THE CLASS *CARICI RUPESTRIS-KOBRESIETEA BELLARDII* OHBA 1974 ALSO IN THE WESTERN CARPATHIANS

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Izvleček
Razred *Carici rupestris-Kobresietea bellardii* je prvič predstavljen v hierarhičnem sistemu višjih sintaksonov vegetacije Zahodnih Karpatov (Slovaška). Na podlagi 10 popisov, opravljenih v gorovju Belianske Tatry v obdobju 1983–2004, smo naredili sintaksonomsko primerjavo s popisi iz bližnjih gorovij in držav (Alpe – Avstrija, Italija in Vzhodni Karpati – Romunija, Ukrajina). Floristične, fitogeografske in ekološke posebnosti so predstavljene v sinoptični tabeli. Položaj fragmentov glacialnoreliktne vegetacije je predstavljen v okviru celotnega areala združb trikrpega ločja in alpinskih resav s pritlikavim grmičjem.

Abstract
A class *Carici rupestris-Kobresietea bellardii* is for the first time accepted in the hierarchical system of higher syntaxa in the Western Carpathians (Slovakia). On the basis of 10 relevés, obtained in the Belianske Tatry Mts during the period 1983–2004, syntaxonomic comparison was made with the data from the neighbouring mountain ranges and countries (Alps – Austria, Italy, and Eastern Carpathians – Romania, Ukraine). Floristic, phytogeographical and ecological peculiarities are presented in the synoptic table, and the positions of the fragments of glacial relict vegetation type are discussed in the framework of whole areas of wind edge naked rush and dwarf-shrub heath communities.

Ključne besede: alpinska vegetacija, *Carici rupestris-Kobresietea bellardii*, fitocenologija, Slovaška, sintaksonomija
Key words: alpine vegetation, *Carici rupestris-Kobresietea bellardii*, phytosociology, Slovakia, syntaxonomy

1. INTRODUCTION

Wind edge naked-rush and dwarf-shrub heath communities extend over the arctic and northern alpine zone of the Northern Hemisphere. Typical biotopes are windswept slopes and ridges dominated by low grasslands and cushions or *Dryas*-mats, often called *Dryas* tundra.

Climatic changes during the Pleistocene, through a series of bottlenecks and expansions in populations size and range according to the climatic condition, had a dramatic influence on separation, migration, and extinction of plant communities (Hewitt 1996). In Central Europe the mean annual temperatures are estimated to have been around 13–17 °C lower than at present (Frenzel & al., 1992). It is very likely that the character of high mountain vegetation was more uniform than recently. During the late-glacial period the tundra vegetation predominated in large areas of Europe, Asia, and North America. Warming began some 13,000 years ago and the ice started to retreat. Arctic-alpine plant taxa are now distributed in arctic latitudes (zonal distribution in Scandinavia, Greenland, Alaska, arctic Siberia, and large mountain systems in Canada and USA). In the more southern

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mountain ranges they are restricted to highest summits only (extrazonal distribution in the Alps, Pyrenees, Apennines, Dinarides and also Carpathians).

Until the mid-20th century, the alpine grasslands and wind edge naked-rush with higher presentation of arctic-alpine taxa in Europe were inserted between plant communities of two classes, according geological substratum (the *Elyno-Seslerietea,* or *Juncetea trifidi*). However, the indices that there are distinct floristic, ecological and historical differences were suggested already by Gams (1936), followed by Braun-Blanquet (1948) by delimitation of a new alliance, and Oberdorfer (1957) by description of the order *Oxytropido-Kobresietalia* (and provisionally also class).

Ohba was the one who described a vicariant order for the Japanese alpine grass-cushion communities, which were later included with European types into a new class *Carici rupestris-Kobresietea bellardii* Ohba 1974. The area of the class corresponds with the areas of main characteristic taxa e.g. *Carex rupestris, Elyna myosuroides, Lloydia serotina, Potentilla nivea* etc. Therefore Ohba (1974) also suggested the future hierarchical structure of lower units for additional mountain systems, like the Caucasus, Sayany Mts, a Baikal region on the level of undescribed orders. Only for the Himalayas-Tibet region does he predict another class.

Komárková (1976, 1981), in the study of vertical and horizontal differences in the arctic and alpine vegetation, considered the extension of the class *Carici rupestris-Kobresietea bellardii* to be very wide, and proposed for North America the vicariate class *Kobresio-Caricetea rupestris drumondiani* Komárková 1976. Its area extends from the Southern Rocky Mountains to the mountains of Alaska.

In the Caucasus, following new phytocoenological data, there was similarly proposed a separate class *Carici bushiorum-Bromopsietea variegatae* Tzepkova 1987, but with doubtful validity (cf. Korotkov & al. 1991). Also the situation in the mountains of Siberia should be considered as provisional. The alpine tundra grasslands on windswept slopes are clumped into a widely constituted class *Betuletea rotundifoliae* Mirkin ex Chytrý et al. 1993 (cf. Chytrý & al. 1993, Valachovič & al. 2002).

In central Europe and the Balkans, all types belong to the order *Oxytropido-Kobresietalia* Oberd. ex Albrecht 1969 (cf. Rodwell & al. 2002). In the Alps these communities are still recognisable, although rare, and more or less clearly distinguished from plant communities of the class *Juncetea trifidi* (syn.: *Caricetea curvulae*, cf. Albrecht 1969). In the Carpathians, the first attempt to distinguish this vegetation type was made by Puscaru & al. (1956) in Romania. Definitively confirmed was the class in the survey of vegetation by Coldea (1997). The nowadays largely accepted class *Carici rupestris-Kobresietea bellardii* (cf. Dierβen, 1992, Pott 1992, Grabherr & Mucina 1993, Coldea 1997) was recently subjected to criticism (Oriolo 2001). The author argues that the extrazonal distribution of naked rush swards in the Alps and Apennines is caused by a different biogeographic region than the climatic belt. The high presence of diagnostic species of the *Caricion firmae* and *Elyno-Seslerietea*, and the fact that species like *Dryas octopetala* or *Silene acaulis* have a broad ecological spectrum and can not be marked as diagnostic for one class, induced him to come to conclusion that the existence of the class in central Europe is not sustainable! The low occurrence of true arctic-alpine taxa and high presence of montane Mediterranean elements were also an argument for this opinion.

The aim of the paper, therefore, is to separate those relevés from the widely viewed *Elyno-Seslerietea*, which can be considered as part of the class *Carici rupestris-Kobresietea bellardii* also in the Western Carpathians. The second aim is to contest the results presented by Oriolo (2001) and to defend the existence of fragments of this vegetation in Central Europe. These questions were a direct inspiration for the revaluation of similar plant communities in Slovakia.

2. MATERIAL AND METHODS

The syntaxonomical survey presented here included 295 phytocoenological relevés of relevant plant communities from the Eastern, Southern and Western Carpathians and Eastern and Southern Alps. All relevés used in this study have been collected in accordance with the principles of the Zürich-Montpéllier school, using the nine-degree scale (Barkman & al. 1964) in Table 1. Although various authors have used different scales of abundance and dominance, the final data were transformed into the 9-degree ordinal scale (van den Maarel 1979) for the purpose of obtaining comparable data for numerical classification.

Plants determined only at the level of genus were excluded, and some others were re-classified within more broadly defined taxa: *Anthemis carpatica* (subsp. *pyrethriformis* (Schur) Beldie), *Arenaria*

ciliata s. l. (*A. tenella*), *Campanula polymorpha* Witasek s. l. (*Campanula tatrae*), *Carex curvula* (subsp. *curvula*), *Gentianella lutescens* (subsp. *lutescens*, subsp. *tatrae*), *Helianthemum grandiflorum* (subsp. *grandiflorum*, subsp. *glabrum*, subsp. *obscurum*), *Luzula spicata* (subsp. *mutabilis), Oxytropis campestre* s. l. (subsp. *tatrae*), *Primula auricula* (subsp. *hungarica*), *Primula elatior* (subsp. *carpatica*, subsp. *poloniensis*), *Salix retusa* (*Salix kitaibeliana*), *Soldanella hungarica* (subsp. *hungarica*, subsp. *major*), *Swertia perennis* (subsp. *alpestris*), *Schistidium apocarpum* (*S. atrofuscum*, *S. strictum*), *Thymus pulcherrimus* (subsp. *pulcherrimus*, subsp. *sudeticus*). The program NCLAS from the SYNTAX 5 package (Podani 1993) performed the numerical classification. The β-flexible method (β = −0.25) with Euclidian distance and Jaccard's, Ružička's and Wishart's similarity coefficients were used. The hypotheses obtained were evaluated by comparison and through analysis of the phytocoenological tables.

To determine the content of the class *Carici rupestris-Kobresietea bellardii* in the Western Carpathians and the syntaxonomical position of other communities with the presence of *Elyna myosuroides* and *Carex rupestris*, our phytocoenological relevés were compared with closely related plant communities. Intentionally, with a view to distinguish clear types, we excluded the transitional stands, such as *Elynetum seslerietosum variae* var. with *Carex firma* in the Alps. Contact stands in the Tatry Mts, from the recently described association *Arenario tenellae-Caricetum firmae*, we put into the form of a synoptic table with aim of detecting the floristic and ecological peculiarities of both vegetation units (Šibík & al. 2004). The caption to each column contains the number of relevés used for the synthesis and an average number of species in a given community. Frequency in % (99 = 100 %) and a mean value of abundance (upper index) are given for each taxon. They were calculated by FYTOPACK (Jarolímek & Schlosser 1997). Individual columns contain also a shortened reference (for unpublished data only names of authors are given), number of relevés and their position on the level of the orographic unit. Diagnostically important taxa of individual plant communities are marked in bold. In this study, only differences between the communities from the *Carici rupestris-Kobresietea* and *Caricion firmae* (*Elyno-Seslerietea*) are highlighted, so the *Arenario-Caricetum firmae* association and its diagnostic taxa are not evaluated in more detail.

The nomenclature of taxa generally follows the Checklist (Marhold & Hindák 1998), the names of taxa occurring only in the Alps follow Ehrendorfer (1973), and a few exceptions include author names. Subspecies, given without the species epithet, appearing in the tables or repeated within the text are marked by asterisks (*). Names of syntaxa are given with author citation or follow the large synthetic studies, equally as for the groups of diagnostic taxa of higher syntaxa (Ohba 1974, Grabherr & Mucina (eds) 1993, Coldea (ed.) 1997, Malinovski & Kricsfalusy 2002, Šibík & al., 2004).

Chorological spectrums were calculated according to the classification of elements used by Poldini (1991) for the Alps, and Dostál (1989) for the Carpathians.

