

Revised flora of Velká Kotlina cirque, the Sudeten Mountains, II

Revize floruly Velké Kotliny v Hrubém Jeseníku, II

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From 616 species, subspecies and hybrids of vascular plants reported as components of the flora of the Velká Kotlina cirque, only 54 % have been actually found in the period 1971 to 1978. Out of the 283 missing taxa, only 44 % are veritable records of species which might have died out or escaped the authors' revision. Altogether 157 taxa belong to doubtful records which infiltrated botanical literature by various mistakes. Both the veritable and doubtful records are listed in a table, and possible sources of confusion discussed. A concluding statistics comprising the 23 newly discovered species shows a grand total of 639 taxa of vascular plants which entered the botanical history of Velká Kotlina.

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INTRODUCTION

In the preceding paper (JENÍK, BUREŠ et BUREŠOVÁ 1983) we have exposed the difficulties accompanying any effort to answer the seemingly simple question about the number of vascular plant species present in Velká Kotlina, a locality of historical interest to Silesian and Moravian botanists. In an annotated table (op.c.: Tab. 2) we have listed all species actually present in the cirque, and assembled relevant details regarding distribution, abundance, population size and phytosociological affinity.

In our card-file, however, there remained a surprisingly high number of entries referring to reported species which were never encountered during the 1971 to 1978 field surveys. Further studies of literature and examination of herbarium sheets led us to divide the missing species into a C-category, i.e. plants which were possibly recorded, but became extinct (or stayed overlooked by the present authors); and a D-category of doubtful taxa associated with Velká Kotlina only by mistake. Both categories are listed and annotated in Tab. 1.

In addition to the discussion of missing species, this paper also contains a numerical account of all categories of vascular plant taxa which were, at one time or another, associated with the Velká Kotlina cirque. We have also tried to sketch the general significance of this species-rich locality, mainly in biogeographical and taxonomical sphere. However, the causal explanation of ecological and florogenetical factors of the floristic diversity of Velká Kotlina will be thoroughly analyzed in a future monograph.

MISSING SPECIES

In Tab. 1, a total of 283 taxa of vascular plants missing from Velká Kotlina are listed. This taxonomically updated list contains species, subspecies and hybrids that were recorded in earlier Silesian and Moravian floras, but never found by the present authors during their field survey in the cirque. In the first approach, the authors took it for granted that in the varied and inaccessible relief these species were simply overlooked. Later, with the increasing intensity of observations, reinforced by systematic exploration of

all squares of the reference grid (see JENÍK, BUREŠ et BUREŠOVÁ 1983: Fig. 1), another possible explanation emerged: the missing species disappeared because of the absence of grazing and cutting of grass, as a result of general changes in land use after World War II. Eventually, doubts arose with regard to the reliability of some earlier floristic papers.

In Tab. 1, missing species are divided into two above mentioned categories. The C-category includes 126 "veritable" taxa, which actually occurred or very likely occurred in the past, or possibly, still hidden occur in the cirque. The criteria used in the establishment of this category involved: (1) ecological and phytogeographical fitness, (2) frequency of records in published floras, (3) reliability of sources or authors concerned, and (4) availability of herbarium specimens. In a locality full of ecological and phytogeographical contrasts, any decision on "fitness" of a species may appear as rather subjective view. Still, there are some limits in the range of ecological and phytogeographical setting which cannot be overcome. Though not completely reliable, herbarium specimens can be regarded as reasonable evidence of a species' occurrence. However, in a locality that virtually functioned as a cross-road of Silesian and Moravian botanists, inspection of all relevant herbaria was next to impossible. Consequently, classification of the C-category could not avoid a certain amount of subjective evaluation.

The D-category of "doubtful" or "improbable" species classed in Tab. 1 contains taxa which did not match the above criteria, and contains which most probably never occurred in Velká Kotlina. Careful analysis of the works of Laus, Otruba, Šmarda and Jeriová disclosed obvious gaps and inconsistency in the data which triggered off a succession of erroneous records. Applying the criteria mentioned in the above paragraph, we dare to enumerate the "doubtful" species with a reasonable accuracy.

DISCREPANCIES BETWEEN REPORTED AND CONFIRMED TAXA

Vegetation cover and its floristic composition naturally vary with time. We have to expect that in a locality easily accessible to diaspores, and affected by severe physical factors, the flora is dynamic — some species get newly established and some species eventually die off. Velká Kotlina, obviously, suffered by frequent stresses and changes that supported florogenetic events.

Another aspect preventing accurate account of living and missing species came from the insufficiency of all floristic investigation. Even a most careful and purposeful study of a flora may not identify all present taxa on the spot, and may fail to check the earlier records. Some of the species may appear only ephemerally and their record in a floristic list is a matter of chance. All these difficulties affected the botanical work in Velká Kotlina throughout the two centuries.

The species-rich cirque and initial success of pioneer botanists in their search for rarities enhanced the interest of numerous local and professional botanists. Particularly after the remarkable collections of Mückusch and Grabowski the fame of Velká Kotlina created a false assumption that this locality could harbour virtually all species. This assumption, necessarily, brought certain less critical authors, both consciously and unconsciously to a light-minded attitude in evaluation of their findings. Contrary to the 19th

century botanists, the modern botanists seem to be more inclined toward this light-mindedness.

Exceptions of enormous species diversity in Velká Kotlina led many botanists from Opava, Olomouc, Šumperk, Brno and Prague institutions to prepare various unpublished lists whose only available example is that of JERIOVÁ (1970). As mentioned in our preceding paper, Jeriová's manuscript naming 501 taxa of vascular plants was a major surprise. A valley of much larger area in a more dissected relief and nutrient-rich limestone, "Dolina Siedmich Prameňov", High Tatra, with its 556 species (HADAČ, ŠMARDA et al. 1960) appeared nearly matched by a locality underlain by monotonous crystalline schists!

SOURCES OF ERRONEOUS RECORDS

LAUS' work (1910) entitled „Der Grosse Kessel im Hochgesenke“, was the first geobotanical treatment of the cirque. Classification of his "formations" is supported by long enumerations of taxa of vascular plants, bryophytes and lichens. Some of these lists, however, are not limited to the area of the cirque, but cover a much broader area of the Hrubý Jeseník range. This inconspicuous extension of the boundaries becomes obvious only after detailed study of the text, and enthusiastic botanist, excerpting plant names and referring them immediately to the locality named in the title, could be deceived.

A major confusion, for example, derives from LAUS' description (1910) of spruce forests, which included a greater part of the Moravice valley, possibly even some more distant localities of Hrubý Jeseník. The meaning of respective list of species was not fully understood by OTRUBA (1925a, 1926) who excerpted this source for his "Silesian" flora. Both directly, or indirectly through Otruba's flora, ŠMARDA (1950a, b) and JERIOVÁ (1970) accepted some of these doubtful data. For example, *Epipogium aphyllum*, listed by LAUS (1910 : 106) as component of the spruce formation, very likely refers to an old record of GRABOWSKI (1843 : 262) from the Ulrich hill near Malá Morávka. *Monotropa hypopitys*, another of the spruce forest's components referred to by LAUS (1900 : 106), had been previously recorded only from other parts of the Hrubý Jeseník range (OBÖRNY 1886 : 533); in OTRUBA's list (1926) the same species is commented on as "... in Hrubý Jeseník also in the surroundings of Velká Kotlina ...". *Platanthera bifolia*, a species recorded in old floras only from the surroundings of Malá Morávka, also appears among character species of the Sudeten spruce formation (LAUS 1910 : 10) which led OTRUBA (1926) to note "... also in Velká Kotlina"; ŠMARDA (1950b) accepted this as a matter of fact, while JERIOVÁ (1970) included the species as "non vidi". Another conspicuous forest species, *Tithymalus amygdaloides*, was never observed in the 19th century either in Velká Kotlina or in its environs; a vague indication of its presence by Laus has been accepted by Otruba, yet omitted by Šmarda and Jeriová. Surprisingly, *Larix decidua* which was listed in Laus' work on Velká Kotlina, was never repeated by succeeding authors. On the other hand, *Moehringia trinervia*, *Moneses uniflora*, *Phleum pratense* and a series of other species appeared as members of the flora of Velká Kotlina in works by Otruba and Jeriová.

