

New localities of some rare bryophyte species in Bulgaria

Rayna Natcheva

Institute of Biodiversity and Ecosystem Research, Department of Plant and Fungal Resources, Bulgarian Academy of Sciences, Acad. Georgi Bonchev Str., bl. 23, 1113 Sofia, Bulgaria, e-mail: raynanatcheva@yahoo.com

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Abstract. New chorological data are presented for ten bryophyte species. Of these, *Corsinia coriandrina*, *Fossombronia angulosa*, *Aulacomnium androgynum*, *Dicranum undulatum*, *Drepanocladus trifarius*, and *Fissidens osmundoides* are red-listed. New localities are reported for the recently found in Bulgaria *Ephemerum crassinervium* subsp. *sessile* and *Thamnobryum neckeroides*, and the occurrence of *Pseudephemerum nitidum* is confirmed.

Key words: Bulgaria, chorology, conservation, liverworts, mosses, new data

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Introduction

The bryophyte flora of Bulgaria is relatively well studied. In recent years, a large number of authors have explored the distribution of bryophytes in the country. Thus, the first account of Bulgarian bryophytes included 550 species (Stefanoff & Petrov 1962). The most recent national checklists already include 191 species of liverworts (Gospodinov & Natcheva 2022), and 605 species of mosses (unpublished data). Nevertheless, 41 species of liverworts and 85 species of mosses are known only with a single location for the entire country.

The aim of the present study was to report new localities of some poorly known and documented bryophytes in Bulgaria.

Results and discussion

Liverworts (*Marchantiophyta*)

Corsinia coriandrina (Spreng.) Lindb.

This is a suboceanic-sub-Mediterranean xerophytic species, growing on wet (usually periodically so) soil and in rock crevices (Dierßen 2001). It is evaluated as Endangered [EN B2ab(iii)] in the national *Red List of Bryophytes in Bulgaria* (Natcheva & al. 2006). In Bulgaria, it was reported for the first time for the northern part of the Black Sea coast by Petkoff (1908), from clay-sandy wet rocks. The same author reported it also as “widespread on damp walls and stones under the chutes of mills, together with *Pellia*” and from higher elevations. As such habitats do not corre-

spond to the general ecology of the species, the other localities mentioned by that author should be treated as doubtful and possibly as misidentifications. The only proven report of *C. coriandrina* in Bulgaria has been for Mt Strandzha, collected in 1955 (Petrov 1963, SOM 289-B).

The new locality of *C. coriandrina* is in the Valley of Struma River, on the southern slopes of the Byalata Kashta Hill. It grows in rock crevices and niches in dry grassland and scrubland, on silicate bedrock, 132 m a.s.l., 41.470059°N, 23.276851°E, 16.02.2024, *coll./det.* R. Natcheva (SOM 11565-B). The species was abundant, with both male and female reproductive organs. Possibly, it is more widespread in the region but overlooked due to its ephemeral growth.

Fossombronia angulosa (Dicks.) Raddi

So far, the only report of this species has been from two locations in Mt Strandzha (Petrov 1963, SOM 502-B, 507-B), in 1956 and 1960. The new locality of the species is also in an area with Mediterranean influence in the Rhodopi Mts (*Eastern*): north of Fotinovo village, on thin soil, in a shaded periodically moist chute under an overhanging sandstone rock, in thermophilous scrubland, 320 m a.s.l., 41.387673°N, 25.349646°E, 25.10.2022, *coll./det.* R. Natcheva (SOM 11500-B). The species is red-listed at national level as Endangered [EN B2ab(iii)c(ii)] (Natcheva & al. 2006). Only male plants were observed.

Riccia nigrella DC.

The species is not rare in Bulgaria, being known from the floristic regions Rila (Simon & Vajda 1959) and Slavyanka mountains (Petrov 1962a), and the Valley of River Struma (Petrov 1962b, Šmarda 1970), as well as from the Rhodopi Mts (*Eastern*) (Papp & Natcheva, unpublished). In the Valley of River Struma, it occurs at a number of locations. The typical habitat is on soil in dry grasslands and scrublands, or soil in rock crevices on biotite and gneiss bedrock, also on serpentine.

Here, we report a curious occurrence of the species on sandy soil in a salt meadow. It occupied micro-elevations, ca. 40-50 cm higher than the sur-

rounding surface, which were possibly less influenced by the salts that the evaporating waters bring to the soil surface. The details of the site are as follows: Tunzha Hilly Country, between villages Zavoy and Zhe lyu Voivoda, 135 m a.s.l., 42.582077°N, 26.515001°E, 24.01.2023, *coll./det.* R. Natcheva (SOM 11499-B). The species was locally abundant, sterile, and grew together with *Riccia sorocarpa* Bisch. and *Oxymitra incrassata* (Brot.) Sérgio & Sim-Sim. Salty habitats are generally hostile to most bryophytes, so few mosses and even fewer liverworts have adapted to such conditions (Guerra & al. 1995).

