



*Hladnikia*

22 (2008)

Posebna številka  
ob Simpoziju  
Flora in vegetacija Slovenije 2008

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Simpozij je posvečen  
70-letnici dr. Toneta Wraberja  
in 10-letnici Botaničnega društva Slovenije.

Ljubljana, Slovenija  
17. in 18. oktober 2008

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Revijo Hladnikia izdaja Botanično društvo Slovenije in jo brezplačno prejemajo člani društva (za včlanitev glejte: <http://bds.biologija.org>). V reviji izhajajo floristični, vegetacijski in drugi botanični prispevki. Revija izhaja v samostojnih, zaporedno oštevilčenih zvezkih.

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## Program Simpozija Flora in vegetacija Slovenije 2008

### PETEK, 17. oktober 2008

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- 9.30-16.00   Ekskurzija  
17.00-17.15   Pozdravni nagovor  
17.15-19.00   **Vabljeni predavanja**  
1. **Metka Škornik:** 10 let Botaničnega društva Slovenije  
2. **Matija Gogala:** Tone Wraber in njegova vloga za popularizacijo botanike  
3. **Peter Skoberne:** Pregled varstva flore na Slovenskem  
4. **Nejc Jogan:** Tone Wraber in preučevanje flore Slovenije  
5. **Tinka Bačič:** Bibliografija Toneta Wraberja  
20.00-       Večerja

### SOBOTA, 18. oktober 2008

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- 9.00-9.15    Pozdravni nagovor  
9.15-11.00   **Kratki referati** (Floristika in taksonomija)  
1. **I. Dakskobler & T. Wraber:** *Crocus biflorus* Mill. vendarle tudi v flori Slovenije  
2. **P. Schönswetter:** "Geneto-floristics": reševanje florističnih in sistematskih vprašanj z molekulskimi metodami  
3. **M. Kaligarič, B. Bohanec, B. Simonovik & N. Šajna:** Morfološka in genetska variabilnost osočnikov (*Salicornia* L.) v Tržaškem zalivu (Severni Jadran)  
4. **B. Frajman & P. Schönswetter:** Filogenija in biogeografija skupine *Euphorbia barrelieri* (Euphorbiaceae)  
5. **K. Bardy, P. Schönswetter, D. C. Albach & M. A. Fischer:** Phylogeography on the Balkan Peninsula – two examples from *Veronica* (Plantaginaceae)  
6. **R. Brus:** Kako je navadna bukev (*Fagus sylvatica* L.) sploh prišla v Slovenijo?  
11.00-11.30   Odmor za kavo  
11.30-13.00   **Kratki referati** (Floristika in taksonomija)  
1. **B. Čušin:** Fitogeografska in taksonomska problematika vrste *Leontodon tenuiflorus* (Gaud.) Rchb.  
2. **J. Bavcon:** *Cyclamen fatrense* Halda & Soják tudi v Sloveniji  
3. **M. Lipovšek:** Zgodaj cvetoče močvirnice v Sloveniji  
4. **S. Škornik, M. Kaligarič & N. Šajna:** Floristična sestava gozdnatih travnikov vzdolž osrednjega dela reke Drave (SV Slovenija) v odvisnosti od svetlobe in rabe

- 5. **N. Praprotnik:** Baron Nikomed Rastern in njegov herbarij
- 6. **I. Breščak:** Botanično delo duhovnika Alojzija Filipiča

13.00-14.30 Kosilo

14.30-16.00 **Kratki referati** (Glive, Fitocenologija)

1. **T. Grebenc, J. Shumkovska Dimitrovska, K. Rusevska, H. Kraigher & M. Karadelev:** Combined approach in exploring the biological activity of two fungi *Antrodia juniperina* and *Pyrofomes demidoffii* based on their phylogenetic position and relation to their anti-cancerogenic and anti-atherogenic activity
2. **B. Surina & M. Rakaj:** Subalpine beech forest with Hairy Alpenrose (Polysticho lonchitis-Fagetum rhododendretosum hirsuti subass. nova) on Mt. Snežnik (Liburnian karst, Dinaric Mts)
3. **M. Meznarič, M. Kaligarič & S. Škornik:** Vegetacija prodišč v odvisnosti od strukture in višine prodišč na primeru srednje Drave
4. **K. Eler & F. Batič:** Talne semenske banke in njihova vloga pri dinamiki vegetacije
5. **D. Baričević, J. Vukelić & I. Šapić:** Comparison of the floristic composition of beech forests on Zrinska Gora and in adjacent areas
6. **S. Redžić, S. Barudanović & S. Trakić:** Diversity patters of alpine and subalpine vegetation in Bosnia-Herzegovina's Dinaric Alps (W Balkan)

16.00-16.30 Odmor za kavo

16.30-18.30 **Kratki referati** (Fitocenologija, Naravovarstvo)

1. **I. Dakskobler:** Združbe visokih steblik z vrsto *Peucedanum ostruthium* v Sloveniji
2. **F. Batič & K. Eler:** Vpliv rabe tal na pestrost travišč na primeru iz osrednje severne Slovenije
3. **L. Kutnar & A. Kobler:** Vpliv različnih scenarijev podnebnih sprememb na pričakovano prostorsko razporeditev gozdne vegetacije
4. **U. Kuhar, M. Germ & A. Gaberščik:** Makrofiti v slovenskih vodotokih in njihov varstveni status
5. **N. Šajna, T. Kavar, M. Kaligarič & J. Šuštar Vožlič:** Ekologija in populacijska genetika hladnikovke (*Hladnikia pastinacifolia* Rehb., Apiaceae)
6. **M. Rogelj:** Pomen in varstvo barij v nižinskih predelih Gorenjske
7. **M. Jež & S. Kaligarič:** Ohranjanje ogroženih habitatnih tipov je pomembno tudi kot ohranjanje habitatov ogroženih vrst metuljev (Lepidoptera)
8. **J. Sedonja:** Kartiranje habitatnih tipov za potrebe ohranjanja narcisnih travnikov v Jeseniških rovtih (Karavanke, Slovenija)

## Postrji:

1. **N. Jasprica, M. Ruščić & S. Kovačić:** *Tamaricion dalmaticae* Jasprica et al., all. nova, on the southeastern Adriatic coast
2. **S. Trakić & S. Redžić:** Syntaxonomic differentiation of vegetation in rock cravices and screes on Bjelasnica Mt. near Sarajevo (B&H)
3. **S. Redžić:** The Syngensis and Syntaxonomy of Forests and Shrubs at the Continental Dinaric Alps (W. Balkan Peninsula)
4. **D. Dujmović Purgar & S. Bolarić:** Floristic composition of meadows – locations of the autochthonous populations of red clover (*Trifolium pratense* L.) on the Hrvatsko Zagorje area (NW Croatia)
5. **D. Dujmović Purgar, Z. Šindrak, D. Mihelj, S. Voća & B. Duralija:** Wild growing fruit species in Republic of Croatia
6. **I. Dakskobler, I. Sinjur, I. Veber & B. Zupan:** Nahajališča in rastišča vrste *Pulsatilla vernalis* v Julijskih Alpah
7. **I. Ljubičić, M. Britvec & I. Vitasović Kosić:** Endemic plants on rocky pastures on the island of Pag
8. **V. Matevski & M. Kostadinovski:** New locality of species *Limosella aquatica* L. in the flora of the Republic of Macedonia
9. **G. M. Schneeweiss, B. Frajman & I. Dakskobler:** *Orobanche lycoctoni* Rhiner, prezrta vrsta pojalnikov v srednjeevropski flori
10. **A. Munda, V. Škerlavaj & M. Žerjav:** Parazitske vrste čašic iz rodu *Monilinia* Honey v Sloveniji
11. **T. Ciringer, M. Kaligarič & J. Ambrožič-Dolinšek:** Mikropropagacija ogrožene vrste *Hladnikia pastinacifolia* - preliminarni rezultati
12. **L. Kutnar, D. Matijašič & R. Pisek:** Kazalniki ugodnega ohranitvenega stanja gozdnih habitatnih tipov v Sloveniji
13. **V. Stamenković:** Ex situ conservation of *Degenia velebitica* (Dègen) Hayek through licensed cultivation and sale
14. **M. Kaligarič, S. Škornik, N. Šajna, N. Pipenbaher & A. Paušič:** Funkcionalni pristop pri raziskovanju sukcesije na opuščenih kmetijskih terasah v submediteranskem okolju
15. **A. Kuhelj & N. Jogan:** Morphometric study of genus *Epipactis* in Slovenia
16. **B. Surina, T. Rakić, S. Stefanović, V. Stevanović & D. Lakušić:** Some novelties in the phylogeny and systematics of the genus *Edraianthus* (Campanulaceae)
17. **B. Mitić, D. Vladović, N. Ževrnja & P. Anterić:** Analysis of Ord. Berberideen, Nymphaeaceen, Papaveraceen and Fumariaceen from C. Studniczka's herbarium
18. **N. D. Hristovski, D. Blažeković, E. Milevska, L. Kocovski & D. Tomovska:** Avgust Rudolf Grisebach Henrich and his contribution to the flora of Pelister Macedonia
19. **A. Kofol Seliger:** Aerobiologija in fenologija pelinolistne žvrklje (*Ambrosia artemisiifolia* L.) v Ljubljani
20. **M. Radojković, T. Bourtoom, D. Tomanek, Z. Stojanović, S. Vidović, Z. Zeković:** Characteristics of edible biodegradable Mung bean films
21. **G. Király & A. Király:** Pannonian influences in the flora of South-West Hungary: the role of climatic and edaphic factors

## Uvodnik

Letošnji simpozij Flora in vegetacija Slovenije 2008 prirejamo ob dveh okroglih obletnicah. Obe sta za vse nas pomembni, višja je 70-letnica Toneta Wraberja, dolgoletnega profesorja sistematske botanike na študiju biologije na Ljubljanski Univerzi. Druga, za nas vse tudi pomembna, pa je 10-letnica od ustanovitve Botaničnega društva Slovenije.

S svojim florističnim, taksonomskim in fitocenološkim delovanjem je Tone Wraber vtisnil neizbrisni pečat preučevanju slovenskega rastlinstva v drugi polovici 20. stoletja. Njegovo ime bo za vedno ostalo ob boku velikim botanikom, delujočim na naših tleh, kot so bili Scopoli, Tommasini, Pospichal, Hayek, Paulin... Neprecenljiv je tudi njegov prispevek k popularizaciji botanike ter seveda njegova vloga univerzitetnega učitelja in mentorja.

Ob tej priložnosti mu vzklikamo: še na mnoga aktivna leta!

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Symposium Flora and vegetation of Slovenia 2008 is dedicated to two anniversaries, both important for Slovenian botanists and botany. Tone Wraber, professor of systematic botany at University of Ljubljana, is celebrating his 70<sup>th</sup> birthday remaining as active as he had been during the last half a century. The other important event is fulfilled first decade of Botanical Society of Slovenia.

Key contribution of Tone Wraber to the exploration of flora, plant taxonomy and vegetation of Slovenia in the second half of 20<sup>th</sup> century is indisputable. His name will always remain side by side to the most excellent students of Slovenian flora as were Scopoli, Tommasini, Pospichal, Hayek, Paulin... Also his contribution to the popular science is invaluable and of course also his role of teacher and supervisor to the dozens of biologists is inestimable.

So, at the occasion of his 70<sup>th</sup> birthday, we all wish him many subsequent years of botanical activity!

NEJC JOGAN  
PRESEDNIK BOTANIČNEGA DRUŠTVA SLOVENIJE/  
PRESIDENT OF THE BOTANICAL SOCIETY OF SLOVENIA

Povzetki

**Vabljena predavanja / Invited lectures**

## Bibliografija Toneta Wraberja

### Bibliography of Tone Wraber

TINKA BAČIČ, NEJC JOGAN

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Obsežna bibliografija Toneta Wraberja do danes obsega blizu 900 bibliografskih enot. Ni resnega botaničnega članka, ki ne bi citiral vsaj enega njegovega dela, najbolj uporabljana in opažena je vsekakor Mala flora Slovenije, pri kateri je kot soavtor sodeloval pri vseh 4 izdajah (1969, 1984, 1999, 2007), njegov delež obdelanih družin pa se je postopno povečeval. O izsledkih svojega znanstveno-raziskovalnega dela je botanično javnost seznanjal preko mnogih florističnih, taksonomskih in fitocenoloških člankov v domačih in tujih znanstvenih revijah. Odkril in objavil je na desetine novih vrst za floro Slovenije ter s tem po plodovitosti gotovo prekosil vse sodobne raziskovalce. Pri oblikovanju temeljev varstva narave v Sloveniji je sodeloval z mnogimi naravovarstvenimi prispevki, objavljenimi v revijah Varstvo narave, Biološki vestnik in Proteus, posebej pomemben pa je Rdeči seznam ogroženih praprotnic in semenk RS (T. Wraber & Skoberne, 1989), ki je poldrugo desetletje usmerjal naravovarstveno botanično dejavnost Sloveniji.

Prof. dr. Tone Wraber je avtor in soavtor znanstvenih in strokovnih monografij, npr. Sto znamenitih rastlin na Slovenskem (Wraber, 1990), Rože na Slovenskem (Pintar & Wraber, 1990), 2 x sto alpskih rastlin na Slovenskem (Wraber, 2006), Travniške rastline na Slovenskem: sto pogostnih vrst (Seliškar & Wraber, 1986), s katerimi je dosegel in navdušil tudi bralce zunaj ozkega strokovnega kroga.

Osem let je bil urednik poljudnoznanstvene revije Proteus. Od leta 1962 do danes je v Proteusu objavil okrog 300 poljudnih, strokovnih in znanstvenih člankov ter krajših prispevkov, s tem pa med drugim bistveno prispeval k razvoju slovenskega biološkega izrazja. S številnimi poljudnimi članki v dnevnem časopisju, mnogimi intervjuji in televizijskimi oddajami je izjemno prispeval k popularizaciji stroke tudi v širši javnosti. Kot področni urednik in s poldrugo stotino prispevkov je sodeloval pri nastanku Enciklopedije Slovenije, ki jo je v letih 1987-2002 izdala založba Mladinska knjiga v sodelovanju s Slovensko akademijo znanosti in umetnosti.



## Tone Wraber in preučevanje flore Slovenije

### Tone Wraber and floristic exploration of Slovenia

NEJC JOGAN

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S svojim florističnim delovanjem je Tone Wraber vtisnil neizbrisni pečat preučevanju slovenskega rastlinstva v drugi polovici 20. stoletja. Poleg nepreseženega števila člankov o florističnih novostih in zanimivostih, je na območju Slovenije začel tudi s sistematičnim kartiranjem flore in zbiranjem ustrezno georeferenciranih florističnih podatkov, kar je kot plod srednjeevropske koordinacije kartiranja flore zaživel konec šestdesetih let. V novo kartografsko mrežo se je tako »prevajalo« številne stare podatke, hkrati pa je steklo zbiranje novih zanimivih najdb ter postopno kartiranje celotne flore po kvadrantih.

