

Bryoflora of the glacial cirques of the Western Krkonoše Mts.

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Abstract: The bryoflora of the cirques at Mt Kotel and of the Labský důl valley has been thoroughly surveyed during the last three years and is here described and compared to historical data. Some 270 taxa have been documented at both localities, 22 additional taxa have been found in the summit part of Mt Kotel. The survey added more than 30% of historically known taxa and, on the other hand, we were unable to confirm some 50 taxa at both localities, part of which however still can be probably found; 15 taxa have been for the first time reported from the Krkonoše Mts, 15 species have been excluded from the flora of Mt Kotel and 12 from that of the Labský důl following the herbarium revisions. The richest parts of the localities proved to be those containing base-rich bedrock – such study sites supported between ca. 180 and 220 species. Some 20% 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

Glacial cirques at the Czech part of the Krkonoše Mts have been subject to the intense bryofloristic survey in the past three years (2001-2003), performed by the authors. The Western part of the mountain range has never been inventoried in an exhaustive way, despite a considerable amount of floristic work done in the past. More than 40 authors have published some 70 papers or book chapters which include some data on the bryoflora of the western part of Krkonoše Mts. Of course, most of the authors have not dealt specifically with the area, and neither of them has made a complete bryofloristic inventory, perhaps with the exception of Šašková (1984), who made a diploma thesis in the part of Labský důl called 'Strmá stráň'. The bryologists which have contributed most to the knowledge of the bryoflora were V. Cypers (Cypers 1897, 1902, 1926, 1927), J. Milde (particularly 1869), J. Váňa (particularly Hadač & Váňa 1971 and Váňa 1967) and V. Schiffner (1896, 1897) but the largest numbers of mosses were recorded in the non-bryologists, particularly the unpublished theses by Wagnerová (1970) and J. Šašková (1984) or the tall-forb-communities describing paper by T. Sýkora & J. Štursa (1973). Other important sources are those Vilhelm (1901), Limpricht (1876), Velenovský (especially 1897, 1901a, 1901b) and Limpricht (1876) – all these records account for some 80% of the hitherto known records but the number of historical sources where we found some information about these localities exceeded 80. The following paper deals with the bryofloristic data collected in the area in 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 survey was made at two major localities – Mt Kotel with its two cirques and Labský důl valley with its several cirques between ‘Navorská jáma’ cirque and the sources of Labe river. The localities will be described in more detail under the respective subchapters. The floristic method was essentially the same as that of Kučera & Buryová (2001) with some improvements. The major localities have been split into study sites according to prominent geomorphologic features (most often broader surroundings of smaller streams and ravines). The size of the study sites was thus quite variable, depending mostly on the degree of geomorphologic homogeneity; the longer dimension of a site was mostly between ca. 150 and 500 m but the width of the studied swath oscillated between ca. 30 and 200 m. 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 harmed by the amount of collected material. In total, 1279 specimens from Mt Kotel and 903 from the Labský důl have been collected; the number of records from the sheets reached 1582 from Mt Kotel and 1506 from Labský důl. For each collected species, the site details (location using hand-held GPS device and basic ecological remarks) were recorded. During the second year of survey, the usefulness of the relative frequency of the species at sites was recognized, and since then it was recorded on the cards after each day by each card author on a 5-degree scale (0 – 1 record, 0.5 – 2 records, 1 – 3-4 records, 1.5 – 5-6 records, 2 – more records). Abundance of species not included in the cards was later calculated from the number of records in the database in the same way. The co-ordinates of the specimens are for practical reasons given in the rectangular grid in the S-1942 map datum (M33 zone with central meridian of 15°E=3500 km false easting). It was not possible to list the herbaria, where the voucher specimens are deposited with exception of specially described specimens; the information is upon request available from the corresponding author. Nomenclature in the text, as well as the Red List criteria (IUCN ver. 3.1), correspond to Kučera & Váňa (2003).

Results

1. Mt Kotel

The study sites at Mt Kotel were located both in the summit region of the mountain and in the cirques which lie on the SSE-ESE slope (see Fig. No. 1). The smaller, more western cirque – Malá Kotelní jáma – is generally less developed; there are fewer rocks and other suitable substrates for bryophytes. The substrate is mostly acidic mica schist or granite, only in the eastern part there are some outcrops of base-rich erlans. Most of the study sites lie in the larger Velká Kotelní jáma cirque, with steeper faces, and well-known outcrops of limestone and erlans in the western part of the cirque (study sites 5-7 and partly 11 described below). The eastern part of the cirques has acidic substrates – mostly granite (study sites 8-13 except most of 11). The bottom of both cirques lies at the altitude of some 1120-1130 m but especially in the case of Velká Kot. jáma the historical data refer even to parts around the Kotelský potok brook beneath the bottom (our sites 12-13 and perhaps even lower). The cirque upper faces lie around 1400 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 (JK stands for J. Kučera and JKo for J. Košnar).

- K1. Mt Kotel, all slopes, above the cirque face on the ESE slope, 1310-1430 m a.s.l. 15.6.2001, 29.8.2002, 26.6.2003, 29.6.2003, BB, MZ, JK, JKo
- K2. Malá Kotelní jáma cirque, SW part above the track (E slopes of ‘Čihadlo’ ridge), 1150-1270 m a.s.l. 3.9.2002 BB, MZ
- K3. Malá Kotelní jáma cirque, E part, 1170-1380 m a.s.l. 13.8.2002 MZ, JV, VP; 3.9.2002, JV, 26.6.2003 MZ
- K4. The ridge between Malá and Velká Kotelní jáma cirques, 1300-1350 m a.s.l. 3.9.2002 JK
- K5. Velká Kotelní jáma cirque, ESE ravine (shortly above and beneath the adit), 1230-1380 m a.s.l. 15.-16.6.2001, 18.6.2001 BB, JK, MZ, VP; 30.8.2002 MZ

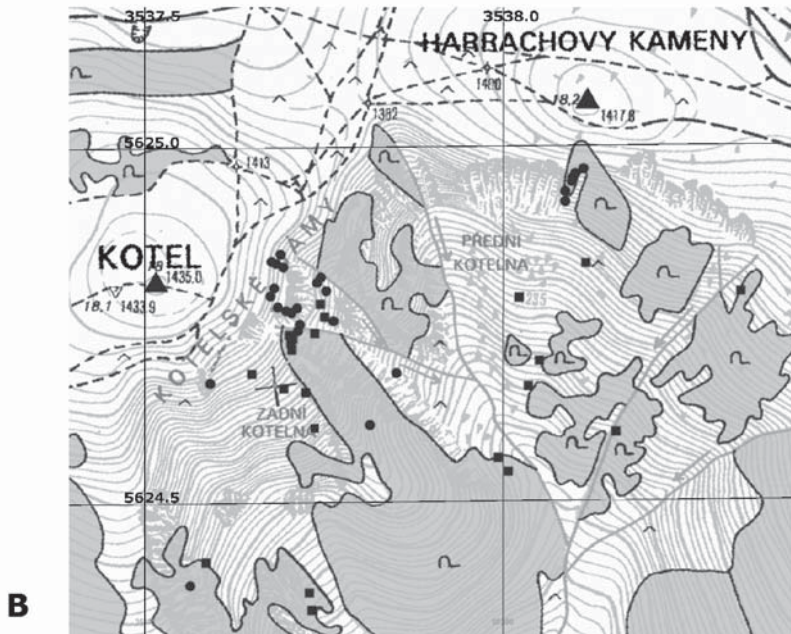
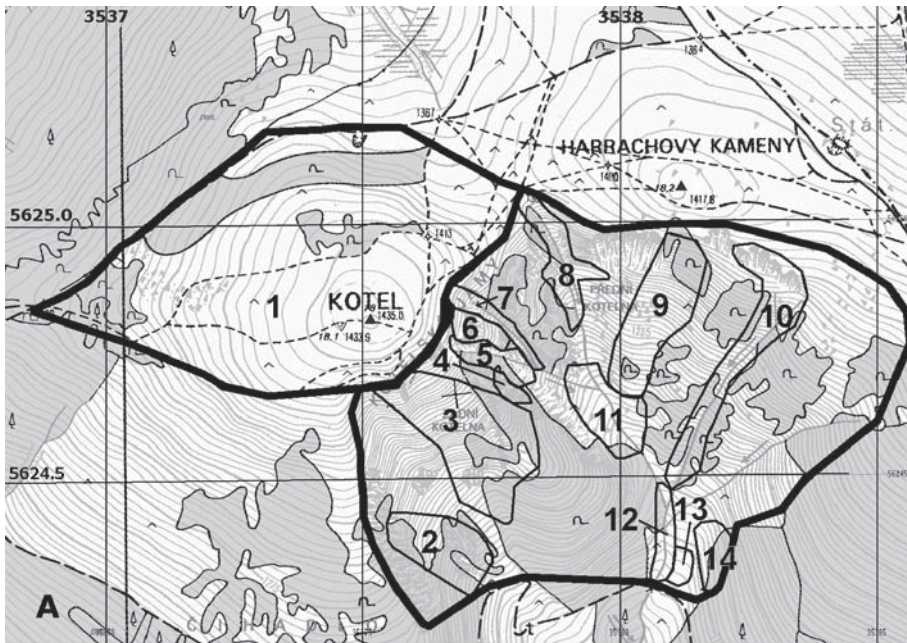


Fig. 1. A. Study sites at Mt Kotel. The grid refers to S-1942 system, M33 zone. B. Distribution of *Gymnomitrium concinnatum* (●) and *Herzogiella striatella* (■) within the study sites at Mt Kotel.

- K6. Velká Kotelní jáma cirque, wedge of mostly erlan rocks between the ESE and SE ravines, 1300-1400 m a.s.l. 29.-30.8.2002 BB, JK, MZ
- K7. Velká Kotelní jáma cirque, SE ravine, 1230-1410 m a.s.l. 16.6.2001 JK, MZ, BB; 31.8.2002 BB, JK; 27.6.2003 MZ, BB, JKo
- K8. Velká Kotelní jáma cirque, SSE ravine, 1200-1385 m a.s.l. 18.6.2001 BB, JK, MZ
- K9. Velká Kotelní jáma cirque, slope beneath the 'Harrachovy kameny' rock formation, 1170-1380 m a.s.l. 2.9.2002 BB, JK, JV, MZ
- K10. Velká Kotelní jáma cirque, SW slope beneath the former hut of 'Jestřábí boudy', 1120-1380 m a.s.l. 17.6.2001 BB, JK, VP
- K11. Bottom of Velká Kotelní jáma cirque, 1130-1200 m a.s.l. 16.6.2001 BB, JK, MZ; 2.9.2002 MZ
- K12. Dwarf pine growths between the bog and the Kotelní potok brook, beneath the cirque bottom, 1070-1120 m a.s.l.
- K13. Peat bog above the track over Kotelní potok brook, beneath the cirque bottom, 1080-1090 m a.s.l. 28.8.2002, JK, JV, MZ
- K14. Beech forest E of the site No. 13, 1100-1130 m a.s.l. 28.8.2002 BB, JK, MZ

2. Labský důl

The Labský důl valley is oriented more or less north to south in its studied upper part. The cirques and steep rock faces have been formed only above the right bank of Labe, therefore all have essentially eastern aspect. The substrate is nearly invariably granite but locally the rocks (mainly near the ground) are obviously quite base-rich (the basicity is perhaps mainly caused by calcium which is washed from the deeper rock layers). The bottom of the valley in the studied part (north of the confluence with Pudlava) has the altitude of 900-1050 m, the cirque faces lie between 1270-1340 m. Study sites correspond either to the whole partial cirques (e.g. Navorská jáma, Harrachova jáma), the ravines (S part of Pančavská jáma cirque surrounding the Pančavský vodopád waterfall, Labská rokle ravine – divided along the stream into three parts) or the rocky slopes between the partial cirques (slope between Labská rokle and Navorská jáma and slope between Harrachova and Pančavská jáma). The localities are shown on Fig. 2.

List of study sites:

- L1. Harrachova jáma cirque, 1025-1350 m a.s.l. 13.9.2002, JK, MZ
- L2. NE slope between Pančavská jáma and Harrachova jáma cirques, beneath 'Krakonošova hlava', 1020-1180 m a.s.l. 13.9.2002, BB
- L3. Pančavská jáma cirque, around the Pančavský vodopád waterfall, 1150-1290 m a.s.l. 28.7.2001, JK, MZ
- L4. Pančavská jáma cirque N of the waterfall, 1040-1310 m a.s.l. 29.7.2001, JK, MZ; 12.9.2002, BB, JK, MZ
- L5. Navorská jáma cirque, 1050-1310 m a.s.l. 11.9.2002, BB, JK, MZ, VP
- L6. Rocky E slope between Labská rokle gorge and Navorská jáma cirque, along the path, 1130-1230 m a.s.l. 10.9.2002, BB, JK, MZ, VP, JV
- L7. Ravine of the left tributary to Labe from ca. 1150 m to 1320 m a.s.l., above the confluence at the lower end of Labská rokle (ca. 250 m) 26.7.2001, JK, MZ
- L8. Lower part of Labská rokle ravine beneath the foot of the waterfall (ca. 150 m downstream), 1180-1250 m a.s.l. 27.7.2001, JK, MZ
- L9. E slope beneath Labská bouda lodge between the lodge and the Labe stream towards the upper end of the waterfall, 1250-1290 m a.s.l. 28.6.2003, BB, MZ, JKo
- L10. Upper part of Labská rokle above the Labský vodopád waterfall (ca. 300 m leg), 1270-1310 m a.s.l. 28.6.2003, 30.6.2003 BB, MZ, JKo; 30.6.2003 BB

List of bryophytes recorded at the individual sites

The + sign after the name means that the species has not been previously recorded from Mt Kotel (K) or the Labský důl (L); the sign stands in bracket where there was a general literature information on the occurrence of the species in the Krkonoše Mts. ++ means that the record is new to the whole Krkonoše Mts. The next abbreviation after the semicolon correspond to those

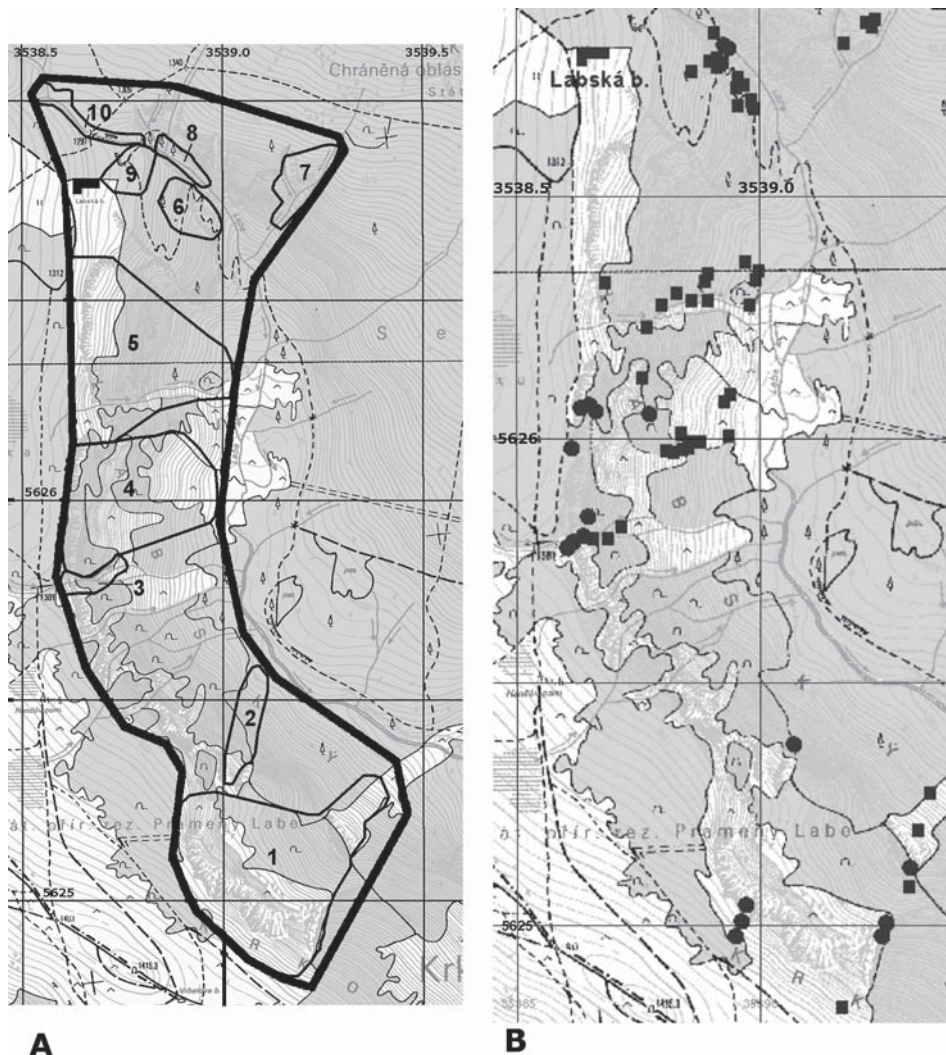


Fig. 2. A. Study sites in the Labský důl valley. B. Distribution of *Gymnomitrium concinnatum* (●) and *Herzogiella striatella* (■) within the study sites.

of the Red List of Kučera & Váňa (2003). Following next are the presence data from individual study sites: H – herbarium record, N – uncollected taxon. The numbers that follow the ‘Avg K’ or ‘Avg L’ abbreviations stand for the mean recorded abundance at the sites of Mt Kotel and Labský důl, 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, see above).

Anastrepta orcadensis [K(+)]; LC-att; K1 (H), K3 (H), K4 (H), K9 (N), K11 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L7 (H), L8 (H). Avg K: 1 (2), Avg L: 0.94 (4).

Anastrophyllum minutum; LC; K2 (H), K3 (H), K4 (N), K5 (H), K6 (H), K7 (N), K9 (H), K10 (H); L1 (H), L2 (H), L3 (N), L4 (H), L6 (H), L7 (N), L8 (N). Avg K: 0.7 (5), Avg L: 0.71 (4).

Aneura pinguis [L+]; LC; K3 (H), K5 (H), K6 (N), K7 (N); L4 (N). Avg K: 0 (4), Avg L: 0 (1).

Anthelia julacea; VU; L1 (H), L9 (H). Avg L: 1 (2).

Bazzania tricrenata; VU; K5 (H), K8 (H); L2 (H), L4 (H), L5 (H). Avg K: 0 (2), Avg L: 1.18 (3).

Bazzania trilobata var. *trilobata* [L(+)]; LC; L4 (H), L7 (N). Avg L: 0 (1).

Blepharostoma trichophyllum; LC; K1 (H), K3 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K11 (N), K12 (N), K13 (N); L1 (N), L2 (H), L4 (H), L5 (H), L6 (N). Avg K: 0.61 (6), Avg L: 1.13 (5).

Calypogeia azurea; LC; K1 (H), K2 (H), K3 (H), K5 (H), K6 (N), K7 (H), K8 (H), K9 (N), K10 (H), K11 (H), K12 (N), K13 (H); L1 (H), L2 (N), L3 (H), L4 (H), L5 (H), L6 (H), L7 (N), L9 (N), L10 (H). Avg K: 0.85 (9), Avg L: 1.16 (8).

Calypogeia integristipula; LC; K2 (N), K3 (N), K5 (N), K6 (N), K7 (N), K8 (N), K9 (H), K10 (N), K11 (N), K13 (N); L1 (H), L2 (H), L3 (H), L4 (H), L5 (N), L6 (H), L7 (H), L10 (N). Avg K: 0.9 (6), Avg L: 1.33 (6).

Calypogeia muelleriana [K+]; LC; K2 (H), K3 (N), K6 (N), K8 (H), K9 (N), K11 (H), K13 (H); L1 (N), L2 (N), L3 (N), L4 (N), L5 (N), L6 (H), L7 (H), L8 (H), L9 (H), L10 (H). Avg K: 0.67 (7), Avg L: 0.67 (9).

Calypogeia neesiana [K+, L+]; LC; K3 (H), K5 (H); L1 (H), L2 (H), L4 (H), L5 (H). Avg K: 0.5 (2), Avg L: 1.06 (4).

Cephalozia bicuspidata; LC; K1 (H), K2 (H), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (H), K11 (N), K13 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (N), L9 (H), L10 (H). Avg K: 1.38 (10), Avg L: 1.53 (7).

Cephalozia leucantha; VU; L1 (H), L2 (H). Avg L: 0.5 (2).

Cephalozia lunulifolia; LC; K1 (H); L1 (N), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H). Avg K: 0 (1), Avg L: 0.92 (6).

Cephaloziella divaricata; LC; K2 (H), K3 (H), K4 (H), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (N), K11 (H); L3 (H), L4 (H), L5 (H), L6 (H), L7 (N), L8 (H). Avg K: 0.85 (7), Avg L: 0.76 (3).

Cephaloziella grimsulana [K+]; EN; K10 (H). Avg K: 0.5 (1).

Cephaloziella rubella; LC; K6 (N-J. Váňa); L4 (H). Avg K: 0 (1), Avg L: 0 (1)

Cephaloziella spinigera [L+]; VU; L4 (H). Avg L: 0 (1).

Chiloscyphus polyanthos var. *pallescens* [K(+)]; LC-att; K3 (H), K8 (H); L3 (N), L4 (H), L5 (H), L6 (H), L8 (H), L9 (H), L10 (H). Avg K: 0.5 (2), Avg L: 0.87 (5).

Chiloscyphus polyanthos var. *polyanthos* [K(+)]; LC; K5 (H); L1 (N), L8 (H), L9 (H), L10 (N). Avg K: 0 (1), Avg L: 0.5 (4).

Chiloscyphus profundus; LC; K2 (N), K12 (N), K14 (H); L1 (N), L2 (N), L3 (N), L4 (H), L5 (H), L6 (N), L9 (H), L10 (N). Avg K: 0.5 (3), Avg L: 0.65 (7).

Conocephalum conicum; LC; K3 (H), K5 (H), K7 (H). Avg K: 0.33 (3).

Diplophyllum albicans; LC; K2 (N), K3 (H), K4 (N), K5 (N), K6 (H), K7 (H), K9 (N), K10 (H); L1 (H), L2 (H), L3 (H), L4 (N), L5 (H), L6 (H), L7 (H), L8 (N), L10 (N). Avg K: 1.1 (6), Avg L: 0.83 (6).

Diplophyllum obtusifolium [K(+), L(+)]; LC; K1 (H), K2 (H), K5 (H), K6 (H), K7 (H), K11 (H); L4 (N), L6 (N), L8 (H). Avg K: 0 (5), Avg L: 0.17 (3).

