

# First records of two ascomycete fungi (Ascomycota) for Slovenia

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**Abstract.** In April and May 2019, two ascomycetous species – *Vibrissea filisporia* (Bonord.) Korf & A. Sánchez 1967 and *Cudoniella tenuispora* (Cooke & Massee) Dennis 1974 were observed in Tivoli, Rožnik and Šiška hill Landscape Park in central Slovenia. This is the first evidence of their presence in the country. Despite specific growth condition requirements, there is a reasonable probability that these two species grow also elsewhere in Slovenia, but have simply been overlooked. We recommend further studies of suitable habitats for the species, to complete the knowledge on their distribution within the country.

Key words: fungi, Ascomycota, first records, *Vibrissea filisporia*, *Cudoniella tenuispora*, Mali Rožnik, Ljubljana, Slovenia

**Izveček. Prvi podatki o dveh vrstah gliv zaprtotrosnic (Ascomycota) za Slovenijo** – V aprilu in maju 2019 sta bili na območju zavarovanega območja Krajinskega parka Tivoli, Rožnik in Šišenski hrib v osrednji Sloveniji najdeni dve glivi zaprtotrosnici, *Vibrissea filisporia* (Bonord.) Korf & A. Sánchez 1967 in *Cudoniella tenuispora* (Cooke & Massee) Dennis 1974. Kljub specifičnim rastiščnim zahtevam je zelo verjetno, da ti dve vrsti uspevata tudi drugod po državi, a sta bili spregledani. Prihodnje študije primernih habitatov bodo lahko dopolnile poznavanje razširjenosti teh vrst v državi.

Ključne besede: glive, Ascomycota, prvi podatki, *Vibrissea filisporia*, *Cudoniella tenuispora*, Mali Rožnik, Ljubljana, Slovenija

## Introduction

Tivoli, Rožnik and Šiška hill Landscape Park is a nature protected area in central Slovenia. Due to highly preserved natural features of the area, it was declared a Landscape Park in 1984 (Ur. l. SRS 1984; Ur. l. RS 2015). Management office for the park, also in charge of conducting organism inventories within the park, was established in 2017 (Anonymous 2018). Part of the assignments of the management team includes fulfilling the inventories of the species within the park.

So far, more than 1,200 different fungi species have been recorded in the Landscape Park in Ljubljana (Šparl, unpublished data). This number is probably underestimation of the true diversity, as systematic studies on fungi in the area are lacking. Due to various high humidity habitats, as well as due to areas with remains of wood mass (Smrekar et al. 2011), the potential for new findings is high.

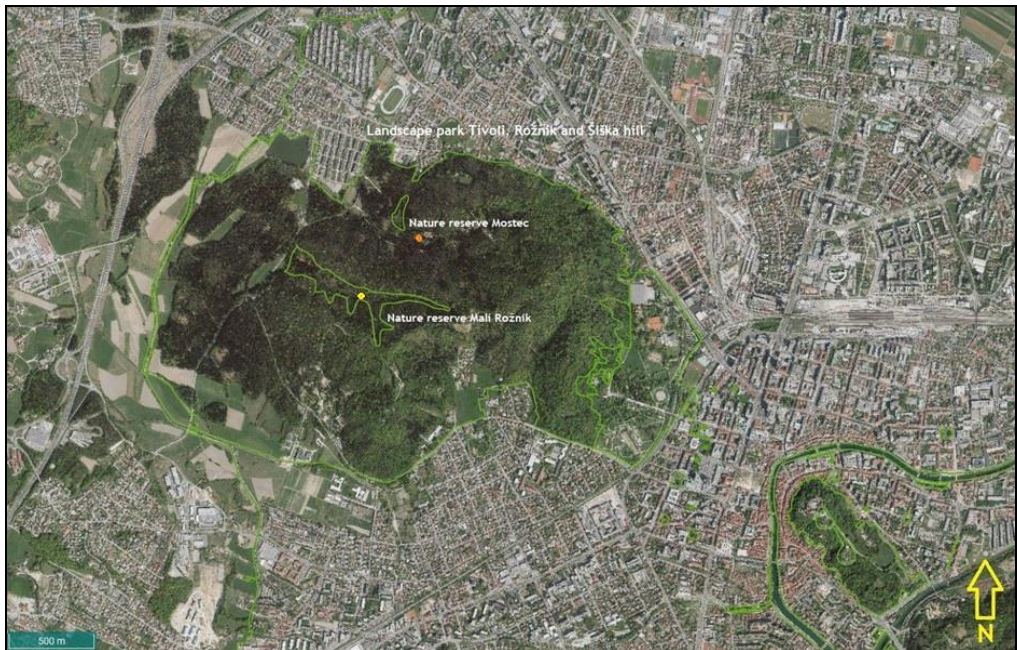
During the few days of targeted research within the park in spring 2019, we observed many different fungal species. Here we report on two that were most interesting, as these are first records not only for the park, but for the whole of Slovenia.