Tab. 1. — Annotated list of vascular plant taxa of Velká Kotlina cirque, reported in literature but left unconfirmed by the authors in the period 1971 to 1978

No	Taxon	Cat.	Note
1	<i>Abies alba</i> MILL.	C	Reported solely by LAUS (1910) in spruce forests
2	<i>Acetosella vulgaris</i> (KOCH) FOURR.	C	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
3	<i>Achillea millefolium</i> L. subsp. <i>millefolium</i>	D	Often confused with subsp. <i>sudetica</i> (OPİZ) WEISS
4	<i>Acinos arvensis</i> (LAM.) DANDY	D	Likely mistake of OTRUBA (1925a : 40), repeated by ŠMARDÁ (1950b)
5	<i>Agrostis canina</i> L.	C	Solely by JERIOVÁ (1970)
6	<i>Agrostis stolonifera</i> L. s.l.	C	Reported by LAUS (1910), OTRUBA (1926, 1930) and JERIOVÁ (1910)
7	<i>Alchemilla reniformis</i> BUSER	C	Listed solely by LAUS (1910)
8	<i>Alisma gramineum</i> LEJ.	D	Solely by JERIOVÁ (1970) as "non vidi"
9	<i>Alisma plantago-aquatica</i> L.	D	Solely by OTRUBA (1926) and JERIOVÁ (1970)
10	<i>Alliaria petiolata</i> (M. BIEB.) CAVARA et GRANDE	D	Solely by OTRUBA (1926) and JERIOVÁ (1970)
11	<i>Allium ursinum</i> L. s.l.	D	Solely by OTRUBA (1926) and JERIOVÁ (1970)
12	<i>Allium victorialis</i> L.	C	Last records by JENÍK (1961) and JERIOVÁ (1970), not found recently
13	<i>Alnus glutinosa</i> (L.) GAERTN	D	Listed solely by OTRUBA (1926, 1930) and JERIOVÁ (1970)
14	<i>Andromeda polifolia</i> L.	D	Reported solely by LAUS (1910)
15	<i>Anthyllis vulneraria</i> L. s.l.	D	Likely mistake of OTRUBA (1925a : 40), followed by ŠMARDÁ (1950b)
16	<i>Arnica montana</i> L.	D	Reported solely by OTRUBA (1925a : 39)
17	<i>Arrhenatherum elatius</i> (L.) J. PRESL et C. PRESL	C	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
18	<i>Asplenium ruta-muraria</i> L.	D	Solely by JERIOVÁ (1970), likely mistake
19	<i>Asplenium septentrionale</i> (L.) HOFFM.	C	Only in SCHAUER (1840) and MÜNCKE (1855)
20	<i>Astrantia major</i> L.	D	Reported solely by ŠMARDÁ (1950b : 326), possibly by mistake
21	<i>Bellis perennis</i> L.	C	Reported by GRABOWSKI (1843), OTRUBA (1926) and JERIOVÁ (1970)
22	<i>Berteroa incana</i> (L.) DC.	D	Likely mistake by OTRUBA (1925a : 40), followed by ŠMARDÁ (1950b)
23	<i>Betonica officinalis</i> L.	D	Reported solely by OTRUBA (1926)
24	<i>Betula pubescens</i> EHRH. subsp. <i>tortuosa</i> (LEDEB.) NYMAN	C	Reported by REJMÁNEK, SÝKORA et ŠTURSÁ (1971)
25	<i>Bromopsis benekenii</i> (LANGE) HOLUB	D	Reported solely by OTRUBA (1926)
26	<i>Campanula bohemica</i> HRUBY subsp. <i>gelida</i> (KOVANDA) KOVANDA	D	Reported solely by JERIOVÁ (1970), not found in the cirque by KOVANDA
27	<i>Campanula cervicaria</i> L.	D	Listed solely by JERIOVÁ (1970), likely by mistake
28	<i>Campanula patula</i> L. s.l.	C	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
29	<i>Campanula rapunculoides</i> L.	D	GRABOWSKI (1843), possibly confusion with <i>C. trachelium</i> L.
30	<i>Campanula rotundifolia</i> L. s.l.	C	Reported already by LAUS (1910)
31	<i>Cardamine dentata</i> SCHULT.	D	Reported solely by LAUS (1910)
32	<i>Cardamine impatiens</i> L.	C	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
33	<i>Cardamine resedifolia</i> L.	C	Recorded already by WIMMER (1840)
34	<i>Cardamine rivularis</i> SCHUR	C	Reported solely by ŠMARDÁ (1950a) and JERIOVÁ (1970)

No	Taxon	Cat.	Note
35	<i>Cardaminopsis halleri</i> (L.) HAYEK	C	Reported already by GRABOWSKI (1843)
36	<i>Carex capillaris</i> L.	C	Found by SCHAUER (WIMMER 1840)
37	<i>Carex caryophyllea</i> LATOURR.	D	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
38	<i>Carex dioica</i> L.	C	Reported solely by OTRUBA (1930)
39	<i>Carex divulsa</i> STOKES	D	Listed solely by JERIOVÁ (1970)
40	<i>Carex flacca</i> SCHREBER	D	Reported solely by ŠMARDÁ (1950a) possibly confused with <i>C. burbaumii</i> WAHLENB.
41	<i>Carex limosa</i> L.	C	Reported solely by LAUS (1910) and OTRUBA (1930)
42	<i>Carex oederi</i> RETZ.	C	Recorded first by FIEK (1881)
43	<i>Carex pairaei</i> F. W. SCHULTZ	D	Reported solely by OTRUBA (1926)
44	<i>Carex pauciflora</i> LIGHTF.	C	Listed only by OBORNY (1883)
45	<i>Carex pulicaris</i> L.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
46	<i>Carex remota</i> L.	C	First recorded by FIEK (1881)
47	<i>Carex rupestris</i> All.	C	Found by SPATZIER (GRABOWSKI 1843)
48	<i>Carex vesicaria</i> L.	D	Solely by LAUS (1910), OTRUBA (1926) and JERIOVÁ (1970)
49	<i>Carex vulpina</i> L.	C	Reported already by GRABOWSKI (1843)
50	<i>Carex</i> × <i>decolorans</i> WIMM. (= <i>C. bigelowii</i> × <i>nigra</i>)	C	Recorded only by SCHUBE (1903—1904) and DOSTÁL et al. (1948—1950)
51	<i>Carum carvi</i> L.	C	LAUS (1910), ŠMARDÁ (1950a) and JERIOVÁ (1970)
52	<i>Cerastium holosteoides</i> FRIES em. HYL.	D	Solely by OTRUBA (1926)
53	<i>Cerastium semidecandrum</i> L.	D	FIEK (1881), OTRUBA (1926) and JERIOVÁ (1970)
54	<i>Chaerophyllum aromaticum</i> L.	D	Solely by OTRUBA (1926) and JERIOVÁ (1970)
55	<i>Chelidonium majus</i> L.	C	OTRUBA (1926) and JERIOVÁ (1970)
56	<i>Chrysaspis aurea</i> (POLL.) GREENE	D	Reported solely by OTRUBA (1925a : 40)
57	<i>Chrysaspis spadicea</i> (L.) GREENE	C	Reported solely by OBORNY (1886)
58	<i>Chrysosplenium oppositifolium</i> L.	D	Recorded solely by OTRUBA (1926), likely a mistake
59	<i>Circaea alpina</i> L.	C	Reported only by LAUS (1910), from spruce forests
60	<i>Circaea intermedia</i> EHRH.	D	Recorded by LAUS (1910) from spruce forests, repeated by JERIOVÁ (1970)
61	<i>Cirsium palustre</i> (L.) SCOP.	C	OTRUBA (1926), ŠMARDÁ (1950a) and JERIOVÁ (1970)
62	<i>Clinopodium vulgare</i> L.	D	Likely mistake of OTRUBA (1925a : 40), repeated by ŠMARDÁ (1950b)
63	<i>Coronilla varia</i> L.	D	Probable mistake of OTRUBA (1925a : 40), followed by ŠMARDÁ (1950b)
64	<i>Cota tinctoria</i> (L.) J. GAY	D	Likely mistake of OTRUBA (1925a : 40), repeated by ŠMARDÁ (1950b)
65	<i>Crataegus oxyacantha</i> L. s.l.	D	Reported solely by OTRUBA (1926, 1930)
66	<i>Cruciata glabra</i> (L.) EHREND.	C	Found by PROCHÁZKA in 1966, confirmed by HENDRYCH (1979).- In 1982 located in E3c by present authors
67	<i>Cynosurus cristatus</i> L.	D	Solely by OTRUBA (1926) and JERIOVÁ (1970)
68	<i>Dactylorhiza majalis</i> (REICHENBACH.) HUNT et SUMMERH.	C	Recorded solely by OTRUBA (1926), likely mistake
69	<i>Dentaria bulbifera</i> L.	C	Commonly listed
70	<i>Dentaria enneaphyllos</i> L.	D	Reported solely by LAUS (1910) in spruce forests
71	<i>Dianthus deltoides</i> L.	C	Recorded by LAUS (1910), ŠMARDÁ (1950a, b) and JERIOVÁ (1970)

