* (*Megabombus*) *gerstaeckeri* Morawitz, 1882, one of

¹ Edmund Mach Foundation, Technology Transfer Centre - 38098 San Michele all'Adige (TN), Italy; e-mail: paolo_api.fontana@fmach.it

² Edmund Mach Foundation, Technology Transfer Centre - 38098 San Michele all'Adige (TN), Italy; e-mail: livia.zanotelli@fmach.it

the species of the *Bombus* Latreille, 1802 most localized in Europe and particularly linked to the flowering of various species of the genus *Aconitum* L.. From a taxonomic point of view, the Authors accept the recent separation at the specific level between *B. (Alpigenobombus) wurflenii* Radoszkowski, 1914 and *B. (Alpigenobombus) mastrucatus* Gerstaecker, 1869 and, adopting the current subspecific subdivision, assign the Monte Verena population to *B. (Alpigenobombus) mastrucatus mastrucatus* Gerstaecker, 1869.

PAROLE CHIAVE: Apoidea Anthophila, *Bombus gerstaeckeri*, *B. mastrucatus*, *Aconitum*, Sette Comuni Plateau, Mount Verena.

INTRODUCTION

This article is intended to be the first in a series we decided to call “apidological gleanings”. By “apidological gleanings”, we mean occasional collections of Apoidea Anthophila, i.e., not included in specific research programs. These samples were caught during nature excursions, travel and vacations, or simply in the authors’ gardens or workplaces. There is a general lack of data on these insects which plays a strategic ecological role and that yet are facing growing conservation threats. The importance of documenting the populations of this group, suggest to publish the data we have been collecting over the years, even if outside of defined experimental frameworks, thus giving them a certain organic structure. In many cases, these gleanings are allowing us to census species of particular interest or to contribute, albeit limited, to the knowledge of the apidofauna of areas still little studied. In this series of articles, we will therefore give priority to those data sets that are most relevant from a faunal or ecological perspective, or that have allowed us to identify



Fig. 1 - Location of Monte Verena in the Alps.

unusual and little-known species. This first contribution brings together data from several excursions on the southern slope of Monte Verena, one of the highest peaks of the Altopiano dei Sette Comuni in the Venetian Prealps. Monte Verena rises to 2,015 m above sea level and is located entirely within the municipality of Roana (province of Vicenza). On its summit, Monte Verena preserves the imposing remains of a military fortification, Forte Verena, an Italian fortress built between 1910 and 1914 to defend the Italian border with the Austro-Hungarian Empire and subject to several conflicts during the First World War (July 28, 1914, and November 11, 1918).

Geologically, Monte Verena is composed of rocks belonging to the grey limestone formation, the dominant unit within the Sette Comuni Plateau. These are compact, homogeneous, grey-hazelnut limestones, stratified in regular layers with spacings varying from 5 to 40 cm. The bedding joints are nodular, reflecting their proximity to the upper boundary of the red ammonite.

At the summit, the vegetation of Monte Verena is characterized by mountain pine, *Pinus mugo* Turra, while the slope that constitutes its southern side is covered by forests of spruce, *Picea abies* (L.) H. Karst., and larch, *Larix decidua* Mill., with a sporadic presence of beech, *Fagus sylvatica* L.. The wooded formations are traversed by some ski slopes (and the related ski lift) and by natural pastures that can essentially be characterized as alpine and subalpine calcareous grasslands (Nassi A.). The northern side, however, drops with sheer walls covered in arboreal vegetation and bare rocks with little vegetation, onto the Assa valley below.

Apoidea Anthophila is a monophyletic subdivision, not yet universally considered a true taxonomic rank, belonging to the order Hymenoptera, the polyphyletic clade Spheciformes, and the superfamily Apoidea. The etymology of Anthophila derives from the Greek and means “flower lovers,” being composed of “anthos” (flower) and “philein” (to love). The Anthophila group is therefore composed of all those Apoidea families that are completely dependent on floral resources for nutrients, relying on pollen and nectar for their development (Michez et al., 2019). Nectar is the main source of carbohydrates for these insects, while pollen provides proteins, fats, vitamins, and other essential nutrients (Monterastelli, 2018). Due to this close dependence, bees are the most efficient pollinators. These insects are commonly called “wild bees” to distinguish them from the honey bee (*Apis mellifera* Linnaeus, 1758). Even the latter species, although bred for millennia, remains a wild species and is native to much of Europe, all of Africa including Madagascar, the Middle East, and some areas of Central Asia (Fontana et al., 2018). The Apoidea Anthophila are a very large group that includes over 20,000 described species worldwide (Michener, 2007). Most bees are solitary, but there are also species that display various forms of gregariousness and presociality, up to the most complex degree of sociality manifested in eusociality (Michener, 2007). There are many eusocial European bees, such as species from the genera *Bombus* Latreille, 1802, *Halictus* Latreille, 1804, and *Lasioglossum* Curtis, 1833, as well as, of course, *Apis mellifera* (Fontana & Zanotelli, 2025). In most bee species, females gather food and nest independently, but there is also a large group of species, known as kleptoparasitic bees, which have developed a different strategy, laying their eggs in the



Fig. 2 - Habitat from the top of Monte Verena with flowering *Cirsium eriophorum* (L.) Scop. in the foreground; 12 August 2025 (photo by Paolo Fontana).

nests of other species, thus exploiting the resources gathered by the host for the development of their offspring (Michez et al., 2019). A particular case of parasitism in bees is that of the species from the subgenus *Psithyrus* Lepeletier, 1832, belonging to the genus *Bombus*. These are the so-called “cuckoo bumblebees,” which will be discussed in greater detail in the discussion of the species. Approximately 75% of all bee species nest in the ground, and those that nest above ground exhibit a variety of behaviors, using pre-existing cavities or building their own nests with self-produced or collected materials, such as mud, resin, or various plant material (Michener, 2007).

A recent checklist of European bees compiled by Ghisbain et al. (2023) listed 2,138 species and 77 genera divided into six families: Andrenidae, Apidae, Colletidae, Halictidae, Megachilidae and Melittidae. As regards the Italian fauna, the first official list published as part of the Checklist of the Italian Fauna listed 944 species (Pagliano 1995). The last version of the Checklist of the Italian Fauna (Stock, 2003) reported 938 species (not to mention the many controversial subspecies). Today we know that the species of Anthophilous Apoidea in the Italian fauna exceed a thousand species (Monterastelli, 2018) and according to a recent publication in which the leading European experts on Apoidea Anthophila participated, the species in Italy would be 1050 and precisely 954 species in continental Italy, 332 in

Sardinia and 636 in Sicily (Reverté et al., 2023). To these 1050 species two new species must be added, described in recent years from Sardinia, namely *Lasioglossum* (*Hemihalictus*) *inexpectatum* Flaminio & Pauly, 2024 (Flaminio et al., 2024) and *Andrena* (*Plastandrena*) *culucciae* Annessi, Riccieri & Di Giulio, 2025 (Annessi et al., 2025). To these two new native species, a new alien species should be added to the two already known for some time, namely *Megachile* (*Callomegachile*) *sculpturalis* Smith, 1853 and *Megachile* (*Callomegachile*) *disjunctiformis* Cockerell, 1911: *Xylocopa* (*Koptortosoma*) *aestuans* (L. 1758) reported in 2023 for Sicily (Flaminio et al., 2023a). In the same year have been reported for Sicily and the island of Lampedusa a species endemic to North Africa which may have escaped scholars' attention until now or which may have been introduced in recent times, namely *Melitta schmiedeknechti* Friese 1899 (Flaminio et al., 2023b). The Italian Apoidea Anthophila would therefore currently count 1054 species.

MATERIAL AND E METHODS

Most of the Apoidea Anthophila collections were carried out from the departure point of the ski lift (chairlift), located at approximately 1670 m above sea level, to the summit (2015 m), crossing the meadows. A single, brief collection was made in September in Spiazzo Garibaldi (1460 m), within a very dense bloom of *Aconitum deganii paniculatum* (Arcang.) Mucher and the alien species *Impatiens glandulifera* Royle. The collection took place from mid-August to early September. The specimens were searched by sight, looking for them on the blooms still present during the sampling. The specimens were captured using an entomological net. After capture, the specimens were placed in test tubes containing bibulous paper to which a few drops of ethyl acetate had been added. Each test tube was labeled with the location, date, and altitude, and the geographic coordinates for each collection station were recorded using Google Maps. The collected material was then manipulated for mounting on an entomological pin. The specimens from each test tube were dried by shaking them for a few minutes inside a plastic bag containing small pieces of tissue paper. This process is particularly important for bumblebees because it allows for the best restoration of the thick, long hair that covers their bodies (technically called their "coat"), an important factor for better analyzing the color pattern and hair type of each specimen. After this drying process, the specimens were mounted on an entomological pin, arranging their appendages to highlight their main morphological characteristics. Further pins were used to hold them in place. For all males, the genitalia were removed. These were glued to the ends of thin cardboard strips, which were then inserted immediately beneath the specimen once it was completely dry (usually after 2-3 weeks). The collection data for each specimen were entered into a spreadsheet that allowed for the creation of location tags and the receipt of a unique numeric code for each sample. Afterwards, the identification was carried out using an Optika EMX-210-2 stereoscope. For the species of the *Bombus* genus, the dichotomous keys and other information contained in the two reference guides were used, namely that of Intoppa et al. (2009) and Rasmont et al. (2021). For the species of the genera *Lasioglossum* and *Hylaeus*

several published dichotomous keys have been used, but above all some keys not yet published and received from the Authors.

The nature photographs were taken mostly with an OM SYSTEM OM-5 mirrorless camera, generally used with an Olympus M.Zuiko ED 60mm f/2.8 macro lens and, in some cases, with an Olympus M.Zuiko 14-150 f/4-5.6 II ED lens. Some environmental photographs were taken with a Galaxy AT smartphone (2018).

The plant species were identified using the Pl@ntNet smartphone app and based on the Flora del Veneto (Argenti et al., 2019), whose nomenclature was adopted.

All specimens are currently held in the Paolo Fontana collection (Isola Vicentina, Vicenza, Italy).

RESULTS

The data presented here, being the result of sampling carried out in late summer, do not claim to provide a complete representation of the Apoidea Anthophila population on Mount Verena. Collections carried out from early spring onwards will certainly significantly expand the faunal list. A certain relevance can be given to the results presented for species of the *Bombus* genus, which, being social as many other apoidea (with the complication of kleptoparasitic species), have a prolonged phenology and are therefore presumably present in large numbers (perhaps with a prevalence of males) even in late summer. It is therefore plausible that the species listed here for this genus, also considering the considerable size and showiness of these insects, constitute a significant portion of those actually living on Mount Verena. However, since a single individual of as many as six *Bombus* species was sampled, it cannot be ruled out that the number of species for this genus as well could be significantly higher. A total of 148 specimens were sampled and identified, 124 of which belong to the *Bombus* genus; All the specimens were identified as belonging to 24 species of Apoidea Anthophila, of which 16 species belonged to the *Bombus* genus.

