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Aculeate wasps and bees of the Val di Cogne in Italy (Hymenoptera : Aculeata)

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Abstract
Aculeate wasps and bees were collected in the Val di Cogne in the North West Italy during July 2023. A total of 58 species were found, spanning 31 different genera. Notes on the ecology of each species are provided and comments on conservation and threats within the area are presented.

Keywords | *Bombus* • Aosta • Alps • southern Europe • Apoidea • Apocrita

Guêpes aculéates et abeilles du Val di Cogne en Italie (Hymenoptera: Aculeata)

Résumé
Des spécimens d'aculéates (guêpes et abeilles) ont été collectés dans le Val di Cogne, dans le nord-ouest de l'Italie, en juillet 2023. Au total, 58 espèces ont été trouvées, pour 31 genres différents. Des informations sur l'écologie de chaque espèce sont fournies, ainsi que des commentaires sur la conservation et les menaces qui pèsent sur elles.

Mots-clefs | *Bombus* • Val d'Aoste • Alpes • Europe méridionale • Apoidea • Apocrita

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INTRODUCTION

As the largest mountain range in central Europe, the Alps have historically formed a natural focal point for the study of aculeates in the region. However, studies have often focused on specific areas or specific taxa (SCHMID-EGGER, 2011 ; ROSA *et al.*, 2017). Specifically, within the Valle d'Aosta region of Italy, the study of aculeate fauna has mainly focused on Chrysididae (ROSA, 2006) and Apidae (VICIDOMINI *et al.*, 2000), with other taxonomic group receiving little attention. The aim of this study is to contribute to the knowledge of aculeate fauna of the region, specifically within the Val di Cogne.

STUDY AREA

Sampling was conducted in the Val di Cogne (Cogne Valley) in northwestern Italy. This valley lies south of the larger Aosta valley and spans approximately 24 km, running in a northwest-southeasterly direction. It is part of the Graian Alps and marks the northern border of the Gran Paradiso National Park. Two areas were selected for the survey namely: the Vallone dell'Urtier east of Cogne village, at altitudes varying between 1600 m and 2420 m a.s.l. and the Vallone del Grauson northeast of Cogne, between altitudes of 1900 m and 2580 m a.s.l..

HABITATS

Habitat of the valley are dominated by subalpine pastures (figure 1). This can loosely be described as species-rich meadows which are cut annually for hay or grazed by livestock (SCHMID-EGGER, 2011). Aside from various grasses,

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Figure 1. Subalpine pasture. This habitat is frequent around the villages of Cogne and Lillaz.

herbaceous plant species are conspicuous here and include *Knautia arvensis* (L.) Coulter, *Centaurea scabiosa* L., *Linaria vulgaris* Miller, *Trifolium pratense* L., *Vicia cracca* L., *Plantago media* L., *Chamaenerion angustifolium* (L.) Scopoli and *Achillea millefolium* L. Between 1500 m and around 1900 m, the valley slopes are dominated by coniferous forest. This is comprised primarily of *Larix decidua* Miller, *Picea abies* (L.) H. Karst. and *Pinus cembra* L. (figure 2). Clearings in the forest are frequent and lusher, damper clearings are home to species such as *Digitalis lutea* L., *Geranium sylvaticum* L., *Achillea millefolium*, *Vaccinium myrtillus* L. 1753 and *Rubus saxatilis* L. 1753. Drier clearings are frequented by *Melampyrum sylvaticum* L., *Petrosedum montanum* (Songeon & E.P. Perrier) Grulich, *Onobrychis viciifolia* Scopoli, *Carduus defloratus* L. and *Thymus* sp. At the lower end of this altitude range, xerothermic grasslands are also present. These grasslands are characterized by rocky terrain and bare patches of soil. They are often found on slopes and in areas of previous or neglected cultivation. Many of the species listed for the previous habitats are present here. The rockier areas are often frequented by various Crassulaceae.

Above the tree-line, between 1900-2300, small shrubs are frequent, notably *Rhododendron ferrugineum* L. and *Juniperus communis* L. (Grignolio *et al.*, 2003). Alpine grasslands are also prevalent above 1900 m (figure 3). This can be described at grasslands above the tree-line which receive little grazing pressure from livestock. The drier and stonier areas are frequented by species such as *Sempervivum arachnoideum* L., *Campanula barbata* L., *Aster alpinus* L., *Arnica montana* L., *Oxytropis campestris* (L.) de Candolle. and *Pilosella officinarum* Vaillant among others. Lusher areas are frequented by *Centaurea nervosa* Willd. 1809, *Achillea millefolium*, *Carduus defloratus* Willdenow 1809, *Astragalus alopecurus* Pallas, *Onobrychis viciifolia* and others, whilst damp stream-sides are usually dominated by *Saxifraga aizoides* L. Above 2300 m, *Fetsuca varia* agg. is abundant and rocky areas and scree are frequent, supporting species such as *Jacobaea uniflora* (All.) Veldkamp, *Jacobaea incana* (L.) Veldkamp, *Adenostyles leucophylla* (Willd.) Rchb., *Cerastium latifolium* L. and others.

The area exhibits a typical climate of the inner Alps. Temperatures average around – 6 °C in winter and 9 °C in summer (Poussin *et al.*, 2019). However, relative extremes in temperature are also common, ranging from – 23 °C in winter to 25°C in summer (Grignolio *et al.*, 2003). The surrounding high elevations of the valley provide a barrier to storms arriving from the Atlantic or Mediterranean, resulting in drier conditions in the Aosta valley compared to valleys in the northern and western alps (Baroni *et al.*, 2021).

Figure 2. Mixed coniferous forests of Larix decidua, Picea abies and Pinus cembra dominate altitudes between 1500–1900 m.

Figure 3. Alpine grassland in the Vallone del Grauson. This habitat is dominant above 2000 m and is floristically diverse.

Annual precipitation ranges from 480 mm on the valley floor to about 1400 mm at the head of the Cogne valley (ISOTTA *et al.*, 2014). The weather conditions during the sampling period were excellent, with a temperature range of 19–30 °C with very little wind and approximately 10% cloud cover.

METHODS

Sampling was carried out over the course of two days in the vicinity of the village of Cogne, from 25 July 2023 to 26 July 2023. Sampling was conducted along pre-planned routes which primarily followed marked hiking trails. Stops were made at sites which were expected to hold higher levels of aculeate activity, including bare soil banks, dead wood and sheltered, flower-rich areas. Any bees and aculeate wasps which were found were caught with a hand net. Specimens which were identifiable in the field were quickly examined before being released. This was achieved by holding them by the legs (for males and females with weak stingers) or by placing them in a small transparent container (for stinging females). All other specimens which could not be readily identified in the field were extracted with a pooter for subsequent microscopic examination. Notes were made on the activity, habitat, altitude and GPS coordinates of each specimen.

