

Bryoflora of the Úpská jáma cirque and adjacent localities of the Eastern Krkonoše Mts.

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Abstract: The bryoflora of the Úpská jáma cirque and Mt Sněžka has been profoundly surveyed during the last three years and is here described and compared to historical data. A total of 260 taxa has been documented at both localities, 240 in the cirque and 10 at Mt Sněžka. The survey added some 17% to the historically known taxa of the cirque and 27% to the bryoflora of Mt Sněžka and, on the other hand, we were unable to confirm some 10% of taxa in the cirque and 24% at Mt Sněžka, part of which however still can be probably found. Three taxa (in addition to 3 other published in Kučera & al. 2004) have been for the first time reported from the Krkonoše Mts. The flora of the Úpská jáma cirque proved to be somewhat poorer than that of the cirques in the western Krkonoše Mts but the species richness is more evenly distributed. The flora of Mt Sněžka proved to be quite strongly affected by human impact, which however cannot be simply seen as a reason for its pauperization. Some 15% of the taxa are regarded threatened and those at highest risk were surveyed in more detail. The scantiest populations consisted of just a few individuals covering several cm².

Key words: bryophytes, the Sudetes, threatened, arctic-alpine, the Czech Republic, fertility, abundance, species diversity

Introduction

The summit region of the eastern Krkonoše Mts has undergone the bryofloristic inventory already in 1998-2000. The results of it have been described in Kučera & Buryová 2001. The recent survey in 2001-2003 brought a substantial extension of the survey within the grant project on the biodiversity centres of the High Sudetes (GAČR 206/01/0411). Úpská jáma cirque and Mt Sněžka (both Czech and Polish parts) have now been surveyed in an unprecedented detail and several previously known populations of threatened taxa have been quantitatively documented at localities adjacent to the cirque (uppermost part of the Bílé Labe valley, Čertova zahrádka at the E slope of Mt Studniční hora, valley of Rudný potok, Důl pod Koulemi valley). The summit region of the eastern part is historically similarly known as the western part (cf. Kučera & al. 2004). Some 55 authors have published 130 papers or book chapters, which include some data on the bryoflora of the region. However, in contrast to the cirques of the western Krkonoše, the composition of the data is different. No larger non-bryological paper with bryophyte data from these localities has been published. The paper of Kučera & Buryová (2001) includes about one third of the hitherto known records. The older works that have contributed most to the knowledge of the bryoflora were J. Milde (particularly Milde 1869), Ch. Nees (particularly Nees & Flotow 1836), J. Velenovský (particularly Velenovský 1897), K.G. Limpricht (particularly Limpricht 1876a and b) and V. Schiffner. In addition, more than 400 records on hepatics were published within the series of Duda & Váňa (1968-1996), most of them for the first time ever. The following paper deals with the bryofloristic data collected in the area over the past three years. However, not only bryofloristic data have been collected (some demographic and ecological data for selected important species have been collected as well) but these data will be published elsewhere.

Methods

The floristic method, essentially the same as that of Kučera & Buryová (2001), has been described in detail in Kučera & al. 2004. The survey was made at two major localities – Úpská jáma cirque and Mt Sněžka. These localities have been split into study sites according to prominent geomorphologic features (most often broader surroundings of streams and ravines). Each site has been surveyed by the whole group when possible (usually the group consisted of three or four), mostly during the whole day, each bryologist noting the bryophytes in his own recording card (with exception of the 2001 data when only one card per site was written). The number of man days for each study site is specified below. Intentionally collected have been only bryophytes, which could not be identified in the field with certainty or which herbarium record was felt to be useful, observing that no population was endangered by the amount of collected material. In total, 829 specimens from Úpská jáma cirque, 102 from Mt Sněžka and 115 from the other adjacent localities have been collected; the number of records from the sheets reached 1491 from the Úpská jáma and 197 from Mt Sněžka. Nomenclature in the text, as well as the Red List criteria (IUCN ver. 3.1), correspond to Kučera & Váňa (2003) in case of exceptions author citations are supplied.

Results

Description of study sites

The study sites in the Úpská jáma cirque have eastern to southern aspect. The cirque itself is the best developed in the whole mountain range, with the altitudinal span of more than 400 mts. The substrate is however less diverse than in the case of Mt Kotel, mostly formed by the acidic mica schists and granite, the only exception are the outcrops of base-rich erlans in so-called ‘Krkonošova zahrádka’ (site U4, see below). The bottom of the cirques lies at the altitude of some 1050 m, whereas the upper faces lie between 1370 and 1500 m. The numbers of the localities refer to the map on Fig. 1, the dates refer to the survey by the authors specified by their initials.

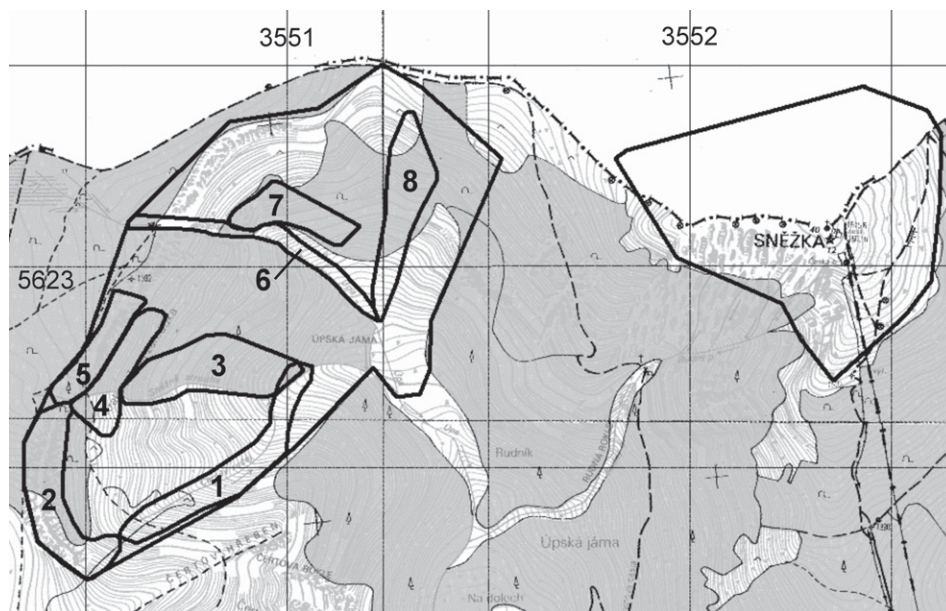
- U1. Ravine of Lavinový potok (also called Čertův ručej) brook between 1080 and ca. 1350 m a.s.l. 30.9.2001, 1.10.2001, BB, JK, MZ.
- U2. ‘Studniční stěna’ cirque face between the Lavinový potok brook and ‘Sněžný most’, 1380 – 1480 m a.s.l. 3.10.2001 BB, JK, MZ, 22.9.2002 dtto+VP.
- U3. Ravine of Sněžná strouha, 1080 – 1310 m a.s.l. 24.-25.7.2002, BB, JK, MZ, JV.
- U4. ‘Krkonošova zahrádka’ beneath the cirque wall, 1300 – 1370 m a.s.l. 25.7.2002 JK, JV, MZ, 22.-23.9.2002, BB, MZ.
- U5. E-facing cirque wall between (including the) ‘Sněžný most’ and the ravine of Úpa, 1350 – 1420 m a.s.l. 23.9.2002 JK.
- U6. Ravine of Úpa including the Horní Úpský vodopád waterfall, 1110 – 1400 m a.s.l. 2.10.2001 BB, JK, MZ, 26.7.2002 dtto+JV.
- U7. Rocks NE of the lower end of the Horní Úpský vodopád waterfall, 1200 – 1270 m a.s.l. 2.10.2001 BB, JK, MZ, 25.9.2002 BB, JK.
- U8. Ravine of Úpička, 1080 – 1350 m a.s.l. 23.7.2002 BB, JK, JV.

Mt Sněžka has not been further divided into study sites due to the relatively small size and no natural boundaries. The geological substratum is acidic mica schist, local base and nutrient enrichments occur in the summit area around the buildings. The locality was visited on 14th (Polish side) and 21st (Czech side) September 2002 (BB, JK, MZ, VP).

List of bryophytes recorded at the individual sites

The taxa names are followed by the Red List categories abbreviations. The + sign after the name means that the species has not been previously recorded from Úpská jáma cirque (U) or Mt Sněžka (S); the sign stands in rounded brackets where there was a general literature infor-

Fig. 1. Study sites in the Úpská jáma cirque and Mt Sněžka. The grid refers to S-1942 system, M33 zone.



mation on the occurrence of the species in the Krkonoše Mts. ++ means that the record is new to the whole Krkonoše Mts. The abbreviations of localities follow the above description, H stands for herbarium record, N for uncollected taxon. The numbers that follow the 'Avg U' or 'Avg S' abbreviations stand for the mean recorded frequency, recorded on a 5-degree scale between 0 (one occurrence) and 2 (more than 5 occurrences) at the sites of Úpská jáma cirque and Mt Sněžka, respectively, with the number of records in brackets (this number is generally smaller than the number of recorded occurrences as the earlier data sheets did not include abundance records).

- Anastrepta orcadensis*; LC-att; U1 (H), U6 (H), S (H); Avg S: 1.5 (4).
Anastrophyllum minutum; LC; U3 (H), U5 (N), U7 (H), S (H); Avg U: 0.33 (3), Avg S: 0.67 (3).
Aneura pinguis; LC; U3 (N), U4 (H), U5 (N), U7 (N), U8 (H); Avg U: 0.2 (5).
Anthelia julacea; VU; U1 (H), U2 (H), U3 (H), U4 (H), U7 (H); Avg U: 0.17 (4).
Anthelia juratzkana; CR; U2 (H); Avg U: 0 (1).
Bazzania trilobata var. *trilobata*; LC; [S+]; S (N); Avg S: 1 (1).
Blepharostoma trichophyllum; LC; [S+]; U1 (N), U3 (H), U4 (H), U8 (H); S (N); Avg U: 0.11 (3), Avg S: 0 (2).
Calypogeia azurea; LC; U1 (H), U2 (H), U3 (H), U4 (H), U6 (H), U7 (N), U8 (H); Avg U: 1.23 (5).
Calypogeia integristipula; LC; [S+]; U1 (H), U2 (H), U3 (H), U4 (H), U6 (N), U8 (N); S (H); Avg U: 0.95 (5), Avg S: 0.8 (5).
Calypogeia muelleriana; LC; U1 (H), U2 (H), U3 (H), U4 (H), U6 (H), U8 (N); Avg U: 0.625 (4).
Calypogeia neesiana; LC; U1 (H), U3 (H), U4 (H), U8 (N); Avg U: 0.33 (3).
Cephalozia bicuspidata; LC; [S+]; U1 (H), U2 (H), U3 (H), U4 (H), U5 (N), U6 (H), U7 (N), U8 (H); S (H); Avg U: 1.16 (7), Avg S: 0.83 (6).
Cephalozia leucantha; VU; [U+]; U1 (H); Avg U: 0 (1).
Cephalozia lunulifolia; LC; [U+]; U1 (H), U3 (H); Avg U: 0.17 (2).
Cephaloziella divaricata; LC; U1 (H), U3 (N), U6 (N), U7 (H), S (H); Avg U: 0.25 (4), Avg S: 0.67 (3).
Cephaloziella grimsulana; EN; U7 (N, J. Váňa).
Cephaloziella rubella; LC; [U+]; U6 (H); Avg U: 0 (1).
Cladopodiella francisci; DD; [++][U+]; U3 (H); Avg U: 0 (1).
Conocephalum conicum; LC; U6 (N), U8 (N); Avg U: 0 (2).

Diplophyllum albicans; LC; U1 (H), U2 (H), U3 (H), U5 (N), U6 (N), U8 (N); S (N); Avg U: 1 (4), Avg S: 0.75 (4).

Diplophyllum obtusifolium; LC; [U(+), S(+)]; U2 (H), U8 (N); S (N); Avg U: 0 (2), Avg S: 0 (1).

Diplophyllum taxifolium; LC; U1 (H), U2 (H), U3 (H), U4 (H), U5 (N), U6 (N), U7 (N), U8 (H); S (H); Avg U: 1.08 (7), Avg S: 1.5 (6).

Gymnocolea inflata; LC; U1 (H), U2 (H), U3 (H), U4 (N), U5 (N), U6 (H), U7 (N), U8 (N); S (H); Avg U: 1.14 (7), Avg S: 1.625 (8).

Gymnomitrium concinnum; LR-nt; U1 (H), U2 (H), U3 (H), U4 (H), U5 (H), U6 (H), S (H); Avg U: 0.98 (5), Avg S: 1 (2).

Harpanthus flotovianus; LC-att; U1 (H), U3 (H), U4 (H), U6 (H); Avg U: 0.92 (3).

Chiloscyphus coadunatus; LC; [U(+)]; U1 (N);

Chiloscyphus polyanthos var. *pallescens*; LC-att; U3 (H), U6 (H); Avg U: 1 (2).

Chiloscyphus polyanthos var. *polyanthos*; LC; U6 (N);

Chiloscyphus profundus; LC; U1 (N), U3 (H), U4 (N), U8 (N); Avg U: 0.08 (3).

Jungermannia obovata; LC; U1 (H), U3 (H), U4 (H), U5 (N), U6 (H), U7 (N), U8 (N); Avg U: 0.89 (6).

Jungermannia pumila; LR-nt; U6 (H); Avg U: 0 (1).

Jungermannia sphaerocarpa; LC; U1 (H), U3 (H), U6 (H), U8 (H); Avg U: 1.33 (3).

Lepidozia reptans; LC; [U(+), S(+)]; U3 (N), U6 (N), S (N); Avg U: 0 (1), Avg S: 0 (1).

Lophozia attenuata; LC; U1 (H), U3 (H), U4 (H), U6 (H), S (N); Avg U: 0 (3), Avg S: 1 (1).

Lophozia bantrienis; LC; U8 (H); Avg U: 1 (1).

Lophozia barbata; LC; U3 (N), U4 (N); Avg U: 1 (2).

Lophozia floerkei; LC; U1 (H), U2 (N), U4 (H), U6 (H), S (N); Avg U: 0.6 (3), Avg S: 0 (1).

Lophozia hatcheri; LC; [S+]; U1 (N), U3 (N), U4 (H), U6 (N), U7 (N), U8 (H); S (H); Avg U: 1.5 (5), Avg S: 1.79 (7).

Lophozia incisa; LC-att; U1 (H), U3 (H), U4 (H), U8 (H); Avg U: 0 (4).

Lophozia kunzeana; CR; [U+]; U3 (H); Avg U: 0 (1).

Lophozia longidens; LC-att; U1 (H); Avg U: 1 (1).

Lophozia longiflora; LC; [S+]; U1 (H), U2 (H), U3 (H), U4 (H), U8 (N); S (H); Avg U: 0 (4), Avg S: 0 (1).

Lophozia lycopodioides; LC; U1 (H), U2 (N), U3 (H), U4 (H), U5 (N), U6 (H), U7 (N), U8 (N); S (N); Avg U: 1.36 (7), Avg S: 0.75 (2).

Lophozia sudetica; LC; U1 (H), U2 (H), U3 (H), U4 (H), U5 (H), U6 (H), U7 (H), U8 (H); S (H); Avg U: 1.76 (7), Avg S: 1.57 (7).

Lophozia ventricosa var. *ventricosa*; LC; U1 (H), U2 (N), U3 (H), U4 (H), U6 (H), U7 (H), U8 (H); S (H); Avg U: 0.94 (6), Avg S: 1.57 (7).

Lophozia wenzelii; EN; [S(+)]; U1 (H), U2 (H), S (H); Avg U: 0 (2), Avg S: 1 (3).

Marchantia polymorpha s.l.; -; [U(+)]; U6 (N);

Marchantia polymorpha subsp. *montivagans*; DD; U8 (H); Avg U: 0 (1).

Marsupella alpina; VU; U1 (H), U2 (H); Avg U: 0.25 (2).

Marsupella emarginata var. *aquatica*; LC; U1 (N), U2 (N), U3 (H), U4 (N), U5 (N), U6 (N), U7 (N), U8 (N); Avg U: 1.3 (5).

Marsupella emarginata var. *emarginata*; LC; U1 (H), U2 (H), U3 (H), U4 (H), U5 (N), U6 (H), U7 (H), U8 (N); Avg U: 1.74 (7).

Marsupella funckii; LR-nt; U7 (H); Avg U: 0.83 (1).

Marsupella sparsifolia; EN; U2 (H), U5 (H); Avg U: 0 (2).

Marsupella sphacelata; LC; U1 (H), U2 (H), U3 (H), U4 (H), U5 (N), U6 (N), U7 (H), U8 (N); Avg U: 1.40 (7).

Marsupella sprucei; CR; S (H); Avg S: 1 (4).

Metzgeria furcata; LC; U3 (H); Avg U: 0 (1).

Moerckia blyttii; VU; U5 (H); Avg U: 0 (1).

Mylia taylorii; LC; U1 (N), U2 (N), U3 (H), U6 (N), S (N); Avg U: 0 (1), Avg S: 2 (1).

