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New Locality of *Ophrys insectifera* L. in Bulgaria

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Abstract

Ophrys insectifera L. is an European endemic species. This is the second rarest species of the genus *Ophrys* L. (Orchidaceae) in Bulgaria after *Ophrys reinholdii* Spruner ex Boiss. It is included in the Red Data Book of Bulgaria in category of "Critically Endangered" due to the small number of populations (only five known until now) and their small numbers (only 46 known individuals in the whole country). In May 2015 we found a new locality of the species in Dragoevska Mountain, southwest of Dragoevo village, Veliki Preslav Municipality. This is the first locality of species for North Bulgaria. All previously known locality are located in Southwestern Bulgaria. We found the species in the lowest altitude in the country – just under 300 m a.s.l. All known localities are at altitude between 960 m a.s.l. and 1260 m a.s.l. The new population is the largest in Bulgaria. It is composed of 38 individuals located in an area of 55 m2. Of these, 27 individuals are in generative state and 11 individuals are in vegetative state. The habitat is characterized by rich floristic diversity – with 64 associated species. We reported the anthropogenic influence and prospects for the further existence of the population.

Keywords: *Ophrys insectifera, new locality, Dragoevska Mt.*

1. Introduction

The fly orchid (*Ophrys insectifera* L.) is one of five species of the genus *Ophrys* L. of the family Orchidaceae, spread in Bulgaria. It is a perennial herb with two egg-shaped tubers. The stems are 15–40 cm tall, with 3–5 rosette leaves and 1–3 leaves similar to inflorescence leaves. Inflorescences are composed of 2–10 (15) flowers. Sepals are green and spread. Both petals are linear, long 4–7 mm, brownish-purple in color with a velvet-fiber directed forward. The labellum resembles the body of a wasp, elongated, tripartite, the middle part incised, brown-purple, with short velvet-fiber. The “mirror” centrally located, bluish gray, shiny. Flowering in May–June, fruiting in June– July. Insect pollinated plant. Propagated by seeds [1].

The species is widespread in Europe and can be considered as a European endemic. Its locations range from Ireland in the north to the mountains of Northern Spain in the west, to the North Apennines and Greece in the south and to Ukraine in the east. Of all species of genus *Ophrys*, this species has the furthest northern location. In the northeast there are isolated populations in Norway and in the Moscow region. It is found from the sea level to 1700 m a.s.l. Its habitats are diverse: wetlands, grasslands, meadows, open pine forests and wooded meadows, rarely in peat bogs [2, 3].

In Bulgaria, *Ophrys insectifera* is the second rarest species of the genus *Ophrys* after *Ophrys reinholdii Spruner ex Boiss*. It was first established in the 1970s years [4]. Until now seven localities are known: Golo Bardo Mt – northwards of Chervena Mogila and Stefanovo villages, Radomir Municipality; near Ostritsa Reserve (Znepole floristic region) [1, 5, 6]; the trail from Teshel village to the Orpheus chalet (Western Rhodope Mts floristic subregion) [7]; Buynovsko gorge [5], Trigrad gorge [5], the E8 trail from Trigrad village to Chairite lakes [7] (Central Rhodope Mts floristic subregion). The populations change in number across the years. The number of plants in each of populations is quite limited: the population on Golo Bardo Mt has 1–5 individuals [1, 5], the second one near to Chervena Mogila village has 40-150 individuals [6], the third one near to Stefanovo village has 10-15 individuals [6], the fourth one on the trail from Teshel village to the Orpheus chalet has 10 individuals [7], the fifth one in Trigrad gorge has 5 individuals [5], the sixth one in Buynovsko gorge has 20 flowering individuals [5], and the seventh one on the E8 trail from Trigrad village to Chairite lakes has 6 individuals [7]. The five specimens identified in the period 2004–2005 in the Trigrad Gorge have not been encountered in recent years. So far, the populations were found only in calcareous rocky places: slightly

used pastures, in the periphery of *Carpinus orientalis* shrubs, mixed open forest, outlands of the low-growing deciduous forests and forest glades [1, 6, 7]. According to Asyov & al. [8], the altitude at which the species can be found ranges from sea level up to 1000 m a.s.l., According to Tsvetanov & al. [5] and Petrova [1] the altitude ranges to 1100 m a.s.l., and according to Vladimirov [6] it ranges to 1200 m a.s.l. Popatanasov discovered two populations: of 960 m a.s.l. and 1260 m a.s.l. [7].

