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Orobanche mayeri (Suess. & Ronniger) Bertsch & F. Bertsch – a species new to Poland

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Abstract

Two new localities of *Orobanche mayeri* (Suess. & Ronniger) Bertsch & F. Bertsch, one of the rarest representatives of the family Orobanchaceae in Europe, are reported from southern Poland. The species was recorded in the Pieniny Mts (Central Western Carpathians) in July 2009. The hosts, abundance and habitat preferences at the new localities are described and a supplemented map of the distribution in Europe and Poland is given.

Keywords: Orobanchaceae, *Orobanche mayeri*, distribution, habitat, Pieniny Mts, Poland

Introduction

Orobanche mayeri (Suess. & Ronniger) Bertsch & F. Bertsch, Mayer's broomrape, is one of the rarest representatives of the family Orobanchaceae in Europe. It was known only from single localities in Germany, Slovakia and Romania prior to this report. It is red-listed as a threatened species in Baden-Württemberg [1] and Germany: (category R) [2], as a highly endangered of extinction [3], as well as in Slovakia (category LRr) [4]. It is considered to be threatened in central Europe (Verantwortlichkeit Mitteleuropas, VME) [5,6].

The species was discovered by the botanist and pharmacists Adolf Mayer (1871-1952) from Germany in Zeller Horn in the Swabian Alb in Baden-Württemberg in 1940 and incorrectly determined as *O. elatior*. It was later revised by Süssenguth and Ronniger [7] and identified as *O. alsatica* var. *mayeri*. The taxon, considered to be endemic, was known only from one locality in Europe. It was later recorded at over ten localities in the Slovakian Carpathians in the 1990s [4].

General distribution

Orobanche mayeri is a rare species associated mostly with the flora of the Western Carpathians, especially with the area of the Central Carpathians [4]. Its distribution is not fully known.

Orobanche mayeri was first reported from Germany [7]. It was treated as an endemic taxon but was later recorded at over ten localities in Slovakia in the Carpathians. It was mostly recorded in the Nizkie Tatra Mts (district: Demänovská dolina, Liptovský Hrádok, Krakova hola, Malužiná, Čierny Váh) and was collected at one locality in the Choczańskie Góry Mts (Kvačianska valley) and at three localities in the Western Beskidy Mts in Orava [4].

Pujadas-Salvá and Gómez-Garciá [8] report one more locality from Romania, from the southern Carpathians, based on a herbarium specimen in Jena: Bucegi Plateau, 2000 m, 14.07.1961, leg. K. Shäfer, JE (Fig. 1). The locality needs confirmation.

The location given by Kaiser [9] from Karlstadt (Kalbenstein) in Bavaria is incorrect and belongs to *Orobanche alsatica* [10] (Uhlich personal communication, 2010).

Taxonomic notes

Orobanche mayeri (Suess. & Ronniger) Bertsch & F. Bertsch [11]. Basionym: *Orobanche alsatica* Kirschleger var. *mayeri* Süssenguth & Ronniger [7]. Syn.: *Orobanche alsatica* var. *mayeri* Süssenguth et Ronniger; *O. alsatica* subsp. *mayeri* (Suess. & Ronniger) Kreutz [12].

The complex of morphologically similar species treated as *O. alsatica* agg., in which *O. mayeri* is included, requires special and critical taxonomic revision. The species is also morphologically similar to *O. flava* [4]. A list of characters differentiating the species within the *O. alsatica* agg. is given in a study by Pujadas-Salvá and Gómez-Garciá [8].

Although it was described by Süssenguth and Ronniger [7] as a variety of *O. alsatica* and reported as a subspecies in Kreutz [12], Rothmaler [13] and Pusch and Günther [10]. *O. mayeri* seemed to differ sufficiently by distinct morphological and ecological characters that it could be raised to the rank of species. This was done by Bertsch and Bertsch [11] and the rank was later accepted by Hepp [14], Nieschalk and Nieschalk [15], Zázvorka [4], Senghas and Seybold [16] as well as Pujadas-Salvá and Gómez-Garciá [8].

