

Ophrys helenae (Orchidaceae), a new species for the flora of the Republic of North Macedonia

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Abstract. *Ophrys helenae* of the family *Orchidaceae* is a Balkan endemic species. It has been recorded on Mt Galichica (May 2015) and the shores of Lake Prespa (May 2021). These are the first records for the species in the flora of the Republic of North Macedonia. Data on the distribution, habitat preferences and population size are also presented in the manuscript.

Key words: distribution, habitat, new record, North Macedonia, *Ophrys*

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Introduction

In the Republic of North Macedonia, the genus *Ophrys* is represented by only four confirmed taxa: *O. apifera* Huds., *O. scolopax* subsp. *cornuta* (Steven) E.G. Camus, *O. sphegodes* subsp. *sphegodes* Mill., and *O. sphegodes* subsp. *mammosa* (Desf.) E. Nelson (Stojanoff 1921; Jurišić 1923; Soška 1938; Matevski & al. 2010; Glasnović 2012, 2020; Ponert 2014). Other taxa, such as *O. sphegodes* subsp. *atrata* (Rchb. f.) A. Bolòs and *O. reinholdii* Fleischm., which have been reported for North Macedonia (Bergman & al. 2004; Glasnović 2012, 2020) would require confirmation.

Ophrys helenae (Helen's Bee Orchid) is a Balkan endemic species distributed in Greece, Albania and Bulgaria (Delforge 2016). It is considered as morpho-

logically very stable and distinct species within the genus *Ophrys* (Löki & al. 2020). Nevertheless, there exist a number of reported hybrids between *O. helenae* and other *Ophrys* species (e.g. Thiele & Thiele 2001; Ellenbast 2013, etc.). On the other hand, Danesch & Danesch (1977) have found only one hybrid specimen among 2000 individuals of *O. helenae* and *O. mammosa* in three different studied locations in Epirus (Greece).

Ophrys helenae is treated occasionally as a subspecies of *O. sphegodes* Mill. – *O. sphegodes* subsp. *helenae* (Renz) Soó & D.M. Moore (Moore 1980; Kühn & al. 2019; POWO 2024). Other authors treat *O. helenae* as a distinct species of the *O. sphegodes* group (Paulus & Hirth 2017; Löki & al. 2020; Strid 2024), or *O. mammosa* group (Delforge 2016).

Ophrys helenae is an easily recognizable taxon which differs from the other taxa of the *Ophrys sphegodes* group by its large flowers and absence of speculum. Analysis of the morphometric features of almost 2000 individuals from Greece has shown that *Ophrys helenae* is one of the most uniform *Ophrys* species (Danesch and Danesch 1977). The species is 15-30 (40) cm high, with inflorescence of (2) 4-8 flowers; sepals 10-16 × 5-8 mm, green to reddish, elongated triangular; petals 6-13 × 2-4 mm, green, occasionally reddish, broadly lanceolate; lip entire, almost circular, globose, without protuberances and without any apical appendix, velvety pubescent, with bright red and dark red pattern, speculum absent; basal field poorly outlined; pseudoeyes reduced, pale, indistinct; gynostemium relatively short. It blooms from late March through April and May in open forest or shrub habitats (Danesch & Danesch 1977;

Moore 1980; Delforge 2016; Charitonidou & al. 2021).

Almost all species of the genus *Ophrys* are pollinated by sexual deception, i.e. pseudocopulation. *Ophrys helenae* is the only species of the genus that attracts pollinators by shelter mimicry (roost mimicry or sleeping-hole mimicry), since the male bees of the genera *Tetralonia* and *Eucera* (Eucerini, Apidae, Hymenoptera) are lured to the flowers in the evening or at overcast weather, when they search for an overnight sleeping place. Actually, the featureless labellum pattern of the flowers imitates a dark hole (Paulus & Gack 1993; Paulus 2006; Vereecken & al. 2012). The ancestors of *O. helenae* are sexually deceptive *Ophrys* species, with whom it shares similar chemical signature (e.g., n-alkenes present in the pheromones of female bees) but changed labellum properties, such as loss of the patterns and speculum, as well as lack of UV reflection to mimic a dark hole (Vereecken & al. 2012).



Fig. 1. *Ophrys helenae*: **A**, specimen from Mt Galichica, Peshtani village, 22.05.2015 (photographed by M.-A. Bouchet); **B**, specimen from Prespa, Pretor, 29.05.2021 (photographed by S. Hristovski).

The aim of this paper is to present the first records of *O. helenae* in North Macedonia, with notes on its habitat and threat status.

Materials and methods

Fieldwork on Mt Galichica and Lake Prespa watershed was carried out as part of two different project activities. In both cases, for the localities of *O. helenae* the following data were also taken: GPS coordinates, altitude, photographs of the plant and habitat, as well as composition of the plant community.

Fieldwork on Mt Galichica (22.05.2015) was carried out by M.-A. Bouchet and M. Kostadinovski as part of the “Biodiversity Assessment for Ohrid to Peshtani National A3 Expressway” project. The site of *O. helenae* was also visited on 24.05.2024 by S. Hristovski.

Fieldwork in Prespa was conducted in May 2021 for estimation of the biomass production in the wet meadows surrounding Lake Prespa by S. Hristovski, S. Pejovik, M. Chobanova & D. Zaec. The site of *O. helenae* was also visited on 13.05.2022.