Diplophyllum taxifolium; LC; K1 (H), K2 (H), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K8 (N), K9 (H), K10 (H), K11 (H), K12 (N), K13 (N); L1 (N), L2 (N), L3 (H), L4 (H), L5 (N), L6 (H), L7 (H), L8 (N), L9 (N), L10 (N). Avg K: 1.47 (10), Avg L: 1.15 (7)

Gymnocolea inflata; LC; K1 (H), K2 (N), K3 (H), K5 (N), K6 (N), K7 (N), K8 (H), K9 (H), K10 (H); L1 (H), L2 (N), L3 (N), L4 (H), L5 (H), L6 (H), L8 (N). Avg K: 0.91 (6), Avg L: 1.32 (5).

Gymnomitrium concinnatum; LR-nt; K2 (H), K3 (H), K5 (H), K6 (H), K7 (H), K8 (N), K9 (H); L1 (H), L2 (H), L3 (H), L4 (H), L8 (H). Avg K: 1.23 (6), Avg L: 1.17 (3).

Gymnomitrium coralloides [L+]; EN; L5 (H). Avg L: 0 (1).

Haplomitrium hookeri [L+]; CR; L6 (H). Avg L: 0 (1).

Harpanthus flotovianus; LC-att; L3 (N), L6 (H), L9 (H), L10 (H). Avg L: 0 (3).

Jungermannia confertissima; EN; K5 (H), K6 (N). Avg K: 0.5 (2).

Jungermannia hyalina [K+]; LR-nt; K3 (H), K5 (H). Avg K: 0 (2).

Jungermannia obovata; LC; K3 (N), K7 (H), K8 (H), K11 (N), K13 (N); L3 (H), L4 (H), L5 (N), L6 (H), L7 (H), L8 (H), L9 (H), L10 (H). Avg K: 0.33 (3), Avg L: 0.77 (5).

Jungermannia pumila [L+]; LR-nt; L9 (H). Avg L: 0 (1).

Jungermannia sphaerocarpa; LC; K5 (H), K10 (H); L1 (H), L3 (H), L5 (H), L7 (H), L8 (H), L10 (H). Avg K: 0 (1), Avg L: 0.38 (4).

Lejeunea cavifolia; LC; K7 (N); L4 (H). Avg K: 0.5 (1), Avg L: 1 (1).

Lepidozia reptans; LC; K9 (N), K10 (N), K13 (N); L2 (N), L3 (H), L4 (N), L6 (N), L7 (N), L8 (N). Avg K: 0.5 (2), Avg L: 0.5 (4).

Lophozia attenuata [K+]; LC; K1 (H), K2 (H), K5 (H), K6 (N), K10 (N), K11 (H), K13 (H); L1 (H), L2 (N), L3 (H), L4 (H), L5 (H), L7 (N). Avg K: 0.43 (5), Avg L: 1.04 (4).

Lophozia bantrienis; LC; K6 (H), K7 (H). Avg K: 0 (1).

Lophozia barbata; LC; K2 (H), K3 (H), K5 (H), K6 (H), K7 (H), K9 (N), K11 (H), K12 (N), K13 (N); L2 (N), L3 (N), L4 (N), L6 (H), L7 (H). Avg K: 0.4 (9), Avg L: 0.33 (4).

Lophozia bicrenata [L+]; LC-att; L6 (H). Avg L: 0.5 (1).

Lophozia excisa; LC-att; K5 (H). Avg K: 0 (1).

Lophozia floerkei; LC; K1 (H), K9 (H), K10 (H), K11 (H); L1 (H), L2 (H), L4 (H), L5 (H), L6 (H). Avg K: 0 (3), Avg L: 0.82 (5).

Lophozia grandiretis [++]; VU; L10 (H). Avg L: 0 (1).

Lophozia hatcheri; LC; K1 (N), K2 (H), K3 (H), K4 (H), K5 (H), K6 (H), K7 (N), K8 (N), K9 (H), K10 (H), K11 (H), K12 (H), K13 (H); L2 (N), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L10 (H). Avg K: 1.23 (10), Avg L: 0.87 (5).

Lophozia heterocolpos [K+]; CR; K6 (H). Avg K: 0 (1).

Lophozia incisa; LC-att; L1 (H), L2 (H), L3 (H), L4 (H), L7 (H). Avg L: 0 (3).

Lophozia longiflora; LC; K1 (H), K6 (N), K11 (H); L1 (H), L2 (N), L4 (H), L5 (H), L6 (H), L7 (H). Avg K: 0.33 (3), Avg L: 0.4 (6).

Lophozia lycopodioides; LC; K1 (N), K2 (H), K3 (H), K4 (N), K5 (H), K6 (N), K7 (N), K8 (N), K9 (N), K10 (N), K11 (H), K12 (N), K13 (N); L1 (N), L2 (N), L3 (H), L4 (H), L5 (N), L6 (H), L7 (N), L8 (N), L9 (N), L10 (N). Avg K: 1.35 (9), Avg L: 1.53 (7).

Lophozia sudetica; LC; K1 (H), K2 (H), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (H), K11 (H), K12 (N), K13 (N); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (N), L9 (N), L10 (H). Avg K: 1.27 (11), Avg L: 1.08 (7).

Lophozia ventricosa var. *ventricosa*; LC; K1 (H), K2 (H), K3 (H), K4 (N), K5 (H), K6 (N), K7 (H), K8 (N), K9 (N), K10 (N), K11 (H), K12 (H), K13 (N); L1 (H), L2 (H), L3 (N), L4 (H), L5 (N), L6 (H), L7 (N), L8 (N), L9 (N), L10 (H). Avg K: 1.33 (10), Avg L: 1.42 (7).

Lophozia wenzelii [L+]; EN; L3 (H). Avg L: 0 (1).

Marchantia polymorpha (s.l.) [K(+)]; -; K1 (N); L9 (N), L10 (H). Avg K: 1 (1), Avg L: 1.42 (2).

Marchantia polymorpha subsp. *montivagans* [L(+)]; DD; L5 (H), L6 (N), L8 (H), L9 (N). Avg L: 1 (4).

Marsupella alpina [L+]; VU; L1 (H). Avg L: 0 (1).

Marsupella emarginata var. *aquatica*; LC; K2 (N), K3 (N), K5 (H), K6 (N), K8 (N), K9 (N), K10 (H), K13 (N); L1 (H), L3 (N), L4 (N), L5 (N), L6 (N), L7 (N), L8 (N). Avg K: 1.3 (5), Avg L: 1.21 (4).

Marsupella emarginata var. *emarginata*; LC; K2 (H), K3 (N), K5 (H), K6 (H), K7 (H), K8 (N), K9 (N), K13 (N); L1 (H), L2 (N), L3 (H), L4 (N), L5 (H), L6 (H), L7 (N), L8 (H), L10 (N). Avg K: 0.92 (7), Avg L: 1.1 (6).

Marsupella funckii; LR-nt; K6 (H). Avg K: 1 (1).

Marsupella sphacelata; LC; K1 (H), K2 (H), K3 (H), K4 (N), K5 (H), K6 (H), K7 (N), K8 (H), K9 (H), K10 (H), K12 (H), K13 (H); L1 (H), L2 (H), L4 (H), L5 (H), L6 (H), L7 (H), L10 (H).

Avg K: 0.72 (7), Avg L: 0.58 (6).

Metzgeria furcata [L(+)]; LC; K3 (H), K9 (N), K12 (H), K14 (H); L4 (H), L6 (N). Avg K: 0.5 (2), Avg L: 0 (2).

Moerckia blyttii; VU; L10 (H). Avg L: 0 (1).

Moerckia hibernica [L+]; CR; L6 (H), L10 (H). Avg L: 0 (2).

Mylia taylorii; LC; K1 (H), K2 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (N), L6 (N), L7 (N). Avg K: 0.5 (2), Avg L: 0.93 (5).

Nardia geoscyphus [K(+)]; LC-att; K3 (H), K7 (H). Avg K: 0 (2).

Nardia scalaris; LC; K1 (N), K2 (H), K3 (H), K5 (H), K6 (N), K7 (N), K8 (H), K9 (N), K10 (H), K11 (N), K13 (H); L1 (N), L2 (N), L3 (H), L4 (H), L5 (H), L6 (N), L7 (N), L8 (N), L10 (N). Avg K: 0.97 (9), Avg L: 0.96 (6).

Pellia neesiana; LC; K2 (N), K3 (H), K5 (N), K7 (H), K8 (H), K10 (N), K11 (H); L1 (N), L3 (N), L4 (N), L5 (H), L6 (H), L7 (N), L8 (N), L9 (N), L10 (N). Avg K: 0.63 (4), Avg L: 1.41 (6).

Plagiochila asplenoides [L(+)]; LC; L2 (N), L6 (N), L9 (N). Avg L: 0 (3).

Plagiochila porelloides [L+]; LC; K3 (H), K5 (H), K6 (H), K7 (N), K8 (N), K11 (N), K12 (N), K14 (N); L3 (H), L4 (H), L5 (N), L6 (H), L7 (N), L8 (H), L10 (N). Avg K: 0.72 (6), Avg L: 0.25 (5).

Porella cordaeana [L+]; LR-nt; K3 (H), K11 (H), K12 (H); L4 (H). Avg K: 0 (3), Avg L: 0 (1).

Preissia quadrata; LC; K5 (N), K6 (H), K7 (H). Avg K: 0.75 (2).

Ptilidium ciliare; LC; K1 (N), K2 (H), K3 (H), K4 (N), K5 (H), K6 (N), K7 (N), K8 (N), K9 (N), K10 (N), K12 (N), K13 (N); L1 (N), L2 (N), L3 (N), L4 (N), L5 (N), L6 (N), L7 (N), L8 (N), L10 (H). Avg K: 0.77 (9), Avg L: 0.83 (6).

Ptilidium pulcherrimum; LC; K2 (H), K3 (H), K4 (N), K9 (N), K10 (N), K11 (N), K13 (N); L1 (N), L2 (N), L3 (N), L4 (H), L5 (N), L6 (N), L7 (N), L9 (N), L10 (H). Avg K: 0.5 (5), Avg L: 0.99 (7).

Radula lindenbergiana; VU; K3 (H), K5 (H), K6 (H), K7 (H), K11 (H); L4 (H), L6 (H). Avg K: 0.69 (5), Avg L: 0.38 (2).

Riccardia multifida; LC-att; L3 (N), L4 (H). Avg L: 1 (1).

Scapania aequiloba [K+]; LC-att; K5 (H), K6 (N). Avg K: 0 (2).

Scapania cuspiduligera; EN; K5 (H), K6 (H), K7 (H). Avg K: 0.53 (3).

Scapania gymnostomophila [K+]; EN; K7 (H). Avg K: 0 (1).

Scapania helvetica; CR; K6 (N-J. Váña), K7 (H). Avg K: 0.25 (2).

Scapania irrigua [K(+)]; LC; K2 (H), K3 (H), K5 (H), K6 (N), K7 (H), K10 (H), K11 (H); L1 (N), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L8 (H), L9 (H), L10 (H). Avg K: 0.9 (6), Avg L: 0.52 (7).

Scapania nemorea; LC; L1 (H), L2 (H), L5 (H). Avg L: 0 (3).

Scapania paludosa [K+]; VU; K13 (N-J. Váña); L6 (H). Avg K: 0 (1), Avg L: 0 (1).

Scapania praetervisa; VU; K1 (H), K5 (H), K6 (H), K7 (H). Avg K: 0.58 (3).

Scapania sp. [sect. *Curtae* (Müll. Frib.) H. Buch] [K(+)]; -: K1 (H), K3 (H), K10 (H). Avg K: 0.5 (2).

Scapania subalpina [L+]; LR-nt; K1 (H), K8 (H); L10 (H). Avg K: 0 (1), Avg L: 0 (1).

Scapania uliginosa; LC; K1 (H), K3 (N), K8 (N), K10 (H), K11 (H), K13 (H); L1 (H), L4 (N), L5 (H), L6 (H), L7 (N), L8 (N), L10 (H). Avg K: 0.83 (3), Avg L: 0.5 (5)

Scapania umbrosa [K(+)]; LC; K9 (N); L1 (H), L5 (H), L6 (N). Avg K: 1 (1), Avg L: 0.61 (3).

Scapania undulata; LC; K1 (H), K2 (H), K3 (H), K7 (N), K8 (H), K9 (N), K10 (H), K11 (H), K12 (H), K13 (H); L1 (H), L3 (H), L4 (H), L5 (H), L6 (H), L7 (N), L8 (N), L10 (N). Avg K: 0.86 (6), Avg L: 1.37 (5).

Tritomaria exsecta; LC-att; K5 (H). Avg K: 0 (1).

Tritomaria quinquedentata [L(+)]; LC; K5 (H), K6 (N), K7 (H); L2 (H), L4 (H). Avg K: 0.88 (2), Avg L: 0 (2)

Amblystegium radicale [++]; LC-att; L3 (H). Avg L: 0 (1).

Amblystegium serpens [K(+), L(+)]; LC; K1 (H), K12 (H); L2 (H). Avg K: 0 (1), Avg L: 0 (1).
Amphidium lapponicum [K+]; VU; K6 (H); L8 (H). Avg K: 0 (1), Avg L: 0 (1).
Amphidium mougeotii; LC; K5 (H), K6 (H), K7 (H), K8 (N), K11 (H); L4 (H), L7 (N), L8 (N).
 Avg K: 0.69 (3), Avg L: 0 (0).
Andreaea rothii subsp. *falcata* [K(+), L(+)]; LC; K3 (H), K4 (H), K6 (H), K8 (H), K9 (H), K10 (H); L4 (H), L5 (N), L6 (H), L7 (H), L8 (H). Avg K: 1.29 (4), Avg L: 0.75 (4).
Andreaea rupestris [L(+)]; LC; K1 (H), K2 (H), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (H), K11 (H), K12 (N), K13 (N); L1 (N), L2 (N), L3 (H), L4 (H), L5 (N), L6 (N), L7 (H), L8 (H), L10 (N). Avg K: 1.51 (11), Avg L: 1.6 (6).
Anomodon rugelii [K+, L+]; VU; K3 (H); L4 (H). Avg K: 0 (1), Avg L: 0.6 (1).
Atrichum tenellum [L+]; LC-att; L4 (H). Avg L: 1 (1).
Atrichum undulatum var. *undulatum* [K(+)]; LC; K6 (N); L4 (N), L5 (N), L6 (N), L7 (N), L9 (N), L10 (N). Avg K: 1 (1), Avg L: 0.5 (5).
Barbula unguiculata [K+, L+]; LC; K1 (H); L5 (H). Avg K: 0.67 (1), Avg L: 1 (1).
Bartramia halleriana; LC-att; K2 (H). Avg K: 0 (1).
Bartramia ithyphylla [L(+)]; LC; K5 (H), K6 (H), K7 (N); L3 (N), L4 (N), L7 (N), L8 (N). Avg K: 0.67 (3), Avg L: 0 (0).
Blindia acuta; LC; K1 (H), K3 (H), K5 (H), K6 (N), K7 (H), K8 (N), K9 (N), K10 (N), K11 (N), K13 (N); L1 (N), L3 (N), L4 (H), L5 (N), L8 (N), L9 (N). Avg K: 0.5 (6), Avg L: 0.67 (4).
Brachydontium trichodes [K(+)]; LC-att; K8 (H), K10 (H); L1 (N), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L10 (H). Avg K: 1 (1), Avg L: 0.33 (5).
Brachythecium albicans [L(+)]; LC; L9 (H). Avg L: 0.33 (1).
Brachythecium geheebii [L+]; EN; L4 (H). Avg L: 0 (1).
Brachythecium glareosum; LC; K6 (N), K9 (N). Avg K: 0 (2).
Brachythecium oedipodium [K+, L+]; LC-att; K1 (H), K2 (H), K3 (H); L1 (H), L2 (H), L4 (H), L5 (H), L6 (N), L8 (H). Avg K: 0 (2), Avg L: 0.69 (6).
Brachythecium plumosum; LC; K5 (H), K7 (H), K11 (N), K13 (H); L4 (N), L6 (N), L8 (H), L9 (H). Avg K: 0.67 (3), Avg L: 0.5 (2).
Brachythecium populeum [K(+)]; LC; K1 (H), K3 (H), K5 (H); L4 (H), L6 (H). Avg K: 0.5 (2), Avg L: 0 (2).
Brachythecium reflexum; LC; K1 (H), K2 (N), K3 (H), K4 (N), K5 (H), K6 (N), K7 (H), K9 (N), K10 (N), K11 (H), K12 (N), K13 (N), K14 (H); L1 (H), L2 (N), L3 (N), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L9 (H), L10 (N). Avg K: 1.19 (12), Avg L: 1.74 (7).
Brachythecium rivulare; LC; K1 (H), K3 (H), K5 (H), K6 (N), K7 (N), K11 (H); L1 (N), L3 (H), L4 (H), L5 (H), L6 (H), L7 (N), L8 (N), L9 (H), L10 (H). Avg K: 1.36 (3), Avg L: 0.84 (7).
Brachythecium salebrosum [L+]; LC; K1 (H), K5 (H), K12 (H); L4 (H), L5 (H), L6 (N), L8 (H), L9 (H). Avg K: 1 (2), Avg L: 0.2 (5).
Brachythecium starkei; LC-att; K1 (H), K2 (H), K3 (H), K5 (H), K7 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L8 (H). Avg K: 0.6 (4), Avg L: 0.5 (7).
Brachythecium velutinum [K(+)]; LC; K1 (H), K2 (N), K3 (H), K5 (N), K6 (N), K7 (N); L3 (N), L4 (N), L6 (N), L7 (H), L9 (H). Avg K: 0.2 (5), Avg L: 0 (4).
Bryoerythrophyllum ferruginascens [++]; VU; K1 (H). Avg K: 0 (1).
Bryoerythrophyllum recurvirostrum; LC; K1 (H), K5 (H), K6 (N), K7 (H). Avg K: 1.03 (3).
Bryum argenteum [K(+)]; LC; K1 (H). Avg K: 0 (1).
Bryum bimum; LC; K1 (H). Avg K: 0 (1).
Bryum caespiticium; LC; K1 (H), K8 (H). Avg K: 0 (1).
Bryum capillare [K(+), L(+)]; LC; K1 (N), K3 (H), K5 (H), K6 (H), K7 (H), K11 (H); L8 (N). Avg K: 0.08 (6), Avg L: 0 (0).
Bryum cirrhatum Hoppe & Hornsch. [K(+)]; -; K5 (H). Avg K: 0 (1).
Bryum creberrimum [K+, L+]; DD; K1 (H); L9 (H). Avg K: 0 (1), Avg L: 0 (1).
Bryum elegans [K(+)]; LC-att; K5 (H), K6 (N), K11 (H). Avg K: 0.67 (1).

Bryum laevifilum [K+, L+]; LC; K1 (H), K7 (H); L1 (H), L3 (H), L4 (H). Avg K: 0 (1), Avg L: 0 (3).

Bryum muehlenbeckii [K+]; LC-att; K7 (H), K8 (H), K9 (H), K10 (H); L9 (H). Avg K: 0.89 (3), Avg L: 0 (1).

Bryum pallens; LC; K3 (H), K5 (N), K7 (N); L2 (N), L5 (H), L6 (N), L9 (N), L10 (N). Avg K: 0.75 (2), Avg L: 0.5 (4).

Bryum pallescens [L+]; LC; K1 (H), K5 (H), K7 (H); L4 (H), L10 (H). Avg K: 0.88 (2), Avg L: 0 (2).

Bryum pseudotriquetrum; LC; K1 (H), K3 (H), K5 (H), K6 (N), K7 (H), K11 (H); L1 (N), L3 (N), L4 (N), L5 (H), L6 (N), L8 (H), L9 (H), L10 (N). Avg K: 0.88 (5), Avg L: 1.17 (6).

Bryum stirtonii [(++)]; NE; K1 (H), K7 (H). Avg K: 0.5 (1).

Bryum turbinatum [K(+)]; EN; K1 (H). Avg K: 0 (1).

Bryum weigelii [K(+)]; LC-att; K3 (H), K5 (H), K7 (H); L4 (H), L6 (H), L9 (H), L10 (H). Avg K: 0 (2), Avg L: 0.58 (4).

Calliergon cordifolium [L+]; LC; L5 (N), L6 (H), L9 (H). Avg L: 0.72 (3).

Calliergonella cuspidata [L+]; LC; L9 (H). Avg L: 0 (1).

Campylium protensum; LC; K3 (H), K5 (H), K6 (N), K7 (H), K11 (H). Avg K: 1.07 (5).

Campylium stellatum; LR-nt; K5 (N), K11 (H). Avg K: 0 (0).

Campylophyllum halleri; VU; K7 (H). Avg K: 0 (1).

Campylophyllum sommerfeltii [K+, L+]; EN; K12 (H), K14 (H); L4 (H), L5 (H). Avg K: 1 (2), Avg L: 0 (2).

Campylopus flexuosus [L+]; LC; L6 (H). Avg L: 0 (1).

Ceratodon purpureus [K(+)]; LC; K1 (H), K2 (H), K6 (N), K8 (H), K11 (H), K12 (N), K13 (N); L1 (N), L2 (N), L4 (H), L5 (H), L6 (N), L7 (N), L8 (N), L9 (H), L10 (H). Avg K: 0.17 (6), Avg L: 0.45 (7).

Cirriphyllum piliferum [K+, L+]; LC; K5 (H), K6 (N); L4 (N), L6 (H). Avg K: 0 (1), Avg L: 0.5 (2).

Cratoneuron filicinum; LC; K1 (H). Avg K: 0 (1).

Ctenidium molluscum; LC; K3 (H), K5 (H), K6 (N), K7 (H), K11 (H); L4 (H). Avg K: 0.78 (3), Avg L: 1 (1).

Cynodontium gracilescens [??+]; VU; L4 (H). Avg L: 0.5 (1).

Cynodontium polycarpon; LC; K1 (N), K2 (N), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (N), K11 (N), K12 (N), K13 (N); L1 (N), L2 (N), L3 (H), L4 (H), L5 (H), L6 (N), L7 (N), L8 (H), L9 (N), L10 (N). Avg K: 1.31 (10), Avg L: 0.56 (7).

Cynodontium strumiferum; LC; K3 (H), K5 (H), K6 (H), K9 (N); L4 (H), L5 (H), L6 (H), L7 (N). Avg K: 0.13 (4), Avg L: 0 (3).

Dichodontium palustre; LC; K3 (N), K5 (H), K6 (N), K7 (H), K11 (N); L1 (N), L4 (H), L5 (N), L6 (N), L8 (N), L9 (H), L10 (H). Avg K: 0.71 (4), Avg L: 0.64 (6).

Dichodontium pellucidum [L+]; LC; K3 (H), K6 (N), K7 (H); L4 (H), L9 (H), L10 (H). Avg K: 0.5 (3), Avg L: 0.33 (3).

Dicranella cerviculata [K(+), L(+)]; LC; K1 (H), K2 (N), K5 (H), K6 (N), K7 (N), K8 (H), K9 (N), K10 (N), K11 (N); L1 (N), L2 (N), L3 (N), L4 (N), L5 (H), L6 (N), L7 (N), L9 (N), L10 (N). Avg K: 0.93 (5), Avg L: 0.68 (7).

