Roleček J., Čornej I. I. & Tokarjuk A. I. (2014): Understanding the extreme species richness of semi-dry grasslands in east-central Europe: a comparative approach. – Preslia 86: 13–34.

Electronic Appendix 1. – Taxonomical concepts and nomenclature of taxa mentioned in the paper and deviating from Ehrendorfer (1973) or not included therein

Centaurea scabiosa s.lat. = *Centaurea* sect. *Lopholoma* sensu Tutin et al. (1976) (incl. *C. scabiosa*, *C. cephalariifolia*, *C. alpestris*, *C. sadlerana*, *C. badensis*, *C. grinensis*, *C. spiculata*, *C. stereophylla*)

Chamaecytisus blockianus = *Cytisus blockianus* sensu ILDIS World Database of Legumes 2010 [= *Cytisus blockianus* Pawł.; = *Chamaecytisus blockianus* (Pawł.) Klásk.]

Festuca ser. *Valesiacae* = *Festuca* ser. *Valesiacae* sensu Dengler at al. (2012) (incl. *F. pseudovina, F. illyrica, F. wagneri, F. makutrensis, F. valesiaca, F. carnuntina, F. rupicola, F. taurica, F. dalmatica, F. pseudodalmatica*) [= mostly *F. rupicola*]

Ferulago sylvatica = *Ferulago sylvatica* sensu Hand (2011) [= *Ferulago sylvatica* (Besser) Rchb.)]

Galium oelandicum = *Galium oelandicum* sensu Marhold (2011) [= *Galium oelandicum* (Sterner & Hyl.) Ehrend.]

Linum nervosum = *Linum nervosum* sensu The International Plant Names Index 2013 [= *Linum nervosum* Waldst. & Kit.]

Molinia arundinacea subsp. *freyi* = *Molinia arundinacea* subsp. *freyi* sensu Dančák et al. (2012)

Paeonia tenuifolia = *Paeonia tenuifolia* sensu Aghababian (2011) [= *Paeonia tenuifolia* L.]

Psephellus trinervius = *Psephellus trinervius* sensu Greuter W. (2006+) [= *Psephellus trinervius* (Willd.) Wagenitz; = *Centaurea trinervia* Willd.]

Senecio doria s.lat. = *Senecio doria* group sensu Grulich & Hodálová (1994) [= cf. *Senecio macrophyllus* M. Bieb.]

Serratula coronata = *Serratula coronata* sensu Greuter W. (2006+) [= *Serratula coronata* L.]

References

Aghababian M. (2011): *Paeoniaceae*. – In: Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. [http://www.emplantbase.org/]

Dančák M., Duchoslav M. & Trávníček B. (2012): Taxonomy and cytogeography of the *Molinia caerulea* complex in central Europe. – Preslia 84: 351–374.

Dengler J., Becker T., Ruprecht E., Szabó A., Becker U., Beldean M., Bita-Nicolae C., Dolnik C., Goia I., Peyrat J., Sutcliffe L. M. E., Turtureanu P. D. & Uğurlu E. (2012): *Festuco-Brometea* communities of the Transylvanian Plateau (Romania) – a preliminary overview on syntaxonomy, ecology, and biodiverzity. – Tuexenia 32: 319–359.

Ehrendorfer F. (ed.) (1973): Liste der Gefäßpflanzen Mitteleuropas. Ed. 2. – Gustav Fischer Verlag, Stuttgart.

Greuter W. (2006+): *Compositae* (pro parte majore). – In: Greuter W. & von Raab-Straube E. (ed.): *Compositae*. Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. [http://www.emplantbase.org/]

Grulich V. & Hodálová I. (1994): The *Senecio doria* group (*Asteraceae-Senecioneae*) in Central and Southeastern Europe. – Phyton 34: 247–265.

Hand R. (2011): *Apiaceae*. – In: Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. [http://www.emplantbase.org/]

ILDIS World Database of Legumes 2010. – In: Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. [http://www.emplantbase.org/]

Marhold K. (2011): *Rubiaceae*. – In: Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. [http://www.emplantbase.org/]

The International Plant Names Index 2013. [http://www.ipni.org]

Tutin T. G., Heywood V. H., Burges N. A., Valentine D. H., Walters S. M. & Webb D. A. (eds) (1976): Flora Europaea. Vol. 4. – Cambridge University Press, Cambridge.

Electronic Appendix 2. – The most species-rich relevé and full frequency table for the extremely species-rich semi-dry grasslands in Prut-Siret interfluve, Ukraine.