In the tables (Tab. 1 and Tab. 2) the names of syntaxa are abbreviated: **aa** *Arabidion alpinae*, **ac** *Arabidion coerulae*, **an** *Androsacion alpinae*, **AT** *Asplenietea trichomanis*, **Cc** *Caricetalia curvulae*, **cf** *Caricion firmae*, **cr** *Cratoneurion commutati*, **cy** *Cystopteridion*, **CK** *Carici rupestris-Kobresietea*, **Cv** *Calamagrostietalia villosae*, **cv** *Calamagrostion villosae*, **ES** *Elyno-Seslerietea*, **fc** *Festucion carpaticae*, **fp** *Festucion pictae*, **fs** *Festuco saxatilis-Seslerion bielzii* (Pawł. et Walas 1949) Coldea 1984, **fv** *Festucion versicoloris*, **Jp** *Junipero-Pinetalia mugo* Boşcaiu 1971, **JT** *Juncetea trifidi*, **jt** *Juncion trifidi*, **lv** *Loiseleurio-Vaccinion*, **Na** *Nardetalia*, **ns** *Nardion strictae*, **oe** *Oxytropido-Elynion*, **pa** *Poion alpinae*, **Pc** *Potentilletalia caulescentis*, **pc** *Potentillion caulescentis*, **pn** *Potentillo ternatae-Nardion strictae* Simon 1958, **pt** *Papaverion tatrici*, **sa** *Seslerio-Asterion alpini*, **Sc** *Seslerietalia coerulae*, **st** *Seslerion tatrae*, **tf** *Trisetion fusci*, **Tr** *Thlaspietalia rotundifolii*.

3. RESULTS

In the Belianske Tatry Mts (Western Carpathians) are there verified three recent localities of the wiry *Elyna myosuroides* with relatively near distance and tiny altitudinal span in the alpine belt (1940–2040 m). The single finding of this species in Vysoké Tatry Mts (Šmarda 1955) was confirmed by Dúbravcová (1996) inside the association *Silenetum acaulis* Krajina 1933.

Similarly as in the other mountains, the *Elyna myosuroides* occupies wind-exposed rocky ridges near summits and extreme slopes (Fig. 1). Sporadically, and with low abundance it pervades into the dense alpine grasslands. A more typical environment is sparse herbaceous undergrowth created by cushion chamaephytes, such as *Silene acaulis, Minuartia sedoides, Saxifraga oppositifolia, S. paniculata* and other low plants. The ground cover of lichens

Figure 1: A general view on the typical biotop of the association *Oxytropido carpaticae-Elynetum* on limestone in the Belianske Tatry Mts.
Slika 1: Pogled na tipično rastišče asociacije *Oxytropido carpaticae-Elynetum* na apnencu v gorovju Belianske Tatry.

(*Alectoria ochroleuca, Cetraria islandica, Cladonia pyxidata, Dactylina madreporiformis, Thamnolia vermicularis, Vulpicida tubulosus*) and some mosses attain 5–30 %, which represent about one third of the cover of vascular plants (40–90 %).

The average height of vascular plants is 3–5 cm. This lowest layer then overgrows plants with height around 15–25 cm, mostly the *Elyna* itself as a dominant species (Fig. 2), sometimes with fescue *Festuca versicolor*. From the diagnostic species of the alliance *Oxytropido carpaticae-Elynion* and higher syntaxa are derived frequent species such as *Androsace chamaejasme, Cerastium eriophorum, Comastoma tenellum, Ligusticum mutellinoides, Lloydia serotina, Minuartia sedoides, Oxytropis carpatica,* and *O. halleri*. Rare species include *Astragalus alpinus, Carex atrata, C. capillaris, Draba fladnizensis, D. siliquosa, Kobresia simpliciuscula* etc. (see Table 1).

The soils are shallow, fine soil and humus spreads among the stones. During the hot summer days the soil dries out. In the winter the snow cover is very slight, due to windstorms. From the geological point of view, generally present are calcareous-silicate rocks, namely base-rich marl, limestone (commonly with layers or nodules of siliceous horn-stone), but also acid quartzite. The tolerance of *Elyna myosuroides* and several accompanying species to the pH value signify that, for wind edge naked-rush communities, the role is played more by the extreme climatic conditions than by the character of substratum. In the Belianske Tatry Mts, on the area of relevé Nr. 10 (Table 1) was measured pH (KCl) 6.16 and pH (H_2O) 6.49. Whereas subass. *seslerietosum variae* prefers rendzina soil with pH between 5.9–8.0, the subass. *helictotrichetosum versicoloris* overgrowth podzolised soils with pH between 3.5–6.5.

To compare data from the Western Carpathians and neighbouring countries we select comparable data from Austria (Albrecht 1969), Italy (Oriolo 2001), Romania (Puşcaru 1956, Coldea 1990), and Ukraine (Malynovskij & Kricsfalusy 2002).

Recently only two associations, namely *Oxytropido carpaticae-Elynetum* (Puşcaru & al. 1956) Coldea

Figure 2. A tuft of wiry (*Elyna myosuroides*) is a dominant species.
Slika 2: Šop alpske eline (*Elyna myosuroides*), ki je dominantna vrsta.

The photos were taken on 13. september 2004.

1991 and *Achilleo schurii-Dryadetum* (Beldie 1967) Coldea 1984 were recognised in the Carpathians. Probably the *Dryas*-mats with *Salix reticulata* could be also classified within this vegetation (cf. Šibík & al. 2004). Equally, the plant communities from the alliance *Festucion versicoloris*, may represent phytocoenoses of class *Carici rupestris-Kobresietea*. Ohba (1974) was the first to point out this actuality, and he included the relevés from the alliance *Festucion versicoloris* obtained by Krajina (1933) in the Vysoké Tatry Mts to the order *Oxytropido-Kobresietalia*, but this fact was still marginalized.

As regards the chorological spectra, which were used as an argument for liquidation of the class in Central Europe, we compared 18 relevés from the Alps (Oriolo 2001) and our material (Fig. 3). The biggest differences are caused by disparate evaluation of the some taxa in Poldini (1991) and Dostál (1989). Species such as *Agrostis alpina, Antenaria carpatica, Avenula versicolor, Carex firma, Galium anisophyllon, Primula minima, Rhodax alpestris* and many others are assigned by Poldini (1991) as Montane Mediterranean elements, while according Dostál (1989) they belong to the Alpine-Carpatic or European elements. The high value by Montane Mediterranean elements (36 %) and low presence of European species (2 %) are replaced in the Western Carpathians by 17 % of Alpine-Carpatic and 24 % of European species. Nevertheless, in both spectra it is evident that in the naked rush swards there occur approx. 30 % Arctic-Alpine species, and around 15 % of the Circumboreal and Euroasiatic (Eurosiberian) species.

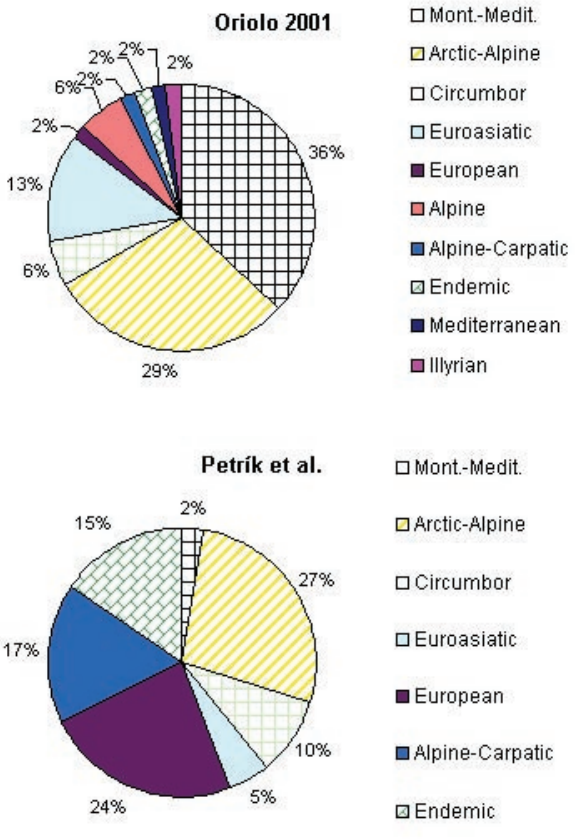

Figure 3. Chorological spectra in S-Alps (Oriolo 2001, classification according to Poldini 1991), and Western Carpathians (Tab. 1 according to Dostál 1989).
Slika 3: Horološki spekter v južnih Alpah(Oriolo 2001, klasifikacija vrst po Poldini 1991) in Zahodnih Karpatih (tabela 1 po Dostál 1989).

Figure 4 shows the differences between plant communities of the class *Carici rupestris-Kobresietea* (cluster A) and the *Elyno-Seslerietea* (cluster B) in the Carpathians. The clusters A1, A2 and A3 of the dendrogram represent separate, well-defined plant communities, different from phytocoenoses of the alliance *Caricion firmae* (B) despite their sharing of several species.

4. DISCUSSION

The relatively species-rich naked rush swards in the arctic zone (Lünterbusch & Daniëls 2004) are, in the Carpathians, much deprived of typical arctic elements. A linkage between the centre of the class is represented by species such as *Silene acaulis, Elyna myosuroides, Kobresia simpliciuscula, Saxifraga oppositifolia, Erigeron uniflorus, Lloydia serotina, Minuartia sedoides, Pedicularis oederi*, and moreover frequent numerous cryptogams. Certain species manifest in the Carpathians slightly different ecological demands, like hygrophilous *Tofieldia pusilla* or the autecological behaviour of the *Dryas octopetala*, a species with relatively wide distribution. As the large synoptic revision revealed (Šibík & al. 2004), the stands with presence of the *Carex rupestris* indicate in the alpine belt community of the *Arenario tenellae-Caricetum firmae* and in the supramontane and subalpine belts a community of the alliance *Seslerio-Asterion alpini* Hadač ex Hadač et al. 1969 or *Potentillion caulescentis* Br.-Bl. in Br.-Bl. & Jenny 1926 emend. Sutter 1969.