Dicranella heteromalla; LC; K1 (N), K2 (N), K3 (H), K4 (N), K5 (H), K6 (N), K7 (H), K9 (N), K10 (N), K11 (N), K13 (H), K14 (N); L1 (N), L2 (N), L3 (N), L4 (H), L5 (H), L6 (N), L7 (H), L8 (H), L9 (N), L10 (N). Avg K: 0.7 (8), Avg L: 0.75 (7).

Dicranella subulata; EN; K7 (H); L2 (H). Avg K: 0 (1), Avg L: 0 (1).

Dicranella varia [K+, L+]; LC; K1 (H); L5 (H). Avg K: 0 (1), Avg L: 0 (1).

Dicranodontium denudatum; LC; K1 (N), K2 (N), K3 (H), K4 (N), K6 (H), K7 (N), K8 (H), K9 (H), K10 (N), K11 (N), K12 (N), K13 (H); L1 (H), L2 (H), L3 (N), L4 (H), L5 (H), L6 (H), L7 (H), L8 (N), L9 (H), L10 (N). Avg K: 0.61 (9), Avg L: 1.32 (7).

Dicranodontium uncinatum [L+]; EN; L2 (H). Avg L: 0 (1).

Dicranoweisia crispula; LC; K1 (N), K3 (H), K5 (H), K6 (H), K7 (H), K9 (N), K11 (H); L1 (H), L3 (N), L4 (N), L5 (N), L8 (N), L9 (N), L10 (N). Avg K: 0.89 (7), Avg L: 0.6 (5).

Dicranum flexicaule [L(+)]; LC; K1 (H), K2 (H), K3 (H), K4 (H), K5 (H), K7 (N), K9 (H), K10 (H), K11 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L9 (H). Avg K: 0.44 (9), Avg L: 0.78 (7).

Dicranum fuscescens; LC; K11 (H); L2 (H), L6 (H). Avg K: 0.5 (1), Avg L: 0 (2).

Dicranum majus [K+, L+]; EN; K1 (H), K2 (H), K5 (H), K7 (H); L1 (H), L2 (H), L3 (H), L5 (H). Avg K: 0.33 (3), Avg L: 0.25 (4).

Dicranum montanum; LC; K2 (N), K3 (H), K4 (N), K6 (N), K8 (H), K9 (N), K10 (N), K11 (H), K12 (N), K13 (N), K14 (H); L1 (N), L2 (N), L3 (N), L4 (H), L5 (H), L6 (N), L7 (N), L9 (N), L10 (N). Avg K: 1.1 (8), Avg L: 1.17 (7).

Dicranum scoparium; LC; K1 (H), K2 (H), K3 (H), K4 (H), K5 (H), K6 (H), K7 (H), K8 (H), K9 (N), K10 (H), K11 (H), K12 (N), K13 (N), K14 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (N), L9 (H), L10 (H). Avg K: 1.44 (11), Avg L: 1.63 (7).

Dicranum tauricum [L+]; LC; L4 (H), L6 (H). Avg L: 0.33 (2).

Didymodon fallax [K+]; LC; K1 (H); L5 (H). Avg K: 0 (1), Avg L: 1 (1).

Didymodon rigidulus var. *rigidulus* [K+]; LC; K1 (H). Avg K: 0.5 (1).

Diphyscium foliosum [L(+)]; LC-att; K6 (H); L3 (H), L4 (H). Avg K: 1 (1), Avg L: 0 (1).

Distichium capillaceum; LC; K1 (H), K5 (H), K6 (H), K7 (H). Avg K: 1.25 (2).

Distichium inclinatum; VU; K5 (H), K6 (H), K7 (H). Avg K: 0.67 (3).

Ditrichum flexicaule; LC-att; K5 (H). Avg K: 1 (1).

Ditrichum gracile [K+]; LC; K5 (H), K6 (H), K7 (H). Avg K: 0 (3).

Ditrichum heteromallum [K(+), L(+)]; LC; K1 (H), K3 (N), K7 (H), K8 (H), K9 (N), K10 (H); L1 (N), L2 (H), L3 (H), L4 (N), L6 (H), L7 (H), L8 (N), L10 (H). Avg K: 0.8 (5), Avg L: 0.56 (6).

Ditrichum lineare [K+, L+]; LC-att; K1 (H), K5 (H), K8 (H); L3 (H), L4 (H). Avg K: 0.33 (3), Avg L: 0 (2).

Ditrichum pusillum [K+]; LC-att; K1 (H), K7 (H). Avg K: 0 (2).

Ditrichum zonatum [K+]; EN; K7 (H), K8 (H). Avg K: 0 (2).

Encalypta streptocarpa [K(+), L+]; LC; K1 (H), K7 (N); L5 (H). Avg K: 0.5 (2), Avg L: 0 (1).

Encalypta trachymitria [++]; DD; K6 (H). Avg K: 0 (1).

Fissidens dubius var. *dubius* [K(+)]; LC; K5 (N), K6 (H), K7 (H). Avg K: 0.38 (2).

Fissidens gymnanthus [K+]; LC-att; K5 (H). Avg K: 0 (1).

Fissidens osmundoides; LC-att; K5 (H), K6 (H), K7 (H), K11 (H). Avg K: 1.13 (4).

Funaria hygrometrica [L(+)]; LC; L10 (H). Avg L: 0 (1).

Grimmia anodon [++]; EN; K1 (H). Avg K: 0 (1).

Grimmia anomala; VU; K7 (H). Avg K: 0 (1).

Grimmia donniana [L(+)]; LC; K1 (H), K3 (H), K4 (N), K5 (N), K6 (H), K7 (H), K8 (N), K11 (N); L3 (N), L5 (N), L7 (H), L8 (N). Avg K: 1.29 (4), Avg L: 1 (1).

Grimmia elongata [L+]; LR-nt; K3 (H), K6 (H), K7 (H), K8 (H), K9 (H); L4 (H), L8 (H). Avg K: 1.4 (5), Avg L: 0.25 (2).

Grimmia funalis; LC-att; K5 (H), K6 (H), K7 (H), K11 (H); L4 (H), L7 (N). Avg K: 0.95 (4), Avg L: 0 (1).

Grimmia hartmanii; LC; K1 (H), K2 (N), K3 (H), K5 (H), K7 (N), K11 (H), K12 (N); L1 (H), L3 (H), L4 (H), L5 (N), L6 (N), L8 (H). Avg K: 0.5 (6), Avg L: 0.73 (5).

Grimmia incurva [L(+)]; LC; K1 (H), K3 (H), K4 (H), K5 (H), K6 (H), K7 (N), K9 (N), K11 (N); L1 (H), L4 (N), L5 (N), L7 (N). Avg K: 0.94 (6), Avg L: 0.67 (3).

Grimmia pulvinata [K+]; LC; K1 (H). Avg K: 0 (1).

Grimmia ramondii; LC-att; K1 (H), K2 (H), K3 (H), K4 (H), K5 (H), K6 (H), K7 (H), K9 (N), K11 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L8 (H), L10 (H). Avg K: 1.15 (8), Avg L: 0.56 (6).

Grimmia sessitana [K+, L+]; VU; K8 (H), K10 (H), K11 (H), K12 (H); L8 (H). Avg K: 0.33 (3), Avg L: 1 (1).

Grimmia torquata [L+]; VU; K7 (H); L8 (H). Avg K: 0 (1), Avg L: 0 (1).

Gymnostomum aeruginosum; LC; K5 (H), K6 (H), K7 (H). Avg K: 1 (2).

Hedwigia ciliata [L+]; LC; L4 (H). Avg L: 0 (0).

Herzogiella seligeri [K+]; LC; K14 (H); L5 (H). Avg K: 0 (1), Avg L: 0 (1).

Herzogiella striatella; LR-nt; K2 (H), K3 (H), K5 (H), K6 (H), K9 (H), K10 (H), K11 (H); L1 (H), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L9 (N). Avg K: 1 (7), Avg L: 1.08 (5).

Heterocladium heteropterum; LC; K2 (N), K3 (H), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (H), K12 (H), K13 (N); L1 (N), L3 (N), L4 (H), L5 (N), L6 (H), L7 (H), L8 (N), L10 (N). Avg K: 0.49 (7), Avg L: 0.51 (5).

Homalothecium lutescens [K+]; LC; K1 (H). Avg K: 0 (1).

Homalothecium sericeum; LC; K1 (H). Avg K: 0 (1).

Hygrohypnum molle; LR-nt; L8 (H). Avg L: 0 (1).

Hygrohypnum ochraceum; LC; K8 (H), K11 (H); L3 (H), L4 (H), L6 (H), L8 (N), L9 (H), L10 (H). Avg K: 0.5 (2), Avg L: 1.38 (4).

Hylocomium pyrenaicum; VU; K1 (H), K5 (H), K6 (N), K7 (H). Avg K: 0.33 (3).

Hylocomium splendens [L+]; LC; K1 (N), K3 (N), K4 (N), K5 (N), K6 (N), K7 (N); L1 (H), L2 (N), L3 (N), L4 (H), L5 (N), L6 (N). Avg K: 0.53 (5), Avg L: 1.13 (5).

Hylocomium umbratum; LC-att; L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H). Avg L: 0.4 (6).

Hymenostylium recurvirostrum; LR-nt; K5 (H). Avg K: 0 (1).

Hypnum andoi [L+]; LC; L6 (H). Avg L: 0 (1).

Hypnum callichroum; EN; K11 (H); L1 (H), L3 (H), L4 (H), L6 (H). Avg K: 0 (1), Avg L: 0.42 (4).

Hypnum cupressiforme var. *cupressiforme*; LC; K3 (H), K5 (H), K6 (N), K9 (N), K13 (N); L4 (H), L6 (N). Avg K: 0.17 (5), Avg L: 1 (2).

Hypnum cupressiforme var. *subjulaceum* [++]; DD; K7 (H). Avg K: 1 (1).

Hypnum pallescens; LC-att; K2 (H), K12 (H), K14 (H); L4 (H), L5 (H). Avg K: 0.5 (3), Avg L: 0.5 (2).

Isopterygiopsis muelleriana [++]; CR; L6 (H). Avg L: 0 (1).

Isothecium alopecuroides; LC; K6 (N), K7 (H), K12 (N); L4 (N), L5 (N), L6 (H), L7 (H). Avg K: 0.17 (3), Avg L: 0 (3).

Kiaeria blyttii; LC; K1 (H), K2 (H), K3 (H), K4 (N), K5 (H), K6 (N), K7 (H), K8 (H), K9 (H), K10 (H), K11 (H), K12 (H); L1 (H), L2 (H), L3 (N), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L10 (H). Avg K: 1.28 (10), Avg L: 1.07 (6).

Kiaeria falcata; CR; L5 (H). Avg L: 0 (1).

Kiaeria starkei; LC; K1 (H), K3 (N), K7 (H), K8 (H), K11 (H); L1 (H), L5 (H), L6 (H), L8 (H). Avg K: 0.5 (4), Avg L: 0.19 (4).

Lescuraea incurvata; LC; K1 (N), K3 (H), K5 (H), K6 (N), K7 (H), K9 (N), K11 (H), K12 (H); L3 (H), L4 (H), L6 (H), L8 (H), L9 (H), L10 (N). Avg K: 0.96 (8), Avg L: 1.31 (5).

Lescuraea mutabilis; EN; K12 (H), K14 (H); L4 (H), L5 (H). Avg K: 0.63 (2), Avg L: 0.25 (2).

Lescuraea patens [++]; CR; K3 (H), K5 (H), K11 (H); L4 (H). Avg K: 0.56 (3), Avg L: 0.78 (1).

Meesia uliginosa; CR; K5 (H). Avg K: 0 (1).

Mnium ambiguum [K+, L+]; VU; K3 (H), K5 (H), K6 (H), K7 (H); L4 (H). Avg K: 0.88 (4), Avg L: 0 (1).

Mnium hornum; LC; K2 (H), K3 (N), K6 (N), K9 (N), K11 (H); L1 (H), L2 (N), L5 (N), L6 (H), L7 (H), L8 (N). Avg K: 0.3 (5), Avg L: 0.8 (5).

Mnium marginatum [K+]; LC; K6 (N-J. Váña). Avg K: 1 (1).

Mnium spinosum; LC; K5 (H), K6 (N), K7 (H), K11 (H). Avg K: 1.02 (3).

Mnium stellare [K+]; LC; K5 (H), K6 (H), K7 (N). Avg K: 0.44 (3).

Mnium thomsonii; CR; K5 (H), K7 (H). Avg K: 0.25 (2).

Myurella julacea; EN; K5 (H), K6 (H), K7 (H). Avg K: 0.87 (3).

Oligotrichum hercynicum; LC; K1 (H), K3 (H), K5 (N), K6 (N), K7 (N), K9 (N), K10 (N), K11 (N); L1 (N), L2 (N), L3 (N), L4 (N), L5 (N), L6 (N), L8 (N), L9 (N), L10 (N). Avg K: 0.81 (5), Avg L: 0.8 (7).

Orthothecium intricatum; LC; K5 (H), K6 (H), K7 (H). Avg K: 0.67 (2).

Orthotrichum anomalum [K+]; LC; K1 (N). Avg K: 0 (1).

Orthotrichum pallens [K+, L+]; LC; K1 (H); L4 (H), L6 (H), L7 (H). Avg K: 0 (1), Avg L: 0 (3).

Palustriella commutata [L+]; LC; K3 (H), K5 (H); L4 (H). Avg K: 1 (2), Avg L: 0 (1).

Palustriella decipiens; LR-nt; K3 (H), K5 (H), K7 (H). Avg K: 0.47 (3).

Palustriella falcata [L+]; LC; K3 (H), K5 (H), K6 (N), K7 (N), K11 (H); L3 (N). Avg K: 0.7 (5), Avg L: 0 (0).

Paraleucobryum longifolium; LC; K1 (H), K2 (H), K3 (H), K5 (H), K6 (H), K9 (H), K11 (N), K12 (H), K13 (N); L1 (N), L3 (N), L4 (H), L5 (H), L6 (H), L7 (N), L8 (N), L9 (N), L10 (H). Avg K: 0.95 (7), Avg L: 1 (6).

Philonotis fontana; LC; K1 (H), K3 (H), K5 (H), K6 (N), K7 (N), K8 (H), K10 (H), K11 (N); L3 (N), L4 (H), L6 (N), L8 (H), L9 (H). Avg K: 0.54 (4), Avg L: 0.89 (3).

Philonotis seriata; LC; K3 (H), K5 (H), K7 (H), K8 (H), K13 (N); L3 (N), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L9 (H), L10 (H). Avg K: 0.77 (5), Avg L: 1.21 (5).

Philonotis tomentella [K+]; VU; K1 (H), K5 (H). Avg K: 1 (1).

Plagiobryum zierii [L(+)]; VU; K6 (H), K7 (H); L4 (H). Avg K: 0.88 (2), Avg L: 0 (0).

Plagiomnium affine; LC; K1 (N), K2 (N), K3 (H), K5 (H), K6 (N), K7 (H), K8 (H), K9 (N), K11 (H), K13 (N); L1 (H), L2 (N), L3 (H), L4 (H), L5 (N), L6 (H), L8 (N), L9 (N). Avg K: 0.81 (9), Avg L: 0.61 (6).

Plagiomnium ellipticum [++]; LC-att; L5 (H). Avg L: 0 (1).

Plagiomnium medium [K+]; LR-nt; K3 (H), K5 (H), K6 (N); L4 (H), L8 (H), L9 (H), L10 (H). Avg K: 0 (3), Avg L: 0.17 (3).

Plagiomnium undulatum; LC; K6 (N). Avg K: 0 (1).

Plagiothecium cavifolium; LC; K5 (H), K7 (H), K14 (H); L4 (H), L9 (H), L10 (N). Avg K: 0.22 (3), Avg L: 0 (3).

Plagiothecium curvifolium; LC; K1 (N), K2 (H), K3 (H), K9 (H), K11 (N), K12 (N), K13 (H), K14 (N); L1 (N), L2 (N), L3 (N), L4 (N), L5 (H), L6 (N), L7 (H), L8 (N), L9 (N). Avg K: 0.05 (7), Avg L: 1.04 (7).

Plagiothecium denticulatum var. *denticulatum*; LC; K1 (N), K2 (H), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (H), K11 (H), K12 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L9 (N). Avg K: 0.8 (11), Avg L: 1.15 (6).

Plagiothecium denticulatum var. *obtusifolium* [K+, L+]; VU; K8 (H); L2 (H), L5 (H), L8 (H), L10 (H). Avg K: 1 (1), Avg L: 0.5 (4).

Plagiothecium laetum [K+]; LC; K2 (N), K3 (H), K4 (N), K6 (N), K9 (H), K10 (N), K11 (H), K12 (N), K13 (N); L1 (N), L2 (N), L3 (N), L4 (H), L5 (N), L6 (N), L7 (N), L8 (N), L9 (H), L10 (N). Avg K: 0.78 (8), Avg L: 0.81 (7).

Plagiothecium platyphyllum [L+]; LC-att; L3 (H), L6 (N), L8 (H), L10 (H). Avg L: 0 (2).

Plagiothecium succulentum [K+]; LC; K9 (H). Avg K: 0 (1).

Plagiothecium undulatum [K(+)]; LC; K2 (N); L1 (H), L2 (N), L5 (H), L6 (N), L7 (N). Avg K: 1 (1), Avg L: 1.38 (4).

Platyhypnidium riparioides [L(+)]; LC; L4 (H), L8 (N). Avg L: 0 (1).

Pleurozium schreberi; LC; K1 (N), K2 (N), K3 (N), K4 (N), K5 (N), K6 (N), K7 (N), K9 (N), K10 (N), K11 (N), K13 (N); L1 (N), L2 (N), L3 (N), L4 (N), L5 (N), L6 (H), L7 (N), L9 (N), L10 (N). Avg K: 0.79 (8), Avg L: 1.01 (7).

Pogonatum aloides [K(+)]; LC; K6 (H). Avg K: 0 (1).

Pogonatum urnigerum; LC; K1 (N), K3 (H), K5 (N), K6 (H), K7 (N), K8 (H), K9 (N), K10 (N), K11 (N); L1 (N), L3 (N), L4 (N), L5 (N), L6 (N), L7 (N), L8 (N), L9 (H), L10 (N). Avg K: 0.75

- (6), Avg L: 0.74 (6).
- Pohlia cruda* [L(+)]; LC; K5 (H), K6 (H), K7 (H), K8 (N), K11 (N); L7 (N). Avg K: 0.89 (3), Avg L: 0 (0).
- Pohlia drummondii* [L+]; LC; K5 (H), K7 (H), K11 (H); L10 (H). Avg K: 0.11 (3), Avg L: 0.5 (1).
- Pohlia elongata*; LR-nt; K5 (H), K6 (H); L5 (H). Avg K: 0.33 (2), Avg L: 0 (1).
- Pohlia ludwigii* [L+]; VU; K1 (H), K7 (H), K8 (H), K11 (H); L5 (H). Avg K: 0.5 (2), Avg L: 0 (1).
- Pohlia nutans* subsp. *nutans*; LC; K1 (H), K2 (N), K3 (N), K4 (N), K5 (H), K6 (H), K7 (N), K8 (H), K9 (N), K10 (N), K11 (H), K12 (N), K13 (H), K14 (H); L1 (H), L2 (N), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (N), L9 (H), L10 (N). Avg K: 1.63 (11), Avg L: 1.66 (7).
- Pohlia nutans* subsp. *schimperi* [+++]; LR-nt; K2 (H), K4 (H), K5 (H), K6 (H), K7 (H), K9 (H), K10 (H); L3 (H), L5 (H), L8 (H). Avg K: 0.36 (7), Avg L: 0 (3).
- Pohlia wahlenbergii* var. *glacialis* (Brid.) Warb. [K+, L+]; -; K5 (H), K7 (H), K8 (H); L6 (N), L9 (H). Avg K: 0.75 (2), Avg L: 0.63 (4).
- Pohlia wahlenbergii* var. *wahlenbergii*; LC; K1 (H), K3 (H), K7 (N); L5 (H), L6 (N), L8 (N), L9 (H), L10 (N). Avg K: 0.33 (3), Avg L: 0.5 (2).
- Polytrichastrum alpinum*; LC; K1 (H), K2 (H), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K9 (N), K11 (N), K13 (N); L1 (N), L2 (N), L3 (H), L4 (H), L5 (N), L6 (H), L7 (N), L8 (N), L9 (H), L10 (N). Avg K: 1.13 (9), Avg L: 1.41 (7).
- Polytrichastrum formosum*; LC; K1 (H), K2 (N), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (H), K11 (H), K12 (N), K13 (H), K14 (N); L1 (H), L2 (N), L3 (N), L4 (H), L5 (N), L6 (H), L7 (H), L8 (H), L9 (H), L10 (N). Avg K: 1.01 (13), Avg L: 1.46 (7).
- Polytrichastrum longisetum*; LC; K3 (H), K5 (H), K8 (H), K10 (H), K11 (H), K13 (H); L1 (H), L4 (H), L5 (H), L7 (H), L8 (H). Avg K: 0.33 (6), Avg L: 0 (4).
- Polytrichum commune*; LC; K1 (N), K2 (N), K3 (N), K4 (N), K6 (N), K7 (H), K8 (N), K9 (N), K10 (H), K11 (N), K12 (N), K13 (N); L1 (H), L2 (N), L3 (N), L4 (N), L5 (H), L6 (H), L7 (N), L8 (N), L9 (N), L10 (H). Avg K: 1.19 (9), Avg L: 1.54 (7).
- Polytrichum juniperinum*; LC; K1 (H), K2 (H), K3 (H), K4 (N), K5 (N), K6 (N), K7 (N), K8 (H), K9 (N), K11 (N), K13 (N); L1 (N), L2 (N), L3 (N), L4 (H), L5 (N), L6 (N), L7 (N), L8 (H), L9 (N), L10 (N). Avg K: 0.81 (9), Avg L: 0.91 (7).
- Polytrichum perigoniale* [K(+)]; LC; K1 (H), K10 (H); L5 (H). Avg K: 0 (1), Avg L: 0 (1).
- Polytrichum piliferum*; LC; K1 (H), K2 (N), K3 (H), K4 (N), K5 (H), K6 (N), K7 (N), K8 (H), K9 (N), K10 (N), K11 (N); L1 (N), L2 (N), L3 (N), L4 (H), L5 (N), L6 (N), L7 (N), L8 (N), L9 (H), L10 (N). Avg K: 1.42 (9), Avg L: 0.75 (7).
- Polytrichum strictum*; LC; K1 (H), K2 (N), K3 (H), K5 (H), K9 (N), K10 (N), K11 (N), K13 (H); L1 (N), L4 (N), L5 (N), L6 (N), L10 (N). Avg K: 1.19 (6), Avg L: 0.2 (5).
- Pseudobryum cinclidioides* [L+]; EN; L3 (H), L9 (H). Avg L: 0.25 (2).
- Pseudoleskeella catenulata*; LC; K5 (H). Avg K: 0 (1).
- Pseudoleskeella nervosa* [L(+)]; LC; K1 (H), K10 (H), K11 (H), K12 (N), K14 (N); L4 (H). Avg K: 0.44 (4), Avg L: 0 (1).
- Pseudoleskeella rupestris*; VU; K5 (H), K6 (H), K7 (H). Avg K: 0.83 (3).
- Pseudotaxiphyllum elegans* [K(+)]; LC; K1 (N), K2 (N), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (N), K10 (N), K12 (N), K13 (N); L1 (N), L2 (N), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L10 (N). Avg K: 0.84 (11), Avg L: 0.96 (6).
- Pterigynandrum filiforme*; LC; K14 (H). Avg K: 0 (1).
- Ptychodium plicatum*; EN; K7 (H). Avg K: 0 (1).
- Racomitrium aciculare*; LC; K3 (N), K5 (H), K6 (N), K7 (N), K8 (H), K9 (N), K11 (N), K12 (N), K13 (H); L1 (N), L2 (N), L3 (N), L4 (H), L5 (H), L6 (N), L7 (N), L8 (H), L9 (H), L10 (N). Avg K: 0.65 (7), Avg L: 0.76 (7).
- Racomitrium aquaticum*; LC; K2 (H), K3 (N), K4 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (N), K10 (N), K11 (H), K13 (H); L1 (H), L2 (N), L3 (H), L4 (H), L5 (H), L6 (H), L7 (N), L8 (H), L9 (N), L10 (N). Avg K: 0.95 (8), Avg L: 0.95 (7).

