

## TAXONOMICAL AND CHOROLOGICAL NOTES 12 (126–136)

Beáta PAPP<sup>1</sup>, Peter ERZBERGER<sup>2</sup>, László LÖKÖS<sup>3</sup>, Erzsébet SZURDOKI<sup>4</sup>,  
Csaba NÉMETH<sup>5</sup>, Krisztina BUCZKÓ<sup>6</sup>, Mária HÖHN<sup>7</sup>,  
Rebeka ASZALÓSNÉ BALOGH<sup>8</sup>, Kornél BARÁTH<sup>9</sup>,  
Gábor MATUS<sup>10</sup>, Dániel PIFKÓ<sup>11</sup> and Edit FARKAS<sup>12</sup>

<sup>1,3,4,6</sup>Department of Botany, Hungarian Natural History Museum  
H–1431 Budapest, Pf. 137, Hungary; <sup>1</sup>papp.beata@nhmus.hu, <sup>3</sup>lokos.laszlo@nhmus.hu,

<sup>4</sup>szurdoki.erzsebet@nhmus.hu, <sup>6</sup>buczko.krisztina@nhmus.hu

<sup>2</sup>Belziger Str. 37, D-10823 Berlin, Germany; erzberger.peter@gmail.com

<sup>5</sup>GINOP Sustainable Ecosystems Group, Centre for Ecological Research  
H–8237 Tihany, Klebelsberg Kuno út 3, Hungary; nemetsaba@gmail.com

<sup>7</sup>Department of Botany and Soroksár Botanical Garden, Faculty of Horticultural Science,  
Szent István University, Budapest, Hungary; hohn.maria@kertk.szie.hu

<sup>8,10</sup>Department of Botany, Institute of Biology and Ecology, Faculty of Science and Technology,  
University of Debrecen, H–4032 Debrecen, Egyetem tér 1, Hungary; <sup>8</sup>beca002@gmail.com,

<sup>10</sup>matus.gabor@science.unideb.hu

<sup>9</sup>Department of Biology, Savaria Campus, Eötvös Loránd University  
H–9700 Szombathely, Károlyi Gáspár tér 4, Hungary; barath.kornel@ttk.nyme.hu

<sup>11</sup>National Educational Library and Museum 1087 Budapest Könyves Kálmán krt. 40, Hungary

<sup>12</sup>Institute of Ecology and Botany, MTA Centre for Ecological Research  
H–2163 Vácrátót, Alkotmány u. 2–4, Hungary; farkas.edit@okologia.mta.hu

Papp, B., Erzberger, P., Lökös, L., Szurdoki, E., Németh, Cs., Buczkó, K., Höhn, M., Aszalósné Balogh, R., Baráth, K., Matus, G., Pifkó, D. & Farkas, E. (2020): Taxonomical and chorological notes 12 (126–136). – *Studia bot. hung.* 51(1): 77–98.

**Abstract:** The present part of the series provides new records of 11 taxa, among them five lichen-forming fungi and six bryophytes. One lichen-forming fungus was discovered as new species in Hungary (*Parmeliella triptophylla*), however it was collected 115 years ago, this species should be considered as an extinct species in Hungary. One bryophyte is newly reported from Hungary (*Brachytheciastrum olympicum*). The occurrence of one lichen-forming fungus (*Parmelia submontana*) and two bryophyte species (*Palustriella falcata*, *Ptychostomum pseudotriquetrum* var. *bimum*) was confirmed in Hungary. Amendments to the known distribution of lichen-forming fungi species are reported from Hungary (*Cladonia mitis*) and Romania (*Multiclavula mucida*, *Xanthoparmelia protomatrae*) and three bryophytes from Hungary are also reported (*Callicladium haldanianum*, *Codonoblepharon forsteri*, *Ephemerum cohaerens*).

**Key words:** Amblystegiaceae, Brachytheciaceae, Bryaceae, bryophyte, Callicladiaceae, Cladonia-ceae, Clavulinaceae, Hungary, lichen-forming fungi, Orthotrichaceae, Pannariaceae, Parmeliaceae, Pottiaceae, Romania

## INTRODUCTION

This paper is the twelfth part of the series launched in *Studia botanica hungarica* focusing on the new chorological records, nomenclature, and taxonomy of plant species from algae to vascular plants and fungi (BARINA *et al.* 2015, 2020, CSIKY *et al.* 2017, DEME *et al.* 2019, KIRÁLY *et al.* 2019*a, b*, MATUS *et al.* 2018, MESTERHÁZY *et al.* 2017, PAPP *et al.* 2016, SCHMIDT *et al.* 2018, TAKÁCS *et al.* 2016).

## MATERIAL AND METHODS

Nomenclature and taxonomy of lichen-forming fungi and bryophytes follow CABI (2020), ROBERT *et al.* (2020) and HODGETTS *et al.* (2020), respectively. Codes of the Central European Flora Mapping grid are in square brackets. Abbreviations of herbaria follow THIERS (2017).

## NEW RECORDS WITH ANNOTATIONS

### Lichen-forming fungi

#### (126) *Cladonia mitis* Sandst. (Cladoniaceae)

Hungary, Hajdú-Bihar County, Nyírség, Hajdúsámson: Martinkai-legelő (on EOTR 69-221 map as Csernusz-puszta), west of forest lot 135/A, 47.57975° N 21.80393° E, alt.: 134 m, 24.11.2018, leg.: G. Matus, R. Balogh, det.: L. Lökös, E. Farkas, N. Varga (DE 6267, BP 96764).

Former Hungarian records of this ‘reindeer lichen’ are predominantly from regions of higher altitude and of higher precipitation like the Northern Mountain Range (Zemplén, Bükk, and Cserhát), the Transdanubian Middle Range (Pilis, Velence, Bakony, and Balaton Uplands), as well as the Mecsek Mts in South and Őrség in West Hungary, respectively (Fig. 1, FARKAS *et al.* 2012, VARGA *et al.* 2014, VERSEGHY 1994). The occurrence of the species in the easternmost part of Hungary at such a low altitude and under continental climate is remarkable.

The recent record is new for the Nyírség, as well as for the whole Eupannonicum (Hungarian Plains). HPTLC analysis for chemical substances was applied in solvent system *C* according to ARUP *et al.* (1993) and has indicated the presence of usnic acid and rangiformic acid.

*Cladonia mitis* (Figs 2–3) is a legally protected lichen species in Hungary [18/2008(VI.19) KvVM, 83/2013.(IX.25.) VM] and is a species of community interest [Habitat Directive 92/43 EEC, annex V]. The specimens have been collected on the northern slope of a sand dune, in *Festucetum vaginatae*, on acidic sandy soil, at a military training area abandoned decades ago (along an eroded infantry

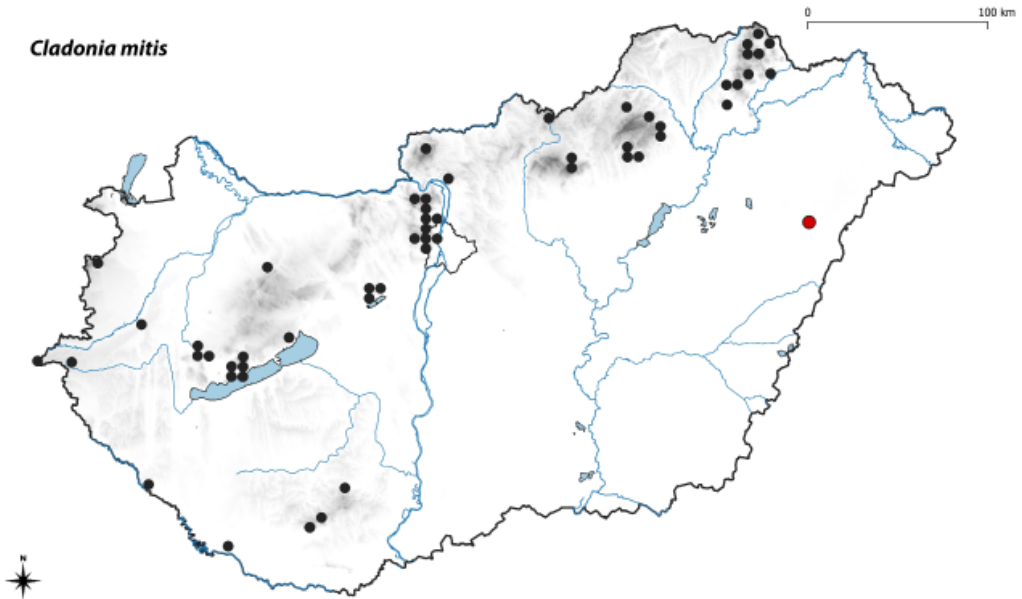


Fig. 1. Known occurrences of *Cladonia mitis* in Hungary.



Fig. 2. *Cladonia mitis* in Hajdúsámson, Martinkai-legelő (Nyírség, E Hungary).



Fig. 3. *Cladonia mitis* in Hajdúsámson, Martinkai-legelő (Nyírség, E Hungary).

trench). Accompanying cryptogams were *Cladonia convoluta*, *C. cf. fimbriata*, *C. magyarica*, *C. rangiformis*, *C. subrangiformis*, *Brachythecium albicans*, *Polytrichum piliferum*, together with vascular plants as *Carex hirta*, *Centaurea micranthos*, *Chondrilla juncea*, *Crepis rhoeadifolia*, *Cynodon dactylon*, *Euphorbia cyparissias*, *Equisetum ramosissimum*, *Eryngium campestre*, *Hieracium pilosella*, *Hypericum perforatum*, *Hypochoeris radicata*, *Luzula campestris*, *Poa bulbosa*, *Potentilla arenaria*, *Rumex acetosella*, *Vicia lathyroides*.

