

Research Article

The hunt for *Scabiosa trenta* Hacq: how the pursuit of a phantom ignited a passion for botany and mountaineering

Valentina Boscariol^{1,2,3,4}, Marco Canella^{1,4,5}, Sara Natale^{1,4}, Špela Pungaršek⁶,
Francesco Dal Grande^{1,4} and Elena Canadelli^{2,4}

¹Department of Biology, University of Padova, Padova, Italy

²Department of Historical and Geographic Sciences and the Ancient World, University of Padova, Padova, Italy

³Department of Earth and Marine Sciences, University of Palermo, Palermo, Italy

⁴National Biodiversity Future Center, Palermo, Italy

⁵Botanical Garden of Padova, Padova, Italy

⁶Slovenian Museum of Natural History, Ljubljana, Slovenia

Correspondence: Valentina Boscariol (valentina.boscariol@studenti.unipd.it)

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Scabiosa trenta Hacq. was first described in 1782 by Balthasar Hacquet, with its specific epithet referring to the Trenta Valley in Slovenia. Since then, *S. trenta* has been the focus of numerous mountaineering and botanical expeditions, particularly by the alpinist Julius Kugy during the Golden Age of Alpinism, a period in the second half of 19th century in which climbers explored remote mountain areas solely with the use of rudimentary equipment. The 'hunt' for *S. trenta* began in 1877 when Kugy was 19, sparking his lifelong passion for botany and alpinism. Among his companions was Albert Bois de Chesne, who founded the Juliana Alpine Botanical Garden in 1926, a key facility for plant conservation and natural science communication in the Julian Alps. However, despite extensive efforts of many botanists, the species has never been located. Having examined Hacquet's herbarium specimen, currently stored in the Slovenian Museum of Natural History, Anton Kerner von Marilaun proposed in 1893 that *S. trenta* was not a distinct species but an ecotype of *Cephalaria leucantha* (L.) Roem. & Schult., otherwise typically found at lower elevations. Over time, the taxonomic inaccuracy that caused the publication of *S. trenta* ignited the interest in botany in many explorers and mountaineers. This species became a symbol of the unreachable in Slovenian folklore, inspiring studies on the alpine flora.

Keywords: Alps, Caprifoliaceae, herbaria, living collections, taxonomy

Introduction

Plant biodiversity in alpine environments is particularly sensitive to climate change, often experiencing more pronounced impacts compared to lowland ecosystems (Rosbakh et al. 2014, Mountain Research Initiative EDW Working Group 2015,

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Tognela et al. 2025). This vulnerability stems from a combination of extreme climatic conditions, habitat fragmentation, and the limited ability of some species to shift to higher elevations (Lamprecht et al. 2018, Porro et al. 2021, Lodetti et al. 2024). These effects extend across all altitudinal zones, from forests to nival belts, disrupting long-established ecological dynamics (Bayle et al. 2025).

Understanding these changes requires a historical perspective on alpine flora (Abbott 2008, Jaroszynska et al. 2023). A crucial period for the documentation and study of mountain biodiversity was the late 19th century, during the era known as ‘Golden Age of Alpinism’ (firstly named *alpinismo eroico*: Tufi 2023). This period was marked by growing interest in exploring remote and technically challenging mountain summits, with climbers relying solely on the rudimentary equipment available at the time. Along with geographic explorations, botanical discoveries were advancing in parallel, which led to the description of numerous alpine species, particularly endemics with restricted distributions and highly specialized ecological adaptations. Scientific interest in alpine flora, particularly in the context of climate change and conservation, remains strong. Long-term monitoring programs, such as the Global Observation Research Initiative in Alpine Environments (GLORIA), track shifts in plant distribution on summits worldwide, offering key insights into the effects of climate change on mountain ecosystems (Grabherr et al. 2000). Similarly, conservation initiatives such as the Alpine Seed Conservation Network, which has collected germplasm from over 400 endemic species across the Alpine Arc, highlight the ongoing efforts to preserve alpine biodiversity (Müller et al. 2017).

For such conservation efforts to be effective, a robust taxonomic foundation is essential (Ranjbaran et al. 2025). Clear and accurate species identification is critical for long-term ecological monitoring and conservation planning (Conix 2019, Bevilacqua et al. 2021). Many species described during early alpine explorations in the 19th century were classified based on limited specimens or preliminary descriptions. In some cases, misidentifications, unrecognized or incorrect attributions have led to taxonomic confusions and unreliable distribution records (Rao 2018). Reviewing type specimens through historical herbarium analysis, digitization, and modern morphological and molecular techniques are therefore essential for clarifying relationships among closely related taxa (Magauer et al. 2014). Taxonomic revisions not only correct historical inaccuracies but also ensure consistency in biodiversity databases such as the Global Biodiversity Information Facility (GBIF 2025a), playing a crucial role in standardizing botanical knowledge.

