



A new record of the genus *Calonema*, with the new species *Calonema gansuence* from China

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Abstract

The genus *Calonema* is recorded from China for the first time as the new species *Calonema gansuence*, described on the basis of material collected from Qilian Mountain, Gansu Province, China. This new species is characterized by its brick brown sporocarps, relatively thick peridium and spores (about 9–12 µm in diam.) marked with rows of warts. A description, scanning electron micrographs and a key to all of the species in the genus *Calonema* are provided herein. Holotype specimens are deposited in the Herbarium of the Mycological Institute of Jilin Agricultural University (HMJAU), Changchun, China.

Key words: Myxogastrids, SEM, slime molds, taxonomy

Introduction

Myxomycetes are common inhabitants of decaying plant material throughout the world. They are particularly abundant in forested regions where decaying logs, stumps, and dead leaves provide a plentiful supply of potential substrates (Eliasson 2013; Rollins 2013, Stephenson & Stempen 1994). This taxonomic group of organisms consists of more than 900 species worldwide (Li & Li 1989; Kirk *et al.* 2008).

The genus *Calonema* was established by Morgan in 1893, and five species—*Calonema aureum* Morgan, *C. foliicola* Estrada, J. M. Ramirez & Lado, *C. cornuvioides* Chassain & Nann.-Bremek., *C. dissipatum* Nann.-Bremek. and *C. gesinkii* Nann.-Bremek.—are currently known (Kirk *et al.* 2008; Lado 2005–2013). While not previously reported from China, sporocarps of a member of the genus *Calonema* were found on the bark surface of a dead log in Gansu Province, China, in August 2012. This specimen is morphologically different from all other members of this genus and is described herein as a species new to science.

Materials & methods

Sporocarps and the microscopic structures that make them up were examined by light and scanning electron microscopy (Martin & Alexopoulos 1969, Zhang & Li 2013). Permanent slides were prepared with Hoyer's reagent (Martin & Alexopoulos 1969). Slide mounts were made according to Robbrecht (1974) by spreading portions of the capillitium in a drop of 94% alcohol, determining the colour after one minute, and then adding Hoyer's reagent. Colour terms are given according to the Flora of British Fungi (Royal Botanic Garden Edinburgh 1969).

More than ten sporocarps were observed under a stereomicroscope (20×) and more than 20 spores under an optical microscope (100×). The sporocarps, portions of the capillitium, and spores were measured with the use of a Nikon DM1000 microscope and photographed with a Canon G15 camera. For ultrastructural observations, the sporocarps were attached to a mounting block, coated with gold using a Hitachi E-1010 sputter, and examined with a Hitachi S-4800 scanning electron microscope at 10 kV at the Changchun Institute of Applied Chemistry, Chinese Academy of Sciences. The specimens were deposited in the Herbarium of the Mycological Institute, Jilin Agricultural University (HMJAU).

Results

Taxonomy

Calonema gansuence B. Zhang & Yu Li, *sp. nov.* Figs. 1–2

MycoBank: MB 803965

This new species differs from other similar species by the relatively thick peridium of the sporocarps and spores marked with rows of warts.

Type:—China, Gansu Province, on the bark surface of a dead log, 8 August 2012, Zhang Bo 2012112202, Zhang Bo 2012112502 (Holotype, HMJAU10360).

Etymology:—*gansuence* (Latin), referring to the fact that the new species was collected from the Gansu Province.

Distribution:—China, Gansu Province, Qilan mountain. Zhang Bo 2012112202, 36–37° S, 96° W, 3865 m; Zhang Bo 2012112502, 38° S, 101° W, 3654 m.