Nomenclature of habitats follows Mucina & al. (2016). Nomenclature of plant species follows Strid (2024).

Results and discussion

Localities

Ophrys helenae was observed at two localities (Fig. 1)

- Mt Galichica, Peshtani village, 41.009640° N, 20.806937° E, 745 m, Helleno-Balkan savory steppes, 22.05.2015, 1 individual, leg.: Michel-Ange Bouchet (photographed, not collected) (Fig. 1A) The same site was also visited on 24.05.2024 by S. Hristovski, but *O. helenae* was not recorded.
- Prespa, Pretor, N40.9667133, E21.067095, 848m a.s.l., Pannonic sand steppes, 29.05.2021, 1 individual, leg.: S. Hristovski, S. Pejovik, M. Chobanova & D. Zaec (photographed, not collected). The same specimen in flowering phase was observed on 13.05.2022 (Fig. 1B)

Habitat (Fig. 2)

The habitat on Mt Galichica was a dry grassland identified as a Helleno-Balkan *Satureja montana* steppes (Fig. 2A). The species grew on limestone, on a moderate slope facing northwest. The vegetation included such annual species like *Avena barbata*, *Crepis sancta*, *Helianthemum salicifolium*, *Orlaya daucoide*s, *Salvia viridis*; also perennials like *Centaurea saloni-tana*, *Convolvulus althaeoides* subsp. *tenuissimus*, *C. cantabrica*, *Dactylis glomerata*, *Eryngium campestre*, *Micromeria juliana*, and *Stipa pulcherrima* (alliance *Saturejion montanae* Horvat & al. 1974, order *Stipo pulcherrimae-Festucetalia pallentis* Pop, 1968, class *Festuco-Brometea* Br.-Bl. & Tx. ex Soó 1947). The other recorded orchid species were: *Anacamptis morio*, *A. papilionacea*, *Orchis purpurea*, *Ophrys sphegodes* subsp. *sphgodes*, and *Himantoglossum calcaratum* subsp. *rumelicum*. The location was at an altitude of 745 m a.s.l.

The habitat of *O. helenae* in Prespa belonged to Pannonic sand steppes (Fig. 2B). That habitat was reported for North Macedonia as a result of the habitat mapping in Prespa (Fotiadis & al. 2018). It included natural grasslands on sandy soils, such as dunes along the coast of the Great Prespa Lake. Annual species, therophytes, mostly dominated, but wet meadow species might also occur due to the high level of subsurface water. The species was associated to *Silene frivaldszkyana-Erysimum pusillum* subsp. *microstylum* comm. (alliance *Sileno conicae-Cerastion semidecandri* Korneck, 1974, order *Corynephorretalia canescentis* Klika 1934, and class *Koelerio-Corynephorreteia canescentis* Klika in Klika & Novák 1941). No other orchid species were noticed. The soil was sandy, of low humidity during both field visits. This habitat was at an altitude of 848 m a.s.l.

Distribution and threat status

Ophrys helenae is mainly distributed in mainland Greece, with few records from Peloponnese and the Aegean islands (Papadopoulos & al. 2011; Delforge 2016; Löki & al. 2020; Strid 2024). In Albania, it oc-



Fig. 2. Habitat of *O. helenae*: **A**, Helleno-Balkan savory steppes, Mt Galichica, Peshtani village, 22.05.2015 (photographed by M.-A. Bouchet); **B**, Pannonic sand steppes, Prespa, Pretor, 29.05.2021 (photographed by S. Hristovski).



Fig. 3. Distribution map of *Ophrys helenae* in the Republic of North Macedonia.

curs in the southernmost parts of the country and rather sporadically northwards (Barina & al. 2016). There has been only one known locality in Bulgaria: Voyvodsko Plateau in the northeastern part of the country (Zahariev 2021).

Past and future distribution of *O. helenae* has been modelled in two climate scenarios and a shift south-east has been predicted (Charitonidou & al. 2021). Although the recent findings in Bulgaria and North Macedonia are to the north of Greece, they do not change significantly the main distribution area of the species. Further findings in the adjacent areas and analysis of the origin of the specimens will be essential for monitoring the future shifts in the distribution of *O. helenae*.

The species is assessed as Least Concern according to the IUCN Red List of Threatened Species (Shuka 2018). The latest Red Data Book of Greece provides no reference on the species (Phitos & al. 2009), although in the earlier one it has been considered as Rare (Phitos & al. 1995). The latest Red List assessment of the Greek orchids does not place *O. helenae* in any of the threat categories and considers it as a relatively com-

mon species in the northwest of the country (Tsiftsis & Tsiropidis 2016). The species has not been evaluated on the basis of IUCN criteria for the Red Lists of Albania and Bulgaria.

Distribution of *O. helenae* in North Macedonia is confined to two localities (Fig. 3), both in the Prespa-Ohrid watershed in the southwestern parts of the country. In both localities, only single specimens were discovered. The authors believe that future research will reveal more localities in the region, which is an almost natural extension of the main range of the species in Greece. Currently, the authors have not been able to present any threat assessment status due to a lack of target research and valid data. Nevertheless, the species in North Macedonia can be considered as rare with two incidental records.

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