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A CRITICAL LIST OF ENDEMIC VASCULAR PLANTS IN THE UKRAINIAN CARPATHIANS

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Abstract: We present here the list of the 189 taxa of vascular plants from the Ukrainian Carpathians that are most often mentioned in the literature as endemics. This list includes aspects of taxonomic and chorological validity, synonyms, current known distribution in the Ukrainian Carpathians, some notes and most important literature references for all the analyzed taxa. From this list 70 taxa have been validated by the criteria used and considered as Carpathian endemics or sub-endemics that occur in the Ukrainian Carpathians. Additionally, 68 taxa were treated as critical and could not be confirmed through currently known data, while 51 taxa have been designated as (most probably) absent in flora of this region and/or non-endemic.

Key words: endemics, plant endemism, Ukrainian Carpathians, distribution.

Introduction

Plant endemism is one of the most interesting and, at the same time, debatable biogeographical phenomena, which is also of particular importance in studies of floristic and vegetation history of different areas [150, 154, 155, 184, 185, 188]. Furthermore, plant endemics represent an important element of biodiversity, thus having a decisive role in studies for conservation planning. Characterized by a distribution limited to a defined geographic unit, endemics confer local identity to a region's flora, offering clues on particular features of florogenesis and represent the classification basis of biogeographical units and at decision level in local and national conservation policies [18, 61, 62, 63, 64].

Investigations on plant endemics closely correlate with several problematic aspects. Firstly, scientists differ in views over which criteria to use for taxa delimitation, resulting in an impressive number of taxonomic entities treated as endemic for a certain region. In accordance with the latest data available, some of these taxa can be taxonomically or chorologically re-evaluated, being placed in synonymy and/or invalidated [61]. Thus, some authors prefer to regard as endemics only those taxa which are clearly delimited and do not show a morpho-geographical gradient (i.e. are not polymorphic) [61, 63, 64], while other authors work deeply with infraspecific units, hybrids and apomictic complexes, describing multiple additional but hardly distinguishable endemics [76, 77, 185]. Finally, a lack of validated data about current distribution as well as misidentification of some taxa result in wrong interpretation of number and spatial limits of endemics for certain regions [24, 64]. This can infer wrong signals in biogeographical analyses and conservation strategy assessments.

Mountain systems are known to harbour a high diversity of endemic species [108, 195], mostly through habitat isolation and environmental heterogeneity [77, 137, 155]. These factors, together with elevation gradients [196] finally drive morphogenetic divergence and differentiation processes in species.

Study area

The Ukrainian Carpathians belong to the Eastern Carpathians (Fig. 1), one of the four main subunits of the Carpathian mountain range (*Western Carpathians*: Austria, Slovakia, Hungary and Poland; *Eastern Carpathians*: Slovakia, Poland, Ukraine and Romania; *Southern Carpathians*, incl. *Transdanubian Carpathians*: Romania and Serbia; *Apuseni Mountains*: Romania). The delimitation of the Eastern Carpathians from the other subunits has often been debated, though the generally accepted limits are the Łupków Pass in the north – in Poland (Pawłowski, 1970); while the southern limit (in Romania), separating them from the Southern Carpathians has two equally accepted variants: Prahova Valley is the more geographically supported (Mihăilescu, 1963), while floristic affinities would recommend including also the Ciucaș Mountains in the Southern Carpathians (Negrean & Oltean, 1989), a view with which we also agree and adopt here.

The Ukrainian Carpathians are located in the northern part of the Eastern Carpathians, extending through the western part of Ukraine, on the territories of Lviv, Ivano-Frankivsk, Zakarpattia, and Chernivtsi regions (oblasts). The area occupied by the Ukrainian Carpathians totals 24,000 km² [16, 143]. They mostly consist of flysch, with only small areas occupied by limestones, shales and volcanic rocks (predominantly andesites and gneisses) [119]. The highest elevation is 2061 m a.s.l. (Goverla Mt.). Their vertical stratification, according both to the climatic particularities and vegetation characteristics, has led to the following classification into regions: submontane (up to 550-600 m a.s.l.), lower montane (up to 1200-1250 m a.s.l.), higher montane (up to 1640 m a.s.l.), subalpine (up to 1800-1850 m a.s.l.), and alpine (up to 2061 m a.s.l.) belts [16, 56, 116].

The most recent phytogeographical division of Carpathians was proposed by Tassenkevich [186, 187] and is based on the physiographic division developed by Kondracki [94]. According to this recent phytogeographical classification, the Ukrainian Carpathians belong to the Eastern Carpathian sector (Carpathian subprovince of the Central-European floristic province). Within the Ukrainian Carpathians, Tassenkevich [187] identified 6 districts: a) Subcarpathia or Prykarpattia (incl. only Prykarpattia region), b) Eastern Beskyds or Shidni Beskydy (incl. region of Siansko-Verkhniodnisterski Beskydy, region of Skolivski Beskydy, and Bukivskiy region), c) Gorgany (without regions), d) Polonynas Carpathians or Polonynski Karpaty (incl. regions of Rivna, Borzhava and Krasna), e) Pokutia-Marmaros Carpathians or Pokutsko-Marmaroski Karpaty (incl. regions of Svydovets, Chornohora, Gryniava, Marmaros, and Pokutsko-Bukovynskiy region), f) Vygortat-Gutyn or Volcanic Carpathians, also known as Vygortat-Gutynski Karpaty (incl. Vygortat region).

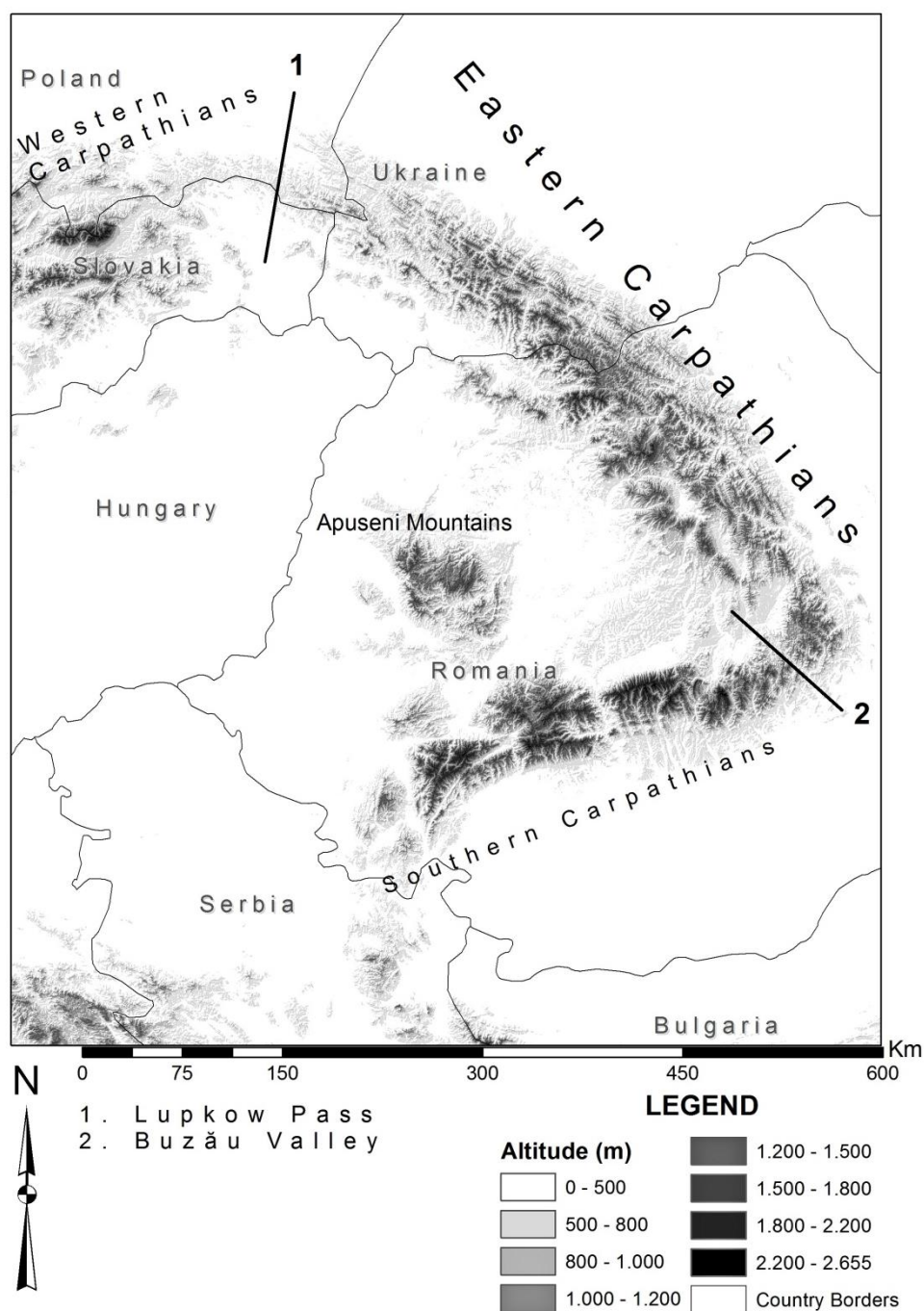


Fig. 1: Eastern Carpathians: general position within the Carpathian Mountain Range

However, regionalization of the Ukrainian Carpathians by Tassenkevich [186, 187] is not widely accepted [227] and is problematical in practical application due to a lack of data on plant taxa distribution in the described regions. The majority of available data (including published materials) on plant distribution in the Ukrainian Carpathians are based on older phytogeographical division by Chopyk [17], who adopted physiographic regionalization by Tsys' [197, 198, 199]. Therefore, here we follow the phytogeographical division of the Ukrainian Carpathians by Chopyk [17] with some minor changes adopted for a better physiographical resolution. According to Chopyk [17], the Ukrainian Carpathians belong to the Carpathian floristic province and are represented by two subprovinces – Eastern Carpathian and

Pannonic. Eastern Carpathian subprovince includes 9 regions: a) Subcarpathia or Prykarpattia (Precarpathian Lowlands), b) Shidni Beskydy (Eastern Beskyds) and Nyzki Polonyny (Polonynas), c) Gorgany, d) Svydovets, e) Chornohora, f) Chyvchyny and Gryniava, g) Maramaros, h) Volcanic or Vygorlat-Gutyn Carpathians, and i) Zakarpatske Peredgir'ia or Khust-Solotvyno Depression (also mentioned as Transcarpathian foothills). Pannonic subprovince includes the only one region of Transcarpathian Lowlands (fig. 2).

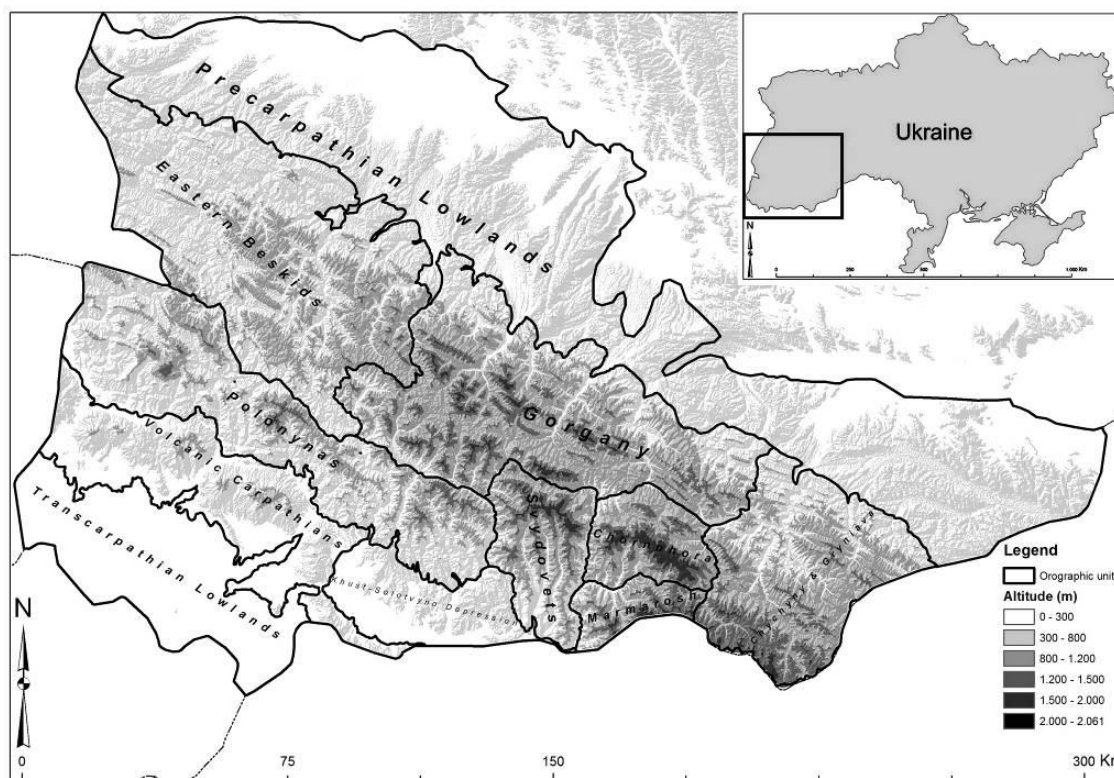


Fig. 2: Phytogeographical division of Ukrainian Carpathians, modified from Chopyk [17].

Previous studies

Plant endemism has been studied in the Ukrainian Carpathians for a long period [16, 17, 97, 104, 118, 120, 149, 151, 158], and the evaluated number of endemics increases over time. For example, in 1977 Stoyko [177] published the first version of the list of endemic plants of the Ukrainian Carpathians, which included 51 taxa. Since then, the list has been complemented with 30 additional taxa in 1991 [179] and 11 taxa in 1993 [176]. In the 2003 version of this list published by Tasenkevich [185], 125 taxa of vascular plants were distinguished as endemics and subendemics (only 120 taxa according to the 2013 version [188]). The criteria used by different authors for validating the taxa also varied largely, without any clear consensus on taxonomy. This generated problematic aspects on having a clear view over plant endemism in the Ukrainian Carpathians.

Consequently, the real number and current distribution of endemic plant taxa in the Ukrainian Carpathians is still under question [63]. Therefore, we present here a critical analysis of the endemic plant taxa list from Ukrainian Carpathians with revisions. This list does not exhaustively cover all taxa mentioned as endemic over time [24], many of which have been clarified over time, making such a re-enumeration redundant. Instead, our aim is to provide a

useful tool for verification of taxa which are most often mentioned as endemics or subendemics in contemporary or older publications, by reviewing the most important and most recent studies on Carpathian endemic taxa.

Criteria and typification

The nomenclature of the taxa included in our review generally follow the Euro + Med PlantBase online database (<http://ww2.bgbm.org/EuroPlusMed>) [39] and The Plant List (<http://www.theplantlist.org/>) [191]. In some cases, we have prioritized the more recent in-depth taxonomic studies (e.g. *Aconitum*) or highly-practiced names (e.g. *Festuca carpatica* vs. *Leucopoa carpatica*). Each species' chorology is in accordance with the currently known floristic literature from Ukraine and the neighbouring countries (see reference list for each species), completed with herbarium data and our own field surveys.

Each endemic taxon has detailed information on its validity category, known synonyms and distribution by regions (see fig. 2). The list builds mostly on published data sources, including recent taxonomic revisions, and contains the 189 taxa of vascular plants that are most often mentioned as endemic for the Carpathians and occurring in Ukraine. These have been split into two lists: A1 containing the valid endemics occurring in the Ukrainian Carpathians, while A2 includes all the critical and non-valid taxa that were at some point in time mentioned as endemic to the Carpathians and occurring in Ukraine. From a geographical perspective (see **Status** in the taxa list), considering the main units of the Carpathian Mountain range (namely the Western Carpathians, Eastern Carpathians, Southern Carpathians and Apuseni Mountains), we have used the following categories to classify the endemic taxa occurring in the Ukrainian Carpathians based on their general distribution:

Pan-Carpathian endemics – endemic species that occur in at least three units (with or without the Apuseni Mountains);

Western-Eastern Carpathian endemics – taxa that occur in the Western Carpathians and parts of the Eastern Carpathians only;

Eastern Carpathian endemics – endemic plants occurring only in the Eastern Carpathians;

Eastern Carpathian – Apuseni Mountains endemics – species that occur only in the two subunits of the Carpathians;

South-Eastern Carpathian endemics – endemic plants that occur only in the South-Eastern unit of the Carpathians.

Additionally, we considered the ecological component of the classification by validating only those taxa that have a clear distribution in the mountain-subalpine region of the Carpathians. These were regarded as a clear biotic element of the Carpathians and validated as Carpathian “**endemics**”. Secondly, we used the term “**subendemic**” to characterize those taxa that have a larger ecological spectrum of preferences, which has allowed them to be more widespread in the adjacent lowland regions of the Carpathians. Thirdly, we classified as “**subendemic**” also those taxa that are ecologically confined to the mountain region, but which have very few occurrences (not frequent) also in the adjacent regions. Finally, we did not consider as valid Carpathian endemics or subendemics those plant species that have an ecological optimum below beech forest level and their main distribution area includes other individualized

mountain ranges such as the Balkan Mountains s.l. (Stara Planina, Rila, Pirin and Rhodopes), Sudeten Mts. or the Alps.

The following abbreviations were used for validity categories in our studied taxa:

++ taxon is present, accepted with its current taxonomic status and has well-known distribution information (59 taxa).