Work of R. A. Balogh has been supported by the ÚNKP-19-3-I-DE-392 New National Excellence Program of the Ministry for Innovation and Technology, and also by the project of National Research, Development and Innovation Office, NKFI K124341.

R. A. Balogh, G. Matus, L. Lőkös, N. Varga and E. Farkas

(127) *Multiclavula mucida* (Pers.) R. H. Petersen (Clavulinaceae)

Romania. Suceava County, Municipiul Vatra Dornei, Commune Poiana Stampei, Dorna valley at village Căsoi, in Rezervația naturală ‘Tinovul Mare Poiana Stampei’, on heavily wet stump of a fallen coniferous tree. Lat.: 47.299728° N, long.: 25.114134° E, alt.: ca 920 m a.s.l. Leg.: L. Lőkös, D. Pifkó, 06.08.2019. [BP 96765] (Fig. 4).

The first Romanian record of *Multiclavula mucida* was reported from the Mureş valley (Eastern Carpathians, Romania) in 2018 (SCHMIDT *et al.* 2018). The new record from Poiana Stampei is the second known occurrence from Romania at the northwestern border of the Călimani Mts *ca* 40 km from the first locality (cf. CIURCHEA 2004, ELIADE 1965) (Fig. 5).

Due to its botanical values this peat bog area received a reservation status in 1955 (nr. 1625), and legal protection in 2000 (nr. 5/2000, pos. 2715, Annex I). Later it became also a Natura 2000 area (ROSCI0247) in 2007, and partly a Ramsar site (nr. 2003) in 2012. It is the largest peat bog area in Romania, its wooded (*Betula*, *Picea*, *Pinus*) vegetation can supply continuous humid conditions for the rather hygrophilous cryptogams.

The fieldwork was supported by the project NKFI K119208, and laboratory work also by the project NKFI K124341.

L. Lőkös, E. Farkas, M. Höhn, D. Pifkó, E. Szurdoki and K. Buczkó



Fig. 4. *Multiclavula mucida* in reserve ‘Tinovul Mare Poiana Stampei’ (Eastern Carpathians, Romania) (Photo: Lőkös, L., 2019)

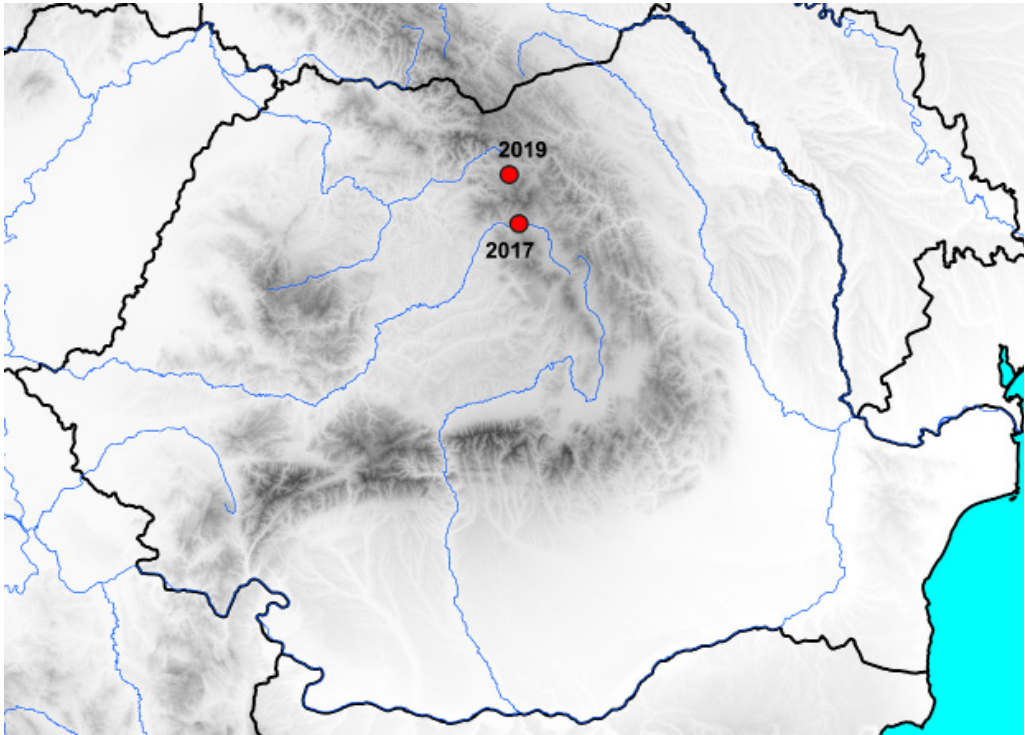


Fig. 5. Known occurrences of *Multiclavula mucida* in Romania.

(128) *Parmelia submontana* Hale (Parmeliaceae)

Hungary. Pest County, Börzsöny Mts, southern slope of Mt Magas-Tax at 'Taxi nyiladék', ca 3.1 km NE of Szokolya-Királyrét, on bark of an old *Quercus petraea* in an oak wood. Lat.: 47.911818° N, long.: 18.946406° E, alt.: ca 450 m a.s.l. Leg. E. Farkas and L. Lőkös, 06.06.2020. [BP 96766] (Fig. 6). – Hungary. Pest County, Buda Mts, SE side of Mt Meszes-hegy above valley Cseresznyés-völgy, ca 4,7 km WNW of Nagykovácsi, on bark (*Fraxinus ornus*). Lat.: 47.587824° N, long.: 18.821284° E, alt.: ca 380 m a.s.l. Leg. L. Lőkös, 12.07.2020. [BP 96767].

*Parmelia submontana* Hale is a lichen species with predominantly European distribution, a Mediterranean-South-European montane element (HALE 1987, SCHINDLER 1975, 1997). Earlier it was considered as an infraspecific taxon of *Parmelia sulcata* Tayl. with elongated lobes (e.g. NYLANDER 1860, ZAHLBRUCKNER 1907, 1927). It was accepted at species level by Mason E. Hale providing a clear interpretation of its diagnostic characters, i.e. the long, hanging, separate, strap-shaped, little branched lobes; numerous, mostly laminal, orbicular soralia; granular to isidioid soredia; small, effigurate pseudocyphellae pattern; sparse, mostly simple rhizines (HALE 1987). Since the early synonym names for this taxon proved to be illegitim from nomenclatural point of view, a new, legitim name was also given (HALE 1987). Its position in the *Parmelia*

*saxatilis* clade in the phylogenetic tree was confirmed by molecular genetic studies, its clear separation from other really isidiate species was well supported (OSSOWSKA *et al.* 2018).



**Fig. 6.** *Parmelia submontana*, growing on *Quercus* bark (Magas-Tax, Börzsöny Mts, Hungary)  
(Photo: Farkas, E.)

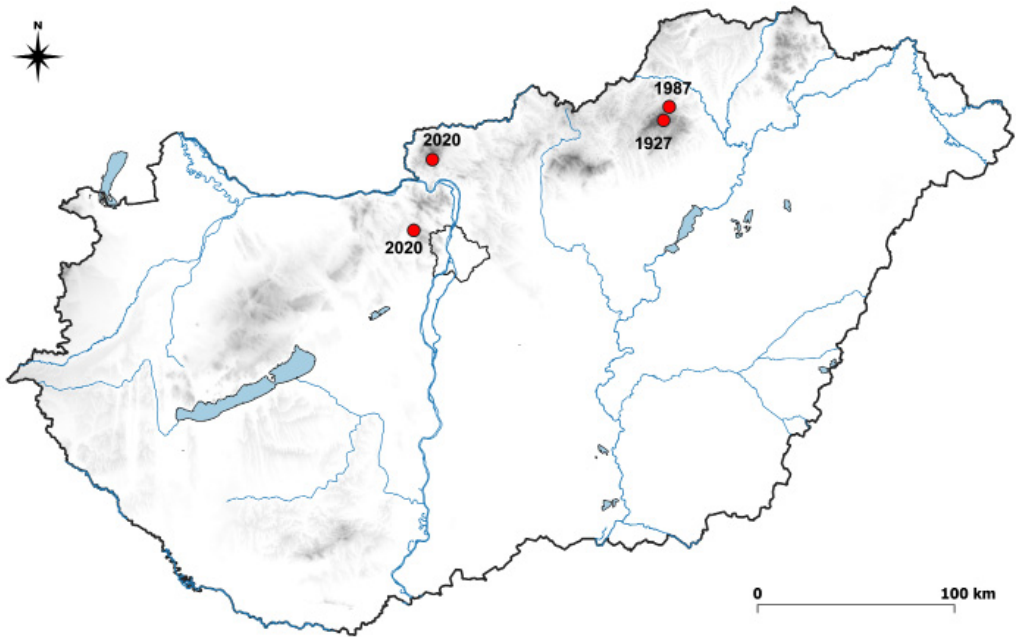


Fig. 7. Known occurrences of *Parmelia submontana* in Hungary.

The first Hungarian specimen of *Parmelia submontana* was collected by F. Fóris (as *P. sulcata*) from beech bark at 'Kismező' in the Bükk Mts in 1927 (revised later as *P. contorta* by K. Verseghy). The second known locality was reported also from the Bükk Mts ('Osztra-tető') by KISZELY VÁMOSI *et al.* (1989) (as *Parmelia contorta*). Both specimens were published under the name *Parmelia contorta* by VERSEGHY (1994).

