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Spiraea decumbens Koch subsp. *tomentosa* (Poech) Dostál, novelty for the flora of Slovenia and the Dinaric Alps

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Key words: flora, vegetation, endemic species, *Spiraea decumbens,* Trnovski Gozd plateau, Dinaric Alps, Slovenia.

Ključne besede: flora, vegetacija, endemiti, *Spiraea decumbens*, Trnovski gozd, Dinarsko gorstvo, Slovenija.

Abstract

In Govci under Mt. Poldanovec above the Trebuša Valley we found a new locality of southeastern-Alpine (Alpic) endemic *Spiraea decumbens* subsp. *tomentosa*, which is new to the flora of Slovenia and the Dinaric Alps. Its closest known localities are in the western Julian Prealps in Northeastern Italy. A small population of several ten shrublets occurs at elevations of about 570 m in shady, almost vertical dolomite rocks, in a stand of the endemic association *Phyteumato columnae-Primuletum carniolicae.* Despite a very small population we assume there are other localities in this area, where numerous gorges are very difficult to acces and have therefore not yet been sufficiently studied.

Izvleček

V Govcih pod Poldanovcem nad dolino Trebuše smo našli novo nahajališče jugovzhodno-alpskega endemita *Spiraea decumbens* subsp. *tomentosa*, kar je novost za floro Slovenije in Dinarskega gorstva. Njegova najbližja znana nahajališča so v zahodnih Julijskih Predalpah v severovzhodni Italiji. Majhna populacija, nekaj deset grmičev, raste na nadmorski višini okoli 570 m v senčnem skoraj navpičnem dolomitnem skalovju, v sestoju endemične asociacije *Phyteumato columnae-Primuletum carniolicae.* Kljub zelo majhni populaciji domnevamo, da je nahajališč več, vendar so številne grape v tem območju zelo težko dostopne in še ne dovolj raziskane.

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Introduction

Spiraea decumbens is an endemic species of the Southeastern Alps with known localities in northeastern Italy (provinces of Udine, Pordenone, Belluno and Treviso) and northwestern Slovenia (Kobarid municipality: Breginjski kot, and Bovec municipality: Učja valley) – Aeschimann et al. (2004: 726–728) and Pavlin et al. (2015). We distinguish between two subspecies, type subspecies *S. decumbens* subsp. *decumbens* (sprawling spiraea, also white lace spiraea) and subspecies *Spiraea decumbens* subsp. *tomentosa,* syn. *S. decumbens* subsp. *hacquetii, Spiraea hacquetii* (which could be translated as Hacquet's spiraea) – Poldini et al. (2001), Aeschimann et al. (2004), Pavlin et al. (2015), Pignatti (2017). The main difference between them is the hairiness of their leaves and inflorescences. The leaves, pedicels, inflorescence and fruits of the type subspecies are glabrous. The leaves of the subsp. *tomentosa* are tomentose on the upper side and below, often finely serrated only on the upper third; pedicels, receptacle and fruits are also hairy. The type subspecies occurs in Italian provinces of Udine and Pordenone (Friuli Venezia Giulia region) and in northwestern Slovenia, whereas the subspecies *tomentosa* has so far been known only in northeastern Italy, in the regions Friuli Venezia Giulia (provinces of Udine and Pordenone) and Veneto (provinces of Belluno and Treviso) – Poldini (2002), Aeschimann et al. (2004), Gobbo & Poldini (2005), E. Pignatti & S. Pignatti (2017).

The type subspecies predominates in the eastern part of the species range (Julian Alps and Julian Prealps), but it is frequent also in the Carnic Alps (in the west all the way to the Lumiei valley) and the Carnic Prealps (up to Mt. Raut and Mt. Jouf di Maniago). Where the ranges of both subspecies overlap it is not uncommon for their populations to almost come into contact (Arzino Valley, Mt. Jouf di Maniago) – Martini, in litt.

Fabrizio Martini (in litt.) finds that the distinction between the two subspecies is not always unequivocal because of the atypical specimens (perhaps hybrids, introgressive forms) that also occur in the areas where the ranges of both subspecies overlap. According to detailed range maps for Friuli Venezia Giulia and based on his own experience Martini (in litt.) finds that the subspecies *S. decumbens* subsp. *tomentosa* occurs mainly in the western part of the species' range (Carnic Alps to the west of the Tagliamento River, but individual sites are located also in the southern Carnic Alps (up to the Gleriis valley to the north of the town of Moggio Udinese) and in the western Julian Prealps. Melzer (1982) reported about the locality of this subspecies in the Julian Alps in the Val Saisera (Zajzera), under Mt. Jôf di Montasio (Montaž), on 1800 m a.s.l. (source: Schaeftlein, 1935, herbarium GZU).