Family Colletidae

Genus *Hylaeus* Fabricius, 1793

Hylaeus (Prosopis) gibbus group

Family Halictidae

Genus *Halictus* Latreille, 1804

Halictus (Protohalictus) rubicundus (Christ, 1791)

Genus *Lasioglossum* Curtis, 1833

Lasioglossum (Dialictus) lissonotum (Noskiewicz 1925)

Lasioglossum (Dialictus) nitidulum (Fabricius, 1804)

Lasioglossum (Hemihalictus) rufitarse (Zetterstedt, 1838)

Lasioglossum (Hemihalictus) villosulum (Kirby, 1802)

Lasioglossum (Sphecodogastra) albipes (Fabricius, 1781)

Lasioglossum (Sphecodogastra) fratellum (Pérez, 1903) [males]

Lasioglossum (Sphecodogastra) fratellum/subfulvicorne [females]

Family Apidae

Genus *Bombus* Latreille, 1802

Bombus (*Alpigenobombus*) *mastrucatus mastrucatus* Gerstaecker, 1869

Bombus (*Bombus*) *lucorum lucorum* (Linnaeus, 1761)

Bombus (*Bombus*) *terrestris dalmatinus* Dalla Torre, 1882

Bombus (*Kallobombus*) *soroensis proteus* Gerstaecker, 1868

Bombus (*Megabombus*) *gerstaeckeri* Morawitz, 1882

Bombus (*Megabombus*) *hortorum hortorum* (Linnaeus, 1761)

Bombus (*Megabombus*) *runderatus autumnalis* (Fabricius, 1793)

Bombus (*Psithyrus*) *campestris campestris* (Panzer, 1801)

Bombus (*Psithyrus*) *rupestris rupestris* (Fabricius, 1793)

Bombus (*Psithyrus*) *sylvestris* (Lepeletier, 1832)

Bombus (*Pyrobombus*) *pratorum pratorum* (Linnaeus, 1761)

Bombus (*Thoracobombus*) *humilis appeninus* (Vogt, 1909)

Bombus (*Thoracobombus*) *mesomelas mesomelas* Gerstaecker, 1869

Bombus (*Thoracobombus*) *pascuorum floralis* (Gmelin, 1790)

Bombus (*Thoracobombus*) *pascuorum pascuorum* (Scopoli, 1763)

Bombus (*Thoracobombus*) *runderarius runderarius* (Müller, 17776)

Bombus (*Thoracobombus*) *sylvarum sylvarum* (Linnaeus, 1761)

Altitudinal distribution

Even though these were samplings carried out in small numbers and on a low elevation relief, the data obtained highlight a certain altitudinal distribution for some species. Only 8 of the 24 species sampled were found at 2000 m altitude i.e

Bombus (*Alpigenobombus*) *m. mastrucatus*, *B. (Bombus) l. lucorum*, *B. (Kallobombus) soroensis proteus*, *B. (Megabombus) runderatus autumnalis*, *B. (Psithyrus) c. campestris*, *B. (Thoracobombus) m. mesomelas*, *B. (Thoracobombus) p. pascuorum* and *B. (Thoracobombus) r. runderarius*. The greatest number of species (15) was intercepted

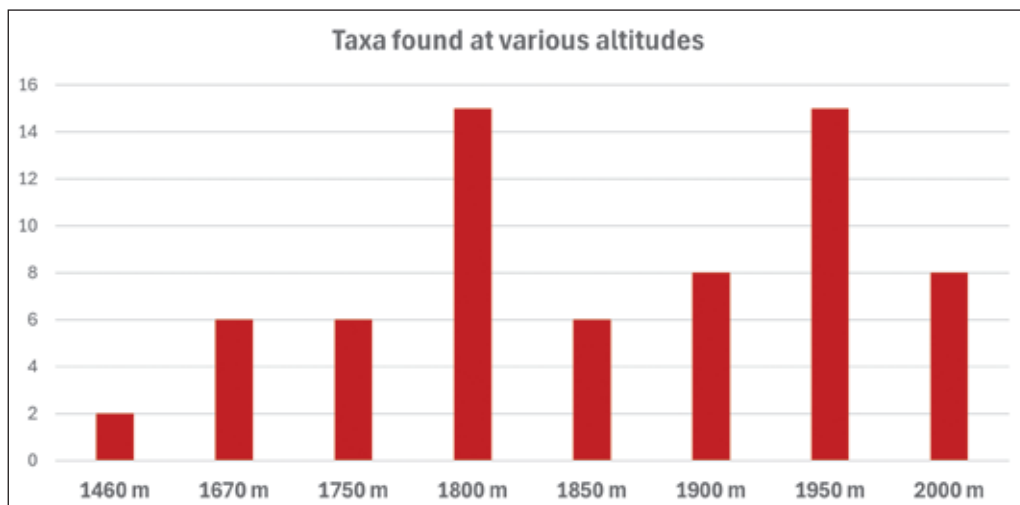


Fig. 3 - Number of taxa found at different altitudes of Monte Verena.

at altitudes of 1800 m and 1950 m. Some species have been found only at lower altitudes up to 1800 m above sea level, namely *Hylaeus* (*Prosopis*) *gibbus* group, *Lasioglossum* (*Evylaeus*) *rufitarse*, *Bombus* (*Pyrobombus*) *p. pratorum* and *B. (Thoracobombus) s. sylvarum*. *Bombus* (*Megabombus*) *gerstaeckeri* and *B. (Megabombus) h. hortorum* were not found above 1900 m.

Tab. 1 - Presence of taxa detected (dark green) and probable (light green) at the different altitudes sampled on Mount Verena.

Taxa	1460 m	1670 m	1750 m	1800 m	1850 m	1900 m	1950 m	2000 m
<i>Hylaeus (Prosopis) gibbus</i> group								
<i>Halictus (Protohalictus) rubicundus</i>								
<i>Lasioglossum (Dialictus) lissonotum</i>								
<i>Lasioglossum (Hemihalictus) rufitarse</i>								
<i>Lasioglossum (Hemihalictus) villosulum</i>								
<i>Lasioglossum (Sphecodogastra) albipes</i>								
<i>Lasioglossum (Sphecodogastra) fratellum</i>								
<i>Lasioglossum (Sphecodogastra) nitidulum</i>								
<i>Bombus (Alpigenobombus) mastrucatus mastrucatus</i>								
<i>Bombus (Bombus) lucorum lucorum</i>								
<i>Bombus (Bombus) terrestris dalmatinus</i>								
<i>Bombus (Kallobombus) soroeensis proteus</i>								
<i>Bombus (Megabombus) gerstaeckeri</i>								
<i>Bombus (Megabombus) hortorum hortorum</i>								
<i>Bombus (Megabombus) ruderatus autumnalis</i>								
<i>Bombus (Psithyrus) campestris campestris</i>								
<i>Bombus (Psithyrus) rupestris rupestris</i>								
<i>Bombus (Psithyrus) sylvestris</i>								
<i>Bombus (Pyrobombus) pratorum pratorum</i>								
<i>Bombus (Thoracobombus) humilis appeninus</i>								
<i>Bombus (Thoracobombus) mesomelas mesomelas</i>								
<i>Bombus (Thoracobombus) pascuorum floralis</i>								
<i>Bombus (Thoracobombus) pascuorum pascuorum</i>								
<i>Bombus (Thoracobombus) ruderarius ruderarius</i>								
<i>Bombus (Thoracobombus) sylvarum sylvarum</i>								

Species on the IUCN Red Lists

In the Red List of Apoidea published by Nieto et al. in 2014, all species found and identified at species level in this survey were assessed as LC (least concern) at both the European and European Union levels. The exceptions are *Lasioglossum (Dialictus) lissonotum* (classified as DD or data deficient) and *Bombus (Megabombus) gerstaeckeri* (classified as VU or vulnerable), which have identical classifications at both the European and European Union levels. Only two species of those recorded on Monte Verena are included in the Italian Red List of Apoidea species (Quaranta et al., 2018), namely *Halictus (Halictus) rubicundus* and *Bombus (Megabombus) gerstaeckeri*, both classified as DD/LC (Data deficient/least concern) for Italy.

Even in the new Red List of European Apoidea species (Michez et al., 2025), the only two species found in this study not classified as LC are once again *Lasioglossum (Dialictus) lissonotum*, now classified as NT (or Near Threatened), and *Bombus (Megabombus) gerstaeckeri*, also classified as NT in this new edition; both species have the same classification both at the European and European Union levels. Therefore, for these two species, the new Red List also highlights a worsening of the classifications regarding conservation status, based on new and more detailed data. In a press release dated 11 October 2025, the IUCN declared that in the new European Red List almost 100 new species of Anthophilous Apoidea have been classified as threatened, with over 20% of the species belonging to groups such as the species of the genera *Bombus* and *Colletes* Latreille, 1802 are now classified as at risk of extinction.

Annotated list of species

Below is some information on the taxonomy, distribution, and biology of the species found on Mount Verena, with, in addition, some interesting observations and a detailed list of the specimens collected. For some species, the data presented are more extensive and detailed.

Family **Colletidae** Lepeletier, 1841

Genus *Hylaeus* Fabricius, 1793

Bees of the genus *Hylaeus* are also known by the common name of yellow-faced bees or masked bees. The bodies of these bees are almost hairless, and in fact, female *Hylaeus* transport pollen to the nest by ingesting it, rather than outside. These solitary bees nest in pre-existing cavities, such as holes in wood or walls, hollow stems, or even in galls abandoned by other insects. As in most Colletidae, their nests are lined with a membranous secretion similar to cellophane, into which they deposit a liquid food composed of pollen and nectar. The genus *Hylaeus* is cosmopolitan and is known from all continents except Antarctica. Approximately 90 species of *Hylaeus* are known in Europe (Le Divelec, 2022) and about 50 in Italy (Stock, 2003).

Hylaeus (Prosopis) gibbus group

The subgenus *Prosopis* Fabricius, 1804, has from 15 to 18 species in Europe depending on the different authors. As regards the group of *Hyleus gibbus* Saunders, 1850 according to the latest taxonomic revision (Le Divelec, 2022) it currently includes five species in Western Europe and North Africa: *Hylaeus confusus* Nylander, 1852, *Hylaeus gibbus* Saunders, 1850, *Hylaeus incongruus* Förster, 1871, *Hylaeus pictus* (Smith, 1853) and *Hylaeus purpurissatus* (Vachal, 1895).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski lift departure, 45°55'7.00"N - 11°24'17.92"E, 1670 m, 12.VIII.2025, 1 female, leg. P. Fontana.

