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SHORT COMMUNICATION

First records of *Geastraceae* and *Nidulariaceae* (*Basidiomycota*, *Fungi*) from Bahia, Northeastern Brazil

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ABSTRACT: (First records of *Geastraceae* and *Nidulariaceae* (*Basidiomycota*, *Fungi*) from Bahia, Northeastern Brazil). The state of Bahia has a great variety of tropical ecosystems, that harbour several interesting fungal species. Collections of gasteromycete specimens made from May/2005 to April/2008, in remnants of Atlantic Rain Forest, revealed interesting data. Six species of gasteromycetes, belonging to the families *Geastraceae* (*Geastrum fimbriatum*, *G. hieronymi*, *G. lageniforme*, *G. saccatum* and *G. schweinitzii*) and *Nidulariaceae* (*Cyathus montagnei*), were identified. All the species are new records from Bahia. *Geastrum hieronymi* is reported for the second time from Brazil and *G. lageniforme* is a new record from Northeastern Brazil.
Key words: gasteroid fungi, earthstars fungi, bird's nest fungi, fungal taxonomy.

RESUMO: (Primeiros registros de *Geastraceae* e *Nidulariaceae* (*Basidiomycota*, *Fungi*) para o estado da Bahia, Nordeste do Brasil). O estado da Bahia possui uma grande variedade de ecossistemas tropicais que certamente abriga diversas espécies interessantes de fungos. Coletas de gasteromicetos feitas de maio/2005 a abril/2008, em remanescentes de Mata Atlântica, revelaram dados interessantes. Seis espécies de gasteromicetos, pertencentes às famílias *Geastraceae* (*Geastrum fimbriatum*, *G. hieronymi*, *G. lageniforme*, *G. saccatum* e *G. schweinitzii*) e *Nidulariaceae* (*Cyathus montagnei*), foram identificadas. Todas as espécies são novos registros para a Bahia. *Geastrum hieronymi* é reportado pela segunda vez para o Brazil e *G. lageniforme* é novo registro para o Nordeste.
Palavras-chave: fungos gasteróides, fungos "estrelas-da-terra", fungos "ninhos-de-pássaro", taxonomia de fungos.

INTRODUCTION

Knowledge of gasteroid fungi in Northeastern Brazil has increased since the beginning of the XXI century, with the publications of interesting data (Baseia *et al*. 2003a, Baseia & Milanez 2003b, Baseia & Calonge 2005, 2006, Leite & Baseia 2007, Leite *et al*. 2007, Fazolino *et al*. 2008, Gurgel *et al.* 2008). The states with the most known gasteroid mycobiota are: Pernambuco (35 species), Rio Grande do Norte (14 species) and Paraíba (8 species). Additionally, there are also records of gasteromycetes from the states of Ceará and Bahia, both with 2 species, and the state of Alagoas, with 1 species (Trierveiler-Pereira & Baseia 2009).

The state of Bahia, located in Northeastern Brazil, has an area of 567.295 sq. km and has an extraordinary variety of tropical ecosystems, harbouring several interesting fungal species (Góes-Neto 1999). Most of the knowledge of macroscopic basidiomycetes in this state was obtained from mycological studies conducted by Torrend (Torrend 1920a, 1920b, 1935) and Góes-Neto (Góes-Neto 1996, 1999, Góes-Neto *et al*. 2000), especially on polyporoid fungi.

Reports of gasteromycetes from Bahia are very scarce and the specimens belong to the genus *Scleroderma* Pers. Guzmán (1970) and Goés-Neto (1996) reported *Scleroderma verrucosum* (Bull.) Pers., and recently Gurgel *et al*. (2008) recorded *Scleroderma nitidum* Berk. from the city of Senhor do Bonfim.

The state of Bahia covers a vast area where natural ecosystems are threatened by disorderly human progress. Studies on fungi taxonomy and diversity must be conducted to gather information on the species present in these ecosystems before they become extinct. With the aim to improve the knowledge of gasteroid fungi in Bahia, we present in this paper the results of our investigations on *Geastraceae* and *Nidulariaceae*.