This study reconstructs the historical and taxonomic journey of *Scabiosa trenta* Hacq., a species described in the late 18th century by Balthasar Hacquet (1739/1740–1815) (Hacquet 1782) as endemic to the Trenta Valley, a floristically significant area within the Triglav massif in the Julian Alps (Slovenia). Despite being the focus of numerous botanical and mountaineering expeditions, *S. trenta* has never been found again. Among those who searched for this mystery

most intensively was Julius Kugy (1858–1944), a key figure in the exploration of the Julian Alps, who dedicated a significant effort to locate this elusive species. The study aims to 1) clarify Kugy’s role in the exploration of the Julian Alps to find specimens of *S. trenta*, 2) examine the botanical and cultural significance of the search for this species, and 3) highlight the role of combined fieldwork and herbarium studies in the taxonomy of alpine species.

A new species of *Scabiosa*

Balthasar Hacquet spent part of his life in Ljubljana, where he held the chair of anatomy at the Ljubljana Lyceum (1773–1787). During these years, Hacquet dedicated himself to studying the flora of Carniola (historical region, which covered a large part of today’s Slovenian territory), conducting explorations from the Julian Alps to Istria. His contributions to botanical knowledge were published in the work *Plantae Alpinae Carniolicae* (Hacquet 1782). In this publication, protologues of eleven species newly introduced to science were included, some of which are still accepted today, e.g., *Gentiana terglouensis* Hacq. and *Crepis terglouensis* (Hacq.) A.Kern. This work also contains the protologue of a new species belonging to the genus *Scabiosa*, which Hacquet named *Scabiosa trenta* Hacq. (Fig. 1A). The author noted that this species closely resembled a *Scabiosa* species described by Linnaeus, currently known as *Cephalaria transsylvanica* (L.) Roem. & Schult.

Regarding the *locus classicus*, Hacquet indicated the mountains surrounding the municipality of Trenta, specifying localities such as the western rocky slopes of Terglou (Triglav), beneath Mount Ziperie (Ciprje), at Trachinerwerk (Draški vrh), and above Mischelen-verch (Mišelj vrh). Hacquet’s description emphasized the unique coloration and specific alpine growing habitat of *S. trenta* as key differentiating factors from other *Scabiosa* species. The publication is accompanied by a set of botanical tables including a drawing of *S. trenta* (Fig. 1B). Although the specific page containing the figure bears no signature, the drawing is attributable to Hacquet himself. Hacquet also collected a single herbarium specimen of *S. trenta* (Fig. 1C), which is currently stored in the Slovenian Museum of Natural History (one of the successors of the Provincial Museum for Carniola, Ljubljana). Hacquet did not designate a type of the new species because type concept did not exist at that time. Despite the current poor conditions of this voucher, it represents the only herbarium specimen documenting the description of *S. trenta*.

Julius Kugy and the exploration of the Julian Alps

Julius Kugy was introduced to alpine botany by the naturalist Rudolf Baumbach during the first years of the 1870s. In these years Kugy undertook his first hikes in the Julian Alps and started to familiarize himself with their flora. He

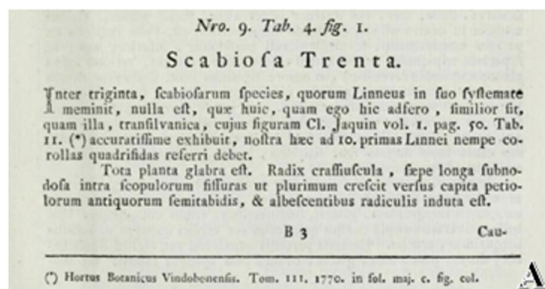


Figure 1. (A) Excerpt of the protologue (Hacquet 1782, p. 13), (B) drawing by Balthasar Hacquet published in Hacquet (1782, Table 4, Fig. 1), (C) original specimen of *S. trenta* deposited at the Slovenian Museum of Natural History, LJM (photo: Kunc).

also collected the first specimens of a novel species, which he brought to Muzio Tommasini who described the plants as *Orchis provincialis-maculata* Tomm.

In 1877, when Kugy was 19 years old, Tommasini made him aware of *Scabiosa trenta* Hacq. Tommasini asked him if he would be willing to search for the taxon on his behalf, explaining that he had already attempted to locate the plant himself without success, also having sought assistance from local inhabitants. In the same year Kugy started a long-term 'hunt' for this species (Table 1, Fig. 2, based on Kugy 2000).

