

## *CHOUARDIA LAKUSICII* (ŠILIĆ) SPETA (HYACINTHACEAE) IN CROATIAN FLORA

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*Chouardia lakusicii* (Šilić) Speta, a very rare species in the Croatian flora, was discovered during a study of the karstic flora on the Torac and Ivanova lazina mountains above the villages of Majkovi and Mravinjac, northeast of the village of Slano (Southern Dalmatia, Croatia). Previously, this species in Croatia had been only described in one locality, north of Mt. Biokovo (the Zabiokovlje area). The present specimens were recorded at elevations of 720 – 780 m, within open rocky limestone and in the crevices in limestone blocks. The populations showed good viability. According to the International Union for Conservation of Nature methods for threat assessment, we propose that *Ch. lakusicii* should be included in the category of vulnerable taxa (VU; criteria A3C, B2A, b (ii, v)) and included in the national red list.

**Keywords:** *Chouardia lakusicii*, distribution, new localities, threat assessment, Croatia

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*Chouardia lakusicii* (Šilić) Speta je vrlo rijetka vrsta Hrvatske flore. Do sada je ta vrsta u Hrvatskoj zabilježena na jednom lokalitetu, i to sjeveroistočno od planine Biokovo (Zabiokovsko područje). Nedavno smo je otkrili na brdima Torac i Ivanova lazina iznad selâ Majkovi i Mravinjac, sjeveroistočno od naselja Slano (južna Dalmacija, Dubrovačko primorje) na nadmorskoj visini od 720 do 780 m. Raste na otvorenim stjenovitim vapnencima i u pukotinama vapnenačkih kamenitih blokova. Populacija je dobro održiva. Temeljem metoda procjene ugroženosti Međunarodne Unije za očuvanje prirode, predlažemo uvrštavanje *Ch. lakusicii* u nacionalni crveni popis ugroženih vrsta u kategoriji osjetljive svojte (VU; kriterij A3C, B2A, b (ii, v)).

**Ključne riječi:** *Chouardia lakusicii*, rasprostranjenost, nova nalazišta, procjena ugroženosti, Hrvatska

### INTRODUCTION

In recent years, new groups have been recognized and taxonomically and phylogenetically justified within the well-described genus *Scilla* (SPETA, 1971, 1976, 1979, 1998a, b; PFOSSER & SPETA, 1999).

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Two Croatian endemic taxa, previously treated as *Scilla lakusicii* (Šilić) and *S. litardierei* (Breistr.) Speta, were moved to the genus *Chouardia* and are now treated as *Chouardia lakusicii* (Šilić) Speta and *Ch. Litardierei* (Breistr.) Speta based on morphology (differences in the stem structure, flower pedicels and bracts) and cytology (SILJAK-YAKOVLJEV *et al.*, 2010). Originally, the species *Scilla albanica* Turill, endemic to Albania, was also placed within the genus *Chouardia* (SPETA, 1981; TRÁVNÍČEK *et al.*, 2009). In accordance with the recent taxonomic modifications, *S. albanica*, together with *S. messeniaca* Boiss. From Greece belong to the genus *Schnarfia* (SPETA, 1998b).

Plants of the genus *Chouardia* are perennial geophytes that produce bulbs. They develop 1 – 9 linear and basal leaves and a stem without leaves. The basal leaves are as long as the stem and reach heights up to 45 cm. These plants develop a dense inflorescence of 15 – 175 light blue flowers at the top of the stem. Each perigon is composed of 6 free sepals, and the stamens with free filaments develop close to the base of the perigon. The fruit is a capsule.

Members of the genus *Chouardia* are distributed along the Dinaric Alps, from Planinsko Polje near Postojna (Slovenia) in the northwest to Albania in the southeast (VUKOVIĆ & NIKOLIĆ, 2006). The genus contains only two species, *Chouardia lakusicii* (Šilić) Speta and *Ch. Litardierei* (Breistr.) Speta.

Unlike the widely distributed *Ch. Litardierei*, *Ch. Lakusicii* was known only in the one locality in Croatia, i.e., Kozička Poljica, located along the road between the villages of Kozica and Slivno in the Zabiokovlje area at an elevation of 800 m (ŠILIC & ŠOLIĆ, 2002a,b). During the study of the flora of the mountainous karst area northeast of the village of Slano in Southern Dalmatia, several new sites of this species in Croatia were discovered.