The common and characteristic species of the higher syntaxa in the Alps, like *Arenaria ciliata, Campanula scheuchzeri, Carex curvula, Festuca pumila, Oxytropis campestre, Pedicularis rostrato-capitata, Salix serpyllifolia*, are missing in the Western Carpathians or are replaced by vicariant taxa *Arenaria tenella,*

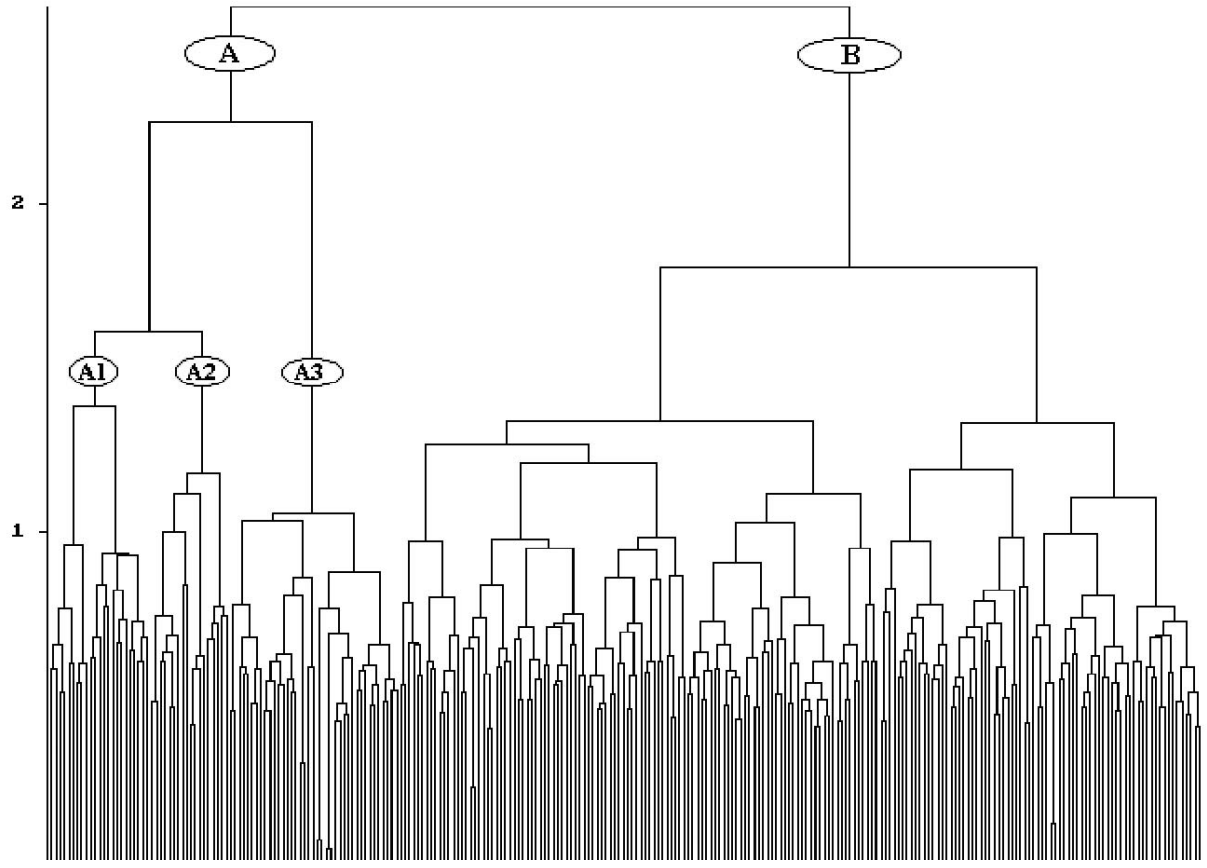

Figure 4. Dendrogram of the numerical classification of the selected plant communities of the class *Carici rupestris-Kobresietea* (A) and *Elyno-Seslerietea* (B) in the Carpathians. A1 – *Oxytropido carpaticae-Elynetum*, A2 – *Achilleo schurii-Dryadetum*, A3 – *Dryado-Salicetum reticulatae* Domin 1929, B – *Arenario tenellae-Caricetum firmae*; (used parameters: β-flexible method with Ružička's similarity coefficient).
Slika 4: Dendrogram numerične klasifikacije izbranih združb razreda *Carici rupestris-Kobresietea* (A) in *Elyno-Seslerietea* (B) v Karpatih. A1 – *Oxytropido carpaticae-Elynetum*, A2 – *Achilleo schurii-Dryadetum*, A3 – *Dryado-Salicetum reticulatae* Domin 1929, B – *Arenario tenellae-Caricetum firmae*; (uporabljeni parameri: β-fleksibilna metoda in koeficient podobnosti po Ružički).

Campanula tatrae, Oxytropis carpatica and functional types e.g. *Carex sempervirens* subsp. *tatrorum, Festuca supina, Pedicularis oederi* etc. (Tab. 2). Delicate differences within Carpathians plant communities present *Carex firma* and *Sesleria tatrae,* in the western part of the Carpathians, and *Carex curvula* and *Sesleria bielzii* in the eastern part, respectively.

Typical for the class *Carici rupestris-Kobresietea* is a tiny percentage of endemic species. Practically each endemic in Table 1 represents a diagnostic taxon of *Elyno-Seslerietea* and other higher units. This fact confirms that the majority of endemic vascular plants concentrate in vegetation types from sunny refugial areas, that remained unglaciated during the Pleistocene period e.g. numerous endemic species in the Apennines and southern Alps (Feoli Chiapella & Feoli 1977, Oriolo 2001). These species probably survived the last glaciation in more or less interconnected southern populations, represented nowadays by the relict populations found at high elevation in the Pyrenees, the Alps and the Carpathians. Today these taxa occupy a large areas in mountains and have partly occur also the highest summits, where are found the last refuges of the cryo-xerophytic wind edge naked rush swards. In spite of the fragmentary occurrence of these communities in Central Europe, they must be considered as relict vegetation from the glacial period. The present floristic composition is the answer of vegetation to the climatic changes during last 8,000 years, and the presence of more ther-

mophilous plants is not a reason for re-classification of the plant communities inside the *Elyno-Seslerietea*, as proposed by Oriolo (2001). Because in his study lack the relevés from the whole Central European region, therefore its conclusions have only local value. Factual confirmation of the class completes the total area in the Northern Hemisphere and it is a contribution to the complementary vegetation survey of Europe.

The results support the assumption of Ohba (1974) that part of the vegetation on neutral (calcareous-silicate) soils, originally included within alliances such as *Festucion versicoloris* (Western Carpathians) probably also belongs within naked swards of the class *Carici rupestris-Kobresietea bellardii*.

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6. REFERENCES

Albrecht, J. 1969: Soziologische und ökologische Untersuchungen alpiner Rasengesellschaften insbesondere an Standorten auf Kalk-Silikat-Gesteinen. Diss. Botanicae, Verl. J. Cramer 5: 1–91.

Barkman, J. J., Doing, H. & Segal, S. 1964: Kritische Bemerkungen und Vorschläge zur quantitativen Vegetationsanalyse. Acta Bot. Neerl. 13: 394–419.

Braun-Blanquet, J. 1930: Zentralalpen und Tatra, eine pflanzensoziologische Paralelle. Veröff. Geobot. Inst. Rübel Zürich 6: 81–123.

Braun-Blanquet, J. 1948: La végétation alpine des Pyrénées orientales, Barcelona, 306 pp.

Coldea, G. 1990: Munţii Rodnei. Studiu geobotanic. Ed. Acad. Române, Bucureşti, 183 pp.

Coldea, G. (ed.) 1997: Les associations végétales de Roumaniae. 1. Les associations herbacées naturalles. Press. Univ. Cluj, 261 pp.

Chytrý, M., Pešout, P. & Anenchonov, O. A. 1993: Syntaxonomy of vegetation of Svyatoi Nos Peninsula, Lake Baikal. 1. Non forest communities. Folia Geobot. Phytotax., Praha 28: 337–383.

Dierβen, K. 1992: Zur Synsystematik nordeuropäischer Vegetationstypen. 1. Alpine Vegetation und floristisch verwandte Vegetationseinheiten tiefer Lagen sowie der Arktis. Ber. d. Reinh.-Tüxen-Ges., Hannover 4: 191–226.

Dostál, J. 1989: Nová květena ČSSR 1–2. Academia, Praha, 1548 pp.

Dúbravcová, Z. 1996: Spoločenstvá triedy *Juncetea trifidi* v Západných Karpatoch. – Kandidátska dizertačná práca, msc. [Depon. in PrF UK Bratislava].

Dúbravcová, Z., Lisická, E. & Paclová, L. 1980: Vegetácia vápencových a dolomitových obvodov Západných Tatier, msc. [Depon. in PrF UK Bratislava].

Ehrendorfer, E. (ed.) 1973: Liste der Gefässpflanzen Mitteleuropas. – Gustav Fischer Verlag, Stuttgart, 318 pp.

Feoli Chiapella, L. & Feoli, E. 1977: A numerical phytosociological study of the summits of the Majella Massif (Italy). Vegetatio, 34: 21–39.

Frenzel, B., Pécsi, M. & Velichko, A. A. 1992: Atlas of Paleoclimates and Paleoenvironments of the Northern Hemisphere. Gustav Fisher Verlag, Stuttgart.

Gams, H. 1936: Beiträge zur pflanzengeographischen Karte Österreichs. I. Die Vegetation des Glocknergebietes. Abh. Zool.-Bot. Ges. Wien, 16: 1–79.

Grabherr, G. & Mucina, L. (eds) 1993: Die Pflanzengesellschaften Österreichs 2, Gustav Fischer Verlag, Jena, 523 pp.

Hadač, E. et al. 1969: Die Pflanzengesellschaften des Tales "Dolina Siedmich prameňov" in der Belauer Tatra. Vegetácia ČSSR B2: 5–343.

Hewitt, G. M. 1996: Some genetic consequences of the ice ages, and their role in divergence and speciation. Biol. J. Linn. Soc., 58: 247–276.

Huttegger, K., Kurtz, I. & Heiselmayer, P. 2004: Plant communities distribution: *Elynetum myosuroides* Rübel 1911 in the Eastern Alps. Hacquetia, Ljubljana, 3: 91–94.

Jarolímek, I. & Schlosser, G. 1997: FYTOPACK – a system of programs to process phytocoenological tables. Biologia, Bratislava, 52: 53–59.

Komárková, V. 1981: Holoarctic alpine and arctic vegetation: circumpolar relationship and floristic-sociological, high-level units. In: Dierschke,

H. (ed.), Syntaxonomie. Ber. Internat. Symposion d. Internat. Ver. Vegetationskunde 1980 in Rinteln. Cramer, Vaduz, pp. 451–476.

Korotkov, K.O., Morozova, O.V. & Belonovskaja, E.A. 1991: The USSR vegetation syntaxa prodromus. G.E.Vilchek, Moscow, 346 pp.

