THE ORCHID FLORA OF THE WHITE CARPATHIANS

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Samenvatting

De Witte Karpaten zijn een middelgebergte op de Tsjechisch-Slowaakse grens met een rijke orchideeënflora. Uit het gebied zijn 44 soorten bekend. De auteurs geven een karakteristiek van het gebied en een overzicht van de er voorkomende orchideeën met aantekeningen over voorkomen, verspreiding en taxonomie. Recente veranderingen in de landbouw vormen een bedreiging voor flora en fauna van het gebergte.

Zusammenfassung

Die Weißen Karpaten (Bílé Karpaty) sind ein Mittelgebirge an der tschechisch-slowakischen Grenze mit einer reichen Orchideenflora. Aus dem Gebiet sind 44 Arten bekannt. Die Autoren geben eine Charakteristik des Gebietes und einen Überblick über die dort wachsenden Orchideen mit Bemerkungen über Vorkommen, Verbreitung und Taxonomie. Rezente Änderungen in der Landwirtschaft bilden eine Bedrohung für Flora und Fauna des Gebirges.

Introduction

The White Carpathians (Bílé Karpaty) are a mountain range stretching out for some 60 km along the Czech-Slovakian border.
A large part of it was proclaimed a Protected Landscape Area, 435 km^2 on Slovakian territory in 1979, 715 km^2 in the Czech Republic in 1981 (Fig. 1). The main reason of giving this region legal protection was to preserve the extensive areas of species-rich grasslands and natural deciduous forests. Within the area, some 85 nature reserves of up to 700 ha large, mostly meadows and pastures, have been established.
Forty-four orchid species have been recorded from the area, which is three-quarters of the orchid flora occurring in the Czech Republic and Slovakia (the former Czechoslovakia). The region's significance for orchids is illustrated by Fig. 2.

In this contribution we would like to introduce Western European orchideologists to this orchid-rich region. A more detailed survey with information on the distribution of each species occurring in the White Carpathians in the past and at the present time, comments

on their ecology and threatening factors, was published five years ago (Tlusták & Jongepierová-Hlobilová 1990) in Czech with summaries in English and German.

Abiotic conditions

The White Carpathians are part of the western part of the Carpathian Mts., which run from the eastern part of the Czech Republic, via Slovakia and the Ukraine into Rumania. Geologically the White Carpathians consist of sandstone (flysh) with limestone inclusions, except for the north-eastern part on Slovakian territory where a range of limestone and dolomite rocks dominate.
The region is situated between elevations of 175 m in the outer regions and 970 m above sea level at the highest top (Velká Javořina).
The greatest part lies in the moderately warm to warm climate region with rather dry and warm summers and moderately cold winters. In the north-eastern part and at higher altitudes summers are wetter and less warm, whereas winters are longer and colder. The average annual precipitation varies from 550 to 940 mm according to altitude, but has been significantly less in the past years.

Vegetation

The most typical feature of the White Carpathians are the colourful dry grasslands, which cover over 3000 ha, principally in the south-western part. Characteristic of these grasslands is the mosaic-like pattern of plant distribution. One can find there at short distance from each other, grassland, wood fringe and forest species, xerophilous and hygrophilous species, and a variety of different phytogeographical elements. Phytosociologically these grasslands belong to the *Cirsio-Brachypodion pinnati* alliance of the *Festuco-Brometea* class. Typical species are: *Festuca rupicola, Bromus erectus, Briza media, Koeleria pyramidata, Carex montana, Anthericum ramosum, Asperula tinctoria, Astragalus danicus, Bupleurum falcatum, Chamaecytisus virescens, Cirsium pannonicum, Crepis praemorsa, Cruciata glabra, Dorycnium pentaphyllum, Filipendula vulgaris, Hypochoeris maculata, Inula hirta, I. salicina, Iris graminea, Knautia kitaibelii, Lathyrus latifolius, Melampyrum cristatum, Orobanche alba, O. lutea, Peucedanum cervaria, Polygala major, Potentilla alba, Primula veris, Pulmonaria angustifolia, P. mollis, Scorzonera hispanica, S. purpurea, Serratula tinctoria, Thesium linophyllon, Trifolium alpestre, T. montanum, T. rubens, Veronica chamaedrys* subsp. *vindobonensis, V. teucrium,* as well as the orchids *Anacamptis pyramidalis, Gymnadenia conopsea, Ophrys holoserica, Orchis mascula, O. militaris, O. ustulata, Platanthera bifolia, P. chlorantha, Traunsteinera globosa*, and seldom also *Orchis purpurea* and *Ophrys apifera.*

