

*Terfezia terfezioides* – a new hypogeous fungus  
for Balkan Peninsula

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*Terfezia terfezioides* (Matt.) Trappe was found for the first time in FR Yugoslavia in 1991. Description of the specimens, its mycorrhizal association with *Robinia pseudoacacia* and distribution in Europe are discussed in the paper. This is the first locality of *T. terfezioides* on Balkan Peninsula.

**Key words:** hypogeous fungi, *Terfezia terfezioides*, distribution of fungi, mycorrhiza, *Robinia pseudoacacia*.

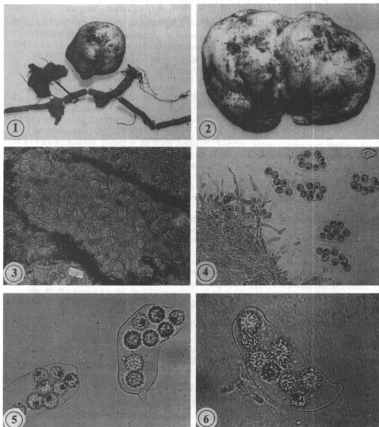
## INTRODUCTION

*Terfezia terfezioides* (Matt.) Trappe (= *Choiromyces terfezioides* Matt. = *Mattirolomyces terfezioides* (Matt.) Fischer) was discovered in Piemonte, Italy (M a t t i r o l o 1887).

*T. terfezioides* is largely distributed in Hungary (H o l l ó s 1933; N o v a k and Z e l l e r 1959; S z e m e r e 1965; B a b o s 1981; K i r á l y and B r a t e k 1992; B r a t e k et al. 1992). It was known also as a rare species in France and Italy (M o n t e c c h i and L a z z a r i (1985, 1993). In 1991 it was collected for the first time in FR Yugoslavia under *Robinia pseudoacacia*, an American species intensively widespreading in Europe.

## DESCRIPTION OF THE SPECIMENS

*Ascomata* hypogeous or subepigeous, 2-4-12 cm diameter, solid, the largest specimen 160g in weight, subglobose, often irregular in form, surface smooth, wrinkled when dry, whitish at first, becoming yellowish to grayish when dry (Figs 1, 2).



Figs 1-6. *Terfezia terfezioides*, ascomata, habit and section. Fig. 1. Ascoma and connections with roots of *Robinia pseudoacacia*,  $\times 1/3$ . Fig. 2. Ascoma,  $\times 1$ . Fig. 3. Sterile veins in gleba,  $\times 120$ .

Fig. 4. Asci and septate hyphae of gleba,  $\times 320$ . Figs 5, 6. Asci with spores,  $\times 460$ .

*Peridium* thin, 50-80  $\mu\text{m}$ , at the basis up to 100  $\mu\text{m}$  thick, composed of irregular, hyaline or pale yellowish cells mostly  $12-25 \times 7-12 \mu\text{m}$ , smaller at the surface, 6-10  $\mu\text{m}$  diam. with thin or slightly thickened walls. Not separating from the gleba. The smaller specimens usually dry, so that the peridium turns into a hard cover and the gleba turns into powdery mass of spores.

*Gleba* white, creme, becoming yellow or slightly rose, distinctly marbled with whitish veins arising from different points on the periphery (Fig. 3). Gleba composed of interwoven septate hyphae 5-10  $\mu\text{m}$  (Fig. 4), at first solid, hard, becomes soft and mushy; smell sweet, pleasant, aging gives unpleasant odor.

*Asci* not forming regular hymenium, randomly distributed, 90-150  $\times$  35-60  $\mu\text{m}$  broadly ellipsoid to subglobose with a short stalk, 8 spored (Fig. 5). *Ascospores* (13) 15-18 (-19)  $\mu\text{m}$  excluding ornamentation, globose, at first hyaline becoming yellowish, ornamented with a distinct reticulum, meshes 2-8  $\mu\text{m}$  across, 3-5  $\mu\text{m}$  high, spiny at the angles (Fig. 6). The sculpture of spores distinctly visible at SEM (Fig. 7; Ł a w r y n o w i c z 1988).

