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Epipactis albensis (Orchidaceae): a new species in the flora of Romania

Attila Molnár V.[1] & Gábor Sramkó[2]

[1]*Department of Botany, Faculty of Sciences & Technology, University of Debrecen, H-4032 Debrecen, PO. B. 14., Hungary; e-mail: mva@science.unideb.hu*
[2]*ELTE-MTM Ecology Research Group, H-1117 Budapest, Pázmány Péter sétány 1/C, Hungary; e-mail: sramko.gabor@science.unideb.hu*

Abstract: A small population of *Epipactis albensis* Nováková & Rydlo, a species previously unknown in the flora of Romania, was found in Gorge Turda (Cheile Turzii, county Cluj) in 2011. The occurrence is currently the easternmost known population of this strictly autogamous species originally described from the Czech Republic, and recently known only from five other Central-European countries. Morphological features, habitat preference, soil reaction, currently known distribution and biological characteristics of the plant are presented.

Key words: *Epipactis albensis*; autogamous species; distribution; floristics; mapping; Romania

Introduction

The genus *Epipactis* is one of the taxonomically most difficult European orchid genera (Squirrell et al. 2002; Hollingsworth et al. 2006). Studies in the last decades have provided description of numerous new autogamous species from Central and Southern Europe. Another result of recent researches has greatly expanded the distribution areas of some species originally believed to be local or regional endemics (e.g. *E. pontica, E. exilis, E. greuteri, E. voethii, E. futakii* and *E. tallosii*). *Epipactis albensis* (Elbe-Helleborine) was described by Nováková & Rydlo (1978) from the Czech Republic. The species is currently known from only five other countries in Central Europe: Slovakia (Rydlo 1982; Vlčko 1997; Kolník & Kučera 2002), Poland (Rydlo 1989), Austria (Breiner et al. 1993; Timpe & Mrkvicka 1996), Germany (Wucherpfennig 1993a, b), and Hungary (Timpe 1995; Molnár et al. 1995). The species is reported from Northern Italy (Hoffmann 2004), but the published photograph shows *Epipactis pontica* Taubenheim. Jatiová & Šmiták (1996), who knew the species well, additionally postulated the presence of *E. albensis* in Romania and Ukraine.

On 12th August 2011, a population of *E. albensis* was found in Gorge Turda (Cheile Turzii) in the vicinity of Turda (Central Romania; N 46.56° E 23.68°).

From a floristic point of view Gorge Turda is one of the best known and most diverse territories in Romania. The presence of 988 vascular plant species is reported from a 3.2 square kilometer size area (Nyárády 1939) including *E. helleborine* [under the name *Helleborine latifolia* (L.) Druce]. In the latest catalogue of Romania's vascular plant flora (Oprea 2005) only six species of the genus (*Epipactis helleborine, E. purpurata, E. atrorubens, E. danubialis, E. leptochila* and *E. microphylla)* can be found. As an addition to the list above, *Epipactis greuteri* was recently published from Romania (Ardelean 2011).

E. albensis is an obligate autogamous taxon, which is reflected by its floral morphology: anther sessile, clinandre only slightly developed, viscidium absent, rostellum is non-functional and pollinia is powdery (Wucherpfennig 2007; Claessens & Kleynen 2011).

Material and methods

For each individual studied, 21 morphological characters were measured and two relations were calculated. Data for all characters were taken in the field without damaging the plants. For documentation purposes two flowering specimens were collected (without rhizome), which are deposited in Herbarium of University of Debrecen, Hungary (DE).

The identification was checked by comparing the plants to the description and keys in the works of Delforge (2006), Vlčko et al. (2003) and Wucherpfennig (1993a, 2007), while the accompanying plant species were identified using the comprehensive Romanian flora (Săvulescu & Nyárády 1952–1976), which is followed in the nomenclature below. The soil-sampling and the measurement of soil acidity was undertaken in accordance with the methods used for *Ophrys* (Molnár et al. 2011).