The new Hungarian localities of *Parmelia submontana* were found 1) in Mt Magas-Tax in the Börzsöny Mts during the 20th Hungarian Biodiversity Days in 2020, where it grew on oak trees; and 2) in Mt Meszes-hegy, Buda Mts, growing on ash tree. *P. submontana* might be one of the Mediterranean lichen species, expectedly spreading further in Hungary due to global climatic changes. It is new to both the Börzsöny and the Buda Mts. Based on its rare occurrence (Fig. 7) it is suggested for 'vulnerable' category in the Hungarian lichen red list.

Laboratory investigation was supported by the project NKFI K124341.

E. Farkas and L. Lökös

(129) *Parmeliella triptophylla* (Ach.) Müll. Arg. (Pannariaceae)

Hung. med. In monte Dobogókő. Leg.: Tomek, J., 24.04.1905 [BP 83137 sub *Parmelia trichotera*]. – New to Hungary!

The Pannariaceae family was represented in Hungary only with 3 species, i.e. *Fuscopannaria leucophaea* (11 localities), *Moelleropsis nebulosa* (9 localities), and



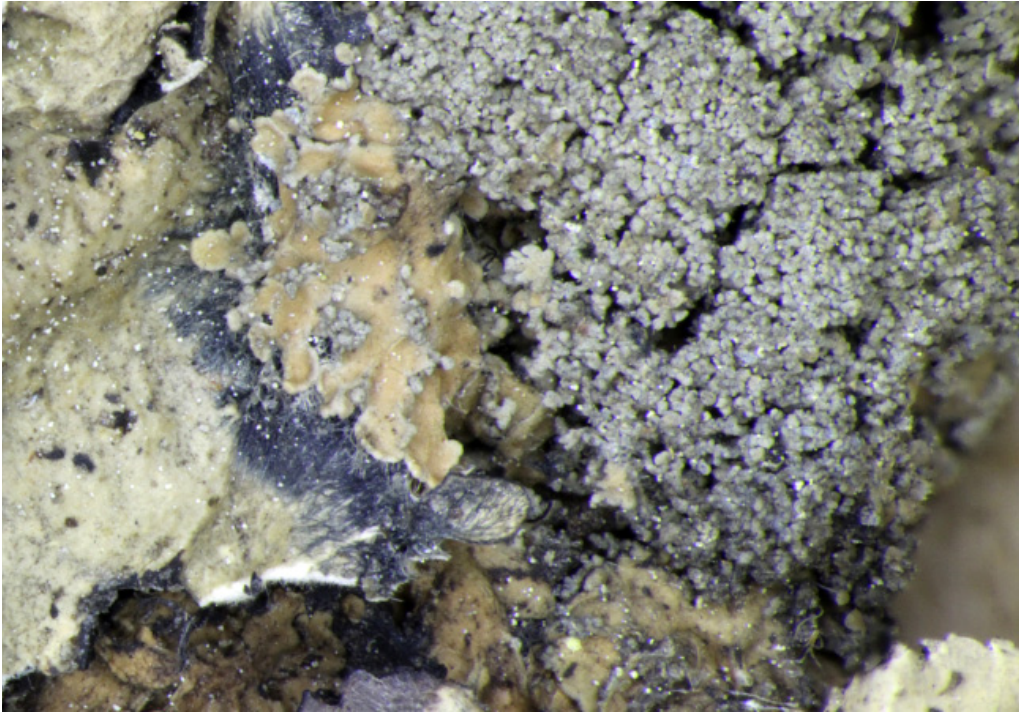


Fig. 8. *Parmeliella triptophylla* growing on *Parmotrema perlatum* thallus in Dobogókő (Visegrád Mts, Hungary) (BP 83137).

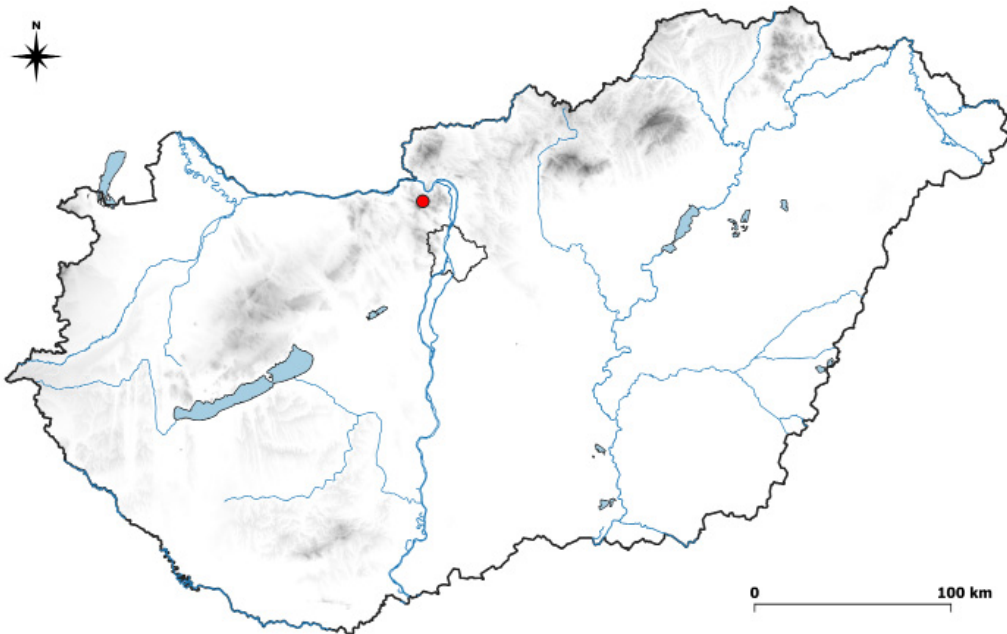


Fig. 9. Old occurrence of *Parmeliella triptophylla* in Hungary.

*Protopannaria pezizoides* (3 localities) (KÖFARAGÓ-GYELNIK 1940, SZATALA 1930, VERSEGHY 1994). All of them are rare, with a few specimens only, mostly from the first half of the last century (before 1964).

*Parmeliella triptophylla* is a widespread cool-temperate species, circumtemperate in the Northern Hemisphere, growing in humid montane forests, usually on old shaded trees (JØRGENSEN 1987, 2007). It is characterised by the wide black prothallus, and the coralloid isidia.

The Hungarian specimen was found incidentally, during the revision of some old *Parmelia trichotera* specimens. *Parmeliella triptophylla* was growing on the thallus of *Parmotrema perlatum* (Fig. 8), and it was misidentified as *Parmelia dubia*. The specimen was collected 115 years ago, when climatic conditions in the Dobogókő region (Fig. 9) were probably more favourable for this species. *Parmeliella triptophylla* should be considered as an extinct species in Hungary in the Hungarian lichen red list.

The laboratory work was supported by the project NKFI K124341.

L. Lőkös and E. Farkas

(130) *Xanthoparmelia protomatrae* (Gyeln.) Hale (Parmeliaceae)

Romania. Mureş County, Lunca Bradului (Palotailva), steep siliceous rocky ridges in Mureş valley at the southwestern border of the Călimani Mts (Eastern Carpathians), ca 1.1 km ENE of Neagra, on exposed siliceous rock. Lat.: 46.969205° N, long.: 25.170631° E, alt.: ca 705 m a.s.l. Leg.: Lőkös, L., Höhn, M. and Szurdoki, E., 26.09.2017 [BP 96768]. – Romania. Mureş County, Lunca Bradului (Palotailva), steep siliceous rocky ridges in Mureş valley at the southwestern border of the Călimani Mts (Eastern Carpathians), ca 1.1 km ENE of Neagra, on exposed siliceous rock. Lat.: 46.968895° N, long.: 25.170852° E, alt.: ca 685 m a.s.l. Leg.: Lőkös, L., Höhn, M. and Szurdoki, E., 26.09.2017 [BP 96769]. – New to the Călimani Mts (Eastern Carpathians).

Old Romanian records (before 1940): Hungaria. Com. Szatmár. In rupibus trachyticis in Valea mare prope pag. Nagysikárló. Alt. ca. 230–270 m s. m. Leg.: Fóriiss, F. (4534), 17.06.1918. [herb. Kazinczy Ferenc Múzeum] (FÓRISS 1937 as *Parmelia protomatrae* f. *crustaeformis*). – Hungaria. Albae Carolinae, Pulverthurm. Leg.: Haynald, L., 26. Aug. 185x [ca 1852–1863]. [BP 21625] (GYELNIK 1931 as *Parmelia protomatrae* var. *tenuior*, HALE 1974, 1990, KROG 1978). – Transsilvania, Domugledicum, Herkulesfürdő, in valle Cserna Patak, ad saxa silicea. Leg.: V. Gyelnik, 21.07.1935. [herb. n.a.] (GYELNIK 1938 as *Parmelia protomatrae* f. *crustaeformis*). – In corticibus Alnorum. Váradsja. Leg.: Haynald, L. (Crypt. 4254), 12.04.1858. [BP 23608]. – Transsilvania, distr. Turda. Fissura Cheia Turzii, in rupibus porphyritico-tuffaceis, sub “Povârnişul Pop”. Alt. cca 480 m s. m. Leg.: Cretzoiu, P., Nyárády, E. I., Pteaneu, P., 26.10.1939. [BP 21684] (Flora Romaniae exsiccata, no. 1827). (BORZA 1940 as *Parmelia conspersa*).

