

***Balaniopsis triangularis* sp. nov. from indoor environments**

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Abstract — A new species of *Balaniopsis* is described and illustrated from specimens collected during indoor mold inspections in North America.

Key Words — hyphomycete, mitosporic fungi, taxonomy, type

Introduction

In recent years, unidentified triangular spores that appeared to be conidia were recorded by the authors on tape lifts and in spore traps. Occasionally, conidiogenous cells and parts of conidiophore stipes were also seen. On rare occasions, the orientation of the spores relative to the conidiogenous cells and conidiophores was seen. Although the organism has not been successfully grown in culture, a specimen recently collected from conifer wood over a crawl space in a building in Vancouver, Canada, allowed the authors to characterize the species as *Balaniopsis triangularis* anam. sp. nov..

Materials and methods

Conidiophores and conidia of the fungus were mounted in lacto-fuchsin (0.1 g acid fuchsin, 100 ml 85% lactic acid) (Carmichael 1955). Microscopic

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observations were made using Nomarski differential interference contrast optics. Herbarium acronyms follow Index Herbariorum (Holmgren & Holmgren 1998).

Results

Balaniopsis triangularis D.W. Li & W.B. Kendr., **anam. sp. nov.** Figures 1–13
MYCOBANK MB 511446.

Conidiophora macronemata, determinata, erecta, non-ramosa vel ramosa, recta vel flexuosa, lutea, septata, interdum >200 µm longa et 0.7–2 µm crassa apud basis, 2.9–3.4 µm apud apicem. Cellulae conidiogae polyblasticae, laeves, cupulatae vel obconicae. Conidia unicellularia, triangularia, non catenata, laevia, lutea, 6.0–7.4 × 6.4–8.6 × 3.0–3.6 µm. Teleomorphosis ignota.

Holotypus BPI 878719, *Isotypus* DAOM 239847 *superficie in ligno domi, Vancouver, Canada leg. S. Campbell., 28 iv. 2008.*

ETYMOLOGY: referring to the triangular shape of the conidia.

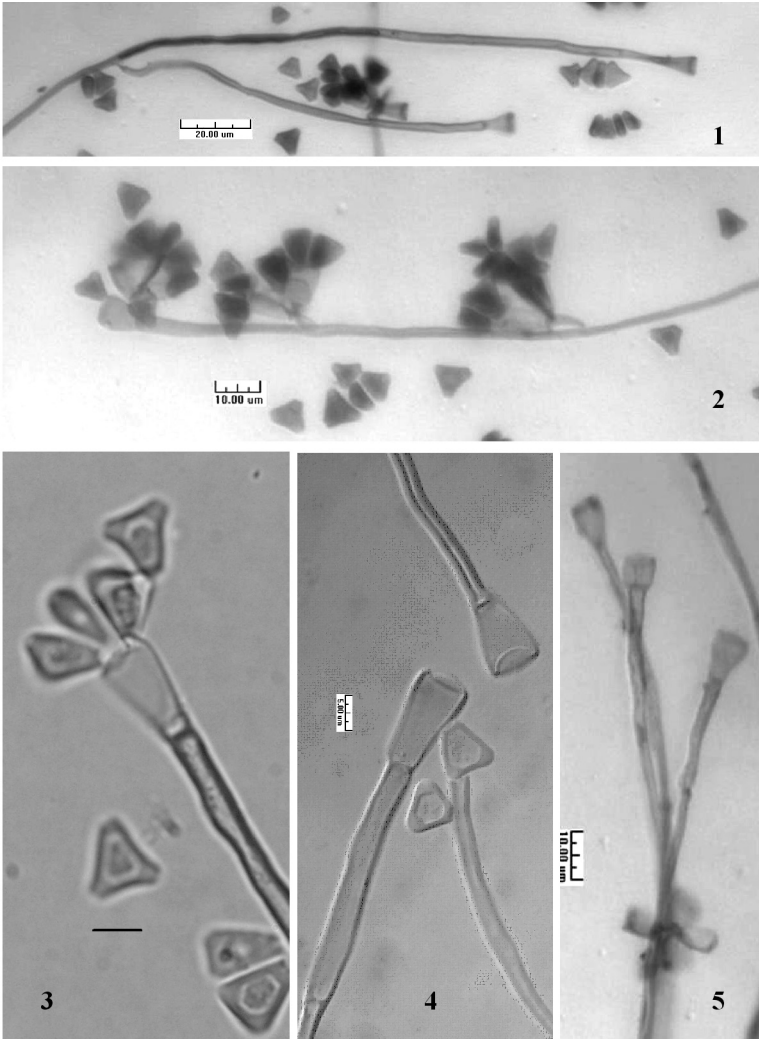
CONIDIOPHORES solitary, determinate, erect, unbranched or branched, straight or flexuous, yellowish, smooth, septate, thin-walled when young, becoming thick-walled at maturity, sometimes exceeding 200 µm in length, 0.7–2 µm wide at base, widening to 2.9–3.4 µm at the apex.