No	Taxon	Cat.	Note
72	<i>Dianthus superbus</i> L. subsp. <i>superbus</i>	D	OTRUBA (1926) reported both subspecies, possibly by mistake
73	<i>Diphasiastrum complanatum</i> (L.) HOLUB	C	OBORNY (1883), SCHUBE (1903–1904), OTRUBA (1925a), JERIOVÁ (1970)
74	<i>Epilobium</i> × <i>amphibolum</i> HAUSKN. (= <i>E. alpestre</i> × <i>alsinifolium</i>)	C	Reported solely by SCHUBE (1903–1904)
75	<i>Epilobium</i> × <i>freymii</i> ČELAK. (= <i>E. montanum</i> × <i>alpestre</i>)	C	Recorded solely by OBORNY (1886) and SCHUBE (1903–1904)
76	<i>Epilobium</i> × <i>haynaldianum</i> HAUSKN. (= <i>E. palustre</i> × <i>alsinifolium</i>)	C	Solely by SCHUBE (1903–1904)
77	<i>Epilobium</i> × <i>simulatum</i> HAUSKN. (= <i>E. palustre</i> × <i>nutans</i>)	C	Listed solely by OBORNY (1886) and SCHUBE (1903–1904)
78	<i>Epipactis helleborine</i> (L.) CRANTZ s.l.	D	Reported solely by LAUS (1910) from spruce forests and OTRUBA (1926)
79	<i>Epipogium aphyllum</i> (F. W. SCHMIDT) Sw.	D	Solely by LAUS (1910) from spruce forests
80	<i>Erigeron acer</i> L. s.l.	C	Reported already by FIEK (1881)
81	<i>Eriophorum vaginatum</i> L.	C	Reported already by OBORNY (1883)
82	<i>Eupatorium cannabinum</i> L.	D	Likely mistake of OTRUBA (1926), accepted by JERIOVÁ (1970)
83	<i>Euphrasia tatrae</i> WETTST.	D	In SCHUBE (1903–1904) as <i>E. minima</i> f. <i>carpatica</i> ; in JERIOVÁ (1970) as <i>E. tatrae</i> var. <i>carpatica</i>
84	<i>Euphrasia</i> × <i>calvescens</i> BECK (= <i>E. picta</i> × <i>rostkoviana</i>)	C	Reported solely by DOSTÁL et al. (1948 to 1950) and SMEKAL (1964)
85	<i>Falcaria vulgaris</i> BERNH.	D	Likely mistake of OTRUBA (1925a : 40), later taken over by ŠMARDÁ (1950b)
86	<i>Festuca arundinacea</i> SCHREB.	D	Reported solely by JERIOVÁ (1970), likely mistake
87	<i>Festuca gigantea</i> (L.) VILL.	D	Solely by LAUS (1910) in spruce forests
88	<i>Festuca ovina</i> L.	D	Solely by OTRUBA (1930) and JERIOVÁ (1970)
89	<i>Festuca versicolor</i> TAUSCH	C	Recorded solely by WIMMER (1840)
90	<i>Filipendula vulgaris</i> MOENCH	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
91	<i>Frangula alnus</i> MILL.	C	Reported already by FIEK (1881)
92	<i>Galeobdolon luteum</i> HUDS. em. HOLUB	C	Reported solely by SÝKORA et ŠTURSA (1973)
93	<i>Galeopsis speciosa</i> MILL.	D	Reported solely by REJMÁNEK, SÝKORA et ŠTURSA (1971), possibly mistaken for related species
94	<i>Galium sylvaticum</i> L.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
95	<i>Geranium palustre</i> L.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
96	<i>Geranium robertianum</i> L.	C	Reported solely by LAUS (1910) in spruce forests and JERIOVÁ (1970)
97	<i>Geum urbanum</i> L.	D	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
98	<i>Hepatica nobilis</i> SCHREB.	C	GRABOWSKI's report (1843) later repeated but unconfirmed
99	<i>Hieracium anfractum</i> (FRIES) FRIES	C	Recorded by SKŘIVÁNEK (1956)
100	<i>Hieracium atratum</i> FRIES	D	JERIOVÁ (1970), the source not indicated
101	<i>Hieracium bifidum</i> KIT. ex HORNEB.	C	Reported already by SCHUBE (1903 to 1904)
102	<i>Hieracium caesium</i> FRIES	C	Recorded by OBORNY (1883) and JERIOVÁ (1970)
103	<i>Hieracium carpaticum</i> BESS.	D	JERIOVÁ (1970), the source not indicated.

No	Taxon	Cat.	Note
104	<i>Hieracium chlorocephalum</i> UECHTR.	C	subsp. <i>engleri</i> forme OBOR. et ZAHN. recorded as endemic taxon of Hrubý Jeseník Mts.
105	<i>Hieracium engleri</i> UECHTR.	C	Already by GRABOWSKI (1843) and solely in the cirque
106	<i>Hieracium eximium</i> BACKH.	C	Reported by FIEK (1881)
107	<i>Hieracium grabowskianum</i> NAEGELI et PETER	C	Reported solely by LAUS (1910)
108	<i>Hieracium holosericeum</i> BACKH.	C	Reported by OBORNY and ŠMARDÁ (1950a)
109	<i>Hieracium inuloides</i> TAUSCH	C	Already by WIMMER (1840)
110	<i>Hieracium laevigatum</i> WILLD.	C	subsp. <i>tridentatum</i> FRIES and subsp. <i>gothicum</i> FRIES reported by LAUS (1910)
111	<i>Hieracium moravicum</i> FREYN	C	Endemic species of Hrubý Jeseník Mts.
112	<i>Hieracium nigratum</i> UECHTR.	C	Reported already by FIEK (1881)
113	<i>Hieracium pachycephalum</i> UECHTR.	C	Reported already by FIEK (1881)
114	<i>Hieracium rohacsense</i> KIT. ex KANITZ	D	Listed by JERIOVÁ (1970), the source not indicated
115	<i>Hieracium silesianum</i> KRAUSE	C	Reported already by FIEK (1881), possibly an endemic species of Hrubý Jeseník Mts.
116	<i>Hieracium striatum</i> TAUSCH	C	Listed already by SCHUBE (1903—1904)
117	<i>Hieracium stygium</i> UECHTR.	C	Reported already by FIEK (1881)
118	<i>Hieracium sudeticum</i> STERNB.	D	Listed by LAUS (1910)
119	<i>Hieracium umbellatum</i> L.	D	Recorded only by JERIOVÁ (1970), the source not indicated
120	<i>Hieracium umbrosum</i> JORD. s.l.	C	LAUS (1910) reported subsp. <i>umbrosum</i> and subsp. <i>divisum</i> JORD.
121	<i>Hieracium valdepilosum</i> VILL.	C	Reported already by FIEK (1881)
122	<i>Holcus lanatus</i> L.	C	Listed solely by OTRUBA (1926)
123	<i>Hypericum hirsutum</i> L.	D	Reported solely by OTRUBA (1926)
124	<i>Hypericum montanum</i> L.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
125	<i>Hypericum perforatum</i> L. s.l.	D	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
126	<i>Hypochoeris radicata</i> L.	C	Reported solely by ŠMARDÁ (1950b)
127	<i>Jasione montana</i> L.	D	Reported solely by OTRUBA (1926), followed by JERIOVÁ (1970)
128	<i>Juncus conglomeratus</i> L.	C	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
429	<i>Knautia arvensis</i> app.	D	Solely by OTRUBA (1926) and JERIOVÁ (1970)
130	<i>Koeleria pyramidata</i> (LAM.) P. B. r	D	Likely mistaken by OTRUBA (1925a : 40) repeated by ŠMARDÁ (1950b)
131	<i>Larix decidua</i> MILL.	D	Reported solely by LAUS (1910) in the spruce forests, possibly outside the cirque
132	<i>Lathyrus vernus</i> (L.) BERNH.	C	Listed solely by ŠMARDÁ (1950a, b)
133	<i>Lemna minor</i> L.	C	Solely by OTRUBA (1926) and JERIOVÁ (1970), ephemeral occurrence likely
134	× <i>Leucadenia schweinfurthii</i> (HEGELM.) SCHLECHTER (= <i>Gymnadenia conopsea</i> × <i>Leucorchis albidia</i>)	C	Reported solely by SCHUBE (1903—1904)
135	<i>Leucanthemum vulgare</i> agg.	C	Listed already by GRABOWSKI (1843)
136	<i>Listera cordata</i> (L.) R. BR.	C	Reported only by OBORNY (1883)
137	<i>Loiseleuria procumbens</i> (L.) DESV.	D	DUDA (1951) reported by MÜCKUSCH
138	<i>Lotus corniculatus</i> L.	C	LAUS (1910), OTRUBA (1926) and JERIOVÁ (1970)
139	<i>Lotus uliginosus</i> SCHKUHR	D	Listed solely by OTRUBA (1926)