Based on its special chemical character *Xanthoparmelia protomatrae* was described by Vilmos Gyelnik from the Visegrád Mts (Hungary) (GYELNIK 1931, as

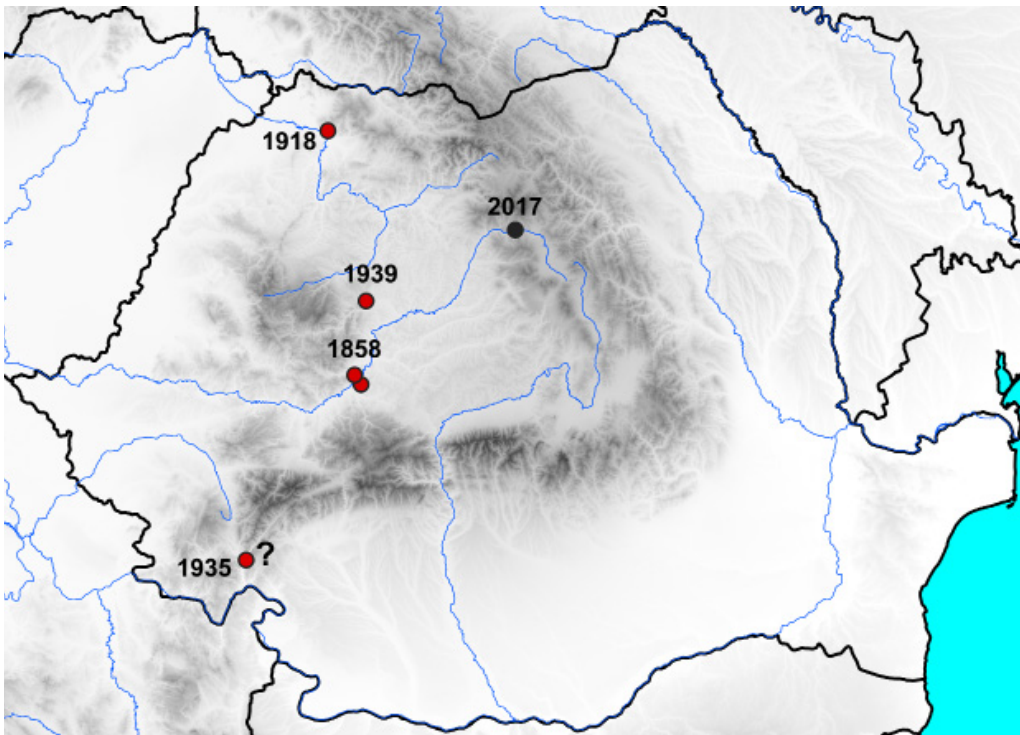


Fig. 10. Distribution of *Xanthoparmelia protomatrae* in Romania (? = literature record, location of the specimen is unknown).

*Parmelia protomatrae*). It was also accepted at species level (as *Xanthoparmelia protomatrae*) by KROG (1978), HALE (1990), VERSEGHY (1988, 1994), as well as in modern molecular genetic papers (BLANCO *et al.* 2004, CRESPO *et al.* 2010). *Xanthoparmelia protomatrae* was also treated as a species in the first European checklist of parmelioid lichens (HAWKSWORTH *et al.* 2008), and it was reported from many countries worldwide: Armenia, Austria, Belgium, China, Croatia, Czech Republic, France, Germany, Hungary, Italy, Mongolia, Netherlands, Norway, Portugal, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Spain, Turkey, Ukraine, United Kingdom (GASPARYAN *et al.* 2015, HAWKSWORTH *et al.* 2008, HUNECK *et al.* 1992, KROG 1978, SPIER 1992, STORDEUR *et al.* 2018). However, it was considered as a synonym (an infraspecific taxon) of morphologically similar species (e.g. *X. somloensis*, *X. taractica*) by some authors (CIURCHEA 2004, KROG 1978, SANTESSON 1993).

A new form of the species (*Parmelia protomatrae* f. *tenuior*) was described from 'Alba Carolina' by GYELNIK (1931). Alba Carolina is a historical name for the old Hungarian town, Gyulafehérvár, which is today Alba Iulia in Romania. This Romanian locality was erroneously cited as Hungarian locality (KROG 1978,

HALE 1990), and it was also overlooked and omitted in Romanian lichen checklists (MORUZI *et al.* 1967, CIURCHEA 2004). In addition, the type specimen of *Parmelia protomatrae* f. *tenuior* was erroneously revised as *Parmelia taractica* f. *angustiphylla* by VERSEGHY (1988). Further Romanian records were published from Nagysikárló (today Cicârlău) by FÓRISS (1937) (the only *X. protomatrae* record cited from Romania in MORUZI *et al.* 1967), and from Herkulesfürdő (Băile Herculane) by GYELNIK (1938). However, *Xanthoparmelia protomatrae* was synonymised with *X. somloensis* (now is the synonym of *X. stenophylla*) in the latest Romanian checklist (CIURCHEA 2004), so *X. protomatrae* as an independent species has practically disappeared from the Romanian lichen flora.

Based on the three old published records, further two old unpublished (Váradja (= Oarda) 1858; Turda 1939) and two recently collected specimens we can confirm the presence of *X. protomatrae* in Romania (Fig. 10).

The fieldwork was supported by the project NKFI K119208, and laboratory work also by the project NKFI K124341. Many thanks to Gábor Hegyessy and Dalma Dobronoki (Kazinczy Ferenc Múzeum, Sátoraljaújhely, Hungary) for the kind help in localisation of *X. protomatrae* specimen from Nagysikárló.

L. Lőkös, K. Buczkó, M. Höhn, E. Szurdoki and E. Farkas

### Bryophytes

#### (131) *Brachytheciastrum olympicum* (Jur.) Vanderp. *et al.* (Brachytheciaceae)

Hungary, Hajdú-Bihar County, [8392.3] at Hortobágyi halastó lake near Hortobágy village, on soil, N 47.609472°, E 21.069208°, 85 m, 12.04.2010, leg. B. Papp, det. B. Papp and P. Erzberger as *Brachythecium velutinum* var. *salicinum* (Schimp.) Mönk., rev. B. Papp in 2019 (BP 189926), conf. M. Ignatov in 2019.

It is reported here for the first time in Hungary. In the past *Brachythecium olympicum* was synonymised with *B. velutinum* (Hedw.) Schimp. var. *salicinum* (Schimp.) Moenk.) (DÜLL 1985). According to the recent taxonomic treatment *Brachytheciastrum salicinum* is elevated to species rank, but *B. olympicum* has been recognised as a separate species (HODGETTS *et al.* 2020, ORGAZ *et al.* 2013). Both species have smooth setae, which distinguish them from their close relatives, *B. velutinum* and *B. dieckii*. The latter has many leaf cells prorate on the dorsal side; it has not been recorded in Hungary. *B. olympicum* has some prorate cells on the dorsal side of the leaf and a triangular leaf shape, while the leaf cells of *B. salicinum* are smooth, not prorate, and the leaf shape is lanceolate. *B. olympicum* lives on rocks and calcareous soil, between 1,300 and 2,200 m above sea level according to ORGAZ *et al.* (2013). It is known mainly from southern Europe, e.g. Portugal, France (incl. Corsica), Italy (Sardinia, Sicily), Albania, Bosnia-Herzegovina, Croatia, Greece, North Macedonia, Romania, Slovenia, European

part of Turkey, Cyprus, Caucasus, and SE Russia (HODGETTS and LOCKHART 2020), but some records are doubtful due to the former synonymy with *B. salicinum*. It is vulnerable (VU) in Europe according to the new European red list of bryophytes (HODGETTS *et al.* 2019). In contrast with most of the earlier known habitats of the species the Hungarian record originates from low elevation. The climate of the site is characterised by high continentality, large daily and yearly temperature fluctuation, and low precipitation (500 mm/year).

B. Papp

(132) *Callicladium haldanianum* (Grev.) H. A. Crum (Callicladiaceae)

Hungary, Borsod-Abaúj-Zemplén County, [7688.4] Kismohos bog at Kelemér village, on the base of *Betula* tree, N 48.337222°, E 20.425417°, 320 m, 23.06.2017, leg. et det.: B. Papp, P. Erzberger and E. Szurdoki (BP 192923, B-Erzberger 23514); and 17.08.2018, leg. et det.: B. Papp and E. Szurdoki (BP 195011).

It is a northern subcontinental element (DÜLL 1985). The species was reported for the first time from Hungary by ERZBERGER *et al.* (2016). It was found in 2015 in the western part of Hungary in Somogy County, in an alder swamp at Lake Baláta on rotting wood [9669.3]. Our record collected in 2017 in Kismohos bog represents the second locality of the species. It was found only on one birch tree. Later on, in 2018 and 2019 during bryophyte monitoring work conducted in the bog, several other well-developed patches of *C. haldanianum* have been found on tree bases and on humus rich soil around trees (PAPP and SZURDOKI 2019). It seems that the species is spreading in the bog occupying more and more suitable trees. The spread of the species on a wider scale was also reported from Central European countries, e.g. in Poland (STEBEL 2013) and in Germany around Berlin (KLAWITTER 1993, MEINUNGER and SCHRÖDER 2007). The species is similar to *Hypnum cupressiforme* Hedw. and they can grow in the same habitat.

Hence, *C. haldanianum* can easily be overlooked, but its leaves are only slightly secund compared with *Hypnum cupressiforme*. Microscopically it can be identified easily, having large alar cells, which form more or less distinct auricles.

