




Authentic collections of *Myriostoma calongei* revealed this species as occurring from Paraíba State, Brazil

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ABSTRACT – (Authentic collections of *Myriostoma calongei* revealed this species as occurring from Paraíba State, Brazil). *Myriostoma* is a gasteroid genus belonging to the order Geastrales, which is distinguished by its basidiomes with multiple columns/pedicels, several ostioles in its endoperidium, and predominantly subglobose basidiospores with ornamentation. Furthermore, members of the genus *Myriostoma* have been found in Central and South America, Europe and Africa, but are not frequently found in nature. This work aims to report the first sighting of *M. calongei* from the State of Paraíba, with some insights on its morphology.

Keywords: description; earthstar fungi; taxonomy

RESUMO – (Coletas autênticas de *Myriostoma calongei* revelaram esta espécie como ocorrendo no Estado da Paraíba, Brasil). *Myriostoma* é um gênero gasteroide pertencente à ordem Geastrales, que se distingue por seus basidiomas com múltiplas colunas/pedícelos, vários ostíolos em seu endoperídio e basidiósporos predominantemente subglobosos com ornamentação. Ademais, membros do gênero *Myriostoma* foram encontrados na América Central e do Sul, Europa e África, mas não são frequentemente encontrados na natureza. Este trabalho tem como objetivo relatar o primeiro avistamento de *M. calongei* do Estado da Paraíba, com algumas informações sobre sua morfologia.

Palavras-chave: descrição; fungo estrela-da-terra; taxonomia

Introduction

Myriostoma Desv. is a genus treated similar to *Geastrum* Pers., but differing in possessing many ostioles and pedicels (Sousa et al. 2017). After a bibliographic revision, we found that the genus *Myriostoma*, which was previously described as monospecific one, has been pointed out to be actually composed by five cryptic species: *M. areolatum* (Calonge & M. Mata) M.P. Martín, J.O. Sousa & Baseia; *M. australianum* J.O. Sousa, Baseia & M.P. Martín, *M. calongei* Baseia, J.O. Sousa & M.P. Martín, *M. capillisporum* (V.J. Staněk) Suz, A.M. Ainsw., Baseia & M.P. Martín, and the putative type species *M. anglicum* Desv. nom. illeg., a arbitrarily described name for *Lycoperdon coliforme* Dickks. *Myriostoma anglicum* is illegitimate (Turland et al. 2018 Art. 52.1) because Desvaux (1809) ignored Dickson (1785) when he replaced the epithet ‘coliforme’ by ‘anglicum’. Thus, *M. coliforme* (Dickson) Corda is the correct name for the species, although the name *M. anglicum* is the type of the genus.

Thus, field trips revealed specimens of the genus *Myriostoma* found in Atlantic Forest fragments from Paraíba, and later identified as *M. calongei*, confirming the occurrence of the species in the State of Paraíba.

Material and methods

Collection of *Myriostoma* specimens were collected in March and July/2022, in two fragment of Atlantic Forest, in the municipalities of Cabedelo and João Pessoa, Paraíba State, Brazil. The region has a humid tropical Aw climate (Peel et al. 2007). Color code follows Kelly (1965). Microscopy was performed after removing pieces of the gleba, endoperidium, and exoperidium, using 4% KOH and Congo red, to rehydrate and stain the sample (da Silva et al. 2014, Sousa et al. 2014). Basidiospores shapes are named according to Bas (1969) and statistics are based in 30 measured ones. In addition the sample was respectively observed under optical microscope, using immersion oil for better visualization. The materials are being preserved in the herbarium JPB (Departamento de Sistemática e Ecologia, Universidade Federal da Paraíba).

Results and discussion

Myriostoma calongei Baseia, J.O. Sousa & M.P. Martín, PLoS One 12: 9/19. 2017.

Basidiomata epigeous, expanded, growing solitary or in small group. Exoperidium firm-coriaceous to

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subcoriaceous; external surface yellowish brown (77. m.y Br) to pale buff (76. l.y Br) near at base/centre, surface dry, squamulose, squamules appressed, dark yellowish brown (75. deep y Br), open into 6-8 rays measuring 27-36 × 20-27 mm (width measured at base), acute to subobtuse terminal region; internal surface beige (72. d. O Y), dull, wrinkled. Endoperidium soft, multipedicelate, 34-43 × 18-20 mm, isodiametric in top view and ellipsoid in side view, silver gray (near 264. l. Gray), surface shiny, wrinkled, multiostiolate, ostioles erupted up to 2-3 mm in diam. Gleba spongy, pulverulent, soft, dark yellowish brown (81. d. gy. y Br). Exoperidium: outer surface, with hyphae 1.40-9.80 µm in diam., wall thickness, 0.4-1.9 µm, yellowish brown; inner surface pseudoparenchymatous, cells 19.5-46 × 16.6-39.2 µm, mostly subisodiametric, colorless, thin-walled. Endoperidium surface with abundant hyphae 1.0-3.9 µm, brown pigmented to slightly paler, slightly thick to thick-walled to 0.4-1.4 µm. Eucapitium with plentiful hyphae 1.9-4.9 µm, strongly interwoven, brown to yellowish brown pigmented, moderately to thick-walled 0.4-1.4 µm, incrustated with somewhat resinous tufts. Basidia not seen. Basidiospores 4.9-8.8 × (3.4-)4.4-8.3 µm (measured with ornamentation), av. 6.9 × 6.2 µm, Q = 1.00-1.40 (1.43), av.Q = 1.11, mostly subglobose, but also globose to sometimes broadly ellipsoid occasionally ellipsoid, melleous to yellowish brown, strongly ornamented, ornaments crested 0.4-1.9 µm high, mostly yellowish.

