

DATA ABOUT THE ACTUAL LOCAL POPULATIONS OF BRYOPHYTE SPECIES PROTECTED IN HUNGARY

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A total of 28 new and 37 confirmed, earlier Hungarian records of 17 species included in the Red Data Book of European Bryophytes and/or legally protected in Hungary are reported in this paper. Estimations of the local population size and observations on accompanying bryophytes are given, habitat conditions are characterised, and threats are discussed.

Key words: confirmation of old occurrences, Hungary, new records, rare and threatened bryophytes.

INTRODUCTION

This paper is the second in a series of publications concerning rare European bryophytes and locally rare species from Hungary. Similar records were published in PAPP *et al.* (2000). That paper dealt also with general aspects of the protection of bryophytes in Europe and Hungary and the methods of obtaining information about the actual distribution of rare species. Some of the problems connected with the monitoring of bryophyte populations and resulting in part from biological features of the endangered species (*e.g.* habitat requirements or life strategies) were discussed in PAPP *et al.* (2002).

In 2000, the number of bryophyte species legally protected in Hungary was increased to 80, as further 60 bryophytes were added to the already protected 20 *Sphagnum* species. Most of the newly protected species (50 species, enumerated in the Appendix of PAPP *et al.* 2000) are included in the Red Data Book of European Bryophytes (RDB) (ECCB 1995), and the others are locally rare species (*Calliergon giganteum*, *C. stramineum*, *Campylium elodes*, *Warnstorfia exannulata*, *Drepanocladus lycopodioides*, *D. revolvens* incl. *D. cossonii*, *D. sendtneri*, *Meesia triquetra*, *Scorpidium scorpioides*, *Sphagnum cuspidatum*) living in endangered mires and wet meadows. A list of the Hungarian legally protected bryophyte species is also given in PAPP *et al.* (2002). Intensive bryological investigations are going on as to the distribution of these rare species and changes of their populations, resulting in an estimate of their threat status according to the new IUCN categories.

The investigations include revision of herbarium specimens, confirmation of old records, the attempt to find new localities in suitable habitats, and to estimate the size of local populations.

METHODS

To obtain the earlier distribution data of the investigated species the Bryophyte Herbarium of the Hungarian Natural History Museum, Budapest (BP) and Eszterházy Károly College, Eger (EGR) were consulted. The retrieval was mainly based on locality description of herbarium specimens and the diaries of Ádám Boros and László Vajda about their field trips (BOROS 1915–1971, VAJDA 1933–1978) as well as published records (BOROS 1968, ORBÁN and VAJDA 1983).

Nomenclature follows GROLLE and LONG (2000), SÖDERSTRÖM *et al.* (2002) for liverworts and hornworts and CORLEY *et al.* (1981) and CORLEY and CRUNDWELL (1991) for mosses with amendments according to recent publications, *e.g.* KOPERSKI *et al.* (2000). The European distribution of the species is given according to DÜLL (1983, 1984, 1985, 1992) and SÖDERSTRÖM *et al.* (2002).

Estimation of population size is sometimes difficult in bryophytes and may depend on special features of the taxa in question (for *Pyramidula tetragona*, *e.g.*, see PAPP *et al.* 2000, 2002). For epiphytic and epixylic species (*e.g.* *Dicranum viride*), it seems appropriate to count the trees colonised as individuals, since destruction of the phorophyte or substrate will affect all plants growing on it. Therefore, counting the individual bryophyte plants or cushions on each tree would lead to an overestimation of population size and to an underestimation of threat.

Information about the habitat demands of the species is summarised according to BOROS (1968), ORBÁN and VAJDA (1983) and field experience of the authors.

RESULTS

Hepaticae

Asterella saccata (WAHLENB.) A. Evans is a xerophytic, subcontinental species. It lives in calcareous open grasslands. It is vulnerable in Europe according to the RDB.