Nardia geoscyphus; LC-att; [U(+)]; U3 (H), U4 (H); Avg U: 0 (2).

Nardia scalaris; LC; U1 (H), U2 (H), U3 (H), U4 (H), U5 (H), U6 (H), U7 (N), U8 (N); S (H); Avg U: 1.41 (7), Avg S: 1.67 (3).

Pellia neesiana; LC; U1 (N), U2 (N), U3 (N), U4 (H), U5 (N), U6 (N), U7 (N), U8 (N); Avg U: 1.17 (5).

Plagiochila asplenioides; LC; U4 (H); Avg U: 0 (1).

Plagiochila porelloides; LC; [U+]; U3 (H), U4 (N), U5 (N), U6 (H), U8 (H); Avg U: 0.53 (5).

Porella cordaeana; LR-nt; U3 (H); Avg U: 0.5 (1).

Ptilidium ciliare; LC; U1 (H), U2 (N), U3 (N), U4 (N), U5 (N), U6 (N), U7 (N), U8 (N); S (N); Avg U: 0.925

(5), Avg S: 1.4 (5).
Ptilidium pulcherrimum; LC; U1 (N), U3 (N), U4 (N), U5 (N), U8 (N); S (N); Avg U: 0.35 (4), Avg S: 0.5 (2).
Radula complanata s.l. (ster.); -; U3 (H); Avg U: 0 (1).
Riccardia multifida; LC-att; U3 (H), U4 (H), U8 (H); Avg U: 0.74 (3).
Scapania curta; LC; U1 (H), U2 (H), U3 (H); Avg U: 0 (3).
Scapania irrigua; LC; U1 (H), U2 (N), U3 (H), U4 (H), U5 (N), U6 (H), U7 (N), U8 (H); S (N); Avg U: 0.96 (6), Avg S: 0 (1).
Scapania paludosa; VU; U6 (H); Avg U: 1 (1).
Scapania parvifolia; CR; [S+]; U1 (H), S (H); Avg U: 0 (1), Avg S: 0 (2).
Scapania sp. [sect. *Curtae* (Müll. Frib.) H. Buch]; -; U1 (H); Avg U: 0 (1).
Scapania subalpina; LR-nt; U3 (H), U4 (H), U6 (H); Avg U: 1 (3).
Scapania uliginosa; LC; U1 (H), U2 (N), U3 (H), U4 (H), U5 (N), U6 (N), U7 (N), U8 (H); Avg U: 1.13 (5).
Scapania umbrosa; LC; [U(+)]; U1 (H), U3 (H), U8 (N); Avg U: 0 (2).
Scapania undulata; LC; U1 (H), U2 (N), U3 (H), U4 (H), U5 (N), U6 (H), U7 (N), U8 (N); Avg U: 1.57 (6).
Tetralophozia setiformis; VU; S (H); Avg S: 2 (8).
Tritomaria exsectiformis; LC-att; [++][U+]; U7 (H); Avg U: 0 (1).
Tritomaria quinquedentata; LC; [U(+)]; U4 (H); Avg U: 0 (1).
Amphidium mougeotii; LC; [S(+)]; U3 (H), U5 (N), U7 (N), U8 (N); S (N); Avg U: 1.25 (4), Avg S: 0 (1).
Andreaea rothii subsp. *falcata*; LC; U2 (N), U3 (H), U5 (H), U7 (H), U8 (H); S (H); Avg U: 0.8 (5), Avg S: 0.61 (9).
Andreaea rothii subsp. *rothii*; VU; U7 (H), U8 (H); Avg U: 0 (2).
Andreaea rupestris; LC; U1 (H), U2 (H), U3 (N), U4 (H), U5 (H), U6 (H), U7 (H), U8 (H); S (H); Avg U: 1.74 (6), Avg S: 2 (7).
Atrichum undulatum var. *undulatum*; LC; U7 (H); Avg U: 0 (1).
Bartramia ithyphylla; LC; S (H); Avg S: 0 (1).
Blindia acuta; LC; U1 (N), U2 (N), U3 (H), U4 (H), U5 (N), U6 (H), U7 (N), U8 (N); S (N); Avg U: 0.90 (7), Avg S: 0 (1).
Brachydontium trichodes; LC-att; U1 (H), U4 (H), U6 (H); Avg U: 0 (1).
Brachythecium albicans; LC; [S+]; S (H); Avg S: 0 (3).
Brachythecium oedipodium; LC-att; [U+, S+]; U1 (H), U3 (H), U4 (H), U6 (H), S (H); Avg U: 0.1875 (4), Avg S: 0 (1).
Brachythecium plumosum; LC; U4 (N), U6 (H), U8 (H); Avg U: 0.25 (2).
Brachythecium populeum; LC; [U(+)]; U1 (N);
Brachythecium reflexum; LC; U1 (H), U2 (N), U3 (H), U4 (H), U6 (H), U8 (N); Avg U: 1.19 (3).
Brachythecium rivulare; LC; U3 (N), U4 (N), U5 (H), U6 (H), U7 (N), U8 (H); Avg U: 1.13 (5).
Brachythecium rutabulum; LC; U4 (H), U8 (H); Avg U: 0 (2).
Brachythecium salebrosum; LC; [U(+), S(+)]; U3 (H), U4 (H), S (H); Avg U: 0.25 (2), Avg S: 0 (1).
Brachythecium starkei; LC-att; U1 (H), U3 (H), U4 (H), U6 (H), S (H); Avg U: 0.35 (4), Avg S: 0 (2).
Brachythecium velutinum; LC; [U(+), S(+)]; U3 (H), U6 (N), S (H); Avg U: 0 (1), Avg S: 0 (1).
Bryoerythrophyllum recurvirostrum; LC; S (H); Avg S: 0 (1).
Bryum bimum; LC; U8 (H); Avg U: 0 (1).
Bryum laevifilum; LC; [U+]; U3 (H); Avg U: 0 (1).
Bryum muehlenbeckii; LC-att; U3 (H), U7 (H), U8 (N); Avg U: 0.33 (3).
Bryum pallens; LC; U3 (N); Avg U: 0 (1).
Bryum pallescens; LC; U7 (H), U8 (H); S (H); Avg U: 0.25 (2), Avg S: 1 (2).
Bryum pseudotriquetrum; LC; U3 (H), U4 (H), U6 (N), U7 (N), U8 (H); Avg U: 0.85 (4).
Bryum weigelii; LC-att; U3 (N), U4 (H), U5 (H), U6 (H), U8 (H); Avg U: 0.4 (5).
Campylium protensum; LC; U3 (N), U4 (N), U8 (N); Avg U: 0.67 (3).
Campylium stellatum; LR-nt; U3 (H), U7 (H), U8 (H); Avg U: 0.67 (3).
Campylophyllum sommerfeltii; EN; [U+]; U4 (H); Avg U: 0 (1).
Ceratodon purpureus; LC; U1 (H), U6 (H), U8 (N); S (H); Avg U: 0.33 (3), Avg S: 0.33 (3).
Climacium dendroides; LC; U8 (H); Avg U: 0 (1).
Coscinodon cribrosus; LC; [++][U+]; U5 (H); Avg U: 0 (1).
Cratoneuron filicinum; LC; [S+]; S (N); Avg S: 0 (1).
Ctenidium molluscum; LC; U4 (H), U7 (N), U8 (N); Avg U: 0.08 (3).
Cynodontium polycarpon; LC; U1 (N), U2 (N), U3 (N), U4 (H), U5 (N), U6 (H), U7 (H), U8 (N); S (H); Avg U: 1.58 (7), Avg S: 1.5 (6).
Cynodontium strumiferum; LC; [S(+)]; U4 (H), U8 (H); S (H); Avg U: 0.5 (2), Avg S: 0 (1).

Dicranella cerviculata; LC; U1 (N), U2 (H), U3 (H), U4 (N), U5 (N), U6 (H), U7 (N), U8 (N); S (H); Avg U: 0.65 (7), Avg S: 1.5 (4).
Dicranella heteromalla; LC; [S(+)]; U1 (H), U2 (H), U3 (H), U4 (N), U6 (N), U7 (N), U8 (N); S (N); Avg U: 0.64 (6), Avg S: 0.67 (3).
Dicranodontium denudatum; LC; [S(+)]; U1 (H), U2 (N), U3 (N), U4 (N), U5 (N), U6 (N), U7 (N), U8 (N); S (H); Avg U: 0.80 (6), Avg S: 1.25 (4).
Dicranoweisia crispula; LC; U3 (H), U4 (N), U6 (N), U7 (H), U8 (N); Avg U: 0.87 (5).
Dicranum elongatum; EN; S (H); Avg S: 1.5 (9).
Dicranum flexicaule; LC; U1 (H), U2 (H), U3 (H), U4 (H), U6 (H), U7 (H), S (H); Avg U: 0 (6), Avg S: 1.67 (3).
Dicranum majus; EN; [U(+), S(+)]; U1 (H), U3 (H), U4 (H), S (H); Avg U: 0.33 (3), Avg S: 0 (1).
Dicranum montanum; LC; [S(+)]; U1 (N), U3 (N), U4 (N), U8 (N); S (N); Avg U: 0.625 (3), Avg S: 1 (3).
Dicranum scoparium; LC; U1 (H), U2 (N), U3 (H), U4 (H), U5 (N), U6 (H), U7 (H), U8 (N); S (H); Avg U: 1.56 (7), Avg S: 1.71 (7).
Didymodon fallax; LC; S (N); Avg S: 0 (1).
Dichodontium palustre; LC; U1 (N), U3 (N), U4 (N), U5 (N), U6 (N), U7 (N), U8 (N); Avg U: 1.21 (6).
Diphyscium foliosum; LC-att; U7 (H);
Ditrichum heteromallum; LC; [U(+), S(+)]; U2 (H), U5 (H), U6 (N), U7 (H), U8 (N); S (N); Avg U: 0.25 (4), Avg S: 0 (1).
Ditrichum lineare; LC-att; [U+]; U2 (H); Avg U: 0 (1).
Ditrichum zonatum; EN; [U+]; U2 (H), U7 (H); Avg U: 0.25 (2).
Encalypta streptocarpa; LC; S (N); Avg S: 0 (1).
Fontinalis antipyretica; LC; U5 (H), U6 (H); Avg U: 1 (2).
Grimmia donniana; LC; U2 (H), U5 (H), U6 (N), U7 (H), U8 (N); S (H); Avg U: 0.3125 (4), Avg S: 1.5 (2).
Grimmia elongata; LR-nt; U2 (H), U3 (H), U4 (N), U5 (N), U7 (H), U8 (H); S (H); Avg U: 0.69 (6), Avg S: 2 (2).
Grimmia funalis; LC-att; U3 (H), U7 (H); Avg U: 0.25 (2).
Grimmia hartmanii; LC; U3 (H), U4 (H); Avg U: 0.5 (2).
Grimmia incurva; LC; U3 (N), U4 (N), U5 (N), U7 (H), U8 (N); S (H); Avg U: 0.27 (5), Avg S: 1.2 (5).
Grimmia montana; LR-nt; U7 (H); Avg U: 0.83 (1).
Grimmia muehlenbeckii; LC; U7 (H); Avg U: 0 (1).
Grimmia ramondii; LC-att; U3 (H), U4 (H), U6 (H), U7 (H), U8 (H); Avg U: 0.3 (5).
Hedwigia ciliata; LC; [U(+)]; U7 (H); Avg U: 0 (1).
Herzogiella striatella; LR-nt; [S(+)]; U1 (H), U2 (H), U3 (H), U4 (H), U5 (H), U6 (H), U7 (H), U8 (H); S (H); Avg U: 0.14 (7), Avg S: 0 (2).
Heterocladium heteropterum; LC; U1 (H), U3 (N), U4 (N), U6 (N), U8 (H); Avg U: 0.625 (4).
Hygrohypnum molle; LR-nt; U6 (H), U7 (H); Avg U: 0.5 (2).
Hygrohypnum ochraceum; LC; U5 (N), U6 (H); Avg U: 0.58 (2).
Hylocomium pyrenaicum; VU; U4 (H); Avg U: 0 (1).
Hylocomium splendens; LC; U1 (N), U2 (N), U3 (N), U4 (H), U6 (N), U7 (N), U8 (N); Avg U: 0.53 (5).
Hylocomium umbratum; LC-att; [U(+)]; U1 (H), U4 (H); Avg U: 0 (1).
Hypnum callichroum; EN; U4 (H); Avg U: 0.6 (1).
Hypnum cupressiforme var. *cupressiforme*; LC; [U(+)]; U7 (H), U8 (N); Avg U: 0 (2).
Hypnum pallescens; LC-att; U3 (H); Avg U: 0 (1).
Isoetecium alopecuroides; LC; [U(+)]; U2 (H), U3 (H); Avg U: 0 (2).
Kiaeria blytii; LC; U2 (H), U3 (H), U4 (H), U6 (H), U7 (H), U8 (N); S (H); Avg U: 1.04 (6), Avg S: 2 (2).
Kiaeria falcata; CR; [U(+)]; U5 (H); Avg U: 0.5 (1).
Kiaeria starkei; LC; U1 (H), U2 (H), U3 (H), U5 (H), S (H); Avg U: 0.125 (4), Avg S: 1 (3).
Lescuraea incurvata; LC; [S(+)]; U3 (H), U4 (H), U6 (H), S (H); Avg U: 0.08 (3), Avg S: 0 (3).
Lescuraea mutabilis; EN; U3 (H); Avg U: 0 (1).
Lescuraea patens; CR; [++][U+]; U6 (H); Avg U: 0 (1).
Lescuraea radicata; DD-va; U6 (H); Avg U: 0 (1).
Mnium hornum; LC; U3 (H), U8 (N); Avg U: 0.5 (2).
Mnium spinosum; LC; U5 (H), S (H); Avg U: 0 (1), Avg S: 0 (1).
Oligotrichum hercynicum; LC; U1 (N), U2 (N), U3 (N), U4 (H), U5 (H), U6 (N), U7 (H), U8 (H); S (N); Avg U: 0.86 (7), Avg S: 1 (2).
Orthotrichum pallens; LC; [U+]; U3 (H); Avg U: 0.5 (1).
Palustriella commutata; LC; U4 (H), U8 (H); Avg U: 0.25 (2).