Racomitrium canescens subsp. *canescens*; LC; L9 (H). Avg L: 0 (1).

Racomitrium elongatum [L+]; LC; K1 (H), K2 (H), K3 (H), K5 (H), K6 (N), K8 (H), K9 (N), K13 (H); L1 (H), L3 (N), L4 (H), L5 (N), L9 (H). Avg K: 0.63 (7), Avg L: 0 (4).

Racomitrium fasciculare; LC; K1 (N), K2 (H), K3 (N), K4 (N), K5 (H), K6 (H), K7 (N), K8 (N), K9 (N); L1 (N), L2 (N), L3 (N), L4 (H), L5 (H), L6 (H), L8 (H), L9 (H), L10 (N). Avg K: 0.85 (8), Avg L: 0.84 (7).

Racomitrium lanuginosum; LC; K2 (H), K3 (H), K4 (N), K5 (H), K6 (N), K7 (N), K8 (N), K9 (N), K11 (N); L1 (N), L2 (N), L3 (N), L4 (N), L5 (N), L6 (N), L7 (N), L8 (N). Avg K: 1.22 (6), Avg L: 0.9 (5).

Racomitrium macounii subsp. *alpinum* [L+]; LC; K3 (N), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (N); L1 (H), L5 (N), L6 (N), L10 (H). Avg K: 0.82 (5), Avg L: 0.25 (4).

Racomitrium microcarpon [L(+)]; LC; K1 (H), K5 (H), K8 (N), K10 (N), K11 (H); L3 (N), L4 (H), L7 (N), L8 (N). Avg K: 0.5 (2), Avg L: 0.5 (1).

Racomitrium sudeticum; LC; K1 (H), K2 (H), K3 (H), K4 (H), K5 (H), K6 (H), K7 (H), K8 (H), K9 (H), K10 (H), K11 (H), K13 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L7 (H), L8 (H), L9 (H), L10 (H). Avg K: 1.89 (9), Avg L: 1.72 (7).

Racomitrium sudeticum fo. *kindbergii* Frisvoll [K+, L+]; -; K12 (H); L9 (H), L10 (H). Avg K: 0 (1), Avg L: 0 (2).

Rhabdoweisia crispata; LC-att; L4 (H), L8 (H). Avg L: 0 (2).

Rhabdoweisia fugax; LC; K2 (N), K3 (H), K4 (N), K5 (H), K6 (H), K7 (H), K8 (N), K9 (N), K10 (H), K12 (H), K13 (N); L3 (H), L4 (N), L7 (H), L8 (N). Avg K: 0.8 (7), Avg L: 1 (1).

Rhizomnium magnifolium; LC-att; K5 (H), K6 (N), K7 (N), K11 (H); L1 (N), L3 (N), L4 (H), L5 (H), L6 (N), L9 (H). Avg K: 0.75 (4), Avg L: 0.4 (5).

Rhizomnium punctatum; LC; K1 (N), K2 (N), K3 (H), K5 (H), K6 (N), K7 (N), K8 (N), K11 (N), K12 (N); L1 (N), L2 (N), L3 (N), L4 (H), L5 (N), L6 (N), L7 (N), L8 (N), L9 (H), L10 (N). Avg K: 0.31 (6), Avg L: 0.81 (7).

Rhodobryum roseum; LC; K2 (N), K5 (H), K6 (N), K7 (N), K13 (N); L1 (N), L2 (N), L3 (H), L4 (H), L5 (N), L6 (N). Avg K: 0.38 (4), Avg L: 0.68 (5).

Rhynchostegium murale [K(+)]; LC; K1 (H), K5 (H); L5 (H), L10 (H). Avg K: 0 (1), Avg L: 0 (2).

Rhytidiadelphus loreus [K(+)]; LC; K2 (H), K4 (N), K5 (H), K7 (N); L1 (N), L2 (N), L3 (N), L4 (N), L5 (N), L6 (H), L7 (H), L8 (N). Avg K: 0.5 (4), Avg L: 0.9 (5).

Rhytidiadelphus squarrosus; LC; K1 (H), K5 (N), K7 (H), K9 (N), K11 (N); L3 (N), L4 (N), L5 (H), L8 (N), L9 (N), L10 (N). Avg K: 0.33 (3), Avg L: 0.17 (4).

Rhytidiadelphus subpinnatus [K(+)]; LC-att; K1 (H), K3 (N), K5 (H), K6 (N), K7 (H); L1 (H), L2 (H), L3 (H), L4 (H), L5 (H), L6 (H), L9 (H). Avg K: 0.5 (4), Avg L: 0.91 (6).

Rhytidiadelphus triquetrus [L+]; LC; K5 (N), K6 (N), K7 (N); L4 (N), L5 (H). Avg K: 0.25 (2), Avg L: 0 (2).

Saelania glaucescens; EN; K7 (H). Avg K: 0 (1).

Sanionia uncinata; LC; K1 (H), K2 (N), K3 (H), K5 (H), K6 (H), K7 (N), K9 (N), K10 (H), K11 (N), K12 (H), K13 (N), K14 (H); L1 (H), L2 (N), L3 (N), L4 (H), L5 (N), L6 (H), L7 (N), L8 (N), L9 (H), L10 (N). Avg K: 1.03 (9), Avg L: 1.36 (7).

Schistidium apocarpum [K(+), L(+)]; LC; K1 (H); L10 (H). Avg K: 0 (2).

Schistidium crassipilum [K+]; LC; K1 (H). Avg K: 0 (1), Avg L: 0 (1).

Schistidium dupretii [L+]; LC; K1 (H), K5 (H), K6 (H), K7 (H), K11 (H); L8 (N), L10 (H). Avg K: 1 (1).

Schistidium papillosum; LC; K3 (N), K5 (H), K6 (H), K7 (H), K11 (N). Avg K: 0.88 (4), Avg L: 0 (1).

Schistidium pruinatum [++]; DD; L4 (H). Avg K: 0 (3).

Schistidium rivulare [L(+)]; LR-nt; L4 (H), L5 (H). Avg L: 0 (1).

Schistidium robustum [K+]; LC; K1 (H), K6 (N). Avg L: 0 (2).

Schistostega pennata [L(+)]; LC; L7 (H). Avg K: 0 (1).

Seligeria donniana [K+]; LC; K5 (H), K6 (H). Avg L: 0 (0).

Sphagnum brevifolium [L+]; LC; L1 (H). Avg L: 0 (1).

Sphagnum capillifolium [K(+)]; LC; K1 (H), K2 (H), K3 (N), K4 (N), K5 (H), K6 (H), K9 (N), K10 (H); L4 (H), L6 (H). Avg K: 0.35 (8), Avg L: 0.71 (2).

Sphagnum centrale [K+, L+]; LC-att; K10 (H); L5 (H), L10 (H). Avg K: 0 (1), Avg L: 0.25 (2).

Sphagnum compactum; LC; K3 (N), K9 (H), K10 (H), K11 (N); L3 (N), L6 (N). Avg K: 1 (2), Avg L: 0 (1).

Sphagnum cuspidatum; LC; K13 (H); L5 (H). Avg K: 0.5 (1), Avg L: 0 (1).

Sphagnum denticulatum; LC; K2 (H), K3 (N), K6 (N), K8 (N), K9 (N), K10 (H), K11 (H), K12 (H), K13 (H); L1 (H), L2 (N), L3 (N), L4 (N), L5 (H), L6 (N), L7 (H), L8 (N), L10 (H). Avg K: 1.15 (5), Avg L: 1.03 (6).

Sphagnum fallax; LC; K2 (H), K3 (N), K8 (N), K9 (H), K10 (H), K13 (H); L1 (H), L2 (N), L3 (N), L5 (H), L6 (H), L7 (H), L8 (N), L10 (H). Avg K: 1.1 (5), Avg L: 1.35 (5).

Sphagnum fimbriatum [L+]; LC; L5 (N). Avg L: 0 (1).

Sphagnum flexuosum; LC; L1 (H), L3 (H), L5 (H), L7 (H), L10 (H). Avg L: 0.3 (5).

Sphagnum girgensohnii; LC; K1 (H), K2 (H), K6 (N), K7 (N), K8 (H), K9 (N), K10 (H), K11 (H), K13 (H); L1 (H), L2 (N), L3 (N), L4 (H), L5 (H), L6 (H), L7 (H), L8 (N), L9 (H), L10 (H). Avg K: 0.81 (7), Avg L: 1.4 (7).

Sphagnum lindbergii; LC; L1 (H). Avg L: 2 (1).

Sphagnum magellanicum [L(+)]; LC; L10 (H). Avg L: 0 (1).

Sphagnum majus [L+]; LC; L5 (H). Avg L: 0 (1).

Sphagnum palustre [L(+)]; LC; K2 (H), K3 (H), K9 (H), K10 (H); L6 (H). Avg K: 0.96 (4), Avg L: 1 (1).

Sphagnum papillosum [L+]; LC; K8 (H), K9 (H), K10 (H), K11 (H), K13 (H); L1 (H), L2 (H), L4 (H), L5 (H), L6 (N). Avg K: 1.17 (3), Avg L: 0.6 (5).

Sphagnum quinquefarium [K+]; LC; K5 (H); L1 (N), L2 (N), L4 (H). Avg K: 0 (1), Avg L: 1.67 (3).

Sphagnum riparium [K+]; LC; K2 (N); L1 (N), L3 (N), L5 (N), L6 (N), L7 (N), L10 (N). Avg K: 1 (1), Avg L: 0.63 (4).

Sphagnum russowii; LC; K2 (H), K3 (N), K5 (H), K6 (H), K8 (H), K9 (H), K10 (N), K11 (H), K13 (N); L1 (H), L2 (N), L3 (N), L4 (H), L5 (H), L6 (N), L7 (N), L8 (N), L9 (H), L10 (N). Avg K: 1.38 (6), Avg L: 1.49 (6).

Sphagnum squarrosum [K(+)]; LC; K2 (N), K8 (H); L1 (N), L3 (N), L4 (N), L5 (N), L6 (H), L7 (N), L8 (N), L10 (N). Avg K: 0 (2), Avg L: 1.02 (5).

Sphagnum subnitens [L+]; LC-att; K10 (H), K12 (H); L1 (H), L7 (H). Avg K: 0 (1), Avg L: 0 (2).

Sphagnum teres [K(+)]; LC; K3 (N), K8 (H), K9 (N), K11 (H); L1 (N), L6 (N), L10 (H). Avg K: 1 (2), Avg L: 0.5 (3).

Splachnum sphaericum [L+]; LR-nt; L1 (H), L4 (H). Avg L: 0 (2).

Straminergon stramineum [K(+)]; LC; K2 (H), K3 (N), K9 (N), K10 (N), K13 (H); L1 (H), L2 (N), L4 (N), L5 (H), L6 (H), L8 (N), L9 (H), L10 (N). Avg K: 1 (4), Avg L: 0.82 (7).

Syntrichia norvegica [++]; CR; K1 (H). Avg K: 0.5 (1).

Syntrichia ruralis [K(+)]; LC; K1 (H), K3 (H). Avg K: 0 (2).

Tayloria tenuis [L(+)]; DD-va; L10 (H). Avg L: 0 (1).

Tetraphis pellucida [K(+)]; LC; K2 (N), K5 (N), K9 (N), K10 (N), K11 (N), K13 (N); L1 (H), L2 (N), L3 (N), L4 (H), L5 (N), L6 (H), L7 (N), L9 (N), L10 (N). Avg K: 0.75 (3), Avg L: 1.32 (7).

Tetraplodon mnioides [L(+)]; EN; L1 (H). Avg L: 0 (1).

Tetradontium repandum [K+, L+]; LC-att; K1 (H), K6 (H), K7 (H), K9 (H); L1 (H), L2 (H), L6 (H). Avg K: 0 (3), Avg L: 0.67 (3).

Thuidium tamariscinum [K(+)]; LC; K13 (N); L6 (H). Avg K: 0.5 (1), Avg L: 0.33 (1).

Tortella bambergeri [L+]; LC; K1 (H), K5 (H), K11 (H); L4 (N), L6 (H). Avg K: 0 (2), Avg L: 0 (1).

Tortella tortuosa; LC; K1 (H), K3 (H), K5 (H), K6 (N), K7 (H), K11 (H); L4 (H), L5 (H), L9 (H). Avg K: 1.42 (4), Avg L: 0 (3).

Tortula eucalyprata Lindb. (*Desmatodon latifolius* var. *latifolius*); EN; K1 (H). Avg K: 0 (1).

Tortula eucalyprata Lindb. (*Desmatodon latifolius* var. *muticus*) [++]; EN; K1 (H), K3 (H). Avg K: 0 (1).

Tortula muralis var. *muralis* [K(+), L(+)]; LC; K1 (N), K6 (N); L10 (N). Avg K: 0.5 (2), Avg L: 1 (1).

Trichodon cylindricus [K+, L+]; LC; K5 (H), K7 (H); L9 (H). Avg K: 0 (1), Avg L: 0 (1).

Trichostomum tenuirostre [L+]; LC-att; K3 (H), K5 (H), K6 (H), K7 (H), K11 (H); L1 (H), L2 (H), L4 (H), L6 (H), L8 (H). Avg K: 1.14 (4), Avg L: 0.85 (4).

Warnstorfia exannulata; LC; K10 (N); L3 (H), L5 (H), L6 (N), L10 (H). Avg K: 0 (0), Avg L: 0.67 (3).

Warnstorfia fluitans; LC; K7 (H); L1 (H), L5 (H). Avg K: 0 (1), Avg L: 0.25 (2).

Warnstorfia sarmentosa; LC-att; K7 (H), K8 (H), K10 (H); L1 (N), L2 (N), L3 (H), L4 (N), L5 (H), L6 (N), L9 (N), L10 (N). Avg K: 0 (1), Avg L: 0.29 (7).

Weissia controversa var. *wimmeriana*; VU; K5 (H), K6 (N), K7 (H), K11 (H). Avg K: 0.5 (4).

Species recorded only outside the described study sites in the Labský důl valley:

Pogonatum aloides, *Pohlia camptotrachela* [L+], *Pterigynandrum filiforme*

Summarization for the study sites

Table 1: Species numbers at the study sites of Mt Kotel

Study site	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Liverwort taxa	25	28	39	13	41	39	37	26	28	27	27	15	23	3
Moss taxa	100	58	90	32	121	108	116	57	65	53	83	34	42	15
Total	125	86	129	45	162	147	153	83	93	80	110	49	65	18
Totals for related sites		147 (43/104)			217 (53/164)			131 (40/91)				87 (27/60)		

Table 2: Species numbers at the study sites of Labský důl valley

Study site	1	2	3	4	5	6	7	9	8	10	
Liverwort taxa	39	36	37	51	40	45	32	20	29	31	
Moss taxa	84	60	81	121	107	101	64	69	81	74	
Total	123	96	118	172	147	146	96	89	110	105	
Totals for related sites			187 (54/133)							147 (40/107)	

Details for important taxa

1) Critically endangered taxa

Lophozia heterocolpos

– Velká Kotelní jáma cirque: wedge of rock outcrops between the ravines of ESE- and SE-flowing streams, ESE slope, 180 m E of the top of Mt. Kotel; E3537.69-N5624.83, ca. 1390 m, on erlan rock, 29.8.2002; leg. J. Váňa

The species has been recorded for the first time at Mt Kotel.

Haplomitrium hookeri

– along the touristic path towards the Labská bouda lodge, 260 m E of the lodge; E3538.917; N5626.775; ca. 1205 m; wet soil in a gully along the path, nearly not shaded; 10.9.2002; leg. J. Kučera (9880)

The species has for a long time thought to be extinct in our country (Váňa 1993) – the last collection before this was made 10.7.1939 at ‘Bílá louka’ in the summit eastern part of the Krkonoše Mts (Futschig 1966, specimen in herb. Váňa); all other historical reports originate from within 1 km of that site. *Haplomitrium* perhaps does not stay very long at a particular place – the effort for re-finding it in June 2003 was unsuccessful, although the conspicuous associated species – *Moerckia hibernica* – was still present. The population was formed by some 20-50 shoots (the exact number was impossible to detect despite a considerable effort in the field), intermingled mostly among *Moerckia hibernica* thalli. Other associated species included *Calypogeia azurea*, *Sphagnum fallax*, *Scapania undulata* and *S. irrigua*.

Moerckia hibernica

– along the touristic path towards the Labská bouda lodge, 260 m E of the lodge; E3538.917; N5626.775; ca. 1205 m; wet soil in a gully along the path, nearly not shaded; 10.9.2002; leg. J. Kučera (9881)

– left S-facing bank of ESE-flowing Labe brook, N of the Labská bouda lodge, 120 m NW of the bridge on the touristic path towards Vysoké kolo Mt.; E3538.60; N5627.00; 1300 m; in wet slope beneath an overhang of *Sphagnum russowii*, *S. girgensohnii*; 30.6.2003; leg. B. Buryová (3658)

Although evaluated only as Endangered by Váňa (1993), there were not many more or later historical reports than in the case of *Haplomitrium*. During the revision in herb. BRNM, we however came across a specimen, collected by Futschig in 1972 on ‘Čertova louka’ in the summit eastern part of the Krkonoše Mts., 1420 m. Both our finds, located within just 400 m are also new to the flora of the valley. The first population covered about 12 cm², the second 120 cm² (in three patches).

Scapania cf. helvetica

– Velká Kotelní jáma cirque: W part of the cirque in the source area of the right branch of SE-flowing stream, 160 m E of the top of Mt. Kotel, SE exposed slope; E3537.68-N5624.85, ca. 1390 m, on wet humus, hanging on shaded decaying vegetation in spring, 31.8.2002 leg. B. Buryová (2997), det. J. Váňa.

The species is known for a long time from the locality; this specimen was sterile. It seems that *S. h.* disappeared from the ‘old’ locality around the adit or the population dwindled to the hardly detectable size.

Isopterygiopsis muelleriana

– rocky slope along (beneath) the touristic path towards the Labská bouda lodge, 280 m E of the lodge; E3538.93; N5626.78; ca. 1195 m; granite stone in the grass in the ESE slope, half-shaded; 10.9.2002; leg. J. Kučera (9865)

New to the flora of the Czech Republic (cf. Blockeel & al. 2003). The find was made quite unconsciously, therefore no other details have been recorded but the discovered population probably covered about 1-2 dm².

Kiaeria falcata

– uppermost part of the Navorská jáma cirque, E exposed slope at the R side of Navorský potok stream, 560 m S of the Labská bouda chalet; E3538.65; N5626.23; 1275 m; fissure of a periodically wet vertical/inclined NE-facing granitic outcrop; 11.9.2002; leg. B. Buryová (3114)

The effort for re-finding the species in the Krkonoše Mts has for long been unsuccessful (cf.

Kučera & Buryová 2001). First in July 2002 we found it again in the Úpská jáma cirque and near Luční bouda lodge; no details about the population size were unfortunately collected.

Lescuraea patens

The find of this species, new to the Czech Republic, was quite surprising for us (see Kučera & al. 2003). In addition to the 4 localities of Velká Kot. jáma and one in the Malá Kot. jáma listed in the article, the species was later identified from the following specimens collected at one site:

- Malá Kotelní jáma cirque: the easternmost ravine, 380 m SE of the top of Mt. Kotel, E3537.75-N5624.52, ca. 1220 m, inclined at a gneiss stone, shaded by vegetation, 31.8.2002 leg. M. Zmrhalová (10599 & 10913)
- Labský důl: central part of the ‘Pančavská jáma’ cirque, 170 m E of the ‘Ambrožova vyhlídka’ observatory; E3538.78; N5625.97; 1125 m; base of a rowan tree, horizontally on bark, half-shaded, dry; 12.9.2002; leg. J. Kučera (9939); Pančavská jáma cirque, 400 m NE-ENE of ‘Ambrožova vyhlídka’ observatory; E3538.88; N5626.03; 1080 m; horizontally at an E-facing trunk of *Acer pseudoplatanus*, shaded; 12.9.2002; leg. M. Zmrhalová (10840); dtto vertically at base of an E-facing granite stone, shaded, M. Zmrhalová (10842)

The other site in the Malá Kot. jáma (3537.70-5624.67, 1330 m) has been revisited on 26 April 2003 and the species was refound in order to assess the quantity of the population which was estimated at 3.6 dm² (total for 6 nearby patches). The other measured populations (Kučera 9578 and Zmrhalová 10638) accounted for ca. 2.0 dm², the remaining finds were unconscious and therefore not measured, however none of them was perhaps very extensive. Therefore the realistic total for all discovered patches at Mt Kotel may be around 10 dm². It seems thus that *Lescuraea patens* is, contrary to the literature information on ecology, able to grow also epiphytically, although not commonly. It is interesting that all finds have been concentrated only into the Pančavská jáma cirque, within 300 mts.

Meesia uliginosa

- Velká Kotelní jáma cirque: above the westernmost (ESE) ravine beneath the cirque face, 170 m ESE of the top of Mt. Kotel, E 3537.68-N 5624.77, ca. 1385 m, on thin humus layer over erlan (?) rocks in the slope, 15.6.2001 leg. J. Kučera (7991)

The species, reported earlier from the Velká Kot. jáma only by Futschig (1966), has been collected unconsciously – with completely withered capsules in several plants, associated with *Gymnostomum aeruginosum* and *Myurella julacea*. Later repeated attempts to relocate the find proved unsuccessful. The population – if still present – must be enormously small, consisting perhaps of only several, mostly sterile, plants.