The flora of Kismohos Lake is well-explored. Several detailed botanical investigations, including floristical and vegetation surveys have been conducted there. Bryophytes have also been considered in many studies (CZENTHE 1985, KRÖEL-DULAY 1995, LÁJER 1998, ZÓLYOMI 1931). Earlier Hungarian bryologists have often visited the site. For example, Ádám Boros visited it four times between 1924 and 1960 (BOROS 1915–1971) and published several papers (BOROS 1924, 1926, 1940, 1951, 1964). Later on, as a part of the Hungarian Biodiversity-monitoring System, monitoring of bryophyte assemblages has been carried out from 2000 onwards (ÓDOR *et al.* 2000, 2006, 2013, PAPP *et al.* 2001, 2004, 2007, 2010a, 2016). During so many detailed investigations it is unlikely that the spe-

cies would not have been recognised earlier, if it had occurred there. Hence, its appearance and spread in Hungary are recent processes.

B. Papp, P. Erzberger and E. Szurdoki

(133) *Codonoblepharon forsteri* (Dicks.) Goffinet (*Zygodon forsteri* (Dicks.) Mitt.) (Orthotrichaceae)

Hungary, Pest County, [8579.1] north of Biatorbágy, Kálvária-hill, mixed forest with *Quercus cerris* in a dendrotelma of a *Quercus cerris*, N 47.49236°, E 18.84311°, 260 m, 18.05.2018, leg. et det.: P. Erzberger (B-Erzberger 24592), N 47.4922°, E 18.8430°, 270 m, 21.05.2018, leg. et det.: P. Erzberger (BP 194730). Hungary, Nógrád County, [8083.1] Cserhát Mts, Bokor village, Bokri-hill, in coppiced oak forest, N 47.9074°, E 19.5587°, 288 m, 18.07.2019, leg. et det.: Cs. Németh (Herbarium of Csaba Németh, HCsN 9582, 9585). – Hungary, Veszprém County, [9073.1] Balaton Upland region, Balatonfüred (Balatonarács), Koloska-valley, in coppiced oak forest, N 46.9847°, E 17.8922°, 176 m, 08.29.2019, leg. et det.: Cs. Németh (Herbarium of Csaba Németh, HCsN 9609). – Hungary, Nógrád County, [8181.2] Cserhát Mts, between Alsópetény and Legénd in an oak forest, in a dendrotelma of a *Quercus petraea*, N 47.8712°, E 19.2777°, 400 m, 19.07.2019, leg. et det.: B. Papp, B. and P. Erzberger (BP 195400, B-Erzberger 26635).

This atlantic-sub-Mediterranean species (DÜLL 1985) was reported for the first time in Hungary in 2016 (PAPP and SINIGLA 2017). It was found in a knot-hole of a *Quercus cerris* tree in a managed *Quercus cerris*, *Quercus petraea* forest in Balaton Upland region [9171.1]. In 2017 the site was revisited and another tree inhabited by *Codonoblepharon forsteri* was discovered (PAPP and SZURDOKI 2017). The species usually grows in knot-holes (dendrotelma) or other hollows of trees, where water runs down on the bark, and often on callus tissue. It has a very scattered distribution and is red-listed in many countries where it occurs, and endangered (EN) in Europe according to the new European red list of bryophytes (HODGETTS *et al.* 2019). The Hungarian sites are thermophilous oak forests, where usually another rare species protected in Hungary, *Anacamptodon splachnoides* occurs, which lives in the same microhabitat (knot-holes). Sometimes they can live on the same tree or even in the same knot-hole. In some localities, like Bokri-hill in the Cserhát Mts, *C. forsteri* has quite well-developed populations, colonising *ca* 20 trees. Earlier Hungarian bryologists have not reported this species despite the fact that they collected and recorded *A. splachnoides* in more than 30 sites in the country in various mountain areas (BOROS 1915–1971, 1968). We suppose the appearance and spread of the species in Hungary are recent and ongoing events.

Cs. Németh, P. Erzberger and B. Papp

(134) *Ephemerum cohaerens* (Hedw.) Hampe (Pottiaceae)

Hungary, Pest County, [8879.3] Danube bank at Lórév, on soil, N 47.113639°, E 18.888472°, 100 m, 21.09.2018, leg. et det.: B. Papp (BP 194975). – Pest County, [8380.2] Szentendrei-sziget, Szigetmonostor, Vízkelő, N 47.678167°, E 19.092389°, 100 m, 20.10.2018, leg. et det.: B. Papp (BP 194966). – Komárom-Esztergom County, [8178.4] Esztergom, Danube bank at Búbánat-völgy,

N 47.81397°, E 18.81611°, 110 m, 10.11.2018, leg. et det.: B. Papp (BP 195023). – Komárom-Esztergom County, [8179.3] Pilismarót, Danube bank near the ferry to Szob, N 47.80994°, E 18.87142°, 105 m, 10.11.2018, leg. et det.: B. Papp (BP 195030). – Pest County, [8380.2] Göd, Danube bank, N 47.69619°, E 19.12943°, 95 m, 11.11.2018, leg. et det.: B. Papp (BP 195035). – Fejér County, [9179.2] Danube bank at Kisapostag, on soil, N 46.865306°, E 18.922361°, 95 m, 13.10.2019, leg. et det.: B. Papp and P. Erzberger (BP 195401, B-Erzberger 26973, 26974). – Tolna County, [9179.4] Danube bank at Dunaföldvár, on soil, N 46.818528°, E 18.922778°, 100 m, 13.10.2019, leg. et det.: B. Papp (BP 195402). – Fejér County, [9079.2] Dunaújváros, Szalki island at the Danube, on soil, N 46.982806°, E 18.947028°, 95 m, 16.10.2019, leg. et det.: B. Papp (BP 195403). – Bács-Kiskun County, [9079.4] Dunavecse, Danube bank, on soil, N 46.92153°, E 18.96622°, 90 m, 21.10.2019, leg. et det.: P. Erzberger (B-Erzberger 27024). – Nógrád County, [8180.3] Danube bank at Kismaros, on soil in a *Salicetum*, N 47.821417°, E 19.010417°, 105 m, 19.10.2019, leg. et det.: B. Papp, Cs. Németh and P. Erzberger (BP 195404, B-Erzberger 27014).

In the 20th century, the species was found only once in Hungary at the Danube near Érd by Förster (BOROS 1968, ORBÁN and VAJDA 1983). In Hungary, *E. cohaerens* is a protected species; in the latest checklist and red list of Hungarian bryophytes (PAPP *et al.* 2010b) it was placed in the data deficient category (DD), which means that this taxon had no recent data. According to the new European red list of bryophytes (HODGETTS *et al.* 2019), it is rare and threatened in Europe, being in the vulnerable category (VU). It is a lowland species with western and Central European distribution, appearing mainly along rivers, like Danube, Rhine, Rhone, and their tributaries (BIJLSMA *et al.* 2012). In many countries, where it occurs, *E. cohaerens* is red-listed (regionally extinct (RE) in Austria and in Slovenia; critically endangered (CR) in Spain, in Switzerland and in Romania; endangered (EN) in Great Britain, in Germany and in Poland; vulnerable (VU) in Ireland and in Slovakia; data deficient (DD) in the Czech Republic). Apart from these, it is known from the Azores, France, Italy, Belgium, the Netherlands and Croatia (HODGETTS and LOCKHART 2020). In Hungary its main habitat is clayey soil under willow trees or even in the root mat of willows. This is a higher zone of the riverbank, which is inundated only occasionally. The species has a seasonal appearance, mostly from September to December in Hungary, when the water level is usually low. Apparently, it is not rare along the Hungarian Danube section, which is evidenced by several collections made during the last years. Certainly, it was overlooked and under-collected in the past due to its small size and seasonality.

B. Papp, P. Erzberger and Cs. Németh

(135) *Palustriella falcata* (Brid.) Hedenäs (*Cratoneuron commutatum* (Hedw.) Roth var. *falcatum* (Brid.) Moenk.) (Amblystegiaceae)

Hungary, Veszprém County, [8871.1] Bakonygyepes, Széki forest, in a wetland, N 47.155472°, E 17.510694°, 260 m, 09.08.2019, leg. et det.: B. Papp (BP 195405, Herbarium of Csaba Németh, HCsN 9595, B-Erzberger 26718). – Vas County, [8664.2] Kőszeg, spring area below Árpád-forrás, N 47.37693°, E 16.47708°, 460 m, 06.10.2018, leg. et det.: P. Erzberger and K. Baráth (B-Erzberger 25559).

In ORBÁN and VAJDA (1983) this is an infraspecific taxon, mentioned as a variety of *Cratoneuron commutatum*. However, *P. falcata* was elevated to species rank by HEDENÄS (1992). According to DÜLL (1985) it is a species of the temperate zone of Europe, living in similar habitats as *P. commutata*, in calcareous source areas, wetlands and streams. *P. falcata* differs from *P. commutata* by having an irregularly branched stem with no or very few paraphyllia and rhizoids. Earlier records are scarce from Hungary (*ca* 5–6 localities) and it is supposed that degradation and drying of wetlands induced by anthropogenic influence and climate change destroyed these populations. Nowadays, the only documented known localities of the species are in Széki forest and Kőszeg Mts.