Old occurrences confirmed: Budapest County, Budapest, Buda Mts, Remete Hill, Máriaremete, southern slope of the hill, on soil in limestone open grassland, above a cave (N 47° 33.668', E 18° 55.907') and along the footpath to the top marked by blue colour (N 47° 33.671', E 18° 55.633'), ca 380 m a. s. l., 22.04.2001, and 24.03.2002, leg. and det. Erzberger, P. and 27.03.2002, leg. and det. Erzberger, P. and Papp, B. About 10 patches of 10 × 10 cm² were found. Earlier data from here: 02.05.1921 and 09.04.1922, leg. and det. Györfy, I., 28.03.1926, leg. and det. Boros, Á. and Degen, Á., 22.03.1934, leg. and det. Szepesfalvy, J. – Fejér County, Vértes Mts, Zuppa Hill, Szárliget, southwestern slope of the hill, on soil in limestone open grassland (N 47° 30.382', E 18° 30.889'), ca 380 m a. s. l., 04.04.2002, leg. and det. Erzberger, P., Papp, B. and Szurdoki, E. 3–4 patches of 10 × 10 cm² were discovered. Earlier data from here: 14.05.1942 and 18.04.1948, leg. and det. Boros, Á. – Fejér County, Vértes Mts, Lőingató Hill, Óbarok (Bicske), western slope of the hill, on soil in open limestone grassland (N 47° 30' 36.0", E 18° 33' 42.1" and N 47° 30' 45.1", E 18° 33' 28.2"), ca 260–290 m a. s. l., 17.04.2003, leg. and det. Erzberger, P. and Papp, B. About 60 patches of 10 × 10 cm² were found in two places. Earlier data from here: 07.04.1940, leg. and det. Boros, Á. – Fejér County, Vértes Mts, Szőlő-kő, Csákvár, eastern slope of the hill, on soil in open limestone grassland (N 47° 22' 55.5", E 18° 26' 26.5"), ca 240 m a. s. l., 19.04.2003, leg. and det. Papp, B. and Erzberger, P. About

20 patches of $10 \times 10 \text{ cm}^2$ were detected. Earlier data from here: 21.03.1937, leg. and det. Boros Á. – Komárom County, Gerecse Mts, Kő-hegy at the monument Turul, Alsógalla (Tatabánya), southern slope of the hill, on soil in open limestone grassland (N $47^\circ 35' 11.8''$, E $18^\circ 24' 29.0''$), ca 310 m a. s. l., 22.04.2003, leg. and det. Erzberger, P. and Papp, B. About 10 patches of $10 \times 10 \text{ cm}^2$ were found. Earlier data from here: 15.03.1921, 01.05.1938, 02.04.1939, leg. and det. Boros Á.

New occurrence: Pest County, Pilis–Visegrád Mts, Csúcs Hill, Csobánka, western slope of the hill, on soil in open limestone grassland, ca 300 m a. s. l., 25.04.2003, leg. and det. Erzberger, P. About 10 patches of $10 \times 10 \text{ cm}^2$ were discovered. There are earlier data only from the neighbouring Oszoly Hill (Szepesfalvy, J., 28.04.1931, Vajda, L., 04.05.1941).

Some remarks on recognising this species and on its habitat demands seem appropriate. Sterile *Asterella saccata* is very similar to the considerably more frequent *Mannia fragrans* (Balb.) Frye et L. Clark, which occurs in much the same habitats. The two species can, however, be readily distinguished by their different smells: strongly aromatic in *M. fragrans*, less strong and less pleasant, somewhat fishy in *A. saccata*, similar in smell to the alpine relative *A. lindenberghiana* (Nees) Arnell, but not so pronounced. Plants of *A. saccata* with female receptacles are easily recognised due to the single involucre of each archegonium; in the field patches of fertile *A. saccata* differ from fertile *M. fragrans* by their yellowish colour (brownish in *M. fragrans*).

A. saccata is less of a pioneer than *M. fragrans*, which is often found on rather unstable, open soil. *A. saccata* prefers more stable and sheltered microhabitats like medium-sized, earth-filled rock fissures, more frequently in steep or nearly vertical surfaces than *M. fragrans*, which is mostly found on horizontal substrates. *A. saccata* often grows at the edge of a rock ledge, sometimes protected by overhanging tufts of grass.