The first year was mostly dedicated to the exploration of the Wochein basin *Bohinjska kotlina*, a tectonic-glacial basin that includes the Bohinj Valley, the Bohinj Lake, and the surrounding mountainous terrain. Kugy explained that he started exploring this area because it was ecologically suitable for *Scabiosa*, also according to the protologue, which refers to debris slopes. In the same year Kugy shifted the research on the other side of the Triglav massif, arguing that the specific

epithet designed by Hacquet had been probably chosen according to the main geographical distribution of the species, thus in the Trenta valley *Dolina Trente*. In this first year, Kugy was supported by the local forester Anton Tožbar. He also reported collaboration with local inhabitants, such as the shepherd Kenda (family name not specified) who suggested Mala Mojstrovka mountain as a site of high floristic diversity and a likely candidate for the occurrence of *S. trenta*.

Subsequently, forester Andreas (Andrej) Komac joined the research efforts, assisting Kugy in numerous expeditions as an experienced mountaineer and a connoisseur of the geography and geomorphology of the region. In the following decades, Komac also put himself at the service of Albert Bois de Chesne (1875–1953), a close friend and climbing companion of Kugy. The Bois de Chesne-Komac duo continued the exploration of the Trenta Valley, with a particular focus on floristic research. In such expeditions, Komac had the role of an expert climber, responsible for preparing and clearing

Table 1. List of the main localities in the Julian Alps visited by J. Kugy for his ‘hunt’ for *S. trenta*. Data are not available in records that are marked as N/A. Geographic locations are based on Kugy (2000). In the cases of broad areas as e.g. mountain valleys, coordinates are selected as centroids of the whole area.

Location	Type of location	Geographic area	Companions	Year	Latitude	Longitude
Mišelj vrh	Mountain peak	Wochein basin	Anton Tožbar	1877	46 356434	13 837704
Mali Draški vrh	Mountain peak	Wochein basin	Anton Tožbar	1877	46 362970	13 891573
Ziperie (Ciprije)	Locality	Trenta Valley	Anton Tožbar	1877	46 349230	13 880196
Trebišnja	Shepherd's cottage	Trenta Valley	Anton Tožbar	1877	46 356438	13 772959
Mala Mojstrovka	Mountain peak	Trenta Valley	Anton Tožbar	1877	46 437400	13 731124
Vršac	Mountain peak	Trenta Valley	Anton Tožbar	1877	46 332913	13 741776
Kanjavec	Mountain peak	Trenta Valley	Anton Tožbar	1877	46 360108	13 809820
Western Face of Triglav	Mountain area	Trenta Valley	Anton Tožbar	1878	46 377829	13 830908
Mala Mojstrovka	Mountain peak	Trenta Valley	S. Klančnik	1878	46 390624	13 933402
Mali Draški vrh	Mountain peak	Trenta Valley	S. Klančnik	1878	46 261570	13 767173
Veliki Draški vrh	Mountain peak	Trenta Valley	S. Klančnik	1878	46 360201	13 875780
Tosc	Mountain peak	Trenta Valley	S. Klančnik	1878	46 356722	13 868370
Triglav	Mountain peak	Trenta Valley	S. Klančnik	1878	46 378298	13 836582
Mišelj vrh	Mountain peak	Trenta Valley	S. Klančnik	1878	46 356433	13 837703
Vrata Valley	Valley	Trenta Valley	S. Klančnik	1878	46 423810	13 873577
Luknja	Mountain pass	Triglav massif	S. Klančnik	N/A	46 383600	13 837800
Luknja	Mountain pass	Triglav massif	Unknown	N/A	46 383600	13 837800
Kanjavec	Mountain peak	Triglav massif	Unknown	N/A	46 366500	13 833200
Suhi Plaz or Škrlatica	Mountain peak	Triglav massif	Andrej Komac	N/A	46 359800	13 838700
Debeli vrh	Mountain peak	Triglav massif	Unknown	N/A	46 360300	13 887600
Lipanski vrh	Mountain peak	Triglav massif	Andrej Komac	N/A	46 351200	13 851300
Ukanc	Valley	Wochein basin	Unknown	N/A	46 281600	13 832300
Bohinj Lake (Bohinjsko jezero)	Lake	Wochein basin	Unknown	N/A	46 281100	13 888900
Hribarce	Plateau	Triglav massif	Unknown	N/A	46 365200	13 857900
Komna	Alpine pasture	Triglav massif	Unknown	N/A	46 300900	13 774200
Triglav	Mountain peak	Triglav massif	Various	N/A	46 379400	13 836400
Luknja	Mountain pass	Triglav massif	Anton Tožbar	N/A	46 383600	13 837800
Kanjavec	Mountain peak	Triglav massif	Anton Tožbar	N/A	46 366500	13 833200
Suhi Plaz or Škrlatica	Mountain peak	Triglav massif	Andrej Komac	N/A	46 359800	13 838700
Debeli vrh	Mountain peak	Triglav massif	Andrej Komac	N/A	46 360300	13 887600
Lipanski vrh	Mountain peak	Triglav massif	Andrej Komac	N/A	46 351200	13 851300
Jezerca	Lake	Triglav massif	Unknown	N/A	46 295600	13 806200
Poljane	Alpine pasture	Triglav massif	Unknown	N/A	46 319200	13 788500