Currently known distribution of the type subspecies in Slovenia was published several years ago (Pavlin et al., 2015: 3, 8, 10). The data by grid squares are still valid, but recently (in the autumn of 2021) Marko Pavlin discovered a new locality on the sunny slopes of Mt. Stol, which is situated about 5 km more to the east than other localities under the Stol ridge. *Spiraea decumbens* occurs subspontaneously also in the Trenta Valley, near Mary's chapel on the northern side of the road towards the Upper Trenta Valley and Vršič, about 500 m from the side road exit to Zadnjica. The spiraea there was planted and spread subspontaneously in the rocks in the immediate vicinity of the chapel (Simona Strgulc Krajšek, Filip Küzmič, written note and FloVegSi database).

On 14 July 2021 we found a new locality of *Spiraea decumbens* in Govci above the Trebuša Valley, on the northern edge of the Trnovski Gozd plateau (9949/3), namely its tomentose subspecies *S. decumbens* subsp. *tomentosa*, which is new to the flora of Slovenia and the Dinaric Alps, and therefore deserves to be reported in more detail.

Methods

Spiraea decumbens subsp. *tomentosa* was found as we were looking for localities of *Daphne blagayana* in Govci above the Trebuša Valley. The relevés on its new locality and its surroundings were made using the standard Central-European phytosociological method (Braun-Blanquet, 1964) and entered into the FloVegSi database (T. Seliškar et al., 2003). The relevés were processed using hierarchical classification, unweighted average linkage method – UPGMA and Wishart's similarity ratio. We transformed the combined cover-abundance values into ordinal scale (1–9) according to van der Maarel (1979). Numerical comparisons were performed with the SYN-TAX 2000 program package (Podani, 2001). Flora alpina (Aeschimann et al., 2004) and Flora d'Italia (Pignatti, 2017) were used for identifying differentiation characters between the two subspecies. While the opinion of the authors of the Flora alpina was that *Spiraea decumbens* subsp. *hacquetii* is its valid name, we follow the new edition of Flora d'Italia, using as valid the name *Spiraea decumbens* subsp. *tomentosa*. For the proper Slovenian name of this taxon we propose the name "Hacquetova medvejka", whereas the basionym of this taxon is *Spiraea hacquetii* Fenzel & Koch.

The nomenclatural sources for the names of vascular plants are the Mala flora Slovenije (Martinčič et al., 2007) and FloVegSi database, the nomenclatural source for mosses is Hodgetts et al. (2020) and the nomenclatural sources for the names of syntaxa are Šilc & Čarni (2012), E. Pignatti & S. Pignatti (2014), Pavlin et al. (2015) and Mucina et al. (2016).

