

First Polish records of Myxomycetes rare in Europe

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Abstract

Seven species of Myxomycetes are reported from Poland for the first time. These are *Arcyria virescens*, *Cribraria costata*, *C. elegans*, *C. languescens*, *C. mirabilis*, *C. pertenuis* and *Trichia flavicomma*. They have very few localities in Europe and *Cribraria pertenuis* is known only from two sites worldwide. The species are described and illustrated with microphotographs, including first published micrographs of *C. pertenuis*. Localities are given and the taxonomy and ecology of each species are discussed.

Keywords: Myxomycetes; taxonomy; distribution; new records; Poland; Europe

Introduction

Only approximately 250 species of Myxomycetes (Myxogastria) have been noted from Poland until the present moment [1]. Investigations were conducted by the author in the Niepołomice Primeval Forest, a remaining part of an old-growth forest in southern Poland (Małopolska Province). The majority of the forest complex is commercially managed by the State Forests National Forest Holding. The average altitude is 210 meters above sea level. In total, the forest area covers 10 924 ha and is divided into 403 forest sections (Fig. 1). It comprises six forest reserves (Dębina, Długosz Królewski, Gibiel, Koło, Lipówka and Wiślisko Kobyle). *Pinus sylvestris* is the main stand-forming tree species dominating in more than 61% of the forest. *Quercus robur*, which predominates in 19.2% of the area, is the second most important tree species [2].

Material and methods

The material was collected by the author during the 2010–2012 spring-autumn seasons in the Niepołomice Primeval Forest. Specimens were collected both in commercially managed forest areas (below: NF-section number) and protected sites (below: R-section number and the name of the reserve).

All microscopic measurements were taken with 100× magnification using an immersion objective. Spore diameter was measured together with the spore wall ornamentation. Laboratory examinations were conducted using a ZEISS Axioskop 2 plus light microscope. Microphotographs were

taken using a Nikon D7000 digital camera and a Nikon H600L microscope.

Specimens and microscope slides are deposited in the Herbarium Universitatis Jagellonicae Cracoviensis (KRA) in the MYXO division.

The nomenclature was accepted after Lado (2005–2015) [3].

Results and discussion

Arcyria virescens G. Lister Fig. 2d–f

DIAGNOSTIC CHARACTERS. Sporocarps in broad groups, ochraceous yellow to greenish yellow. Stalks single or 2–4 adherent, 0.7–1.2 mm long (Fig. 2e). Calyculus slender, funnel-shaped, inner surface with a network of ridges (Fig. 2d). Capillitium elastic, threads 5–6 µm wide, strongly decorated with groups of rings, half-rings and reticulate lines (Fig. 2f). Spores globose, 9.5–10 µm.

DISTRIBUTION IN EUROPE. It has been reported only from France [4].

SPECIMENS EXAMINED. On dead wood of *Quercus robur*, R-255 Dębina, 2010.10.26, KRAMYXO 6122.

Cribraria costata Dhillon & Nann.-Bremek. Fig. 3a,b

DIAGNOSTIC CHARACTERS. Sporocarps in groups, ochraceous yellow to ochraceous brown. Sporotheca globose 0.4–0.6 mm diam. Stalks slender, hollow, longitudinally plicate, granular between the plicae, 1.6–2.2 mm long. Peridial cup reduced to 1/5 of the sporotheca and remaining between the ribs of which 24–35 radiate from the apex of the stalk and reach halfway up the sporangium (Fig. 3a). Calcic granules