the paths, while Bois de Chesne deepened his knowledge of the flora of the Triglav Massif.

Meanwhile, by the late 1870s, Kugy gradually developed the hypothesis that *S. trenta* was an artefact of Hacquet's invention, and that the species had, in fact, never existed. During this period, Kugy displayed a growing enthusiasm for the exploration of the Julian Alps. His ascents to mountain peaks became increasingly frequent but more geographically dispersed. This shift may indicate that his search had become less methodical and species-specific and was instead evolving into a broader floristic and geographical exploration.

It is not clear if Kugy based his search for *S. trenta* just on the ecological and morphological descriptions included in the protologue or also examined the original specimen, which he never mentioned in his writings. It is also not clear how Kugy distinguished the putative *S. trenta* from congeneric species occurring in the study area, because he specifically mentioned in his book (Kugy 2000) that his foresters repeatedly brought him plants that just marginally resembled Hacquet's *Scabiosa*. Regarding this, there is a general scarcity of Kugy's original study-materials in European herbaria, which contain only a few specimens stored in the collection

‘R. Solla’ (*Herbarium Patavinum* – PAD; Perazza 2008) and in ‘R. Baumbach’ collection (Museum of Natural History of Pordenone). Both collections do not include vouchers of *Scabiosa* or allied taxa. In fact, Kugy's efforts appear to be mainly directed toward locating living individuals of *S. trenta* and exploring the Julian Alps rather than collecting herbarium specimens to document his observations. Nevertheless, his correspondence with contemporary botanists and his knowledge about current findings in taxonomy remained strong for all his life.

The mystery unveiled: Anton Kerner and *Cephalaria leucantha*

In 1915 Julius Kugy accidentally encountered Carlo Marchesetti, the botanist who informed him that Anton Kerner von Marilaun (1831–1898), sceptical of the distribution reported by Hacquet for this elusive *Scabiosa* species, had conducted herbarium studies and identified the original specimen of *Scabiosa trenta* Hacq. as *Cephalaria leucantha* (L.) Roem. & Schult (Kugy 2000).