Family **Halictidae** Thomson, 1869

Genus *Halictus* Latreille, 1804

Halictus bees are small (4-5 mm) or medium-large (14-16 mm) bees; they are generally larger than *Lasioglossum* bees, from which they differ by the presence of hair bands on both the distal and proximal sides of the dorsal segments of the abdomen (or only on the distal). The genus includes solitary and gregarious species, capable of forming presocial colonies (i.e., with several fertile females sharing



Fig. 4 - Female of *Halictus rubicundus* on *Mentha longifolia* (L.) L.; Monte Verena, 7 September 2025 (photo Paolo Fontana).

a nest) or eusocial (with a true division into castes). *Halictus* typically nest in the ground. The genus counts approximately 300 species worldwide and approximately 40 in Italy (Reverté et al., 2023).

***Halictus (Protohalictus) rubicundus* (Christ, 1791)**

Halictus rubicundus is widespread throughout the Northern Hemisphere and displays diverse social behaviors depending on the climate, being solitary in the north or in areas with a short breeding season, or eusocial in other areas. Both solitary and eusocial behavior can be observed in the same location, and thus the study of this species (Soulcy & Danforth, 2002) has contributed to our understanding of the evolution of social behavior. On Mount Verna, several specimens have been found on inflorescences of *Mentha longifolia* (L.) L.

In the Checklist of Italian Fauna Species (online version 2.0), this species is recorded for the North, South, and Sicily (Stock, 2003).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 female and 1 male, leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 female, leg. P. Fontana; Monte Verena SE, 45°55'18"N - 11°25'49"E, 1800 m, 7.IX.2025, 4 females and 1 male, leg. P. Fontana.

Genus *Lasioglossum* Curtis, 1833

Lasioglossum bees are mostly small or very small (4-5 mm), with some being larger (7-9 mm). They nest in the ground, like *Halictus* bees, and like them, they can be solitary, gregarious, or social. The *Lasioglossum* genus is one of the most complex (also from a taxonomic point of view), with over 1,800 species worldwide and approximately 100 species in Italy (Reverté et al., 2023).

***Lasioglossum (Dialictus) lissonotum* (Noskiewicz 1925)**

The species of the subgenus *Dialictus* Robertson, 1902 generally have a metallic appearance and exhibit very different forms of sociality. *Lasioglossum lissonotum* is a small bee (6 mm) that cannot be distinguished in the field from other small species of the subgenus *Dialictus* Robertson, 1902 and primarily inhabits dry meadows and scree slopes (Amiet et al. 2001, Westrich 2018). *L. lissonotum* is a highly localized species, occurring between 400 and 1,600 meters above sea level.

Lasioglossum (Dialictus) lissonotum is classified as NT (Near Threatened) at both the continental Europe and European Union levels in the updated European Red List of Bees (Michez et al., 2025).

In the Italian Fauna Species Checklist (online version 2.0), this species is recorded only for the North (Stock, 2003).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 2 males, leg. P. Fontana.

***Lasioglossum (Dialictus) nitidulum* (Fabricius, 1804)**

Lasioglossum nitidulum is a small (6 mm) species with a metallic green body. It primarily inhabits open habitats and nests primarily in vertical structures, particularly rock cavities and, less commonly, horizontal surfaces (Westrich 2018). *L. nitidulum* is a species regularly found at low and medium altitudes.

In the Checklist of Italian Fauna Species (online version 2.0), this species is recorded for the North, South, and Sicily (Stock, 2003).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 female, leg. P. Fontana.

***Lasioglossum (Hemihalictus) rufitarse* (Zetterstedt, 1838)**

Lasioglossum rufitarse is a small species (6-7 mm) that cannot be identified in the field (Amiet et al. 2001). *Lasioglossum rufitarse* is a typical species of montane forests, but also of lowland forests. It is found mainly at forest edges, in clearings, and in logging areas (Amiet et al. 2001). The nesting biology of *L. rufitarse* is unknown. Females dig their nests in the ground, preferring areas with sparse vegetation. It is likely a solitary species (Westrich 2018). *L. rufitarse* is widely distributed between 400 and 1,700 m above sea level.

In the Checklist of the Species of the Italian Fauna (online version 2.0), this species is recorded for the North and South (Stock, 2003).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 1 female, leg. P. Fontana; Monte Verena SE, 45°55'18"N - 11°25'49"E, 1800 m, 7.IX.2025, 2 females, leg. P. Fontana.

***Lasioglossum (Hemihalictus) villosulum* (Kirby, 1802)**

Lasioglossum villosulum is a small species (6-7 mm) that is very difficult to identify in the field. It is a ubiquitous species found in most slightly thermophilic environments, from dry grasslands to forest edges, including urban and ruderal areas. However, it prefers sites with open, sparse vegetation (Amiet et al. 2001, Westrich 2018). *L. villosulum* is a solitary species that digs its nests in flat areas or on banks with sparse vegetation. The species can form large aggregations. This species does not highlight preferences for ground type.. *L. villosulum* is a common species at both low and medium altitudes. Several records have also been found above 1,400 m.

In the Checklist of Italian Fauna Species (online version 2.0), this species is recorded for Northern Italy, Southern Italy, Sicily, and Sardinia (Stock, 2003).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 female, leg. P. Fontana.

***Lasioglossum (Sphecodogastra) albipes* (Fabricius, 1781)**

The species of the subgenus *Evylaeus* (Robertson, 1902) are blackish bees without a metallic sheen. *L. (Sphecodogastra) albipes* is a medium-sized species (7-9 mm). Some males have a partially red abdomen, as in the case of the specimens found on Monte Verena. *L. albipes* is a ubiquitous species that particularly favors forest environments and wooded areas. It is generally a social species, although it appears solitary at higher altitudes and in northern Europe. It digs its nests into flat terrain with little or no vegetation. *L. albipes* species often forms monogynous colonies (a single queen), but sometimes there may be multiple queens in the same colony. However, in all cases, there is always a single queen that lays the eggs, while the other queens assist the workers. (Plateaux-Quénu, 1989). On Mount Verena, some specimens have been found on *Cirsium vulgare* (Savi) Ten.



Fig. 5 - Male *Lasioglossum albipes* on *Cirsium vulgare* (Savi) Ten.; Monte Verena, 1900 m, 5 September 2025 (photo by Paolo Fontana).

In the Checklist of Italian Fauna Species (online version 2.0), this species is recorded for North, South, and Sicily (Stock, 2003).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski slope, 45°55'40.45"N - 11°24'40.76"E, 1900 m, 5.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'23"N - 11°25'01"E, 1800 m, 7.IX.2025, 2 females, leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 male, leg. P. Fontana.

Lasioglossum (Sphecodogastra) fratellum (Pérez, 1903)

Females of *Lasioglossum (Sphecodogastra) fratellum* are indistinguishable, on a morphological basis alone, from those of *Lasioglossum (Sphecodogastra) subfulvicorne* (Blüthgen, 1934). After that only the males collected on Monte Verena are certainly to be attributed to the species *Lasioglossum (Sphecodogastra) fratellum*. This species is associated with cool, humid environments, generally at high altitudes. It is often found near mountain wetlands (low- and high-altitude marshes), at the edges of forests, and in tall herb communities. Outside mountainous regions, the species is restricted to marshy areas and cool forests. (Westrich 2018).



Fig. 6 - Females assigned to *Lasioglossum fratellum*/*subfulvicorne* on *Leontodon hispidus* L.; Monte Verena, 7 September 2025 (photo Paolo Fontana).

L. fratellum is a solitary species that digs its nests in the ground, often forming large aggregations. Most nests are monogynous (a single queen); However, several observations indicate that the species sometimes forms polygynous nests. In this case, a single female is responsible for resource gathering and egg-laying, while the second female appears to primarily serve as a guard. This is likely an intermediate evolutionary stage between strictly solitary and social behavior (Heide Van der, 1992). Some specimens of this species have been collected on *Leontodon hispidus* L.

In the Checklist of the Species of the Italian Fauna (online version 2.0), this species is listed for both the North and South (Stock, 2003).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'40.45"N - 11°24'40.76"E, 1900 m, 5.IX.2025, 1 male, leg. P. Fontana.

***Lasioglossum (Sphecodogastra) fratellum* group:** Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 2 females, leg. P. Fontana

Family **Apidae** Latreille, 1802

Genus ***Bombus*** Latreille, 1802

Bumblebees are a well-studied group of Apoidea Anthophila, not only for their size and often elegant and fascinating livery, but above all for aspects related to their biology, ecology, and biogeography. They are also among the few bee species managed for pollination services in agriculture. They are in most cases social insects that form temporary societies that are cyclically founded by a female individual who was fertilized the previous season (in our climates) generally called the "queen", but better defined as "foundress" As will be seen, these foundresses raise a certain number of sterile females called "workers," and at a certain point during the season, fertile females (foundresses) and males, individuals destined to mate and form (the foundresses) the following season's colonies (Monterastelli, 2018). The systematic classification of the genus *Bombus* has been and still is the subject of various interpretations by taxonomists. Until a few years ago, the genus, as far as the species from the Western Palearctic are concerned, was divided by many authors into two different genera, namely *Bombus* Latreille, 1802 and *Psithyrus* Lepeletier, 1832, each of which was divided into many subgenera. This solution is the one adopted, for example, by Intoppa et al. (2009). Today, the solution of a single genus, *Bombus*, divided into subgenera is practically unanimously accepted. This solution has found solid foundations over the years thanks to molecular biology studies, which have demonstrated that *Psithyrus* are placed, albeit compactly, among the other subgenera and therefore must be considered a single subgenus with the

subgeneric subdivisions of the past reduced to “species groups”. A very convincing taxonomic structure, which saw approximately 250 species known worldwide grouped into 38 subgenera, was proposed by Cameron et al. (2007) but soon after simplified, reducing the subgenera to 15, by Williams et al. (2008). This taxonomic solution is the one presented in the recent and fundamental work Bumblebees of Europe (Rasmont et al., 2021) which has been adopted in this work also regarding the subdivision into subspecies which, however, is in many cases truly unconvincing. However, based on the new nomenclatural solution that will be adopted for the species *wurflenii/mastrucatus*, we have deemed it useful, even if tentatively and often on a geographical basis, to also assign the subspecific identification when this is foreseen.

