

***Epipactis pontica* (Orchidaceae): a new species for the Bulgarian flora**

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Abstract. The occurrence of *Epipactis pontica*, a new species for the Bulgarian flora, is reported on the basis of authors' collections and a revision of specimens of genus *Epipactis* in the herbaria SOM, SO and SOA. A description of habitats and data about the size and spatial structure of the populations are given. Results of the morphometric study of one population are presented.

Key words: Bulgarian flora, *Epipactis* (Orchidaceae)

Introduction

In 1997, during a field study of species of genus *Epipactis* in the beech forests belt of Mt Plana in West Bulgaria a small population of a so far unknown species for Bulgaria was found. The features of the plant have prompted the authors to definitely identify it as *E. pontica* Taubenheim. This species was described from northern Anatolia but, according to Delforge (1995), was also distributed in Austria and possibly in Bulgaria, Yugoslavia, Hungary and Romania. There are confirmed data about the distribution of the species in Slovenia (Jogan 2001), Croatia (Flora Croatica Database 2005), Slovakia, and the Czech Republic (Vlčko & al. 2003).

Materials and methods

The field data about the distribution, population size and habitats were collected during the authors' investi-

gations in different parts of the country. Furthermore, we revised the samples of genus *Epipactis* in the herbaria of the Institute of Botany, BAS (SOM), Sofia University (SO), and the Agrarian University, Plovdiv (SOA).

Epipactis pontica is a comparatively rare species. That is why, a morphometric study was undertaken in one population in accordance with the methods used for orchids (Bateman & Denholm 1983; Golz & Reinhard 1986; Tyteca & Gathoye 1989). The plants were at the beginning of the anthesis, with 1–3 opened/semiopened flowers. Thus, it was possible to measure the parameters of the flowers. For each individual studied plant, 18 characters (Fig. 1) were measured and three relations were calculated. Data for the characters NN 1–6 were taken in the field, without damaging the plants. Characters NN 7–18 were measured in the laboratory, from a single picked flower, kept in a soft, moist paper. The mean values, sample standard deviations and variance of the characters and relations were calculated. The estimation of variance follows Zaitsev (1984).

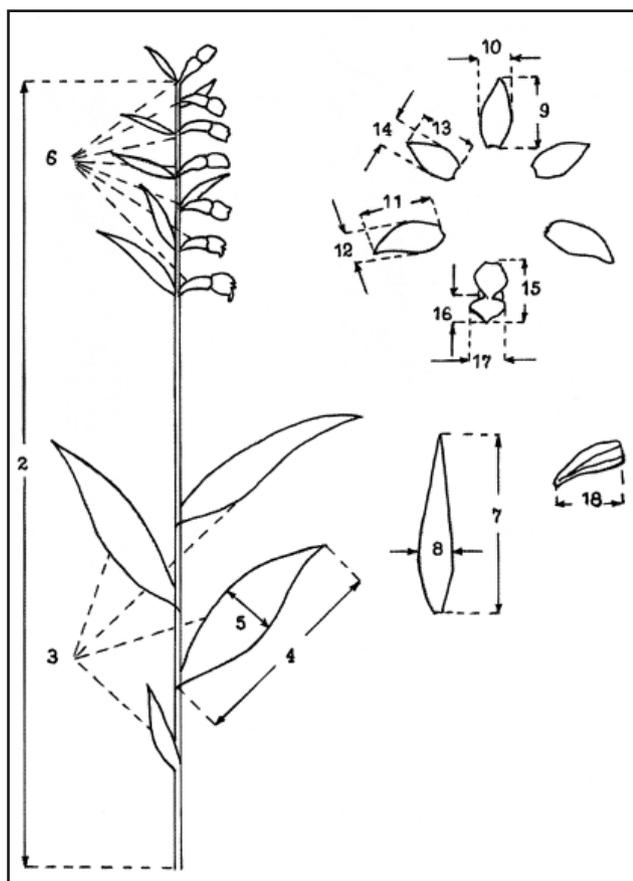


Fig. 1. Characters for the morphometric study.