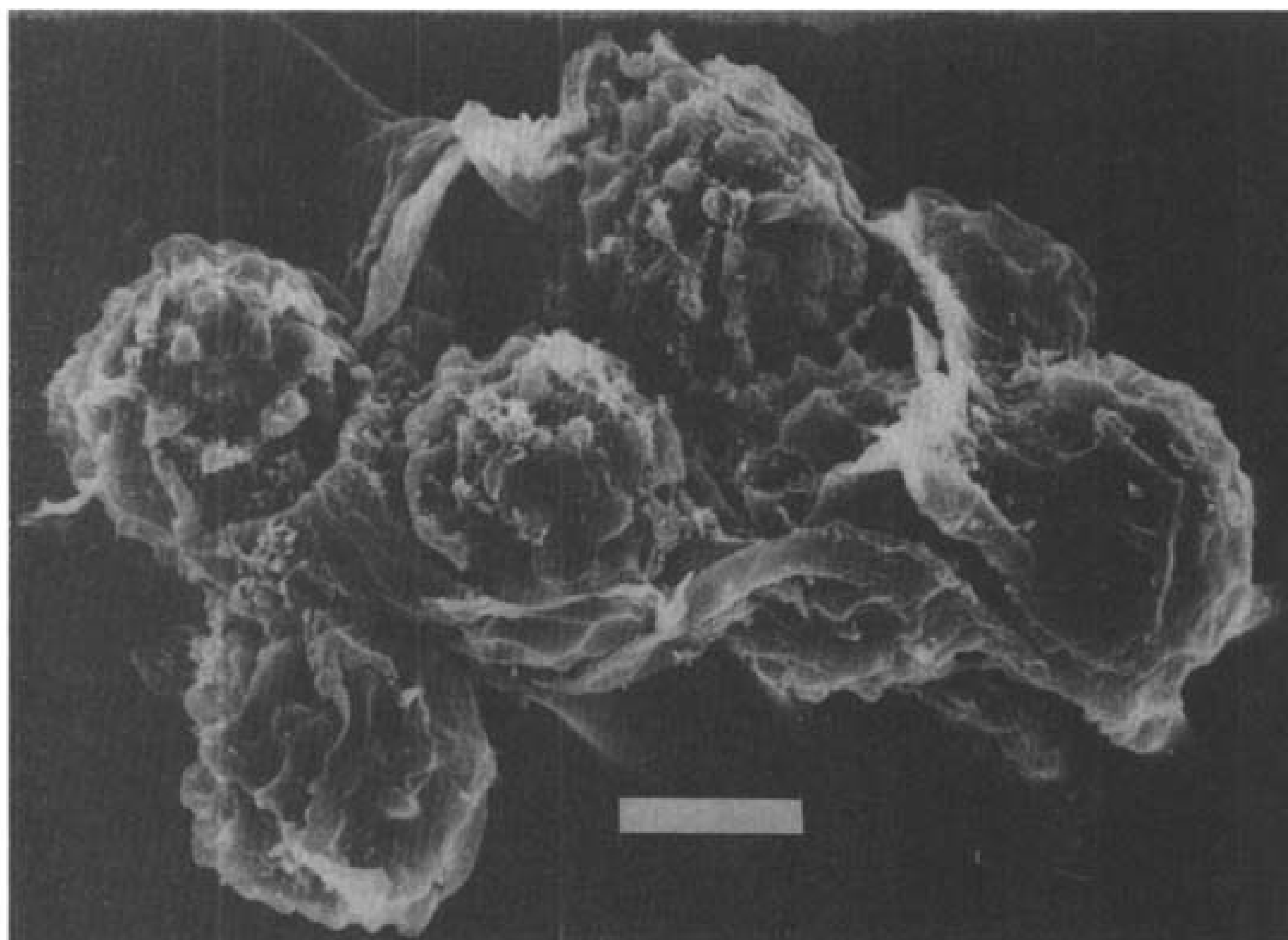


Fig. 7. *Terfezia terfezioides* (SEM): spores in ascus (Herb. K: Hungary)  
(bar — 10  $\mu\text{m}$ )

The collected specimens are kept in the Herbarium of the Natural History Museum in Belgrade (BEO), and in the Herbarium Universitatis Lodzensis in Łódź (LOD 20708).