Mnium thomsonii

- Velká Kotelní jáma cirque: the westernmost (ESE) ravine beneath the cirque face, near the old adit entrance, 210 m ESE of the top of Mt. Kotel, E3537.71-N5624.74, ca. 1365 m, niche in a limestone rock, 15.6.2001 leg. J. Kučera (8018)
- dtto, ravine of the SE-flowing stream, rocks above the right bank, 230 m E of the top of Mt. Kotel, E3537.75-N5624.82, 1335 m a.s.l., 31.8.2002 leg. J. Kučera – base of an erlan rock in the slope, NE-facing, shaded (9803) and in a turf of *Saxifraga oppositifolia* over an erlan rock outcrop, N-facing, half-shaded, dry (9797)

The species has perhaps never been published from the Krkonoše Mts but has been earlier collected at Mt Kotel by Z. Pilous (1949 and 1951, PR!, teste J. Váňa). At the two latter sites, the patches were estimated at ca. 20 cm², the first one was collected unconsciously but perhaps also in a very small quantity.

Syntrichia norvegica

- Mt. Kotel, slope 155 m NNE of the summit, base of a concrete bunker, E3537.56-N5624.96,

1425 m, shaded humus in fissure between bunker base and gneiss stone, ass. with *Ceratodon purpureus*, *Schistidium* sp., S-facing, 26.6.2003 leg. B. Buryová (3517-8) & shaded humus and disintegrated mortar, SSE-facing, B. Buryová (3515)

First discovered in the Czech Republic in 2002 on Mt Sněžka (Bloeker & al. 2003), the species seems to occur occasionally on base-rich artificial substrates in the highest regions of the Krkonoše Mts.

Tayloria tenuis

– N exposed right bank of Labe brook, 40 m WNW of the Labský vodopád observatory; E3538.76; N5626.90; 1275 m; thick humus layer over top of granitic boulder, horizontally and hanging; 28.6.2003; leg. B. Buryová (3607)

The find was not yet known to Kučera & Váňa (2003) when the list went into press, now the Red List evaluation should be CR. The extent of the population was ca. 12.5 dm² in 11 tufts.

2) Endangered species

Cephaloziella grimsulana

– Velká Kotelní jáma cirque: E part of the cirque, in the ravine of the SSW-flowing stream, right side ca. 20 m from the brook, 320 m SSE of ‘Harrachovy kameny’ rock formation, E3538.25-N5624.77, base of a granite outcrop in the SW slope, dripped by water, slightly shaded, 17.6.2001 leg. J. Kučera (8135) and B. Buryová (2712)

Little known species due to its tiny size and impossible distinction from the common *C. divaricata* in the field. It has not yet been reported from other site than Úpská jáma cirque in the Krkonoše Mts. Unfortunately, no quantitative data are available but the population at the collection site was definitely small.

Gymnomitrium corallioides

– Labský důl: rocks at the cirque edge in the southern part of the ‘Navorská jáma’ cirque, 640 m S of the Labská bouda lodge; E3538.72; N5626.16; ca. 1260 m; WNW exposed vertical granite rock face, dry, little shaded, 2 mts above the ground; 11.9.2002; leg. J. Kučera (9917)

This species has not yet been recorded from the valley. The find was located on the cirque upper face. The population covered 2.2 dm².

Jungermannia confertissima

Originally reported as *J. jenseniana* Grolle (Futschig & Váňa 1969, re-determined in Váňa 1974) was confirmed in Velká Kot. jáma at the entrance to the old adit (E3537.70-N5624.74, 1350 m) in the similar condition as described in the above source but nowhere else.

Lophozia wenzelii

– Pančavský vodopád waterfall, R side of the stream, ca. 100-110 m E of the fall’s upper edge; E3538.71; N5625.81; ca. 1180 m; on wet humus beneath a granite stone in the E slope; 28.7.2001; leg. J. Kučera (8292)

Not yet recorded from the valley; an interesting find outside the ‘main’ habitat for the species. Unfortunately, the population size details have not been recorded.

Scapania cuspiduligera

Confined to the limestones and erlans of the Velká Kotelní jáma where we were able to document some eight sites, especially in the middle part of the SE ravine and around the old adit. The species never covered larger patches of rocks or their fissures, so that the whole population perhaps does not exceed 50 cm² (the measurement has not been performed due to the difficult recognition in the field).

Scapania gymnostomophila

- Velká Kotelní jáma cirque: Velká Kotelní jáma cirque: ravine of the SE-flowing stream, rocks above the right bank, 250 m E of the top of Mt. Kotel, E3537.765-N5624.795, ca. 1330 m, on humus, hanging over NE-facing erlan rocks, little shaded, dry, 31.8.2002 leg. J. Kučera (9815); 27.6.2003 leg. M. Zmrhalová (11152)

It is not quite clear if the two sites are completely identical; the collections have been made unconsciously and the extent of population is obviously very small (estimated at less than 10 cm²). The species was earlier in the Krkonoše Mts known only from the valley of Rudný potok brook in the eastern part of the range.

Brachythecium geheebii

- Pančavská jáma cirque, 390 m NE-ESE of 'Ambrožova vyhlídka' observatory; E3538.87; N5626.03; 1090 m; vertically at a SE-facing granite boulder, half shaded; 12.9.2002; leg. M. Zmrhalová (10847)

The species usually grows at bases of deciduous trees, more rarely, as in this case, on base-rich substrates. The collection has been made unconsciously, therefore no other details have been recorded.

Bryum turbinatum

- WNW slope of Mt. Kotel, 460 m WNW of the summit, ditch by the touristic path, E3537.095-N5624.99, ca. 1355 m, mineral soil in periodically wet ditch, half-shaded by vegetation, 14.6.2001 leg. J. Kučera (7969); 2.9.2002 and 30.6.2003 leg. B. Buryová (3045, 3644)

The occurrences of this species have not been usually historically specified as it was regarded to be quite common. However, a major part of the revised specimens from the Sudetes belonged to *B. pseudotriquetrum* or other taxa. It seems to be however very rare, at least nowadays. The population at the site seems to be changing only very little.

Campylophyllum sommerfeltii

- Velká Kotelní jáma cirque: bottom part, beech forest at the WSW slopes of Kotelný potok brook 150, resp. 160 m NE of the bridge at the tour. path, 790-800 m ESE of the top of Mt. Kotel, E3538.19-N5624.39 and E3538.19-N5624.38, ca. 1120 m, on bark of beech near base, half-shaded, nearly horizontal, 28.8.2002 leg. J. Kučera (9726-7), M. Zmrhalová (10498)
- Velká Kotelní jáma cirque: bottom of the cirque, S slope, left side of the brook, 35 m ENE of a footbridge on the touristic path, E3538.09-N5624.31, 1080 m, inclined half-shaded moist W-facing bark of beech trunk in birch-beech wood, 28.8.2002 leg. B. Buryová (2912, 2921); dttto, 50 m NE of the footbridge, E3538.10-N5624.33, 1085 m, bark of vertical beech trunk in beech wood, ass. with *Paraleucobryum longifolium*, 28.8.2002 leg. B. Buryová (2930)
- Labský důl: central southern part of the 'Navorská jáma' cirque, dwarf pine growth south of the brooklet, 600 m S of the Labská bouda lodge; E3538.75; N5626.20; ca. 1230 m; on a horizontal stem of a dwarf pine, half-shaded; 11.9.2002; leg. J. Kučera (9914)
- Labský důl: central part of the 'Pančavská jáma' cirque, 210 m E of the 'Ambrožova vyhlídka' observatory; E3538.82; N5625.97; 1100 m; horizontally on the base of a rowan, half-shaded, no humus; 12.9.2002; leg. J. Kučera (9934)

The species is known very imperfectly in our country. It seems to have very similar ecology to *Hypnum pallescens* and *Lescuraea mutabilis*, the frequency of occurrence is however shared with the latter species. It is unknown why it has not been recorded earlier from the region (the only record – collection we have encountered was that of Mr Pilous, made near the settlement Mísečky, 1230 m, in 1950 – herb. BRNM; the second record has already been made on the Polish side – Pielgrzymy, leg. V. Schiffner 1899, PRC!). It might have not been recognized from *Hypnum pallescens*.

The population at Mt Kotel was measured to include about 13 dm². In Labský důl valley, the spe-

cies has been collected as *Hypnum pallescens*, therefore no other details have been recorded.

Dicranella subulata

- Velká Kotelní jáma cirque: ravine of the SE-flowing stream, above the right bank, 240 m E of the top of Mt. Kotel, E3537.76-N5624.81, ca. 1330 m, soil in the NE slope above the brook, half-shaded; 31.8.2002 leg. J. Kučera (9808, 9811)
- Labský důl: ravine in the upper part of NNE exposed slope between Pančavská and Harrachova jáma cirques (ben. 'Krkonošova hlava' rock formation), 520 m ESE of 'Hančův pomník' memorial; E3539.04; N5625.33; 1180 m; soil in vertical N-facing granitic outcrop crevice, shaded by ferns; 13.9.2002; leg. B. Buryová, det. J. Kučera (3227)

For unknown reasons a rapidly retreating species in our country, with several last refuges in the higher mountains (Kučera & Váňa 2003). The population has not been measured but was not extensive – covering at the two microsites ca. 0.5 dm². In Labský důl valley, it was found in just a few stems.

Dicranodontium uncinatum

- Labský důl: lower part of the forested boulder scree on NNE exposed slope between Pančavská and Harrachova jáma cirques, 530 m E of 'Hančův pomník' memorial; E3539.08; N5625.55; 1025–30 m; moist cold NW-facing vertical granitic boulder face; 13.9.2002; leg. B. Buryová (3196)

The species is new to the Czech part of the Krkonoše Mts. It has been earlier reported from the Polish part – both 'Snow cirques' (Schneeegruben or Śnieżne Kotły, Limpricht 1876, 1890). The Cypers's report (1897) from Mt Kotel is based on misidentification for *Dicranum flexicaule*. Unfortunately the collection has been made unconsciously, therefore no other details have been recorded.

Dicranum majus

- Mt. Kotel: NNE slope, 260 m NNE of the top, 3537.60- 5625.06, 1405 m, B. Buryová 2662 N slope, 440 m NNW of the top, E3537.29-N5625.19, M. Zmrhalová (11155) WNW slope, 420 m WNW of the summit, E3537.11-N5624.93, 1365 m, B. Buryová (3577-9)
- Malá Kotelní jáma cirque: SW part of the cirque, 480 m SSE of the top of Mt. Kotel, beneath the lower marginal rocks in NE slope, E3537.62-N5624.34, 1225 m, B. Buryová (3059)
- Velká Kotelní jáma cirque: ravine of the SE-flowing stream, 1330, 1335, 1405 m, B. Buryová (3017, 3012, 2994)
- Velká Kotelní jáma cirque: ravine of the ESE-flowing stream close to the old adit, M. Zmrhalová (10555)
- Labský důl: 'Harrachova jáma' cirque, 520 m NE of the Vrbatova bouda hut, above the right bank of the brooklet; E3539.31; N5625.08; 1140 m; humus beneath the blueberries, N slope, half-shaded; 13.9.2002; leg. J. Kučera (9975); dtto, 670 ESE of Hančův pomník monument; E3539.13; N5625.19; 1190 m; inclined on thick humus layer over a N-facing granite outcrop, shaded; 13.9.2002; leg. M. Zmrhalová (11203)
- Labský důl: bottom of the forested boulder scree on NNE exposed slope between Pančavská and Harrachova jáma cirques, 545 m E of 'Hančův pomník' memorial; E3539.09; N5625.56; 1025 m; inclined N-facing cold granitic boulder face, ass. with *Sphagnum russowii*, *Polytrichastrum alpinum*; 13.9.2002; leg. B. Buryová (3193); dtto, E3539.07; N5625.54; 1035 m; on humus and decaying vegetation, in moss layer; 13.9.2002; leg. B. Buryová (3203); dtto, E3539.08; N5625.51; 1035–1040 m; hanging from shaded N-facing vertical granitic boulder face; 13.9.2002; leg. B. Buryová (3208)
- Labský důl: Pančavský vodopád waterfall, E slope along the R side of the stream, ca. 20–30 m E of the fall's upper edge; E3538.63; N5625.79; ca. 1265 m; on humus over granite rock outcrops in the E slope, half-shaded; 28.7.2001; leg. J. Kučera (8306)

- Labský důl: upper southern part (cirque edge) of the ‘Navorská jáma’ cirque, 630 m S of the Labská bouda lodge; E3538.72; N5626.16; ca. 1255 m; mossy granite rock, N-facing, inclined, half-shaded, thick humus layer; 11.9.2002; leg. J. Kučera (9916)
- Labský důl: upper part of the Navorská jáma cirque, rocks at E exposed slope at the L side of Navorský potok stream (S margin of the rock complex), 480 m S of the Labská bouda chalet; E3538.68; N5626.31; 1260 m; on decaying vegetation at inclined NW-facing top of granitic boulder overgrown by blueberries; 11.9.2002; leg. B. Buryová (3229)

It is perhaps generally commoner in the subalpine belt than earlier suggested (cf. Kučera & Buryová 2001) but definitely vulnerable to the destruction or alteration of habitat. Therefore it has nearly vanished from the forests below the treeline but the population in the dwarf pine belt seems to be not immediately threatened.

Ditrichum zonatum

- Velká Kotelní jáma cirque: central part, ravine of the SSE-flowing stream (uppermost part), 380 m NE of the top of Mt. Kotel, E3537.815-N5625.045, 1380 m, in the fissure among stones of the wall, on thin soil layer, 18.6.2001 leg. J. Kučera (8142)
- Velká Kotelní jáma cirque: ravine of the SE-flowing stream, rocks at the eastern side of the ravine 170 m E of the top of Mt. Kotel, E3537.69-N5624.84, 1380 m, fissure of NE-facing gneiss rock, open, dry, 31.8.2002 leg. J. Kučera (9783)

Very imperfectly known species, historically not always distinguished from the common *D. heteromallum*. The measurements have not been made, as the taxon was recognized only from collected material but none of the populations was extensive – maybe some 10 to 20 cm² in total.

Grimmia anodon

- WNW slope of Mt. Kotel, 200 m NW of the summit, S facing side of the concrete bunker around the entrance, E3537.36-N5624.93, 1415 m, open horizontal + vertical concrete wall face, 29.6.2003 leg. B. Buryová (3634)

The find of this species was quite surprising as it has never been recorded from the Krkonoše Mts. It has been known only from the foothills in the region – in the vicinity of the villages Hertvíkovice and Vlčice where it grows on conglomerate rocks at the altitude of ca. 500 m. The population at the bunker totalled 30 cm².

Hypnum callichroum

- Velká Kotelní jáma cirque: bottom of the cirque at the confluence of the brooks from ESE and SSE ravines, 460 m ESE of the top of Mt. Kotel, E3537.95-N5624.68, 1170 m, on a stone, 16.6.2001 leg. M. Zmrhalová (9622)

In Labský důl valley, the species seems to be rather regularly occurring in several parts of the valley, whereas it is absent from some others. Particularly many occurrences were found in the rocky slope ESE of the Labská bouda lodge (10 plus microsites on the area of about 0.25 ha between E3538.92-E3538.98 and N5626.69-N5626.78, 1145-1205 m a.s.l. – Kučera 9863-4, 9870-1, 9876, 9882; BB 3084-6, 3088, 3092, MZ10729, VP10671). Three other occurrences were recorded in the Harrachova jáma cirque (E3539.31-32, N5625.19, 1085 & 1095 m, JK 9965, 9967 and E3539.37-N5625.80, 1230 m, MZ9750), and two in the Pančavská jáma cirque (E3538.65-N5625.80, 1230 m, MZ9750 and E3538.70-N5625.89, 1180-1185 m, BB3167). The discovered population accounts for ca. 0.75 m².

Lescuraea mutabilis

- Velká Kotelní jáma cirque: bottom part, beech forest at the WSW slopes above the Kotelný potok brook 150 m NE of the bridge at the tour. path, 800 m ESE of the top of Mt. Kotel, E3538.19-N5624.38, 1120 m, creeping beech stem, on bark, little shaded, 28.8.2002 leg. J. Kučera (9725); dtto, E3538.16-N5624.38, 1105 m, horizontally at a trunk of *Fagus sylvatica*,

28.8.2002 leg. M. Zmrhalová (10497)

- Velká Kotelní jáma cirque: at the Kotelný potok brook beneath the bottom of the cirque, left side of the brook, S slope, 35 m NE of a footbridge on the touristic path, E3538.09-N5624.31, 1080 m, bark of *Acer pseudoplatanus* on horizontal part of trunk (peeling off), in beech wood, ass. with *Brachythecium reflexum*, 28.8.2002 leg. B. Buryová (2919, 2920, 2922; dtto, E3538.08-N5624.32, 1085 m, W-NW facing inclined half shaded bark of horizontal beech trunk in beech wood, 20 cm above the ground, 28.8.2002 leg. B. Buryová (2926)
- Labský důl: Pančavská jáma cirque, 400 m NE-ENE of ‘Ambrožova vyhlídka’ observatory; E3538.87; N5626.04; 1075 m; inclined at an E-facing doddered trunk of *Acer pseudoplatanus*, half shaded; 12.9.2002; leg. M. Zmrhalová (10838)
- Labský důl: central part of the ‘Pančavská jáma’ cirque, 170 m E of the ‘Ambrožova vyhlídka’ observatory; E3538.78; N5625.97; 1125 m; base of a rowan tree, horizontally on bark, half-shaded, dry; 12.9.2002; leg. J. Kučera (9938)
- Labský důl: upper part of the Navorská jáma cirque, forested boulder scree at ESE exposed slope at the L side of Navorský potok stream (beneath the rock complex), 465 m S of the Labská bouda ch; E3538.69; N5626.33; 1250 m; vertical SE-facing bark of decaying *Sorbus* branch 15 cm above the ground, ass. with *Brachythecium reflexum*; 11.9.2002; leg. B. Buryová (3134)

Lescuraea mutabilis is a species that also has strongly retreated, compared to the described situation before the World War II. It is found in similar conditions and similarly rare as *Campylophyllum sommerfeltii*, although historically much better documented. The revealed population accounted for ca. 19 dm² at Mt Kotel, The population of the species in the Labský důl valley has not been measured.

Myurella julacea

- Velká Kotelní jáma cirque: above the westernmost ravine beneath the cirque face, 170 m ESE of the top of Mt. Kotel, E3537.68-N5624.77, 1385 m, on thin humus layer over base-rich siliceous rocks in the slope, 15.6.2001 leg. J. Kučera (7979, 7991); dtto, 175 m E-ESE of the top of Mt. Kotel, E3537.68-N5624.76, 1360 m, 15.6.2001 leg. M. Zmrhalová (9515, 9520)
- Velká Kotelní jáma cirque: wedge of rock outcrops between the ravines of ESE- and SE-flowing streams, ESE slope, 180 m E of the top of Mt. Kotel, E3537.70-N5624.82, 1380 m, base of E-facing erlan rock, half-shaded, 30.8.2002 leg. J. Kučera (9765); dtto, 170 m E of the top of Mt. Kotel, E3537.69-N5624.83, ca. 1390 m, 29.8.2002 leg. J. Váňa (17); dtto, 245 m E of the top of Mt. Kotel, E3537.76-N5624.79, 1340 m, fissure of vertical eroded outcrop beneath an overhang, 30.8.2002 leg. B. Buryová (2980)
- Velká Kotelní jáma cirque: ravine of the SE-flowing stream, rocks at the right side of the ravine 190 m ENE of the top of Mt. Kotel, E3537.694-N5624.855, 1390 m, fissure of SE-facing erlan rock, little shaded, dry, 31.8.2002 leg. J. Kučera (9774)

The cirque is the only locality of this montane basiphilous species in the Krkonoše Mts. All measured populations accounted for ca. 2.9 dm².

Pseudobryum cinclidioides

- Labský důl: E exposed slope, 45 m E (=beneath) of the Labská bouda lodge; E3538.74; N5626.80; 1285 m; open spring area with *Carex canescens*, above dwarf pines, ass. with *Calliergon cordifolium*; 28.6.2003; leg. B. Buryová (3610), M. Zmrhalová (11125)
- Labský důl: Pančavský vodopád waterfall, beneath the upper edge, L side of the streambed; E3538.61; N5625.80; ca. 1280 m; wet niche beneath a granite boulder, in the waterfall; 28.7.2001; leg. J. Kučera (8309); dtto, stream in the E-facing rocky slope N of the Pančavský vodopád waterfall (ca. 65 m E of the fall’s upper edge), left side of the stream; E3538.64; N5625.80; 1250 m; humus layer on horizontal ledge of a granite outcrop; 28.7.2001; leg. M. Zmrhalová (9753)

There are several historical records from the area (Milde 1869, Velenovský 1897), all of them

from the sources of Labe and the 'Labská louka' mire. The population beneath the Labská bouda lodge (shown to us by P. Hájek who again was shown it by Mr Z. Pilous) is quite extensive, covering ca. 2.1 m² in total, while the other from the upper part of the Pančavský vodopád covers only several dm².

Ptychodium plicatum

– Velká Kotelní jáma cirque: ravine of the SE-flowing stream in the W part of the cirque, left bank, 250 m E of the top of Mt. Kotel, E3537.77-N5624.80, ca. 1320 m, base-rich siliceous rock at the brook, vertical face, 16.6.2001 leg. J. Kučera (8102)

The species was collected inconspicuously, associated as one stem to a specimen of *Pseudoleskeella rupestris*. Literature records for this species from Mt Kotel are quite many, so it can be assumed that *Ptychodium* strongly retreated at the locality (the historical collectors themselves might have been the culprits in this case).

Saelania glaucescens

– Velká Kotelní jáma cirque: ravine of the SE-flowing stream, upper part, NE exposed slope, rocks at the SW side of the brook, 180 m E of the top of Mt. Kotel, E3537.70-N5624.83, 1380 m, humus layer in fissure of vertical NE-facing base-rich outcrop, beneath an overhang, 31.8.2002 leg. B. Buryová (3005); dtto, middle part of the ravine, 270 m E of the top of Mt. Kotel, E3537.78-N5624.79, 1315 m, ESE-facing base-rich siliceous rock, fissure, 16.6.2001 leg. J. Kučera (8098)

Historically collected several times at Mt Kotel (even in Malá Kot. jáma by A. Hilitzer in 1920) but interestingly not discovered by the authors who contributed most to knowledge of the bryoflora at the site (Milde, Velenovský). The two populations accounted for ca. 1.2 dm².

Tetraplodon mnioides

– Labský důl: 'Harrachova jáma' cirque, 490 m NE of the Vrbatova bouda hut, at the brooklet; E3539.28; N5625.04; ca. 1165 m; in a scar on the stem of a rowan tree (*Sorbus aucuparia*), little shaded, dry; 13.9.2002; leg. J. Kučera (9978)

The only discovered cushion was about 2×3 cm.