Palustriella decipiens; LR-nt; U8 (H); Avg U: 0.8 (1).
Palustriella falcata; LC; U3 (N), U4 (H), U8 (N); Avg U: 0.67 (3).
Paraleucobryum longifolium; LC; [S(+)]; U1 (H), U3 (H), U4 (H), U7 (H), U8 (H); S (N); Avg U: 0.4 (5), Avg S: 0 (1).
Philonotis fontana; LC; U3 (H), U4 (H), U5 (H), U6 (N), U8 (H); Avg U: 1.42 (5).
Philonotis seriata; LC; U3 (H), U4 (N), U5 (N), U6 (H), U7 (N), U8 (H); Avg U: 1.18 (6).
Philonotis tomentella; VU; [U+]; U3 (H); Avg U: 0 (1).
Plagiomnium affine; LC; [S(+)]; U1 (H), U4 (N), U6 (N), S (N); Avg U: 0 (1), Avg S: 0 (1).
Plagiomnium cuspidatum; LC; S (H); Avg S: 1 (1).
Plagiomnium medium; LR-nt; [U+, S+]; U4 (H), U5 (H), U8 (H); S (H); Avg U: 0.25 (4), Avg S: 0 (2).
Plagiomnium undulatum; LC; [U(+)]; U8 (H); Avg U: 0 (1).
Plagiothecium cavifolium; LC; [S(+)]; U1 (H), U4 (H), S (H); Avg U: 0.5 (2), Avg S: 1 (1).
Plagiothecium curvifolium; LC; U1 (H), U3 (N), U4 (H), U6 (N), U8 (N); Avg U: 0.5 (3).
Plagiothecium denticulatum var. *denticulatum*; LC; [S(+)]; U1 (N), U2 (N), U3 (H), U4 (H), U5 (N), U6 (H), U8 (N); S (H); Avg U: 1.36 (5), Avg S: 1 (2).
Plagiothecium denticulatum var. *obtusifolium*; VU; [S+]; U1 (H), U4 (H), U6 (H), S (H); Avg U: 0.33 (3), Avg S: 0 (1).
Plagiothecium laetum; LC; [U+, S+]; U1 (H), U2 (N), U3 (N), U4 (N), U5 (N), U6 (H), U7 (N), U8 (H); S (N); Avg U: 0.94 (6), Avg S: 0.9 (5).
Plagiothecium platyphyllum; LC-att; [U+]; U6 (N), U8 (H); Avg U: 0 (2).
Plagiothecium undulatum; LC; U1 (H), U3 (N), U4 (N), U6 (N); Avg U: 0.17 (2).
Platyhypnidium riparioides; LC; U6 (N);
Pleurozium schreberi; LC; [U(+)]; U1 (H), U2 (N), U3 (H), U4 (H), U5 (N), U6 (N), U7 (N), U8 (N); S (N); Avg U: 0.79 (7), Avg S: 1.1 (5).
Pogonatum aloides; LC; [S+]; S (H); Avg S: 0 (1).
Pogonatum urnigerum; LC; U2 (N), U3 (N), U4 (N), U5 (H), U6 (N), U7 (N), U8 (N); S (N); Avg U: 0.67 (6), Avg S: 1.5 (1).
Pohlia cruda; LC; [S+]; S (N); Avg S: 0 (1).
Pohlia drummondii; LC; [U+]; U5 (H), S (N); Avg U: 0 (1), Avg S: 1 (1).
Pohlia elongata; LR-nt; U4 (N); Avg U: 0 (1).
Pohlia filum; DD; [S+]; S (H); Avg S: 0(1).
Pohlia ludwigii; VU; U3 (H), U4 (H), U5 (H); Avg U: 0.42 (3).
Pohlia nutans subsp. *nutans*; LC; U1 (N), U2 (N), U3 (H), U4 (H), U5 (N), U6 (N), U7 (H), U8 (N); S (H); Avg U: 1.70 (7), Avg S: 2 (8).
Pohlia nutans subsp. *schimperii*; LR-nt; [++][U+, S+]; U1 (H), U3 (H), U5 (H), S (H); Avg U: 0 (3), Avg S: 0 (1).
Pohlia wahlenbergii var. *glacialis* (Brid.) Warb.; -, [U(+)]; U3 (N), U6 (N); Avg U: 0.5 (1).
Pohlia wahlenbergii var. *wahlenbergii*; LC; U4 (N), U6 (H), U8 (N); Avg U: 0 (3).
Polytrichastrum alpinum; LC; U1 (H), U2 (H), U3 (H), U4 (N), U5 (N), U6 (H), U7 (N), S (H); Avg U: 1.33 (6), Avg S: 1.83 (6).
Polytrichastrum formosum; LC; [S(+)]; U1 (H), U2 (H), U3 (H), U4 (H), U5 (H), U6 (N), U7 (N), U8 (N); S (N); Avg U: 1.23 (7), Avg S: 1.5 (4).
Polytrichastrum longisetum; LC; [S(+)]; U1 (H), U2 (H), U4 (H), U6 (H), U8 (N); S (H); Avg U: 0 (4), Avg S: 1 (3).
Polytrichum commune; LC; U1 (N), U2 (N), U3 (H), U4 (N), U5 (N), U6 (N), U7 (N), U8 (N); S (H); Avg U: 1.33 (7), Avg S: 1 (2).
Polytrichum juniperinum; LC; U1 (N), U2 (N), U3 (N), U4 (N), U6 (N), U8 (N); S (N); Avg U: 0.63 (4), Avg S: 0.67 (3).
Polytrichum perigoniale; LC; U6 (H); Avg U: 0 (1).
Polytrichum piliferum; LC; U1 (N), U2 (N), U3 (N), U4 (N), U5 (N), U6 (H), U7 (H), U8 (N); S (N); Avg U: 1.41 (7), Avg S: 1.7 (5).
Polytrichum strictum; LC; U1 (N), U3 (H), U8 (N); S (H); Avg U: 0.5 (2), Avg S: 1.5 (2).
Pseudoleskeella nervosa; LC; [U(+)]; U3 (N), U6 (H); Avg U: 0.5 (2).
Pseudotaxiphyllum elegans; LC; U1 (H), U2 (N), U3 (N), U4 (H), U5 (N), U6 (N), U7 (N), U8 (H); S (H); Avg U: 0.81 (6), Avg S: 0.67 (6).
Racomitrium aciculare; LC; U1 (H), U2 (N), U3 (N), U4 (N), U5 (N), U6 (H), U7 (H), U8 (N); Avg U: 0.93 (7).
Racomitrium aquaticum; LC; [S(+)]; U1 (N), U2 (N), U3 (N), U4 (H), U5 (H), U6 (H), U7 (H), U8 (N); S

(H); Avg U: 0.82 (7), Avg S: 0 (1).
Racomitrium canescens; LC; S (H); Avg S: 0 (1).
Racomitrium elongatum; LC; U3 (H), U4 (N), S (N); Avg U: 0.5 (2), Avg S: 0 (1).
Racomitrium fasciculare; LC; U1 (H), U2 (N), U3 (H), U4 (H), U5 (N), U6 (N), U7 (H), U8 (N); S (N); Avg U: 1.18 (6), Avg S: 2 (2).
Racomitrium lanuginosum; LC; U1 (N), U2 (N), U3 (H), U4 (N), U5 (N), U6 (N), U7 (N), U8 (N); S (H); Avg U: 1.375 (6), Avg S: 1.93 (7).
Racomitrium macounii subsp. *alpinum*; LC; U1 (H), U2 (H), U3 (H), U4 (H), U5 (H), U6 (H), U7 (H), U8 (H); Avg U: 1.05 (8).
Racomitrium macounii subsp. *macounii*; EN; U5 (H), U6 (H); Avg U: 0.47 (2).
Racomitrium microcarpon; LC; U3 (H), U4 (H), U6 (H), S (N); Avg U: 0.44 (3), Avg S: 0 (1).
Racomitrium sudeticum; LC; U1 (H), U2 (H), U3 (H), U4 (H), U5 (N), U6 (H), U7 (H), U8 (H); S (H); Avg U: 1.83 (7), Avg S: 1.5 (6).
Rhabdoweisia fugax; LC; U2 (H), U3 (N), U4 (N), U5 (N), U6 (H), U7 (H), U8 (H); S (H); Avg U: 0.67 (6), Avg S: 0 (2).
Rhizomnium magnifolium; LC-att; U1 (H), U3 (H), U4 (H), U5 (N), U6 (H), U8 (H); Avg U: 0.61 (5).
Rhizomnium punctatum; LC; U3 (H), U4 (H), U5 (N), U6 (H), U8 (N); Avg U: 0.67 (5).
Rhodobryum roseum; LC; U3 (H), U4 (N), U5 (N), U8 (N); Avg U: 0.417 (4).
Rhytidiadelphus loreus; LC; U1 (H), U2 (N), U3 (H), U4 (N), U6 (H), S (N); Avg U: 0 (2), Avg S: 1 (1).
Rhytidiadelphus squarrosus; LC; U1 (N), U3 (N), U4 (H), U6 (N); Avg U: 0.17 (2).
Rhytidiadelphus subpinatus; LC-att; [S(+)]; U1 (H), U3 (H), U4 (H), U6 (H), U8 (N); S (H); Avg U: 0.33 (3), Avg S: 0 (1).
Rhytidiadelphus triquetrus; LC; [U(+)]; U3 (N); Avg U: 0 (1).
Sanionia uncinata; LC; U1 (N), U3 (N), U4 (H), U6 (N), U7 (N), U8 (N); S (H); Avg U: 0.71 (3), Avg S: 0.4 (5).
Scorpidium revolvens; DD; U7 (H); Avg U: 0 (1).
Schistidium dupretii; LC; [U+]; U6 (H); Avg U: 0 (1).
Sphagnum capillifolium; LC; [S(+)]; U1 (N), U2 (H), U3 (H), U4 (N), U7 (H), S (H); Avg U: 0.25 (4), Avg S: 0.67 (3).
Sphagnum centrale; LC-att; U8 (H); Avg U: 0 (1).
Sphagnum compactum; LC; [S(+)]; U1 (H), U2 (N), U3 (N), U4 (H), U5 (N), U7 (N), U8 (N); S (N); Avg U: 1.25 (6), Avg S: 1 (1).
Sphagnum cuspidatum; LC; [U(+)]; U1 (H), U4 (H); Avg U: 0.25 (2).
Sphagnum denticulatum; LC; [S(+)]; U1 (H), U2 (N), U3 (H), U4 (H), U5 (N), U6 (N), U7 (N), U8 (N); S (N); Avg U: 1.5 (6), Avg S: 0 (1).
Sphagnum fallax; LC; U1 (H), U3 (N), U4 (N), U5 (N), U6 (H), U8 (H); Avg U: 1.2 (5).
Sphagnum fimbriatum; LC; U1 (H), U3 (H); Avg U: 0 (1).
Sphagnum flexuosum; LC; U1 (H), U3 (H), U4 (H), U8 (H); Avg U: 0.33 (4).
Sphagnum fuscum; LC; [U(+)]; U3 (N); Avg U: 1 (1).
Sphagnum girgensohnii; LC; [S(+)]; U1 (H), U2 (H), U3 (H), U4 (H), U5 (N), U6 (N), U7 (N), U8 (H); S (N); Avg U: 1.55 (7), Avg S: 1 (2).
Sphagnum lindbergii; LC; U1 (N), U2 (N);
Sphagnum magellanicum; LC; [U(+)]; U1 (H);
Sphagnum majus; LC; [U(+)]; U1 (N), U3 (H), U6 (H); Avg U: 0.25 (2).
Sphagnum palustre; LC; U6 (H); Avg U: 0.33 (1).
Sphagnum papillosum; LC; [S+]; U3 (H), U4 (H), U5 (H), U6 (H), U7 (H), U8 (H); S (H); Avg U: 1.22 (6), Avg S: 0 (1).
Sphagnum quinquefarium; LC; [U+]; U1 (H); Avg U: 0 (1).
Sphagnum rubellum; LC; U1 (H), U8 (H); Avg U: 0.25 (2).
Sphagnum russowii; LC; [S(+)]; U1 (H), U2 (H), U3 (N), U4 (H), U5 (N), U6 (N), U7 (N), U8 (N); S (N); Avg U: 1.60 (7), Avg S: 2 (1).
Sphagnum squarrosus; LC; U1 (H), U3 (N), U8 (N); Avg U: 0.75 (2).
Sphagnum subnitens; LC-att; U1 (H), U3 (H), U7 (H), U8 (H); Avg U: 1.25 (3).
Sphagnum subsecundum; LC; U4 (H); Avg U: 0 (1).
Sphagnum teres; LC; U3 (N), U4 (H), U6 (H), U8 (N); Avg U: 0.92 (4).
Splachnum sphaericum; LR-nt; U1 (H), U2 (H); Avg U: 0 (2).
Straminergon stramineum; LC; U1 (H), U2 (N), U3 (H), U4 (H), U5 (N), U6 (H), U7 (H), U8 (N); Avg U: 0.79 (7).

Syntrichia norvegica; CR; [++][S+]; S (H); Avg S: 0 (1).
Tetraphis pellucida; LC; [S(+)]; U1 (N), U3 (N), U4 (N), U6 (H), U8 (N); S (N); Avg U: 0.5 (3), Avg S: 0.25 (4).
Tetradontium repandum; LC-att; [U+]; U1 (H), U3 (H); Avg U: 0.25 (2).
Thuidium tamariscinum; LC; [U(+)]; U8 (N); Avg U: 0.5 (1).
Tortella tortuosa; LC; S (N); Avg S: 0 (1).
Tortula muralis var. *muralis*; LC; [U(+)]; U6 (H); Avg U: 0 (1).
Trichostomum tenuirostre; LC-att; U3 (H); Avg U: 0 (1).
Warnstorfia exannulata; LC; U1 (H), U2 (N), U3 (H), U4 (H), U6 (H); Avg U: 0.33 (4).
Warnstorfia fluviatans; LC; U1 (H), U3 (H), S (H); Avg U: 0 (2), Avg S: 0 (1).
Warnstorfia pseudostraminea; CR; [U+]; U1 (H), U3 (H), U5 (H); Avg U: 0.05 (3).
Warnstorfia sarmentosa; LC-att; U1 (N), U2 (N), U3 (H), U4 (H), U5 (N), U7 (H), U8 (N); Avg U: 1.05 (6).

Summarization for the study sites

Table 1: Species numbers at the study sites. The total for the whole Úpská jáma is 242 taxa.

| Study site | Mt Sněžka | U1 | U2 | U3 | U4 | U5 | U6 | U7 | U8 |
|----------------|-----------|-----|----|-----|-----|----|-----|----|-----|
| Liverwort taxa | 29 | 46 | 30 | 51 | 39 | 23 | 39 | 24 | 36 |
| Moss taxa | 81 | 77 | 51 | 106 | 96 | 59 | 86 | 66 | 91 |
| Total | 110 | 123 | 81 | 157 | 135 | 82 | 125 | 90 | 127 |

Details for important taxa:

1) Critically endangered taxa

Anthelia juratzkana

- Úpská jáma cirque: ‘Studniční stěna’ cirque face, 610 m ENE of the top of Mt. Studniční hora, E3550.53-N5622.27, ca. 1400 m, thin humus layer over a NE-facing gneiss outcrop, moderately wet, 3.10.2001 leg. J. Kučera (8456)

The discovered population was extremely small, accounting for less than 5 cm².

Lophozia kunzeana

- Úpská jáma cirque: ravine of Sněžná strouha, ca. 130 m above the confluence with Lavinový potok at the right brook bank, E3550.93-N5622.685, 1130 m, at the edge of moss carpet covering the top of a granite boulder, on soil layer, 24.7.2002 leg. J. Kučera (10270)

The population covered a patch of 30×6 cm in the abundance of 90%, i.e. ca. 160 cm².

Marsupella sprucei

- Czech Rep.: Mt Sněžka at the Polish boundary, WNW of the summit at the frontier milestone 28/3, E3552.26-N5623.14, 1590-1595 m, bare open acid soil, among *Oligotrichum*, 14.9.2002 leg. J. Kučera (10319), V. Plášek (10694), M. Zmrhalová (11038)
- Poland: Mt Śnieżka at the Czech boundary, WNW of the summit at the frontier milestone 28/3, same coordinates, bare open acid soil, among *Oligotrichum*, 14.9.2002 leg. J. Kučera (10320)

The sum for all these nearby populations was ca. 2.0 dm².

Scapania parvifolia

- Poland: Mt Śnieżka, NNW slopes along the tourist path, 340 m SE of the chalet ‘Dom Śląski’, E3551.87-N5623.25, 1430 m, open bare acid soil, among heathers, 14.9.2002 leg. J. Kučera (10308), M. Zmrhalová (11200)
- Úpská jáma cirque: ravine of Lavinový potok, right bank, ca. 860 m ENE of the top of Mt. Studniční hora, E3550.73-N5622.415, 1265 m, on old grass in the slope above the brook bank, 30.9.2001 leg. J. Kučera (8360); dtto on small granite stone at the brook bank, Kučera (8361)

The population in Úpská jáma cirque was very small, covering less than ca. 10 cm². The Polish population at Mt Sněžka was not measured.

Kiaeria falcata

- Úpská jáma cirque: ‘Sněžný most’, above ‘Krkonošova zahrádka’, 780 m NE of the summit of Mt Studniční hora, E3550.44-N5622.68, 1405 m, granite stone - outcrop in the E slope, inclined face, open, moist, late snow area, 25.7.2002 leg. J. Kučera (10288), dtto 22.9.2002 leg. V. Plášek (10708)
- Valley of Bílé Labe just beneath the Luční bouda chalet, left bank, E3549.23-N5622.97, 1407 m, granite stone at the bank, moist, not shaded, 25.7.2002 leg. J. Kučera (10292)

The population at ‘Sněžný most’ in the cirque accounted for 8.4 dm². The specimen from beneath the Luční bouda lodge was collected unconsciously; the population perhaps did not cover more than 1 dm².

Lescuraea patens

- Úpská jáma cirque: spring area of Úpa river above the edge of Horní Úpský vodopád waterfall, E3550.65-N5623.10, 1380 m, horizontally and inclined on an E-facing granite bolder at the left stream bank, shaded by vegetation, 26.7.2002 leg. M. Zmrhalová (11023)

The plant was unfortunately collected unconsciously and therefore the extent of the population not measured.

Lescuraea radiciosa

- Úpská jáma cirque: S exposed slope 30 m left of Úpa brook, ca. 130 m E of the foot of ‘Horní Úpský vodopád’ waterfall, grassland, E3551.00-N5623.09, 1180 m, vertical face of a granite stone shaded by grass, 25.9.2002 leg. B. Buryová (3863), teste Z. Hradílek.

The species was evaluated as DD-va (Vanished) in Kučera & Váňa 2003, as the last record of the species before this one was made in 1954 in Labský důl valley, where our search for it was unsuccessful. This collection, first in the eastern Krkonoše Mts, was also made unconsciously and thus the information about the quantity is not available but with certainty the population did not exceed 1 dm².

Syntrichia norvegica

- Mt Sněžka, ca. 70 m W of the top, E3552.285-N5623.11, 1595 m, inclined at ledge of SSW-facing mica schist rock, 21.9.2002 leg. M. Zmrhalová (10706)

Also collected unconsciously without the information on quantity; for additional information see Blockeel & al. (2003).