At higher levels in the central and eastern part pastures arose, as a substitute to the original beech forests. Most of these belong to the *Cynosurion cristati* alliance. In these

biotopes *Nardus stricta, Sieglingia decumbens, Antennaria dioica, Anthyllis vulneraria, Euphrasia rostkoviana, Genista germanica, Gentianella ciliata, G. lutescens* and *Polygala vulgaris* are common elements. They are also the optimal sites for *Coeloglossum viride, Dactylorhiza sambucina* and *Orchis morio.*

Within grassland vegetations, small marshes, springs and flushes can be found. They mostly belong to the *Calthion palustris* alliance and more rarely to the *Cardaminion amarae* or *Caricion davallianae* alliance. In these places one can encounter *Blysmus compressus, Carex davalliana, C. distans, C. flava, C. hordeistichos, Eriophorum angustifolium, E. latifolium, Cirsium canum, C. rivulare, Equisetum telmateia, Euphorbia villosa, Iris sibirica, Mentha longifolia, Parnassia palustris, Salix repens* subsp. *rosmarinifolia, Senecio umbrosus, Taraxacum* Sect. *Palustria, Thalictrum lucidum, Valeriana dioica* and *V. simplicifolia,* as well as the orchids *Dactylorhiza incarnata, D. majalis, Epipactis palustris*, and at one site also *Liparis loeselii.*

Another important part of the grasslands are wood fringe communities of the *Geranion sanguinei* alliance. In many places, however, plants typical of this alliance (such as *Iris variegata, Laserpitium latifolium, Lathyrus niger, Melampyrum nemorosum, Origanum vulgare, Tanacetum corymbosum*, and *Vincetoxicum hirundinaria)* do not form linear margins but can be found scattered across the meadows. The same counts for the species *Lilium martagon*, *Cypripedium calceolus*, *Dactylorhiza fuchsii* and *Listera ovata.*
At higher levels wood fringes belong to the *Trifolion medii* alliance. A third community in the meadow-forest gradient is formed by scrub of the *Rhamno-Prunetea* class.

Completely different vegetations are found on the Považská Bradla rocks in Slovakia, which belong to the *Seslerio-Festucion glaucae* or *Alysso-Sedion* alliance with the species *Alyssum saxatile, Aster alpinus, Dianthus hongaricus, Draba aizoides, Lactuca perennis, Leontodon incanus, Melica ciliata, Orlaya grandiflora, Phyteuma orbiculare, Saxifraga paniculata, Seseli elatum* and *Teucrium montanum.* It is in this area that *Epipactis atrorubens* is the most common within the territory of the White Carpathians.

Forest plant communities are represented by subxerophilous oak forest (*Quercion pubescenti-petrae*) remnants at the lowest levels in the southwest, and elsewhere oak-hornbeam and beech forests. Unfortunately, about half of the natural forests have been replaced by species-poor spruce plantations.
Characteristic deciduous forest species are *Actaea spicata, Anemone ranunculoides, Campanula trachelium, Carex pilosa, Cornus mas, Dentaria bulbifera, Hacquetia epipactis, Isopyrum thalictroides, Lathyrus vernus, Lonicera xylosteum, Lunaria rediviva, Melittis melissophyllum, Petasites albus, Sorbus torminalis, Staphylea pinnata, Symphytum tuberosum,* and the orchids *Cephalanthera damasonium, C. longifolia, C. rubra, Corallorhiza trifida, Epipactis helleborine, E. leptochila, E. microphylla, E. muelleri, E. purpurata, Limodorum abortivum, Neottia nidus-avis,* and *Orchis pallens.*
Our knowledge of the present occurrence of forest species (particularly *Corallorhiza*

trifida, Epipactis species and *Epipogium aphyllum*) is negatively influenced by a low interest of botanists in forest vegetations.

Landscape

The whole of the mountain range was originally covered with deciduous forests. In neolithic times people started to settle the south-western part of the area, by which a process of gradual deforestation took place. Besides arable fields, extensive meadows and steppes arose, which were enriched with thermophilous plant species spreading along the rivers Morava and Váh from the Pannonian region. These meadows were mown once a year (in July) and up until this century not fertilized; only some were additionally grazed later in the year, particularly in the vicinity of villages.
In the central part and on the Slovakian side settlements did not arise until the Middle Ages. The countryside there is of a different nature with its scattered farmhouses and surrounding fields, orchards, pastures and meadows.
From the 1960s the so-called socialization of agriculture caused big changes for the worse. A range of species-rich meadows was destroyed by ploughing up, fertilizing, melioration, intensive grazing or, conversely, by abandoning them. Nevertheless, more than 2000 ha of meadows have so far been preserved and their protection is secured in reserves (60 in the Czech Republic, 25 in Slovakia).