Ena ključnih podlag za resno delo na področju floristike, toliko bolj pa sistemske botanike, je bila tudi največja herbarijska zbirka na ozemlju Slovenije. Herbarij Ljubljanske Univerze (LJU) je tako danes edina urejena sodobna herbarijska zbirka v Sloveniji. Njenemu urejanju je slavljenec posvetil prvih nekaj službenih let, kasneje pa je v zbirko vestno prinašal nov material, tako da je danes v urejenem delu zbirke čez 7000 pol, ki jih je nabral na 1180 lokalitetah, nadalje pa še nekajkrat toliko ne popolnoma urejenega herbarijskega materiala. Po številu nabranih pol prednjačijo lokalitete Stena pri Dragonji, Veliki Snežnik, Strunjan, Mangartsko sedlo in Slavnik, med kvadranti pa 9748/2, 9547/4, 0447/4, 9748/1, 9952/2, 0547/2 in 9648/2 s čez 200 herbarijskimi polami na kvadrant. Teh nekaj vodilnih kvadrantov leži v Julijcih, v Slovenski Istri ter v okolici Ljubljane, ta območja pa tudi sicer izstopajo po intenziteti delovanja slavljenca.

Sam ali skupaj s sodelavci ter kot mentor skupaj s svojimi mlajšimi kolegi se je lotil številnih taksonomsko zahtevnih skupin in razrešil prenekatero nejasnost ter med drugim prepoznal in opisal nekaj za znanost novih taksonov kot Vardjanov košutnik, Petkovškov mak in Widderjev slanozor.

Poznavanje flore Slovenije tako brez delovanja Toneta Wraberja ne bi bilo niti približno tako, kot je, in se v veliki meri tudi po njegovi zaslugi Slovenija lahko uvršča ob bok ostalim srednjeevropskim državam.

## Pregled varstva flore na Slovenskem

### Survey of plant conservation on the Slovenian territory

PETER SKOBERNE

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Začetki varovanja flore na Slovenskem sovpadajo s povečanim zanimanjem za obiskovanje narave, predvsem gora v 19. stoletju. Zato je bila na pobudo planinske organizacije zavarovana planika leta 1896 na Goriškem, dve leti kasneje pa tudi na Kranjskem in Štajerskem. Na Kranjskem je bil zavarovan tudi Blagayev volčin.

Ta prva zavarovanja so bila pokazatelj prebujanja naravovarstvene miselnosti, ki je dobivala vedno bolj določeno obliko – od posameznih zamisli do prvih ukrepov, kot so zavarovana območja, in celo ustanavljanja posebnih služb.

V Nemčiji je kot prvi poklicni naravovarstvenik deloval Hugo von Conwentz (1855-1922), znan predvsem po sistematičnem, praktičnem in pragmatičnem pristopu k varstvu narave. Njegov priručnik o naravnih spomenikih in njihovem varstvu je eno prvih klasičnih metodoloških del na področju varstva narave v Evropi.

Conwentzov priručnik iz leta 1904 je spodbudil Alfonza Paulina, da je le dve leti kasneje pripravil rokopisni predlog botaničnih spomenikov Kranjske. Čeprav je ta rokopis objavil Ernest Mayer šele leta 1988, je bil Paulinov predlog dobro poznan tedanjim varstvu narave naklonjenim naravoslovcem, saj na vsebinske predloge iz rokopisa naletimo v različnih kasnejših dokumentih in predpisih.

Leta 1915 je za Štajersko izšel nov odlok, ki je zavaroval 20, pretežno alpskih rastlin.

Po prvi svetovni vojni je Odsek za varstvo prirode in prirodnih spomenikov pripravil naravovarstveni program in ga januarja 1920 predložil pokrajinski vladi. V tem dokumentu, Spomenici, je druga od štirih točk posvečena ohranjanju rastlinskih in živalskih vrst. Za rastlinske vrste in varstva potrebna območja, pomembna za rastline, so zapisane utemeljitve.

Spomenica je spodbudila zavarovanje 23 rastlin leta 1922, ta seznam pa se je leta 1947 in 1949 razširil na 56 vrst.

Leta 1963 je kustos v Prirodoslovnem muzeju Slovenije Tone Wraber pripravil razstavo Naše zaščitene rastline. Ob tej priložnosti je izšla tudi knjižica, ki je predstavila vse zavarovane rastline. Tone Wraber je ob tem izdelal tudi prvo kritično analizo seznama teh vrst in ga objavil v reviji Varstvo narave. Ta izhodišča so bila upoštevana pri pripravi seznama zavarovanih vrst leta 1978.

Tone Wraber pri pripravi prvega celovitega pregleda naravne dediščine Slovenije (1976) prispeval botanični del z opredelitvijo rastlinsko najvrednejših območij Slovenije. Ogroženost rastlin je postala težišče utemeljitve za zavarovanje ali druge varstvene ukrepe, zato je zaradi njegovega izjemnega poznavanja literature in terena lahko nastal prvi rdeči seznam cvetnic in praprotnic (1989).

Sodeloval je tudi pri vključevanju Slovenije v Evropsko unijo, ko je bilo treba dodati slovenske evropsko pomembne vrste na priloge Direktive o habitatih ter opredeljevanju območij Natura 2000.

Evpovska zakonodaja se zrcali tudi pri varovanju rastlinskih vrst, tako posameznih, kot tudi njihovih življenjskih prostorov.

## **10 let Botaničnega društva Slovenije**

### **10 years of Botanical Society of Slovenia**

METKA ŠKORNIK

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Botanično društvo Slovenije (Botanical Society of Slovenia) deluje od aprila 1998. Je nepridobitno združenje profesionalnih botanikov in ljubiteljev botanike, ki združuje in povezuje članstvo na amaterski podlagi. Nastalo je na pobudo članov Botanične sekcije Društva biologov Slovenije. Število članov se je od 60 (1998) povečalo na skoraj 180 (2008).

Področja delovanja: botanični večeri (1 do 2 na mesec), ekskurzije, kartiranja flore, jesensko srečanje slovenskih botanikov, simpoziji Flora in vegetacija Slovenije.

Društvo izdaja glasilo Hladnikia, organizira tekmovanja v poznavanju flore za srednješolce, sodeluje z nevladnimi organizacijami (Koalicija za Volovjo reber, Koalicija za trajnostni razvoj podeželja ...), se povezuje s sorodnimi društvi, izdaja priložnostne publikacije.

V sodelovanju s Centrom za kartografijo favne in flore (CKFF) je društvo izpeljalo projekt IPA za Slovenijo.



## **Predavanja / Lectures**

## Združbe visokih steblik z vrsto *Peucedanum ostruthium* v Sloveniji

### Tall herb communities with *Peucedanum ostruthium* in Slovenija

IGOR DAKSKOBLER

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*Peucedanum ostruthium* je južnoevropska montanska vrsta, značilnica združb visokih steblik in zelene jelše iz razreda *Mulgedio-Aconitetea*. Razširjena je v celotnem alpskem loku, prav tako v nekaterih drugih gorovjih (npr. Pireneji, Apenini). V Sloveniji uspeva le v Julijskih Alpah (Triglavsko in Krnsko pogorje, gore na Bovškem), kjer smo jo našli v subalpskih bukovich in macesnovih gozdovih (*Polysticho lonchitis-Fagetum*, *Rhodothamno-Laricetum*), v subalpskih grmiščih (*Salicetum waldsteinianae*, *Alnetum viridis*, *Rhododendro hirsuti-Pinetum prostratae*), v subalpinsko-alpinskih traviščih iz reda *Elyno-Seslerietea* (npr. v sestojih asociacij *Caricetum ferrugineae* s. lat. in *Rhododendretum hirsuti*), v subalpskih traviščih iz razreda *Calluno-Ulicetea*, predvsem pa v sestojih visokih steblik. Te za zdaj uvrščamo v tri sintaksone: *Aconito ranunculifolii-Adenostyletum glabrae peucedanetosum ostruthii* subass. nova (razred *Thlaspietea rotundifolii*, zveza *Petasition paradoxi*), *Rumicetum alpini* (zveza *Rumicion alpini*) in *Aconito ranunculifolii-Peucedanetum ostruthii* ass. nova (zveza *Adenostylon alliariae*). Oba nova sintaksona bomo v predavanju podrobneje predstavili.

## Talne semenske banke in njihova vloga pri dinamiki vegetacije

### Soil seed banks and their role in vegetation dynamics

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Ob motnjah ali ob propadu posameznih rastlinskih osebkov v združbi se lahko nastali prostor zapolni z vegetativno razrastjo sosednjih rastlin, disperzijo semen ali trosov iz bližnje ali bolj oddaljene okolice ali pa iz semen iz tal. Slednji način regeneracije vegetacije definiramo kot talne semenske banke. Rastline, katerih seme je v tleh, lahko hitro kolonizirajo nastali prostor in vplivajo na nadaljnjo sukcesijo, vrstno pestrost združbe ter delovanje ekosistema. Talne semenske banke pri posameznih rastlinskih vrstah se razlikujejo glede njihove trajnosti, ta pa je v povezavi s tipom vegetacije, kjer posamezne rastlinske vrste najdemo. Znano je, da je pomen talnih semenskih bank večji v združbah, ki so pogosteje podvržene motnjam. Pomen in trajnost semenskih bank pri posameznih rastlinskih vrstah je povezan z nekaterimi drugimi biološkimi lastnostmi vrste (npr. življenjska oblika, življenjska doba, idr.), še posebej pa z nekaterimi morfološkimi lastnostmi semen. V prispevku je predstavljena raziskava talnih semenskih bank pri sukcesiji na primorskem Krasu, kjer smo po metodi kalitve v dveh terminih (jeseni, spomladi) želeli oceniti trajnost semenskih bank posameznih rastlin, le-to povezati z nekaterimi funkcionalnimi lastnostmi vrst, primerjati podobnost med sestavo talnih semenskih bank in sestavo nadzemne vegetacije ter s tem ovrednotiti pomen semenskih bank za potencialno obnovo zaraščenih površin na krasu ter za dinamiko vegetacije nasploh. Rezultati kažejo, da so talne semenske banke pri zaraščanju travišč na krasu le omejenega pomena, večina vrst gradi slabo obstojne, prehodne semenske banke, še posebej vse tamkajšnje vrste trav. Trajnejše zaloge semen v tleh smo našli pri vrstah z drobnim, okroglim semenom, npr. *Teucrium montanum*, *Satureja montana*, *Verbascum nigrum*, *Thymus* sp. Opazno je zmanjševanje podobnosti med semenskimi bankami in vegetacijo pri napredujoči sukcesiji; v kasnejših sukcesijskih stadijih je očitno vse večji pomen disperzije semena iz okolice, kar kaže porast deleža anemohornih vrst.

## Pestrost alpinske in subalpinske vegetacije Dinarskih Alp v Bosni in Hercegovini (zahodni Balkan)

### Diversity patterns of alpine and subalpine vegetation in Bosnia-Herzegovina's Dinaric Alps (W Balkan)

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Bosnia-Herzegovina's Dinaric Alps comprise the area between Plješevica Mt. in northwest and Orjen Mt. in southeast. Vegetation occurring in the mountain belt of this part of Dinaric Alps is characterized by extremely high level of both biological and ecological diversity. Climax vegetation above tree line is alpine grassland accompanied with extrazonal vegetational forms – snow beds, screes, rock crevices, mountain springs, blanket bogs, tall herbs. These vegetation types are the most dominant factors that determine unique physiognomy of mountain ecosystems, as well as their primary bio production. They are characterized by extreme floristic richness and high number of both endemic and glacial relicts that build up high number of phytocoenoses of which many are endemo-relict. In regard of syntaxonomy mountain vegetation is being differentiated in 10 classes: *Elyno-Seslerietea*, *Juncetea trifidi*, *Salicetea herbaceae*, *Thalspieta rotundifolii*, *Asplenietea trichomanis*, *Scheuchzerio-Caricetea fuscae*, *Montio-Cardaminetea*, *Loiseleurio-Vaccinietea*, *Mulgedio-Aconitetea* and *Molinio-Arrhenatheretea*. These classes are being differentiated in 20 vegetational orders, 38 alliances and 190 associations and sub-associations, which makes 60% of plant communities in total vegetation diversity of B&H, as well as 12.5% of classes as top syntaxonomic category in vegetation diversity of Europe.

Alpine and subalpine grasslands on carbonate ground occur in 76 endemo-relict associations, 9 endemic alliances and 3 orders which are included in class *Elyno-Seslerietea*. Grasslands occurring on acid alpine soil, frequently developed over silicate bedrock, are represented with 15 associations and 4 alliances of mainly endemic character, and one order belonging to class *Juncetea trifidi*.

In the belt of this vegetation, in cold habitats, where snow maintains over entire year, develops vegetation around snow beds with 7 glacial-relict associations, 2 alliance and 2 orders, comprised by class *Salicetea herbaceae*. Vegetation of rock crevices is represented with 28 endemo-relict associations, while vegetation of alpine screes is represented with 20 of them. In its number especially protruding are associations belonging to sub alpine and mountain meadows of endemic alliance *Pancicion* comprising 17 associations.

Basic imprint to entire vegetation image of not only B&H and Balkan Peninsula, but also south-eastern Europe, is given by rich and unique development forms of mountain vegetation.



**Subalpinski bukov gozd z dlakavim slečem (*Polysticho lonchitis-Fagetum rhododendretosum hirsuti* subass. nova) na Snežniku (Liburnijski kras, Dinaridi)**

**Subalpine beech forest with Hairy Alpenrose (*Polysticho lonchitis-Fagetum rhododendretosum hirsuti* subass. nova) on Mt. Snežnik (Liburnian karst, Dinaric Mts)**

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Subalpine beech stands with Hairy Alpenrose (*Rhododendron hirsutum*) were phytosociologically studied on Mt. Snežnik (Dinaric Mts). They thrived on stony and steep slopes of northern exposure. Comparisons with other subalpine Beech stands (*Polysticho lonchitis-Fagetum* s. lat.), Fir-Beech stands with Hairy Alpenrose (*Omphalodo-Fagetum* s. lat. *rhododendretosum hirsuti*), and prealpine fir-beech stands with Hairy Alpenrose (*Homogyno sylvestris-Fagetum* s. lat. *rhododendretosum hirsuti*), stands of Hairy Alpenrose and Beech (*Rhododendro hirsuti-Fagetum* s. lat.), as well as Austrian subalpine beech stands (*Saxifrago rotundifoliae-Fagetum* s. lat.) showed their unique floristic composition due to ecological conditions, and thus distinct syntaxonomical position within the association *Polysticho-Fagetum*. Therefore, a new subassociation *Polysticho-Fagetum rhododendretosum hirsuti* subass. nova was described, and as differential species for the subassociation *Rhododendron hirsutum*, *Rubus saxatilis*, *Rosa pendulina*, and *Clematis alpina* were chosen.