No	Taxon	Cat.	Note
140	<i>Luzula pilosa</i> (L.) WILLD.	C	Solely by OTRUBA (1926) and JERIOVÁ (1970)
141	<i>Luzula sudetica</i> (WILLD.) SCHULT.	C	Explicitly from the cirque reported only by LAUS (1910)
142	<i>Lysimachia nummularia</i> L.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
143	<i>Lysimachia vulgaris</i> L.	C	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
144	<i>Lythrum salicaria</i> L. s.l.	D	Solely by OTRUBA (1926)
145	<i>Melampyrum nemorosum</i> L. s.l.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
146	<i>Melica uniflora</i> RETZ.	D	Listed solely by LAUS (1910) from spruce forests, possibly outside the cirque
147	<i>Minuartia verna</i> (L.) HIERN	D	Presumably found by SCHAUER (FIEK 1881), later unconfirmed and by mistake as <i>M. gerardii</i> (WILLD.) HAYEK
148	<i>Moehringia trinervia</i> (L.) CLAIRV.	D	LAUS (1910), OTRUBA (1926) and JERIOVÁ (1970)
149	<i>Molinia arundinacea</i> SCHRANK	D	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
150	<i>Moneses uniflora</i> (L.) A. GRAY	D	LAUS (1910), OTRUBA (1926) and JERIOVÁ (1970)
151	<i>Monotropa hypopitys</i> L.	D	LAUS (1910) — in the spruce forests, OTRUBA (1926) — forests in the cirque
152	<i>Myosotis alpestris</i> F. W. SCHMIDT	C	Reported solely by DOSTÁL et al. (1948 to 1950) and JERIOVÁ (1970)
153	<i>Myosotis caespitosa</i> C. F. SCHULTZ	D	Recorded solely by JERIOVÁ (1970)
154	<i>Myosotis ramosissima</i> ROCH. in SCHULT.	D	Listed solely by JERIOVÁ (1970)
155	<i>Myosotis suaveolens</i> WALDST. et KIT. ex WILLD.	D	Solely by OBORNY (1883) as <i>M. sylvatica</i> var. <i>alpestris</i> SCHMIDT
156	<i>Neottia nidus-avis</i> (L.) L. C. RICHARD	D	Solely by LAUS (1910) in spruce forests, obviously outside the cirque
157	<i>Ophioglossum vulgatum</i> L.	D	Reported solely by OTRUBA (1926)
158	<i>Orchis mascula</i> L. s.l.	C	Listed by GRABOWSKI (1843), LAUS (1910) and OTRUBA (1926)
159	<i>Origanum vulgare</i> L. s.l.	D	Probably mistaken report of OTRUBA (1925a : 40), repeated by ŠMARDÁ (1950b)
160	<i>Orthilia secunda</i> (L.) HOUSE	C	Reported solely by SCHUBE (1903—1904) and OTRUBA (1926)
161	<i>Oxycoccus palustris</i> PERS.	C	Listed only by OBORNY (1883)
162	<i>Pedicularis palustris</i> L.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
163	<i>Pedicularis sylvatica</i> L.	D	Listed solely by OTRUBA (1926) from Vysoká hole Mt.
164	<i>Persicaria amphibia</i> (L.) S. F. GRAY	C	Reported solely by OTRUBA (1926), ephemeral occurrence possible
165	<i>Petasites kablikianus</i> TAUSCH ex BERCHT.	D	Listed solely by JERIOVÁ (1970)
166	<i>Phleum pratense</i> L. s.l.	C	LAUS (1910), OTRUBA (1926, 1930) and JERIOVÁ (1970)
167	<i>Pilosella arvicola</i> (NAEG. et PET.) SOJÁK	C	Solely by LAUS (1910) as subsp. <i>molandianum</i> NAEG. et PET.
168	<i>Pilosella atramentaria</i> (NAEG. et PET.) SOJÁK	D	Reported solely by LAUS (1910)
169	<i>Pilosella auricula</i> (L.) F. W. SCHULTZ et C. H. SCHULTZ	C	Explicitly from the cirque first listed only by LAUS (1910)
170	<i>Pilosella bauhinii</i> (SCHULT. ex BESS.) ARV.-TOUV.	D	JERIOVÁ (1970), LAUS (1910) as subsp. <i>viscidulum</i> (TAUSCH) ZAHN
171	<i>Pilosella bifurcata</i> (M. BIEB.) F. W. SCHULTZ et C. H. SCHULTZ	D	Solely by OTRUBA (1926)

No	Taxon	Cat.	Note
172	<i>Pilosella caespitosa</i> (DUM.) SELL et C. WEST	C	Reported already by GRABOWSKI (1843)
173	<i>Pilosella cymosa</i> (L.) F. W. SCHULTZ et C. H. SCHULTZ	D	Reported by JERIOVÁ (1970), the source not indicated
174	<i>Pilosella flagellaris</i> (WILLD.) SELL et C. WEST	C	Already by OBORNY (1883) LAUS (1910) as subsp. <i>glatzenze</i> NAEG. et PET.
175	<i>Pilosella floribunda</i> (WIMM. et GRAB.) ARV.-TOUV.	C	Reported solely by LAUS (1910)
176	<i>Pilosella iserana</i> (UECHTR.) SOJÁK	C	Reported solely by LAUS (1910) and JERIOVÁ (1970)
177	<i>Pilosella piloselliflora</i> (NAEG. et PET.) SOJÁK	D	Listed solely by LAUS (1910)
178	<i>Pilosella piloselloides</i> (VILL.) SOJÁK	C	Reported already by FIEK (1881)
179	<i>Pilosella praealta</i> (VILL. ex GOCHNAT) F. W. SCHULTZ et C. H. SCHULTZ	C	Listed solely by SCHUBE (1903—1904)
180	<i>Pilosella stolonifera</i> (WALDST. et KIT.)	D	Recorded solely by FIEK (1881), likely mistake
181	<i>Pinus cembra</i> L.	C	LAUS (1910) mentioned plantations of this tree in the cirque; all specimen died out
182	<i>Pinus sylvestris</i> L.	D	Solely by OTRUBA (1926)
183	<i>Pistolochia solida</i> (L.) BERNH.	D	Reported solely by OTRUBA (1926), likely mistake
184	<i>Plantago lanceolata</i> L. subsp. <i>lanceolata</i>	C	Reported solely by GRABOWSKI (1843), disappeared
185	<i>Plantago media</i> L. s.l.	C	Listed solely by GRABOWSKI (1843), disappeared
186	<i>Platanthera bifolia</i> (L.) L. C. RICHARD	D	LAUS (1910) in spruce forests, possibly outside the cirque
187	<i>Pneumonanthe asclepiadea</i> (L.) F. W. SCHMIDT	D	In 1949 found SOUČKOVÁ outside the cirque (DUDA 1949), from the cirque reported by JERIOVÁ (1970) as „non vidi“
188	<i>Poa palustris</i> L. s.l.	C	Reported already by FIEK (1881)
189	<i>Poa riphaea</i> (ASCH. et GRAEBN.) FRITSCH	C	Possibly discovered by WIMMER (1940) — endemic species of Hr. Jeseník Mts.
190	<i>Poa</i> × <i>pawlowskii</i> JIRÁSEK (= <i>P. chaisii</i> × <i>remota</i>)	D	Reported solely by JERIOVÁ (1970)
191	<i>Polygala oxyptera</i> REICHENB.	C	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
192	<i>Polygonatum odoratum</i> (MILL.) DRUCE	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
193	<i>Polystichum braunii</i> (SPENN.) FÉE	C	First reported by MILDE (1856), after LAUS (1910), never confirmed
194	<i>Polystichum</i> × <i>luerssenii</i> (DÖRFLER) HAHNE (= <i>P. braunii</i> × <i>aculeatum</i>)	C	Reported solely by SCHUBE (1903—1904) and DOSTÁL et al. (1948—1950)
195	<i>Potentilla anglica</i> LAICH.	C	Listed only by GRABOWSKI (1843) and JERIOVÁ (1970)
196	<i>Potentilla argentea</i> L. s.l.	D	Possible mistake by OTRUBA (1925a : 40), repeated by ŠMARD (1950b)
197	<i>Potentilla heptaphylla</i> L.	D	Likely mistake by OTRUBA (1925a : 40), accepted by ŠMARD (1950b)
198	<i>Potentilla inclinata</i> VILL.	D	Likely mistake by OTRUBA (1925a : 40), accepted by ŠMARD (1950b)
199	<i>Potentilla neumanniiana</i> REICHENB.	D	Likely mistake by OTRUBA (1925a : 40), accepted by ŠMARD (1950b)
200	<i>Potentilla recta</i> L. s.l.	D	Likely mistake by OTRUBA (1925a : 40), accepted by ŠMARD (1950b) and JERIOVÁ (1970)
201	<i>Potentilla reptans</i> L.	C	Reported solely by DOSTÁL et al. (1948 to 1950) and JERIOVÁ (1970)