Frullania inflata Gottsche var. *inflata* is a thermophilous, sub-Mediterranean, montane element. It lives on siliceous rocks (granite, basalt, gneiss). The species is very rare throughout its range in Europe. It is known from six European countries only (SÖDERSTRÖM *et al.* 2002). It is vulnerable in Europe according to the RDB.

Old occurrence confirmed: Zala County, Balaton-felvidék region, Tátika Hill, Zalaszántó, Tinóállás rocks at the southern slope of the hill, on shaded basalt rocks (N $46^\circ 54.093'$, E $17^\circ 15.345'$), ca 350 m a. s. l., 30.03.2002, leg. and det. Papp, B. and Erzberger, P. Three patches of $3 \times 3 \text{ cm}^2$ were found on two rocks. Earlier data from here: 03.06.1955, leg. and det. Vajda, L., 30.04.1956, leg. and det. Boros, Á. and Vajda, L.

New occurrence: Heves County, Bükk Mts, Szarvaskő, 10 km NNW of Eger, Vár-hegy, southern slope, on partly shaded volcanic bedrock (diabas), (UTM DU 51), ca 250 m a. s. l., 23.04.1998, leg. Pócs, T. and Erzberger, P., det. Pócs, T. Several small patches (a few cm^2 each) were found. It is interesting that in both known sites of *Frullania inflata* the thermophilous *Fabronia pusilla* Raddi also grows.

Musci

Amblystegium radicale (P. Beauv.) Schimp. (syn.: *A. saxatile* Schimp.) is a species of the temperate zone of Europe. It occurs in wet meadows, at springs, and usually grows on organic matter like decaying sedges or *Juncus*. Rare in Europe according to the RDB.

New occurrence: Vas County, Őrség region, Szőce meadow, Szőce, on the western edge of the meadow at the springs and their surroundings, ca 230 m a. s. l., 15.07.1997, leg. and det. Erzberger, P., 23.07.2000, leg. and det. Papp, B. The species was found in at least four places.

Anacamptodon splachnoides (Brid.) Brid. is a sub-Mediterranean-subcontinental-montane species (MARTIGNY 1995) growing on the moist and partly decaying bark of trees – “dendrotelma” – (mostly *Quercus*, also *Fagus*, *Betula*, outside of Hungary; e.g. in Germany, also on trunks of *Picea*, SCHRÖDER and MEINUNGER 1994, 2000). It is endangered in Europe according to the RDB. Since it grows in a habitat that necessarily changes with time, it is not possible to confirm old locations or relate recent findings to older records. Old data are published in SZEPES-FALVY (1938) and BOROS (1968).

New occurrence: Pest County, Buda Mts, in game reserve forest, 2 km east of Páty, at the base of a tree (*Quercus cerris*), ca 300 m a. s. l., 06.02.2001, leg. Erzberger, P., det. Papp, B., teste Meinunger, L.

Anomodon rostratus (Hedw.) Schimp. is a sub-Mediterranean, montane species. It occurs on shaded calcareous rocks, in rock crevices. Rare according to the RDB.

Old occurrences confirmed: Borsod-Abaúj-Zemplén County, Bükk Mts, Vörös-kő, Ómassa, in shaded calcareous rock crevices, (N 48° 06' 78.1", E 20° 31' 72.7"), ca 600 m a. s. l., 10.08.2001, leg. and det. Papp, B. and Erzberger, P. Earlier data: 16.05.1951, leg. and det. Vajda, L. – Borsod-Abaúj-Zemplén County, Bükk Mts, Háromkút Valley, Ómassa, on shaded calcareous rock, ca 580 m a. s. l., 10.08.2001, leg. and det. Papp, B. and Erzberger, P. Earlier data: 26.06.1932, leg. and det. Boros, Á. and 16.05.1951, leg. and det. Boros, Á. and Vajda, L. – Fejér County, Vértes Mts, Vár Valley, Csókakő, at the base of a calcareous rock, shaded, ca 350 m a. s. l., 23.04.2001, leg. and det. Erzberger, P. Earlier data: 01.08.1934, leg. and det. Boros, Á. – Pest County, Pilis Mts, Vaskapu Valley, Pilisszentkereszt, at the base of calcareous rocks in shaded situations, ca 450 m a. s. l., 28.04.2001, leg. and det. Erzberger, P. Earlier data: 04.04.1946, leg. and det. Boros, Á., 02.06.1946, leg. and det. Boros, Á. and Vajda, L. – Veszprém County, Bakony Mts, Ördög-árok gorge, Gézaháza, on shaded calcareous rock, ca 360 m a. s. l., 06.10.2002, leg. Papp, B. and Szurdoki, E., det. Papp, B. Earlier data: 01.06.1964, leg. and det. Vajda, L.