In the original description of *O. alsatica* subsp. *mayeri*, Süssenguth and Ronniger [7] report bright yellow taxa. However,

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only a few plants were yellow at the locus calssicus while the colour of most specimens ranged from light to dark brown [12]. Pink-red or reddish plants are also reported by [4]. Many species of the genus *Orobanche*, including those within the *O. alsatica* sensu lato group, are often yellow; however, they almost never constitute the majority of a population. Such pigmentation is not typical and is a result of the insolation rate or incomplete plant pigmentation. Yellow and albinotic varieties can usually occur in more shaded sites.

Biology and habitat conditions

The locality in Zeller Horn, is situated in a NW-facing mountain meadow (840-900 m). *Orobanche mayeri* grows on calcareous, loamy soil, with solitary beech trees. The area was declared a protected nature reserve in 1950 and is one of the most important plant habitats in the Swabian Alb [12]. It grows in Germany in the ass. Bupleuro longifolii-Laserpitietum latifolii (Geranion sanguinei, Origanetalia) [13] (Uhlich personal communication, 2009).

O. mayeri grows at altitudes from 650 to 1000 m, maximum 1500 m, at the localities in Slovakia. It usually occurs on S-facing habitats, on grassy slopes, overgrowing rocks, in relict pine groves and thinned spruce forests as well as in relict montane xerothermic grasslands on dolomites and limestone. In Slovakia the plant grows in Erico-Pinion (= Pulsatillo slavicae-Pinion) and Laserpitio-Calamagrostietum variae (Seslerietalia). It is often accompanied by *O. reticulata* [4].

O. mayeri flowers from the end of June until the end of July (August) [4,12]. *Laserpitium latifolium* is its exclusive host [10,12]. Zázvorka [4] additionally reports another host plant, *Pimpinella major* subsp. *rhodochlamys*, from the locality in Ohnište in the Nizkie Tatra Mts.

Methods

Field studies were carried out in July in 2009. The localities are situated in the Western Carpathian province, Central Western Carpathians subprovince, Obniżenie Orawsko-Podhalańskie depression macroregion, Pieniny mesoregion [17]. The distribution of its localities was mapped using the ATPOL grid based on cartogram units 10 × 10 km [18].

The nomenclature of the vascular plant species listed in the phytosociological table follows Mirek et al. [19] and the nomenclature of syntaxa is used after Matuszkiewicz [20]. Phytosociological relevés were conducted using the Braun-Blanquet method [21].

Results

New localities

Two localities of *O. mayeri*, separated by 1.5 km in a straight line, were recorded in southern Poland in the Central Pieniny Mts, ATPOL EG33 (Fig. 1, Fig. 2).

BIAŁE SKAŁY. The ecotone zone of an overgrowing rock grassland and a thinned oak-hornbeam forest on the S-facing slope of the Białe Skały rocks, near the blue tourist trail, 49°25'31.1"N/20°25'19"E, alt. 725 m. Species of the Querco-Fagetea class dominate in the community with a very small participation of the Seslerietea variae, Festuco-Brometea and Trifolio-Geranietea sanguinei classes. Only five specimens were recorded.

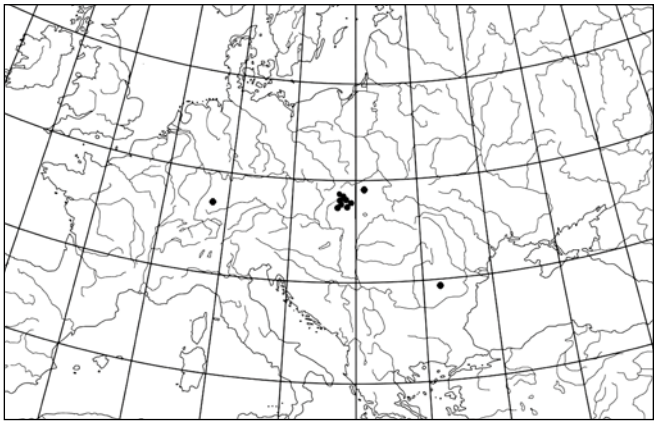

Fig. 1 General distribution map of *Orobanche mayeri*.