No	Taxon	Cat.	Note
202	<i>Poterium sanguisorba</i> L.	D	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
203	<i>Pseudolysimachion spicatum</i> (L.) OPIZ	D	Likely mistake by OTRUBA (1925a : 40), accepted by ŠMARDÁ (1950b)
204	<i>Pteridium aquilinum</i> (L.) KUHN	C	Found by UECHTRITZ (FIEK 1881), later unconfirmed
205	<i>Pulsatilla vernalis</i> (L.) MILL.	C	Reported already WIMMER (1840), today missing
206	<i>Pyrola chlorantha</i> SW.	C	Listed already by GRABOWSKI (1843), today missing
207	<i>Pyrus pyrastrer</i> BURGSD.	C	Curious finding of OTRUBA (1930) from the lower part of the cirque
208	<i>Ranunculus aconitifolius</i> L.	D	Reported already by GRABOWSKI (1843), formerly not distinguished against <i>R. platanifolius</i>
209	<i>Ranunculus auricomus</i> L. s.l.	C	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
210	<i>Ranunculus flammula</i> L.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
211	<i>Ranunculus repens</i> L.	C	Listed already by GRABOWSKI (1843), ephemeral occurrence possible
212	<i>Rhinanthus alectorolophus</i> POLLICH s.l.	D	OTRUBA (1926) and JERIOVÁ (1970)
213	<i>Rhinanthus minor</i> L. s.l.	D	OTRUBA (1926) and JERIOVÁ (1970)
214	<i>Ribes alpinum</i> L.	C	Reported by FIEK (1881) after UECHTRITZ, later never confirmed
215	<i>Roegneria canina</i> (L.) NEVSKI	C	First reported by JENÍK (1961), today not confirmed
216	<i>Rorippa sylvestris</i> (L.) BESS.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
217	<i>Rosa corymbifera</i> BORKH.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
218	<i>Rosa glauca</i> POURR.	D	OTRUBA (1926), JERIOVÁ (1970)
219	<i>Rosa tomentosa</i> SM.	D	OTRUBA (1926), JERIOVÁ (1970)
220	<i>Rubus bellardii</i> WEIHE et NEES	D	Listed solely by OTRUBA (1926) and JERIOVÁ (1970)
221	<i>Rubus gremlii</i> FOCKE	D	Reported solely by JERIOVÁ (1970)
222	<i>Rubus infestus</i> WEIHE ex BOENN.	D	Reported solely by JERIOVÁ (1970)
223	<i>Rubus nemorensis</i> P. J. MÜLL. et LEFÈVRE	D	Listed solely by JERIOVÁ (1970)
224	<i>Rumex alpinus</i> L.	D	Reported solely by JERIOVÁ (1970)
225	<i>Sagina saginoides</i> (L.) KARSTEN	C	Explicitly from the cirque solely by OTRUBA (1926) and SUTORÝ (1978)
226	<i>Sagina</i> × <i>normaniana</i> LAGERH. (= <i>S. procumbens</i> × <i>saginoides</i>)	C	Reported only by SUTORÝ (1978)
227	<i>Salix cinerea</i> L.	D	OTRUBA (1926) and JERIOVÁ (1970)
228	<i>Salix fragilis</i> L.	D	OTRUBA (1926) and JERIOVÁ (1970)
229	<i>Salix herbacea</i> L.	C	Recorded already by GRABOWSKI (1843), confirmed by KRKAVEC (1971)
230	<i>Salix lapponum</i> L.	C	WIMMER (1840), MÜNCKE (1855), OTRUBA (1925a) and JERIOVÁ (1970)
231	<i>Salix purpurea</i> L. s.l.	C	FIEK (1881), LAUS (1910), OTRUBA (1926, 1930) and JERIOVÁ (1970)
232	<i>Salix</i> × <i>siegeertii</i> ANDERSS. (= <i>S. purpurea</i> × <i>silesiaca</i>)	D	Recorded solely by JERIOVÁ (1970) as „non vidi“, the source not indicated
233	<i>Salix</i> × <i>subaurita</i> ANDERSS. (= <i>S. aurita</i> × <i>silesiaca</i>)	C	Listed by FIEK (1881), after WIMMER, confirmed by KRKAVEC (1971)
234	<i>Sambucus nigra</i> L.	C	GRABOWSKI (1843), OBORNÝ (1883), LAUS (1910), OTRUBA (1926)
235	<i>Sanicula europaea</i> L.	D	The record of LAUS (1910) in the spruce forests accepted by OTRUBA (1926)