The orchids

The earlier cited work on the orchids of the White Carpathians (Tlusták & Jongepierová-Hlobilová 1990) includes some 7000 records from 4000 locations obtained from literature, herbaria, oral and written reports and fieldwork by the authors. 43 orchid species were proven to occur or have occurred in the region.
Recent field and taxonomic work by several botanists has made an up-date of this information necessary and is presented here. A survey is given in Table 1.

Anacamptis pyramidalis is a relatively rare species in the Czech Republic. The richest populations are found in the southwestern part of the White Carpathians, in the reserves of Čertoryje, Zahrady pod Hájem, Jazevčí and Machová.
Also the hybrid with *Gymnadenia conopsea*, x *Gymnanacamptis anacamptis,* has been recorded.

The three *Cephalanthera* species are rather rare in the former Czechoslovakia. In the White Carpathians, however, *C. damasonium* and *C. longifolia* are common throughout the area. *C. rubra* is rarer, currently known from 22 sites in the southwest and the Považská Bradla region.

Coeloglossum viride shows the tendency to disappear from Czech and Slovakian lowland areas. In the White Carpathians it is still found scattered across the region, but rich populations are exceptional.

Corallorhiza trifida is very rare in the region. In the past twenty years only 4 finds were recorded (Velká, Vápenky, Květná, Lubina). Other records are more than 50 years old. The population of some 15 plants near Květná is yearly checked.

Cypripedium calceolus occurs here only in the western part. It is recently known from 5 sites. In the reserves of Čertoryje, Porážky and Dolnoněmčanské Louky yearly several plants are being observed.

Dactylorhiza fuchsii is a very variable taxon, and transitional forms between this species and *D. maculata* are observed in many areas of Central Europe. From the White Carpathians, only *D. fuchsii* has been reported, but the possible occurrence of *D. maculata* cannot be ruled out.
In 1981 the occurrence of *D. fuchsii* subsp. *sooana* (Borsos) Borsos was confirmed (Batoušek 1981), a subspecies with predominantly white flowers, bound here to wood fringes in the eastern part of the region. From the current 49 sites of *D. fuchsii*, about a quarter has been proved to belong to this subspecies.

Dactylorhiza incarnata is a rather common species in the area, mainly occurring in the western part, where it often replaces *D. majalis*.
Also the hybrids *D.* x *aschersoniana* (*D. incarnata* x *majalis)* and *D.* x *kerneriorum (D. fuchsii* x *incarnata)* have been observed.

Dactylorhiza majalis is the most common *Dactylorhiza* of the former Czechoslovakia. In the White Carpathians, it is found all over the area. The species is currently preserved in 40 nature reserves.
Besides, it has been found to form hybrids with *D. fuchsii* (*D.* x *braunii*) and *D. sambucina* (*D.* x *ruppertii*).

Dactylorhiza sambucina is a rather common orchid in the White Carpathians and occurs in 43 nature reserves. It is only missing in the most western part of the area. It can be seen in both colour forms (yellow and purple), which give the meadows a fine appearance in spring. There are only few sites known from the Slovakian territory, probably because of less intensive research, but also because of the larger extent of calcareous soils.

Epipactis albensis was first described from the Czech Republic in 1978. It seems to be limited to riparian woods along the rivers Elbe, Morava, Váh and Danube. In 1993, J. Rydlo discovered it in the White Carpathians, near the village of Tasov. More detailed research in suitable locations might lead to more finds in the future.

Rich population of *Dactylorhiza sambucina*. Nature Reserve "Chmelinec", Vyškovec, May 10, 1990. Photo: P. Kuča.

A population of hundreds of plants of *Orchis pallens* in Hrabina forest near Horní Němčí, May 13, 1993. Photo: J.W. Jongepier.

Epipactis atrorubens occurs mainly in the region of Považská Bradla. There are, however, records from other parts of the area, where its occurrence is probably connected with marly limestone inclusions. Since 1970 it was recorded 8 times.

Here also, *Epipactis helleborine* is the most common helleborine. We have received 71 records in the past 20 years.

The rare *Epipactis leptochila* was first discovered in 1983 in Hodňovská Dolina valley near Brumov by P. Batoušek, and concerns subsp. *neglecta* Kümpel, a subspecies absent from the rest of the Czech Republic (Batoušek 1985). It is currently represented in the region with 3 sites, all in the northeastern part of the area. These differ ecologically from Slovakian sites by their lower altitudes and sandstone soil (in Slovakia on limestone soils).

Epipactis microphylla is rare, but less than *E. leptochila*. In Slovakia it is not very rare at lower elevations of the Carpathian Mts. In the White Carpathians it is restricted to the central and north-eastern parts. In the past 20 years it was recorded 16 times.

Epipactis muelleri is probably often overlooked or mistaken for *E. helleborine*. It has a scattered occurrence in the Czech Republic and Slovakia. The oldest record from the White Carpathians goes back to 1887. Its presence in the region was only reaffirmed almost a century after (Kubát 1975). Currently it is known to be growing at some 14 sites.