Specimens were identified according to the following literature: WIESBAUER *et al.* (2020) (Chrysididae), GUSENLEITNER, (1995–1999) (Vespidae), BITSCH *et al.* (2020–2022) (Sphecidae and Crabronidae), AMIET *et al.* (2004–2014) (Colletidae, Andrenidae, Halictidae, Megachilidae, Apidae) and RASMONT *et al.* (2021) (*Bombus*, Apidae).

RESULTS

All specimens which were caught during the survey have been retained in the author's collection. The collector (*leg.*) and determiner (*det.*) was O. BECKETT, unless stated otherwise.

Family Chrysididae

Hedychridium cupratum (DAHLBOM, 1854)

Italy. 1 ♀; Vallone del Grauson (45.637200, 7.404821); 2370 m a.s.l.; 26 July 2023. Comment: Basking on bare soil in dry alpine grassland.
Remarks. Endemic to the Alps, distributed in Italy, Switzerland and Austria. It can be locally common in alpine grasslands, forest edges and along pathways up to 2500 m. The host is unknown (WIESBAUER *et al.*, 2020).

Chrysis simplonica LINSENMAIER, 1951

Italy. 1 ♂; Vallone dell'Urtier (45.597234, 7.408900); 1830 m a.s.l.; 25 July 2023. Comment: Feeding on *Saxifraga aizoides* in stony subalpine pasture.
Remarks. Thinly distributed in southern and central Europe. Occurs in forest edges, limestone grasslands, scree slopes and meadows in mountainous areas. Its host is *Rhodanthidium caturigense* (GIRAUD, 1863). Rarely encountered (WIESBAUER *et al.*, 2020).

Figure 4. *Chrysis simplonica*, an uncommon species of southern and central Europe.

Family Vespidae

Ancistrocerus antilope (Panzer, 1797)

Italy. 1 ♀; Vallone del Grauson (45.634757, 7.381457); 2070 m a.s.l.; 26 July 2023. Comment: Feeding on *Rubus idaeus* L. 1753 by alpine trackside.
Remarks. A Holarctic species, distributed widely in Europe, although more frequent in central and northern Europe. It can be particularly common in the Alps and other lower mountain ranges (Gusenleitner, 1995). It is univoltine (Fateryga *et al*., 2023).

Ancistrocerus oviventris (Wesmael, 1836)

Italy. 1 ♀; Vallone dell'Urtier (45.598422, 7.437059); 2250 m a.s.l.; 25 July 2023. Comment: Basking on deadwood by alpine trackside.
Remarks. A Palearctic species which is widespread in Europe, occurring in several distinct forms, the nominate form *Ancistrocerus o. oviventris* (Wesmael) occurring in the alps (Gusenleitner, 1995). Similarly to *A. antilope*, it is also more frequent in mountainous areas of central Europe and is generally univoltine (von Schultheß Rechberg, 1887-1897).

Dolichovespula norwegica (Fabricius,1781)

Italy. 2 ♂♂; Vallone dell'Urtier (45.599134, 7.419355); 1910 m a.s.l.; 25 July 2023. Comment: Two workers, both basking on foliage in coniferous woodland. 4 ♂♂; Vallone del Grauson (45.634757, 7.381457); 2070 m a.s.l.; 26 July 2023. Comment: Four workers, all feeding on *Rubus idaeus* by alpine trackside.
Remarks. A Holarctic species which in Europe is distributed in central and northern areas; the Alps marking the southern limit of its distribution. It inhabits a range of habitats and can be especially frequent in heathland and bogland margins and woodland edges, especially in hilly regions.

Dolichovespula sylvestris (Scopoli, 1763)

Italy. 1 ♀; Vallone dell'Urtier (45.598200, 7.397312); 1830 m a.s.l.; 25 July 2023. Comment: Basking on *Larix decidua* trunk in coniferous woodland.
Remarks. A Palearctic species, found widely in Europe but scarce in Mediterranean areas. It is generally more prevalent in central and northern Europe where the climate is temperate (Archer, 2006). In northern Europe, it is found in a variety of habitats but is more frequent in areas of woodland.

Eumenes subpomiformis Blüthgen, 1938

Italy. 1 ♀; Cascate di Lillaz (45.594913, 7.396713); 1690 m a.s.l.; 25 July 2023. Comment: Feeding on *Thymus* sp. flowers in mixed woodland clearing.
Remarks. In Europe, this species is found in central and southern areas and it has been recorded throughout Italy (Gusenleitner, 1999). In the Alps it occurs to around 1920 m (Neumayer, 2019).

Leptochilus alpestris (Saussure, 1856)

Italy.1 ♀; Vallone dell'Urtier (45.597042, 7.404784); 1820 m a.s.l.; 25 July 2023. Comment: Basking on bare soil in alpine grassland.
Remarks. A species which in Europe is present in southern and central areas, from Portugal east to Turkey and as far north as central Germany (Gusenleitner, 1995). It generally prefers dry, open habitats which support populations of snails such as *Cepaea nemoralis* (Linnaeus, 1758), as female *L. alpestris* nest in empty snail shells (Fateryga, 2013).

Odynerus reniformis (Gmelin, 1790)

Italy. 1 ♀; Vallone dell'Urtier (45.598397, 7.444827); 2220 m a.s.l.; 25 July 2023. Comment: Basking on bare rock adjacent to track in alpine grassland.
Remarks. Found throughout much of Europe with exception to some northerly areas, eastward to central Asia (Gusenleitner, 1998). In Italy, it is distributed in the north and the south, as well as Sardinia (Sodca & Borsato, 1995). It can be found in a variety of habitats, including heathland and ruderal areas (Edwards, 1997).

Polistes biglumis (Linnaeus, 1758)

Italy. 2 ♀; Gimillan (45.619600, 7.370601); 1990 m a.s.l.; 26 July 2023. Comment: On flowerhead of *Laserpitium siler* L. in coniferous woodland edge. 4 ♀: Cascate de Pila, Vallone del Grauson (45.634828, 7.381512); 2070 m a.s.l.; 26 July 2023. Comment: Feeding on flowers of *Rubus idaeus* by trackside in alpine grassland.
Remarks. A Palearctic species, in Europe this is the only *Polistes* which inhabits areas with an alpine climate, being frequent in mountainous and hilly regions (Fucini *et al*., 2009). It can be found in rocky habitats and the relatively small nests (maximum of 30 individuals) are active between April and September (Kovac *et al*., 2020).

