



Mycosphere 5 (3): 425–428 (2014)

www.mycosphere.org

Copyright © 2014

Article

Doi 10.5943/mycosphere/5/3/5

ISSN 2077 7019

Mycosphere
Online Edition

Two new records of *Cyathus* species for South America

Barbosa MMB¹, Cruz RHSF², Calonge FD³ and Baseia IG⁴

¹Programa de Pós-Graduação em Biologia de Fungos, Departamento de Micologia, Universidade Federal de Pernambuco, Avenida Professor Moraes Rego 1235, Recife-PE 50.670-901 Brazil, marcosmbb@gmail.com

²Programa de Pós-Graduação em Sistemática e Evolução, Centro de Biociências, Universidade Federal do Rio Grande do Norte, Avenida Senador Salgado Filho, 3000, Natal-RN 59.078-970 Brazil, rhudsoncruz@yahoo.com.br

³Real Jardín Botánico de Madrid, CSIC, Plaza de Murillo, 2, Madrid, Spain, 28014 calonge@rjb.csic.es

⁴Departamento de Botânica, Ecologia e Zoologia, Centro de Biociências, Universidade Federal do Rio Grande do Norte, Avenida Senador Salgado Filho, 3000, Natal-RN 59.078-970 Brazil, baseia@cb.ufrn.br

Barbosa MMB, Cruz RHSF, Calonge FD, Baseia IG 2014 – Two new records of *Cyathus* species for South America. *Mycosphere* 5(3), 425–428, Doi 10.5943/mycosphere/5/3/5

Abstract

Recent fieldtrips in semi-arid region on Araripe National Forest in Brazil revealed two *Cyathus* species that are reported for the first time to South America, *C. gracilis* and *C. helena*. Both were found in a highland environment with an elevation about 900 m. Detailed descriptions and images are given.

Key words – Brazil – Nidulariaceae – gasteromycetes – semi-arid regions – taxonomy

Introduction

Bird's nest fungi are a curious group represented by the genera *Cyathus* Haller, *Crucibulum* Tul. & C. Tul., *Mycocalia* J.T. Palmer, *Nidularia* Fr. and *Nidula* V.S. White. Traditionally allocated to the family Nidulariaceae Dumort. and included in gasteromycetes (Brodie 1975), they are incorporated into the family Agaricaceae Chevall. (Kirk et al. 2008) as consequence of evolutionary studies (Hibbett et al. 1997, Hibbett & Binder 2002). Nevertheless, some authors (Zhao et al. 2007, Zhao et al. 2008, Cruz et al. 2012) prefer to maintain these fungi in the family Nidulariaceae, based on a multilocus phylogenetic analysis of Agaricales proposed by Matheny et al. (2006).

In Brazil the study of Nidulariaceae began with the arrival of researchers from other countries in the 18th and 19th centuries (Berkeley 1842, Berkeley & Cooke 1876, Lloyd 1906), but it was in southern Brazil that the study of Brazilian mycobiota gained prominence primarily through the studies of Fr. Johannes Rick, considered the father of Brazilian mycology (Fidalgo 1962). Thus, studies of Brazilian fungi evolved in such way that attracted researchers in various regions of the country (Bononi et al. 1984, Baseia & Milanez 2001a, Baseia & Milanez 2001b, Baseia & Milanez 2003, Cortez et al. 2006, Trierveiler-Pereira & Baseia 2009, Trierveiler-Pereira et al. 2009, Cruz et al. 2012). Despite this increase, many areas of Brazil remain unexplored or little studied. Accordingly, the aim of the present study is to widen knowledge of *Cyathus* species richness for South America, based in studies on the semiarid region of Brazil.

Material & Methods

Samples were collected during the rainy season (February-June) between 2011 and 2013. Expeditions were conducted in the Araripe National Forest, Ceará state, with an area of 39.262,326

hectares. The collection site is located in a large semiarid area with diversified vegetation (Highland Moist Forest, Tropical Savana, Tropical Semideciduous Forest, and Tropical Deciduous Shrubland) due to the characteristics of the highland region. Specimens were studied in the laboratory, following methodologies proposed by Brodie (1975) and Zhao et al. (2008). Colors were coded according to Kueppers (1982). Specimen identification followed the concepts proposed by Brodie (1975, 1984), Gómez & Pérez-Silva (1988) and Calonge (1998). Microscopic measures included extreme values with the mean in parenthesis. After analyses, the material was added to the UFRN-Fungi Herbarium.

