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Short communication

New bryophyte taxa for Bosnia and Herzegovina

Jovana P. Pantović[1]*, Svetlana N. Grdović[2], Marko S. Sabovljević[1,3]

[1] University of Belgrade, Faculty of Biology, Institute of Botany and Botanical Garden, Takovska 43, 11000 Belgrade, Serbia

[2] University of Belgrade, Faculty of Veterinary Medicine, Bulevar oslobođenja 18, 11000 Belgrade, Serbia

[3] Pavol Jozef Šafárik University, Institute of Biology and Ecology, Faculty of Science Department of Botany, Mánesova 23, 040 01 Košice, Slovakia

Abstract – Bosnia and Herzegovina has a long history of bryophyte flora research. However, it is still considered insufficiently investigated, and until recently bryophyte investigations were completely neglected. Hence new records for the country are expected with novel explorations. Here, we report one liverwort (*Porella obtusata)* and four moss species (*Bryum klinggraeffii, Cinclidotus danubicus, Habrodon perpusillus and Imbribryum subapiculatum*) new for the country's bryophyte flora. With these new records, the bryoflora of Bosnia and Herzegovina numbers 673 taxa (no hornworts, 134 liverworts and 539 mosses).

Keywords: Balkans, bryoflora, liverwort, mosses, new records

Introduction

The Balkan Peninsula is characterized by a diversity of geological history, climate and habitat types, which all resulted in a diverse and rich bryophyte flora in a relatively small area (Sabovljević et al. 2011). Lately, numerous new records have been published within the Balkan region, i.e. Albania, Croatia, North Macedonia, Montenegro and Serbia (e.g., Sabovljević et al. 2010). In spite of that, distributional data of many species are still incomplete, especially for ephemeral species and those that are taxonomically difficult and unresolved. Furthermore, certain parts of many regions and countries are to date completely unexplored in terms of bryology. Bryological research in Bosnia and Herzegovina started with Sendtner in the middle of the 19th century (Kummer and Sendtner 1849). However, explorations were sporadic, with long interruptions (Grgić 1985), hence there is a lack of recent and updated floristic data, in particular of certain areas. For example, only a few studies were published recently for Bosnia and Herzegovina (e.g., Pantović et al. 2016, 2017). At present, the bryophyte flora of the country numbers 133 liverworts and 535 moss taxa (Hodgetts and Lockhart 2020, Ellis et al. 2021a,b).

Materials and methods

The subject of the bryological research was the tributaries of the lower course of the Neretva River in the region of southern Herzegovina (Bosnia and Herzegovina, SE Europe), namely the rivers Buna, Bunica, Bregava, Tihaljina and Trebižat (Fig. 1). The area of southern Herzegovina is influenced by a Mediterranean and sub-Mediterranean climate. This area has approximately 2,291 hours of sunshine per year, while the vegetation period lasts around or more than 240 days. Although the precipitation is high, with an average rainfall of 1,515 mm y^{-1}, owing to the porous nature of its karstic soil, there is a general lack of surface water (Galić 2011). The main features of the investigated area result in the richness of natural geomorphological, hydrological and biological values (Redžić et al. 2008, Lasić and Jasprica 2016).

The bryophyte samples were collected in August 2020. All main habitat types alongside the river courses were investigated, and specimens were collected from various substrata, e.g. soil, rocks, and tree bark. The list of species localities with details is given below. Voucher specimens were deposited in the Bryophyte Collection of the Herbarium of University of Belgrade (BEOU). Nomenclature for liverworts and mosses follows Hodgetts and Lockhart (2020).

The investigated sites include: 1 – Peć Mlini, 43.33747 N, 17.32592 E, 143 m a.s.l., date 11.08.20., leg: Jovana Pantović (JP) & Gordana Čokanović (GČ), det: JP, 2 – Peć Mlini, 43.33698 N, 17.32373 E, 137 m, 11.08.20., leg: JP & GČ, det: Marko Sabovljević (MS), 3 – Bagin most, Humac, 43.18675 N, 17.51575 E, 69 m, 11.08.20., leg: JP & GČ, det: MS, 4 – Struge, 43.09229 N, 17.69733 E, 7 m, 12.08.20., leg: JP & GČ,

* Corresponding author e-mail: jpantovic@bio.bg.ac.rs

det: MS, 5 – Trebižat River, near Hacijenda bar, 43.12312 N, 17.67339 E, 17 m, 12.08.20., leg: JP & GČ, det: MS, 6 – Bagin most, 43.18342 N, 17.52270 E, 64 m, 13.08.2020., leg: JP & GČ, det: JP, 7 – Ljubuški, Baščine, 43.18040 N, 17.52745 E, 65 m, 13.08.20., leg: JP & GČ, det: JP, 8 – Bregava River, near the confluence, 43.10134 N, 17.73029 E, 8 m, 13.08.20., leg: JP & GČ, det: JP, 9 – Bregava River, near mini hydroelectric power plant "Do", 43.08491 N, 18.00514 E, 94 m, 14.08.20., leg: JP & GČ, det: JP, 10 – Buna and Neretva confluence, 43.23527 N, 17.83394 E, 25 m, 15.08.20., leg: JP & GČ, det: JP, 11 – Buna and Neretva confluence, 43.23570 N, 17.83407 E, 30 m, 15.08.20., leg: JP & GČ, det: JP, 12 – Buna River, Dokića pond, 43.24556 N, 17.84653 E, 367 m, 15.08.20., leg: JP & GČ, det: MS, 13 – Bunica River, Malo Polje, 43.23239 N, 17.88093 E, 42 m, 15.08.20., leg: JP & GČ, det: JP, 14 – Bunica River, 43.23667 N, 17.86907 E, 38 m, 15.08.20., leg: JP & GČ, det: JP, 15 – Tekija, Buna River source, 43.25667 N, 17.90298 E, 38 m, 15.08.20., leg: JP & GČ, det: JP.