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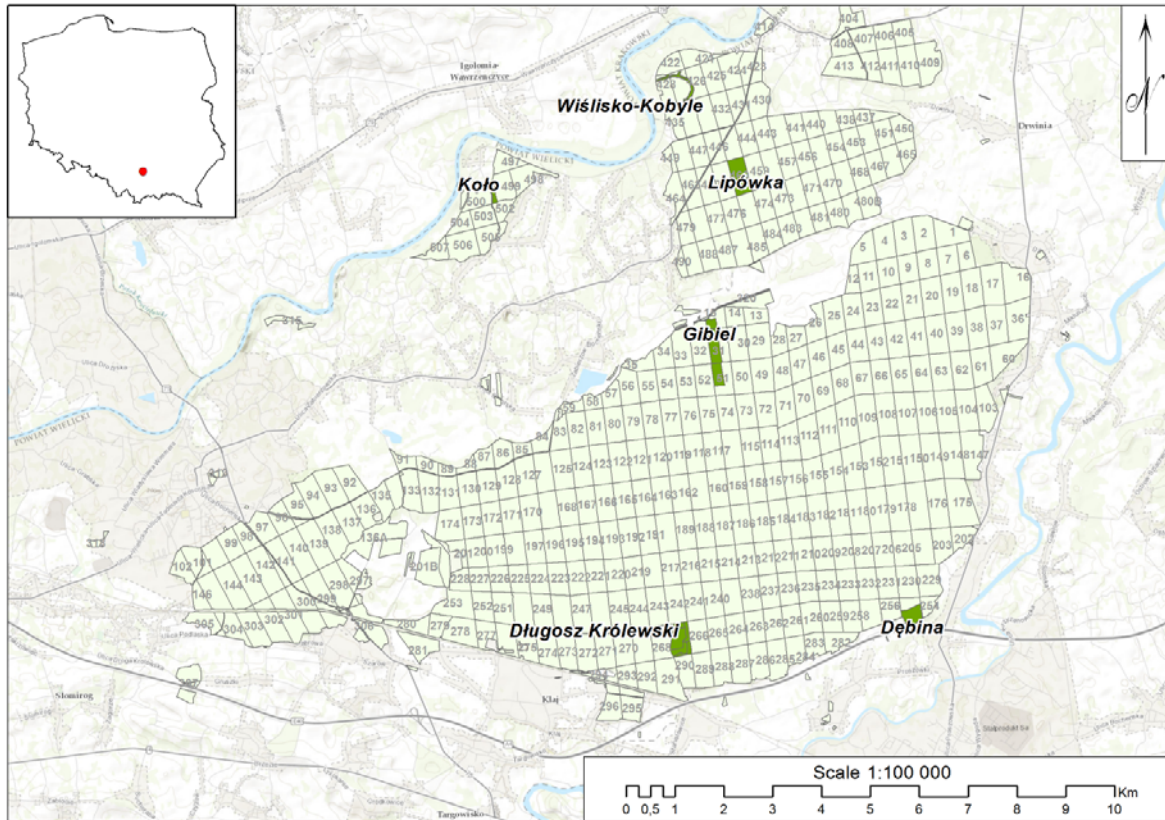


Fig. 1 Situation of the study area with forest section numbers and the names of the nature reserves.

1.5–2.5 μm . Nodes of the peridial net numerous, pulvinate, irregular, rounded, elongate and angular (Fig. 3b). Spores pale, minutely warted, 6.0–7.0 μm .

NOTES. This specimen was found in association with sporocarps of *Cribraria piriformis*.

DISTRIBUTION IN EUROPE. It has been reported only from France and Germany [4,5].

SPECIMENS EXAMINED. On dead wood of *Pinus sylvestris*, NF-270, 2010.08.19, KRA MYXO 6120.

***Cribraria elegans* Berk. & M.A. Curtis Fig. 3c,d**

DIAGNOSTIC CHARACTERS. Sporocarps loosely gregarious, dark purplish-brown, shining. Sporotheca globose 0.3–0.45 mm diam. Stalks slender, furrowed, 0.7–1.3 mm long. Peridial cup occupying 1/2 of the sporotheca, concentrically plicate and filled with dark calcic granules concentrated especially along the cup margin and arranged as lines radiating from the stalk (Fig. 3c). Calcic granules dark, 1.5–2 μm . Nodes of the peridial net expanded, flat, polygonal and scarcely thickened (Fig. 3d). Spores globose, 6.5–8.0 μm .

