

## Rare and protected plant species of the Uzhansky National Nature Park (Transcarpathia, Ukraine)

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Abstract: Special features of the flora of the Uzhansky National Nature Park are elucidated. Geographical, zoological and chorological analyses of the flora are given. Main important groups of plant species (rare, endemics, relicts) are mentioned too.

Keywords: rare plants, distribution, biodiversity conservation, Uzhansky National Nature Park, Ukraine.

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### Introduction

Uzhansky National Nature Park (UNNP) was organized in 1999 on the base of the "Stuzhytsia" Regional Landscape Park (14 665 ha) in the way of changing of its nature conservation status and joining to it the left-bank of the upper part of the river Uzh basin. Total area of the UNNP is 39 159 ha.

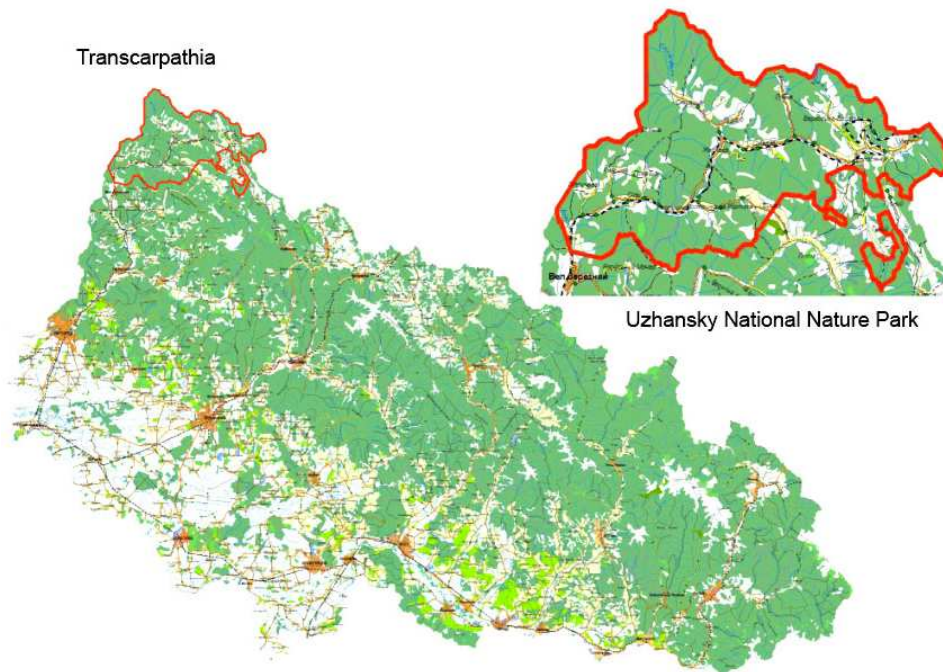
UNNP as a constituent part of the UNESCO International Biosphere Reserve "East Carpathians" (the only trilateral example in the world) is of great scientific significance for investigations aimed to conservation of biological and landscape diversity and enhancement of sustainable development of the whole Carpathian region (Figure).

Plant kingdom of the UNNP is studied quite well. The initial records on the flora and vegetation of the territory, included to the UNNP today we can find in

the papers of Hungarian and Czech scientists from the first part of the XX century (FEKETE & BLATTNY, 1914; HRÁBAR, 1940; UBRIZSY, 1942; ZLATNIK et al., 1938; etc.). These data were essentially updated by the numerous botanists in the second part of the XX century (Fodor, 1956, 1974; STOYKO, 1980; KRICSFALUSY, SABADOSH & MIHALY, 1993; HADAČ et al., 1995; HADAČ, STOYKO & BURAL, 1995; USTIMENKO & POPOVICH, 1995 a,b; HADAČ, STOYKO & TASENKEVICH, 1996; KRICSFALUSY et al., 2001). These authors also compiled the first lists of plant species and plant communities that occur on the territory of the UNNP. The characteristic of main features of nature of the UNNP was published during the last decades (STOYKO et al., 1991; DENISIUK & STOYKO, 1993; MALTSEV et al., 1999).