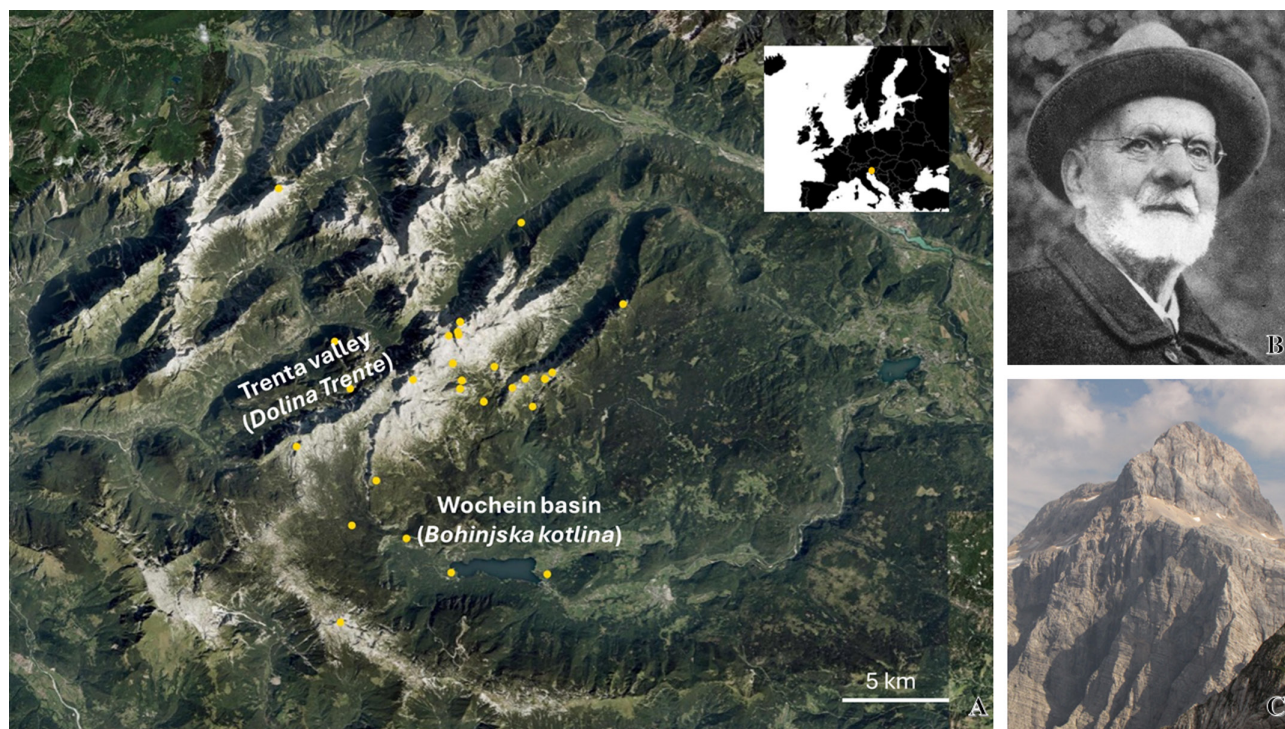


Figure 2. (A) Map showing locations of Kugy's expeditions in late 1800. Each yellow dot represents a visited location, map realized with QGIS, (B) a photo of Julius Kugy, archive of the Slovenian Natural History Museum, and (C) a photo of the Northern side of Triglav from Sovatna (photo: Pungarsek).

Currently, the species described by Hacquet is considered a synonym. Two of the most reliable global plant checklists (Schellenberger Costa et al. 2023), World Flora Online (WFO 2025) and Plants of the World Online (POWO 2025) indicate *S. trenta* as a synonym of *Cephalaria transylvanica*. Conversely, some regional checklists (Dryades 2025) continue to attribute it to *C. leucantha*, following Kerner's interpretation. Historical botanists such as Roberto de Visiani also considered this issue in *Flora Dalmatica* (De Visiani 1847), comparing *S. trenta* with both *C. transylvanica* and *C. leucantha*, and suggesting that its morphological features match the latter more closely. The distribution patterns (GBIF 2025b, 2025c) of the two *Cephalaria* species further support this interpretation, as *C. leucantha* has a wider distribution between the Alps and the Balkans. The ambiguous characteristic of the bract shape in the original description accounts for the historical attribution of *S. trenta* as a synonym of *C. transylvanica* or *C. leucantha*. Ovoid bracts ending in a rounded shape would support its attribution to *C. leucantha*, while the mucronate bracts would support its attribution to *C. transylvanica* (as currently accepted in POWO and WFO).

These ambiguities are resolved through the examination of Hacquet's specimen. The specimen was sent to Kerner by the management of the Provincial museum for Carniola, so that he could have examined Hacquet's specimen, and added a drawing of it in his article (Kerner 1893, Fig. 2). There is no data when the specimen was returned to the museum; however, in the 20th century the whole herbarium collection of the Provincial museum was moved at least three times

(Praprotnik 2015), which is the most likely reason for the specimen being in damaged condition today. We can therefore hypothesise that at Kerner's time the original material collected by Hacquet was still in the condition good enough to permit a taxonomical study, which would have been currently impossible due to the deterioration of the specimen.

Kerner (1893) highlighted inconsistencies in the description of *S. trenta* compared with Hacquet's specimen, in particular regarding the structure of the bracts ('*Deckschuppen*'). In particular, Kerner's analysis of the original material and the drawing highlighted that Hacquet's textual description of 'mucronate-awned bracts' did not match the real traits and exaggerated the differences of the putative new species from *Scabiosa leucantha* L. (now classified as *C. leucantha*). Kerner's main conclusion was that *S. trenta* is not a distinct species but merely an ecotype of *C. leucantha* (Kerner 1893, Table 2).

The morphological differences described by Hacquet – such as the smaller, solitary, globose flower head, the more compact growth form, and the shorter, unbranched stem – could be attributed to phenotypic plasticity rather than genetic distinction. Kerner hypothesized that these traits were the result of high-altitude stress, where harsher climatic conditions (low temperatures, strong winds, and limited soil nutrients in rocky crevices) could induce dwarfism and alter floral morphology (Table 2). Kerner acknowledged that Hacquet provided detailed locality data (Trenta, western Triglav region), but he doubted whether the plant ever truly belonged to the high-altitude Alpine flora. In this article, he also referenced the failed attempts of Julius Kugy to rediscover

Table 2. Comparison between the morphological traits described in the protologue of *S. trenta* by Hacquet and those of the accepted species *C. leucantha* (known as *S. leucantha* at Hacquet's time). Regarding the hypothesis of Kerner that the Hacquet specimen was just an ecotype of *C. leucantha*, the putative environmental drivers that could have induced these differences are also listed.