***Bombus (Alpigenobombus) mastrucatus mastrucatus* Gerstaecker, 1869**

Bombus mastrucatus belongs to a group of species characterized by very developed and serrated mandibles in both females and males and for this unmistakable feature they are grouped in the genus *Alpigenobombus* Skorikov, 1914. Intoppa (2009) and Rasmont et al. (2021) consider *mastrucatus* as one of the subspecies of *B. wurflenii* Radoszkowski, 1860 but a recent revision of the subgenus *Alpigenobombus* has instead highlighted, on a molecular basis, how the Alpine and European population must be considered a distinct species (Williams et al., 2023). In this article the Authors declare that they do not recognize to subspecies a taxonomic value but rather a coat patterns. However, as regards the subspecies considered by Rasmont et al. (2021), according to the data presented by Williams et al. (2023) the subspecies *B. balcaniensis* Rasmont, Ghisbain & Terzo, 2021, *B. brevigena* Thomson, 1870, *B. flavicante* Pérez, 1890 and *B. knechteli* Reinig in Reinig & Rasmont, 1988 should be assigned to *B. mastrucatus*, while the subspecies *uralicus* (Tkalců, 1969) should be assigned to *B. wurflenii*. Regarding the distribution of *B. mastrucatus* and *B. wurflenii*, the first species lives in Europe while the second lives in Anatolia, the Caucasus, the Urals and northern Iran. According to the subspecific subdivision of Rasmont et al. 2021 the Alpine populations must be assigned to *B. (Alpigenobombus) mastrucatus mastrucatus*, the subspecies present in the Alps and the Massif Central. Following Williams (2023) and Rasmont et al. (2021) and awaiting further studies, the populations of the Balkans should be named *B. (Alpigenobombus) mastrucatus balcaniensis* Rasmont, Ghisbain & Terzo, 2021 and those present in the Pyrenees, Cantabrian Mountains and south-western Massif Central *B. (Alpigenobombus) mastrucatus flavicante* Pérez, 1980. In Italy this bumblebee is present in the Alps and southwards up to the Tuscan-Emilian Apennines (Intoppa, 2009).

From an ecological point of view, *B. mastrucatus*, like all species of the *Alpigenobombus* subgenus, is a mountain species (Williams et al., 2023). According to Rasmont et al. (2021) *B. mastrucatus* is a forest species but we have also found it many times in environments without arboreal vegetation and even on Monte Verena specimens were captured in pastures. According to Rasmont et al. (2021) *B. mas-*

trucatus is a species that is able to be active even during the rain and can fly even with a completely wet coat.

A particular feeding behavior linked to the conformation of this species' mandibles is very interesting. As previously mentioned, females of *B. mastrucatus* have enlarged mandibles with six large, evenly spaced teeth, and males also have much more developed mandibles than other species of the genus. These peculiar mandibles are used to bore holes in flowers with very deep and narrow corollas to steal nectar from the outside. This behavior is generally reported for *B. mastrucatus* on flowers of the genus *Aconitum* L. (Løken, 1950 and 1973; Rasmont et al., 2021), but we have also observed it on *Gentiana purpurea* L., in Val Bedretto (Switzerland, Canton of Ticino).

On Monte Verena, the species has been observed foraging on various plant species and has been sampled from 1,750 m above sea level to the summit, proving to be one of the most frequent species.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena, Forte, 45°55'50.23"N - 11°24'49.02"E, 2000 m, 12.VIII.2025, 11 females, leg. P. Fontana; Monte Verena S, ski slope, 45°55'33.45"N - 11°24'32.40"E, 1850 m, 12.VIII.2025, 2 females and 1 male; leg. P. Fontana; Monte Verena S, ski slope, 45°55'16.01"N - 11°24'24.23"E, 1750 m, 12.VIII.2025, 1 female and 2 males, leg. P. Fontana;



Fig. 7 - Male Bombus (Alpigenobombus) m. mastrucatus on Scabiosa sp.; Monte Verena, 7 September 2025 (photo by Paolo Fontana).

Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 1 female and 2 males, leg. P. Fontana; Monte Verena S, ski slope, 45°55'40.45"N - 11°24'40.76"E, 1900 m, 5.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 3 males, leg. P. Fontana; Monte Verena SE, 45°55'18"N - 11°25'49"E, 1800 m, 7.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 1 female, leg. P. Fontana.

***Bombus (Bombus) lucorum lucorum* (Linnaeus, 1761)**

B. lucorum is a very common and widely distributed species, being present in Northern Europe up to the Arctic Circle, while in the south the species is often confined to mountainous regions; the species is also present in the mountains of Anatolia, the southern Caucasus, and northern Iran. In Italy, *B. lucorum* is present with the nominate subspecies throughout the peninsula and Sicily, and with the only other subspecies known to date, namely *Bombus (Bombus) lucorum aritzoensis* Krüger, 1951, limited to Sardinia. From a dietary standpoint, *B. lucorum* is practically a generalist (polyleptic) species, as is its choice of habitat, although it seems to prefer ecotone environments on the edges of forests. Two males and four females



Fig. 8 - Female *Bombus (Bombus) lucorum* on *Cirsium vulgare* (Savi) Ten.; Monte Verena, 7 September 2025 (photo by Paolo Fontana).

have been assigned to this species, three of which (collected in August) are most likely workers, and one (collected in September) of significantly larger size, is a queen. The males were also collected in September. As regards altitudinal distribution, *B. lucorum* has been found on Monte Verena from 1800 m above sea level up to the summit.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena, Forte, 45°55'50.23"N - 11°24'49.02"E, 2000 m, 12.VIII.2025, 3 females, leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 female and 1 male, leg. P. Fontana; Monte Verena SE, 45°55'18"N - 11°25'49"E, 1800 m, 7.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 1 female, leg. P. Fontana.

***Bombus (Bombus) terrestris dalmatinus* Dalla Torre, 1882**

Bombus terrestris is the only species of the genus with a distribution centered around the Mediterranean. It ranges northward as far as Stockholm, while to the south it is present in all countries bordering the Mediterranean, except Egypt. To the west, it reaches the Canary Islands, and to the east, the Altai Mountains and Mongolia (Rasmont et al., 2021). This species has been divided into eight subspecies, two of which are endemic to Italy: *B. terrestris calabricus* (Krüger, 1958) and *B. terrestris sassaricus* (Tournier, 1890). In Italy, specifically in the Tuscan Archipelago, *B. xanthopus* (Kriechbaumer, 1877) is also present, although until a few years ago it was considered a subspecies of *terrestris*. The populations of *B. terrestris* in northern Italy and southward to the northern Apennines have been assigned to the subspecies *dalmatinus*, both on the basis of their coloration and, above all, recent genetic studies (Rasmont et al., 2008 and Lecocq et al., 2016). *B. terrestris* is a practically ubiquitous species due to its habitat selection and a generalist diet. A single large female has been assigned to this taxon, which is unequivocally a founder (queen).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 1 female, leg. P. Fontana.

***Bombus (Kallobombus) soroensis proteus* Gerstaecker, 1868**

Bombus soroensis is the only known species in Europe and the Mediterranean Basin of the subgenus *Kallobombus* Dalla Torre, 1880. In Italy this taxon is present with two subspecies: *B. soroensis proteus* Gerstaecker, 1868 in northern Italy (Alps) and *B. soroensis lectitatus* Kruseman, 1958 in the Apennines. *Bombus s. proteus* is present in central and western Europe, in the Alps and the Massif Central, in the Balkans, the Carpathians and Anatolia, while it is absent from the Pyrenees, the Iberian Peninsula, the British Isles and the Scandinavian Peninsula. *Bombus soroensis* is

considered a species typical of habitats located on the edges of forests and according to other authors a typically forest species. In the southern regions of Europe the species more frequently colonizes high altitudes (Rasmont et al., 2021). The nesting habits of *B. soroeensis* are not well known, but the limited data available describe this species as a ground-nesting species, where it forms moderately sized colonies of up to 80-150 individuals (Rasmont et al., 2021).

On Mount Verena, this species was the second most abundant (after *B. mastrucatus*) and was intercepted from 1,670 m up to the summit.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena, Forte, 45°55'50.23"N - 11°24'49.02"E, 2000 m, 12.VIII.2025, 3 females and 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'33.45"N - 11°24'32.40"E, 1850 m, 12.VIII.2025, 1 female and 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'16.01"N - 11°24'24.23"E, 1750 m, 12.VIII.2025, 3 females and 2 males, leg. P. Fontana; Monte Verena S, ski lift departure, 45°55'7.00"N - 11°24'17.92"E, 1670 m, 12.VIII.2025, 2 females, leg. P. Fontana; Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 2 females, leg. P. Fontana; Monte Verena S, ski slope, 45°55'40.45"N - 11°24'40.76"E, 1900 m, 5.IX.2025, 1 male leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 female and 2 males, leg. P. Fontana.

***Bombus (Megabombus) gerstaeckeri* Morawitz, 1882**

Bombus gerstaeckeri is the West Palearctic species characterized by the longest cheeks (malar space) and mouthparts of all the species of the genus (Rasmont et al., 2021). The livery of this species is unmistakable and does not show the variability that characterizes many *Bombus* species and for this reason it is one of the few species of the boreal region that can be easily identified in the field (Rasmont et al., 2021). The distribution of this species is very discontinuous. It may be locally common, as observed on Monte Verena (where many specimens have been observed in addition to those collected), but there are very few locations where the species has been observed so much so that most records, as for example reported by Rasmont (1999) for France, come from a very small number of sites. *B. gerstaeckeri* is known with certainty from the Pyrenees, the Alps, the Carpathians, and the Caucasus. The species has recently been reported from the Tatra Mountains in Poland (Pawlikowski et al., 2016) while the presence of this species in the Balkans and other regions of Eastern Europe has not been confirmed in recent years (Rasmont et al., 2021). Even though it was reported in the Apennines by Grandi (1957), this species is not present as reported by Intoppa et al. (2009). As regards Italy, Intoppa et al., (1995) report the species for Piedmont, Trentino-Alto Adige and Abruzzo but for this region (as they will confirm later) they attribute the data to an identification error. According to the iNaturalist website (<https://www.inaturalist.org/taxa/876161-Bombus-gerstaeckeri>) *B. gerstaeckeri* has also been reported for Friuli Venezia Giulia. To date, no records have been published

for the Veneto region, but the species was recently discovered in the Agordino area (Auronzo, Belluno) by Andree Cappellari and Lorenzo Marini (University of Padua). They entered two Italian records (the second from Scurelle, Trentino) for this species into the EuPPollNet (European Plant-Pollinator Networks) database, a completely open European database containing harmonized taxonomic data on plant-pollinator interactions, referenced in both space and time, along with other ecological variables of interest (Lanuza et al., 2025). In this vast database, however, data on *B. gerstaeckeri* are very scarce, and in addition to the two Italian records mentioned above, there are a very limited number of records from very few localities, all from Germany.