Mosses (*Bryophyta*)

Aulacomnium androgynum (Hedw.) Schwägr.

The species is evaluated as Endangered [EN B2ab(iii)] at national level (Natcheva & al. 2006). It was reported for the first time in Bulgaria from Mt Belasitsa (Petrov 1962b, SOM 4347-B). Later, in 1968 it has been collected also from the Rhodopi Mts (*Central*) (Ganeva & Düll 1999). Both localities were revisited, but *A. androgynum* could not be found there. However, it has recently been collected from two other floristic regions: Vitoshka and Sredna Gora mountains. The details of the localities are as follows:

(1) Mt Vitoshka: near the road between Chuipetlovo and Yarlovo villages, in crevices of a large single-standing sandstone cliff in a beech forest, 1207 m a.s.l., 42.50663°N, 23.2427°E, 14.04.2020, *coll./det.* R. Natcheva (SOM 11870-B). The species was sterile, with abundant gemmae, and grew with *Pohlia elongata* Hedw.

(2) Mt Lozenska: at the northern foothills of peak Polovrak, southeast of St. Spas Monastery, on the soil of a road bank and at the root bases of trees in a beech forest, 1000 m a.s.l., 42.587685°N, 23.522853°E, 31.03.2023, *coll./det.* R. Natcheva (SOM 11342-B).

Dicranum undulatum Schrad. ex Brid.

In Bulgaria, *D. undulatum* is red-listed as Endangered [EN B2ab(iii)] (Natcheva & al. 2006). This is a boreal-mountain species (Dierßen 2001) and has not been seen in the country for more than 100 years. It

was reported from two sites in Mt Vitosha. Arnaudoff (1911) published it without any data on location. However, in Arnaudoff's collection at SOM, there is a specimen, belonging to this species labelled "at the watersheds below peak Cherni Vrah" bearing immature sporophytes, collected on 15.08.1909. In the same year, Podpéra (1911) published it from another part of the mountain: Dragalevsko Blato (the mires around the springs and in the upper course of Dragalevska River). The species has been collected by J. Podpéra on 25.07.1908 (SOM 2849-B). There was one more mention of the species from the Balkan Range (*Western*): Vitinya (Stefanoff & Petrov 1962), without location or a voucher specimen. Considering the fact that in this region there are no *Sphagnum*-dominated mires, the report should be treated as erroneous.

The present report is the first recent observation of *D. undulatum* in Bulgaria. It is again from Mt Vitosha, but from a third location: western slopes of peak Skoparnika, at the springs of river Struma, in a *Sphagnum*-dominated mire, 2157 m a.s.l., 42.551239°N, 23.289199°E, 21.06.2023, *coll./det.* R. Natcheva (SOM 11416-B). It grew on several hummocks raised up to 40 cm, together with *Bruckenthalia spiculifolia* (Salisb.) Rchb. and *Vaccinium uliginosum* L., bearing abundant immature sporophytes.

Drepanocladus trifarius (F. Weber & D. Mohr)
Broth. ex Paris

This is a subarctic-subalpine species (Dierßen 2001). In Bulgaria, it is red-listed as Vulnerable (VU D2, Natcheva & al. 2006). The species was reported only once for Bulgaria by Stefanoff (1971). It has been observed on 31.07.1968, growing in swampy places along a forest. There is no herbarium specimen of this species in any Bulgarian herbarium. Our attempts to find it at the site were unsuccessful. Furthermore, currently at that place there are no habitats matching the ecological requirements of *D. trifarius*.

Recently, the species was collected in the Balkan Range (*Western*): on southwestern slopes of peak Malak Kom, 1784 m a.s.l., 43.167924°N, 23.073868°E, 18.10.2022, *coll./det.* R. Natcheva (SOM 11560-B). There it grew in flushes in several spring areas, at the

edge of a wide mire complex, together with *Campylium protensum* (Brid.) Kindb., *Sarmentypnum exannulatum* (Schimp.) Hedenäs, *Philonotis fontana* (Hedw.) Brid., and *Riccardia incurvata* Lindb.

Ephemerum crassinervium subsp. *sessile* (Bruch)
Holyoak

This is a recently found species in the Bulgarian flora, collected for the first time in 2007 in a single locality at the Black Sea coast (Papp & al. 2018). Lately, it has been collected in two more floristic regions:

(1) Rhodopi Mts (*Central*): the Smolyan Lakes, bottom of lake Bistoto, on bare periodically inundated mud, 1544 m a.s.l., 41.62032°N, 24.679338°E, 22.10.2022, *coll./det.* R. Natcheva (SOM 11564-B). The species was fertile and grew abundantly with *Physcomitrium readeri* Müll.Hal., *Riccia sorocarpa* Bisch., and *Fossombronia* sp. on sparsely vegetated mud, dominated by *Bidens tripartita* L.