## Materials and methods

Tivoli, Rožnik and Šiška hill Landscape Park is positioned in central Slovenia, within the capital city Ljubljana (Fig. 1). It covers 4.59 km<sup>2</sup>, at about 300–429 m altitude, encompassing different seminatural habitats. Three quarters of this area are covered by forests, in which beech, fir and noble deciduous trees prevail. Natural forest associations are present particularly on the eastern slopes, while other forested areas have been changed owing to planned forestation with spruce, also Douglas firs and even eastern white pine. A smaller part of the Landscape Park is overgrown by regularly maintained grasslands, which stretch from the western edge of the area towards its south (Fig. 1). At the eastern part of the area spreads the urban green area, Tivoli Park, a transition between the urban flat part of the city and its hilly forested area.

During the three days in spring 2019 (20. 4., 25. 4. and 2. 5.2019) we conducted a field work study within different parts of the park: Mali Rožnik Nature Reserve (Gauss-Krüger coordinates of the central point of the area are Y: 459573, X: 101895) and the area near Mostec Nature Reserve (Gauss-Krüger coordinates of the central point of the area are Y: 460036, X: 102173). In both areas, fungi were searched for visually and on foot. We paid special attention to the area of Mali Rožnik Nature Reserve, which is an extensive marshland and as such an exceptionally vulnerable ecosystem.

All observed fungi were photographed at the sites and accurate locations recorded. Specimens were collected by hand and later determined by observing morphological microstructures (ascospores, paraphyses, etc.) under 1000× magnification, using immersion oil and Carl Zeiss Jenaval microscope. All data was transferred to the »Boletus informaticus« database (Koller 2019, Zupan 2019). All fungal material was dried and exsiccates deposited at the »Mycotheca and Herbarium« of the Slovenian Forestry Institute.



**Figure 1.** The locations where two fungal species, both new for Slovenian mycoflora, were observed. Upper orange circle indicates the locality of *Vibrissea filisporia* (Bonord.) Korf & A. Sánchez 1967 and lower yellow circle the locality of *Cudoniella tenuispora* (Cooke & Massee) Dennis 1974. The wider green area denotes »Tivoli, Rožnik and Šiška hill« Landscape Park, while the two inner green areas designate Mostec Nature Reserve (northern area) and Mali Rožnik Nature Reserve (southern area). Source of base map: GURS, 2019.

**Slika 1.** Lokacije najdb dveh vrst gliv, novih za slovensko mikofloro. Zgornji oranžni krog ponazarja najdbo vrste *Vibrissea filisporia* (Bonord.) Korf & A. Sánchez 1967, spodnji rumeni krog pa najdbo vrste *Cudoniella tenuispora* (Cooke & Massee) Dennis 1974. Širše zeleno orisano območje ponazarja Krajski park Tivoli, Rožnik in Šiški hrib, notranji zeleni območji pa Naravni rezervat Mostec (severno) in Naravni rezervat Mali Rožnik (južno od prvega v osrednjem delu krajinskega parka). Vir osnovne kartografske podlage: SDMS, 2019.

## Results and discussion

During our rather short research in the Landscape Park, we discovered two new fungi species for the Park and Slovenia as a whole. The species *Vibrissea filisporia* (Bonord.) Korf & A. Sánchez 1967 (f. Vibrisseaceae, o. Heliales, cl. Leotiomyces) (Wang et al. 2006a, Wang et al. 2006b, Hustad & Miller 2011, Sandoval-Leiva et al. 2014) was found in the area close to Mostec on 25. 4. 2019 and 2. 5. 2019 (Fig. 1). The second species *Cudoniella tenuispora* (Cooke & Massee) Dennis 1974 (f. Helotiaceae, o. Heliales, cl. Leotiomyces) (Wang et al. 2006a, Wang et al. 2006b, Hustad & Miller 2011) was found in Mali Rožnik Nature Reserve on 20. 4. 2019 and 2. 5. 2019 (Fig. 1).