NOTES. Similar to the specimens recorded in a study by Adamonyte and Eliasson [6], margins of nodes forming the sporothecal net were very often distinctly darker than their

centers (KRAMYXO 6124; see Fig. 3d) and lighter purplish red calcic granules were observed in some sporotheca (KRAMYXO 4605) in the material collected by me.

These specimens were found in association with sporocarps of *Cribraria pertenuis*, *C. intricata* and *Stemonitis axifera*.

DISTRIBUTION IN EUROPE. It has been reported only from France and Austria [5,7].

SPECIMENS EXAMINED. On dead wood of *Pinus sylvestris*, NF-209, 2010.08.13, KRAMYXO 4605; R-267 Długosz Królewski, 2011.07.23, KRA MYXO 6124.

***Cribraria languescens* Rex Fig. 3e,f**

DIAGNOSTIC CHARACTERS. Sporocarps in groups, coppery brown to dark purplish brown (Fig. 3e). Sporotheca globose 0.3–0.4 mm diam. Stalks slender, tenuous, 1.8–2.5 mm long. Peridial cup occupying 1/3–1/2 of the sporotheca, somewhat shiny, finely ribbed and dotted with calcic granules; usually thickened at the rim (Fig. 3f). Calcic granules 1.5–2 μm , pale violet to purplish brown. Nodes of the peridial net thickened, rather flat and angular, with few free ends. Spores pale, globose, minutely warted, 6.5–7.0 μm .

NOTES. These specimens were found in association with sporocarps of *Cribraria cancellata*, *C. pertenuis* and *C. vulgaris*.