Krajina, V. 1933: Die Pflanzengesellschaften des Mlynica-Tales in den Vysoké Tatry (Hohe Tatra). 2. Teil. Beih. Bot. Centralbl., Dresden, 51: 1–224.

Lünterbusch, Ch.H. & Daniëls, F.J.A. 2004: Phytosociological aspects of *Dryas integrifolia* vegetation on moist-wet soil in the Northwest Greenland. Phytocoenologia 34: 241–270.

Maarel, van den E. (1979): Transformation of cover-abundance values in phytosociology and its effect on community similarity. Vegetatio 39: 97–114.

Malynovski, K. & Kricsfalusy, V. 2002: Plant communities of the Ukrainian Carpathian highlands. Uzhgorod, 244 pp.

Marhold, K. & Hindák, F. (eds) 1998: Zoznam nižších a vyšších rastlín Slovenska. Veda, Bratislava, 687 pp.

Oberdorfer, E. 1957: Süddeutsche Pflanzengesellschaften. Pflanzensoziologie 10, Jena, 564 pp.

Ohba, T. 1974: Vergleichende Studien über die alpine Vegetation Japans. 1. *Carici rupestris-Kobresietea bellardii*. Phytocoenologia, Stuttgart 1: 339–401.

Oriolo, G. 2001: Naked rush swards (*Oxytropido-Elynion* Br.-Bl. 1949) on the Alps and the Apennines and their syntaxonomical position. Fitosociologia, Pavia 38: 91–101.

Pawłowski, B. 1935: Über die Klimaxassoziation in der alpinen Stufe der Tatra. Bull. Int. Acad. Polon. Sci., Cl. Sci. Math., Ser. B, Sci. Nat. 1935: 115–146.

Pawłowski, B. & Stecki, K. 1927: Die Pflanzenassoziationen des Tatra-Gebirges. IV. Teil: Die Pflanzenassoziationen des Mięłusia-Tales und des Hauptmassivs der Czerwone Wierchy. Bull. Int. Acad. Polon. Sci., Cl. Sci. Math., Ser. B, Sci. Nath., Suppl. 2: 79–121.

Podani, J. 1993: SYN-TAX-pc. Computer Programs for Multivariate Data Analysis in Ecology and Systematics. Ver. 5.0. Scientia Publ., 104 pp.

Poldini, L. 1991: Atlante corologico delle plante vascolari nel Friuli-Venezia Giulia. Udine, 899 pp.

Pott, R. 1992: *Carici rupestris-Kobresietea bellardii* Ohba 1974 – Nacktriedrasen. In: Pott, R., Die Pflanzengesellschaften Deutschlands. Verlag Eugen Ulmer, Stuttgart, pp. 267–268.

Puşcaru, D., Puşcaru-Soroceanu, E., Paucă, A., Şerbănescu, I., Beldie, A., Ştefureac, T., Cernescu, N., Saghin, F., Creţu, V., Lupan, L. & Taşcento, V. 1956: Păşunile alpine din Munţii Bucegi. Inst. Cercet. Agronom., Bucureşti, Tratate Monografii 4: 1–511.

Reisigl, H. & Keller, R. 1987: Alpenpflanzen im Lebensraum. Alpine Rasen, Schutt- und Felsvegetation. Gustav Fischer Verlag. Stuttgart, New York, 149 pp.

Rodwell, J.S., Schaminée, J.H.J., Mucina, L., Pignatti, S., Dring, J. & Moss, D. 2002: The Diversity of European Vegetation. An overview of the phytosociological alliances and their relationships to EUNIS habitats. Wageningen. 168 pp.

Šibík, J., Petrík, A. & Kliment, J. 2004: Syntaxonomical revision of plant communities with *Carex firma* and *Dryas octopetala* (alliance *Caricion firmae*) in the Western Carpathians. Polish Botanical Journal, Krakow, 49/2: 181–202.

Šmarda, J. 1955: *Elyna myosuroides* (Vill.) Fritsch ve Vysokých Tatrách. Biológia, Bratislava 10: 65–67.

Šmarda, J. etal. 1971: K ekologii rostlinných společenstev Doliny Sedmi pramenů v Belanských Tatrách. Práce Štúd. Československ. Ochr. Prír., Ser. III, 4: 5–204.

Unar, J., Unarová, M. & Šmarda, J. 1984: Vegetační poměry Tomanovy doliny a Žlebu spod Diery v Západních Tatrách. 1. Fytocenologické tabulky. Folia Fac. Sci. Nat. Univ. Purkynianae Brun., Ser. Biol. 25(10): 5–101.

Valachovič, M., Anenkhonov, O. A. & Hodálová, I. 2002: Vegetation along an altitudinal gradient in the Gremyachaya Valley, Barguzinskii Range, Eastern Siberia. Biologia, Bratislava 57: 83–100.

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APPENDIX

Headings and localities of relevés in Table 1: rels. 1 and 2 from Mt. Predné Jatky, 3–6 ridge between Mt. Hlúpy and Vyšné Kopské sedlo Saddle, 7–10 from Mt. Ždiarska Vidla.

Relevé nr.	Area m^2	Aspect	Slope °	Alt. m	Cover E_1 %	Cover E_0 %	Cover total %	Geology	Date
1	3	NNW	30–40	1950	50	30	60	marl	18. 8. 1983
2	3	SSW	20	1940	70	10	75	limestone	4. 8. 2000
3	3	SW	0–30	1983	90	10	95	horn-stone	10. 8. 1991
4	20	SW	50	1970	80	5	80	horn-stone	4. 8. 2001
5	3	ESE	30–40	1960	50	10	60	quartzite	1. 8. 1992
6	3	ESE	0–20	1972	80	20	90	quartzite	12. 8. 1991
7	8	SSE	40–60	2040	45	15	50	horn-stone	24. 7. 1990
8	3	SW	40–60	2025	50	10	60	horn-stone	1. 8. 1990
9	9	SSE	65	1950	40	20	50	horn-stone	8. 8. 1987
10	9	SE	50	1971	40	10	50	marl	13. 9. 2004

Table 1: Association *Oxytropido carpaticae-Elynetum* in the Belianske Tatry Mts (Western Carpathians). Chorological elements of vascular plants follow Dostál (1989).

Tabela 1: Asociacija *Oxytropido carpaticae-Elynetum* na gorovju Belianske Tatry (Zahodni Karpati). Horološki elementi po Dostál (1989).

Relevé number		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Const. Chor.**
Number of species		**64**	**42**	**41**	**66**	**44**	**57**	**58**	**56**	**46**	**54**	**%**
Diagnostic taxa of the association												
CK	*Elyna myosuroides*	3	3	4	1	2b	4	2a	2a	2b	2b	100^{6} Arct-Alp
JT, Cv	*Campanula tatrae*	+	+	+	+	+	+	.	+	+	.	80^{2} Endemic
cf	*Dactylina madreporiformis* (E_0)	1	+	+	+	+	.	2a	.	+	1	80^{3}
tf	*Rhodiola rosea*	+	+	+	+	r	.	.	r	r	+	80^{2} Circumbor
oe, Sc	*Oxytropis halleri*	+	.	2b	2b	.	.	2a	1	+	+	70^{4} European
JT, Cc	*Primula minima*	+	.	+	+	1	2m	.	1	.	+	70^{3} European
oe, fv	*Ligusticum mutellinoides*	r	1	1	+	+	+	.	.	.	+	70^{2} Arct-Alp
fv	*Agrostis alpina*	.	.	.	.	2b	1	2b	2a	1	1	60^{4} European
	Thymus alpestris	.	.	+	1	+	1	+	1	.	.	60^{3} European
oe, fv	*Carex fuliginosa*	.	+	.	1	2a	+	.	+	.	+	60^{3} Circumbor
pa	*Poa alpina*	+	+	+	+	.	+	+	.	.	.	60^{2} Circumbor
oe, st	*Oxytropis carpatica*	.	+	+	+	.	+	.	.	.	+	50^{2} Endemic
an, fv	*Luzula *mutabilis*	.	.	+	+	+	+	.	.	.	.	40^{2} Alp-Carp
Oxytropido-Elynion, Oxytropido-Elynetalia												
cf	*Androsace chamaejasme*	+	2m	2m	1	+	1	2m	2m	+	+	100^{3} Circumbor
fv	*Cerastium eriophorum*	.	+	2a	2a	1	1	+	1	+	+	90^{3} Arct-Alp
fv, cf	*Minuartia sedoides*	1	+	1	2a	+	+	+	1	.	.	80^{3} Alp-Carp
Pc	*Saxifraga paniculata*	+	.	1	2b	.	+	2b	2b	2b	1	80^{4} Arct-Alp
cf	*Arenaria tenella*	+	+	.	.	.	.	2a	+	1	+	60^{3} Arct-Alp
fv	*Antennaria carpatica*	.	.	1	+	.	+	.	r	.	+	50^{2} Alp-Carp
cf, pc	*Draba aizoides*	.	.	.	1	.	.	1	.	+	+	40^{3} European