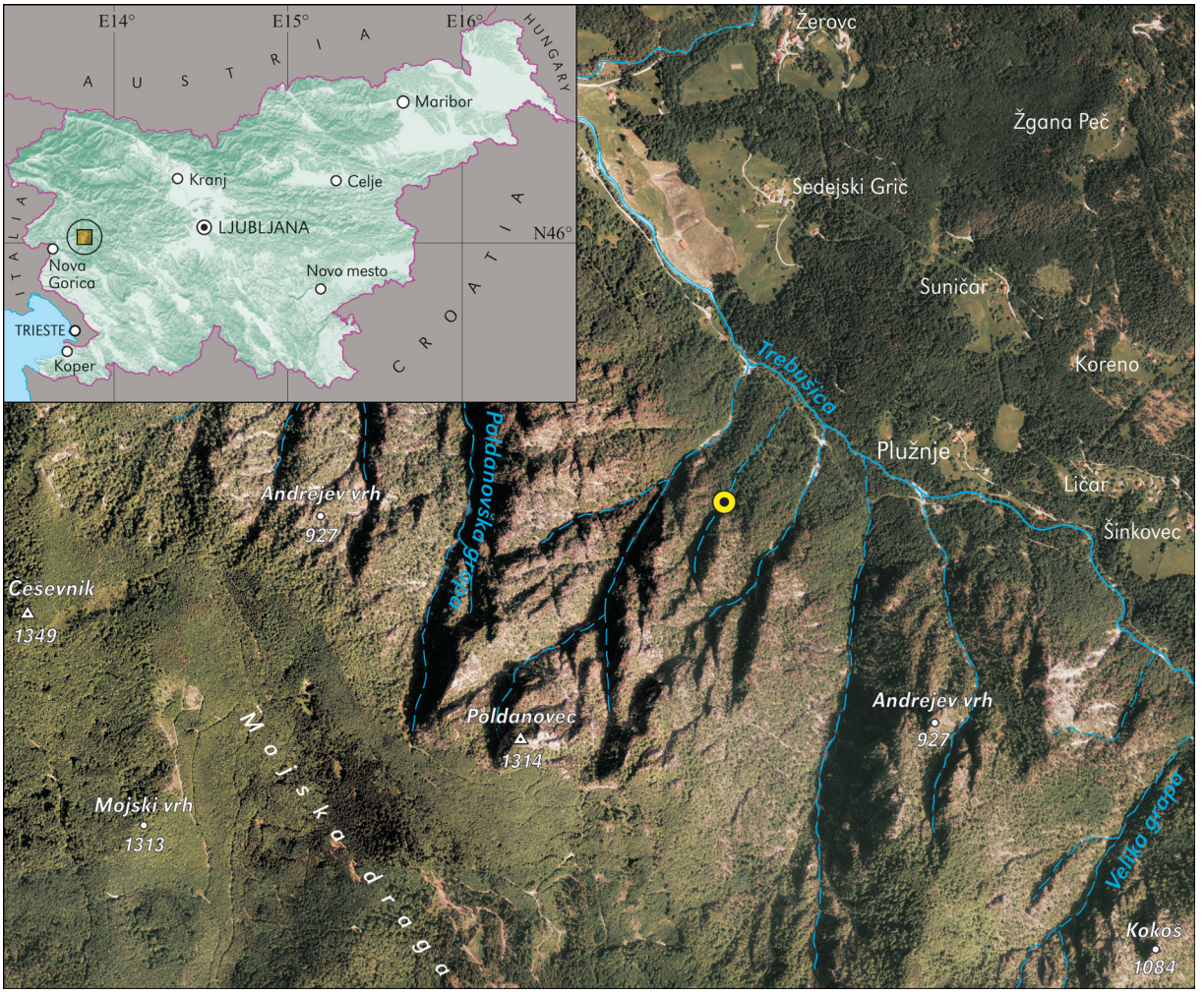

Figure 1: Locality of *Spiraea decumbens* subsp. *tomentosa* in Govci under Mt. Poldanovec.
Slika 1: Nahajališče podvrste *Spiraea decumbens* subsp. *tomentosa* v Govcih pod Poldanovcem.

Results and discussion

New locality of subspecies *Spiraea decumbens* subsp. *tomentosa*

9949/3 (UTM 33TVL19) Slovenia: Primorska, Trnovski Gozd plateau, Govci above the Trebuša Valley, under Mt. Poldanovec, 570 m a.s.l., shady dolomite rocks in a small gorge, at the foot of its extremely steep, difficult-to-access upper (spring) area. Leg. et det. I. Dakskobler, 14. 7. 2021, herbarium LJS 12267.

S. decumbens subsp. *tomentosa* occurs in the forested area under Mt. Poldanovec, in a small gorge that we provisionally call Ličerjeva Grapa (after the forester Franc Ličer) – Figures 1 and 3. To the west of this gorge is a bigger one called Špikova Grapa, and to the east of the latter several more gorges, including Orlejška Grapa, which is the deepest. The locality is at the elevation of about

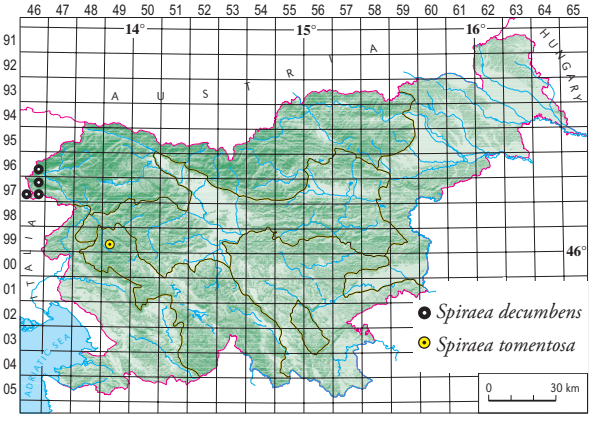

Figure 2: Natural localities of *Spiraea decumbens* in Slovenia (excluding its subspontaneous locality in the Trenta Valley, quadrant 9648/2).
Slika 2: Naravna nahajališča vrste *Spiraea decumbens* v Sloveniji (njenega subspontanega nahajališče v Trenti, v kvadrantu 9648/2, nismo upoštevali).