Description:—Sporocarps sporangiate or forming small plasmodiocarps. Sporocarps scattered, sessile, globose to subglobose or pulvinate, 0.3–0.5 mm in diam., 0.3–0.5 × 0.2–0.8 mm, occasionally slightly elongated. Plasmodiocarps simple. Sporotheca brick gray brown to reddish brown, fading to yellowish brown when old (Fig 1–1,2). Hypothallus inconspicuous, membranous, colorless to dark reddish brown, yellowish red by transmitted light. Stipe absent. Peridium thick, persistent, single, partly evanescent, filled with abundant deposits of granular material, dark brick to purplish chestnut, yellowish brown by transmitted light, the inner surface ornamented with plicate wrinkles, dehiscence apical and irregular (Fig 1–6, 7). Columella absent. Capillitium consisting of tubular threads, elastic, slightly or not expanded, pale yellow to yellow by transmitted light, threads 3–4 µm diam., with irregular swelling, 5–9 µm in diam., straight or slightly flexuous, branched and anastomosed, with few free ends, decorated with faint irregular spirals or half rings or reticulate (Fig 1–3, 4, 5). Spores free, dark brown, yellowish brown in mass, yellow pale to colorless by transmitted light, globose to subglobose, 9–12 µm in diam., densely warted (Fig 1–8). Plasmodium not observed.

Key to Species of *Calonema*

1.	Spores warted	2
1*	Spores reticulate	4
2(1)	Sporocarps stalked.....	3
2*(1)	Sporocarps sessile.....	<i>C. gansuence</i>
3(2)	Sporocarps 0.3–0.8 mm, yellow, capillitium decorated with warts, spines and scattered toothed structures	<i>C. dissipatum</i>
3*(2)	Sporocarps 0.5–1.4 mm, red to light red, capillitium ornamented with spiral-like structures or half rings.....	<i>C. foliicola</i>
4(1*)	Spores bearing a usually complete reticulum.....	5
4*(1*)	Spores bearing reticulations arranged in small distant groups	<i>C. cornuroides</i>
5(4)	Peridium marked by dense branching veins, spores 10–15 µm in diam. including the border.....	<i>C. aureum</i>
5*(4)	Peridium smooth, the spores 16–18 µm in diam. including the border.....	<i>C. gesinkii</i>

