Two interesting bryofloristic records from the Krkonoše Mts – *Racomitrium macounii* subsp. *alpinum* and *Grimmia reflexidens*

Dva zajímavé bryofloristické nálezy z Krkonoš: *Racomitrium macounii* subsp. *alpinum* a *Grimmia reflexidens*

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During the field inventory survey of bryophytes in eastern part of the Krkonoše Mts carried out in 1998, a new species to the bryoflora of the Czech Republic was discovered – *Racomitrium macounii* subsp. *alpinum*. After the revision of *Racomitrium sudeticum* from herbaria PRC and PR, three other specimens of *R. macounii* subsp. *alpinum* were revealed, all of them collected in the vicinity of existing localities. Another interesting species discovered was *Grimmia reflexidens* (known to-date rather as *Grimmia sessitana*). This taxon was omitted from the recent check-list of Czech bryophytes (Váňa 1997) due to the doubts about Vilhelm's records and poor understanding of *G. reflexidens* with respect to *Grimmia alpestris*. The revision of *Grimmia alpestris* specimens from herbaria PRC, PR, BRNU and OP confirmed the Vilhelm's determination of *G. reflexidens* from the Krkonoše Mts as correct and excluded (for the time being) *G. alpestris* from bryoflora of these mountains. On the contrary, only *G. alpestris* could be confirmed for the bryoflora of the other high Sudeten Mts, i. e. the Hrubý Jeseník Mts.

Keywords: *Racomitrium, Grimmia*, bryophytes, new record, Krkonoše Mts, Czech Republic

Racomitrium macounii subsp. *alpinum* new to the moss flora of the Czech Republic

In 1998, we carried out an inventory field survey of bryophytes on some localities in the vicinity of Mt Sněžka. At two of the visited localities, i. e. the ravine called Čertova zahrádka on the eastern slope of Mt Studniční hora and at the place called Krakonošova zahrádka in Úpská jáma cirque, we collected samples of large *Racomitrium* plants growing there on continuously or seasonally wet rocks. After a detailed microscopic examination we determined the plants as *Racomitrium macounii* Kindb. ex Kindb. subsp. *alpinum* (E. Lawton) Frisvoll, a species new to the bryoflora of the Czech Republic.

Racomitrium macounii is a species first introduced into the European bryoflora after the Frisvoll's revision of *Racomitrium* sect. *Laevifolia* (Kindb.) Nog. (Frisvoll 1988). It was described by N. C. Kindberg in 1889 from British Columbia. In Europe, it was described by Juratzka from the Austrian Alps 7 years earlier (as *Racomitrium sudeticum* (Funck) B. et S. var. *validior* Jur.). The taxon was, however, forgotten during the following years and synonymized with *Racomitrium macounii*, at first in the Frisvoll's revision (it was for instance omitted from the Vilhelm's monograph of the genus *Racomitrium* in Czechoslovakia – Vilhelm 1926). The subspecies *alpinum*, which was likewise described from North America (as a form of *R. sudeticum*) differs from subsp. *macounii* mainly in

having straight appressed leaves (when dry) with somewhat longer hair-points rather than crisped leaves, usually without hair-points, typical of the subsp. *macounii*. In Europe, *R. macounii* subsp. *alpinum* is known from the Alps and Carpathians, Wales, Scotland, Scandinavia, and further from the Caucasus, Faroe Islands, Iceland, Greenland, northwestern North America, and some parts of Asia (NE Turkey, Japan). It is a boreo-montane taxon with a clear affinity to the oceanic climate.

Bednarek-Ochyra (1995) revised material of *Racomitrium* from Poland. She found two localities of subsp. *macounii* in the Tatra Mts and one locality on the Polish side of the Krkonoše Mts. The subspecies *alpinum*, which is generally more frequent, grows scattered through the Tatra Mts. So far, four localities have been also known from the glacier cirques in the northern (Polish) part of the Krkonoše Mts. The occurrence of *R. macounii* could have been therefore expected in the Czech Republic too, but the revision of the genus *Racomitrium* in our country has not been done yet.

Krkonoše Mts and especially Mt Sněžka were thoroughly investigated by bryologists in the past. During revision of *Racomitrium sudeticum* in PR and PRC herbaria, we discovered three other specimens of *R. macounii* subsp. *alpinum*, all collected in the vicinity of the Mt Sněžka (see the list of revised specimens).

