https://ojs.lib.unideb.hu/kitaibelia
ISSN 2064-4507 (Online) ● ISSN 1219-9672 (Print)

31(1): 95–100.; 2026
DOI: 10.17542/kit.31.088
research paper • eredeti közlemény

New records of *Parmelia submontana* (Parmeliaceae, lichenized Ascomycota) in the Mátra Mts, North Hungary

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A *Parmelia submontana* (Parmeliaceae, lichenizált Ascomycota) új előfordulásai a Mátrából

Összefoglalás – A mediterrán párás hegyvidéki erdők zuzmófajának tartott *Parmelia submontana* Hale eddig mindössze négy példányban került begyűjtésre hazánkból. Egy 1974-ben gyűjtött, tévesen azonosított példány nemrégiben történt revíziója bizonyította, majd további négy, 2024-ben és 2025-ben gyűjtött példány pedig megerősítette a faj jelenlétét a Mátra hegységben. Eredményeink összhangban vannak a faj utóbbi évtizedekben tapasztalt európai terjedésével, valamint azzal, hogy az elmúlt években több magyarországi tájról is kimutatták.

Kulcsszavak: Északi-középhegység, éves csapadékösszeg, florisztika, hegyvidéki élőhely, klímaváltozás, ritka faj, zuzmóképző gombák

Summary – So far *Parmelia submontane* Hale, considered a Mediterranean species of humid montane forests, had only four collected specimens from Hungary. A recent revision of a misidentified specimen collected in 1974 proved its existence in the Mátra Mts and further four collections from years 2024 and 2025 confirmed presence of the species here. Our findings are in line with a spreading trend of the species across Europe in last decades and as well as with recent collections from a number of Hungarian landscapes.

Keywords: chorology, climate change, Hungarian Northern Mountain Range, lichen-forming fungi, mean annual precipitation, montane habitat, rare species

The species

Taxonomic views on and nomenclature of the European-North-African *Parmelia submontana* Hale, a member of the species-rich genus of shield lichens, have changed considerably (*syn*.: *Parmelia bohemica* Nádv. non Gyeln., *P. contorta* Bory non (Hoffm.) Spreng., *P. saxatilis* var. *contorta* (Bory) Zahlbr., *P. sulcata* var. *contorta* ("Bory") Nyl., *P. sulcata* var. *contortoides* Zahlbr.) until reaching the recent scientific name (HALE 1987). *Parmelia submontana* is accepted and confirmed as a distinct species also by molecular genetic studies (MOLINA *et al.* 2004, 2011, THELL *et al.* 2017).

Thallus foliose, heteromerous, dorsiventral, very loosely attached, not forming rosettes. Lobes strap-shaped, geotropically oriented, with upwards incurved apices, sublinear, elon-

gate, separate, to 7 cm long, 2–4(–6) mm wide, often with down-rolled margins. Upper surface grey (to pale brown in exposed situations), with a network of white, elongated pseudocyphellae which erode to form punctiform, up to 0.3 mm wide soralia soon developing dense clusters of subglobose to ovoid, rarely coralloid, *c*. 0.2 mm wide, soft isidioid outgrowths. Lower surface black, except at the brown apices, with simple to rarely furcate, black rhizines, most abundant in the older parts of thallus (*https://italic.units.it*).

This corticolous species is originally the most frequent in the Mediterranean–Southern European mountain ranges *(https://italic.units.it*) and less frequent in Central Europe but found in most countries (AT, DE, CZ, SK, PL). It usually inhabits regions with high amounts of precipitation but occurs in well-lit conditions (Wirth *et al.* 2013). In Italy it is mainly reported from old *Fagus* and *Abies* trunks in humid montane forests (*https://italic.units.it*) while in Germany it is confined to colline and submontane altitudes with almost 90% of records from these zones (*https://www.flechten-deutschland.de)*.