New occurrences: Borsod-Abaúj-Zemplén County, Bükk Mts, Füzér-kő in Hór Valley, Cserépfalu, in shaded calcareous rock crevices on the western slope (N 47° 59.993', E 20° 31.226'), ca 340 m a. s. l., 28.09.2001, leg. Papp, B. and Szurdoki, E., det. Papp, B. – Fejér County, Vértes Mts,

Ugró Valley, north of Csákkberény, shaded calcareous rocks at the eastern side of the valley, ca 300 m a. s. l., 29.04.2001, leg. and det. Erzberger, P. The plants covered an area of several dm².

Dicranum viride (Sull. et Lesq.) Lindb. is a subcontinental, montane species. It occurs on tree trunks in humid forests, mainly on the lower part of the trees. It is included in the Bern Convention (The Convention on Conservation of European Wildlife and Natural Habitats, 1979), and in the European Community Directive on the Conservation of Natural Habitats and Wild Fauna and Flora, 1992. It is vulnerable according to the RDB. Some of the new occurrences have been published earlier (ERZBERGER 1999).

Old occurrences confirmed: Borsod-Abaúj-Zemplén County, Bükk Mts, Füzér-kő in Hór Valley, Cserépfalu, on the southern and eastern slope of the hill, on deciduous trees and on decaying wood, (N 47° 59.993', E 20° 31.226'), ca 340 m a. s. l., 28.09.2001, leg. Papp, B. and Szurdoki, E., det. Papp, B. Earlier data: 30.03.1959, leg. and det. Boros, Á. The species was detected on 9 *Quercus*, 4 *Carpinus*, 2 *Fagus*, 1 *Tilia*, 1 *Crataegus* trees and 2 decaying trunks growing in patches of different size (1–10 (20) cm²). As outlined under methods, not these patches were counted as individuals, but rather individual trees colonised. With this approach, the above-mentioned population appears small (19 individuals), although this population is one of the biggest in Hungary. – Borsod-Abaúj-Zemplén County, Zemplén Mts, Vadász-tető hill, Pálháza, on *Fagus* tree, ca 450 m a. s. l., 19.06.2000, leg. and det. Papp, B. Earlier data: 01.08.1953, leg. and det. Vajda, L. The species was found on one tree. – Borsod-Abaúj-Zemplén County, Zemplén Mts, Vajda Valley, Pálháza, on andesite rock, ca 300 m a. s. l., 19.06.2000, leg. and det. Papp, B. Earlier data: 06.10.1953, leg. and det. Boros, Á. and Vajda, L. One small patch of the species was found on an andesite rock. The surrounding *Fagus* forest had been felled. There is no suitable substrate for the species. This population is very endangered, almost extinct. – Borsod-Abaúj-Zemplén County, Zemplén Mts, Piskés-tető hill, Hollóháza, on *Fagus* tree, (N 48° 31.222', E 21° 25.058'), ca 500 m a. s. l., 27.09.2001, leg. Papp, B. and Szurdoki, E., det. Papp, B. Earlier data: 30.06.1954, leg. and det. Vajda, L. The species was found on one tree. – Szabolcs-Szatmár-Bereg County, Nyírség region, Bátorliget, *Betula* trees in meadow, ca 120 m a. s. l., 08.09.2000, leg. Papp, B. and Szurdoki, E., det. Papp, B. Earlier data: 04.11.1989, leg. Barabás, K. and Tóth, Z., det. Tóth, Z. and Orbán, S. and 30.06.1996, leg. and det. Jakab, G. Several trees are colonised by species closely resembling *Dicranum viride* in the field. *D. tauricum* also occurs at the site, hence the estimation of population size is difficult. But the population size certainly does not reach 50. – Zala County, Göcsej region, at the Vetyemi ősbükkös (old forest), Tormafölde, on decaying wood, (N 46° 32' 867", E 16° 37' 198"), ca 200 m a. s. l., 24.06.2001, leg. Papp, B. and Szurdoki, E., det. Papp, B. Earlier data: 12.07.1955, leg. and det. Boros, Á. One decaying *Fagus* tree of large size near a small stream was colonised by the species. The species covers 60 cm² on the tree. The population size is 1.