Through the rather frequent occurrence of wetlands and springs, *Epipactis palustris* is spreaded all over the area. The past twenty years it has been recorded about a hundred times.

Epipactis purpurata is recorded from the whole area of the White Carpathians, but it has recently been registered only 11 times.

Epipogium aphyllum was last collected by S. Richter near Haluzice and on a hill called Cigán near Nedašov. Since then it has been missing from the White Carpathians, probably due to the low botanists' attention paid to forests. We suppose it might still be hidden in some forests.

A study by the authors on the *Gymnadenia conopsea* complex has shown that three types can be distinguished in the region (Jongepierová & Jongepier 1989).
In the White Carpathians and elsewhere, *G. conopsea* subsp. *conopsea*, flowering from half of May, is common on meadows and pastures.
In marshes and flushes, seldom in dry grasslands, subsp. *densiflora* (Wahl.) Camus occurs, differing in its robustness, later flowering time (end of June), denser spikes, higher number of non-sheathing leaves and a pleasant carnation-like smell. It currently

grows on more than 10 sites across the region. A further study (Jongepierová & Jongepier, in prep.) indicates that in Slovakia and the Czech Republic this taxon is bound to calcareous soils.
In dry grasslands and pastures exposed to the sun, a third type can often be observed, differing from the nominal subspecies in a later flowering time (2 - 3 weeks later), larger stature and from subsp. *densiflora* in the smaller number of non-sheathing leaves, larger flowers, laxer spikes and a different smell. The taxonomic status and nomenclature of this taxon is not yet solved. Pure populations are from the Czech Republic so far known from only four steppe-grasslands; elsewhere this taxon mixes freely with subsp. *conopsea*.

Most of the sites of *Herminium monorchis* in the area were discovered by the amateur botanist S. Staněk in the first half of this century. The majority has been destroyed by agricultural measures. The last record of this species dates back to 1961, when it was collected by F. Weber near Korytná. A possible rediscovery is most likely in the limestone rock areas on Slovakian side.

Himantoglossum adriaticum reaches the northernmost border of its distribution area in Slovakia and the south of Moravia. From the White Carpathians two sites are known (Skalica, Bošácká Dolina), both outside the Protected Landscape Area. At the first one it was last seen in 1863, the second one concerns a record by F. Procházka from 1980. It is now considered extinct.

Limodorum abortivum only grows in the Slovakian White Carpathians. From the last 20 years 3 sites are known: Bošácká Dolina (2 x) and Lubina.

Liparis loeselii used to grow at two sites in the region. One was destroyed, the second near Březová was reaffirmed in 1983, when 6 plants were discovered. Since, the population has been monitored. No plants were found from 1988 to 1992 and the species was considered missing. In 1993, however, two plants were found again and in 1994 even ten.

The most common orchid in the area is *Listera ovata*. It occurs in all parts, in woods, along brooks and rivers, as well as on meadows.

Malaxis monophyllos was only recorded from 3 sites in the Považská Bradla region in the 19th century. Although it has not been seen for some 150 years, it is not yet considered extinct. Its inconspicuous appearance and irregular flowering as well as the presence of several suitable sites keeps hopes of its reappearance alive.

Neottia nidus-avis belongs to the commonest orchid species. More than 100 records have been gathered in recent times.

The only Czech sites of *Ophrys apifera* are situated in the White Carpathians, where it was found first in 1981 near Horní Němčí. Ten years later it was also discovered in the nature reserve of Čertoryje. Since then, a few plants have been found flowering every year.

Also the sites of *Ophrys fuciflora* are the only ones in the Czech Republic. In the past it occurred at 94 (!) different sites, mostly situated in the western half of the area. However, only 15 % of the 222 records concern the last 20 years. The richest populations (of over 100 individuals) are located in the nature reserve "Zahrady pod Hájem" and in Brezovská Dolina valley.
O. fuciflora is a very variable species, but all plants in the former Czechoslovakia are classified as subsp. *holubyana* (András.) Dost.

Ophrys sphegodes is absent from the Czech Republic and currently known from only 2 sites in southern Slovakia (Bratislava, Štúrovo). Last century it was once also found in the Slovakian White Carpathians by J.L. Holuby in Bošácká Dolina valley.

Orchis coriophora is a species extinct from the Czech Republic, but Slovakia has still got some 10 sites left. In the White Carpathians it was last seen by V. Tlusták in the nature reserve "Jazevčí" in 1970. As it is very sensitive to eutrophication, there is slight hope of rediscovering it.

Up until the 1950s, also *Orchis laxiflora* occurred in the area, though on its outskirts, outside the Protected Landscape Area near the town of Veselí nad Moravou. The marsh was then drained and changed into arable land.