Morphological trait	<i>Scabiosa trenta</i> Hacquet	<i>Cephalaria leucantha</i> (L.) Roem. & Schult., typical form	Environmental and biological drivers
Plant Habit	small, compact, alpine herb	tall herbaceous plant	temperature, wind strength, soil texture and elements, resources allocation
Stem	solitary, unbranched, slightly striated	erect, branched, up to 1.5 meters tall	temperature, wind strength, resources allocation
Root System	thick, nodose, penetrating rocky crevices	fibrous, deep-rooted	soil texture, water and nutrients content
Lower Leaves	deeply pinnatifid, amplexicaul, highly crenate/runcinate	pinnatifid, not amplexicaul, larger segments	temperature, light irradiance and wavelength
Upper Leaves	linear, delicate	linear to lanceolate, slightly hairy	low temperature, light irradiance and wavelength
Inflorescence	solitary, globose	larger, rounded flower heads	low temperature, light irradiance and wavelength

the plant. Moreover, he cited the attempts of another botanist, Franc Krašan (1840–1907), another alpine botanist who also spent time looking for this species in the Triglav region without success.

Nowadays, it is well established that alpine plants may vary in several traits – such as leaf shape, stem height, floral morphology, or even pigmentation – due to both genetic adaptation and phenotypic plasticity triggered by environmental conditions (Körner 2003, Körner and Hiltbrunner 2021, Testolin et al. 2021). Reciprocal transplant and field measurements show that many alpine species combine constitutive traits, such as dwarf phenotypes or high cell-wall lignification, with flexible responses, including changes in leaf anatomy, photosynthetic temperature optima, or pigment composition (Pellissier et al. 2010, Körner 2020). For example, species may display rapid plastic adjustments of specific leaf area, stomatal density, and foliar nitrogen content across microclimatic gradients within a single season (Halloy and Mark 1996, Rosbakh et al. 2025), while populations exposed to repeated summer warming may shift genetically toward faster growth rates or earlier flowering times (Theurillat and Guisan 2001, Visakorpi et al. 2023). Such variation is particularly evident in response to altitudinal shifts, as species migrate toward higher elevations to track suitable climates, often encountering new environmental pressures that influence their morphology and physiology. These processes can also influence the reproductive phase, especially seed-related traits, which are critical for population persistence, colonization, and post-disturbance recovery (Jiménez-Alfaro et al. 2016, Saatkamp et al. 2019). Seed dispersal mechanisms, germination timing, and soil seed bank dynamics respond to both biotic and abiotic filters, and seedling establishment – one of the most climate-sensitive life stages – represents a major bottleneck for recruitment (Vázquez-Ramírez and Venn 2025). Overall, the morphological and ecological traits of alpine plants represent an integrated outcome of both their evolutionary history and current environmental pressures, providing strong support to the hypothesis – already anticipated by Kerner – that the

morphology of *S. trenta* could reflect adaptive responses to specific high-altitude conditions rather than true taxonomic distinctiveness.

Cephalaria leucantha grows on dry, stony slopes in the Mediterranean region (Nikolić 2020). It is certainly intriguing that this species was able to survive in an alpine valley, given that it usually thrives in warmer climates. Wraber (1990) also suggested that Hacquet could have found the specimen in a valley where the warm wind coming from the south along the Soča river used to make the local conditions warmer than in other parts of the Julian Alps.

In the last 2000 years several important periods of recent climate change have impacted Europe, the Medieval Climate Anomaly (MCA), between ~900 and 1350 AD (Graham et al. 2011) and the subsequent Little Ice Age (LIA), between ~1400 and 1850 AD (Mann 2002), which is best known for its global drop in average temperatures, larger glaciers, harsher winters, and less fruitful harvests, which was evident also in Carniola (Ogrin 2002, 2005).

Severe climatic changes can also influence the distribution ranges of some plant species. In the Southeastern Alps there are other records of the Mediterranean flora. *Cotinus coggygria* Scop. remained in the Bohinj area after the Pleistocene, whereas the occurrence of some Mediterranean species in Ukanc (also in the Bohinj area) probably appeared as a consequence of military actions during the First World War (Dakskobler et al. 2010). Also *Drypis spinosa* L. is a widespread Mediterranean species that also prospers in the Kamnik-Savinja Alps in Slovenia (Wraber 1990). Wraber (1990) suggested that *C. leucantha* in the Trenta valley was probably a remnant from the warmer periods, when Mediterranean flora spread into the Alps and then shifted back during LIA. Small relic populations may have survived, and Hacquet's plant could be the last example of this species in the Julian Alps. However, recent climate changes also enable Mediterranean species to spread northwards into warmer alpine valleys (Dakskobler and Trnkoczy 2020, Dakskobler and Martinčič 2021), opening the possibility that *C. leucantha* could occur further in the Julian Alps.

