

THE EASTERNMOST DISTRIBUTION OF OPHIOGLOSSUM LUSITANICUM L. (OPHIOGLOSSACEAE), NEW TO FLORA OF IRAN

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Ophioglossum lusitanicum L. (Pteridophyta) is recorded from Iran. Based on morphological, anatomical, sporological and ecological investigations, it is possible to distinguish this species from the well-known one in northern Iran, *O. vulgatum* L. Its discovery in a submountain area of Langerud, Gilan province, represents an extension of its phytogeographical range in eastern Eurasia. Geographical distribution and characteristic details of the species as well as a concrete comparison with *O. vulgatum* is presented.

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شرقی ترین دامنه پراکنش گونه‌ای مارزبان (*Ophioglossum lusitanicum* L.).

جدید برای فلور ایران.

علیرضا نقی نژاد و کوروش کاوسی

گونه‌ای مارزبان (*Ophioglossum lusitanicum* L.) برای اولین بار از ایران گزارش می‌شود. بر پایه مطالعات مورفولوژی، آناتومیکی، اسپورولوژی و اکولوژی، گونه اخیر از گونه معروف و تا حال شناخته شده خزری یعنی *O. vulgatum* قابل تمایز است. کشف این گونه در یک منطقه کوهپایه‌ای در شهرستان لنگرود (استان گیلان)، گسترش دامنه پراکنش جغرافیایی آن را به طرف شرق اوراسیا نشان می‌دهد. پراکنش دقیق گونه، شرح ویژگیهای آن و مقایسه آن با گونه *O. vulgatum* خواهد آمد.

Introduction

Because of considerable shortage of specialized investigations on the Iranian Pteridophytes, it seems that more studies on this subject are necessary. In order to undertake much intensive taxonomical and ecological studies on the Pteridophytes and in the framework of the first author's studies on the flora and vegetation of northern Iran, we supply a great collection of Pteridophyte flora. In our collected specimens, a very rare and tiny plant that later named as *Ophioglossum lusitanicum* L. (*Ophioglossaceae*), was encountered. At first, this plant appeared to be as juvenile forms of *O. vulgatum* L.-another rare but well-known species of northern Iran (Hyrcanian area). But later, a deep view on the diagnostic characters of the collected specimens and the ever collected plants of *O. vulgatum* revealed that the specimens belong to *O. lusitanicum* L. It is possible to distinguish this species from *O. vulgatum* on the morphological, anatomical, sporological and ecological grounds (Boissier, 1884; Iljin, 1934; Henderson, 1965; Paul, 1987). *O. lusitanicum* that is recorded for the first time from the flora of Iran, appears to be restricted to some definite habitats from atlantic Europe and Mediterranean to the Caucasus and Hyrcanian area, while *O. vulgatum* is subcosmopolitan and occurs on the wide variety of habitats. There is no report of *O. lusitanicum* in the local literatures except Parsa (1978), that included this species in his book but without any likely localities and materials. The species, its habitat and geographical distribution are described and a concrete comparison with *O. vulgatum* is presented.

***Ophioglossum lusitanicum* L., Sp. Pl. 1063 (1753). Fig. 1.**

Materials examined: Iran, Gilan province, Langerud, Leyla-kuh, beside the mountain road of Jir-Sara village to Emamzadeh Seyyed-

Kazem, Sadegh-ali-Sara village (Bijar-Cheshneh), 200-300 m, 18.11.2003, Naqinezhad, 33472 -TUH; as the latter, 27.2.2004, Naqinezhad, 33473-TUH.

Main morphological characters

O. lusitanicum is similar to *O. vulgatum* but it is recognized with some different characters presented in the table 1.

Despite the species delimitation in *Ophioglossum* is a worldwide problem (Paul, 1987), but according to table 1, *O. lusitanicum* is clearly distinct in terms of size, frond, venation, epidermal cells and stomata and spore ornamentation. While in most geographical areas, *O. vulgatum* is extremely variable in size and shape even within a single population, *O. lusitanicum* is not a variable species (Paul, 1987).