Orchis mascula is a very common orchid here. It tolerates moderate amounts of fertilizers and persists longer than other orchids in competition with mesophilous vegetations.
The plants belong to subsp. *signifera* (Vest) Soó, the subspecies common in Moravia and Slovakia. Subsp. *mascula* occurs in Bohemia.

Orchis militaris is an often observed orchid as well. It shows a distribution pattern similar to that of *O. mascula*. It occurs mostly in dry grasslands but at wet places, too.

The number of sites with *Orchis morio* in the former Czechoslovakia has been reduced with 80 % in the second half of this century. In the White Carpathians it is still found scattered across the whole area. Altogether we collected 117 records in the past 20 years. The richer populations are bound to pastures with low cattle densities in the central part of the mountain range.

Orchis pallens is the earliest flowering orchid, occurring in deciduous woods, wood fringes and meadows bordering on woods or shrub. It is not uncommon (60 records since 1970), but limited to areas at lower altitudes.

Though *Orchis purpurea* has a scattered distribution in the Czech Republic and is quite common in Slovakia, it is very rare in the White Carpathians. Only now and then some plants are observed, exclusively in the west, where it has recently been reported from 9 sites.
The hybrid *Orchis* x *hybrida* (*O. militaris* x *purpurea*) has been found here, too.

Orchis tridentata has been missing since 1970, when it was last seen by V. Tlusták in the nature reserve "Čertoryje". At most of the other 11 original sites plants of this species were destroyed by ploughing up or fertilizing. There might, however, be a chance of finding it again in the warmest parts of the region, in steppe-like grassland vegetations.

Orchis ustulata appears in both (recently described) forms in the former Czechoslovakia. In the White Carpathians only subsp. *aestivalis* (Kümpel) Kümpel et Mrkvička, which has laxer spikes and flowers in July, has been observed.
In the Czech Republic, a 85 % decline in the number of sites of this orchid was noticed during the last 30 years. This is comparable to the situation in the studied region, where 26 sites have remained out of 112 recorded in the past.

Platanthera bifolia is a common orchid throughout Central Europe and also appears frequently in most parts of the White Carpathians.
The occurrence of the hybrid *Platanthera* x *hybrida* (*P. bifolia* x *chlorantha*) has been confirmed several times.

Platanthera chlorantha is a much rarer orchid, in both the White Carpathians and the surrounding countries. It has hardly been recorded from the central part of the mountain-ridge.
In the past it was probably badly distinguished from *P. bifolia* - half of the records originate from the last 30 years.

Spiranthes spiralis is currently known from only 2 sites in the Czech Republic, but Slovakia still possesses several relatively rich populations. In the White Carpathians it was recorded from 4 sites, three around Valašské Klobouky, a fourth near Starý Hrozenkov. It was last collected by P. Sillinger near Valašské Klobouky (Dubovec) in 1955. The White Carpathian Red Data List (Kuča et al. 1992) considers it extinct, but searching for this inconspicuous orchid in late summer at suitable places in the northern part of the area might confirm it still occurs in the region.

Traunsteinera globosa, though rare in the Czech Republic and not common in Slovakia, belongs to the most common orchids in the White Carpathians. It is remarkable that this typically monticolous orchid occurs here mostly on hills in dry grasslands (*Festuco-Brometea*) and as often at lower (down to 300 m!) as at higher elevations.

Threats

The occurrence of most orchids in the area of the White Carpathians is safeguarded by a system of nature reserves and by a restrictive policy towards high-productive agriculture and other negative impacts on ecosystems in the Protected Landscape Area. The region and its rich flora are, however, not yet out of danger. Particularly the political and economic changes that have been taking place since 1990 form a threat to its further existence.

Before the Velvet Revolution most of the land, including nature reserves, was owned and managed by large state and cooperative farms, and forests were in the hands of state forestry institutions. These organizations were, however, bound to restrictions imposed by the Protected Landscape Area status and the yet severer ones in nature reserves. The farms used to mow large areas of valuable meadows once a year in June or July, even if hay production was far from economical.

Now, agriculture has to be cost-effective, which in this region can hardly be realized without subsidies. Farms are thus going bankrupt, which hazards the management of some 3000 hectares of species-rich grassland and their flora and fauna.

To protect the valuable flora of the White Carpathians we are trying hard to find sustainable economic solutions in order not to be too much dependent on state subsidies. Besides financial resources, international recognition of the region's high biological values is badly needed.