+ taxon is present, but it may have faulty distribution data due to misidentification or incomplete floristic surveys and needs further investigations (11 taxa);

? taxon is doubtful, with its taxonomy and/or chorology under question and in need of further clarifications (40 taxa);

?? taxon is most probably absent or its taxonomy and/or endemic status are very doubtful (28 taxa);

- taxon is absent from the flora of the Ukrainian Carpathians region and/or is not endemic, but is cited sometimes as endemic (51 taxa);

Conservative aspects

Endemics represent one of the main focus categories for conservation strategies due to their highly representative value for natural habitats of a region. Regardless of their rarity, which is not necessarily an attribute of endemics within their given geographical unit (in this case the Eastern Carpathians), these particular biological elements are prone to an amplified response to different disturbance factors such as climate change or human intervention. This 'sensitivity' is caused by their reduced occurrence and island-type distribution in mountainous regions. Endemics are usually candidates for inclusion in the Red Lists and Red Data books of all the Carpathian countries, depending on their local distribution (Table 1), one of the main factors to be considered in their evaluation being their rarity. While many taxa are uniformly distributed in the Carpathian subunits, as they approach their distribution limits their occurrence becomes scarce or even exceptional, and thus they are candidates for focus of conservation policies in the country concerned. Such a situation can be observed in Table 1, where certain taxa are protected towards their areal margins, while in their main distribution they are not included within a threatened category. Our recommendation is to consider such national evaluations in accordance with their entire occurrence, including their distribution in neighbouring countries. Only in this way can conservation strategies work efficiently to protect those biological entities that are more prone to genetic depletion and fast population decline. Generalized Red Lists often encounter difficulties of applicability due to their omissions over a specific regions's flora and population density of the species. Nevertheless, in the case of endemics, their protection status should be jointly evaluated with the policies of the other countries, as regards unique species typical for the region, being part of the biological heritage of the Carpathian mountain range.

Table 1: Carpathian endemic plants from the Ukrainian Carpathians included in national and regional Red Lists

Taxon	UKR ¹⁾	RO ²⁾	RO ³⁾	CZE ⁴⁾	SVK ⁵⁾	HUN ⁶⁾	POL ⁷⁾	Carpathians ⁸⁾
<i>Achillea oxyloba</i> (DC.) Sch. Bip. subsp. <i>schurii</i> (Sch. Bip.) Heimerl.	R	.	R	.	.	.	.	.
<i>Aconitum bucovinense</i> Zapal.	.	.	.	.	.	.	EN	.
<i>Aconitum degenii</i> Gáyér subsp. <i>degenii</i>	.	.	.	.	.	.	VU	.
<i>Aconitum lasiocarpum</i> (Rchb.) Gáyér subsp. <i>kotulae</i> (Pawl.) Starmühl. & Mitka	VU	.	.	.	.	.	VU	.
<i>Aconitum lasiocarpum</i> (Rchb.) Gáyér subsp. <i>lasiocarpum</i>	VU	.	.	.	VU	.	VU	VU
<i>Aconitum moldavicum</i> Hacq. subsp. <i>hosteanum</i> (Schur) Graebn. & P. Graebn	.	.	.	.	.	.	DD	.
<i>Aconitum moldavicum</i> Hacq. subsp. <i>moldavicum</i>	.	.	.	.	.	NT	.	.
<i>Alopecurus pratensis</i> L. subsp. <i>laguriformis</i> (Schur) Tzvelev	.	.	R	.	.	.	.	.
<i>Arabidopsis neglecta</i> (Schult.) O'Kane & Al-Shehbaz	.	.	R	.	.	.	.	.
<i>Armeria pocutica</i> Pawl.	EX	.	R	.	.	.	.	EN
<i>Campanula carpatica</i> Jacq.	R	.	R	.	.	.	.	.
<i>Campanula kladniana</i> (Schur) Witašek	R	.	NE	.	.	.	.	.
<i>Campanula serrata</i> (Schult.) Hendrych	.	.	.	.	.	.	VU	.
<i>Cardamine glanduligera</i> O. Schwarz	.	.	.	VU	.	NT	.	.
<i>Centaurea phrygia</i> L. subsp. <i>carpatica</i> (Porcius) Dostál	.	.	R	.	.	.	.	.
<i>Chrysosplenium alpinum</i> Schur	.	.	R	.	.	.	.	.
<i>Crocus banaticus</i> J. Gay	VU	.	.	.	.	.	.	VU
<i>Dactylorhiza maculata</i> (L.) Soó subsp. <i>schurii</i> (Klinge) Soó	VU	.	R	.	NA	.	.	.
<i>Dianthus spiculifolius</i> Schur subsp. <i>spiculifolius</i>	.	.	R	.	.	.	.	.
<i>Dianthus tenuifolius</i> Schur	.	.	NT	.	.	.	.	.
<i>Doronicum carpaticum</i> (Griseb. & A. Schenk) Nyman	.	.	R	.	.	.	.	.
<i>Erysimum witmanni</i> Zaw. subsp. <i>transsilvanicum</i> (Schur) P.W. Ball	.	.	R	.	.	.	.	.
<i>Euphorbia carpatica</i> Wol.	.	.	VU	.	.	.	.	VU
<i>Festuca carpatica</i> F.G. Dietr.	.	CR	R	.	.	.	.	.

<i>Taxon</i>	UKR ¹⁾	RO ²⁾	RO ³⁾	CZE ⁴⁾	SVK ⁵⁾	HUN ⁶⁾	POL ⁷⁾	Carpathians ⁸⁾
<i>Festuca porcii</i> Hack.	VU	.	.	.	.	.	.	.
<i>Festuca rupicola</i> Heuff. subsp. <i>saxatilis</i> (Schur) Rauschert	NE	.	.	.	CR	.	.	.
<i>Festuca versicolor</i> Tausch. subsp. <i>versicolor</i>	.	.	R	.	.	.	.	.
<i>Galium transcarpaticum</i> Stojko & Tassenk.	.	.	.	.	.	.	.	VU
<i>Genista tinctoria</i> L. subsp. <i>oligosperma</i> (Andrae) Borza	EW	.	.	.	.	.	.	.
<i>Heracleum carpaticum</i> Porcius	.	CR	VU/R	.	.	.	.	VU
<i>Heracleum sphondylium</i> L. subsp. <i>transsilvanicum</i> (Schur) Brummitt	.	.	NT	.	.	.	.	.
<i>Jovibarba globifera</i> (L.) J. Parn. subsp. <i>preissiana</i> (Domin) Holub	R	.	.	.	.	.	.	.
<i>Koeleria macrantha</i> (Ledeb.) Schult. subsp. <i>transsilvanica</i> (Schur) A. Nyár.	.	.	R	.	.	.	.	.
<i>Leontodon kulczynskii</i> Popov	.	.	R	.	.	.	.	.
<i>Melampyrum saxosum</i> Baumg.	.	.	R	.	VU***	.	EN	.
<i>Minuartia verna</i> L. subsp. <i>oxypetala</i> (Wol.) G. Halliday	R	.	R	.	.	.	.	.
<i>Noccaea dacica</i> (Heuff.) F. K. Mey subsp. <i>dacica</i> F. K. Mey	.	.	R	.	.	.	.	.
<i>Oxytropis carpatica</i> R. Uechtr.	.	.	R	.	NT	.	VU	VU
<i>Phyteuma tetramerum</i> Schur	.	.	R	.	.	.	.	.
<i>Phyteuma vagneri</i> A. Kern.	.	.	R	.	.	.	.	.
<i>Plantago atrata</i> Hoppe subsp. <i>carpatica</i> (Soó) Soó	.	.	R	.	NT	.	VU	.
<i>Poa granitica</i> Braun-Blanq. subsp. <i>disparilis</i> (Nyár.) Nyár.	.	.	R	.	.	.	.	.
<i>Poa rehmannii</i> (Asch. & Graebn.) Wol.	R	VU	R	.	.	.	.	.
<i>Pulmonaria filarszkyana</i> Jáv.	.	.	NT/R	.	.	.	.	.
<i>Pyrola carpatica</i> Holub & Křisa	.	.	R	.	NT	.	DD	.
<i>Ranunculus carpaticus</i> Herbich	.	.	R	.	EN	.	.	.
<i>Salix kitaibeliana</i> Willd.	R	.	UTU*	.	VU	.	.	.
<i>Saussurea porcii</i> Degen	R	EX**	EX**	.	.	.	.	.

Taxon	UKR ¹⁾	RO ²⁾	RO ³⁾	CZE ⁴⁾	SVK ⁵⁾	HUN ⁶⁾	POL ⁷⁾	Carpathians ⁸⁾
<i>Scabiosa columbaria</i> L. subsp. <i>pseudobananatica</i> (Schur) Jáv. & Csapody	.	.	R	.	.	.	.	.
<i>Scabiosa lucida</i> Vill. subsp. <i>barbata</i> Nyár.	.	.	R	.	.	.	.	.
<i>Scorzoneroideis pseudotaraxaci</i> (Schur) Holub	.	.	R	.	.	.	.	.
<i>Sempervivum montanum</i> L. subsp. <i>carpaticum</i> Wettst. ex Hayek	.	.	R	.	.	.	.	.
<i>Sesleria heuffleriana</i> Schur subsp. <i>heuffleriana</i>	CR	.	.	.	NT	.	.	.
<i>Silene nutans</i> L. subsp. <i>dubia</i> (Rohrb.) Zapal.	.	.	R	.	CR	.	EN	.
<i>Silene zawadzskii</i> Herbich	R	.	R	.	.	.	.	VU
<i>Syringa josikaea</i> J. Jacq. ex Rchb. f.	VU	LR	VU/R	.	.	.	.	EN
<i>Thymus alternans</i> Klokov	.	.	.	.	NT	.	.	.
<i>Thymus pulcherrimus</i> Schur	.	.	R	.	.	.	.	.
<i>Trisetum fuscum</i> (Schult.) Schult.	.	.	R	.	.	.	.	.
<i>Trisetum macrotrichum</i> Hack..	.	.	R	.	.	.	.	.
TOTAL (60, of which):	19	5	44	1	12	2	11	9

Table abbreviations: Red Lists threat categories (depending on the list, a subset of these categories were used: EX – Extinct, EW – Extinct in the Wild, CR – Critically Endangered, EN – Endangered; VU – Vulnerable, NT – Near Threatened, LR – Low Risk, R – Rare, NE – Not Evaluated, utu – Unrecognized taxonomic unit, NA – Not Applicable (taxonomic problematic cases), DD – Data Deficient); Red Lists (1 – Didukh (ed.), 2009a; 2 – Dihoru & Negrean, 2009; 3 – Oltean *et al.*, 1994; 4 – Grulich, 2012; 5 – Turis *et al.*, 2014; 6 – Király (ed.), 2007; 7 – Mirek & Piękoś-Mirkowa (eds.), 2008; 8 – Witkowski, Król, Solarz (eds.) & Carpathian ecoregion initiative consortium, 2003); * (included as *Salix retusa* L.); ** (studies published prior to the species' rediscovery in 2014, see Matiš *et al.*, 2014); *** (incl. *Melampyrum herbichii* Wol.)

Obs. Only taxa that are represented in at least one National or Regional Red List / Red Data Book were included in the table (60 out of 70 validated endemics occurring in the Ukrainian Carpathians)

A1: Carpathian endemic taxa occurring in the Ukrainian Carpathians:

1. ++. *Achillea oxyloba* (DC.) Sch. Bip. subsp. *schurii* (Sch. Bip.) Heimerl **Syn.:** *A. schurii* Sch. Bip., *A. dacica* Simonk., *Anthemis oxyloba* Schur, *A. schurii* Heimerl, *A. tenuifolia* Schur, *Ptarmica tenuifolia* Schur. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora (Petros Mt., Pip Ivan Mt. [232]), Chyvchyny (Mokryniv Kamin' Mt. [232]), Polonynas (Ugolsko-Shyrokoluzhanskiy Massif), Marmaros (Pip Ivan Marmaroskiy Mt. [232]), Svydovets (Blyznytsia Mt., Flantus Mt. [232]). **Ref.:** [4, 16, 18, 104, 120, 179, 185, 232].
2. +. *Aconitum bucovinense* Zapał. **Syn.:** *A. callibotryon* L. subsp. *bucovinense* (Zapał.) Grinț., *A. firmum* Rchb. subsp. *bucovinense* (Zapał.) Graebn. & P. Graebn., *A. firmum* Rchb. subsp. *bucovinense* Asch. & Graebn. **Status:** South-Eastern Carpathian endemic. Critical taxon. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Gorgany. **Ref.:** [14, 24, 66, 130, 131, 132, 145, 146, 147].
3. ++. *Aconitum degenii* Gáyér subsp. *degenii*. **Syn.:** *A. × hebegynum* non DC., *A. paniculatum* Lam., *A. prutense* (Zapał.) Tzvel., *A. variegatum* L. subsp. *paniculatum* (Arcang.) Greuter & Burdet., *A. variegatum* L. subsp. *kotulae* non Pawł., *A. variegatum* L. subsp. *valesiacum* (Gáyér) Greuter & Burdet. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Gorgany, Marmaros, Svydovets, Volcanic Carpathians. **Ref.:** [24, 130, 131, 132, 145, 146, 147].
4. ++. *Aconitum firmum* Rchb. subsp. *firmum*. **Syn.:** *A. acutum* Rchb., *A. hians* Host, *A. koelleanum* Rchb. var. *firmum* (Rchb.) Rchb., *A. tauricum* Wulf. subsp. *koelleanum* (Rchb.) Gáyér, *A. nanum* Baumg. p.p., *A. palmatifidum* Rchb., *A. romanicum* Woł. p.p., *A. skerisorae* Seitz non Gáyér., *A. napellus* L. em. Skalický subsp. *skerisorae* (Gáyér) Seitz, *A. tatrae* Borb. in Pallas, *A. napellus* L. var. *firmum* (Rchb.) Pawł., *A. napellus* L. subsp. *firmum* (Rchb.) Gáyér, *A. koelleanum* Rchb. var. *firmum* (Rchb.) Rchb., *A. napellus* L. var. *babiogorense* Zapał., *A. napellus* L. var. *tatrense* Zapał., *A. napellus* L. var. *vestitum* Zapał. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Gorgany, Marmaros, Svydovets, Volcanic Carpathians. **Ref.:** [24, 130, 131, 132, 145, 146, 147].
5. ++. *Aconitum firmum* Rchb. subsp. *fissurae* Nyár. **Syn.:** *A. fissurae* Nyár., *A. flerovii* Steinb., *A. napellus* L. em. Skalický subsp. *fissurae* (Nyár.) Seitz, *A. napellus* L. em. Skalický subsp. *fissurae* Seitz, *A. romanicum* Woł. p.p., *A. calybotryon* L. subsp. *fissurae* Nyár., *A. multifidum* Koch ex Rchb. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Gorgany, Marmaros, Svydovets, Volcanic Carpathians. **Ref.:** [24, 130, 131, 132, 145, 146, 147].
6. ++. *Aconitum firmum* Rchb. subsp. *fussianum* Starmühl. **Syn.:** n.a. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Svydovets. **Ref.:** [130, 131, 132, 145, 146, 147, 185].
7. ++. *Aconitum lasiocarpum* (Rchb.) Gáyér subsp. *kotulae* (Pawł.) Starmühl. & Mitka **Syn.:** *A. paniculatum* Lam. var. *podolicum* Zapał., *A. paniculatum* f. *podolicum* Zapał., *A. podolicum* (Zapał.) Vorosch., *A. beskidense* (Zapał.) Gáyér, *A. × cammarum* Jacq. var. *beskidense* Zapał., *A. × cammarum* Jacq. var. *koscieliskianum* Zapał. p.p., *A. gracile* Rchb. f. *beskidense* (Zapał.) Grinț., *A. gracile* Rchb. subsp. *grosseratum* (Gáyér) Grinț. f. *beskidense* Zapał., *A. paniculatum* Lam. f. *latilobum* Zapał., *A. variegatum* L. subsp. *kotulae*

- Pawł., *A. variegatum* L. f. *kotulae* (Pawł.) Skalický. **Status:** Pan-Carpathian subendemic. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Marmaros. **Ref.:** [125, 130, 131, 132, 145, 146, 147].
8. ++. *Aconitum lasiocarpum* (Rchb.) Gáyér subsp. *lasiocarpum*. **Syn.:** *A. paniculatum* Lam. subsp. *lasiocarpum* (Rchb.) Soó, *A. toxicum* Rchb. subsp. *lasiocarpum* (Rchb.) Grinț., *A. toxicum* Rchb. var. *dasycarpum* Schur, *A. vagneri* A. Kern. ex Gáyér, *A. dasycarpum* Schur ex Gáyér, *A. nasutum* Fisch. ex Rchb. var. *lasiocarpum* Rchb. **Status:** Eastern Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Gorgany, Marmaros, Svydovets, Volcanic Carpathians. **Ref.:** [24, 125, 130, 131, 132, 145, 146, 147].
 9. ++. *Aconitum moldavicum* Hacq. subsp. *hosteanum* (Schur) Graebn. & P. Graebn. in Ascherson & Graebn. **Syn.:** *A. hosteanum* Schur. **Status:** Pan-Carpathian subendemic. **Distr.:** All regions. **Ref.:** [130, 131, 132, 145, 146, 147].
 10. ++. *Aconitum moldavicum* Hacq. subsp. *moldavicum*. **Syn.:** *A. carpathicum* (DC.) Sagorski & Schneider p.p., *A. lycoctonum* L. subsp. *moldavicum* (Hacq.) Jalas, *A. septentrionale* Koelle var. *carpathicum* DC., *Delphinium moldavicum* (Hacq.) Brândză. **Status:** Pan-Carpathian subendemic. **Distr.:** All regions. **Ref.:** [130, 131, 132, 145, 146, 147].
 11. ++. *Alopecurus pratensis* L. subsp. *laguriformis* (Schur) Tzvelev **Syn.:** *A. laguriformis* Schur, *A. brachystachyus* auct. non M. Bieb. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chyvchyny, Polonynas; also suggested for Ukrainian Carpathians [17]. **Ref.:** [16, 17, 18, 24, 104, 120, 179, 185].
 12. ++. *Arabis neglecta* (Schult.) O'Kane & Al-Shehbaz **Syn.:** *Cardaminopsis neglecta* (Schult.) Hayek, *Arabis neglecta* Schult., *Erysimum neglectum* (Schult.) Kuntze. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Svydovets; is cited only from Svydovets by Antosiak [4]. **Ref.:** [4, 16, 18, 24, 104, 120, 179, 185].
 13. +. *Armeria pocutica* Pawł. **Syn.:** *A. elongata* auct. non (Hoffm.) Koch, *A. maritima* (Mill.) Willd. subsp. *elongata* auct. non (Hoffm.) Bonnier, *A. vulgaris* auct. non Willd. **Status:** South-Eastern Carpathian endemic. **Distr.:** In Ukrainian Carpathians is probably extinct [70]; it is cited on the basis of vouchers collected by B. Pawłowski (12.07.1935, above confluence of Dzembronia and Chorniy Cheremosh rivers, near Topilche village, Verkhovyna district, Ivano-Frankivsk region) for Chornohora [70]. Needs to be re-confirmed. **Ref.:** [18, 24, 70, 104, 120, 179, 185].
 14. ++. *Campanula carpatica* Jacq. **Incl.:** *C. carpatica* subsp. *turbinata* (Schott, Nyman & Kotschy) Nyman. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Marmaros, Svydovets. However it is cited only for Svydovets, Chornohora and Marmaros by Kagalo & Sytschak [69]. **Ref.:** [4, 24, 16, 17, 18, 69, 104, 120, 179, 185].
 15. ++. *Campanula kladniana* (Schur) Witašek **Syn.:** *C. rotundifolia* L. subsp. *kladniana* (Schur) Witašek. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora (Mts. Petros, Goverla, Shpyci, Rebra, Gutyn-Tomnatek, Pip Ivan [233]), Chyvchyny (Chorniy Kamin' Mt. [233]), Eastern Beskyds (Pikuy Mt. [233]), Gorgany (Negrovets Mt. [233]), Marmaros (Pip Ivan Marmaroskiy Mt. [233]), Polonynas, Svydovets (Dragobrat Mt., Blyznytsia Mt., Flantus Mt.). **Ref.:** [17, 18, 185, 233].
 16. ++. *Campanula rotundifolia* L. subsp. *polymorpha* (Witašek) Tacik **Syn.:** *C. polymorpha* (Witašek) Prain, *C. kladniana* subsp. *polymorpha* Witašek. **Status:** Pan-Carpathian endemic.

