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Notes on the distribution of Mediterranean-Atlantic bryophytes in Bulgaria

Abstract

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About 108 species or 17 % of the Bulgarian bryoflora (85 mosses and 23 liverworts) have a Mediterranean-Atlantic character,. The liverworts mostly belong to the *Codoniaceae* and *Ricciaceae*, the mosses mainly to the *Pottiaceae*. These bryophytes occur principally in the southern parts of the country, in SE Bulgaria (Strandža mountain), along the Black Sea coast, on Mts Rila and Vitoša, and also in lowland areas in the northern parts, e.g. near Vidin, Lom and Ruse.

Introduction

It is a characteristic feature of the Bulgarian flora that it consists of different floristic elements, reflecting the diversity of the vegetation types present. The Mediterranean-type vegetation, mainly found in the south-western part of the country – the Struma and the Mesta river valleys – as well as in the mountains of eastern Rodopi and Strandža and along Black Sea coast, is of great interest. So far, it was mainly the vascular plants that were investigated, while the bryophytes were neglected in the description of the vegetation in Bulgaria.

Notes on the distribution of some bryophyte species can be found in publications of Petrov (1962a-b, 1963), where several of them are reported as new for Bulgaria.

The aim of the present paper is to draw attention to the importance of the Mediterranean-Atlantic element in the bryoflora of the regions in which Mediterranean and Submediterranean vascular plants prevail. Floristic elements have been defined in conformity with Podpěra (1954), Müller (1954-1958), and Boros (1968). The nomenclature follows the annotated list of species of Corley & al. (1981) and Grolle (1983).

Distribution of Mediterranean-Atlantic bryophytes

The Bulgarian bryoflora comprises 670 species (Petrov 1975). Among these, 108 have a Mediterranean-Atlantic character (85 species of mosses and 23 species of liverworts), representing 17 % of the total bryoflora. Their list is as follows:

Marchantiopsida

Calypogeia fissa (L.) Raddi
Corsinia coriandrina (Spruce) Lindb.
Fossombronia angulosa (Dicks.) Raddi
F. husnotii Corb.
F. pusilla (L.) Nees var. *pusilla*
F. pusilla var. *decipiens* Corb.
Jungermannia hyalina Lyell
Lunularia cruciata (L.) Lindb.
Mannia androgyna (L.) A. Evans
M. fragrans (Balb.) Frye & L. Clark
Oxymitra paleacea Bisch. ex Lindenb.
Phaeoceros laevis (L.) Prosk.
Porella arboris-vitae (With.) Grolle
Riccia ciliata Hoffm.
R. ciliifera Link ex Lindenb.
R. crustata Trab.
R. crystallina L.
R. glauca L.
R. gougetiana Durieu & Mont.
R. nigrella DC.
R. papillosa Moris
R. sorocarpa Bisch.
Scapania compacta (Roth) Dumort.
Targionia hypophylla L.

Bryopsida

Aloina ambigua (Bruch & al.) Limpr.
A. rigida (Hedw.) Limpr.
Brachythecium albicans (Hedw.) Bruch & al.
B. oxycladum (Brid.) A. Jaeger
Bryum bicolor Dicks.
B. canariense Brid.
B. radiculosum Brid.
Cinclidotus fontinaloides (Hedw.) P. Beauv.
C. mucronatus (Brid.) A. L. M. Guim.
C. riparius (Brid.) Arnott
Cirriphyllum crassinervium (Taylor) Loeske & M. Fleisch.
C. reichenbachianum (Huebener) Wijk & Margad.
C. tenuinerve (Lindb.) Wijk & Margad.
Cheilothela chloropus (Brid.) Lindb.
Crossidium squamiferum (Viv.) Jur.
Didymodon acutus (Brid.) K. Saito
D. fallax (Hedw.) R. H. Zander
D. insulanus (De Not.) M. O. Hill
D. vinealis (Brid.) R. H. Zander
Entodon concinnus (De Not.) Paris
Entosthodon fascicularis (Hedw.) Müll. Hal.
Ephemerum serratum (Hedw.) Hampe
Eucladium verticillatum (Brid.) Bruch & al.
Eurhynchium speciosum (Brid.) Jur.
E. striatum (Hedw.) Schimp.
Fabronia ciliaris (Brid.) Brid.
F. pusilla Raddi
Fissidens rivularis (Spruce) Bruch & al.
Funaria muehlenbergii Turner
Grimmia crinita Brid.
G. decipiens (Schultz) Lindb.
G. laevigata (Brid.) Brid.
G. orbicularis Bruch ex Wils.
G. tergestina Tomm. ex Bruch & al.
G. trichophylla Grev.
Gymnostomum calcareum Nees & Hornsch.
Homalia besseri Lobarz.
Homalothecium philippeanum (Spruce) Bruch & al.
H. sericeum (Hedw.) Bruch & al.
Leptodon smithii (Hedw.) F. Weber & D. Mohr
Lescuraea saviana (De Not.) E. Lawton
Neckera complanata (Hedw.) Huebener
N. crispa Hedw.
N. pumila var *philippeana* (Bruch & al.) Milde
Phascum curvicolle Hedw.
P. cuspidatum Hedw.
Philonotis marchica (Hedw.) Brid.
Physcomitrium pyriforme (Hedw.) Brid.
Plagiomnium undulatum (Hedw.) T. J. Kop.
Pleuridium subulatum (Hedw.) Rabenh.
Pleurochaete squarrosa (Brid.) Lindb.
Pohlia delicatula (Hedw.) Grout
Pottia bryoides (Dicks.) Mitt.
P. davalliana (Sm.) C. E. O. Jensen
P. starckeana (Hedw.) Müll. Hal.
P. truncata (Hedw.) Bruch & al.
Pseudephemerum nitidum (Hedw.) Reimers
Pseudocrossidium hornschuchianum (Schultz) R. H. Zander
P. revolutum (Brid.) R. H. Zander
Pterogonium gracile (Hedw.) Sm.
Pterygoneurum ovatum (Hedw.) Dixon
Rhynchostegiella tenella (Dicks.) Limpr.
Rhynchostegium megapolitanum (F. Weber & D. Mohr) Bruch & al.