Results and Discussion

Taxonomy

Cyathus gracilis H.J. Brodie, Can. J. Bot. 51 (7): 1393 (1973) Figs 1A–1B

Basidiomata campanulate, 8-10 mm high, 6-8 mm wide at mouth. Expanded in the upper third and constricted abruptly in the base. Exoperidium hirsute with irregular thin hairs of 1 mm long, Brown (Y70: M90/C90), faintly plicate to smooth. Inner surface faintly plicate, silvery shine (B20: M00/C00). External layer of Epiphragm hirsute and concolor to exoperidium. Inner layer of Epiphragm White and brittle, membranous. Basal emplacement conspicuous, up to 3 mm of wide, concolor to exoperidium. Mouth distinctly fimbriate, with tomentum up to 0,5 mm of long. Peridioles circular to elliptical, 2-2,5 x 1,4-2 mm, Dark Grey (Y50: M70/C90). Tunic whitish and thin. Double layered cortex. Basidiospores smooth, hyaline, subglobose to elliptical, 7-10 x 10-16 μm (9 x 13 μm), thick wall of 2-3 μm (2,1 μm). Apiculus present.

Habitat and distribution – It grows on decomposing trunks in partially shaded areas. Region with a mean altitude of 900 m. To date known only for the Philippines (Brodie 1975).

Material examined – BRAZIL. Ceará State: Crato, Floresta Nacional do Araripe, leg. MMB Barbosa, 20/III/2012. UFRN-Fungi 1734.

Notes – This species is uncommon, reported only for the Philippines, whose highest point is 2900 m. The studied sample was found in highland regions with mean altitude of 900 m, perhaps demonstrating that the climate and environment at high altitudes are determinants for the occurrence of this species. However, deeper studies are needed to come to a clearer conclusion about the ecology of this species. The Brazilian sample has a delicate and thin basidioma, primarily at the base, where it resembles a pedicel, the main trait reported by Brodie (1973) to characterize it. External and internal striae can only be clearly observed under stereoscopic microscope. According to Brodie (1975), the closest species to *C. gracilis* is *C. intermedius* (Mont.) Tul. & C. Tul, due to the similar size and shape of the basidiospores. However, the former has a cortex with two layers, while the latter has only one. This is the second record of this species in the world and the first for South America.

Cyathus helenae H.J. Brodie, Can. J. Bot. 44: 1235 (1966) Figs 1C–1D

Basidiomata infundibuliform to slightly campanulate, 8-12 mm high, 7-9 mm wide at the mouth. Expanded in the upper third and abruptly constricted in the base. Exoperidium woolly to slightly hirsute, with fine darker hair, Brown (Y70: M80/C80), smooth. Inner surface distinctly plicate, 0,7 mm of wide, silvery (B40: M00/C00), shiny. Epiphragm composed by two layers being the most external hirsute and concolor to exoperidium and the most internal brittle and whitish, membranous. Basal emplacement conspicuous, concolor to exoperidium. Mouth slightly fimbriate with hairs up to 0,3 mm of length. Peridioles circular to elliptical, 2,5 x 2-2,5 mm, Silvery Gray (B40: M00/C00). Tunic present, thick and greyish. Cortex single layered. Basidiospores smooth, hyaline, 10-16 x 9-14 μm (10 x 15 μm), elliptical, thick walled, up to 2 μm . Apiculus absent.

Habitat and distribution – It grows on decaying wood in partially shaded areas. Know for Canada (Brodie 1975), Mexico (Gómez & Pérez-Silva 1988) and Costa Rica (Calonge et al. 2005).