Warnstorfia pseudostraminea

- Úpská jáma cirque: ravine of Lavinový potok, left bank, beneath a small waterfall, ca. 340 m above the confluence with Sněžná strouha, E3550.82-N5622.48, ca. 1220 m, on humus in the grass, hanging over a SE-facing granite rock at the brook bank, 1.10.2001 leg. J. Kučera (8404), B. Buryová (2848), M. Zmrhalová (9875)
- Úpská jáma cirque: ravine of Sněžná strouha, ca. 110 m above the confluence with Lavinový potok, E3550.94-N5622.69, 1120 m, niche at the left bank of the brook, beneath an overhang, shaded, moist, 24.7.2002 leg. J. Kučera (10268); dtto, E3551.00-N5622.72, 1105 m, vertically on acid wet humus beneath vegetation, NW-exposed, shaded, 24.7.2002 leg. M. Zmrhalová (10945); dtto, 1115 m, on moist humose soil, shaded by vegetation, NE-exposed, M. Zmrhalová (10982)
- Úpská jáma cirque: cirque face NNE of ‘Sněžný most’, 1060 m NE of the summit of Mt Studniční hora, E3550.57-N5622.925, 1390 m, on old grass at a brooklet, late snow area, E-facing, wet, 23.9.2002 leg. J. Kučera (10378)
- Úpská jáma cirque: cirque face 30 m ESE of ‘Sněžný most’, 770 m NE of the summit of Mt Studniční hora, right bank of Sněžná strouha stream, E3550.43-N5622.68, 1420 m, on decaying *Deschampsia cespitosa* in NE exposed slope, open wet late snow area, 22.9.2002 leg. B. Buryová (3816)
- Úpská jáma cirque: ‘Sněžný most’, above ‘Krkonošova zahrádka’, 780 m NE of the summit of Mt Studniční hora, E3550.45-N5622.67, 1400 m, on old grass, wet, half-shaded, late snow area, 25.7.2002 leg. J. Kučera (10287); dtto, ca 750 m NE of the top of Studniční stěna Mt., E3550.42-N5622.68, 1425 m, inclined on moist humose soil at left E-facing bank of the stream, open, 25.7.2002 leg. M. Zmrhalová (10972, 10973), V. Plášek (10707)

The species has been rediscovered perhaps after more than a century in the Czech Republic; in the Krkonoše Mts, there have been only two records of the species until now – Sendtner’s collection from ‘Labská louka’ mire (from 1838 sec. Cypers 1902) and Milde’s collection from ‘Bílá louka’ from 1860. *Warnstorfia pseudostraminea* seems to prefer very cold places with longly persistent snow, sometimes it is perhaps transported downstream as in the cases of occurrences around Lavinový potok and Sněžná strouha brooklets. The population in the ravine of Lavinový potok accounted for 8.0 dm², that at the Sněžná strouha for 19.2 dm², 1.5 dm² were at Sněžný most and about 0.7 dm² at the cirque face north of Sněžný most (Kučera 10378), making thus

the total at ca. 30 dm².

2) Endangered taxa

Cephalozia grimsulana

The collection of unambiguous material could not be retrieved during the survey. However, J. Váňa could see the plants at the site in August 2003.

Lophozia wenzelii

- Czech Republic: SW slopes of Mt Sněžka, 170 m SW of the summit, E3552.24-N5622.96, 1485 m, N-facing mica schist rocks, moist fissure, 21.9.2002 leg. J. Kučera (10336)
- Poland: Mt Śnieżka, NNW slopes along the road, 430 m ESE of the chalet 'Dom Śląski', E3551.98-N5623.25, 1450 m, fissure in a granite stone in a scree, NNE facing, 14.9.2002 leg. J. Kučera (10309); dtto, E3552.02-N5623.26, 1445 m, inclined on acid moist humus among granite stones in a scree, NNW slope, 14.9.2002 leg. M. Zmrhalová (11036)
- Úpská jáma cirque: 'Studniční stěna' cirque face, 600 m ENE of the top of Mt. Studniční hora, E3550.50-N5622.30, ca. 1395 m, flushed rock outcrops, in the grass, 3.10.2001 leg. J. Kučera (8460)
- Úpská jáma cirque: ravine of Lavinový potok, right bank, ca. 770 m ENE of the top of Mt. Studniční hora, E3550.66-N5622.365, 1305 m, wet humus over an inclined N face of a granite outcrop in the terrain level, 30.9.2001 leg. J. Kučera (8365); dtto, N slope above the right bank, ca. 250 m above the confluence with Sněžná strouha, E3550.935-N5622.50, 1185 m, wet peaty soil in the sloping spring site, beneath a *Sphagnum* hummock, 1.10.2001 leg. J. Kučera (8399), teste J. Váňa.

Marsupella sparsifolia

- Úpská jáma cirque: 'Studniční stěna' cirque face, 570 m ENE of the top of Mt. Studniční hora, E3550.49-N5622.26, 1445 m, flushed inclined gneiss rock outcrop, NE face, 3.10.2001 leg. J. Kučera (8447)
- Úpská jáma cirque: cirque face NNE of 'Sněžný most', 860 m NE of the summit of Mt Studniční hora, E3550.50-N5622.73, 1385 m, E-facing moist granitic rock outcrop, 23.9.2002 leg. J. Kučera (10364)

Neither of the populations has unfortunately been measured but none of them exceeded 1 dm².

Campylophyllum sommerfeltii

- Úpská jáma cirque, ESE slope between the ravine of Sněžná strouha and the ravine of Úpa, ca 400 m W-WNW of the confluence of Sněžná strouha with Lavinový potok, E3550.67-N5622.82, 1305 m, alluvium at ESE slope, at moist humose soil, half-shaded, 23.9.2002 leg. M. Zmrhalová (10702)

Dicranum elongatum

- Poland: Mt Śnieżka, scree at NNW slopes above the road, 470 m ESE of the chalet 'Dom Śląski' and 290 m WNW of the summit of Śnieżka, E3552.03-N5623.24, 1465 m, on soil among the stones of the scree, little shaded, 14.9.2002 leg. J. Kučera (10312), Zmrhalová (11041); dtto, E3552.03-N5623.23, 1470 m, Kučera (10313), Zmrhalová (11042), Buryová (3798); dtto, E3552.04-N5623.23, 1475 m, Kučera (10314), Zmrhalová (11044); dtto, E3552.04-N5623.21, 1490 m, Kučera (10315), Buryová (3800); dtto, E3552.06-N5623.21, 1495 m, Kučera (10316), Zmrhalová (11037)

The population was estimated to cover ca. 16 dm² but very probably the real extant is still somewhat greater. *D. elongatum* obviously quite thrives in the northern slope. It is questionable if some of the earlier collections have been made on the Czech side of the mountain; very probably not.

Dicranum majus

- SW slopes of Mt Sněžka, 190 m SW of the summit, E3552.23-N5622.95, 1470 m, mica schist rock ledges, on thick humus layer, WNW-facing, 21.9.2002 leg. J. Kučera (10332)
- Úpská jáma cirque: ravine of Lavinový potok, slope above the right bank, ca. 730 m ENE of the top of Mt. Studniční hora, E3550.64-N5622.33, 1340 m, on humus beneath dwarf pines in the N slope above the brook, 30.9.2001 leg. J. Kučera (8369); dtto, ca. 680 m ENE of the top of Mt. Studniční hora, E3550.63-N5622.33, 1340 m, on humose soil beneath a mountain pine in the NE slope, horizontally, shaded, 30.9.2001 leg. M. Zmrhalová (9841); dtto, right bank, ca. 850 m ENE of the top of Mt. Studniční hora, E3550.78-N5622.43, 1245 m, on humus layer over a granite stone, inclined in the N-facing slope, 30.9.2001 leg. M. Zmrhalová (9807); dtto, right bank, ca. 790 m ENE of the top of Mt. Studniční hora, E3550.66-N5622.40, 1300 m, on needles beneath dwarf pine in N-exposed slope 10 m above the stre-

am, 30.9.2001 leg. B. Buryová (2799); dtto, ca. 730 m ENE of the top of Mt. Studniční hora, E3550.64-N5622.33, 1340 m, on humus beneath dwarf pines in the N slope above the brook, 30.9.2001 leg. B. Buryová (2805)

- Úpská jáma cirque: left side of brook beneath the confluence of Sněžná strouha and Lavinový potok, 210 W of Úpa and Sněžná strouha confluence, E3551.01-N5622.73, 1100 m, half shaded moist humus beneath blueberries and *Calamagrostis villosa*, 24.7.2002 leg. B. Buryová (3711)
- Úpská jáma cirque: ravine of Sněžná strouha, ca 935 m NE of the top of Studniční stěna Mt., E3550.69-N5622.68, 1265 m, horizontally on wet humose soil in the E-facing slope, open, in *Sphagnum majus*, 24.7.2002 leg. M. Zmrhalová (10968)
- Úpská jáma cirque: ‘Krkonošova zahrádka’, above the ravine of Sněžná strouha, 470 m W of the confluence of Sněž. strouha and Lavinový potok, E exposed slope, E3550.53-N5622.62, 1350 m, on moist shaded decaying fern in a scree overgrown by *Athyrium distentifolium*, 22.9.2002 leg. B. Buryová (3834)

Ditrichum zonatum

- Úpská jáma cirque: rocks ENE of the foot of ‘Horní Úpský vodopád’ waterfall, ca. 110 m ENE of the fall’s foot, middle part of a small ravine, SW exposed slope on the left side of a stream, E3550.97-N5623.15, 1230 m, humus layer over an almost vertical moist NW face of granitic rock, little shaded, 25.9.2002 leg. B. Buryová (3880)
- Úpská jáma cirque: N part of ‘Studniční stěna’ cirque face, 740 m NE of the summit of Mt Studniční hora, E3550.45-N5622.62, ca. 1410 m, fissure of E-facing granitic rock, vertically, unshaded, on sandy soil, 22.9.2002 leg. J. Kučera (10354); dtto, E3550.44-N5622.615, ca. 1420 m, fissure of E-facing granitic rock, vertically, little shaded, 22.9.2002 leg. J. Kučera (10355), B. Buryová (3825); dtto, 590 m ENE of the top of Mt. Studniční hora, E3550.51-N5622.24, 1440 m, humus layer over NE-facing gneiss rock outcrop, 3.10.2001 leg. J. Kučera (8442)

Neither of the populations has unfortunately been mesasured but none of them exceeded 0.5 dm².

Hypnum callichroum

- Úpská jáma cirque, beneath ‘Sněhový most’ towards ‘Krkonošova zahrádka’ slope, 805 m NE of the top of Studniční hora Mt., E3550.55-N5622.64, 1350 m, inclined on decaying grass, E-facing slope, fully shaded by ferns, 22.9.2002 leg. M. Zmrhalová (11202); dtto, E3550.53-N5622.64, 1355 m, vertically on wet humose soil in E-exposed sloping spring site, shaded by vegetation, 22.9.2002 leg. M. Zmrhalová (11071); dtto, E3550.56-N5622.59, 1355 m, inclined on moist decaying plant remains over an E-facing granite stone, shaded by ferns and dwarf pines, 22.9.2002 leg. M. Zmrhalová (11077)
- Úpská jáma cirque: ‘Krkonošova zahrádka’, above the ravine of Sněžná strouha, 360 m WNW of the confluence of Sněžná strouha and Lavinový potok, ESE exposed scree slope, E3550.66-N5622.84, 1315 m, moist decaying ferns and *Calamagrostis* in a scree depression, shaded by ferns, 23.9.2002 leg. B. Buryová (3852); dtto, 460 m W of the confluence of Sněžná strouha and Lavinový potok, E exposed slope, E3550.54-N5622.62, 1350 m, on shaded decaying *Deschampsia cespitosa* and ferns in a granitic scree, ass. with *Sphagnum girgensohnii*, *Polytrichum commune*, 22.9.2002 leg. B. Buryová (3836)

Hypnum callichroum was not discovered by Kučera & Buryová (2001); following the discovery in the Labský důl valley, we succeeded in finding it here as well, though in smaller quantity. The populations accounted for 8.5 dm².

Lescuraea mutabilis

- Úpská jáma cirque: ravine of Sněžná strouha, ca. 960 m NE of the top of Mt Studniční hora, E3550.70-N5622.695, 1250 m, on a trunk of *Acer pseudoplatanus*, E-exposed, shaded, 25.7.2002 leg. M. Zmrhalová (10987-8)

Racomitrium macounii subsp. *macounii*

- Úpská jáma cirque: cirque face NNE of ‘Sněžný most’, 1070 m NE of the summit of Mt Studniční hora, E3550.63-N5622.90, 1355 m, wet granitic rock at a small waterfall, E-facing, 23.9.2002 leg. J. Kučera (10380)
- Úpská jáma cirque: streambed of Úpa, 380 m above the confluence of Úpa and Sněžná strouha, E3551.00-N5623.06, 1165 m, wet, inclined face of a granite rock outcrop in the streambed, 2.10.2001 leg. J. Kučera (8413); dtto, E3551.00-N5623.05, 1165 m, open fissures of inclined granit ESE-exposed rock in Úpa stream, with *Racomitrium aciculare*, *Philonotis seriata*, 2.10.2001 leg. B. Buryová (2859,2860); dtto, ca. 100 m E beneath the foot of waterfall, E3550.97-N5623.08, 1180 m, inclined half-shaded face of E-facing granitic rock in Úpa stream, 2.10.2001 leg. B. Buryová (2865); dtto, ca. 30-40 m beneath the foot of water-

fall, E3550.885-N5623.09, 1225 m, nearly vertical faces of the rocky streambed (granite), half-shaded, SE-facing, 2.10.2001 leg. J. Kučera (8422); dtto, E3550.88-N5623.09, 1230 m, NE-facing washed inclined face of granite stone in stream, 2.10.2001 leg. B. Buryová (2868)

- Úpská jáma cirque: ‘Horní Úpský vodopád’ waterfall, 30–40 m above the waterfall’s foot, E3550.865-N5623.09, ca. 1260 m, E-facing granitic rock at the waterfall, right bank, 26.7.2002 leg. J. Kučera (10299)
- Úpská jáma cirque: E-flowing Úpa brook ca. 30 m beneath (E of) the stone bridge above ‘Horní Úpský vodopád’ waterfall, at the left bank, E3550.71-N5623.11, 1380 m, sandy soil over an open S-facing inclined/vertical face of granitic stone, 26.7.2002 leg. B. Buryová (3774,3776-7,3780-1,3786,3789); dtto, E3550.68-N5623.11, Buryová 3772.

The major population in Úpa brook is more or less continuous, though of course very dynamic, occurring between ca. 1160 and 1380 m. The estimated extent is about 10 dm². The smaller recently discovered population in a stream north of ‘Sněžný most’ (not measured but roughly about 1 dm²) seems to be confined to the specific habitat of the small cascade.

3) Vulnerable and other taxa (selection)

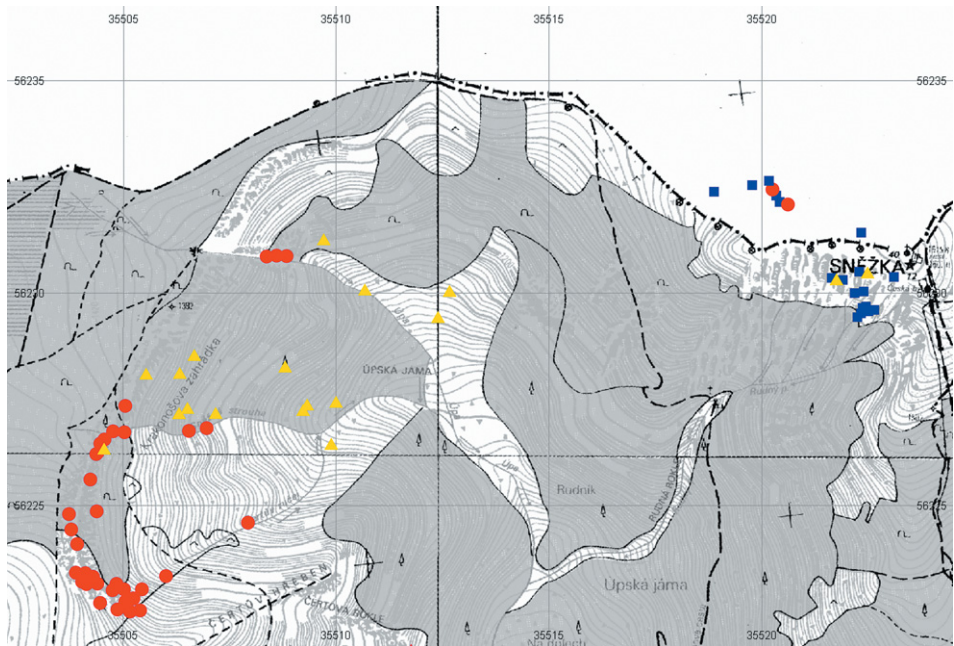
Cephalozia leucantha

- Úpská jáma cirque: ravine of Lavinový potok, ca. 220 m above the confluence with Sněžná strouha, E3550.98-N5622.54, 1160 m, on a humose soil beneath vegetation in the NE slope, inclined, 1.10.2001 leg. M. Zmrhalová (9865); dtto, slope above the right bank, ca. 730 m ENE of the top of Mt. Studniční hora, E3550.64-N5622.33, 1340 m, on humus beneath dwarf pines in the N slope above the brook, 30.9.2001 leg. J. Kučera (8370)

Gymnomitrium concinnatum

Kučera & Buryová (2001) speculated that the species retreated dramatically in the region, having been unable to retrieve a single population. As in the case of western Krkonoše Mts, even here the species is in fact not rare. The number of microlocalities totalled in the Úpská jáma cirque and at Mt Sněžka (Fig. 2), the measured extent of populations was ca. 34.0 dm² (equal to roughly 3·10⁵ stems at the mean estimated density of 90 stems per 1 cm²) in the Úpská jáma cirque and ca. 0.6 dm² at Mt Sněžka (~5000 stems).