Tortula eucalyprata

The species, known mostly as *Desmatodon latifolius*, has been found in two in our opinion distinct varieties that have not yet been combined under *Tortula eucalyprata*, var. *latifolius* and var. *muticus* (Brid.) Brid. Interestingly, both varieties have been recorded at the locality, once even under essentially identical conditions within 10 cm which suggests the genetic distinctness of both taxa.

Var. *latifolius*:

– WSW slope of Mt. Kotel: along the touristic path, 750 m W of the top of Mt. Kotel, E3536.77-N5624.79, ca. 1310 m, on soil among siliceous stones along the path, 15.6.2001 and 29.8.2002 leg. B. Buryová (2634 & 2942)

Var. *muticus*:

– WSW slope of Mt. Kotel: along the touristic path, 750 m W of the top of Mt. Kotel, E3536.77-N5624.80, ca. 1315 m, on humose soil among siliceous stones along the path, 15.6.2001 leg. J. Kučera (7972) & M. Zmrhalová (9484)

– Malá Kotelní jáma cirque: the easternmost ravine, 260 m ESE-SE of the top of Mt. Kotel, E3537.71-N5624.65, 1300 m, 31.8.2002 leg. M. Zmrhalová (10613)

The historical reports (Milde 1869, Matouschek 1902) have not been located precisely (only as 'Mt Kotel') but very probably have been made in the Velká Kot. jáma, as is the case of most records. The population along the path at the ascent to Mt Kotel covered ca. 2 dm².

3) Vulnerable and other taxa (selection)

Anthelia julacea

- Labský důl valley, 205 m ENE of the Labská bouda chalet, NE-facing slope, E3538.80-N5626.87, 1270 m, horizontally and inclined on a NE-facing granite stone, half shaded, 28.6.2003 leg. M. Zmrhalová (11119)
- Labský důl valley: ‘Harrachova jáma’ cirque, 420 m ENE of the Vrbatova bouda hut, in the rocky ravine, E3539.25-N5624.97, ca. 1220 m, base of WNW-facing vertical granite rock at the right bank of the brooklet, 13.9.2002 leg. J. Kučera (9983); dtto, 390 m ENE of the Vrbatova bouda hut, E3539.25-N5624.92, ca. 1270 m, on wet soil among other hepatics in the brooklet, J. Kučera 9984; dtto, 340 m ENE of the Vrbatova bouda hut, above the upper end of the rocky ravine, E3539.22-N5624.86, 1320 m, on dripping granite rock plate in the NE slope, J. Kučera 9986; dtto, upper part above the cirque face, 210 m NE of the Vrbatova bouda hut, E3539.04-N5624.91, 1355 m, wet dripping granite rock outcrop, J. Kučera 9989; dtto, 240 m NNE of the Vrbatova bouda hut, E3538.95-N5624.98, 1355 m, ledge of a granite rock, N-facing, wet, open, J. Kučera 9990

Historically reported only from the Labský vodopád waterfall (might be in fact identical with the first locality); the population in Harrachova jáma cirque is however much more extensive.

Bazzania tricrenata

- Velká Kotelní jáma cirque: rocks at the western side of the ravine of SSE-flowing stream (lower part), 390 m E of the top of Mt. Kotel, E3537.90-N5624.76, 1215 m, face and fissures of granitic outcrop in the SSE slope, 18.6.2001 leg. M. Zmrhalová (9792)
- Velká Kotelní jáma cirque: western part, NE slope above the ESE-flowing stream, ca. 10 m above (SSW of) the brook, 270 m ESE of the top of Mt. Kotel, E3537.77-N5624.71, 1300 m, on small SSE-exposed siliceous rock above a small cascade, 18.6.2001 leg. B. Buryová (2747)
- Labský důl valley, ravine in upper part of NNE exposed slope between Pančavská and Harrachova jáma cirques, 520 m ESE of ‘Hančův pomník’ memorial, E3539.06-N5625.38, 1135-1140 m, hanging from a WNW-facing granitic stone, 13.9.2002 leg. B. Buryová (3223); dtto, E3539.07-N5625.54, 1030 m, B. Buryová (3201)
- Labský důl valley: bottom part of the ‘Pančavská jáma’ cirque, 360 m E of the ‘Ambrožova vyhlídka’ observatory, E3538.97-N5626.00, 1045 m, earth-covered tree roots, half-shaded, 12.9.2002 leg. J. Kučera (9921); dtto, 350 m ENE of ‘Ambrožova vyhlídka’ observatory, E3538.95-N5626.04, 1045 m, inclined at a NE-facing granite stone, shaded, 12.9.2002 leg. M. Zmrhalová (10815); dtto, E3538.96-N5626.03, 1045 m, M. Zmrhalová 10813; dtto, 330 m E of ‘Ambrožova vyhlídka’ observatory, E3538.94-N5625.97, 1045 m, NNE-facing shaded cold vertical granitic stone face, 12.9.2002 leg. B. Buryová (3152-3); dtto, 260 m E of the ‘Ambrožova vyhlídka’ observatory, E3538.87-N5625.99, 1075 m, N-exposed inclined face of a half-shaded granite boulder, E slope, 12.9.2002 leg. J. Kučera (9926); dtto, 240 m E of ‘Ambrožova vyhlídka’ observatory, E3538.85-N5626.01, 1090 m, vertically at humose soil, SE slope, shaded by vegetation, 12.9.2002 leg. M. Zmrhalová (10848); dtto, 220 m NE of ‘Ambrožova vyhlídka’ observatory, E3538.82-N5626.05, 1120 m, vertically at base of a NE-facing granite rock, shaded, 12.9.2002 leg. M. Zmrhalová (10862); dtto, 125 m ESE of ‘Ambrožova vyhlídka’ observatory, E3538.72-N5625.90, 1170 m, hanging from vertical granite stone face in scree, NW exposed site, shaded by birches, 12.9.2002 leg. B. Buryová (3166); dtto, upper part beneath the rocks, 70 m ENE of the ‘Ambrožova vyhlídka’ observatory, E3538.68-N5625.98, ca. 1220 m, hanging over granite rocks, beneath the blueberries, vertically, half-shaded, 12.9.2002 leg. J. Kučera (9942)
- Labský důl valley: bottom of the ‘Navorská jáma’ cirque, 560 m SE of the Labská bouda lodge, E3538.99-N5626.35, 1060 m, half-shaded granite stone, N vertical face near the base, 11.9.2002 leg. J. Kučera (9898)

Cephaloziella spinigera

– Labský důl valley: forested boulder scree in lower part of ESE slope at the R side of Pančava stream, 335 m E of ‘Ambrožova vyhlídka’ observatory; E3538.95; N5625.96; 1145 m; on wet thick humus layer hanging from a NE-facing granite boulder face; 12.9.2002; leg. B. Buryová (3142), det. J. Váňa, teste J. Paton

The species is mostly found in acidic bogs; the ecology here was remarkable.

Gymnomitrium concinnatum

The species was evaluated in the highest risk category in Váňa 1993, yet indeed Kučera & Buryová (2001) speculated that the species retreated dramatically in the region, having been unable to retrieve a single population. Fortunately for the taxon, the speculations have proved completely wrong – virtually the species was found at any suitable site; the number of microlocalities totalled 31 at Mt Kotel (Fig. 1) and 18 in the Labský důl valley (Fig. 2), the measured extent of populations was nearly 0.90 m² (equal to roughly 8·10⁵ stems at the mean estimated density of 90 stems per 1 cm²) at Mt Kotel. In the Labský důl valley, the situation was interesting in the fact that 17 of the measured sites yielded 0.87 m² (or 7.8·10⁵ stems) but one site (E3539.06-N5625.39) contributed more than the rest of other sites. Here, at a 3×3 m rock the abundance of *Gymnomitrium* was estimated to be between 30-50% which corresponds to 2.7-4.5 m² or 2.4-4·10⁶ stems.

Lophozia grandiretis

– Labský důl valley: 160 m N-NNE of the Labská bouda chalet, along the river Labe, E-facing slope; E3538.66; N5626.93; 1300 m; horizontally on a SE-facing granite stone in the stream, half shaded; 28.6.2003; leg. M. Zmrhalová (11136), det. J. Váňa

The first record in the whole Krkonoše Mts; the current distribution and ecology in our country is rather imperfectly known. Here, the associated species were *Hygrohypnum ochraceum*, *Jungermannia obovata*, *Scapania uliginosa* and *Philonotis seriata*, the population extent was 16 cm² (50% on 8×4 cm).

Marsupella alpina

– Labský důl valley: Harrachova jáma cirque, N part, ca. 500 m SE of Hančův pomník monument; E3538.95; N5625.19; ca. 1250 m; inclined on an E-facing granite rock, open; 13.9.2002; leg. M. Zmrhalová (11206), det. J. Váňa

This liverwort has until now been known only from one two very close sites in the Úpská jáma cirque. This record has unfortunately been made unconsciously, therefore no information on the population size etc. is known.

Moerckia blyttii

– Labský důl valley: right side of the S-flowing branch of Labe brook 30 m N of the confluence, NNW of the Labská bouda lodge, 170 m NW of the bridge on the touristic path towards Mt Vysoké kolo; E3538.55; N5627.04; 1310 m; humus in moist shaded vertical niches beneath grass turfs, E-facing steep slope by a late snow area; 30.6.2003; leg. B. Buryová (3664)

Interestingly, nearly all hitherto known occurrences of this species in Krkonoše Mts concentrate in a small area around Luční bouda lodge (‘Bílá louka’); several occurrences lie also in the nearby Úpská jáma cirque. Only one record originates from the western part of the mountains (Mt Medvědíň – ca. 4 km to the south-east of this site, at ca. 1200 m, 1982 leg. Šašková, PRC!). The reason for it might be the rather tight association with the late-snow areas which are very rare in the western Krkonoše Mts. The population covered ca. 2.5 dm².

Scapania paludosa

– Velká Kotelní jáma cirque: peat bog beneath the cirque bottom at SW slope, noted J. Váňa.

– Labský důl valley: granitic rocks 360 m ESE of the Labská bouda lodge, E3538.98; N5626.69,

1140 m, spring area, ESE slope, half shaded, 10.9.2002 coll. M. Zmrhalová (10890), teste J. Váňa.

First record from Mt Kotel; sporadically occurring at the higher altitudes of the Krkonoše Mts.

Scapania praetervis

- Mt. Kotel, slope 155 m NNE of the summit, by the SSE-facing side of concrete bunker, E3537.56-N5624.96, 1425 m, thin half-shaded humus layer within gneiss stones at the base of bunker, 26.6.2003 leg. B. Buryová (3586), det. J. Váňa
- Velká Kotelní jáma cirque: ESE exposed slope at the left side of westernmost (ESE) ravine, 265 m E-ESE of the top of Mt. Kotel, E3537.78-N5624.76, 1305 m, moist vertical fissure at base of ESE-facing gneiss outcrop, shaded by vegetation, 30.8.2002 leg. B. Buryová (2951), det. J. Váňa; the westernmost ravine near the old adit entrance, 240 m ESE of the top of Mt. Kotel, E3537.71-N5624.74, 1355 m, on soil over base-rich siliceous rocks in the NE slope, half-shaded, in the grass, 15.6.2001 leg. M. Zmrhalová (9489); dtto, 245 m ESE of the top of Mt. Kotel, E3537.72-N5624.74, 1345 m, 15.6.2001 leg. M. Zmrhalová (9473); dtto, 210 m ESE of the top of Mt. Kotel, E3537.71-N5624.73, ca. 1355 m, on soil over base-rich siliceous rocks in the NE slope, half-shaded, in the grass, 15.6.2001 leg. J. Kučera (8021); dtto, 200 m ESE of the top of Mt. Kotel, E3537.71-N5624.74, ca. 1360 m, wet, dripping shaded limestone rock, 15.6.2001 leg. J. Kučera (8012)
- Velká Kotelní jáma cirque: wedge of rock outcrops between the ravines of ESE- and SE-flowing streams, ESE slope, 190 m ESE of the top of Mt. Kotel, E3537.70-N5624.77, 1380 m, fissure of inclined E-facing gneiss rock outcrop, half-shaded, 30.8.2002 leg. J. Kučera (9753)
- Velká Kotelní jáma cirque: ravine of the SE-flowing stream in the W part of the cirque, 290 m E of the top of Mt. Kotel, E3537.80-N5624.77, 1290-1300 m, fissure and a small ledge beneath a rock overhang, on thin humus layer, 16.6.2001 leg. J. Kučera (8091)

The species seems to be quite regular on the base-rich sunstrates of Mt Kotel but never in large quantity – the individual patches rarely exceed several cm².

Amphidium lapponicum

- Velká Kotelní jáma cirque: wedge of rock outcrops between the ravines of ESE- and SE-flowing streams, ESE slope just at the cirque face, 170 m E of the top of Mt. Kotel, E3537.68-N5624.80, 1390 m, fissure of erlan rock outcrop, E-facing, half-shaded, dry, 30.8.2002 leg. Z. Palice & J. Kučera (9768)
- Labský důl: rocks above the scree at the left bank of the Labe (ca. 20 m above the brook), 140-150 m beneath the waterfall; E3538.96; N5626.81; ca. 1185 m; horizontally in a gneiss rock fissure at the base of the rock, S-facing; 27.7.2001; leg. J. Kučera (8240)

Historical reports from the Labský důl valley exist from e.g. Veselsky (1860, leg. Funck) and Milde (1861 ff.), we were however unable to locate the specimens. At Mt Kotel, it grew in several little tufts (11 cm² in total, only one 1×1 cm tuft was fertile) and makes the first – and thus very interesting – record of the species here. In the Labská rokle ravine, the discovered population was tiny – not more than ca. 2 cm², associated species was *Grimmia torquata* within several decimeters, also in a very tiny population. *Amphidium lapponicum* is obviously critically endangered at both localities due to the extremely small population size.

Anomodon rugelii

- Malá Kotelní jáma cirque: the easternmost ravine, 240 m SE of the top of Mt. Kotel, E3537.70-N5624.66, 1335 m, vertically at shaded base of a gneiss rock outcrop, 31.8.2002 leg. M. Zmrhalová (10622)

First record of the species at Mt Kotel; the other occurrences in the Krkonoše Mts lie at lower altitudes of the foothills.

Bryoerythrophyllum ferruginascens

- WNW slope of Mt. Kotel: along the touristic path, 470 m WNW of the top, E3537.07-N5624.97, 1350 m, bare open moist sandy soil at the path edge, 2.9.2002 leg. B. Buryová (3046)

The species has never been reported from the Sudetes, although perhaps rather due to non-recognition in the past, as evidenced by the presence as associated species to *Grimmia alpestris* from the Velká kotlina cirque in the Hrubý Jeseník Mts (leg. Šmarda 1946). This site might however be a more recent introduction, as the taxon is obviously spreading in the recent past, especially on denuded base-rich substrate along the forest tracks etc.

Campylophyllum halleri

- Velká Kotelní jáma cirque: the SE ravine, middle part, 260 m E of the top of Mt. Kotel, E3537.77-N5624.79, ca. 1320 m, inclined on fissures and ledges of a NE-facing gneiss rock, slightly shaded, 27.6.2003 leg. M. Zmrhalová (11151-3)

The species was perhaps discovered at Mt Kotel by Z. Pilous (published with other records in Pilous 1952; specimen in PR from 1951, teste J. Váňa), our search for it was unsuccessful until the third visit of the SE ravine when P. Hájek showed us the exact place. The population was measured to cover 2.2 dm² in total.

Cynodontium gracilescens

- Labský důl: Pančavská jáma cirque, ‘Schustlerova zahrádka’, 220 m NE of ‘Ambrožova vyhlídka’ observatory; E3538.75; N5626.13; 1200-1210 m; on humus hanging over granite rock outcrop in the E slope; 29.7.2001; leg. J. Kučera (8316), M. Zmrhalová (9760)

The species is very probably new record for the whole Krkonoše Mts. It has been indeed reported, even perhaps from the site where we discovered it („Zwischen Elb- und Panschefall“, Milde 1869; „in der Nähe des Panschefalles“, Limpricht 1876) but Limpricht later (1890) denied all his and Milde’s earlier records from Krkonoše Mts. The discovered population accounted for 30 dm² in total.

Distichium inclinatum

- Velká Kotelní jáma cirque: the westernmost ravine, near the old adit entrance, 200 m ESE of the top of Mt. Kotel, E3537.71-N5624.74, ca. 1350-1360 m, on humus over a ledge of limestone rock, half-shaded, damp, and in the fissures, 15.6.2001 leg. J. Kučera (8010, 8013), M. Zmrhalová (9493) & V. Plášek (10382)
- Velká Kotelní jáma cirque: E slope between westernmost and SE-flowing ravines, 250 m E of the top of Mt. Kotel, E3537.765-N5624.78, 1335 m, humus over inclined/vertical face of base-rich siliceous S-facing outcrop beneath an overhang, near a cavern, 30.8.2002 leg. B. Buryová (2968)
- Velká Kotelní jáma cirque: ravine of the SE-flowing stream, middle part, 260 m E of the top of Mt. Kotel, E3537.77-N5624.79, ca. 1320 m, inclined on fissures and ledges of a NE-facing gneiss rock, slightly shaded, 27.6.2003 leg. M. Zmrhalová (11151-2); dtto, middle part of the NNE-facing side-gorge at the right side of the brook, 240 m E of the top of Mt. Kotel, E3537.76-N5624.80, 1330 m, humus on projection of base-rich NE exposed rock base, 31.8.2002 leg. B. Buryová (3018); dtto, upper third of the NNE exposed side-gorge at the right side of the brook, 235 m E of the top of Mt. Kotel, E3537.75-N5624.80, 1335 m, humus layer on NE-facing ledge of base-rich rock, 31.8.2002 leg. B. Buryová (3013); dtto, upper part of the ravine, NE-facing slope, rocks at the right side of the brook, 180 m E of the top of Mt. Kotel, E3537.70-N5624.83, 1380 m, vertical NE-facing base-rich outcrop face, 31.8.2002 leg. B. Buryová (3006)

The occurrence at Mt Kotel is known for a long time, the species is scattered at suitable sites and perhaps not under immediate threat.

Grimmia anomala

- Velká Kotelní jáma cirque: ravine of the SE-flowing stream, beneath the rocks at the right side of the ravine, 190 m ENE of the top of Mt. Kotel, E3537.70-N5624.85, 1370 m, inclined, open, dry ESE-facing erlan rock outcrop, 31.8.2002 leg. J. Kučera (9790) & B. Buryová (3001).

Interestingly, this species, rather common at suitable sites in the Hrubý Jeseník Mts, seems to have only this single locality in the Krkonoše Mts. It was first recognized by Z. Pilous (Pilous 1957) but collected inconsciously already by Vilhelm in 1919 (several unidentified specimens in herb. PRC, det J. Kučera). *Grimmia anomala* grows here on ca. 1.2 × 3.2 m large erlan rock plate, the cover was estimated at ca. 40% which equals to ca. 1.5 m² of pure stand.

Grimmia sessitana

- Valley of Kotelní potok brook 30 m above the touristic path crossing at a bridge, 750 m SE of the top of Mt. Kotel, E3538.07-N5624.31, 1080 m, top face of a granitic boulder near the brook, 16.6.2001 leg. J. Kučera (8051)
- Velká Kotelní jáma cirque: bottom of the cirque, above the confluence of ESE- and SE-flowing streams, 450 m ESE of the top of Mt. Kotel, E3537.95-N5624.715, 1180 m, granite stone among tall forbs, open, dry face, 2.9.2002 leg. J. Kučera (9819)
- Velká Kotelní jáma cirque: central part, ravine of the SSE-flowing stream (middle part), SSE-exposed slope above the right side of the brook, 400 m E of the top of Mt. Kotel, E3537.91-N5624.82, 1220 m, open dry SW-exposed face of siliceous boulder, 18.6.2001 leg. B. Buryová (2739)
- Velká Kotelní jáma cirque: ravine of the SSW-flowing stream (lower part), 540 m S of ‘Harrachovy kameny’ rock formation, E3538.11-N5624.52, 1135 m, fissure of an open siliceous stone in the brook bed, 17.6.2001 leg. B. Buryová (2718); dtto, upper part, 300 m SE of ‘Harrachovy kameny’ rock formation, E3538.31-N5624.84, 1340 m, inclined face of a periodically flooded granite outcrop, SSW-facing, open, 17.6.2001 leg. J. Kučera (8120)
- Labský důl: scree beneath the rocks at the left bank of the Labe (ca. 20 m above the brook), 140-150 m beneath the waterfall; E3538.96; N5626.81; ca. 1185 m; inclined, S-facing gneiss boulder face in the scree; 27.7.2001; leg. J. Kučera (8241), M. Zmrhalová (9782); dtto (ca. 10 m above the brook), ca. 140 m beneath the waterfall; E3538.94; N5626.81; ca. 1195 m; gneiss boulder in the scree, SW-facing inclined face; 27.7.2001; leg. J. Kučera (8244, 8245); dtto, ca. 110 m beneath the waterfall; E3538.93; N5626.83; 1200 m; SW face of a granite boulder in the scree; 27.7.2001; leg. J. Kučera (8256); dtto, 40 m ENE of the waterfall; E3538.86; N5626.90; 1235 m; on inclined S-facing boulder at SE slope; 27.7.2001; leg. M. Zmrhalová (9727)

Until now, *Grimmia sessitana* has only been known from a single site in the whole country – ‘Čertova zahrádka’ on the E slopes of Mt Studniční hora in the eastern part of the range (see Buryová & Kučera 2001). It seems however, that it occurs at more sites of the summit region. With the exception of Kučera 8051 (0.41 dm²) the other stands in the Velká Kotelní jáma cirque have not been recognized in the field and therefore not measured. In the Labský důl valley, all occurrences have been recorded in the Labská rokle ravine beneath the waterfall, mostly in the scree between 100 and 150 mts from the fall’s foot. The population accounted for some 93 cm².

Grimmia torquata

- Velká Kotelní jáma cirque: ravine of the SE-flowing stream, rocks at the right side of the ravine 190 m ENE of the top of Mt. Kotel, E3537.69-N5624.855, 1390 m, beneath an overhang of ESE-facing erlan rock, vertically, half-shaded, 31.8.2002 leg. J. Kučera (9772)
- Velká Kotelní jáma cirque: ravine of the SE-flowing stream, upper third of the NNE exposed side-gorge at the right side of the brook, 250 m E of the top of Mt. Kotel, E3537.75-N5624.80, 1345 m, horizontally on a NE-facing gneiss rock, fissure, nearly not shaded, 27.6.2003 leg. M. Zmrhalová (11148)
- Labský důl valley: identical with the locality of *Amphidium lapponicum*, Kučera 8236, 8239.

