

New records of fungi of the classes Sordariomycetes and Dothideomycetes from Europe

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During a mycofloristic survey of selected localities in the Czech Republic and Croatia, several species of the classes Sordariomycetes and Dothideomycetes were found. These collections represent new records for the country or for Europe. The following species are characterised, illustrated and discussed: *Montagnula cirsii*, *Paradiaporthe artemisiae* (first collections for the Czech Republic), *Jahnula sangamonensis* (first published collection for Europe) and *Thyronectria pistaciae* (first collection for Croatia).

Key words: *Thyronectria*, *Paradiaporthe*, *Montagnula*, *Jahnula*, diversity, ecology.

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Při mykofloristickém průzkumu vybraných lokalit v České republice a Chorvatsku bylo nalezeno několik druhů z tříd Sordariomycetes a Dothideomycetes, jejichž sběry lze označit jako nové pro daný stát, popřípadě pro Evropu. V této práci jsou podrobněji popsány, ilustrovány a diskutovány druhy: *Montagnula cirsii*, *Paradiaporthe artemisiae* (první sběry pro Českou republiku), *Jahnula sangamonensis* (první publikovaný sběr pro Evropu) a *Thyronectria pistaciae* (první sběr pro Chorvatsko).

INTRODUCTION

Although the mycobiota of macromycetes of the Czech Republic is already well documented, there is relatively little information on the distribution and ecology of representatives of the Sordariomycetes and Dothideomycetes in available surveys and the Czech database (see Slavíček 2014–2018). A similar situation occurs in Croatia, where a comprehensive checklist of fungi is not available. The aim of this article is to contribute to the knowledge and diversity of members of the Sordariomycetes and Dothideomycetes in selected areas of the Czech Republic and Croatia.

MATERIAL AND METHODS

Collection sites. The material described in the results was collected mainly in the Czech Republic during a mycofloristic survey of the Vítkovská vrchovina Highlands in the valley of the Setina river (erroneously named Sezina in public maps), between the villages Olbramice and Zbyslavice, and also on Okrouhlík hill near the village of Kyjovice. The Vítkovská vrchovina Highlands belong in terms of geomorphology to the Sudetes of the Bohemian Massif and form the south-eastern part of the foothills of the Nížký Jeseník Mts. Another locality was situated in the Žabí údolí Valley between the villages Radkov, Hradec nad Moravicí and Filipovice in the Nížký Jeseník Mts. The studied areas are situated in the north-eastern part of the Vítkovská vrchovina Highlands with altitudes of 280–400 metres.

Thyronectria pistaciae was collected near the village of Brela in Croatia. The surveyed locality is situated in the coastal part of Dalmatia. The surroundings of Brela under the Massif of Biokovo is covered by characteristic Mediterranean calciphilous vegetation.

The studied localities are phytosociologically characterised below. Collected material is deposited in the herbarium of the Moravian Museum (BRNM, Brno, Czech Republic).

Microscopic and macroscopic study. For microscopic study, a Bresser trino microscope was used, and photos were made using a USB 2.0 YW500 digital camera (SRATE). Microscopic structures were measured with the PIXIMÉTRE software (by A. Henriot, 2020) in distilled water. Material was studied mainly in fresh condition (only *Thyronectria pistaciae* was studied in dry condition). In the case of the *Paradiaportha artemisiae* collection, immersion oil was used at a magnification of 1000×. Always min. 5 measurements of ascoma, 10 measurements of asci and min. 20 measurements of cells of ascomatal wall and ascospores were made, unless otherwise stated. Only 10 ascospores were measured in the case of *Montagnula cirsii*, because the material was in bad condition.

Macrophotographs of the collections were taken with Canon PowerShot SX500 IS and Panasonic Lumix DMC-FZ300 cameras with the help of a Raynox DRC 250 conversion lens. The method of focus stacking was used, where 5–10 photos with different depth of field were captured and stacked with CombineZP (software by A. Hadley, 2012) and subsequently modified with the Zoner Photo Studio 17 software (ZONER, Brno, Czech Republic).