Fig. 2. Distribution of *Gymnomitrium concinnatum* (●), *Herzogiella striatella* (▲) and *Tetralophozia setiformis* (■) within the study sites.



Marsupella alpina

- Úpská jáma cirque: ravine of Lavinový potok, 'Limprichtova skalka' rock, ca. 15-20 m NW of the stream, ca. 700 m ENE of the top of Mt. Studniční hora, E3550.60-N5622.33, 1350 m, N-facing, open, flushed gneiss rock outcrop, 30.9.2001 leg. J. Kučera (8374,8376), M. Zmrhalová (9844); dtto, ca. 650 m ENE (68°) of the top of Mt. Studniční hora (55 m WSW of 'Limprichtova skalka' rock), E3550.55-N5622.32, ca. 1380 m, inclined face of open moist NE-facing gneiss outcrop, 3.10.2001 leg. B. Buryová (2888-9,2891)

The population at the 'classical' site – so called Limprichtova skalka accounted for ca. 81 dm² but the other, at the foot of Studniční stěna, was not much smaller, about 60 dm².

Marsupella funckii

- Úpská jáma cirque: rocks NE of the foot of 'Horní Úpský vodopád' waterfall (ca. 60 m ENE of the foot), E3550.921-N5623.124, 1225 m, base of inclined SE-facing rocks, in a wet fissure, 2.10.2001 leg. J. Kučera (8439); dtto, E3550.92-N5623.12, leg. M. Zmrhalová (9906), B. Buryová (2878); dtto, E3550.88-N5623.095, 1235 m, on humus veneath vegetation in the SE slope, inclined, 2.10.2001 leg. M. Zmrhalová (9902); dtto, ca. 80 m ENE of the fall's foot, at the bottom of small ravine, left side of a stream, E3550.95-N5623.13, 1210 m, moist open W-facing granit rock outcrop, 25.9.2002 leg. B. Buryová (3874)
- Úpská jáma cirque: streambed of Úpa, left bank, ca. 30-40 m beneath the foot of 'Horní Úpský vodopád' waterfall, E3550.88-N5623.095, 1235 m, inclined face of a granite stone in the SE slope, 2.10.2001 leg. M. Zmrhalová (9903)

Not found during the last survey of Kučera & Buryová (2001); the population is obviously very small, consisting always only of scattered plants, which however were encountered at several nearby sites.

Moerckia blyttii

- Mt Studniční hora, NNW slope, 510 m NNW of the summit, E3549.70-N5622.51, 1460 m, acid soil at a gully edge, 22.7.2002 leg. J. Kučera (10234)
- Úpská jáma cirque: ravine of Sněžná strouha, Sněžný most, ca 750 m NE of the top of Studniční stěna Mt., E3550.43-N5622.68, 1425 m, inclined on moist humose soil in the E-facing slope, slightly shaded, 25.7.2002 leg. M. Zmrhalová (11005)

The population at 'Sněžný most' accounted for ca. 8 dm².

Scapania paludosa

- spring of Úpa river, E3550.64-N5623.12, 1390 m, wet place, 26.7.2002 leg. J. Váňa (8)

No details were recorded at the site.

Tetralophozia setiformis

The species was documented from a single site by Kučera & Buryová (2001). It proved however that the population is fortunately much richer, especially on the northern, Polish slope. There we were unable to even estimate the extent of the population. The measured extent of the population at the southern slope was 0.98 m², which might stand for a significant part of the real extent. Map of the distribution is shown in Fig. 2.

Andreaea rothii subsp. *rothii*

- Úpská jáma cirque: rocks north of the foot of 'Horní Úpský vodopád' waterfall, E3550.91-N5623.09, 1235 m, fissure of moist S-facing inclined granit rock face, 2.10.2001 leg. B. Buryová (2877)
- Úpská jáma cirque: 485 m NNE of the confluence of the brooks Úpa and Úpička, bottom of the big WSW-facing granite outcrop on left side of Úpička stream, E3551.33-N5623.33, 1325 m, open periodically wet granite outcrop face, 23.7.2002 leg. B. Buryová (3707)
- Úpská jáma cirque: SW slopes above Úpička brook above the waterfall, rocks ca. 270 m WSW of the former chalet 'Obří bouda', E3551.31-N5623.37, 1335 m, SW-facing granite rock, inclined, sunny, ± dry, 23.7.2002 leg. J. Kučera (10264)

First records of the subspecies *rothii* from the Úpská jáma cirque. The population at Úpička (latter two sites) accounted for 2.4 dm² but the number is probably quite underestimated. The population at Úpa was not discerned in the field and therefore not measured.

Herzogiella striatella

The measured extent of the population in the Úpská jáma cirque was 89.7 dm²; the population at Mt Sněžka was measured at ca. 1.03 m². The distribution map for the microlocalities at the study sites is shown in Fig. 2.

Hylocomium pyrenaicum

- Úpská jáma cirque: ravine of Sněžná strouha, beneath Sněžný most towards Krakonošova zahrádka, ca. 770 m NE of the top of Studniční stěna Mt., E3550.49-N5622.65, 1370 m, horizontally on moist humose soil beneath vegetation, E-facing slope, 25.7.2002 leg. M. Zmrhalová (11003)
The population was measured at 4.5 dm².

Philonotis tomentella

- Úpská jáma cirque: ravine of Sněžná strouha (left branch), ca. 270 m above (WNW of) the confluence with Lavinový potok brook, right part of the rocks with waterfall on ESE exposed slope, E3550.74-N5622.79, 1240 m, open wet humus in moderately base-rich streambed, 25.7.2002 leg. B. Buryová (3760)

Plagiothecium denticulatum var. *obtusifolium*

- SSW slopes of Mt Sněžka, 210 m SW of the summit, E3552.18-N5623.00, 1450 m, shaded decaying leaves beneath *Avenella flexuosa* turfs, between scree and rock outcrops, S-facing site, 21.9.2002 leg. B. Buryová (3809)
- Úpská jáma cirque: streambed of Úpa, 340 m above the confluence of Úpa and Sněžná strouha, E3551.03-N5623.03, 1145 m, wet soil beneath a stone in the streambed, 2.10.2001 leg. J. Kučera (8411)
- Úpská jáma cirque: ‘Krakonošova zahrádka’, above the ravine of Sněžná strouha, 490 m W of the confluence of Sněžná strouha and Lavinový potok, E exposed slope, E3550.51-N5622.64, 1365 m, on moist shaded decaying leaves of *Athyrium distentifolium* over a granitic stone, 22.9.2002 leg. B. Buryová (3820); dtto, 360 m WNW of the confluence of Sněžná strouha and Lavinový potok, ESE exposed scree slope, E3550.66-N5622.83, 1310 m, moist decaying vegetation in a scree depression, shaded by ferns, 23.9.2002 leg. B. Buryová (3851)
- Úpská jáma cirque: ravine of Lavinový potok, right bank, ca. 900 m ENE of the top of Mt. Studniční hora, E3550.78-N5622.43, 1240 m, on humus beneath ferns in N slope, 30.9.2001 leg. B. Buryová (2782); dtto, 15 m above the right bank, ca. 785 m ENE of the top of Mt. Studniční hora, E3550.68-N5622.36, 1310 m, in wet, half-shaded, N-exposed sloping spring site, 30.9.2001 leg. B. Buryová (2803)

Pohlia ludwigii

- Úpská jáma cirque: cirque face 30 m ESE of ‘Sněžný most’, 770 m NE of the summit of Mt Studniční hora, E3550.43-N5622.67, 1420 m, on decaying *Deschampsia cespitosa* in NE exposed slope, open wet late snow area, 22.9.2002 leg. B. Buryová (3815-6)
- Úpská jáma cirque: ‘Sněžný most’, above ‘Krakonošova zahrádka’, 790 m NE of the summit of Mt Studniční hora, E3550.46-N5622.67, 1395 m, on old grass, very wet, half-shaded, late snow area, 25.7.2002 leg. J. Kučera (10286); dtto, E3550.44-N5622.68, 1405 m, granitic gravel, late snow area, wet, not shaded, E-or., 25.7.2002 leg. J. Kučera (10289)
- Úpská jáma cirque, beneath ‘Sněhový most’ towards ‘Krakonošova zahrádka’ slope, 820 m NE of the top of Studniční hora Mt., E3550.50-N5622.68, 1365 m, horizontally on humose soil, E-facing slope, shaded by vegetation, 22.9.2002 leg. M. Zmrhalová (11180)
- Úpská jáma cirque: beneath the confluence of Sněžná strouha and Lavinový potok, 210 W of Úpa and Sněžná strouha confluence, E3551.01-N5622.73, 1100 m, shaded wet sandy soil along the brook, ass. with *Polytrichastrum alpinum*, *Nardia scalaris*, 24.7.2002 leg. B. Buryová (3710); dtto, ESE exposed slope ca. 30 m left of Sněžná strouha brook, 240 W of Úpa and Sněžná strouha confluence, left side of a stream above dwarf pines, lower part of boulder scree, E3550.98-N5622.74, 1110 m, wet shaded humus and decaying grass in a stream bank, 24.7.2002 leg. B. Buryová (3714)
- Valley of Bílé Labe just beneath the Luční bouda chalet, left bank, E3549.23-N5622.97, 1407 m, slope above the brook, in a hollow, 25.7.2002 leg. J. Kučera (10293)

Pohlia nutans subsp. *schimperi*

- SW slopes of Mt Sněžka, upper part of Krakonošova rukavice cirque, 105 m SW-SSW of the top of Sněžka Mt., E3552.245-N5623.04, 1530 m, horizontally on acid moist humus in the SSW-facing slope, sheltered by a rock, 21.9.2002 leg. M. Zmrhalová (11059)
- Mt Studniční hora, N slope, E3549.95-N5622.39, ca. 1500 m, on open humus, 22.7.2002 leg. B. Buryová (2904)
- Úpská jáma cirque: ravine of Lavinový potok, left bank, ca. 800 m ENE of the top of Mt. Studniční hora, E3550.68-N5622.39, 1290 m, on acid humus in the alpine meadow above the brook bank, 30.9.2001 leg. J. Kučera (8363)
- Úpská jáma cirque: ravine of Sněžná strouha 130 m above (WSW) of the confluence with Lavinový potok,

right brook bank, E3550.93-N5622.685, 1130 m, on thin humus layer over a granite rock outcrop, horizontally, nearly unshaded, dry, 25.7.2002 leg. J. Kučera (9588)

- Úpská jáma cirque: cirque edge between ‘Sněžný most’ and the top of Hor. Úpský vodopád waterfall, 120 m ENE of ‘Sněžný most’, 850 m NE of the top of Mt. Studniční hora, E3550.49-N5622.72, 1390 m, thin humus layer on a granite rock ledge, E-facing, unshaded, 23.9.2002 leg. J. Kučera (9590)

Scorpidium revolvens

- Úpská jáma cirque: rocks NE of the foot of ‘Horní Úpský vodopád’ waterfall (ca. 50 m ENE of the foot), E3550.91-N5623.12, 1220-1225 m, wet base of granite SE-facing rocks, 2.10.2001 leg. J. Kučera (8435), B. Buryová (2881), M. Zmrhalová (9905)

We happened perhaps to re-find the Velenovský’s locality of the species (Velenovský 1897), one of the very few confirmed of this species after *S. cossonii* has been generally separated from the species concept. The conditions of the site seem to be quite acid, although some other basiphilous species were recorded at the site, too (*Aneura pinguis*, *Campylium stellatum*).

Taxa recorded outside Úpská jáma cirque and Mt Sněžka

Scapania gymnostomophila (EN)

- Obří Důl: valley of Rudný potok brook ca. 120 m above the lower pitheap, rocks at the left brook side ca. 20 m above the brook, beneath the forest fence, E3551.82-N5622.53, ca. 1115 m, W-facing, base-rich, slightly wet and nearly open rocks, 29.9.2001 leg. J. Kučera (8346-8), B. Buryová (2775), M. Zmrhalová (9919)

Kučera & Buryová (2001) were unable to find the population, though searching perhaps only several meters from the site. The population was measured but unfortunately the field notes were not found. A rough estimate would be at ca. 1 dm².

Dicranella subulata (EN)

- Obří Důl: valley of Rudný potok brook at the lower pitheap, left brook side above the access track, E3551.76-N5622.42, 1055 m, on moist half-shaded bare acid soil, NW-facing, 29.9.2001 leg. B. Buryová (2756)

The species has been confirmed at the same site as during the survey by Kučera & Buryová (2001) but then the details for the locality have not been given.

Andreaea frigida (CR)

- Valley ‘Důl pod Koulemi’ ca. 0.62 km above the confluence with Jelení potok brook, E3553.46-N5622.30, 1125 m, wet shaded vertical S-facing mica schist rock, 24.9.2002 not. Buryová & Kučera.

The locality, described already in Kučera & Buryová (2001), was revisited in order to assess the quantity of the population and locate it more precisely using the GPS. Indeed, the site is about 100 m higher upstream than reported earlier. The population accounts for ca. 15.3 dm² (sum for 261 cushions of the species), the rocks that support the species have the surface of ca. 5.3 m².

Grimmia atrata (VU)

The species was confirmed at its only Czech locality at Rudník (valley of Rudný potok brook). It grows here on acidic iron-containing rocks in two parts of the ravine – one between ca. 1130 and 1150 m a.s.l. (E3551.82-N5622.56-58) and another shortly above the track at the waterworks between ca. 1230 and 1250 m a.s.l. (E3551.92-94-N5622.78-79). The population was estimated at ca. 51 m² at the first site and ca. 5.7 m² at the second site.

Grimmia sessitana (VU)

The locality in the scree beneath the ‘Čertova zahrádka’ at the E foothill of Mt Studniční hora has already been described in Buryová & Kučera 1999. The species grows at the gneiss boulders and stones of the E facing sloping scree in a swath ca. 85 m long and up to 20 m wide between E3551.22-N5622.12 and E3551.29-N5622.07, 1000-1040 m a.s.l. Part of the population has been measured (on the area of ca. 350 m²) – it accounted for 20.9 dm² (in 288 cushions). The rest of the population extends on roughly 600 m² in smaller abundance; therefore a rough estimate of the grand total for the population might be ca. 50 dm².

Isopterygiopsis pulchella (CR)

- E slopes of Mt Studniční hora; rocks between 'Čertova rokle' and 'Čertova zahrádka' ravines, E3551.19-N5622.14, ca. 1050 m, N-facing porphyrite(?) rocks, half-shaded, moist, in a fissure, 24.9.2002 leg. J. Kučera (10385)

The species grew in a cushion of *Amphidium mougeotii*, the population was very scanty – four cushions (7×2 cm, 30%, 5×3 cm, 100%, 2.5×1 cm, 20%, 1×0.5 cm, 5%; 17 capsules in total) accounting for the sum of 20 cm². The historical records ('Obří důl valley', 1839? coll. O. Sendtner (Milde 1861 ff.), IX.1900 coll. J. Velenovský (Velenovský 1901a) might well belong here or to the calcareous rocks of Rudník. The specimens are missing from Velenovský's herbarium in PRC and Sendtner's herbarium in M, respectively.

Historically reported species without recent records

We were unable to re-find 116 taxa that have been historically reported from the Obří důl valley, Úpská jáma cirque and Mt Sněžka. Unfortunately it is very difficult to filter out the historical reports from the Úpská jáma cirque, as the historical name 'Riesengrund/Obří důl' included the cirque, whereas nowadays we understand with this name only the part of the valley below the cirque (or exactly below the 'Dolní Úpský vodopád waterfall). The latter part has not been subject to our study. Also included in the historical term were the base-rich rocks containing localities 'Rudník' and 'Čertova zahrádka', where we only measured some populations of the most interesting taxa. We could thus exclude only a smaller part of historical records from the valley which were more exactly specified (by the altitude or other description) but anyway tried to sort out at least the most suspicious records (41 of the 116, described here under a and b). The taxa denoted with ! were revised by us.

a) doubtful records

Bazzania flaccida

Reported as *Jungermannia implexa* by Opiz (1824) from the 'Úpský vodopád' waterfall. Very probably a misidentification for forms of *B. trilobata* or *B. tricrenata*.

Lophozia barbata

'NE slope of Mt Sněžka', 1480 m, coll. Zlatník (1928).

Moerckia hibernica

'Springs of Úpa, 1400 m', coll. Prager (Prager 1907); 'Wörllichgraben' [=U1], coll. Kern (1914). Given the authors, the identifications are not certain but anyway the species has strongly retreated in the past.