For a detailed description of the species, we refer to the revisions by Frisvoll (1988) and Bednarek-Ochyra (1995). Here the most important diagnostic characters are compiled and compared with those of *Racomitrium sudeticum*, a species most similar in its appearance (Table 1). A drawing based on the Czech specimen is presented (Fig. 1e, f).

Table 1. – The most important diagnostic features and ecological requirements of *Racomitrium macounii* subsp. *alpinum* and comparison with *R. sudeticum*.

Taxon	*R. sudeticum*	*R. macounii* subsp. *alpinum*
Colour	dark green to olivaceous	brownish, brown-green or reddish-green
Leaf nerve	mainly 3-stratose, in middle part rarely with 4-stratose spots, in upper part 2–3-stratose	mostly 4-stratose throughout, in upper part 3–4-stratose
Leaf margin	recurved on both sides (rarely nearly flat on one side), unistratose or partly bistratose in 1 (rarely in small patches 2) rows	flat on one side, regularly bistratose for 2–4 cell rows
Ecology	acid, siliceous, mostly dry and open rocks, rarely on soil	mostly siliceous but usually slightly basic, at least periodically moist rocks, rarely on soil

List of revised specimens:

1. Na skále mokvavé kolmé v Čert. zahrádce v Krkonoších, IX. 1896 [On the wet perpendicular rock in the "Čertova zahrádka" ravine in the Krkonoše Mts] leg. J. Velenovský sub *Dryptodon hartmannii*, c. spor., rev. B. Buryová IX.1998, PRC.
2. NE Bohemia. Krkonoše Mts, Obří důl valley, "Čertova zahrádka" ravine, SE facing rock near dry stream bed, 1095 m a. s. l., 24. 9. 1998, leg. B. Buryová & J. Kučera (PRC, herb. Buryová No. 1830).
3. Bauer-Musci europaei exsiccati No. 1074: Böhmen, Riesengebirge, an Felswänden zwischen dem Aupafalle und dem Woerlichgraben (=Lavinová rokle), 6. 10. 1899 leg. E. Bauer sub *Racomitrium sudeticum* (PR, PRC).
4. NE Bohemia. Krkonoše Mts, Obří důl valley, E slope of the Mt Studniční hora: vertical rock face with trickling water above the „Krakonošova zahrádka" site, 1350 m a. s. l., 4. 6. 1998 leg. B. Buryová & J. Kučera (PRC, herb. Buryová No. 1704).
5. Pilous-Musci čechoslovenici exsiccati No. 228: Bohemia. Montes Krkonoše. In saxis graniticis in valle rivi Bílé Labe, ca 1280 m, VII.1946 leg. Z. Pilous sub *Rhacomitrium sudeticum* fo. *epilosa* Vilh. (PR, PRC).