Figure 3: Gorge under Mt. Poldanovec, locality of *Spiraea decumbens* subsp. *tomentosa.* Photo: I. Dakskobler.
Slika 3: Grapa pod Poldanovcem, kjer je nahajališče Hacquetove medvejke (*Spiraea decumbens* subsp. *tomentosa*). Foto: I. Dakskobler.

570 m, the parent material (geological substrate) is dolomite, and the surrounding forest communities are classified predominantly in associations *Rhododendro hirsuti-Fagetum* and *Fraxino orni-Pinetum nigrae* (Dakskobler, 1998, 1999, 2003). The spiraea grows in an almost vertical northwest-facing rock wall on the right bank of a narrow gorge, covering only several square metres (Figure 4). The population comprises several ten shrublets (Figure 5). Based on its morphological characters – tomentose leaves, pedicel and receptacle – we determine it as *S. decumbens* subsp. *tomentosa* (Figure 6 and Figure 7, herbarium LJS 12267). Comparison with the photographs of the taxon *Spiraea decumbens* subsp. *tomentosa* from northeastern Italy, which were kindly forwarded to us by Fabrizio Martini (photographs were taken by Claudio Peruzovich, Elio Polli, Manfredo Torelli and Giuliano Mainardis), shows that leaves of the specimens from Govci are not shiny, and according to this character they are very similar to the specimens photographed at the locality of Lake Verzegnis (Carnic Prealps).

Table 1 comprises companion species in the chasmophytic community. In addition to the relevé with *Spiraea decumbens* subsp. *tomentosa* we included also three relevés of chasmophytic communities in the immediate vicinity. Based on its species composition the stand with Hacquet's spiraea under Mt. Poldanovec is classified into the association *Phyteumato columnae-Primuletum carniolicae* (Dakskobler & Martinčič, 2020), provisionally into a new subunit (variant) with *Spiraea decumbens* subsp. *tomentosa*. Diagnostic species of the association are mainly *Primula carniolica, Phyteuma scheuchzeri* subsp. *columnae* and *Paederota lutea*. The first two are not known in Slovenia in communities with *Spiraea decumbens* subsp. *decumbens* (i.e. in the stands of associations *Spiraeo-Potentilletum caulescentis*, *Aquilegio einseleanae-Spiraeetum decumbentis* and *Spiraeo decumbentis-Seslerietum calcariae*), and the third (*Paederota lutea*) occurs in some of the relevés – Pavlin et al. (2015). *Phyteuma scheuchzeri* subsp. *columnae* is presented in the stands of the association *Spiraeo-Potentilletum caulescentis* in NE Italy (Poldini, 1969;

Figure 4: Population of *Spiraea decumbens* subsp. *tomentosa* under Mt. Poldanovec. Photo: I. Dakskobler.
Slika 4: Populacija Hacquetove medvejke (*Spiraea decumbens* subsp. *tomentosa*) pod Poldanovcem. Foto: I. Dakskobler.

Figure 5: *Spiraea decumbens* subsp. *tomentosa* under Mt. Poldanovec, close-up. Photo: I. Dakskobler.
Slika 5: Hacquetova medvejka (*Spiraea decumbens* subsp. *tomentosa*) pod Poldanovcem, bližnji pogled. Foto: I. Dakskobler.

Figure 6: *Spiraea decumbens* subsp. *tomentosa*, inflorescence. Photo: I. Dakskobler.
Slika 6: Hacquetova medvejka (*Spiraea decumbens* subsp. *tomentosa*), posnetek socvetja. Foto: I. Dakskobler.

Figure 7: *Spiraea decumbens* subsp. *decumbens* (Breginj – Prekopa, Leg. B. Vreš) – left and *Spiraea decumbens* subsp. *tomentosa* (Govci) – right. Photo: B. Vreš.
Slika 7: *Spiraea decumbens* subsp. *decumbens* (Breginj – Prekopa, Leg. B. Vreš) – levo in *Spiraea decumbens* subsp. *tomentosa* (Govci) – desno. Foto: B. Vreš.