Figure 5. *Polistes biglumis.* This is the only European species of *Polistes* with a montane distribution.

Symmorphus allobrogus (Saussure, 1855)

Italy. 1 ♀; Vallone dell'Urtier (45.597430, 7.411492); 1840 m a.s.l ;25 July 2023. Comment: On flower of *Centaurea nervosa* in subalpine pasture.
Remarks. In Europe this species is widespread, but in central and southern areas it is restricted to mountainous habitats. Here it may exploit urban and ruderal sites, as well as woodlands where it preys on Chrysomelidae larvae (Budrienė *et al*., 2013).

Vespula vulgaris (Linnaeus, 1758)

Italy. 4 ♀; Lillaz (45.593451, 7.392886); 1630 m a.s.l.; 25 July 2023.
Comment: All workers, collecting wood pulp from fence posts adjacent to woodland margin.
Remarks. A near cosmopolitan species which has been recorded from all continents except Antarctica. It is strongly generalist in its habitat preferences and commonly occurs in urban and ruderal areas. It is more prevalent in central and northern Europe, where it can be ubiquitous.

Family Sphecidae

Ammophila campestris Latreille, 1809

Italy. 1 ♂: Vallone dell'Urtier (45.599987, 7.445709); 2270 m a.s.l.; 25 July 2023. Comment: Crawling on bare soil in alpine grassland. 2 ♂♂, 1 ♀: Grauson Inferiore (45.637399, 7.401547); 2300 m a.s.l.; 26 July 2023. Comment: All crawling on bare soil and rock adjacent to trackside in alpine grassland.
Remarks. A Palearctic species which is widespread in Europe. Widely distributed in Italy (Tomarchio & Turrisi, 2006). It occurs up to 2500 m in the Alps, occurring in a variety of habitats and preying on sawfly larvae (Hymenoptera: Tenthredinidae) (Bitsch *et al*., 2020).

Podalonia alpina (Kohl, 1888)

Italy. 1 ♀; Grauson Inferiore (45.638368, 7.410421); 2420 m a.s.l.; 26 July 2023. Comment: Actively crawling on bare soil on trackside in rocky alpine grassland.
Remarks. A Palearctic species. In Europe, it inhabits mountains of central and southern areas. It occurs up to around 2500 m in the Alps (Bitsch *et al*., 2022).

Podalonia hirsuta (Scopoli, 1763)

Italy. 1 ♀; Grauson Inferiore (45.637391, 7.401528); 2300 m a.s.l.; 26 July 2023. Comment: Crawling on damp mud adjacent to stream in alpine grassland. 1 ♀; Grauson Inferiore (45.637275, 7.406186); 2370 m a.s.l.; 26 July 2023. Comment: Crawling on bare soil on trackside in alpine grassland.
Remarks. In Europe this species is widespread but more abundant in southern areas. It occurs up to 2500 m in the Alps, where it inhabits a range of habitats and predates Lepidoptera larvae, especially Noctuidae (Bitsch *et al*., 2022).

Family Crabronidae

Bembix tarsata (Latreille, 1809)

Italy.1 ♀; Vallone dell'Urtier (45.597000, 7.396484); 1760 m a.s.l.; 25 July 2023. Comment: Feeding on *Carduus defloratus* in subalpine pasture.
Remarks. In Europe, this species is found in southern and central areas, from the Iberian Peninsula eastwards, as far north as Slovakia. A variety of habitats are frequented, where females prey on various Diptera (Bitsch *et al*., 2020).

Crabro alpinus Imhoff, 1863

Italy. 4 ♂♂; Grauson Inferiore (45.637905, 7.398909); 2290 m a.s.l.; 26 July 2023. Comment: All four visiting flowers of *Achillea millefolium* in alpine grassland.
Remarks. Locally common in the mountains of southern and central Europe, from Spain as far east as the Caucasus. Predatory on various Diptera (Bitsch *et al*., 2021).

Crabro cribrarius (Linnaeus,1758)

Italy. 3 ♂♂; Grauson Inferiore (45.637905, 7.398909); 2290 m a.s.l.; 26 July 2023. Comment: All 3 visiting flowers of *Achillea millefolium* in alpine grassland.
Remarks. Distributed across much of Europe and generally common in a range of habitats. It can be frequent in the cooler areas of southern Europe, such as the Alps and Pyrenees. Predatory on various Diptera (Bitsch *et al*., 2021).

Cerceris rybyensis (Linnaeus,1771)

Italy. 1 ♀; Vallone del Grauson (45.635037, 7.383521); 2140 m a.s.l.; 26 July 2023. Comment: Basking on leaves of *Rubus idaeus* adjacent to hiking trail.
Remarks. A common species across much of Europe where it is found in various habitats. The nests are provisioned with various Apoidea, particularly *Lasioglossum*, *Halictus*, *Panurginus* and *Andrena* (Bitsch *et al*., 2022).

Tachysphex pompiliformis agg.

Italy. 1 ♀; Grauson Inferiore (45.637916, 7.398787); 2290 m a.s.l.; 26 July 2023. Comment: Visiting flowers of *Achillea millefolium* in alpine grassland.
Remarks. The *Tachysphex pompiliformis* (Panzer, 1804) species group consists of 10 morphologically similar species in Europe and Turkey (Straka, 2016). Variation among specimens means that determination can be difficult and, in some cases, not possible. The female specimen caught during this survey could not be identified to species level with confidence, and since several of these species occur in the Alpine region, it has been designated *Tachysphex pompiliformis* agg.

Family Colletidae

Hylaeus difformis (Eversmann, 1852)

Italy. 1 ♀; Cascate di Lillaz (45.595244, 7.396481); 1720 m a.s.l.; 25 July 2023. Comment: Foraging on *Sonchus* sp. in dry mixed woodland clearing.
Remarks. Distributed across southern and central Europe. Amiet *et al.* (2014) cite 1600 m as the maximum altitude of this species in the Alps. It is univoltine (April-September) and widely polylectic.