## Primerjava floristične sestave bukovih gozdov Zrinske gore in sosednjih področij

### Comparison of the floristic composition of beech forests on Zrinska Gora and in adjacent areas

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The article presents the floristic composition of submontane beech forests in the area of Zrinska Gora in central Croatia. Their composition was compared with the floristic composition of similar beech forests inhabiting adjacent areas in Croatia, Slovenia and Bosnia and Herzegovina. Since no phytocoenological study of the forest vegetation on Zrinska Gora has been made earlier, the results of this research provide the first scientific insights into the forest vegetation of this highly interesting part of Croatia situated at the transition from the Dinaric into the Pannonian area. A phytocoenological survey was conducted in some twenty localities using classical methods of the Braun-Blanquet School. The phytocoenological relevés were entered in the TurboVeg database and were processed with a multivariate analysis technique, together with the relevés from the adjacent areas, in the statistical Syntax2000 software package. The floristic composition was also analyzed on the basis of affiliation to particular floral geoelements. The occurrence of Illyrian and Illyricoidal species was analyzed in particular. The results of preliminary research indicate the occurrence of two types of beech forests in the study area. The first type refers to neutrophilic forests growing in deeper soils and smaller inclinations. They are dominated by the species such as *Galium odoratum*, *Circaea lutetiana*, *Galeobdolon luteum*, *Pulmonaria officinalis*, *Dryopteris filix-mas*, *Athyrium filix-femina*, *Rubus hirtus*, *Alliaria petiolata* and *Polystichum setiferum*. Floristically, this type is more similar to forests in Slovenia. The second type involves acidophilic forests occurring in shallower soils and bigger slopes and is more similar to beech forests in the Pannonian part of Croatia, as well as to those in the north-western part of Bosnia and Herzegovina. This type is primarily characterized by a significant participation of the species such as *Festuca drymeia*, *Luzula luzuloides*, *Pteridium aquilinum*, *Melampyrum pratense* and the species of the genus *Hieracium*. It should be pointed out that the analysis of the floristic composition has revealed a considerable decrease in the share and cover of Illyrian and Illyricoidal species going from the west towards the east. The study area represents the transition from the Dinaric and Illyrian area into the sub-Pannonian area.

## Vpliv rabe tal na pestrost travišč na primeru iz osrednje severne Slovenije

### Impact of landuse on diversity of grasslands: a case from central-north Slovenia

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Biotsko raznovrstnost v kmetijski rabi tal predstavljajo v veliki meri trajna travišča na zelo suhih in mokrih rastiščih. Diverziteti suhih travišč je odvisna od lastnosti tal, klime, načina in trajanja kmetijske rabe. Opisana so travišča na dolomitni podlagi na območju Doliča na pobočju, kjer se na južnem pobočju izmenjujejo globoka tla (globlja od 100 cm) s plitvimi (globoka do 20 cm), na katerih je bil pred kmetijsko rabo gozd, v prvem primeru verjetno združba *Hacquetio-Fagetum*, v drugem *Erico-Pinetum*. Na teh traviščih so bile v preteklosti tudi njive, v zgornjih legah pred najmanj 70-80 leti, v srednjih še pred 50 leti in v spodnjih pred 20 leti. Strmejšje vrhnje lege so že v zaraščanju s trepetliko in belim topolom, ki ju spremljajo smreka, rdeči bor in dob. V osrednjem delu je manjši visokodebelni sadovnjak, nižje so še dvakrat na leto košena travišča. V preteklosti je bila raba kosna, s pašo v jesenskem času, ki se je prenehala pred približno 20 leti. Travišča na globokih tleh bi lahko uvrstili v skupino visokih pahovkovij, kjer je sestava bolj tipična v spodnjih legah, ki so še košene in močno spremenjena na vrhu, kjer se začne proces zaraščanja. Na plitvih tleh prevladujejo fragmenti združb s pokončnim stoklascem, ki pa je zaradi hladne klime komaj prisoten. Raznovrstnost je zaradi ekstenzivne rabe travišč dokaj velika. Trave nikjer ne prevladujejo, delež metuljnic je povsod manjši od deleža trav. Za ohranjanja biotske raznovrstnosti so najbolj zanimive površine na plitvih tleh, kjer se pojavlja do 6 vrst kukavičnic in vrste kot so *Linum flavum* L., *Aster amellus* L., *Gentiana verna* L., *Globularia punctata* Lapeyr., *Dianthus carthusianorum* L. in še mnoge druge. Pri zaraščanju te površine hitro prekrijeta vrsti *Erica carnea* L. in *Pinus sylvestris* L.. V jesenskem aspektu se na predvsem še košenih površinah pojavljata v obilju vrsti *Euphrasia rostkoviana* Hayne. in *Gentianella aspera* (Hegetschw.&Heer) Dostal ex Skalicky). Na globljih tleh se s staranjem travišč in opuščanjem rabe večja delež šašev, kompetitivnih trav kot sta skalna glota in trstikasta stožka in delež gozdnih vrst. Iz analiziranega je razvidno, da le določen način kmetijske rabe ohranja primerne habitate za obstoj ogroženih vrst suhih travišč, ki so prav zaradi opuščanja rabe ali pa ponekod tudi zaradi gnojenja ogrožena.

## Botanično delo duhovnika Alojzija Filipiča

### Botanical work of Alojzij Filipič

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Alojzij Filipič se je rodil v Ravnici pri Grgarju 31. 5. 1988. V Gorici je obiskoval gimnazijo in bogoslovje ter postal duhovnik. Največji del življenja (1919 – 1945) je preživel v Grgarju kot župnik in dekan, preostanek pa kot župnik v Batujah (1945-1963).

Po nekajletnem zbiranju gradiva, ki pa še ni popolno, se je izluščila podoba dobrototnega, gorečega, narodno zavednega, skromnega, veselega in žlahtnega humorja polnega duhovnika, ki mi je bila botanika ljubljén konjiček.

Z botaniko se je začel ukvarjati v Grgarju. Vanjo ga je vpeljal tržaški botanik Carlo Zirnich. Herbarij iz grgarskega obdobja je zgorel z župniščem vred ob bombardiranju leta 1945. Njegov ohranjeni herbarij pa je iz batujskega obdobja. Hrani ga Škofijska gimnazija Vipava. Sestavlja ga okrog 3000 herbarijskih pol rastlin s Primorske, Notranjske, Snežnika, pa tudi iz Julijskih Alp. V herbariju so primerki 637 rodov. Med njimi je posebnost kroglasta osvaljkarica (*Pilularia globulifera*) z Lijaka pri Ajševici, ki je danes tam ni več. Na rastlinskih polah so zapisana imena znanih botanikov, kot: dr. Toneta Wrabra in Carla Zirnicha, ki so mu določali tiste primerke, ki jih sam ni znal. V Batujah je v privatni zbirki tudi stiskalnica, s katero je stiskal rastline.

V slovenski naravoslovni reviji *Proteus* je v letniku 1958/59 objavil botanični članek pod naslovom Mala Lazna - botanični vrt Trnovskega gozda. Opremil ga je z izvirnimi skicami. Pomembno je njegovo odkritje nahajališča Kochovega svišča (*Gentiana acaulis*), ter za Slovenijo nove vrste Beckove zvončice (*Campanula beckiana*).

Dopisoval si je z dr. Angelo Piskernik, z dr. Maksom Wrabrom, reškim botanikom Karlom Kocjančičem, njegov dober znanec in svetovalec pa je bil tudi dr. Tone Wraber.

O rastlinah, ki jih je nabiral, je večkrat pisal prijatelju pesniku Ludviku Zorzutu.

Nekrolog mu je v Biološkem vestniku napisal dr. Tone Wraber. (Biološki vestnik XII, Ljubljana 1964).

## ***Crocus biflorus* Mill. vendarle tudi v flori Slovenije**

### ***Indeed Crocus biflorus* Mill. part of the flora of Slovenia**

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Prvi podatek o pojavljanju dvocvetnega žafrana (*Crocus biflorus*) na ozemlju današnje republike Slovenije je dokumentiran z nabirkom v okolici Komna na Tržaško-Komenskem Krasu leta 1844, shranjenem v herbariju TSM. Še isto leto je bilo to nahajališče objavljeno v 2. izdaji Kochovega »Sinopsisa«. Še vedno kot *Crocus biflorus* ta žafran z več nahajališč na istem območju, a v mejah današnje Italije, navajata v flornih delih Marchesetti (1896-1897) in Pospichal (1897), kakor mnogo pozneje Mayer (1952) za slovensko etnično ozemlje in, po netočno razumljenem Marchesettijevem navedku, tudi še Sušnik (1969) za ozemlje današnje republike Slovenije. Vendar je Witasek (1902) ugotovila, da gre pri tem žafranu za *Crocus weldenii*. Do istega spoznanja je, ne vedoč za njeno objavo, prišel tudi Lausi (1965). V zgodnji pomladi 2008 na dveh nahajališčih v srednji Soški dolini (Plave, Morsko) najdeni žafran pa se je izkazal kot pravi *C. biflorus* subsp. *biflorus*. Obe nahajališči širita doslej znani areal te podvrste znatno na vzhod, vse na južno vznožje Julijskih Alp, to vednost pa dopolnjuje še doslej spregledana najdba K. Zirnicha iz leta 1955 iste podvrste v Italiji zahodno od Gorice. Referat obravnava zgodovino odkrivanja podvrst *C. biflorus* subsp. *weldenii* in *C. biflorus* subsp. *biflorus* v Sloveniji in italijanski soseščini ter na arealnih kartah prikazuje njuno razširjenost na navedenih območjih. Podatki o geološki podlagi in podnebjju ter fitocenološka tabela ilustrirajo ekološke razmere novih nahajališč. *C. biflorus* subsp. *biflorus* uspeva na košenih travnikih, ki jih uvrščamo v asociacijo *Anthoxantho-Brometum erecti*, in v (pol)ruderalnih združbah iz razreda *Molinio-Arrhenatheretea*. Ta podvrsta predstavlja nov takson v flori Slovenije, medtem ko pojavljanje podvrste *C. biflorus* subsp. *weldenii* na ozemlju Slovenije po letu 1844 ni bilo več potrjeno. Potrjeno tudi ni nahajališče podvrste *C. biflorus* subsp. *biflorus* na nahajališču pri Gorici v Italiji.

## “Geneto-floristics”: reševanje florističnih in sistematskih vprašanj z molekulskimi metodami

## “Geneto-floristics”: solving floristic-systematic problems with molecular tools

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My presentation aims to brake down reciprocal reservations of “field/morphological guys” and “molecular guys”. I illustrate this with two examples of my own research.

In the course of molecular phylogeographical investigations in *Androsace* a previously unrecognised entity from the Komovi mountains (Črna Gora) was identified as a clearly separated new species, *Androsace komovensis*. It morphologically resembles *A. mathildae* from the Abruzzo mountains (Italy), but differs in the persistent, dense and regular indumentum of the leaf margin. Molecular phylogenetic data indicate that *A. komovensis* is not closely related to *A. mathildae*, but is sister species to the Eastern Alpine *A. hausmanni*.

*Papaver alpinum* s.l. is an extraordinarily polymorphic taxon. We tested previous hypotheses about relationships and taxonomical status of the numerous described taxa within this species group by applying molecular approaches. In addition we re-evaluated morphological characters used in previous taxonomic treatments in light of the molecular results. The ancestral sequence haplotypes were widespread and dominant throughout the Alps, whereas peripheral populations in other mountain ranges were often characterised by haplotypes directly derived from the central haplotypes. AFLP data corroborated the pattern of a ‘centrifugal radiation’ and additionally showed that most populations were genetically distinct, presumably due to the effect of genetic drift in small and isolated populations. The morphological data did not reveal clear patterns of variation; only the Pyrenean and Sierra Nevada populations differed in two non-overlapping characters. Our study implied that previous taxonomic concepts of *P. alpinum* s.l. were highly artificial, and that either nearly all populations have to be raised to some taxonomic rank or that, preferably, no infraspecific taxa should be recognised at all. The only segregate possibly deserving taxonomic rank is the Iberian subsp. *lapeyrousianum*.

## **Floristična sestava gozdnatih travnikov vzdolž osrednjega dela reke Drave (SV Slovenija) v odvisnosti od svetlobe in rabe**

### **The species composition in relation to light and management in riparian wooded meadows along the middle Drava River (NE Slovenia).**

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In the present study, we investigated the species richness and species composition in relation to light and management regime in remnants of wooded meadows within the riparian forests along the middle Drava River in Slovenia. 41 plots of still managed and, at different time periods (< 5 yrs, 5-15 yrs, > 15 yrs), abandoned riparian wooded meadows (RWM) were sampled. Next to vegetation relevés, light intensity (Photosynthetically Active Radiation (PAR)) was also measured in plots. Within RWM that were still managed two floristically distinct types were recognized by TWINSpan and DCA analysis: meadow-like and forest-like. Light intensity and mean number of species differed significantly between types. The CCA of active RWM showed significant relation between species composition and light conditions. The number of species per relevé on active RWM was negatively correlated with light intensity – in contrast to North European wooded grasslands. This could be explained by the influence of species-rich riparian hornbeam forests, which contribute a great number of understorey species, in contrast to naturally mesotrophic meadows. CCA of both active and abandoned RWM demonstrated that light was good predictor of RWM species composition and that abandonment caused profound changes in floristic composition. The species turnover during succession was more pronounced in less shaded meadow-like RWM where more light-requiring (grassland) species occurred. Species richness was the highest in active forest-like RWM. There were no significant differences in species richness between active meadow-like RWM and groups of abandoned RWM. The clear positive correlation between cover-abundance values of invasive neophyte *Solidago gigantea* and light intensity showed that abandoned RWM are very susceptible for colonization until there is enough light.

## Kako je navadna bukev (*Fagus sylvatica* L.) sploh prišla v Slovenijo?

### How did European beech (*Fagus sylvatica* L.) come to Slovenia?

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Najstarejši zanesljivo določeni fosili bukve izvirajo iz srednjega eocena (pred 45 mil. let) z zahodne Severne Amerike, ki velja za izvorni center rodu. Del populacij se je razširil proti zahodu in kot vrsta *Fagus castaneifolia* v paleogenu naselil srednjo Azijo in postopoma tudi Evropo. Do zgodnjega oligocena (pred 30 mil. let) je bukev že poraščala celotno območje od pacifiške Severne Amerike čez Azijo do Evrope. V Evropi so precej pogosti fosilni ostanki iz terciarja, v neogenu sta bili razširjeni dve dobro diferencirani in geografsko ločeni vrsti: *Fagus gussonii*, v poznem miocenu razširjena v južni Evropi in sorodna današnji bukvi s Kavkaza, in *F. haidingeri*, močno razširjena v drugih delih Evrope in precej podobna današnji vrsti *Fagus sylvatica*.

Fosilni ostanki v krovnem oligocenskem laporju iz slovenskih premogovnikov, predvsem Zagorja, Trbovelj in Novega Dola kažejo, da je bila v oligocenu bukev razširjena tudi na ozemlju današnje Slovenije. Fosilne ostanke je Ettingshausen uvrstil v polimorfno vrsto *Fagus feroniae*. Na ozemlju Slovenije je bila gotovo razširjena tudi v bližnjih hrvaških nahajališčih (Planina, Podsused, Sv. Nedelja, Radoboj) večkrat najdena vrsta *Fagus pristina*. Kdaj se je razvila vrsta *F. sylvatica*, ni natančno znano, nekateri avtorji menijo, da šele v kvartarju, najstarejši pelodni diagrami iz južne Evrope pa zanesljivo dokazujejo njeno prisotnost že vsaj 500.000 let.