Results and discussion

Epipactis pontica Taubenheim, Die Orchidee, 26(2): 68. 1975 (Fig. 2, 3, 4)

Rhizomatous perennial herb; stems 1–2 (4), 15–30 cm high, slender, green, covered with dense pubescence; cauline leaves 3–7, green, spirally arranged, lanceolate, 4.5–8.5 × 1–2.5 cm, the upper leaves smaller, bract-like; the bract of the lowermost flower longer than the flower, 1.5–4 cm; inflorescence with 5–16 flowers, lax, sub-unilateral; flowers small, pendant, not opening fully, petals and sepals yellowish-green; semitransparent (hyaline); hypochile without nectar, pale green, brown-tinted, shining; epichile very small (2.5–3 × 2.5–4.2 m), pale greenish-white, callus green; rostellum without a gland; pollinia disintegrating on the stigma at the time when the flowers open; pedicels short, green, sometimes violet-tinted at the base; ovary fusiform, glabrescent, green. A self-pollinating species, sometimes cleistogamous.¹

¹ The description is based on personal data and Delforge (1995).

Distribution in Bulgaria

Our personal field studies have established *E. pontica* for three floristic regions. There are herbarium specimens from three more regions. Data about the localities and corresponding vouchers are listed below:

Balkan Range (*Western*): Petrohan pass (Sofia District), beech forest, FN-77, July 1949, coll. G. Stoilov, sub *E. latifolia* var. *gracilis* (s.n. SOA).

Znepole region: Mt Konyova (medium high parts), south of Choklyovo village (Pernik district), beech forest, FM-49, 21.07.1943, coll. D. Jordanov, sub *E. latifolia* var. *typica* (SO 94138).

Vitoshka region: Mt Plana, southwest of Kokalyane village, a shady deciduous forest above Kokalyane Monastery, 900 m, FN-91, 42°35' N, 23°25' E, 30.07.1997, coll. D. Venkova & J. Stojanov, det. A. Petrova & D. Venkova (SOM 155297); the same locality, 25.07.1998, coll. A. Petrova & D. Venkova (SOM 155325, 155326, 155327) (Fig. 2).

Rila Mts: southwest of Klisoura village, Sofia district, beech forest, 920 m, FM-88, 42°20' N, 23°20' E, 07.08.2004, coll. A. Petrova (SOM 160574).

Mt Sredna Gora (*Western*): Mt Lozenska, on the slopes above Dolni Lozen village (Sofia District), GN-01, 29.07.1948, coll. A. Yanev, sub *E. latifolia* (SO 29893); Mt Lozenska, northeastern slope of peak Polovrak, mixed deciduous forest, about 1100 m, GN-01, 02.08.1997, coll. D. Stojanov, sub *E. helleborine* ssp. *viridiflora* (SO 98890).

Rhodopi Mts (*Central*): southwest of Kiselchovo village, Smolyan district, beech forest, 1300 m, LF-09, 02.08.2003 (Fig. 3), observed by A. Petrova & D. Venkova; southwest of Kohnitsa village, Smolyan district, beech forest, 950 m, LF-09, 03.08.2003, coll. A. Petrova & D. Venkova (SOM 159642); east of Dobraluk village, Plovdiv district, beech forest, 980 m, LG-14, 15.07.2005, with buds, coll. A. Petrova & D. Venkova (SOM 162993).

The map of localities, most of which are in the western part of the country, is given in Fig. 4.

Habitat and population data

The population of *E. pontica* in Mt Plana is situated on a slope facing north-northeast, with 50–60° inclination. The base rocks are two-mica migmatized gneisses (Kozoukharov & al. 1980), with surface out-



Fig. 3. *E. pontica*, a sample from Kiselchovo village population.

Fig. 2. *E. pontica*, a sample from the population in Mt Plana.