No	Taxon	Cat.	Note
236	<i>Saponaria officinalis</i> L.	D	Reported solely by JERIOVÁ (1970)
237	<i>Sarothamnus scoparius</i> (L.) WIMM. ex KOCH s.l.	D	OTRUBA (1926) and JERIOVÁ (1970)
238	<i>Saxifraga umbrosa</i> agg.	C	Firstly reported by GÜNTHER et al. (1824), today missing (JENÍK 1980)
239	<i>Scabiosa ochroleuca</i> L.	D	Mistake by OTRUBA (1925a : 40), accepted by ŠMARDÁ (1950b)
240	<i>Scorzoneroideis autumnalis</i> (L.) MOENCH	C	Listed solely by LAUS (1910) and JERIOVÁ (1970)
241	<i>Scrophularia umbrosa</i> DUM.	D	Reported solely by OTRUBA (1926)
242	<i>Scutellaria galericulata</i> L.	D	OTRUBA (1926) and JERIOVÁ (1970)
243	<i>Sedum acre</i> L.	D	Mistake by OTRUBA (1925a : 40), repeated by ŠMARDÁ (1950b)
244	<i>Selinum carvifolia</i> (L.) L.	D	OTRUBA (1926) and JERIOVÁ (1970)
245	<i>Senecio jacobaea</i> L.	D	OTRUBA (1926) and JERIOVÁ (1970)
246	<i>Senecio sylvaticus</i> L.	D	Solely JERIOVÁ (1970)
247	<i>Senecio viscosus</i> L.	D	Listed solely by JERIOVÁ (1970) as „non vidi“, the source not indicated
248	<i>Seseli annuum</i> L.	D	Mistake by OTRUBA (1925a : 40)
249	<i>Seseli varium</i> TREVIR.	D	Mistake by ŠMARDÁ (1950b : 326)
250	<i>Siegingia decumbens</i> (L.) BERNH.	C	Reported solely by OTRUBA (1926)
251	<i>Silene nutans</i> L. s.l.	D	Mistake by OTRUBA (1925a : 40), accepted by ŠMARDÁ (1950b)
252	<i>Solanum dulcamara</i> L.	D	Listed solely by JERIOVÁ (1970) as „non vidi“, the source not indicated
253	<i>Sorbus aria</i> (L.) CRANTZ	D	Listed solely by ŠMARDÁ (1950b : 327)
254	<i>Sorbus aucuparia</i> L. subsp. <i>glabrata</i> (WIMM. et GRAB.) CAJ.	C	Frequently recorded, by present authors not confirmed
255	<i>Stachys recta</i> L.	D	Likely mistake of OTRUBA (1925a : 40), accepted by ŠMARDÁ (1950b)
256	<i>Stellaria palustris</i> RETZ.	D	Reported solely by OTRUBA (1926) and JERIOVÁ (1970)
257	<i>Steris viscaria</i> (L.) RAFIN.	D	Likely mistake by OTRUBA (1925. : 40), repeated by ŠMARDÁ (1950b)
258	<i>Succisa pratensis</i> MOENCH	D	OTRUBA (1926), JERIOVÁ (1970)
259	<i>Symphytum tuberosum</i> L.	D	OTRUBA (1926), JERIOVÁ (1970)
260	<i>Tanacetum vulgare</i> L.	D	OTRUBA (1926), JERIOVÁ (1970)
261	<i>Thymus alpestris</i> TAUSCH	C	Recorded by OBORNY (1883) and JERIOVÁ (1970)
262	<i>Thymus pulegioides</i> L.	D	Listed solely by MÜNCKE (1855)
263	<i>Tithymalus amygdaloides</i> (L.) HILL.	D	LAUS (1910) in spruce forests, OTRUBA (1926) in forests surrounding the cirque
264	<i>Trifolium arvense</i> L.	D	Mistake by OTRUBA (1925a : 40), repeated by ŠMARDÁ (1950b)
265	<i>Trifolium medium</i> L.	D	Likely mistake by OTRUBA (1925a : 40), accepted by ŠMARDÁ (1950b)
266	<i>Trifolium montanum</i> L.	D	From the cirque listed by OTRUBA (1925a, 1926), bellow the cirque reported by PODPĚRA (1949)
267	<i>Triglochin palustre</i> L.	D	Solely by OTRUBA (1926)
268	<i>Turritis glabra</i> L.	D	Reported only by OTRUBA (1926) and ŠMARDÁ (1950b)
269	<i>Typha angustifolia</i> L.	D	Solely by OTRUBA (1926)
270	<i>Typha latifolia</i> L.	D	Listed solely by JERIOVÁ (1970) as „non vidi“, the source not indicated
271	<i>Ulmus glabra</i> HUDS.	D	Listed solely by OTRUBA (1930) and JERIOVÁ (1970)
272	<i>Valeriana officinalis</i> L.	D	LAUS (1910), OTRUBA (1930) and JERIOVÁ (1970)

No	Taxon	Cat.	Note
273	<i>Veronica anagallis-aquatica</i> L.	D	Solely by JERIOVÁ (1970)
274	<i>Veronica beccabunga</i> L.	C	Listed solely by OTRUBA (1926, 1930) and JERIOVÁ (1970)
275	<i>Veronica bellidioides</i> L.	C	Discovered by SPATZIER in 1838 (GRABOWSKI (1843), today missing
276	<i>Veronica montana</i> L.	D	Solely by JERIOVÁ (1970)
277	<i>Viburnum opulus</i> L.	C	Listed solely by OTRUBA (1926, 1930) and JERIOVÁ (1970)
278	<i>Vicia tenuifolia</i> ROTH.	D	Reported solely by LAUS (1910 : 122)
279	<i>Vinca minor</i> L.	D	OTRUBA (1926), JERIOVÁ (1970)
280	<i>Viola hirta</i> L.	D	Mistake by OTRUBA (1925a : 40), accepted by ŠMARDÁ (1950b)
281	<i>Viola riviniana</i> REICHENB.	D	Solely by OTRUBA (1926)
282	<i>Woodsia alpina</i> (BOLTON) S. F. GRAY	C	Discovered by UECHTRITZ in 1853 (FIEK 1881), confirmed by VICHEREK (1960), today missing
283	<i>Woodsia ilvensis</i> (L.) R. BR.	C	Listed e.g. by OBORNY (1883), today missing, herb. sheets found by CHRTEK

A number of xeric and thermophilous vascular species got into the flora of Velká Kotlina through another vagary appearing right at the beginning of OTRUBA's "Introduction to the flora of Czechoslovak Silesia" (1925a : 5): "I am going to mention, therefore, several species recorded by myself in similar balks between Bruntál and Malá Morávka, and from Bruntál onwards to Krnov in the north. These are: *Viscaria vulgaris*, *Silene nutans*, *inflata*, *Coronilla varia*, *Lotus corniculatus*, *Anthyllis vulneraria*, *Trifolium arvense*, *montanum*, *aureum*, *medium*, *Calamintha acinos*, *clinopodium*, *Stachys recta*, *Veronica spicata*, *Falcaria Rivini*, *Seseli coloratum*, *Potentilla argentea*, *canescens*, *opaca*, at places also *recta* and *verna*, *Anthemis tinctoria*, *Scabiosa ochroleuca*, *Knautia arvensis*, *Senecio Jacobaea*, *Thymus serpyllum*, *ovatus*, *Hypericum perforatum*, *Helianthemum obscurum*, *Koeleria pyramidata*, *Dianthus carthusianorum*, *deltoides*, *Sedum acre*, *Jasione montana*, *Turritis glabra*, *Berteroa incana*, *Origanum vulgare*, *Viola hirta*, *Brunella vulgaris*, etc. All these species occur also on balks of the Haná Plain and Odra region, and all of them can be found also in front of the entrance to Velká Kotlina or right in Velká Kotlina."¹⁾ The vagueness of the preceding text was emphasized by the fact that a majority of these species did not appear in Otruba's list as records in Velká Kotlina. Despite this, all above named species were accepted by ŠMARDÁ (1950b). Similar inconsistencies in other works of Otruba introduced further doubtful records, such as *Campanula cervicaria*, *Carex dioica*, *Arnica montana*, and many other species (see Tab. 1).

Certain anthropogenic species, such as *Turritis glabra*, *Lathyrus sylvestris*, *Lotus corniculatus*, *Anthyllis vulneraria*, *Coronilla varia*, *Verbascum nigrum*,

*) The quotation is in original nomenclature used by Otruba, and for the reason of clarity, we record also original Czech wording of the last and crucial sentence: "... všechny nalezneme před vstupem do Velké Kotliny neb v Kotlině samé"

Tab. 2. — Counts and percentages of vascular plant species, subspecies and hybrids recorded in literature and/or field in association with Velká Kotlina cirque: A — confirmed occurrence of earlier records, B — newly found taxa, C — veritable earlier records, D — doubtful records

Category	Totals	Percentage of			
		A + B	A + B + C	A + C + D	A + B + C + D
A	333	93.5	69.1	54.0	52.1
B	23	6.5	4.8	3.7	3.6
A + B	356	100.0	73.9	57.8	55.7
C	126	35.4	26.1	20.5	19.7
A + B + C	482	135.4	100.0	78.2	75.4
D	157	44.1	32.6	25.5	24.6
A + C + D	616	173.0	127.8	100.0	96.4
A + B + C + D	639	179.5	132.6	103.7	100.0

Erigeron droebachiensis, commented on by Otruba as growing “also at the entrance of Velká Kotlina” or “also in the Moravice valley above Karlov toward Velká Kotlina” (OTRUBA 1925b) are less doubtfull. Recent studies of anthropogenic flora of the Hrubý Jeseník range (PROCHÁZKA 1967, BUREŠ et KRÁLÍK 1977) suggest that these species do spread along the trails in higher altitude, and occassionally occur in clearings. We can thus assume their temporary establishment along the Moravian and Silesian tracks, two parallel traffic lanes that previously followed the Moravice riversides. Therefore, those anthropogenic species reported by OTRUBA (1925a, 1926, 1930) from inside Velká Kotlina, such as *Dianthus deltoides*, *Chelidonium majus*, *Campanula patula* or *Leucanthemum vulgare*, were left, in our Table 1, as “veritable” species.