Regarding habitat, *B. gerstaeckeri* is a typically subalpine species that frequents sparse coniferous forests, but only where there is an abundance of plants of the genus *Aconitum* L., its preferred plant species (Rasmont et al., 2021). *B. gerstaeckeri* is in fact universally considered an oligolectic species (linked to the exploitation of a number of plant species for pollen collection) with an extraordinary preference for the flowers of species of the genus *Aconitum* (Dellicour et al., 2012). The anatomical conformation of this bumblebee's head and mouthparts allow it to exploit the nectar of particularly large and elongated flowers that other species are unable to collect. *Bombus gerstaeckeri* is, obviously, not the only bumblebee to visit aconites. In the various sites studied by Dellicour et al. (2012) also observed numerous visits on these flowers by *B. hortorum* (L. 1761) and *B. wurflenii* Radoszkowski 1860 (for the identity of this species see what was said for *B. mastrucatus*) but not by solitary bees. As detailed by Ponchau et al. (2006), *B. gerstaeckeri* is thought to have an advantage due to a remarkably long proboscis, which allows it to reach and collect more nectar from these flowers than its competitors and this adaptation can be interpreted as a feeding strategy based on specialization on abundant resources, rich in pollen/nectar and underexploited by other species (Dellicour et al., 2012). The *B. gerstaeckeri* specimens observed on Monte Verena were intent on foraging for a few plant species. In mid-August 2025 the species was found on flowers of *Aconitum lycoctonum* L. emended Koelle, the same species on which it had been found by Marini and Cappellari in Auronzo at the end of August 2018. Utelli & Roy (2000) conducted a careful study on the pollination of *Aconitum lycoctonum* highlighting that *B. hortorum* and *B. gerstaeckeri*, both belonging to the subgenus *Megabombus* and therefore with very long mouthparts and head, are the most important pollinators for this plant species. The same authors also demonstrated that *B. (Thoracombus) pascuorum* (Scopoli, 1763) is also an important pollinator of *A. lycoctonum* but at lower altitudes, where it was sometimes the most abundant pollinator. The specimens of *B. gerstaeckeri* found at the beginning of September 2025 on Monte Verena were all busy foraging on *Gentianella germanica* (Wild.) E. F. Warb. flowers at higher altitudes (where the flowering of *A. lycoctonum* had finished) while in Spiazzo Garibalidi, at 1460 m above sea level, the species was very abundant and dedicated to foraging exclusively on flowers of *Aconitum degenii paniculatum* (Arcang.) Mucher completely neglecting those of *Impatiens glandulifera* Royle, visited in large numbers by *B. (Megabombus) h. hortorum* (Linnaeus, 1761) and by very few other species of the genus.

Ponchau et al. (2006) then highlighted another truly characteristic aspect of the biology of *B. gerstaeckeri*. These authors studied in Eyne (France, Eastern Pyrenees) the populations of three species of bumblebees that feed on plants of various species of *Aconitum*, namely *Bombus gerstaeckeri*, *B. hortorum* and *B. wurflenii* (which should be referred to *B. mastrucatus flavicante* Pérez, 1890) and estimated the relative populations. Their investigation further confirmed *B. gerstaeckeri*'s highest preference for *Aconitum* (while the other two species were observed feeding on other plants as well). However, more importantly, this study highlighted that the observed *B. gerstaeckeri* population was extremely small, founded by only 33 queens in 2001 and with a total number of workers estimated between 40 and 102. The observed worker/queen ratio was therefore 1-3 workers per queen. This behavior is highly unusual for a eusocial species, and the authors also observed queens feeding throughout the colony's lifespan. This type of social organization is like that of some Arctic *Bombus* species and could be interpreted as the result of an insularity syndrome (Ponchau et al., 2006), that is, a set of evolutionary changes that occur in a species when it finds itself isolated, for example on an island.

Three species of bumblebees that feed on *Aconitum* spp. have been commonly observed: We estimated the populations of these three species. For *B. hortorum* and *B. wurflenii*, the total populations of workers feeding on *Aconitum* spp. ranged from 101 to 523 and from 156 to 270, respectively. These two species also feed on other plants, while *B. gerstaeckeri* visits only *Aconitum* spp. The observed population of *B.*



Fig. 9 - Flowering of *Aconitum lycoctonum* L.; Monte Verena, 1850 m, 12 August 2025 (photo Paolo Fontana).



Fig. 10 - Male *Bombus* (*Megabombus*) *gerstaeckeri* on *Gentianella germanica* (Wild.) E. F. Warb.; Monte Verena, 1900 m, 5 September 2025 (photo Paolo Fontana).

gerstaeckeri was extremely small, founded by only 33 queens in 2001. With a total number of workers estimated at 40 to 102, the observed worker-to-queen ratio of 1 to 3 workers per queen is highly unusual for a eusocial species. We also observed queens feeding throughout the colony's lifespan. This type of social organization is similar to that of some Arctic species and could be interpreted as the result of an insularity syndrome. Of the 14 specimens sampled on Monte Verena on various dates, 8 are female and 6 are male. Among the 8 females, it is difficult to distinguish specimens assignable to the worker caste, as the sampled specimens have an average length (after being mounted on a pin) from the tip of the head (labrum) to the tip of the abdomen equal to 21 mm with a standard deviation of 1.28 mm. The largest female measures 23 mm and the two smallest measure 19.5 and 19.00 mm, measurements which, according to Rasmont et al. (2021), would easily assign all the sampled female specimens to the queen caste.

B. gerstaeckeri is reported to nest in abandoned rodent burrows (Amiet, 1996) but also among scree stones provided they can find the necessary material such as moss, dry grass and dead leaves (von Hagen, 1994).

Bombus (*Megabombus*) *gerstaeckeri*, is classified as NT (Near Threatened) at both the continental Europe and European Union levels in the updated European Red List of Bees (Michez et al., 2025).



Fig. 11 - Female *Bombus* (*Megabombus*) *gerstaeckeri* on *Aconitum degenii paniculatum* (Arcang.) Mucher; Monte Verena, Spiazzo Garibaldi, 1460 m, 7 September 2025 (photo Paolo Fontana).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski slope, 45°55'33.45"N - 11°24'32.40"E, 1850 m, 12.VIII.2025, 1 female and 2 males, leg. P. Fontana; Monte Verena S, ski slope, 45°55'16.01"N - 11°24'24.23"E, 1750 m, 12.VIII.2025, 4 females, leg. P. Fontana; Monte Verena S, ski slope, 45°55'40.45"N - 11°24'40.76"E, 1900 m, 5.IX.2025, 1 female, leg. P. Fontana; Monte Verena S, ski slope, 45°55'23"N - 11°25'01"E, 1800 m, 7.IX.2025, 1 female, leg. P. Fontana; Monte Verena S, Spiazzo Garibaldi, 45°53'14"N - 11°24'25"E, 1460 m, 7.IX.2025, 2 females and 3 males, leg. P. Fontana.

***Bombus* (*Megabombus*) *hortorum hortorum* (Linnaeus, 1761)**

Bombus hortorum is a common species with a wide distribution throughout Europe and much of the Western Palearctic. Six subspecies are known for this species, but only the nominal subspecies, *B. h. hortorum*, has been recorded in Italy. In Italy, the species is known throughout the peninsula and in Sicily, while some older records from Sardinia have not been confirmed; in central and southern Italy, this species prefers to live above 500 m above sea level (Intoppa et al., 2009). *B. h. hortorum* is widespread throughout Europe except for Ireland and is also pres-

ent in Iceland (Rasmont et al., 2021). *B. hortorum* is also known to populate forest areas, especially on the edges. On Monte Verena, *B. hortorum* was one of the most frequent species but was only found up to 1900 m above sea level. On 12 August 2025, a significant number of individuals (mostly worker females) were observed and sampled at the base of the chairlift, along a narrow slope several meters long completely covered by *Galeopsis pubescens* Besser subsp. *murriana* (Borbás & Wetst.) Mur in full bloom.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski slope, 45°55'33.45"N - 11°24'32.40"E, 1850 m, 12.VIII.2025, 2 females, leg. P. Fontana; Monte Verena S, ski slope, 45°55'16.01"N - 11°24'24.23"E, 1750 m, 12.VIII.2025, 2 females, leg. P. Fontana; Monte Verena S, ski lift departure, 45°55'7.00"N - 11°24'17.92"E, 1670 m, 12.VIII.2025, 7 females, leg. P. Fontana; Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 1 female, leg. P. Fontana; Monte Verena S, ski slope, 45°55'40.45"N - 11°24'40.76"E, 1900 m, 5.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'23"N - 11°25'01"E, 1800 m, 7.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, Spiazzo Garibaldi, 45°53'14"N - 11°24'25"E, 1460 m, 7.IX.2025, 1 female and 1 male, leg. P. Fontana.

***Bombus* (Megabombus) *runderatus autumnalis* (Fabricius, 1793)**

Bombus runderatus is the third species of the subgenus *Megabombus* Dalla Torre, 1880 (of the 4 known for Italy) found on Monte Verena. *Megabombus* are characterized by cheeks (malar space) and mouthparts of great length within the genus *Bombus*, and this particularity determines the ability of these species to access floral resources precluded or difficult to access by many other species. *Bombus runderatus* is a common species in central-western Europe and especially in the Mediterranean area. It is recorded in this vast area with as many as 6 subspecies, three of which are present in Italy and of these two are endemic. *B. runderatus autumnalis* is present in northern Italy, *B. r. sardiniensis* Tournier, 1890 in Sardinia and *B. r. siculus* Friese, 1909 in southern Italy and Sicily (Rasmont et al., 2021). Most authors consider *B. runderatus* a typical open-space species, and little information is available on its breeding habits.

On Mount Verena, a single individual was collected, a large female that had lost almost all of its fur and had many skeletal parts (especially the mandibles and basitarsi) that were very worn. Identification was therefore not easy but based on the length of the head and ligula, and thanks to some intact patches of fur from the coat, this attribution was reached. The single specimen was collected just below Forte Verena (2000 m) on an inflorescence of *Cirsium eriophorum* (L.) Scop., together with several males of *B. mesomelas*.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena, Forte, 45°55'50.23"N - 11°24'49.02"E, 2000 m, 12.VIII.2025, 1 female, leg. P. Fontana.