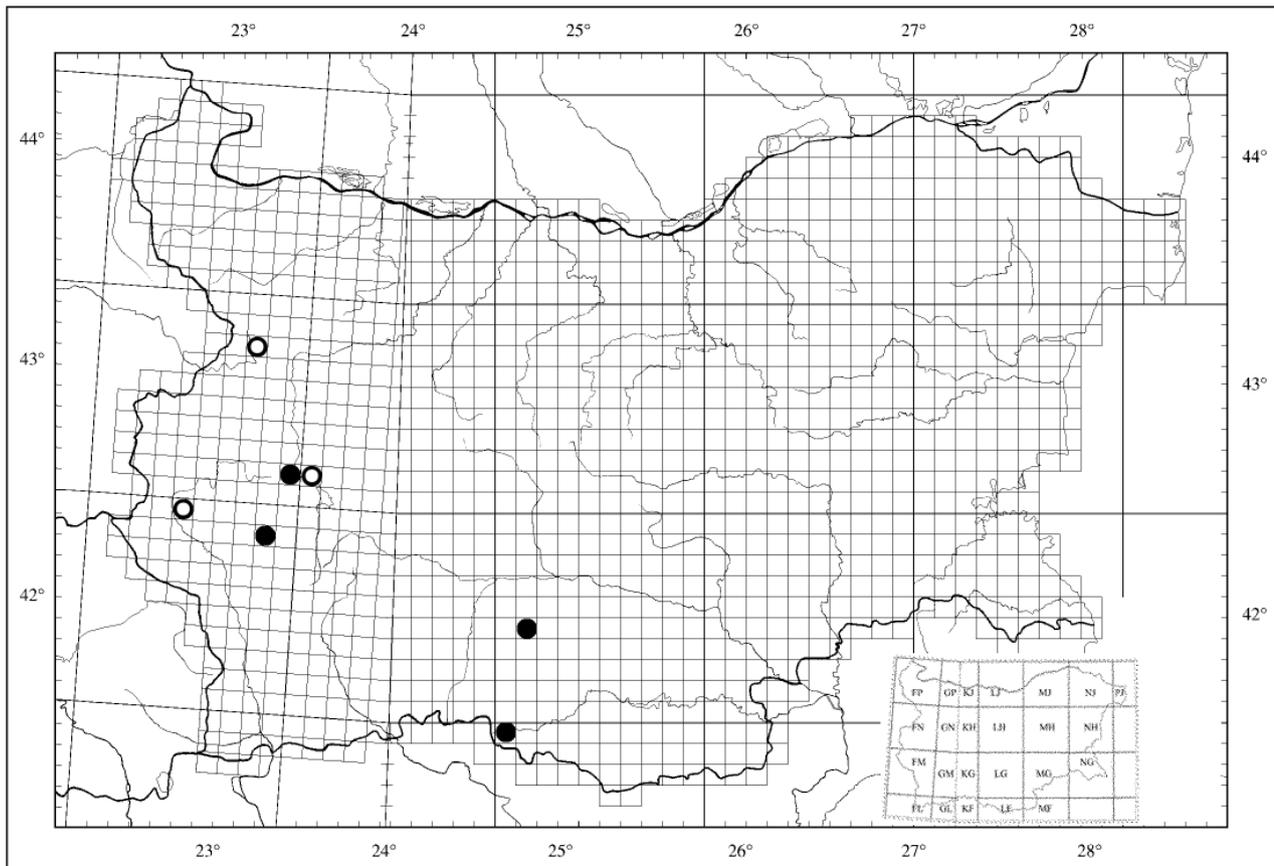


Fig. 4. Distribution map of *E. pontica* in Bulgaria: ● – personal data; ○ – data from Herbaria.

crops. The soil type is Dystric Cambisol, mostly quite shallow. The plant community is a mixed beech forest (*Fagus sylvatica* L.), with the participation of lime (*Tilia rubra* DC.) and Norway maple (*Acer platanoides* L.). The trees are of different age, both of seed and sprout origin, 10–25 m high. Some old beech trees are 80–100 cm in diameter. The forest is shady. There is practically no shrub floor. Grasses and herbs species show insignificant coverage. More common are *Poa nemoralis* L., *Sanicula europaea* L., *Mercurialis perennis* L., *Prenanthes purpurea* L., *Waldsteinia geoides* Willd., *Veronica urticifolia* Jacq., *Galium odoratum* (L.) Scop., *Cruciata glabra* (L.) Ehrend., *Stellaria holostea* L., *Lamium galeobdolon* L., *Luzula sylvatica* (Huds.) Gaudin, *Polygonatum odoratum* (Mill.) Druce, *Geranium robertianum* L., and *Cystopteris fragilis* (L.) Bernh.