Reboulia hemisphaerica

Reported from the Obří důl valley (Milde 1867, Kavina 1915). If at all correct, probably found at the limestones of Rudník.

Scapania compacta

'Foot of Mt Sněžka', 1835 coll. Nees (Nees 1836); 'Úpská jáma, south part of Studniční stěna', 1972 coll. Berciková (Berciková 1976). The occurrence of this species is not very likely; the second author moreover was not a bryologist.

Andreaea rupestris var. *papillosa*

'Felsrunse auf der Südseite des Schneekoppengipfels', 1886 coll. F. Kern sub *A. sparsifolia* J.E. Zetterst. (Kern 1914). Very likely a misidentification for *A. rupestris* var. *rupestris*.

Bryum arcticum

'Mt Sněžka', coll. Boss, teste C. Müller (Milde 1869). We were unable to trace the specimen; it is the only record of the species from the Krkonoše Mts (and for the Czech Republic as well, though it is of course not certain if the record refers to the Czech or Polish territory).

Bryum radiculosum

'Mt Sněžka, chapel', coll. Nees (Nees 1840). Very uncertain record.

Bryum schleicheri

'Springs of Úpa', coll. Velenovský (Velenovský 1897). The specimen is unfortunately missing from Velenovský's herbarium in PRC.

Campylocladus chrysophyllus

'Mt Sněžka', Veselsky 1860; 'Obří důl valley', coll. Milde (Milde 1869). Very uncertain record, likely a misidentification for *Campylium protensum* or *C. stellatum*.

Cynodontium bruntonii

'Mt Sněžka', coll. Nees ff. (Milde 1869). Very likely a misidentification for *Dicranoweisia crispula*.

Dicranum fuscescens

Rim of Úpská jáma and 'Sněhový klín' [=perhaps Sněhový most in the cirque], both reports from Berciková 1976. Probably a misidentification for *D. flexicaule*.

Drepanocladus aduncus

'bei den Quellen der Obří důl gegen Wiesenbaude' [perhaps meant the springs of Úpa towards the Úpské rašeliníště mire], 1958 coll. Boros (Boros & al. 1960). Very likely a misidentification for *Warnstorfia fluitans* or *exannulata*.

Eurhynchium crassinervium

'Beneath the Úpa waterfall, IX.1900 coll. Velenovský (Šulcová 1990). Very likely a misidentification for *Brachythecium plumosum*, as in other cases (Pilous's specimens from Mt Kotel, identified by Šulcová as *E. crassinervium*).

Hygrohypnum luridum

'Kl. Aupa im Riesengrunde' [?=Úpička in the cirque], coll. Milde (1869); 'Quellen der Obří důl' [see under *Drepanocladus aduncus*], 1958 coll. Boros (Boros & al. 1960). Both records are very probably based on misidentification.

Molendoa sendtneriana

'Čertova zahrádka', coll. J. Velenovský (Velenovský 1897). The specimen is unfortunately missing from Velenovský's herbarium in PRC, however all his other specimens assigned to this species were not identified correctly; most misidentifications were for *Gymnostomum aeruginosum*.

Plagiothecium nemorale

'Aupenabhang', 1835 coll. Nees (Nees 1836 sub *P. neglectum*). The historical concept of *P. neglectum* varied over the time, very probably *P. succulentum* was meant but even this could have been incorrectly identified.

Polytrichastrum sexangulare

'Čertova zahrádka', 1896 coll. J. Velenovský (1897). Probably referring to the rocks beneath the foot of Horní Úpský vodopád waterfall, as in the case of *Grimmia unicolor* etc. Unfortunately the specimen is missing from Velenovský's herbarium in PRC. However, his specimen from 'Obří důl valley', coll. IX. 1900, is *Pogonatum urnigerum* (rev. Buryová, PRC). Another doubtful report exists from the Úpská jáma cirque, cited in Jenfk (1961), referring to a personal communication from Mr Pilous. However, no specimen of the species from the Krkonoše Mts was found in his herbarium (PR).

Pseudobryum cinclidioides

'Quellen der Obří důl' [see under *Drepanocladus aduncus*], 1958 coll. Boros (Boros & al. 1960). Very uncertain record with respect to the author.

Racomitrium ericoides

'Aupagrund' [=Úpská jáma cirque], coll. F. Czapek (Matouschek 1897). Probably referring to either *R. elongatum* or *R. canescens*, as in other cases when specimens could be revised.

Racomitrium heterostichum

'Úpská jáma, south part of Studniční stěna', 1972 coll. Berciková (Berciková 1976). Probably referring to *R. sudeticum*, which at that time was not specifically recognized.

Thuidium abietinum var. *abietinum*

'Slopes of Mt Sněžka', coll. Cypers (Cypers 1902). The occurrence of this species is very unlikely, in particular with respect to the author.

b) records referring probably to sites outside of Úpská jáma cirque or Mt Sněžka

Bazzania trilobata

'Úpa-valley' (Dědeček 1883). Perhaps found in the lower parts; Kučera & Buryová (2001) reported the species from the 'Čertova zahrádka'.

! *Lophozia bantriensis*

'Mt Sněžka', coll. Limpricht 1866 (BP, rev. Hubáčková, Duda & Váňa 1991). We were able to verify the species only on base-rich sites of Úpička stream in the cirque, Rudník and Čertova zahrádka. It is not completely excluded that the Limpricht's locality could in fact be identical with 'Rudník', which lies on the slopes of Mt Sněžka.

! *Marsupella emarginata*

'Mt Sněžka', 1900 coll. A. Schmidt (PRC!, rev. J.Váňa, Duda & Váňa 1981). The locality very probably refers to the central or upper part of Rudný potok brook at the slopes of Mt Sněžka – there the species was confirmed.

! *Scapania helvetica*

'Obří důl valley', 1899 coll. Schiffner, 1900 coll. Velenovský (Velenovský 1901b), omnia rev. Duda (Duda & Váňa 1969).

Campylophyllum halleri

The historical records from Obří důl valley (Veselsky 1860 ff.) likely refer to the well-known site at Rudník.

Encalypta ciliata

'Obří důl valley', coll. Milde, Cypers (Milde 1869, Cypers 1897). Very probably referring to the calcareous rocks of either Rudník or Čertova zahrádka.

Fissidens dubius var. *dubius*

'Obří důl valley', coll. Milde (Milde 1868 ff.).

Fontinalis squamosa

'Obří důl valley', coll. Göppert (Veselsky 1860); 'Quellen der Obří důl gegen Wiesenbaude' [see under *Drepanocladus aduncus*], 1958 coll. Boros with the note 'copiously' (Boros & al. 1960). It is very suspicious that a rich occurrence of the species in the otherwise very little affected environment should disappear; the site supports rich populations of *F. antipyretica*, which is not mentioned in the article; therefore we suppose the misidentification for this species. However, the species occurs frequently in Úpa brook in lower part of Obří důl valley.

Gymnostomum aeruginosum

'Obří důl valley', reported by Milde (1869), Limpricht (1876 Limpricht 1876b, on several sites'), Velenovský (1897), Matouschek (1902). Very probably referring to the calcareous rocks of either Rudník or Čertova zahrádka.

Neckera crispa

'Obří důl valley', coll. J. Milde (Milde 1869), J. Velenovský (Velenovský 1897). Very probably referring to the calcareous rocks of Rudník, where it was even confirmed by us.

Orthothecium intricatum

'Obří důl valley', ?1839 coll. O. Sendtner (Milde 1861 ff.). Very probably referring to the calcareous rocks of either Rudník or Čertova zahrádka.

Orthotrichum anomalum

'Obří důl valley', coll. J. Milde (Milde 1869).

! *Orthotrichum speciosum*

'Obří důl valley', 1927 coll. R. Wihan (PR, rev. M. Vondráček (1993)).

Pohlia cruda

'Aupathal', coll. F. Czapek (Matouschek 1897); 'Obří důl', coll. Cypers (1897). Very probably referring to the base-rich rocks of either Rudník or Čertova zahrádka.

Pohlia filum

'Obří důl', coll. Velenovský (1903). Revised specimen exists from 'Čertova zahrádka', IX. 1896 coll. J. Velenovský (Havránková 1985); the locality might be identical.

Pseudoleskeella catenulata

'Obří důl', coll. Limpricht (Limpricht 1876b); 'Čertova zahrádka', coll. Velenovský (Velenovský 1897). Very probably referring to the base-rich rocks of either Rudník or Čertova zahrádka.

! *Saelania glaucescens*

'Riesen- und Aupengrund' [Obří důl + Úpská jáma cirque], 1819 coll. Funck (Funck 1820); 'Mt Sněžka', ?1839 coll. O. Sendtner (Milde, teste J. Kučera; Milde 1869). Very probably referring to the base-rich rocks of either Rudník or Čertova zahrádka.

Tortella tortuosa

'Obří důl', coll. Milde (Milde 1869); 'Úpská jáma, dolní část Sněhového klínu [=perhaps upper part of 'Krakonošova zahrádka' beneath Sněhový most', 1972 coll. Berciková (Berciková 1976). Milde's site probably refers to the limestones of Rudník, Berciková's report is uncertain, probably a misidentification for *Trichostomum tenuirostre*.

! *Tortula eucalyprata* Lindb. (*Desmatodon latifolius* (Hedw.) Brid.)

'Mt Sněžka', coll. ? (Limpricht 1890); Obří důl valley, 1900 coll. Velenovský (Velenovský 1901a, teste J. Kučera, PRC!)

Trichostomum crispulum

'Obří důl', coll. Milde (Milde 1869). Probably refers to the limestones of Rudník, the misidentification for *Weissia controversa* s.l. is probable.

c) other records (i.e. revised or probable historical occurrences)

! *Anastrophyllum saxicola*

'Mt Sněžka', revised specimens (Duda & Váňa 1983) coll. by Flotow 1824, Limpricht 1876 and Schiffner s.d., further unrevised ones reported by Funck 1819 (sec. Rabenhorst 1848, Velenovský 1901b), Nees 1840, Limpricht 1876, Limpricht 1876a, Dědeček 1883 (own collection 1879 plus Corda s.d.) and Vilhelm 1898 (sec. Velenovský Velenovský 1901b); 'Obří důl, Sněhový žleb' (=locality U3), coll. Ch. Nees (Nees 1840 sec. Duda & Váňa 1983), not revised. The collections could have been made on the Czech, as well as on the Polish side of the mountain. Despite much effort spent by the previous generations of bryologists and us during this survey, the species could not be retrieved; the occurrence however can hardly be completely excluded, although it is certain that the population has at least dwindled to a fraction of the historical state.

! *Bazzania tricrenata*

'Am Aupa-Abhange' [on slope of Úpa; perhaps around the Úpa in the cirque], 1824 coll. J. Flotow (Nees 1838, Nees 1848a), 1835 coll. Ch. Nees (Nees 1836); 'Obří důl' s.d. coll. Kalenský (MP!, Duda & Váňa 1989), E slope by Úpa, 1250 m, 1965 coll. Váňa (LIT!, Duda & Váňa 1989). The occurrence at the locality

cannot be completely excluded.

! Calypogeia azurea

‘Mt Sněžka’, 1926 coll. Wihan (rev. Duda, Duda & Váňa 1986a).

! Gymnomitrium corallioides

Several times recorded in the Úpská jáma cirque (localities U1-U3), at latest in 1998 (coll. Palice, cf. Kučera & Buryová 2001). Despite the focused effort, the species has not been found again.

Jamesoniella autumnalis

‘Slopes of Úpa’, coll. Ch. Funck sec. Dědeček 1883.

Jamesoniella undulifolia

‘Slopes of Úpa, Úpská jáma cirque’, coll. J. Flotow, Ch. Funck (Nees 1836). Unfortunately, the specimens, as well as the other specimens from the nearby Czech localities are missing from Nees’s herbarium in STR.

! Lejeunea cavifolia

‘Waterfalls of Úpa’, 1900 coll. Velenovský (PRC, rev. Duda, cf. Duda & Váňa 1976)

Lophozia incisa

‘Mt Sněžka’, coll. Nees (Nees 1833).

Marchantia polymorpha

‘Chapel at Mt Sněžka’, 1835 coll. Nees (Nees 1836, 1848b sub *M. alpestris*), ‘Mt Sněžka’, coll. Dědeček (Dědeček 1883)

Marsupella funckii

‘At the foot of Mt Sněžka’, coll. J. Flotow (Nees 1836).

! Marsupella sparsifolia

‘Mt Sněžka’, 1926 coll. Wihan (rev. Váňa, Duda & Váňa 1978b).

Marsupella sphacelata

‘Mt Sněžka between the summit and the former Obří bouda chalet’, 1958 coll. Boros (Boros & al. 1960).

! Marsupella sprucei

‘Waterfalls of Úpa’, 1882 coll. Limpricht (BP!, rev. Váňa, cf. Duda & Váňa 1979); ‘Obří důl beneath Mt Sněžka, S slope’, 1919 coll. Vilhelm (PRC!, rev. Váňa). No other place in addition to the above described close to the Sněžka’s summit has been found. The locality at Rudník, described in Futschig & Váňa (1969) has been investigated again (with J. Váňa) without success.

Nardia geoscyphus

‘Mt Sněžka’ (Limpricht 1876c)

Preissia quadrata

Several very old poorly located records from the Obří důl valley and Mt Sněžka (Nees 1840, Limpricht 1876, Limpricht 1876a, Dědeček 1883, Matouschek 1895). Probably most refer to the ‘Rudník’ limestones except Matouschek who literally reports ‘in the vicinity of the Obří bouda chalet’ – there the species could have been confined to a temporary base-rich artificial substrate.

Radula cf. *complanata*

‘Obří důl, 1220 m’, 1960 coll. J. Váňa (Duda & Váňa 1978a). Collected on a calcareous stone near the path, the plants were sterile.

Radula lindenbergiana

Reported historically from the U3 and U6 sites of the cirque, and from the unspecified locality in the Obří důl valley (in addition to the base-rich localities Čertova zahrádka and Rudník). Our collection from U3 cannot be with certainty assigned to either *R. complanata* or *R. lindenbergiana*.

! Scapania mucronata

'Mt Sněžka', 1898 coll. J. Vilhelm sub *Jungermania saxicola* (PRC, rev. Duda, Duda & Váňa 1969).

! Scapania scandica

'Summit of Mt Sněžka', 1869 coll. Limpricht sub *S. irrigua* (BP, rev. Duda, Duda & Váňa 1969).

! Scapania undulata

'Mt Sněžka', s.d. coll. Nees (Nees 1833), 1926 coll. Wihan (teste Duda, Duda & Váňa 1972).

! Tritomaria exsecta

'Slopes of Úpa' (Nees 1836), 'Foot of Mt Sněžka', coll. Nees (Nees 1836), 1870 coll. Limpricht (BP, teste Duda, Duda & Váňa 1982) 'Mt Sněžka', coll. Nees (Nees 1836), 1870 coll. Limpricht (BP, teste Duda, Duda & Váňa 1982).

! Andreaea rothii subsp. *rothii*

The locality at Mt Sněžka (Kučera & Buryová 2001) was not found during this survey but we assume that the population has not vanished there.

! Arctoa fulvella

'am Abfall des Brunnenberges gegen den Riesengrund' [=slope of Mt Studniční hora towards Obří důl], 1300 m, VII. 1876 coll. K.G. Limpricht (Limpricht 1876 Limpricht 1876c; BP!, teste J. Kučera). Not refound since that despite the effort of several generations of bryologists, regarded extinct.

Aulacomnium palustre

Noted by Kučera & Buryová (2001) at the U6 locality, not re-found during this survey.

Brachydontium trichodes

'Auf der Koppe' [=Mt Sněžka], coll. Nees (Nees 1840).

Brachythecium glareosum

'Koppenkegel' [=summit of Mt Sněžka], ca. 1500 m, coll. Milde (Milde 1869).

! Brachythecium mildeanum

'Úpská jáma cirque, uppermost part of Sněžná strouha brook beneath „Krkonošova zahrádka“', ca. 1300 m, wet soil, 4.6.1998 coll. J. Kučera 3026, teste Z. Soldán. Not refound at the site.

Bryum algovicum

'Mt Sněžka', coll. Milde (Milde 1869).

Bryum amblyodon Müll. Hal. (*Bryum imbricatum* (Schwägr.) Bruch & Schimp. in Kučera & Váňa 2003)

'Koppenkegel' [=summit of Mt Sněžka], coll. Milde (Milde 1869).

Bryum argenteum

Noted by Kučera & Buryová (2001) at the summit of Mt Sněžka, not re-found during this survey.

Bryum caespiticium

'Mt Sněžka, at a small field chapel', 1835 coll. Nees (Nees 1836), Velenovský (1897) reports the species from the locality without indication of the collector, maybe referring to the same record.

Bryum funkii

'Aupagrund' [?= Úpská jáma cirque], 1839 coll. Sendtner (Milde 1861 ff.).

! Bryum lonchocaulon Müll. Hal. (*B. cirrhatum* Hoppe & Hornsch., nom. illeg.)

'Chapel at Mt Sněžka', 1870, 1897 coll. V. Cypers (1897), teste J. Kučera (KM!).