Not reported earlier from Mt Kotel but collected there already by Z. Pilous in 1954 (Rev. Váňa, PR). The population is obviously quite small, measured (at Mt Kotel) at ca. 50 cm².

Herzogiella striatella

Similar case as *Gymnomitrium concinnatum* – evaluated Endangered (highest risk) in Váňa 1995, found at 5 microsites in eastern part of the mountains by Kučera & Buryová 2001. The number of recently discovered microlocalities totalled 22 at Mt Kotel (Fig. 1) and 52 in the Labský důl valley (Fig. 2), the measured extent of populations was 28 dm² (equal to roughly 4.5·10⁴ stems at the mean estimated density of 16 stems per 1 cm²) at Mt Kotel and 3.22 m² (or 5.2·10⁵ stems) in the Labský důl valley.

Hylocomium pyrenaicum

- WNW slope of Mt. Kotel, 480 m WNW of the summit, by the touristic path, E3537.06-N5624.96, 1345 m, in tuft of grass above the path ditch, ass. with *Rhytidiadelphus subpinnatus*, 29.6.2003 leg. B. Buryová (3613); dtto, 450 m WNW of the summit, 40 m above the touristic path, E3537.08-N5624.94, 1355 m, decaying grass over a siliceous stone in wet meadow with *Anemone narcissiflora*, 29.6.2003 leg. B. Buryová (3619)
- Velká Kotelní jáma cirque: E slopes of Mt. Kotel just beneath the cirque face, uppermost part of the ESE ravine, 180 m ESE of the top of Mt. Kotel, E3537.68-N5624.76, 1370 m, 15.6.2001 leg. M. Zmrhalová (9514); dtto, Velká Kotelní jáma cirque: western part, along the ESE-flowing stream - uppermost part, 240 m E-ESE of the top of Mt. Kotel, E3537.74-N5624.755, 1325 m, aluvium at ESE slope, vertically at gneiss stone in scree, half-shaded, 30.8.2002 leg. M. Zmrhalová (10530)
- Velká Kotelní jáma cirque: western part, rocks above (SSW of) the ESE-flowing stream, ca. 260 m ESE of the top of Mt. Kotel, E3537.75-N5624.72, 1305 m, 18.6.2001 leg. M. Zmrhalová (9675)
- Velká Kotelní jáma cirque: western part, beneath the rocks above (SSW of) the ESE-flowing stream, ca. 20-25 m above the brook, 270 m ESE of the top of Mt. Kotel, E3537.77-N5624.705, 1300 m, on humus in the grass, SE slope, 18.6.2001 leg. J. Kučera (8203)
- Velká Kotelní jáma cirque: ravine of the SE-flowing stream in the W part of the cirque, 260 m E of the top of Mt. Kotel, E3537.75-N5624.83, ca. 1345 m, 16.6.2001 leg. M. Zmrhalová (9638)
- Velká Kotelní jáma cirque: ravine of the SE-flowing stream in the W part of the cirque, right bank, 270 m E of the top of Mt. Kotel, E3537.78-N5624.79, 1315 m, on humus over nearly horizontal, ESE-facing base-rich siliceous rock, 16.6.2001 leg. J. Kučera (8099)

Mnium ambiguum

The species is quite regular (ca. 10 sites) on base-rich erlan and limestone rocks in the SE and ESE ravines and between them in the Velká Kot. jáma (1270 to 1380 m). It has also been recorded at two close sites in the Malá Kot. jáma:

- Malá Kotelní jáma cirque: the easternmost ravine, 235 m ESE-SE of the top of Mt. Kotel, E3537.70-N5624.68, 1335 m, inclined at moist humose soil, shaded by vegetation, 31.8.2002 leg. M. Zmrhalová (10684); dtto, E3537.70-N5624.66, 1335 m, inclined at moist humose soil, shaded by vegetation, 31.8.2002 leg. M. Zmrhalová (10686)
- Labský důl valley: Schusterova zahrádka cirque, 180 m ENE of 'Ambrožova vyhlídka' observatory, E3538.77-N5626.05, ca. 1150 m, sandy soil in a rock niche beneath an overhang, E-facing, 29.7.2001 leg. J. Kučera (8322), M. Zmrhalová (10929)

The lack of historical records is perhaps mainly based on non-recognition from both *M. marginatum* and *M. thomsonii*. The six measured populations account for 3.0 dm² which might represent very roughly a half of the extant population.

Pohlia ludwigii

- WNW slope of Mt. Kotel, 480 m WNW of the summit, ditch by the touristic path, E3537.06-N5624.96, 1340 m, shaded periodically wet mineral soil, ass. with *Calypogeia azurea*, 29.6.2003 leg. B. Buryová (3611, 3616, 3617)
- N slope of Mt. Kotel: in the ca. 60 m ditch stretch along the touristic path, 370-380 m N-NNW of the top of Mt. Kotel, E3537.45-51, N5625.17-18, 1375 m, standing in water and on moist soil, 15.6.2001 and 2.9.2002 leg. J. Kučera (7975), B. Buryová (2635-6, 3044), V. Plášek (10394)
- Velká Kotelní jáma cirque: ravine of the SSE-flowing stream (uppermost part), 390 m ENE of the top of Mt. Kotel, E3537.83-84, N5625.01-04, 1360-1380 m, on wet sandy soil and beneath tall forbs in the SSE slope, 18.6.2001 leg. J. Kučera (8148-50), B. Buryová (2722, 2724), M. Zmrhalová (9641-2)
- Velká Kotelní jáma cirque: W part of the cirque in the source area of the right branch of SE-flowing stream, 160 m E of the top of Mt. Kotel, SE exposed slope, E3537.68-N5624.85, 1390 m, on humus and decaying vegetation in late snow area above the spring site, 31.8.2002 leg. B. Buryová (3000)
- Velká Kotelní jáma cirque: bottom of the cirque, beneath the scree at the right side of the brook, 540 m ESE of the top of Mt. Kotel, E3538.00-N5624.58, 1045 m, on wet shaded decaying vegetation in a spring site, ass. with *Pohlia wahlenbergii*, *Philonotis seriata*, 27.6.2003 leg. B. Buryová (3559)
- Labský důl valley, Navorská jáma cirque, 180 m S-SSE of Labská bouda lodge; E3538.653; N5626.584; 1295 m; horizontally in an ESE-facing periodically flooded stream, shaded by vegetation, E-ESE slope; 11.9.2002; leg. M. Zmrhalová (10876)

Interestingly, the species has been earlier recorded only by Wagnerová (1991). The extant population is relatively extensive (perhaps several m² in total). In the Labský důl valley, the species has been recorded not very far from the historical record ('Elbwiese' = Labská louka mire around the sources of Labe, Milde 1869).

Pseudoleskeella rupestris

First published from the Czech Republic by Váňa (1995) and known to exist on a single site around the old adit. The species has however been collected here earlier (e.g. the specimen named 'Leskea catenulata' from BRNM, collected in 1951 by Z. Pilous, rev. B. Buryová). Confirmed around the entrance to the old adit (3537.71-5624.74, 1350 m), and further found at several microsites in the middle part of the SE ravine (1320-1340 m) and at the joint of SE and ESE ravines (ca. 1250 m). The population was measured to total ca. 15 dm².

Weissia controversa var. *wimmeriana*

- Velká Kotelní jáma cirque: lower part of the ESE ravine, above the confluence with SSE-flowing stream, 400 m ESE of the top of Mt. Kotel, E3537.90-N5624.69, ca. 1190 m, on humus over a siliceous stone by the brooklet, 16.6.2001 leg. J. Kučera (8078)
- Velká Kotelní jáma cirque: rocks at the confluence of brooklets (ESE-flowing and SE-flowing stream in the W part of the cirque), 310 m ESE of the top of Mt. Kotel, E3537.81-N5624.75, ca. 1260 m, on humus, hanging over base-rich rocks in ESE slope, 16.6.2001 leg. J. Kučera (8087), M. Zmrhalová (9451-2); dtto, above the confluence with the SE-flowing stream, SE-facing rocks 290 m ESE of the top of Mt. Kotel, E3537.80-N5624.74, ca. 1270 m, on humus among base-rich stones, SE slope, 18.6.2001 leg. J. Kučera (8193)

Not reported earlier from the locality but collected already by Z. Pilous in 1951 and later (specimens in PR). The species is perhaps quite regularly scattered and the population is apparently migrating and somewhat fluctuating at the site. The measurements have not been performed but very rough estimate of the cover is several dm² in total.

Historically reported species without recent records

In total, 49 historically reported species have not been re-found during the survey at Mt Kotel and 51 in the Labský důl valley. Among them, the following eight are regarded to be extremely doubtful.

Anastrophyllum hellerianum

Velenovský (1901b) reports the species from Mt Kotel on behalf of Vilhelm's collection. The specimen has never been found but all other Velenovský's identifications of *A. h.* were incorrect.

Bryum schleicheri

Velká Kot. jáma, coll. Wagnerová 1966, 1969 (Wagnerová 1970). Most of the mosses, collected by Wagnerová, have been identified by J. Váňa. Similarly as in other cases (see below), very likely a misidentification for *B. pseudotriquetrum*.

Dicranoweisia cirrata

Velká Kot. jáma (1350 m!), coll. Wagnerová 1969 (Wagnerová 1970). Very likely a misidentification for some other species or misspelled *D. crispula*.

Leskea polycarpa

Velká Kotelná jáma, coll. Pokorná (Pokorná 1978); Malá Kotelní jáma, 1390 m, 1990 coll. Wagnerová (Wagnerová 1992). Very unlikely to occur at this altitude; both authors are non-bryologists – probably a misidentification for some other *Leskeaceae*.

Paludella squarrosa

Labský důl: reported by Zlatník (1928) from beneath the Labská bouda lodge, 1280 m – with respect to the ecology it is probably the mistake for *Dichodontium palustre*.

Plagiomnium rostratum

Labský důl: reported by Wagnerová (1992) from 'Schustlerova zahrádka' in the Pančavská jáma, 1270 m, with respect to the ecology it is probably the mistake for either *Plagiomnium affine* or *P. ellipticum*.

Racomitrium heterostichum

Velká Kot. jáma (Berciková 1976, Wagnerová 1970, Wagnerová & Šírová 1971). Very likely *R. sudeticum*, included as a subspecies of *R. heterostichum* in Pilous & Duda (1960), was meant.

Rhizomnium pseudopunctatum

Velká Kot. jáma, coll. Wagnerová 1969 (Wagnerová 1970). As in previous case, Pilous & Duda (1960) have recognized only *R. punctatum* and *R. pseudopunctatum*, and the differentiating character was the percurrency of the costa. Hence, both *R. punctatum* and *magnifolium*, occurring at Mt Kotel, could be included in this concept.

Some eleven more species, reported from Mt Kotel and seven species from the Labský důl, are uncertain records which could not be verified:

Bazzania flaccida

'Elbgrund', coll. J. Flotow (Nees 1838). In earlier times, forms of *Bazzania trilobata* (particularly *B. trilobata* var. *depauperata*) have been confused with *B. flaccida* (cf. Grolle 1973).

Gymnomitrium obtusum

Vel. Kot. jáma, 1380m, coll. Cypers (Cypers 1926). Until now, the only verified records is from the Polish side of the range (Melzergrund or dolina Łomniczky). The misidentification for the obtuse-lobed modification of the common *G. concinnatum* is very likely.

Brachythecium rutabulum

Velká & Malá Kot. jáma, coll. Wagnerová 1969, 1989 (Wagnerová 1970, 1991). ‘Labský důl valley, main scree in the Pančavská jáma cirque – Schustlerova zahrádka, 1100m; Pančavská jáma SE of the waterfall; Harrachova jáma cirque, avalanche course, 1030 m’, VII.1971 coll. Sýkora & Štursa (Sýkora & Štursa 1973). Very probably a misidentification for either *B. rivulare* or *B. salebrosum* but anyway the occurrence of the species in the lower parts of the Labský důl valley is likely. It has even been confirmed at the anthropically affected site near the former Jestřábí boudy lodge.

Cynodontium bruntonii

Kotel, coll. Limpricht (Milde 1869 ff.). Very probably a misidentification for *Dicranoweisia crispula*. *C. bruntonii* is a thermophilous species, not known from the altitudes over 700-800m in our country.

Dicranum polysetum

Kotel, coll. Dresler (Matouschek 1902). This species seems to occur only in drier woods at lower altitudes in the Krkonoše Mts. Very probably a misidentification for *D. scoparium*.

Eurhynchium flotowianum

‘Im Elbgrunde’, coll. Nees (Nees 1840). With respect to ecology of the species a very improbable record.

Eurhynchium speciosum

‘Labský důl valley, Strmá stráň’, coll. J. Šašková (Šašková 1984); probably a misidentification for *E. hians* or even a different genus of *Brachytheciaceae*. The specimen is missing in herbarium PRC where the other collections of the author are deposited.

Homomallium incurvatum

‘Im Elbgrunde’, coll. Milde (Milde 1869). If not a misidentification, the record is perhaps from the lowermost part of the valley where some basic substrata, including the artificial ones occur.

Kiaeria falcata

Kotel, coll. Milde (Milde 1869), Cypers (Cypers 1897), Dresler (Matouschek 1902). *K. falcata* has been commonly misidentified with *K. blyttii* or even for completely unrelated species by less experienced bryologists. The species seems to be confined to very extreme habitats in the Krkonoše Mts that do not occur at all at Mt Kotel; hence the records are very uncertain.

Orthotrichum rupestre

‘Im Elbgrunde’, coll. Milde (Milde 1869). If not a misidentification, the record is perhaps from the lowermost part of the valley.

Plagiomnium elatum

‘Labský důl valley, Strmá stráň’, coll. J. Šašková (Šašková 1984); with respect to the author (a non-bryologist), there is a high chance for misidentification for e.g. *P. affine*. The specimen is missing in herbarium PRC where the other collections of the author are deposited.

Platygyrium repens

Malá Kot. jáma, 1140m, coll. Wagnerová 1969 (Wagnerová 1970). Perhaps the only historical report of the species from this altitude. The author is not bryologist, hence there is a high chance for misidentification for even a completely unrelated species.

Racomitrium macounii subsp. *macounii*

Velká Kot. jáma, 1200m, coll. Cypers (Cypers 1927). Reported as *R. sudeticum* var. *validius* Jur. but it is unlikely that Cypers would have a material of this variety for comparison; thus very likely a misidentification for a larger form of *R. sudeticum*. In our opinion, there is no suitable habitat for *R. m. macounii* at Mt Kotel.

Scleropodium purum

‘Im Elbgrunde’, coll. Nees (Nees 1840). If not a misidentification, the record is perhaps from the lowermost part of the valley.

Sphagnum inundatum

Velká Kot. jáma, coll. Wagnerová 1969 (Wagnerová 1970). Very likely a misidentification for *S. denticulatum*.

Sphagnum subsecundum

several localities in both Velká and Malá Kot. jáma, 1969, 1990 coll. Wagnerová (Wagnerová 1970, 1992). ‘Labský důl valley, Navorská jáma cirque, 1250 m’, IX.1990 coll. Wagnerová (Wagnerová 1992). Very likely a misidentification for *S. denticulatum*.

The remaining species (33 from Mt Kotel and 40 from the Labský důl) are included in the following list. The exclamation mark means that the at least one specimen of the species has been revised.

Anastrophyllum michauxii

‘Labský důl valley’, coll. K.G. Limpricht (Limpricht 1876). A species that has strongly retreated from its mostly epixylic habitat.

! *Anastrophyllum saxicola*

‘Labský důl valley’, VI.1942 coll. J. Futschig (OP, rev. Váňa (Duda & Váňa 1983)). According to Futschig (pers. comm. to J. Váňa), collected somewhere at the rocky slope beneath the Labská bouda lodge; despite the effort in many subsequent years, the search proved unsuccessful.

Anthelia julacea

‘Beneath the top of Kotel’, coll. Vilhelm, Velká Kot. jáma, 1380m, coll. Cypers (Velenovský 1901b, Cypers 1926). There are very few suitable sites for the species at Mt Kotel but some do exist. The population might have been too small to survive the overall warming and shrinking of the suitable habitat but, the misidentification cannot be fully excluded as well.

Bazzania trilobata

Kotelní důl, coll. Nees (Dědeček 1883). The species very probably still grows in the lower wooded parts of the valley which have not been subject to our study.

! *Bazzania trilobata* var. *depauperata*

‘Labský důl, am oberen Rand in der Nähe des Wasserfalles der Pančice’, VII.1967 coll. J. Futschig (Futschig & Váňa 1969, teste J. Duda (Duda & Váňa 1991)). Not refound despite a focused search but could still occur at the site.

! Cephalozia pleniceps

Velká Kotelná jáma, 1300 m, 1966 coll. Váňa, herb. Váňa! (Duda & Váňa 45, 1986). The species was still present at the site in several years following the first discovery but our search proved unsuccessful.

Chiloscyphus coadunatus

‘Labský důl valley, Harrachova jáma cirque, 1030 m’, VII.1971 coll. Sýkora & Štursa (Sýkora & Štursa 1973). With certainty occurring in the lower parts of the valley, at this particular site could have been overlooked during our survey.

! Geocalyx graveolens

Nearby the lodge ‘Kotelní bouda’, 1938 coll. Futschig, OP! (Duda & Váňa 1977). The site is actually outside the studied area; the lodge is not standing anymore and the site conditions could have changed since the record was made.

Harpanthus flotovianus

Velká Kot. jáma, 1350 m, coll. Cypers (Cypers 1926). Despite the continuing occurrence of several spring sites in the upper part of the cirque, the search for the species proved unsuccessful.

Harpanthus scutatus

‘Labský důl valley’, 1819 coll. Ch. Funck (Nees 1833 ff.). Similarly as *Anastrophyllum michauxii*, strongly retreating species occurring mostly epixylic; very probably collected in the lower parts of the valley outside our study area.

Jamesoniella autumnalis

‘Labský důl valley’, coll. K.G. Limpricht (Limpricht 1876). It could perhaps still occur in the valley but rather in its lower part outside our study area.

! Jungermannia atrovirens

Velká Kot. jáma, 1300-1350 m, 1966 coll. Váňa, herb. Váňa! (Duda & Váňa 1969). A similar case as with *Cephalozia pleniceps*; the species has been for the last time seen in 1968 at the site.

! Lophozia ascendens

‘Labský důl valley, on decaying wood’, VII.1964 coll. J. Futschig (Futschig 1966); ‘dtto, 900 m’, VI.1985 coll. J. Váňa (Duda & Váňa 1989). Both records are obviously from the lower part of valley outside our study area.

Lophozia incisa

‘Im Kesselgrunde’, coll. Nees (Nees 1833). Very probably the collection site lies outside the studied area, in the lower parts around the Kotelní potok brook.

! Lophozia kunzeana

‘Labský důl valley, above the site ‘U Dívčí Lávky’ [ca. 800 m]’, VI.1942 coll. J. Futschig (OP, rev. J. Duda (Duda & Váňa 1983); ‘beneath the Labská bouda lodge [ca. 1250-1300 m]’, IX.1900 coll. J. Velenovský (PRC, rev. J. Duda l.c.). Rare species which however still could occur in the valley.

! Marsupella sprucei

‘Labský důl valley, near the Labský vodopád waterfall’, VI.1895 coll. A.W. Evans (BP!, rev. J. Váňa (Duda & Váňa 1979)). Never collected since that time, perhaps having occurred in a very small population.

! Moerckia hibernica

'Im Waldbache des Kesselgrundes', 1833 coll. Nees (Nees 1833 ff., rev. Váňa, STR!). One of the most intensely searched species throughout the 20th century and also during our survey; despite this, the search at Mt. Kotel proved again unsuccessful.

! Nardia geoscyphus

'Labský důl valley, Strmá stráň, 1200 m', coll. J. Šašková (Šašková 1984); teste J. Váňa (PRC!).

Nowellia curvifolia

'Elbgrund' (Limpricht 1876). Probably collected in the lower part of the valley, not subject to our survey.

Porella platyphylla

'Labský důl valley, main scree in the Pančavská jáma cirque – Schustlerova zahrádka, 1080 m', VII.1971 coll. Sýkora & Štursa (Sýkora & Štursa 1973). Might be a misidentification for *P. cordaeana*, proven to occur at the site.

! Radula complanata

Kotel, 1898 coll. Vilhelm (Rev. Váňa, PRC!). The species has perhaps been collected in the lower wooded part of the valley, outside the studied area.; 'Labský důl valley, on rocks', 1832 coll. J. Flotow (Dědeček 1883). Might be a misidentification for *R. lindenberghiana*, proven to occur at the site.

! Riccardia chamaedryfolia

'Labský důl valley, near the waterfall of Pančava', IX.1946 coll. Z. Pilous, rev. J. Váňa (OP!, Duda & Váňa 1981).

Scapania curta

'Labský důl valley', coll. J. Dědeček (Dědeček 1883). Probably collected in the lower part of the valley, not subject to our survey.

! Amblystegium fluviatile

'Labský důl valley', VII.1947 coll. Z. Pilous, rev. J. Váňa (PRC!). Probably collected in the lower part of the valley, not subject to our survey.

! Anomobryum julaceum var. *concinatum*

Kotel, near the old adit, 1947 and 1951 coll. Pilous (Pilous 1951a, rev. Váňa, PR!, rev. Buryová, BRNM!). The species uses to grow in very little quantities (according our experience from the localities in the Hrubý Jeseník Mts), so it might be re-discovered again in future at the locality. Anyway, no larger population could have survived.

Brachythecium geheebii

Velká Kot. jáma, coll. H. Schulze (Velenovský 1897). If correctly identified, a similar case as the preceding one.

Bryum alpinum

'In praeruptis sub Kotel', coll. Velenovský (Podpěra 1952), Velká Kot. jáma, coll. Wagnerová 1989 (Wagnerová 1991). There is quite a high probability of incorrect identification (for e.g. *Bryum muehlenbeckii*, *Pohlia nutans* subsp. *schimperii* or even *Bryum pseudotriquetrum*) in both cases.

Bryum imbricatum

Kotel, coll. Nees (Nees 1840 ff.), coll. Cypers (Cypers 1897). The species has been commonly misidentified (e.g. with the similar and much commoner *B. pallescens*) but there is no reason why it still could not occur at the locality. The common occurrence of *B. pallescens* prevented us from checking every population.

! *Bryum mildeanum*

‘In the ravine beneath Mt Kotel’, 1900 coll. Velenovský (Rev. Kučera, BRNM!). The small size and tendency to growths in small patches could be the reason for not re-locating the species but it could of course have disappeared completely.

! *Campylium protensum*

‘Labský důl valley’, IX.1896 coll. J. Velenovský sub *C. stellatum* (rev. J. Váňa, PRC!)

! *Cynodontium tenellum*

Kotelné jámy, 1946 coll. Pilous (Rev. Váňa, PR!). Perhaps not found due to the difficult recognition in the field from the common *C. polycarpon*.