Recently a monograph study on evaluation of natural, cultural and historical legacy of the UNNP has been published by KRICSFALUSY with co-authors (2001). The physical-geographic description of the UNNP (geographical situation, climate, geological and geomorphologic structures, soils, river network), analyses of the flora, vegetation and fauna diversity, functional zoning of the territory, characteristics of nature and culture heritages are given in this book.

Review of researches carried out on the territory of the UNNP is given in details in the papers of TASENKEVICH (1994, 1998), IVANEHA, LESIO & SEHEDA (2002) and IVANEHA & USTYMENKO (2003).



**Fig. 1. Map of the Uzhansky National Nature Park**

## Materials and methods

The list of rare plants was compiled by generalization of the literary data (FEKETE & BLATTNY, 1914; FODOR, 1956, 1974; HADAČ et al., 1995; HADAČ, STOYKO & BURAL, 1995; HADAČ, STOYKO & TASENKEVICH, 1996; HRÁBAR, 1940; KRICSFALUSY et al., 2001; KRICSFALUSY, SABADOSH & MIHALY, 1993; STOYKO, 1980; TASENKEVICH, 1994, 1998; UBRIZSY, 1942; USTIMENKO & POPOVICH, 1995 a,b; ZLATNIK et al., 1938;), on the basis of own observations, as well as processing of the herbarium collections of Ukraine and abroad.

The nomenclature of taxa was adjusted according to MOSYAKIN & FEDORONCHUK (1999).

## Results and discussions

The vegetation cover of the UNNP has typical for the East Beskydy features. The relatively low mountains, temperate warm and humid climate affect peculiarities of vertical zones distribution. One can identify three vegetation belts: foothills (up to 500 m above sea level), lower mountain zone (within 500-1100 m) and subalpine zone (over 1100-1150 m). An upper mountain zone, generally typical for the East Carpathians and mainly formed of coniferous forests, is not presented here.

In the lower mountain zone the following natural forest stands are widely spread: beech, silver fir-beech, and beech-silver fir ones. Among beech forests one can find very valuable from the forest-economic point of view sycamore and ash-tree ones. The unique for the Europe virgin forests have been preserved on the territory of the UNNP on the area over 3000 hectares. These ecosystems are included in a core area and are protected as an exceptional phenomenon of nature.

In subalpine zone the remains of crummholz of a Green alder (*Alnus viridis* (Chaix) DC.) have been preserved. It does not exist anymore farther in the West Carpathians. The biggest fragments of a natural timberline formed by crummholz of a beech (*Fagus sylvatica* L.) is located on the main mountain ridge, where it passes at heights 1150-1250 m above sea level.

Among non-forest biotopes a special attention is paid to mountain meadows above the timberline, i.e. poloniny, as a specific natural phenomenon for the East Carpathians. Expansion of the area of these meadows is connected with man's economic activity in the past. These localities are centres of many endemic species of flora and fauna, and they need the special regimes of conservation and management.

Flora of the UNNP is characterized by the rich species diversity owing to propitious climatic and varied geological and geomorphologic conditions. In spite on the long history of floristic studies on this territory the inventory of the flora was begun only last decade.

The first annotated list of the vascular plants of the UNNP (territory of the former "Stuzhytsia" Regional Landscape Park) was compiled by KRICSFALUSY, SABADOSH & MIHALY (1993). It includes 969 species of natural and segetal flora.

STOYKO & TASENKEVICH (1997) have been compiled the list of vascular plants which included 550 species of natural flora on 1, January, 1996.

According to the last records (KRICSFALUSY et al., 2001) 573 plant species are found out on the territory of the UNNP. 80 of them belong to rare species. Systematic, geographical, ecologic and coenotic as well as zoological analyses of the flora was carried out on the base of these data (KRICSFALUSY, BUDNIKOV & LESIO, 2005).

Next study carried out by authors allowed greatly to extend the list of rare species as well as to analyze the phenomenon of the flora rarity. Determining character of rarity and degree of threat to existence of populations of either species we took into account the number and area of localities, their natural state as well as zoological status.