Both species were found growing on branches of dead wood (Fig. 2).



**Figure 2.** Two new fungi species for Slovenia, photographed at the sites within Tivoli, Rožnik and Šišenski hrib Landscape Park in 2019. Left: *Vibrissea filisporia* on a fallen branch at Mostec; right: *Cudoniella tenuispora* on a hardwood fallen branch at Mali Rožnik (photo: Luka Šparl).

**Slika 2.** Dve vrsti gliv, novi za Slovenijo, fotografirani na rastišču v Krajinskem parku Tivoli, Rožnik in Šišenski hrib v letu 2019. Levo: *Vibrissea filisporia* na padli veji v Mostecu; desno: *Cudoniella tenuispora* na padli veji v Malem Rožniku (foto: Luka Šparl).

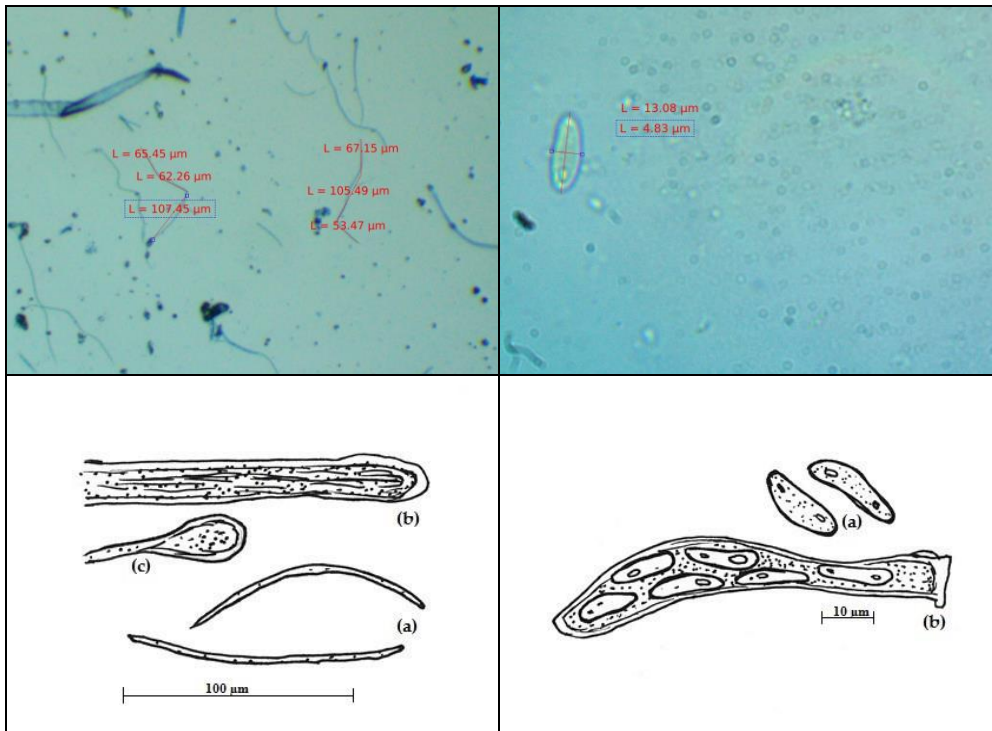
Determination of the species was done visually on the found individuals in nature (Fig. 2), as well based on measurements of the spores (Fig. 3). Paraphyses of *V. filisporia* are several times branched, often fasciculate, rarely simple, apices 2–5  $\mu\text{m}$  wide; outermost cells of the ectal excipulum round or pyriform, without projections. Disk bluish-grey, yellow or ochraceous. Measurements of the typical structures for determination are given in Tab. 1, and are within measurements given by Medardi (2006). As we observed both living and dead cells and tissues, we could not differentiate between such spores. Apothecia were sessile, receptacle brown to light brown (Fig. 2).

**Table 1.** Morphological characteristics of the two new fungi species for Slovenia, found in Tivoli, Rožnik and Šiška hill Landscape Park in 2019.