At international level, the species is included in Appendix II of Convention on International Trade in Endangered Species of Wild Fauna and Flora [9] and in The IUCN Red List of Threatened Species in the category „Least Concern" (LC) [10]. At national level, it appears in Appendix 3 of the Biodiversity Act of Republic of Bulgaria [11], in the Red List of Bulgarian vascular plants [12] and in the Red Data Book of Republic of Bulgaria [1] in the category "Critically Endangered" (CR C2a(i); D). The population in Trigrad is within the limits of the Trigrad gorge Protected Site. The population in the Golo Bardo Mt near the Chervena mogila village is within the limits of the Golo Bardo – Nahodishte na Muhovidna Pchelitsa Protected Site. All localities are in protected areas of the European ecological network Natura 2000 in Bulgaria. Currently, a plan for conservation of the species is in development [1].

The factors with negative impact on the distribution and the population status of the species are: limited distribution, low number of individuals in the populations, changes in the dynamics of local species (overgrowing with shrubs), low reproductive capacity, damage of the fruit pods by insect larvae, sensitivity to spring frosts during flower clustering, afforestation with coniferous forests, cuttings of the coniferous forests and use of the glades for timber storage and grazing during the flowering and fruiting of the plant, fires [1, 6].

The measures necessary for the protection of the species are related to: the continuation of studies on the distribution and abundance of populations; monitoring of known populations and study of the negative factors in the different localities [1].

2. Materials and Methods

This survey was conducted on the route method in the period May – September 2015. In determining the species, accompanying *Ophrys insectifera*, we used the Handbook for Plants in Bulgaria [13]. The names of the taxa are according to the Conspectus of the Bulgarian vascular flora [8]. The abbreviations of the authors' names of the plants are according to the International Plant Names Index [14]. The life forms are according to the Raunkiaer's system [15]. For their determination are used the Flora of the People Republic Bulgaria, Volumes 1 to 9 [16, 17] and the Flora of the Republic of Bulgaria, Volumes 10 and 11 [18, 19]. The projective cover of associated species is according to Braun-Blanquet [20]. The marking of population of the species was made using GPS receiver Garmin Oregon 450. We used WGS 84 UTM 35N coordinate system. The distances from locality to adjacent objects are measured as the crow flies using software Google Earth Pro Portable ver. 7.1.5.

3. Results and Discussion

Until now, *Ophrys insectifera* not been detected in North Bulgaria. In early May 2015, we found a new locality of species within the Dragoevska Mt, southwest of the Dragoevo village, Veliki Preslav Municipality (Figure 1). It is located in quadrant MH87 from UTM-network of Bulgaria. The coordinates of the center of the locality are: 43.109753 N and 26.857318 E. Altitude is 297 m a.s.l. This is the lowest point in which the species has been registered in Bulgaria. The currently known localities are at altitude between 960 m a.s.l. and 1260 m a.s.l. We propose the correction of the vertical range of the species distribution. In the Conspectus of the Bulgarian vascular flora [8], the range of the species is noted within the values from 0 to 1000 m a.s.l. The results of field studies to date [1, 5, 6, 7], to which we add ours, show existing distribution in the range of 300 to 1260 m a.s.l.

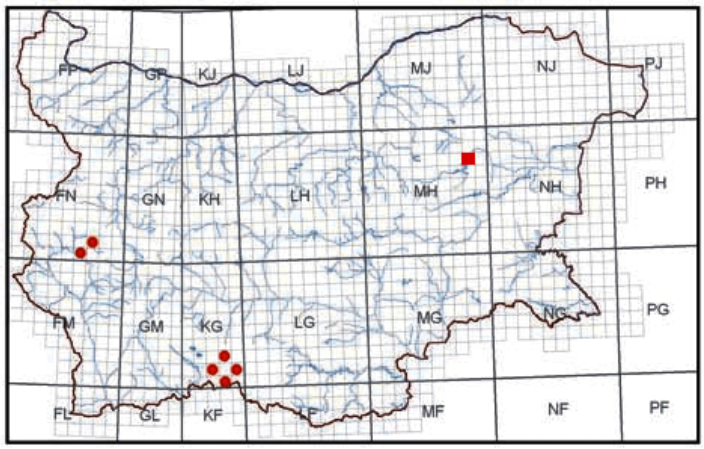

Fig. 1. Map of the distribution of *Ophrys insectifera* in Bulgaria
Legend: circle – known localities, box – new locality