## MATERIAL AND METHODS

During a survey of the flora of Southern Dalmatia, conducted during 2010–2011, full-flowering plants clearly determined as *Chouardia lakusicii* (Šilić) Speta were discovered (end of April and beginning of May). The identification was performed using the keys of TUTIN (1968), PIGNATTI (1982) and ŠILIC (1990, 1991).

All of the detected localities were geo-coded using GPS devices with a precision of < ±50 m and geo-referenced in accordance with NIKOLIĆ (2006). The MTB 64 square units are also determined for all of the sightings (NIKOLIĆ *et al.*, 1998). The data on the location of the site plant species as well as species that come with it are deposited in the Flora Croatica Database (FCD) (NIKOLIĆ, 2012).

## RESULTS AND DISCUSSION

Lakušić Squill, *Chouardia lakusicii* (Šilić) Speta (Family *Hyacinthaceae*, Order *Liliales*, Superorder *Lilianaes*) (Fig. 1) is an endemic species of the Southeast Dinaric Alps. In addition to Croatia, a small number of other localities are also known, in Bosnia and Southeast Herzegovina, Montenegro and Albania. The species was first described (*locus classicus*) in the mountain above the town of Trebinje (Herzegovina, Bosnia and Herzegovina) (ŠILIC, 1991).

The species is recorded at five localities in the mountains of Torac and Ivanova lazina above the villages of Majkovi and Mravinjac (Dubrovnik coastal area, north-east from village of Slano, Southern Dalmatia) (Tab. 1, Fig. 2).



**Fig. 1.** *Chouardia lakusicii* (Šilić) Speta from the locality in the mountains of Torac and Ivanova lazina above the villages of Majkovi and Mravinjac (photo: M. Ruščić).

**Tab. 1.** New localities of *Chouardia lakusicii* (Šilić) Speta in the Torac and Ivanova lazina mountains above the villages of Majkovi and Mravinjac (Dubrovnik coastal area, north-east from Slano, Southern Dalmatia)

No.	Locality and MTB grid cell	Elevation above sea level (m)	Habitat	X coordinate	Y coordinate
1	Croatia, Southern Dalmatia, Dubrovnik coastal area, northeast of Slano, Torac Mountain, north of Majkovi village (MTB 3273.21)	727	Rocky grassland, limestone rock crevices, southeast exposure	5739773	4741577
2	Croatia, Southern Dalmatia, Dubrovnik coastal area, northeast of Slano, Torac Mountain, north of Majkovi village (MTB 3273.21)	767	Rocky grassland, limestone rock crevices, southeast exposure	5739656	4741711
3	Croatia, Southern Dalmatia, Dubrovnik coastal area, northeast of Slano, Torac Mountain, north of Majkovi village (MTB 3273.21)	775	Rocky grassland, limestone rock crevices, between stone blocks, the top of Torac Mountain	5739606	4741824
4	Croatia, Southern Dalmatia, Dubrovnik coastal area, northeast of Slano, Ivanova lazina Mountain, northwest of Mravinjac village (MTB 3273.23)	764	Rocky grassland, limestone rock crevices, between stone blocks, around manna ash, downy oak, Montpellier maple and hophornbeam shrubs	5742289	4739459
5	Croatia, Southern Dalmatia, Dubrovnik coastal area, northeast of Slano, Ivanova lazina Mountain, northwest of Mravinjac village (MTB 3273.23)	777	Rocky grassland, limestone rock crevices, between stone blocks, around manna ash, downy oak, Montpellier maple and hophornbeam shrubs	5742257	4739489