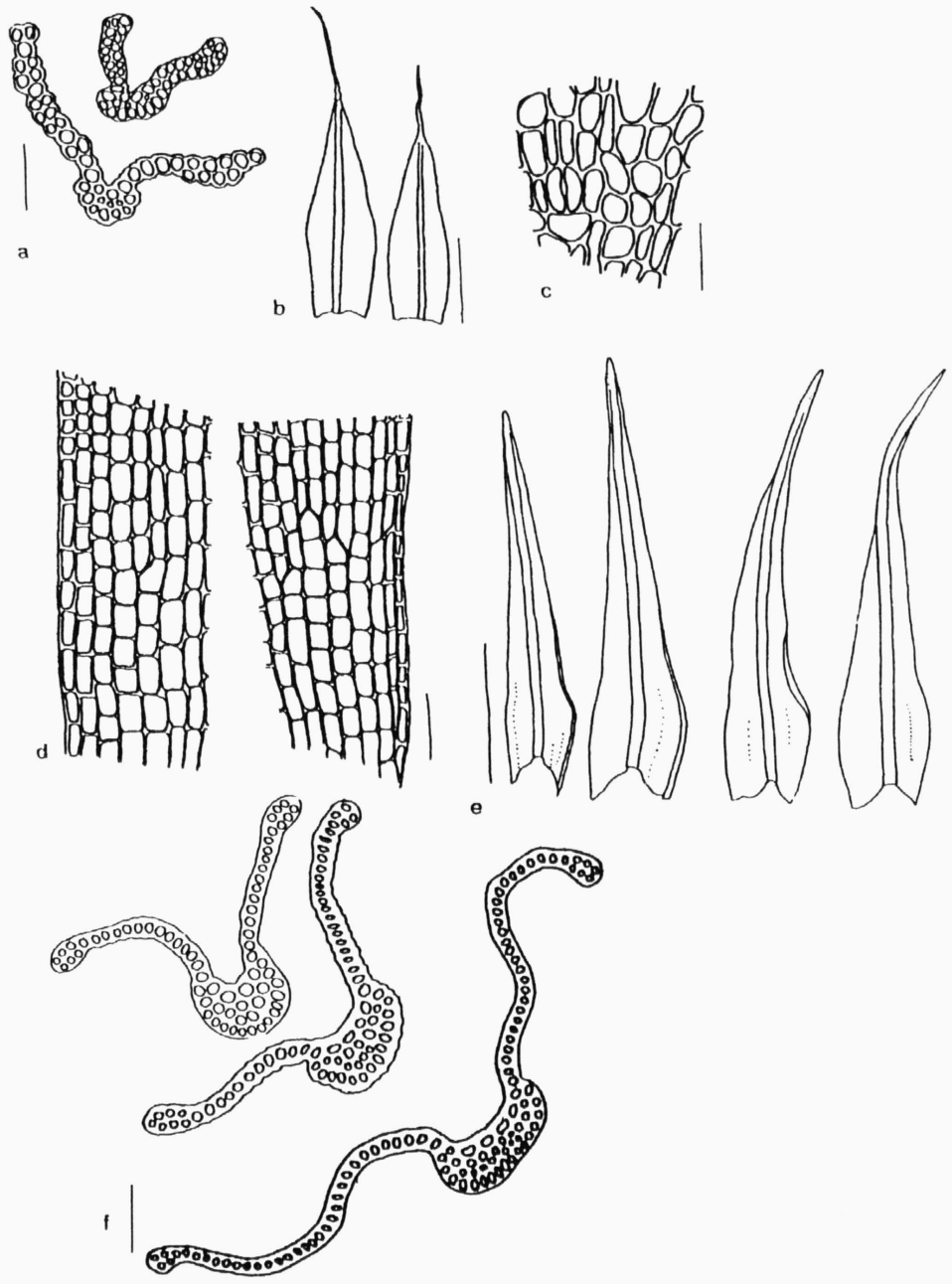

Fig. 1. – a–d: *Grimmia reflexidens* (herb. J. Kučera, CS3153); a: transverse section of leaves from the same plant; b: leaves; c: proximal exothecial cells and stoma; d: proximal cells of leaves from the same plant; e–f: *Racomitrium macounii* subsp. *alpinum* (Velenovský, PRC); e: leaves; f: transverse section of leaves; Bar: a, c, d, f: 20 μm; b: 0.5 μm, e: 1 mm.

Grimmia reflexidens confirmed to the area of the Czech Republic

Another interesting taxon discovered during our field survey was *Grimmia reflexidens* Müll. Hal. (Fig. 1a–d). It grew quite abundantly on gneiss stones of the scree on eastern foothill of Mt Studničná hora beneath "Čertova zahrádka" ravine, at the altitudes of 970–1040 m a. s. l.

This species, known to European bryologists in the past mostly as *Grimmia sessitana* De Not. (for synonymization see Muñoz 1998) was omitted from the check-list of bryophytes of the Czech Republic (Váňa 1997). For that reason, we first regarded our record as new to our bryoflora. However, *G. reflexidens* was discovered in the Czech Republic much earlier by J. Vilhelm who collected it at the same locality in 1919 (Vilhelm 1924). Interestingly, he collected multiple specimens and, because of an unclear taxonomic concept of *G. alpestris* (F. Weber & D. Mohr) Schleich. and *G. sessitana*, gave these plants three different names: *G. sessitana*, *G. subsulcata* Limpr. and *G. apiculata* Hornsch. (the first two are now regarded as synonymous to *G. reflexidens*). Later R. Vaněk, who revised some material of *Grimmia* in the Czech herbaria, corrected the determination of *G. apiculata* to *G. subsulcata* (= *G. reflexidens*) but regarded the specimen named *G. sessitana* to be *G. alpestris*.