The locality shares similar conditions with the localities described by other authors [1, 5, 6, 7]. It is situated about 35 m away from the belt of mixed deciduous forest. The exposure is northeast. The slope is 15º. The main rock is limestone. The soil is shallow calcareous. Cover of the vegetation is 90%.

The population is composed of 38 individuals, on a total area of 55 m^2. Of these 27 individuals are in generative condition (Figure 2) and 11 individuals are in vegetative condition. The new population is the second-largest population after the population in the Golo Bardo Mt near the Chervena mogila village [6].

The habitat of the species is grasslands dominated by *Carex flacca*. Species that accompany *Ophrys insectifera*, were studied in the period from May to September 2015. A complete list of these species is shown in Appendix.

Most of the associated species – 45 species are hemicryptophytes (H): herbaceous perennial plants with regeneration buds, located close to the ground. This is understandable given the type of habitat. Phanerophytes (Ph) – trees and shrubs, are 8 species. The bushes dominate – mainly *Paliurus spina-christi*. The tree species are represented by single individuals of *Pyrus pyraster* and *Quercus cerris* by height up to 5 m. The chamaephytes (Ch) – herbaceous plants with regeneration buds located at a height of 25 cm from the surface of the earth, are 6 species. Cryptophytes (Cr) – plants with bulbs and tubers, are 2 species. Therophytes (Th) – annual herbaceous plants, are 2 species. The transitional group therophytes – hemicryptophytes (Th-H) is represented only by one species. Weak presence of therophytes due to the dense cover of perennial herbaceous plants.

Fig. 2. A flower from *Ophrys insectifera*
(photo by D. Zahariev, 6 May 2015)

The habitat conditions are favorable for the development of the species. Weak overgrowth of shrubs and trees offering protection from the wind, which is necessary for individuals of *Ophrys insectifera* and they prefer precisely such habitats. This is particularly important because of the remoteness of the forest belt. The height of grass cover is also crucial for the existence of population due to the relatively small size of the individuals of *Ophrys insectifera*. The composition of the grass cover is favorable for the development of individuals of *Ophrys insectifera*. During flowering, they have enough space and are easily noticeable. Other herbaceous plants exceed their size until after the flowering period has ended.

There is no grazing in the habitat, despite the proximity to Dragoevo village – 640 m from the first house in the village (Figure 3). Existing roads are far away and no threat. The nearest roadway is at a distance of 270 m, and the nearest dirtroad – at a distance of 95 m. The nearest farmland is at a distance of 160 m at the foot of the mountain. Near to Dragoevo village is one of the stone quarries in the region. The

distance from the locality to the quarry is 550 m. The air currents are favorable and there is no dust.

Fig. 3. Location of the population of *Ophrys insectifera*

4. Conclusions

The locality of the species that we have found is new for the North Bulgarian and the Northeast Bulgarian floristic regions. The new population is the second-largest population among the currently known populations of the species in Bulgaria. We propose that the altitude, at which the species is spread in Bulgaria, is adjusted to the range between 300 and 1260 m a.s.l. The habitat's characteristics are fully consistent with the previously recorded habitats of the same species in the country. The habitat is characterized by rich floristic diversity – the associated species are 64 in number. Among the associated species two species from family Orchidaceae have been identified: *Anacamptis pyramidalis* and *Orchis tridentata*. The conditions established in the habitat reveal good prospects for the existence of the species in the new locality.