Relevé header: Dzjurkač site, grasslands north of the Spas'ka village, Storožynec district, Černivci region; Latitude: 48°18'; Longitude: 25°48'; Date: 2. 7. 2005; Herb layer cover: 95 %; Herb layer maximum height: 150 cm; Number of species: 90 (the world record for 9 m^2; Wilson et al. 2012, J. Dengler pers. comm.); Relevé author: A. I. Tokarjuk.

Herb layer species list and covers estimated on Braun-Blanquet scale with first and second degrees (codes r and +) lumped: *Arrhenatherum elatius* 2, *Avenochloa pubescens* 2, *Anthericum ramosum* 1, *Anthoxanthum odoratum* 1, *Anthyllis vulneraria* agg. 1, *Betonica officinalis* 1, *Brachypodium pinnatum* 1, *Briza media* 1, *Centaurea jacea* 1, *Centaurea scabiosa* 1, *Dactylis glomerata* 1, *Deschampsia cespitosa* 1, *Equisetum telmateia* 1, *Ferulago sylvatica* 1, *Festuca rubra* agg. 1, *Filipendula vulgaris* 1, *Galium verum* 1, *Laserpitium latifolium* 1, *Medicago falcata* 1, *Muscari comosum* 1, *Pedicularis exaltata* 1, *Peucedanum oreoselinum* 1, *Potentilla erecta* 1, *Prunella grandiflora* 1, *Salvia pratensis* 1, *Sanguisorba officinalis* 1, *Trifolium alpestre* 1, *Trifolium pannonicum* 1, *Achillea millefolium* agg. +, *Agropyron repens* +, *Asperula cynanchica* +, *Campanula glomerata* +, *Campanula patula* +, *Campanula persicifolia* +, *Carex tomentosa* +, *Centaurea phrygia* agg. +, *Cichorium intybus* +, *Colchicum autumnale* +, *Coronilla varia* +, *Crepis biennis* +, *Cynosurus cristatus* +, *Danthonia decumbens* +, *Dianthus carthusianorum* agg. +, *Euphorbia angulata* +, *Euphorbia villosa* agg. +, *Euphrasia stricta* +, *Festuca pratensis* +, *Gladiolus imbricatus* +, *Gymnadenia conopsea* +, *Hieracium cymosum* +, *Holcus lanatus* +, *Hypericum maculatum* +, *Hypochaeris maculata* +, *Inula hirta* +, *Iris graminea* +, *Knautia arvensis* agg. +, *Lathyrus niger* +, *Leontodon hispidus* +, *Leucanthemum vulgare* agg. +, *Lilium martagon* +, *Linum catharticum* +, *Lotus corniculatus* +, *Lychnis viscaria* +, *Melampyrum nemorosum* +, *Molinia arundinacea* subsp. *freyi* +, *Nepeta pannonica* +, *Ononis arvensis* +, *Plantago media* +, *Platanthera bifolia* +, *Poa pratensis* agg. +, *Polygonatum odoratum* +, *Potentilla alba* +, *Potentilla recta* +, *Pteridium aquilinum* +, *Pulmonaria mollis* +, *Pyrethrum corymbosum* +, *Ranunculus polyanthemos* +, *Serratula tinctoria* +, *Silene vulgaris* +, *Stellaria graminea* +, *Stenactis annua* +, *Thymus pulegioides* +, *Tragopogon orientalis* +, *Trifolium montanum* +, *Valeriana wallrothii* +, *Veratrum album* subsp. *lobelianum* +, *Veratrum nigrum* +, *Vicia cracca* agg. +, *Vicia dumetorum* +, *Viola hirta* +.

Full frequency table for Dzjurkač and Pidokruh sites. Legend: f_D – percentage frequency in 36 relevés from Dzjurkač site; f_Z – percentage frequency in 8 relevés from Pidokruh site.

Species	**f_D**	**f_Z**
Achillea millefolium agg.	69	63
Adenophora liliifolia	22	0
Agrimonia eupatoria	0	38
Agropyron intermedium	17	13
Agropyron repens	11	13
Agrostis tenuis	78	75
Agrostis stolonifera agg.	14	0
Agrostis stricta	6	0
Ajuga reptans	6	0
Allium oleraceum	14	25
Allium scorodoprasum	22	0
Angelica sylvestris	31	0
Anthericum ramosum	47	75
Anthoxanthum odoratum	64	0
Anthyllis vulneraria	25	13
Arabis glabra	3	0
Arrhenatherum elatius	78	0
Asarum europaeum	3	0
Asperula cynanchica	6	100
Astragalus glycyphyllos	3	0
Astragalus onobrychis	3	0
Astrantia major	11	0
Avenochloa pubescens	39	25
Betonica officinalis	94	63