RESULTS AND DISCUSSION

SORDARIOMYCETES

Thyronectria pistaciae Checa, M.N. Blanco, Jaklitsch, Voglmayr & G. Moreno
Figs. 1–2

(*Hypocreales, Nectriaceae*)

Description. Stroma 2–3 mm in diam., erumpent from suberoderm, yellowish. Ascomata perithecial, aggregated, subglobose, orange-brown to yellowish pruinose, 260–300(320) µm in diam., ostioles 70–105.5 × 64–84.5 µm, short, conical. Ascomatal wall three-layered, external layer to 22.6 µm in diam., consisting of a *textura angularis-globulosa* made up of light yellow to lemon yellow cells 4–5 × 3–4.5(5) µm, middle layer to 8.5 µm thick consisting of a *textura prismatica* of dark reddish cells 2–5(5.5) × 2–4 µm, inner layer consisting of yellow cells, 5.5 µm in diam. Ascii 84–127 × 11.6–15 µm, cylindrical, short-stalked, 8-spored. Ascospores (14)15–16(16.5) × (9)9.5–12(12.5) µm, Q = 1.2–1.5, Q_{av} = 1.4 (N = 40), irregularly globose-ellipsoidal, at maturity non-translucently dark green, with 3–4 transversal and 1–2 longitudinal septa.

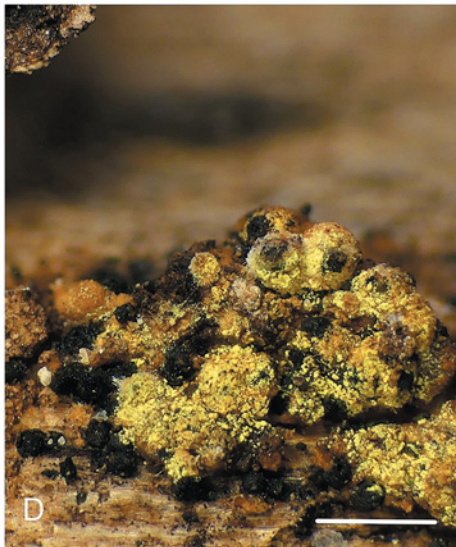
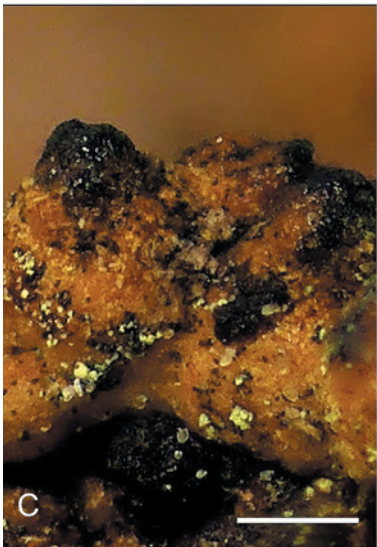
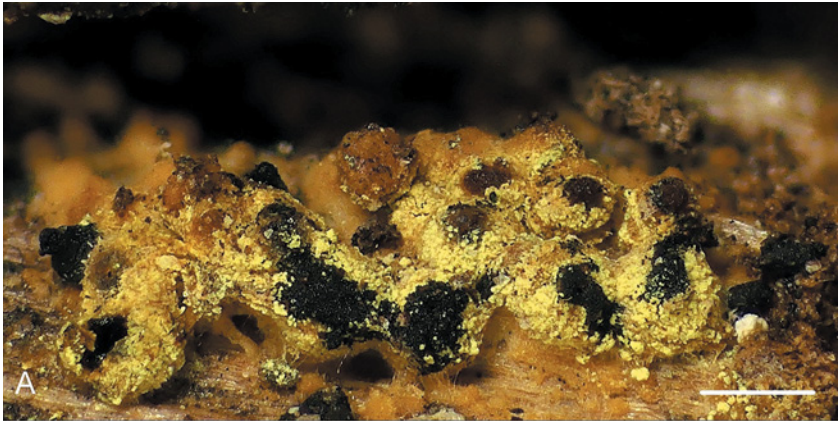
Habitat. On dead corticated branches of *Pistacia lentiscus* (Checa et al. 2015) and on branches of *Pistacia terebinthus* (this study). According to Checa et al. (2015), *T. pistaciae* is probably a fungicolous species. The collection described in this study was associated with *Cryptovalsa* sp. The biotope of the Croatian collection consists mainly of pine forest with *Pinus halepensis* of the *Erico arboreae-Pinetum halepensis* association with evergreen shrubs, predominated by *Laurus nobilis*, *Paliurus spina-christii*, *Pistacia terebinthus* and *Viburnum tinus* subsp. *tinus*.