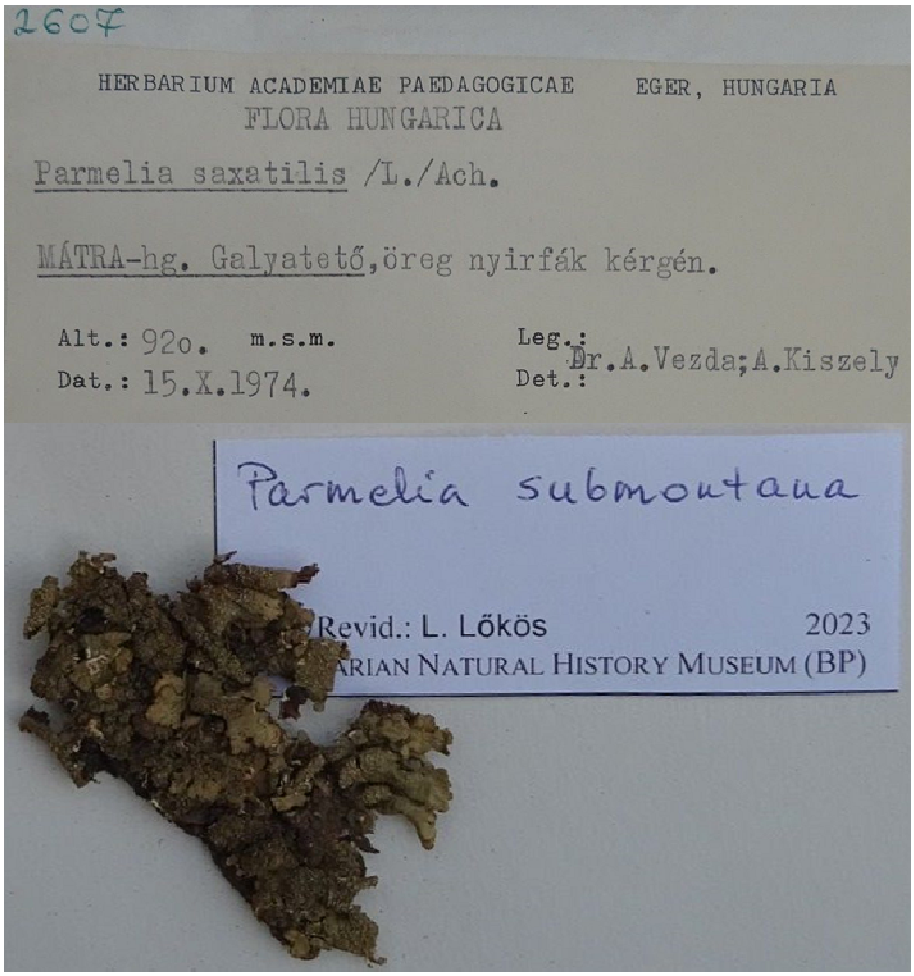

Fig. 1 The first known specimen of *Parmelia submontana* from Mátra Mts, after its revision in 2023 (photo: L. Lőkös)
1. ábra A *Parmelia submontana* elsőként gyűjtött mátrai példánya 2023-as revíziójakor (fotó: Lőkös L.)

Chorological trends

Since the late 1980s an increasing number of records from the northern edge of its distribution have been reported (FAŁTYNOWICZ *et al.* 2025). An apparent expansion of its area towards the north has also been observed in the last four decades. The species has first been recorded in The Netherlands in 1985 (VAN DEN BOOM *et al.* 1994), in Scandinavia 37 years ago (Sweden; ARVIDSSON 1989) while it has been reported as new for Scotland (CRITTENDEN 1992), Denmark (CHRISTENSEN 1997), Belgium (SÉRUSIAUX *et al.* 1999), Norway (GAUSLAA 1999) as well as for Lithuania (MOTIEJUNAITE 2002). Further spreading in the UK (https://wales-lichens.org.uk/node/173) and Scandinavia has recently been summarized (THELL *et al.* 2017). Parallel with geographical spreading, increasing frequency on the former marginal areas such as Central Europea has also been detected (Germany: SCHINDLER 1997, Czech Republic: *https://dalib.cz*, Slovakia: ORTHOVÁ 2000).

Hungarian recods

In Hungary *Parmelia submontana* has been recorded first time in the Bükk Mts (Kismező) by Fóriss in 1927. Revision of another alleged specimen also from the Bükk Mts (Osztra-tető, Kiszelyné-Vámosi A., 1987) revealed an erroneous identification (FARKAS *et al.* 2024). Almost a century later, four more collections were reported within three years from the country between 2020 and 2022 (FARKAS & LŐKÖS 2020, FARKAS *et al*. 2024). So far no record from the Mátra Mts has been known as no collections were available and no publications on the regional lichen flora (e.g. GALLÉ 1975, KISZELYNÉ-VÁMOSI 1968, 1971, 1980, 1982–1983, VERSEGHY 1994, MOLNÁR 2005) mentioned the species.

