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New interesting localities of *Cladopodiella fluitans* and *Geocalyx graveolens* (Marchantiophyta, Jungermanniales) in SE Poland against the background of their distribution in the country

Nowe interesujące stanowiska *Cladopodiella fluitans* i *Geocalyx graveolens* (Marchantiophyta, Jungermanniales) w południowo-wschodniej Polsce na tle ich rozmieszczenia w kraju

SUMMARY

Important new data on the occurrence of two liverworts, *Cladopodiella fluitans* (Ness) H. Buch and *Geocalyx graveolens* (Schrad.) Ness., in Poland are discussed. Both species are strictly protected by law and endangered (V) in Poland. A detailed description of the localities discovered in the Roztocze National Park (SE Poland) is provided and the geographical distribution of the species in Poland is given and mapped. The importance of the present localities is briefly outlined as the new findings shift the range of *Cladopodiella fluitans* and *Geocalyx graveolens* eastwards and shed a new light on the current distribution of the species in Poland.

STRESZCZENIE

W pracy przedstawiono nowe, istotne dane na temat występowania wątrobowców *Cladopodiella fluitans* (Ness) H. Buch i *Geocalyx graveolens* (Schrad.) Ness. w Polsce. Obydwa taksomy są ściśle chronione i narażone na wyginięcie (kategoria V) w naszym kraju. Szczegółowo opisano nowe stanowiska znalezione na terenie Roztoczańskiego Parku Narodowego oraz zestawiono dane na temat obecnego rozmieszczenia tych gatunków w Polsce. Krótko przedyskutowano również wartość odkrytych stanowisk, jako że znacznie przesuwają zasięgi *Cladopodiella fluitans* i *Geocalyx graveolens* ku wschodowi, weryfikując i uzupełniając dotychczasowe informacje o ich rozmieszczeniu.

K e y w o r d s: *Cladopodiella fluitans*, *Geocalyx graveolens*, liverworts, protected species, threatened species, distribution, Roztocze National Park, SE Poland

INTRODUCTION

Geocalyx graveolens and *Cladopodiella fluitans* are liverwort species closely associated with specific plant formations, e.g. riverside forests, boggy and marshy forests or transitional and raised bogs, threatened mostly by disturbances of natural water circulation. Intensive human activity, especially the drainage of bogs and river regulation, seems to be the most important factor responsible for the destruction of these habitats. Consequently, the two liverworts are regarded as endangered in Poland and lose suitable natural habitats similarly to other components of the Polish hepaticoflora (9). Both species are strictly protected by law (the Regulation of the Minister of Environment of 19th July 2004) and included in the current red list of liverworts in Poland in the category V (vulnerable) (12).

DESCRIPTION OF NEW LOCALITIES

New localities of *Cladopodiella fluitans* and *Geocalyx graveolens* were discovered in the central and southern part of the Roztocze National Park (The Roztocze macroregion). The species had not been previously reported from this part of Poland in any bryological paper. *Cladopodiella fluitans* was reported from the area as a sporadic species in one of the phytosociological relevés conducted in patches of raised peatbog as early as 1992 (3). However, the occurrence of the taxon was not documented by the herbarium collection, which unfortunately made the confirmation of both its determination and its occurrence impossible.

Cladopodiella fluitans (Ness) H. Buch

Sampling site. The locality of the *Cladopodiella fluitans* was recorded in the “Międzyrzeki” bog (a strictly protected area of the Park), forest section 339, alt. 250 m a.s.l. (N 50°31'58" E 23°01'21"), ATMOS grid Fg 01, in September 2005 (Fig. 1A). The species grows abundantly on exposed peat in hollows of the continental raised peatbog (*Ledo-Sphagnetum magellanicum* Sukopp 1959 cm. Neuhacsl 1969) and in smaller numbers on *Sphagnum-Polytrichum* hummocks among stems of *Sphagnum magellanicum*. Four further subpopulations were found between 2006 and 2008, exclusively in the S, S-E and E parts of the strictly protected area. They are situated 0.3–0.5 km away from the first site in adjacent forest sections (334, 338–340). The taxon occurs in the same substrate and habitat conditions. The specimens recorded in the area were barren. The diversification and characteristics of local populations of the species have been studied and described in detail (24).