R. murale (Hedw.) Bruch & al.
Scleropodium touretii (Brid.) L. F. Koch
Scorpiurium circinatum (Brid.) M. Fleisch. & Loeske
Taxiphyllum wissgrillii (Garov.) Wijk & Margad.
Thamnobryum alopecurum (Hedw.) Nieuwl.
Tortella flavovirens (Bruch) Broth.
T. humilis (Hedw.) Jenn.
T. inclinata (R. Hedw.) Limpr.
T. nitida (Lindb.) Broth.
Tortula cuneifolia (With.) Turner
T. inermis (Brid.) Mont.
T. intermedia (Brid.) De Not.
T. laevipila (Brid.) Schwaegr.
T. marginata (Bruch & al.) Spruce
T. obtusifolia (Schwaegr.) Math.
T. pagorum (Milde) De Not.
T. subulata Hedw.
Trichostomum brachydontium Bruch
T. crispulum Bruch
Weisia brachycarpa (Nees & Hornsch.) Jur.
W. condensa (Voit) Lindb.
W. longifolia Mitt.

The liverworts mainly belong to the *Codoniaceae* and *Ricciaceae,* and to the genera *Fossombronia* and *Riccia*. The mosses are mostly represented by the families *Pottiaceae* (39 species), *Brachytheciaceae* (14 species), *Neckeraceae* (5 species), and *Grimmiaceae* (6 species). The largest genera are *Tortula* (8 species) and *Grimmia* (6 species). Each of the genera *Pottia, Tortella,* and *Didymodon* is represented by 4 species, *Weisia* and *Cinclidotus* by 3.

When one contemplates the Bulgarian distribution of bryophytes with Mediterranean-Atlantic character, one will notice some regions in which most of their occurrences are concentrated. The first such region (see Fig. 1) is in the south-west: it includes Mt Belasica, the surroundings of the town Petrič, Mt Malak Kožuh, the southern slopes of Mt Pirin (areas of the village Gorno Spančevo and the town Melnik), the northern slopes of Mt Slavjanka, and Parilski dol. There one may find, among others, the following species: *Riccia ciliata, R. ciliifera, R. crystallina, R. sorocarpa, Fossombronia husnotii, Lunularia cruciata, Mannia fragrans, Leptodon smithii, Neckera complanata, Pottia bryoides, Pterygoneurum ovatum, Scleropodium touretii, Aloina ambigua,* and *Eucladium verticillatum*. The reserve "Tisata" in the Kresna gorge (Struma valley) is interesting not only because of vascular plants that are typical for this region, but also of species such as *Riccia gougetiana, Oxymitra paleacea, Tortula pagorum,* and *Weisia longifolia.*

A second important concentration of no less than 14 Mediterranean-Atlantic bryophyte species occurs near the Bačkovski Monastery. Among them are *Porella arboris-vitae, Leptodon smithii, Pseudocrossidium revolutum, Rhynchostegium megapolitanum, Tortula inermis, Grimmia laevigata,* and *Gymnostomum calcareum.*

The Strandža mountain in south-eastern Bulgaria is another floristically interesting region. *Corsinia coriandrina, Fossombronia angulosa, Scapania compacta, Scorpiurium circinatum, Trichostomum brachydontium,* and *Bryum bicolor* are known from there.

The mild and humid climate of the Black Sea coast has favoured a northward spread of some species that are otherwise typical for the southern parts of the country. For example, an isolated locality of *Bryum bicolor* is situated at Balčik (north of the town Varna).