We revised the Czech material named *G. alpestris* from herbaria PRC, PR, BRNU and OP (no specimens of *G. sessitana* or *G. subsulcata* from the Czech Republic were present in these herbaria) and found that only *G. reflexidens* was documented from the Krkonoše Mts whereas only *G. alpestris* was documented from the Hrubý Jeseník Mts. *G. alpestris* plants from the Šumava Mts (Gr. Arber and Gr. Osser, both on Bavarian side) belonged to *G. montana* Bruch & Schimp. A complete revision of this difficult group in the Czech Republic is needed.

For a detailed description of *G. reflexidens* we refer to Muñoz (1998). A determination key to the Czech species of *Grimmia* subg. *Orthogrimmia* Schimp. sect. *Montanae* I. Hag. is given here. This group comprises species with rather small (up to 2 mm), narrowly ovate-lanceolate, keeled leaves with mostly plane margins, 2–4 stratose lamina in distal half and basal cells with transverse walls thicker than longitudinal walls.

1a Laminar cells not bulging 2
1b Laminar cells bulging 3
2a Leaves always with plane margins, flexuous and sigmoid in lateral view when moist. Plants dioecious, stomata at the urn base lacking, operculum rostrate ..... ***G. montana***
2b Leaves sometimes with one margin slightly recurved, straight in lateral view when moist. Plants autoecious, stomata at the urn base present, operculum mammillate ..... ***G. reflexidens***
3a Leaves strongly plicate on both sides of the costa, usually cucullate in apex, hair-point short (to 0.4 mm), lamina cells sometimes papillose ..... ***G. caespiticia***
3b Leaves plane or weakly plicate, not obviously cucullate in apex, hair point usually long, to ca. 1.5 mm 4
4a Plants autoecious, stomata at the urn base present, capsule stramineous, basal marginal cells rectangular, (2–)3–5: 1 ..... ***G. reflexidens***
4b Plants dioecious, stomata at the urn base lacking, capsule castaneous, basal marginal cells isodiametrical to shortly rectangular, 1–3.5: 1 ..... ***G. alpestris***

List of revised specimens:

G. reflexidens Müll. Hal.

1. Krkonoše, Čertova zahrádka, skála proti Hedysarum. [Krkonoše Mts, "Čertova zahrádka" ravine, the rock against the locality of *Hedysarum*] 30. 7. 1919 leg. J. Vilhelm sub *G. apiculata* Hornsch., pro *G. subsulcata* Limpr. rev. R. Vaněk 1946, PRC.
2. Krkonoše, Čertova zahrádka, levá suť [Krkonoše Mts, "Čertova zahrádka" ravine, scree on the left side], 30. 7. 1919 leg. J. Vilhelm sub *G. apiculata*, pro *G. subsulcata* Limpr. rev. R. Vaněk 1946, PRC.
3. Krkonoše, Čertova zahrádka, levá suť [Krkonoše Mts, "Čertova zahrádka" ravine, scree on the left side], 30. 7. 1919 leg. J. Vilhelm sub *G. subsulcata* Limpr., teste R. Vaněk, PRC.
4. Krkonoše, Čertova zahrádka, levá suť [Krkonoše Mts, "Čertova zahrádka" ravine, scree on the left side], 30. 7. 1919 leg. J. Vilhelm sub *G. sessitana* De Not., pro *G. alpestris* (F. Weber et D. Mohr) Schleich. rev. R. Vaněk 1947, PRC.
5. Krkonoše (Giant Mts), scree beneath "Čertova zahrádka" ravine, gneiss boulder of the scree, 975 m a. s. l., grid 5260c, 24. 9. 1998 leg. J. Kučera & B. Buryová, herb. J. Kučera CS3152, herb. B. Buryová 1729.
6. Krkonoše Mts, Obří důl valley, E facing scree below the "Čertova zahrádka" ravine, sunny gneiss stone, 1000 m a. s. l., 24. 9. 1998 leg. B. Buryová et J. Kučera, herb. B. Buryová 1732.
7. Krkonoše (Giant Mts), scree beneath the "Čertova zahrádka" ravine, gneiss boulder of the scree, 1030 m a. s. l., grid 5260c, 24. 9. 1998 leg. J. Kučera et B. Buryová, herb. J. Kučera CS3153, herb. B. Buryová 1831.
8. Krkonoše (Giant Mts), scree beneath Čertova zahrádka ravine, gneiss boulder of the scree, 1040 m a. s. l., grid 5260c, 24. 9. 1998 leg. J. Kučera et B. Buryová, herb. J. Kučera CS3154.