Ecology. *Cladopodiella fluitans* is a peatbog liverwort that occurs in hollows, sometimes directly in water, in raised peat bogs. It also grows in acidic, dystrophic transitional bogs in communities of the order *Scheuchzerietalia palustris* Nordh. 1937. It is associated with Atlantic raised peat bogs and is an indicator taxon of well-preserved plant associations of this type (2, 7, 21, 22).

Distribution in Poland. The species has a suboceanic distribution in Europe and belongs to the circumboreal element (2, 19, 21). It is widespread and quite frequent in northern Poland, especially in the Pomorskie, Mazurskie and Augustowskie Lakelands (1, 4, 5, 21, 22) while it occurs in mountainous areas considerably less often. The species is known in S-W Poland from a few localities in the Śląska Lowland (leg. W. Koła 1962, cf. 21), the Oświęcimska Basin, the Śląska and Śląsko-Krakowska Uplands (7 and lit. cited, 14) and from the Połaniecka Basin (17). *Cladopodiella fluitans* also occurs extrazonally in the mountains at scattered localities in the Sudetes (21 and lit.

cited) and is known only in the western part of the Carpathians from the Tatra Mts. (20). Its occurrence in the Beskid Śląski Range (18) has not been confirmed (16). The current distribution of the species in Poland is mapped in Figure 2.

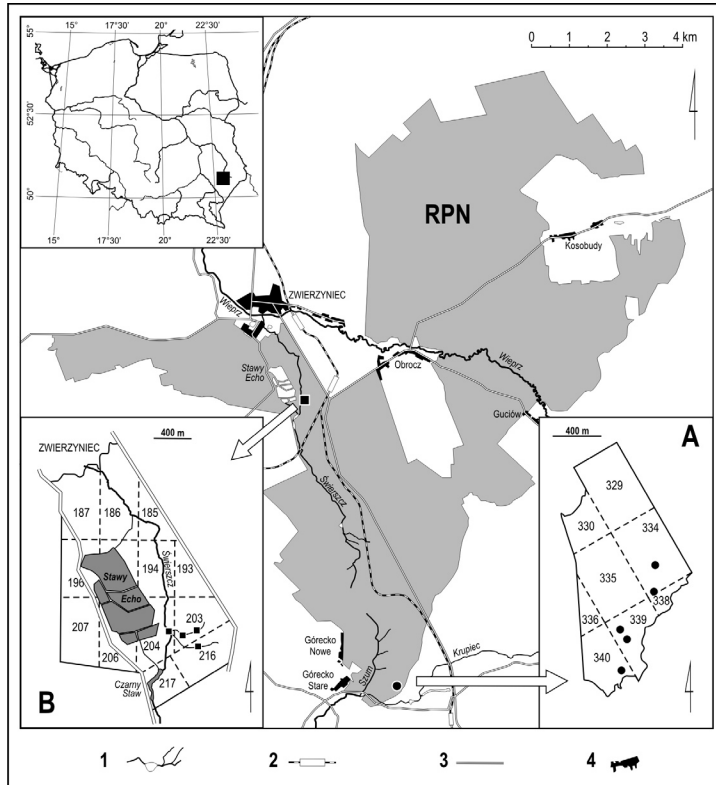


Figure 1. New localities of *Cladopodiella fluitans* (circles) and *Geocalyx graveolens* (squares) in the Roztocze National Park (RPN). Key: A – the strictly protected area “Międzyrzeki”, B – surroundings of the Stawy Echo ponds, 1 – rivers and ponds, 2 – railways, 3 – roads, 4 – buildings

Geocalyx graveolens (Schrad.) Ness. Turpswort.