Gypsaceous soils and areas of basic limestone bedrock represent a peculiar ecological niche occupied by a special flora. On calcareous rocks in a place named "Dikilitaš", to the west of Varna, were found mosses such as *Pseudocrossidium revolutum, Tortella flavovirens, T. inclinata, Weisia condensa, W. brachycarpa, Didymodon vinealis, Grimmia orbicularis,* and *G. tergestina.*

Some Submediterranean-Subatlantic species such as *Entosthodon fascicularis, Neckera crispa,* and *N. complanata* occur not only in the south-western parts of Bulgaria but also in the north – near the towns of Vidin, Lom, and Ruse. Near Ruse is the single known occurrence of *Aloina rigida,* reported by Velenovský (1902).

All bryophyte localities mentioned are either situated in south Bulgaria or close to the Black Sea coast, or else at low altitude. Remarkably, no less than 18 meridional species have been found on Mt Vitoša mountain near Sofija and about 16 species are known from Mt Rila, near the Rila Monastery and the resort "Borovec". The latter include *Riccia ciliifera, R. nigrella, Neckera complanata, N. crispa, Grimmia trichophylla, G. laevigata, G. tergestina, Tortula intermedia, T. laevipila,* and *T. subulata.*

Some of the records were published by foreign botanists (Velenovský 1902; Mickievicz & al. 1966; Šmarda 1970), based on specimens found by them that are not represented in the herbarium of the Institute of Botany (SOM).

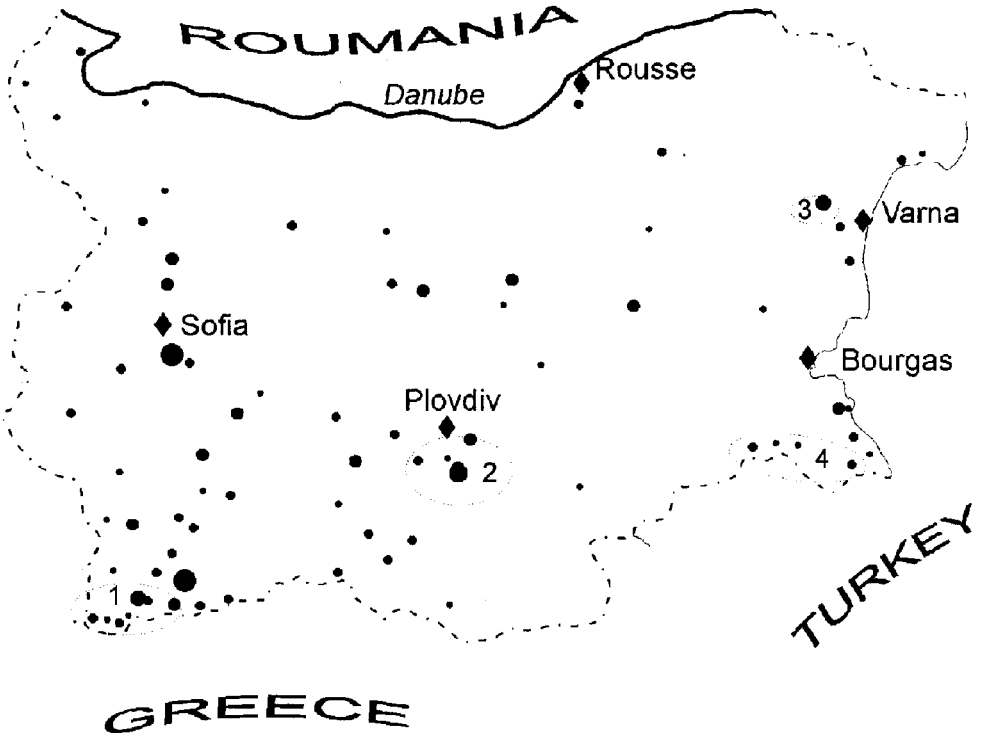

Fig. 1. Localities of Mediterranean-Atlantic bryophytes in Bulgaria. – • = 1 species, • = 2-5 species, • = 6-9 species, ● = 10-13 species; ● = 14-16 species, ● = 17-18 species. – 1, the region of the towns of Petrič and Melnik; 2, the region of Bačkovsky monastery and the town of Asenovgrad; 3, the region of "Dikilitaš"; 4, Strandža mountains.

The presence of different floristic elements in the Bulgarian bryoflora is an interesting phenomenon that is not yet fully understood. The distributional peculiarities of these elements and their participation in the build-up of different vegetation types are significant for appreciating the richness and originality of the Bulgarian flora and vegetation and their interaction with the flora and vegetation of the neighbouring territories. New, thorough investigations, adding to a summary of the known data on the various elements of the country's bryoflora, will therefore be of great value for the progress of Bulgarian bryology.

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