Our attempt to find herbarium sheets supporting some of Otruba's curious records failed. Regional Institution in Olomouc posessing Otruba's herbarium does not contain herbarium specimens from Velká Kotlina even of the genera *Potentilla* and *Carex*, which were in the centre of interest of the late author. We also assume that Otruba visited Velká Kotlina only after the appearance of his “Introduction to the flora of Czechoslovak Silesia” (1925, 1926), as reflected in the absence of some abundant populations of conspicuous species, e.g. *Saxifraga paniculata* and *Asplenium trichomanes*. The 1930 paper apparently contains more suitable floristic data and realistic descriptions of biotopes in Velká Kotlina. Some of the peculiarities could have been caused by confusion between species or their names, e.g. *Scrophularia umbrosa*, *Sanguisorba minor*, *Polygonatum odoratum*, *Filipendula vulgaris*, *Scabiosa ochroleuca*. A few of these strange records by Otruba, however, were later confirmed, e.g. *Ficaria verna* and *Padus avium*.

J. Šmarda, an experienced professional botanist, performed in Velká Kotlina phytosociological studies, and his knowledge of vascular plants of this region cannot be doubted. His lists from this locality (ŠMARDA 1950a, b), however, contain some unconfirmed reports or vaguely published data of his predecessors.

The manuscript by JERIOVÁ (1970) containing a list of vascular species compiled from old records and her own observations, is of varying value. Obviously, the author was not consistent in application of the comment "non vidi". Species thus designated refer to actual rarities, e.g. *Conioselinum tataricum*, *Corallorhiza trifida*, *Crepis sibirica*, *Hippochaete hyemalis*, *Galium uliginosum* and *Gentiana punctata*, as well as to fairly abundant species, such as *Botrychium lunaria*, *Coeloglossum viride*, *Helianthemum grandiflorum*, *Listera ovata*, *Traunsteinera globosa*, *Poa supina* and *Streptopus amplexifolius*. Species of the vernal aspect, e.g. *Pistolochia cava*, *Gagea lutea*, *Primula elatior* and *Ficaria verna*, also indicated as "non vidi", probably escaped the attention of the author. However, the majority of doubtful data in her list derive from the uncritical acceptance of earlier uncertain records of Laus, Otruba and Šmarda.

ANALYSIS OF THE FLORA

The species-rich flora of Velká Kotlina deserves a detailed analysis from various ecological and biogeographical viewpoints. We are reserving this thorough analysis for a future monograph, which when completed will also contain a broader outline of natural factors causing the diversity. In the following text we only comment on Tab. 2 which presents simple statistics with regard to the categories defined in the preceding paper and contained in the annotated tables (Tab. 2 in JENÍK, BUREŠ, BUREŠOVÁ 1983, including A and B-categories; Tab. 1 of the present paper, including C and D-categories). These numerical data reflect the successive scientific achievements in this remarkable local flora, and leave the natural factors open for later discussion.

Confirmed species. — During our research in Velká Kotlina, we have identified in the field only 333 species, subspecies and hybrids of vascular plants, which is a total representing merely 54 % of all taxa reported in earlier literature. The majority of these "confirmed species" was first reported and repeatedly recorded by botanists of the 19th century, as summarized in old Silesian and Moravian floras by WIMMER (1840, 1857), GRABOWSKI (1843), FIEK (1881), OBOBNÝ (1883—1886) and SCHUBE (1904). We also succeeded in confirming the occurrence of some recently reported taxa, such as *Carex digitata*, *C. gracilis*, *C. panicea*, *Cirsium rivulare*, *Fragaria vesca*, *Galeopsis pubescens*, *Galium mollugo*, *G. palustre*, *G. uliginosum*, *Plantago major*, *Ficaria bulbifera*, *Sambucus racemosa* and *Stellaria graminea*. Though not all of these species can be regarded as hemerophilous plants, at least part of them are newly immigrated species transported both by man and more natural agents like wind, birds and mammals. We also succeeded in finding species whose occurrence was reported only in the older works, e.g. *Juncus articulatus* (only by GRABOWSKI 1843), *Galium pumilum* (lastly, by MÜNCKE 1855), *Lysimachia nemorum* (only by MÜNCKE 1855). *Gentiana punctata*, a species reported as extinct in the Hrubý Jeseník range (DOSTÁL et al. 1948—1950; HENDRYCH 1977), grows in several sites of the cirque (see also BUREŠ 1978). Among the very rare taxa, encountered and precisely localized during our research, the following ones are worth of mention: *Hippochaete hyemalis*, *Crepis sibirica*, *Conioselinum tataricum*, *Polystichum*

aculeatum, *P. lonchitis*, *Corallorhiza trifida*, *Carex buxbaumii*, *Swertia perennis*, and *Plantago *sudetica*.

Newly recorded species. — Altogether 23 new taxa have been identified in the cirque during the period 1971 to 1978. These "new taxa" can be divided into three groups: (1) Species which escaped attention of botanists due to their extreme rarity, inaccessibility of their habitat, ephemeral occurrence or early flowering in spring: *Tilia platyphyllos*, *Cerastium arvense*, *Cirsium × ambiguum*, *Crataegus monogyna* and *Gagea lutea*. (2) Taxa which had not been distinguished in earlier period, e.g. *Agrostis *oreophila*, *Alchemilla acutiloba*, *A. obtusa*, *A. subcrenata*, *A. xanthochlora*, *Dactylorhiza *psychrophila*, *Dryopteris oreades*, *D. expansa* and *Festuca diffusa*. Newly identified taxa, whose synonyms were reported in earlier times, are listed under their new valid names, e.g. *Trollius altissimus*, *Aconitum callibotryon*, *Phleum commutatum*, *Empetrum hermaphroditum*, but not included in the category of newly recorded species. (3) Newly transplanted species, such as *Duschekia viridis* and *Picea pungens*, newly dispersed neophytes (*Epilobium ciliatum*) or obviously transported species (*Sagina nodosa*, *Trisetum flavescens*). We did not include among the newly recorded species those taxa which were only reported from the broader area, but neither precisely listed nor supported by herbarium specimens from Velká Kotlina, e.g. *Galeopsis pubescens*, *Juniperus communis*, *Stellaria alsine*, *Taraxacum officinale*, *Vaccinium uliginosum* and *Populus tremula*.

Veritable species. — In our card-file of taxa reported from the Velká Kotlina cirque, we have classed 126 veritable taxa, which makes 20.5 % of all species recorded in the past, and 19.7 % of the total including our new records. As mentioned in our previous paper (JENÍK, BUREŠ et BUREŠOVÁ 1983) this category contains species that we failed to find even after long, thorough search, or species whose earlier reported specimen or population became extinct. We could not confirm some of the recently published or personally reported species, e.g. *Salix herbacea* (found by KRKAVEC 1971), *Pulsatilla vernalis* (personally reported by J. Beran, an amateur botanist from Šternberk, who had seen the species in flower in Velká Kotlina in 1973), *Woodsia ilvensis* (documented in herbarium), *Allium victorialis*, etc. In spite of our efforts, some taxa of the genera *Hieracium* and *Rubus*, and hybrids of *Epilobium* remained unidentified, and thus unconfirmed. Other likely species safely reported in the past, yet not found by the present authors, include: *Veronica bellidioides*, *Woodsia alpina*, *Poa riphaea*, *Cardaminopsis halleri*, *Festuca versicolor*, *Cardamine resedifolia*, *Dentaria bulbifera*, *Eriophorum vaginatum*, *Frangula alnus*, *Abies alba*, *Carex capillaris*, *C. rupestris*, *C. vulpina*, *Hepatica nobilis*, *Polystichum braunii*, *Pteridium aquilinum*, *Pyrola chlorantha* and *Ribes alpinum*.

Carex rupestris, an arctic-alpine species found by SPATZIER (GRABOWSKI 1843 : 268) in Velká Kotlina right at the beginning of its floristic glory, was not confirmed in the period 1971 to 1978. However, this name appeared also in a list compiled by LAUS (1910 : 127), and later in another work by OTRUBA (1926). These records lack a clear reference to a definite habitat, and the un conspicuous plants of this species still may grow in a hidden site of Velká Kotlina. Just for comparison: *Carex rupestris* was first collected in Velká Kotelná Jáma, a floristically well explored cirque of the Giant Mountains, only in 1964 (HEMPEL and BÜTTNER 1965).