Results and discussion

The new locality of *E. albensis* lies near Stream Hăsdate within the administrative area of the city of Turda (cca. 15 km south-east of Cluj-Napoca in county Cluj) at an elevation of ca. 450 m a.s.l. This area lies within the

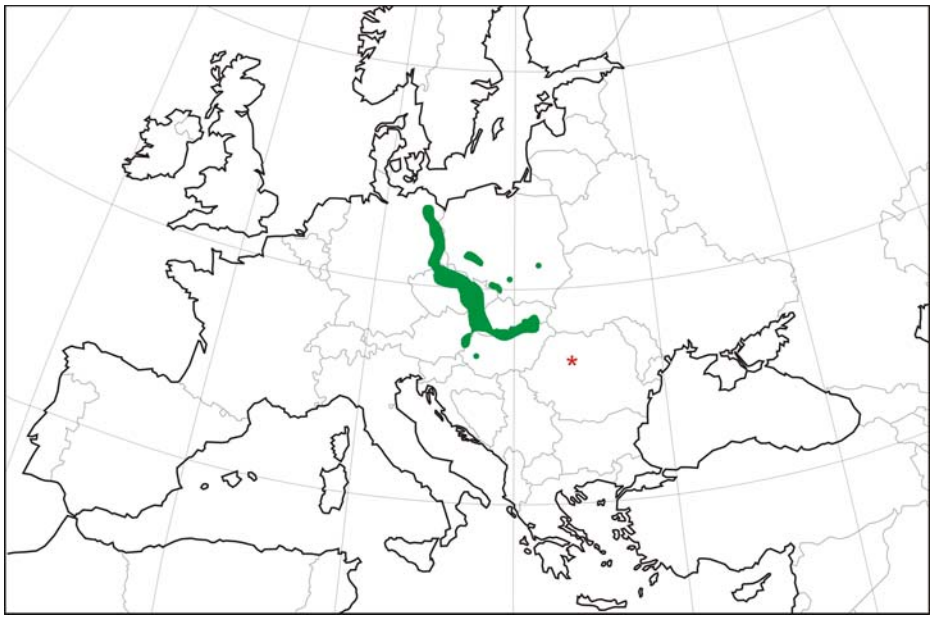

Fig. 1. General distribution map of *Epipactis albensis* (after Gügel et al. 2010; Baumann 2005; Timpe & Mrkvicka 1996; Procházka et al. 1999; Bernacki 2001 and Sulyok & Molnár 2011, modified). The newly found occurrence is marked with an asterisk.

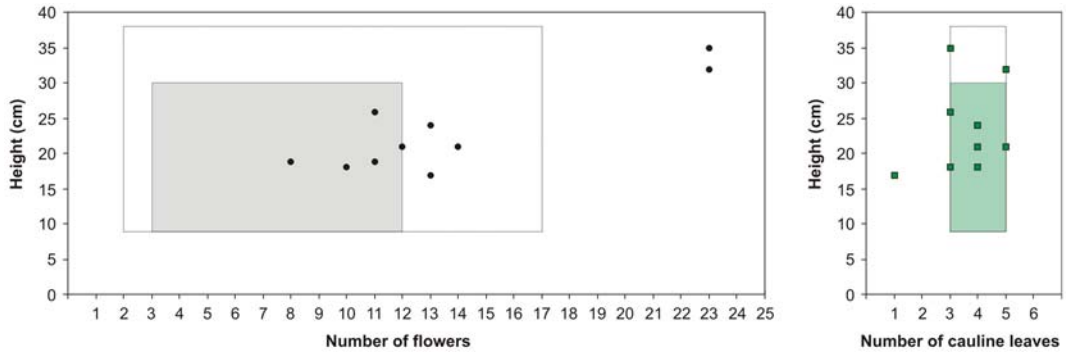

Fig. 2. Characteristics of 10 individuals of the populations investigated (black dots) and the typical (shaded rectangle) and extreme values (open rectangle) published by Vlčko et al. (2003).

Table 1. Morphometric data of *E. albensis* from Cheile Turzii (Gorge Turda).