Fig. 2 Distribution of *Orobanche mayeri* in Poland (in the ATPOL grid, 10 × 10 km). Black circles – new localities.

TRZY KORONY. S-, SE- and SW-facing rock ledges and cliffs below the Okrąglica summit, 49°24'49.4"N/20°24'51"E, alt. 915-967 m. The species is scattered in a xerothermic grassland of the Festuco-Brometea class in the ecotone zone with rock grasslands of the Dendranthemo-Seslerietum ass. (Seslerietea variae class); with a high occurrence of species of the Trifolio-Geranietea sanguinei and Querco-Fagetea classes. A total of ca. 30 specimens were recorded. The majority of the specimens were observed in an open, S-facing xerothermic grassland (Fig. 3).

A detailed list of species recorded at the localities is given in Tab. 1.

Conclusions

The calcareous substrate, the exceptional geomorphological and microclimatic differentiation, the absence of glaciation, the vicinity of the Tatra Mts and calcareous Slovakian

Fig. 3 *Orobanche mayeri*. **a**,**b** Inflorescences. **c** Xerothermic grassland with species on Okrąglica. Photo by R. Piwowarczyk, 2009.07.30.

ranges and, consequently, migration opportunities between the ranges, and the low altitude of the range influence a high differentiation of the vegetation in the Pieniny Mts. Relicts, that is plants that have survived at their localities from the earliest geological periods and live in isolated populations at considerable distances from their range limits, also occur in the area.

Orobanche mayeri grows in the Pieniny Mts in rock grassland communities, especially in the ecotone zone of two classes that represent them: xerothermic grasslands of Festuco-Brometea class and montane grasslands Seslerietea variae developing on calcareous substrate. In the former, Dendranthemo-Seslerietum variae, a rock montane grassland and an endemic association in the Pieniny Mts, is particularly interesting. Scrub and forest species of the Trifolio-Geranietea sanguinei and Querco-Fagetea classes often occur in the communities occupied by *O. mayeri*. This is associated with progressing secondary succession and the mosaic pattern of phytocoenoses (Tab. 1).

Communities occupied by *O. mayeri* in Germany and Slovakia are similar to Polish localities. They are rare communities of the Geranion sanguinei, Seslerietalia or Erico-Pinion [4,16]. It should be added that the occurrence of range limit and impoverished forms of communities of the Erico-Pinetea class in the Polish Pieniny Mts has been the subject of several controversies and requires further investigation [20].

The montane occurrence is observed within the species' range. *O. mayeri* most frequently occurs at ca. 725-967 m in Poland, ca. 840-900 in Germany [12], 650-1000, rarely at 1500 in Slovakia [4] and 2000 m in Romania (after [8]).

The species grows to a height of 35 to 45(55) cm at its localities in Slovakia [4] and up to 60 cm in Germany [12]. It was between 22 and 60 cm tall at the Polish localities.

As a rarely occurring species with a small distribution range, *O. mayeri* is highly threatened in Europe. Additionally, populations at its localities are not numerous. Only two specimens were recorded in Zeller Horn in 2008 [22], nine in 2009 (Uhlich personal communication). Its populations range from

Tab. 1 Plant communities with *Orobanche mayeri*.

Number of relevé	**1**	**2**	**3**	**4**
Location	Białe Skały	Okrąglica 1	Okrąglica 2	Okrąglica 3
Date	29.07.2009	30.07.2009	30.07.2009	30.07.2009
Area of relevé (m^2)	25	25	40	25
Exposure	S	SE	SE	S
Inclination	20	30	30	70
Latitude (N)	49°25'31.1"	49°24'50.4"	49°24'50.8"	49°24'49.4"
Longitude (E)	20°25'19"	20°24'49.8"	20°24'50.9"	20°24'51"
Altitude (m)	725	967	915	921
Density of tree layer A (%)	75	30	30	0
Density of shrub layer B (%)	20	15	10	15
Density of herb layer C (%)	60	95	75	100
Density of moss layer D (%)	15	5	5	5
Number of species	27	45	46	34
Orobanche mayeri	+	+	+	+
Ch. Dendranthemo-Seslerietum variae				
Sesleria varia	+	3	1	4
Centaurea triumfetti	.	.	+	+
Dendranthema zawadzkii	.	.	+	+
Erysimum wittmannii	.	.	r	+
Helianthemum alpestre subsp. *rupifragum*	.	.	+	+

