Botanica SERBICA

(2021) 45 (2): 361-368

DOI: https://doi.org/10.2298/BOTSERB2102361T
journal homepage: botanicaserbica.bio.bg.ac.rs

Original Scientific Report

New records and noteworthy data of plants, algae and fungi in SE Europe and adjacent regions, 6

Gordana Tomović[1*], Marko S. Sabovljević[1*], Ermin Mašić[2], Slađana S. Popović[3], Aleksandra Marković[3], Ivana Trbojević[1], Jovana Pantović[1], Karel Sutorý[4], Marjan Niketić[5], Petya Boycheva[6], Dobri Ivanov[6], Alma Hajrudinović-Bogunić[7], Ante Begić[8], Boris Assyov[9], Gabriela Tamas[10], Constantin-Ciprian Bîrsan[10] and Sorin Ștefănuț[10]

1 Institute for Botany and Botanical Garden, Faculty of Biology, University of Belgrade, Takovska 43, 11 000 Belgrade, Serbia
2 University of Sarajevo, Faculty of Science, Department of Biology, Zmaja od Bosne 33-35, Sarajevo, Bosna i Hercegovina
3 Institute of Chemistry, Technology and Metallurgy - National Institute of the Republic of Serbia, University of Belgrade, Njegoševa 12, 11000 Belgrade, Serbia
4 Moravian Museum, Department of Botany, Hviezdoslavova 29a, 627 00 Brno, Czech Republic
5 Natural History Museum, Njegoševa 51, 11000 Belgrade, Serbia
6 Department of Biology, Medical University Varna, 84 Tsar Osvoboditel Blvd., 9000 Varna, Bulgaria
7 University of Sarajevo, Faculty of Forestry, Zagrebačka 20, 71000 Sarajevo, Bosnia and Herzegovina
8 Šumsko-gospodarsko društvo Županije Zapadnohercegovačke d.o.o., Kralja Tomislava 5, 88240 Posušje, Bosnia and Herzegovina
9 Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2 Gagarin Str., 1113 Sofia, Bulgaria
10 Institute of Biology – Bucharest, Romanian Academy, 296 Splaiul Independentei, 060031 Bucharest, P.O. Box 56-53, Romania
*column editors, to whom contribution should be sent (botanicaserbica@bio.bg.ac.rs)

ABSTRACT:
This paper presents new records and noteworthy data on the following taxa in SE Europe and adjacent regions: cyanobacteria *Anagnostidinema amphibium,* mycorrhizal fungus *Tricholoma frondosae,* stonewort *Chara connivens,* mosses *Dicranum polysetum* and *Ulota intermedia,* and dicots *Eclipta prostrata, Paeonia daurica* subsp. *daurica*, *Ruta graveolens* and *Sorbus bosniaca*.

Keywords:
new report, *Anagnostidinema amphibium, Chara connivens, Dicranum polysetum, Eclipta prostrata, Paeonia daurica* subsp. *daurica*, *Ruta graveolens, Sorbus bosniaca, Tricholoma frondosae, Ulota intermedia,* SE Europe

UDC: 581.95:561.232+561.284+561.263+561.32+561.6/.9

Received: 03 September 2021
Revision accepted: 01 October 2021

***Anagnostidinema amphibium* (C.Agardh ex Gomont) Strunecký, Bohunická, J.R. Johansen & J. Komárek 2017 fam. Oscillatoriophycidae (Cyanobacteria)**
Contributors: Ermin Mašić and Slađana Popović
Geographical focus: Bosnia and Herzegovina
New record and noteworthy data: The first record for Bosnia and Herzegovina.
Specimen data: Municipality of Kakanj, Tičići thermal spring, N 44.136614°, E 18.047986°; October 2019; leg./det. Mašić E, Popović J.

Voucher: Cyanobacteria and algae collection (Mašić, E.) s/n, Laboratory for the Study of the Systematics of Algae and Fungi, Department of Biology, Faculty of Science, University of Sarajevo (Bosnia and Herzegovina)

Bosnia and Herzegovina are extremely rich in mineral, thermal and thermo-mineral waters. The main reason for the appearance of these waters is reflected in the heterogeneous and complex geological structure of Bosnia and Herzegovina (Operta & Hyseni 2013). Explorations of

© 2021 Institute of Botany and Botanical Garden Jevremovac, Belgrade

these habitats in Bosnia and Herzegovina from the aspect of geology, hydrology and balneology are numerous (Skopljak *et al.* 2017), while research from the aspect of biology and ecology has not been performed so far. In this regard, preliminary research of the thermal spring located in the Municipality of Kakanj (Tičići) was conducted. This spring belongs to the North-Eastern perimeter of the Zenica-Sarajevo basin, together with the Sidica, Ribnica, Kraljeva Sutjeska, Toplik and Sedra springs (Skopljak *et al.* 2017). The spring in Tičići is the most important thermal spring in the Municipality of Kakanj, but also beyond the Zenica-Sarajevo basin. Water appears in the contact between the sediment of the Lower Miocene and the limestone of the Upper Cretaceous. In the investigated area, two thermal springs belonging to the hydrocarbon-sulphate-calcium-sodic type with mineralization at around 1000 mgl^{-1} are present (Miošić 1982). Drilling was performed in the vicinity of the Tičići spring (Borehole IT-1) in the period from 1985 to 1986. The basic research of the drillhole IT-1 parameters showed a discharge of 30 ls^{-1} and a temperature of 54°C (Slišković 1987 in Skopljak *et al.* 2017). The structures made after drilling and capturing the spring were overgrown with a thick biofilm of phototrophic microorganisms, predominantly Cyanobacteria. A detailed examination of the collected material revealed species from the genera *Anagnostidinema* (Strunecky *et al.* 2017), *Jaaginema, Leptolyngbya* and *Phormidium* (Komarek & Anagnostidis 2005). By analyzing the available data related to phycological research in Bosnia and Herzegovina, distribution data were not found for the species *A. amphibium* (Mašić 2020). This species formed a light to dark blue-green thick biofilm at the sampling site (Cvijan & Blaženčić 1996; Komarek & Anagnostidis 2005). In addition to this species, representatives of other genera were also present, but those of the genus *Leptolyngbya* were more recorded than others and were occasionally seen as densely entangled trichomes in the mass of *Anagnostidinema*. In order to gain a complete picture of the level of biodiversity of this unique habitat type, detailed research is necessary in the future.