Epipactis pontica occurs between 800 m and 950 m. Only eight plants were found in 1997. In 1998 we counted about 110 individuals on an area of about 12 ha. The spatial structure is uneven, occasionally with groups of about 15 plants. The species is more abundant in the area above Kokalyane Monastery. On the lower part of the slope, where the community turns into an oak-hornbeam forest (*Quercus dalechampii* Ten. – *Carpinus betulus* L.), single plants of *E. pontica* are found occasionally.

This population was visited again in 2002 (2nd August). The numbers of aboveground developed plants were significantly lower than in 1998: only 34 plants were counted.

The population in the Rila Mts was situated on a north-facing slope with inclination of 45–50°. The base rocks were gneisses. The soil type was Euthric Cambisol. The plant community was about 70-year-old beech forest of seed origin, with single older trees in small ravines. The forest was shady, with no shrub floor and very sparse coverage of perennials, including *Galium odoratum* (L.) Scop., *Mycelis muralis* (L.) Dumort., *Lathyrus vernus* Bernh., *L. venetus* (Mill.) Wohlf., *Prenanthes purpurea* L., *Lamium galeobdolon* L., *Neottia nidus-avis* L. and *Athyrium filix-femina* (L.) Roth. Although the beech forest formed a large massif there, the population of *E. pontica* was rather local. It occurred at altitudes between 920 m and 980 m, and manifested uneven spatial structure on an approximate area of 2 ha. About 80 plants were counted. The individuals preferred spots with smaller inclination, good humus deposits and without competition of other herbs.

Both populations of *E. pontica* in the Smolyan district, Rhodopi Mts, were situated on the northern slopes in the upper part of the watershed of Arda River, at a distance of about 3 km. The geomorphology of the area was quite complex, with steep slopes and a mosaic vegetation pattern: pure coniferous, mixed and deciduous forests, meadows and riparian habitats. The base rock was a Proterozoic limestone. The population near Kiselchovo village consisted of widely scattered individuals in a beech wood, which formed a narrow stripe at the lower part of the slope (spruce or pine forests were developed above this narrow beech belt). Here, in an area over 10 ha we counted only 12 plants, usually in small flat spots of the terrain. The population near Koshnitsa village was more numerous: we have observed over 40 plants in an area of about 2.5 ha.

The locality near Dobraluk village in the Rhodopi Mts was situated on a southeast-facing steep slope. The base rock was a Proterozoic limestone. The population occupied an area of about 0.05 ha in a place with smaller inclination. The beech forest was very shady, with only singular herbs in the floor. Only eight plants were counted.

Morphometric data

The minimal, maximal and mean values of the characters, standard deviations and variability for the population in Mt Plana registered in 1998 are given in Table 1.

Results of the morphometric study have shown that the scope of the minimum–maximum values, as well as of the mean values coincides very well with the available data on the species (Delforge 1995; Baumann & Künkele 1988). The mean value of the leaf length is in the lower range, while the sepals length is near the top of the range reported by Delforge (8 mm) for character 9 and slightly above it for character 11, for which the maximum measured value is 10.2 mm. There have been slight differences, as compared with the data cited in literature for characters 16 and 17: “length and width of the epichile”.

The variability coefficient of all characters was normal (according to the scale of Zaitsev 1984). Only for the “number of stems” character it was close to the top of the normal variability range. The high variability of this feature is understandable: most individuals develop only one stem but, although very seldom, there are

Table 1. Morphometric data on *E. pontica* from Mt Plana population.