So, according the last our data 112 rare plant species grow on the territory of the UNNP on 2007 (Table). One of them (*Syringa josikaea* Jacq.) is included into International Red List (IUCN RED LIST, 1998), one (*Silene nutans* L. subsp. *dubia* (Herbich) Zapal.) - European (COUNCIL OF EUROPE ..., 1991), 40 - National (SHELYAG-SOSONKO YU., 1996), and 81 (together with species from mentioned above groups) - Regional (KRICSFALUSY, BUDNIKOV & MIHALY, 1999). 30 plant species need local protection on the territory of the UNNP. Besides, two species (*Campanula abietina* Griseb. & Schenk., *Syringa josikaea*) are under protection of Bern Convention (BERN..., 1979) and 10 species - Directive of European Union on biotopes protection called "Natura 2000" (1999).

Some plants (total 19 species) with very limited distribution in the Ukrainian Carpathians and known only from a few localities are noted in the flora of the UNNP. Below we give the brief characteristics most interesting of them.

*Carex rhizina* Blytt ex Lindbl. - found by IGOSHINA in 1952 in the vicinity of Kostryno village in the Velyky Berezny district (Igoshina, 1955). Till now it is the only information regarding the occurrence of this species in the Ukrainian Carpathians.

*Chamaespartium sagittale* (L.) P. Gibbs - found by TERRAY in 2003 on the Stinka Mt. (verbal information).

*Dactylis glomerata* L. subsp. *slovenica* (Domin) Domin - elicited by HADAČ et al. (1995) on the Stinka Mt. It is the only known site of this species in the Ukrainian Carpathians. Recently it was considered as a West-East Carpathian endemic, but the next study did not confirm the endemic status of this species (MARHOLD K. & HINDAK F., 1998).

*Tofieldia calyculata* (L.) Wahl. - recently has found by TASENKEVICH (2002) in the vicinity of Verkhovyna Bystra village in the Velyky Berezny district on a marshy meadow located close by the trail to Rozsypanets Mt. This species is rare for the Ukrainian Carpathians and it is noted for Transcarpathia for the first time.

*Waldsteinia geoides* Willd. - found by KRICSFALUSY in 1985 in the vicinity of Kostryno village in the Velyky Berezny district (KRICSFALUSY, BUDNIKOV & MIHALY, 1999). This species did not mention for Transcarpathia in the floristic works (BARBARYCH A. & AL., 1965, DOBROCHAYEVA D. & AL., 1987; FODOR, 1974; etc.). However, it has to be noted that add herbarium data.

**Tab. 1. Rare and protected vascular plant species of the Uzhansky National Nature Park**

No	Taxa	Red Data Book of Ukraine, 1996	European Red List, 1991	IUCN Red List, 1998	Bern Convention, 1979	Natura 2000	Red List of Transcarpathia, 1999	Local protection
1	<i>Aconitum anthora</i> L. subsp. <i>jacquini</i> (Reichenb.) Domin	+					+	
2	<i>Aconitum variegatum</i> L. subsp. <i>paniculatum</i> (Arkangeli) Greuter						+	
3	<i>Allium ursinum</i> L.	+					+	
4	<i>Allium victorialis</i> L.							+
5	<i>Alnus viridis</i> (Chaix) DC.							+
6	<i>Arnica montana</i> L.	+				+	+	
7	<i>Arum alpinum</i> Schott & Kotschy						+	
8	<i>Astrantia major</i> L.	+				+	+	
9	<i>Atropa bella-donna</i> L.	+					+	
10	<i>Blechnum spicant</i> (L.) Roth						+	
11	<i>Bupleurum longifolium</i> L. subsp. <i>vapincence</i> (Vill.) Todor						+	
12	<i>Campanula abietina</i> Griseb. & Schenk.				+			
13	<i>Campanula rotundifolia</i> L. subsp. <i>polymorpha</i> (Witas.) Tacik						+	
14	<i>Campanula serrata</i> (Kit.ex Schult.) Hendrych						+	
15	<i>Cardaminopsis halleri</i> (L.) Hayek subsp. <i>ovirensis</i> (Wulf) Hegi & E. Smid						+	
16	<i>Carex rhizina</i> Blytt ex Lindbl.						+	
17	<i>Cephalanthera longifolia</i> (L.) Fritsch	+				+	+	
18	<i>Cephalanthera rubra</i> (L.) Rich.	+					+	
19	<i>Chamaespartium sagittale</i> (L.) P. Gibbs	+					+	
20	<i>Cicerbita alpina</i> (L.) Wallr.							+
21	<i>Cirsium waldsteinii</i> Rouy							+
22	<i>Clematis alpina</i> (L.) Miller							+
23	<i>Coeloglossum viride</i> (L.) Hartm.	+					+	
24	<i>Colchicum autumnale</i> L.	+				+	+	
25	<i>Conioselinum tataricum</i> Hoffm.						+	
26	<i>Cortusa matthioli</i> L.						+	
27	<i>Cotoneaster integerrimus</i> Medicus						+	
28	<i>Crocus heuffelianus</i> Herb.	+					+	
29	<i>Dactylis glomerata</i> L. subsp. <i>slovenica</i> Dom.						+	
30	<i>Dactylorhiza fuchsii</i> (Druce) Soó subsp. <i>fuchsii</i>	+					+	
31	<i>Dactylorhiza incarnata</i> (L.) Soó	+					+	