Distribution. Known from southern Spain (Checa et al. 2015) and newly from Croatia (this study).

Material examined

Croatia. Brela, Filipovići, 50 m a.s.l., on dead corticated branches of *Pistacia terebinthus*, 10 July 2018, leg. & det. P. Mlčoch (BRNM 825890).

Notes. This species is well distinguishable from other members of the genus by the yellowish stroma and the substrate, microscopically by the typical green ascospores, their sizes, and the numbers of septa. Checa et al. (2015) supposed that it is a taxon ecologically bound to the genus *Pistacia*. The species is described from Spain, but based on the Croatian collection we assume that this species may occur elsewhere in the distribution range of its host plants (at least in the Mediterranean region, where it may be uncommon or overlooked). This species had not yet been recorded in Croatia (N. Matočec, pers. comm.).



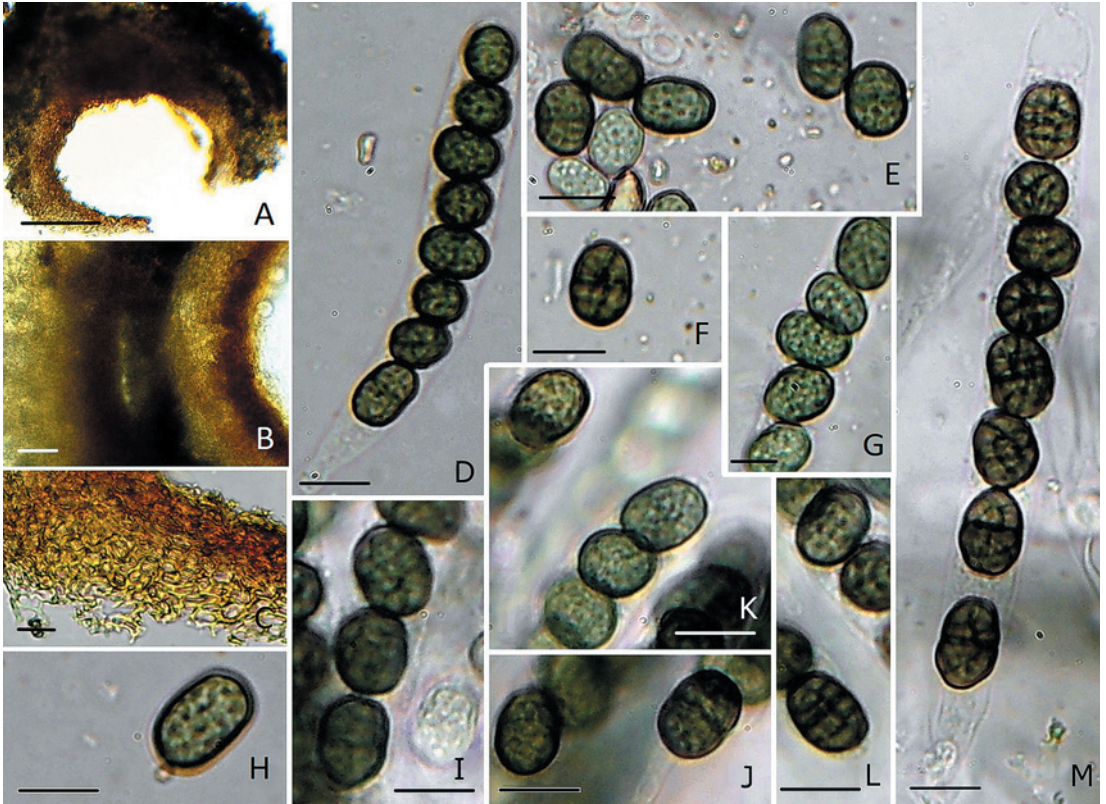


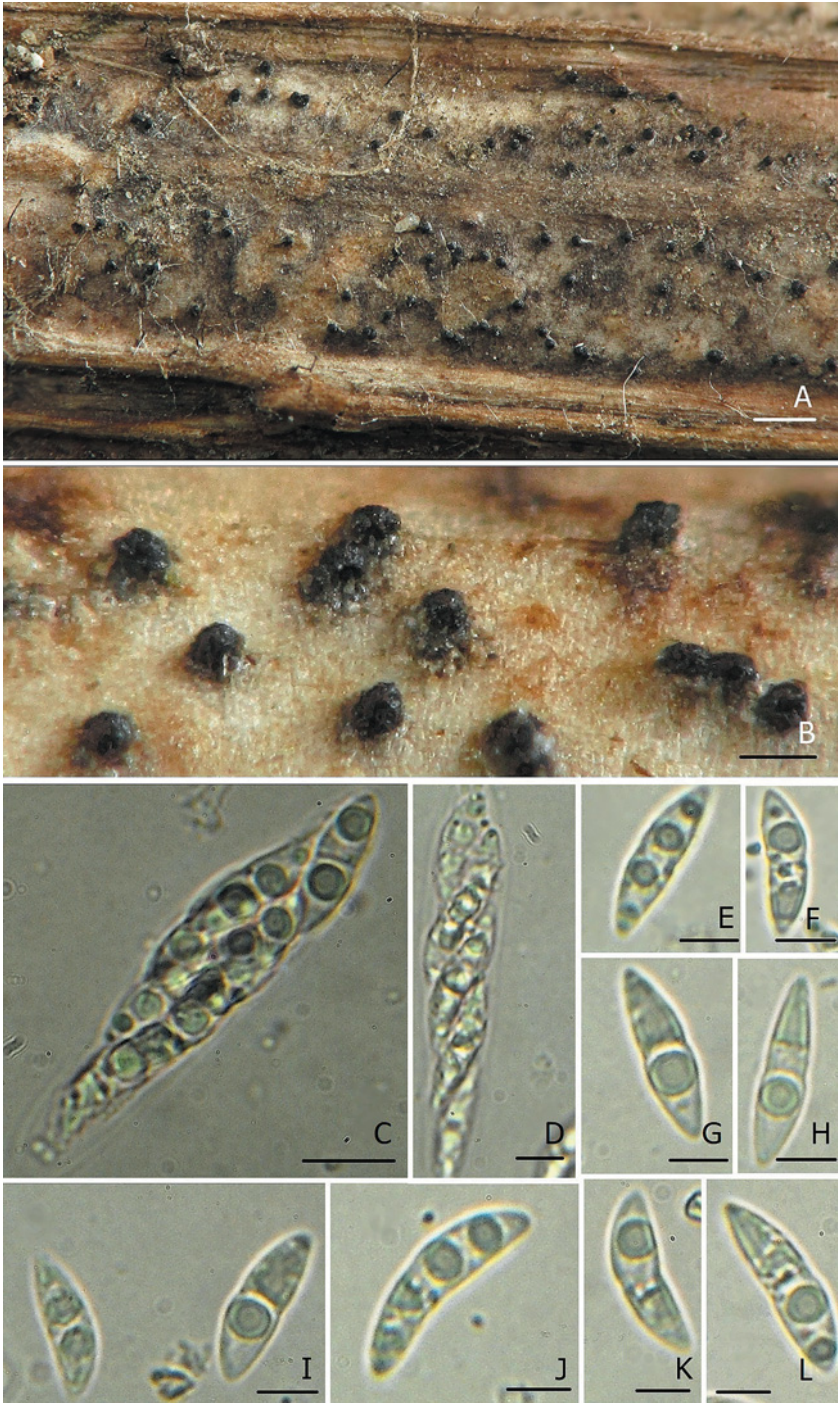
Fig. 2. *Thyronectria pistaciae* on *Pistacia terebinthus* (BRNM 825890). **A** – perithecial ascoma; **B, C** – ascomatal wall; **D, M** – asci; **E–L** – ascospores. Scale bars = 100 µm (A), 5 µm (B, C), 10 µm (D–L). Photo P. Mlčoch.