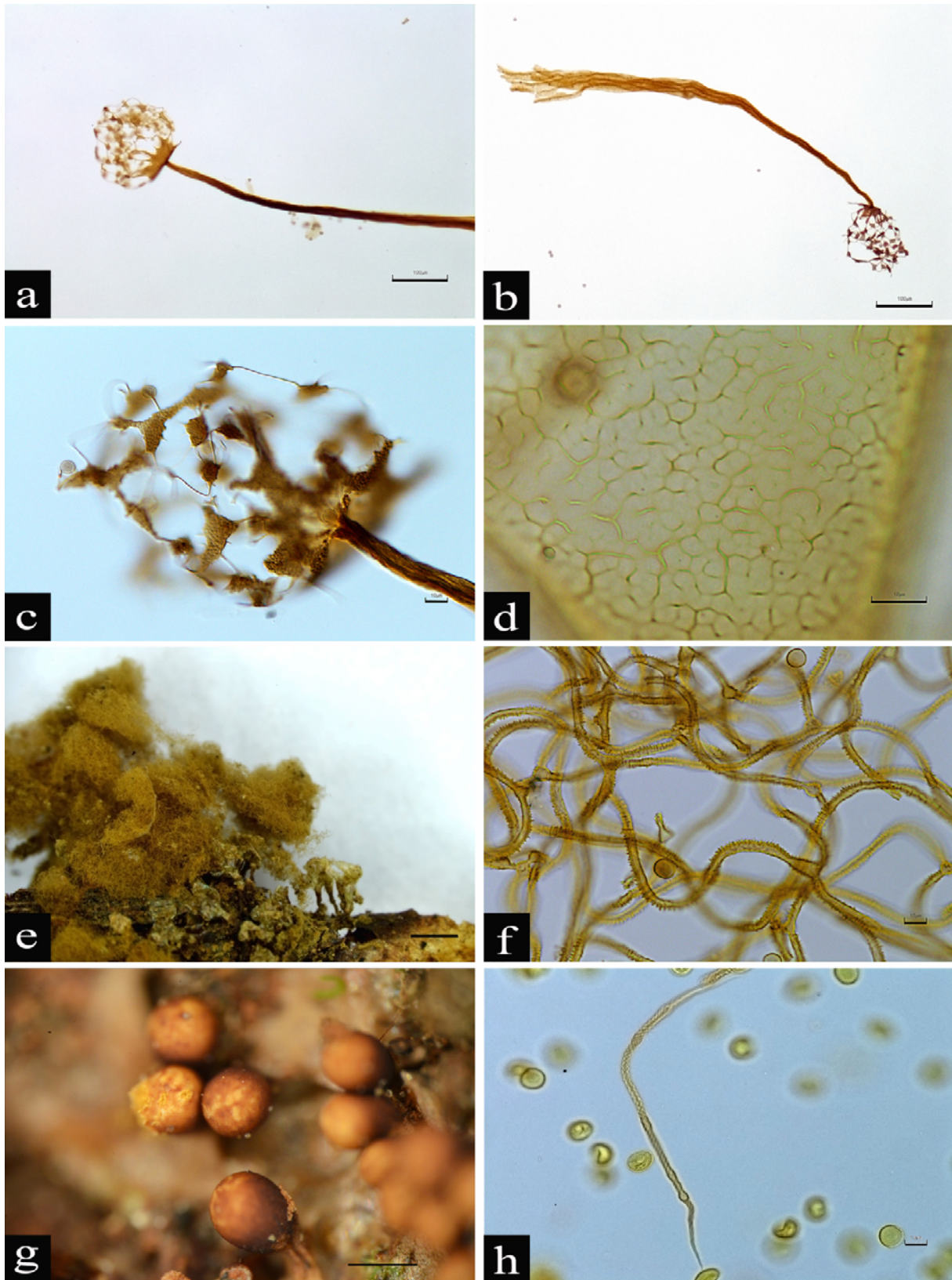


Fig. 2 Morphological and anatomical characters of examined specimens. **a–c** *Cribraria pertenuis*: (a) sporocarp (KRA MYXO 4603), (b) sporocarp (KRA MYXO 6116), (c) sporocarp (KRA MYXO 6135). **d–f** *Arcyria virescens* (KRA MYXO 6122): (d) the inner surface of the calyculus, (e) sporocarps, (f) capillitium and spores. **g,h** *Trichia flavicoma* (KRA MYXO 6137): (g) sporocarps, (h) elaters and spores. Scale bars: **a,b** 100 µm; **c,d,f,h** 10 µm; **e,g** 1 mm.