Relevé number		1	2	3	4	5	6	7	8	9	10	Const. Chor.
	Carex capillaris	.	.	.	.	.	.	1	2a	+	1	40^{3} Arct-Alp
an, fv	*Saxifraga oppositifolia*	2m	+	.	1	.	+	.	.	.	.	40^{3} Circumbor
ac	*Myosotis alpestris*	.	+	+	+	.	.	.	.	.	.	30^{2} European
	Kobresia simpliciuscula	+	1	.	.	.	.	.	.	.	.	20^{3} Arct-Alp
JT	*Carex atrata*	.	+	.	.	.	.	.	.	.	.	10^{2} Arct-Alp
	Sedum atratum	.	.	.	.	.	.	+	.	.	.	10^{2} European
Carici rupestris-Kobresietea												
fv	*Lloydia serotina*	1	1	2m	2m	1	1	1	2m	.	+	90^{3} Arct-Alp
fv	*Comastoma tenellum*	+	+	+	+	.	+	.	r	.	+	70^{2} Arct-Alp
cf, fv	*Pedicularis oederi*	+	.	1	+	.	.	.	+	.	.	40^{2} Arct-Alp
cf	*Minuartia gerardii*	+	.	+	1	.	+	.	.	.	.	40^{2} Arct-Alp
Sc, pc	*Aster alpinus*	.	.	.	.	.	.	1	2b	1	1	40^{4} Euroas
	Gentiana nivalis	.	.	.	.	.	.	.	+	.	+	20^{2} Arct-Alp
	Draba fladnizensis	.	.	.	+	.	.	.	+	.	.	20^{2} Arct-Alp
	Erigeron hungaricus	.	.	.	+	.	.	.	.	.	.	10^{2} Endemic
fv	*Saussurea alpina*	.	.	.	1	.	.	.	.	.	.	10^{3} Circumbor
	Astragalus alpinus	.	.	.	.	.	2a	.	.	.	.	10^{5} Arct-Alp
cf	*Dryas octopetala*	.	.	.	.	.	.	.	.	.	r	10^{1} Arct-Alp
Caricion firmae												
fv	*Bistorta vivipara*	+	+	2b	2a	1	1	+	1	+	+	100^{3} Arct-Alp
fv	*Silene acaulis*	2b	2a	2a	3	2b	2b	2a	.	2a	1	90^{5} Arct-Alp
lv	*Thamnolia vermicularis* (E_0)	+	.	+	+	+	2a	1	+	+	+	90^{2}
	Rhodax alpestris	.	+	.	+	.	.	1	+	.	+	50^{2} European
	Vulpicida tubulosus (E_0)	+	.	+	+	+	.	.	.	.	+	50^{2}
	Alectoria ochroleuca (E_0)	+	.	.	.	+	1	.	.	.	.	30^{2}
pc	*Carex firma*	+	+	.	.	.	.	.	.	.	.	20^{2} Alp-Carp
	Ranunculus alpestris	+	.	.	.	.	.	.	.	.	.	10^{2} Arct-Alp
	Saxifraga aizoides	+	.	.	.	.	.	.	.	.	.	10^{2} Arct-Alp
	Saussurea pygmaea	.	.	.	.	r	.	.	.	.	.	10^{1} Arct-Alp
	Chamorchis alpina	.	.	.	.	.	.	.	.	.	+	10^{2} Arct-Alp
Seslerietalia coerulae, Elyno-Seslerietea												
Sc	*Ranunculus breyninus*	+	2b	+	1	+	+	1	1	1	+	100^{3} European
	Galium anisophyllon	+	1	+	+	+	+	.	+	+	.	80^{2} European
pc	*Trisetum alpestre*	+	+	.	.	.	.	2b	1	2a	1	60^{4} Alp-Carp
st	*Bupleurum ranunculoides*	.	+	.	1	.	.	1	1	.	1	50^{3} Alp-Carp
	Euphrasia salisburgensis	+	.	.	.	.	.	+	1	r	.	40^{2} European
st	*Astragalus australis*	.	.	.	.	.	.	1	1	1	.	30^{3} Euroas
	*Gentianella *tatrae*	.	.	.	.	.	.	.	r	r	+	30^{1} Endemic
Sc, st	*Carex *tatrorum*	1	.	.	+	.	.	.	.	.	.	20^{3} Endemic
	Phyteuma orbiculare	.	.	.	+	+	.	.	.	.	.	20^{2} European
st	*Tephroseris capitata*	.	.	r	+	.	.	.	.	.	.	20^{2} European
st	*Astragalus frigidus*	.	+	.	.	.	.	.	.	.	.	10^{2} Alp-Carp
st	*Sesleria tatrae*	.	.	.	+	.	.	.	.	.	.	10^{2} Endemic
ES	*Selaginella selaginoides*	.	.	.	.	.	.	.	.	.	r	10^{1} Alp-Carp
Sc, Pc	*Thymus *sudeticus*	.	.	.	.	.	.	.	.	.	+	10^{2} Endemic
Festucion versicoloris												
	Festuca versicolor	2b	2a	2b	2a	1	2a	2a	2b	2a	2a	100^{5} European
cf	*Hedysarum hedysaroides*	+	+	.	+	.	1	.	.	.	.	40^{2} Arct-Alp
an	*Saxifraga moschata*	+	.	.	+	.	.	.	+	.	.	30^{2} Euroas
cf	*Bartsia alpina*	.	.	.	.	.	.	.	.	.	+	10^{2} Arct-Alp
ac	*Leontodon pseudotaraxaci*	.	.	.	.	.	.	.	.	.	+	10^{2} Endemic

Relevé number		1	2	3	4	5	6	7	8	9	10	Const. Chor.
Caricetalia curvulae, Juncetea trifidi												
JT	*Festuca supina*	.	1	1	.	+	1	.	.	.	.	40^3 Circumbor
	Oreochloa disticha	.	.	+	.	.	1	.	.	.	.	20^3 Alp-Carp
	Cetraria cucullata (E_0)	.	.	+	.	.	.	.	+	.	.	20^2
	Cetraria islandica (E_0)	.	.	.	+	.	+	.	.	.	.	20^2
	Cladonia gracilis	.	.	.	+	.	.	.	.	.	.	10^2
jt	*Juncus trifidus*	.	.	.	+	.	.	.	.	.	.	10^2 Circumbor
	Cetraria nivalis (E_0)	.	.	.	.	.	1	.	.	.	.	10^3
	Avenula versicolor	.	.	.	.	.	+	.	.	.	.	10^2 Alp-Carp
	Campanula alpina	.	.	.	.	.	+	.	.	.	.	10^2 European
Potentillion caulescentis												
	*Primula *hungarica*	.	+	.	.	.	.	2b	+	1	1	50^3 Endemic
	Artemisia eriantha	.	.	+	+	+	.	.	.	1	.	40^2 Alp-Carp
	Campanula cochlearifolia	.	.	.	.	+	.	.	.	+	+	30^2 Alp-Carp
Sc	*Leontopodium alpinum*	.	.	.	.	.	.	1	.	1	+	30^3 Euroas
	Androsace lactea	+	.	.	.	.	.	.	.	r	.	20^2 European
	Draba tomentosa	.	.	.	+	.	.	.	.	.	.	10^2 European
Potentilletalia caulescentis, Asplenietea trichomanis												
AT	*Tortella tortuosa* (E_0)	1	+	+	+	.	+	+	+	+	.	80^2
Pc	*Ditrichum flexicaule* (E_0)	2b	+	1	+	.	.	.	.	.	+	50^3
Other taxa												
	Viola biflora	.	+	.	.	1	.	.	.	.	.	20^3 European
	Draba siliquosa	.	.	.	.	.	.	1	1	.	.	20^3 Mont-Med
	Draba dubia	.	.	.	.	.	.	1	.	+	.	20^3 European
pt	*Saxifraga wahlenbergii*	+	.	.	.	.	.	.	.	.	.	10^2 Endemic
	Anthoxanthum alpinum	.	.	.	+	.	.	.	.	.	.	10^2 Arct-Alp
pt	*Delphinium oxysepalum*	.	.	.	+	.	.	.	.	.	.	10^2 Endemic
	Draba ˣsturii Strobel	.	.	.	r	.	.	.	.	.	.	10^1
an	*Poa laxa*	.	.	.	.	+	.	.	.	.	.	10^2 European
	*Poa *carpatica*	.	.	.	.	.	+	.	.	.	.	10^2 Endemic
ac	*Salix retusa*	.	.	.	.	.	1	.	.	.	.	10^3 Alp-Carp
an	*Saxifraga bryoides*	.	.	.	.	.	1	.	.	.	.	10^3 European
	Salix sp.	.	.	.	.	.	.	.	.	.	r	10^1
***Bryophytes* & *Lichens* (E_0)**												
	Cladonia pyxidata s. l.	1	+	+	1	1	1	1	+	+	.	90^3
	Physconia muscigena	+	+	.	+	1	1	+	+	+	.	80^2
	Myurella julacea	.	.	+	.	+	+	+	+	.	.	50^2
	Mycobilimbia lobulata	+	.	.	.	.	.	+	+	+	+	50^2
	Encalypta alpina	+	.	.	.	.	.	+	+	1	+	50^2
	Psora decipiens	.	.	.	.	.	.	+	+	+	1	40^2
	Ochrolechia upsaliensis	+	+	+	.	.	.	.	+	.	.	40^2
	Ctenidium procerrimum	+	+	.	1	.	.	.	.	.	+	40^2
	Fulgensia bracteata	+	.	.	.	.	.	.	+	+	+	40^2
	Hypnum vaucheri	1	.	.	.	.	.	1	.	+	+	40^3
	Caloplaca ammiospila	+	.	.	.	1	+	+	.	.	.	40^2
	Rhytidium rugosum	1	1	.	+	.	.	.	.	.	.	30^3
	Entodon concinnus	1	+	.	+	.	.	.	.	.	.	30^2
	Hypnum revolutum	+	.	.	+	.	+	.	.	.	.	30^2
	Mnium thomsonii	+	.	.	+	.	.	.	.	+	.	30^2
	Distichium inclinatum	+	.	.	.	.	+	+	.	.	.	30^2
	Phaeorrhiza nimbosa	+	.	.	.	.	.	+	.	+	.	30^2