## HABITAT

The Deliblato Sands, where the fungi were found, is a nature reserve. It is a large area, ellipsoid in shape, ca 35 km long and 20 km wide, covered with Eolian sand. It is a dry area with no open watercourses and with specific xerophilous vegetation rich in steppic species (S t j e p a n o v i ć-V e s e l i ć i ć 1953). The climate is pronouncedly continental.

The specimens were found in sandy and dry soil, where the chief component is quartz ( $\text{SiO}_2$ ). Calcite ( $\text{CaCO}_3$ ) is also an important constituent of the sand composition of the Deliblato Sands. Different parts and soil strata of the Sands vary in calcite content (1-15%). The specimens of *T. terfezioides* have so far been found on the sites where the surface layer (0-20 cm) is low in calcite, as it is washed away by rain water, while the deeper layers (50-60 cm) are somewhat richer, containing 5-10% of calcite.

The area is chiefly populated with black locusts and sparse herbaceous, xerophilous vegetation. Other species of trees, scattered in that area are as follows: white poplar, black pine, hawthorn, willow, and juniper. The fruit bodies have always been found close to the black locust trees. No specimens of *T. terfezioides* have been found on the neighbouring sites populated with black locusts lying outside the area of the Sands, on other soil types.

Investigations by B r a t e k et al. (1996) indicate the existence of atypical mycorrhizal association between black locust and *T. terfezioides* which can be considered as being of endo- or ectendo-type, since both mantle and Hartig net are absent. According to H a r l e y and H a r l e y (1987), in black locust VA mycorrhiza is typical, although ectomycorrhiza has also been observed. *T. terfezioides* has been found also under *Cerasus avium*, as well as in mixed forests on sandy soil, but also in an old cemetery with almost no vegetation (S z e m e r e 1965).

## DISTRIBUTION

The first specimens of *T. terfezioides* on Balkan Peninsula were recorded in July, 1991 on the sites lying on the edge of the Deliblato Sands, approximately 2 km off the Danube (Fig. 8). The specimens were subsequently found on five more sites, in the south-eastern part of the Sands, in the area

of about  $5 \times 10$  km, within the UTM square: EQ16. One specimen was found at the other end of the Sands, about 30 km away, in the UTM square: DQ98.

According to Ławrynowicz (1990) *Terfezia terfezioides* is distributed in the Carpathian Basin both on the Hungarian Highland (numerous localities around Budapest and in the Komitat Pest) and Great Hungarian Plain, including even its part adjacent to the Danube valley (Szekszard, Kiskunlaháza, Kecel and Kajdacs). Outside that area, it is very rare: it occurs at Moncalieri in Piedmont (Italy) and Le Thoronet in the Var department (France). The hypothetical distribution seems to cover SE Europe in the warm belt of the temperate continental climate and the northern belt of the Mediterranean climate in S Europe.