Dicranoweisia cirrata

There are two known historical records from ‘Labský důl valley’. Both of specimens were collected by Z. Pilous – 1) leg. VII.1947, probably as an epiphyte in the lower part of the valley (not subject to our survey), rev. V. Pospíšil (Pospíšil 1989); 2) leg. 1.IX.1947 on bark of solitary tree at the altitude about 1000 m a.s.l., gemmiferous plants, teste Plášek (Plášek 2001).

Dicranum bonjeanii

Kotel, coll. Pilous (Pilous 1969). The revision of the specimen would be important as there is a high chance of misidentification for the forms of *D. scoparium*.

! *Distichium capillaceum*

‘Elbgrund, Serpentine bei Spindelmühle’, VI.1897 coll. V. Schiffner (PRC!, rev. J. Kučera). The locality is perhaps identical with so-called ‘Medvědí koleno’ at ca. 800 m a.s.l., outside the studied area. The species has been recorded nearby by the authors in 1997 (Kučera 2297).

! *Encalypta spathulata*

Kotel, 1949 coll. Pilous (Rev. Váňa, PR!). This taxon could be identical with ‘our’ *Encalypta trachymitria* (see the discussion under the entry in Kučera & Váňa 2003) – all our gatherings of *E. rhapsocarpa* s. l. had at least traces of rudimentary peristome whereas the Pilous’ specimen labeled *E. spathulata* had not but otherwise we could not see any difference.

Fontinalis antipyretica

‘Elbfall [Labský vodopád waterfall]’, coll. J. Milde (1869). Interestingly, not refound at that particular site but very likely still occurring in the lower parts of the valley.

Fontinalis squamosa

‘Elbfall; Elbgrund’, coll. J. Milde (1869). Very probably still occurring in the lower parts of the valley.

! *Grimmia elatior*

Kotel (Limpricht 1876), 1898 coll. Vilhelm (rev. Kučera, PRC!). Strangely, this species seems to have vanished from all historical localities that were searched in the recent time.

Grimmia longirostris

Velká Kot. jáma, coll. Matouschek (Matouschek 1895 ff.). The historical (and perhaps even recent) occurrence of this species at the locality is of course possible but there is a high chance for misidentification as well, due to the changing historical concepts of the species.

Homalia trichomanoides

‘Elbgrund, 850 m’, coll. V. Cypers (1902). Very probably still occurring in the lower parts of the valley.

Hookeria lucens

‘Im Elbgrunde’, coll. M. v. Uechtritz (Veselsky 1860ff.); ‘Elbgrund in der Nähe des Elbfalles’, coll. V. Cypers (1902). The two records might well refer to the same locality where the species has not been refound during our survey.

Hygrohypnum molle (incl. *H. duriusculum*)

Kotel (Milde 1869), am Abhange der Kesselkoppe, coll. Cypers (Cypers 1902). Very probably the species would be found in the lower parts of the valley in the Kotelní potok brook.

Hygrohypnum smithii

Mt Kotel, coll. Limpricht (Milde 1869 ff.); ‘am Elbfalle’, VIII.1832 coll. J. Flotow (Milde 1869 ff.). This species seems to have vanished from all our historical localities and is regarded extinct in our country.

Hylocomium pyrenaicum

‘Elbgrund’, coll. J. Milde (1869). There are not many sites where the species could be found in the valley; one of them is the lower part of the Pančavská jáma cirque; our to-date search was however unsuccessful.

Isopterygiopsis pulchella

Mt Kotel, coll. O. Sendtner (Milde 1861 ff.), Velká Kot. jáma, unterhalb des Bergwerkes, coll. Cypers (Cypers 1902 ff.). The species could have been overlooked due to the tendency to grow in very small patches but the population in the country has definitely dwindled.

! *Lescuraea radicata*

‘Labský důl valley, near the waterfall of Pančava, ca. 1350 m’ coll. Z. Pilous (Pilous 1957). We were able to trace even more specimens, collected by Pilous (near the waterfall of Pančava, VI.1954, PR!, dtto sub *L. mutabilis*, ca. 1200m, V.1948 and ca. 1290m [the latter labelled ‘on bark of Salix’!], IX.1948 both BRNM!). Our search for the species remained unsuccessful but there are still many sites at the locality where the species could grow.

! *Lescuraea saxicola*

‘Labský důl valley, waterfall of Pančava’ V.1948 coll. Z. Pilous (PR!, rev. J. Kučera). Velenovský’s record (1897) from the Labský vodopád waterfall is based on misidentification for *Brachythecium populeum* (PRC!, rev. J. Kučera).

Neckera pennata

‘Im Elbgrunde, 820m and without exact locality’, coll. V. Cypers (Schiffner 1897, Cypers 1902; 1894 at 950m and 1896 coll. V. Cypers sec. Kafková 1988). All records are obviously from the lower parts of the valley, the recent occurrence is however questionable due to the strong retreat of the species in our country.

Orthotrichum speciosum

‘Im Elbgrunde, an *Sorbus*’, coll. V. Cypers (Cypers 1897); dtto, on *Fagus*, X.1886 coll. V. Cypers sub *O. affine*, KM, rev. M. Vondráček; dtto, VIII.1898 coll. J. Podpěra, PR (Vondráček 1993). Very probably still occurring in the lower parts of the valley.

Orthotrichum stramineum

‘Im Elbgrunde, 860 m’ X.1886 coll. V. Cypers sub *O. affine*, KM, rev. M. Vondráček; ‘Labský důl valley, beneath the Labská bouda lodge’, IX.1896 coll. J. Velenovský, PRC, rev. M. Vondráček PR (Vondráček 1993). Very probably still occurring in the lower parts of the valley.

! *Plagiopus oederianus*

Kotel, 1954 coll. Pilous (Rev. Váňa, PR!). Perhaps having existed in too small population to survive to these days.

! *Plagiothecium nemorale*

Mt Kotel, 1898 coll. Vilhelm (Vilhelm 1901, teste Váňa, PRC!). Collected very probably in the lower wooded parts outside our study area; ‘Elbfall [Labský vodopád waterfall]’, coll. J. Milde (1869). The record is not fully credible, as the earlier concept of the species has not always been identical with the recent one.

Platyhypnidium riparioides

Kotel, coll. Milde (Milde 1869). Very probably the species would be found in the lower parts of the valley in the Kotelní potok brook.

Pohlia annotina

Kotel, coll. Pilous (Havránková 1985). A species which might occur periodically after a suitable substrate is made.

(*Pterigynandrum filiforme*)

‘Im oberen Teile des Elbgrundes, an *Sorbus*’ (Cypers 1902). We have recorded the species in the lower part of the valley.

Ptilium crista-castrensis

[Velká?] Kot. jáma, coll. Milde (Milde 1869); ‘Elbgrund’ (Cypers 1902). Collected very probably in the lower wooded parts outside our study area in both cases. It has to be stressed that the species has retreated over the last century and may not be retrieved at the localities.

! *Racomitrium canescens*

Velká Kotelná jáma, 1919 coll. Vilhelm (rev. Kučera, PRC!). Only *R. elongatum* has been seen from this species complex but the occurrence is still possible.

! *Schistidium lancifolium*

Kotel, 1865 coll. Limpricht, S! (Blom 1996). This species is quite rare in the region and has not been found despite a targeted search.

! (*Schistidium papillosum*)

‘Elbgrund, Serpentine bei Spindelmühle’, VI.1897 coll. V. Schiffner (PRC!, rev. J. Kučera). The locality is outside our study area; we have recorded the species only above the cirque face, at the ‘Hančův pomník’ memorial (Kučera 8315).

Schistidium rivulare

am Abhange des Kesselkoppe, coll. Cypers (Cypers 1897). Very probably the species would be found in the lower parts of the valley in the Kotelní potok brook.

Serpoleskea confervoides

Kotel, 1200 m, coll. Limpricht (Limpricht 1876). The search for the species proved unsuccessful but it is difficult to pretend that it vanished completely from the locality due to the tiny size of the plants.

Serpoleskea subtilis

Mt Kotel (Milde 1869); 'Labský důl valley', coll. V. Cypers (Cypers 1902). It would be very probably found in the lower wooded parts outside the studied area.

Sphagnum rubellum

'Cirque face of Labská jáma, 1350 m', VII.1973 coll. M. Berciková (Berciková 1976). The occurrence at the reported locality is possible but it could well also be a misidentification for e.g. *S. capillifolium* or even *S. russowii* or *S. subnitens*.

! *Stegonia latifolia*

Velká Kotelná jáma, 1350 m, 1951 coll. Pilous (Pilous 1951b, rev. Váňa, PR!). The author of this remarkable find later himself stated that he could not find the species anymore.

Ulota bruchii

'Labský důl valley, near the Labská bouda lodge', IX.1896 coll. J. Velenovský, PRC, rev. M. Vondráček (Vondráček 1994); 'Elbgrund' (Cypers 1897). The species obviously disappeared from the upper part of the valley but could still occur in the lower parts.

Ulota coarctata

Mt Kotel, coll. Cypers (Cypers 1897); 'Elbgrund' (Cypers 1897). The species has strongly retreated throughout Central Europe but the presence at the turn of 19th and 20th centuries cannot be excluded. However, the specimen is not present in Cypers' herbarium and generally, the number of misidentifications of this author is quite high.

Ulota crispa

'Labský důl valley, near the Labská bouda lodge', IX.1896 coll. J. Velenovský, PRC; 'Labský důl', coll. W. Schmidt, PRC; 'Labský důl, Dívčí Lávky [ca. 780 m]', coll. V. Schiffner, PR, omnia rev. M. Vondráček (Vondráček 1994); 'Elbgrund' (Cypers 1897). The species obviously disappeared from the upper part of the valley but could still occur in the lower parts.

Excluded historically reported species from Mt Kotel

Cephalozia lacinulata (Velenovský 1900) – est *Cephalozia lunulifolia* (Duda & Váňa 1985, PRC!)

Jungermannia jenseniana (Váňa 1967 ff.) – est *Jungermannia confertissima* (Váňa 1974, PRC!)

Lophozia wenzelii (Váňa 1967) – est *Lophozia ventricosa* (rev. Váňa, herb. Váňa!)

Marsupella alpina (Velenovský 1901b) – est *Marsupella emarginata* (Duda & Váňa 1979, PRC!)

Marsupella boeckii (Velenovský 1901b) – est *Cephalozia divaricata* (Duda & Váňa 1979, PRC!)

Plagiochila asplenioides (Váňa 1967) – est *P. porelloides* (rev. Váňa, herb. Váňa!)

Bryum schleicheri (Hadač & Váňa 1971) – est *Bryum pseudotriquetrum* (rev. Kučera, herb. Váňa!)

Cirriphyllum cirrhosum (Velenovský 1900, 1901a, Vilhelm 1901) – est *Brachythecium plumosum* (rev. Kučera, PRC!)
Cirriphyllum crassinervium (coll. Velenovský, Vilhelm, Pilous; Šulcová 1990) – est *Brachythecium plumosum* (rev. Kučera, PRC!)
Dicranodontium uncinatum (Cypers 1897) – est *Dicranum flexicaule* (rev. Kučera, KM!)
Encalypta rhaptocharpa (Pilous 1952 ff.) – est *E. spathulata* (rev. Pilous, unpubl., teste Váňa, PR!)
Grimmia unicolor (Velenovský 1901a) – est *Grimmia elongata* (rev. Kučera, PRC!)
Hygrohypnum eugyrium (Schiffner 1897) – est *Ctenidium molluscum* (Limpricht & Limpricht 1904)
Hypnum imponens (Vilhelm 1901, Velenovský 1901a) – est *Ctenidium molluscum* (rev. Váňa, PRC!)
Racomitrium ericoides (Vilhelm 1901) – est *Racomitrium elongatum* (rev. Kučera, PRC!)

Excluded historically reported species from the Labský důl valley

Pellia epiphylla (Šašková 1984) – est *Pellia* cf. *neesiana* (rev. Váňa, PRC!)
Bryum cirrhatum (Velenovský 1897) – est *B. pallescens* (rev. Kučera, PRC!)
Campylium stellatum (1896 coll. J. Velenovský – est *C. protensum* (rev. Váňa, PRC!)
Dicranum polysetum (Šašková 1984) – est *Dicranum scoparium* (rev. Váňa, PRC!)
Orthotrichum affine (Cypers 1897) – est *O. speciosum* & *O. stramineum* (Vondráček 1993)
Philonotis caespitosa (Boros & Šmarda 1960) – est *P. seriata* (Buryová 1996)
Plagiothecium succulentum (Šašková 1984) – est *P. denticulatum* (rev. Váňa, PRC!)
Racomitrium canescens (Šašková 1984) – est *R. elongatum* (rev. Váňa, PRC!)
Racomitrium heterostichum (Šašková 1984) – est *R. sudeticum* (rev. Váňa, PRC!)
Rhizomnium pseudopunctatum (Šašková 1984) – est *R. magnifolium* (rev. Zmrhalová, PRC!)
Sphagnum obtusum (Cypers 1927) – est *S. girgensohnii* (rev. Váňa, KM!).

Several other incorrectly identified species that have not been cited in literature, have been found during the revision of herbarium material.

Cephalozia catenulata (coll. Limpricht 1871) – est *C. leucantha* (Duda & Váňa 1986)
Cephalozia connivens (coll. Limpricht 1871) – est *C. lunulifolia* (Duda & Váňa 1985)
Marsupella alpina (coll. A. Schmidt 1895) – est *M. sphacelata* (Duda & Váňa 1980)
Mylia anomala (coll. Hilitzer 1924) – est *M. taylorii* (Duda & Váňa 1973)
Nardia compressa (coll. v. Sterneck 1894) – est *N. scalaris* (Duda & Váňa 1972)
Trichocolea tomentella (coll. Cypers 1888) – est *Blepharostoma trichophyllum* (rev. Váňa, KM!)
Dicranella crispa (coll. Vilhelm 1919) – est *Ceratodon purpureus* (rev. Kučera, PRC!)

Discussion

The richness of both localities is fully comparable (and by chance even identical in number). The number of bryophytes recorded at the study sites varied between 45 and 162 at Mt Kotel and between 89 and 172 in the Labský důl. Generally, the species diversity is more evenly distributed throughout the sites in the Labský důl valley and these sites have somewhat larger proportion of liverworts. The richest sites proved to be the base-rich parts of the Velká Kotelní jáma cirque at Mt Kotel (the richest site had 162 taxa but the sum for all three base-rich sites, still smaller than Pančavská jáma cirque is 217) and Pančavská jáma cirque in the Labský důl. The numbers however reflect not only the bryophyte diversity at the sites but also the number of man days spent. It is of general interest that the bryophyte diversity is obviously greater than that of vascular plants. Only 165 species have been reported from the Pančavská jáma cirque (Šourek 1969), whereas the realistic number for bryophytes is at least 200; even the richer cirques at Mt Kotel host 213 species of vascular plants (same source) compared to 264 recently confirmed and perhaps nearly 300

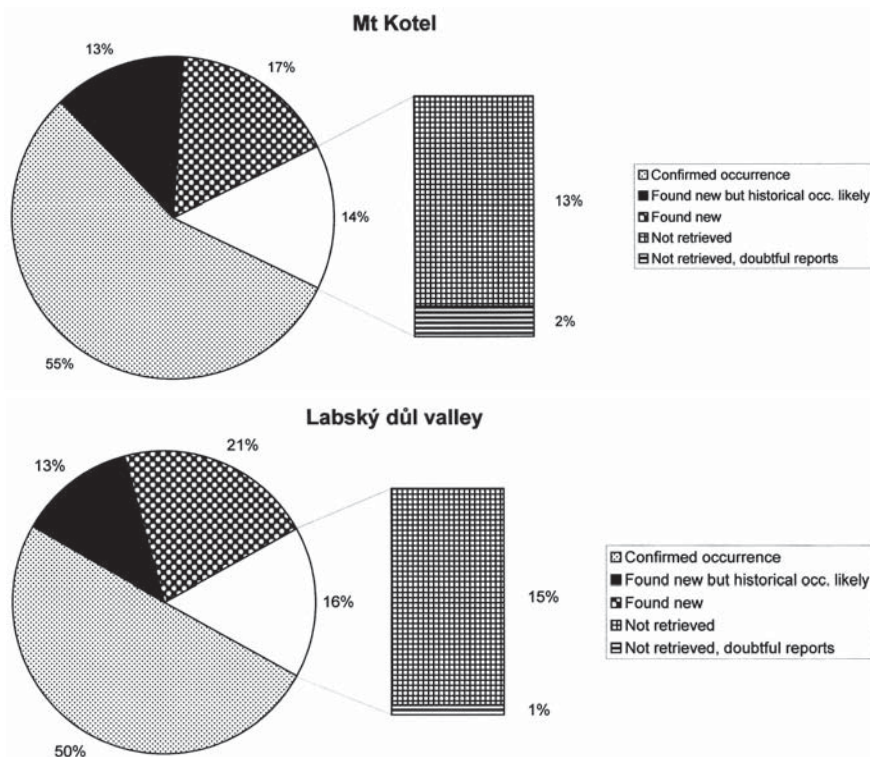


Fig. 3. Comparison of the historical records with our data on presence of the taxa.

ever recorded bryophyte species.

The comparison of the present survey with historical data (Fig. 3) shows basically two facts. The first one is that the flora has not been adequately surveyed prior to this inventory, as shown by our 'addition' of roughly one third of taxa to the known pool. The second fact is that even during this rather thorough study, more than 10% of the total has not been confirmed. The real losses are however somewhat smaller, as some of the taxa would definitely be found in the lower unsurveyed parts of the localities, some would be found should the survey be still deeper (at most 3% of the area has been surveyed) and another part has likely been historically reported in error. Among the unconfirmed taxa, only *Hygrohypnum smithii* is believed to be extinct from our flora but perhaps *Gymnomitrium obtusum*, *Grimmia elatior* and *Stegonia latifolia* are very close to similar conclusion. Other taxa can perhaps be evaluated as extinct from the flora of the Krkonoše Mts (*Anastrophyllum michauxii*, *Anastrophyllum saxicola*, *Harpanthus scutatus*, *Jungermannia atrovirens*, *Anomobryum julaceum* var. *concinatum*, *Neckera pennata*, *Ulota coarctata*) or from the respective localities (*Cephalozia pleniceps*, *Moerckia hibernica*, *Anomobryum julaceum* var. *concinatum*, *Isopterygiopsis pulchella*, *Plagiopus oederianus* or *Serpoleskea confervoides* from Mt Kotel, *Marsupella sprucei*, *Hookeria lucens* or *Neckera pennata* from the Labský důl valley and *Ptilium crista-castrensis* and *Ulota coarctata* from both localities), but fortunately do occur elsewhere in the country.

Among the confirmed taxa, one was believed to be extinct and about 20 endangered (highest risk category) in the previous Red List version (Váňa 1993). This means that we were generally able to document smaller threat level than previously thought for some species (and of course vice versa yet to a smaller degree). Again, the proven lower threat has to be assigned to poor ear-

lier knowledge of many montane taxa. Very few of the recorded taxa can be seen as indicators of human impact – such taxa are perhaps only *Barbula unguiculata*, *Brachythecium albicans*, *Bryum argenteum*, *Dicranella varia*, *Didymodon fallax* and *rigidulus*, *Grimmia pulvinata* and *Tortula muralis*. Some other species, which usually occur on natural sites have been recorded also only on artificial substrate (*Bryum creberrimum*, *Grimmia anodon*, *Schistidium apocarpum* and *robustum*, *Syntrichia norvegica*). The affected sites are practically only those beneath the Labská bouda lodge; the remaining occurrences of anthropically bound taxa were on the concrete bunkers or other concrete parts dispersed at the localities. Three of the recorded taxa can be evaluated as ‘slow invaders’ – *Campylopus flexuosus*, *Bryoerythrophyllum ferruginascens* and *Dicranum tauricum*. They are slowly spreading throughout the country at suitable sites but the speed of the spread is obviously modest.

Conclusions

Total 269 taxa have been recorded in both cirques of Mt Kotel and in the cirques of the Labský důl. At Mt Kotel, additional 22 taxa occur in the summit part above the cirques. Four of the taxa (*Isopterygiopsis muelleriana*, *Lescuraea patens* *Pohlia nutans* subsp. *schimperi* and *Syntrichia norvegica*) are new to the flora of Czech Republic (see Kučera & al. 2003, Kučera & Váňa 2003 and Blockeel & al. 2003), eight others are new to the flora of Krkonoše Mts. 102 taxa in total are newly reported here from Mt Kotel and 106 taxa from the Labský důl valley (about 13% of those were, however, historically reported as of general occurrence). Should we accept the historical occurrence of all not re-found species, the total for the flora of Mt Kotel would be some 340 taxa and that of the Labský důl valley 318 taxa (the infraspecific taxa make up about 2-3%). The unconfirmed taxa account to some 15% of the localities’ flora. We were able to confirm the occurrence of a large number of species, considered to be threatened. Among them, 6 from Mt Kotel and 6 from the Labský důl valley belong to the CR category (which includes *Tayloria tenuis*, evaluated as Data Deficient-Vanished in Kučera & Váňa 2003), 17, resp. 12 to EN category, 20, resp. 18 to VU, 13, resp. 12 to LR-nt and 3, resp. 4 to DD. The survey however itself contributed to this evaluation of threatened status.

The bryoflora of both localities has to be evaluated as extremely rich and very little affected by human impact, which only emphasizes the already well-known unique status of the glacial cirques of the Krkonoše Mts as biodiversity centres and refuges.

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Mechorosty ledovcových karů Západních Krkonoš

V článku jsou shrnuty výsledky tříletého intenzivního bryofloristického průzkumu Kotelních jam a karů Labského dolu v západních Krkonoších. Díky detailní inventarizaci bylo na obou lokalitách celkem nalezeno 346 taxonů mechorostů – 269 shodně v karech Labského dolu i Kotle, 22 dalších bylo zaznamenáno ve vrcholové části Kotle nad jámami. Tento průzkum přidal k dosud známé bryoflore lokalit více než 30%, včetně čtyř taxonů nových pro flóru ČR a osmi dalších nových pro flóru Krkonoš. Nepotvrzených historických údajů zůstalo mezi 10 a 15%, přičemž podíl skutečně vymizelých druhů je pravděpodobně mnohem menší. Při akceptování všech historických údajů by celkový počet taxonů Kotle představoval 340 taxonů a Labského dolu 318 taxonů. Pouze velmi malý počet z nalezených druhů je možné označit jako ruderalní, což podtrhuje význam lokalit jako mimořádně zachovalých a člověkem minimálně narušených. Jsou prezentovány i základní údaje o početnosti nejohroženějších druhů obou lokalit, přičemž se podařilo prokázat, že rozdíly v početnosti populací druhů, dříve hodnocených jako stejně ohrožené, mohou dosahovat i několika řádů. Tato data mají tedy zásadní význam a již byla využita pro přehodnocení ohroženosti některých taxonů podle kritérií IUCN.

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