CONIDIogenous CELLS terminal, subapical or lateral, obovoid first, becoming cupulate or obconic (champagne flute-shaped) after conidia have been released, due to partial collapse of apical portion, smooth, yellowish, terminal, solitary, (6.8–) 9.3–14.7 (–16.6) (mean = 12 ± 2.7 , n=17) long, (5.6–) 6.3–7.9 (–8.6) (mean = 7.1 ± 0.8 µm, n=17) wide at the widest point, narrowing to the proximal end (2.6–) 2.7–3.3 (–3.8) (mean = 3.0 ± 0.3 µm, n=17), subapical or lateral in whorls of 3–5, (7.8–) 8.3–10.5 (–12.6) (mean = 9.4 ± 1.1 , n = 19) × (5.1–) 6.6–8.4 (–8.9) (mean = 7.5 ± 0.9 , n = 19). Developing 6–8 conidia polyblastically and perhaps synchronously in the apical area.

CONIDIA 1-celled (amerosporous), cuneiform (wedge-shaped) when young, triangular at maturity, yellowish, smooth-walled, later becoming thick-walled, (5.6–) 6.0–7.4 (–8.8) (mean = 6.7 ± 0.7 , n = 31) × (5.5–) 6.4–8.6 (–9.6) µm (mean = 7.5 ± 1.1 µm, n = 31) × (2.7–) 3.0–3.6 (–4.2) µm (mean = 3.3 ± 0.3 µm, n = 31) µm, side wall about 1 µm thick, at the three corners 2–2.4 µm thick. Conidial secession is rhexolytic. The remnants of separating cell walls persist at the base of some conidia (Figure 7). The corners of the released conidia may appear rounded or, more commonly, truncate. The truncate condition probably indicates some minor collapse of the outer wall subsequent to drying.

TELEOMORPH unknown.

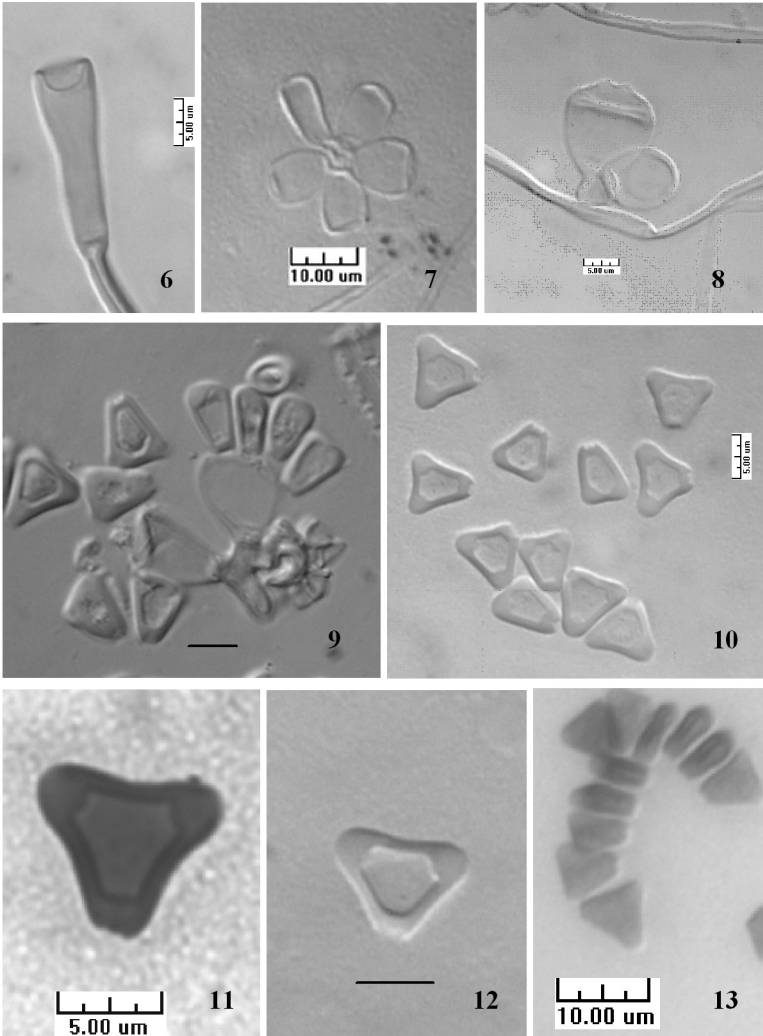
KNOWN GEOGRAPHICAL DISTRIBUTION: British Columbia, Canada; California and New York, USA.



Figures 1-5. *Balaniopsis triangularis*. 1. Branched conidiophore, conidiogenous cells, and conidia. 2. Conidiophore with terminal and lateral conidiogenous cells, and conidia. 3, 4. Terminal conidiogenous cells. 5. Terminal and lateral conidiogenous cells. 5. Conidiogenous cells.
Scale bars: 1 = 20 μm, 2, 5 = 10 μm, 3-4 = 5 μm.