***Chara connivens* Salzm. ex A. Braun 1835, fam. Characeae (charophyte algae)**

Contributors: Aleksandra Marković and Ivana Trbojević

Geographical focus: Serbia

New record and noteworthy data: This is the third record for Serbia.

Specimen data: Serbia, Banat, Slatina near Baranda, N 45.073317°, E 20.456517°; saline permanent pond, in shallow water very close to the shore, 2-3 cm deep, in the mud; 3 June 2020; leg. Marković A, Ćirić M, Vidaković D, Gavrilović B; det. Marković A, Trbojević I.

Voucher: Institute of Chemistry, Technology and Metallurgy, University of Belgrade, charophyte collection, 46.

In 2014, *Chara connivens* was declared Critically Endangered (CR) by Blaženčić (2014) given that it was found at only one locality on the territory of Serbia (Srebrno Lake by Veliko Gradište; *leg. J. & Ž. Blaženčić 30.09.1983 and 17.07.1984*). However, in June 2017, it was discovered at the new site of Dulin pond, a shallow, permanent freshwater body, situated in the Deliblato Sands Nature Reserve (Trbojević *et al.* 2020). The finding in Slatina, near Baranda, is hence the third record for Serbia. Slatina is a saline pond, a soda pan, affected by anthropogenic disturbance and considered degraded. It has been subjected to considerable modification of the natural hydrological regime caused by the construction of irrigation channels (Ćirić *et al.* 2021). Only male specimens were found as one small patch in the very shallow water and muddy substrate. During the field investigations carried out in June 2021, *C. connivens* was found at the same locality again (*leg. Marković A, Vidaković D, 08.06.2021.*), thus confirming that the population is small but stable. This time only female specimens were found.

The main distribution of *C. connivens* is in Europe in the western Mediterranean area. Besides Europe, it can also be found in North Africa and southern Asia. It is considered to be introduced in northern Europe (the Baltic Sea area). It is rare and/or red listed in many countries in Europe (Italy, France, Germany, etc.), but common on the Iberian peninsula and the Czech Republic (Blaženčić *et al.* 2006; Caisova & Gabka 2009; Korsch *et al.* 2013; Mouronval *et al.* 2015; Becker 2016).

Chara connivens can be found in fresh and brackish waters, permanent and temporary, where it can tolerate nutrient enrichment. It is a halophyte species preferring shallow water (Urbaniak & Gąbka 2014; Mouronval *et al.* 2015; Becker 2016). In terms of species ecology, the Slatina locality could be considered the only one typical for *C. connivens* in Serbia. Specimens found in the explicitly freshwater Dulin pond turned out to be genetically specific (Trbojević *et al.* 2020), hence, further findings of *C. connivens* specimens in various localities are needed in order to resolve the status of the unusual specimens from Dulin pond.

***Dicranum polysetum* Sw. ex anon., fam. Dicranaceae (bryophyte, moss)**

Contributors: Jovana Pantović

Geographical focus: Serbia

New records and noteworthy data: The first records for the Vojvodina Province (North Bačka County, Bačka region).

Specimen data: 1) Bačka, Donji Tavankut, Čikerija, N 46.10179°, E 19.48245°, on sandy soil in a pine plantation, 134 m a.s.l.; 28 February 2021; leg. Pantović J, Stevanoski I.; det. Pantović J.; **2)** Bačka, Subotička Peščara, Radanovačka Šuma, N 46.14154°, E 19.7176°, on sandy soil in a pine plantation, 123 m a.s.l.; 6 March 2021; leg. Pantović J, Bogosavljević J.; det. Pantović J.

Vouchers: Herbarium of the Institute of Botany and Botanical Garden Jevremovac, University of Belgrade (BEOU), bryophyte collection Bryo/08711 and Bryo/08712.

Dicranum polysetum is a calcifuge species which usually grows on the ground in forests and plantations, especially under pines and birches, in boreal and continental climates (Blockeel *et al.* 2014). This circumpolar boreal-montane species is widespread in North, Central and Eastern Europe. Under continental climate conditions, it can be found in suitable lowland forest habitats. For example, it was recently found growing in a similar habitat – on a *Pinus* plantation at lower altitude in Hungary (Szűcs 2018).

According to the European Red List (Hodgetts *et al.* 2019), it is considered to be of Least Concern (LC). Although it is widespread and not threatened in Europe, it is rare in some countries and therefore red-listed, e. g. in Luxembourg, the Netherlands, Great Britain (VU), Germany and Romania (NT).