◀ **Fig. 1.** *Thyronectria pistaciae* on *Pistacia terebinthus* (BRNM 825890). **A–D** – stroma with perithecial ascomata. Scale bars = 300 µm (A, B), 150 µm (C), 500 µm (D). Photo P. Mlčoch.

Paradiaporthe artemisiae Senan., Camporesi & K.D. Hyde
(*Diaporthales, Diaporthaceae*)

Fig. 3

Description. Stroma absent. Ascomata perithecial, 524–860 µm in diam., spherical, solitary or in crowded groups, epistromatic zone absent, blackened zone absent. Ostioles 140–220 × 80–115 µm, shortly erumpent from epidermis of stem. Ascomatal wall up to 25 µm in diam., consisting of a *textura angularis* made up of brown, polygonal cells 4–6 × (3)3.5–4(4.5) µm. Asci 54.5–61 × 10–12 µm, cylindrical-clavate, short-stalked. Ascospores (14)14.5–18.5 × (4)4.5–5 µm, $Q = 3.1–3.8$, $Q_{av} = 3.4$, irregularly fusiform, hyaline, 1-septate, with one to two lipid droplets in each cell.



◀ **Fig. 3.** *Paradiaporthe artemisiae* on *Artemisia* sp. (BRNM 825886). **A, B** – erumpent ostioles on stems; **C, D** – asci; **E–L** – ascospores. Scale bars = 1 mm (A), 100 µm (B), 5 µm (C–L).
Photo P. Mlčoch.

Habitat. On dead stems of *Artemisia vulgaris* in ruderal habitats, where the dominant phytocenosis is *Tanaceto vulgaris-Artemisietum vulgaris*.

Distribution. Known from Italy (Sananayake et al. 2017) and the Czech Republic (this study).

Material examined

Czech Republic. Vítkovská vrchovina Highlands, Zbyslavice, Zbyslavice ponds, ruderal habitat at 280 m a.s.l., on dead stems of *Artemisia* sp., 28 Sept. 2017, leg. & det. P. Mlčoch (BRNM 825886). – Nizký Jeseník Mountains, Radkov, Žabí údolí Valley, nitrophilous ruderal vegetation near Melč stream, 400 m a.s.l., 49°50'8.1" N, 17°47'31.1" E, on dead stems of *Artemisia vulgaris*, soc. *Leptosphaeria valesiaca*, 25 Aug. 2020, leg. & det. P. Mlčoch (BRNM 825889).

Notes. According to Sananayake et al. (2017), the ostioles are 135–138 × 110–140 µm, in our study they are slightly larger. Based on the three known collections, *P. artemisiae* is probably an overlooked or uncommon species, so far known only from Europe.