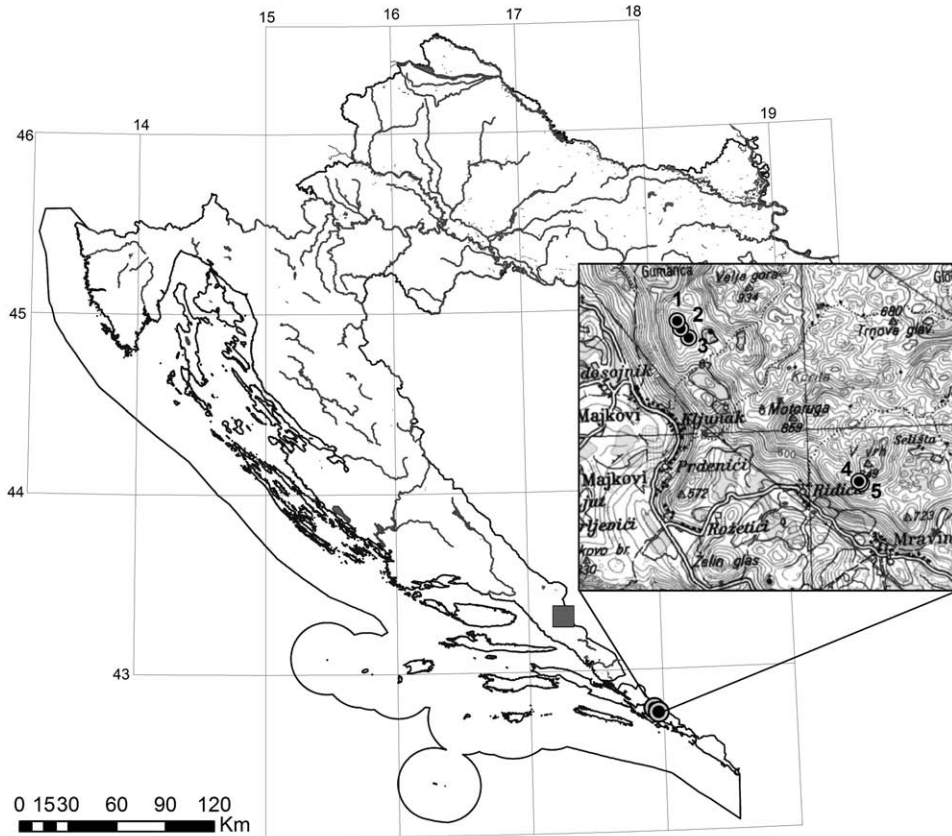


Fig. 2. Known locality (■) and new localities (⊙) of *Chouardia lakusicii* (Šilic) Speta in Croatia.

All of the localities are located within the sub-Mediterranean zone of deciduous forest vegetation belonging to the thermophilous order *Quercetalia pubescentis* Braun-Blanquet (1931) 1932, but have been degraded by human activities into dry grasslands, rocky pastures and shrublands.

Ecologically, localities 1, 2 and 3 (Tab. 1, Fig. 2) on Torac Mountain are categorized as East Adriatic rocky grasslands and dry grasslands dominated by associations of the order *Scorzonero villosae-Chrysopogonetalia grylli* Horvatić et Horvat in Horvatić 1963 (TERZI, 2011): *Stipo bromoidis-Salvietum officinalis* Horvatić 1963 and *Bromo erecti-Seslerietum interruptae* Trinajstić 1987 ex Terzi 2011 (TERZI, 2011). In addition to *Ch. lakusicii*, the following taxa are recorded in these associations: *Acer monspessulanum* L., *Betonica officinalis* L. ssp. *officinalis*, *Brachypodium retusum* (Pers.) P.Beauv., *Bromus erectus* Huds., *Bunium alpinum* Waldst. Et Kit. Ssp. *montanum* (Koch) P.W.Ball, *Carex halleriana* Asso, *Cerastium brachypetalum* Pers., *Dianthus sylvestris* Wulfen in Jacq. Ssp. *tergestinus* (Reichenb.) Hayek, *Edraianthus tenuifolius* (Waldst. Et Kit.) A.DC., *Ephedra fragilis* Desf. Ssp. *campylopoda* (C. A. Mayer) Asch. Et Graeb., *Euphorbia spinosa* L., *Frangula rupestris* (Scop.) Schur., *Fraxinus ornus* L., *Fritillaria graeca* Boiss.