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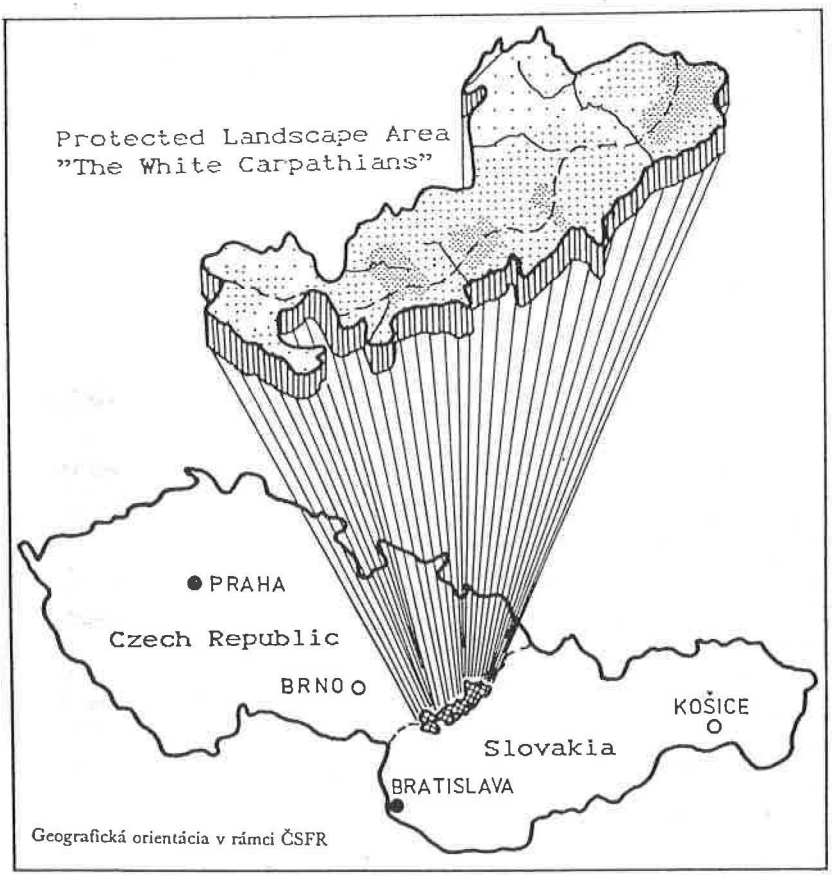

Fig.1 Map of the Czech Republic, Slovakia and the situation of the Protected Landscape Area of The White Carpathians

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1 *Dactylorhiza fuchsii* subsp. *sooana*, hillside meadow "Pod Cigánem" near Nedašov, June 3, 1993. Photo: J.W. Jongepier

2 *Gymnadenia conopsea* subsp. *densiflora*, lakeshore in quarry, Nature Reserve "Lom Rasová", Komňa, July 9, 1994. Photo: P. Batoušek

3 *Ophrys arachnitiformis*, Talairan, 10-5-1994; foto: H. Dekker (zie pag. 103)

4 *Ophrys sphegifera* x *sphegodes*, Arques, 8-5-1994; foto: H. Dekker (zie pag. 102)

Table 1

	number of sites[1]	degree of threat[2] BK[3]	Cz[4]	Sl[5]
Himantoglossum adriaticum	2 / 0	1	3	3
Ophrys sphegodes	1 / 0	1	-	3
Orchis coriophora	31 / 0	1	1	3
Orchis laxiflora	1 / 0	1	3	3
Spiranthes spiralis	5 / 0	1	3	3
Epipogium aphyllum	10 / 0	2	3	3
Herminium monorchis	15 / 0	2	3	3
Malaxis monophyllos	2 / 0	2	3	4
Orchis tridentata	12 / 0	2	3	3
Corallorhiza trifida	25 / 4	3	4	4
Epipactis leptochila	3 / 3	3	3	3
Epipactis albensis	? / 1	3	4	3
Gymnadenia conopsea subsp. densiflora	? / 10	3	3	3
Limodorum abortivum	9 / 3	3	3	4
Liparis loeselii	2 / 1	3	3	3
Ophrys apifera	2 / 2	3	3	3
Ophrys fuciflora	94 / 20	3	3	3
Anacamptis pyramidalis	62 / 25	4	4	3
Cephalanthera rubra	35 / 22	4	4	4
Cypripedium calceolus	28 / 5	4	4	4
Dactylorhiza fuchsii s.l.	130 / 49	4	5	6
Epipactis atrorubens	15 / 8	4	5	5
Epipactis microphylla	70 / 15	4	4	4
Epipactis muelleri	15 / 14	4	4	3
Epipactis purpurata	90 / 11	4	5	4
Orchis purpurea	26 / 9	4	4	4
Coeloglossum viride	105 / 30	5	4	4
Dactylorhiza incarnata	97 / 24	5	4	3
Orchis militaris	175 / 55	5	4	5
Orchis morio	251 / 77	5	4	4
Orchis pallens	153 / 45	5	4	4
Orchis ustulata	112 / 26	5	4	4
Cephalanthera damasonium	94 / 58	6	5	5
Cephalanthera longifolia	82 / 63	6	5	5
Dactylorhiza sambucina	197 / 87	6	4	4
Epipactis palustris	146 / 70	6	4	4
Gymnadenia conopsea s.l.	284 / 160	6	5	4
Orchis mascula	184 / 69	6	4	4
Platanthera chlorantha	72 / 44	6	5	4
Dactylorhiza majalis	217 / 108	7	5	6
Epipactis helleborine	149 / 67	7	7	7
Listera ovata	312 / 151	7	7	6
Neottia nidus-avis	163 / 93	7	7	7
Platanthera bifolia	249 / 148	7	5	7
Traunsteinera globosa	250 / 95	7	4	4