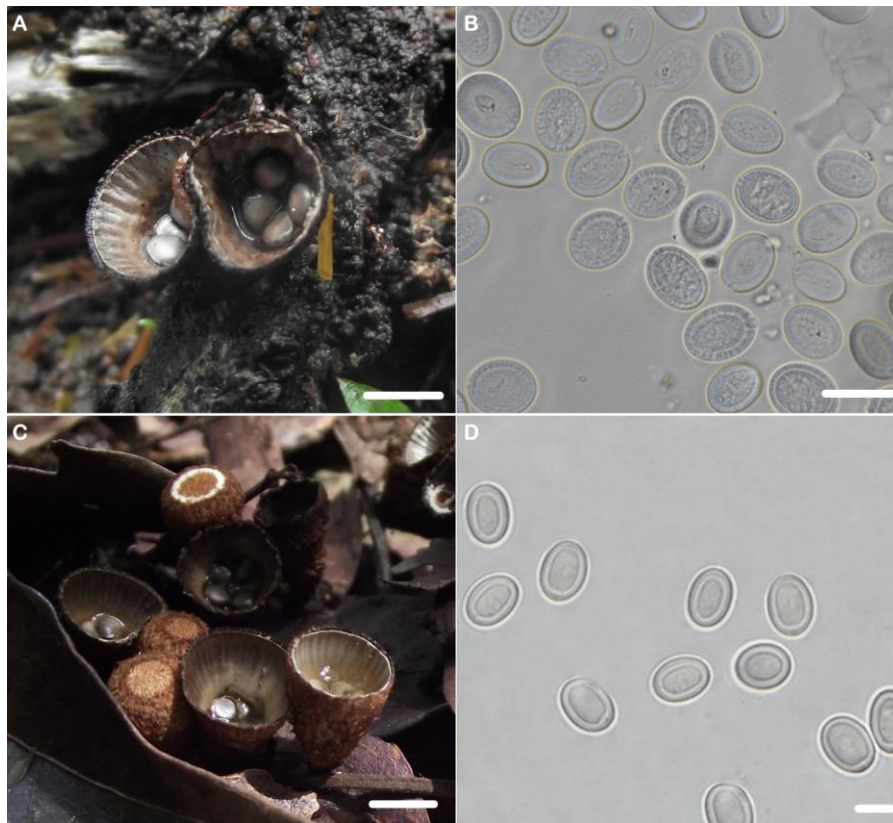


Fig. 1 – A, *Cyathus gracilis* – Bars = 4 mm. B, Basidiospores of *C. gracilis* – Bars = 10 μ m. C, *C. helenae* – Bars = 4 mm. D, Basidiospores of *C. helenae* – Bars = 10 μ m.

Material examined – BRAZIL. Ceará State: Crato, Floresta Nacional do Araripe, leg. MMB Barbosa, 22/III/2012. UFRN-Fungi 1739. leg. MMB Barbosa, 16/IV/2011. UFRN-Fungi 1694.

Notes – It is characterized by a cortex with a single layer and 12-14 x 15-19 μ m elliptical basidiospores (Brodie 1970). It was initially reported for alpine and desert regions of North America. It is very close to *C. striatus* (Huds.) Willd., but the absence of arrow markings in the mouth makes it distinctive. A few basidiomata show slight variations in morphology such as the absence of fimbriae in the mouth and triangular peridioles, but the vast majority of specimens exhibit the characters that distinguish *C. helenae*. This is the first record of this species for South America.

Acknowledgements

The authors thank CNPq (National Council for Scientific and Technological Development) for providing a scholarship and financial support for the project to the first author, and CAPES (Coordination of Improvement of Higher Education Personnel) for providing a scholarship to the third author. We also thank the PPBio-Semiarid Project (Program of Research on Biodiversity of the Brazilian Semi-arid) for financial support for collection expeditions. Sincere thanks to Dr. Francisco William from the Chico Mendes Institute for Biodiversity Conservation for logistic support and allowing studies in the area.

References

- Baseia IG, Milanez AI. 2001a – *Crucibulum laeve* (Huds.) Kambly in cerrado vegetation of São Paulo State, Brazil. *Acta Botanica Brasilica* 15 (1), 13–16.
- Baseia IG, Milanez AI. 2001b – *Nidularia pulvinata* (Shwein.) Fr. (Gasteromycetes): a new record from Brazil. *Revista Brasileira de Botânica* 24 (4), 479–481.