New occurrences: Borsod-Abaúj-Zemplén County, Bükk Mts, Őserdő (old forest), Répáshuta, on *Fagus* trees, ca 860 m a. s. l., 12.08.2001, leg. and det. Papp, B. and Erzberger, P. In this forest both *Dicranum viride* and the similar *D. tauricum* occur. It is difficult to distinguish them in the field. Patches tentatively identified as *Dicranum viride* were detected on 37 *Fagus* trees. On the basis of the microscopic identification of the samples, *Dicranum viride* was found on 26 trees, while *D. tauricum* was collected from 11 trees. Two trees were colonised by both species. The population size of *Dicranum viride* is 26 individuals. – Borsod-Abaúj-Zemplén County, Bükk Mts, Ódor-vár hill in Hór Valley, Cserépfalu, *Quercetum* on the southern slope, on *Quercus cerris*, ca 350 m a. s. l.,

06.08.1998, leg. de Bruyn, U. and Erzberger, P. det. Erzberger, P. The species was collected from a tree. – Heves County, Bükk Mts, Vár-hegy, Felsőtárkány, *Quercetum*, on siliceous rock, ca 600 m a. s. l., 08.08.1998, leg. Siemsen, M. and Erzberger, P., det. Erzberger, P. – Borsod-Abaúj-Zemplén County, Bükk Mts, Szárba-oldal hill in Hór Valley, Cserépfalu, *Quercetum*, on *Quercus* tree, ca 450 m a. s. l., 09.08.1998, leg. Klawitter, J. and Erzberger, P., det. Erzberger, P. and 06.11.2001, leg. and det. Papp, B. The species was found on several trees. But the population size certainly does not reach 50.

***Drepanocladus cossonii* (Schimp.) Loeske (syn.: *Scorpidium cossonii* (Schimp.) Hedenäs)** is a boreal, montane species. It lives in wet meadows. It is a protected species in Hungary.

New occurrence: Győr-Sopron-Moson County, Kis-Tómalom meadow, Sopron, ca 150 m a. s. l., 27.08.2000, leg. and det. Papp, B. and Erzberger, P.

***Drepanocladus lycopodioides* (Brid.) Warnst. (syn.: *Pseudocalliergon lycopodioides* (Brid.) Hedenäs)** is a boreal species. It lives in wet meadows. It is included in the list of protected bryophytes in Hungary.

Old occurrences confirmed: Zala County, meadows along the road from Gyepükaján to Szentimrefalva, near Meleg-víz stream, Csabrendek, in *Caricetum elatae*, ca 125 m a. s. l., 31.03.2002, leg. and det. Papp, B. and Erzberger, P. Earlier data: 11.06.1962, leg. and det. Boros, Á. – Zala County, Batyki rét meadow, Túrje, ca 120 m a. s. l., 29.07.2000, leg. and det. Papp, B. and Erzberger, P. Earlier data: 04.06.1953, leg. and det. Vajda, L. and 19.09.1953, leg. and det. Boros, Á. and Vajda, L.

***Drepanocladus sendtneri* (H. Muell.) Warnst.** is a boreal element. It lives in wet meadows. It is a protected bryophyte in Hungary.