Tab. 1 *(continued)*

Number of relevé	1	2	3	4
Ch. Seslerietea variae				
Carduus glaucus	+	+	+	+
Jovibarba hirta subsp. *glabrescens*	.	+	.	+
Scabiosa lucida	.	+	+	.
Ch. Festuco-Brometea				
Allium montanum	+	+	+	2
Festuca pallens	.	+	+	1
Euphorbia cyparissias	.	+	+	+
Teucrium montanum	+	.	.	+
Ch. Trifolio-Geranietea sanguinei				
Campanula rapunculoides	+	+	+	+
Libanotis pyrenaica	+	+	+	+
Bupleurum falcatum	.	.	+	+
Coronilla varia	.	.	+	+
Clinopodium vulgare	+	.	+	.
Polygonatum odoratum	.	+	+	.
Ch. Querco-Fagetea				
Fagus sylvatica A	3	2	2	.
Corylus avellana B	+	+	.	+
Melica nutans	3	.	+	.
Acer pseudoplatanus C	+	.	+	.
Epipactis helleborine	+	+	.	.
Lathyrus vernus	.	+	+	.
Lonicera xylosteum B	+	.	+	.
Lonicera xylosteum C	+	.	+	.
Others				
Laserpitium latifolium	1	1	1	1
Digitalis grandiflora	+	+	+	+
Vincetoxicum hirundinaria	+	+	+	1
Calamagrostis varia	.	4	1	+
Picea abies A	2	+	2	.
Galium mollugo s.l.	.	+	+	+
Cotoneaster integerrimus C	.	+	+	+
Bupleurum longifolium	.	+	+	+
Thymus pulegioides	.	+	+	+
Fragaria vesca	+	+	+	.
Rosa dumalis C	+	+	.	+
Rubus idaeus	.	+	2	.
Aconitum variegatum	.	+	+	.
Cotoneaster integerrimus B	.	+	.	+
Hypericum perforatum	.	+	.	+
Lathyrus pratensis	.	+	+	.
Mycelis muralis	+	.	+	.

SPORADIC: **Ch. Dendranthemo-Seslerietum variae:** *Astragalus australis* 2(r); *Bellidiastrum michelii* 3. **Ch. Festuco-Brometea:** *Dianthus carthusianorum* 3; *Veronica spicata* 4. **Ch. Querco-Fagetea:** *Acer pseudoplatanus* A 1(1); *Actaea spicata* 2; *Corylus avellana* C 1; *Euphorbia amygdaloides* 1; *Galium odoratum* 2; *G. schultesii* 2; *Lilium martagon* 2; *Viola reichenbachiana* 1. **Others:** *Abies alba* A 3(1); B 1(1); C 2; *Alyssum saxatile* 4(r); *Briza media* 3; *Cirsium* sp. 2; *Cornus sanguinea* B 1; C 1; *Epipactis atrorubens* 4; *Euphrasia salisburgensis* 4; *Fagus sylvatica* B 1; C 1; *Gypsophila repens* 3(r); 4(r); *Heracleum sphondyllium* 3; *Juniperus communis* B 4(1); *Picea abies* B 3; C 1; *Medicago falcata* 3; *Orobanche caryophyllacea* 2; *Polygonatum verticillatum* 1; *Salix silesiaca* A 2(1); *Senecio nemorensis* 2; *Tanacetum corymbosum* subsp. *clusii* 2; *Taraxacum* sp. 2; *Tussilago farfara* 2; *Urtica dioica* 3.

five to 30 specimens in Poland. The most numerous populations and the greatest density of localities have been observed in Slovakia.

Relict habitats occupied by *O. mayeri* at the European localities and the disjunctive and limited distribution range also indicate its relict character. Investigations planned by the author should provide further data on the distribution, taxonomy and ecology of the taxon.

The new localities of the species are within the protected area of the Pieniny National Park. Progressing secondary

succession and the proximity of tourist trails pose a threat to the species.

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