***Bombus (Psithyrus) campestris campestris* (Panzer, 1801)**

The species of the subgenus *Psithyrus* Lepeletier, 1832, constitute a particular case of parasitism in bees. These bees specialize in parasitizing the nests of "true" bumblebees and are therefore called "cuckoo bumblebees." Female *Psithyrus* bees do not collect pollen, lacking the typical baskets on their hind legs like true bumblebees, nor do they build their own nests. Furthermore, these bees do not form a worker caste and produce only male and female reproductive offspring. Female cuckoo bumblebees born and fertilized the previous season (foundresses) emerge from winter diapause later than founding females of true bumblebees to ensure that the latter have had sufficient time to establish a nest and build a sufficiently developed colony. Once a host colony has been identified, the female *Psithyrus* bee enters the nest and usurps it, killing or subduing the host queen, and then begins to lay her eggs. The host species' workers will feed the usurper and her offspring. Furthermore, cuckoo bumblebees have liveries that tend to resemble those of true bumblebees, whose colonies they typically usurp. The same behavior is also known for only two species of the *Bombus* genus not belonging to the subgenus *Psithyrus* that, despite possessing the anatomical structures for pollen collection (albeit less developed), they behave like *Psithyrus*. These are *Bombus (Alpinobombus) hyperboreus* (Schönherr, 1809) and *Bombus (Thoracobombus) inexpectatus* (Tkalců, 1963).

In the Western Palearctic, nine species of *Psithyrus* are considered valid. Until a few decades ago, they were divided into five subgenera (*Psithyrus* was considered a genus), now simply considered species groups. Some species have recently been synonymized or are now considered subspecies (Rasmont et al., 20219). All 9 species known for the subgenus *Psithyrus* in the Western Palearctic have also been reported in Italy.

B. (Psithyrus) campestris is present in Italy with one of the three known subspecies, the nominate one. This subspecies is present throughout Europe south of the 63rd parallel, except in the Mediterranean. It lives at low altitudes in the northern part of its range, while in the south it frequents hilly and mountainous environments (Rasmont et al., 2021). The primary host of this red-footed bumblebee is *Bombus pascuorum* (not particularly common on Mount Verena), but the species is known to parasitize the nests of many other species. Among those found on Mount Verena (where *B. campestris* was found to be moderately common) are *B. humilis*, *B. soroeensis*, *B. pratorum*, and *B. hortorum*.

On Mount Verena, *B. campestris* was found from 1,800 m above sea level up to the summit.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena, Forte, 45°55'50.23"N - 11°24'49.02"E, 2000 m, 12.VIII.2025, 2 males, leg. P. Fontana; Monte Verena S, ski slope, 45°55'23"N - 11°25'01"E, 1800 m, 7.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 3 males, leg. P. Fontana.



Fig. 12 - Male *Bombus* (*Psithyrus*) *campestris* on *Scabiosa* sp.; Monte Verena, just below the summit, 7 September 2025 (photo by Paolo Fontana).

***Bombus* (*Psithyrus*) *rupestris rupestris* (Fabricius, 1793)**

In the Western Palearctic, *B. rupestris* is known with 5 subspecies, of which only the nominate subspecies and *B. rupestris nobilei* Rasmont, Ghisbain & Terzo, 1921 are present in Italy. The subspecies *siculus* Reinig, 1931 is now considered a synonym of *B. rupestris nobilei*. *B. r. rupestris* is present throughout the species' range, except for the Iberian Peninsula, the Pyrenees, southern Italy, Sicily, Anatolia, the Caucasus, Iran, and the eastern part of European Russia (Rasmont et al., 2021). This species lives at low altitudes in the northern part of its range, while in the south it frequents hilly and mountainous environments (Rasmont et al., 2021). The *Bombus* species most parasitized by *B. rupestris* appears to be *B. (Melanobombus) lapidarius* (Linnaeus, 1758), a species not found on Mount Verena where, instead, *B. sylvarum* and *B. pascuorum* have been found among the possible host species.

A single male of this species was found on Mount Verena at 1950 m above sea level.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 male, leg. P. Fontana.



Fig. 13 - Male *Bombus (Psithyrus) rupestris* on *Cirsium vulgare* (Savi) Ten.; Monte Verena, 7 September 2025(photo Paolo Fontana).

***Bombus (Psithyrus) sylvestris* (Lepeletier, 1832)**

B. sylvestris is a species for which only the nominal form is known. Its distribution is practically that of its main host species, *B. pratorum*, which is widely distributed throughout much of the Western Palearctic, where in many areas it is one of the most common *Bombus* species. Other species reported as possible hosts of *B. sylvestris* are *B. pascuorum* and *B. jonellus* (Kirby, 1802). On Mount Verena, *B. sylvestris* was found to be quite common and was sampled from 1800 to 1950 m above sea level.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski slope, 45°55'40.45"N - 11°24'40.76"E, 1900 m, 5.IX.2025, 2 males, leg. P. Fontana; Monte Verena S, ski slope, 45°55'23"N - 11°25'01"E, 1800 m, 7.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 2 males, leg. P. Fontana.

***Bombus (Pyrobombus) pratorum pratorum* (Linnaeus, 1761)**

The subgenus *Pyrobombus* Dalla Torre, 1880, includes 12 species in the Western



Fig. 14 - Male *Bombus* (*Psithyrus*) *sylvestris* on *Gentianella germanica* (Wild.) E. F. Warb.; Monte Verena, 1900 m, 5 September 2025, (photo Paolo Fontana).

Palearctic (Rasmont et al., 2021), but only one of these, *B. pratorum*, has been found on Monte Verena. These are generally mountainous or alpine species, in some cases with very fragmented distributions. *B. pratorum* is one of the most common and widespread species in the Western Palearctic, and its nominate subspecies (three in total) covers practically all of Europe except for the Iberian Peninsula. In terms of habitat preference, this species clearly appears to prefer forest environments, from coastal areas to the subalpine zone (Rasmont, 1988). *B. pratorum* forms small colonies with a maximum of 40 workers, and nests can be built either inside abandoned rodent burrows or on the surface under tufts of grass. In woodpiles, artificial cavities, and even abandoned bird nests (natural or artificial) (Rasmont et al., 2021).

Only two females of this species have been found on Mount Verena at 1,800 m above sea level.

Examined material: Italy, Veneto, Roan (Vicenza), Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 1 female, leg. P. Fontana; Monte Verena SE, 45°55'18"N - 11°25'49"E, 1800 m, 7.IX.2025, 1 female, leg. P. Fontana.

***Bombus (Thoracobombus) humilis appeninus* (Vogt, 1909)**

The subgenus *Thoracobombus* Dalla Torre, 1880 is the most complex in the Western Palearctic region, counting 19 species (Rasmont et al., 2021). In recent years, species that until a few decades ago were assigned to distinct subgenera (see Intoppa et al., 2009) have been added to this subgenus. Due to the variety of morphological characteristics, especially regarding the male genitalia, the subgenus is divided into species groups. *Bombus humilis* Illiger 1806 belongs to the *B. sylvarum* Group (Linnaeus, 1761) or *Thoracobombus* sensu stricto and has 6 subspecies and several forms. This species, in fact, presents a great chromatic polymorphism. Rasmont et al., (2021), pragmatically, decided to consider as subspecies those taxa that show a defined geographical distribution and as forms those found in mixed populations without a clear geographical distribution. The only specimen of *B. humilis* found on Monte Verena can undoubtedly be assigned to the subspecies *appeninus* Vogt, 1909 due to its very dark overall coloration, interspersed with red hairs on the head and abdominal segments. This subspecies is typical of northern Italy, where, however, specimens can also be assigned, based on their coloration, to the nominate form (found by us, for example, on the Altopiano dei Sette Comuni) as well as to *B. humilis quasimuscurom* Vogt, 1909 (to which we assigned a specimen we found in Val d'Aosta).

The only female of *B. humilis appeninus* was found on Monte Verena at an altitude of 1670 m.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski lift departure, 45°55'7.00"N - 11°24'17.92"E, 1670 m, 12.VIII.2025, 1 female, leg. P. Fontana.

***Bombus (Thoracobombus) mesomelas mesomelas* Gerstaecker, 1869**

B. mesomelas belongs to the *B. pomorum* (Panzer, 1805) group or until a few years ago assigned to the subgenus *Rhodobombus* Dalla Torre, 1880 (Intoppa et al., 2009). *B. mesomelas* has only two subspecies and the nominal one is widespread in the Cantabrian Mountains, the Pyrenees, the Alps, the Tatras, the Apennines and the Carpathians (Rasmont et al., 2021). *B. mesomelas* is a typical species of open spaces such as hay meadows and subalpine and alpine grasslands, with a particular predilection for xeric and south-facing grasslands. It is a species that, although locally abundant, has a discontinuous distribution and is less frequent in the eastern part of its range. *B. mesomelas* nests underground and deep, in abandoned rodent burrows (Rasmont et al., 2021). On Mount Verena the species was found to be very common, especially towards the summit, even though it was found from 1670 to 2000 m. On Mount Verena, *B. mesomelas* was found to be particularly common on the inflorescences of *Cirsium eriophorum* (L.) Scop. [also known as *Lophiolepis eriophora* (L.)], i.e. the Woolly Thistle, a plant particularly common especially in the summit portion of the relief. In September the species was present on *Cirsium vulgare* (Savi) Ten. Flowers.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena, Forte, 45°55'50.23"N - 11°24'49.02"E, 2000 m, 12.VIII.2025, 10 males, leg. P. Fontana; Monte Verena S, ski slope, 45°55'33.45"N - 11°24'32.40"E, 1850 m, 12.VIII.2025, 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'16.01"N - 11°24'24.23"E, 1750 m, 12.VIII.2025, 2 males, leg. P. Fontana; Monte Verena S, ski lift departure, 45°55'7.00"N - 11°24'17.92"E, 1670 m, 12.VIII.2025, 2 females, leg. P. Fontana; Monte Verena S, ski slope, 45°55'23"N - 11°25'01"E, 1800 m, 7.IX.2025, 1 male, leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 2 males, leg. P. Fontana.