- Distr.:** Chornohora, Chyvchyny, Gorgany, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Marmaros, Svydovets. **Ref.:** [4, 16, 17, 18, 104, 179].
17. ++. ***Campanula serrata*** (Schult.) Hendrych **Syn.:** *C. arcuata* Schur, *C. hornungiana* Schur, *C. kitaibeliana* Schult., *C. lanceolata* subsp. *arcuata* (Schur) Simonk., *C. lanceolata* var. *hornungiana* (Schur) Simonk., *C. napuligera* Schur, *C. pseudolanceolata* Pant., *C. pseudolanceolata* subsp. *semiamplexicaulis* Vlădescu & Săvul., *C. rhomboidalis* subsp. *pseudolanceolata* (Pant.) Nyman, *C. redux* Schott, Nyman & Kotschy. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Gorgany, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Marmaros, Svydovets. **Ref.:** [4, 17, 18, 24, 104, 179, 185].
 18. ++. ***Cardamine glanduligera*** O. Schwarz **Syn.:** *C. glandulosa* (Waldst. & Kit.) Schmalh. nom. illeg., *Dentaria glandulosa* Waldst. & Kit., *Crucifera novemfolia* E.H.L. Krause. **Status:** Pan-Carpathian subendemic. **Distr.:** All regions. **Ref.:** [16, 17, 18, 179].
 19. ++. ***Carduus kernerii*** Simonk. subsp. *kernerii*. **Syn.:** *C. fussii* Simonk. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Marmaros, Svydovets. **Ref.:** [4, 17, 18, 24, 120, 185].
 20. ++. ***Centaurea marmarosiensis*** (Jáv.) Czerep **Syn.:** *C. mollis* Waldst. & Kit. subsp. *marmarosiensis* (Jáv.) Soó, *Cyanus marmarosiensis* (Jáv.) Dostál, *C. montanus* subsp. *marmarosiensis* (Jáv.) Soják. **Status:** Eastern Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Marmaros, Svydovets; is cited only from Chornohora by Antosiak [4]. **Ref.:** [4, 16, 17, 18, 24, 104, 120, 179, 185].
 21. ++. ***Centaurea phrygia*** L. subsp. *carpatica* (Porcius) Dostál **Syn.:** *C. carpatica* (Porcius) Porcius, *C. plumosa* Lam. subsp. *carpatica* Porcius, *C. rodnensis* Simonk., *Jacea carpatica* (Porcius) Soják, *J. phrygia* subsp. *carpatica* (Porcius) Dostál. **Status:** South-Eastern Carpathian endemic. **Distr.:** All regions. **Ref.:** [4, 16, 17, 18, 24, 104, 120, 179, 185].
 22. ++. ***Chrysosplenium alpinum*** Schur **Syn.:** *Ch. oppositifolium* auct. non L., *Ch. glaciale* Fuss, *Ch. transsilvanicum* Schur, *Ch. rosulare* Schott ex Maxim. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Marmaros [4]. **Ref.:** [4, 16, 18, 24, 104, 120, 179, 185].
 23. ++. ***Crocus banaticus*** J. Gay **Syn.:** *C. iridiflorus* Heuff. ex Rchb., *C. byzantinus* Ker Gawl. p.p., *C. nudiflorus* Schult. non Sm., *C. speciosus* Rochel non M. Bieb., *C. herbertianus* Körn., *Crociris iridiflora* (Heuff.) Schur. **Status:** South-Eastern Carpathian subendemic (occurs in the lowlands and Central Serbia). Suggested as Carpatho-Balkan taxon by several authors [10, 24, 123]. Closely linked in its distribution with the Carpathian Mountain range, it does not occur in the Balkans. **Distr.:** Volcanic Carpathians [138], Khust-Solotvyno Depression [138]). **Ref.:** [10, 17, 24, 123, 138].
 24. +. ***Dactylorhiza maculata*** (L.) Soó subsp. *schurii* (Klinge) Soó **Syn.:** *D. schurii* (Klinge) Aver., *D. maculata* (L.) Soó subsp. *maculata* var. *sudetica* (Rchb. f.) Soó, *Orchis maculata* L. subsp. *maculata* var. *schurii* (Klinge) Soó, *O. angustifolia* Loisel. ex Rchb. f. *schurii* Klinge. **Status:** Pan-Carpathian endemic. **Distr.:** Most probably present in Ukraine, but with unknown distribution. **Ref.:** [18, 104, 106, 120, 203].
 25. +. ***Dianthus spiculifolius*** Schur subsp. *spiculifolius*. **Syn.:** n.a. **Status:** South-Eastern Carpathian endemic. **Distr.:** In the Ukrainian Carpathians perhaps absent, possibly occurring in Chyvchyny (cited from South Bukovina on the basis of one old voucher; however there is no recently collected specimen). **Ref.:** [18, 41, 46].

26. ++. *Dianthus tenuifolius* Schur **Syn.:** *D. bukovinensis* (Zapał.) Klokov, *D. carthusianorum* L. var. *bucovinensis* Zapał., *D. graminifolius* Schur. **Status:** South-Eastern Carpathian endemic [63, 64, 104, 179]. Also erroneously mentioned as a Central European taxon [24, 112]. **Distr.:** Chyvchyny and Marmaros (Pip Ivan Mt.) [24, 104, 112]. **Ref.:** [16, 18, 24, 63, 64, 104, 112, 179].
27. ++. *Doronicum carpaticum* (Griseb. & A. Schenk) Nyman **Syn.:** *D. grandiflorum* subsp. *carpaticum* (Griseb. & A. Schenk) Rouy, *D. columnae* Ten. subsp. *carpaticum* Sóo, *D. pardalianches* Heuff., *D. cordatum* var. *asperum* Borbás, *Aronicum carpaticum* (Griseb. & A. Schenk) Schur, *A. scorpioides* Koch var. *carpaticum* Griseb. & A. Schenk, *A. latifolium* Schur, *Arnica scorpioides* Baumg. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Marmaros, Svydovets. **Ref.:** [4, 16, 17, 18, 120, 179].
28. ++. *Erysimum witmanni* Zaw. subsp. *transsilvanicum* (Schur) P. W. Ball **Syn.:** *E. transsilvanicum* Schur, *E. odoratum* Baumg. p.p., *E. baumgartenianum* Jáv. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chyvchyny (Chorniy Dil Mts. only). **Ref.:** [16, 17, 18, 24, 104, 120, 185].
29. ++. *Euphorbia carpatica* Woł. **Syn.:** *E. jasiewiczii* (Chrtek & Krísa) Radcl.-Sm., *E. jasiewiczii* (Chrtek & Krísa) Dubovik, *Tithymalus carpaticus* (Woł.) Á. Löve & D. Löve, *T. jasiewiczii* Chrtek & Krísa. **Status:** South-Eastern Carpathian endemic. **Distr.:** All regions; is cited only from Svydovets by Antosiak [4]. **Ref.:** [4, 16, 18, 24, 104, 120, 179, 185].
30. ++. *Festuca carpatica* F.G. Dietr. **Syn.:** *F. nutans* Wahlenb., *F. dimorpha* Janka, *F. pseudolaxa* Schur, *F. laxa* Schur, *Amphigenes carpatica* Janka, *A. nutans* Janka. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Gorgany, Svydovets; is cited only from Svydovets by Antosiak [4]. **Ref.:** [16, 17, 18, 24, 104, 120, 179, 185].
31. ++. *Festuca porcii* Hack. **Syn.:** n.a. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora (Ur. Tsybulnik, Petrosul Mt. [9]), Chyvchyny (Ur. Glystovate, Chyvchyn Mt. [9]); is cited only from Svydovets by Antosiak [4]. **Ref.:** [4, 9, 16, 17, 18, 24, 104, 120, 179, 185].
32. ++. *Festuca rupicola* Heuff. subsp. *saxatilis* (Schur) Rauschert **Syn.:** *F. saxatilis* Schur, *F. sulcata* (Hack.) Nym. subsp. *saxatilis* K. Richt., *F. valesiaca* Schleich. ex Gaudin subsp. *saxatilis* (Schur) E.B. Alexeev. **Status:** Pan-Carpathian endemic. **Distr.:** Chyvchyny (Mts. Velyka Budiyovska, Gnitesa, Lozdun, Suligul, Chyvchyn [189]), Chornohora (Petros Mt. only [189]), Eastern Beskyds (occurring on Stinka and Stiy Mts. [189]), Gryniava (Chorniy Dil Mts. – Ur. Velykiy Kamin, watershed of rivers Chorniy Cheremosh and Biliy Cheremosh [189]), Marmaros (Petros Mt., Pip Ivan, Nienieska Mt. [189]), Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [189]). **Ref.:** [17, 18, 185, 189].
33. ++. *Festuca versicolor* Tausch subsp. *versicolor*. **Syn.:** n.a. **Status:** Pan-Carpathian endemic. Also mentioned as a Carpathian-Sudetic taxon [24, 122], but having its main distribution in the Carpathian Mountains. **Distr.:** Chornohora, Svydovets. **Ref.:** [4, 18, 24, 93, 113, 120, 122].
34. +. *Galium transcarpaticum* Stojko & Tasenk. **Syn.:** n.a. **Status:** mentioned as Eastern Carpathian paleoendemic [178, 179]. **Distr.:** Polonynas (Mts. Chur', Velyka Ugol'ka, Velykiy Grebin' [59]), Svydovets (Mts. Kuzij, Sokolove Berdo [59]). **Ref.:** [4, 18, 24, 59, 104, 120, 178, 179, 185].

35. +. *Genista tinctoria* L. subsp. *oligosperma* (Andrae) Borza **Syn.:** *G. oligosperma* (Andrae) Simonk. **Status:** South-Eastern Carpathian endemic. **Distr.:** In Ukrainian Carpathians is currently extinct; before, it was known from Marmaros (Pip Ivan Marmaroskiy Mt., Berlibashka Mt. [68]). **Ref.:** [4, 16, 18, 68, 104, 120, 179, 185].
36. ++. *Heracleum carpaticum* Porcius **Syn.:** *H. simplicifolium* Herbich p.p., *H. simplicifolium* sensu Borza, *H. alpinum* Baumg. et auct. Transs. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Marmaros [4]. **Ref.:** [4, 16, 18, 24, 104, 120, 179, 185].
37. ++. *Heracleum sphondylium* L. subsp. *transsilvanicum* (Schur) Brummitt **Syn.:** *H. palmatum* Baumg., *H. simplicifolium* Herbich s.str., *H. palmatum* Baumg. subsp. *transsilvanicum* (Schur) Nyman, *H. transsilvanicum* Schur. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chyvchyny. **Ref.:** [16, 18, 24, 104, 120, 179, 185].
38. ++. *Jovibarba globifera* (L.) J. Parn. subsp. *preissiana* (Domin) Holub **Syn.:** *J. preissiana* (Dom.) Omelcz. & Czopik, *J. hirta* (Pollini) Opiz subsp. *glabrescens* Favarger, *Sempervivum soboliferum* Sims subsp. *preissianum* Pawł., *S. soboliferum* Sims subsp. *glabrescens* Soó, *S. hirtum* L. f. *glabrescens* Sabr., *S. hirtum* L. subsp. *Glabrescens* Jáv. **Status:** Western-Eastern Carpathian endemic. **Distr.:** Gryniava (Chorniy Dil Mts., Velykiy Kamin Mt., Preluky [21]), Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Marmaros (Pip Ivan Marmaroskiy Mt. [21]), Svydovets (Blyznitsa Mt., Gereshaska Mt. [21]). **Ref.:** [4, 16, 18, 21, 24, 104, 120, 179, 185].
39. +. *Koeleria macrantha* (Ledeb.) Schult. subsp. *transsilvanica* (Schur) A. Nyár. **Syn.:** *K. transsilvanica* Schur, *K. gracilis* Pers. subsp. *transsilvanica* (Schur) Domin. **Status:** South-Eastern Carpathian endemic. **Distr.:** In Ukrainian Carpathians perhaps is absent [102, 105]; however it is cited from Chornohora (Petros Mt.) by Malynovskiy [117] without vouchers. Needs confirmation with specimen. **Ref.:** [17, 18, 102, 105, 117, 185].
40. ++. *Leontodon kulczynskii* Popov **Syn.:** *L. repens* Schur, nom. illeg., *L. caucasicus* auct non (M. Bieb.) Fisch., *L. hispidus* L. subsp. *repens* (Schur) Jáv. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora [17], Chyvchyny, Gorgany, Marmaros [4, 17], Svydovets [17]. **Ref.:** [4, 16, 17, 18, 104, 120, 179].
41. ++. *Leucanthemum rotundifolium* (Waldst. & Kit. ex Willd.) DC. non Opiz **Syn.:** *Leucanthemum waldsteinii* (Sch.Bip.) Pouzar, *Chrysanthemum rotundifolium* Willd., *C. rotundifolium* Waldst. & Kit., *Tanacetum waldsteinii* Sch. Bip., *T. rotundifolium* (Willd.) Simonk. [non DC.] **Status:** Pan-Carpathian subendemic. Also cited from Vranica Planina (Bosnia and Hercegovina) by Beck-Mannagetta et al. [7]. **Distr.:** All regions (is cited for Chornohora, Marmaros and Svydovets by Antosiak [4]). **Ref.:** [4, 7, 16, 17, 18, 104, 120, 179].
42. ++. *Luzula alpinopilosa* (Chaix) Breistr. subsp. *obscura* S. E. Fröhner **Syn.:** *L. spadicea* (All.) DC. in Lam. & DC., *L. carpatica* Kitt. ex Kanitz, *L. obscura* (S. E. Fröhner) Novikov, *L. spadicea* (All.) DC. var. *carpatica* (Kitt. ex Kanitz) Nyman, *Juncus alpinopilosus* Chaix in Vill., *J. spadiceus* All. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Marmaros, Svydovets. **Ref.:** [18, 24, 91, 104, 185].
43. ++. *Melampyrum saxosum* Baumg. **Syn.:** *M. saxosum* Baumg. subsp. *javorkae* (Soó) Soó, *M. saxosum* Baumg. subsp. *baumgartenii* (Soó) Soó, *M. sylvaticum* Simonk., *M. sylvaticum* L. subsp. *saxosum* (Baumg.) Nyman. **Status:** Eastern Carpathian endemic [24, 127]. **Distr.:**

- Chornohora, Chyvchyny, Gorgany, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif), Marmaros, Svydovets, Khust-Solotvyno Depression, Volcanic Carpathians. **Ref.:** [4, 16, 17, 18, 24, 104, 120, 127, 179, 185].
44. ++. ***Minuartia verna*** L. subsp. ***oxypetala*** (Woł.) G. Halliday **Syn.:** *M. oxypetala* (Woł.) Kulcz., *Alsine oxypetala* Woł. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chyvchyny (Mts. Budychevska, Chyvchyn, Chyvchynazh, Popadia-Luston (Ryzhuvatiy), Gnietiesa, Fatia-Banului [47]), Marmaros [47]. **Ref.:** [18, 24, 47, 104, 120, 179, 185].
45. ++. ***Noccaea dacica*** (Heuff.) F. K. Mey subsp. ***dacica*** F. K. Mey **Syn.:** *Thlaspi dacicum* Heuff. subsp. *dacicum*, *Th. korongianum* Czetz., *Th. trojagense* Zapał. **Status:** South-Eastern Carpathian endemic. **Distr.:** Svydovets. **Ref.:** [16, 18, 24, 104, 120, 179, 185].
46. ++. ***Oxytropis carpatica*** R. Uechtr. **Syn.:** *O. montana* var. *carpatica* (Uechtr.) Hausskn. **Status:** Pan-Carpathian endemic. **Distr.:** Chyvchyny; also is supposedly occurring in Svydovets [4]. However Dr. Sytschak considered that this taxon is absent from the Ukrainian Carpathians and it is cited only as a result of misidentification (pers. comm.). **Ref.:** [4, 16, 18, 104, 120, 179, 185].
47. ++. ***Phyteuma tetramerum*** Schur **Syn.:** *Ph. spicatum* Baumg. non L. **Status:** South-Eastern Carpathian endemic. **Distr.:** All regions (Chornohora, Chyvchyny, Marmaros, Svydovets [17]); also cited for Chornohora, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif) and Svydovets by Antosiak [4]. **Ref.:** [4, 16, 17, 18, 24, 104, 120, 179, 185].
48. ++. ***Phyteuma vagneri*** A. Kern. **Syn.:** *Ph. spiciforme* Rochel, *Ph. limonifolium* L., *Ph. atropurpureum* Schur, *Ph. nigrum* Baumg. var. *atropurpureum* Schur, *Ph. halleri* auct. non All., *Ph. ovatum* Baumg., *Ph. betonicaefolium* Baumg., *Ph. michelii* Sternh., *Physoplexis comosa* Schur. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora, Chyvchyny [17], Eastern Beskyds [17], Gorgany [17], Polonynas (Borzhava – own field observations of A. Novikoff; Ugolsko-Shyrokoluzhanskiy Massif [4]) [17], Marmaros [4], Svydovets. **Ref.:** [4, 16, 17, 18, 24, 104, 120, 179, 185].
49. ++. ***Plantago atrata*** Hoppe subsp. ***carpatica*** (Soó) Soó **Syn.:** *P. frutescens* Schur, *P. alpina* Schur. **Status:** Pan-Carpathian endemic. **Distr.:** Chyvchyny (Sulygul-Chyvchyn Mts. only), Svydovets. **Ref.:** [17, 18, 104, 24].
50. ++. ***Poa granitica*** Braun-Blanq. subsp. ***disparilis*** (Nyár.) Nyár. **Syn.:** *P. cenisia* All. subsp. *granitica* (Br.-Bl.) Borza var. *disparilis* (Nyár.) Nyár. & Borza, *P. deylii* Chrtek & V. Jirásek, *P. × breazensis* Nyár. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora, Marmaros, Svydovets. **Ref.:** [4, 16, 18, 24, 104, 120, 179, 185].
51. ++. ***Poa rehmannii*** (K. Richt.) Woł. **Syn.:** *P. rehmannii* (Asch. & Graebn.) Woł., *P. nemoralis* L. subsp. *rehmannii* Asch. & Graebn., *P. anceps* Rehmann non G. Forst., *P. caesia* Sm. subsp. *rehmannii* Richt. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora (only one known locality in Verkhovyna town, between Chornohora and Chyvchyny Mts.) [17]; between villages Bystrets and Verkhovyna [27]), Gryniava (Chorniy Dil Mts. [27]). **Ref.:** [16, 17, 18, 24, 27, 104, 120, 179, 185].
52. ++. ***Pulmonaria filarszkyana*** Jáv. **Syn.:** *P. rubra* Schott subsp. *filarszkyana* (Jáv.) Domin, *P. rubra* Schott var. *filarszkyana* Guşul., *P. dacica* Simonk., *P. rubra* var. *dacica* Simonk., *P. angustifolia* A. Kern. **Status:** Eastern Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif), Marmaros, Svydovets; also

cited from Polonynas (Ugolsko-Shyrokoluzhanskiy Massif) and Marmaros [4]. **Ref.:** [4, 24, 16, 17, 18, 104, 120, 179, 185].