[1] total number of sites recorded / number of currently known sites

[2] 1 - extinct, 2 - missing, 3 - endangered, 4 - most vulnerable, 5 - vulnerable, 6 - potentially threatened, 7 - not threatened.

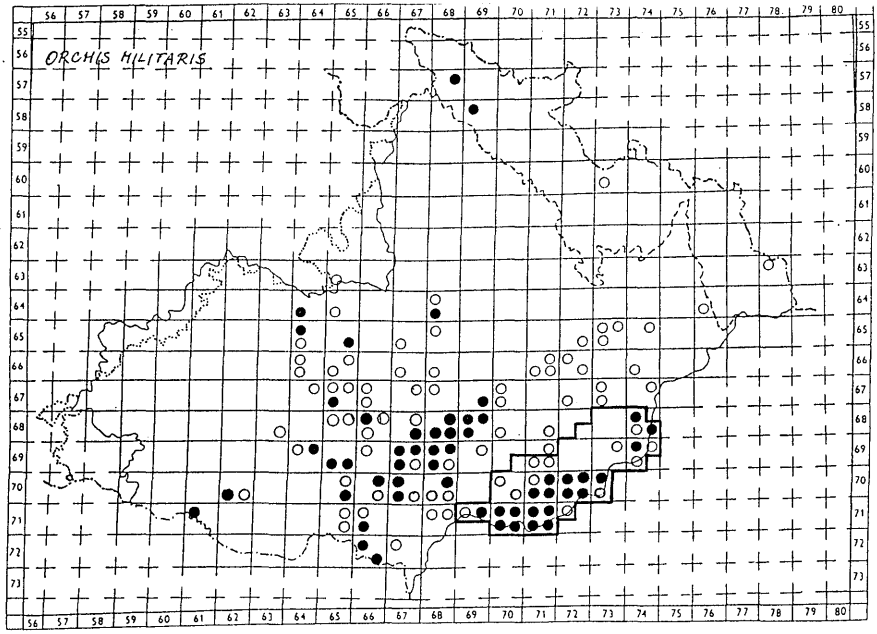
[3] White Carpathians, [4] Czech Republic, [5] Slovakia.

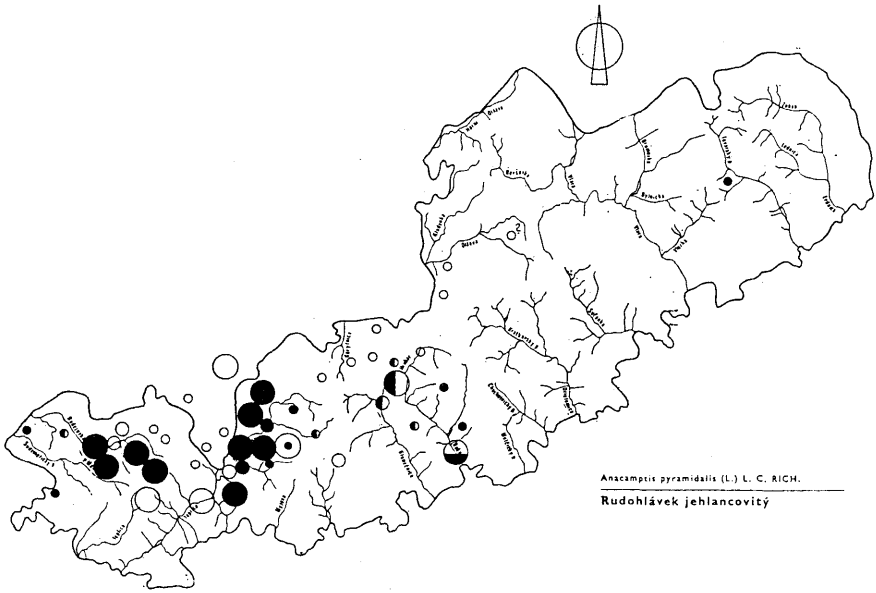
Epipactis leptochila ssp. *neglecta*, Hodňovská Dolina valley near Brumov, 17-7-1994 (P. Batoušek)

Fig. 2. (p. 88): Distribution map of *Orchis militaris* in Moravia (after: J. Šmiták, Rozšíření vstavačovitých na Moravě a Slezsku; in print). Bold: the White Carpathians. Open circles: recorded before 1980. Full circles: recorded in or after 1980.