In Serbia, all previous records were restricted to coniferous forests in montane areas in the central and western part of the country (e.g. Papp & Sabovljević 2002; Veljić *et al.* 2006; Lučić *et al.* 2013; Papp *et al.* 2014; Pantović *et al.* 2021). Although it is not so rare, some records are more than 50 years old, and have not been confirmed during the novel exploration of localities, e.g. on Mt. Kopaonik and Majdanpečka Domena. These new findings are important as they represent the first records of *D. polysetum* for the Vojvodina Province, as well as for Bačka Region and North Bačka County. Moreover, they are significant as the first records in this particular habitat type, on sandy soil in a lowland conifer plantation in the sand habitats.

***Eclipta prostrata* (L.) L., fam. Asteraceae (dicot, vascular plant)**

Contributor: Karel Sutorý

Geographical focus: Serbia

New record and noteworthy data: The published record of this pantropical weed is the second for Serbia. The first one was published by Perić & Rilak (2017).

Specimen data: Šumadija, Belgrade, in the vicinity of the Monument of Gratitude to France outside the southern margin of the ruins of Kalemegdan fortress, N 44.819333°, E 20.450667°, ca 115 m s.m.; 14 Aug 2019; 5 July 2021; leg./det. Sutorý K.

Voucher: Herbarium of the Moravian Museum (BRNM).

Eclipta prostrata had already been found in Serbia by Perić & Rilak (2017) on the island of Donja Ada close to Pančevo under relatively natural conditions. Recently it was collected in Belgrade but under totally artificial conditions, growing there as a weed in flower beds. Its occurrence is determined by relatively regular irrigation and intense exposure to the sun. As can be deduced from the repeated finds (2019, 2021) at the locality, it can persist under these conditions for several years.

***Paeonia daurica* Andrews subsp. *daurica*, fam. Paeoniaceae (dicot, vascular plant)**

= *P. mascula* subsp. *triternata* (Boiss.) Stearn & P.H. Davis

– „*P. mascula*“, auct.

– „*P. corallina*“, auct.

Contributors: Marjan Niketić and Gordana Tomović

Geographical focus: Serbia, Northern Macedonia

New records and noteworthy data: A new species for Northern Macedonia and the first findings of the species in E Serbia south of the Nišava River.

Specimen data: 1) Serbia, Northeastern Serbia, Mt. Kučaj, Radovanska river gorge, Trešnjina Padina, N 43.915493°, E 21.765964°, MGRS 34T EP66, limestone, 650 m a.s.l.; May 2015; leg. Paunović M.; det. Niketić M.; **2)** Serbia, Eastern Serbia, Dimitrovgrad, St. Dimitrija Monastery – Lukavačka Rudina, N 43.0046499°, E 22.7851389°, MGRS 34T FN46, *Carpinetum betuli* forest, limestone, 700 m a.s.l.; 21 April 2014; leg./det. Niketić M; **3)** Northern Macedonia, Demir Kapija, Krastovec, below the summit, MGRS 34T FL08, forest, 9 June 1925; leg./det. Černjavski P.; rev. Hong D-Y. 16 August 2003; **4)** Northern Macedonia, Demir Kapija, Krastovec, MGRS 34T FL08, forest, 27 June 1988; leg./det. Niketić M.

Vouchers: Natural History Museum in Belgrade, General Herbarium of the Balkan Peninsula (BEO), 100049, 100048, 5411, 100056.

This species is new to the flora of Northern Macedonia (around Demir Kapija), and two new populations have also been found in NE and E Serbia. Only a few individuals were found in all three populations. It is distributed from the Orient (Iran in the east) to Crimea and southeastern Europe (northwestern Croatia in the west), while the type subspecies in the Orient is present only in Turkey and Lebanon (Hong *et al.* 2008; Hong 2010, 2011). It is otherwise closely related to *P. mascula* (L.) Mill. which, according to the above authors, is distributed from the Orient to the Iberian Peninsula, being only distributed in southern Greece on the Balkan Peninsula, while the data for Albania (Meyer 2011; Barina 2017) in our opinion correspond to *P. daurica*.

According to Hong *et al.* (2008), *P. daurica* has wider leaf lobes (often almost orbicular) which are widest in the upper third and are truncate, rounded or apiculate, while its chromosome number is $2n = 10$. *Paeonia mascula* has relatively narrower leaf lobes which are widest just above the middle and are acute, rounded-cuspidate or cuspidate, while its chromosome number is $2n = 20$. In accordance with the revision of Hong *et al.* (2008) and the conclusions of Lazarević & Stojanović (2012) it is logical to assume that all literature data for *P. mascula* (= *P. corallina*) for the area of Northern Macedonia (Micevski 1995; Teofilovski 2011) and Serbia (Blečić 1972; Amidžić &

Krivošej 2001) actually refer to *P. daurica*. The only herbarium evidence of its presence (BEO 5411, 100056) in the flora of Northern Macedonia comes from the vicinity of Demir Kapija and the previous literature data from the same locality (Soška 1939, sub. *P. corallina*) probably also refers to this species.

In the flora of Serbia, *P. daurica* is sporadically distributed in W and E Serbia, Šumadija, Kosovo and Metohija (Lazarević & Stojanović 2012). The newly discovered population from the vicinity of Dimitrovgrad (BEO 100048) is currently the only finding of the species in E Serbia south of the Nišava River.