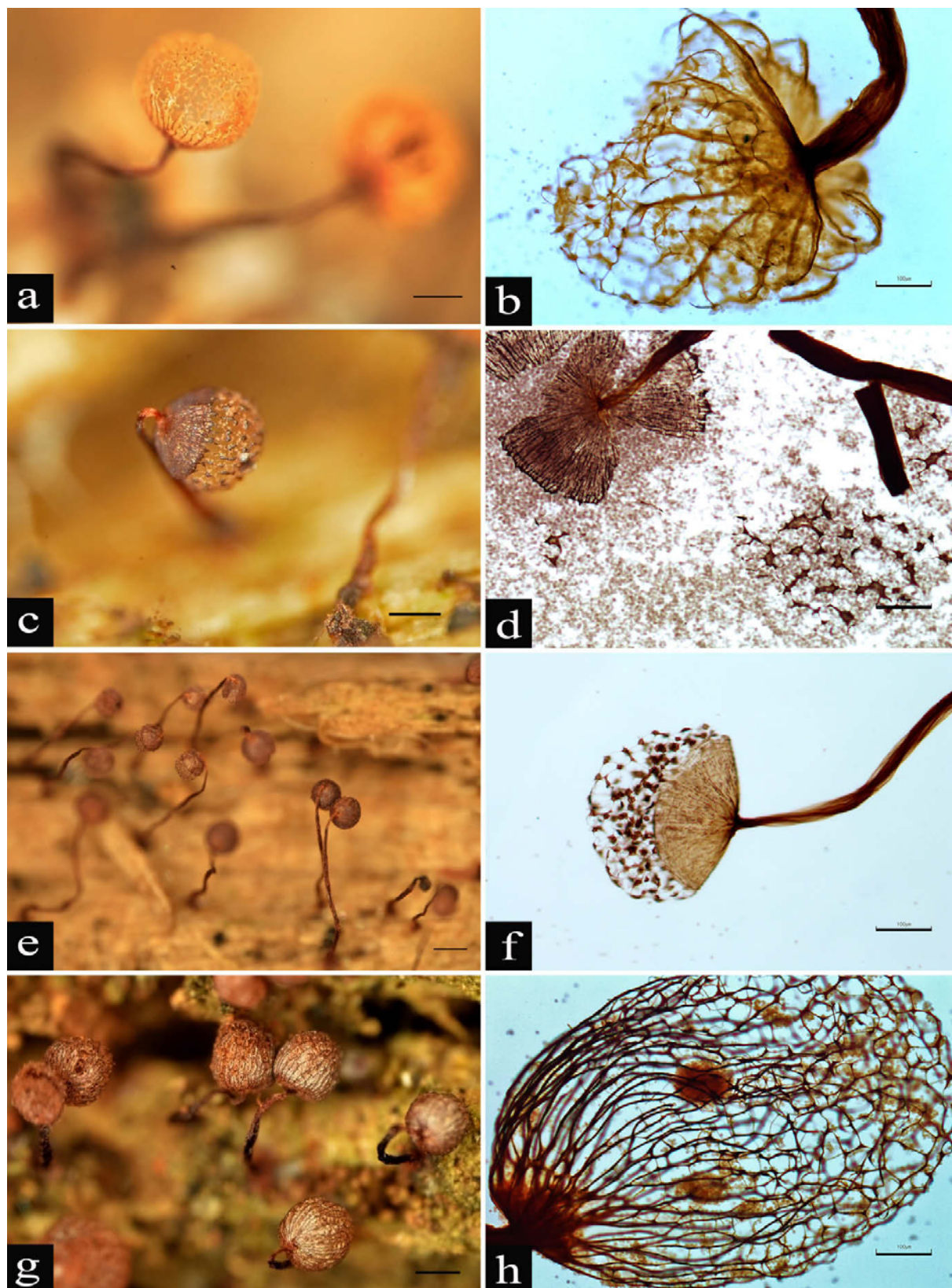


Fig. 3 Morphological and anatomical characters of examined specimens. **a,b** *Cribraria costata* (KRA MYXO 6120): (a) sporocarp, (b) sporocarp. **c,d** *C. elegans*: (c) sporocarp (KRA MYXO 4605), (d) fragment of the peridial cup and peridial net (KRA MYXO 6124). **e,f** *C. languescens* (KRA MYXO 5172): (e) sporocarps, (f) sporocarp. **g,h** *C. mirabilis* (KRA MYXO 6126): (g) sporocarps, (h) sporocarp. Scale bars: **a** 0.25 mm; **b,d,f,h** 100 μ m; **c** 0.2 mm; **e,g** 0.5 mm.

DISTRIBUTION IN EUROPE. It has been recorded only in a few European countries such as France, Germany, Hungary and Russia [4,5,8,9].

SPECIMENS EXAMINED. On dead wood of *Pinus sylvestris*; NF-253, 2010.07.23, KRA MYXO 5172; NF-9, 2011.08.19, KRA MYXO 6131; NF-22, 2011.08.19, KRA MYXO 5688.

Cribraria mirabilis (Rostaf.) Masee Fig. 3g,h

DIAGNOSTIC CHARACTERS. Sporocarps in large groups, purple-brown to dark purple. Sporotheca globose or subglobose, iridescent, 0.6–0.8 mm diam (Fig. 3g). Stalks grooved, 0.9–1.3 mm long. Peridial net consisting of iridescent membranes between 28–41 thickened ribs reaching from the base to over half way up the sporangium and giving rise to a net without widened nodes (Fig. 3h). Calcic granules dark, 1–1.5 µm. Spores pale, globose, minutely warted, 6–7 µm, often bearing calcic granules.

DISTRIBUTION IN EUROPE. It has been recorded only in a few European countries such as France, Germany, Ireland, Italy, Netherlands, Spain and Sweden [4,5,10–13].