Cardamine resedifolia is another veritable species reported from Velká Kotlina already by WIMMER (1840) and GRABOWSKI (1843). This little plant still grows in shaded crevices of the crags on the Vozka, Keprník and Petrovy Kameny mounts. The only recent report is that of OTRUBA (1930) who described its location as "low rocks near the upper margin of Velká Kotlina". This vague description was little help in our vain effort to confirm the presence of this species.

In the biogeographical evaluation of Velká Kotlina, the occurrence of *Festuca versicolor* might play an important role. Remarkably, WIMMER (1857 : 60), a distinguished botanist of the past century, collected this grass species in Čertova Zahrádka and Malá Sněžná Jáma, the two glacial cirques comparable to Velká Kotlina. Later, FIEK (1881 : 522) wrote that *Festuca versicolor* was reported solely by WIMMER, and, since then, never rediscovered. According to phytosociological studies of the present authors (JENÍK, BUREŠ et BUREŠOVÁ 1980 : 6), the ecological niche potentially suitable to *F. versicolor* in Velká Kotlina, is dominated by *Agrostis alpina*; consequently, population of *F. versicolor* was never as large as in the case of the Giant Mountains localities.

According to earlier findings of JENÍK (1980) *Saxifraga umbrosa* also belongs to the veritable occurrences in Velká Kotlina — a surprising statement in the case of a species which disappeared in the second half of the 19th century from all Silesian and Moravian floras.

Doubtful species. — Among the 616 taxa reported from Velká Kotlina in the past, about 157, or 25 %, must be considered doubtful. These species do not grow at the present time in Velká Kotlina, and they probably never occurred there. Their records happened to appear in the literature only by mistake or in a vague note whose careful analysis threw serious doubts on their actual presence. Those species names designated as D-category in Tab. 1. penetrated the literature mainly by unfortunate or unintentional errors by Laus, Otruba and Šmarda. The surprising number of doubtful species was a major problem in the revision of the flora of Velká Kotlina. We hope that the preceding chapter on possible sources of erroneous records adequately explains our criteria leading to the establishment of the D-category of doubtful species.

Beside the errors due to vague and confused literature, some could have penetrated the flora of Velká Kotlina by incorrect identification of some taxa or, still more frequently, by confusion between two related taxa, e.g. *Achillea millefolium* s.s., *Agrostis canina*, *Astrantia major*, *Campanula *gelida*, *C. rapunculoides*, *Chrysosplenium oppositifolium*, *Dactylorhiza majalis*, *Dianthus superbus* s.s., *Festuca arundinacea*, *Filipendula vulgaris*, *Galium sylvaticum*, *Geranium palustre*, *Hypericum hirsutum*, *H. perforatum*, *Petasites kablikianus*, *Sanguisorba minor*, etc.

CONCLUSIONS

As a result of revision of older floristic data and their comparison with the current field research, altogether 283 taxa of vascular plants have been found missing in Velká Kotlina, the famous locality in the Sudeten Mountains. This total represents nearly half of all species reported from this locality in the course of its two centuries of botanical history.

Among the missing species about 44 % belong to veritable findings which could not be confirmed because of their extinction or because the present authors overlooked their presence in the cirque. The remaining 56 % must be considered as doubtful species, which infiltrated the floristic lists of Velká Kotlina by mistake.

Many unfortunate mistakes and conclusions can be traced back to particular papers by Laus, Otruba and Šmarda. General over-estimations of the species diversity of Velká Kotlina, possibly, also induced other authors to be less critical in examination of their collections or in personal communications. However, the incessant changes of the cirque's ecosystems, and dynamic exchange of diaspores between the cirque and its environment, allow the assumption that immigration and extinction will continue.

Numerical data presented in Table 2 show that Velká Kotlina is fully entitled to maintain its status of the "species-richest locality" in the Sudeten Mountains. With 356 confirmed and newly recorded species, subspecies and hybrids of vascular plants, the flora of this cirque exceeds by more than one third that of Úpská Jáma cirque of the Giant Mountains (ŠOUREK 1969 : 49).

ZÁVĚRY

Srovnáním skutečných nálezů při floristickém výzkumu v letech 1971 až 1978 (viz taxony kategorie A a B v předchozí práci — JENÍK, BUREŠ et BUREŠOVÁ 1983) se staršími údaji v literatuře jsme zjistili, že ve Velké Kotlině v Hrubém Jeseníku je celkem 283 taxonů (druhů, poddruhů a kříženců), tj. 46 % taxonů cévnatých rostlin nezvěstných. Tento překvapivě vysoký počet chybějících taxonů lze rozdělit na dvě skupiny: Kategorie C zahrnuje 126 taxonů, které pravděpodobně v minulosti na lokalitě rostly, nebo se tu dosud skrývají vyskytují. Kategorie D zahrnuje 157 taxonů, které se do přímé souvislosti s květenou Velké Kotliny dostaly pravděpodobně omylem a jsou tedy taxony pochybnými.

Mezi taxony klasifikované jako „pravděpodobné“ řadíme po podrobném seznámení s lokalitou a kritickou literaturou takové, které vlivem přírodní dynamiky nebo lidských zásahů na lokalitě vyhynuly. Nevylučujeme, že mezi druhy „pravděpodobnými“ jsou i takové, které budou v terénu identifikovány v nejbližší době a ztotožněny s dřívějšími záznamy (dříve zmíněná kategorie A). Nálezy, které budou uskutečněny v pozdějších letech, mohou však být výsledkem též opětovného nastěhování dočasně vyhynulého druhu.

Taxony klasifikované jako „pochybné“ pronikly do literatury o Velké Kotlině převážně vlivem nejasných formulací v pracích Lause, Otruby a Šmardy, částečně velivem omylů při identifikaci rostlin. Omyly jsou častější až v tomto století, kdy Velká Kotlina začala v botanické literatuře zaujímat věhlasné místo, které zdánlivě není determinované svou subalpínskou polohou a mohou v něm potenciálně růst zástupci různých ekoelementů a geoelementů. Není vyloučeno, že další konfrontace s literaturou a herbářovými položkami umožní přeřadit několik druhů kategorie D do kategorie C.

Na základě 356 potvrzených a nově zjištěných taxonů lze Velkou Kotlinu nadále považovat za druhově nejbohatší naleziště celých Sudet.

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Ellenberg:

Vegetation Mitteleuropas mit den Alpen in ökologischer Sicht

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Zájem široké veřejnosti o příručku profesora Ellenberga vedl již čtyři roky po objevení se 2. vydání k publikování třetího, vylepšeného vydání. Autor se rozhodl zachovat přibližně v celé textové části stránkový rozsah, znění textu a vyobrazení jako v předchozím vydání (recenze 2. vydání viz např. Folia Geobot. Phytotax., Praha, 15 : 215–216). Po úvodním oddílu, pojednávajícím všeobecně o vegetaci střední Evropy a o vzniku současné vegetace vlivem člověka, následují oddíly o přirozených lesích a křovinách, dále o ostatních převážně přirozených formacích a o formacích, vzniklých a zachovaných převážně antropickým vlivem. Závěrečný oddíl obsahuje obsáhlý výčet literatury, odkazy na změny ve fytoocenologickém systému a přehled vegetačních jednotek a druhů.

Úpravy, provedené ve 3. vydání, se týkají především posledního oddílu příručky — doplnění nových literárních pramenů, odkazů k obrázkům, některých změn ve fytoocenologickém systému a rozšíření a zpřesnění přehledu charakteristických druhů uvedených syntaxonů. Četná vylepšení a zpřesnění byla provedena zvláště ve fytoocenologii kryptogamických společenstev (především lišejníků) a v úpravě taxonomické nomenklatury podle moderních bryologických a lichenologických příruček. Proti předchozímu vydání jsou zde naopak vypuštěny odkazy na vegetační zpracování jednotlivých oblastí.

Profesor Ellenberg je jedním z nejvýznamnějších světových geobotaniků. Jeho široký rozhled, zejména v ekologických směrech a výborné pedagogické schopnosti byly plně využity při sepsání této knihy, která je nepostradatelnou pomůckou všem zájemcům o poznání středoevropské vegetace.

Z. Neuhauslová