Poldini, 1973). E. Pignatti & S. Pignatti (2014, 2016) published three association tables from the Dolomites in NE Italy, which comprise also *Spiraea decumbens* subsp. *tomentosa*: *Potentilletum caulescentis* (frequency 58 %), *Physoplexidi-Asplenietum seelosii* (frequency 27 %) and *Saxifragetum burseranae* (frequency 4 %). The species that are common in both their relevés with *Spiraea tomentosa* and our relevé from Govci include *Paederota lutea, Phyteuma scheuchzeri* subsp. *columnae, Valeriana saxatilis*, *Aster bellidiastrum*, *Asplenium ruta-muraria*, *A. trichomanes*, *Sesleria caerulea, Carex mucronata* and *C. ferruginea*.

In the immediate vicinity of the locality of *Spiraea decumbens* subsp. *tomentosa* in Govci, but not in its stand, grows another endemic species, *Aquilegia iulia*, which is also unknown in other distribution ranges of *Spiraea decumbens.*

Conclusions

The differences between the flora and vegetation of the Julian Alps (as part of the Southeastern Alps) and the Trnovski Gozd Plateau (northeasternmost part of the Dinaric Alps) are not yet completely clear. Certain typical Alpine (Alpic) species thus still grow on the northern edge of the Trnovski Gozd plateau, e.g. *Campanula zoysii, Aquilegia iulia* (southeastern-Alpine endemics) and *Larix decidua*. This area represents also the localities of other species that otherwise dominate mainly in the Alpine-Prealpine part of Slovenia: *Campanula carnica, C. cochleariifolia*, *Cerastium subtriflorum, Draba aizoides, Dryas octopetala, Heliosperma alpestre*, *Pedicularis rosea, Potentilla clusiana, Ranunculus carinthiacus*, *R. hybridus*, *R. traunfellneri, Rhodothamnus chamaecistus, Saxifraga crustata, S. squarrosa, Senecio abrotanifolius* (Dakskobler, 2019; Dakskobler & Vreš, 2021). It is therefore not surprising that the new locality of the southeastern-Alpine (Alpic) endemic *Spiraea decumbens* was discovered here, but its subspecies identity is unexpected, because most of the localities of *S. decumbens* subsp. *tomentosa* are situated to the west of the type subspecies, exclusively in northeastern Italy. The population in Govci is very small and difficult to access, which prevents us from making more in-depth morphological or genetic comparisons with populations from Italy.

Spiraea decumbens subsp. *tomentosa* was not observed in other gorges surveyed so far on the northern edge of the Trnovski Gozd plateau, under Stador, Stanov Rob, Poldanovec and Zeleni Rob. Because of the difficult and challenging terrain in Govci many gorges there are difficult to reach and we only succeeded in surveying a few of them. We assume that the population of *Spiraea decumbens* subsp. *tomentosa* on the northern edge of the Trnovski Gozd plateau is larger than the currently known population, and that other researchers, who are more experienced climbers, are likely to find new localities of this subspecies. There are other montane species with a small population size (e.g. *Botrychium simplex*, *Carex brunnescens, Nigritella archiducis-joannis*) known in Slovenia, but we believe they are more threatened than the studied subspecies in Govci. The human impact in this part of the Trnovski Gozd plateau is insignificant. The threat factors consist mainly in natural disasters and climate change. Nevertheless, given its scarcity *Spiraea decumbens* subsp. *tomentosa* should be properly evaluated and considered in the Red List of threatened vascular flora of Slovenia (Anonymous, 2002).

Povzetek

Spiraea decumbens Koch subsp. _tomentosa_ (Poech) Dostál, novost za floro Slovenije in Dinarskega gorstva