Pleistocenske poledenitve je bukev v Evropi preživela samo v ledenodobnih zatočiščih. Za območja njihove zanesljive prisotnosti so dolgo veljali predvsem južnoevropski polotoki, vse več dokazov (prisotnost bukovega peloda, ostanki do 80.000 let starih makroskopskih rastlinskih ostankov, npr. oglja v paleolitski jami Divje babe, genetske raziskave, areali ilirikoidnih vrst..) pa podpira hipotezo, da so bili mikrorefugiji na ozemlju današnje Slovenije naseljeni z bukvi nepretrgoma iz terciarja in da je večino srednje in zahodne Evrope v postglacialu naselila prav bukev iz Slovenije.



## Ohranjanje ogroženih habitatnih tipov je pomembno tudi kot ohranjanje habitatov ogroženih vrst metuljev (*Lepidoptera*)

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Ogroženi habitatni tipi Evropske Unije so določeni z Direktivo o habitatih. V pravni red Slovenije so preneseni z uredbo o habitatnih tipih (Uradni list RS 2002). Strokovno so opredeljeni v priročniku Habitatni tipi Slovenije (Jogan 2004). Varstvena območja, ki so namenjena njihovem ohranjanju so določena z uredbo o območjih Natura 2000. Ohranjanje habitatnih tipov ni utemeljeno samo z vegetacijskimi razlogi ampak tudi z razlogi ohranjanja habitatov ogroženih vrst metuljev. Metulji (*Lepidoptera*) so rastlinojede žuželke katerih življenje je tesno povezano z rastlinami. Samice odlagajo jajčeca na določene ovopozitorske rastline, gosenice se hranijo z določenimi rastlinami in tudi odrasli metulji se hranijo z nektarjem določenih rastlinskih vrst. Glede na to so nekateri habitatni tipi hkrati habitatni ogroženih metuljev in jih je potrebno ohranjati tudi kot njihov habitat. V prispevku so predstavljeni primeri povezave med habitatni metuljev in habitatnimi tipi ter primeri terenskih raziskav v letu 2007.

## Vpliv različnih scenarijev podnebnih sprememb na pričakovano prostorsko razporeditev gozdne vegetacije

### Influence of different climate-change scenarios on the expected spatial distribution of forest vegetation

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V raziskavi smo simulirali prerazporeditev gozdne vegetacije v Sloveniji, do katere bi lahko prišlo ob napovedanih podnebnih spremembah. Potencialne prostorske spremembe gozdne vegetacije so bile analizirane v GIS okolju s pomočjo empiričnega modela, ki napoveduje prostorsko razporeditev gozdne vegetacije v odvisnosti od klimatskih in drugih parametrov. Pri simulaciji smo uporabili obstoječe napovedi podnebnih sprememb za Slovenijo, iz katerih smo oblikovali tri različne možne scenarije: scenarij po trendu, vroče-suhi in vlažno-manj vroči scenarij. Model povezuje klimatske, reliefne in talne parametre, vendar pa ne upošteva drugih dejavnikov, ki lahko pomembno vplivajo na pojavljanje gozdne vegetacije (npr. zaraščanje in sukcesija, antropogeni dejavniki, sekundarni vplivi kot so bolezni, zoo-komponenta, požari).

Rezultati simulacij na osnovi treh klimatskih scenarijev kažejo, da se bo vzorec razporeditve 13 vegetacijskih tipov (skupin podobnih združb) menjal pod vplivom podnebnih sprememb. Domnevamo lahko, da se bo v naslednjih desetletjih sedanji vegetacijski tip spremenil na večini gozdnih površin; do leta 2040 na 62 % po vlažno-manj vročem scenariju do 87 % po vroče-suhem scenariju. S segrevanjem podnebja, ki je predvideno po vseh treh scenarijih, se bo predvidoma do leta 2040 delež različnih termofilnih gozdov iz sedanjih 14 % povečeval na 21 % do 71 %. Povečanje deleža termofilnih gozdov, ki so praviloma gospodarsko manj zanimivi in hkrati tudi požarno bolj ogroženi od večine ostalih, bi bilo predvsem na račun zmanjševanja deleža danes prevladujočih mezofilnih gozdov. Iz ekološko-naravovarstvenega in gozdnogospodarskega vidika je še posebej pomembno napovedano zmanjševanje deleža vegetacijske skupine, v kateri prevladujejo dinarski jelovo-bukovi gozdovi *Omphalodo-Fagetum*. Ob predpostavki, da se današnja ekološke amplituda tega vegetacijskega tipa ne bi spreminjala, bi uresničitev najbolj pesimističnega vroče-suhega scenarija do koncu 21. stoletja povzročila celo njegovo izginjanja z ozemlja naše države.

## **Kombiniran pristop pri ugotavljanju biološke aktivnosti gliv na primeru vrst *Antrodia juniperina* in *Pyrofomes demidoffii* z ugotavljanjem njihovega filogenetskega položaja in dejanskega antikancerogenega in antiaterogenega delovanja**

### **Combined approach in exploring the biological activity of two fungi *Antrodia juniperina* and *Pyrofomes demidoffii*, based on their phylogenetic position and relation to their anti-cancerogenic and anti-atherogenic activity**

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Fruitbodies of basidiomycetes fungi *Antrodia juniperina* and *Pyrofomes demidoffii* are commonly found on specific wood substrate of Greek juniper occurring exclusively in warm regions of Europe (south-eastern Balkan Peninsula and Turkey), with high potential for use in human medicine as anti-cancer and anti-atherogenic drugs of natural origin. Preliminary results of tests for the biological activity of dried and homogenised mature sporocarps of basidiomycete fungi *Antrodia juniperina* and *Pyrofomes demidoffii*, as separate and independent applications, indicated their relative high biological activity against adenocarcinoma of glandulla mammae as tested on cancer-induced mouse. Aiming to broaden the list to closely relative species to studied ones comprehensive descriptions and phylogenetic analysis were performed on each of the genus. In the molecular analysis of ITS regions were applied for comparison of phylogenetic relationship among closely related species. Molecular markers separated both *Antrodia juniperina* and *Pyrofomes demidoffii* from their close relatives after ML analysis, thus representing a clear and stable species. The distribution of limited number of potentially biologically active close relatives based on the molecular markers did not show any significant pattern of the distribution of biological activities in common among lineages. In future we expect to include more species and closely related genera in molecular screening for their anti-cancer activity.

## **Makrofiti v slovenskih vodotokih in njihov varstveni status**

### **Macrophytes of Slovenian watercourses and their conservation status**

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The macrophyte survey was performed on 750 km of Slovenian watercourses using the methodology of Kohler & Janauer (1995). Different documents on threatened macrophyte species, i.e. Slovenian Red list of Pteridophyta and Spermatophyta, Slovenian Decree on protected wild plant species, Convention on the conservation of European wildlife and natural habitats (Bern Convention), EC Habitat Directive, and The IUCN Red list of threatened species were examined to compare the level of endangerment at national and international levels. 105 macrophyte species were recorded during the investigation. 39 are listed on the Red list of Pteridophyta & Spermatophyta. Three out of them are classified as endangered (*Groenlandia densa*, *Oenanthe fistulosa* and *Potamogeton trichoides*) and others are classified as vulnerable. Eight species, including two endangered species, were found only in watercourses with a karst hydrology, characterised by alternation of floods and dry periods. *Butomus umbelatus* and all species of *Iris* are included in Decree on protected wild plant species and *Trapa natans* in Bern Convention, while other documents does not comprise any of the species found in Slovenian watercourses. Data analysis revealed that some species found in Red list, i.e. *Myriophyllum spicatum*, *Potamogeton nodosus* and *P. perfoliatus* as well as *Ranunculus trichophyllus* are relatively frequent and abundant, therefore they might be omitted from the Red list.

## **Pomen in varstvo barj v nižinskih predelih Gorenjske**

### **Mires in lower areas of Gorenjska region – significance and conservation**

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V zadnjih petnajstih letih je bilo evidentiranih precej novih barj, večinoma v nižinskih predelih Gorenjske, pod 800 metri nadmorske višine. Praviloma gre za malopovršinska nizka in prehodna barja. Nastala so lahko ob zaraščanju vodnega telesa po naravni poti, v uleklinah na neprepustni podlagi, na povirnih območjih ali z zaraščanjem umetnih vodnih oblik, npr. nekdanjih ribnikov. Čeprav gre običajno za barja manjših površin, lahko glede na prisotnost rastlinskih vrst ter njihovo razporeditev v obravnavanem območju njihov pomen označimo kot velik.

Predvsem visoka barja so učinkovito varovana s posebnimi akti o zavarovanju ali v okviru Triglavskega narodnega parka. Novo evidentirana barja manjših površin so večinoma pod določenim naravovarstvenim statusom, ki pa vedno ne zagotavlja ohranjanja ugodnega stanja. Ogroža jih predvsem urbanizacija, pa tudi vrsta drugih dejavnikov: opuščanje kmetijske rabe, neustrezne rekreacijske dejavnosti in zaraščanje po naravni poti. Pri izvajanju varstva se Zavod RS za varstvo narave srečuje s številnimi problemi.

## **Kartiranje habitatnih tipov za potrebe ohranjanja narcisnih travnikov v Jeseniških rovtih (Karavanke, Slovenija)**

### **Habitat mapping as prerequisite for conservation of daffodil meadows in the Jeseniški rovti (Karavanke, Slovenia)**

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Karavanke so biotsko zelo bogato območje. Območju raziskovanja, ki obsega del Karavank od Jesenic severno proti Golici oz. avstrijski meji, vzhodno do Struške in zahodno do Hruške planine, dajejo pomemben pečat narcisni travniki. Že med terenskim delom je bilo mogoče opredeliti dva ključna dejavnika izginjanja narcisnih travnikov: intenzifikacija in opuščanje kmetijske rabe. Namen raziskave je bil vsebinsko in prostorsko opredeliti habitatne tipe, obenem popisati in določiti habitatno preferenco dnevnih metuljev ter te prostorske podatke povezati s prisotnostjo in pogostostjo narcise s ciljem ohranjanja te vrste in njenega habitata. Habitatni tipi so bili kartirani po nacionalni tipologiji (Habitatni tipi Slovenije, HTS 2004), usklajeni s palearktično klasifikacijo. Kartirali smo negozdne habitatne tipe izven območij s strnjeno poselitvijo. Evidentiranih je bilo 52 različnih habitatnih tipov v 204 kombinacijah, od tega so na 91% kartiranega območja prisotni evropsko pomembni habitatni tipi iz Priloge I Direktive o habitatih. Najpogostejša so suha volkovja in podobna kisl travišča pod gozdno mejo, ter gorski ekstenzivno gojeni travniki na katerih naletimo na: *Narcissus poeticus radiiflorus*, *Trollius europaeus*, *Dactylorhiza sp.*, *Gymnadenia conopsea*, *Plantanthera bifolia*, *Traunsteinera globosa*, *Listera ovata*, *Drosera rotundifolia*, *Pinguicula vulgaris*, *Lilium martagon*, *Lilium cariolicum*, *Nigritella rhellicani*, *Nigritella lithopolitana*, *Szorzonera rosea* in ostale travniške vrste. Na traviščih so pogosta povirna močvirja z muncem, okroglostno rosiko in šotnimi mahovi. Na raziskovanem območju je bilo registriranih 76 vrst dnevnih metuljev, od teh 10 zavarovanih vrst, med temi tri iz Direktive o habitatih. Zbrane podatke smo povezali s podatki o pojavljanju narcise. Ti kompleksni prostorski podatki bodo dobra podlaga za določitev podrobnejših ukrepov za ohranjanje biotske pestrosti v Jeseniških rovtih.

## Filogeografija Balkanskega polotoka – dva primera iz rodu *Veronica* (Plantaginaceae)

### Phylogeography on the Balkan Peninsula – two examples from *Veronica* (Plantaginaceae)

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The Balkan Peninsula is one of the hotspots of biodiversity in Europe with more than 6500 species of native seed plants; presuming because of its role as a refugial area during the Pleistocene ice ages. Despite being a source for the recolonization of Europe, the Balkan Peninsula was a place for continuous diversification and formation of new species further enhancing its richness in endemic species.

Up to now, our knowledge of the phylogeographic history of plant species of the Balkan Peninsula is predominantly based on the study of trees. However, most of its species richness is due to herbaceous perennials such as the genus *Veronica*.

The already available phylogenetic framework of the genus *Veronica* makes it an excellent model taxon for our study. We focus on species from two different subgenera: subgenus *Pseudolysimachium* (*V. barrelieri*, *V. orchidea* and *V. spicata*) – occurring on grasslands – and subgenus *Chamaedrys* (*V. chamaedrys* agg.) – mainly inhabiting forests. Using genome size estimation, AFLP fingerprints and cpDNA markers we address the following main questions:

- 1) Do molecular and genome size data confirm the current taxonomy?
- 2) Which geographical patterns do the genetic entities exhibit on the Balkan Peninsula?
- 3) What is the origin of the polyploids?

The analysis for the subgenus *Chamaedrys* reveals that the diploid species form distinct genetic entities whereas the tetraploid *V. cham.* subsp. *chamaedrys* is polymorphic, phenetically as well as genetically, and has probably originated more than once via autopolyploidization. The three species analyzed from the subgenus *Pseudolysimachium* show a partly congruent genetic pattern compared to phenology but appear to hybridize over large areas or are currently evolving.

## *Cyclamen fatrense* & Soják tudi v Sloveniji

### *Cyclamen fatrense* Halda & Soják also in Slovenia

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In 1971 Halda & Soyak described a new species *Cyclamen fatrense* for the then territory of Czechoslovakia. It differs from *C. purpurascens* Mill. primarily by its plain green patternless leaves. It is now regarded as an important endemite of Slovakian flora, with a small distribution area (Veľká Fatra and Starohorské vrchy). It appears mostly in deciduous and mixed forests (Kanka & al. 2008). Reportedly, the question is of mostly non-specific beech and spruce associations growing on limestone soil, or even of spruce monocultures (Halda & Soyak 1971, Bernátová & Feráková 1999, Kliment, 1999). According to Kanka et al. 2008 the association concerned is *Carici albae-Fagetum* which is heterogeneous and in consequence further divided into smaller units.

In Slovenia a form of *C. purpurascens* can be found without a marbled leaf pattern. It is common on karst soil or predominantly limestone grounds. It can be found from Črni vrh above Idrija towards Col and Čaven. It appears in spots also along the Kolpa river, as well as in Dolenjska and Gorenjska. This form is stable and remains so also after several years of growing in the Botanic Garden culture. In his monography on the genus *Cyclamen* Grey-Wilson (1988, 2002) refers to this species as one of the forms of the species *C. purpurascens*. He also mentions the outstanding diversity of common cyclamen with respect to its leaf pattern. I fully agree with the above statements and deal with this form in the very same sense for Slovenia. Horticulturally speaking, such a form is of great value because it may be a basis for a new cultivar. Proceeding from a several-year observation period during which the leaf pattern of common cyclamen has remained stable and due to its horticultural value I would place it in the group of green forms so as to distinguish it from the other forms with diversely marbled leaves. In the form under observation the underside of the leaves is likewise green, which is quite rare with diversely marbled leaves.