- Baseia IG, Milanez AI. 2003 – *Cyathus* (Gasteromycetes) in areas of the Brazilian cerrado region, São Paulo State. *Mycotaxon* 80, 493–502.
- Berkeley MJ, Cooke MC. 1876 – The fungi of Brazil, including those collected by J.W.H. Trail, Esq. M.A. in 1874. *Botanical Journal of the Linnean Society* 15, 363–398.
- Berkeley MJ. 1842 – Notice of some fungi collected by C. Darwin Esq. in South America and the Islands of the Pacific. *Natural History Magazine* 9 (60), 443–448.
- Bononi VL, Guzmán G, Capelari M. 1984 – Basidiomycetos do Parque Estadual da Ilha do Cardoso, V: Gasteromicetos. *Rickia* 11: 91–97.
- Brodie HJ. 1970 – A previously unnamed species of *Cyathus* from the Cypress Hills, Alberta. *Canadian Journal of Botany* 48 (4), 749–750.
- Brodie HJ. 1973 – A new species of *Cyathus* from the Philippines. *Canadian Journal of Botany* 51, 1393–1394.
- Brodie HJ. 1975 – The bird's nest fungi. Toronto, University of Toronto Press.
- Brodie HJ. 1984 – More bird's nest fungi (Nidulariaceae): a supplement to “The Bird's Nest Fungi”(1975). *Lejeunia* 112, 69 pp.
- Calonge FD, Mata, M, Carranza J. 2005 – Contribución al catálogo de los Gasteromycetes (Basidiomycotina, Fungi) de Costa Rica. *Anales del Jardín Botánico de Madrid* 62 (1), 23–45.
- Calonge FD. 1998 – Gasteromycetes: Lycoperdales, Nidulariales, Phallales, Sclerodermatales, Tulostomatales. *Flora Micológica Ibérica* 3, 271 pp.
- Cortez VG, Baseia IG, Guerrero RT. 2006 – Additions to the micobiota (Agaricales, Basidiomycetes) of Rio Grande do Sul, Brazil II: The bird's nest fungi *Nidularia pulvinata* (Schwein.) Fr. *Biociências (Porto Alegre)* 14 (1), 15–18.
- Cruz RHSF, Barbosa MMB, Baseia IG. 2012 – *Cyathus badius* and *C. earlei* reported from the Brazilian Atlantic rainforest. *Mycotaxon* 121, 365–369.
- Fidalgo O. 1962 – Rick, o pai da micologia brasileira. *Rickia* 1, 3–11.
- Gómez CL, Pérez-Silva E. 1988 – Especies de Nidulariales (Gasteromycetes) comunes en Mexico. *Revista Mexicana de Micología* 4, 161–183.
- Hibbett DS, Binder M. 2002 – Evolution of complex fruiting body morphologies in Homobasidiomycetes. *Proceedings of the Royal Society of London B: Biological Sciences* 269, 1963–1969.
- Hibbett DS, Pine EM, Langer E, Langer G, Donoghue MJ. 1997 – Evolution of gilled mushrooms and puffballs inferred from ribosomal DNA sequences. *Proceedings of the National Academy of Sciences. USA* 94, 12002–12006.
- Kirk PM, Cannon PF, David JC, Stalpers J. 2008 – *Ainsworth & Bisby's Dictionary of the Fungi*, 10. ed. Wallingford, Oxon.: CAB international, pp.771.
- Kueppers H. 1982 – *Color Atlas: A practical guide for color mixing*. Barron's, London.
- Lloyd CG. 1906 – The Nidulariaceae or “Bird's nest fungi”. *Cincinnati*. 32 pp.
- Matheny PB, Curtis JM, Hofstetter V, Aime MC, Moncalvo J-M, Ge Z-W, Yang Z-L, Slot JC, Ammirati JF, Baroni TJ, Bougher NL, Hughes KW, Lodge DJ, Kerrigan RW, Seidl MT, Aanen DK, DeNitis M, Daniele GM, Desjardin DE, Kropp BR, Norvell LN, Parker A, Vellinga EC, Vilgalys R, Hibbett DS. 2006 – Major clades of Agaricales: a multilocus phylogenetic overview. *Mycologia* 98, 984–997.
- Trierveiler-Pereira L, Baseia IG. 2009 – Revision of the Herbarium URM IV. Nidulariaceae (Basidiomycota). *Nova Hedwigia* 89 (3-4), 361–369.
- Trierveiler-Pereira L, Bezerra KMT, Bezerra JL, Baseia IG. 2009 – First records of Geastraceae and Nidulariaceae (Basidiomycota, Fungi) from Bahia, Northeastern Brazil.
- Zhao R-L, Desjardin DE, Soyong K, Hyde KD. 2008 – A new species of bird's nest fungi: characterization of *Cyathus subglobisporus* sp. nov. based on morphological and molecular data. *Persoonia* 21, 71–76.
- Zhao R-L, Jeewon R, Desjardin DE, Soyong K, Hyde KD. 2007 – Ribosomal DNA phylogenies of *Cyathus*: Is the current infrageneric classification appropriate? *Mycologia* 99 (3), 385–395.