Family Andrenidae

Andrena barbareae (Panzer, 1805)

Italy.1 ♀; Cascate di Lillaz (45.594913, 7.396713); 1690 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Thymus sp.* in a mixed woodland clearing.
Remarks. Found in south-central Europe in montane and subalpine habitats. Widely recorded from the Alps between 1200-1700 m. Bivoltine (April-May and July-August) and widely polylectic (Schmid-Egger & Scheuchl, 1997).

Andrena freygessneri (Alfken, 1904)

Italy. 3 ♀♀; Pila, Vallone del Grauson (45.635218, 7.382361); 2100 m a.s.l.; 26 July 2023. Comment: Foraging on flowers of *Sempervivum arachnoideum* in alpine grassland. 1 ♀; Grauson Inferiore, Vallone del Grauson (45.637473, 7.402299); 2320 m a.s.l.; 26 July 2023. Comment: Foraging on flowers of *Sempervivum montanum* L. in rocky alpine grassland.
Remarks. An endemic species of the western and central Alps, known from France, Switzerland, Italy and Austria. It flies in alpine grasslands, typically between 1600-2000 m. It is univoltine (June-August) and is polylectic, but with a strong preference for *Sempervivum* (Scheuchl & Willner, 2016).

Andrena fulvago (Christ, 1791)

Italy. 1 ♀; Grauson Inferiore, Vallone del Grauson (45.637205, 7.404808); 2380 m a.s.l.; 26 July 2023. Comment: Foraging on *Hieracium villosum* Jacq. and *Crepis aurea* (L.) in rocky alpine grassland.
Remarks. A species of open grasslands across much of Europe, as far north as southern Fennoscandia. Univoltine (typically May-July) although it has been recorded in August in Switzerland and may do so in Italy at higher altitudes. Oligolectic on Asteraceae (Falk, 2015).

Andrena labiata Fabricius 1781

Italy. 1 ♀; Refugio Grauson, Vallone del Grauson (45.639444, 7.410157); 2460 m a.s.l.; 26 July 2023. Comment: Flying around bare soil on a trackside in dry alpine grassland.
Remarks. Found across much of Europe around field margins, dry meadows and forest edges. Univoltine (April-July) and widely polylectic, although it can rely heavily on *Veronica sp.* and *Potentilla sp.* (Scheuchl &Willner, 2016).

Andrena nuptialis Pérez, 1902

Italy. 1 ♀; Goilles Dessus, Vallone dell'Urtier (45.597402, 7.407511); 1840 m a.s.l.; 25 July 2023. Comment: Foraging on *Peucedanum ostruthium* (L.) in subalpine pasture.
Remarks. Found in southern and central Europe in xeric grasslands (Kemp *et al*., 2013). In Italy it is only known from Piedmont and Valle

d'Aosta (Scheuchl & Willner, 2016; GBIF, 2023). Bivoltine (April-May and July-August); the second generation being oligolectic on Apiaceae.

Panurginus cf. *sericatus* (Warncke, 1972)

Italy. 1 ♀; Refugio Grauson (45.637441, 7.402585); 2340 m a.s.l.; 26 July 2023. Comment: Visiting flowers of *Hieracium villosum* in rocky alpine grassland.
Remarks. Females of the two species *Panurginus montanus* Giraud, 1861 and *Panurginus sericatus* cannot be separated using the key in Amiet *et al.*, 2010, so this specimen cannot be determined with confidence. Both species are univoltine (June-August) and inhabit various habitats between 900–3100 m, foraging on a variety of flower species (Amiet *et al.*, 2010).

Panurgus banksianus (Kirby, 1802)

Italy. 1 ♂; Refugio Grauson (45.637441, 7.402585); 2340 m a.s.l.; 26 July 2023. Comment: Visiting flowers of *Hieracium villosum* in rocky alpine grassland.
Remarks. In Europe, this species is distributed from Portugal eastward to Greece and as far north as southern Sweden. It can be found in a variety of habitats up to the tree line in the Alps. It forages on yellow Asteraceae and is active in one generation between June and August (Scheuchl & Willner, 2016).

Panurgus calcaratus (Scopoli,1763)

Italy. 2 ♂♂; Cascate de Lillaz (45.595418, 7.396039); 1690 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Leontodon* sp. in dry coniferous woodland clearing.
Remarks. A widespread European species, but absent from northern Fennoscandia, Ireland and some Mediterranean islands. It is found in various habitats where there is plentiful yellow Asteraceae, the primarily pollen source (Scheuchl & Willner, 2016). There is one generation between June and September.

Family Halictidae

Dufourea minuta Lepeletier, 1841

Italy. 1 ♀; Vallone dell'Urtier (45.598877, 7.434057); 2090 m a.s.l.; 25 July 2023. Comment: Foraging on *Hieracium tomentosum* L. in rocky alpine grassland.
Remarks. Distributed primarily in southern, eastern and northern Europe, from the Pyrenees eastwards to Finland and the southern Urals. In the Alps, it flies between 1000 and 2250 m in habitats with yellow Asteraceae, the primary pollen source (Amiet *et al*., 2014).

Halictus simplex agg. Blüthgen, 1931

Italy. 1 ♀; Cascate di Lillaz (45.595022, 7.396706); 1690 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Hieracium tomentosum* in dry mixed woodland clearing.
Remarks. Reliable separation of the females of *Halictus simplex* Blüthgen, 1923, *Halictus compressus* (Walckenaer, 1802) and *Halictus langobardicus* Blüthgen, 1944 is not possible (Gérard *et al.*, 2025). Members of this species complex inhabit open grassland habitats where they are polylectic (Scheuchl & Willner, 2016). They fly in both lowland and montane areas, appearing between April and September and often appear together.

Halictus maculatus Smith, 1848

Italy. 1 ♂; Cascate di Lillaz (45.595085, 7.396643); 1690 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Thymus sp.* in dry mixed woodland clearing.
Remarks. A widespread and generally common species across much of continental Europe. Found up to 1700 m in the alpine valleys. Observed between April and October (Amiet *et al.*, 2001) and widely polylectic (Scheuchl & Willner, 2016).

Family Megachilidae

Heriades crenulatus Nylander, 1856

Italy. 1 ♀; Vallone dell'Urtier (45.596367, 7.395631); 1720 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Carduus defloratus* in subalpine pasture.
Remarks. A species of southern and central Europe and N. Africa. In the Alps it is widespread, where it usually occurs up to 1500 m. It is univoltine between June and September and oligolectic on Asteraceae (Amiet *et al.*, 2004).