Appendix

Accompanying species of *Ophrys insectifera* in population southwest of Dragoevo village

№	Plant name	Family	Life form	Pro-jective cover
1	*Carex flacca* Schreb.	Cyperaceae	H	4
2	*Paliurus spina-christi* Mill.	Rhamnaceae	Ph	2a
3	*Poa pratensis* L.	Poaceae	H	2a
4	*Teucrium chamaedrys* L.	Lamiaceae	Ch	2m
5	*Dorycnium herbaceum* Vill.	Fabaceae	Ch	2m
6	*Briza media* L.	Poaceae	H	2m
7	*Calamagrostis epigeios* (L.) Roth	Poaceae	H	2m
8	*Dactylis glomerata* L.	Poaceae	H	2m
9	*Hieracium pilosella* L.	Asteraceae	H	2m
10	*Leucanthemum vulgare* Lam.	Asteraceae	H	2m
11	*Plantago lanceolata* L.	Plantaginaceae	H	2m
12	*Plantago media* L.	Plantaginaceae	H	2m
13	*Trifolium alpestre* L.	Fabaceae	H	2m
14	*Crataegus monogyna* Jacq.	Rosaceae	Ph	1
15	*Fraxinus ornus* L.	Oleaceae	Ph	1
16	*Teucrium polium* L.	Lamiaceae	Ch	1
17	*Artemisia alba* L.	Asteraceae	Ch	1
18	*Origanum vulgare* L.	Lamiaceae	Ch	1
19	*Avenula compressa* (Heuff.)	Poaceae	H	1

	W.Sauer & Chmel.			
20	*Achillea millefolium* L.	Asteraceae	H	1
21	*Agrimonia eupatoria* L.	Rosaceae	H	1
22	*Bituminaria bituminosa* (L.) C.H.Stirt.	Fabaceae	H	1
23	*Brachypodium pinnatum* (L.) P.Beauv.	Poaceae	H	1
24	*Botriochloa ischaemum* (L.) Keng	Poaceae	H	1
25	*Centaurea affinis* Friv.	Asteraceae	H	1
26	*Clinopodium vulgare* L.	Lamiaceae	H	1
27	*Coronilla varia* L.	Fabaceae	H	1
28	*Cota tinctoria* (L.) J.Gay.	Asteraceae	H	1
29	*Digitalis lanata* Ehrh.	Scrophulariaceae	H	1
30	*Eryngium campestre* L.	Apiaceae	H	1
31	*Foeniculum vulgare* Mill.	Apiaceae	H	1
32	*Hieracium praealtum* Gochnat	Asteraceae	H	1
33	*Hypericum elegans* Stephan ex Willd.	Hypericaceae	H	1
34	*Inula ensifolia* L.	Asteraceae	H	1
35	*Knautia arvensis* Coult.	Caprifoliaceae	H	1
36	*Linum tenuifolium* L.	Linaceae	H	1
37	*Lotus corniculatus* L.	Fabaceae	H	1
38	*Polygala major* Jacq.	Polygalaceae	H	1
39	*Prunella vulgaris* L.	Lamiaceae	H	1
40	*Ranunculus oxyspermus* Willd.	Ranunculaceae	H	1
41	*Sanguisorba minor* Scop.	Rosaceae	H	1
42	*Scabiosa ochroleuca* L.	Caprifoliaceae	H	1
43	*Scorzonera hispanica* L.	Asteraceae	H	1
44	*Viola riviniana* Rchb.	Violaceae	H	1
45	*Orchis tridentata* Scop.	Orchidaceae	Cr	1
46	*Centaurea rutifolia* Sm.	Asteraceae	Th	1
47	*Chamaecytisus hirsutus* Link	Fabaceae	Ph	+
48	*Cornus sanguinea* L.	Cornaceae	Ph	+
49	*Pyrus pyraster* (L.) Burgsd.	Rosaceae	Ph	+
50	*Ononis arvensis* L.	Fabaceae	Ch	+
51	*Asperula cynanchica* L.	Rubiaceae	H	+
52	*Ajuga laxmanii* (L.) Benth.	Lamiaceae	H	+
53	*Carlina vulgaris* L.	Asteraceae	H	+
54	*Knautia macedonica*	Caprifoliaceae	H	+

	Griseb.			
55	*Picris hieracioides* L.	Asteraceae	H	+
56	*Thesium simplex* Velen.	Santalaceae	H	+
57	*Anacamptis pyramidalis* (L.) Rich.	Orchidaceae	Cr	+
58	*Linum bienne* Mill.	Linaceae	Th-H	+
59	*Lathyrus sphaericus* Retz.	Fabaceae	Th	+
60	*Lembotropis nigricans* (L.) Griseb.	Fabaceae	Ph	r
61	*Quercus cerris* L.	Fagaceae	Ph	r
62	*Campanula bononiensis* L.	Campanulaceae	H	r
63	*Campanula sibirica* L.	Campanulaceae	H	r
64	*Centaurea scabiosa* L.	Asteraceae	H	r