Et Spruner, *F. messanensis* Raf. Ssp. *gracilis* (Ebel) Rix, *Gladiolus illyricus* W.D.J.Koch, *Helichrysum italicum* (Roth) G.Don, *Helictotrichon convolutum* (C.Presl) Henrard, *Hieracium villosum* Jacq., *Juniperus oxycedrus* L. ssp. *oxycedrus*, *Moltkia petraea* (Tratt.) Griseb., *Muscari comosum* (L.) Mill., *Narcissus poeticus* L., *Orchis provincialis* Balb. Ssp. *pauciflora* (Ten.) Camus, *O. tridentata* Scop., *Ostrya carpinifolia* Scop., *Polygala nicaeensis* Risso ex Koch ssp. *mediterranea* Chodat, *Prunus mahaleb* L., *Rhamnus intermedium* Steud. Et Hohst., *Salvia officinalis* L., *Satureja montana* L., *Sesleria autumnalis* (Scop.) F.W.Schultz, *S. robusta* Schott, Nyman et Kotschy, *S. tenuifolia* Schrad., *Stipa pennata* L. ssp. *eriocaulis* (Borbás) Martinovský et Skalický, *Symphytum bulbosum* Schimp, *Teucrium chamaedrys* L., *T. montanum* L., *Thlaspi perfoliatum* L., *Tulipa sylvestris* L. ssp. *sylvestris* and *Valeriana tuberosa* L.

Localities 4 and 5 (Tab. 1, Fig. 2) on Ivanova lazina mountain are also categorized as rocky grasslands and dry grasslands dominated by the same associations, i.e., ass. *Bromo erecti-Seslerietum interruptae* Trinajstić 1987 ex Terzi 2011 and *Stipo bromoidis-Salvietum officinalis* Horvatić 1963. Unlike in the other sites, in these sites, there is a notable progression from grasslands to shrublands of manna ash (*Fraxinus ornus* L.), downy oak (*Quercus pubescens* Willd.) and hophornbeam (*Ostrya carpinifolia* Scop.). The floristic composition of these localities is as follows: *Chouardia lakusicii*, *Acer monspessulanum* L., *Anthoxanthum odoratum* L., *Arabis hirsuta* (L.) Scop., *A. turrita* L., *Betonica officinalis* L. ssp. *officinalis*, *Brachypodium pinnatum* (L.) P.Beauv., *B. retusum* (Pers.) P.Beauv., *Bromus erectus* Huds., *Bunium alpinum* Waldst. Et Kit. Ssp. *montanum* (Koch) P.W.Ball, *Campanula glomerata* L., *C. pyramidalis* L., *Colchicum autumnale* L., *Cornus mas* L., *Edraianthus tenuifolius* (Waldst. Et Kit.) A.DC., *Euphorbia myrsinites* L., *Fritillaria messanensis* Raf. Ssp. *gracilis* (Ebel) Rix, *F. graeca* Boiss. Et Spruner, *Geranium sanguineum* L., *Gladiolus illyricus* W.D.J.Koch, *Inula spiraeifolia* L., *Juniperus oxycedrus* L. ssp. *oxycedrus*, *Limodorum abortivum* (L.) Sw., *Myosotis ramosissima* Rochel, *Narcissus poeticus* L., *Orchis provincialis* Balb. Ssp. *pauciflora* (Ten.) Camus, *O. tridentata* Scop., *Ornithogalum dalmaticum* Speta, *Pistacia terebinthus* L., *Ranunculus garganicus* Ten., *Salvia officinalis* L., *Satureja cuneifolia* Ten., *Scorzonera austriaca* Willd. Ssp. *austriaca*, *S. villosa* Scop., *Sesleria tenuifolia* Schrad., *Stachys subcrenata* (Vis.) Briq., *Stipa pennata* L. ssp. *eriocaulis* (Borbás) Martinovský et Skalický, *Symphytum bulbosum* Schimp., *Tanacetum cinerariifolium* (Trevir.) Sch.Bip., *Teucrium chamaedrys* L., *Tulipa sylvestris* L. ssp. *sylvestris*, *Thlaspi perfoliatum* L. and *Veronica austriaca* L. ssp. *jacquinii* (Baumg.) Eb.Fisch.

In these localities, *Ch. lakusicii* is represented by numerous specimens that successfully develop flowers and produce fruits. It can be assumed that fires in the past in these areas fostered the recovery and growth of this species.