***Ruta graveolens* L., fam. Rutaceae (dicot, vascular plant)**
Contributors: Petya Boycheva and Dobri Ivanov
Geographical focus: Bulgaria
New record and noteworthy data: A rare species. This is the first record for the territory of the European NATURA 2000 network at the Provadiysko - Royaksko plato site, Northeast Bulgaria.
Specimen data: Varna region, Provadia Municipality, Venchan village, close to arable land and dirt road, N 43.14330°, E 27.23120°; 8 November 2019; leg./det. Boycheva P, Yaneva G.
Voucher: Bulgarian Academy of Sciences, Institute of Biodiversity and Ecosystem Research, Herbarium (SOM), 176957.

A new locality in Northeast Bulgaria. Six exemplars are registered per 1 m^2, near a dirt road, in grassy communities with a predominance of cereal grasses. Although the species is not new to the Northeastern Bulgaria floristic region (Vladimirov *et al.* 2008; Assyov *et al.* 2012; Zahariev 2014), this is the first time it has been registered on the territory of the European NATURA 2000 network at the Provadiysko – Royaksko plato site (MOEW). The tertiary relic species is included in *Annex III* of the Biodiversity Act and classified under the Endangered category in the Red Book of Bulgaria (Peev *et al.* 2011); it is also included in Red List of Bulgarian vascular plants (Petrova & Vladimirov 2009).

***Sorbus bosniaca* A. Hajrudinović, Frajman, Schönsw. & F. Bogunić, fam. Rosaceae (dicot, vascular plant)**
Contributors: Alma Hajrudinović-Bogunić and Ante Begić
Geographical focus: Bosnia and Herzegovina
New record and noteworthy data: This is a new record for Bosnia and Herzegovina. **Specimen data:** SW Bosnia and Herzegovina, locality Karamanovi Klanci, Drežanka Canyon, N 43.547222°, E 17.500556°, 1330 m a.s.l.; 10 June 2021; leg./det. Hajrudinović-Bogunić A, Begić A.; $2n = 4x$.
Voucher: National museum of Bosnia and Herzegovina, Herbarium of Bosnia and Herzegovina (SARA), BH collection 52473.

The *Sorbus* subgenus *Soraria* Májovský & Bernátová comprises di-, tri- and tetraploid taxa which originated from hybridization between members of subgenera *Aria* Pers. and *Sorbus* (Májovský & Bernátová 2001). Recently, Hajrudinović *et al.* (2015) identified and described the new tetraploid and apomictic species *Sorbus bosniaca* from Mt. Krug, Bosnia and Herzegovina (B&H). Two other previously reported locations of *S.* ×*thuringiaca* (Nyman) Schonach (putative *S. bosniaca*) in B&H (Beck-Mannagetta 1927) could not be confirmed (Mt. Maglić, Dragoš Sedlo) or are inaccessible because of mine fields (the surroundings of Mt. Slovinj, Koričino Sedlo) (Hajrudinović *et al.* 2015). Also, putative *S. bosniaca* individuals were reported from two other localities in B&H (Borova Glava in the vicinity of Livno and Bare, Mrkonjić Grad; Beech & Rivers 2017) but lack data on their morphological, cytometric and/or molecular verification, an important aspect in the identification of *S. bosniaca*.

Sorbus bosniaca is a rare and endemic shrub or small tree species. It is found growing in mixed stands of *Fagus sylvatica* L. and *Abies alba* Mill. in various stages of degradation and different associations of xerophilous meadows on calcareous dolomitic substrate. The newly found *S. bosniaca* population at Drežanka Canyon in B&H inhabits xerophilous *Pinus heldreichii* H. Christ forests. This locality counts about 20 adult *S. bosniaca* individuals and numerous seedlings. Individuals from this population were genotyped for nuclear microsatellite markers to verify its identity following Hajrudinović *et al.* (2015) and the results confirmed identical genetic structure to *S. bosniaca* from the *locus classicus* at ca. 60 km distance (Hajrudinović-Bogunić, unpublished results). The obtained genetic profile enabled the conclusion about the ploidy level and apomictic clonal reproduction. Such a dispersion of clones from the *locus classicus* suggests the spread of seeds via birds.

***Tricholoma frondosae* Kalamees & Shchukin, fam. Tricholomataceae (fungus, mycorrhizal)**
Contributor: Boris Assyov
Geographical focus: Bulgaria
New record and noteworthy data: This is the first record for the Balkan Peninsula and Bulgaria (Zervakis *et al.* 1998; Ivančević 2002; Mešić & Tkalčec 2003; Denchev & Assyov 2010; Lazarević *et al.* 2011; Karadelev *et al.* 2018).
Specimen data: Mt. Vitosha, along the Strouma River valley, in the vicinity of Chuipetlovo village, N 42.523579°, E 23.246088°, under *Populus tremula* L., 1285 m a.s.l.; 9 November 2020; leg./det. Assyov B.
Voucher: Bulgarian Academy of Sciences, Institute of Biodiversity and Ecosystem Research, Mycological Collection (SOMF), 30349.