(2) Mt Sredna Gora: Mt Vakarelska, west of Bakardere Dam, in an oak forest, on bare leached cinnamonic loamy soil along a cart road, on gneiss bedrock, 763 m a.s.l., 42.488356°N, 23.709259°E, 17.11.2023, *coll./det.* R. Natcheva (SOM 11486-B). At this site, few fertile individuals were observed, but sterile gametophytes and protonemata were scattered along with *Riccia sorocarpa* and *Pleuroidium subulatum* (Hedw.) Rabenh.

Apparently, *E. crassinervium* subsp. *sessile* is more widespread in Bulgaria but has been overlooked due to its small size and ephemeral growth.

Fissidens osmundoides Hedw.

This subarctic-subalpine species was first reported from the Balkan range (*Central*), in the region above Karlovo town (Kuc & al. 1965). It was collected from calcareous rock fissures at 500 m a.s.l. A herbarium voucher is stored at BP. *Fissidens osmundoides* has not been observed ever since in Bulgaria. It is evaluated as Vulnerable (VU D2) in the national *Red List of Bryophytes in Bulgaria* (Natcheva & al. 2006).

Recently, the species has been found on Mt Vitosha: at the springs of river Struma, between the peaks Karachair and Kupena, in a spring fen, 2117 m a.s.l.,

42.540873°N, 23.291573°E, 19.09.2022, *coll./det.* R. Natcheva (SOM 11938-B). The species formed small dense patches, all sterile.

Pseudephemerum nitidum (Hedw.) Loeske

So far, this has been a species of uncertain occurrence in Bulgaria. It was mentioned for the Bulgarian flora only once in the first national bryophyte checklist, but without precise location, just with a recording “Sofia” (Stefanoff & Petrov 1962). However, it is unclear if it has been meant the city of Sofia or in a broader sense the region of Sofia. No herbarium specimen are present. Therefore, the species was treated as Data Deficient in the *Red List of Bryophytes in Bulgaria* (Natcheva & al. 2006).

Since then *P. nitidum* has not been observed until a search for bryophytes on the periodically dry bottom of Shiroka Polyana Dam. The details of the site are: Rhodopi Mts. (*Western*), along the road to Longurlii locality, on the summer dry muddy exposed shore of Shiroka Polyana Dam, 1522 m a.s.l., 41.762228°N, 24.138372°E, 23.08.2017, *coll./det.* R. Natcheva (SOM 9641-B). Single individuals or small groups of plants of the species were scattered on the bare soil, growing together with *Dicranella schreberiana* (Hedw.) Dixon and *Atrichum tenellum* (Röhl.) Bruch et Schimp. In the last four years, the author has focused on studying bryophytes on the muddy shores of dams and rivers. However, *P. nitidum* has not been found elsewhere. Apparently, the species is rare in Bulgaria and its threat status needs to be re-evaluated.

Thamnobryum neckeroides (Hook.) E. Lawton

This is a rare moss across Europe. It is included in the *European Bryophyte Red Data Book* as VU (Hodgetts & al. 2019). The species is red-listed in most of the countries of occurrence (Hodgetts & Lockhart 2020). The first report of *T. neckeroides* for South-eastern Europe has been from Bulgaria in 2022, in the Bulgarka Nature Park (Central Balkan Range, Natcheva & Ganeva 2022).

Here, a second locality of the species is reported from Mt Belasitsa: Kongura Nature Reserve, S of Petrich town, along the upper course of river Petrichka,

on amphibolite rocks by the river, in a beech forest, 1460 m a.s.l., 41.32786°N, 23.18603°E, 07.06.2023, *coll./det.* R. Natcheva (SOM 11392-B). The population in the Kongura Nature Reserve consisted of two sub-populations situated along the upper course of river Petrichka and one of its tributaries. All plants were sterile. It grew together with *Thamnobryum alopecurum* (Hedw.) Gangulee, *Brachythecium rivulare* Schimp., and *Isothecium alopecuroides* (Lam. ex Dubois) Isov.

Since *T. neckeroides* is a large and readily identifiable species, we conclude that it has not been overlooked but rather has a limited distribution in Bulgaria. It meets the IUCN criteria for VU D2 (IUCN 2012).