Fig. 3,4,5 (p. 88-89): Distribution maps of (a) *Anacamptis pyramidalis*, (b) *Dactylorhiza incarnata* and (c) *Traunsteinera globosa* in the White Carpathians.
Open circles (○): sites from which the species is considered extinct.
Full circles (•) : sites where the species is still present.

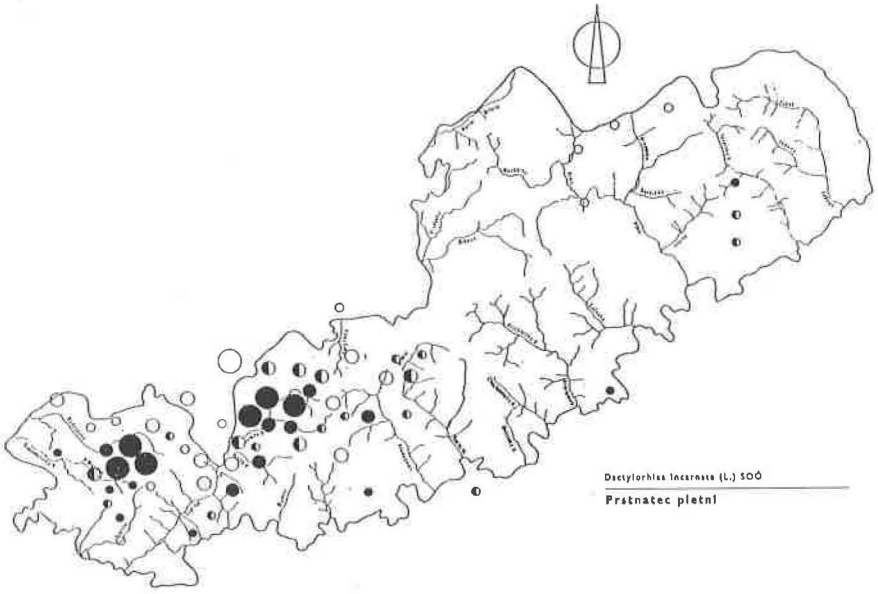
o : recorded once; O : recorded 2 to 5 times or including 2 to 5 'microsites'; O : recorded more than 5 times or including several 'microsites' recorded more than once; ◐ - to be verified; ◒ - exact location unknown; ◉ - now scarce, earlier much more abundant; ? - doubtful record.

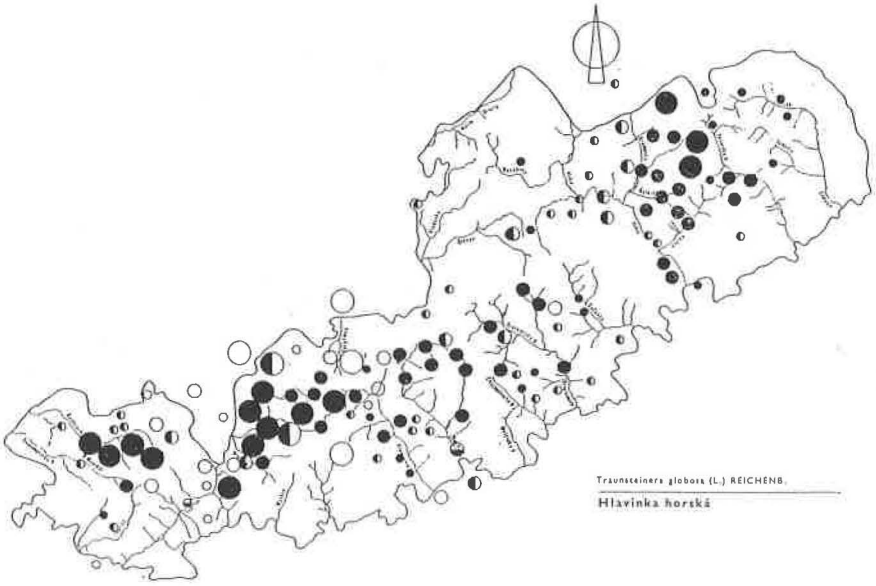




Anacamptis pyramidalis (L.) L. C. RICH.

Rudohlávek jehlancovitý


Dactylorhiza incarnata (L.) SOÓ
Prstnatec pletní


Traunsteinera globosa (L.) REICHENB.
Hlavinka horská