***Bombus (Thoracobombus) pascuorum floralis* (Gmelin, 1790)**

B. pascuorum is a very widespread and often very common species, resulting in many environments as the most represented species both in terms of number of specimens and phenology, in fact in many cases it is one of the last species to be seen flying even until late autumn. The range of *B. pascuorum* is very vast and continuous and includes all of Europe, up to the Scandinavian Peninsula and Iceland, resulting less frequent in purely Mediterranean habitats. Rasmont et al. (2021) list 23 subspecies for *B. pascuorum* and those cited by



Fig. 15 - Male *Bombus (Thoracobombus) mesomelas* on *Cirsium vulgare* (Savi) Ten.; Monte Verena, 7 September 2025 (photo by Paolo Fontana).

these authors for Italy are *B. p. intermedius* Vogt, 1909 in North-Western Italy, *B. p. melleofacies* Vogt, 1909 in Central and Southern Italy, *B. p. pascuorum* (Scopoli, 1763) in Northern Italy, *B. p. siciliensis* (Tkalčů, 1977) in Sicily and *B. p. floralis* (Gmelin, 1790) in Northeastern Italy (Rasmont et al., 2021). *B. p. floralis* is characterized by having a general reddish coloration but with the first abdominal segments more or less extensively covered with black hairs and at the same time with yellow hairs in the pleural area (laterals). Several specimens found by us on the Altopiano dei Sette Comuni and in the Cansiglio area should be assigned to this subspecies, known from Northeastern Italy, as well as others from neighboring areas also in Trentino. In these situations, individuals with a coloration intermediate between *B. p. pascuorum* and *B. p. floralis* are also present. On Mount Verena, just below the summit (19,050 m), a male with the typical coloration of this subspecies was found (a few other specimens were observed but not collected), as well as others that can be assigned to the nominate subspecies based on their coloration. It is unclear whether this taxon should therefore be considered a true subspecies that would see the Venetian and Trentino Alps as an area of natural hybridization with the nominate subspecies, or whether it is simply a chromatic form with a marked eastern geographic distribution. At present, the only option left is to attribute the male in question to *B. p. floralis*.



Fig. 16 - Male *Bombus* (*Thoracobombus*) *pascuorum floralis* on *Cirsium vulgare* (Savi) Ten.; Monte Verena, 7 September 2025 (photo by Paolo Fontana).

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 male, leg. P. Fontana.

***Bombus (Thoracobombus) pascuorum pascuorum* (Scopoli, 1763)**

On Mount Verena, five specimens identifiable as *B. p. pascuorum* were collected, and others (not many) were observed. The coloration of these specimens varied from reddish to blond-grey. The nominal subspecies of *B. pascuorum* is typical of Northern Italy, where, however, based on what was previously mentioned, it seems to be mixed with *B. p. floralis* moving eastward. As regards the most inhabited environments *B. pascuorum* appears to prefer forest habitats or at the edges of forests and nests in a variety of situations. Nests, in fact, can be found under simple layers of moss or vegetation, as well as inside abandoned rodent or even bird nests (Rasmont et al., 2021).

On Mount Verena, *B. p. pascuorum* has been found, in small numbers, from 1800 m above sea level up to the summit.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski slope, 45°55'22.22"N - 11°24'28.07"E, 1800 m, 5.IX.2025, 2 females, leg. P. Fontana;



Fig. 17 - Female *Bombus (Thoracobombus) p. pascuorum* on *Gentianella germanica* (Wild.) E. F. Warb.; Monte Verena, 1800 m, 5 September 2025 (photo Paolo Fontana).

Monte Verena S, ski slope, 45°55'40.45"N - 11°24'40.76"E, 1900 m, 5.IX.202, 2 females, leg. P. Fontana; Monte Verena, Forte, 45°55'50.23"N - 11°24'49.02"E, 2000 m, 12.VIII.2025, 1 female, leg. P. Fontana.

***Bombus (Thoracobombus) ruderarius ruderarius* (Müller, 17776)**

B. ruderarius is a species present in a large part of the Western Palearctic and the nominate subspecies, the only one of the three known present in Italy, lives in Europe south of the Arctic Circle in the Finno-Scandinavian Peninsula but is absent in Russia, in much of the Iberian Peninsula and in the typical Mediterranean regions as well as in the relative islands (Rasmont et al., 2021). In Italy the species is considered montane or submontane and is particularly reported from the northern regions and the Central Apennines. Intoppa et al. (2009) exclude it for Sardinia but not for Sicily where, however, it is not reported by Rasmont et al. (2021). The nests of *B. ruderarius* are set up underground, often at the base of tufts of grass and are quite deep. The colonies are small and normally number 25-30 workers.

On Mount Verena the species was found to be fairly common and was intercepted from 1750 m above sea level up to the summit.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena, Fort, 45°55'50.23"N - 11°24'49.02"E - 2000 m, 12.VIII.2025, 2 females and 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'33.45"N - 11°24'32.40"E, 1850 m, 12.VIII.2025, 1 male, leg. P. Fontana; Monte Verena S, ski slope, 45°55'16.01"N - 11°24'24.23"E, 1750 m, 12.VIII.2025, 1 male, leg. P. Fontana; Monte Verena S, top, 45°55'48"N - 11°25'01"E, 1950 m, 7.IX.2025, 1 female, leg. P. Fontana.

***Bombus (Thoracobombus) sylvarum sylvarum* (Linnaeus, 1761)**

B. sylvarum is a bumblebee with an unmistakable livery, although at first glance it could be confused with particularly tawny specimens of *B. mesomelas*. It is a widely distributed species in the Western Palearctic, where in some regions it is very common and may even be the most abundant bumblebee (Rasmont et al., 2021). In Italy, the species is actually uncommon, although it is widespread throughout the peninsula and in Sicily, but is absent from Sardinia. Of the four known subspecies of *B. sylvarum*, two are reported for Italy: the nominal one (present in much of continental Europe) and *B. s. rogenhoferi* Dalla Torre, 1882, an Italian endemic known from the southern part of the peninsula and Sicily. *B. sylvarum* is also a bumblebee species that shows a particular preference for forest or edge environments (as its name easily suggests), while regarding its nesting habits, few observations are available and, in some cases, it nests above ground and in other cases underground (Rasmont et al., 2021). On Monte Verena, a single female was found at the base of the chairlift at 1670 m above sea level on an inflorescence of *Echium vulgare* L.

Examined material: Italy, Veneto, Roana (Vicenza), Monte Verena S, ski lift departure, 45°55'13"N - 11°24'45"E, 1670 m, 7.IX.2025, 1 male, leg. P. Fontana.

CONCLUSIONS

The data presented in this paper, although derived from only three excursions conducted in late summer, highlights, at least for species of the genus *Bombus*, a particularly complex fauna of Apoidea Anthophila on Mount Verena. Of particular interest is the presence of two species, *Lasioglossum (Dialictus) lissonotum*, and *Bombus (Megabombus) gerstaeckeri*, both classified as NT (Near Threatened) at both the continental Europe and European Union levels. Also of particular interest are the data relating to the altitudinal distribution of the species, which, despite being on a modest relief, show clear preferences for low, medium, or high altitudes. Mount Verena, at 2,015 m, is only the lowest of the 20 peaks on the Plateau that exceed 2,000 m. This data suggests the importance of investigating the other reliefs surrounding the Sette Comuni Plateau, starting from the higher peaks such as Cima Dodici (XII) or Cima Ferozzo 2341 m, Monte Trentin or Monte Gomion 2325 m, Cima Portule 2308 m, Cima Kempel 2295 m, Cima Undici or Cima delle Pozze 2229 m, Cima Dieci or Monte Castelnuovo 2215 m and Cima Del Prà 2213 m, which could preserve distinctly alpine or subalpine apoidea faunas. These species are particularly threatened by the phenomenon of global warming, especially with regard to the populations that still survive on reliefs of limited altitude and that cannot ascend to higher altitudes to pursue habitats suitable for their survival (Rahimi & Jung, 2024).

A consideration should be made on the peculiar environmental situation of the southern slope of Monte Verena; the area investigated is in fact widely covered by ski slopes, which include some ski lifts and routes for mechanical vehicles. Furthermore, during the summer, part of the grassland areas of Monte Verena are used for grazing. The influence of human management of grassland environments significantly influences the conservation and evolution of Apoidea populations (Zimmermann et al., 2023), whether they are urban or recreational areas (such as ski resorts) or whether the grasslands are managed through grazing or mowing. A trend observed across much of Europe is the expanding of woodland (Palmero et al., 2021) and a loss of permanent meadows (Monteiro et al., 2011), which began especially after the Second World War, coinciding with the drastic abandonment of mountain areas. It would therefore be important to evaluate whether the presence of ski slopes on Monte Verena could be a factor that is not entirely negative, and, above all, what strategies should be implemented to ensure the conservation or restoration of habitats suitable for supporting complex and vital biodiversity. In this site it would be of primary importance to ensure the conservation of a heterogeneous flora and above all of the different species of *Aconitum* which are certainly linked to the presence of *Bombus gerstaeckeri*, an extremely localized and threatened species.



Fig. 18 - One of the ski slopes of Monte Verena crossed by a track for mechanical vehicles; 7 September 2025 (photo Paolo Fontana).

ACKNOWLEDGMENTS

We are grateful to Simone Flaminio (Laboratory of Zoology, University of Mons, Belgium) for helping us identify some species, to Andree Cappellari and Lorenzo Marini (University of Padua, Department of Agronomy, Animals, Food, Natural Resources and Environment - DAFNAE, Italy) for providing information on some species, to Filippo Prosser (Fondazione Museo Civico di Rovereto, Italy) for valuable assistance in identifying plant species cited in the text and illustrations, and to Cinzia Vivian (Isola Vicentina, Italy) for accompanying and assisting the first author on some excursions to Monte Verena.

BIBLIOGRAPHY

- AMiet F., 1996 - Apidae 1. Teil: allgemeiner Teil, Gattungsschlüssel, die Gattungen *Apis*, *Bombus* und *Psithyrus*. Insecta Helvetica 12, Neuchâtel: 98 pp.
- AMiet F., HERRMANN, M., MÜLLER, A., & NEUMEYER, R., 2001 - Fauna Helvetica 6. Apidae 3: *Halictus*, *Lasioglossum*.: 208 pp.
- ANNESI M., RICCIERI A., & DI GIULIO A., 2025 - A new species of *Andrena* (Hymenoptera, Andrenidae) from northern Sardinia (Italy). *Journal of Hymenoptera Research*, 98: 795-816.