HABITAT: saprotrophic on damp wood and plywood.

SPECIMENS EXAMINED: CANADA, British Columbia, Vancouver, Marine Drive, crawl space of building, 28 April 2008, Shannon Campbell, holotype (BPI 878719), isotype (DAOM 239847); UNITED STATES, New York, Livingston, 7 March 2007, anonymous, (BPI 878411).



Figures 6-13. *Balaniopsis triangularis*. 6. Terminal conidiogenous cells. 7-8. Lateral conidiogenous cells. 9. Lateral conidiogenous cells bearing conidia in face- and side-view. 10-12. Conidia in face-view. 13. Conidia in face- and side-view.

Scale bars: 6, 8-12 = 5 μm, 7, 13 = 10 μm.

Discussion

The genus *Balaniopsis* P.M. Kirk was proposed by Kirk (1985) with a single species, *Balaniopsis africana* (Kiffer) P.M. Kirk (= *Balanium africanum* Kiffer). His establishment of the new genus was based on three major characters:

1) rhexolytic conidial secession, 2) percurrent extension, and 3) conidia in short, branched chains on unbranched conidiophores. However, Whitton et al. (2002) emended the generic description, reinterpreting the conidiogenous cells and adding a second species. There were significant differences between Kiffer's specimen referred to as the holotype by Kirk (1985) and Kirk's generic and specific descriptions, which were based on the specimen he collected in Kenya. The key characters of the revised circumscription of *Balaniopsis* include rhexolytic conidial secession, sometimes with percurrent extension of the conidiogenous cell, and unbranched or branched conidiophores. The description of conidia as occurring in short branched chains was not included in the revised circumscription because the entity defined by Kirk (1985) as a basal conidium was interpreted by Ellis (1976) and Whitton et al. (2002) as a conidiogenous cell, which implied that the conidia were produced singly and probably synchronously.

Whitton et al. (2002) clarified that the holotype and Kirk's specimen are two different species. *Balanium africanum*, described and illustrated by Kiffer (1973), has a light-dark-light pattern of pigmentation of the conidiophore cells, triangular conidia ($9-12 \times 7-10 \mu\text{m}$), and longer separating cells, while Kirk's specimen has concolourous conidiophores, broadly obovoid conidia ($12.8-14.5 \times 9.5-11 \mu\text{m}$), and much shorter separating cells. The name *Balaniopsis africana* must be applied to Kiffer's collection. The specimen collected by Kirk is not conspecific with that of Kiffer. Thus, Whitton et al. (2002) re-described it under a new specific name, *Balaniopsis kirkii* Whitton et al. Another new species, *Balaniopsis dendroidea* Whitton et al., with globose conidia and branched conidiophores, was described by Whitton et al. (2002). *Balaniopsis triangularis* is different from the other three species in its much smaller, triangular conidia ($6.0-7.4 \times 6.4-8.6 \mu\text{m}$), obovoid or obconic conidiogenous cells, and reduced separating cell.

Balaniopsis triangularis is in some ways similar to *Stellomyces kendrickii* Kesh. Prasad & Bhat (Keshava Prasad & Bhat 2002). However, although the conidia of *S. kendrickii* are often triangular, they have an attenuated base and arise from very narrow extensions of the conidiogenous cell. In addition, in *Stellomyces*, one conidiogenous cell may give rise to several clusters of conidia (which may be terminal or intercalary) and that conidiogenous cell may even be branched, with more than one cluster at the end of each branch. In *B. triangularis*, the conidiogenous cell is not branched; each conidiogenous cell gives rise to only one cluster of conidia which is always terminal; and the conidia do not arise on fine outgrowths like those seen in *Stellomyces*.

The holotype was collected from a wooden structure in crawl space of a building and could not be isolated in pure culture. It would appear that the material had been in situ for so long that the mycelium and spores had died.

Although rare, this fungus occurs with significant frequency on building materials, where its presence needs to be acknowledged and recorded. It is our opinion that it is now necessary and appropriate to make available a binomial for this organism.

Key to species of *Balaniopsis*

1. Conidiophores typically dichotomously branched; conidia brown to pale brown, more or less spherical, 8.5–13µm diameter. *B. dendroidea*
1. Conidiophores unbranched 2
2. Conidia broadly obovoid, dark brown, 12.8–14.5 × 9.5–11µm *B. kirkii*
2. Conidia more or less triangular 3
3. Conidiophores with a distinctive light–dark–light pigmentation pattern; conidia brown to pale brown, 9–12 × 7–10µm. *B. africana*
3. Conidiophores concolorous; conidia yellow, 6.0–7.4 × 6.4–8.6µm *B. triangularis*

Acknowledgments

The authors are grateful to Drs David Minter and James Scott for their critical review of the manuscript and suggestions for revision. The authors also want to express their gratitude to Pacific Environmental Consulting, North Vancouver, British Columbia, and SanAir Technologies Laboratory, Powhatan, Virginia, for providing specimens.

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