Sampling site. The locality of *Geocalyx graveolens* was discovered in the Świerszcz river valley, ca. 350 m N of the Czarny Staw pond, near the S-E banks of the Stawy Echo ponds, forest section 203, alt. 240 m a.s.l. (N 50°35'42", E 22°59'15"), ATMOS grid Eg 91, in April 2008. Further specimens were recorded very close to the place of the first collection (forest sect. 204, 216) in autumn 2008 (Fig. 1B). The taxon occurs here in boggy patches of the riverside alder forest, *Fraxino-Alnetum* W. Mat. 1952, on humus on the river banks, at the base of alder trunks and decaying logs, quite abundantly in places. All the samples recorded were barren.

Ecology. *Geocalyx graveolens* grows on rock, frequently on sandstones, mineral soil and humus in the mountains (especially in forest zone), while it occurs on rotting wood, humus and tree bases in wet and very wet sites, such as alder forests, e.g. *Fraxino-Alnetum*, *Carici elongate-Alnetum* Sok. 1972, or other types of boggy forests (*Alnetea* class) in the lowland (2, 8, 10, 22, 23).

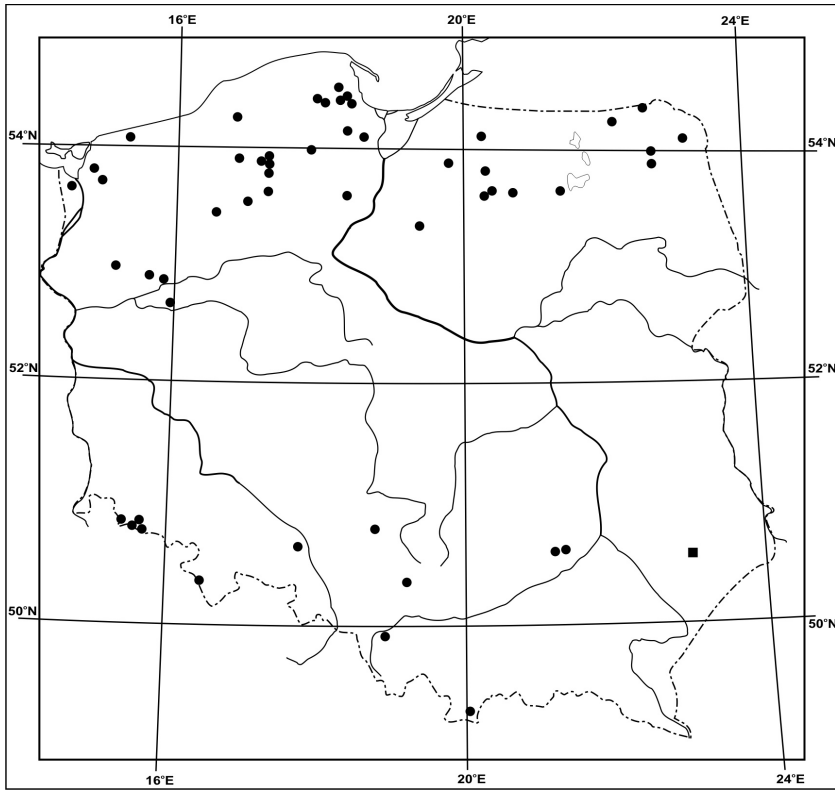


Figure 2. Distribution of *Cladopodiella fluitans* in Poland according to Szwejkowski 1964 (extended and changed). Key: new locality is marked as square

Distribution in Poland. *Geocalyx graveolens* exhibits a boreal-montane distribution in Europe (2, 19, 23). The species has two centres of occurrence in Poland: (1) the Eastern and Central Sudetes and the Western Beskidy Mts., and (2) the north-eastern lowland. It also occurs in the north-western lowland in very small numbers. The majority of its localities in northern Poland were recorded prior to 1900 (cf. 23). Other localities from the west, central and north-eastern parts of Poland were reported in the 20th and 21st centuries (1, 4, 5, 8, 10). The species is known from one locality in the Kielecka Upland but it was marked as questionable (cf. 23). In the Carpathians, it is known only from their western part from a few dispersed localities in the Beskid Wysoki Range (6, 11), the Gorce Range (15) and in the Tatra Mts. (13, 20). The occurrence of the species in the Beskid Śląski Range (18) has not been confirmed (16). The recent distribution of the species in Poland is mapped in Figure 3.