## Filogenija in biogeografija skupine *Euphorbia barrelieri* (Euphorbiaceae)

### Phylogeny of *Euphorbia barrelieri* group (Euphorbiaceae)

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*Euphorbia* is one of the largest genera of seed plants with mostly tropical distribution. Around 100 species are native to Europe (*Euphorbia* subg. *Esula*) with the highest diversity in Southern Europe. The *E. barrelieri* group consists of c. five species distributed in the Eastern Alps, Balkan and Apennine Peninsulas. *Euphorbia saxatilis* is endemic to the northeastern Calcareous Alps of Austria, *E. triflora* is disjunctly distributed on Čaven in Slovenia and on Velebit and Gorski Kotar in Croatia, *E. kernerii* on the southern outskirts of the Carnic Alps and the southwestern outskirts of the Julian Alps, and *E. hercegovina* in the Dinaric Mountains from Bosnia and Herzegovina to Montenegro as well as on Pelješac Peninsula in Croatia. *Euphorbia barrelieri* is more widespread, *E. barrelieri* subsp. *barrelieri* is confined to the Apennine Peninsula and *E. barrelieri* subsp. *thessala* to the southern Balkan Peninsula.

The aim of the study was to test hypotheses on the relationships among the taxa based on classical morphological and biogeographical assumptions, as well as to infer the phylogenetic position of the group within *Euphorbia*, using AFLP and chloroplast (*trnT-trnF*) as well as nuclear ribosomal DNA sequences (ITS), respectively.

The sequence data suggest that the *E. barrelieri* group as traditionally circumscribed is not monophyletic, *E. nicaeensis* (incl. *E. glareosa*) and *E. segueriana* (incl. *E. niciciana*) are nested within it. The sister to the group is *E. pithyusa* from the western Mediterranean. Chloroplast and nuclear phylogenies are incongruent, suggesting a complicated evolutionary history. The ITS phylogeny is in several respects congruent with patterns suggested by AFLP data. *Euphorbia kernerii* and *E. triflora* form distinct clades and should be treated as independent species. *Euphorbia hercegovina* subsp. *javoriensis* is clearly nested within *E. triflora*. Additional studies to better understand the evolutionary history of the group and relationships among the taxa are underway.

## **Vegetacija prodišč v odvisnosti od strukture in višine prodišč na primeru srednje Drave**

### **Vegetation of the river gravel bars in the relation to bar structure and height on the case of middle Drava river stream**

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In the present study we studied species composition in relation to selected environmental variables (height, soil structure (proportions of mud, sand, gravel)) and age of the gravel bar on the gravel bars of the middle Drava River. The research included 29 selected gravel bars in the section Markovci - Zavrč and section Obrež - Središče ob Dravi. We determined the relative height of the gravel bars and estimated proportion of mud, sand and gravel (in percentage). We sampled the vegetation on 154 plots using the Braun-Blanquet method.

Using multivariate analyses (methods of classification and ordination) we compared the floristic composition of the relevés. 155 plant species were found which indicates high species richness and vegetation variability of researched gravel bars. DCA ordination of the relevés on the basis of species composition showed a continuous variation of species composition along the moisture gradient. With TWINSpan classification three groups of relevés were separated. CCA ordination demonstrated that size of the particles in sediment and bar elevation (cm) were environmental variables that mostly correlated with the species composition of the gravel bars. Namely, both factors could affect the soil moisture; lower areas with fine sediment (mud) are wetter (and probably very fertile), while larger particles sediments (gravel) on higher places are dryer. The vegetation coverage increases with the content of mud and is as expected in positive correlation with the height and maximal height of the vegetation. Gravel on the other hand was in negative correlation with the height of the vegetation – lower pioneer plants, xerophile species, which are more resistant to drought and do not grow high, prevail on the soil with major proportion of gravel. The age of the gravel bar was not correlated with any of the variables.

## **Ekologija in populacijska genetika hladnikovke (*Hladnikia pastinacifolia* Rchb., Apiaceae)**

### **Ecology and population genetics of *Hladnikia pastinacifolia* Rchb., Apiaceae**

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*Hladnikia pastinacifolia* Rchb., a narrow endemic, is regarded as a Tertiary relic species. Paleo-endemics are remnants of previously widespread taxa and their current distribution is sometimes reduced to small refugia. *Hladnikia* has an extremely narrow distribution area, despite many available habitats. We will discuss the plant life-history traits most likely to underlie this pattern.

Additionally, we used the genetic approach to investigate potential differentiation between and within the northern and the southern populations. We examined random amplified polymorphic DNA (RAPD) variation. *Hladnikia* was found to be highly monomorphic for RAPD. However, AMOVA analysis showed that the majority of the genetic diversity was partitioned within selected populations. The low genetic divergence between populations indicates their recent fragmentation.

## Fitogeografska in taksonomska problematika vrste

### *Leontodon tenuiflorus* (Gaud.) Rchb.

### A contribution to the phytogeography and taxonomy of *Leontodon tenuiflorus* (Gaud.) Rchb.

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Najdba tankokoškastega jajčarja na hudourniškem produ v povirju Nadiže je fitogeografsko zanimiva, saj lokaliteta sodi na skrajni vzhodni rob njegovega areala, ki se ujema tudi z vzhodno mejo vrst *Spiraea decumbens* in *Euphorbia triflora* subsp. *keneri*. Vrsta uspeva v fragmentu fitocenoze, ki jo lahko uvrstimo v red *Epilobietalia fleischeri*. Na rastišču, poleg sive vrbe, prevladujejo vrste iz razreda *Thlaspietea*.

Nabrane rastline se že po videzu dobro ločijo od podobnih taksonov, zlasti so značilni ozki in temnozeleni listi, raskavi na otip. Dolgopecljati laski s kratkimi kraki pa so le potrdili našo ugotovitev. Zato se pridružujemo avtorjem, ki obravnavani takson vrednotijo kot vrsto.

## Morfološka in genetska variabilnost osočnikov (*Salicornia* L.) v Tržaškem zalivu (Severni jadrán)

### Morphologic and genetic variability of glassworts (*Salicornia* L.) from the Gulf of Trieste (Northern Adriatic)

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The morphologic and genetic variability of annual glassworts were studied. Four pre-determined morphotypes of *Salicornia* (*S. patula*, *S. emerici*, *S. veneta* and the “saline type”) from 10 locations of the Gulf of Trieste coasts were studied. Beside morphometry, genetic variability was detected by means of ploidy level estimation using flow cytometry and with molecular DNA analysis of ITS regions of nrDNA and cpDNA. Two groups, diploids and tetraploids, which match with same nrDNA sequence, were recognized. Two types of cpDNA emerged among diploids, one of it - as a consequence of mutation before polyploidization - appear in all the three tetraploid morphotypes. In our case hybridization indicates tetraploid maternal progenitors, providing a plastid genome. The morphometry, based on regenerative traits, separated the four morphotypes, but the three most important characters in floral region (length of the fertile segment (LFS), length of the lateral flower (LLF), width of the scarious margin of the fertile segment (SM)) match with two genetically recognized taxa: diploid *S. patula* and widely distributed tetraploid, *S. emerici*, comprising also endemic morphotype *S. veneta* and the “saline type”. The determination key is given. It showed up, that the tetraploid *S. emerici* is far most common species of annual glassworts in the area, occupying more extreme habitats than *S. patula*, mostly forming monodominant stands. We estimate that in Slovenian seacoast around 95% of the glassworts belong to *S. emerici*. We discuss the habitual variability between tetraploids, being not more than phenotypic plasticity, by salinity-moisture-nutrients gradient and tidal regime. Further study in order to reconsider and revise the taxonomical status of endemic *S. veneta* is proposed.

## Baron Nikomed Rastern in njegov herbarij

### Baron Nikomed Rastern and his Herbarium

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Baron Nikomed Rastern se je rodil 15. septembra 1806 na Češeniku nad Dobom pri Domžalah. Bil je zadnji moški potomec rodbine Rastern, ki se je na Kranjsko priselila s Tirolske. Politično je pripadal konservativnim krogom. Od leta 1967 do smrti je bil predstavnik veleposestnikov v Kranjskem deželnem zboru. Intenzivno se je ukvarjal z gospodarstvom na svojem posestvu in ljubiteljsko z botaniko. Bil je tudi član Muzejskega društva za Kranjsko. Umril je 24. decembra 1875 na Češeniku.

Zbral je obširen herbarij, ki ga hrani Prirodoslovni muzej Slovenije. V herbariju je okrog 6000 pol. Rastline so s Kranjske in Primorske (okolica Češenika, Kolovec, Šmarna gora, Želimlje, Krim, Iška, Zaplata, dolina Kokre, Storžič, Črna prst, Predel, Porezen, Kepa, Ljubelj, Nanos, Čaven, Sežana, Lipica, okolica Trsta, Devin, Nabežina, Tržič...). Na Kranjskem je največ sodeloval z A. Fleischmannom.

Imel je živahne stike z mnogimi znanimi tujimi botaniki (M. Tommasini, E. Josch, J. Freyn, J. C. Pittoni, R. Huter, F. Kokeil, D. Pacher, A. Pirona, E. Burnat...). Aktivno je sodeloval z dunajskim Društvom za zamenjavo rastlin (Botanischen tauschverein). V zbirki niso samo primerki iz Evrope (Dalmacija, Vojvodina, Makedonija, Črna gora, Grčija, Švica, Francija, Norveška, Belgija, Madžarska, Italija...), ampak tudi na primer s Perzije, Kurdistana, iz okolice Carigrada, z Urala...

Okrog leta 1840 je Rastern na Kozjeku pri Srednjem vrhu pri Storžiču nabral neznano vrsto iz rodu *Allium*, A. Fleischmann pa jo je nabral na Mokrici in Storžiču. Herbarijske primerke sta poslala za zbirko *Flora Germanica exsiccata* in H. G. L. Reichenbach jo je na herbarijskem listku opisal kot *Allium kermesinum*.

Skupaj z botanikom E. Joschem je leta 1863 na Čavnu našel vrsto *Centaurea alpina*, tedaj novo za floro Kranjske in Primorske.

Leta 1868 je Rastern na Kolovcu pri Kamniku našel takson *Scopolia carniolica* f. *hladnikiana*, ki na tem nahajališču raste še sedaj.

## **Posterske predstavitve / Poster presentations**

## Sintaksonomska diferencijacija vegetacije skalnih fisur in melišč na gori Bjelasnica pri Sarajevu (B&H)

### Syntaxonomic differentiation of vegetation in rock cravices and screes on Bjelasnica Mt. near Sarajevo (B&H)

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Bjelasnica Mt. is situated south-western from B&H's capitol Sarajevo. From geomorphologic standpoint Bjelasnica represents plateau inclined from its highest peak Opservatorija in northeast (2067 m) to Volujak (1454 m) that is positioned in southwest. Massif of Bjelasnica Mt. is built of limestone, dolomites and dolomitified limestone. Due to supra-Mediterranean impacts that reach its east facing slopes through canyon of Rakitnica river, there are significant differences in climate character on investigated area which is mainly mountainous, while on the other hand, climate belongs to two pluviometric types-supra-Mediterranean and continental one. These differences are reflected especially in the investigated vegetation types for they occur on undeveloped soils which can not buffer variation in hydro-thermic regime in habitats. Spatially, the investigated vegetation takes places in marginal area of Bjelasnica's plateau from 1300 to 2000 m above sea level, in upper mountainous, sub alpine and alpine belt. Vegetation of rock crevices and screes on carbonate bedrock was analysed after Braun-Blanquet approach (1964). In total 180 rélevés were made of which 117 for vegetation of rock crevices and 63 for vegetation on carbonate screes. Regarding syntaxonomy vegetation of carbonate screes belonging to class *Thlaspeetea rotundifolii* Br.-Bl. 1947 in the investigated area is being differentiated in one endemic order which occurs only in south-eastern Dinaric Alps, five alliances and eight associations. Vegetation of rock crevices on carbonate ground belonging to class *Asplenetia trichomanis* (H. Meier) Br.-Bl. 1934 in the investigated area is being differentiated in three orders, five alliances and nine associations. Identified level of syntaxonomic diversity in the investigated area, which is considered to be very limited, reflects the diversity of habitats arising from diversity of climate. Major proportion of plants that were identified within phytocoenologically analysed vegetation types on Bjelasnica Mt. are endemic ones which was clearly shown in spectra of floral elements done for plant communities belonging to vegetation of rock crevices and screes. Hence, most of identified plant communities are of endemic character, too.



## Karakterizacija biološko razgradljivih polimernih filmov zelene soje

### Characteristics of edible biodegradable Mung bean films

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Edible biodegradable polymer films represent another example of technological innovations, which aims to satisfy criteria of healthy nutrition and human medicine with obtaining of pharmaceutical and edible products characteristics. The components used in the production of biodegradable polymer films can be classified into three categories: hydrocolloids, lipids and composites. *Mung bean* is used as an alternative substance in biodegradable film production due to high protein content.

In this work, the effects of different plasticizer types (sorbitol, polyethylenglycol and glycerol) were tested on the protein films characteristics made of *Mung bean*. The influence of different concentrations (40%, 50% and 60%) of three plasticizers on protein films was determined. Explored characteristics were tensile strength and water vapour permeability. The characteristics were represented as average values and the experimental results uncertainties.

The obtained values for the tensile strength were in the range from  $13.799 \cdot 10^3$  to  $63.426 \cdot 10^3$  Pa and reproducibility of the results were very good (in the range 11.0-25.4%, expressed as a coefficient of variation  $K_v$ ). The highest value of tensile strength achieved for film with 60% of sorbitol as plasticizer, and it showed the best reproducibility of the tensile strength ( $K_v = 11.0\%$ ). The water vapour permeability was in the range from 0.505 to 1.171 g mm/m<sup>2</sup> day kPa, with reproducibility from 5.56% to 33.21%. For concentration of 50% of both plasticizers, reproducibility was lower. Considering the water vapour permeability and its reproducibility, films with polyethylenglycol as plasticizers showed the best properties ( $C = 60\%$ ,  $K_v = 5.65\%$ ).

The results and statistic indicators enable use of examined protein films made from *Mung bean* in pharmaceutical and edible products, in accordance to needed characteristics of final product with most efficient attributes.

## **Mikropropagacija ogrožene vrste *Hladnikia pastinacifolia* - preliminarni rezultati**

### **Micropropagation of Endangered *Hladnikia pastinacifolia* - preliminary results**

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*Hladnikia pastinacifolia* Rehb. is endemic species in the area of Slovenia with limited distributional range of 4 km<sup>2</sup> within the Trnovski gozd. *H. pastinacifolia* is a red list species in Slovenia, listed also in the Appendix II of Habitat Directive. Its habitats are considered as endangered, in the case of screes also priority habitats (Appendix I of Habitat Directives). An efficient protocol for rapid multiplication of *H. pastinacifolia* for ex situ conservation is described, due to possible degradation of its natural habitats.