Brachypodium pinnatum	72	100
Briza media	64	88
Bromus inermis	8	25
Bupleurum falcatum	0	100
Calamagrostis epigejos	25	50
Campanula bononiensis	0	13
Campanula cervicaria	6	0
Campanula glomerata	72	100
Campanula patula	36	0
Campanula persicifolia	61	0
Campanula rapunculoides	22	0
Campanula trachelium	14	0
Carex hirta	6	0
Carex michelii	3	0
Carex montana	19	100
Carex pallescens	17	0
Carex tomentosa	14	38
Centaurea jacea	81	100
Centaurea phrygia agg.	39	0
Centaurea scabiosa	53	75
Cerastium holosteoides	11	0
Chaerophyllum aromaticum	8	0
Chamaecytisus albus	0	25
Chamaecytisus blockianus	14	0
Cichorium intybus	19	63
Cirsium canum	0	13
Cirsium oleraceum	6	0
Cirsium pannonicum	3	100
Clematis recta	0	25
Clinopodium vulgare	25	13
Colchicum autumnale	33	0
Convallaria majalis	17	0
Convolvulus arvensis	3	13
Coronilla varia	47	88
Crepis biennis	19	13
Cruciata glabra	64	88
Cuscuta sp.	19	0
Cynosurus cristatus	11	0
Dactylis glomerata	89	88
Dactylorhiza maculata agg.	11	0
Danthonia decumbens	19	0
Deschampsia cespitosa	14	0
Dianthus carthusianorum agg.	67	0
Dianthus deltoides	3	0
Digitalis grandiflora	11	0
Epipactis palustris	8	0

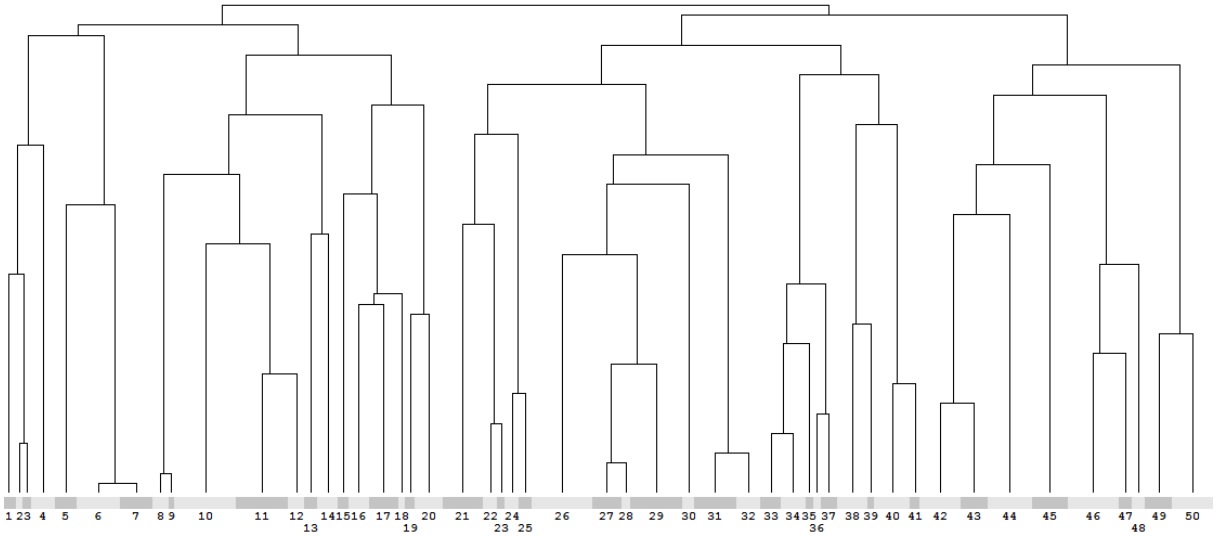
Equisetum arvense	25	63
Equisetum palustre	3	0
Equisetum telmateia	69	0
Erigeron annuus	39	0
Euphorbia amygdaloides	3	0
Euphorbia angulata	25	13
Euphorbia cyparissias	6	13
Euphorbia esula	0	25
Euphorbia villosa agg.	17	38
Euphrasia stricta	11	0
Ferulago sylvatica	58	0
Festuca pratensis	25	38
Festuca rubra agg.	33	0
Festuca rupicola	3	63
Filipendula ulmaria	17	0
Filipendula vulgaris	94	100
Fragaria vesca	25	13
Fragaria viridis	0	13
Galium boreale	39	50
Galium verum	44	88
Genista tinctoria	0	100
Gentiana cruciata	3	13
Geranium palustre	6	0
Geranium sanguineum	14	88
Gladiolus imbricatus	50	0
Gymnadenia conopsea	39	38
Helianthemum nummularium agg.	19	0
Heracleum sphondylium	14	0
Hieracium cymosum	17	13
Hieracium pilosella	3	0
Hieracium umbellatum	8	25
Holcus lanatus	47	0
Hypericum maculatum	58	0
Hypericum perforatum	3	0
Hypochaeris maculata	53	0
Inula ensifolia	3	0
Inula hirta	3	38
Inula salicina	11	88
Iris graminea	19	0
Knautia arvensis agg.	39	100
Koeleria macrantha	3	13
Laserpitium latifolium	81	0
Lathyrus latifolius	6	0
Lathyrus niger	44	0
Lathyrus pratensis	22	0
Leontodon hispidus	36	63