Tricholoma frondosae is a relatively recently described species of the genus, where the authentic materials originate from Northern Europe (Kalameees 2001). A latter phy-

logenetic study found ITS diversity within the materials identified as *T. frondosae,* identifying two clades, dubbed as 'type I' and 'type II' (Heilmann-Clausen *et al.* 2017), which still remain taxonomically untreated. Of these, the former is believed by Heilmann-Clausen *et al.* (2017) to correspond to the type of *T. frondosae* on account of basidiomata coloration and the size of the basidiospores. The same authors describe Type II as being characterized by more greenish colours and larger spores. To what extent this colour difference is consistent is unknown, but what seems a warm-colored, large-spored Spanish collection was recently shown to belong to type II (Olariaga *et al.* 2020). The specimen presented here also possesses the typical warm colouration described for *T. frondosae,* combined with basidiospores measuring (5–)5.2–6.3(–6.6) × (3.3–)3.5–4.2(–4.4) µm, mean 5.7 × 3.9 µm, mean Q value 1.5 (n=30), comparing remarkably well to the values given in the original description of the species [(4.6–)4.8–6.4(–7.2) × (3.0–)3.2–4.0(–4.6) µm, mean 5.73 × 3.75 µm, mean Q value 1.54]. The molecularly verified Spanish collection (Olariaga *et al.* 2020), representing type II was reported as having notably wider spores with a lower Q-ratio (5.1–6.9 × 4–5.4 µm, Q=1.2–1.4; n=50). This combination of characteristics prompts the author to tentatively place the Bulgarian collection as type I, which would apparently represent *T. frondosae* s. str.

Until now *Tricholoma frondosae* s. l. was mostly known from more northern latitudes in Europe – Denmark, Estonia, Finland, Latvia, Lithuania, Russia, and Sweden, and from fewer findings in the Czech Republic, France, Germany, Poland, Switzerland and the United Kingdom (Kalameees 2001; Kotlaba 2009; Christensen & Heilmann-Clausen 2013; Heilmann-Clausen *et al.* 2017; Olariaga *et al.* 2020). The southernmost record in the adjacent areas to Europe so far seems that from the western parts of Anatolia (Şen & Alli 2019). Published barcoded collections of type I are now known from Sweden, the USA and China, and type II from Denmark, France, Poland, Slovenia, Spain and Sweden (Heilmann-Clausen *et al.* 2017; Reschke *et al.* 2018; Olariaga *et al.* 2020). The specimen presented here constitutes the first record of the species from the Balkan Peninsula. The Bulgarian finding comes from a patch of *Populus tremula* L. in a mixed riverine forest of *Betula pendula* L. and *Pinus sylvestris* L. with *Alnus alnobetula* (Ehrh.) K. Koch, *Salix alba* L. and *Juniperus communis* L. in the understorey, resembling the habitats mentioned by Kalameees (2001).

***Tozzia alpina* subsp. *carpathica* (Wolll.) Dostàl, fam. Orobanchaceae (dicot, vascular plant)**

Contributors: Gabriela Tamas and Constantin-Ciprian Bîrsan

Geographical focus: Romania

New record and noteworthy data: This is the first record of *Tozzia alpina* subsp. *carpathica* for the Ciucaş Mountains.

Specimen data: Mts. Ciucaş, Pârâului Alb Gorges, SSE slope, N 45.494056°, E 25.983000°, 1560 m a.s.l., 9 July 2021; leg./det. Tamas G, Bîrsan C-C.

Voucher: Herbarium of the Bucharest Institute of Biology – Romanian Academy (BUCA), vascular plant collection, 159647.

Tozzia alpina subsp. *carpathica* is a species of Community interest listed in Annex II and Annex IV of the Council Directive 92/43/EEC (the EU Habitats Directive). It is also listed in Annex I of the Bern Convention. According to the IUCN European Red List of Vascular Plants, *T. alpina* subsp. *carpathica* is assessed as Data Deficient (Bilz *et al.* 2011).

In Romania the species is protected in 23 Natura 2000 sites (https://eunis.eea.europa.eu/species/183388). The newly recorded population of *T. alpina* subsp. *carpathica* is located in the Pârâului Alb Gorges on the Ciucaş Mountains (Central Romania), a Natura 2000 site since 2007. The population numbers over 40 individuals spread over a 40 m^2 humid area, most of the individuals being in the flowering phase. We recorded Carpathian tozzia along with *Alchemilla mollis* (Buser) Rothm., *Geum rivale* L., *Hypericum tetrapterum* Fr., *Myosotis sylvatica* Hoffm., *Polygonum bistorta* L., *Rubus* sp., *Rumex alpestris* Jacq., *R. alpinus* L., *Ranunculus repens* L., *Senecio nemorensis* L. subsp. *jacquinianus* (Rchb.) Čelak, *Urtica dioica* L. and *Veratrum album* L.

***Ulota intermedia* Schimp., fam. Orthotrichaceae (moss, bryophyte)**

Contributor: Sorin Ştefănuţ

Geographical focus: Romania

New records and noteworthy data: Two new localities and the first record for Northeastern Romania.

Specimen data: **1)** Southern Carpathians, Braşov County, Mts. Făgăraş, Viştişoara valley, N 45.649694°, E 24.765222°, 1160 m a.s.l.; 21 August 2020; leg./det. Ştefănuţ S.; **2)** Northeastern Romania, Suceava County, Teşna valley, N 47.365028°, E 25.137556°, 871 m a.s.l.; 14 March 2021; leg./det. Ştefănuţ S.

Vouchers: Herbarium of the Institute of Biology – Bucharest, Romanian Academy (BUCA), bryophyte collection, B12055, B12119.

Ulota intermedia was collected from the branch of a maple tree on the right bank of the Viştişoara valley, Sibiu County and from the trunk of a black alder tree on the left bank of the Teşna valley, Suceava County. *U. intermedia* was recently reported in Romania from Platoul Padiş (Bihor County), Scărişoara and Poiana Aiudului (Alba County), Păltiniş (Sibiu County) and Piatra Mare Mountain (Braşov County) (Caparrós *et al.* 2016). The nearest localities of *U. intermedia* are in Hungary and Serbia (Hodgetts & Lockhart 2020). The conservation status of *U. intermedia* in Romania is Near Threatened – NT,

but this status may worsen due to the fact that the species grows on trees on the shore and these trees are often cut down.

