

Contribution to the bryophyte flora of the Djerdap National Park (E Serbia)

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Abstract. The article is a contribution to knowledge of the bryophyte flora of the Djerdap National Park in the Eastern Serbia. Eighty-two bryophyte species were recorded, 71 mosses and 11 liverworts.

Key words: bryophytes, Djerdap National Park, Eastern Serbia, flora, SE Europe

Introduction

Although there have been some recent attempts to improve knowledge on the bryophyte flora of Serbia, many regions are still very poorly known and many new species can be recorded (e.g. Sabovljević 1999, 2003a, b; Blockeel & al. 2000, 2003; Sabovljević & Stevanović 2000; Papp & Sabovljević 2001; Sabovljević & Cvetić 2001, 2003; Veljić & al. 2001; Sabovljević & Sérgio 2002; Pócs & al. 2004). Even the regions under legal protection, like the National Parks, are out of knowledge on bryophytes growing within them. Lately, some data on bryophytes from four National Parks of Serbia have been presented (NP Šar Planina: Sabovljević 1998; NP Tara: Papp & Sabovljević 2002; NP Kopaonik: Papp & al. 2004; NP Fruška Gora: Cvetić & Sabovljević, 2005). Presently, there is one more National Park in Serbia with no data on bryophytes: the Djerdap National Park.

Fig. 1. The position of the Djerdap National Park. The two grey-coloured strips indicate the two degrees of protection. The darker grey stands for a higher protection level, while the lighter grey shows a lower protection level. The arrow indicates the position of the Djerdap NP within Serbia and SE Europe. A – Austria, AL – Albania, BG – Bulgaria, BH – Bosnia & Herzegovina, CG – Montenegro, GR – Greece, H – Hungary, HR – Croatia, I – Italy, MD – Moldova, MK – Macedonia (FYR), RO – Romania, SLO – Slovenia, SR – Serbia and TR – Turkey.

The Djerdap National Park (Iron Gate Gorge of the Danube) is situated in the Eastern Serbia, on the right side of the Danube canyon (Fig. 1). The park is an internationally protected region which continues into the Romanian Iron Gate Nature Reserve (Parcul Natural Portile de Fier), along the left bank of the Danube. The area of the park in Serbia covers 63.608 ha, with a surrounding protective area of 93.968 ha. The Djerdap National Park follows some 100 km of the Danube, from Golubac town to Karatas by Kladovo, covering a narrow strip of forested hills, about 2–8 km wide, in the altitude range from 50 to 800 meters.



The Djerdap gorge was declared a National Park in 1974. The park is mostly covered by the forest (ca. 64%). It comprises terrestrial and river parts and consists of three canyon-gorge valleys (Golubačka, Gospodjin Vir and Mali i Veliki Kazan) and tree basins (Ljupkovska, Donjomilanovačka and Oršavska). Canyons cut into the limestone rocks of the South Carpathians.

The park ecosystems have refugial characteristics, with high percentage of relict species and communities and this is one of the most valuable peculiarities of this region (Stevanović & Vasić 1995).

The specific climatic conditions, relief and soils, and hydrology referred especially to the Danube canyon have endowed this region with some of the most complex and richest relict vegetation in SE Europe. The taxonomic richness of the vascular flora amounts to over 1100 species within the park limits, with unusually rich relict tree flora (Stevanović & Vasić 1995). Of the ca. 50 forest communities within the park, about 35 have relict characteristics, some of which are relict and endemic polydominant forest types (eg. *Fagocolurnetum mixtum*; *Quercocolurnetum mixtum*; *Fraxinocolurnetum mixtum*; *Syringocolurnetum mixtum*; *Celto-Juglandetum*) (Stevanović & Vasić 1995). Endemics are mostly present among the non-tree species and one of the famous endemics of the Djerdap gorge is *Tulipa hungarica*.

The main natural feature and attraction of the Djerdap National Park is the Djerdap gorge – the famous Iron Gate – a magnificent gateway through the southern slopes of the Carpathian Mountains, where the longest and greatest river accumulation in Serbia is located.

Up to date no bryophyte survey has been made in the region of the Djerdap National Park, although a few bryophyte records can be found (Pavletić 1955).