Relevé number	1	2	3	4	5	6	7	8	9	10	Const. Chor.
Grimmia sp.	.	.	.	.	+	.	.	.	+	+	30^2
Squamarina gypsacea	.	.	.	.	.	.	1	.	2b	+	30^4
Encalypta ciliata	.	.	+	+	+	.	.	.	.	.	30^2
Plagiochila porelloides	.	.	.	+	+	+	.	.	.	.	30^2
Cetraria aculeata et *muricata*	.	.	.	.	+	+	+	.	.	.	30^2
Campylium stellatum	+	+	.	.	.	.	.	.	.	.	20^2
Lecanora epibryon	+	.	.	.	.	.	+	.	.	.	20^2
Solorina sp.	+	.	.	.	.	.	.	.	+	.	20^2
Toninia sp.	+	.	.	.	.	.	.	.	1	.	20^3
Cladonia coccifera	.	.	+	.	.	+	.	.	.	.	20^2
Caloplaca sp.	.	.	.	+	.	.	.	+	.	.	20^2
Cladonia furcata	.	.	.	+	.	+	.	.	.	.	20^2
Anaptychia bryorum	.	.	.	.	+	+	.	.	.	.	20^2
Hypogymnia physodes	.	.	.	.	+	1	.	.	.	.	20^3
Polytrichum alpinum	.	.	.	.	+	1	.	.	.	.	20^3
Pseudevernia furfuracea	.	.	.	.	1	.	+	.	.	.	20^3
Grimmia funalis	.	.	.	.	+	.	.	1	.	.	20^3
Hypnum cupressiforme	.	.	.	.	+	.	.	.	+	.	20^2
Anaptychia sp.	.	.	.	.	.	.	2a	+	.	.	20^4
Leptogium sp.	.	.	.	.	.	.	+	+	.	.	20^2
Megaspora verrucosa	.	.	.	.	.	.	+	.	.	+	20^2
Schistidium apocarpum	.	.	.	.	.	.	.	+	.	+	20^2
Stegonia latifolia	.	.	.	.	.	.	1	1	.	.	20^3
Ctenidium molluscum	+	.	.	.	.	.	.	.	.	.	10^2
Didymodon giganteus	+	.	.	.	.	.	.	.	.	.	10^2
Hypogymnia sp.	+	.	.	.	.	.	.	.	.	.	10^2
Lecidea lurida	+	.	.	.	.	.	.	.	.	.	10^2
Encalypta streptocarpa	+	.	.	.	.	.	.	.	.	.	10^2
Racomitrium canescens	+	.	.	.	.	.	.	.	.	.	10^2
Thelopsis melathelia	+	.	.	.	.	.	.	.	.	.	10^2
Hypnum sp.	.	+	.	.	.	.	.	.	.	.	10^2
Lecidoma demissum	.	.	+	.	.	.	.	.	.	.	10^2
*Caloplaca *chloroleuca*	.	.	.	+	.	.	.	.	.	.	10^2
Peltigera rufescens	.	.	.	+	.	.	.	.	.	.	10^2
Protoblastenia terricola	.	.	.	+	.	.	.	.	.	.	10^2
Pertusaria glomerata	.	.	.	.	+	.	.	.	.	.	10^2
Bryoria bicolor	.	.	.	.	.	1	.	.	.	.	10^3
Polytrichum piliferum	.	.	.	.	.	1	.	.	.	.	10^3
Bryoria sp.	.	.	.	.	.	+	.	.	.	.	10^2
Cladonia bellidiflora	.	.	.	.	.	+	.	.	.	.	10^2
Parmelia omphalodes	.	.	.	.	.	+	.	.	.	.	10^2
Sphaerophorus fragilis	.	.	.	.	.	+	.	.	.	.	10^2
Toninia opuntioides	.	.	.	.	.	.	1	.	.	.	10^3
Caloplaca epiphyta	.	.	.	.	.	.	+	.	.	.	10^2
Dermatocarpon miniatum	.	.	.	.	.	.	+	.	.	.	10^2
Diploschistes gypsaceus	.	.	.	.	.	.	+	.	.	.	10^2
Encalypta rhaptocarpa	.	.	.	.	.	.	+	.	.	.	10^2
Marsupella sp.	.	.	.	.	.	.	+	.	.	.	10^2
Schistidium atrofuscum	.	.	.	.	.	.	+	.	.	.	10^2
Umbilicaria cylindrica	.	.	.	.	.	.	+	.	.	.	10^2
Xanthoria sorediata	.	.	.	.	.	.	+	.	.	.	10^2

Relevé number	1	2	3	4	5	6	7	8	9	10	Const.	Chor.
Anoectangium sp.	.	.	.	.	.	.	.	+	.	.	10^2	
Physcia caesia	.	.	.	.	.	.	.	+	.	.	10^2	
Plagiobryum demissum	.	.	.	.	.	.	.	+	.	.	10^2	
Pseudoleskeella catenulata	.	.	.	.	.	.	.	+	.	.	10^2	
Myurella tenerrima	.	.	.	.	.	.	.	+	.	.	10^2	
Collema sp.	.	.	.	.	.	.	.	.	+	.	10^2	
Dermatocarpon sp.	.	.	.	.	.	.	.	.	+	.	10^2	
*Cladonia *pocillum*	.	.	.	.	.	.	.	.	.	1	10^3	
Toninia sedifolia	.	.	.	.	.	.	.	.	.	+	10^2	
Xanthoria elegans	.	.	.	.	.	.	.	.	.	+	10^2	

Table 2: Comparison of the Western Carpathian plant community of the association *Oxytropido carpaticae-Elynetum* (class *Carici rupestris-Kobresietea bellardii*) with other relevant associations from Carpathians and Alps (a brief synoptic table)

A–E *Carici rupestris-Kobresietea* (*Oxytropido-Elynion*), F *Elyno-Seslerietea* (*Caricion firmae*)
A *Oxytropido carpaticae-Elynetum* (Western Carpathians), B *Oxytropido carpaticae-Elynetum* (Southern Carpathians), C *Achilleo schurii-Dryadetum* (Eastern Carpathians), D *Elynetum myosuroides* (Eastern Alps), E *Elynetum myosuroides* (Southern Alps), F *Arenario tenellae-Caricetum firmae* (Western Carpathians)

Tabela 2: Primerjava sestojev asociacije *Oxytropido carpaticae-Elynetum* (razred *Carici rupestris-Kobresietea bellardii*) z Zahodnih Karpatov z primerljivimi asociacijami z Karpatov in Alp (skrajšana sinoptična tabela)

A–E *Carici rupestris-Kobresietea* (*Oxytropido-Elynion*), F *Elyno-Seslerietea* (*Caricion firmae*)
A *Oxytropido carpaticae-Elynetum* (zahodni Karpati), B *Oxytropido carpaticae-Elynetum* (južni Karpati), C *Achilleo schurii-Dryadetum* (vzhodni Karpati), D *Elynetum myosuroides* (vzhodne Alpe), E *Elynetum myosuroides* (južne Alpe), F *Arenario tenellae-Caricetum firmae* (zahodni Karpati)

Community		A	B	C	D	E	F
Number of relevés		**10**	**14**	**13**	**58**	**18**	**182**
Average species number		**53**	**29**	**26**	**23**	**24**	**39**
Differencial taxa of the associations							
oe	*Elyna myosuroides*	**99^6**	**99^5**	.	**98^6**	**99^6**	.
JT, Cc	*Primula minima*	**70^3**	**86^3**	23^2	57^3	56^3	13^2
oe, Sc	*Oxytropis halleri*	**70^4**	**43^2**	.	2^3	.	3^2
pa	*Poa alpina*	**60^2**	**50^2**	8^2	28^2	56^3	19^2
oe, st	*Oxytropis carpatica*	**50^2**	**14^2**	.	.	.	18^3
an, fv	*Luzula spicata*	**40^2**	**36^2**	.	2^2	6^2	1^2
JT, Cv	*Campanula polymorpha* s. l.	**80^2**	.	38^2	.	.	15^2
cf	*Dactylina madreporiformis* (E_0)	**80^3**	.	.	5^2	.	23^3
tf	*Rhodiola rosea*	**80^2**	.	8^2	.	.	23^2
oe, fv	*Ligusticum mutellinoides*	**70^2**	.	.	33^2	17^2	8^2
	Thymus alpestris	**60^3**	.	.	.	.	5^2
oe, fv	*Agrostis alpina*	**60^4**	.	.	34^3	56^3	1^3
fv	*Carex fuliginosa*	**60^3**	.	.	12^4	.	13^2
	Armeria alpina	.	**50^2**	.	.	.	
oe, cf	*Dryas octopetala*	10^1	79^3	**99^8**	14^2	67^3	74^5
oe	*Achillea *schurii*	.	36^2	**85^2**	.	.	.
fs	*Sesleria bielzii*	.	.	**85^2**	.	.	.
fv, cf	*Bartsia alpina*	10^2	7^2	**77^2**	.	78^3	37^2
	Rhytidiadelphus triquetrus (E_0)	.	.	**69^3**	.	.	16^2
	Hylocomium splendens (E_0)	.	.	**54^3**	.	.	19^3

Community		A	B	C	D	E	F
	Salix hastata	.	.	**46^{2}**	.	.	.
Cv, st	*Anemone narcissiflora*	.	.	**46^{2}**	.	.	1^{2}
MU	*Primula elatior*	.	.	**38^{2}**	.	.	.
	Soldanella hungarica	.	.	**38^{2}**	.	.	.
oe	*Festuca pumila*	.	.	.	**97^{4}**	.	.
	Carex rupestris	.	14^{2}	8^{2}	**78^{4}**	11^{2}	5^{6}
oe, Sc	*Oxytropis campestris* s. l.	.	.	.	**74^{3}**	.	1^{3}
oe	*Salix serpyllifolia*	.	.	.	**47^{3}**	**39^{2}**	.
JT, Cc	*Euphrasia minima*	.	.	.	**40^{2}**	**50^{2}**	.
	Campanula scheuchzeri	.	.	.	**36^{2}**	**17^{2}**	.
	Gentiana orbicularis	.	.	.	**41^{2}**	.	.
	Ranunculus montanus	.	.	.	**21^{3}**	.	.
Sc	*Thymus *polytrichus*	.	.	.	7^{2}	**56^{2}**	.
Sc	*Achillea clavennae*	.	.	.	3^{2}	**56^{3}**	.
JT, Cc	*Leontodon helveticus*	.	.	.	2^{1}	**44^{2}**	.
	Pedicularis rostrato-capitata	.	.	.	9^{2}	**39^{2}**	.
JT, Cc	*Potentilla aurea*	.	.	.	.	**56^{3}**	1^{2}
	Arctostaphylos alpinus	.	.	.	.	**39^{3}**	.
	Carex ornithopoda	.	.	.	.	**39^{3}**	.
cf, pc	*Carex firma*	20^{2}	.	.	12^{3}	56^{3}	**99^{7}**
cf	*Ranunculus alpestris*	10^{2}	.	.	26^{2}	11^{2}	**74^{2}**
cf	*Crepis jacquinii*	.	.	.	.	.	**74^{3}**
cf, pc	*Saxifraga caesia*	.	.	.	.	.	**67^{2}**
	Salix alpina	.	.	8^{2}	.	.	**44^{2}**
Sc, cy	*Bellidiastrum michelii*	.	.	.	.	56^{2}	**34^{2}**
	Soldanella carpatica	.	.	.	.	.	**25^{2}**
Oxytropido-Elynion*, *Oxytropido-Elynetalia							
cf	*Androsace chamaejasme*	99^{3}	64^{2}	.	10^{2}	.	60^{2}
fv	*Cerastium eriophorum*	90^{3}	57^{2}	38^{2}	.	.	24^{2}
cf, fv	*Minuartia sedoides*	80^{3}	50^{2}	.	48^{2}	.	54^{2}
Pc	*Saxifraga paniculata*	80^{4}	36^{2}	77^{2}	40^{2}	.	45^{2}
cf	*Arenaria ciliata* s. l.	60^{3}	.	.	64^{2}	.	60^{2}
fv	*Antennaria carpatica*	50^{2}	29^{2}	23^{2}	.	67^{3}	3^{2}
an, fv	*Saxifraga oppositifolia*	40^{3}	29^{2}	31^{3}	43^{2}	.	8^{2}
ac	*Myosotis alpestris*	30^{2}	14^{2}	38^{2}	21^{2}	.	9^{2}
	Carex capillaris	40^{3}	.	8^{2}	21^{3}	11^{2}	4^{2}
cf, pc	*Draba aizoides*	40^{3}	.	.	3^{2}	.	32^{2}
st	*Astragalus australis*	30^{3}	.	31^{2}	.	6^{3}	3^{2}
	Kobresia simpliciuscula	20^{3}	.	.	.	.	14^{5}
JT	*Carex atrata*	10^{2}	7^{2}	.	2^{2}	11^{2}	5^{2}
	Sedum atratum	10^{2}	.	.	.	.	3^{2}
	Anthemis carpatica	.	21^{2}	8^{2}	.	.	.
	Gentiana verna	.	7^{2}	.	9^{2}	11^{2}	3^{2}
	Androsace villosa	.	7^{2}	.	.	.	.
	Carex parviflora	.	.	.	14^{2}	17^{2}	.
	Oxytropis lapponica	.	.	.	10^{3}	.	.
Carici rupestris-Kobresietea							
fv	*Lloydia serotina*	**90^{3}**	.	8^{2}	22^{3}	11^{2}	29^{2}
fv	*Comastoma tenellum*	**70^{2}**	.	.	16^{2}	.	10^{2}
cf, fv	*Pedicularis oederi*	40^{2}	36^{2}	.	3^{3}	.	64^{2}
cf	*Minuartia gerardii*	40^{2}	36^{2}	.	83^{3}	17^{2}	42^{2}