Old occurrences confirmed: Zala County, meadows along the road from Gyepükaján to Szentimrefalva, near Meleg-víz stream, Csabrendek, in *Caricetum elatae*, ca 125 m a. s. l., 31.03.2002, leg. and det. Papp, B. and Erzberger, P. Earlier data: 15.09.1961, 11.06.1962, leg. and det. Boros, Á. – Zala County, Batyki rét meadow, Túrje, ca 120 m a. s. l., 29.07.2000, leg. and det. Papp, B. and Erzberger, P. Earlier data: 19.09.1953, leg. and det. Vajda, L.

***Entosthodon hungaricus* (Boros) Loeske** – It is a continental-Mediterranean species. In Hungary its characteristic habitat is in alkali areas in the Danube–Tisza Interfluve and Tiszántúl regions, but it occurs in calcareous sandy areas and on calcareous rocks of the mountain range as well. It is rare according to the RDB.

Old occurrences: Bács-Kiskun County, on alkali soil at lake Böddi-szék near Dunatetőtlen, ca 100 m a. s. l., 16.04.1998, leg. and det. Papp, B. – Bács-Kiskun County, on alkali soil at lake Zab-szék near Fülöpszállás, ca 100 m a. s. l., 17.04.1998, leg. and det. Papp, B. – Bács-Kiskun County, on alkali soil at lake Kelemen-szék near Fülöpszállás, ca 100 m a. s. l., 17.04.1999, leg. and det. Papp, B. – Bács-Kiskun County, on alkali soil at lake Büdös-szék near Szabadszállás, ca 100 m a. s. l., 17.04.1998 and 06.11.1998, leg. and det. Papp, B. – Bács-Kiskun County, on alkali soil at lake

Kis-rét near Szabadszállás, ca 100 m a. s. l., 15.04.1978, leg. Rajczy, M., det. Papp, B. and 16.04.1999, leg. and det. Papp, B. Earlier data: Boros has collected several specimens around Szabadszállás and Fülöpszállás: 13.05.1925, 13.05.1926, 13.04.1951, 15.04.1951, leg. and det. Boros, Á. Orbán has one record from Fülöpszállás in natronate pasture, 19.03.1976, leg. and det. Orbán, S. The exact localities cannot be determined. – Békés County, on alkali soil between Törökhalom and Hegyeshalom at Kétegyháza, ca 90 m a. s. l., 03.03.2000, leg. and det. Papp, B., Jakab, G. and Ódor, P. Earlier data: 12.05.1923 and 23.05.1924, leg. and det. Boros, Á. – Békés County, on alkali soil at Peres, northwest of Kétegyháza, ca 90 m a. s. l., 03.03.2000, leg. and det. Papp, B., Jakab, G. and Ódor, P. Earlier data: 12.05.1923 and 23.05.1924, leg. and det. Boros, Á. – Békés County, on alkali soil at Szikmező, southwest of Elek, ca 90 m a. s. l., 03.03.2000, leg. and det. Papp, B., Jakab, G. and Ódor, P. Earlier data: 17.03.1999, leg. and det. Jakab, G.

New occurrences: Csongrád County, on alkali soil at Lapis-tó near Szentés, ca 80 m a. s. l., 04.03.2000, leg. and det. Papp, B. and Ódor, P. – Bács-Kiskun County, on alkali soil at lake Szappan-szék near Fülöpháza, ca 100 m a. s. l., 09.04.1999, leg. Papp, B., Rajczy, M. and Szurdoki, E., det. Papp, B.

Fissidens arnoldii Ruthe is a species of the temperate zone of Europe. Rare according to the RDB. In Hungary it was usually found on rocks at water mills and sometimes on calcareous rocks of streams in ravines. All the known localities of this species in Hungary have been checked recently and the results were published (PAPP *et al.* 2000). In that paper an earlier locality was mentioned, where further search was needed. In 2002, the species was discovered at this site. In addition, a new site was discovered, the first one east of the river Danube in Hungary (ERZBERGER 2002).

Old occurrence confirmed: Veszprém County, Bakony Mts, Ördög-árok gorge, Gézaháza, on shaded calcareous rock in the stream bed, ca 380 m a. s. l., 06.10.2002, leg. Papp, B. and Szurdoki, E., det. Papp, B. The species was not rare in the upper part of the gorge. It grew on the rocks near the water and was associated with *Fissidens pusillus*, *F. crassipes*, *Amblystegium tenax* and *Hygrohypnum luridum*. Earlier data: 05.07.1969, leg. and det. Boros, Á. and Vajda, L.