Habitat and Ecology

In Iran: *Ophioglossum vulgatum* grows on wet shady places in closed Hyrcanian forests, while *O. lusitanicum* is adapted to sandy or gravelly soils in open forest areas. Small areas along the relatively wide submountain road of Leyla-kuh is colonized by a dense population of latter species. Habitat of the species is characterized by an especial accumulated soil with sandy to sandy-loamy texture within which small gravels are found. Sometimes this soil type is named as alluvial-colluvial. The most outstanding cover is relevant to *Tortula ruralis* (Hedw.) Smith, a moss that completely covers the whole habitat. Also, *O. lusitanicum* is surrounded by some juvenile plants such as *Cerastium glomeratum* Thull., *Euphorbia peplus* L., *Geranium molle* L., *Hypericum perforatum* L., *Lotus* sp., *Luzula forsteri* (Smith) DC., *Origanum vulgare* L., *Oxalis corniculata* L., *Poa annua* L. It seems that the recorded species along with the above mentioned plants can be considered as an ephemeral plant community. This community

Table 1. Morphological differences between the two *Ophioglossum* species.

Species	Height (cm)	Leaf	Sterile blade	Epidermal cell	Vein	Fertile portion of blade	Sporangia	Spore
<i>O. lusitanicum</i>	3-7	1-3	Lanceolate to linear-lanceolate, 8 × 2 to 40 × 7 mm	Almost rectangular with straight margin	Forming elongate areole without included free veins	Arising near the base of the sterile portion	6-10 pairs	Smooth
<i>O. vulgatum</i>	Up to 30	1	Broadly ovate or strongly oblong, narrowed toward base 17×8 to 100×50mm	Margin sinuate undulate	Vein areole with included free veins	Arising from the middle of the sterile portion	Up to 40 pairs	Tuberculate

grow on an open degraded submountain area surrounded by a large tea plantation which formerly seemed to have been a closed hyrcanian forest.

In other geographical areas. It is necessary to state that *O. vulgatum* has a wide variety of habitats in its distributional places and wouldn't grow as luxuriantly in exposed or heavily grazed coastal sites as in a damp meadow. By contrast, *O. lusitanicum* prefers relatively exposed habitats. In Europe, this species is a predominantly coastal plant with some inland stations (Valentine, 1964; Paul, 1987) and part of an ephemeral plant community colonizing areas with shallow, clayey to sandy soil that is moist (or even flooded) in winter but completely dries out in summer. In British Isles, this fern is mainly to be found in short turf on the moist peaty or sandy soil of coastal rocky downs and cliff-tops. In Turkey, it grows in open associations with *Pinus brutia*, *Arbutus* & *Erica* (30-350 m).

Note on growing season

It is interesting that *O. lusitanicum* has a winter growing season and is apparent only in the winter month (in contrary to *O. vulgatum* as a spring species) thus its aerial parts completely disappear as soon as the spring drought. In other word, the unobtrusive habit together with

its absence in the main botanical collecting season accounts for its being seldom recorded and its distribution may still be inadequately known.

Geographical distribution

Distributional areas of *O. lusitanicum* is basically Circum-mediterranean extending to the Atlantic Islands in western Europe and with isolated outposts in St. Helena, the Scilly from the Coast of Britain (Maire, 1952; Clapham, et al, 1962; Jalas & Suominen, 1972). The westernmost habitat for the species has been found in Canarian and Madeiran islands (Boissier, 1884; Coste, 1901; Valentine, 1964). The nearest record of the species to Iran is in the west of Transcaucasus area (Abkhazia) (Iljin, 1934). Thus new discovery of *O. lusitanicum* in Hyrcanian area of Iran is the easternmost record of this species uptil now. According to these distributional places, this species is a Mediterranean element extending into some areas of Euro-Siberian region. In contrary, *O. vulgatum* extends in North temperate regions from Northern America, almost throughout Europe, temperate Asia to Sibiria and as a disjunct in Algeria (Boissier, 1884; Coste, 1901; Henderson, 1965).



Fig. 1. *Ophioglossum lusitanicum* L. (nat. size); spike ($\times 4$).

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