N	Character	Min.	Max.	Mean (n=20)	δ	C.V. (%)
1	Number of stems	1	4	1.4	0.86	62.3
2	Height of the stem (cm)	15	31	21.6	4.3	19.9
3	Number of sheathing leaves	2	6	4.1	1.3	32
4	Length of 2 nd leaf (mm)	37	72	49	8.6	17.5
5	Maximum width of 2 nd leaf (mm)	11	24	17.6	3.99	22.6
6	Number of flowers	5	16	9.8	3.2	32.6
7	Length of lower bract (mm)	18.8	35	26.9	5.8	21.6
8	Width of lower bract (mm)	3.8	6.8	7.1	1	14.1
9	Length of upper sepal (mm)	6.6	9.2	7.9	0.69	8.7
10	Width of upper sepal (mm)	3.1	4.6	3.48	0.42	12.1
11	Length of lateral sepal (mm)	6.7	10.2	8.7	0.89	10.2
12	Width of lateral sepal (mm)	3	4.2	3.5	0.38	10.8
13	Length of petal (mm)	5.8	8.8	7.09	0.78	11
14	Width of petal (mm)	2.9	4.5	3.44	0.35	10.2
15	Length of labelum (mm)	5.9	7.6	6.7	0.51	7.6
16	Labelum – length of epichile (mm)	2.5	3.3	2.8	0.25	8.9
17	Labelum – width of epichile (mm)	2.6	3.6	3.03	0.3	9.9
18	Length of ovary (mm)	7.3	12.8	9.8	1.48	15.1
19	Relation length/width of leaf	2	4.45	2.90	0.64	22
20	Relation length/width of upper sepal	1.83	2.58	2.29	0.20	8.7
21	Relation length/width of epichile	0.77	1.04	0.94	0.07	7.4

plants with 3 or 4 stems. For the other characters the variability coefficient values were higher for the vegetative features (characters 2–8), as compared to those of the flowers (characters 9–17). For all generative characters, variability was low (C.V. – 7.1–12 %).

Conclusion

Epipactis is a genus with plenty of research contributions, both taxonomical and floristic, in the last decades. The present study proves the presence of *E. pontica* for the Bulgarian flora with data from six mountain areas. The altitude range of the known localities varies between 800 m (above Gorni Lozen village) to about 1400 m (Petrochan pass). Habitats are beech or occasionally mixed deciduous forest, mostly on rather steep slopes, shady and with sparse herb floor coverage. The flowering period – the last 10 days of July and the first 10 days of August – is characteristic. Populations differ in size but, as a rule, are not numerous and of low density. Observations of the population in Mt Plana in 1997, 1998 and 2002 have shown significant fluctuations in the number of the above-ground plants, which is not uncommon for the orchid species.

In our opinion the species is much wider distributed across the country but the thorough field studies in appropriate habitats at the localities (especially Mt Plana and the upper part of the watershed of Arda River in the Rhodopi Mts) have shown that the populations were local. On the basis of the available data, the species was evaluated for the national Red List according to the IUCN criteria (IUCN 2001) in the category **Endangered** (EN B2ab(iii)c(iv)), owing to the limited area of occupancy, very fragmented distribution, strong decline of the beech forests in Bulgaria and fluctuations in the number of mature individuals.

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References

- Batemann, R.S. & Denholm, I. 1983. A reappraisal of the British and Irish dactylorhizas. 1. The tetraploid marsh-orchids. – *Watsonia*, **14**: 347-376.
- Baumaun, H. & Künkele, S. 1988. Die Orchideen Europas. Kosmos, Franckhfurt.
- Delforge, P. 1995. Orchids of Britain and Europe. Collins, London.
- Flora Croatica Database. 2005. (Department of Botany, Faculty of Science, University of Zagreb): <http://hirc.botanic.hr/fcd> (accessed 24.07.2005).
- Golz, P. & Reinhard, H. 1986. Orchideen in Jugoslavien. – Mitt. Bl. Arbeitskr. Heim. Orch., Baden-Württ., **18**(4): 689-827.
- IUCN. 2001. IUCN Red List Categories and Criteria. Version 3.1. IUCN Species Survival Commission. IUCN, Gland & Cambridge.
- Jogan, N. (ed.). 2001. Materials for the Atlas of Flora of Slovenia. Center for Fauna and Flora Mapping, Ljubljana.
- Kozoukharov, D., Kozoukharova, E. & Christov, S. 1980. The Precambrian in the northern parts of Mt. Plana and the Vakarel hills. – *Rev. Bulg. Geol. Soc.*, **41**(3): 211-222 (in Bulgarian).
- Tyteca, D. & Gathoye, J. 1989. Contribution à l'étude biostatistique des *Dactylorhiza* d'Europe occidentale. – *Mem. Soc. Royale Bot. Belg.*, **11**: 43-64.
- Vlčko, J., Díte, D. & Kolník, M. 2003. Orchids of Slovakia. ZO SZOPK Orchidea, Zvolen.
- Zaitsev, G. 1984. Mathematical Statistic in the Experimental Botany. Nauka, Moscow (in Russian).