Community		A	B	C	D	E	F
Sc, pc	*Aster alpinus*	40^{4}	.	23^{2}	24^{3}	22^{2}	12^{3}
	Draba fladnizensis	20^{2}	.	.	5^{2}	.	.
	Astragalus alpinus	10^{5}	29^{3}	.	2^{3}	.	.
	Gentiana nivalis	20^{2}	21^{2}	.	16^{2}	11^{2}	3^{2}
fv	*Saussurea alpina*	10^{3}	.	23^{2}	36^{3}	.	2^{2}
	Erigeron hungaricus	10^{2}	.	.	.	.	1^{1}
	Erigeron uniflorus	.	21^{2}	.	28^{2}	39^{2}	1^{2}
Sc, fv	*Potentilla crantzii*	.	.	8^{2}	21^{2}	6^{2}	1^{2}
Caricion firmae							
fv	*Bistorta vivipara*	99^{3}	93^{3}	62^{2}	90^{3}	99^{3}	72^{2}
fv, fs	*Silene acaulis*	90^{5}	79^{2}	8^{3}	84^{3}	72^{2}	73^{3}
	Rhodax alpestris	50^{2}	29^{3}	8^{2}	10^{2}	39^{2}	59^{3}
	Chamorchis alpina	10^{2}	29^{2}	.	3^{2}	11^{2}	34^{2}
lv	*Thamnolia vermicularis* (E_0)	90^{2}	36^{3}	.	71^{2}	.	53^{2}
	Alectoria ochroleuca (E_0)	30^{2}	21^{2}	.	19^{2}	.	25^{2}
	Vulpicida tubulosus (E_0)	50^{2}	.	.	28^{2}	.	46^{3}
	Saxifraga aizoides	10^{2}	.	54^{2}	.	.	54^{2}
	Saussurea pygmaea	10^{1}	.	.	.	.	.
Festuco saxatilis-Seslerion bielzii							
	Swertia punctata	.	.	15^{3}	.	.	.
	*Festuca *saxatilis*	.	7^{2}	8^{2}	.	.	.
	Dianthus tenuifolius	.	.	8^{2}	.	.	.
Seslerietalia coerulae, Elyno-Seslerietea							
Sc	*Ranunculus breyninus*	99^{3}	14^{2}	54^{2}	.	.	41^{2}
	Galium anisophyllon	80^{2}	36^{2}	54^{2}	19^{2}	44^{2}	62^{2}
Sc, st	*Carex sempervirens*	20^{3}	29^{3}	77^{3}	2^{5}	17^{2}	13^{2}
pc	*Trisetum alpestre*	60^{4}	.	38^{2}	.	.	58^{3}
ES	*Selaginella selaginoides*	10^{1}	.	31^{2}	.	72^{2}	34^{2}
	Gentianella lutescens	30^{1}	.	8^{2}	.	.	33^{2}
	Phyteuma orbiculare	20^{2}	.	23^{2}	9^{2}	.	31^{2}
Sc, Pc	*Thymus pulcherrimus*	10^{2}	.	8^{2}	.	.	10^{2}
Sc	*Anthyllis *alpestris*	.	.	31^{2}	2^{1}	33^{2}	16^{2}
st, cf	*Ranunculus thora*	.	.	23^{3}	.	.	4^{2}
	Helianthemum grandiflorum	.	.	8^{2}	.	.	14^{2}
	Euphrasia salisburgensis	40^{2}	.	.	.	6^{2}	46^{2}
st	*Bupleurum ranunculoides*	50^{3}	7^{2}	.	.	.	8^{2}
st	*Sesleria tatrae*	10^{2}	.	.	.	.	35^{2}
st	*Tephroseris capitata*	20^{2}	.	.	.	.	1^{1}
st	*Astragalus frigidus*	10^{2}	.	.	7^{2}	.	1^{2}
Sc	*Sesleria albicans*	.	29^{2}	.	21^{2}	72^{3}	13^{3}
ES, Tr	*Biscutella laevigata*	.	7^{2}	.	3^{2}	.	31^{2}
sa	*Hieracium villosum*	.	21^{2}	.	.	6^{2}	4^{2}
ES	*Scabiosa lucida*	.	14^{2}	38^{2}	.	.	10^{2}
st, fs	*Linum extraaxillare*	.	7^{2}	15^{2}	.	.	2^{1}
	Parnassia palustris	.	7^{2}	15^{2}	5^{2}	28^{2}	10^{2}
Sc, pc	*Gentiana clusii*	.	.	.	5^{2}	11^{2}	20^{2}
sa, pc	*Gypsophila repens*	.	.	.	3^{1}	.	9^{3}
	Phyteuma vagneri	.	.	8^{2}	.	.	.
Festucion versicoloris							
fs	*Festuca versicolor*	99^{5}	29^{3}	46^{3}	.	.	99^{5}
	Pedicularis verticillata	.	29^{2}	46^{2}	3^{3}	.	34^{2}

Community		A	B	C	D	E	F
cf	*Hedysarum hedysaroides*	40^{2}	14^{3}	31^{2}	14^{4}	39^{2}	14^{2}
an	*Saxifraga moschata*	30^{2}	.	.	10^{2}	.	7^{2}
ac, fs	*Leontodon pseudotaraxac*i	10^{2}	14^{2}	38^{2}	.	.	10^{2}
Loiseleurio-Vaccinion							
Jp	*Vaccinium vitis-idaea*	.	.	31^{2}	7^{2}	44^{2}	11^{2}
	Vaccinium gaultherioides	.	14^{2}	31^{3}	.	**94^{3}**	2^{2}
Jp	*Vaccinium myrtillus*	.	.	15^{3}	.	.	.
st	*Euphrasia tatrae*	.	.	.	.	.	1^{2}
	Loiseleuria procumbens	.	7^{2}	.	2^{1}	17^{2}	.
Caricetalia curvulae, Juncetea trifidi							
	Cetraria islandica (E_0)	20^{2}	57^{3}	8^{2}	59^{3}	17^{2}	55^{2}
JT	*Festuca supina*	40^{3}	**99^{3}**	31^{3}	.	.	3^{2}
	Campanula alpina	10^{2}	36^{2}	31^{3}	.	.	6^{2}
jt	*Juncus trifidus*	10^{2}	14^{5}	8^{2}	.	.	1^{2}
	Cetraria nivalis (E_0)	10^{3}	36^{2}	.	**91^{3}**	6^{2}	10^{2}
	Cetraria cucullata (E_0)	20^{2}	.	.	3^{2}	.	8^{2}
	Oreochloa disticha	20^{3}	.	.	3^{5}	.	2^{3}
	Avenula versicolor	10^{2}	.	15^{2}	.	50^{3}	.
Cc, pn	*Potentilla *chrysocraspeda*	.	29^{2}	.	.	.	.
	Cladonia arbuscula (E_0)	.	29^{2}	.	.	.	3^{2}
cv	*Pulsatilla scherfelii*	.	14^{2}	.	.	.	1^{2}
Cc	*Carex curvula*	.	14^{2}	8^{2}	2^{5}	.	.
jt	*Hieracium alpinum*	.	.	31^{2}	.	.	.
Jp	*Huperzia selago*	.	.	31^{2}	.	.	4^{2}
Jp	*Juniperus sibirica*	.	.	8^{2}	.	.	1^{2}
Jp	*Rhododendron myrtifolium*	.	.	8^{2}	.	.	.
	*Juncus *monanthos*	.	.	.	2^{3}	28^{2}	.
ns	*Luzula sudetica*	.	14^{2}	.	.	.	.
Potentillion caulescentis							
	Primula auricula	50^{3}	.	.	.	.	46^{2}
	Artemisia eriantha	40^{2}	.	.	.	.	5^{2}
Sc	*Leontopodium alpinum*	30^{3}	21^{2}	.	40^{2}	28^{2}	25^{2}
	Campanula cochleariifolia	30^{2}	.	.	12^{2}	.	55^{3}
	Androsace lactea	20^{2}	.	.	.	.	11^{2}
	Draba tomentosa	10^{2}	.	.	.	.	10^{2}
Potentilletalia caulescentis, Asplenietea trichomanis							
AT	*Tortella tortuosa* (E_0)	80^{2}	14^{2}	.	17^{2}	.	92^{5}
Pc	*Ditrichum flexicaule* (E_0)	50^{3}	14^{2}	.	.	.	72^{3}
cy	*Asplenium viride*	.	.	23^{2}	.	.	10^{2}
Pc	*Silene zawadskii*	.	.	15^{2}	.	.	.
Cc	*Agrostis rupestris*	.	36^{3}	.	.	11^{4}	.
cy	*Swertia perennis*	.	.	.	.	.	24^{2}
Arabidion coeruleae							
ac	*Salix retusa*	10^{3}	7^{2}	.	2^{2}	11^{4}	11^{2}
st, pa	*Alchemilla flabellata*	.	36^{2}	.	.	22^{2}	1^{2}
ac	*Salix reticulata*	.	29^{2}	46^{5}	3^{2}	.	47^{3}
pt	*Saxifraga wahlenbergii*	10^{2}	.	.	.	.	20^{2}
pt	*Pritzelago alpina*	.	.	.	.	.	14^{2}
st	*Cardaminopsis halleri*	.	.	15^{2}	.	.	.
Salicetalia herbaceae, Salicetea herbacea							
	Sedum alpestre	.	21^{2}	.	.	.	.