Icteranthidium laterale (Latreille, 1809)

Italy. 1 ♀; Vallone dell'Urtier (45.597184, 7.397080); 1760 m a.s.l.; 25 July 2023. Comment: Basking on bare rock in stoney mixed woodland clearing.
Remarks. Distributed in southern and central Europe in dry grasslands and steppe (Scheuchl & Willner, 2016), usually up to 1500 m. It is univoltine (June-August) and oligolectic on Cardueae (Amiet *et al.*, 2004).

Megachile analis Nylander, 1852

Italy. 1 ♀; Vallone dell'Urtier (45.596601, 7.401817); 1810 m a.s.l.; 25 July 2023. Comment: Foraging on *Onobrychis viciifolia* in rocky coniferous woodland clearing.
Remarks. A widespread species in northern and central Europe. In the alps it inhabits dry areas of waste ground (Scheuchl & Willner, 2016), generally between 1000-2300 m (Amiet *et al.*, 2004). It is univoltine between May and September and is oligolectic on Campanulaceae and Fabaceae.

Megachile lagopoda (Linnaeus, 1761)

Italy. 1 ♀; Vallone dell'Urtier (45.596720, 7.396424); 1730 m a.s.l.; 25 July 2023. Comment: Foraging on flowers of *Centaurea* sp. in rocky subalpine pasture.
Remarks. Widespread in continental Europe in dry grasslands and clay pits (Scheuchl & Willner, 2016), generally up to 1400 m in the alps. Univoltine (May-August) and polylectic, but with preference for Asteraceae (Amiet *et al.*, 2004).

Megachile pyrenaica Lepeletier, 1841

Italy. 3 ♀♀; Vallone dell'Urtier (45.596254, 7.396098); 1720 m a.s.l.; 25 July 2023. Comment: Flying around bare soil in subalpine pasture.
2 ♀♀; Vallone dell'Urtier (45.597590, 7.408525); 1820 m a.s.l.; 25 July 2023. Comment Visiting flowers of *Onobrychis viciifolia* in subalpine pasture. 2 ♀♀; Pila, Vallone del Grauson (45.635111, 7.382575); 2090 m a.s.l.; 26 July 2023. Comment: Basking on rocks on hiking track through alpine pasture. 1 ♀ Grauson Inferiore, Vallone del Grauson (45.637215, 7.404828); 2360 m a.s.l.; 26 July 2023. Comment: Basking on rocks in rocky dry alpine grassland.
Remarks. Distributed in southwestern and south-central Europe in areas of dry grassland and rocky steppe (Scheuchl & Willner, 2016). It occurs up to 2200 m and is a univoltine species (April-August). It is typically a high-altitude species in the Alps, although it can sometimes be found at lower altitudes. It is oligolectic on Fabaceae (Amiet *et al.*, 2004).

Hoplitis villosa (Schenck, 1853)

Italy. 1 ♀; Vallone dell'Urtier (45.597042, 7.404784); 1820 m a.s.l.; 25 July 2023. Comment: visiting flowers of *Carduus defloratus* in subalpine pasture.
Remarks. A species of western, central and eastern Europe, occurring in the Alps in habitats between 1000-2300 m. It is univoltine (May-September) and is oligolectic on Asteraceae (Amiet *et al.*, 2004).

Stelis phaeoptera (Kirby, 1802)

Italy. 1 ♀; Vallone dell'Urtier (45.595961, 7.395538); 1720 m a.s.l.; 25 July 2023. Comment: Flying around bare soil in subalpine pasture.
Remarks. Found across most of Europe, where it is univoltine (April-September) and typically found below 1900 m (Amiet *et al.*, 2004). It may be found in a wide variety of habitats and uses various *Osmia*, *Hoplitis* and other Megachilidae as hosts (Scheuchl & Willner, 2016).

Trachusa byssina (Panzer, 1804)

Italy. 1 ♂; Goilles Dessus, Vallone dell'Urtier (45.596852, 7.403426);

Figure 6. *Hoplitis villosa* female foraging on *Carduus defloratus*. This species is fairly frequent above the tree-line.

820 m a.s.l.; 25 July 2023. Comment: Basking on bare rock in stony mixed woodland clearing.
Remarks. Found throughout much of continental Europe in habitats such as flower-rich forest edges, meadows, heaths and sand pits (Scheuchl & Willner, 2016). It is univoltine (May-September) and is oligolectic on Fabaceae, flying below 2100 m (Amiet *et al.*, 2004).

Family Apidae

Epeolus alpinus Friese, 1893

Italy. 1 ♀; Grauson Inferiore, Vallone del Grauson (45.637223, 7.391848); 2260 m a.s.l.; 26 July 2023. Comment: Flying around short turf in dry alpine grassland.
Remarks. A scarce kleptoparasitic species found from Spain northwards through the alps to the Baltic Sea Coast and Fennoscandia. Found in the alps from 1450-2200 m between June and August (Amiet *et al.*, 2007). Neither of its host species, *Colletes floralis* Eversmann, 1852 or *Colletes impunctatus* Nylander 1852 were seen during the survey.

Anthophora mucida Gribodo 1873

Italy. 1 ♀; Refugio Grauson, Vallone del Grauson (45.641057, 7.410364); 2510 m a.s.l.; 26 July 2023. Comment: Foraging on *Oxytropis campestris* in alpine grassland.
Remarks. Found in southern Europe from Spain to Ukraine in warm dry habitats; can be common in some alpine areas up to 1500 m. It is univoltine (April-July) and widely polylectic (Amiet *et al.*, 2007).

Bombus hortorum (L., 1761)

Italy. 4 ♀♀; Lillaz (45.593631, 7.392860); 1620 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Digitalis lutea* in dry woodland clearing.
Remarks. A common species found throughout Europe, usually around woodlands at low to moderate altitudes. It is polylectic with workers foraging primarily on long flowers such as Fabaceae, Scrophulariaceae, Plantaginaceae and Lamiaceae (Rasmont *et al.*, 2021).

Bombus humilis Illiger, 1806

Italy. 1 ♂; Lillaz (45.593704, 7.392769); 1620 m a.s.l.; 25 July 2023. Comment: basking on flowerhead of *Knautia arvensis* in dry woodland clearing.
Remarks. A locally common species of flower-rich grasslands, heath, scrub and woodland edges across much of Europe. It is polylectic, with workers showing a preference for various Fabaceae, *Stachys*, *Echium* and *Cirsium* (Rasmont *et al.*, 2021).