**Tabela 1.** Morfološke karakteristike dveh vrst gliv, novih za Slovenijo, najdenih leta 2019 v Krajinskem parku Tivoli, Rožnik in Šišenski hrib.

Structure	<i>Vibrissea filisporia</i>	<i>Cudoniella tenuispora</i>
Apothecium [mm]	0.7–2.0 (n = 10)	27.0–32.0 (n = 4)
Ascospores size [ $\mu\text{m}$ ]	100–210 $\times$ 1–1.3 (n = 10)	9.4–14.8 $\times$ 4.2–4.9 (n = 20)
Asci size [ $\mu\text{m}$ ]	120–305 (–325) $\times$ 6–8 (n = 5)	83–102 $\times$ 8.3–10.1 (n = 5)

In *C. tenuispora*, asci and ascospores were smaller (Tab. 1; Fig. 3). We observed negative iodine reaction on ascus apex. Macroscopically, this species is highly reminiscent of the similar *Cudoniella clavus* which has smaller apothecium, rarely bigger than 15 mm (Breitenbach & Kränzlin 1984, Handsen & Knudsen 2000).



**Figure 3.** Microphotographs of ascospores of *Vibrissea filisporia* (upper left) and *Cudoniella tenuispora* (upper right) and sketches of ascospores (a), asci (b) and paraphyses (c) of *V. filisporia* (lower left) and *C. tenuispora* (lower right) found in 2019 in central Slovenia. Dimension rates on sketches are approximated; accurate dimensions are included in Tab. 1. Abbreviations: L – length (photo: Eva Zupan).

**Slika 3.** Mikrofotografije askospor vrste *Vibrissea filisporia* (zgoraj levo) in *Cudoniella tenuispora* (zgoraj desno) ter skice askospor (a), askov (b) in parafiz (c) vrst *V. filisporia* (spodaj levo) in *C. tenuispora* (spodaj desno), najdenih v letu 2019 na območju osrednje Slovenije. Razmerja dimenzij na skicah so ocenjena, natančne dimenzije so podane v Tab. 1. Okrajšave: L – dolžina.

The exsiccates of both species were given identification numbers, and are stored in the »Mycotheca and Herbarium« of the Slovenian Forestry Institute (*V. filisporia* with ID number 7008 and *C. tenuispora* with ID number 7013).

*Vibrissea filisporia* was described as *Sarea filisporia* Bonord. for the first time in 1853 by German mycologist H. F. Bonorden. The current combination was proposed by A. Sánchez in 1967 (Sánchez, 1967). According to Sanchez (1967), this aquatic species grows isolated or in small groups in woods or marshes and streams, on dead branches, especially on *Salix sp.* or *Alnus* immersed in ditches. It grows from spring to autumn, and is considered rare in Europe.

*Cudoniella tenuispora* (Cooke & Masee) Dennis 1974 was described as *Sarcoscypha tenuispora* Cooke & Masee for the first time in 1893 by Cooke and Masee. The current combination was proposed by British mycologist R. W. G. Dennis in 1974 (Dennis 1974). This aquatic species grows isolated, rarely gregarious in forest streams, on little wet branches of hardwoods. The apothecia are white to cream, diameter from 5 to 15 mm, pileus convex,

white and brownish small squamules on top. Small squamules on white-cream stipe (Dennis 1974, Beyer 2004, Wang et al. 2015, Gierczyk et al. 2019).

As the two species are confirmed for Slovenia, we suggest Slovenian vernacular names for both. Name »temnoroba potočka« is suggested for *V. filisporia* and name »ozkotrosna žebljarka« for *C. tenuispora*.

Both species require marshy ecosystems with pure and chemically unpolluted slow water flow, without any pesticide content (Sanchez 1967, Schefer 1986, Medardi 2006, Shearer et al. 2007). These findings in Landscape Park indicate good conservation status of these parts of the Park. Due to exceptional rarity of the species, and sensitivity of suitable habitats which are in decline across Europe (Silva et al. 2007, Čížková-Končalová et al. 2013), additional observations on both species are needed to improve knowledge on their biology, ecology and conservation status. We recommend additional field research of suitable habitats throughout Slovenia, as there is a great probability that both species are present in other parts of the country as well.

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