Habitat: On soil among litter, solitary or in small group of four basidiomata in Atlantic Forest fragments.

Material examined: Brazil, Paraíba, João Pessoa, Bairro da Penha, EMEF Antônio Santos Coelho Neto, in a forest fragment behind the school, 08-III-2022, leg. G. Gomes-Filho s/n FW 01/2022 (JPB 66975); Cabedelo, Floresta Nacional Restinga de Cabedelo, 12-VII-2022, I.S. Miranda & F. Wartchow FW 06/2022 (JPB 66976).

Myriostoma used to be a monospecific genus, but recent phylogenies found five species (Sousa et al. 2017, 2018). Among the known species, *M. calongei* was described as lacking areolate ostioles in the endoperidium, and the presence of silver-gray endoperidium that seems more verrucose than other species with these warts measuring 0.13±0.28 mm high (Sousa et al. 2017). Another question that arose here was regarding to basidiospores shape: all specimens of the three additional species analyzed by Sousa et al. (2017) presented as globose or nearly so, while in *M. calongei* they found sometimes ranging to ellipsoid (see Bas 1969: 321 for basidiospores shape). *Myriostoma coliforme* sensu Baseia & Galvão (2002) is suspected to be conspecific to *M. calongei*, but described as having globose basidiospores. However, the drawings depicted by them (p. 4, fig. 6) showed broadly ellipsoid ones (est. Q = 1.25). Thus, we can conclude that the basidiospore' shape also can be used for segregate *M. calongei* from the other species.

Myriostoma australianum is also a species that producing basidiospores with a certain variability of basiospores shape, with (6.5-) 7.1-8 × (6.3-) 6.7-8.3 µm [$x = 7.9 \pm 0.5 \times 7.5 \pm 0.5$, Qm = 1.05, n = 30], but it probably presents a smaller range, according to Sousa et al. (2019).

Thus, considering the Neotropical distribution of *M. calongei*, we also propose the use of the basidiospores shapes range as additional feature for species characterization. In addition, we confirm the occurrence of this taxon from urban fragments of Atlantic Forest in Paraíba, Brazil.

Known from Argentina and Brazil, in the States of Goiás, Pernambuco, São Paulo, and Rio Grande do Norte (Sousa et al. 2017, Camilo-Cotrim et al. 2020, Trierweiler-Pereira & Gugliotta 2020), this work points a new perspective of including the distribution of this gasteroid genus, more specifically the first record of *M. calongei* in the State of Paraíba, in the cities of Cabedelo and João Pessoa.

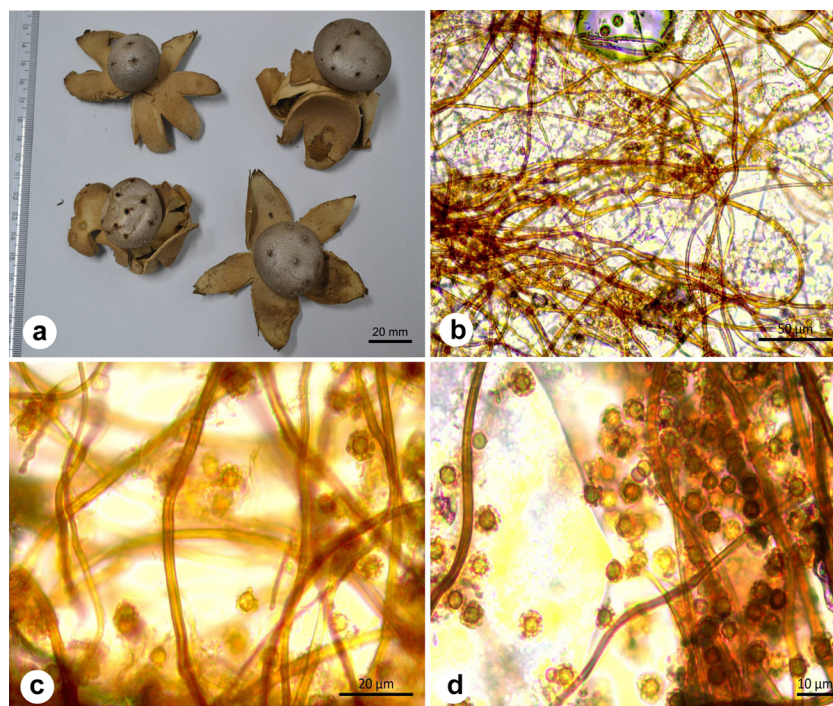


Figure 1. *Myriostoma calongei* Baseia, J.O. Sousa & M.P. Martín. a. Basidiomata. b, c, d. Glebal eucapitilia and basidiospores.

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Conflict of interest

The authors declare no conflicts of interest.

Authors Contributions

Isabella S. Miranda: design of the study, data collection, data analysis and interpretation, manuscript preparation, critical revision, adding intellectual content.

Iuri G. Baseia: design of the study, data analysis and interpretation, manuscript preparation, critical revision, adding intellectual content.

Gildo Gomes-Filho: collection, manuscript preparation, critical revision, adding intellectual content.

Felipe Wartchow: supervision, data analysis and interpretation, manuscript preparation, critical revision, adding intellectual content.

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