Bombus hypnorum (L.,1758)

Italy. 3 ♂♂; 2 ♀♀; Cascate di Lillaz (45.593892, 7.396754); 1660 m a.s.l.; 25 July 2023. Comment: both sexes visiting flowers of *Chamaenerion angustifolium* in woodland clearing.
Remarks. Common in much of Europe but absent from Mediterranean climes. It is strongly associated with forests and increasingly with human habitation (Rasmont *et al.*, 2021). It is polylectic with a preference for *Rubus* sp. (Falk, 2015).

Bombus lapidarius (L., 1758)

Italy. 4 ♀♀; Cogne (45.608184, 7.358539); 1540 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Cirsium vulgare* (Savi) Ten. in ruderal land.
Remarks. Common in most of Europe but becoming an increasingly scarce and montane or alpine-dwelling species in the south (Rasmont *et al.*, 2021). It is polylectic and inhabits flower-rich grasslands, forest edges and clearings, showing a preference for Fabaceae and purple Asteraceae.

Bombus lucorum (L., 1761)

Italy. 1 ♂; Cascate di Lillaz (45.593998, 7.396921); 1660 m a.s.l.; 25 July 2023. Comment: basking on rocks in woodland clearing. 1 ♂; Cret, Vallone dell'Urtier (45.597518, 7.427712); 1970 m a.s.l.; 25 July 2023. Comment: visiting flowers of *Carduus defloratus* in coniferous woodland clearing. 1 ♂; Cretetta, Vallone del Grauson (45.621125, 7.372551; 1900 m a.s.l.; 26 July 2023. Comment: basking on rock in coniferous woodland clearing.
Remarks. Common over most of Europe in a wide range of habitats and at a variety of altitudes. It is becoming scarcer in areas with increasingly warm and dry climates (Rasmont *et al.*, 2021). It is widely polylectic. It should be noted that *B. lucorum* is one of three

morphologically similar species, along with *Bombus magnus* Vogt, 1911 and *Bombus cryptarum* (Fabricius, 1775). Workers of the *Bombus lucorum* agg. species group were frequently encountered throughout the survey area but are too morphologically similar to separate with confidence. *B. magnus* is exceptionally rare in the Alps, whilst *B. cryptarum* is localised in heathland sites. *B. lucorum* is abundant throughout the Alps at higher altitudes (Yvan Brugerolles *pers. comm.*).

Bombus mastrucatus Gerstäcker, 1869

Italy. 4 ♀; Lillaz (45.598057, 7.380795); 1600 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Vicia cracca* in subalpine pasture. One specimen was observed engaging in 'nectar robbing' behaviour. 2 ♀; Vallone dell'Urtier (45.599219, 7.421392); 1930 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Trifolium pratense* in coniferous woodland clearing. 1 ♂; Vallone dell'Urtier (45.598170, 7.444366); 2210 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Leontodon sp.* in coniferous woodland clearing. 3 ♀; Vallone dell'Urtier (45.599825, 7.451566); 2310 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Teucrium montanum* L. in alpine grassland. Vallone del Grauson (45.626065, 7.373722); 1920 m a.s.l.; 26 July 2023. Comment: 'Nectar robbing' on flowers of *Salvia pratensis* L.
Remarks. This species was previously known as *Bombus wurflenii* Radoszkowski, 1859, but the taxonomy was revised by Williams *et al.*, (2023) so that *B. wurflenii* refers to the taxon present in the Caucasus, whilst the European taxon was recognised as a separate species, known as *Bombus mastrucatus*. It occurs in mountainous regions of Europe and is common in the Alps. It occurs in and around woodland habitats and forages on a wide range of flower species, but a preference is shown towards *Vaccinium, Aconitum,* Lamiaceae and Fabaceae (Rasmont *et al.*, 2021).

Figure 7. *Bombus mastrucatus* worker 'nectar-robbing' on *Vicia cracca* flowers.

Bombus mesomelas Gerstäcker, 1869

Italy. 2 ♀♀; Vallone dell'Urtier (45.597030, 7.400405); 1860 m a.s.l.; 25 July 2023. Comment: visiting flowers of *Centaurea nervosa* in coniferous woodland clearing. 5 ♀♀; Goilles Dessus, Vallone dell'Urtier (45.597430, 7.407451); 1840 m a.s.l.; 25 July 2023. Comment: visiting flowers of *Centaurea nervosa* and *Trifolium pratense* in subalpine pasture. 1 ♀♀; Vallone dell'Urtier (45.598201, 7.416312); 1860 m a.s.l.; 25 July 2023. Comment: visiting flowers of *Carduus defloratus* in subalpine pasture. 3 ♀♀; Cret, Vallone dell'Urtier (45.597537, 7.427760); 1970 m a.s.l.; 25 July 2023. Comment: visiting flowers of *Trifolium pratense* in coniferous woodland clearing. 6 ♀♀; Tzavanis, Vallone dell'Urtier (45.599898, 7.447523); 2270 m a.s.l.; 25 July 2023. Comment: visiting flowers of *Cirsium spinosissimum* (L.) Scopoli 1769 and *Carduus defloratus* in alpine grassland. 3 ♀♀; Tchezeu, Vallone del Grauson (45.628313, 7.375835); 1940 m a.s.l.; 26 July 2023. Comment: visiting flowers of *Teucrium montanum* in rocky woodland clearing. 5 ♀♀; Grauson Inferiore, Vallone del Grauson (45.637200, 7.391666); 2240 m a.s.l.; 26 July 2023. Comment: visiting flowers of *Carduus defloratus* in coniferous woodland clearing. 3 ♀♀, 1 ♂; Refugio Grauson, Vallone del Grauson (45.641302, 7.410572); 2500 m a.s.l.; 26 July 2023. Comment: visiting flowers of *Carduus defloratus* in alpine grassland.
Remarks. A montane and alpine species of southern and central Europe. It can be frequent in flower-rich grasslands, particularly south-facing xeric types (Rasmont *et al.*, 2021). It is widely polylectic but is particularly fond of *Trifolium* species and purple Asteraceae.

Figure 8. *Bombus mesomelas* worker foraging on *Carduus defloratus*. This is one of the most frequent Bombus species in warm, open habitats in the subalpine and alpine zones.