Materials and methods

In July of 2001, the author compiled a huge collection of bryophytes. The bryophyte specimens are deposited in BEOU herbarium. The transect method was used to cover as many different ecosystems as possible in the central region of the Djerdap National Park (Fig. 1). The nomenclature mainly follows for mosses Corley & al. (1981), Corley and Crundwell (1991), Cortini-Pedrotti (2001a, b) and for hepatics Grolle

and Long (2001). *Bryum lanatum* is treated as a good species according to Frahm (2002).

The following sites have been visited:

1. Tekija
2. Misija by Tekija
3. Golubinje surrounding at Miroč
4. Stari Kivilovski potok
5. Suvi ponor

Results

A list of the bryophyte species of the Djerdap National Park collected in July 2001:

Mosses:

1. *Amblystegium serpens* (Hedw.) Schimp. – 1, 3 – on the shaded concrete wall
2. *Anomodon attenuatus* (Hedw.) Huebener. – 1 – on base rocks
3. *Anomodon vitticulosus* (Hedw.) Hook & Taylor – 5 – on base rocks
4. *Atrichum angustatum* (Brid.) Bruch & Schimp. – 3 – on soil
5. *Atrichum undulatum* (Hedw.) P. Beauv. – 1 – on soil
6. *Brachythecium glareosum* (Bruch ex Spruce) Schimp. – 3 – on the steep slopes by the tracks
7. *Brachythecium mildeanum* (Schimp.) Schimp. – 1 – on the steep slopes by the tracks
8. *Brachythecium rutabulum* (Hedw.) Schimp. – 3 – on soil, in the forest
9. *Brachythecium velutinum* (Hedw.) Schimp. – 1 – on rocks
10. *Bryum argenteum* Hedw. – 1 – on concrete walls and roofs
11. *Bryum capillare* Hedw. – 1 – on walls and roofs
12. *Bryum elegans* Nees – 3 – on soil
13. *Bryum lanatum* (P. Beauv.) Brid. – 1 – on concrete
14. *Bryum subelegans* Kindb. – 3 – at the foot of a tree
15. *Ceratodon purpureus* (Hedw.) Brid. – 1, 3 – on soil
16. *Conardia compacta* (Müll.Hal) H. Rob. – 3 – on shaded base rocks
17. *Ctenidium molluscum* (Hedw.) Mitt. – 3 – on rocks
18. *Dicranella heteromalla* (Hedw.) Schimp. – 1 – on soil
19. *Dicranella varia* (Hedw.) Schimp. – 3 – at the foot of a tree
20. *Dicranum scoparium* Hedw. – 3 – on soil, in the forest
21. *Didymodon vinealis* (Brid.) Zander – 1 – on soil