The cultural heritage of a taxonomic inaccuracy

Kerner's taxonomic revision of *Scabiosa trenta* Hacq. put an end to Kugy's search for this species. However, his exploration of mountain areas, especially the Julian Alps, carried on until 1930. Kugy's influence expanded internationally thanks to his books, benefitting from the translations by H.E.G. Tyndale, a British alpinist and editor of 'The Alpine Journal'. Tyndale translated two of Kugy's key works, 'Alpine pilgrimage' (1934) and 'Son of the mountains: the life of an alpine guide' (1938). These books were not only well-received in the UK but also reshaped British perceptions of the Alps, especially the Julian Alps region, which was previously less known compared to the French or Swiss Alps. Tyndale visited Kugy in Trieste and later climbed with him, noting the synergy between Kugy's reverence for British mountaineering traditions and his profound local knowledge of the Julian Alps (Rozman 1987).

Kugy is portrayed not only as a mountaineer, but as a symbol of Slovenian mountain heritage – a figure who blended intellect, physical courage, and emotional sensitivity. His love for the Slovenian mountains and for climbing are celebrated by the bronze monument dedicated to him, which was built close to the Trenta village in 1953 (Praprotnik 2006, Soca Valley 2025). He was also honoured with an alpine hiking trail, which is 720 km long and crosses the mountains and the valleys of Italy, Slovenia, and Austria, originated from the collaboration of the Alpine Clubs of these three countries (Julius Kugy Alpine Trail 2025). Other initiatives continue to be organised to celebrate Kugy's story and life, such as the recent exhibition (June 2024–January 2025) in Gorizia, entitled 'Storie di montagna a Palazzo Coronini. Julius Kugy e donne in quota', and the connected event 'Julius Kugy. Il romantico alpinista', including references to his research for *S. trenta* (Comune di Gorizia 2024a, 2024b). He also continues to be an example for the new generations and a source of inspiration, to mention Kugy as the name for the official mascot of the European Youth Olympic Festival 2023 (EOC 2022).

Bois de Chesne, one of Kugy's closest friends and his companion of many alpine expeditions, contributed to shaping the history and culture of alpine botany in the Julian Alps. He was a prominent naturalist of the late 19th and early 20th centuries, who made lasting contributions to the botanical heritage of the Julian Alps, particularly the Triglav region. Motivated by a shared fascination with high-altitude flora – also taking part in the hunt for the elusive *S. trenta* – Bois de Chesne acquired land in Trenta, where he founded the Juliana Alpine Botanical Garden in 1926 (Praprotnik 2006). Working with Kugy and local foresters, he collected and cultivated native plants, creating a living repository of Triglav's botanical diversity (Bois de Chesne 1977, Fig. 3). Today, it contains approximately 600 species (Canella et al. 2025) and is managed by the Slovenian Museum of Natural History, serving as a centre for ecological education and citizen science

(Pungaršek 2020). European Union funding also supported the development of school-oriented Interactive Identification Tools (Project SiiT) for the species hosted in Juliana Botanical Garden. Among these, there is an interactive guide that introduces visitors to the diverse plant species thriving in Juliana, offering insights into their adaptations to mountain life and aiding in plant identification (Nimis et al. 2014).

Regarding the legacy of *S. trenta* and its alpine context, it extended beyond botany and mountaineering into the realm of cultural aesthetics. While figures like Kugy and Bois de Chesne grounded the species in scientific and ecological narratives, the delicate morphology and rarity of *Scabiosa* also captivated artistic and commercial imaginations. This crossover between alpine discovery and cultural expression is particularly evident in how botanical studies – especially of unique species like *S. trenta* – influenced material culture across Europe. Scientific discoveries have often played a significant role in shaping fashion trends and market dynamics, in particular botanical studies have often influenced the development of floral patterns in textiles, wallpaper, and artisanal crafts. In the 18th century these products were manufactured in France and exported across Europe, and were highly sought after by the elite, including members of royal courts. Notably, the workshop of Marie-Jeanne (Rose) Bertin, a France's prominent fashion merchant, supplied artificial floral accessories to distinguished figures such as Marie-Antoinette, reflecting the intersection of scientific exploration, material culture, and aesthetic preferences in the period. A recent study on this artisan by Kesterton (2024) highlights how the description of *S. trenta* and related congeneric species in the 18th century contributed to the increased demand for artificial flowers based on the morphology of *Scabiosa*.