MATERIAL AND METHODS

Collections of specimens were made from May/2005 to April/2008, in the Atlantic Rain Forest at different stages of preservation in the state of Bahia, Brazil.

Dried material was prepared for examination under light microscopy by removing small sections of the peridium and gleba from the basidiomata and soaking them in Melzer's iodine reagent or 3% KOH. Macro and microscopic characteristics were examined following traditional techniques used in taxonomic studies of gasteroid fungi (Miller & Miller 1988). Taxonomic

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position and author names followed the database Index Fungorum (http://www.indexfungorum.org/Names/Names.asp). Exsiccates of examined material are preserved in the mycological collection of the CEPEC Herbarium.

RESULTS AND DISCUSSION

A total of six species have been identified, belonging to the families *Geastraceae* (5 species) and *Nidulariaceae* (1 species). All species identified in this study are new records from the state of Bahia. *Geastrum hieronymi* is reported for the second time from Brazil and *G. lageniforme* is a new record from Northeastern Brazil. *Geastrum schweinitzii* is the most abundant species and the same pattern has been observed in other remnants of Atlantic Rain Forest in Northeastern Brazil.

Distribution in Brazil and taxonomic remarks were included for each species. Species are listed alphabetically within each family.

Geastraceae Corda 1842

1. *Geastrum fimbriatum* Fr., Syst. Mycol. 3: 16, 1829.

Description: Ponce de León (1968), Leite *et al*. (2007).

Distribution in Brazil: States of Rio Grande do Sul (Rick 1961), Rio de Janeiro (Berkeley & Cooke 1876) and Pernambuco (Leite *et al*. 2007).

Specimen examined: BRAZIL. BAHIA: **Uruçuca**, 18 May 2006, *J.L. Bezerra 840* (CEPEC, mycol. col. 1376).

Taxonomic remarks: *Geastrum fimbriatum* is characterized by light-colored exoperidium, dark-colored and sessile endoperdium, fibrillose mouth and peristome not delimited and usually concolor with endoperidium (Leite *et al*. 2007). The species is close to *G. saccatum*, but the latter shows a whitish peristome delimited by a groove (Baseia *et al*. 2003b).

2. *Geastrum hieronymi* Henn., Hedw. 36: 211, 1897. **Fig. 1a**

Description: Ponce de León (1968), Leite *et al*. (2007).

Distribution in Brazil: State of Pernambuco (Leite *et al*. 2007).

Specimens examined: BRAZIL. BAHIA: **Ilhéus**, Matinha CEPEC, 12 May 2005, *J.L. Bezerra 841* (CEPEC, mycol. col. 1377); *ibid*, 06 June 2006, *J.L. Bezerra 843* (CEPEC, mycol. col. 1379); **Jussari**, RPPN Serra do Teimoso, 16 May 2006, *J.L. Bezerra 842* (CEPEC, mycol. col. 1378).

Taxonomic remarks: The species was first reported from Brazil by Ponce de León (1968), but the collection site was not mentioned in the article. Leite *et al*. (2007) reported the species for the first time from Northeastern Brazil. According to these authors, *Geastrum hieronymi* is recognized by the following characters: exoperidium arched, dark-colored and short pedicellate endoperidium, short and narrow stalk, fibrillose mouth and peristome not delimited.

3. *Geastrum lageniforme* Vitt., Monogr. Lycoperd: 16, 1842. **Fig. 1b**

Description: Soto & Wright (2000), Sunhede (1989).

Distribution in Brazil: States of Rio Grande do Sul (Rick 1961) and Rio de Janeiro (Hennings l904a).

Specimens examined: BRAZIL. BAHIA: **Jussari**, RPPN Serra do Teimoso, 24 May 2005, *J.L. Bezerra 844* (CEPEC, mycol. col. 1380); *ibid*, 16 May 2006, *J.L. Bezerra 845* (CEPEC, mycol. col. 1381); **Uruçuca**, EMARC, 18 May 2006, *J.L. Bezerra 846* (CEPEC, mycol. col. 1382).