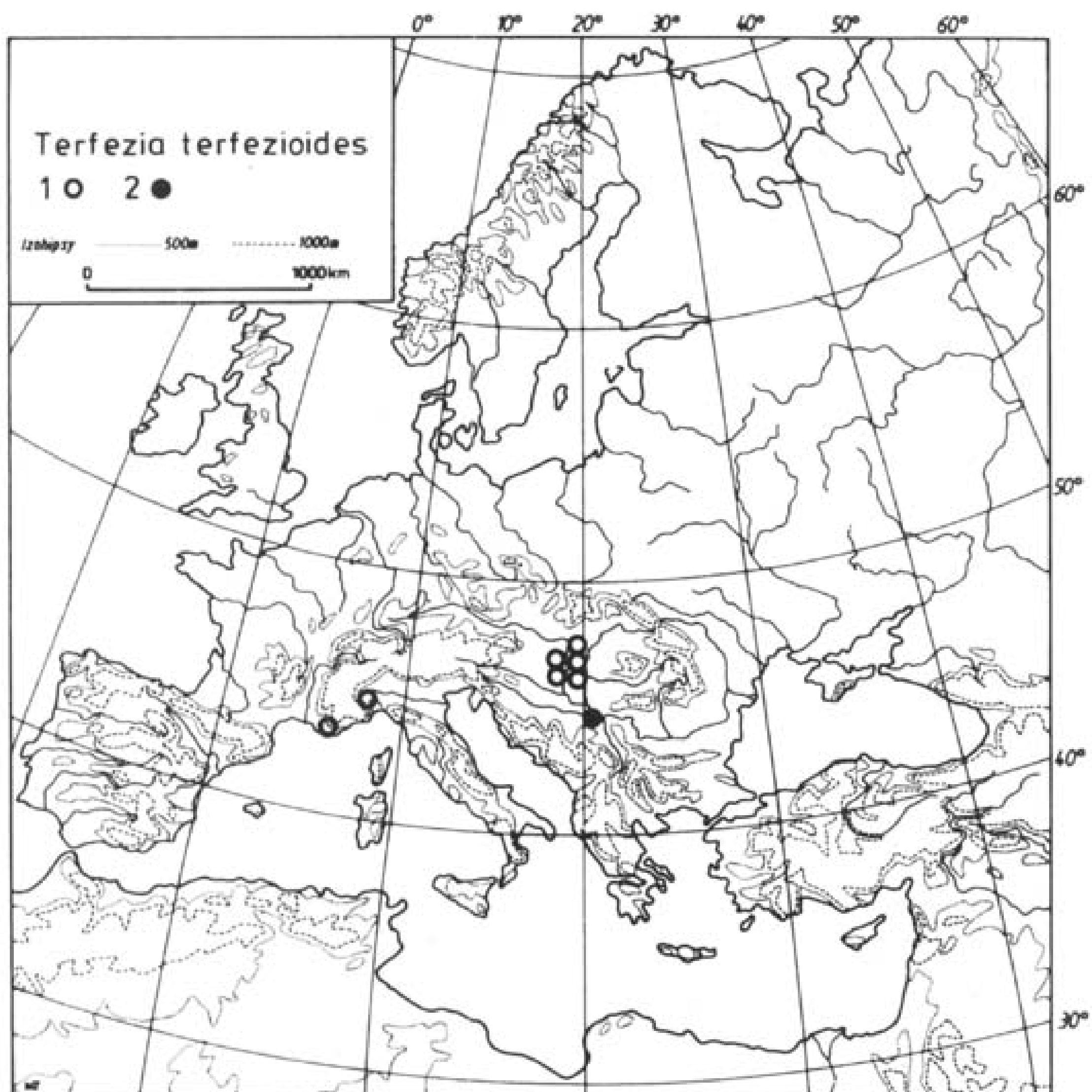


Fig. 8. Distribution in Europe: 1 — localities according to Ławrynowicz (1990); 2 — discovered locality on Balkan Peninsula

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*Terfezia terfezioides* — nowy grzyb podziemny dla Półwyspu Bałkańskiego

## Streszczenie

*Terfezia terfezioides*, gatunek znany dotychczas z licznych stanowisk na Węgrzech oraz pojedynczych we Francji i Włoszech, został ostatnio stwierdzony w okolicach Belgradu, po raz pierwszy na Półwyspie Bałkańskim. W świetle zebranej literatury, pierwszoplanowym partnerem mikoryzowym dla tego grzyba jest *Robinia pseudoacacia*. W pracy podano cechy taksonomiczne zebranych okazów, wyniki obserwacji wymagań siedliskowych oraz dane dotyczące rozmieszczenia tego gatunku w Europie.