New occurrence: Nógrád County, Cserhát Mts, valley of Cserkúti-patak, Cserhátszentiván, on a flat stone in the creek, which was partly dried out at that time, ca 250 m a. s. l., 05.08.2001, leg. and det. Erzberger, P. (teste Papp, B. and Ahrens, M.). Scattered plants of *F. arnoldii* were growing in association with *Amblystegium tenax*.

Fissidens exiguus Sull. is a subatlantic, sub-Mediterranean species. It occurs on the rocks of streams. Earlier records exist from the Börzsöny Mts only. Rare according to the RDB.

New occurrence: Borsod-Abaúj-Zemplén County, Aggtelek karst, "Ifjúsági tábor" in Henc Valley, Varbóc, on rocks and on a concrete wall along the stream under a bridge, ca 170 m a. s. l., 05.08.1994, leg. and det. Papp, B.

Phascum floerkeanum F. Weber et D. Mohr is a basiphytic, photophytic species that grows in disturbed soil, e.g. in arable fields. It is data deficient (K) according to ECCB (1995).

New occurrences: Baranya County, Villány Mts, Kövesmáj at Tenkes Hill near Máriagyűd, calcareous open grassland, ca 300 m a. s. l., 02.05.1999, leg. and det. Papp, B. – Bács-Kiskun County, Plain of Solt, alkaline steppe near Miklapusztá, at an eroded site ("szíkpádka"), associated with *Phascum curvicolle*, *Pottia bryoides*, *Barbula unguiculata*, *Homalothecium lutescens*, ca 100 m a. s. l., 16.03.1997, leg. and det. Erzberger, P. – Bács-Kiskun County, near Bak-ér at Dömsöd, ca 100 m a. s. l., 13.04.1982, leg. Rajczy, M., det. Papp, B. – Bács-Kiskun County, on alkali soil at lake Böddi-szék near Dunatetőten, ca 100 m a. s. l., 06.11.1998, leg. and det. Papp, B. – Bács-Kiskun County, on alkali soil at lake Zab-szék near Fülöpszállás, ca 100 m a. s. l., 15.04.1978, leg. Rajczy, M., det. Papp, B. and 17.04.1998, leg. and det. Papp, B. – Bács-Kiskun County, on alkali soil at lake Kelemen-szék near Fülöpszállás, ca 100 m a. s. l., 17.04.1999, leg. and det. Papp, B. – Bács-Kiskun County, on alkali soil at lake Bűdös-szék near Szabadszállás, ca 100 m a. s. l., 17.04.1998, leg. and det. Papp, B. – Bács-Kiskun County, on alkali soil at lake Kis-rét near Szabadszállás, ca 100 m a. s. l., 15.04.1978, leg. Rajczy, M., det. Papp, B. and 16.04.1998, leg. and det. Papp, B. – Békés County, on alkali soil between Törökhalom and Hegyeshalom at Kétegyháza, ca 90 m a. s. l., 03.03.2000, leg. and det. Papp, B., Jakab, G. and Ódor, P. – Békés County, on alkali soil at Peres, northwest of Kétegyháza, ca 90 m a. s. l., 03.03.2000, leg. and det. Papp, B., Jakab, G. and Ódor, P. – Pest County, Danube Valley, in a stubble field near Dunakeszi, ca 100 m a. s. l., 15.04.1992, 02.02.1994, leg. and det. Erzberger, P. – Veszprém County, Balaton Upland, Koloska Valley at Balatonarács, along trail, ca 260 m a. s. l., 08.02.2001, leg. and det. Papp, B. and Erzberger, P.

Pyramidula tetragona (Brid.) Brid. is a sub-Mediterranean, subatlantic species. It is a short-lived species occurring in open grasslands mainly in spring and autumn. It is included in the Bern Convention (The Convention on Conservation of European Wildlife and Natural Habitats, 1979), and in the European Community Directive on the Conservation of Natural Habitats and Wild Fauna and Flora, 1992. It is vulnerable according to the RDB.