SPECIMENS EXAMINED. On dead wood of *Pinus sylvestris*; NF-122, 2011.07.16, KRA MYXO 6126; NF-123, 2011.07.16, KRA MYXO 6125.

Cribraria pertenuis Flatau & Schirmer Fig. 2a–c

DIAGNOSTIC CHARACTERS. Sporocarps scattered, pale violet to pale brown. Sporotheca globose, 0.10–0.18 mm diam. Stalks slender, tenuous, 0.5–0.8 mm long. Peridial cup star-shaped, occupying 1/5–1/4 of the sporotheca and sometimes with deep irregular teeth (Fig. 2a–c). Peridial net with few meshes. Nodes flat and polyhedral, with very few free ends (Fig. 2c). Calcic granules 1.5–2.5 µm. Spores globose, pale violet to pale brown, minutely warted with some larger warts, 7–8 µm.

NOTES. The species may resemble *Cribraria macrostipitata* and *C. stellifera*, which are also small-sized; however, they differ by thickened net nodes with more numerous free ends. The former has longer stalks, 3–5 mm in length, while the latter has densely packed and larger calcic granules, 3–4 µm in size [5,14].

Since as many as ten localities of the species were recorded in three vegetative seasons, *C. pertenuis* may not be such an exceptionally rare species. The scarcity of literature reports

concerning this slime mould may be related to the lack of its descriptions in popular determination keys to Myxomycetes published prior to 2011 [5,12,13,15].

These specimens were found in association with sporocarps of: *Ceratiomyxa fruticulosa*, *Cribraria argillacea*, *C. cancellata*, *C. elegans*, *C. languescens*, *C. microcarpa*, *C. personii*, *C. vulgaris* and *Stemonitis axifera*.

GENERAL DISTRIBUTION. Published data regarding the species is available only from Germany and France [4,15].

SPECIMENS EXAMINED. On dead wood of *Quercus robur*, R-255 Dębina, 2010.07.16, KRAMYXO 6116, 2010.07.16 KRAMYXO 6117; on dead wood of *Carpinus betulus*, R-499 Koło, 2010.08.14, KRAMYXO 6121; on dead wood of *Tilia* sp., R-460 Lipówka, 2011.08.03, KRAMYXO 6127; on dead wood of *Pinus sylvestris*, R-267 Długosz Królewski, 2010.08.12, KRA MYXO 6119, 2012.06.21, KRA MYXO 6133; NF-10, 2011.08.19, KRA MYXO 6130; NF-179, 2012.08.22, KRA MYXO 6135; NF-209, 2010.08.13, KRA MYXO 4603; NF-253, 2010.07.23, KRA MYXO 6118.

Trichia flavicoma (Lister) Ing Fig. 2g,h

DIAGNOSTIC CHARACTERS. Sporocarps ovoid, gregarious, ochraceous brown marked with a reticulum of yellow lines, 0.3–0.4 mm diam (Fig. 2g). Stalks single or adherent, 0.2–0.3 mm long. Capillitium made of free ochraceous yellow threads. Elaters 4.5–5 µm wide, smooth, often with swellings, free ends pointed, 35–45 µm long (Fig. 2h). Spores globose, minutely warted, 11–13 µm.

NOTES. In taxonomic studies, *Trichia flavicoma* is reported as a species occurring only on dead leaves and litter. This is one of the features that distinguish it from *T. subfusca*, which is associated with dead wood and should have short, often bent elater ends (12–20 µm) [4,5,12,13]. However, *T. flavicoma* has recently been reported to occur also on dead wood [16–18] as recorded at the Polish locality. As the specimens are morphologically strictly consistent with the description of *T. flavicoma*, the species may have a broader microhabitat range than reported previously.

DISTRIBUTION IN EUROPE. It has been reported from Portugal, Spain, France, Ukraine, Great Britain, Netherlands, Germany, Lithuania and Russia [4,5,11–13,16,17,19,20].

SPECIMENS EXAMINED. On dead wood of *Quercus robur*, R-51 Gibiel, 2012.10.12, KRA MYXO 6137.

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Competing interests

No competing interests have been declared.

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