Character	Mean	Median	SD	Min	Max
Height (cm)	23.9	22.5	5.7	18	35
Number of flowers	13.2	11.5	5.6	7	23
Number of cauline leaves	3.6	4	1.2	1	5
Number of bract-like leaves	1.3	2	0.9	0	2
Length of lowermost bract (mm)	23.7	23.5	5.0	17	31
Length of 1st leaf (mm)	17.1	19	6.6	5	23
Width of 1st leaf (mm)	12.6	13	7.0	4	23
Length of 2nd leaf (mm)	31.7	32	7.9	24	42
Width of 2nd leaf (mm)	18.3	18	3.6	13	23
Length of 3rd leaf (mm)	39.1	40	5.2	32	47
Width of 3rd leaf (mm)	16.4	17	3.4	12	21
Length of 4th leaf (mm)	37.8	38.5	4.4	31	42
Width of 4th leaf (mm)	9.3	8.5	3.2	5	14
Length of 5th leaf (mm)	29.5	30.5	3.1	25	32
Width of 5th leaf (mm)	5	5	0.8	4	6
Length of 6th leaf (mm)	23.3	23	1.5	22	25
Width of 6th leaf (mm)	3.3	3	0.6	3	4
Height of emergence of 1st leaf (cm)	4.4	4	1.5	2.5	7
Length of inflorescence (cm)	8.5	7.8	3.3	5	17
Length of inflorescence / Height of plant	0.35	0.32	0.08	0.26	0.5
Height of emergence of 1st leaf / Height of plant	0.19	0.19	0.07	0.10	0.27

Table 2. Some morphological characters of *E. albensis* collected in Gorge Turda and comparison of these to the published data in recent literature.

Character	Wucherpfennig (1993a)	Vlčko et al. (2003)	Delforge (2006)	Present study
Height (cm)	(8–)20(–37)	9–30(–38)	8–30(–47)	(18–)19–28(–35)
Number of flowers	(1–)5–10(–17)	(2–)3–12(–17)	(2–)3–12(–25)	(7–)8–18(–23)
Number of cauline leaves	(1–)3(–4)	3–5	3–5	(1–)3–4(–5)
Number of bract-like leaves	(0)1(2)	No data	No data	(0)1–2
Length of lowermost bract (mm)	No data	ca. 40	ca. 40	(17–)20–28(–31)
Length of leaves (mm)	(23–)36(–50)	30–63	20–63	(5–)20–40(–47)
Width of leaves (mm)	(10–)18(–28)	10–20	14–36	(4–)10–20(–23)
Length of inflorescence (cm)	No data	No data	–16	(5–)6–11(–17)
Viscidium	Absent	Absent	Usually absent	Absent

Trascău Mountains that forms the south-eastern part of Apuseni Mountains. The geo-coordinates of the exact location are N 46.5627° E 23.6812°. This occurrence can be recognised as the easternmost known locality of the species. The nearest known populations live in Hungary (ca. 260 km away, Fig. 1.)

Morphological characteristics

Mean, median, minimal and maximal values of the characters and standard deviations for the population registered in 2011 are given in Table 1. As in *Epipactis pontica* (Petrova & Venkova 2006) the variation in vegetative characters are fairly high.

Our morphometric measurements (Table 2, Fig. 2.) fit well into the data published for this species (Delforge 2006, Vlčko et al. 2003).

The morphological description of the species is given here based on own observations and according to Wucherpfennig (1993a), Vlčko et al. (2003), Delforge (2006). The typical values of the Turda population are typed in boldface.

Epipactis albensis Nováková & Rydlo, Preslia, 50(2): 162. 1978

Syn.: *Epipactis latifolia* forma *gracilis* Dageförde ex Hegi, Ill. Fl. Mitt.-Eur. ed.1/2(20): 376. 1909

Rhizomatous perennial herb. Stem **1**(–2); green, basis glabrous, the upper part almost glabrous, (8–)**18**–**35**(–51) cm high, slender. Cauline leaves (**1**–)2–4(–**5**), pale green, ovate lanceolate, at the margin slightly undulated, (**5**–)30–**47**(–63) × (**4**–)15–**23**(–28) mm, longer than internodes. The upper 1–2 leaves smaller, bract-like. The lowermost bracts are longer [(14–)**17**–**31**(–50) mm] than the flower [(13–)**16**–**19**(–20) mm)]. Inflorescence unilateral, lax, with (2–)**7**–**23**(–35) flowers, (1–)**5**–**17**(–20) cm long. Flowers small, pendant, rarely opening fully, mainly half-opening, sometimes cleistogamous. Pedicels short (2–4 mm), green. Sepals greenish, 6–10 × 2.5–4.7 mm. Petals whitish green or (rarely) pale violet. Hypochile with nectar, cup like; purple, brown (or rarely green) coloured inside, 2.7–4 mm long. Mesochile 'V'-form. Epichile straight, cordate, 2.7–4 × 2.8–4.5 mm, margins green and bent upwards, tubercles (calli) whitish or rarely tinged with pale violet. Viscidium absent. Pollinia powdery. Ovaries glabrescent, green.