B. Papp, P. Erzberger, Cs. Németh and K. Baráth

(136) *Ptychostomum pseudotriquetrum* var. *bimum* (Schreb.) Holyoak et N. Pedersen (*Bryum pseudotriquetrum* var. *bimum* (Schreb.) Lilj., *Bryum bimum* (Schreb.) Turner) (Bryaceae)

Hungary, Zala County, [9069.4] Sümegprága, abandoned basalt quarry, in earth-filled fissures of basaltic rock, N 46.93456°, E 17.28367°, 250 m, 23.10.2015, leg. et det.: P. Erzberger (as *Bryum creberrimum*, rev. W. Schröder, B-Erzberger 20920/A). – Veszprém County, [9171.2] between Köveskál and Szentbékállá, Sásdi-rétek, wetland, 130 m, 04.08.1996, leg. B. Papp (as *Bryum pseudotriquetrum*, rev. P. Erzberger and W. Schröder (ERZBERGER and SCHRÖDER 2013), BP 163341). – Veszprém County, [9170.1] Tapolca, Körtvélyes wetland, N 46.871946°, E 17.395782°, 120 m, 23.05.2020, leg. B. Papp and E. Szurdoki, det. B. Papp (BP 195810). – Veszprém County, [9170.1] Tapolca (Kalicsmajor), Lesencetomaj wetland, N 46.870256°, E 17.379306°, 120 m, 23.05.2020, leg. B. Papp and E. Szurdoki, det. B. Papp (BP 195811).

It is mentioned as a separate species being rare in Hungary in Orbán and Vajda (1983), later on it was treated as a variety of *Bryum pseudotriquetrum* in the Hungarian checklist of Erzberger and Papp (2004), and it was omitted in the last Hungarian checklist and red list (PAPP *et al.* 2010b). *Ptychostomum pseudotriquetrum* var. *bimum* is synoicous, it can be found nearly always with sporophytes; the spores are usually 15–25 µm, while *P. pseudotriquetrum* var. *pseudotriquetrum* is dioicous, sporophytes are rarely produced, and the spores are usually 12–18 µm (ERZBERGER and SCHRÖDER 2013).

*P. pseudotriquetrum* var. *bimum* can be found often in disturbed habitats; in old quarries, sand pits, in moist meadows, in wetlands, by streams (ERZBERGER and SCHRÖDER 2013). Nowadays, it has only four known locations in Hungary. Out of them three are wetlands situated in the Balaton-felvidék region.

B. Papp, P. Erzberger and E. Szurdoki

\* \* \*

We are very grateful to the staff of the Calimani National Park, especially to Basarab Birladeanu (director), and to Claudiu Rogojan (biologist) for their kind help and the research permis-



sion in the Calimani Mts, furthermore to Péter Ábrán for his help in the fieldwork. We also grateful to the Hungarian Biodiversity Research Society for organising the 20th Hungarian Biodiversity Day in the Börzsöny Mts (Hungary).

**Összefoglaló:** Regionális adatokat közlő rovatunk jelen részében 11 kriptogám faj új előfordulásairól számolunk be, melyek közül 5 zuzmó és 6 moha. Egy zuzmófajt először (*Parmeliella triptophylla*) találtak Magyarország területén, de mivel egy 115 évvel ezelőtt gyűjtött anyagból került elő, kihaltként kell számon tartani. Egy mohafajt elsőként közlünk Magyarországon területéről (*Brachytheciastrum olympicum*). Korábbi előfordulását erősítjük meg Magyarországon két moha fajnak (*Palustriella falcata*, *Ptychostomum pseudotriquetrum* var. *bimum*) és egy zuzmófajnak (*Parmelia submontana*). Az ismert elterjedéseket kiegészítő új zuzmó adatokat közlünk Magyarországról (*Cladonia mitis*) és Romániából (*Multiclavula mucida*, *Xanthoparmelia protomatrae*), valamint mohafajokat Magyarországról (*Callicladium haldanianum*, *Codonoblepharon forsteri*, *Ephemerum cohaerens*).

## REFERENCES

- ARUP, U., EKMAN, S., LINDBLOM, L. and MATTSSON, J. E. (1993): High performance thin layer chromatography (HPTLC), an improved technique for screening lichen substances. – *Lichenologist* **25**(1): 61–71. <https://doi.org/10.1017/s0024282993000076>
- BARINA, Z., BENEDEK, L., BOROS, L., DIMA, B., FOLCZ, Á., KIRÁLY, G., KOSZKA, A., MALATINSZKY, Á., PAPP, D., PIFKÓ, D. and PAPP, V. (2015): Taxonomical and chorological notes 1 (1–19). – *Studia bot. hung.* **46**(2): 205–221. <https://doi.org/10.17110/studbot.2015.46.2.205>
- BARINA Z., MOLNÁR Cs., SOMOGYI G., SZEDERJESI T., PIFKÓ D., RIGÓ A., MÁRTONFFY A., VIRÓK V. and DUDÁŠ M. (2020): Taxonomical and chorological notes 11 (112–125). – *Studia bot. hung.* **51**(1): 67–76.
- BIJLSMA, R. J., NIEUWKOOP, J. and SIEBEL, H. (2012): *Ephemerum cohaerens* and *E. rutheanum*: persistent annual bryophytes in the Dutch Rhine floodplain. – *Lindbergia* **35**: 63–75.
- BLANCO, O., CRESPO, A., ELIX, J. A., HAWKSWORTH, D. L. and LUMBSCH, H. T. (2004): A molecular phylogeny and a new classification of parmelioid lichens containing *Xanthoparmelia*-type lichenan (Ascomycota: Lecanorales). – *Taxon* **53**(4): 959–975. <https://doi.org/10.2307/4135563>
- BOROS, Á. (1915–1971): Florisztikai jegyzékek [Field diaries]. – Budapest, Hungarian Natural History Museum, mscr.
- BOROS, Á. (1924): Magyar láptanulmányok IV. (Ungarische Moorstudien). Az egerbektai és a keleméri mohalápok növényzete. (Die Flora der Moore von Egerbakta und Kelemér). – *Magyar Bot. Lapok* **23**: 62–64.
- BOROS, Á. (1926): Közép és nyugatmagyarország Sphagnum-lápjai növényföldrajzi szempontból. – *A debreceni Tisza István Tudományos Társulat Honismereti Bizottságának Kiadványa* **2**: 1–25.
- BOROS, Á. (1940): Magyarország néhány érdekes májmohája. – *Bot. Közlem.* **5–6**: 240–244.
- BOROS, Á. (1951): Bryologische Beiträge zur Kenntnis der Flora von Ungarn and der Karpaten. – *Acta Biologica* **2**: 369–409.
- BOROS, Á. (1964): Tözegmoha és tözegmohás lápok Magyarországon. – *Vasi Szemle* **1**: 53–68.
- BOROS, Á. (1968): *Bryogeographie und Bryoflora Ungarns*. – Akadémiai Kiadó, Budapest, 466 pp.
- BORZA, AL. (ed) (1940): Schedae ad “Floram Romaniae exsiccata. Cent. XIX–XXI. Nos. 1801–2100. – *Bul. Grăd. Bot. și Muz. Bot. Cluj* **20**: 8–73.
- CABI (2020): *The Index Fungorum*. – <http://www.indexfungorum.org> (accessed 5 May 2020).
- CIURCHEA, M. (2004): *Determinatorul lichenilor din România*. – Editura BIT, Iași, 488 pp.