Acknowledgment - BA acknowledges the support of the National Science Programme "Environmental Protection and Reduction of Risks of Adverse Events and Natural Disasters", approved by the Resolution of the Council of Ministers № 577/17.08.2018 and supported by the Ministry of Education and Science (MES) of Bulgaria (Agreement № D01-230/06.12.2018). JP and MSS would like to thank the Rufford Foundation for supporting this research (project ID 25015-1).

REFERENCES

Amidžić L & Krivošej Z. 2001. *Querco-Paeonietum officinalis-masculae* Amidžić & Krivošej – nova zajednica sladuna i cera sa božurima u Nacionalnom parku "Tara". *Zaštita Prirode* **52**: 15–22.

Assyov B, Petrova A, Dimitrov D & Vasilev R. 2012. *Conspectus of the Bulgarian vascular flora. Distribution maps and floristic elements*. Ed. 4. Bulgarian Biodiversity Foundation, Sofia

Barina Z. (ed.) 2017. *Distribution atlas of vascular plants in Albania*. Hungarian Natural History Museum, Budapest.

Beck-Mannagetta G. 1927. *Flora Bosne, Hercegovine i oblasti Novog Pazara, III. Horipetale*. Državna štamparija u Sarajevu, Beograd-Sarajevo.

Becker R. 2016. *Chara connivens*. In: Arbeitsgruppe Characeen Deutschlands (eds.), *Armleuchteralgen. Die Characeen Deutschlands*, pp. 270–282, Springer Verlag, Heidelberg.

Beech E & Rivers MC. 2017. *Sorbus bosniaca*. *The IUCN Red List of Threatened Species* **2017**: e.T86090679A86090682.

Bilz M, Kell SP, Maxted N & Lansdown RV. 2011. *European Red List of Vascular Plants*. Publications Office of the European Union, Luxembourg.

Blaženčić J. 2014. Overview of the stoneworts (Charales) of Serbia with the estimation of the threat status. *Botanica Serbica* **38**(1): 121–130.

Blaženčić J, Stevanović B, Blaženčić Ž & Stevanović V. 2006. Red data list of charophytes in the Balkans. *Biodiversity & Conservation* **15**: 3445–3457.

Blečić V. 1972. Red Dilleniales. In: Josifović M (ed.), *Flora SR Srbije* **3**, pp. 980–102, Srpska Akademija nauka i umetnosti, Beograd.

Blockeel TL, Bosanquet SD, Hill MO & Preston CD. 2014. *Atlas of British & Irish Bryophytes,* Volume **2**. Pisces publications.

Caisova L & Gąbka M. 2009. Charophytes (Characeae, Charophyta) in the Czech Republic: taxonomy, autecology and distribution. *Fottea* **9**: 1–43.

Caparrós R, Lara F, Draper I, Mazimpaka V & Garilleti R. 2016. Integrative taxonomy sheds light on an old problem: the *Ulota crispa* complex (Orthotrichaceae, Musci). *Botanical Journal of the Linnean Society* **180**: 427–451.

Christensen M & Heilmann-Clausen J. 2013. *The genus Tricholoma*. *Fungi of Northern Europe* **4**. Svampetryk, Tilst.

Ćirić M, Gavrilović B, Krizmanić J, Dojčinović BP & Vidaković D. 2021. Can a benthic diatom community complement chemical analyses and discriminate between disturbed and undisturbed saline wetland habitats? A study of seven soda pans in Serbia. *Wetlands Ecology and Management* **29**: 451–466.

Cvijan M & Blaženčić J. 1996. *Flora algi Srbije: Cyanophyta*. Naučna knjiga, Beograd.

Denchev CM & Assyov B. 2010. Checklists of the larger basidiomycetes in Bulgaria. *Mycotaxon* **111**: 297–282 + on-line version. Mycotaxon Checklists Online (http://www.mycotaxon.com/resources/checklists/denchev-v111-checklist.pdf): 1–76.

Hajrudinović A, Frajman B, Schönswetter P, Silajdžić E, Siljak-Yakovlev S & Bogunić F. 2015. Towards a better understanding of polyploid *Sorbus* (Rosaceae) from Bosnia and Herzegovina (Balkan Peninsula), including description of a novel, tetraploid apomictic species. *Botanical Journal of the Linnean Society* **178**: 670–685.

Heilmann-Clausen J, Christensen M, Frøslev TG & Kjøller R. 2017. Taxonomy of *Tricholoma* in northern Europe based on ITS sequence data and morphological characters. *Persoonia* **38**: 38–57.