Grimmia alpestris (F. Weber et D. Mohr) Schleicher

1. Oesterr. Schlesien, Gesenke, Kessel, 23. Juli 1870, ex reliquiis K. G. Limprichti (Bauer, Musci europaei exsiccati No. 1061), BRNU (2 specimens, one mixed with *G. caespiticia* (Brid.) Jur.), OP (2 specimens).
2. Hr. Jeseník: Velká Kotlina – na skalkách s periodicky stékající vodou [On rocks with periodically flowing water], 1350 m a. s. l., 12. 7. 1946 leg. J. Šmarda, OP.

Grimmia montana Bruch et Schimp.

1. Krkonoše, Riesengrund, IX. 1900 leg. J. Velenovský sub *G. alpestris*, teste R. Vaněk 1946, PRC.
2. Šumava, žuly na vrcholi Javoru [Šumava, granite rock on the top of Mt Arber] 1901 leg. J. Velenovský sub *G. alpestris*, teste R. Vaněk 1946, PRC.
3. Šumava, na suché k jihu obrácené skále svorové na špičce Osseru hojně, ale jen sterilní [Šumava Mts, on dry S facing mica schist rock at the peak part of Osser, abundant but only sterile], IX. 1901 leg. J. Velenovský sub *G. alpestris*, teste R. Vaněk 1946, PRC.

Grimmia funalis (Schwaegr.) Bruch et Schimp.

1. Hr. Jeseník, výchozy erlánových skal na SV svahu Jeleního hřbetu [Hrubý Jeseník Mts, erlan rock outcrops on NE slope of the Jelení hřbet ridge] ca. 1270 m. 8. 8. 1958 leg. J. Vicherek sub *Grimmia alpestris*, OP.

Souhrn

Během inventarizačního průzkumu mechorostů, který autoři prováděli během roku 1998 ve vrcholové části východních Krkonoš, byly nalezeny dva význačné druhy – *Racomitrium macounii* subsp. *alpinum* (nový nález pro území České republiky) a *Grimmia reflexidens* (potvrzení zpochybňovaného výskytu druhu, který není uveden na recentním seznamu druhů mechorostů České republiky – Váňa 1997). *R. macounii* bylo autory nalezeno na dvou místech na východních svazích Studniční hory v rokli Čertova zahrádka a v Krakonošově zahrádce v Úpské jámě. Po revizi druhu *R. sudeticum* v herbářích PR a PRC byly další položky tohoto v Evropě nově rozlišovaného druhu identifikovány z oblasti Úpské jámy a dolu Bílého Labe. Tento taxon, náležející do sekce *Laevifolia* se od nejpříbuznějšího druhu *R. sudeticum* odlišuje okrajem listů, které jsou pravidelně dvouvrstevné ve dvou až čtyřech řadách, čtyřvrstevným žebrem na průřezu obvykle v celé délce listu, hnědavou až červenohnědou barvou a poněkud odlišnou ekologií. Tento boreálně-montánní taxon se ve střední Evropě vyskytuje v Alpách, Tatrách i na polské straně Krkonoš a jeho výskyt na našem území byl tedy očekáván.

Grimmia reflexidens (známá dosud jako *G. sessitana*) byla z našeho území udávána Vilhelmem (ze stejné lokality, odkud byla nyní potvrzena, tedy ze sutě pod Čertovou zahrádkou na východním úpatí Studniční hory). Tento údaj byl v pozdější době zpochybněn a na základě zařazení Vilhelmových položek pod druh *Grimmia alpestris* v herbáři PRC nezařazen do seznamu mechorostů České republiky. Revize materiálu *G. alpestris* a *G. sessitana* z herbářů PRC, PR, BRNU a OP ukázala, že v Krkonoších byl patrně sbírán pouze druh *G. reflexidens*, zatímco v Hrubém Jeseníku pouze *G. alpestris*, ačkoli výskyt obou druhů je v obou pohořích možný a v budoucnosti může být potvrzen.

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