Bryum pallens

'Koppenkegel' [=summit of Mt Sněžka], coll. Milde (Milde 1869); 'Mt Sněžka, chapel', 1839? coll. Sendtner (Rabenhorst 1848; teste Podpěra (1973).

Dicranella subulata

'Mt Sněžka', coll. C. Ludwig (Limpricht 1890), Ch. Funck (Funck 1820), V. Cypers (1897); Obří důl, coll. Milde (Milde 1869), V. Cypers (1897).

Dicranoweisia crispula

Noted by Kučera & Buryová (2001) at the Mt Sněžka, not re-found during this survey.

! *Dicranum spadiceum*

'Mt Sněžka', 26.7.1869 coll. K.G. Limpricht sub *D. elongatum* (BP!, rev. J. Kučera; originally described as *D. scoparium* var. *alpestre* Milde); 'summit of Mt Sněžka', VII. 1886 coll. F. Kern (Kern 1914). The latter identification is uncertain with respect to the author.

Diphyscium foliosum

'Summit of Mt Sněžka' (Kern 1914).

Distichium capillaceum

'Summit of Mt Sněžka, chapel at Mt Sněžka', coll. Nees (Nees 1840), Milde (1869). The report from Obří důl (Milde 1869) refers probably to the limestones of Rudník.

Distichium inclinatum

'Mt Sněžka, chapel', coll. Nees (Nees 1836 ff.), Mt Sněžka, coll. O. Sendtner, F. Schulze, 1839 L. Rabenhorst (Rabenhorst 1848 ff.). The report from Obří důl (Milde 1861 ff.) refers probably to the limestones of Rudník.

Ditrichum flexicaule

'Summit of Mt Sněžka', coll. Milde (Milde 1869). The reports from Obří důl (Milde 1869, Velenovský 1897) refer probably to the limestones of Rudník.

! *Ditrichum zonatum*

'Mt Sněžka', coll. Limpricht (Limpricht 1890), 1896 Velenovský (1897), 1953 Z. Pilous (Pilous 1953b), 1565 m, 25.9.1998 coll. Kučera 3245 (Buryová & Kučera 2001). Not refound during this survey.

Grimmia funalis

'Handschuh im Riesengrunde' [Krakonošova rukavice at the SW slopes of Mt Sněžka], coll. F. Kern (Kern 1914).

! *Grimmia unicolor*

'Čertova zahrádka', IX. 1896 coll. J. Velenovský (PRC!, teste J. Kučera; the locality has obviously been misspelled by J. Velenovský, as in the case of *Cephaloziella grimsulana*, and perhaps identical with the following one); 'unterhalb des Aupafalles im Riesengrunde, am linken Bachufer', VII. 1905 coll. J. Baumgartner (OP!, teste J. Kučera). Regarded as extinct from the site – perhaps due to the avalanche action that affects the site regularly, as in 2002.

Herzogiella seligeri

'Aupenabhang' [slope of Úpa; perhaps around the Úpa in the cirque], 1835 coll. Nees (Nees 1836)

! *Heterocladium dimorphum*

'Obří důl valley', 1900 coll. J. Velenovský (Velenovský 1901a), teste Pospíšil (1990). Very probably referring to the calcareous rocks of Rudník.

Hygrohypnum smithii

'Aupafall' [Úpa waterfall], coll. Limpricht (Milde 1869). Regarded as extinct from the site, not refound by several subsequent generations of bryologists.

Hylocomium splendens

'Summit of Mt Sněžka', coll. Kern (Kern 1914). Not refound even during the preceding survey by Kučera & Buryová (2001).

Hylocomium umbratum

'Mt Sněžka', coll. Milde (Milde 1869).

Hypnum cupressiforme var. *cupressiforme*

Noted by Kučera & Buryová (2001) at the Mt Sněžka, not re-found during this survey.

Leptobryum pyriforme

'Summit of Mt Sněžka', coll. Limpricht/Milde (Milde 1869 ff.).

Lescuraea mutabilis

'Slopes of Mt Sněžka', coll. Milde (Milde 1869).

Orthotrichum stramineum

'Slopes of Mt Sněžka', coll. J. Milde (Milde 1869).

! *Philonotis fontana*

'Mt Sněžka', 1920 coll. A. Hilitzer (PR, rev. Buryová 1996).

! *Philonotis seriata*

'Mt Sněžka', 1926 coll. R. Wihan (PR, rev. Buryová 1996).

Plagiobryum zierii

'Riesen- und Aupengrund' [Obří důl + Úpská jáma cirque], 1819 coll. Funck (Funck 1820), coll. Ludwig (Milde 1869). The records from the Obří důl valley might refer to the yet existing localities at 'Čertova zahrádka' and 'Rudník'.

Plagiothecium ruthei

'Handschuh in Riesengrunde', coll. Kern (1914). Not refound during recent survey.

Pogonatum aloides

'Aupagrund' [=Úpská jáma cirque], coll. F. Czapek (Matouschek 1897).

Pohlia elongata var. *polymorpha*

'Aupenabhang', coll. Limpricht (1876 Limpricht 1876b).

! *Pohlia longicollis*

'Aupenabhang'; 'Schneegraben', coll. Limpricht (Milde 1869); Úpička IX.1954 coll. Z. Pilous (herb. PR!, teste J. Kučera).

! *Pohlia obtusifolia*

'Obří důl valley, on way towards Mt Sněžka', 1919 coll. J. Vilhelm, (herb. PRC!, teste J. Kučera).

Pohlia wahlenbergii var. *wahlenbergii*

'Foot of Mt Sněžka', 1835 coll. Nees (Nees 1836).

Pseudoleskeella nervosa

'im Gehänge an der Schneekoppe', coll. Milde, allegedly even with the sporophytes. (Milde 1869).

Ptychodium plicatum

'Foot of Mt Sněžka', 1835 coll. Nees (Nees 1836). 'Summit of Mt Sněžka', coll. Milde (Milde 1869).

Rhytidiadelphus squarrosus

'Summit of Mt Sněžka', coll. Milde (Milde 1869).

Rhytidium rugosum

'Summit of Mt Sněžka', (Limpricht 1876b).

! Schistidium apocarpum

Collected at two sites of Mt Sněžka: Rocks S of the top of Mt. Sněžka, 1600 m, 25.9.1998 coll. J. Kučera (3240) and SSE slope of Mt. Sněžka beneath the chair-lift, concrete pillar of the lift, 1570 m, 25.9.1998 coll. J. Kučera (3227). Not refound at the first site during this survey, the second site was not re-searched.

! Schistidium dupretii

Collected 1998 with *S. apocarpum* (Kučera 3227, see above).

Sphagnum rubellum

'NE slope of Mt Sněžka', 1480 m, coll. Zlatník (1928)

! Sphagnum tenellum

Site U6 („north of Horní Úpský vodopád waterfall, 1310 m, 31.8.1999 coll. B. Buryová 1816, 1818“). Not refound during recent survey.

Syntrichia ruralis

'Mt Sněžka', coll. J. v. Sterneck (Matouschek 1901).

Tayloria serrata

'Slopes of Mt Sněžka', 1953 coll. Z. Pilous (Pilous 1953a).

! Tetraplodon angustatus

Mt Sněžka', 1952 coll. Z. Pilous (PR!, teste J. Váňa).

Tetraplodon mnioides

'NW [Polish] side of Mt Sněžka', coll. Nees (Milde 1869); 'Obří důl', coll. Roemer (Milde 1861 ff.).

! Tortula muralis var. *muralis*

Noted by Kučera & Buryová (2001) at Mt Sněžka, not re-found during this survey.

Warnstorfia sarmentosa

'Slopes of Mt Sněžka', coll. Vilhelm (Vilhelm 1901).

Weissia controversa var. *controversa*

'Mt Sněžka', coll. Milde (Milde 1869).

Excluded historically reported species

Amblystegium serpens

site U8, spring site, ca. 1360 m, with *Calypogeia muelleriana*, Kučera 3676 (Kučera & Buryová 2001) – est *Heterocladium heteropterum*.

Calliergon cordifolium

Site U6, coll. B. Buryová (Kučera & Buryová 2001) – est *Straminergon stramineum*.

Calypogeia sphagnicola

'Wörlichgraben' [locality U1], 1904 coll. Schiffner (Schiffner 1914) – est *C. muelleriana* (Duda & Váňa 1986b).

Cephaloziella varians (Gottsche) Steph.

Reported as *Marsupella boeckii* (Velenovský 1) and later as *Cephaloziella arctica* from the rocks beneath Horní Úpský vodopád waterfall. The specimens correspond to *C. grimsulana* (Duda 1978, Duda & Váňa 1980).

Marsupella alpina

'Beneath the summit of Mt Sněžka', IX.1900 coll. Velenovský (Velenovský 1901b) – est *M. emarginata* (Duda & Váňa 1980).

Discussion

We have several interesting possibilities for comparisons of Úpská jáma's bryoflora – a comparison with the earlier survey by Kučera & Buryová (2001), and the comparison with the recent survey of the cirques of western Krkonoše Mts. (Kučera & al. 2004). Both surveys were made using the same methods, though of course in case of the earlier survey of Úpská jáma, on a much smaller scale of extent. The possibilities of comparison with earlier historical surveys are yet more limited than in case of e.g. Labský důl valley, due to the imprecise location of historical collections when Úpská jáma cirque was not always separated from the other localities in Obří důl valley, especially those of Rudník and Čertova zahrádka, where a very different set of species occurs due to the specific (calcareous) substrate (see above at the section on non-retrieved taxa).

Comparison with the survey 1998-2000

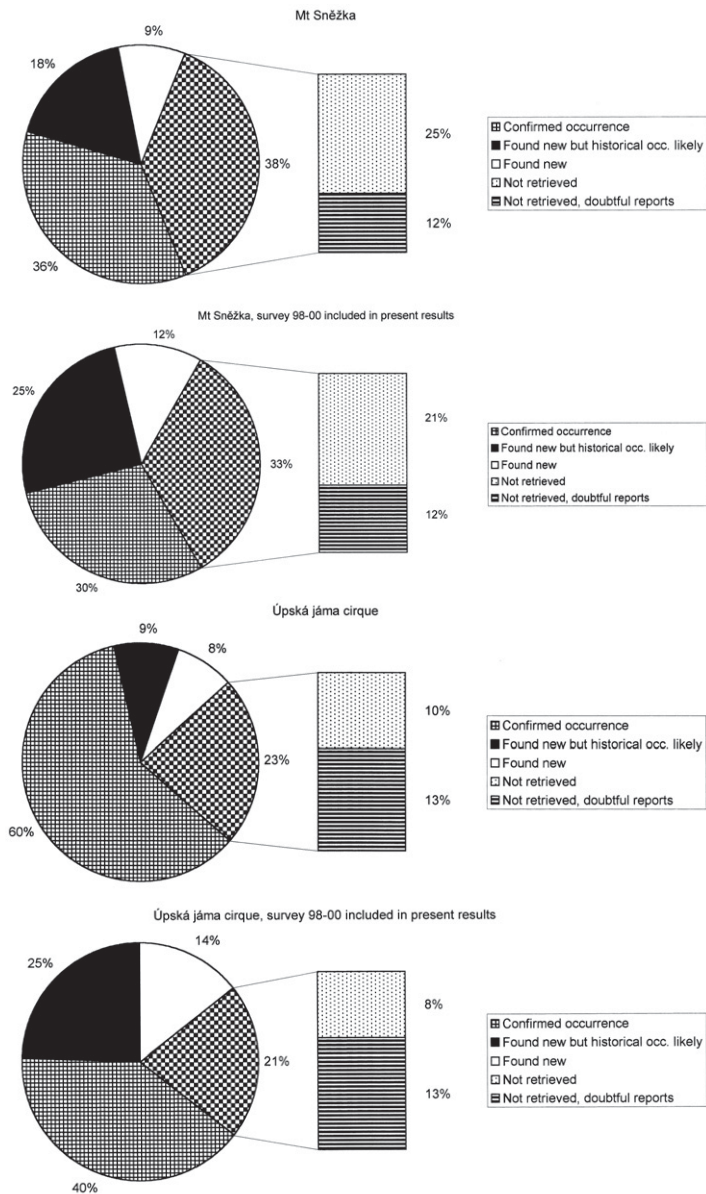
During the survey 98-00, roughly 4.5 man days have been spent in the Úpská jáma cirque and one man day at Mt Sněžka. During the recent survey, 34.5 man days have been spent in the Úpská jáma cirque and 5.5 at Mt Sněžka, i.e. the survey was more than seven times as deep on average. This is well reflected in the results: 240 taxa (including 2 subspecies and 3 varieties) were documented now from Úpská jáma cirque and 110 taxa (including) from Mt Sněžka, compared to 161 taxa from the cirque and 50 from Mt Sněžka during the survey 98-00, which correspond to the addition of 50% in total (259 vs. 173). On the other hand, only 6 taxa in the cirque (2.4%) and 8 at Mt Sněžka (6.8%) were not re-found since the survey 98-00 (some of the non-retrieved taxa were collected at places not visited during this survey). Several of the taxa, not found during the survey 98-00 or found only at one site in small quantity, were even found to occur in surprisingly high frequency and quantity (*Gymnomitrium concinnatum*, *Harpanthus flotovianus*, *Tetralophozia setiformis* and some common taxa like *Plagiothecium laetum* or *Pleurozium schreberi*). Particularly important was the (re)discovery of taxa, missing in our flora for more than four decades or even believed to be extinct (*Cladopodiella francisci*, *Lescurea mutabilis*, *L. radicata*, *Hypnum callichroum*, *Kiaeria falcata*, *Warnstorfia pseudostraminea*) and discovery of new species of the flora (*Lescurea patens*, *Syntrichia norvegica*).

Comparison with historical data (pre-1998)

It is obviously of little use to compare our data, acquired in 2001-2003, with the preceding ones, including the survey 1998-2000. If we accept the premise that no taxon of those 14 non-retrieved versus survey 98-00 has vanished, it makes much more sense to compare the combined data with the pre-1998 state.

The area, similarly as in the case of western Krkonoše Mts (Kučera & al. 2004), has not been adequately surveyed in past; particularly missing have been the inventory surveys, when even the common taxa would have been recorded. The addition, brought by our surveys, is 40% for the Úpská jáma cirque and 37% for Mt Sněžka, i.e. even more than in the western Krkonoše Mts, where the addition was between 30-34%. Of course, a large proportion of the 'additions' was realized by rather common species, which have not been specifically recorded earlier; this part was estimated at some two thirds (see Fig. 3). The number of unconfirmed taxa, i.e. taxa which were not found between 1998 and 2003, is rather high – 21% of the total (historical+recent) for the Úpská jáma cirque and even 33% for Mt Sněžka. However, if we subtract the doubtful records and poorly located records which perhaps refer to localities outside the study area, the number will lower to 9% and 24%, respectively (see Fig. 3.). These are already rather realistic numbers, showing the substantially stronger anthropic impact on Mt Sněžka. In case of Úpská jáma cirque, the value is very similar to those obtained for Kotelní jámy cirques (13%) and Labský důl valley (16%), cf. Kučera & al. (2004). The composition of non-retrieved taxa is similar as in the case of

Fig. 3. Comparison of the historical records with our data on presence of the taxa.



cirques of the western Krkonoše Mts; the losses unfortunately affect the taxa with (at least partly) arctic-alpine pattern of distribution (*Anastrophyllum saxicola*, *Jamesoniella undulifolia*, *Arctoa fulvella*, *Dicranum elongatum*, *Dicranum spadiceum*, *Grimmia unicolor*, *Hygrohypnum smithii*, *Pohlia longicollis*, *Pohlia obtusifolia*, *Ptychodium plicatum*, *Rhytidium rugosum*), though their proportion among the missing ones is not striking at the first sight.

Comparison with the cirques of the western Krkonoše Mts

The identical methods used and comparable number of man days spent in the field constitute the ideal basis for the comparison. Although the Úpská jáma is the best developed cirque in the whole Krkonoše Mts, it seems to be the least diverse in the simple number of species – 240 (246 including those from 98-00 survey) taxa versus 270 found in both Kotelní jámy cirques and the cirques of Labský důl valley. The higher number of taxa at Mt Kotel can perhaps be explained by the occurrence of base-rich substrata, which is not outweighed by the number of acidophilous, predominantly arctic-alpine taxa, which occur exclusively in the Úpská jáma cirque. The difference against the Labský důl valley is however difficult to explain, particularly given the smaller geomorphological development of the cirques of Labský důl, likewise uniform bedrock and, paradoxically, the smaller number of man days spent on the survey (27.5 vs. 34.5). The composition of the species occurring in the Labský důl and not in the Úpská jáma does not shed too much light on the possible reasons, which obviously concur in their role. Definitely there is a higher proportion of basiphilous species at the sites of Labský důl (17 vs. 6 exclusively occurring), and higher proportion of forest species (13 vs. 3), although this is not caused by the altitude, which is identical at the cirques' bottoms. Also higher is the number of anthropically bound species (4 vs. 0). The number of exclusively occurring arcto-alpine species is (maybe by chance) not higher in the Úpská jáma cirque, as could be expected (11 exclusively occurring arctic-alpine species in the Úpská jáma vs. 10 in the Labský důl). Even the historical records are fewer from the Úpská jáma cirque than from the cirques of western Krkonoše Mts (150 vs. 209 from Labský důl and 232 from Mt Kotel; doubtful and obviously misplaced records were omitted), which perhaps at least partly supports our hypothesis that Úpská jáma is indeed poorer in species.