Hodgetts N, Cálix M, Englefield E, Fettes N, García Criado M, Patin L, Nieto A, Bergamini A, Bisang I, Baisheva E, Campisi P, Cogoni A, Hallingbäck T,Konstantinova N, Lockhart N, Sabovljević M, Schnyder N, Schröck C, Sérgio C, Sim Sim M, Vrba J, Ferreira CC, Afonina O, Blockeel T, Blom H, Caspari S, Gabriel R, Garcia C, Garilleti R, González Mancebo J, Goldberg I, Hedenäs L, Holyoak D, Hugonnot V, Huttunen S, Ignatov M, Ignatova E, Infante M, Juutinen R, Kiebacher T, Köckinger H, Kučera J, Lönnell N, Lüth M, Martins A, Maslovsky O, Papp B, Porley R, Rothero G, Söderström L, Ştefănuţ S, Syrjänen K, Untereiner A, Váňa J, Vanderpoorten A, Vellak K, Aleffi M, Bates J, Bell N, Brugués M, Cronberg N, Denyer J, Duckett J, During HJ, Enroth J, Fedosov V, Flatberg KI, Ganeva A, Gorski P, Gunnarsson U, Hassel K, Hespanhol H, Hill M, Hodd R, Hylander K, Ingerpuu N, Laaka-Lindberg S, Lara F, Mazimpaka V, Mežaka A, Müller F, Orgaz JD, Patiño J, Pilkington S, Puche F, Ros RM, Rumsey F, Segarra-Moragues JG, Seneca A, Stebel A, Virtanen R, Weibull H, Wilbraham J & Żarnowiec J. 2019. *A miniature world in decline: European Red List of Mosses, Liverworts and Hornworts*. IUCN, Brussels.

Hodgetts NG & Lockhart N. 2020. *Checklist and country status of European bryophytes –update 2020. Irish Wildlife Manuals*, No. **123**. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Hong D-Y. 2010. *Paeonies of the World. Taxonomy and Phytogeography*. Royal Botanic Gardens, Kew.

Hong D-Y. 2011. *Paeonies of the World. Polymorphism and Diversity*. Royal Botanic Gardens, Kew.

Hong D-Y, Zhang D-M, Wang X-Q, Kuruglu ST & Tzanoudakis D. 2008. Relationships and taxonomy of *Paeonia arietina* G. Anderson complex (Paeoniaceae) and its allies. *Taxon* **57**(3): 922–932.

Ivančević B. 2002. Zabeležene vrste makromiceta u Srbiji i Crnoj Gori do 1993 godine. *Svet Gljiva* **14**: 7–10.

Kalamees K. 2001. Taxonomy and ecology of the species of the *Tricholoma equestre* group in the Nordic and Baltic countries. *Folia Cryptogamica Estonica* **38**: 14–23.

Karadelev M, Rusevska K, Kost G & Kopanja DM. 2018. Checklist of macrofungal species from the phylum Basidiomycota of the Republic of Macedonia. *Acta Musei Macedonici Scientiarum Naturalium* **21**(1): 23–112.

Komarek J & Anagnostidis K. 2005. *Bd. 19/2: Cyanoprokaryota: teil 2: Oscillatoriales*. Elsevier, München.

Korsch H, Doege A, Raabe U & van de Weyer K. 2013. *Rote Liste der Armleuchteralgen (Charophyceae) Deutschlands, 3. Fassung, Stand: Dezember 2012*. Thüringische Botanische Gesellschaft e.V., Jena.

Kotlaba F. 2009. Čirůvka osiková – *Tricholoma frondosae,* dvojník čirůvky zelánky. *Mykologické listy* **106**: 1–5.

Lazarević J, Perić O & Perić B. 2011. Ektomikorizne gljive u Crnoj Gori – diverzitet i distribucija. *Mycologia Montenegrina* **14**: 85–115.

Lazarević P & Stojanović V. 2012. Divlji božuri (*Paeonia* L.) u Srbiji. – rasprostranjenje, stanje populacija, ugroženost i zaštita. *Zaštita Prirode* **62**: 19–44.

Lučić A, Cvjetićanin R, Novaković-Vuković M, Ristić D, Popović V, Rakonjac L & Mladenović-Drinić S. 2013. Interpopulation variability of Austrian pine (*Pinus nigra* Arnold) in Serbia. *Genetika* **45**:641–654.

Májovský J & Bernátová D. 2001. New hybridogenous subgenera of the genus *Sorbus* L. emend. Crantz. *Acta Horticulturae et Regiotecturae* **4**: 20–21.

Mašić E. 2020. Bibliography of phycological research in Bosnia and Herzegovina (1849–2019). *Phytologia Balcanica* **26**: 437–443.

Mešić A & Tkalčec Z. 2003. Preliminary checklist of Agaricales from Croatia IV: Families Bolbitiaceae, Coprinaceae, Entolomataceae and Pluteaceae. *Mycotaxon* **87**: 283–309.

Meyer FK. 2011. Beiträge zur Flora von Albanien. *Hausssknechtia* **15**: 1–220.

Micevski K. 1995. *Flora na Republika Makedonija* **1(3)**. Makedonska Akademija na naukite i umetnostite, Skopje.

Miošić N. 1982. Genetska kategorizacija mineralnih, termalnih i termomineralnih voda Bosne i Hercegovine. *Geološki Glasnik* **27**: 221–256.

Mouronval JB, Baoudouin S, Borel N, Soulié-Märche I & Grillas P. 2015. *Guide des characées de France méditerranéenne*. Office National de la Chasse et de la Faune Sauvage, Paris.

Olariaga I, Ballester L, Fernandes U, López-Amiano JI, Magaña V, Martínez-Gil R, Martín J, Pancorbo F, Parra LA, Pérez-Daniëls P, Pérez-Del-Aamo C, Rodríguez-Andrade E, Rodríguez-Arribas C, Sánchez-Dueñas G, Teres JL, Torres D & Traba JM. 2020. II encuentro de la Sociedad Ibérica de Micología (Cerler, 26–30 de septiembre de 2018): hallazgo de 103 especies nuevas para Aragón, 15 para la Península Ibérica y 11 especies nuevas para la ciencia. *Fungi Iberici* **1**: 7–80.

Operta M & Hyseni S. 2013. Thermal mineral waters in Bosnia and Herzegovina as well as the potential for tourism development. *Intternational Journal of Water Research* **1**: 25–29.