Taxonomic remarks: Ponce de León (1968) considered *Geastrum lageniforme* a synonym of *Geastrum indicum* (Klotzsch) R. Rauschert. However, others such as Sunhede (1989), Calonge (1999) and Soto & Wright (2000) kept the species separate. *Geastrum lageniforme* resembles *G. saccatum* but the former has longitudinal ridges in the mycelial layer and its rays are longer and more slender. Sunhede (1989) reported that the two species can be separated microscopically, since *G. lageniforme* has slightly smaller basidiospores and thin-walled clamped hyphae in the outer mycelial layer. The same author also presents a table comparing the main differences between *Geastrum lageniforme*, *G. triplex* and *G. morganii* Lloyd.

4. *Geastrum saccatum* Fr., Syst. Mycol. 3: 16, 1829.

Description: Ponce de León (1968), Leite & Baseia (2007).

Distribution in Brazil: States of Rio Grande do Sul (Rick 1961, Baseia *et al*. 2003), Paraná (de Meijer 2006), São Paulo (Baseia *et al*. 2003b), Pernambuco (Baseia *et al*. 2003b), Paraíba (Baseia *et al*. 2003), Rio Grande do Norte (Leite & Baseia 2007) and Amazonas (Hennings 1904b).

Specimens examined: BRAZIL. BAHIA: **Ilhéus**, Matinha CEPEC, 12 May 2005, *J.L. Bezerra 847* (CEPEC, mycol. col. 1383); *ibid*, *J.L. Bezerra 849* (CEPEC, mycol. col. 1385); **Buerarema**, Fazenda Conjunto Camacan, 10 May 2006, *J.L. Bezerra* 848 (CEPEC, mycol. col. 1384); **São José da Vitória**, Fazenda Vale Feliz, 11 May 2006, *J.L. Bezerra 850* (CEPEC, mycol. col. 1386).

Taxonomic remarks: The species is close to *G. fimbriatum* and *G. lageniforme* (see discussions above). *Geastrum saccatum* also resembles *G. triplex*, but the later usually has larger basidiomata and a prominent pseudo-parenchymatous collar around the endoperidial body (Battes 2004).

5. *Geastrum schweinitzii* (Berk. & M.A. Curtis) Zeller, Mycotaxon 40: 649, 1948.

≡ *Coilomyces schweinitzii* Berk. & M.A. Curtis, Jour. Acad. Nat. Sci. Phil. 2(2): 297, 1853.

Description: Ponce de León (1968), Baseia *et al*. (2003).

Distribution in Brazil: States of Rio Grande do Sul (Rick 1961, Baseia *et al*. 2003, Cortez *et al*. 2008), São Paulo (Baseia *et al*. 2003b), Alagoas (Baseia *et al*. 2003), Pernambuco (Baseia *et al*. 2003b, Leite & Baseia 2007) and Paraíba (Baseia *et al*. 2003).

Specimens examined: BRAZIL. BAHIA: **Ilhéus**, Matinha CEPEC, 12 May 2005, *J.L. Bezerra 851* (CEPEC, mycol. col. 1387); *ibid*, *J.L. Bezerra 852* (CEPEC, mycol. col. 1388); **Buerarema**, Fazenda Conjunto Camacan, 10 May 2006, *J.L. Bezerra 853* (CEPEC, mycol. col. 1389); **Uruçuca**, EMARC, 18 May 2006, *J.L. Bezerra 856* (CEPEC, mycol. col. 1392); **Ilhéus**, Matinha CEPEC, 06 June 2006, *J.L. Bezerra 854* (CEPEC, mycol. col. 1390); *ibid*, RPPN Mãe-da-Mata, 19 December 2006, *J.L. Bezerra 855* (CEPEC, mycol. col. 1391).

Taxonomic remarks: The species can be recognized by its light-color and small basidiomata (usually up to 2.0 cm diam.), fibrillose mouth and delimited peristome, caespitose habit and growing on a whitish subiculum (Baseia *et al*. 2003). *Geastrum schweinitzii* can be found on rotting wood and dead leaves in the litter fall.