Community		A	B	C	D	E	F
	Salix herbacea	.	14^{2}	.	.	.	.
fp, an	*Doronicum stiriacum*	.	.	31^{2}	.	.	.
	Luzula alpinopilosa	.	.	8^{2}	.	.	.
Mulgedio-Aconitetea							
	Anthoxanthum alpinum	10^{2}	14^{2}	8^{2}	.	.	.
	Primula halleri	.	14^{2}	8^{2}	3^{1}	11^{2}	.
Cv	*Ligusticum mutellina*	.	14^{2}	.	.	.	1^{2}
Cv, Na	*Campanula serrata*	.	7^{2}	.	.	.	.
fc	*Festuca carpatica*	.	.	31^{2}	.	.	.
	Bistorta major	.	.	31^{3}	.	.	1^{2}
Thlaspietea rotundifolii							
an, fp	*Veronica baumgartenii*	.	.	31^{2}	.	.	.
aa, cy	*Arabis alpina*	.	.	23^{2}	.	.	1^{2}
pt	*Delphinium oxysepalum*	10^{2}	.	.	.	.	1^{1}
an	*Saxifraga bryoides*	10^{3}	.	.	2^{2}	.	.
an	*Poa laxa*	10^{2}	.	.	.	.	.
an	*Saxifraga hieraciifolia*	.	.	.	.	.	1^{2}
Other taxa							
	Draba siliquosa	20^{3}	.	.	10^{2}	.	1^{2}
	Draba dubia	20^{3}	.	.	2^{1}	.	.
	Viola biflora	20^{3}	.	23^{2}	.	.	3^{2}
	Draba ˣsturii Strobel	10^{1}	.	.	.	.	.
	*Poa *carpatica*	10^{2}	.	.	.	.	.
	*Thymus *parviflorus*	.	43^{2}	.	.	.	.
	Arenaria rotundifolia M.Bieb.	.	36^{2}	.	.	.	.
	Festuca bucegiensis	.	36^{3}	.	.	.	.
	Viola alpina	.	36^{2}	.	.	.	17^{3}
	*Trifolium *ochranthum*	.	36^{2}	.	.	.	.
	*Dianthus *gelidus*	.	29^{2}	.	.	.	.
	Minuartia recurva	.	29^{2}	.	.	.	.
	Thalictrum alpinum	.	21^{2}	.	.	.	.
	*Alyssum *repens*	.	14^{2}	.	.	.	.
	Luzula multiflora	.	14^{2}	.	.	.	.
	Ranunculus pseudomontanus	.	14^{2}	.	.	.	3^{2}
	Botrychium lunaria	.	14^{2}	.	3^{2}	.	2^{2}
	Bellardiochloa variegata	.	7^{2}	.	.	.	.
	Cerastium transsilvanicum	.	7^{2}	.	.	.	.
	Koeleria macrantha	.	7^{2}	.	.	.	.
pn	*Viola declinata*	.	7^{2}	.	.	.	.
cr	*Pinguicula alpina*	.	7^{2}	31^{2}	.	.	34^{2}
	Callianthemum coriandrifolium	.	.	8^{2}	.	.	.
	Coeloglossum viride	.	.	8^{2}	.	.	.
	Dianthus superbus	.	.	8^{2}	.	.	.
	Doronicum carpaticum	.	.	8^{2}	.	.	.
	*Minuartia *oxypetala*	.	.	8^{2}	.	.	.
	Trisetum spicatum	.	.	.	17^{3}	.	.
	Astragalus helveticus	.	.	.	16^{2}	.	.
	Phyteuma hemisphaericum	.	.	.	12^{2}	17^{2}	.
	Sesleria ovata	.	.	.	14^{2}	.	.
	Gentianella campestris	.	.	.	12^{2}	.	.
	Gentiana prostrata	.	.	.	12^{2}	.	.

Community	A	B	C	D	E	F
Pedicularis aspleniifolia	.	.	.	12^2	.	.
Phyteuma globuraliifolium	.	.	.	12^2	.	.
Cerastium alpinum	.	.	.	10^2	.	.
Potentilla nivea	.	.	.	10^2	.	.
Homogyne alpina	.	.	.	.	33^3	1^2
Gentiana acaulis	.	.	.	.	28^2	.
Oxytropis jacquinii	.	.	.	2^3	22^2	.
Euphrasia pulchella	.	.	.	.	22^2	.
Homogyne discolor	.	.	.	.	22^3	.
Daphne striata	.	.	.	.	17^2	.
Festuca alpina	.	.	.	.	17^2	.
Lotus alpinus	.	.	.	.	17^2	.
Saxifraga crustata	.	.	.	.	17^2	.
Phyteuma sieberi	.	.	.	.	11^2	.
Sesleria sphaerocephala	.	.	.	.	11^2	.
Soldanella alpina	.	.	.	.	11^2	.
Leontodon hispidus	.	.	.	.	6^2	.
Bryophytes & Lichens (E_0)						
Cladonia pyxidata s. l.	90^3	.	.	2^2	.	8^2
Physconia muscigena	80^2	.	.	2^2	.	4^2
Encalypta alpina	50^2	7^2	.	.	.	27^3
Myurella julacea	50^2	21^2	.	3^2	.	14^2
Rhytidium rugosum	30^3	21^2	.	10^2	.	40^2
Hypnum vaucheri	40^3	21^2	.	.	.	7^2
Cetraria aculeata et *muricata*	30^2	14^2	.	.	.	.
Stegonia latifolia	20^3	36^2	.	.	.	8^2
Hypnum cupressiforme	20^2	14^2	.	.	.	12^2
Mycobilimbia lobulata	50^2	.	.	.	.	5^2
Ctenidium procerrimum	40^2	.	.	.	.	32^3
Caloplaca ammiospila	40^2	.	.	.	.	14^2
Fulgensia bracteata	40^2	.	.	.	.	10^2
Psora decipiens	40^2	.	.	.	.	4^2
Ochrolechia upsaliensis	40^2	.	.	.	.	2^2
Entodon concinnus	30^2	.	.	.	.	25^2
Schistidium apocarpum	30^2	.	.	.	.	19^2
Squamarina gypsacea	30^4	.	.	.	.	18^2
Mnium thomsonii	30^2	.	.	.	.	18^2
Plagiochila porelloides	30^2	.	.	.	.	11^2
Distichium inclinatum	30^2	.	.	.	.	5^2
Hypnum revolutum	30^2	.	.	2^2	.	1^2
Campylium stellatum	20^2	.	.	.	.	32^2
Megaspora verrucosa	20^2	.	.	.	.	20^2
Lecanora epibryon	20^2	.	.	.	.	14^2
Pseudevernia furfuracea	20^3	.	.	.	.	4^2
Ctenidium molluscum	10^2	.	.	.	.	43^2
*Cladonia *pocillum*	10^3	.	.	.	.	5^2
Grimmia funalis	20^3	.	.	.	.	.
Plagiochila asplenioides	.	43^2	.	.	.	4^2
Desmatodon latifolius	.	43^2	.	.	.	1^2
Polytrichum juniperinum	.	36^2	.	2^2	.	1^2
Distichium capillaceum	.	29^2	.	5^2	.	37^2

Community	A	B	C	D	E	F
Polytrichum piliferum	.	29^{2}	.	.	.	.
Tortula ruralis	.	29^{2}	.	.	.	.
Thuidium delicatulum	.	21^{2}	.	.	.	1^{1}
Racomitrium lanuginosum	.	.	31^{2}	.	.	13^{3}
Pleurozium schreberi	.	.	31^{2}	.	.	5^{2}
Dicranum scoparium	.	.	31^{2}	.	.	3^{2}
Hypnum bambergeri	.	.	.	.	.	32^{3}
Orthothecium rufescens	.	.	.	.	.	27^{2}
Solorina bispora	.	.	.	.	.	18^{2}
Cirriphyllum cirrosum	.	.	.	.	.	15^{2}
Didymodon giganteus	.	.	.	.	.	15^{3}

Explanations:
Campanula polymorpha Witasek
Doronicum carpaticum (Griseb. & Schenk) Nyman
Thymus serpyllum L. subsp. *parviflorus* (Opiz ex Heinr.Braun) Lyka
Trifolium repens subsp. *ochranthum* (K.Maly)Nyar.

Sources to Table 2:

A: ***Oxytropido carpaticae-Elynetum*** **(Western Carpathians):** 9 – Petrík (Tab. 1, rels. 1–9, Belianske Tatry Mts), 1 – Petrík & Šibík (Tab. 1, rel. 10, Belianske Tatry Mts);
B: ***Oxytropido carpaticae-Elynetum*** **(Southern Carpathians):** 14 – Puscaru 1956 (Tab. 24, rels. 1–14, Bucegi Mts);
C: ***Achilleo schurii-Dryadetum*** (**Eastern Carpathians):** 8 – Coldea 1990 (p. 79, rels. 1–8, Rodna Mts), 5 – Malinovskij & Kricsfalusy 2002 (p. 84, rels. 1–5, Bliznitsa Mts);
D: ***Elynetum myosuroides*** **(Eastern Alps):** 58 – Albrecht 1969 (Tab. 3, rels. 43–58, 60–70, 79–109);
E: ***Elynetum myosuroides*** **(Southern Alps):** 18 – Oriolo 2001 (Tab. 2, rels 1–18);
F: ***Arenario tenellae-Caricetum firmae*** **(Western Carpathians):** 1 – Braun-Blanquet 1930 (p. 25, Belianske Tatry Mts), 18 – Dúbravcová & al. 1980 (Tab. 1, rels. 1–18, Západné Tatry Mts), 10 – Hadač & al. 1969 (pp. 63–64, rels. 136, 214, 218, 231, 240, and pp. 58–59, rels. 24, 149, 150, 153, 154, Belianske Tatry Mts), 7 – Pawłowski 1935 (Tab. 2, rels. 1–4, 6–8, Belianske Tatry Mts); 10 – Pawłowski & Stecki 1927 (Tab. 2, rels. 7–9, 13–17, Západné Tatry Mts, and Tab. 2., rels. 21, 22, Belianske Tatry Mts), 6 – Šmarda & al. 1971 (Tab. 2, rels. 1–6, Belianske Tatry Mts), 10 – Unar & al. 1984 (Tab. 15, rels. 1–10, Západné Tatry Mts), 5 – Valachovič ined., Belianske Tatry Mts, and 115 – Petrík ined., Západné Tatry Mts (18), Vysoké Tatry Mts (3), Belianske Tatry Mts (94), see also Tab. 1 in Šibík & al. 2004.