We used solid Murashige and Skoog medium for establishment of tissue culture with and without growth regulators: 6-benzylaminopurine (0-20 µM BAP), 2-isopentynil adenine (0-20 µM 2-iP), thidiazuron (0-10 µM TDZ), kinetin (0-20 µM K), zeatin (0-20 µM K), naphthalene acetic acid (0-1 µM NAA), indol-3-butyric acid (0-3 µM IBA). Development of axillary shoots was most successful with combination of growth regulators respectively: 10 µM BAP/1 µM IBA, follows 2 µM BAP/3 µM IBA, 10 µM BAP/3 µM IBA and 0.5 µM TDZ. The protocol can be applied also for research in the field of population genetics and ecology of species.

## Nahajališča in rastišča vrste *Pulsatilla vernalis* v Julijskih Alpah

### Localities and sites of *Pulsatilla vernalis* in the Julian Alps

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Applying the standard Central-European method we phytosociologically studied the sites of *Pulsatilla vernalis*, a rare and protected species of Slovenian flora, in the frost hollows on mountain pastures Ovčarija and Za Grivo in the Fužina pasturelands (the Triglav Mountains, the Julian Alps). We established that it grows in a unique community of swards and heaths which usually extends over small surfaces (4–10 m<sup>2</sup>) and is dominated by herbaceous perennial species (hemicryptophytes) and dwarf shrubs (chamaephytes) with mostly arctic-alpine and south-European montane distribution. This community is explicitly (floristically and ecologically) different from the communities of swards and heaths described in the Julian Alps so far, so we classified it into a new association *Pulsatillo vernalis-Dryadetum octopetalae* ass. nova (order *Rhododendro hirsuti-Ericetalia carneae*) and subdivided it into two, floristically and ecologically clearly distinguished subassociations *-ericetosum carneae* subass. nova and *-vaccinietosum* subass. nova.

## **Floristična združba travnikov – rastišča avtohtonih populacij črne detelje (*Trifolium pratense* L.) na področju Hrvaškega Zagorja (SZ Hrvaška)**

### **Floristic composition of meadows – locations of the autochthonous populations of red clover (*Trifolium pratense* L.) on the Hrvatsko Zagorje area (NW Croatia)**

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The meadow flora was investigated at 17 locations in the area of Hrvatsko Zagorje (NW Croatia) during two vegetational seasons (2007, 2008). Usual methods of collecting and identification were applied in research. The nomenclature of plants was carried out according to Tutin et al. (1964-1980, 1993). The review of collecting plant material includes: taxonomic analysis, duration of life cycle and life form analysis, as well as phytogeographic analysis. Investigated meadows are in the same time habitats of the autochthonous populations of red clover (*Trifolium pratense* L.) within the area of Hrvatsko Zagorje. Autochthonous populations of red clover represent the potential source of traits, such as tolerance to different abiotic stresses, which might be used for breeding purposes.

In total, 112 plant taxa from 32 families were recorded at investigated meadows in Hrvatsko Zagorje. The large number of species is the indicator of badly maintained meadow habitats. This leads to the natural succession, and thus to genetic erosion and extinction of natural populations of the red clover.

## Samonikle sadne vrste v Republici Hrvatski

### Wild growing fruit species in Republic of Croatia

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Thanks to its geographical position and preservation of natural habitats, Croatia distinguishes itself from many other small countries by great biodiversity of wild growing fruit species. After study of existing literature data and terrain exploration, a large number of species are found in following genus: *Rosa* (37 taxa), *Rubus* (33 taxa), *Prunus* (21 taxa), *Sorbus* (13 taxa), *Crataegus* (10 taxa), *Ribes* (9 taxa), *Fragaria* (6 taxa), *Malus* (5 taxa), *Cornus* (4 taxa), *Pyrus* (4 taxa), *Vaccinium* (4 taxa), *Corylus* (3 taxa), *Sambucus* (3 taxa), *Juglans* (2 taxa) and *Castanea* (1 taxa). Owing to long-lasting process of natural selection, wild fruit species have adapted to ecological conditions of habitats and developed natural resistance mechanisms to biotic and abiotic environmental factors. It has been assumed that populations of wild fruit species in Croatia are unique, and that nutritional value of their fruits are exceptionally better in comparison to commercially grown fruit varieties.

Fruits of free growing wild fruit species are gathered from the nature by local inhabitants, weekenders and excursionists. There are also a great number of examples when wild growing fruit species are utilise as rootstock in production of cultivated woody fruit species.

The main research purpose in framework of project “Biodiversity of wild growing fruits populations in Croatia” is to establish a representations of individual wild fruit species from genus *Rubus*, *Vaccinium*, *Fragaria* and *Prunus* over the Croatian territory, and, based on knowledge of their characteristics, to estimate potential and their utilisation in the future.

## Morphometric study of genus *Epipactis* in Slovenia

### Morfometrična analiza rodu *Epipactis* v Sloveniji

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Helleborines (*Epipactis*), a genus of orchids (*Orchidaceae* s.lat.), are taxonomically quite a demanding group due to their extreme variability. This variability arises out of reproduction modes which are autogamy, cleistogamy and apomixis. Various habitats, in which helleborines grow, are just another contribution to it. Interspecific hybrids do appear as well, however it is not known enough about them yet. Hence also the classification of the genus is not completely unambiguous.

According to Mala flora Slovenije (N. Jogan and A. Martinčič et al., 2007), there are eleven species with four subspecies growing in Slovenia. They are *E. atrorubens*, *E. greuteri*, *E. helleborine* ssp. *helleborine*, *E. helleborine* ssp. *leutei*, *E. helleborine* ssp. *orbicularis*, *E. latina*, *E. leptochila* ssp. *leptochila*, *E. leptochila* ssp. *neglecta*, *E. microphylla*, *E. muelleri*, *E. nordeniorum*, *E. palustris*, *E. pontica* and *E. purpurata*. In order to find useful distinguishing features among them, a morphometric analysis was made. Concerning literature and preliminary revision of herbarium material (LJU), 62 potentially useful characters were chosen. Morphometric observations were made in the field on 41 locations on 289 OTU. Additional research on 45 flowers, each of them was from one of the visited locality, was conducted in the laboratory.

As it has been expected, the most information is hidden in the shape of structures. Measurements only do not give satisfactory results. The shape of labellum and gynostemium and the presence of clinandrium and viscidum seem to be the most reliable features. However, still much work needs to be done not only in the field of morphometry; also distribution of taxa and their ecology are not well understood.

## Zgodaj cvetoče močvirnice v Sloveniji

### Early flowering Helleborines in Slovenia

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Podajamo pregled in razlikovalne znake za zgodaj cvetoče taksone iz oblikovnega kroga širokolistne močvirnice (*E. heleborine* (L.) Crantz s.l.) na območju Slovenije. Taksone, ki jih na tem mestu opredeljujemo kot vrste, se od tipične širokolistne močvirnice (*E. helleborine* ssp. *helleborine*) (š.m.) pomembno razlikujejo po morfološki zgradbi. Cvetijo meseca junija in julija, torej pred cvetenjem tipične š.m., neredko pa tudi vzporedno z njenim cvetenjem. Ti taksoni so: leutejeva m. (*E. leutei* K. Robatsch), kratkolistna m. (*E. helleborine* ssp. *orbicularis* (Richter) E. Klein), italijanska m. (*E. latina* (Rossi & E. Klein)), voethijeva m. (*E. voethii* (K. Robatsch)), pontska m. (*E. pontica* Taubenheim) Zaradi v nekaterih virih dvomljivega taksonomskega statusa omenjenih vrst, v prispevku podajamo nekaj pojavov in znakov, ki jih ne gre spregledati pri determinaciji: **1.** Na istem rastišču najdemo n.pr. tipično leutejevo močvirnico, nato prehodne oblike močvirnic, ki jih ne moremo opredeliti kot leutejeve m. in tudi ne kot š.m. s katero pa vendar ohranjajo podobnosti. **2.** Zgodnji čas cvetenja dva do tri tedne prej kot š.m. Uspevajo na bolj sončnih in po hranilih skromnejših rastiščih kot š.m. **3.** Čeprav je zgradba cveta podobna, opazimo da pri zgodaj cvetočih oblikah moč viscidija (če obstaja) hitreje popusti kot pri š.m.. **4.** Zgodaj cvetoče močvirnice imajo praviloma manjše cvetove od š.m., razen kratkolistne in italijanske močvirnice. Razlike med posameznimi močvirnicami lahko vidimo s primerjanjem medenih usten, z lupo pa tudi razlike v strukturi stebrička.

Novi nahajališči za leutejevo m. sta Senovo (9958/4) 350mnv in Gorjanci (0158/4) 450 mnv. Za pontsko m. pa Medno pri Ljubljani (9852/4) 350 mnv.

Prvič omenjeni nahajališči za voethijevo m. sta Goričko (9162/2) 300mnv in Središče Ob Dravi (9563/4) 200mnv.

## **Endemitne rastline kamnitih pašnikov otoka Paga**

### **Endemic plants on rocky pastures on the island of Pag**

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The island of Pag is situated between the group of north Dalmatic and a group of Kvarner islands, at the turn of submediterranean and eumediterranean climat zone. Vascular rocky pastures flora was researched on the island of Pag during in 2005. and 2006. A total of 331 plant taxa (296 species, 34 subspecies and 1 varietas) were found. The taxa belonged to 201 genera and 51 families. Floral analysis (Horvatić, 1963) shows that 23 endemic species of plants were found. Of this number constituted 15 taxa of the group Illyrian-Adriatic, then 7 taxa a group of Illyrian-Apenin and 1 taxa from the group of Kvarner-Liburnian endemic plants. The diversity of flora including the endemic plants on rocky pastures on the island of Pag really depends on the environment in which a large impact has a way of management of pasture lands in agriculture.



## **Nova nahajališča vrste *Limosella aquatica* L. za floro Republike Makedonije**

### **New locality of species *Limosella aquatica* L. in the flora of the Republic of Macedonia**

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During floristic investigations in the southwest parts of the Republic of Macedonia, on the Mt of Galitchica, a new locality of species *Limosella aquatica* L. has been found. Till now, it was only found in the Mt. of Bistra (Toni Voda). From phytogeographical point of view, this newly discovered locality of *Limosella aquatica* L. represents one of the southernmost localities on the Balkan Peninsula.

## ***Tamaricion dalmaticae* Jasprica et al., all. nova, na jugovzhodni obali Jadranskega morja**

### ***Tamaricion dalmaticae* Jasprica et al., all. nova, on the southeastern Adriatic coast**

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*Nerium oleander* L. (Apocynaceae), along with the diverse *Tamarix* species, occupies Mediterranean and Saharan-Arabian riverine and lacustrine dwarf woodlands, scrubs, and tall grass permanent communities temporarily inundated by fresh, brackish, or saline water in infra- to meso-Mediterranean, arid to dry bio-climates. It grows on the initial soils of river beds, creeks, springs, and temporary pools and belongs to the *Nerio-Tamaricetea africanae* class.

The *Nerio-Tamaricetea africanae* class is represented only by the *Tamaricetalia africanae* order. The *Tamaricetalia africanae* order is characterized by the absence of running water during a long period of the year. The order and class characterize the *Tamarix* species - mostly *T. africana* Poir. and *T. gallica* L.

Firstly, the following alliances were included in the order: *Tamaricion africanae* and *Imperato cylindricae-Erianthion ravennae* from Spain, *Nerion oleandri* from Palestine, and *Tamaricion speciosae* from South Morocco. Lately, the *Imperato cylindricae-Erianthion ravennae* alliance was excluded from the *Tamaricetalia africanae* order, which is very close to the *Phragmitetalia*, *Holoschoenetalia vulgaris*, and *Brachypodietalia phoenicoidis* orders. *Nerion oleandri* was never in fact described, but it was mentioned as a *nomen nudum* by Zohary and Orshan (1949). This alliance was revised and proposed as *Ruboulmifolii-Nerion oleandri*, as it differed from other alliances of the *Tamaricetalia africanae* order – *Tamaricion boveniano-canariensis* and *Tamaricion africanae* – which include non-halophytic associations.

In recent investigations of the *Nerio-Tamaricetea africanae* class in Croatia, the *Chrysopogono grylli-Nerietum oleandri* association was described within the *Ruboulmifolii-Nerion oleandri* alliance (Jasprica et al. 2007). This is the only association with oleander in Croatia, and one of two represented along the eastern Adriatic coast.

We have continued to investigate the vegetation of the *Nerio-Tamaricetea africanae* class in the period from 2006 to 2008 in the southeastern Adriatic (Croatia, Bosnia and Herzegovina, Montenegro, Albania). Special attention was paid to the floristic composition and syntaxonomic status of the associations with *Tamarix dalmatica*. According to our data, a new alliance - *Tamaricion dalmaticae* Jasprica et al. - is proposed. The associations and the alliance were also compared to analogous ones in the wider Mediterranean region.

## **Panonski elementi v flori jugozahodne Madžarske: vpliv klimatskih in edafskih dejavnikov**

### **Pannonian influences in the flora of South-West Hungary: the role of climatic and edaphic factors**

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During the former investigations of SW Hungary from phytogeographic point of view species indicating sub-Atlantic or sub-Mediterranean connections played outstanding role, while these give special features to the flora of this region and also have significant role composing the local associations.

There are few researches studying the border of flora elements of "Pannonian" type. "Pannonian" means at present species with oriental focal point of their area whose occurrences are typical in the inner part of the Carpathian Basin.

Especially few works analyse the spatial and temporal changes of the distribution patterns. To investigate this question our examinations based on the evaluating of distribution maps on regional scale. The studied area was the hill country of 150-350 m s. m. situated in SW Hungary.

Conclusions:

In the region authentic „Pannonian” species (endemisms and plants of classic steppe habitats) are absent, or are confined in 1-2 special localities. Therefore for the examination of the transitions are species more applicable which are frequent in Hungary, but become rarer and rarer towards south-western direction.

It's obvious, that eastwards from the Alps and north-eastwards from the Illyricum the frequency of the occurrences of these species increase. Although in these directions due to the similar relief the climatic factors become more and more favourable for them, the frequency of the occurrences do not increase constantly but by leaps according the changes of the edaphic factors.

For these species the most important edaphic factor is even the local existence of calcareous substrates, primarily loess. Their actual small-scale spread patterns are not independent from the locally typical land use. First of all the pasture and grazing management generate these satellite occurrences.

Insular occurrences of these species usually cannot be termed relicts in a qualified sense, because anthropogenous landscape changes played an important role in their development. Regional area changes during the decades can reach a 10 km scale.

## Parazitske vrste čašic iz rodu *Monilinia* Honey v Sloveniji

### Parasitic cup fungi of the genus *Monilinia* Honey in Slovenia

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Čašice iz rodu *Monilinia* (*Ascomycota*, *Leotiomyces*, *Helotiales*, *Sclerotinaceae*) so parazitske glive, ki žive na številnih lesnatih rastlinah iz družin *Rosaceae* in *Ericaceae*. Rod vsebuje trideset vrst, med katerimi je več gospodarsko zelo pomembnih, zlasti *M. laxa*, *M. fructigena* in *M. fructicola*, ki povzročajo sadno gnilobo na številnih vrstah sadnega drevja.