Vrsta *Spiraea decumbens* je endemit Jugovzhodnih Alp z znanimi nahajališči v severovzhodni Italiji (province Udine, Pordenone, Belluno in Treviso) in severozahodni Sloveniji (občina Kobarid: Breginjski kot in občina Bovec: dolina Učje). Razlikujemo dve podvrsti, tipsko *S. decumbens* subsp. *decumbens* (polegla medvejka) in podvrsto *Spiraea decumbens* subsp. *tomentosa,* sin. *S. decumbens* subsp. *hacquetii* (dlakava polegla medvejka, ker je bazionim te podvrste *Spiraea hacquetii*, zanjo predlagamo slovensko ime Hacquetova medvejka). Glavna razlika med njima je v dlakavosti listov in socvetja. Tipska podvrsta ima gole liste, cvetne peclje, socvetje in plodove. Podvrsta *S. decumbens* subsp. *tomentosa* ima na zgornji in spodnji strani dlakave liste, ti so pogosto samo na zgornji tretjini drobno nazobčani, dlakavi so tudi cvetni peclji, cvetišče in plodovi. Tipska podvrsta uspeva v italijanskih provincah Udine in Pordenone (dežela Furlanija Julijska krajina) in v severozahodni Sloveniji, podvrsta *S. decumbens* subsp. *tomentosa* pa je bila do zdaj znana le v severovzhodni Italiji, v deželah Furlanija Julijska krajina (pokrajini / provinci Udine in Pordenone) in Veneto / Benečija (pokrajini / provinci Belluno in Treviso). 14. 7. 2021 smo v Govcih nad dolino Trebuše, na severnem robu Trnovskega gozda (9949/3) našli novo nahajališče polegle medvejke in sicer njene dlakave podvrste (*S. decumbens* subsp. *tomentosa*), kar je novost za floro Slovenije in Dinarskega gorstva. Hacquetova medvejka raste v gozdnatem območju pod Poldanovcem, v manjši grapi, ki ji za zdaj še ne vemo imena, začasno jo imenujemo Ličerjeva grapa (po gozdarju Francu Ličerju) – sliki 1 in 3. Zahodno od nje je večja Špikova grapa, vzhodno od nje je več grap, med katerimi je najbolj globoka Orlejška grapa. Nahajališče je na nadmorski višini približno 570 m, geološka podlaga je dolomit, okoliške gozdne združbe uvrščamo predvsem v asociaciji *Rhododendro hirsuti-Fagetum* in *Fraxino orni-Pinetum nigrae*. Hacquetova medvejka raste v skoraj navpični, proti severozahodu obrnjeni steni desnega brega ozke grape (prav tu se začenja njen zelo strm, težko prehoden zgornji, povirni del), na površini le nekaj kvadratnih metrov (slika 4). Populacija obsega nekaj deset grmičev (slika 5). Po morfoloških znakih, očitni dlakavosti listov, cvetnega peclja in cvetišča, jo določamo kot podvrsto *S. decumbens* subsp. *tomentosa* (sliki 6 in 7, herbarij LJS12267). Primerjava s fotografijami taksona *Spiraea decumbens* subsp. *tomentosa* iz severovzhodne Italije, ki nam jih je prijazno posredoval

prof. Fabrizio Martini (avtorji fotografij so Claudio Peruzovich, Elio Polli, Manfredo Torelli in Giuliano Mainardis), kažejo, da listi primerkov iz Govcev niso bleščeči in so po tem znaku zelo podobni primerkom, ki so jih fotografirali na nahajališču Lago di Verzegnis (Karnijske Alpe). Spremljevalne vrste v združbi skalnih razpok kaže preglednica 1. Poleg popisa, v katerem je medvejka, smo v preglednico uvrstili še tri popise skalnih razpok, ki smo jih naredili v neposredni bližini. Po vrstni sestavi sestoj s poleglo medvejko pod Poldanovcem uvrščamo v asociacijo *Phyteumato columnae-Primuletum carniolicae,* začasno v novo podenoto (varianto) s podvrsto *Spiraea decumbens* subsp. *tomentosa*. Diagnostične vrste za to asociacijo so predvsem *Primula carniolica, Phyteuma scheuchzeri* subsp. *columnae* in *Paederota lutea*. Prvi dve ne poznamo v združbah, kjer v Sloveniji uspeva podvrsta *Spiraea decumbens* subsp. *decumbens* (to je v sestojih asociacij *Spiraeo-Potentilletum caulescentis*, *Aquilegio einseleanae-Spiraeetum decumbentis* in *Spiraeo decumbentis-Seslerietum calcariae*), tretja (*Paederota lutea*) pa se pojavlja v nekaterih popisih. V neposredni bližini nahajališča Hacquetove medvejke, a ne v njenem sestoju, raste še en endemit, *Aquilegia iulia*, ki ga prav tako ne poznamo v drugih območjih razširjenosti vrste *Spiraea decumbens.* Med Julijskimi Alpami (kot delom Jugovzhodnih Alp) in Trnovskim gozdom (skrajnim severovzhodnim delom Dinarskega gorstva) v rastju in rastlinstvu ni ostrih meja. Zato tukajšnje novo nahajališče jugovzhodnoalpskega endemita *Spiraea decumbens* ne preseneča, pač pa njegova podvrstna pripadnost, saj ima podvrsta *S. decumbens* subsp. *tomentosa* večinoma nahajališča bolj zahodno od tipske podvrste, samo v severovzhodni Italiji. Resnejše morfološke ali genetske primerjave s populacijami iz Italije za zdaj niso mogoče, saj je populacija v Govcih zelo majhna in težko dostopna. V drugih do zdaj pregledanih grapah na severnem robu Trnovskega gozda, pod Stadorjem, Stanovim robom, Poldanovcem in Zelenim robom, podvrste *Spiraea decumbens* subp. *tomentosa* nismo opazili. Vendar so številne grape v Govcih zelo težko prehodne in nam je uspelo priti le v nekaterih od njih. Domnevamo, da je populacija Hacquetove medvejke na severnem robu Trnovskega gozda večja od te, ki jo poznamo zdaj in bodo plezalsko bolj vešči raziskovalci verjetno našli njena nova nahajališča. Ker so v tem delu Trnovskega gozda človekovi vplivi zelo majhni, ni zelo ogrožena. Dejavnik ogrožanja so predvsem naravne ujme in podnebne spremembe. Kljub temu za podvrsto *Spiraea decumbens* subsp. *tomentosa* zaradi redkosti predlagamo za uvrstitev na rdeči seznam (Anonymous, 2002).