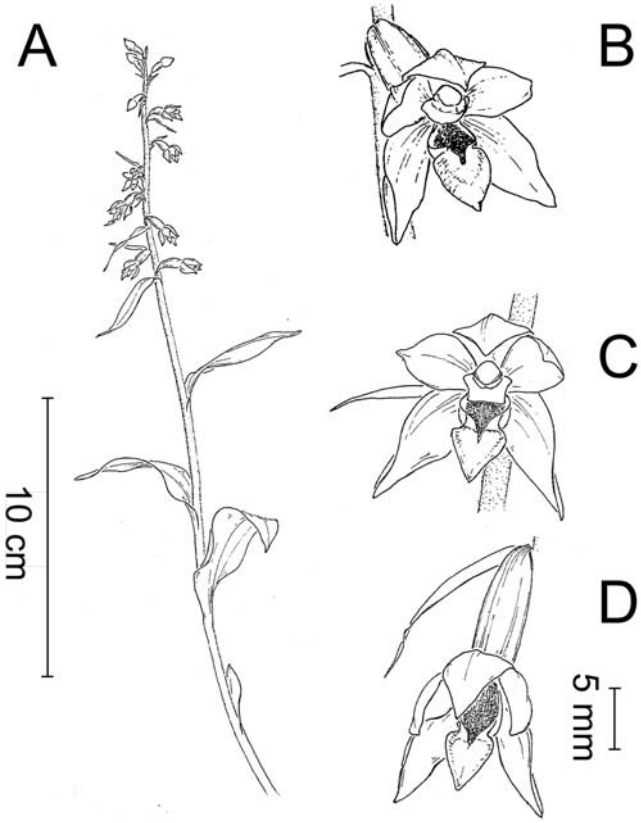

Fig. 3. Habit (A) and fully opened flowers (B–D) of *Epipactis albensis* (original drawings of Judit Kóra).

Habitat conditions

E. albensis grows mostly in plain and colline (under 400 m a.s.l.) altitudinal zones in Germany (Baumann 2005) and Slovakia (Vlčko et al. 2003). In Hungary it can be found between 90 and 620 m a.s.l. (Sulyok & Molnár 2011). The Romanian locality is located at an elevation of 450 meters a.s.l. According to Rydlo (1989) the soil-reaction of the habitats in the former Czechoslovakia extends from strongly acidic to weakly basic (pH 4.95–7.65). In Hungary on four localities the soil reaction varies between pH 4.5 and 6.8, (mean 5.5; Sulyok & Molnár 2011). The Romanian habitat had a soil acidity value of pH (H_20) 6.98, pH (KCl) 6.71. According to Vlčko et al. (2003) *E. albensis* prefers „alluvial softwood