DOTHIDEOMYCETES

Jahnula sangamonensis Shearer & Raja

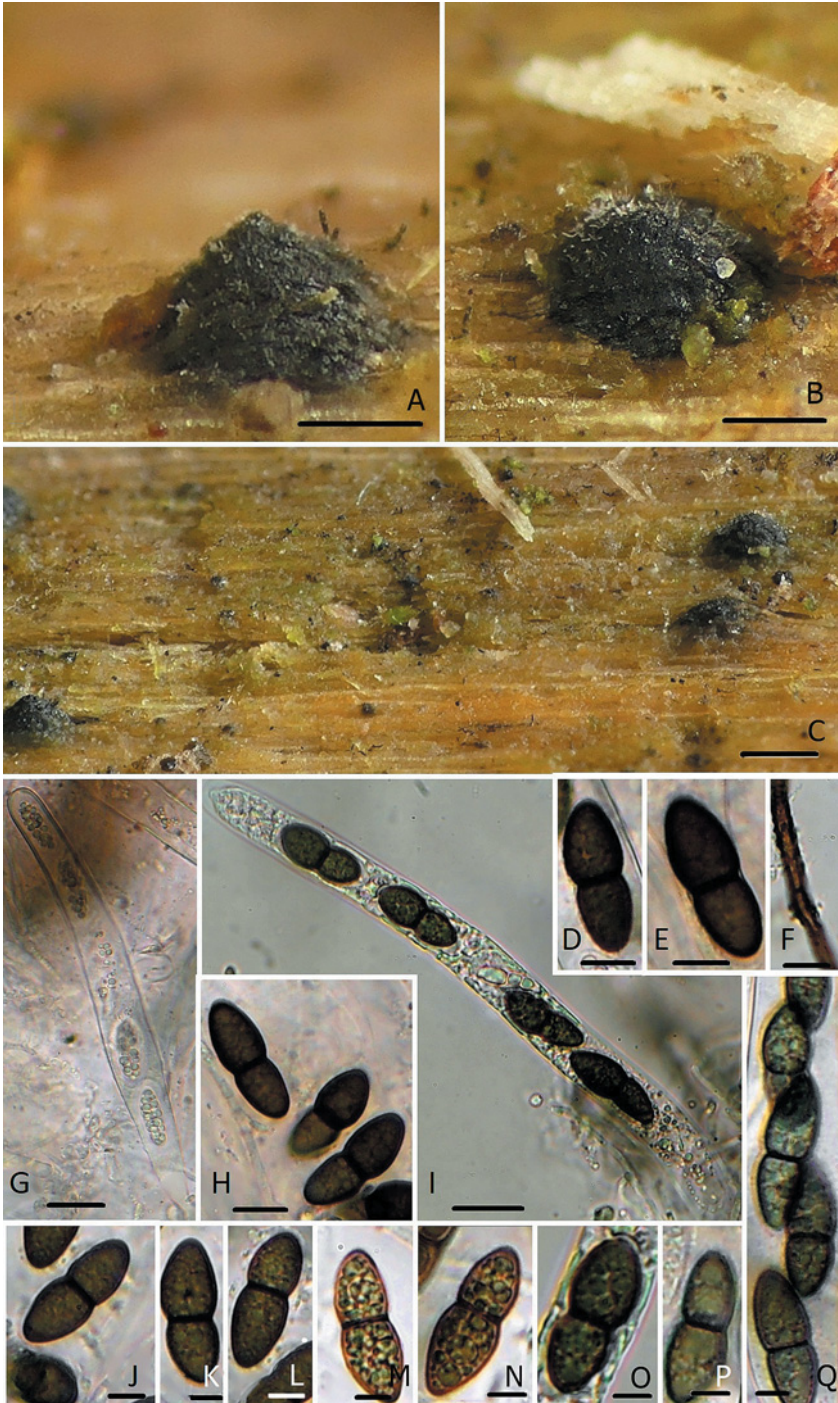
Fig. 4

(*Jahnulales*, *Aliquandostipitaceae*)

Description. Ascomata pseudothecial, 420–470 µm in diam., initially submerged in xylem, later partly erumpent, subglobose to globose, sometimes slightly conical, covered with brown hyphae up to 5.4 µm in diam. on the surface. Ascomatal wall consisting of a *textura angularis* made up of isodiametric, brown cells. Asci 136–200 × 15.5–20 µm, cylindrical, bitunicate, short-stalked, 8-spored. Ascospores (24.5)26–30.5(31) × (9)10–12(12.5) µm, $Q = 2.4–2.8$, $Q_{av} = 2.6$, uniseriate in ascus, didymosporic, initially subhyaline, olive green, later darkening to brown or dark olive brown, upper spore cell wider, guttulate, smooth, without gelatinous sheath or polar apiculum.

Habitat. On dead decorticated wood of *Quercus robur*, under melting snow in humid area below north- to northeast-facing slopes in the valley. The described material was collected in a deciduous forest with *Acer platanoides*, *Quercus robur* and *Tilia cordata*.

Distribution. Illinois, USA (Raja & Shearer 2006) and the Czech Republic (this study).