Bombus monticola Smith, 1849

Italy. 2 ♂♂; Vallone dell'Urtier (45.598355, 7.437078); 2070 m a.s.l.; 25 July 2023. Comment Feeding on flowers of *Trifolium badium* Schreber in coniferous woodland clearing. 1 ♂; Vallone del Grauson (45.635721, 7.383897); 2170 m a.s.l.; Comment: Visiting flowers of Dipsacoideae in coniferous woodland clearing.
Remarks. A widespread European species which inhabits most larger mountain ranges, as well as lowland parts of Fennoscandia. It can be frequent in the subalpine zone. It is a polylectic species but exhibits a favouritism towards Ericaceae flowers (Rasmont *et al.*, 2021).

Bombus pascuorum (Scopoli, 1763)

Italy. 4 ♀♀; Lillaz (45.597997, 7.380737); 1600 m a.s.l.; 25 July 2023. Comment: Foraging on *Vicia cracca* along a coniferous woodland edge. 5 ♀♀; Cascate de Lillaz (45.594211, 7.397462); 1690 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Digitalis lutea* and *Rubus* sp. in mixed woodland clearing.
Remarks. A widespread and often common species found throughout much of Europe, only avoiding hotter Mediterranean areas. It can be found in a wide range of habitats, with Rasmont *et al.*, (2021) describing it as a forest or forest edge species. It is widely polylectic.

Bombus pratorum (Linnaeus, 1761)

Italy. 1 ♀; Cascate de Lillaz (45.595085, 7.396983); 1700 m a.s.l.; 25 July 2023. Comment: A queen, visiting flowers of *Carduus defloratus* in by trackside in a rocky mixed woodland clearing. 2 ♂♂; Vallone dell'Urtier (45.597524, 7.443175); 2170 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Carduus defloratus* in coniferous woodland clearing.
Remarks. Similarly to *Bombus pascuorum*, in Europe, this species is widespread and often common, avoiding only the hotter areas of the Iberian, Italian and Balkan peninsulas. It is strongly associated with woodland habitats and it occurs up to the subalpine zone (Rasmont *et al.*, 2021). It is widely polylectic (Falk, 2015).

Bombus pyrenaeus Pérez, 1879

Italy. 3 ♂♂; Vallone dell'Urtier (45.598789, 7.417312); 1890 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Hieracium tomentosum* in mixed woodland clearing.
Remarks. This species is restricted to mountain ranges of southern and central Europe, occurring from the Pyrenees eastwards to the

Carpathians. It is generally more frequent in the coniferous subalpine zone and also in alpine grassland above the tree-line. It is polylectic but demonstrates a preference for Ericaceae (Rasmont *et al.*, 2021).

Bombus ruderarius (Müller, 1776)

Italy. 1 ♀; Vallone dell'Urtier (45.599168, 7.444517); 2240 m a.s.l.; 25 July 2023. Comment: Foraging on flowers of *Centaurea sp.* in alpine grassland. 2 ♂♂; Vallone dell'Urtier (45.599853, 7.450546); 2310 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Carduus defloratus* in alpine grassland. 1 ♀, 3 ♂♂; Grauson Inferiore (45.637707, 7.396927); 2250 m a.s.l.; 26 July 2023. Comment: Visiting flowers of *Carduus defloratus* in damp alpine grassland. 1 ♂; Refugio Grauson (45.640042, 7.409201); 2490 m a.s.l. 26 July 2023. Comment: Visiting flowers of *Carduus defloratus* in alpine grassland.
Remarks. In Europe, this species is widespread but is absent from northern Fennoscandia and is restricted to mountains in the southern Iberian, Italian and Balkan peninsulas (Rasmont *et al.*, 2021). It is essentially a species of flower-rich grasslands. It is polylectic but demonstrates a strong preference for Fabaceae and purple Asteraceae (Falk, 2015).

Bombus sichelii Radoszkowski, 1860

Italy. 2 ♀♀; Vallone dell'Urtier (45.596608, 7.401872); 1820 m a.s.l.; 25 July 2023. Comment: Foraging on flowers of *Petrosedum montanum* in rocky coniferous woodland clearing. 2 ♀♀, 1 ♂ (45.597543, 7.427746); 1980 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Carduus defloratus* and purple Dipsacoideae in coniferous woodland clearing. 1 ♂ (45.598372, 7.437152); 2060 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Centaurea scabiosa* in rocky alpine grassland. 1 ♂ (45.599080, 7.444793); 2240 m a.s.l.; 25 July 2023. Comment: Visiting flowers of *Hieracium villosum* in rocky alpine grassland. 2 ♀♀; Vallone del Grauson (45.635450, 7.381781); 2090 m a.s.l.; Comment: Visiting flowers of *Carduus defloratus* in subalpine grassland. 1 ♀, 2 ♂♂; Grauson Inferiore (45.637705, 7.397666); 2290 m a.s.l.; 26 July 2023. Comment: Visiting flowers of *Carduus defloratus* in alpine grassland **Remarks.** A mountain-dwelling species which in Europe is restricted to the Picos de Europa, Pyrenees, Alps and various larger mountains in the Balkan Peninsula. Here it inhabits the subalpine zone, particularly in clearings and around edges of coniferous forest. It is widely polylectic (Rasmont *et al.*, 2021).

Bombus sylvarum Linnaeus, 1761

Italy. 1 ♀, 1 ♂; Vallone dell'Urtier (45.598961, 7.449160); 2290 m a.s.l.; 25 July 2023. Comment: Both visiting flowers of *Carduus defloratus* in alpine grassland. 2 ♀♀; Grauson Inferiore (45.637292, 7.401871); 2300 m a.s.l.; 26 July 2023. Comment: Visiting flowers of *Carduus defloratus* in rocky alpine grassland.
Remarks. In Europe, this species is widespread, but it is absent from southern areas of the Iberian and Balkan peninsulas, as well as northern Fennoscandia. It is a species of flower-rich grassland and shrubby areas with abundant Fabaceae. It is polylectic, but purple Asteraceae and Fabaceae are favoured (Rasmont *et al.*, 2021).

Figure 9. *Bombus sichelii* worker foraging on *Petrosedum montanum*. This species is common in subalpine forests as well as alpine grasslands.

Bombus sylvestris (Le Peletier, 1832)

Italy. 1 ♂; Cascate de Lillaz (45.594037, 7.396675); 1640 m a.s.l.; 25 July 2023. Comment: Basking on herbaceous foliage in coniferous woodland clearing.
Remarks. A Palearctic species, it is widespread in Europe, only absent from the southern and northern extremities. It is generally found in woodland and heathland habitats where its hosts *Bombus pratorum* and *Bombus jonellus* occur in sufficient numbers (Falk, 2015).