22. *Didymodon acutus* (Brid.) K. Saito – 1 – on soil
 23. *Encalypta streptocarpa* Hedw. – 3 – on rocks
 24. *Eurhynchium speciosum* (Brid.) Mild. – 3 – on the forest floor
 25. *Fissidens adianthoides* Hedw. – 2 – on shaded soil
 26. *Fissidens bryoides* Hedw. – 5 – on shaded soil
 27. *Fissidens dubius* P. Beauv. – 3 – on shaded soil
 28. *Fontinalis antipyretica* Hedw. – 4 – in a stream
 29. *Funaria hygrometrica* Hedw. – 1 – on a wall
 30. *Grimmia pulvinata* Hedw. – 1, 2 – on a wall
 31. *Grimmia trichophylla* Grev. – 2 – on rocks
 32. *Homalothecium lutescens* (Hedw.) Robins. – on rocks
 33. *Homalothecium philippeanum* (Spruce) Schimp. – 3 – on rocks
 34. *Homalothecium sericeum* (Hedw.) Schimp. – 2 – on rocks
 35. *Hypnum cupressiforme* Hedw. 1, 3, 5 – on rocks and tree bark
 36. *Hypnum resupinatum* Taylor – 2 – on tree bark
 37. *Isothecium alopecuroides* (Lam. ex Dubois) Isov. – 1 – on tree bark
 38. *Isothecium myosuroides* Brid. – 4 – on shaded rock
 39. *Leucobryum glaucum* (Hedw.) Ångström – 3 – on rocky soil
 40. *Leucodon sciuroides* (Hedw.) Schwägr. – 1 – on tree bark
 41. *Neckera besseri* (Lobarzewski) Jur. – 3 – on tree bark
 42. *Neckera crispa* Hedw. – 3 – on rocks
 43. *Neckera complanata* (Hedw.) Huebener – 5 – on rock
 44. *Orthotrichum cupulatum* Hoffm. ex Brid. – 3 – on rock
 45. *Orthotrichum striatum* Hedw. – 3 – on tree bark
 46. *Ortotrichum anomalum* Hedw. – 2 – on rock
 47. *Palustriella commutata* (Hedw.) Ochyra – 4 – at the stream edge
 48. *Plagiomnium affine* (Blandow ex Funck) T.J. Kop. – 3 – on soil
 49. *Plagiomnium rostratum* (Schrad.) T. J. Kop. – 5 – on soil
 50. *Plagiomnium undulatum* (Hedw.) T. J. Kop. – 3 – on soil
 51. *Plagiothecium cuspidatum* H. Philib. – 1, 3 – on soil
 52. *Plagiothecium platyphyllum* Mönk – 3 – on soil
 53. *Plagiothecium succulentum* (Wilson) Lindb. – 2, 3 – on soil
 54. *Pogonatum aloides* (Hedw.) P. Beauv. – 3 – on soil
 55. *Pogonatum urnigerum* (Hedw.) P. Beauv. – 2 – on soil
 56. *Polytrichastrum fomosum* (Hedw.) G.L. Sm. – 3 – on soil
 57. *Polytrichum juniperinum* Hedw. – 1 – on soil
 58. *Pseudocrossidium hornschuchianum* (Schultz) R. H. Zander – 2, 3 – on soil
 59. *Pseudoleskeella nervosa* (Brid.) Nyholm – 1, 3 – on rock
 60. *Rhynchostegiella tenella* (Dicks.) Limpr. – 5 – on rock
 61. *Rhizomnium punctatum* (Hedw.) T. J. Kop. – 3, 5 – on soil
 62. *Rhynchostegium confertum* (Dicks.) Schimp. – 4 – on rocks in the steram
 63. *Rhytidiadelphus triquetrus* (Hedw.) Warnst. – 4 – on forest floor
 64. *Schistidium apocarpum* compl. – 1 – on concrete
 65. *Scorpiurium circinatum* (Brid.) M. Fleisch. & Loeske – 3 – on soil
 66. *Sematophyllum demissum* (Wills.) Mitt. – 3 – on shaded rock
 67. *Syntrichia ruralis* (Hedw.) F. Weber & D. Mohr subsp. *ruralis* – 1 – on soil
 68. *Thamnobryum alopecurum* (Hedw.) Nieuwl. ex Gangulee – 3 – on rock
 69. *Tortella inflexa* (Bruch) Broth. – 3 – on rock
 70. *Tortella tortuosa* (Hedw.) Limpr. – 3 – on rock
 71. *Trichostomum brachydontium* Bruch. – 2, 3 – on soil
- Liverworts:**
1. *Cephalozia* sp. – 5 – on rock
 2. *Conocephalum conicum* (L.) Underw. – 4 – on rock
 3. *Frullania dilatata* (L.) Dumort. – 3 – on tree bark
 4. *Lejeunea cavifolia* (Ehrh.) Lindb. – 2 – on rock
 5. *Lophocolea bidentata* (L.) Dumort. – 3 – on decaying wood
 6. *Lophocolea heterophylla* (Schrad) Dumort. – 3 – on decaying wood
 7. *Marchantia polymorpha* L. – 4 – on soil
 8. *Metzgeria furcata* (L.) Dumort. – 3 – on tree bark
 9. *Plagiochilla porelloides* (Torrey ex nees) Lindenb. – 5 – on soil
 10. *Porella platyphylla* (L.) Dumort. – 3 – on tree bark
 11. *Radula complanata* (L.) Dumort. – 2 – on tree bark

Discussion and conclusion

The study is the first step to the bryophyte flora of the Djerdap National Park with the surrounding areas. A further investigation is expected to increase the number of bryophyte species, especially considering the fact that the collection period was extremely dry and that only a small part of the National Park was covered. There have been no nationally red-listed species among the recorded species (Sabovljević & al. 2004) or internationally (ECCB 1995).

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