Leucanthemum vulgare agg.	81	88
Lilium martagon	42	13
Linum catharticum	22	13
Linum flavum	0	50
Listera ovata	3	0
Lotus corniculatus	64	88
Luzula campestris agg.	11	0
Lychnis flos-cuculi	6	0
Lychnis viscaria	17	0
Lysimachia vulgaris	28	13
Maianthemum bifolium	6	0
Medicago falcata	56	100
Medicago lupulina	3	0
Melampyrum arvense	3	13
Melampyrum cristatum	0	88
Melampyrum nemorosum	42	0
Molinia arundinacea subsp. *freyi*	39	100
Muscari comosum	28	0
Muscari tenuiflorum	3	0
Myosotis palustris agg.	6	0
Nepeta pannonica	14	0
Onobrychis viciifolia agg.	0	50
Ononis arvensis	11	75
Ophioglossum vulgatum	8	0
Orchis militaris	3	0
Orchis ustulata	3	0
Origanum vulgare	14	13
Pedicularis exaltata	39	0
Peucedanum cervaria	3	88
Peucedanum oreoselinum	94	0
Phleum pratense	19	25
Phragmites australis	3	0
Picris hieracioides	3	0
Pimpinella major	6	0
Pimpinella saxifraga	0	38
Plantago lanceolata	42	38
Plantago media	50	63
Platanthera bifolia	17	0
Poa pratensis agg.	33	0
Polygala comosa	8	50
Polygala vulgaris	14	0
Polygonatum multiflorum	3	0
Polygonatum odoratum	44	0
Potentilla alba	50	63
Potentilla erecta	92	38
Potentilla recta	19	13

Primula veris	44	63
Prunella grandiflora	33	88
Prunella vulgaris	22	0
Pteridium aquilinum	64	0
Pulmonaria mollis	36	50
Ranunculus acris	6	0
Ranunculus auricomus agg.	3	0
Ranunculus polyanthemos	36	88
Rhinanthus minor	19	25
Rubus fruticosus agg.	3	0
Rubus idaeus	3	0
Rumex acetosa	11	0
Rumex confertus	3	0
Salvia pratensis	11	63
Salvia verticillata	14	88
Sanguisorba officinalis	58	88
Scabiosa ochroleuca	8	100
Scorzonera humilis	8	0
Scorzonera purpurea	11	0
Senecio doria s.lat.	0	13
Senecio jacobaea	0	50
Serratula tinctoria	50	88
Silene italica agg.	3	0
Silene nutans	3	0
Silene vulgaris	33	0
Solidago virgaurea	6	13
Stachys recta	0	13
Stellaria graminea	56	13
Stellaria holostea	8	0
Succisa pratensis	6	0
Symphytum tuberosum	3	0
Tanacetum corymbosum	64	100
Taraxacum sp.	6	0
Teucrium chamaedrys	6	13
Thalictrum flavum	8	0
Thalictrum lucidum	22	13
Thesium linophyllon	14	88
Thymus pulegioides	25	38
Tragopogon orientalis	28	13
Trifolium alpestre	64	0
Trifolium campestre	11	0
Trifolium montanum	64	88
Trifolium ochroleucon	8	0
Trifolium pannonicum	67	38
Trifolium pratense	19	0
Trifolium repens	11	0

Trisetum flavescens	44	0
Tussilago farfara	0	13
Valeriana officinalis agg.	17	25
Veratrum album subsp. *lobelianum*	19	0
Veratrum nigrum	39	0
Verbascum nigrum	3	0
Veronica chamaedrys agg.	28	13
Veronica spicata agg.	0	38
Veronica teucrium	0	25
Vicia cracca agg.	53	38
Vicia dumetorum	6	0
Vicia sepium	3	0
Vincetoxicum hirundinaria	28	13
Viola hirta	39	75
Viola odorata	3	0
Viola reichenbachiana	3	0

Electronic Appendix 3. – Dendrogram of cluster analysis of 3 819 relevés of Ukrainian, Romanian and Czech dry grasslands (Ward's method; Euclidean distance; percentage abundances log-transformed).