- CRESPO, A., KAUFF, F., DIVAKAR, P. K., DEL PRADO, R., PÉREZ-ORTEGA, S., DE PAZ, G. A., FERENCOVA, Z., BLANCO, O., ROCA-VALIENTE, B., NÚÑEZ-ZAPATA, J., CUBAS, P., ARGÜELLO, A., ELIX, J. A., ESSLINGER, T. L., HAWKSWORTH, D. L., MILLANES, A. M., MOLINA, M. C., WEDIN, M., AHTI, T., APTROOT, A., BARRENO, E., BUNGARTZ, F., CALVELO, S., CANDAN, M., COLE, M. J., ERTZ, D., GOFFINET, B., LINDBLOM, L., LÜCKING, R., LUTZONI, F., MATSSON, J.-E., MESSUTI, M. I., MIADLIKOWSKA, J., PIERCEY-NORMORE, M. D., RICO, V. J., SIPMAN, H., SCHMITT, I., SPRIBILLE, T., THELL, A., THOR, G., UPRETI, D. K. and LUMBSCH, H. T. (2010): Phylogenetic generic classification of parmelioid lichens (Parmeliaceae, Ascomycota) based on molecular, morphological and chemical evidence. – *Taxon* **59**: 1735–1753. <https://doi.org/10.1002/tax.596008>
- CZENTHE, B. (1985): A Keleméri Mohostavak cönológiai viszonyai. – *Bot. Közlem.* **72**: 89–122.
- CSIKY, J., KOVÁTS, D., DEME, J., TAKÁCS, A., ÓVÁRI, M., MOLNÁR, V. A., MALATINSZKY, Á., NAGY, J. and BARINA, Z. (2017): Taxonomical and chorological notes 4 (38–58). – *Studia bot. hung.* **48**(1): 133–144. <https://doi.org/10.17110/studbot.2017.48.1.133>
- DEME, J., PALLA, B., HASZONITS, Gy., CSIKY, J., BARÁTH, K., KOVÁCS, D., ZURDO JORDA, A., ERZBERGER, P., WOLF, M., PAPP, V. and SCHMIDT, D. (2019): Taxonomical and chorological notes 9 (94–98). – *Studia bot. hung.* **50**(2): 381–392. <https://doi.org/10.17110/StudBot.2019.50.2.381>
- DÜLL, R. (1985): Distribution of the European and Macaronesian mosses (Bryophytina) II. – *Bryol. Beiträge* **5**: 110–232.
- ELIADE, E. (1965): Conspectul Macromicetelor din România. – *Acta Bot. Horti Lucr. Gräd. Bot. București* **1964–1965**: 185–324.
- ERZBERGER, P. and PAPP, B. (2004): Annotated checklist of Hungarian bryophytes. – *Studia bot. hung.* **35**: 91–149.
- ERZBERGER, P. and SCHRÖDER, W. (2013): The genus *Bryum* (Bryaceae, Musci) in Hungary. – *Studia bot. hung.* **44**: 5–192.
- ERZBERGER, P., NÉMETH, Cs. and MESTERHÁZY, A. (2016): 6. *Callicladium haldanianum* (Grev.) H. A. Crum [Hungary]. In: ELLIS, L. T. (ed.): New national and regional bryophyte records, 47. – *J. Bryol.* **38**: 151–167. <https://doi.org/10.1080/03736687.2016.1171453>
- FARKAS, E., LÖKÖS, L. and MOLNÁR, K. (2012): *Legally protected species of lichen-forming fungi in Hungary*. – In: LIPNICKI, L. (ed.): Lichen protection – Protected lichen species. Sonar Lite-racki, Gorzów Wlkp., pp. 35–42.
- FÓRISS, F. (1937): Adatok Szatmármegye zuzmóinak ismeretéhez. – *Bot. Közlem.* **34**: 52–56.
- GASPARYAN, A., APTROOT, A., BURGAZ, A. R., OTTE, V., ZAKERI, Z., RICO, V. J., ARAUJO, E., CRESPO, A., DIVAKAR, P. K. and LUMBSCH, H. T. (2015): First inventory of lichens and lichenicolous fungi in the Khosrov Forest State Reserve, Armenia. – *Flora Mediterranea* **25**: 105–114. <https://doi.org/10.7320/flmedit25.105>
- GYELNIK, V. (1931): Additamenta ad cognitionem Parmeliarum. I. – *Feddes Repert.* **29**: 149–157/ (389–397).
- GYELNIK, V. (1938): Additamenta ad cognitionem Parmeliarum. 8. – *Ann. Mycol.* (Berlin) **36**(4): 267–294.
- HALE, M. E. (1987): A monograph of the lichen genus *Parmelia* Acharius sensu stricto (Ascomycotina: Parmeliaceae). – *Smiths. Contrib. Bot.* **66**: 1–55. <https://doi.org/10.5479/si.0081024x.66>
- HALE, M. E. (1990): A synopsis of the lichen genus *Xanthoparmelia* (Vainio) Hale (Ascomycotina, Parmeliaceae). – *Smiths. Contrib. Bot.* **74**: 1–250. <https://doi.org/10.5479/si.0081024x.74>
- HALE, M. E., Jr. (1974): *Bulbothrix*, *Parmelina*, *Relicina*, and *Xanthoparmelia*, four new genera in the Parmeliaceae. – *Phytologia* **28**: 479–490.

- HAWKSWORTH, D. L., BLANCO, O., DIVAKAR, P. K., AHTI, T. and CRESPO, A. (2008): A first checklist of parmelioid and similar lichens in Europe and some adjacent territories, adopting revised generic circumscriptions and with indications of species distributions. – *Lichenologist* **40**(1): 1–21. <https://doi.org/10.1017/s0024282908007329>
- HEDENÄS, L. (1992): *Flora of Madeiran Pleurocarpous mosses (Isobryales, Hypnobryales, Hookeriales)*. – Bryophytorum Bibliotheca 44, Berlin, Stuttgart, 165 pp.
- HODGETTS, N. and 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, 217 pp.
- HODGETTS, N. G., SÖDERSTRÖM, L., BLOCHEEL, T. L., CASPARI, S., IGNATOV, M. S., KONSTANTINOVA, N. A., LOCKHART, N., PAPP, B., SCHRÖCK, C., SIM-SIM, M., BELL, D., BELL, N. E., BLUM, H. H., BRUGGEMAN-NANNENGA, M. A., BRUGUÉS, M., ENROTH, J., FLATBERG, K. I., GARILLETI, R., HEDENÄS, L., HOLYOAK, D. T., HUGONNOT, V., KARIYAWASAM, I., KÖCKINGER, H., KUČERA, J., LARA, F. and PORLEY, R. D. (2020): An annotated checklist of bryophytes of Europe, Macaronesia and Cyprus. – *J. Bryol.* **42**: 1–116. <https://doi.org/10.1080/03736687.2019.1694329>
- 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., SABOVLJEVIC, M., SCHNYDER, N., SCHRÖCK, C., SÉRGIO, C., SIM SIM, M., VRBA, J., FERREIRA, C. C., AFONINA, O., BLOCHEEL, T., BLUM, 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., ŞTEFANUŢ, 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, H. J., ENROTH, J., FEDOSOV, V., FLATBERG, K.-I., 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, 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. and ŽARNOWIEC, J. (2019): *A miniature world in decline: European red list of mosses, liverworts and hornworts*. – IUCN, Brussels, Belgium, 100 pp. <https://doi.org/10.2305/IUCN.CH.2019.ERL.2.en>
- HUNECK, S., AHTI, T., COGT, U., POELT, J. and SIPMAN, H. (1992): Zur Verbreitung und Chemie von Flechten der Mongolei. III. Ergebnisse der Mongolisch-Deutschen Biologischen Expedition seit 1962 Nr. 217. – *Nova Hedwigia* **54**(3–4): 277–308.
- JØRGENSEN, P. M. (1978): The lichen family Pannariaceae in Europe. – *Opera Botanica* **45**: 1–123.
- JØRGENSEN, P. M. (2007): Pannariaceae. – *Nordic Lichen Flora* **3**: 96–112.
- KIRÁLY, G., BARÁTH, K., BAUER, N., ERZBERGER, P., PAPP, B., SZŰCS, P., VERES, Sz. and BARINA, Z. (2019a): Taxonomical and chorological notes 8 (85–93). – *Studia bot. hung.* **50**(1): 241–252. <https://doi.org/10.17110/StudBot.2019.50.1.241>
- KIRÁLY, G., HOHLA, M., SÜVEGES, K., HÁBENCZYUS, A. A., BARINA, Z., KIRÁLY, A., LUKÁCS, B. A., TÜRKE, I. J. and TAKÁCS, A. (2019b): Taxonomical and chorological notes 10 (98–110). – *Studia bot. hung.* **50**(2): 391–407. <https://doi.org/10.17110/StudBot.2019.50.2.391>
- KISZELYNÉ VÁMOSI, A., MARSCHALL, Z., ORBÁN, S. and SUBA, J. (1989): A Bükk hegység északi peremhegyeinek florisztikai és cönológiai jellemzése. – *Acta Acad. Paed. Agriensis, n. s.* **19**(6): 135–185.