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References

- Arnaudoff, N. 1911. Moose aus dem Vitoscha-Gebirge. – Period. Spis. Bulg. Knizh. Druzh., **71**: 469-470 (in Bulgarian).
- Dierßen, K. 2001. Distribution, Ecological Amplitude and Phytosociological Characterization of European Bryophytes. Bryophyt. Biblioth., **56**. J. Cramer Publishing Co., Stuttgart.
- Ganeva, A. & Düll, R. 1999. A contribution to the Bulgarian bryoflora. Checklist of Bulgarian bryophytes. – In: Düll, R., Ganeva, A., Martinčić, A. & Pavletić, Z. (eds), Contributions to the Bryoflora of Former Yugoslavia and Bulgaria. – Bryol. Beitr., **11**: 1-99. (1 Auflage, pp 111-199. IDH-Verlag Bad Münstereifel.)
- Gospodinov, G. & Natcheva, R. 2022. An updated checklist of liverworts and hornworts of Bulgaria. – Herzogia, **35**(1): 138-154.
- Guerra, J., Ros, R.M., Cano, M.J. & Casares-Porcel, M. 1995. Gypsiferous outcrops in SE Spain, refuges of rare, vulnerable and endangered bryophytes and lichens. – Cryptog. Bryol. Lichénol., **16**(2): 125-135.
- Hodgetts, N. & 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.
- Hodgetts, N., Cáliz, 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., Sabovljevic, M., Schnyder, N., Schröck, C., Sérgio, C., Sim Sim, M., Vrba, J., Ferreira, C.C., 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., Hut-

- tunen, 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., Ștefănuț, S., Syrjänen, K., Untereiner, A., Váňa, J. I., Vanderpoorten, A., Vellak, K., Aleffi, M., Bates, J., Bell, N., Brugués, M., Cronberg, N., Denyer, J., Duckett, J., During, H.J., Enroth, J., Fedosov, V., Flatberg, K.-I., Ganeva, A., Gorski, P., Gunnarsson, U., Hassel, K., Hesperhol, H., Hill, M., Hodd, R., Hylander, K., Ingerpuu, N., Laaka-Lindberg, S., Lara, F., Mazimpaka, V., Mežaka, A., Müller, F., Orgaz, J.D., Patiño, J., Pilkington, S., Puche, F., Ros, R.M., Rumsey, F., Segarra-Moragues, J.G., 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. Brussels, Belgium: IUCN.
- IUCN. 2012. IUCN Red List categories and criteria: Version 3.1. Second Ed. Gland, Switzerland & Cambridge, UK: IUCN.
- Kuc, M., Vajda, L. & Pócs, T. 1965. Mosses collected during two study tours in Bulgaria, in 1959 and 1962. – Bot. Közlem., 52(1): 7-18.
- Natcheva, R. & Ganeva, A. 2022. New data on the bryophyte flora of the Bulgarka Nature Park. – Phytol. Balcan., 28(3): 305-310.
- Natcheva, R., Ganeva, A. & Spiridonov, G. 2006. Red List of the bryophytes in Bulgaria. – Phytol. Balcan., 12(1): 55-62.
- Papp, B., Natcheva, R. & Ganeva, A. 2018. Bryophyte diversity along the Northern Black Sea Coast in Bulgaria. – Phytol. Balcan., 24(1): 25-33.
- Petkoff, S. 1908. Contribution à l'étude des Hépatiques de Bulgarie. – Period. Spis. Bulg. Knizh. Druzh., 68: 115-123 (in Bulgarian).
- Petrov, S. 1962a. Contribution à la flore bryologique de la Bulgarie. Bryophytes des montagnes du Pirin et de Slavianka. – Izv. Bot. Inst. (Sofia), 10: 131-144 (in Bulgarian).
- Petrov, S. 1962b. Contribution à la flore bryologique de la Bulgarie. Bryophytes de la montagne Belasica. – Izv. Bot. Inst. (Sofia), 9: 191-199 (in Bulgarian).
- Petrov, S. 1963. Neuer Beitrag zur Kenntnis der Moosflora Bulgariens. – Izv. Bot. Inst. (Sofia), 11: 167-187 (in Bulgarian).
- Podpéra, J. 1911. Ein Beitrag zu der Kryptogamenflora der bulgarischen Hochgebirge. – Beih. Bot. Centralbl., 28(2): 173-224.
- Simon, T. & Vajda, L. 1959. Beiträge zur Moosflora Bulgariens. – Ann. Univ. Sci. Budapest. Rolando Eötvös, Sect. Biol., 2: 259-272.
- Šmarda, J. 1970. Complements à la flore muscinale de la Bulgarie. – Rev. Bryol. Lichénol., 37(1): 33-46.
- Stefanoff, B. & Petrov, S. 1962. Über die Moose und die Moosflora Bulgariens. – Izv. Inst. Gorata, 11: 5-38 (in Bulgarian).
- Stefanoff, B. 1971. Contribution to the Bulgarian bryoflora. – Gorskost. Nauka, 8(4): 3-6 (in Bulgarian).