◀ **Fig. 4.** *Jahnula sangamonensis* (BRNM 825887). **A–C** – pseudothecial ascomata; **F** – hypha on surface of pseudothecial ascoma; **G, I** – asci; **D, E, H, J–Q** – ascospores. Scale bars = 250 µm (A, B), 500 µm (C), 20 µm (G, I), 10 µm (F, H), 5 µm (D, E, J–Q). Photo P. Mlčoch.

Material examined

Czech Republic. Vítkovská vrchovina Highlands, Zbyslavice, Cimberek hill, 310 m a.s.l., on dead decorticated wood of *Quercus robur*, 10 Febr. 2019, leg. & det. P. Mlčoch (BRNM 825887).

Notes. According to Suetrong et al. (2011), *J. sangamonensis* is characterised by ascus sizes of 164–200 × 15–20 µm and ascospore sizes of 20–28 × 10–12 µm having a characteristic morphology: smooth cell walls without ornamentation, without gelatinous sheath and with strongly guttulate spore content. Our collection has slightly longer ascospores (25–30 µm), but otherwise corresponds to the protologue of this species.

The genus *Jahnula* includes 18 species (MycoBank online). Most of them are described from North America, Asia and Australia. Only *Jahnula aquatica* (Kirschst.) Kirschst. is known from Europe. However, it has longer (30–40 µm), fusoid elliptic to narrowly elliptic ascospores. Microscopically, *J. sangamonensis* can be confused with *J. poonythii* K.D. Hyde & S.W. Wong, which has ascospores with tapering ends (Huang et al. 2018) and is known from Mauritius only (Suetrong et al. 2011). *Jahnula bipileata* Raja & Shearer is also similar to the present species, but differs in narrower (10–17 µm) asci, narrower (9–10 µm) striate ascospores with polar appendages and is described from Florida, USA (Raja & Shearer 2006, Suetrong et al. 2011).

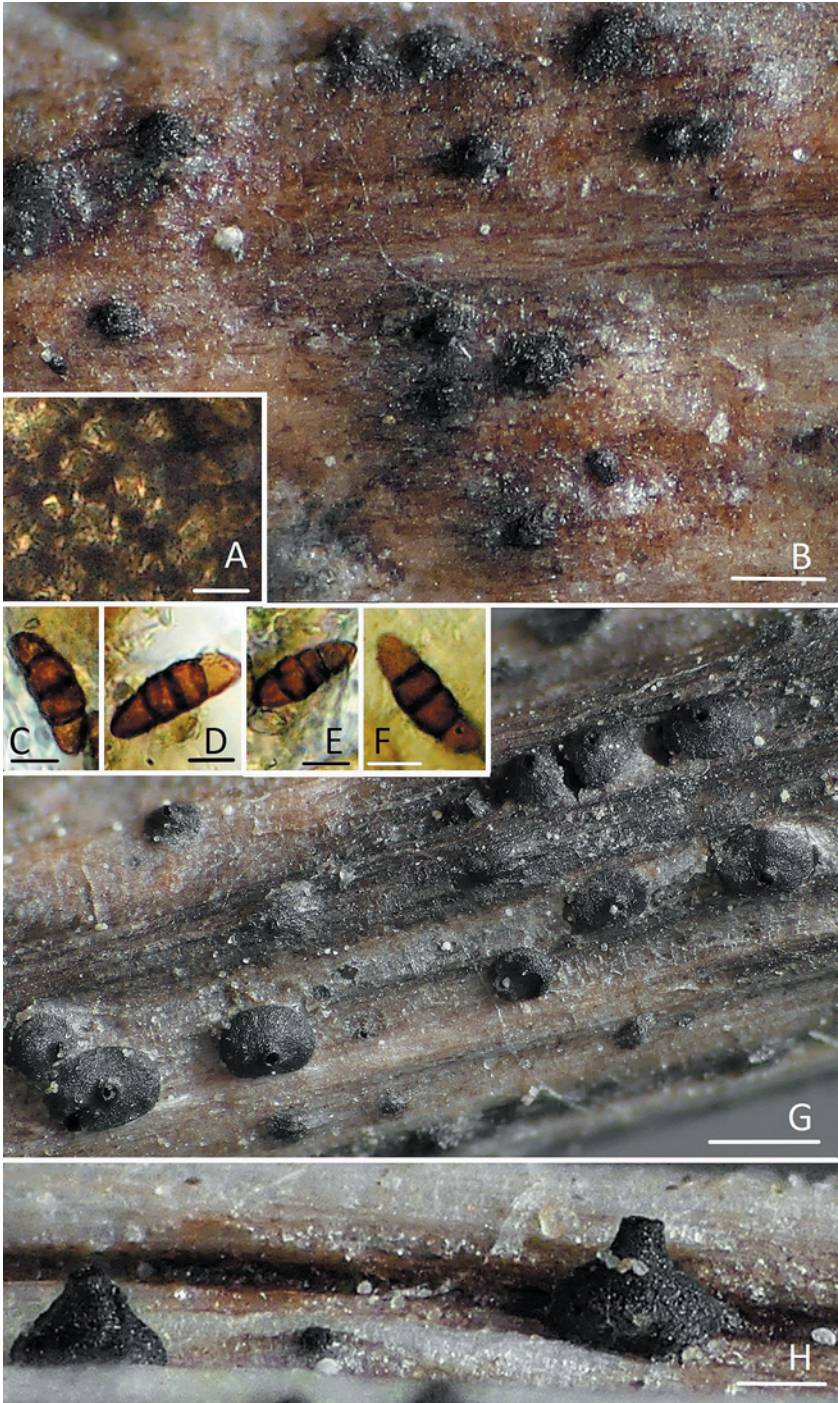
Montagnula cirsii Qing Tian, Camporesi & K.D. Hyde