CONCLUSIONS

The present localities of *Cladopodiella fluitans* and *Geocalyx graveolens* are the first sites in the Lublin district and the easternmost localities in South-east Poland. They considerably extend their occurrence ranges in Poland. The species do

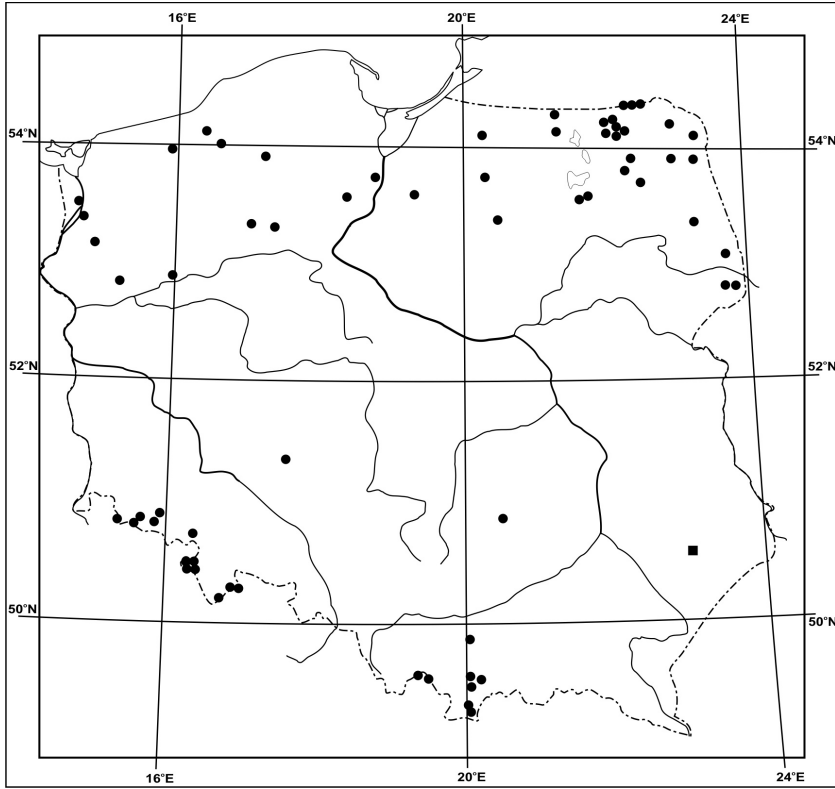


Figure 3. Distribution of *Geocalyx graveolens* in Poland according to Szweykowski & Koźlica 1974 (extended and changed). Key: new locality is marked as square

not seem to be disappearing at the localities and signs of expansion have been observed in the case of *Cladopodiella fluitans* (comp. 24).

It is very likely that *Cladopodiella fluitans* or *Geocalyx graveolens* will be collected in the future, especially in the north-eastern and southern parts of the Lublin district rich in habitats particularly suitable for these liverworts, e.g. Polesie, the Łęczyńsko-Włodawskie Lakeland or the Puszcza Solska Forest. The presence of the taxa in the Roztocze away from the centers of their ranges may also suggest that the hepaticoflora of the region is still unequally and insufficiently known and should be examined further.

Herbarium specimens of both species are in the author's collection. Their duplicates are deposited in the liverwort herbarium of the Department of Botany and Mycology, Maria Curie-Skłodowska University, Lublin (LBL).

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