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Prof. Dr. Andrej Martinčič very kindly determined several moss species in the relevés included in Table 1. Prof. Dr. Fabrizio Martini kindly forwarded the data on the currently known distribution ranges of subspecies of *Spiraea decumbens* in northeastern Italy and the photographs of the studied subspecies (by Claudio Peruzovich, Elio Polli, Manfredo Torelli and Giuliano Mainardis) – I am very grateful to all of them. Marko Pavlin, Ass. Prof. Dr. Simona Strgulc Krajšek and Dr. Filip Küzmič allowed me to cite their recent data that supplement the species range of *Spiraea decumbens* in Slovenia. Iztok Sajko prepared Figure 1 and Figure 2 for print. Dr. Branko Vreš is the caretaker of FloVegSi database and curator of the Herbarium LJS. He also together with Sanja Behrič prepared Figure 7. Two anonymous reviewers helped me with valuable improvements and corrections. English translation by Andreja Šalamon Verbič.

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Table 1: Rock crevice communities in Govci under Mt. Poldanovec.
Tabela 1: Združbe skalnih razpok v Govcih pod Poldanovcem.

	Number of relevé (Zaporedna številka popisa)		1	2	3	4	Pr.	Fr.
	Database number of relevé (Delovna številka popisa)		286298	286306	286308	286307		
	Elevation in m (Nadmorska višina v m)		570	565	575	565		
	Aspect (Lega)		NW	NNW	N	NW		
	Slope in degrees (Nagib v stopinjah)		85	70-100	85	90		
	Parent material (Matična podlaga)		D	D	D	D		
	Soil (Tla)		Li	Li	Li	Li		
	Stoniness in % (Kamnitost v %)		100	100	100	100		
	Cover of herb layer in % (Zastiranje zeliščne plasti v %):	E1	30	30	30	30		
	Cover of moss layer in % (Zastiranje mahovne plasti v %)	E0	20	20	10	20		
	Number of species (Število vrst)		27	21	30	29		
	Relevé area (Velikost popisne ploskve)	m^2	5	10	10	15		
	Date of taking relevé (Datum popisa)		14.07.2021	14.07.2021	14.07.2021	14.07.2021		
	Locality (Nahajališče)		Govci	Govci	Govci	Govci		
	Quadrant (Kvadrant)		9949/3	9949/3	9949/3	9949/3		
	Coordinate GK Y (D-48)	m	410544	410538	410521	410543		
	Coordinate GK X (D-48)	m	5097496	5097510	5097522	5097507		
	Diagnostic species of the association (Diagnostične vrste asociacije)							
AP	*Paederota lutea*	E1	1	1	1	2	4	100
PcSp	*Phyteuma scheuchzeri* subsp. *columnae*	E1	+	1	1	1	4	100
AP	*Orthothecium rufescens*	E0	+	1	1	1	3	100
AP	*Primula carniolica*	E1	r	+	+	.	3	75
AP	*Valeriana tripteris*	E1	1	.	+	+	3	75
AP	***Cystopteridion* s. lat. (*Astrantio-Paederotion luteae* nom. prov.)**							
	Aster bellidiastrum	E1	+	1	1	1	4	100