53. ++. ***Pyrola carpatica*** Holub & Křisa. **Syn.:** *P. rotundifolia* subsp. *carpatica* (Holub & Křisa) Beldie & Váczy, *P. intermedia* auct. non Schleich., *P. rotundifolia* subsp. *intermedia* auct. non (Schleich.) Dostál, *P. rotundifolia* subsp. *intermedia* auct. non (Schleich.) Pawł. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora (Hoverla Mt. only) and Svydovets (Blyznitsa Mt. only). **Ref.:** [16, 18, 24, 104, 120, 179, 185].
54. ++. ***Ranunculus carpaticus*** Herbach **Syn.:** *R. dentatus* (Baumg.) Freyn, *R. gouani* Baumg., *R. lichenfeldianus* Schur. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Svydovets. **Ref.:** [4, 16, 18, 24, 104, 120, 179, 185].
55. ++. ***Salix kitaibeliana*** Willd. **Syn.:** *S. retusa* L. var. *kitaibeliana* (Willd.) Rchb. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora (Mts. Petros, Goverla, Turkul, Shpyci, Rebra, Gutyn Tomnatyk, Brebeneskul, Pip Ivan [29]), Svydovets (Blyznytsia Mt. [29]); also cited from Svydovets by Antosiak [4]. **Ref.:** [4, 16, 18, 29, 120, 179, 185].
56. ++. ***Saussurea porcii*** Degen **Syn.:** *S. parviflora* auct. non (Poir.) DC., *S. serrata* Stankov & Taliev., *S. serrata* Janka, *S. alata* Porcius & Czet. **Status:** Eastern Carpathian endemic. **Distr.:** Chornohora (Polonyna Rognieska, Ur. Prymaratyk [25]); Chyvchyny (Gnetesa [25]), Gryniava (watershed of rivers Chorniy Cheremosh and Biliy Cheremosh, Polonyna Glystovata, between Polonyna Glystovata and Polonyna Preluky [25]). **Ref.:** [4, 16, 17, 18, 25, 104, 120, 179, 185].
57. ++. ***Scabiosa columbaria*** L. subsp. ***pseudobanatica*** (Schur) Jáv. & Csapody **Syn.:** *S. pseudobanatica* (Schur) Jáv., *S. lucida* Vill. subsp. *pseudobanatica* (Schur) Chrtek, *Asterocephalus pseudobanaticus* Schur. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chyvchyny. **Ref.:** [17, 18, 104, 120, 185].
58. ++. ***Scabiosa lucida*** Vill. subsp. ***barbata*** Nyár. **Syn.:** *S. pubescens* Jord. non Waldst. & Kit. ex Willd., *S. opaca* Klokov, *S. longifolia* Waldst. & Kit. **Status:** South-Eastern Carpathian endemic. **Distr.:** Chornohora, Chyvchyny, Gorgany, Eastern Beskyds, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Marmaros, Svydovets. **Ref.:** [4, 16, 17, 18, 24, 104, 120, 179, 185].
59. ++. ***Scorzoneroideis pseudotaraxaci*** (Schur) Holub **Syn.:** *Leontodon montanus* Lam. subsp. *pseudotaraxaci* (Schur) Finch & P.D. Sell, *L. taraxaci* auct. non (L.) Loisel., *L. pseudotaraxaci* Schur, *L. clavatus* Sagorski & Gus. Schneid., *L. medius* Simonk., *L. tatricis* Woł., *Scorzoneroideis montana* (Lam.) J. Holub subsp. *pseudotaraxaci*, *Apargia media* Host. **Status:** Pan-Carpathian endemic. **Distr.:** Svydovets (Blyznitsa Mt. and Dragobrat Mt. only [17]). **Ref.:** [4, 16, 17, 18, 104, 120, 179, 185].
60. ++. ***Sempervivum montanum*** L. subsp. ***carpaticum*** Wettst. ex Hayek **Syn.:** *S. carpaticum* Wettst. ex Prodan, *S. wettsteinii* Letz. subsp. *wettsteinii*. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora (Mts. Menchul, Brebeneskul, Pip Ivan [87]), Chyvchyny, Gorgany, Eastern Beskyds (Pikuy Mt. [87]), Marmaros (Pip Ivan Marmaroskiy Mt. [87]), Precarpathian Lowlands (near Pechenizhyn village of Kolomyia district in Ivano-Frankivsk region [87], doubtful), Svydovets, Volcanic Carpathians (doubtful); is cited only from Marmaros by Antosiak [4]. For Marmaros is also cited by a number of authors [4, 17, 18, 24]. **Ref.:** [4, 17, 18, 24, 86, 87].

61. ++. *Sesleria heufleriana* Schur subsp. *heufleriana*. **Syn.:** *S. caerulea* Baumg., *S. nitida* Heldr. ex Nyman, *S. robusta* Pávai, *S. transilvanica* Schur., *S. uliginosa* Opiz. **Status:** pan-Carpathian subendemic. **Distr.:** Chornohora, Svydovets. **Ref.:** [17, 18].
62. ++. *Silene nutans* L. subsp. *dubia* (Rohrb.) Zapal. **Syn.:** *S. dubia* Rohrb., *S. transsilvanica* Schur, *S. saxatilis* Schur. **Status:** Pan-Carpathian endemic. **Distr.:** All regions; is cited from Polonynas (Ugolsko-Shyrokoluzhanskiy Massif), Marmaros and Svydovets by Antosiak [4]. **Ref.:** [4, 16, 18, 24, 44, 104, 120, 179, 185].
63. ++. *Silene zawadzkii* Herbach **Syn.:** *Melandrium zawadzkii* (Herbach) A. Braun, *Elisanthe zawadskii* (Herbach) Klokov, *Silenanthe zawadskii* (Herbach) Griseb. & Schenk. **Status:** South-Eastern Carpathian endemic. **Distr.:** Gryniava (upper sector of Biliy Cheremosh river; Velykiy Kamin' Mt. on Chorniy Dil Mts.; Ur. Preluky on the left bank of Pryluchnyy stream – left tributary of Perkalab river; Mokryniv Kamin' Mt. [20]). **Ref.:** [16, 18, 20, 24, 44, 104, 120, 179, 185].
64. ++. *Symphytum cordatum* Waldst. & Kit. ex Willd. **Syn.:** *S. cordifolium* Baumg. **Status:** This is often cited as a Pan-Carpathian subendemic but Chorney [24] described it as a non-endemic Central European species. We regard it as a subendemic species, closely linked with the Carpathian mountain range, but with larger ecological preferences, occurring also in lower areas, along river valleys and in humid forested areas. **Distr.:** All regions. **Ref.:** [4, 16, 17, 18, 24, 120, 179].
65. ++. *Syringa josikaea* J. Jacq. ex Rchb. f. **Syn.:** *S. vincetoxifolia* Baumg. ex Steud. **Status:** Eastern Carpathian-Apuseni Mountain endemic. **Distr.:** Eastern Beskyds (only in the upper sector of Uzh, Latorytsia, Rika and Stryi Rivers [139]). **Ref.:** [17, 18, 24, 104, 139].
66. +. *Thymus alternans* Klokov **Syn.:** *Th. marschallianus* auct. non Willd., *Th. glabrescens* auct. non Willd., *Th. serpyllum* L. f. *margittaianus* auct. non Lyka in Jáv. **Status:** Eastern Carpathian endemic. **Distr.:** All regions [140]. **Ref.:** [4, 16, 18, 104, 120, 140, 179, 185].
67. ++. *Thymus pulcherrimus* Schur **Syn.:** *Th. montanus* auct. non Waldst. & Kit., *Th. carpathicus* Čelak., *Th. orbiculatus* Schur ex Beck, *Th. serpyllum* L. subsp. *sudeticus* Lyka, *Th. serpyllum* L. subsp. *pulcherrimus* (Schur) Lyka, *Th. circumcinctus* Klokov, *Th. sudeticus* Opiz ex Borbás subsp. *pulcherrimus* (Schur) Dostál, *Th. sudeticus* Opiz ex Borbás subsp. *carpathicus* Čelak. **Status:** Pan-Carpathian endemic. **Distr.:** All regions. **Ref.:** [4, 16, 18, 24, 140, 179, 185].
68. ++. *Trisetum fuscum* (Schult.) Schult. **Syn.:** *T. ciliare* (Kit. ex Schult.) Domin, *T. carpathicum* auct., non (Host) Roem. & Schult., *T. tenue* Baumg. ex Steud., *T. transylvanicum* Steud., *Avena ciliaris* Kit., *A. fusca* Kit. **Status:** Pan-Carpathian endemic. **Distr.:** Chornohora (Petros Mt. only), Marmaros, Svydovets; also is mentioned from Svydovets by Antosiak [4]. **Ref.:** [4, 16, 17, 18, 24, 104, 120, 179, 185].
69. +. *Trisetum macrotrichum* Hack. **Syn.:** *Trisetaria macrotricha* (Hack.) Banfi & Soldano, *Trisetum tarnowskii* Zapal., *Trisetum gmelinii* Trin., *Avena gmelinii* (Trin.) Nyman, *Bromus cinereus* S.G. Gmel. ex Trin. nom. illeg.). **Status:** South-Eastern Carpathian endemic. **Distr.:** In the Ukrainian Carpathians is perhaps absent, but is cited from one locality (without herbarium specimen) on the border near Cârlibaba village (Romania) by Chopyk [17]. Needs to be confirmed with vouchers. **Ref.:** [17, 18, 24, 120].
70. ++. *Viola declinata* Waldst. & Kit. **Syn.:** n.a. **Status:** South-Eastern Carpathian endemic. Sometimes is considered as Carpatho-Balkan taxon [24, 28, 76, 104, 142], but clarified by

Hurdu [63, 64]. **Distr.:** All regions. **Ref.:** [4, 16, 18, 24, 28, 63, 64, 76, 104, 120, 142, 179, 185].

A2: Other critical or non-endemic taxa that have been regarded at some point as endemics for Ukraine or the entire Carpathian range

1. ?? *Achillea carpatica* Dubovik. **Syn.:** n.a. **Status:** Mentioned as an Eastern Carpathian high mountain endemic taxon [36], which is probably closest to *A. sudetica* Opiz. Taxon of unclear status. **Distr.:** Chornohora, Marmaros. **Ref.:** [4, 24, 36, 52, 103, 116].
2. -. *Acinos alpinus* (L.) Moench. subsp. *alpinus*. **Syn.:** *A. alpinus* (L.) Moench subsp. *baumgartenii* (Simonk.) Szaf. & Pawł. **Status:** *A. alpinus* subsp. *baumgartenii* is mentioned by some Ukrainian authors [120, 179, 185] as a South-Eastern Carpathian endemic; however it is not an endemic taxon, but a synonym of *A. alpinus* subsp. *alpinus*, which also occurs in the Alps [1, 2, 3]. **Distr.:** Chyvchyny, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Svydovets [4]. **Ref.:** [1, 2, 3, 4, 16, 18, 120, 179, 185].
3. ?. *Aconitum moldavicum* Hacq. subsp. *porcii* Starmühl. **Syn.:** n.a. **Status:** South-Eastern Carpathian endemic. Critical taxon, probably of hybrid origin [132]. **Distr.:** Chyvchyny. **Ref.:** [130, 131, 132, 145, 146, 147].
4. ?. *Aconitum moldavicum* Hacq. subsp. *simonkaianum* (Gáyer) Starmühl. **Syn.:** *A. simonkaianum* Gáyer. **Status:** Eastern Carpathian endemic. Critical taxon, probably of hybrid origin [132]. **Distr.:** Chornohora, Chyvchyny. **Ref.:** [130, 131, 132, 145, 146, 147].
5. ?. *Alchemilla babiogorensis* Pawł. **Syn.:** n.a. **Status:** Mentioned as a Western Carpathian [76, 157] or Western-Eastern Carpathian endemic [24, 104, 120, 185]. Critical taxon with unclear chorology. **Distr.:** Chornohora, Svydovets and also confirmed for Marmaros [221]. **Ref.:** [18, 24, 76, 104, 120, 157, 182, 185, 221].
6. ?. *Alchemilla braun-blanquetii* Pawł. **Syn.:** n.a. **Status:** Mentioned as a Western-Eastern Carpathian endemic [24, 104, 120, 185]. Critical taxon with unclear chorology. **Distr.:** Chornohora. **Ref.:** [18, 24, 104, 120, 182, 185, 223].
7. ?. *Alchemilla bucovinensis* Sytschak. **Syn.:** n.a. **Status:** Mentioned as Eastern Carpathian endemic [24, 120, 185]. Critical taxon with unclear chorology. **Distr.:** Chyvchyny, Gryniava, Eastern Beskyds, Gorgany, Polonynas; also is cited for Precarpathian Lowlands [185]. **Ref.:** [18, 24, 120, 180, 182, 185, 223].
8. ?. *Alchemilla connivens* Buser **Syn.:** *A. alpestris* (F.W.Schmidt) Buser subsp. *montana* (F.W. Schmidt) Soó & Palitz, *A. cleistophylla* Rothm. & O. Schwarz, *A. montana* (F.W. Schmidt) Buser non Willd., *A. subconnivens* Pawł., *A. vulgaris* L. subsp. *connivens* (Buser) E.G. Camus. *A. vulgaris* subsp. *montana* (F.W. Schmidt) Gams. **Status:** *A. subconnivens* is mentioned as Western-Eastern Carpathian endemic [120, 181, 185]. Critical taxon with unclear chorology, sometimes placed in synonymy of the widespread mountain species *A. connivens* Buser [24, 192]. It is also considered as endemic for the Western Carpathians [76]. **Distr.:** Chyvchyny. **Ref.:** [18, 24, 76, 120, 181, 182, 185, 192, 222].
9. ?. *Alchemilla czywczyensis* Pawł. **Syn.:** n.a. **Status:** Sometimes is considered as Eastern Carpathian endemic [104, 179, 185], but it is also cited for Bulgaria [24, 53, 111]. On the other side, this taxon is absent in the revision of the genus *Alchemilla* in flora of Bulgaria made by Assenov [5]. Critical taxon with unclear chorology. **Distr.:** Chyvchyny. **Ref.:** [5, 16, 18, 24, 53, 104, 111, 179, 182, 185, 222].