Results and discussion

Here we report five new species for the bryophyte flora of Bosnia and Herzegovina: one liverwort and four mosses (number referring to sites given in text of Materials and methods).

Bryum klinggraeffii Schimp.: site 13: wet rocks by the river.

The ruderal moss *B. klinggraeffii* is widespread through Europe, but it is red-listed in some countries like Portugal (Critically Endangered – CR), Romania (Endangered – EN), and Slovenia (Data Deficient – DD) (Hodgetts and Lockhart 2020).

Cinclidotus danubicus Schiffn. & Baumgartner: site: 3: rocks in the water; site 4: the *Platanus* sp. roots by the water; site 6: rock by the river; site 7: roots by the water; site 8: limestone in dry riverbed; site 10: rocks in the water; site 11: *Salix* sp. bark; site 13: rocks in the water; site 15: rocks in the water.

This species is endemic for Europe, and in the Balkan region is known only from Croatia and Slovenia as well as from Hungary. (Hodgetts and Lockhart 2020).

Habrodon perpusillus (De Not.) Lindb.: site: 5: *Fraxinus* sp. bark; site 9: *Populus nigra* bark.

This species is common in the Mediterranean region; however, it is rare and red-listed in some non-Mediterranean countries, e.g. Romania (CR), Norway, Great Britain, Slovenia (EN), Canary Islands and Switzerland (Vulnerable – VU) (Hodgetts and Lockhart 2020).

Imbribryum subapiculatum (Hampe) D.Bell & Holyoak: site 1: rock crevice by the water; site 2: tufa; site 13: wet rocks by the river; site 14: wet soil by the river.

Imbribryum subapiculatum is a temperate species somewhat less frequent in the Balkan peninsula, probably due to misidentification with other species of small tuber-bearing *Bryum* species.

Porella obtusata (Taylor) Trevis.: site 12: *Populus nigra* bark.

Porella obtusata is a liverwort with a southwestern distribution in Europe. It is considered a threatened species in some European countries, for example it is endangered (EN) in Norway, vulnerable (VU) in Serbia and near threatened (NT) in Italy and the Canary Islands (Hodgetts and Lockhart 2020).

The bryoflora of Bosnia and Herzegovina, together with the new records reported here numbers 673 taxa (134 liverworts and 539 mosses). Further new findings of bryophytes are expected with the intensification of field investigation.

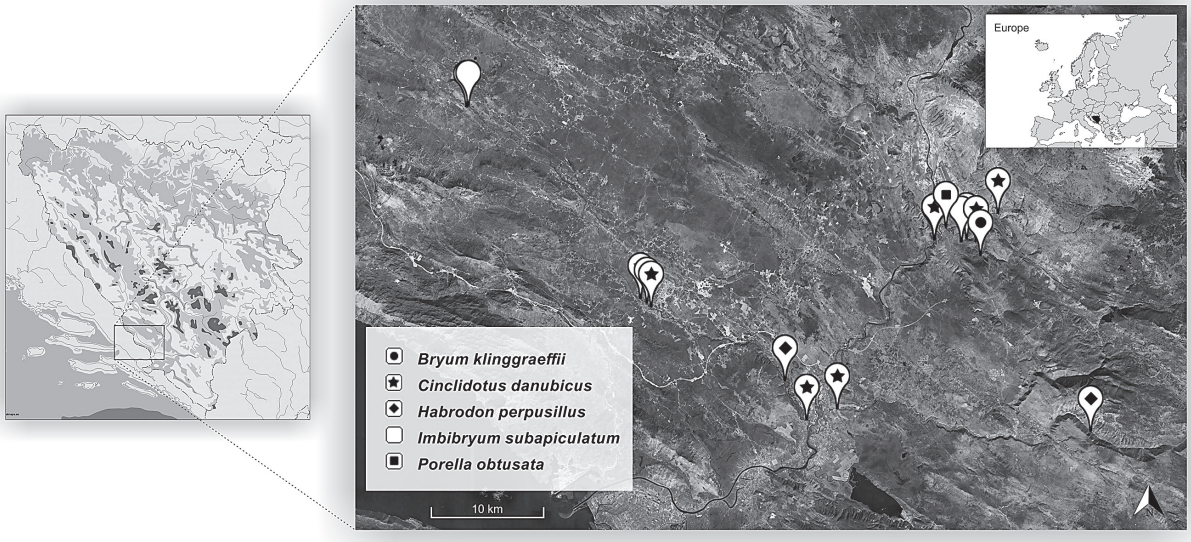

Fig. 1. Position of the investigated area of the lower course of the Neretva River within Bosnia and Herzegovina. All recorded localities of five new species records for the country (liverwoth *Porella obtusata* and mosses *Bryum klinggraeffii*, *Cinclidotus danubicus*, *Habrodon perpusillus* and *Imbribryum subapiculatum*) are marked on the map with a unique symbol.

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