Studied specimens

- Hungary, Heves County, Mátra Mts., Mátraszentimre–Galyatető, [öreg nyírfák kérgén] on bark of old birch trees, alt. 920 m a.s.l., (8085.4), leg. A. Vězda, A. Kiszelyné-Vámosi, 15.X.1974., [EGR 2607], labelled as *Parmelia saxatilis* (L.) Ach., rev.: L. Lőkös (2023) as *Parmelia submontana* Hale (Fig. 1).
- Hungary, Heves County, Mátra Mts., Mátraszentimre–Galyatető, 100 m southwest of 27/C forest lot, near Imre Madách (Mező) street in park, on bark of old *Betula pendula*, N47° 54.917' E19° 55.218', alt. *ca* 945 m a.s.l., (8085.4), leg.: G. Matus, 01.IX.2024., [BP, DE 53/447] (Fig. 2).
- Hungary, Heves County, Mátra Mts, Mátraszentimre, Galyatető, a park with old birch and spruce trees at Mező Imre utca, on bark (*Betula pendula*). N47° 54.920' E19° 55.216', alt.: *ca*. 950 m a.s.l. (8085.4), leg.: B. Döme, L., Lőkös (GPS 259), 01.XI.2024 [hb. Lőkös].
- Hungary, Heves County, Mátra Mts., Gyöngyös–Mátraháza, north of Hotel Ózon Villa Park, south of Kecske-bérc, at the eastern edge of 11/B forest lot, by yellow strip tourist path, on north-eastern side of *Quercus petraea* trunk, in oak-beech forest, N47° 51.587' E19° 58.358', alt. 671 m a.s.l., (8185.2), leg.: G. Matus, 06.VIII.2025 [DE 62/800].
- Hungary, Heves County, Mátra Mts., Mátraszentimre–Galyatető, near Nyírfás street, on bark of newly felled and chopped old *Cerasus avium* in park near Galyatető Grand Hotel, N47° 54.844' E19° 55.263', alt. 928 m a.s.l., (8085.4), leg.: G. Matus, 08.VIII.2025 [DE 62/867].

Fig. 2 Detail of the largest found group of thalli of *Parmelia submontana* Hale on trunk of an old *Betula pendula* at Mátraszentimre-Galyatető, Mátra Mts. (photo: G. Matus)
2. ábra A *Parmelia submontana* Hale legnagyobb talált telepcsoportjának részlete Mátraszentimre-Galyatetőn, idős *Betula pendula* törzsön (fotó: Matus G.)

Discussion

In Hungary, almost half a century passed before the second specimen was found (the Galyatető specimen from 1974 after revision revealed it), and then it took a similarly long time to collect the third specimen. It is particularly noteworthy that, including to the data presented in this article, six more specimens were collected between 2020 and 2025 (FARKAS & LŐKÖS 2020, FARKAS *et al.* 2024). These include both mountainous and lowland occurrences, but these locations share the common characteristic of high average annual precipitation.

Like most thalli throughout the distribution range, all our studied specimens are sterile as apothecia are extremely rare. Vegetative reproduction by soredia and soft isidioid outgrowths (also called as granular to nearly isidioid soredia) (*https://www.afl-lichenologie.fr*, *https://italic.units.it,* CRITTENDEN 1992) can, however, result in local abundance. Italian sources report that it can be locally very abundant in *Fagus* forests of the Apennines (*https://italic.units.it*) and abundant growth, stretching to entire trunks and branches has also been found in a site in Slovakia (ORTHOVÁ 2000). The Galyatető group of thalli found in 2024 on an old birch tree (with a diameter at breast height of 32 to 35 cm) covers the full northern side (from NW to E) of trunk from the ground up to 300 cm. The estimated area occupied by thalli here was about 1.1–1.2 m^2. Size of the other two newly found thalli, however, does not exceed 100 cm^2 just like in most sites at the northern part of the Carpathian Basin (ORTHOVÁ 2000). Similarly, north-eastern side exposure was observed at the Mátraháza specimen growing on a medium sized *Quercus petraea* and found at 1.5 m height. In the

case of the Galyatető record from 2025, however, it was not possible to determine the exposure or height of thalli as the substrate, trunk of a cherry tree, was already felled and chopped up.

Analysis of some pieces of literature and websites where substrate was also mentioned (SCHINDLER 1997, ORTHOVÁ 2000, *https://dalib.cz*, *https://italic.units.it/*, *https://www.verspreidingsatlas.nl*) has revealed that the most frequent substrates in Central Europe and the Mediterranean are *Acer* spp., *Fraxinus excelsior*, *Fagus sylvatica* but about 30 additional woody species, including some shrubs, are mentioned as substrates. This distribution seems to reflect dominance distribution of tree species in these regions rather than preference among them. Chemistry of bark also seems subordinated as the mentioned substrates include neutral (*Acer*, *Salix*, *Ulmus*) as well as moderately acidic (*Alnus*, *Fagus*, *Fraxinus*) and some more acidic barked (*Betula*, *Quercus*) species. Conifers with extremely acidic barks (*Abies*, *Larix, Picea*) (*https://britishlichensociety.org.uk/learning/lichen-ecology*), however, were less common than their frequency in the region would suggest. Non-corticolous records (e.g. moss-covered rock) are extremely rare. Specimens from the Mátra Mts are collected from relatively rare but not uncommon substrates.

Further Hungarian records of the species will most likely come from areas having over 750 mm mean annual precipitation (Southwestern and Western Hungary as well as Mecsek, Bakony, Börzsöny, Mátra, Bükk and Zemplén Mts) and somewhat less likely from all other areas having over 650 mm precipitation. Typical substrates of the species such as *Fagus sylvatica*, *Fraxinus excelsior* and *Acer pseudoplatanus* are likely to host majority of further findings possibly together with *Quercus* spp., forming most of forests in the country.

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Beérkezett / received: 2026. 01. 08. ● Elfogadva / accepted: 2026. 02. 16.