10. ?. *Alchemilla deylii* Plocek ex Soják. **Syn.:** n.a. **Status:** Mentioned as Eastern Carpathian endemic [24, 104, 120]. Critical taxon with unclear chorology. **Distr.:** Chornohora, Svydovets. **Ref.:** [18, 24, 104, 120, 182].
11. -. *Alchemilla gorcensis* Pawł. **Syn.:** n.a. **Status:** Mentioned as a Western-Eastern Carpathian endemic [120, 185], but it also occurs in the Balkans (Bulgaria) [76, 111, 175]. **Distr.:** Chyvchyny and Chornohora [221]. **Ref.:** [18, 24, 76, 111, 175, 182, 185, 120, 221].
12. ?. *Alchemilla hoverlensis* Pawlus & Lovelius. **Syn.:** n.a. **Status:** Mentioned as Eastern Carpathian endemic [24, 104, 120, 192]. Critical species with unclear taxonomy. **Distr.:** Probably it occurs in Chornohora [223]. **Ref.:** [18, 24, 104, 120, 182, 192, 223].
13. ?. *Alchemilla kornasiana* Pawł. **Syn.:** n.a. **Status:** Mentioned as a Western-Eastern Carpathian endemic [24, 104, 185, 192]. Critical taxon with unclear chorology. **Distr.:** Chornohora, Chyvchyny and Gryniava [182, 223]. **Ref.:** [18, 24, 104, 182, 185, 192, 223].
14. -. *Alchemilla ladislai* Pawł. **Syn.:** n.a. **Status:** Mentioned as a Western-Eastern Carpathian endemic [104, 185, 192]. It is also mentioned as endemic to Červený vrchý by Kliment [76]. **Distr.:** It was cited from Eastern Beskyds [223], but further investigations showed that it is absent from Ukrainian Carpathians [182]. **Ref.:** [18, 24, 76, 104, 182, 185, 192, 223].
15. -. *Alchemilla mollis* (Buser) Rothm. **Syn.:** *A. acutiloba* Steven non Opiz var. *mollis* Buser, *A. acutiloba* Steven non Opiz subsp. *mollis* (Buser) Buser, *A. acutiloba* Steven non Opiz subsp. *catillaris* Buser, *A. acutiloba* Steven non Opiz, *A. glareosa* hort., *A. montana* Schur, *A. pilosissima* (Schur) Simonk. p.p., *A. vulgaris* subsp. *acutiloba* (Steven) Nyman, *A. vulgaris* var. *major* Boiss. & Buhse, *A. vulgaris* var. *pilosissima* Schur p.p. **Status:** Erroneously mentioned as an Eastern Carpathian endemic by Stoyko and Tassenkevich [179] It also occurs in the Alps [1-3]. The taxon is also mentioned from the Balkan Peninsula (Stara Planina and northern Greece), Anatolia, the Caucasus and Iran [111, 192]. **Distr.:** Absent from the Ukrainian Carpathians [182], but it is cited erroneously from Chornohora [179]. **Ref.:** [1, 2, 3, 24, 111, 179, 182, 192].
16. ?. *Alchemilla pseudincisa* Pawł. **Syn.:** *A. pseudoincisa* Pawł., *A. sinuata* Rothm. in Sched. non Buser; incl. *A. polonica* Pawł. [76], *A. sokolowskii* Pawł. [76]. **Status:** Mentioned as a Western-Eastern Carpathian endemic [24, 76, 104, 120, 185]. Critical taxon with unclear chorology. **Distr.:** Chornohora, Svydovets [182, 222]. Also is suggested for Gorgany [171]. **Ref.:** [18, 24, 76, 104, 120, 171, 182, 185, 222].
17. ?. *Alchemilla smytniensis* Pawł. **Syn.:** n.a. **Status:** Mentioned as a Western-Eastern Carpathian endemic [24, 104, 120, 185, 192]. Critical taxon with unclear chorology. **Distr.:** Gorgany [222, 182]. **Ref.:** [222, 192, 182, 185, 18, 104, 120, 24].
18. -. *Alchemilla suavis* Plocek. **Syn.:** n.a. **Status:** Western-Eastern Carpathian endemic [76, 185]. Erroneously mentioned from Ukraine by Tassenkevich [185]. Critical taxon with unclear chorology. **Distr.:** n.a. **Ref.:** [18, 24, 76, 185].
19. -. *Alchemilla straminea* Buser. **Syn.:** *A. coriacea* Buser subsp. *straminea* (Buser) Murr, *A. glabra* Neygenf. var. *pungentiflora* Plocek, *A. kotulae* Pawł., *A. pampaniniana* Pamp., *A. pungentiflora* (Plocek) Plocek, *A. subatrica* Pawł. *A. vulgaris* L. subsp. *straminea* (Buser) O. Bolòs & Vigo. **Status:** *A. pungentiflora* is mentioned as Eastern Carpathian endemic [76, 185]. It is also erroneously mentioned from Ukraine by Tassenkevich [185]. Critical taxon with unclear chorology. **Distr.:** n.a. **Ref.:** [24, 76, 185].

20. ?. *Alchemilla szaferi* Pawł. **Syn.:** n.a. **Status:** Mentioned as Eastern Carpathian endemic [24, 104, 120, 179]. Critical taxon with unclear chorology. **Distr.:** Svydovets, Chornohora. **Ref.:** [4, 18, 24, 104, 120, 179, 182, 223].
21. ?. *Alchemilla turkulensis* Pawł. **Syn.:** n.a. **Status:** Mentioned as an Eastern Carpathian or Western-Eastern Carpathian endemic [104, 120, 179, 185, 222]. Critical taxon with unclear chorology. **Distr.:** Chornohora, Chyvchyny, Marmaros, Svydovets. **Ref.:** [4, 16, 18, 24, 104, 120, 179, 182, 185].
22. -. *Alchemilla walasii* Pawł. **Syn.:** n.a. **Status:** Mentioned as a Western-Eastern Carpathian endemic [18, 104, 185], but this taxon is also cited from Belarus and Ukrainian Podlia [24, 181, 192]. Critical taxon with unclear chorology and status [76]. **Distr.:** Eastern Beskyds, Polonynas. Cited for Eastern Beskyds, Gorgany, Chyvchyny and Gryniava by Volgin & Sytschak [223]. **Ref.:** [18, 24, 76, 104, 181, 182, 185, 192, 223].
23. -. *Alchemilla zapalowiczii* Pawł. **Syn.:** n.a. **Status:** Sometimes considered as a Western-Eastern Carpathian or Eastern Carpathian endemic [104, 179, 181, 185, 192, 221], but also cited for Macedonia [111, 24]. Critical taxon with unclear chorology and status [76]. **Distr.:** Chornohora, Chyvchyny. **Ref.:** [16, 18, 24, 76, 104, 111, 179, 182, 185, 192, 221].
24. -. *Antennaria carpatica* (Wahlenb.) Bluff & Fingerh. **Syn.:** *A. alpina* Baumg. [76], *Gnaphalium carpaticum* Wahlenb. [76]. **Status:** Erroneously mentioned as Pan-Carpathian endemic, but it is not endemic to the Carpathian Mountains, occurring also in the Pyrenees and the Alps [24, 60, 65, 76]. Moreover, it was mentioned from North America [212, 213] as *A. carpatica* s.l., but with the specification that *A. carpatica* s.str. is endemic for the European mountains: Carpathians, Alps and the Pyrenees (Urbanska 1983b, see also Bayer & Stebbins 1987). **Distr.:** Chornohora, Marmaros, Svydovets; it is also cited from Svydovets [4], as well as from Marmaros [230]. **Ref.:** [4, 16, 17, 18, 24, 60, 65, 76, 104, 230, 212, 213].
25. -. *Aquilegia transsilvanica* Schur. **Syn.:** *A. paraplesia* Schur, *A. vulgaris* L. var. *transsilvanica* (Schur) Baker, *A. vulgaris* L. var. *paraplesia* (Schur) Baker, *A. fussii* Zimmeter. **Status:** Mentioned as a South-Eastern Carpathian endemic [24, 104, 120, 185], but there are no collected specimens to confirm its distribution in the Ukrainian Carpathians. It occurs only in the Southern Carpathians (Romania). **Distr.:** It is absent in the Ukrainian Carpathians, but it is sometimes cited due to incorrect identification [90] from Gryniava (Velykiy Kamin' Mt. and Dzhogul saddle), Gorgany (Negrovets Mt.); as well as from Svydovets [4] (probably as a result of confusion with *A. vulgaris*). **Ref.:** [4, 16, 18, 24, 90, 104, 120, 185, 231].
26. ?? *Arabidopsis arenosa* (L.) Lawalrée subsp. *borbasii* (Zapał.) O'Kane & Al-Shehbaz **Syn.:** *Arabidopsis borbasii* (O'Kane & Al-Shehbaz) A.P. Iljinsk., *Arabis arenosa* (L.) Scop. subsp. *borbasii* Zapał., *A. arenosa* (L.) Scop. var. *borbasii* Zapał., *A. arenosa* (L.) Scop. var. *dependens* Borbás, *Cardaminopsis arenosa* (L.) Hayek subsp. *borbasii* (Zapał.) Pawł., *C. arenosa* (L.) Hayek var. *multijuga* Kotov, *C. borbasii* (Zapał.) H.E. Hess, Landolt & Hirzel. **Status:** *Cardaminopsis arenosa* subsp. *borbasii* is mentioned as an Eastern Carpathian endemic [120], but has a wider distribution in Europe. Could be an ecological vicariant of *C. arenosa* subsp. *arenosa*, which grows in lower altitudes. Sometimes is synonymized with *C. multijuga* (Borbás) Czerep. occurring in the Alps [24, 126]. **Distr.:** n.a. **Ref.:** [18, 24, 120, 126].

27. ?? *Astragalus australis* (L.) Lam. **Syn.:** *A. australis* (L.) Lam. subsp. *gerardii* (Vill.) P. Fourn., *A. australis* (L.) Lam. var. *balmaeus* Beauverd, *A. australis* (L.) Lam. var. *bucsecsii* (Jav.) Guşul., *A. australis* (L.) Lam. var. *canescens* Beauverd, *A. australis* (L.) Lam. var. *glaberrimus* Kotula, *A. australis* (L.) Lam. var. *glabrescens* Wohlf., *A. australis* (L.) Lam. var. *incanus* Kotula, *A. australis* (L.) Lam. var. *minor* Rouy, *A. australis* (L.) Lam. subsp. *krajinae* Domin., *A. gerardii* (Vill.) Janka, *A. helveticus* (Hartmann) O. Schwarz, *A. krajinae* Domin., *Colutea australis* (L.) Lam., *C. glabra* (Clarion) Poir., *Phaca australis* L., *Ph. australis* L. var. *cenisia* Gaudin, *Ph. australis* L. var. *rubra* Gaudin, *Ph. gerardii* Vill. *Ph. glabra* Clarion, *Ph. halleri* Vill. **Status:** *A. australis* subsp. *krajinae* considered as an Eastern Carpathian [24, 179, 185, 229] or South-Eastern Carpathian [120] endemic, it has unclear taxonomic status. **Distr.:** Chornohora, Marmaros (Nienieska Mt. [229]), Svydovets (Mts. Dragobrat, and Blyznitsa [229]). **Ref.:** [4, 16, 18, 24, 104, 120, 179, 185, 229].
28. -. *Bupleurum falcatum* L. subsp. *cernuum* (Ten.) Arcang. **Syn.:** *B. cernuum* Ten., *B. exaltatum* M. Bieb., *B. linearifolium* DC., *B. sibthorpiatum* Sm., *B. subfalcatum* Schur. **Status:** Regarded by Ukrainian authors [17, 120, 185] as a South-Eastern Carpathian endemic, but it occurs also in the Balkans [175], Alps [1, 2, 3] and Northern Greece [183]. **Distr.:** Chyvchyny (only in the upper sector of the rivers Suchava and Sărat, on the saddle Jogul [17]). Current distribution in the Ukrainian Carpathians is unclear, most probably this taxon is absent there. **Ref.:** [1-3, 16, 17, 18, 120, 175, 183, 185].
29. -. *Bupleurum longifolium* L. **Syn.:** *Bupleurum aureum* Hoffm., *B. longifolium* L. subsp. *aureum* (Hoffm.) Soó *B. longifolium* L. subsp. *vapincense* (Vill.) Todor., *B. longifolium* L. f. *vapincense* (Vill.) Rouy & E.G. Camus, *B. vapincense* Vill. **Status:** *B. longifolium* subsp. *vapincense* is erroneously mentioned as a Western Carpathian endemic [185], but it is a Eurasiatic non-endemic taxon [24, 28, 172]. **Distr.:** n.a. **Ref.:** [18, 24, 28, 172, 185].
30. ?? *Campanula glomerata* L. subsp. *elliptica* (Schult.) Kirschl. **Syn.:** *C. elliptica* Kit. ex Schult., *C. glomerata* L. var. *elliptica* (Kit. ex Schult.) Spreng., *C. pulchra* O.D. Wissjul. **Status:** Mentioned as a Western Carpathian endemic [104, 120], but its distribution in the Ukrainian Carpathians is unclear [16, 24]. According to *Flora Europaea* [202], this taxon occurs also in Central Italy and former Republic of Yugoslavia. **Distr.:** n.a. **Ref.:** [16, 18, 24, 104, 120, 202].
31. ? *Campanula glomerata* L. subsp. *subcapitata* (Popov) Fed. **Syn.:** *C. subcapitata* Popov. **Status:** South-Eastern Carpathian endemic [24, 120] with unclear distribution in the Ukrainian Carpathians and of critical taxonomic validity [16, 24, 216]. **Distr.:** n.a. **Ref.:** [16, 18, 24, 120, 216].
32. -. *Campanula patula* L. subsp. *abietina* (Griseb. & Schenk) Simonk. **Syn.:** *C. abietina* Griseb. & Schenk, *C. patula* var. *pauciflora* Rochel, *C. patula* var. *vajdae* (Pénzes) Fed., *C. stefanoffii* Herm., *C. vajdae* Pénzes, *Neocodon abietinus* (Griseb. & Schenk) Kolak. & Serdyuk. **Status:** Mentioned as a South-Eastern Carpathian endemic [51, 52, 120], but has a Carpato-Balkan distribution [48, 216], occurring also in the Balkans (Pirin & Vitosha Mts). **Distr.:** Chornohora, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Marmaros, Precarpathian Lowlands, Svydovets, Transcarpathian, Khust-Solotvyno Depression, Volcanic Carpathians. **Ref.:** [4, 17, 18, 48, 51, 52, 120, 216].
33. ?? *Carduus collinus* Waldst. & Kit. **Syn.:** *C. brachycephalus* Schur, *C. candicans* Waldst. & Kit. subsp. *brachycephalus* (Schur) Nyman, *C. polyanthemus* Schur, *Cnicus collinus*

Hornem. **Status:** Mentioned as South-Eastern Carpathian endemic [74] but it has a rather unclear taxonomy, also occurring as the lowland taxon. **Distr.:** Transcarpathian Lowlands (only one location on Chorna Hora Mt. near Vynogradovo town, not to be confused with Chornohora mountain range). **Ref.:** [17, 74].

34. ?? *Carduus personata* (L.) Jacq. subsp. *albidus* (Adamović) Kazmi. **Syn.:** *C. bicolorifolius* Klokov, *C. personata* (L.) Jacq. var. *albidus* Adamović. **Status:** *C. bicolorifolius* is mentioned as Eastern Carpathian endemic [103]. Taxon with unclear status and distribution in Ukraine (also is cited for lowlands) [24], occurring also in the Balkan Peninsula. **Distr.:** Chornohora, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif), Marmaros. **Ref.:** [4, 24, 103].
35. ?? *Carex sempervirens* Vill. subsp. *tristis* (M. Bieb.) Kük. **Syn.:** *C. ferruginea* Scop. var. *sempervirens* (Vill.) Fiori, *C. tristis* M. Bieb., *C. sempervirens* Vill. subsp. *pseudotristis* (Domin) Pawł., *C. sempervirens* Vill. var. *pseudotristis* Domin, *C. sempervirens* Vill. subsp. *sempervirens*. **Status:** Mentioned as an Eastern Carpathian endemic [185] but its taxonomic status is unclear [24, 38]. **Distr.:** n.a. **Ref.:** [18, 24, 38, 185].
36. -. *Centaurea phrygia* L. subsp. *melanocalathia* (Borbás) Dostál. **Syn.:** *C. phrygia* L. subsp. *nigriceps* (Dobrocz.) Dostál, *C. nigriceps* Dobrocz., *C. melanocalathia* Borbás, *Jacea melanocalathia* Holub, *J. phrygia* L. subsp. *melanocalathia* Soják. **Status:** Previously has been considered as a Pan-Carpathian endemic [179, 185] or subendemic [104, 120], but following recent karyological studies was reconsidered to be a hybrid form, *C.* × *melanocalathia* [98]. **Distr.:** Chornohora, Volcanic Carpathians [4]. **Ref.:** [4, 16, 18, 98, 104, 120, 179, 185].
37. -. *Cirsium decussatum* Janka. **Syn.:** *C. eriophorum* (L.) Scop. subsp. *decussatum* (Janka) Petr., *C. eriophorum* (L.) Scop. var. *polonicum* Petr., *C. polonicum* (Petr.) Iljin. **Status:** Mentioned as Eastern Carpathian endemic only by Tasenkevich [185], but is not an endemic taxon, occurring also in Precarpathian Lowlands of Ukraine [71, 193, 194], Belarus and Russia [34, 156]. **Distr.:** Chyvchyny. **Ref.:** [17, 18, 24, 34, 71, 156, 185, 193, 194].
38. ?? *Cortusa matthioli* L. **Syn.:** *C. altaica* Losinsk., *C. matthioli* L. subsp. *matthioli*, *C. matthioli* L. subsp. *moravica* (Podp.) Soják, *C. matthioli* L. subsp. *pubens* (Schott, Nyman & Kotschy) Jáv., *C. pubens* Schott, Nyman & Kotschy, *Primula matthioli* (L.) K. Richt. **Status:** *Cortusa matthioli* subsp. *pubens* is mentioned as an Eastern Carpathian local endemic [24, 89], which is also cited for Romania. Not recognized in more recent Floras. **Distr.:** Chornohora (Hoverla Mt. only [89]). **Ref.:** [24, 83- 85, 89].
39. -. *Dactylis glomerata* L. subsp. *slovenica* (Domin) Domin. **Syn.:** *D. slovenica* Domin. **Status:** Erroneously mentioned as an Eastern Carpathian endemic [51, 103, 120], but is not endemic for the Carpathians, occurring also in Central Europe [24, 166, 204]. **Distr.:** Chornohora, Marmaros, Volcanic Carpathians. **Ref.:** [4, 18, 24, 51, 103, 120, 166, 204].
40. -. *Dactylorhiza maculata* (L.) Soó subsp. *transsilvanica* (Schur) Soó. **Syn.:** *D. transsilvanica* (Schur) Aver., *D. maculata* (L.) Soó var. *transsilvanica* (Schur) P. Delforge, *Dactylorhiza maculata* (L.) Verm. var. *heuffelii* Borsos & Soó, *D. maculata* (L.) Verm. var. *hunyadensis* Borsos & Soó, *Orchis candidissima* Krock., *O. maculata* L. var. *alpina* Schur, *O. maculata* L. var. *candidissima* (Krock.) Nyman, *O. maculata* L. f. *carpatica* Zapal., *O. maculata* L. f. *wettsteinii* H. Fleischm., *O. maculata* L. var. *heuffelii* (Borsos & Soó) Pauca, *O. maculata* L. var. *hunyadensis* (Borsos & Soó) Pauca, *O. maculata* L. var. *ochrantha* Pancic, *O. maculata* L. subsp. *transsilvanica* (Schur) Soó, *O. maculata* L. var. *transsilvanica* (Schur) Nyman, *O.*