The bryoflora of Mt Sněžka is quite difficult to compare with any other place due to its uniqueness but at least partial comparison is possible with the bryoflora of summit area of Mt Kotel. The number of taxa is indeed nearly identical – 125 at Mt Kotel and 118 at Mt Sněžka; 70 taxa (40% of the total of 173) are shared.

Conclusions

Total 240 taxa were recorded at the study sites of Úpská jáma cirque and 110 at Mt Sněžka during recent survey. This represents an addition of 1/3 of taxa to the inventory of Úpská jáma and even 1/2 to that of Mt Sněžka, compared to the survey by Kučera & Buryová (2001). In comparison to the historical state, 40% of taxa were added to the bryoflora of the Úpská jáma cirque and 37% to the flora of Mt Sněžka. On the other hand, 9% of the historical total have not been confirmed in the Úpská jáma cirque and 29% at Mt Sněžka, which in the case of the first roughly corresponds to other recently surveyed sites, and thus also to the general level of taxa losses but in case of Mt Sněžka shows the greater level of change, compared to other sites. The pauperization of Sněžka's flora cannot be simply assigned to the human impact, which has been undisputedly strong over the last 150 years but to a large extent perhaps also to the global warming which could make several of the arctic-alpine taxa extinct (*Anastrophyllum saxicola*, *Bryum arcticum* (if correctly identified), *Dicranum spadiceum*). Paradoxically, among the taxa, which could not be recently verified, are several which were obviously bound to artificial substrata (*Distichium capillaceum*, *D. inclinatum*, *Ditrichum flexicaule*, *Preissia quadrata*, *Bryum lonchocaulon*, *B. amblyodon*, *Syntrichia ruralis*); this means that we are unable to prove that the anthropization of the flora at Mt Sněžka grows but, on the other hand, is still substantially greater than at other surveyed localities of the Krkonoše Mts. Indeed, 15 taxa from Mt Sněžka (13% of its flora!) can be described as anthropically bound, whereas perhaps not a single taxon in the Úpská jáma cirque can be seen as anthropic indicator.

The bryoflora of Mt Sněžka is comparably rich as the flora of either the cirques at Mt Kotel or those of the Labský důl valley but still somewhat poorer – roughly by 10%. The exact reasons for

this are quite difficult to detect but probably there is a combination of lack of base-rich substrata, harsher conditions that do not allow the forest taxa to survive and, paradoxically, lack of anthropogenic sites.

Similarly as in other surveyed localities of the Krkonoše Mts, we were able to document a number of threatened elements, and taxa which have not been seen in our country for several decades. 6 species from the Úpská jáma cirque and 3 species of Mt Sněžka are currently regarded Critically Endangered, which is a similar proportion as in other sites. *Isopterygiopsis pulchella* (at 'Čertova zahrádka'), *Kiaeria falcata*, *Warnstorfia pseudostraminea*, *Lescuraea radicata*, *Hypnum callichroum* and *Lescuraea mutabilis* have been documented after more than 50 years.

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References

- Blockeel T. L., Bednarek-Ochyra H., Czernyadjeva I. V., Draper I., Fudali E., Kučera J., Long D. G., Ros R. M., Ochyra R., Schumacker R., Smith V. R., Sollman P., Sotiaux A., Thingsgaard K., Zmrhalová M. (2003): New national and regional bryophyte records, 8. - Journal of Bryology, 25: 217-221.
- Boros Á., Šmarda J., Szweykowski J. (1960): Bryogeographische Beobachtungen der XII. IPE in der Tschechoslowakei. - Veröffentlichungen des Geobotanischen Institutes der Eidgen. Technischen Hochschule Stiftung Rübel, 36: 119-144.
- Buryová B. (in litt.): Rozšíření druhů rodu *Philonotis* v České republice. - (Diplomová práce). PíF UK Praha, 86 pp., 1996.
- Buryová B., Kučera J. (1999): Two interesting bryofloristic records from the Krkonoše Mts – *Racomitrium macounii* subsp. *alpinum* and *Grimmia reflexidens*. - Preslia 71(1): 1-6.
- Cypers-Landrecy V. von (1897): Kryptogamenflora des Riesengebirges und seiner Vorlagen. Laubmoose. I. - Verhandlungen der k. k. zoologisch-botanischen Gesellschaft in Wien, 1897: 1-12.
- (1902): Kryptogamenflora des Riesengebirges und seiner Vorlagen. Laubmoose. II. - Verhandlungen der k. k. zoologisch-botanischen Gesellschaft in Wien, 1902: 530-539.
- Dědeček J. (1883): Mechy jatrovkovitě (*Hepaticae*) květeny české. - Archiv pro přírodovědecké proskoumání Čech, 52: 1-79.
- Duda J. (1978): Bemerkungen zur Verbreitung und Bestimmung der tschechoslowakischen Arten der Gattung *Cephalozia* (*Hepaticae*). - Preslia, 50 (2): 111-118.
- Duda J., Váňa J. (1969): Die Verbreitung der Lebermoose in der Tschechoslowakei - IV. - Čas. Slez. Muz. Ser. A, 18: 21-52.
- (1972): Die Verbreitung der Lebermoose in der Tschechoslowakei – XI. - Čas. Slez. Muz. Ser. A, 21: 49-71.
- (1976): Die Verbreitung der Lebermoose in der Tschechoslowakei – XIX. - Čas. Slez. Muz. Ser. A, 25: 27-50.
- (1978a): Die Verbreitung der Lebermoose in der Tschechoslowakei – XXIII. - Čas. Slez. Muz. Ser. A, 27: 17-31.
- (1978b): Die Verbreitung der Lebermoose in der Tschechoslowakei – XXIV. - Čas. Slez. Muz. Ser. A, 27: 97-112.
- (1979): Die Verbreitung der Lebermoose in der Tschechoslowakei – XXVI. - Čas. Slez. Muz. Ser. A, 28: 111-123.
- (1980): Die Verbreitung der Lebermoose in der Tschechoslowakei – XXVIII. - Čas. Slez. Muz. Ser. A, 29: 97-112.
- (1981): Die Verbreitung der Lebermoose in der Tschechoslowakei – XXXI. - Čas. Slez. Muz. Ser. A, 30: 113-127.
- (1982): Die Verbreitung der Lebermoose in der Tschechoslowakei – XXXIV. - Čas. Slez. Muz. Ser. A, 31: 113-128.

- (1983): Die Verbreitung der Lebermoose in der Tschechoslowakei – XXXVI. - Čas. Sle. Muz. Ser. A, 32: 23-35.
- (1986a): Die Verbreitung der Lebermoose in der Tschechoslowakei – XLVI. - Čas. Sle. Muz. Ser. A, 35: 97-116.
- (1986b): Die Verbreitung der Lebermoose in der Tschechoslowakei – XLVII. - Čas. Sle. Muz. Ser. A, 35: 205-218.
- (1989): Die Verbreitung der Lebermoose in der Tschechoslowakei – LVI. - Čas. Sle. Muz. Ser. A, 38: 209-224.
- (1991): Die Verbreitung der Lebermoose in der Tschechoslowakei – LX. - Čas. Sle. Muz. Ser. A, 40: 29-44.
- Funck Ch. (1820): Nachricht von meiner Anwesenheit im Riesengebirge. - Flora, 2: 65-73.
- Futschig J., Váňa J. (1969): Neue Moosfunde aus dem Riesengebirge. - Opera Corcontica 6: 45-50.
- Havránková K. (in litt.): Rozšíření gemiferních druhů rodu *Pohlia* Hedw. tvořících gemy na lodyžkách na území Československa. - (Diplomová práce). PFF UK Praha. 65 pp, 1985.
- Jeník J. (1961): Alpínská vegetace Krkonoš, Králického Sněžníku a Hrubého Jeseníku. - Nakladatelství ČSAV, Praha: 409 p.
- Kern F. (1914): Verzeichnis der Moosearten, die seit dem Erscheinen der Limprichtschen Werke in Schlesien entdeckt worden sind. - Jahresbericht der schlesischen Gessellschaft für vaterländische Cultur, 91 (1913): 65-72.
- Kučera J., Buryová B. (2001): Bryofloristic survey of the summit region of the Eastern Giant Mts. (Czech Republic). - Opera Corcontica, 36/1999: 105-132.
- Kučera J., Váňa J. (2003): Check- and Red list of the bryophytes of the Czech Republic (2003). - Preslia 75: 193-222.
- Kučera J., Zmrhalová M., Buryová B., Košnar J., Plášek V., Váňa J. (2004): Bryoflora of the glacial cirques of the Western Krkonoše Mts. - Čas. Sle. Muz. Opava (A), 53: 1-47.
- Limpricht K.G. (1876a): Lebermoose. In: Cohn F., ed.: Kryptogamen-Flora von Schlesien. - J. U. Kern's Verlag, Breslau, 1876: 225-352.
- (1876b): Laubmoose. In: Cohn F., ed.: Kryptogamen-Flora von Schlesien. - J. U. Kern's Verlag, Breslau, 1876: 27-224.
- (1876c): Nachträge zu den Laub- und Lebermoosen. In: Cohn F., ed.: Kryptogamen-Flora von Schlesien. - J. U. Kern's Verlag, Breslau, 1876: 413-444.
- (1890): Die Laubmoose Deutschlands, Oesterreichs und der Schweiz. - In: Dr. L. Rabenhorst's Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz, 2. Auflage. Ed. Kummer, Leipzig, Bd. 4, I. Abth.: I-X, 1-836.
- Matoušek F. (1895): Bryologisch-floristische Beiträge aus Böhmen. I. - Lotos, 43: 36-91.
- (1897): Bryologisch-floristische Beiträge aus Böhmen. V. - Deutsche botanische Monatsschrift, 15: 202-206.
- (1901): Bryologisch-floristische Mittheilungen aus Böhmen. X. - Mitt. aus dem Vereine der Naturfreunde in Reichenberg, 32: 24-32.
- (1902): Bryologisch-floristische Mittheilungen aus Böhmen. XI. - Mitt. aus dem Vereine der Naturfreunde in Reichenberg, 33: 44-48.
- Milde J. (1868): Die wichtigsten Entdeckungen in der schlesischen Laubmoos-Flora. - Jahresbericht der schlesischen Gessellschaft für vaterländische Cultur, 45: 102-103.
- (1869): Bryologia Silesiaca. Laubmoos Flora von Nord- und Mitteldeutschland, unter besonderer Berücksichtigung Schlesien und mit Hinzunahme der Floren von Jütland, Holland, der Rheinpfalz, von Baden, Franken, Böhmen, Mähren und der Umgegend von München. - Arthur Felix, Leipzig, 1. Abt.: 1-410.
- Nees von Esenbeck Ch.G. (1833): Naturgeschichte der europäischen Lebermoose mit besonderer Beziehung auf Schlesien und die Oertlichkeiten des Riesengebirges. - August Rücker, Berlin, 1. Bändchen: I-XX, 1-500, 1 Tafel.
- (1836): Naturgeschichte der europäischen Lebermoose mit besonderer Beziehung auf Schlesien und die Oertlichkeiten des Riesengebirges. - August Rücker, Berlin, 2. Bändchen: I-XII, 1-348.
- (1838a): Naturgeschichte der europäischen Lebermoose mit besonderer Beziehung auf Schlesien und die Oertlichkeiten des Riesengebirges. - Grass, Barth und Comp., Breslau, 3. Bändchen: I-VI, 1-594.
- (1838b): Naturgeschichte der europäischen Lebermoose mit besonderer Beziehung auf Schlesien und die Oertlichkeiten des Riesengebirges. - Grass, Barth und Comp., Breslau, 4. Bändchen: I-LXXII, 1-540.
- (1840): Uebersicht der Pflanzengattungen und Arten des schlesischen Riesengebirgs und des Warmbrunn-Hirschberger Thals. - Wendt J.: Die Thermen zu Warmbrunn im Schlesischen Riesengebirge, Breslau - Warmbrunn: 320 p.
- Nees von Esenbeck Ch.G., von Flotow J. (1836): Reisebericht über eine Exkursion nach einem

- Theile des südöstlichen Riesengebirges, unternommen von dem Präsidenten Nees von Esenbeck und dem Major von Flotow. - Beiblätter zur Flora oder allgemeinen botanischen Zeitschrift, 1: 1-60.
- P i l o u s Z. (1953a): Krkonošské koprofilní mechy. - Přírodovědecké Zprávy z Krkonoš, 1953/5-6: 5-6.
- (1953b): *Racomitrium mollissimum* Phil., nový mech československý z Krkonoš. - Přírodovědecké Zprávy z Krkonoš, 1953/3: 3-4.
- P o d p ě r a J. (1973): Bryum generis monographiae prodromus I. 1. Species Eurasiae septentrionalis. Pars 16. systematica. - Academia, Praha. 257 p.
- P o s p í š i l V. (1990): Die Laubmoose *Heterocladium heteropterum* B.S.G. und *H. dimorphum* (Brid.) B.S.G. in der Tschechoslowakei. - Acta Musei Moraviae, Sci. nat., 75: 143-164.
- P r a g e r E. (1907): Neues aus der Moosflora des Riesengebirges. - Allgemeine botanische Zeitschrift, 13: 122-126.
- R a b e n h o r s t L. (1848): Deutschlands Kryptogamen-Flora oder Handbuch zur Bestimmung der kryptogamischen Gewächse Deutschlands, der Schweiz, des Lombardisch-Venetianischen Königreichs und Istriens. Bd. 2, Abt. 3: Leber, Laubmoose und Farne. - E. Kummer, Leipzig, Bd. 2, Abt. 3: 352 p.
- S c h i f f n e r V. (1914): Kritische Bemerkungen über die europäischen Lebermoose mit Bezug auf die Exemplare des Exsiccatenwerkes: Hepaticae europaeae exsiccatae. XIII. Serie. - Gottesberg in Schlesien. 22 p.
- V e l e n o v s k ý J. (1897): Mechy české. - Rozpr. čes. akademie císaře Františka Josefa pro vědy, slovesnost a umění, tř. II., VI (6): I-VII, 1-352.
- (1901a): Bryologické příspěvky z Čech za rok 1900-1901. - Rozpr. čes. akademie císaře Františka Josefa pro vědy, slovesnost a umění, tř. II., 10 (24): 1-12.
- (1901b): Jatrovky české. Část I. - Rozpr. čes. akademie císaře Františka Josefa pro vědy, slovesnost a umění, tř. II., 10 (12): 1 - 49, tab. 1-4.
- (1903): Bryologické příspěvky z Čech za rok 1901-1902. - Rozpr. čes. akademie císaře Františka Josefa pro vědy, slovesnost a umění, tř. II., 12 (11): 1-20.
- V e s e l s k y F. (1860): Verzeichniss in Böhmen vorkommenden Laubmoose. Nach Schimper's Corollarium Bryol. Eur. - Oesterreichische botanische Zeitschrift, 10: 382-399.
- V i l h e l m J. (1901): Bryologisch - floristische Beiträge aus Riesengebirge. - Allgemeine botanische Zeitschrift, 9 (1901): 147-149.
- V o n d r á č e k M. (1993): Revize a rozšíření druhů rodu *Orthotrichum* Hedw. v České a Slovenské republice (Musc). - Sbor. Západočes. muz., Plzeň, Příroda, 85: 1-76.
- Z l a t n í k A. (1928): Aperçu de la végétation des Krkonoše (Riesengebirge). - Preslia, 7: 94-155.

Souhrn

V článku jsou shrnuty výsledky tříletého intenzivního bryofloristického průzkumu Úpské jámy a Sněžky ve východních Krkonoších. Díky detailní inventarizaci bylo na obou lokalitách celkem nalezeno 260 taxonů mechorostů – 240 v Úpské jámě a 110 na Sněžce. Nepotvrzených historických údajů zůstalo kolem 10% v Úpské jámě a 24% na Sněžce, přičemž podíl skutečně vymizelých druhů je pravděpodobně mnohem menší. Při akceptování všech pravděpodobných historických údajů by celkový počet taxonů Úpské jámy představoval asi 275 taxonů a Sněžky 155 taxonů. Je poměrně značný rozdíl v zastoupení druhů, které je možné označit jako ruderalní na obou lokalitách – žádný takový taxon v Úpské jámě oproti 13% bryoflorý Sněžky. Jsou prezentovány i základní údaje o početnosti nejohroženějších druhů obou lokalit, přičemž se podařilo prokázat, že rozdíl v početnosti populací druhů, dřívě hodnocených jako stejně ohrožené, mohou dosahovat i několik řádů. Tato data mají tedy zásadní význam a již byla využita pro přehodnocení ohroženosti některých taxonů podle kritérií IUCN.

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