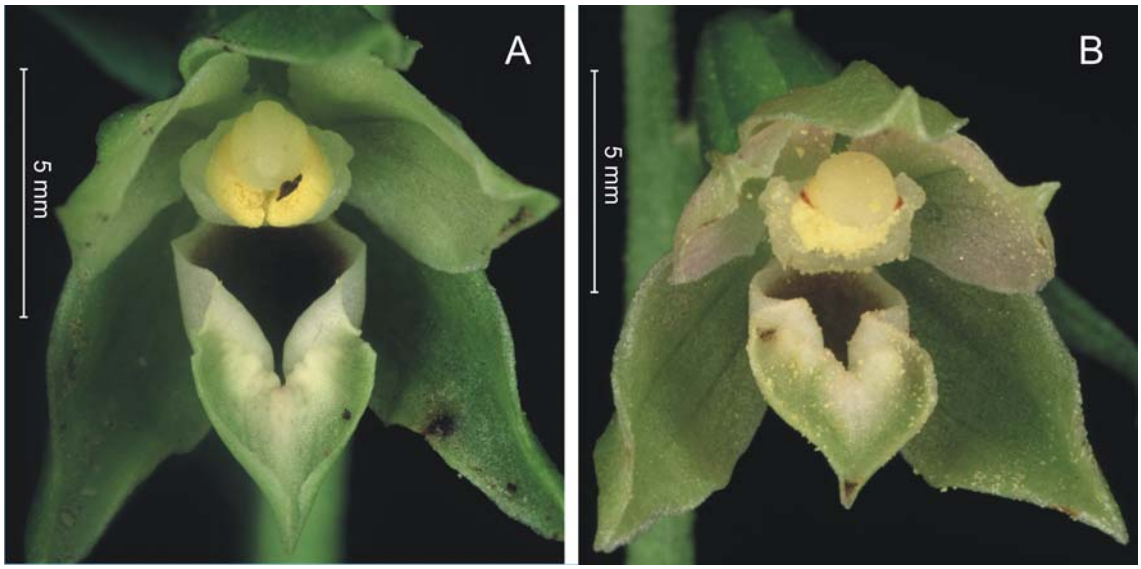

Fig. 4. Flowers of *Epipactis albensis*. A – Hungary: Füzér, 03/08/2005; B – Romania: Cheile Turzii, 12/08/2011 (original photographs). The characteristic features of the species (viscidium missing, epichile green coloured and the edge up-bending, mesochile 'V'-shaped) are clearly visible.

Fig. 5. Herbarium specimens collected in Gorge Turda (Cheile Turzii) on 12/08/2011 deposited in DE.

and hardwood forests, banks with willows and poplars, wet borders of forest roads". It must be noted that the habitat in Turda Gorges has very similar vegetation characteristics.

The locality lies between a tourist trail and Stream Hăsdate, and it is situated about 1–2 meters above the level of the watercourse. The canopy level of the forest is formed by *Salix alba* and *Acer campestre*, while the shrub-layer is represented by *Corylus avellana, Cornus sanguinea, Ribes uva-crispa*. The cover of the herb-layer is around 80–90%, dominant species are: *Aegopodium podagraria, Asarum europaeum, Galeobdolon luteum, Geranium phaeum, Geum urbanum, Hedera helix, Heracleum sphondylium, Mercurialis perennis, Polygonatum latifolium, Pulmonaria officinalis, Stellaria holostea*.

Biological characteristics

In the Czech Republic the number of flowering individuals varies considerably between years (Rydlo 1995). Their seeds are minute, 0.95–1.10 mm long and 0.23–0.29 mm wide, the size of the mature embryo is 170–205 × 100–120 μm (Mrkvicka 1994). The species is probably strongly mycotrophic, because achlorophyllous specimens were also found (Jakubska & Schmidt 2005). The chlorophyll-free form of *Cephalanthera* and the closely related *Epipactis* are non-photosynthetic, fully mycoheterothrophic (Julou et al. 2005). To our knowledge the mycorrhizae of *E. albensis* have not been investigated. Other woodland species of the genus (*Epipactis atrorubens*, *E. helleborine, E. microphylla*) establish relationship with tree ectomycorrhiza-forming ascomycetes (*Wilcoxina, Tuber:* Bidartondo et al. 2004; Selosse et al. 2004; Ouanphanivanh et al. 2008).

E. albensis is one of the latest flowering orchid in Central Europe. The shoots appear above the soil surface in June and July. Flowering begins in late July. The smaller specimens usually bloom even later. In certain years, flowering can be delayed to October or even November (Nováková & Rydlo 1978). The anthesis of one individual generally lasts for 1–2 weeks. In the Turda population on 12th August 31.8% of the flowers

were open, 6.1% withered and 62.1% in bud state in the 10 investigated specimens, so the population was in the first half of flowering.

The flowers are obligate autogamous; the anthers usually open in the buds and allocate pollen to the upper edge of the stigma. The overwhelming proportion of flowers produce fruits.

Conservation

Epipactis albensis is a threatened plant in most countries. The IUCN-status of the species in Poland is VU (Vulnerable, Kaźmierczakowa & Zarzycki 2001), while in the Czech and Slovak Republic (Procházka et al. 1999) and in Hungary (Király et al. 2007) it is EN (Endangered).

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