- ochrantha* (Pancic) H. Fleischm., *O. transsilvanica* Schur. **Status:** Carpatho-Balkan taxon [24, 220, 225] sometimes mentioned as a South-Eastern Carpathian endemic [103, 104], but it is cited from Romania with a Central European distribution [28], including Serbia (W Balkans). **Distr.:** Eastern Beskyds only [159]. **Ref.:** [18, 24, 28, 103, 104, 159, 220, 225].
41. ?. *Delphinium elatum* L. subsp. *nacladense* (Zapał.) Holub. **Syn.:** *D. nacladense* Zapał. **Status:** Taxon with unclear status, considered as South-Eastern Carpathian [120, 179, 185] or, more likely, Eastern Carpathian [133, 134] endemic. **Distr.:** Chyvchyny (on the tops of Mts. Fatia Banului, Gnetiesa, Preluky, Chyvchyn, Chyvchynazh and Budychevska [22]), Gorgany (near Synevyr village, Mizhgoria district, Zakarpattia region [22]), Polonynas (Borzhava – foothills of Velykiy Verkh Mt., in the lower sector of river Osa [22]), Marmaros (Berliebashka Mt. [22]). **Ref.:** [16, 18, 22, 24, 120, 133, 134, 179, 185].
 42. ?? *Dianthus carpaticus* Woł. **Syn.:** *D. carthusianorum* L. p.p. **Status:** Mentioned as a South-Eastern Carpathian endemic [120], but placed in synonymy of *D. carthusianorum* L. by Tutin [202]. **Distr.:** Chornohora, Svydovets. **Ref.:** [4, 18, 46, 120, 202].
 43. -. *Dianthus carthusianorum* L. subsp. *saxigenus* (Schur) Dostál. **Syn.:** *D. carthusianorum* L. p.p., *D. carthusianorum* var. *saxigenus* Schur, *D. pontederiae* A. Kern. subsp. *saxigenus* (Schur) Soó. **Status:** Mentioned as a Western-Eastern Carpathian endemic [104, 120, 185]. **Distr.:** Taxon with unclear status, which is not cited from Ukraine in recent revisions [24, 45, 46]. **Ref.:** [18, 24, 45, 46, 104, 120, 185].
 44. -. *Euphorbia sojakii* (Chrtek & Krísa) Dubovik. **Syn.:** *E. austriaca* A. Kern. subsp. *sojakii* Chrtek & Krísa, *Tithymalus sojakii* (Chrtek & Krísa) Chrtek & Krísa, *T. sojakii* Holub. **Status:** Mentioned as an Eastern Carpathian endemic [104, 120], but it is known only from the Eastern Alps and therefore needs verification in Ukrainian Carpathians [24, 55]. Not endemic. **Distr.:** Eastern Beskyds, Polonynas, Volcanic Carpathians, Transcarpathian Lowlands. **Ref.:** [17, 18, 24, 55, 104, 120].
 45. -. *Euphrasia slovacica* (Yeo) Holub. **Syn.:** *E. arctica* Lange ex Rostrup subsp. *slovaca* Yeo. **Status:** Mentioned as a Pan-Carpathian [185] or Western-Eastern Carpathian [99, 170] endemic. Critical taxon with very low morphological differentiation from the typical species. Moreover, it is not listed for Ukraine in recent taxonomic revisions by Peregrym [152, 153]. **Distr.:** n.a. **Ref.:** [18, 24, 99, 152, 153, 170, 185].
 46. ?? *Festuca tatrae* (Czakó) Degen. **Syn.:** *F. amethystina* L. subsp. *tatrae* (Czakó) Soó, *F. amethystina* L. var. *tatrae* Czakó. **Status:** Mentioned as a Pan-Carpathian endemic [104, 120, 179]. **Distr.:** Taxon is cited for Ukrainian Carpathians (Eastern Beskyds) [104, 120, 179], but is probably absent because it is not confirmed by critical revision of Bednarska [8]. Also erroneously cited from Bucegi Mts. (Romania) [10]. **Ref.:** [8, 10, 16, 18, 24, 104, 120, 179].
 47. ?? *Galium album* subsp. *suberectum* (Klokov) Michalk. **Syn.:** *G. suberectum* Klokov. **Status:** Considered as an Eastern Carpathian endemic [24, 103, 118], but lacking strong taxonomic position [59]. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Marmaros, Svydovets, Volcanic Carpathians [4]. **Ref.:** [4, 24, 59, 103, 118].
 48. -. *Galium pawlowskii* Kučowa **Syn.:** *G. hircynicum* Weigel, *G. saxatile* L., *G. pumilum* subsp. *saxatile* (L.) Dostál. **Status:** *G. pawlowskii* is mentioned as local paleoendemic from Chyvchyny Mts. [24, 109, 110, 179, 185]. Nevertheless, in the study over *G. saxatile* in the Carpathian Mountains, Mirek & Piękoś-Mirkowa consider *G. pawlowskii* Kučowa to be the

same taxon as *G. saxatile*, without any strong differential morphological characters [].
Distr.: Chyvchyny only. **Ref.:** [18, 24, 109, 110, 179, 185].

49. ?? *Galium polonicum* Błocki. **Syn.:** *G. abaujense* Borbás subsp. *polonicum* (Błocki) Soó, *G. carpathicum* Klokov. **Status:** Mentioned as an Eastern Carpathian endemic [4, 12, 81]. Taxon with unclear status, which is also considered as synonymous with *G. polonicum* Błocki [24, 158] distributed in lowlands outside Carpathians (in Podillia region). Probably it is an Eastern Carpathian subendemic. **Distr.:** Polonynas (Ugolsko-Shyrokoluzhanskiy Massif), Svydovets. **Ref.:** [4, 12, 24, 81, 158].
50. -. *Gentiana pyrenaica* L. **Syn.:** *Diploma pyrenaica* Raf., *Ericala pyrenaica* G. Don, *Ericoila pyrenaica* Borkh., *Gentiana dshimilensis* K. Koch, *G. laciniata* Kit. ex Kanitz., *G. wagneri* Janka, *Hippion pyrenaicum* F.W. Schmidt, *Holubia pyrenaica* (L.) Á. Löve & D. Löve, *Holubogentia pyrenaica* (L.) Á. Löve & D. Löve., *Lexipyretum pyrenaicum* Dulac, *Varasia dshimilensis* (K. Koch) Soják, *V. pyrenaica* (L.) Soják. **Status:** *G. laciniata* is erroneously mentioned by some Ukrainian authors as an Eastern Carpathian endemic [16, 120], but it is a Carpatho-Balkan taxon [24, 205]. **Distr.:** Chornohora (Mts. Goverla, Shpyci, and Turkul [234]), Chyvchyny, Marmaros, Svydovets, also is cited for Chornohora and Svydovets by Antosiak [4]. **Ref.:** [4, 16, 17, 18, 24, 120, 205, 234].
51. - *Gentianopsis ciliata* (L.) Ma. **Syn.:** *Anthopogon ciliata* (L.) Raf., *Crossopetalum ciliatum* Fourr., *C. gentiana* Andrzej. ex Trautv., *C. gentianoides* Roth, *Gentiana ciliata* L., *G. fimbriata* Willd. ex Schult., *Gentianella ciliata* (L.) Borkh., *G. ciliata* (L.) Borkh. f. *albiflora* Morariu, *G. fimbriata* Delarbre, *Gentianusa ciliata* (L.) Pohl, *Hippion ciliatum* F.W. Schmidt, *H. dentosum* F.W. Schmidt, *Lehmannia ciliata* Casseb. & Theob., *Lexipyretum ciliatum* Dulac. **Status:** Mentioned as an Eastern Carpathian endemic [116], but it is not listed for Ukrainian Carpathians by Tasenkevich [184]. It is not an endemic because it occurs in mountains all over Europe, and in Asia Minor, Talysh, and Iran [163]. **Distr.:** Chornohora, Svydovets. **Ref.:** [4, 24, 116, 163, 184].
52. -. *Geranium sylvaticum* L.. **Syn.:** *G. aconitifolium* subsp. *venosum* Pers., *G. alpestre* Schur., *G. angulatum* Curtis, *G. argenteum* Geners. non L., *G. batrachoides* Hocq. non Cav., *G. caroli-principis* Pantu, *G. eglandulosum* (Čelak.) Dalla Torre, *G. fastigiatum* (Fr.) Gliemann, *G. knollii* Rchb., *G. krylovii* Tzvelev, *G. lemanianum* Briq., *G. losae* Sennen, *G. praealpinum* Beck, *G. pratense* L. subsp. *sylvaticum* (L.) Bonnier & Layens, *G. sylvaticum* subsp. *lemanianum* (Briq.) Schinz & R. Keller, *G. sylvestre* Bab., *G. uralense* Kuvaev. **Status:** *G. alpestre* is mentioned as a South-Eastern Carpathian endemic [16, 51, 118], but it is not a valid taxon (synonymous with *G. sylvaticum* L.) distributed also in the mountains of Central and Southern Europe [24, 34, 208]. **Distr.:** Chornohora, Chyvchyny, Marmaros, Svydovets. **Ref.:** [4, 16, 17, 18, 24, 34, 51, 118, 208].
53. ?. *Gymnadenia carpatica* (Zapał.) Teppner & E. Klein. **Syn.:** *Nigritella carpatica* (Zapał.) Teppner, E. Klein & Zag., *N. angustifolia* Rich. var. *carpatica* Zapał., *N. angustifolia* Rich. var. *carpatica* Zapał., *N. nigra* (L.) Rchb. subsp. *carpatica* (Zapał.) H. Baumann & R. Lorenz, *N. nigra* (L.) Rchb. var. *carpatica* (Zapał.) Pawł. **Status:** Considered as an Eastern Carpathian endemic [24, 120, 185, 190, 225]. Critical taxon. **Distr.:** Chyvchyny (Polonyna Preluka – Vasytkova Mt. only [19]), Gryniava (Chorniy Dil Mts. – Slatyna Depression, and Zhupany Depression only; Yarovytsia Mts. – Slatyna Depression, Dzhogul saddle only [19]). **Ref.:** [18, 19, 24, 120, 185, 190, 225].

54. -. *Helianthemum grandiflorum* (Scop.) DC. subsp. *glaucescens* (Murb.) J. Holub. **Syn.:** *H. glaucescens* (Murb.) Tzvelev. **Status:** Mentioned by Malinovskiy [120] as an Eastern Carpathian endemic, but it occurs also in Central Europe and the Mediterranean [24, 207]. **Distr.:** n.a. **Ref.:** [18, 24, 120, 207].
55. -. *Hesperis nivea* Baumg. **Syn.:** *H. matronalis* L. subsp. *candida* (Kit.) Hegi & Em. Schmid, *H. candida* Kit. ex Muggenb., Kanitz & Knapp, *Deilosma albiflorum* Fuss. **Status:** Mentioned by some Ukrainian authors [52, 95, 97, 105, 116, 185] as a Pan-Carpathian endemic. Valid taxon with unclear distribution in Ukraine. Some authors treat it as an unclear taxon [24] being often synonymized with European-Mediterranean *H. matronalis* subsp. *candida* [226]. **Distr.:** In Ukrainian Carpathians it is absent but is mentioned, most probably incorrectly, for Polonynas (Ugolsko-Shyrokoluzhanskiy Massif) by Antosiak [4]. **Ref.:** [18, 24, 52, 95, 97, 104, 105, 116, 185, 226].
56. ?. *Hieracium atrellum* (Zahn) Üksip ex Üksip. **Syn.:** *H. atratum* Fr. subsp. *atrellum* Zahn. **Status:** Mentioned as a Western-Eastern Carpathian endemic [116, 179, 185,] or subendemic [104]. Taxon with unclear status and chorology (mentioned for Central Europe [169]). **Distr.:** Chornohora, Gorgany, Svydovets (Blyznitsa Mt. [17]); also is cited for Svydovets by Antosiak [4]. **Ref.:** [4, 17, 18, 24, 116, 169, 179, 185].
57. ?. *Hieracium caesiogenum* Woł. & Zahn. **Syn.:** n.a. **Status:** Mentioned as a South-Eastern Carpathian endemic [120, 185] or Carpatho-Balkan subendemic [16, 102]. Taxon with unclear status and chorology. **Distr.:** Chyvchyny (Chyvchyn Mt. [17]), Gorgany (Krasna, above Ust Chorna village [17]). **Ref.:** [4, 16, 17, 18, 102, 120, 169, 185].
58. ?. *Hieracium catenatum* Sennikov. **Syn.:** n.a. **Status:** Mentioned as an Eastern Carpathian endemic [24, 104, 164, 185]. Critical taxon. **Distr.:** n.a. **Ref.:** [18, 24, 104, 164, 185].
59. -. *Hieracium chlorocephalum* R. Uechtr. subsp. *stygium* (R. Uechtr.) Zahn. **Syn.:** *H. pallidifolium* Čelak. subsp. *stygium* (R. Uechtr.) Čelak., *H. stygium* R. Uechtr.. **Status:** Erroneously mentioned as Pan-Carpathian endemic [116, 179]. Central European taxon with unclear chorology in Ukraine [24, 169]. **Distr.:** Chornohora. **Ref.:** [24, 116, 169, 179].
60. - *Hieracium fritzei* F.W. Schultz. **Syn.:** *H. montanum* Gus. Schneid., *H. polymorphum* Gus. Schneid. **Status:** Mentioned as a Pan-Carpathian endemic by Malinovskiy [116]. This taxon is not an endemic, as it occurs also in the Balkans [24, 34]. **Distr.:** Chornohora, Marmaros [4]. **Ref.:** [4, 24, 34, 116].
61. -. *Hieracium froelichianum* H. Buek subsp. *wimmeri* (R. Uechtr.) Gottschl. & Greuter **Syn.:** *H. epimedium* Fr. subsp. *wimmeri* (R. Uechtr.) Zahn, *H. juranum* Rapin subsp. *wimmeri* (R. Uechtr.) Zahn, *H. macilentum* Fr. subsp. *wimmeri* (R. Uechtr.) Gottschl., *H. wimmeri* R. Uechtr. **Status:** Erroneously mentioned as Pan-Carpathian endemic [51, 116, 103, 179]. Taxon with unclear status and chorology. It is mentioned also for Sudetes [24, 34]. **Distr.:** Chornohora, Chyvchyny, Gorgany, Marmaros (Pip Ivan Mt. [17]). **Ref.:** [17, 24, 34, 51, 103, 116, 179].
62. ?. *Hieracium grofae* Woł. **Syn.:** n.a. **Status:** Eastern Carpathian endemic [24, 104, 120, 179, 185] with unclear taxonomy and chorology. **Distr.:** Gorgany. **Ref.:** [18, 24, 104, 120, 179, 185].
63. ?. *Hieracium krasanii* Woł. **Syn.:** n.a. **Status:** South-Eastern Carpathian endemic [24, 104, 179, 185] with unclear taxonomy and chorology. **Distr.:** Chornohora (Kukul Mt. [17]),

- Chyvchyny (Chyvchyn Mt. [17]), Eastern Beskyds (Pikuy Mt. [17]), Gorgany. **Ref.:** [17, 18, 24, 104, 179, 185].
64. ?. *Hieracium lomnicense* Woł. **Syn.:** *H. czeremoszense* Woł. & Zahn [17]. **Status:** South-Eastern Carpathian endemic [24, 104, 179, 185] with unclear taxonomy and chorology. **Distr.:** Chornohora [17], Gorgany [179], Marmaros [17]. **Ref.:** [17, 18, 24, 104, 179, 185].
65. ?. *Hieracium mukacevense* Üksip. **Syn.:** n.a. **Status:** Mentioned as an Eastern Carpathian endemic [104, 120, 179, 185] or subendemic [24]. Taxon with unclear status and chorology. **Distr.:** Chornohora (Tiachiv district, Novoselytsia village, on the river Teresva [17]), Eastern Beskyds, Polonynas (Polonyna Rivna [17]), Transcarpathian Lowlands (Mukachevo [17]). **Ref.:** [17, 18, 24, 104, 120, 179, 185].
66. ?. *Hieracium paxianum* Nyár. & Zahn. **Syn.:** n.a. **Status:** Mentioned as a South-Eastern Carpathian endemic [104, 120, 179] with unclear taxonomy and chorology. **Distr.:** Chyvchyny. **Ref.:** [18, 24, 104, 120, 179].
67. ?. *Hieracium pocuticum* Woł. **Syn.:** *H. rehmannii* Woł., *H. furcatum* Rehmann [17], *H. rapunculoidiforme* Woł. & Zahn [17]. **Status:** Mentioned as Eastern Carpathian endemic [51, 116, 120, 179, 185]. Taxon with unclear status and chorology. **Distr.:** Chornohora, Chyvchyny, Gorgany [179], Marmaros, Svydovets, Khust-Solotvyno Depression. **Ref.:** [17, 18, 24, 51, 116, 120, 179, 185].
68. ?. *Hieracium rapunculoidiforme* Woł. & Zahn. **Syn.:** n.a. **Status:** Mentioned as Eastern Carpathian endemic [24, 104, 120, 185] with unclear taxonomy and chorology. **Distr.:** n.a. **Ref.:** [18, 24, 104, 120, 185].
69. ??. *Hieracium scitulum* Wotoszcz. **Syn.:** *H. lampromez* Zahn, *H. fritzei* F.W. Schultz. **Status:** Mentioned as Pan-Carpathian endemic [179, 185] or subendemic [24, 102, 169]. Taxon with unclear taxonomy and chorology. **Distr.:** The taxon is not confirmed for Ukrainian Carpathians, probably it could be found in Chornohora [17]. **Ref.:** [17, 18, 24, 102, 169, 179, 185].
70. ?. *Hieracium ukierniae* Woł. & Zahn. **Syn.:** n.a. **Status:** Mentioned as Eastern Carpathian endemic [24, 185]. Critical taxon with unclear chorology in Ukraine [169]. **Distr.:** n.a. **Ref.:** [18, 24, 169, 185].
71. ?. *Hieracium virgiculae* Naegeli & Peter. **Syn.:** n.a. **Status:** Mentioned as a Western-Eastern Carpathian endemic [179, 185] with unclear taxonomy and chorology. **Distr.:** Chornohora, Chyvchyny. **Ref.:** [18, 24, 179, 184, 185].
72. ?. *Hieracium worochtae* Zahn. **Syn.:** n.a. **Status:** Eastern Carpathian local endemic [24, 185] with unclear taxonomy and chorology. **Distr.:** n.a. **Ref.:** [18, 24, 185].
73. -. *Hypericum richeri* Vill. subsp. *grisebachii* (Boiss.) Nyman. **Syn.:** *H. alpigenum* Kanitz, *H. alpinum* Waldst. & Kit., *H. balcanicum* Velen., *H. grisebachii* Boiss., *H. richeri* Vill. subsp. *alpigenum* (Kit.) Em. Schmid, *H. richeri* Vill. subsp. *burseri* Jordanov, *H. richeri* Vill. var. *grisebachii* (Boiss.) D. Jord. & Kožuharov, *H. richeri* Vill. subsp. *transsilvanicum* (Čelak.) Ciocârlan, *H. transsilvanicum* Čelak. **Status:** Erroneously mentioned as an Eastern Carpathian endemic [120], but it is not endemic for the Carpathians, occurring also in the Alps [1-3] and Balkans [175]. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Gorgany, Marmaros, Polonynas, Svydovets. **Ref.:** [1-3, 17, 18, 24, 120, 175].
74. -. *Jacobaea abrotanifolia* (L.) Moench subsp. *carpathica* (Herbich) B. Nord. & Greuter. **Syn.:** *Senecio carpathicus* Herbich, *S. abrotanifolius* Gouan subsp. *carpathicus* (Herbich)