Art Nouveau (around 1890–1920), a style of architecture and applied art, emphasized organic, flowing lines inspired by natural forms, including flowers and plants. Artists and designers of this movement often integrated floral motifs into everyday objects, such as furniture, ceramics, and glassware. In this context, one notable piece is a hatpin by the designer René Lalique (1860–1945) called 'Wespen & Skabiose' (wasps and *Scabiosa*: Fig. 3D) crafted around 1899–1900.

Currently, *S. trenta* has become a potent metaphor for the relentless human pursuit of the sublime and the unknown, particularly within the cultural landscapes of Slovenia, Carinthia (South-Eastern Austria), and Friuli Venezia Giulia (Northeastern Italy). This symbolic resonance is also in cinema, being institutionalized in the prize 'La Scabiosa Trenta', an annual award presented within the Alpi Giulie Cinema festival held in Trieste (Società Alpina delle Giulie APS 2025). The prize underscores the intersection of alpine nature and artistic expression; each year, it is reinterpreted by a regional artist, emphasizing the festival's mission to foster a dialogue between the mountainous environment and cultural creativity through cinema and other visual arts.

In many ways, *S. trenta* transcends its botanical identity, evolving from an elusive alpine specimen to a cultural icon.



Figure 3. (A) Albert Bois de Chesne and Julius Kugy in the Juliana Alpine Botanical Garden (photo: Archive of Olga Bois de Chesne), (B) flowering specimens of *C. leucantha* in the living collection of Juliana Alpine Garden (photo: Kunc), (C) a section of the Juliana Alpine Garden in Trenta (photo: Kunc), (D) the hatpin 'Wespen & Skabiose' designed by René Lalique in 1899–1900 and exposed in Bröhan Museum, Berlin, Germany.

It serves as a lens through which we can observe the entangled histories of science, mountaineering, conservation, art, and national identity. Other examples of plant stories, combining historical, botanical, and folkloric aspects, belong to Slovenian culture, such as the *Potentilla nitida* L. (Triglav rose), one of the symbols of Triglav National Park, known for the legend of the gold-horned goat, Zlatorog and *Favrata zoysii* Feer (Zois' Bellflower), symbol of the Juliana Alpine Botanical Garden and one of the Slovenian Alps (Juliana Alpine Botanical Garden [2025](#), Triglavski narodni park [2025](#)). All

these narratives mirror a broader shift in how natural elements gained cultural meanings across disciplines and generations.

Final remarks

The search for *Scabiosa trenta* Hacq. perfectly embodies the passion and dedication of many alpine botanists in their pursuit of target species. The deep connection to the mountains, particularly the Julian Alps, combined with an unwavering

enthusiasm for botany, sustained Julius Kugy throughout his years-long quest. The recognition of the species' taxonomic inaccuracy gradually emerged over time, ultimately confirmed by the studies of the botanist Anton Kerner von Marilaun. Despite this realization, Kugy never regarded his efforts as a futile endeavour. Instead, he perceived them as a profound experience that ignited a sense of 'faith and gratitude' in him. Even more than ever, ongoing research and a thorough understanding of alpine environments remain essential for monitoring ecological changes. At the core of this endeavour lies a robust taxonomic framework, which can only be strengthened through continuous and dedicated work in the field, historical records and preserved collections.

The figure of Julius Kugy is still commemorated in Austria, Italy and Slovenia through various events, celebrating the love for the mountains and the search for the unknown. This story symbolizes the deep connection between science – botany in this case, – human history, and society, providing a clear example of how science and culture continually shape one another. The legacy of Julius Kugy and his search for *S. trenta* exceeds the boundaries of a simple narrative, deepening its roots in scientific and historical values.

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Author contributions

Valentina Boscaroli: Conceptualization (equal); Investigation (equal); Visualization (equal); Writing – original draft (equal); Writing – review and editing (equal). **Marco Canella:** Conceptualization (equal); Investigation (equal); Visualization (equal); Writing – original draft (equal); Writing – review and editing (equal). **Sara Natale:** Writing – original draft (equal); Writing – review and editing (equal). **Špela Pungaršek:** Writing – original draft (equal); Writing – review and editing (equal). **Francesco Dal Grande:** Supervision (equal); Writing – review and editing (equal). **Elena Canadelli:** Supervision (equal); Writing – review and editing (equal).

Data availability statement

This article has no additional data.

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