Fig. 5

(Pleosporales, Didymosphaeriaceae)

Description. Ascomata pseudothecial, up to 360 µm in diam., solitary or in small groups, globose to subglobose, subepidermal, later semi-immersed to erumpent. Ostioles shortly conical to cylindrical, without setae. Ascomatal wall consisting of a *textura angularis* made up of brown, irregularly globose to polygonate cells (4)5–7(7.5) × (4)5–6 µm. Asci not observed by the author. Ascospores (21.5)22.5–24(26.5) × 6–8(8.5) µm, Q = 2.7–3.9, Q_{av} = 3.3 (N = 10), broadly fusoid, rounded at the ends, dark reddish brown to dark brown, transversally 3-septate, cells constricted at septum.

Habitat. On dead stems of *Asteraceae*. Known from *Cirsium* sp. (Hyde et al. 2016) and *Matricaria recutita* (this study). Our material was collected in ruderal grassland with predominance of the *Tanaceto vulgaris*-*Artemisietum vulgaris* association.



◀ **Fig. 5.** *Montagnula cirsii* on *Matricaria recutita* (BRNM 825888). **A** – cells of ascomatal wall; **B** – ostioles erumpent to epidermis; **C–F** – ascospores; **G–H** – pseudothecial ascoma. Scale bars = 5 µm (A, C–F), 300 µm (B, H), 500 µm (G). Photo P. Mlčoch.

Distribution. Known only from two localities in Europe, Italy (Hyde et al. 2016) and the Czech Republic (this study).

Material examined

Czech Republic. Vítkovská vrchovina Highlands, Kyjovice, Dolní Pole, 370 m a.s.l., ruderal grassland of *Tanacetum vulgare*-*Artemisietum vulgare* ass., on dead stems of *Matricaria recutita*, 16 July 2019, leg. & det. P. Mlčoch (BRNM 825888).

Notes. Members of *Montagnula* are characterised by dark reddish brown to dark brown phragmospores or didymospores. Ascospores of phragmosporous species are usually 3-septate, constricted at the septa, broadly fusoid, smooth and rounded at the ends. The genus *Kalmusia* (*Didymosphaeriaceae*) and some phylogenetically unrevised taxa of the genus *Leptosphaeria* s.l. (for example *Leptosphaeria longipedicellata* J.H. Mill. & Burton) are similar, but the present species is well recognisable by its substrate (dead stems of *Asteraceae*) and ascospore size. According to Hyde et al. (2016), the asci are 8-spored, bitunicate, clavate, long-stalked, 84.5–119.5 × 10.5–13.5 µm, but were not observed in our collection.

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