- Nyman. **Status:** *Senecio carpathicus* is often cited as a Pan-Carpathian endemic [16, 104, 120], it is a Carpatho-Balkan taxon [10, 24], occurring also in Bulgaria and Albania [15]. **Distr.:** Chornohora (Mts. Petros, Shpyci, Rebra, Gutyn-Tomnatyk, Brebeneskul, and Pip Ivan [114]), Chyvchyny (Chyvchyn Mt. [114]), Marmaros, Svydovets. **Ref.:** [4, 10, 15-18, 24, 104, 114, 120].
75. ?? *Knautia dipsacifolia* Kreutzer subsp. *pocutica* (Szabó) Ehrend. **Syn.:** *K. lancifolia* (Heuff.) Simonk. subsp. *pocutica* (Szabó) Holub, *K. sylvatica* var. *pocutica* Szabó. **Status:** Mentioned as a South-Eastern Carpathian endemic [52, 120, 185] with unclear taxonomic status. Probably it is a synonym of *K. dipsacifolia* [13, 24]. **Distr.:** n.a. **Ref.:** [13, 18, 24, 52, 120, 185].
76. ? *Knautia dipsacifolia* Kreutzer subsp. *turocensis* (Borbás) Jáv. ex Kiss. **Syn.:** *K. sylvatica* (L.) Duby var. *turocensis* Borbás. **Status:** Mentioned as a Pan-Carpathian endemic [185] with unclear taxonomic status [76]. **Distr.:** Eastern Beskyds (Pikuy Mt. [24]). **Ref.:** [18, 24, 76, 185].
77. - *Knautia kitaibelii* (Schult.) Borbás. subsp. *alpigena* (Schur) Soó **Syn.:** *K. arvensis* (L.) Coult. var. *kitaibelii* (Schult.) Szabó, *Scabiosa kitaibelii* Schult. **Status:** Erroneously mentioned as a Western Carpathian endemic [103, 104, 118, 120]. It is cited also from the subalpine to lower mountain areas in two locations in Romania [28]. It has an unclear taxonomy and distribution. **Distr.:** Probably could be found in Ukrainian Carpathians [16, 17, 28, 96]. **Ref.:** [16, 17, 18, 24, 96, 103, 104, 118, 120, 96].
78. - *Lathyrus transsylvanicus* (Spreng.) Rchb. **Syn.:** *L. transsylvanicus* Rchb. f., *L. laevigatus* (Waldst. & Kit.) Gren. subsp. *transsylvanicus* (Spreng.) Breistr., *L. laevigatus* (Waldst. & Kit.) Gren. subsp. *transsylvanicus* (Spreng.) Soó, *L. luteus* Baker subsp. *transsylvanicus* (Spreng.) Dostál, *Orobis transsylvanicus* Spreng. **Status:** Mentioned as a Pan-Carpathian endemic [51, 52, 120, 185, 219], but it is also known from the Balkans [24, 104, 162], recently reconfirmed (Marinov *et al.*, 2014). Also mentioned as a Carpatho-Balkan taxon [104] or Carpathian subendemic [76]. **Distr.:** Volcanic Carpathians only (Mts. Lovachka, and Chernecha near Mukachevo [160]). **Ref.:** [17, 18, 24, 51, 52, 76, 104, 120, 160, 162, 185, 219].
79. ?? *Leontodon hispidus* L. subsp. *hastilis* (L.) Corb. **Syn.:** *L. danubialis* Jacq., *L. hastilis* L., *L. hispidus* L. var. *glabratus* F. W. Schultz, nom. illeg., *L. schischkinii* V.N. Vassil., *Vireia hastilis* (L.) Gaertn., *V. hispida* (L.) Gray var. *hastilis* (L.) House. **Status:** *Leontodon schischkinii* is mentioned as an Eastern Carpathian endemic [120]. Taxon with unclear status and chorology (probably it is hybrid or hybridogenic taxon, considered also as synonym of *L. danubialis* Jacq.) [24, 174]. **Distr.:** Chornohora, Svydovets. **Ref.:** [4, 17, 18, 24, 120, 174].
80. ? *Leucanthemum gaudinii* Dalla Torre. **Syn.:** *Chrysanthemum alpicola* (Gremli) Hess & al., *Ch. gaudinii* (Dalla Torre) Dalla Torre & Sarnth., *Ch. leucanthemum* L. subsp. *alpicola* (Gremli) Soó, *Ch. leucanthemum* L. var. *subalpinum* Schur, *Leucanthemum gaudinii* Dalla Torre, *L. raciborskii* Popov & Krasch., *L. subalpinum* (Schur) Tzvelev, *L. vulgare* (Vaill.) Lam. subsp. *subalpinum* (Schur) Tzvelev, *L. vulgare* (Vaill.) Lam. subsp. *subalpinum* (Schur) Soó, *L. vulgare* (Vaill.) Lam. var. *alpicola* Gremli, *L. vulgare* (Vaill.) Lam. subsp. *alpicola* (Gremli) Á. Löve & D. Löve, *Tanacetum subalpinum* (Schur) Simonk., **Status:** *Leucanthemum vulgare* subsp. *subalpinum* is mentioned as a South-Eastern Carpathian

endemic [16, 24, 120], but it occurs also in Central Yugoslavia and therefore could be recognized as subendemic subject to clarification of its taxonomy [206]. **Distr.:** Chornohora, Chyvchyny, Marmaros, Svydovets. **Ref.:** [4, 16, 17, 18, 24, 120].

81. -. *Leucojum vernum* L. var. *carpathicum* Sims. **Syn.:** *L. carpathicum* (Sims) Sweet, *L. vernum* L. subsp. *carpathicum* (Sims) K. Richt, *Erinosma carpathica* (Sims) Herlich **Status:** Erroneously mentioned as an Eastern Carpathian endemic [120], due to its critical taxonomic status and wider distribution range, passing out of the mountain regions. We consider this to be a non-valid endemic [24, 35, 107]. **Distr.:** n.a. **Ref.:** [18, 24, 35, 107, 120].
82. ??. *Libanotis humilis* Schur. **Syn.:** *L. montana* Crantz. s.l. [17], *Seseli libanotis* (L.) W.D.J. Koch p.p. **Status:** Mentioned as a South-Eastern Carpathian endemic [16], taxon with unclear taxonomic status [24, 217]. Given as an alpine variety of *Seseli libanotis* (L.) Koch occurring in the Alps by Beldie [11], but omitted from subsequent studies of the Romanian flora. **Distr.:** Chornohora, Chyvchyny, Eastern Beskyds, Marmaros, Polonynas, Svydovets. **Ref.:** [11, 16, 17, 18, 24, 217].
83. ?. *Melampyrum herbichii* Woł. **Syn.:** *M. sylvaticum* L. subsp. *herbichii* (Woł.) Soó, *M. sylvaticum* L. subsp. *saxosum* (Baumg.) P. Beauv. var. *herbichii* (Woł.) P. Beauv., *M. sylvaticum* L. var. *dentatum* Čelak., *M. sylvaticum* L. subsp. *moeszianum* Soó, *M. sylvaticum* L. f. *csatoi* Soó. **Status:** Mentioned as a South-Eastern Carpathian endemic [16, 120, 179], we consider this to be a highly critical taxon, very close to *M. saxosum* Baumg. [24, 76, 118, 173]. **Distr.:** Chornohora, Chyvchyny, Gorgany, Marmaros, Svydovets. **Ref.:** [4, 16, 17, 18, 24, 76, 118, 120, 173, 179].
84. -. *Melittis melissophyllum* L. subsp. *carpatica* (Klokov) P.W. Ball. **Syn.:** *M. carpatica* Klokov, *M. melissophyllum* L. var. *carpatica* Soó & Borsos, *M. melissophyllum* L. subsp. *sarmatica* (Klokov) Gladkova, *M. sarmatica* Klokov, *M. subcordata* Klokov. **Status:** Mentioned as an Eastern Carpathian endemic [52, 120]. It is not endemic for the Carpathians [1-3, 24, 28, 34, 80]. **Distr.:** Polonynas (Ugolsko-Shyrokoluzhanskiy Massif), Marmaros, Svydovets, Volcanic Carpathians. **Ref.:** [1-4, 18, 24, 28, 34, 52, 80, 120].
85. ?. *Minuartia pauciflora* (Kit. ex Kanitz) Dvořáková. **Syn.:** *M. zarecznyi* (Zapał.) Klok., *M. gerardii* auct. non (Willd.) Hayek, *M. verna* (L.) Hiern subsp. *gerardii* (Willd.) Hayek, *M. verna* (L.) Hiern subsp. *gerardii* (Willd.) Fenzl, *Alsine zarecznyi* Zapał., *Arenaria pauciflora* Kit. **Status:** Considered as a Western Carpathian endemic [16, 26, 78, 97, 103, 118, 142], it was also cited from Ukraine, but has an unclear distribution and requires further investigations. **Distr.:** Chornohora (Petros Mt. [26]), Marmaros (Skurtul Mt., Nienieska Mt. [26]), Svydovets (Mts. Gerashaska, Blyznytsia, and Dragobrat [26]). **Ref.:** [4, 16, 18, 24, 26, 37, 78, 97, 103, 118, 120, 142].
86. -. *Muscari botryoides* (L.) Mill. **Syn.:** *Botryanthus vulgaris* Kunth, *B. alpestris* Jord. & Fourr., *B. boraeanus* Jord. & Fourr., *B. candidus* Jord. & Fourr., *B. compactus* Jord. & Fourr., *B. conicus* Jord. & Fourr., *B. festinus* Jord. & Fourr., *B. heldreichii* Jord. & Fourr., *B. kernerii* Marches., *B. lelievrii* (Boreau) Jord. & Fourr., *B. odorus* Kunth var. *compactus* (Jord. & Fourr.) Nyman, *B. vulgaris* Kunth var. *kernerii* (Marches.) Nyman, *B. vulgaris* Kunth var. *transsilvanicus* (Schur) Nyman, *Botryphile botryoides* (L.) Salisb., des. inval., *Czekelia transsilvanica* (Schur) Schur, *Eubotrys arvensis* Raf., nom. superfl., *Hyacinthus botryoides* L., *Muscari alpinum* Szafer ex Racib., nom. illeg., *M. carpaticum* Racib., *M.*

- heldreichii* Boiss., *M. hymenophorum* Heldr. ex Boiss., *M. inodorum* Montandon, *M. kernerii* (Marches.) Soldano, *M. lelievrii* Boreau, *M. longifolium* Rigo, *M. motelayi* Foucaud, *M. pocuticum* Zapal., *M. polyphyllum* Schur, *M. transsilvanicum* Schur, *M. inflata* Salisb. **Status:** Mentioned as a South-Eastern Carpathian endemic [103, 104], but it occurs also in the Balkans [175], Alps [1-3] and other European mountains excluding the Pyrenees [202]. **Distr.:** Marmaros [73], Volcanic Carpathians [73]. **Ref.:** [1-3, 18, 24, 73, 103, 104, 175, 202].
87. -. *Oberna carpatica* (Zapal.) Czerep. **Syn.:** *O. behen* (L.) Ikonn. subsp. *carpatica* (Zapal.) Tzvel., *Silene carpatica* Zapal., *S. vulgaris* (Moench) Garke subsp. *carpatica* Zapal., *S. venosa* Asch. var. *carpatica* Zapal. **Status:** Mentioned as a Pan-Carpathian endemic [4, 16, 179], but its chorology and taxonomic status are unclear [16, 18, 24, 40, 42, 179, 211]. **Distr.:** Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]), Marmaros. **Ref.:** [4, 16, 18, 24, 40, 42, 179, 211].
88. - *Ornithogalum orthophyllum* Ten. subsp. *kochii* (Parl.) Zahar. **Syn.:** *O. kochii* Parl., *O. orthophyllum* subsp. *kochii* (Parl.) Maire & Weiller, *O. kodjuricum* Parsa, *O. ruthenicum* Bouché ex Kunth, *O. umbellatum* L. subsp. *kochii* (Parl.) Maire & Weiller, *O. umbellatum* L. var. *elongatum* Maire, *Hyacinthus kochii* (Parl.) E. H. L. Krause. **Status:** Erroneously mentioned as a South-Eastern Carpathian endemic [104], it is a lowland taxon, occurring also in the Balkans and Mediterranean region [30, 67, 115, 161, 202]. **Distr.:** n.a. **Ref.:** [18, 24, 30, 67, 104, 107, 115, 161, 202].
89. ?. *Pilosella guthnikiana* (Hegetschw.) Soják. **Syn.:** *Hieracium atrocrinitum* (Arv.-Touv.) Arv.-Touv., *H. aurantiacoides* Arv.-Touv., *H. berdoense* Woł., *H. blockii* Woł., *H. cruentum* Nägeli & Peter non Jord., nom. illeg., *H. cymosum* Vill. var. *multiflorum* Froel., *H. guthnikianum* Hegetschw., *H. multiflorum* Gaudin non Gray, *H. naegelii* (Nägeli & Peter) Zahn non Gremli, *H. rehmannii* (Nägeli & Peter) Prain non Woł., *H. roxolanicum* Rehmann, *H. rubellum* (W.D.J. Koch) Zahn non Vuk., *H. rubricymigerum* (Nägeli & Peter) Üksip, *H. rubrisabinum* (Nägeli) Prain, *H. sabinum* var. *rubellum* W.D.J. Koch, *Pilosella atrocrinita* (Arv.-Touv.) Soják, *P. guthnikiana* subsp. *algovica* (Nägeli & Peter) Schuhw., *P. guthnikiana* subsp. *rubrisabina* (Nägeli) H.P. Fuchs, *P. multiflora* (Froel.) F.W. Schultz & Sch. Bip., *P. roxolanica* (Rehmann) Soják, *P. roxolanica* (Rehmann) Arv.-Touv. **Status:** *Hieracium roxolanicum* is mentioned as a Western Carpathian endemic [16]. Taxon with unclear status and chorology [169]. **Distr.:** Chornohora, Gorgany, Svydovets. **Ref.:** [16, 17, 18, 24, 169].
90. ?? *Poa nemoralis* L. subsp. *carpatica* V. Jirásek. **Syn.:** *P. carpatica* (V.Jirásek) Chopik. **Status:** Critical taxon [24, 166] which is sometimes mentioned as a Western-Eastern Carpathian endemic [16, 104, 120, 185, 204]. **Distr.:** n.a. **Ref.:** [16, 18, 24, 104, 120, 166, 185, 204].
91. -. *Poa pannonica* A. Kern. subsp. *scabra* (Asch. & Graebn.) Soó. **Syn.:** *P. scabra* Kit. ex Steud., *Poa scabra* Asch., *P. scabra* Ehrh., *P. sterilis* M. Bieb. var. *scabra* (Asch.) Asch. & Graebn. **Status:** Erroneously mentioned as a Pan-Carpathian endemic by Tasenkevich [185], but it is a lowland taxon, which occurs in the western plains of Romania (at 160 m alt.) and on the Danube shore. Not endemic [24, 34]. **Distr.:** n.a. **Ref.:** [16, 18, 24, 34, 104, 120, 185].
92. ?? *Primula elatior* (L.) Hill subsp. *carpatica* (Fuss) W.W. Sm. & Forrest. **Syn.:** *P. elatior* (L.) Hill subsp. *carpatica* Nyman, *P. elatior* var. *carpathica* Nikolic. **Status:** Mentioned as a

Western-Eastern Carpathian endemic [58, 185], but it is also considered as synonym with *P. elatior* subsp. *elatior* [214]. **Distr.:** n.a. **Ref.:** [18, 24, 58, 185, 214].