Na osnovi filogenetskih raziskav, morfoloških karakteristik in značilnosti razvojnega cikla razvrščamo glive iz rodu *Monilinia* v dve neformalni skupini: *Junctoriae* in *Disjunctoriae*. V prispevku podrobneje obravnavamo vrste iz skupine *Disjunctoriae*. Žive na vresovkah in povzročajo venenje poganjkov in propadanje plodov, iz katerih nastanejo značilno oblikovani pseudosklerociji t. i. mumije. Zgodaj spomladi iz pseudosklerocijev poženejo čašasto oblikovani apoteciji na tankih pecljih. Vrste iz skupine *Disjunctoriae* so ozko specializirane in imajo le enega gostitelja. Izjema je vrsta *M. vaccinii-corymbosi*, ki okuži številne severnoameriške vrste borovnic in njihove križance.

S standardnimi mikroskopsko morfološkimi in molekularnimi tehnikami smo identificirali tri vrste iz skupine *Disjunctoriae*: *M. urnula*, *M. baccarum* in *M. vaccinii-corymbosi*. Predstavljamo razširjenost teh vrst v Sloveniji, njihovo ekologijo, morfološke karakteristike in značilnosti razvojnega cikla.

## **Aerobiologija in fenologija pelinolistne žvrklje (*Ambrosia artemisiifolia* L.) v Ljubljani**

### **Aerobiology and fenology of ragweed (*Ambrosia artemisiifolia* L.) v Ljubljani**

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Meritve koncentracije cvetnega prahu pelinolistne žvrklje potekajo v Ljubljani od leta 1996. Sezonski indeks cvetnega prahu (letna vsota dnevne koncentracije), ki je indikator prisotnosti rastline na tem področju, z leta v leto močno niha in je odvisen od vremena v avgustu in septembru. Sezona pojavljanja cvetnega prahu povprečno traja od 7. avgusta do 28. septembra. Zelo majhne količine cvetnega prahu se pojavljajo že pred začetkom sezone, v juliju in začetku avgusta. Da bi bolje razumeli dinamiko pojavljanja cvetnega prahu na področju Ljubljane smo v letu 2007 poleg aerobioloških meritev izvedli tudi fenološka opazovanja rastline. Potekala so tedensko od začetka aprila do oktobra. Pojavljanje prvih zrn cvetnega prahu v zraku, najvišjih vrednosti koncentracije v zraku in zaključek sezone pojavljanja so sovpadali s fenološkimi začetka cvetenja in splošnega cvetenja. Dvourni sledenje koncentracije cvetnega prahu kaže na to, da je poleg cvetnega prahu z lokalnih rastišč prinesen tudi z večjih razdalj.

## Kazalniki ugodnega ohranitvenega stanja gozdnih habitatnih tipov v Sloveniji

### Indicators of favourable conservation status of forest habitat types in Slovenia

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Na podlagi rezultatov obstoječih sistemov spremljanja gozdov (gozdna inventura, monitoring na ravneh I in II v okviru programa ICP Forests) smo analizirali stanje EU gozdnih habitatnih tipov (Habitatna direktiva, Natura 2000) v Sloveniji. Ugodno ohranitveno stanje habitatnih tipov smo presojali na osnovi izbranih gozdno-specifičnih indikatorjev (MCPFE). EU gozdni habitatni tipi predstavljajo približno tretjino celotne gozdne površine v Sloveniji. Med njimi prevladujejo 91K0 Ilirski bukovi gozdovi, 9110 Srednjeevropski kisloljubni bukovi gozdovi in 91L0 Ilirski hrastovo-belogabrovi gozdovi. V okviru gozdne inventure smo ugotovili, da se povprečna lesna zaloga po habitatnih tipih nahaja med 108 m<sup>3</sup>/ha in 339 m<sup>3</sup>/ha, delež odmrle lesne mase pa predstavlja od 0,4% do 9,0% lesne zaloge. Povprečni volumen odmrle lesne mase na habitatni tip je 12,2 m<sup>3</sup>/ha. Na ploskvah sistematične mreže (16×16 km) in ploskvah za Intenzivno spremljanje gozdov smo popisali 102 lesnati rastlini in med njimi je bilo 46 drevesnih vrst.

Glede na neposredne vplive človeka in pričakovane učinke podnebnih sprememb so poplavni in drugi nižinski gozdovi (npr. 91E0\* Obrečna vrbovja, jelševja in jesenovja, 91F0 Poplavni gozdovi doba in drugih vrst ob večjih rekah, 91L0 Ilirski hrastovo-belogabrovi gozdovi) med bolj ogroženimi habitatnimi tipi v Sloveniji. Poleg teh so že zaradi majhne površine potencialno ogroženi tudi 9180\* Javorjevi gozdovi v grapah in na pobočnih gruščih, 91D0\* Barjanski gozdovi in 9530\* (Sub)mediteranski gozdovi črnega bora. Kljub številnim dejavnikom, ki ogrožajo slovenske gozdove, pa obravnavani parametri večinoma nakazujejo njihovo ugodno ohranitveno stanje. Vendar pa mora biti gozdnogospodarsko načrtovanje organizirano na prilagojen način, da aktivno odgovarja na vse negativne dejavnike, ki ogrožajo stabilnost in obstoj gozdnih habitatnih tipov. Za izboljšanje obstoječega gozdnogospodarskega sistema načrtovanja predlagamo posebno pozornost prioritetnim in manjšinskim gozdnim habitatnim tipom.

## Singeneza in sintaksonomija gozdov in grmovnih združb kontinentalnih Dinarskih Alp (zahodni Balkanski polotok)

### The Syngenesi and Syntaxonomy of Forests and Shrubs at the Continental Dinaric Alps (W. Balkan Peninsula)

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Continental Dinaric Alps from phytocoenological standpoint, belong to type of differentiation with dark and semi dark coniferous forest (*Piceion abietis* s.lat., *Piceion omoricae* s.lat. and *Pinion sylvestris* s.lat. Mountains Vlasica, Ozren, Romanija, Javorak, Golija, Kopaonik, northern slopes of mountain Vranica and Veliki Stolac belong to this group (43° 30' and 44° 30' N and 17° 30' and 19° E). On vertical profile of the central part of continental Dinaric Alps, climax and oro-climax vegetation makes forests from alliances: *Quercion pubescentis-petraeae*, *Quercion petraeae-cerris*, *Carpinion betuli*, *Fagion moesiaca*, *Fagion „illyricum“* s.lat., *Piceion abietis* and *Abieti-Piceion*. Shrubs and „šibljak“ from alliances: *Seslerio-Ostryon*, *Orneto-Ostryon*, *Ostryo-Carpinion*, *Crataego-Corylion*, *Prunion spinosae*, *Berberidion*; *Juniperion communis* and *Juniperion nanae* are developed in the zone of these forests. Azonal forest vegetation is represented by alliances: *Alnion incanae*, *Salicion albae*, *Quercion robori-petraeae*, *Luzulo-Fagion*, *Orno-Ericion*, *Salicion cinerea*, *Alnion glutinosae* and *Salicion eleagni*.

Investigations of syngenesi of vegetation have shown close relationships among certain communities of shrubs and „šibljak“ with climatogenous vegetation. For example, *Berberidion* is linked with alliances *Orneto-Ostryon* and *Quercion petraeae-cerris*, while communities *Crataego-Corylion* are developed within all zones of climax vegetation. Similar syngenetical relationships exist also with communities of alliance *Juniperion communis*. These investigations have shown complete climatogenity of dark coniferous forests *Piceion abietis* and *Abieti-Piceion* in relation to forests of suballiance *Abieti-Fagenion*.

Coniferous forests represent terminal that is climax stage in development of vegetation in this region, where very intensive processes of secondary successions have took place.

## **Funkcionalni pristop pri raziskovanju sukcesije na opuščenih kmetijskih terasah v submediteranskem okolju**

### **Functional approach in succession study on abandoned agricultural terraces in sub-Mediterranean environment**

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The chronosequence method was applied for studying successional sere of still managed and abandoned terraced vineyards in NW Istria (Slovenia). 54 relevés were collected using standard procedure of the Braun-Blanquet approach. DCA ordination of the relevés showed clear gradient of successional series. With TWINSpan classification six groups of relevés were defined: still active vineyards (1), ruderal stage (stg.) after abandonment (2), late ruderal/early grassland stg. (3), grassland (4), grassland/scrub/forest stg. (5) and scrub/late forest stg. (6). PCA ordination of 190 species according to 18 plant traits delineated two main groups: annuals, with high SLA, overwintering leaves, seed-propagated species (1) and perennials with high LDMC and vegetative propagation (2). In order to identify the predominant plant traits for studied vegetation the matrix of 43 traits x 54 relevés was analyzed with PCA. The PCA ordination of relevés along the first and second axis delineated three main groups. The first and second groups showed active vineyards and early succession stages, the third DCA group was composed by post-ruderal grasslands and scrub/woodland formation. Earlier stages have significantly lower percentages of perennial, phanerophytes, tussock growth-species and proportion of scleromorphic leaves. The C-S-R components, calculated cumulatively for the relevés of each of the 6 groups showed shifts of declining R component from active vineyards to grasslands and increasing C component from active vineyards, through ruderal stage to grassland (and declining again in reforested stage). The S component did not show any clear trend. It was concluded that relatively quick species turnover during the secondary succession in mild sub-Mediterranean climate and fertile soils of flysch bedrock showed roughly the same patterns by using floristic and functional approach. The post-ruderal (grassland/scrub) phase appeared to be much more homogenous when analyzed by functional approach in comparison with floristic approach.



## ***Orobanche lycoctoni* Rhiner, prezrta vrsta pojalknikov v srednjeevropski flori**

### ***Orobanche lycoctoni* Rhiner, a neglected broomrape species of the Central European flora**

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*Orobanche lycoctoni* Rhiner is a poorly known species described from eastern Switzerland, which is not closely related to *O. flava* Mart. ex F.W. Schultz, as previously thought, but instead constitutes a separate lineage with unclear relationships to other broomrapes. Here, we report on its occurrence in the Julian Alps (Slovenia), thus significantly extending its known distribution area (Cantabrian mountains and Glarner Alps). We provide a detailed a phytocoenological characterization of this species inferred from these newly found localities. This species differs from *O. flava* mainly by its yellow-whitish colour, corolla curvature, glabrous corolla lobes, rather disc-like (instead of bilobed) stigma, and the host plant *Aconitum lycoctonum* L.

## **Ex situ ohranjanje vrste *Degenia velebitica* (Dègen) Hayek z licenciranim gojenjem in prodajo sadik**

### ***Ex situ* conservation of *Degenia velebitica* (Dègen) Hayek through licensed cultivation and sale**

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*Degenia velebitica*, generally recognized as a symbol of Croatian mountains as well as rich Croatian endemic flora, grows wild in several spots along the Kapela and Velebit mountains. It enjoys statutory protection since 1964, and wild populations are directly protected within the Velebit National park and Park of nature borders. Nevertheless, *Degenia* is an endangered plant species, suffering from unlawful collecting of specimens or seeds, but mostly as a result of degradation of its natural habitat; rockeries, scree and crevices are being colonized and covered by 'aggressive' plants, such as *Sesleria juncifolia*, which 'smother' delicate *Degenia* populations and stop their development.

Permanent populations of *Degenia* are being cultivated in the Botanical garden of the Faculty of Science (Zagreb University) for the last half of century, and two test flower beds were arranged 10 years ago following the 'tip' from colleges at the Botanical garden of the Ljubljana University, using ordinary garden soil and plenty of calcareous gravel. Fully developed populations blossomed plentifully, providing with a large number of viable seeds that was being used in further experiments and cultivation. Data collected over the years was used to successfully cultivate single pot specimens. Special Licence had to be obtained from the national Nature protection agency before the start of the cultivation programme, and only 10% of the permitted number of specimens was grown, in order to investigate the purchase interest. Most of the specimens were sold to selected Elementary schools from all Croatian provinces at the *Degenia* Exhibition opening ceremony, and the rest was available to the public. Funds obtained from the sales will be invested in the further developing of this *Ex situ* programme, with some other endemic plants such as *Centaurea ragusina* and *Campanula tommasiniana* to follow.

## Novosti v filogeniji in sistematiki rodu *Edraianthus* (*Campanulaceae*)

### Some novelties in the phylogeny and systematics of the genus *Edraianthus* (*Campanulaceae*)

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The genus *Edraianthus* A.DC. (*Campanulaceae*) includes approximately 13 herbaceous species traditionally divided into three sections: *Spathulati*, *Uniflori* & *Capitati*. The majority of the taxa are considered to be stenoendemics. Being one of the taxonomically and biogeographically most interesting and polymorphic genera of the Balkan flora, there were already four monographs of the genus provided. Recently the genus was the subject of extensive molecular phylogenetic and phylogeographic studies which brought some new insights into phylogenetic relationships and systematics both among the genera closely related to *Edraianthus* and within the genus *Edraianthus* itself. According to the results of the molecular phylogeny of the genus *Edraianthus* based on non-coding plastid DNA sequences, the section *Spathulati* is not monophyletic. Two separate lineages, one from the Durmitor Mts and the other from the Prokletije Mts, sister to *E. graminifolius* group, were identified. Due to its spathulate or spathulate-lanceolate leaves and solitary flowers, those populations are morphologically most similar to *E. serpyllifolius*, a taxon restricted to the subalpine and alpine belt of the Central and SE Dinaric Alps from Croatia to Montenegro. Additionally, results of the AFLP fingerprinting data confirmed their unique systematic position. In light of those findings, two new species from the Durmitor and Prokletije Mts, and a change of taxonomic status of *E. serpyllifolius* f. *pilosulus* from the Komovi Mts are proposed.

## **Avgust Rudolf Grisebach Henrih in njegov doprinos k poznavanju flore Pelistera, Makedonija.**

## **Avgust Rudolf Grisebach Henrih and his contribution to the flora of Pelister, Macedonia**

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AUGUST RUDOLF GRISEBACH HENRIH (1814, Hannover - 1879, Göttingen, Germany). He has studied botany and medicine in Berlin and Göttingen, Germany and became doctor of Science in 1836. He was a German Botanist, Professor of Botany and Plant Geography at University in Göttingen, Germany and manager of Botanical Garden. He is the founder of Plant Geography – Phytogeography. He was searching the flora at different part of the Europe, Asia Minor, Caribi, South America etc.

On his journey and researching of Balkan Peninsula's flora in 1839, he visited Rumelia, which belonged in Ottoman Imperia at that time, in a period between June 29th and July 8th he visited Bitola and Pelister where he was much respected although he was 25 years old only. He was admitted by Bitola Pasha and other high officials in that time. At the beginning he has thought that it was *Pinus cembra*. After the revision in 1843, he definitely determined systematically status and published as a new species in the science under the name *Pinus peuce* Grisebach (1843). English and Italian names are Macedonian Pine. Later in 1871 Cvijic gave it a name Molika, which is now most commonly used name.

Besides this pine, he has described several new species with typical location (locus classicus) at Pelister: *Sempervivum marmoreum*, *Sedum erythaeum*, *Dianthus myrtinervius*. *Ranunculus psilostachys* etc.

The authors of this work, this year have visited Grisebach Herbarium in Göttingen and had an opportunity to see allotype material of *Pinus peuce* collected from locus classicus at Pelister.