Bombus terrestris (Linnaeus, 1758)

Italy. 1 ♂; Lillaz (45.598057, 7.380795); 1600 m a.s.l.; 25 July 2023. Comment: Basking on herbaceous foliage in subalpine pasture.
Remarks. A widespread and often ubiquitous species in much of Europe, only avoiding the northern reaches of Fennoscandia (Rasmont *et al.*, 2021). It occurs in a wide variety of habitats and is widely polylectic (Falk, 2015).

DISCUSSION

Species composition

In total, 58 species were recorded over the two-day sampling period. The most speciose family was the Apidae, specifically *Bombus*, which were well represented with 16 species recorded. Only three other Bombus species, *Bombus rupestris* (Fabricius,1793), *Bombus soroeensis* (Fabricius,1777) and *Bombus alpinus* (Linnaeus, 1758) have been recorded in the general area of the Val di Cogne, including the adjacent Gran Paradiso National Park (GBIF, 2023).

Several other *Bombus* species could, theoretically, be present in the valley. *Bombus inexspectatus* (Tkalcu, 1963) is one such species. Given the strong populations of *Bombus ruderarius* above the tree-line in both the Vallone del Grauson and the Vallone dell'Urtier, it is quite possible that *B. inexspectatus* occurs here too, being a scarce inquiline species of *B. ruderarius*, particularly on the south-facing slopes of the southern Alps (Rasmont *et al.*, 2021). Yarrow (1970) notes that this species occurs in very low densities, so considerable surveying efforts may be required to detect it. Another species is *Bombus gerstaeckeri* Morawitz, 1882. This species is oligolectic on *Aconitum*, particularly *Aconitum lycoctonum* L. (Rasmont *et al.*, 2021) and it only occurs where the plants are abundant. Consequently, it is a highly localised species which is rarely numerous (Ponchau *et al.*, 2006).

Because of this, this work should not be interpreted as a comprehensive list of the aculeate fauna of the valley. Additional survey work would undoubtedly increase the species total, given that several common alpine species whose flight periods coincide with the timing of the survey were undetected (e.g., *Colletes impunctatus* Nylander, 1852, *Dufourea alpina* Morawitz, 1865, *Hylaeus glacialis* Morawitz, 1872, *Hylaeus nivalis* (Morawitz, 1867)). These species, among others, have been recorded frequently across the alpine chain and were recorded during similar surveys in

other sections of the Alps (BOSSERT, 2014; SCHMID-EGGER, 2011).

Additional, survey work during other months of the year would probably increase the species total further. Species such as *Andrena lapponica* ZETTERSTEDT, 1838 and *Andrena rogenhoferi* MORAWITZ, 1872 are found throughout the Alps and typically fly between May and mid-July, only rarely extending their flight periods into August. The probability of finding these species was therefore unlikely.

Conservation and existing threats

None of the species recorded are of great conservation concern, according to the European Red List of Bees (NIETO *et al.*, 2014), although *Dufourea minuta* is categorised as 'Near Threatened'. All *Bombus* species which were recorded during the survey are however listed as 'R' (Climatic Risk), 'HR' (High Climatic Risk), 'HHR' (Very High Climatic Risk) or 'HHHR' (Extreme Climatic Risk) according to RASMONT *et al.* (2015), in which future distribution trends were modelled using projected climatic conditions. These designations are applicable to *Bombus hortorum* (HR), *Bombus humilis* (HHR), *Bombus hypnorum* (HR), *Bombus lapidarius* (HHR), *Bombus lucorum* (HR), *Bombus mastrucatus* (R), *Bombus mesomelas* (HR), *Bombus monticola* (HR), *Bombus pascuorum* (R), *Bombus pratorum* (HR), *Bombus pyrenaeus* (HR), *Bombus ruderarius* (HHR), *Bombus sichelii* (HR), *Bombus sylvarum* (HHHR), *Bombus sylvestris* (HR) and *Bombus terrestris* (HR). Some species in particular are threatened due to their limited dispersal capabilities, habitat fragmentation and their boreo-alpine distribution and all are expected to decline and/or regress to a varying degree during the 21st century (RASMONT *et al.*, 2021).

The author is not aware of any existing studies on the potential population or distribution changes of any other species recorded during this survey. However, it is likely that species which are zoogeographically categorised as 'Alpine' or 'Montane' may experience regression and/or decline due to climate change. The findings of RASMONT *et al.* (2015) are corroborated in MANINO *et al.* (2007), which predict increasing population fragmentation of Alpine bumblebee species such as *Bombus mendax* GERSTÄCKER, 1869, *Bombus monticola* and *Bombus alpinus*. BIELLA *et al.*, (2017) reveal that *B. alpinus* has exhibited an altitudinal range shift, with its lower altitudinal limit moving upwards by 479 m since 1984. Based on these findings, other species with similar habitat preferences and altitudinal ranges may experience similar trends, although further study is required.

Aside from climate change, few other threats to the aculeate fauna of the valley were apparent, particularly to species occurring above the tree-line. Grazing by cattle was observed in both alpine grasslands of the Vallone dell'Urtier and the Vallone del Grauson, however stocking density was low and grazing activity was scarcely if at all evident in most areas. Grazing by cattle was more evident in the subalpine pastures below the tree-line, particularly in the Vallone del Grauson (figure 10). Even here, floristic diversity and abundance was still high and stocking density was not excessive.

The meadows surrounding the village of Cogne were much more degraded. During the author's visit, these meadows were in the process of being mown and baled. Floristic diversity and abundance here was very low compared to meadows in the Vallone dell'Urtier and the Vallone del Grauson. Consequently, aculeates were virtually absent here. Overall, the anthropogenic threats appeared to be relatively minor and the habitat quality throughout much of the studied area was high. This is undoubtedly aided by the accessibility of the two valleys, which in the case of the Vallone del Grauson, is limited to stony hiking trails. A section of the Vallone dell'Urtier is accessible by a small paved road. In both cases, the limited accessibility restricts the footfall into the areas, which almost certainly preserves the habitat quality. Other areas of the Alps which have been extensively developed show much higher levels of habitats degradation (SCHMID-EGGER, 2011).

Further, more extensive surveying is required to obtain a more comprehensive list of the aculeate fauna in the Val di Cogne, but it is hoped that this work may provide a useful reference and starting point for those who may wish to study this faunistically rich region further.

Figure 10. Cattle grazing in subalpine pasture in the Vallone del Grauson. The cattle are contained in temporary fencing and are moved frequently. This ensures that floristic diversity and abundance remains relatively high and helps prevent overgrazing

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