93. ?? *Primula elatior* (L.) Hill subsp. *leucophylla* (Pax) Hesl.-Harr. ex W.W. Sm. & H.R. Fletcher. **Syn.:** *P. leucophylla* Pax. **Status:** Mentioned as an Eastern Carpathian endemic [104, 116, 120]. The species does not occur North of Rarău Mts. and Obcinele Bucovinene in Romania (Șuteu *et al.*, unpublished data). Critical taxon which is not listed in revision by Grytsak [58] **Distr.:** n.a. **Ref.:** [18, 24, 58, 104, 116, 120].
94. ?? *Primula elatior* (L.) Hill subsp. *poloninensis* (Domin) Dostál. **Syn.:** *P. poloninensis* Fed., *P. poloniensis* (Domin.) Fed. **Status:** Mentioned as a South-Eastern Carpathian endemic [16, 24, 58, 104, 120, 185], we also consider this to be synonym of *P. elatior* subsp. *elatior* [214]. **Distr.:** Chornohora, Svydovets. **Ref.:** [4, 16, 18, 24, 58, 104, 120, 185, 214].
95. ?? *Ranunculus auricomus* L. subsp. *binatus* (Kit. ex Rchb.) Jasiewicz. **Syn.:** *R. binatus* Kit. ex Rchb. **Status:** It is considered by Tasenkevich [185] as a South-Eastern Carpathian endemic, but has an unclear taxonomy and distribution, requiring further investigations. [24, 209]. **Distr.:** n.a. **Ref.:** [18, 24, 185, 209].
96. ? *Ranunculus malinovskii* Elenevsky & Derv.-Sok. **Syn.:** n.a. **Status:** Mentioned as an Eastern Carpathian endemic [104, 120, 179, 185]. It has an unclear taxonomic status. Most probably *R. malinovskii* is a synonym of *R. acris* L. **Distr.:** Chornohora. **Ref.:** [18, 24, 104, 120, 179, 185].
97. - *Ranunculus serbicus* Vis. **Syn.:** *R. calabrus* (Ten.) Grande, *R. kladnii* Schur, *R. orphanidis* Boiss. & Heldr. **Status:** *R. kladnii* is mentioned as an Eastern Carpathian endemic [118, 120, 218], it is a Carpato-Balkan taxon with unclear taxonomic status, sometimes placed in synonymy of *R. malinovskii* [24, 209]. **Distr.:** Chornohora, Svydovets. **Ref.:** [4, 18, 24, 118, 120, 209, 218].
98. - *Ribes carpaticum* Schult. **Syn.:** *R. petraeum* Wulf. **Status:** Mentioned as a Pan-Carpathian endemic [16, 120], not valid (currently being synonymized with *R. petraeum* Wulf. [24, 165]) and thus not endemic to the Carpathians (occurs in the Alps and other European mountains). **Distr.:** Chornohora (Petros Mt., and Kvasy village), Chyvchyny, Eastern Beskyds (Pikuy Mt.), Marmaros (Bogdan village). **Ref.:** [4, 16, 17, 18, 24, 120, 165].
99. ? *Rosa heterostyla* Chrshan. **Syn.:** *R. canina* L. s.l. **Status:** Considered as an Eastern Carpathian endemic by some authors [16, 43, 104, 120, 179, 185], synonymous with *Rosa canina* L. Critical taxon, probably of hybrid origin. **Distr.:** Eastern Beskyds. **Ref.:** [16, 18, 24, 43, 104, 120, 179, 185].
100. ?? *Rumex arifolius* All. subsp. *carpathicus* (Zapał.) Pawł. **Syn.:** *R. alpestris* Jacq. subsp. *carpathicus* (Zapał.) Dostal, *R. arifolius* All. var. *carpathicus* Zapał., *R. carpathicus* (Zapał.) Zapał. **Status:** Considered as a South-Eastern Carpathian endemic [16, 104, 185], it has an unclear taxonomy and unknown distribution. **Distr.:** All regions. **Ref.:** [16, 17, 18, 24, 104, 185].
101. - *Scilla bifolia* L. subsp. *subtriphylla* (Schur) Domin. **Syn.:** *S. bifolia* L. var. *subtriphylla* (Schur) T. Simon, *S. subtriphylla* Schur. **Status:** Mentioned as a Pan-Carpathian endemic [103, 104, 185], but it is rather an ecotype with unknown chorology. It is not endemic for the Carpathians, also being known from Ukrainian lowlands [92, 100]. **Distr.:** All regions. **Ref.:** [18, 24, 92, 100, 101, 103, 104, 185].

- 102.-. *Scorzoneroides autumnalis* (L.) Moench subsp. *borealis* (Ball) Greuter. **Syn.:** *Apargia pratensis* Link non Hornem., *Hieracium taraxaci* L., *Leontodon autumnalis* L. subsp. *borealis* Ball, *L. autumnalis* L. subsp. *pratensis* (Less.) Arcang., *L. gutzlorum* V.N. Vassil., *L. pratensis* (Less.) Rchb. non Lam., *L. taraxaci* (L.) Loisel., *Oporinia pratensis* Less., *Scorzoneroides autumnalis* (L.) Moench subsp. *pratensis* (Less.) Holub. **Status:** *Leontodon gutzlorum* is mentioned as a Pan-Carpathian endemic [16, 52, 118], but this taxon has unclear taxonomic status and chorology [102]. It is also considered as a synonym of *L. autumnalis* L. [50, 54, 168]. **Distr.:** Chornohora, Svydovets, Marmaros. **Ref.:** [4, 16, 17, 18, 24, 50, 52, 54, 102, 118, 168].
- 103.-. *Sedum telephium* L. subsp. *fabaria* (W.D.J. Koch) Kirschl. **Syn.:** *S. fabaria* W.D.J. Koch. **Status:** Mentioned as a Pan-Carpathian endemic [185], but it also occurs in the Alps, Pyrenees and Jura Massif [1-3]. **Distr.:** n.a. **Ref.:** [1-3, 18, 24, 185].
- 104.?. *Senecio hercynicus* subsp. *ucranicus* (Hodálová) Greuter. **Syn.:** *Senecio ucranicus* Hodálová. **Status:** Mentioned as a South-Eastern Carpathian endemic by Tassenkevich [185]. Critical taxon with unknown distribution. **Distr.:** n.a. **Ref.:** [18, 24, 185].
- 105.-. *Soldanella hungarica* Simonk. subsp. *major* (Neilr.) Pawł. **Syn.:** *S. alpina* L. var. *major* Neilr., *S. major* (Neilr.) Vierh., *S. montana* Willd. subsp. *hungarica* Ludi. **Status:** Mentioned as a Carpathian endemic [103] or Pan-Carpathian subendemic [75, 76], but Fedorov [49] suggested it as an European-Mediterranean montane taxon. Also *S. hungarica* Simonk. subsp. *major* (Neilr.) Pawł. is cited as Western-Eastern Carpathian endemic [185]. This taxon was also considered as non-endemic but occurring in Ukrainian Carpathians [16, 34, 24]. However, recent studies based on ITS and AFLP variation showed that it is isolated from *S. marmarossiensis* Klast. and is included in South Balkans – South Carpathians – Eastern Alps group [228]. Hence this taxon is not represented in the Ukrainian Carpathians. **Distr.:** Chornohora, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif), Marmaros, Svydovets. **Ref.:** [4, 16, 18, 24, 34, 49, 75, 76, 103, 185, 228].
- 106.-. *Soldanella marmarossiensis* Klast. **Syn.:** *S. montana* Mikan subsp. *carpatica* (Vierh.) Fodor var. *mamarosiensis* (Klastersky) Fodor. **Status:** Mentioned as a Pan-Carpathian endemic [51, 118, 177] or taxon with unclear status (it is often synonymized with *S. hungarica* Simonk.) [16, 24]. However, recent studies based on ITS and AFLP variation showed that it is isolated from *S. hungarica* and *S. major* (Neilr.) Vierh. It is included together with *S. montana* Mikan, *S. carpatica* Vierh., *S. oreodoxa* Zhang and *S. rugosa* Zhang in Alps – Tatras – North-Central Carpathian group [228]. Hence, we consider this taxon occurring in flora of Ukrainian Carpathians but not endemic. **Distr.:** Svydovets, Chornohora, Chyvchyny and Gryniava, Marmaros. **Ref.:** [16, 17, 24, 51, 118, 177, 228].
- 107.-. *Swertia perennis* L. subsp. *alpestris* (Baumg. ex Fuss) Simonk. **Syn.:** *S. alpestris* Baumg., *S. alpestris* Fuss, *S. perennis* L. subsp. *alpestris* (Fuss) Domin & Podp. p.p. **Status:** Mentioned as a Pan-Carpathian endemic [16, 179], but it is not a valid taxon [85, 88]. **Distr.:** Chornohora, Chyvchyny, Marmaros, Svydovets. Also is mentioned for Chornohora, and Svydovets by Antosiak [4]. **Ref.:** [4, 16, 17, 18, 24, 85, 88, 179].
- 108.?. *Thalictrum transsilvanicum* Schur. **Syn.:** *Th. minus* L. subsp. *olympicum* (Boiss. & Heldr.) Strid, *Th. olympicum* Boiss. & Heldr., *Th. saxatile* Schleich. ex DC., *Tripterium transsilvanicum* Schur. **Status:** Mentioned as an Eastern Carpathian endemic [16, 52, 120,

- 179]. Taxon with unclear taxonomic status. Occurring also in the Alps [1-3]. **Distr.:** Chyvchyny. **Ref.:** [1-3, 16, 18, 24, 52, 120, 179].
- 109.-. *Thlaspi kovatsii* Heuff. **Syn.:** *Noccaea kovatsii* (Heuff.) F.K. Mey. **Status:** Mentioned as a South-Eastern Carpathian endemic [17, 95, 120, 177, 179], but it occurs also in the Balkans (Bulgaria). **Distr.:** Chyvchyny (Suligul Mt. only). **Ref.:** [17, 18, 24, 95, 120, 177, 179].
- 110.-. *Thymus alpestris* (Čelak.) Tausch ex A. Kern. **Syn.:** *Th. chamaedrys* Fr. var. *alpestris* (Čelak.) Čelak., *Th. serpyllum* L. subsp. *alpestris* (Čelak.) Lyka, nom. illeg., *Th. serpyllum* L. f. *alpestris* Čelak., *Th. serpyllum* L. f. *formosus* Lyka, *Th. serpyllum* L. f. *orbicularis* Lyka, *Th. serpyllum* L. f. *serta-saxorum* Lyka, *Th. subalpestris* Klokov. **Status:** Erroneously mentioned as an Eastern Carpathian endemic [103], but it is a Central European mountain taxon [10, 16, 24, 34]. **Distr.:** Chornohora, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif), Marmaros, Svydovets. **Ref.:** [4, 10, 16, 18, 24, 34, 103, 140].
- 111.-. *Thymus pulegioides* L. subsp. *montanus* (Benth.) Ronniger. **Syn.:** *Th. amplificatus* (Schur) Dalla Torre & Sarnth., *Th. chamaedrys* Fr. subsp. *montanus* (Benth.) Nyman, *Th. clandestinus* Schur, *Th. danubialis* (Simonk.) Simonk., *Th. enervius* Klokov, *Th. istriacus* Heinr. Braun, *Th. montanus* Waldst. & Kit., nom. illeg., *Th. ovatus* Mill. subvar. *parviflorus* Formánek, *Th. parviflorus* Opiz, nom. illeg., *Th. pulegioides* L. var. *barbulatus* (Borbás ex Ronniger) Cap, *Th. pulegioides* L. subvar. *barbulatus* Borbás ex Ronniger, *Th. pulegioides* L. var. *clandestinus* Ronniger, *Th. pulegioides* L. var. *danubialis* (Simonk.) Ronniger, *Th. pulegioides* L. var. *imberbis* (Lyka) Ronniger, *Th. pulegioides* L. var. *istriacus* (Heinr. Braun) Ronniger, *Th. pulegioides* L. var. *parviflorus* (Formánek) Ronniger, *Th. pulegioides* L. var. *prolongatus* Ronniger, *Th. pulegioides* L. var. *rupicola* Ronniger, *Th. pulegioides* L. var. *succinifer* Ronniger, *Th. serpyllum* L. f. *danubialis* (Simonk.) Lyka, *Th. serpyllum* L. f. *eunervius* Lyka, *Th. serpyllum* L. f. *flos-cuculi* Lyka, *Th. serpyllum* L. f. *idae* Lyka, *Th. serpyllum* L. f. *imberbis* Lyka, *Th. serpyllum* L. f. *istriacus* (Heinr. Braun) Lyka, *Th. serpyllum* L. f. *margittaianus* Lyka, *Th. serpyllum* L. subsp. *montanus* (Benth.) Arcang., *Th. serpyllum* L. var. *montanus* Benth., *Th. serpyllum* subsp. *parviflorus* (Formánek) Lyka, nom. illeg. **Status:** Mentioned as an Eastern Carpathian endemic [80, 120], but it was clarified by Nachychko [140] that this subspecies is absent from the Ukrainian Carpathians. **Distr.:** In Ukrainian Carpathians it is absent [140], erroneously mentioned for Chornohora [4]. **Ref.:** [4, 18, 24, 80, 120, 140].
- 112.-. *Tozzia alpina* L. subsp. *carpathica* (Woł.) Dostal. **Syn.:** *T. carpathica* Woł. **Status:** Mentioned as a Pan-Carpathian endemic [16, 179], it is not endemic to the Carpathians, occurring also in the Balkans (Bulgaria) [24, 175]. **Distr.:** Chornohora (Pip Ivan, Bogdan [17]), Chyvchyny, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif [4]). **Ref.:** [4, 16, 17, 24, 175, 179].
- 113.?? *Tragopogon transcarpaticus* Klokov. **Syn.:** *T. orientalis* L. p.p. **Status:** Mentioned as an Eastern Carpathian endemic [16, 17, 82, 118], it occurs also in the lowlands [24], while its taxonomic status is unclear [24, 102]. **Distr.:** All regions. **Ref.:** [4, 16, 17, 18, 24, 82, 102, 118].
- 114.?? *Trifolium pratense* L. subsp. *kotulae* (Pawł.) Soják. **Syn.:** *T. pratense* subsp. *kotulae* (Pawł.) Hadač nom. inval., *T. pratense* var. *kotulae* Pawł., *T. frigidum* Schur, *T. pratense* var. *frigidum* (Schur) Popov non Gaudin, *T. pratense* f. *frigidum* (Schur) Ascherson & Graebn., *T. pratense* var. *alpinum* Kotula, *T. carpaticum* Porcius, *T. transsilvanicum* Schur.

- Status:** Mentioned as a Pan-Carpathian endemic [24, 76, 120, 185], it has an unclear taxonomic status. **Distr.:** n.a. **Ref.:** [18, 24, 76, 120, 185].
- 115.?. *Trisetum flavescens* (L.) Beauv. subsp. *taticum* Chrtek. **Syn.:** *T. flavescens* subsp. *purpurascens* (DC.) Arcang. **Status:** Mentioned as a Pan-Carpathian (or Eastern and Western Carpathian) endemic [24, 76, 185], it is synonymous in *Flora Europaea* [202] with *T. flavescens* subsp. *purpurascens* (DC.) Arcang., which occurs in the Alps as well [1-3]. **Distr.:** Chornohora (Petros Mt. only). **Ref.:** [1-3, 17, 18, 24, 76, 185, 202].
- 116.?. *Trollius europaeus* L. subsp. *transsilvanicus* (Schur) Javorka. **Syn.:** *T. transsilvanicus* Schur. **Status:** Mentioned as a Pan-Carpathian endemic [51, 120, 177, 179]. Taxon with unclear taxonomy and unknown distribution [24, 202, 210]. **Distr.:** Chornohora, Polonynas (Ugolsko-Shyrokoluzhanskiy Massif) [4], Marmaros [4], Svydovets [4]. **Ref.:** [4, 18, 24, 51, 120, 177, 179, 202, 210].
- 117.?. *Valeriana transsilvanica* Schur. **Syn.:** n.a. **Status:** Mentioned as a South-Eastern Carpathian endemic [51, 52, 97, 118, 120]. Taxon with unclear taxonomic status and chorology. **Distr.:** n.a. **Ref.:** [18, 24, 51, 52, 97, 118, 120].
- 118.?. *Valeriana tripteris* L. subsp. *austriaca* E. Walther. **Syn.:** *V. bijuga* Simonk. [76], *V. tripteris* var. *bijuga* (Simonk.) Simonk. [76], *V. intermedia* Hoppe [76]. **Status:** Mentioned as a Carpathian-Alpine taxon [76], subendemic or Eastern-Western Carpathian endemic [34, 120]. Taxon with unclear taxonomic status and chorology [24]. **Distr.:** It is mentioned from the Ukrainian Carpathians by Malynovskiy [120] without any specimen or other supporting evidence. **Ref.:** [18, 24, 34, 76, 120].
- 119.?. *Viola jooi* Janka. **Syn.:** *V. sciaphila* Schur, *V. ambigua* Salzer, *V. prionantha* Janka, *V. transsilvanica* Schur, *V. macroceras* Bunge subsp. *jooi* Kupff. **Status:** Valid South-Eastern Carpathian endemic with unclear distribution in Ukraine [79, 136, 144, 215]. **Distr.:** In the mountain regions it is absent; however, it is mentioned for the lowlands in Ivano-Frankivsk region (Tlumach and Gorodenky districts) [24, 167]. **Ref.:** [17, 18, 24, 32, 79, 136, 144, 167, 215].

Conclusions

We have critically reviewed the latest and most important data on taxonomy and chorology of the Carpathian endemics that occur in Ukraine. Based on published data, herbarium specimens and our own field observations, we have listed 189 taxa that were given at one point in time a status of Carpathian endemic. This list has been divided into two parts – the first part comprising valid (by the criteria we have used) endemics or subendemics occurring in the Ukrainian Carpathians (70 taxa), and a second part listing other critical or/and non-endemic taxa often mentioned as endemic to the Ukrainian Carpathians (119 taxa).

Validated endemics include 59 taxa that retain a high level of confidence (++) and are accepted as endemics or subendemics with a well-known distribution in the Ukrainian Carpathians. This list is completed with 11 taxa that have been included in the second category of valid endemics (+), with a stabile taxonomic position, but with a lacuna of known distribution in the Ukrainian Carpathians, requiring further investigation. Additionally, 41 taxa have been marked as doubtful (?) due to their taxonomic and/or chorological uncertain status. Furthermore, 28 taxa have been considered as highly doubtful (??), most probably non-endemic and/or with very unclear taxonomic and/or chorological status, while 50 taxa have been designated as (most

probably, based on our current knowledge) absent from the flora of this region and/or non-endemic due to latest taxonomic revisions. We hope that this critical evaluation of the Carpathian endemics occurring in Ukraine will constitute the basis for further investigations and will shed light on the currently known distribution of endemics in the mountain region studied.

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O LISTĂ CRITICĂ A PLANTELOR ENDEMICE DIN CARPAȚII UCRAINIENI

(Rezumat)

În această lucrare sunt prezentați 189 de taxoni din Carpații Ucrainieni au fost menționați cel mai frecvent în literatura de specialitate ca fiind endemite carpatice.

Lista include aspecte de validitate taxonomică și corologică, sinonime, distribuția actuală în Carpații Ucrainei, note și cele mai importante referințe pentru toți taxonii analizați.

Din această listă, 70 de taxoni au fost validați prin criteriile adoptate de noi și considerați ca fiind endemite sau sub-endemite Carpatice distribuite și în Carpații Ucrainieni.

Adițional, 69 de taxoni au fost considerați critici și nu au putut fi confirmați prin prisma datelor cunoscute până în prezent, în timp ce un număr de 50 de taxoni au fost considerați (cu o probabilitate mare) absenți din flora regiunii studiate și / sau ne-endemici.

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