The habitats of these new localities correspond with the habitat of the previously known locality in the Zabiokovlje area: both are comprised of spatially separated spots, with the species distributed on open, gently sloping, skeletal limestone rocks. The Zabiokovlje locality is located within the zone of the shrublands belonging to the association *Quercus-Carpinetum orientalis* Horvatić 1939 at 850 m a. s. l. (ŠILIĆ & ŠOLIĆ, 2002a).

Species *Ch. lakusicii* has a narrow distribution and is found only small areas and with a limited area of occupancy (< 2000 km<sup>2</sup>). The total distribution range is composed of three remote spots in only six fragmented locations. We suppose that natural succession could have had a negative influence on the population stability.

Using IUCN criteria 3.1. (IUCN, 2001) and the guidelines for application at the regional level (IUCN, 2003) and related standards, the *Ch. lakusicii* species is assessed as a threatened taxon, as follows:

- **Category** VU.
- **Assessment criteria** A3c, B2a,b (ii, v).
- **Geographic Range** general BiH, Ct (Fig. 2), CG, Al.
- **Population** current population trends =? (uncertain or unknown).
- **Habitat and Ecology (Classification Scheme, Version 3.0)** 3 Shrubland, 3.8 Mediterranean-type Shrubby Vegetation, 4 Grassland, 4.4 Temperate.
- **Threats (Classification Scheme, Version 3.0)** 7 Natural system modifications, 7.1 Fire & fire suppression, 3 Energy production & mining, 3.3 Renewable energy.
- **Conservation Actions needed (Classification Scheme, Version 2.0)** 1 Land/water protection, 1.2 Resource & habitat protection, 4 Education & awareness, 4.3 Awareness & communications, 5 Law & policy, 5.1 Legislation, 5.1.2 National level.
- **Research Needed (Classification Scheme, Version 2.0)** 1 Research, 1.2 Population size, distribution & trends, 2 Conservation Planning, 2.2 Area-based Management Plan, 3 Monitoring, 3.1 Population trends.
- **Regional assessment** no influence on the primary assessment – 1. (VU), 2a. → unknown, 2b. → unknown → no change from step 1.
- **Estimated** M. Ruščić, N. Jasprica, T. Nikolić.
- **Date of assessment** March 9, 2012.

We recommend the species *Ch. lakusicii* for inclusion in the Red Data Book of Croatia.

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## SAŽETAK

### *Chouardia lakusicii* (Šilić) Speta (*Hyacinthaceae*) u hrvatskoj flori

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Rod *Chouardia* obuhvaća dvije vrste: *Chouardia litardierei* (Breistr.) Speta koja je šire rasprostranjena u Hrvatskoj i *Chouardia lakusicii* (Šilić) Speta koja je do sada poznata samo s jednog nalazišta na području Zabiokovlja. Ovim istraživanjem utvrđeno je novo nalazište *Ch. lakusicii* u južnoj Dalmaciji na području brda Torac i Ivanova lazina iznad naselja Majkovi i Mravinjac u Dubrovačkom primorju. Stani-

šta su vapnenačke stijene i pukotine vapnenačkih blokova, na nadmorskoj visini od 720 do 780 m, u okviru submediteranske zone listopadne vegetacije termofilnih šuma reda *Quercetalia pubescentis* Braun-Blanquet (1931) 1932. Antropogenim djelovanjem došlo je do degradacije tih staništa u suhe submediteranske i epimediteranske suhe travnjake reda *Scorzonero villosae-Chrysopogonetalia grylli* Horvatić et Horvat in Horvatić 1963. Nasuprot tomu, *Ch. lakusicii* u Zabiokovlju dolazi unutar zone bjelograbovih šikara as. *Quercu-Carpinetum orientalis* Horvatić 1939 na nadmorskim visinama oko 850 m. S obzirom da je vrsta *Ch. lakusicii* ograničena na manjim fragmentiranim staništima u ukupnom arealu Hrvatske, te zbog moguće prirodne progresije i antropogenih utjecaja, populacije vrste bi se mogle smanjiti i postati nestabilne. Predlažemo uvrštavanje *Ch. lakusicii* u nacionalni popis ugroženih vrsta, i to u kategoriju osjetljive svojte (VU; kriterij A3C, B2A, b (ii,v)).