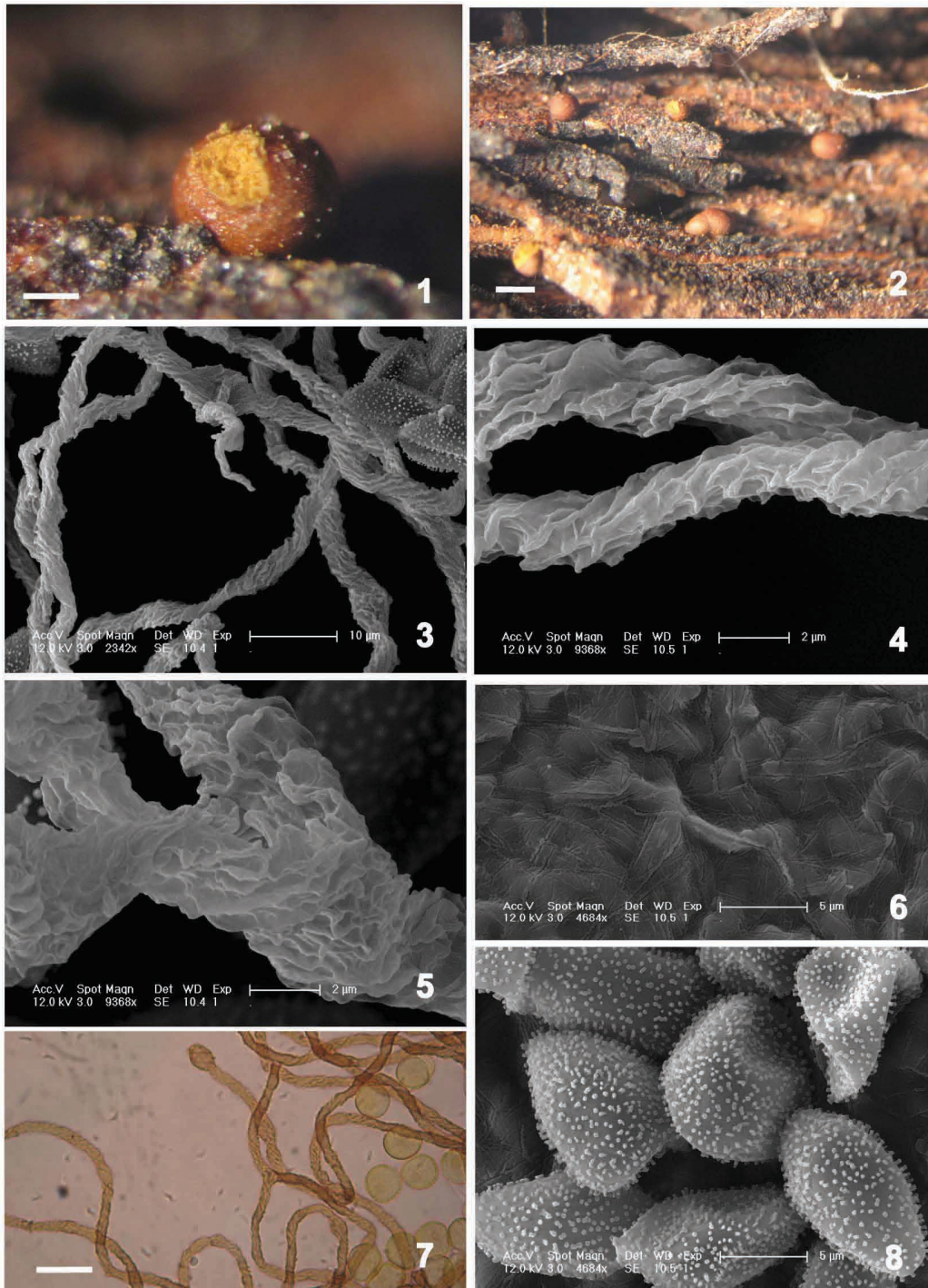
Discussion

In Morgan's description of the genus *Calonema*, the capillitium is described as consisting of "branching threads arising from the base and united into a network, the surface reticulately sculptured and marked with irregular rings and spirals" (Martin & Alexopoulos 1969). Rammeloo (1984) commented on the reticulate-venose ornamentation on portions of the capillitium as a very typical feature of *C. aureum* Morgan. *Calonema gansuence* is also characterized by small sessile sporocarps with a scattered habit, a brick gray brown to reddish brown color, warted spores and a thick, brick brown peridium, which distinguishes it from other species in the genus.

Among the five accepted species of *Calonema*, three (*C. aureum* Morgan, *C. gesinkii* Nann.-Bremek. and *C. cornuroides* Chassain & Nann.-Bremek.) have reticulate spores (Martin & Alexopoulos 1969, Nannenga-Bremekamp 1985, Rammeloo 1983, 1984). The sporocarps of *C. foliicola* Estrada, J. M. Ramirez & Lado and *C. dissipatum* Nann.-Bremek. are stalked, whereas *C. gansuence* is characterized by its sessile sporocarps, thicker peridium and warted spores.

Calonema foliicola (Estrada-Torres *et al.* 2003) is characterized by its small stalked, scattered sporocarps and reddish, warted spores. *Calonema dissipatum* (Chopra *et al.* 1992) is another stalked species with smaller spores (about 8–10 µm in diam. with about a 1 µm border in optical section). *Calonema gesinkii* (Nann.-Bremekamp 1985) is characterized by a smooth peridium and larger spores (13–15 µm in diam. without the border, but 16–18 µm in diam. with the border). *Calonema aureum* (Martin & Alexopoulos 1969; Rammeloo 1984), the type species of the genus, has a capillitium with characteristic rings, and its spores are coarsely reticulate and about 13–15 µm in diam. *Calonema cornuvioides* (Rammeloo 1983) also has the characteristic rings on the capillitium and larger, broken-reticulate spores (about 15–17 µm in diam).

In contrast, *C. gansuence* has warted spores (about 9–12 µm in diam), a brick brown peridium and sessile sporocarps. As such, *C. gansuence* is described herein as a new species distinct from other species in the genus.



FIGURES 1–8: *Calonema gansuence* (HMJAU10360, Holotype) 1–2. Sporocarps. 3–5. Capillitium with faint irregular spirals or half rings or reticulate markings. 6. Inner surface of the peridium, ornamented with wrinkles. 7. Capillitia and spores by transmitted light. 8. Spores densely covered with warts. (Scale bars: 1 = 0.2 mm, 2 = 1 mm).

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