- KLAWITTER, J. (1993): *Heterophyllum haldanianum* im Berliner Raum nicht selten. – *Bryol. Rundbriefe* 14: 3.
- KŐFARAGÓ-GYELNIK, V. (1940): *Cyanophili* II. (Lief. I. Lichinaceae, Heppiaceae; Lief. II. Pannariaceae). – In: RABENHORST, L. (ed.): *Kryptogamenflora von Deutschland und der Schweiz*. Bd. 9, Abt. 2, Teil. 2, Leipzig, 272 pp.
- KRÖEL-DULAY, GY. (1995): *A magyarországi tőzegmohalápok összehasonlító vizsgálata*. – Szakdolgozat (kézirat), ELTE Növényrendszertani és Ökológiai tanszék, Budapest, 53 pp.
- KROG, H. (1978): On *Parmelia protomatrae* (Xanthoparmelia), an overlooked lichen species in Europe. – *Norw. J. Bot.* 25: 51–54.
- LÁJER, K. (1998): Bevezetés a magyarországi lápok vegetációökológiájába. – *Tilia* 6: 84–38.
- MATUS, G., CSIKY, J., BAUER, N., BARÁTH, K., VASUTA, G., BARABÁS, A., HRICSOVINYI, D., TAKÁCS, A., ANTAL, K., BUDAI, J., ERZBERGER, P., MOLNÁR, P. and BARINA, Z. (2018): Taxonomical and chorological notes 7 (75–84). – *Studia bot. hung.* 49(2): 83–94. <https://doi.org/10.17110/studbot.2018.49.2.83>
- MEINUNGER, L. and SCHRÖDER, W. (2007): *Verbreitungsatlas der Moose Deutschlands*. Band 3. – Herausgegeben von O. Dürhammer für die Regensburgische Botanische Gesellschaft, Regensburg, 709 pp.
- MESTERHÁZY, A., MATUS, G., KIRÁLY, G., SZÜCS, P., TÖRÖK, P., VALKÓ, O., PELLER, G., PAPP, V. G., VIRÓK, V., NEMCSOK, Z., RIGÓ, A., HOHLA, M. and BARINA, Z. (2017): Taxonomical and chorological notes 5 (59–70). – *Studia bot. hung.* 48(1): 263–275. <https://doi.org/10.17110/studbot.2017.48.2.263>
- MORUZI, C., PETRIA, EL. and MANTU, EL. (1967): *Catalogul Lichenilor din România*. – Acta Bot. Horti Bucurestiensis, 389 pp.
- NYLANDER, W. (1860): *Synopsis methodica lichenum*. Vol. 1, part 2. – Paris.
- ÓDOR, P., SZURDOKI, E. and PAPP, B. (2000): *A Keleméri Mohosok és Gömörszőlős környéki lápos élőhelyek mohafldrájának felmérése*. – Kézirat, ANP, Aggtelek, 27 pp.
- ÓDOR, P., SZURDOKI, E. and PAPP, B. (2006): *Bryophyta – monitoring az Aggteleki Nemzeti Park területén. Élőhelytípusok mohaszintjének monitorozása az NBmR mohamonitorozó programjának keretében az Aggteleki Nemzeti Park területén*. – Kézirat, ANP, Aggtelek, 49 pp.
- ÓDOR, P., SZURDOKI, E. and PAPP, B. (2013): *Bryophyta – monitoring az Aggteleki Nemzeti Park területén. Élőhelytípusok mohaszintjének monitorozása az NBmR mohamonitorozó programjának keretében az Aggteleki Nemzeti Park területén*. – Kézirat, ANP, Aggtelek, 41 pp.
- ORBÁN, S. and VAJDA, L. (1983): *Magyarország mohafldrájának kézikönyve*. (Handbook of the Hungarian Bryoflora). – Akadémiai Kiadó, Budapest, 518 pp.
- ORGAZ, J. D., CANO, M. J. and GUERRA, J. (2013): Taxonomic revision of *Brachytheciastrum* (Brachytheciaceae, Bryophyta) from the Mediterranean Region. – *Syst. Bot.* 38(2): 283–294. <https://doi.org/10.1600/036364413X666697>
- OSSOWSKA, M., GUZOW-KRZEMIŃSKA, B., DUDEK, M., OSET, M. and KUKWA, M. (2018): Evaluation of diagnostic chemical and morphological characters in five *Parmelia* species (Parmeliaceae, lichenized Ascomycota) with special emphasis on the thallus pruinosity. – *Phytotaxa* 383(2): 165–180. <https://doi.org/10.11646/phytotaxa.383.2.3>
- PAPP, V., KIRÁLY, G., KOSCSÓ, J., MALATINSZKY, Á., NAGY, T., TAKÁCS, A. and DIMA, B. (2016): Taxonomical and chorological notes 2 (20–27). – *Studia bot. hung.* 47(1): 179–191. <https://doi.org/10.17110/studbot.2016.47.1.179>
- PAPP, B. and SINIGLA, M. (2017): *Zygodon forsteri* (Dicks.) Mitt. [Hungary]. In: ELLIS, L. T. (ed.): *New national and regional bryophyte records*, 52. – *J. Bryol.* 39(3): 299. <https://doi.org/10.1080/03736687.2017.1341752>

- PAPP, B. and SZURDOKI, E. (2017): A Káli-medence környéki hegyek mohafloisztikai feltárása (Survey on the bryophyte flora of mountains surrounding Káli Basin (Balaton-felvidék Region, Hungary)). – *Folia hist.-nat. Mus. Bakony*. **34**: 15–27.
- PAPP, B. and SZURDOKI, E. (2019): *Természetvédelmi kezelés monitoring kutatás végzése a Keleméri Mohos-tavak területén mohafajok vizsgálatával*. – Kézirat, ANP, Aggtelek, 22 pp.
- PAPP, B., ERZBERGER, P., ÓDOR, P., HOCK, Zs., SZÖVÉNYI, P., SZURDOKI, E. and TÓTH, Z. (2010b): Updated checklist and red list of Hungarian bryophytes. – *Studia bot. hung.* **41**: 31–59
- PAPP, B., ÓDOR, P. and SZURDOKI, E. (2001): *Az NBmR mohamonitorozó programjának 2000-2001. évi végső jelentése II. Élőhely monitoring*. – Kézirat, KVM Természetvédelmi Hivatala, Természetmegőrzési Főosztály, Budapest, 99 pp.
- PAPP, B., ÓDOR, P. and SZURDOKI, E. (2004): *Az NBmR mohamonitorozó programjának 2004. évi végső jelentése. Faj és élőhely monitoring*. – Kézirat, KVM Természetvédelmi Hivatala, Természetmegőrzési Főosztály, Budapest, 192 pp.
- PAPP, B., ÓDOR, P. and SZURDOKI, E. (2007): *Az NBmR mohamonitorozó programjának 2007. évi végső jelentése. Faj és élőhely monitoring*. – Kézirat, KVM Természetvédelmi Hivatala, Természetmegőrzési Főosztály, Budapest, 105 pp.
- PAPP, B., ÓDOR, P. and SZURDOKI, E. (2010a): *Az NBmR mohamonitorozó programjának 2010. évi végső jelentése. Faj és élőhely monitoring*. – Kézirat, KVM Természetvédelmi Hivatala, Természetmegőrzési Főosztály, Budapest, 103 pp.
- PAPP, B., ÓDOR, P. and SZURDOKI, E. (2016): *Mohamonitorozó 2015–16*. – Kézirat, Vidékfejlesztési Minisztérium, Természetmegőrzési Főosztály, Budapest, 122 pp.
- ROBERT, V., STALPERS, J. and STEGEHUIS, G. (2018): *Mycobank, the fungal website*. – <http://www.mycobank.org/DefaultPage.aspx> (accessed 5 May 2020).
- SANTESSON, R. (1993): *The lichens and lichenicolous fungi of Sweden and Norway*. – SBT-förlaget, Lund, 240 pp.
- SCHINDLER, H. (1975): Über die Flechte *Parmelia contorta* Boy und ihre bisher bekannte Verbreitung. – *Herzogia* **3**: 347–364.
- SCHINDLER, H. (1997): Die höheren Flechten des Nordschwarzwaldes. 10. Die Verbreitung von *Parmelia submontana*, ihr weiteres Vorkommen im übrigen Deutschland und nachtrag zu *Lobaria*. (The macrolichens of the Northern Black Forest (SW Germany) 10. The distribution of *Parmelia submontana*, its additional distribution in Germany and a supplement to *Lobaria*). – *Carolinea* **55**: 13–21.
- SCHMIDT, D., CSIKY, J., MATUS, G., BALOGH, R., SZURDOKI, E., HÖHN, M., ÁBRÁN, P., BUCZKÓ, K. and LÖKÖS, L. (2018): Taxonomical and chorological notes 6 (71–74). – *Studia bot. hung.* **49**(1): 121–130. <https://doi.org/10.17110/studbot.2018.49.1.121>
- SPIER, L. (1992): Lichenen in en om Amersfoort. – *Buxbaumiella* **27**: 39–44.
- STEBEL, A. (2013): Distribution of *Callicladium haldanianum* (Bryophyta, Hypnaceae) in Poland. – *Polish Bot. J.* **58**: 593–603. <https://doi.org/10.2478/pbj-2013-0044>
- STORDEUR, R., BECK, A., CHRISTL, S., CZARNOTA, P., ECKSTEIN, J., KISON, H.-U., OTTE, V., SEELEMANN, A., SIPMAN, H. J. M., SCHIEFELBEIN, U. and UNGETHÜM, K. (2018): Contributions to the lichen flora of Saxony-Anhalt and adjacent regions (part 1). – *Herzogia* **31**(1): 700–715.
- SZATALA, Ö. (1930): Lichenes Hungariae. Magyarország zuzmóflórája. II. Gymnocarpeae (Graphidinae, Cyclocarpineae: Lecanactidaceae – Peltigeraceae). – *Folia Cryptog.* **1**(7): 833–928.
- TAKÁCS, A., BARÁTH, K., CSIKY, J., CSIKYNÉ R., É., KIRÁLY, G., NAGY, T., PAPP, V., SCHMIDT, D., TAMÁSI, B. and BARINA, Z. (2016): Taxonomical and chorological notes 3 (28–37). – *Studia bot. hung.* **47**(2): 345–357. <https://doi.org/10.17110/studbot.2016.47.2.345>

- THIERS, B. M. (2017): *Index Herbariorum: A global directory of public herbaria and associated staff*. – New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/> [accessed on 21 June 2020]
- VARGA, N., LÖKÖS, L., MOLNÁR, K. and FARKAS, E. (2014): *Hazai Cladina fajok kemotaxonomiai revíziójának természetvédelmi vonatkozásai*. – In: LENGYEL, SZ. (ed.): Absztrakt-kötet. 9. Magyar Természetvédelmi Biológiai Konferencia „Tudományoktól a döntéshozatalig”. Szeged, 2014.11.20–2014.11.23. Magyar Biológiai Társaság, p. 137.
- VERSEGHY, K. (1988): Magyarországi zuzmóflóra revíziójának eredményei. (Ergebnisse der Revision der Flechtenflora von Ungarn). – *Bot. Közlem.* **74–75**(1–2): 31–46 (1987–88).
- VERSEGHY, K. (1994): *Magyarország zuzmóflórájának kézikönyve*. (The lichen flora of Hungary). – Magyar Természettudományi Múzeum, Budapest, 415 pp.
- ZAHLBRUCKNER, A. (1907): Vorarbeiten zu einer Flechtenflora Dalmatiens, IV. – *Österr. Bot. Zeitschr.* **57**: 65–73.
- ZAHLBRUCKNER, A. (1927): Beiträge zur Flechtenflora Niederösterreichs. VII. – *Verh. zool.-bot. Gesellsch.*, Wien, **76**: 76–101.
- ZÓLYOMI, B. (1931): A Bükkhegység környékének Sphagnum lápjai. – *Bot. Közlem.* **28**: 89–121.