Legend: 1 – *Brachypodio pinnati-Molinietum arundinaceae* and *Anthoxantho odorati-Agrostietum tenuis* (White Carpathians and Hostýnsko-vsetínská hornatina Upland, Czech Republic; Dzjurkač, Ukraine); 2, 3 – *Brachypodio-Molinietum* (White Carpathians, Czech Republic); 4 – *Brachypodio-Molinietum* (south-western White Carpathians; Pidokruh, Ukraine); 5–7 – *Bromus erectus*-dominated, relatively species-poor grasslands (Czech Republic), 8–12 – *Cirsio-Brachypodion pinnati*, relatively species-poor grasslands (Czech Republic); 13, 14 – *Carlino acaulis-Brometum erecti* (Czech Republic); 15 – *Cirsio-Brachypodion* (Transylvania, Romania); 16–18 – mostly *Polygalo majoris-Brachypodietum pinnati* (south-eastern Czech Republic); 19 – *Cirsio pannonici-Seslerietum caeruleae* (Czech Republic); 20 – *Scabioso ochroleucae-Brachypodietum pinnati* and *Festuco rupicolae-Caricetum humilis* (Czech Republic); 21–41: *Festucion valesiacae* and *Koelerio-Phleion phleoidis*; 42–50: *Alysso-Festucion pallentis*, *Bromo pannonici-Festucion pallentis* and *Diantho lumnitzeri-Seslerion* (Czech Republic). Names of syntaxa follow Chytrý (2007) for Czech relevés and Dengler et al. (2012) for Romanian ones. For details on methodology see Material and methods chapter.

The analysis shows close relationship between Ukrainian relevés of extremely species-rich semi-dry grasslands and Czech relevés of *Brachypodio-Molinietum* association from *Festuco-Brometea* class. While relevés from Pidokruh site fit clearly within the range of variation of *Brachypodio-Molinietum*, relevés from Dzjurkač site show transitions to *Molinio-Arrhenatheretea* class. See Electronic Appendix 4 for the analysis of their relationship to all major types of semi-natural grasslands in Outer Western Carpathians.

References

Chytrý M. (ed.) (2007): Vegetace České republiky 1. Travinná a keříčková vegetace [Vegetation of the Czech Republic 1. Grassland and heathland vegetation]. – Academia, Praha.

Dengler J., Becker T., Ruprecht E., Szabó A., Becker U., Beldean M., Bita-Nicolae C., Dolnik C., Goia I., Peyrat J., Sutcliffe L. M. E., Turtureanu P. D. & Uğurlu E. (2012): *Festuco-Brometea* communities of the Transylvanian Plateau (Romania) – a preliminary overview on syntaxonomy, ecology, and biodiversity. – Tuexenia 32: 319–359.

Electronic Appendix 4. – Relationship of grasslands from Dzjurkač and Pidokruh sites to all major semi-natural grassland types in Outer Western Carpathians.

	Dzjurkač	Pidokruh
Caricion davallianae	467.1	637.5
Calthion palustris	444.4	630.6
Cirsio-Brachypodion pinnati	**304.4**	**422.6**
Arrhenatherion elatioris	358.4	569.0
Cynosurion cristati	415.5	602.8
Polygono-Trisetion flavescentis	386.8	598.4
Violion caninae	423.4	616.5

Legend: The table shows Euclidean distances between frequency columns representing Dzjurkač and Pidokruh sites and (incomplete) frequency columns of different types of semi-natural grasslands in Outer Western Carpathians (Fajmonová et al. 2013). Values for most similar types are given in bold.

The analysis shows clear affinity of Pidokruh grasslands to semi-dry grasslands of *Cirsio-Brachypodion* aliance, while Dzjurkač grasslands are transitional to mesic grasslands of *Arrhenatherion* and *Polygono-Trisetion* alliances. Still, they are most similar to *Cirsio-Brachypodion*. Due to different numbers of relevés representing the two sites, relations between the values within a column (and not between columns) should be considered only.

References

Fajmonová Z., Zelený D., Syrovátka V., Vončina G. & Hájek M. (2013): Distribution of habitat specialists in semi-natural grasslands. – J. Veg. Sci. 24: 616–627.