New occurrence: Budapest County, Budapest, Buda Mts, Remete Hill, Máriaremete, southern slope of the hill, on soil in limestone open grassland, along the footpath to the top marked by blue colour (N 47° 33.671', E 18° 55.633'), ca 380 m a. s. l., 15.04.2003, leg. and det. Erzberger, P.

Rhynchostegiella teneriffae (Mont.) Dirkse et Bouman (syn.: *R. jaquinii* (Garov.) Limpr.), a montane species. It lives on the rocks of streams near the water on andesite or sandstone areas. It is mentioned in the RDB as a rare species.

Old occurrence confirmed: Komárom-Esztergom County, Visegrád Mts, Nyír Valley, Pilismarót, on andesite rocks near the water of the stream, ca 280 m a. s. l., 11.11.2001, leg. and det. Papp, B. Earlier data: 08.10.1950, leg. and det. Boros, Á. and Vajda, L., 24.08.1952, leg. and det. Boros, Á.

Rhynchostegium rotundifolium (Brid.) Schimp. is a sub-Mediterranean-subatlantic species. Rare according to the RDB. It lives on shaded, humid rocks, rock walls, in rock crevices, sometimes on decaying logs.

Old occurrences confirmed: Borsod-Abaúj-Zemplén County, Bükk Mts, Szilvásvár, Szalajka Valley at the slope of Istálló-kő, near the cave Istálló-kői-barlang, on calcareous rock outcrops, ca 550 m a. s. l., 06.04.1992, leg. and det. Erzberger, P. A patch of ca 5 cm² size was found. Earlier data: 30.04.1951, leg. Vajda, L., det. Vajda, L. and Boros, Á. – Pest County, Pilis Mts, Szerkövek rocks, Dobogókő, on shaded andesite rocks, ca 600 m a. s. l., 26.05.2001, leg. and det. Papp, B. Less than 10 patches of 4 × 4 cm². Earlier data: 11.05.1952, leg. and det. Boros, Á. and Vajda, L., 23.03.1957, leg. and det. Vajda, L.

New occurrence: Pest County, Pilis Mts, Vaskapu Valley, Pilisszentkereszt, at the base of calcareous rocks in shaded situations, ca 450 m a. s. l., 28.04.2001, leg. and det. Erzberger, P. With sporophytes. This species rarely produces sporophytes (BOROS 1968).

Taxyphyllum densifolium (Lindb. ex Broth.) Reim. is a pontic, montane species. It lives in humid habitats, on shaded rocks. Rare species according to the RDB.

Old occurrences confirmed: Pest County, Pilis Mts, Szerkövek rocks, Dobogókő, on shaded andesite rocks, ca 600 m a. s. l., 26.05.2001, leg. and det. Papp, B. One patch of 15 cm² and another of 2 cm². Earlier data: 11.05.1952, leg. and det. Boros, Á. and Vajda, L., 10.05.1953, leg. and det. Boros, Á., 12.09.1954, leg. and det. Vajda, L. – Heves County, Mátra Mts, Sor-kő rocks on the northern slope of Sombokor Hill, Paráds, at the eastern part of the rock mass, several (about 20–25) patches on the lower humid part of the rock wall, ca 800–860 m a. s. l., 02.06.2001, leg. and det. Papp, B. Earlier data: 10.06.1951, 23.10.1951, 26.10.1952, leg. and det. Boros, Á., 29.04.1952, leg. and det. Boros, Á. and Vajda, L. – Heves County, Mátra Mts, Sas-kő rocks on the eastern slope of Kékes Hill, Paráds, some (less than 10) patches at the middle part of the rock mass, ca 800 m a. s. l., 26.07.2000 and 04.08.2000, leg. and det. Papp, B. and Erzberger, P. Earlier data: 25.03.1951, 06.05.1951, 15.10.1953, leg. and det. Boros, Á., 27.04.1952, leg. and det. Boros, Á., Pócs, T. and Gelencsér, L., 27.06.1952, 28.10.1952, leg. and det. Boros, Á. and Vajda, L., 09.09.1966, leg. and det. Vajda, L.

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