Tab. 1. – cont.

№	Taxa	Red Data Book of Ukraine, 1996	European Red List, 1991	IUCN Red List, 1998	Bern Convention, 1979	Natura 2000	Red List of Transcarpathia, 1999	Local protection
32	<i>Dactylorhiza maculata</i> (L.) Soó subsp. <i>maculata</i>	+					+	
33	<i>Dactylorhiza majalis</i> (Reichenb.) P.F. Hunt. & Summerhayes	+					+	
34	<i>Dactylorhiza sambucina</i> (L.) Soó	+					+	
35	<i>Daphne mesereum</i> L.						+	
36	<i>Dianthus carthusianorum</i> L. subsp. <i>saxigenus</i> (Schur) Jáv. & Soó							+
37	<i>Empetrum nigrum</i> subsp. <i>hermaphroditum</i> (Hagerup) Böher							+
38	<i>Epilobium alpestre</i> (Jacq.) Krockner							+
39	<i>Epipactis helleborine</i> (L.) Crantz	+				+	+	
40	<i>Epipactis palustris</i> (L.) Crantz	+					+	
41	<i>Epipactis purpurata</i> Smith	+					+	
42	<i>Equisetum hyemale</i> L.						+	
43	<i>Equisetum telmateja</i> Ehrh.						+	
44	<i>Eriophorum gracile</i> Koch						+	
45	<i>Euphorbia carpatica</i> Wołoszcz.						+	
46	<i>Festuca drymeja</i> Mert. & Koch						+	
47	<i>Festuca rupicola</i> Heuff. subsp. <i>saxatilis</i> (Schur) Rauschert						+	
48	<i>Galanthus nivalis</i> L.	+					+	
49	<i>Gentiana cruciata</i> L.							+
50	<i>Gladiolus imbricatus</i> L.						+	
51	<i>Gymnadenia conopsea</i> (L.) R. Br. subsp. <i>conopsea</i>	+					+	
52	<i>Helleborus purpurascens</i> Waldst. & Kit.						+	
53	<i>Hepatica nobilis</i> Mill.							+
54	<i>Huperzia selago</i> (L.) Bernh. ex Schrank & Mart.	+					+	
55	<i>Hypochoeris uniflora</i> Vill.							+
56	<i>Jovibarba globifera</i> (L.) J. Parn. subsp. <i>pressiana</i> (Domin) Holub						+	
57	<i>Lathyrus laevigatus</i> (Waldst. & Kit.) Gren.							+
58	<i>Leucanthemum waldsteinii</i> (Sch. Bip.) Pouzar						+	
59	<i>Leucojum vernum</i> L.	+					+	
60	<i>Lilium martagon</i> L.	+					+	
61	<i>Listera cordata</i> (L.) R. Br.	+					+	
62	<i>Listera ovata</i> (L.) R. Br.	+					+	

Tab. 1. – cont.