	Valeriana saxatilis	E1	+	1	1	2	4	100
	*Hydrogonium croceum (Barbula crocea)**	E0	+	+	1	1	4	100
	Asplenium viride	E1	+	.	+	+	3	75
	Fissidens dubius	E0	+	+	.	+	3	75
	*Jungermannia atrovirens**	E0	+	.	.	+	2	50
	Pinguicula alpina	E1	.	.	1	+	2	50
	Astrantia carniolica	E1	.	+	.	.	1	25
	Viola biflora	E1	.	+	.	.	1	25
	Tofieldia calyculata	E1	.	.	1	.	1	25
	*Marchantia quadrata (Preissia quadrata)**	E0	.	.	+	.	1	25
PcSp	***Physoplexido comosae-Saxifragion petraeae***							
	Spiraea decumbens subsp. *tomentosa*	E1	1	.	.	.	1	25
AT	***Asplenietea trichomanis***							
	Asplenium ruta-muraria	E1	+	.	+	+	3	75
TR	***Thlaspietea rotundifolii***							
	Aquilegia iulia	E1	.	+	r	+	3	75
	Gymnocarpium robertianum	E1	+	.	.	+	2	50
	Adenostyles glabra	E1	1	.	+	.	2	50
	Hieracium bifidum	E1	.	.	+	+	2	50
MC	***Montio-Cardaminetea***							
	Conocephalum conicum	E0	+	.	.	1	2	50
	Palustriella commutata	E0	.	+	.	.		
	*Cololejeunea calcarea**	E0	.	.	+	.	1	25

	Number of relevé (Zaporedna številka popisa)		1	2	3	4	Pr.	Fr.
ES	***Elyno-Seslerietea***							
	Carex ferruginea	E1	+	+	+	+	4	100
	Sesleria caerulea	E1	1	1	1	.	3	75
	Carex mucronata	E1	+	.	1	+	3	75
	Laserpitium peucedanoides	E1	+	.	+	.	2	50
	Betonica alopecuros	E1	.	.	+	+	2	50
FB	***Festuco-Brometea***							
	Buphthalmum salicifolium	E1	+	r	+	.	3	75
EP	***Erico-Pinetea***							
	Rhododendron hirsutum	E1	.	+	r	+	3	75
	Rhodothamnus chamaecistus	E1	.	+	.	+	2	50
	Calamagrostis varia	E1	.	.	+	+	2	50
	Carex ornithopoda	E1	.	+	.	.	1	25
	Rubus saxatilis	E1	.	.	.	r	1	25
VP	***Vaccinio-Piceetea***							
	Homogyne sylvestris	E1	.	.	.	+	1	25
AF	***Aremonio-Fagion***							
	Cyclamen purpurascens	E1	+	.	.	.	1	25
TA	***Tilio-Acerion***							
	Geranium robertianum	E1	.	+	+	.	2	50
	Acer pseudoplatanus	E1	.	.	+	+	2	50
FS	***Fagetalia sylvaticae***							
	Salvia glutinosa	E1	+	.	1	+	3	75
	Galium laevigatum	E1	+	.	.	.	1	25
QP	***Quercetalia pubescenti-petraeae***							
	Fraxinus ornus	E2a	+	.	.	.	1	25
QF	***Querco-Fagetea***							
	Carex digitata	E1	.	.	.	+	1	25
ML	**Mosses (Mahovi)**							
	*Mesoptychia collaris (Lophozia collaris)**	E0	+	+	.	+	3	75
	Ctenidium molluscum	E0	+	.	+	.	2	50
	*Cyrtomnium hymenophylloides**	E0	+	.	.	+	2	50
	*Riccardia palmata**	E0	.	+	.	.	1	25
	Tortella tortuosa	E0	.	.	+	.	1	25

Legend / Legenda

D Dolomite – dolomit
Li Lithosol – kamnišče
Pr. Presence (number of relevés in which the species is presented) – število popisov, v katerih se pojavlja vrsta
Fr. Frequency in % – frekvenca v %

* determined Andrej Martinčič / določil Andrej Martinčič