Legend: 4 – projective cover from 50 to 75%, 2a – from 5 to 12.5%, 2m – projective cover less than 5% and number over 50 individuals, 1 – projective cover less than 5% and number among 6 and 50 individuals, + – projective cover less than 5% and number among 2 and 5 individuals, r – projective cover less than 5% and only one individual

References

[1] A. Petrova, *Ophrys insectifera* L. In: D. Peev et al. (ed.), Red Data Book of Republic of Bulgaria. Vol. 1. Plants and Fungi Sofia, IBER–BAS & MEW, 2011.

[2] H. A.Pedersen, N. Faurholdt, *Ophrys*: the Bee Orchids of Europe, Kew, Surrey, Kew Publishing, 2007.

[3] P. Delforge, Orchids of Britain & Europe, London, Harper Collins, 1995.

[4] R. Krusheva, R. Parvanov, Album of protected and rare plants, Sofia, Zemizdat Publishing House, 1978.

[5] Ts. Tsvetanov, V. Vladimirov, A. Petrova, New localities of Ophrys insectifera (Orchidaceae) in Bulgaria. In: Proceedings, Balkan Scient. Conf. of Biol., May, 19–21, 2005, Plovdiv, Bulgaria, pp. 312–320.

[6] V. Vladimirov (ed.), A Pilot Network of Small Protected Sites for Conservation of Rare Plants in Bulgaria, Sofia, IBER–BAS & MEW, 2014.

[7] A. Popatanasov, Reports 205–207, In: V. Vladimirov, F. Dane, V. Matevski, K. Tan, New floristic records in the Balkans, Phytol. Balcan., Vol. 20, No 2-3, 2014, pp. 267–310.

[8] B. Asyov, A. Petrova, D. Dimitrov, R. Vasilev, Conspectus of the Bulgarian vascular flora. Distribution maps and floristic elements, Sofia, Bulgarian Biodiversity Foundation, 2012.

[9] Convention on International Trade in Endangered Species of Wild Fauna and Flora, Appendix II, 2009, http://www.cites.org/eng/app/appendices.shtml [accessed 1 July 2017].

[10] The IUCN Red List of Threatened Species, Version 2016-1, www.iucnredlist.org [accessed 1 July 2017].

[11] Biodiversity Act, State Gazette number 77, 9 August 2002, pp. 9–42. Last amended in State Gazette number 27, 15 March 2013.

[12] A. Petrova, V. Vladimirov (Eds), Red List of Bulgarian vascular plants, Phytol. Balcan., Vol. 15, No 1, 2009, pp. 63–94.

[13] D. Delipavlov, I. Cheshmedzhiev, M. Popova, D. Tersiyski, I. Kovachev, Handbook for Plants in Bulgaria, Plovdiv, Agrar. Univ. Acad. Press, 2011.

[14] International Plant Names Index (IPNI), http://www.ipni. org/ [accessed 1 July 2017].

[15] C. Raunkiaer, The Life forms of plants and statistical plant geography, Oxford, Clarendon Press, 1934.

[16] D. Yordanov (main ed.), Flora of PR Bulgaria, Vol. 1–7, Sofia, Publishing House of BAS, 1963–1979.

[17] V. Velchev (main ed.), Flora of PR Bulgaria, Vol. 8–9, Sofia, Publishing House of BAS, 1982–1989.

[18] S. Kozhuharov (main ed.), Flora of the Republic of Bulgaria, Vol. 10, Sofia, Prof. M. Drinov Acad. Publ., 1995.
[19] D. Peev (main ed.), Flora of the Republic of Bulgaria, Vol. 11, Sofia, Prof. M. Drinov Acad. Publ., 2012.
[20] V. Westhoff, E. Maarel, The Braun-Blanquet Approach In: Handbook of vegetation science (ed. R. Tuxen), Dr. W. Junk b. v. Publishers the Hague, 1973.

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