In 1969, under the organisation of Science and art Society in Bitola, National Park, Pelister and Forest Faculty in Skopje, organised The First International Symposium for the Molika at Pelister.

On this Symposium, the first author of this work had honour to be in company with Prof. Dr. Tone Wraber and Academic Ernest Mayer from Slovenia.

## **Analiza redov *Berberideen*, *Nymphaeaceen*, *Papaveraceen* in *Fumariaceen* herbarija C. Studniczkega**

### **Analysis of Ord. *Berberideen*, *Nymphaeaceen*, *Papaveraceen* and *Fumariaceen* from C. Studniczka's herbarium**

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We have analysed Ord. *Berberideen*, *Nymphaeaceen*, *Papaveraceen* and *Fumariaceen*, within which we have found 79 herbarium sheets. Most plants have been collected in Europe (71 herbarium sheets). Most herbarium sheets have been collected on the area of Montenegro (15) and Austria (11), which is followed by Croatia, Poland, Germany and the United States with 7 sheets. According to the affiliation to particular herbarium collections, the most representative ones are plants belonging to Flora Dalmatiens collection. However, 20 sheets have remained unmarked, since we don't know which collection they belong to. In reference to Ord. *Ranunculaceen* and *Cruciferen*, there are some new collections, such as: Flora Hungariae centralis, Flora N. Oesterreichs, Flora Principatus Serbiae, Herbarium R. Kühnau, Herbarium P. Gillet de Lyon and Plantes de France. Most herbarium sheets were collected by Studniczka himself (29). In reference to Ord. *Ranunculaceen* and *Cruciferen* some botanists or collectors are mentioned for the first time and these are: Brendel, Dichtl, Gillet, Henser, Hippe, Krout, Kühnau, Moyer, Pacher, Petrović, Schumän, Towle and Willkomm. The oldest herbarium sheet dates from the year 1865 and the newest one is from 1904. The great majority of herbarium sheets, 53 to be exact, have been collected in the period from 1871 till 1880. The year of collection is missing from 9 labels. According to Studniczka, within 79 sheets there are 16 genera with 49 species, in terms of which 14 taxa have been registered. However, according to work *Flora Europea*, there are 17 genera with 41 species, in terms of which 5 taxa have been registered.

## Ekskurzija na Polhograjsko Goro (824 m)

### Excursion to the Polhov Gradec Mountain (824 m a.s.l.)

Organizira / Organised by **Prof. Dr. Tone Wraber**

Izhodišče je Polhov Gradec (390 m), prijazna vas zahodno od Ljubljane. Leži v osrčju predalpskega karbonatnega in silikatnega Polhograjskega hribovja z (zdaj!) najvišjim vrhom Toščem (1021 m), slikovito in z rastlinami bogato Grmado (898 m) ter arheološko in tudi botanično slovito Polhograjsko Goro (824 m). Pod vasjo se združita Velika Božna in Mala voda v Gradaščico, ki teče po poplavam izpostavljeni dolini in se v Ljubljani izliva v Ljubljano. V vasi sta ogleda vredni cerkev Marijinega rojstva z bogatim zlatim oltarjem in graščina, ki je bila zgrajena v 16. stoletju, vendar je bil grad, od katerega ni več sledov, že mnogo prej tudi na vzpetini Kalvarija neposredno nad vasjo. Kraj sam je bil prvič omenjen leta 1261. Še v srednjem veku so v kraju gospodovali Polhograjski gospodi, ki so izumrli okrog leta 1470. Pozneje je imel grad več lastnikov, dokler ga ni 1658 kupil Mark Anton Kunstl iz slovenske kmečke rodbine iz Pungrta pri Škofji Loki. Leta 1684 je od cesarja dobil dedni baronski naslov pl. Polhograjskih, družina pa je pridobila pravico uporabe grba izumrlih Polhograjskih gospodov. Obnovil je današnjo graščino in postavil Neptunov vodnjak in Angleški stolp. Njegova hči je bila podpornica ljubljanskih uršulink. Marku Antonu I. sta sledila še Mark Anton II. in III. Hči Marka Antona III. Antonija (1791–1869) se je 1808 poročila z grofom Rihardom Ursinijem Blagajem (1786–1858) z Boštanja pri Grosupljem, ki se je prebivalcem zaradi podpore vaškemu poljedelstvu in obrti očitno zelo priljubil, saj so ga po odpravi tlačanstva izvolili za prvega župana. Bil je kranjski rodoljub, ki je kot župan uradoval slovensko in v kraju poskrbel za osnovno šolo. 20. junija 2008 je Občina Dobrova-Polhov Gradec poleg graščine odkrila njegov doprni kip. 1875 je graščino kupila Luiza Urbančič roj. Altmann (1841–1937), zadnja lastnica pa je bila njena nečakinja Ana Delago roj. Urbančič (1871–1958), ki so jo 18. decembra 1945 izgnali v Avstrijo. Zdaj so v njem poročna dvorana, krajevna muzejska zbirka in od 11. 6. 2008 tudi Muzej pošte in telekomunikacij.

Nedaleč od gradu je takoj nad Čebelarskim domom obelisk, ki je bil odkrit 7. 9. 1838, dal pa ga je postaviti grof Rihard Ursini Blagaj. Obelisk, zadnjič obnovljen v letih 1988 in 2008, z latinskim napisom spominja na obisk saškega kralja Friderika Avgusta II., ki je 14. maja 1838 prišel v Polhov Gradec, da bi si ogledal leto pred tem odkriti in v letu obiska opisani Blagajev volčin (*Daphne blagayana*). Grof Blagaj je namreč zbiral slovenska ljudska rastlinska imena in jih sporočal tedanjemu kustosu Kranjskega deželnega muzeja v Ljubljani Henriku Freyerju (1802–1866). V maju 1837 mu je domačin s Polhograjske Gore prinesel rastlino in jo imenoval »rumene jožefice«. Ker je Blagaj ni poznal, jo je poslal Freyerju, ta pa jo je spoznal za botanični vedi še neznan in jo krstil z znanstvenim imenom *Daphne blagayana*. Ta volčin je bil sicer prvič najden že 1780 na Sedmograškem v današnji Romuniji, vendar napačno določen kot alpski volčin (*Daphne alpina*). Zmoto so sicer 1866 spoznali in rastlino imenovali *Daphne lerchenfeldiana*, a ima ime *D. blagayana* iz leta 1838 seveda prvenstvo. Klasično nahajališče tega volčina je torej Polhograjska Gora. Današnja vednost o razširjenosti te lepe rastline pravi, da je razširjena v Romuniji, predvsem pa na Balkanskem polotoku (Bolgarija, Grčija, Albanija, Črna Gora, Kosovo, Srbija, Bosna in Hercegovina,

Hrvaška), odmaknjeno od glavnega areala, skupaj z nahajališči na hrvaški strani Gorjancev, pa še v Sloveniji in – najbolj severovzhodno, odkrita šele 1989 - v Furlaniji-Juljski Benečiji. Z Blagayevim volčinom in planiko se leta 1898 začenja tudi z uredbo predpisano individualno varstvo rastlin v Sloveniji, vendar ne smemo pozabiti, da je potrebo po njegovem varstvu prvi izrekel že 1838 saški kralj Friderik Avgust II.

Polhograjska Gora je znana kot pomembno arheološko nahajališče. V starejši (hallstattski) železni dobi je bila prvič naseljena, gradišče, morda le začasno zatočišče v nevarnosti, je bilo na višini sedla, na katerem stoji Logarjeva kmetija. Domnevajo, da je prenehalo nekako pred 2400 leti. Do ponovne, po izkopaninah sodeč pomembnejše naselitve je prišlo v poznoantičnem obdobju, pred okrog 1600 leti, ko so ljudje zaradi negotovih razmer (pritiskov tujih ljudstev v propadajoči rimski državi) ponovno iskali varnejše teže dostopne višinske kraje. Naselbina na Gori je tedaj dobila obrambno obzidje. O tistih časih pričajo najdbe stavbnih temeljev, kovinskega posodja, novcev iz poznorimskega obdobja in celo zakladna najdba, verjetno iz 6. stoletja, že iz časa prihoda prednikov današnjih Slovencev. V 16. stoletju ali tudi že prej je bila prav na vrhu Gore zgrajena cerkvica, posvečena patronu sv. Lovrencu. V času turške nevarnosti so jo utrdili in je bila neke vrste tabor, stalno pa se je v njeni bližini, na sedlu, naselil tudi človek in tam ustvaril kmetijo. Ta je bila leta 1969 opuščena, še vedno pa se njeni lastniki vračajo in za konec tedna postrežejo kar številnim izletnikom. Zgradili so si tudi cestni dostop za terenska vozila. Z nekaj domišljije lahko pomislimo, da se človek zaradi vsakodnevnih težav in naporov spet vse bolj umika na ta odmaknjeni kraj, ki mu nudi duševno in telesno sprostitev. Z vrha je ponuja širen razgled na Juljske Alpe s Triglavom (2864 m), Karavanke, Kamniške Alpe, Polhograjske in Škofjeloško hribovje, Zasavje s Kumom, Ljubljansko barje, visoke notranjske planote vse do Snežnika (1796m) in Trnovskega gozda.

Spodbujen z obiskom saškega kralja je Freyer, najbrž prav zanj, 1838/1839 naredil tudi spisek rastlin, ohranjen v Arhivu Slovenije, ki rastejo na Polhogrjski Gori, zgrajeni iz kasijanskega dolomita. Ta obsega 356 vrst praprotnic in semen in do danes še ni bil pregledan ali dopolnjen. Na Gori srečujemo različne, predvsem gozdne in traviščne združbe. Od gozdnih velja omeniti rdeče borovje s trirobo košeničico (*Genisto januensis-Pinetum sylvestris*) na najbolj strmih, večkrat erodiranih dolomitnih pobočjih, v kateri se takoj nad spomenikom poleg rdečega kot sajena vrsta pojavlja tudi črni bor. Na položnejšem svetu uspeva submontansko bukovje s tevjem (*Hacquetio-Fagetum*), na bolj strmih in osojnih ter v nekaj višji legi bukovje s črnim gabrom (*Ostryo-Fagetum*). Na osončenih krajih je termofilna združba malega jesena in črnega gabra (*Fraxino orni-Ostryetum*), v vlažnih žlebovih osojnih leg pa združba gorskega javora in gorskega bresta (*Aceri-Ulmetum*). Glavne drevesne vrste na Gori so bukev, črni gaber, mali jesen, mokovec, gorski javor, gorski brest in rdeči bor. Seveda ne manjka smreka, a ta je, tako kot črni bor, gotovo drugotna. Črni bor so sadili, zlasti v sosednjem Mačkovem grabnu, po veliki povodnji leta 1926.

Travišča zavzemajo manjšo površino. Na sedlu okrog nekdanje mežnarije pri Logarju so manjše površine gojenih travnikov (*Arrhenathetum*), medtem ko se strme košenice združbe nizkega šaša in Hladnikovega grintavca (*Carici humilis-Scabiosetum hladnikiana*) zaradi prenehanja košnje vso bolj zaraščajo, s tem pa izginja tudi njihova vrstno relativno bogata flora. Tako je vse manj dišečega volčina (*Daphne cneorum*), iz rodu, ki je na Polhogrjski Gori zastopan še s 3 vrstami (*Daphne alpina*, *D. blagayana* in *D. mezereum*)

Poleg Blagayevega volčina je Polhograjska Gora, obenem z Zagorjem, tudi klasično nahajališče kranjskega prstnika (*Potentilla micrantha* subsp. *carniolica*). Od vrst, ki imajo klasično nahajališče v Sloveniji, rastejo na Polhograjski gori še beli šaš (*Carex alba*), rdeča relika (*Chamaecytisus purpureus*), divji klinček (*Dianthus sylvester*), bradavičasta trdoleska (*Euonymus verrucosus*), kranjski mleček (*Euphorbia carniolica*), kranjska selivka (*Grafia golaka*), tevje (*Hacquetia epipactis*), gozdni planinšček (*Homogyne sylvestris*), Fleischmannovo grabljišče (*Knautia fleischmannii*), kranjska lilija (*Lilium carniolicum*), trizoba kukavica (*Orchis tridentata*), pritlikavi prstnik (*Potentilla pusilla*), Hladnikov grintavec (*Scabiosa cinerea* subsp. *hladnikiana*), kranjski volčič (*Scopolia carniolica*), bleščeči Barrelierov jetičnik (*Veronica barrelieri* subsp. *nitens*), širokolistna grašica (*Vicia oroboides*) in verjetno še katera.

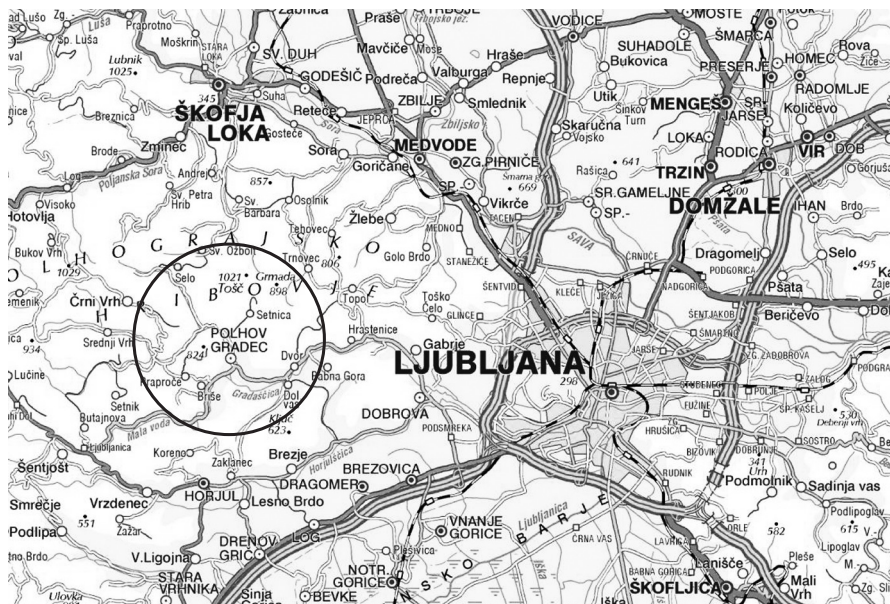
V Sloveniji endemične so naslednje vrste flore Polhograjske Gore: kranjski prstnik, Hladnikov grintavec in Fleischmannovo grabljišče.

Flora Polhograjske Gore je pretežno srednjeevropska, z močno zastopanostjo jugo- in jugovzhodnoevropskih vrst. Zaradi bližine Alp ne preseneča pojavljanje vrst, ki so razširjene v Alpah tudi v višji nadmorski višini, vse do zgornjega montanskega in subalpinskega pasu, kakršne so srčastolistna mračica (*Globularia cordifolia*), dlakavi sleč (*Rhododendron hirsutum*) in modrika (*Sesleria albicans*). Lahko jih imamo za dealpinske vrste, verjetno iz obdobja zadnje ledene dobe.





Polhov Gradec s Polhograjsko Goro v ozadju. (foto: Tine Grebenc)



Položaj Polhovega Gradca in področja ekskurzije. (vir: [www.geopedia.si](http://www.geopedia.si))

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