Pantović J, Veljić M, Grdović S & Sabovljević MS. 2021. An annotated list of moss species of Serbia. *Phytotaxa* **479**: 207–249.

Papp B & Sabovljević M. 2002. The bryophyte flora of Tara National Park (W Serbia, Yugoslavia). *Studia Botanica Hungarica* **33**: 25–39.

Papp B, Szurdoki E, Pantović J & Sabovljević M. 2014. Contributions to the bryophyte flora of the Pešter plateau, SW Serbia. *Studia Botanica Hungarica* **45**: 33–47.

Peev D, Petrova AS, Nachev M, Temniskova D, Denchev CM, Ganeva A, Gussev C & Vladimirov V. (eds.) 2011. *Red Data Book of the Republic of Bulgaria,* Vol. **1**, *Plants & Fungi*. BAS & MOEW Sofia.

Perić R. & Rilak S. 2017. *Eclipta prostrata* (L.) L. (Compositae), an adventive species new to the flora of Serbia. *Botanica Serbica* **41**(1): 89–93.

Petrova A & Vladimirov V. (eds.) 2009. Red list of Bulgarian vascular plants. *Phytologia Balcanica* **15**: 63–94.

Reschke K, Popa F, Yang ZL & Kost G. 2018. Diversity and taxonomy of *Tricholoma* species from Yunnan, China, and notes on species from Europe and North America. *Mycologia* **110**(6): 1081–1109.

Şen İ & Alli H. 2019. *Tricholoma* (Fr.) Staude in the Aegean region of Turkey. *Turkish Journal of Botany* **43**(6): 817–830.

Skopljak F, Šarić Ć & Pobrić V. 2017. Contribution to the genesis of thermal water of the north-east perimeter of the Zenica-Sarajevo basin, Bosnia and Herzegovina. *Rudarsko-Geološko-Naftni Zbornik* **32**: 17–30.

Slišković I. 1987. Hidrogeološke i hidrogeotermalne odlike termomineralnih voda Ribnice i Tičića kod Kaknja. *Geološki Glasnik* **31-32**: 195–213.

Soška T. 1939. Beitrag zur Schluchtenfloren von Südserbien III. *Glasnik Skopskog naučnog društva, Odeljenje prirodnih nauka* **20**(7): 167–191.

Strunecky O, Bohunicka M, Johansen JR, Capkova K, Raabova L, Dvorak P & Komarek J. 2017. A revision of the genus *Geitlerinema* and a description of the genus *Anagnostidinema* gen. nov. (Oscillatoriophycidae, Cyanobacteria). *Fottea* **17**: 114–126.

Szűcs P. 2018. New data on the distribution of *Campylopus introflexus* (Hedw.) Brid. in Hungary. *Acta Biologica Plantarum Agriensis* **6**: 133–139.

Teofilovski A. 2011. *Prilozi za florata na Republika Makedonija*. Privatno izdanie na avtorot AcoTeofilovski, Skopje.

Trbojević I, Marković A, Blaženčić J, Subakov Simić G, Nowak P, Ballot A & Schneider S. 2020. Genetic and morphological variation in *Chara contraria* and a taxon morphologically resembling *Chara connivens*. *Botany Letters* **167**: 187–200.

Urbaniak J & Gąbka M. 2014. *Polish Charophytes. An illustrated guide to Identification*. Uniwersytet Przyrodniczy we Wrocławiu. Wroclaw.

Veljić M, Marin PD, Lakušić D & Ljubić B. 2006. Bryophyte flora of the Uvac River gorge (southwest Serbia). *Archives of Biological Sciences* **58**:187–194.

Vladimirov V, Dane F & Tan K. 2008. New floristic records in the Balkans: 8. *Phytologia Balcanica* **14**: 291–304.

Zahariev D. 2014. An investigation into the flora of the Shumen Heights. *Phytologia Balcanica* **20**: 79–88.

Zervakis G, Dimou D & Balis C. 1998. A check-list of the Greek macrofungi including hosts and biogeographic distribution: I. Basidiomycotina. *Mycotaxon* **66**: 273–336.

REZIME

Botanica SERBICA

Novi i značajni podaci o biljkama, algama i gljivama iz JI Evrope i susednih regiona, 6

Gordana Tomović, Marko S. Sabovljević, Ermin Mašić, Slađana S. Popović, Aleksandra Marković, Ivana Trbojević, Jovana Pantović, Karel Sutorý, Marjan Niketić, Petya Boycheva, Dobri Ivanov, Alma Hajrudinović-Bogunić, Ante Begić, Boris Assyov, Gabriela Tamas, Constantin-Ciprian Bîrsan i Sorin Ștefănuț

U radu su prikazani novi i značajni podaci sa područja JI Evrope i susednih regiona o sledećim taksonima: cijanobakteriji *Anagnostidinema amphibium,* mikorizalnoj gljivi *Tricholoma frondosae,* pršljenčici *Chara connivens,* mahovinama *Dicranum polysetum* i *Ulota intermedia,* i dikotilama *Eclipta prostrata, Paeonia daurica* subsp. *daurica*, *Ruta graveolens* i *Sorbus bosniaca*.

Ključne reči: novi nalaz, *Anagnostidinema amphibium, Chara connivens, Dicranum polysetum, Eclipta prostrata, Paeonia daurica* subsp. *daurica*, *Ruta graveolens, Sorbus bosniaca, Tricholoma frondosae, Ulota intermedia,* JI Evropa