№	Taxa	Red Data Book of Ukraine, 1996	European Red List, 1991	IUCN Red List, 1998	Bern Convention, 1979	Natura 2000	Red List of Transcarpathia, 1999	Local protection
63	<i>Lunaria rediviva</i> L.	+				+	+	
64	<i>Lycopodium annotinum</i> L.	+					+	
65	<i>Matteuccia struthiopteris</i> (L.) Tod.						+	
66	<i>Melampyrum herbichii</i> Wołoszczak							+
67	<i>Melampyrum saxosum</i> Baumg.						+	
68	<i>Myricaria germanica</i> (L.) Desv.						+	
69	<i>Neottia nidus-avis</i> (L.) Rich.	+				+	+	
70	<i>Orchis coriophora</i> L.	+					+	
71	<i>Orchis mascula</i> (L.) L. subsp. <i>signifera</i> (Vest) Soó	+					+	
72	<i>Orchis militaris</i> L.	+				+	+	
73	<i>Pedicularis hacquetii</i> Graf							+
74	<i>Phyllitis scolopendrium</i> (L.) Newm.						+	
75	<i>Phyteuma vagneri</i> A. Kerner						+	
76	<i>Phyteuma spicatum</i> L.							+
77	<i>Platanthera bifolia</i> (L.) Rich.	+				+	+	
78	<i>Pleurospermum austriacum</i> (L.) Hoffm.							+
79	<i>Poa nemoralis</i> L. subsp. <i>carpatica</i> Jir.						+	
80	<i>Poa remota</i> Forselles						+	
81	<i>Potentilla aurea</i> L.							+
82	<i>Pseudorchis albida</i> (L.) A. & D. Löve	+				+	+	
83	<i>Ranunculus carpaticus</i> Herbich						+	
84	<i>Ranunculus oreophilus</i> Bieb.						+	
85	<i>Ranunculus platanifolius</i> L.							+
86	<i>Ribes petraeum</i> Wulfen in Jacq.							+
87	<i>Rumex alpestris</i> Jacq. subsp. <i>carpaticus</i> (Zapał.) Dostál						+	
88	<i>Rumex alpinus</i> L.							+
89	<i>Saxifraga paniculata</i> Mill.							+
90	<i>Scilla bifolia</i> L. subsp. <i>subtriphyllo</i> (Schur) Domin						+	
91	<i>Scopolia carniolica</i> Jacq.	+					+	
92	<i>Scorzonera purpurea</i> L. subsp. <i>rosea</i>							+
93	<i>Sedum annuum</i> L.						+	
94	<i>Silene nutans</i> L. subsp. <i>dubia</i> (Herbich) Zapał.		+				+	
95	<i>Soldanella montana</i> Willd.							+
96	<i>Solidago alpestris</i> Waldst. & Kit.							+
97	<i>Sorbus aucuparia</i> L. subsp. <i>glabrata</i> (Wimmer et Grab.) Cajander							+

Tab. 1. – cont.

No	Taxa	Red Data Book of Ukraine, 1996	European Red List, 1991	IUCN Red List, 1998	Bern Convention, 1979	Natura 2000	Red List of Transcarpathia, 1999	Local protection
98	<i>Syringa josikaea</i> Jacq.	+		+	+		+	
99	<i>Thesium alpinum</i> L.							+
100	<i>Thymus alpestris</i> Tausch ex Kerner						+	
101	<i>Tofieldia calyculata</i> (L.) Wahlenb.							+
102	<i>Tozzia alpina</i> L. subsp. <i>carpatica</i> (Włoszcz.) Pawł.						+	
103	<i>Traunsteinera globosa</i> (L.) Reichenb.	+					+	
104	<i>Valeriana dioica</i> L.	+					+	
105	<i>Valeriana dioica</i> L. subsp. <i>simplicifolia</i> (Reichenb.) Nyman						+	
106	<i>Veratrum album</i> L. subsp. <i>album</i>							+
107	<i>Veronica spicata</i> L.							+
108	<i>Vincetoxicum hirsutinaria</i> Medicus							+
109	<i>Viola dacica</i> Borb.						+	
110	<i>Waldsteinia geoides</i> Willd.						+	
111	<i>Woodsia alpina</i> (Bolt.) S.F. Gray	+					+	
112	<i>Woodsia ilvensis</i> (L.) R. Br.	+					+	