- ARGENTI C., MASIN R., PELLEGRINI B., PERAZZA G., PROSSER F., SCORTEGAGNA S., TASINAZZO S., 2019 - Flora del Veneto. Dalle Dolomiti alla laguna veneziana (2 vol.). Cierre edizioni, Verona: 1728 pp.
- BIELLA P., 2018 - Lista Rossa IUCN delle api italiane minacciate. Comitato Italiano IUCN e Ministero Dell'Ambiente e Della Tutela Del Territorio e Del Mare, Roma.
- CAMERON S.A., HINES H.M. & WILLIAMS P.H., 2007 - A comprehensive phylogeny of the bumble bees (*Bombus*). *Biological Journal of the Linnean Society*, 91: 161-188.
- DELLICOUR S., VERECKEN N. J. & MICHEZ D., 2012 - *Bombus gerstaeckeri* MORAWITZ, 1881 (Hymenoptera, Apidae): observations sur la biologie d'un bourdon localisé et oligolectique. *Osmia*, 5: 12-14.
- FLAMINIO S., BORTOLOTTI L., & CILIA G., 2023a - First report of *Xylocopa aestuans* in Italy: a new species for Europe? *Bulletin of Insectology*, 76 (2): 161-166.
- FLAMINIO S., CILIA G., VELLA A., QUARANTA M., & LO VERDE G., 2023b - *Melitta schmiedeknechti* (Hymenoptera Apoidea, Melittidae), a new species for the fauna of Italy. *Bulletin of Insectology*, 76 (2): 315-319.
- Flaminio S., Pauly A., Cilia G., Cornuel-Willermoz A., Bortolotti L., & Quaranta M., 2024 - *Lasioglossum inexpectatum* sp. nov., a new species from Sardinia and Corsica (Hymenoptera: Apoidea: Halictidae). *Osmia*, 12: 23-32.
- FONTANA P., COSTA C., DI PRISCO G., RUZZIER E., ANNOSCIA D., BATTISTI A., CAODURO G.,... & SEGRÈ A., 2018 - Appeal for biodiversity protection of native honey bee subspecies of *Apis mellifera* in Italy (San Michele all'Adige declaration). *Bulletin of Insectology*, 71 (2): 257-271, ISSN 1721-8861.
- FONTANA P. & ZANOTELLI L., 2025 - Natura Magistra. Cosa ci stanno insegnando l'apicoltura naturale e le colonie selvagge di ape mellifera. Edizioni Montaonda, San Godenzo (Firenze): 130 pp.
- GHISBAIN G., ROSA, P., BOGUSCH P., FLAMINIO S., DIVELEC R. L., DORCHIN A., ... & REVERTÉ S., 2023 - The new annotated checklist of the wild bees of Europe (Hymenoptera: Anthophila). *Zootaxa*, 5327(1): 1-147. <https://doi.org/10.11646/zootaxa.5327.1.1>
- HEIDE A. VON DER., 1992 - Zur Bionomie von *Lasioglossum (Evylaeus) fratellum* (Perez), einer Furchenbiene mit ungewöhnlich langlebigen Weibchen (Hymenoptera, Halictinae). *Drosera*, 2: 171-188.
- INTOPPA F., PIAZZA M.G., BOLCHI SERINI G. & CORNALBA M., 2009 - I bombi. Guida al riconoscimento delle specie italiane. CRA - Unità di Ricerca di Apicoltura e bachicoltura, Bologna: 174 pp.
- INTOPPA F., PIAZZA M.G. & D'ALBORE G.R., 1995 - Catalogo bibliografico delle specie di Bombidae (Hymenoptera Apoidea) segnalate per l'Italia. Istituto sperimentale per la zoologia agraria: 135 pp.
- LANUZA J. B., KNIGHT T. M., MONTES-PEREZ N., GLENNY W., ACUÑA P., ALBRECHT M., ... & BARTOMEUS I., 2025 - EuPPollNet: a European database of plant-pollinator networks. *Global Ecology and Biogeography*, 34(2), e70000.
- LECOCQ T., COPPÉE A., MICHEZ D., BRASERO N., RASPLUS J. Y., VALTEROVA I., & RASMONT P., 2016 - The alien's identity: consequences of taxonomic status for the international bumblebee trade regulations. *Biological Conservation*, 195: 169-176.
- LE DIVELEC R., 2022 - A taxonomic account on the *Hylaeus gibbus* species-group (Hymenoptera: Apoidea: Colletidae). *Annales de La Société Entomologique de France* (N.S.), 58(3): 229-249. <https://doi.org/10.1080/00379271.2022.2085627>
- LØKEN A. 1950 - Bumble bees in relation to Aconitum septentrionale in Western Norway (Eidfjord). *Norsk entomologisk Tidsskrift*, 8: 1-16.
- LØKEN A. 1973 - Studies on Scandinavian bumble bees (Hymenoptera, Apidae). *Norsk entomologisk Tidsskrift*, 20: 1-218.

- MICHENER C.D., 2007 - The bees of the world. Second edition. John Hopkins University Press, Baltimore: 913 pp.
- MICHEZ D., RASMONT P., TERZO M. & VEREECKEN N. J., 2019 - Hymenoptera of Europe 1. Bees of Europe. N.A.P. Editions, Verrières-le-Buisson: 547 pp.
- MICHEZ, D., BOUSTANI, M., SENTIL, A., BENREZKALLAH, J., ... & GHISBAIN, G., 2025 - Measuring the pulse of European biodiversity using the Red List. European Red List of Bees. Brussels, Belgium: European Commission. in press. <https://doi.org/10.2779/521877>
- MONTEIRO A. T., FAVA F., HILTBRUNNER E., DELLA MARIANNA G., & BOCCHI S., 2011 - Assessment of land cover changes and spatial drivers behind loss of permanent meadows in the low-lands of Italian Alps. *Landscape and Urban Planning*, 100(3): 287-294.
- MONTERASTELLI E., 2018 - Le altre api. Guida pratica alla scoperta degli Apoidei: amati e temuti, impariamo a riconoscerli. Edizioni Montanonda89 pp.
- NASSI A. - Analisi dell'impatto dell'evento Vaia sul Comune di Roana ed eventuali ipotesi di riassetto del territorio [tesi di laurea]. Università degli Studi di Padova, Anno accademico 2022/2023.
- NIETO A., ROBERTS S. P. M., KEMP J., RASMONT P., KUHLMANN M., GARCÍA CRIADO M.,... & MICHEZ D., 2014 - European Red List of Bees. Publications Office of the European Union: 86 pp.
- PAGLIANO G., 1995 - Hymenoptera Apoidea in: Minelli A., Ruffo S. & La Porta S. (eds.) Checklist delle specie della fauna italiana (Fascicolo 106). Calderini, Bologna: pp 25.
- PALMERO-INESTA M., PINO J., PESQUER L., & ESPelta J. M., 2021 - Recent forest area increase in Europe: expanding and regenerating forests differ in their regional patterns, drivers and productivity trends. *European Journal of Forest Research*, 140(4): 793-805.
- PAWLKOWSKI T., OLSZEWSKI P., ŻYLA W. & PRZYBYLIŃSKA M., 2016 - The rare oligolectic bumblebee *Bombus gerstaeckeri* Morawitz, 1882 from Poland. *Spixiana*, 39(1), 130.
- PLATEAUX-QUÉNU C., 1989 - Preliminary observations on the social characteristics of *Evylaeus albipes*. *Actes des Colloques Insectes Sociaux*, 5: 335-344.
- PONCHAU O., ISEBYT S., VERHAEGHE J. C. & RASMONT P., 2006 - Is the caste-ratio of the oligolectic bumblebee *Bombus gerstaeckeri* Morawitz (Hymenoptera: Apidae) biased to queens? *Annales de la Société entomologique de France*, 42 (2): 207-214.
- QUARANTA M., CORNALBA M., BIELLA P., COMBA M., BATTISTONI A., RONDININI C., & TEOFILI C., 2018 - Lista Rossa IUCN delle api italiane minacciate. Comitato Italiano IUCN e Ministero dell'Ambiente e della Tutela del Territorio e del Mare: 68 pp.
- RAHIMI, E., & JUNG, C., 2024 - Global trends in climate suitability of bees: Ups and downs in a warming world. *Insects*, 15(2): 127 pp.
- RASMONT P., 1988 - Monographie écologique et zoogéographique des bourdons de France et de Belgique (Hymenoptera, Apidae, Bombinae). Thèse de doctorat, Faculté des Sciences agronomiques de Gembloux, Belgique: 310 + LXII pp.
- RASMONT P., 1999 - Rapport préliminaire sur la faune des bourdons (Hymenoptera, Bombinae) des Pyrénées-Orientales; réserves de la Massane et du Vallon d'Eyne. *Travaux de la Réserve naturelle de la Massane, Banyuls-sur-Mer*, 52: 1-17.
- RASMONT P., COPPÉE A., MICHEZ D., & DE MEULEMEESTER T., 2008 - An overview of the *Bombus terrestris* (L. 1758) subspecies (Hymenoptera: Apidae). *Annales de la Société entomologique de France*, 44(2): 243-250.
- RASMONT P., GHISBAIN G. & TERZO M., 2021 - Bumblebees of Europe and neighbouring regions. Hymenoptera of Europe 3. N.A.P. Editions: 628 pp.
- REVERTÉ S., MILIČIĆ M., AČANSKI J., ANDRIĆ A., ARACIL M., BALZAN M.V., BARTOMEUS I., BOGUSCH P., ... & VUJIĆ A., 2023 - National records of 3000 European bee and hoverfly species: a contribution to pollinator conservation. *Insect Conservation and Diversity*, 16(6): 758-775. <https://doi.org/10.1111/icad.12680>
- SOUÇY, S. L., & DANFORTH, B. N., 2002 - Phylogeography of the socially polymorphic sweat bee

- Halictus rubicundus* (Hymenoptera: Halictidae). *Evolution*, 56(2): 330-341.
- STOCH F. (ed.), 2003-2004 - Checklist of the species of the Italian fauna. <https://www.fauna-italia.it/checklist/>
- UTELLI A.B. & ROY B.A., 2000 - Pollinator abundance and behavior on *Aconitum lycoctonum* (Ranunculaceae): an analysis of the quantity and quality components of pollination. *Oikos*, 89(3): 461-470.
- VON HAGEN E., 1994 - Hummeln - bestimmen, ansiedeln, vermehren, schützen, 4 ed. Naturbuch Verlag, Augsburg: 320 pp.
- WESTRICH P., 2018 - Die Wildbienen Deutschlands. Ulmer, Stuttgart: 822pp.
- WILLIAMS P. H., AN J., DORJI P., HUANG J., JAFFAR S., JAPOSHVILI G., NARAH J., REN Z., STREINZER M., THANOOSING C., TIAN L., & ORR, M. C., 2023 - Bumblebees with big teeth: revising the subgenus *Alpigenobombus* with the good, the bad and the ugly of numts (Hymenoptera: Apidae). *European Journal of Taxonomy*, 892(1): 1-65. <https://doi.org/10.5852/ejt.2023.892.2283>
- WILLIAMS P. H., CAMERON S. A., HINES H. M., CEDERBERG B., & RASMONT P., 2008 - A simplified subgeneric classification of the bumblebees (genus *Bombus*). *Apidologie*, 39(1): 46-74.
- ZIMMERMANN D., SCHODER S., ZETTEL H., HAINZ-RENETZEDER C., & KRATSCHMER S., 2023 - Changes in the wild bee community (Apoidea: Hymenoptera) over 100 years in relation to land use: A case study in a protected steppe habitat in Eastern Austria. *Journal of Insect Conservation*, 27:625-64. <https://doi.org/10.1007/s10841-023-00486-8>.