Key to the species of *Geastrum* reported from Bahia

1. Basidiomata up to 2.0 cm diam. when mature; growing on wood, forming a white subiculum ..... *Geastrum schweinitzii*
1'. Basidiomata larger; not growing on wood, neither forming a white subiculum 2
2. Exoperidium arched; endoperidium short pedicellated ..... *G. hieronymi*
2'. Exoperidium saccate, endoperidium sessile 3
3. Peristome not delimited ..... *G. fimbriatum*
3'. Peristome delimited 4
4. Mycelial layer with longitudinal ridges; outer mycelial layer with thin-walled clamped hyphae; basidiospores 4.5-5 µm diam. (including ornamentation) ..... *G. lageniforme*
4'. Mycelial layer without longitudinal ridges; outer mycelial layer with simple-septate hyphae; basidiospores 4.5-6 µm diam. (including ornamentation) ..... *G. saccatum*

Nidulariaceae **Dumort. 1822**

6. *Cyathus montagnei* Tul. & C. Tul., Ann. Nat. 1: 70, 1844.

Description: Brodie (1975), Baseia & Milanez (2003a).

Distribution in Brazil: States of Rio Grande do Sul (Rick 1961), Paraná (de Meijer 2006), Rio de Janeiro (Brodie 1975) and São Paulo (Baseia & Milanez 2003a).

Specimen examined: BRASIL. BAHIA: **Wenceslau Guimarães**, Reserva Ecológica de Wenceslau Guimarães, 16 April 2008, *J. Pereira 06* (CEPEC, mycol. col. 1393).

Taxonomic remarks: For a long time the species was only known to occur in Brazil, but it seems to be very common in tropical areas (Brodie 1975). *Cyathus montagnei* is recognized by its striate basidiome (externally and internally), very dark brown exoperidium, silvery endoperidium, large peridioles (up to 2.5 cm in diam.) and ellipsoid basidiospores measuring 18-22 µm long (Brodie 1977).

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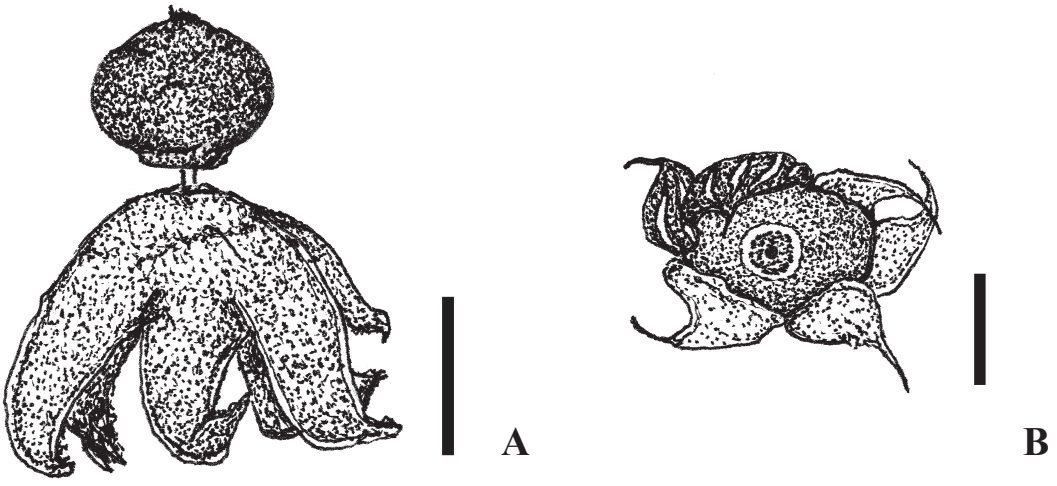

Figure 1. *Geastrum* dried basidiomata. **A**. *G. hieronymi*. **B**. *G. lageniforme*. Scale bars = 1 cm.

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