Among the special features of the flora of the UNNP is presence of 15 endemic plants. Three of them belong to the group of East Carpathian endemics: *Centaurea phrygia* L. subsp. *carpatica* (Porc.) Dostál, *Euphorbia carpatica* Włoszcz. and *Rumex alpestris* Jacq. subsp. *carpaticus* Zapał. The west boundary line of their distribution is on this territory and they do not occur in the West Carpathians. 9 species are from the group of South-East Carpathian endemics: *Aconitum anthora* L. subsp. *jacquinii* (Reichenb.) Domin, *Dianthus carthusianorum* L. subsp. *saxigenus* (Schur) Jáv. & Soó, *Hieracium krasanii* Włoszcz., *Melampyrum saxosum* Baumg., *Phyteuma tetramerum* Schur, *Ph. vagneri* A. Kerner, *Ranunculus carpaticus* Herbich, *Silene nutans* L. subsp. *dubia* (Herbich) Zapał, *Syringa josikaea*. Three species with widest distribution belong to the group of Pan-Carpathian endemics. They are *Campanula serrata* (Schult.) Hendrych, *Centaurea phrygia* subsp. *melanocalathia* Borb. and *Jovibarba globifera* (L.) J. Parn. subsp. *preissiana* (Domin) Holub.

Plant species, which have undoubted the East Carpathian distribution, but occur in other regions of Europe as well, are very interesting from phytogeographical point of view. They are subendemic plants. The only *Campanula rotundifolia* L. subsp. *polymorpha* (Witas.) Tacik and *Symphytum cordatum* Waldst. & Kit. ex Willd. belong to the group of subendemics.

Plant species growing on the limit of their areas and do not spread farther to West are known only from some localities within the East Carpathians on



adjacent territories of Poland or Slovakia. Most of them belong to rare species, though some of them are quite usual for the Ukrainian Carpathians and with no special protected status. However, taking into account location of their populations on the territory of the UNNP on the limit of areas, they need local protection. They are: *Alnus viridis*, *Campanula abietina* Griseb. & Schenk, *Cirsium waldsteinii* Rouy, *Dianthus compactus* Kit., *Lathyrus laevigatus* (Waldst. & Kit.) Gren., *Melampyrum herbichii* Wołoszcz., *Telekia speciosa* (Schreb.) Baumg. etc.

There is the series of Tertiary relics (16 species) in the flora of the UNNP, which survived here since ancient geological ages. Some of them (*Daphne mezereum* L., *Myricaria germanica* (L.) Desv. as well as *Ranunculus oreophilus* Bieb. need local protection.

Species of nemoral element are the majority in the flora of the UNNP that is quite naturally because forest communities are the dominant type of vegetation cover. However, alpine plants (9 species), which remained here since glacial period, in particular on limestone ridges of some mountain peaks of the Poloninsky range and East Beskydy, are the most interesting species.

Among alpine plants with no Red-Data-Book status but needed local protection the following species should be singled out: *Achyrophorus uniflorus* (Vill.) Bluff & Fingerh., *Empetrum nigrum* L. subsp. *hermaphroditum* (Hagerup) Böcher, *Potentilla aurea* L. and *Thesium alpinum* L.

Group of subalpine species is numerous too. It includes about 30 plants which are usually distributed on the mountain meadows and rocky biotopes at altitude more than 1000 m above sea level, but sometime they penetrate into the forest zone by streams. The most interesting of them which need local protection are: *Adenostyles alliariae* (Gouan) A. Kerner, *Calamagrostis villosa* (Chaix) J. F. Gmel., *Cicerbita alpina* (L.) Wallr., *Epilobium alpestre* (Jacq.) Krock., *Melampyrum saxosum* Baumg., *Ranunculus platanifolius* L., *Ribes petraeum* Wulf., *Rumex alpinus* L., *Solidago virgaurea* L. subsp. *alpestris* Waldst. & Kit. ex Willd., *Sorbus aucuparia* L. subsp. *glabrata* (Wimm. & Grab.) Hedl., *Veratrum album* L. subsp. *album* etc.

Analysis of distribution of the rare species on the territory of the UNNP showed that their greatest number grows on the Stinka (44 species) and Kinchyk Bukivsky (39) mountain peaks, the mean number – Opolonyk (22), Kreminets (21), Buben (18), Yavirnyk (17), Rozsypanets (17) and the lowest number – Cheremkha (12), Holanya (12) and Prykny (11).

In generally provision the rare species conservation can be considered satisfactory because most of them grow within the strictly protected zone of the UNNP. The urgent task is to organize the monitoring of rare species, in particular Red-Data-Book plants. The Yavirnyk Mts. as well as a series of other interesting botanical objects, situated on the left-bank of the river Uzh on the territory of the UNNP should be joined protected zone.

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