



First records of *Monoblepharella taylori* Sparrow (Monoblepharidales) in Brazil

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Abstract

Studies of zoosporic organisms carried out in Teresina, state of Piauí, and Timon, state of Maranhão, Brazil, enabled the collection of isolates that were identified as *M. taylori*. These are the first records of the species occurring in Brazil. Description and images are presented in this article.

Key words – Maranhão – Piauí – poti – zoosporic organism

Introduction

Reports of the occurrence of zoosporic organisms in Brazil are still scarce (Rocha 2006, Milanez et al. 2007, Pereira & Rocha 2008, Lista de Espécies da Flora do Brasil 2014). All regions, with the exception of the southeast region, are poorly collected. Thus, knowledge of these organisms in Brazil is limited and fragmented (Rocha et al. 2001, Pereira & Rocha 2008, Rocha et al. 2010, Rocha et al. 2014). Very few specialists study these organisms which is surprising in a country of continental size. Deforestation, pollution and other anthropogenic actions are affecting the environment and the diversity of these organisms even before these localities have been sampled (Rocha 2006, Milanez et al. 2007, Rocha 2009).

Studies were conducted to contribute to the knowledge of the diversity of zoosporic organisms in the states of Piauí and Maranhão (Sales 2009, Rocha et al. 2011). Among the isolates

obtained from these studies, a new chitrid was collected during research conducted in field trips to the Parque Zoobotânico and the mouth of the river Poti in Teresina, state of Piauí, and to the villages of Bacuri and Pinto, in Timon, state of Maranhão. Among other taxa, some isolates obtained in the surveys were identified as *M. taylori* and these are the first records of the species occurring in Brazil.

Monoblepharis taylori belongs to Monoblepharidaceae, a small family made up of two genera: *Monoblepharis* and *Monoblepharella*. *Monoblepharis* includes eleven species and *Monoblepharella* includes five species, all saprophytic, occurring in organic material in freshwater and soil of tropical environments. Sexual reproduction is heterogametic with the fusion of a small antherozoid, posteriorly uniflagellate, with a non-flagellate oosphere within the oogonium. The male and female gametanges can be formed in the same mycelium; the antheridia and the associated oogonium are generally formed in the same hypha. The zygote formed in the oogonium emerges from the water and is free swimming due to a flagellum that persists in the antherozoid. Then the wall of the zygote thickens and it becomes a free oospore in the water (Sparrow 1960, Karling 1977).

Material & Methods

The studies were performed in four areas: two areas in Teresina, state of Piauí, in the Parque Ambiental Zoobotânico, from August 2006 to February 2009 and at the mouth of the river Poti, from July 2013 to January 2014; and two areas in Timon, Maranhão, in the village Bacuri, from May 2008 to June 2009, and in the village of Pinto, from August 2009 to February 2010.

Samples of water (100 ml) and soil from the banks (100g) were collected from predetermined points, identified and brought to the laboratory of zoosporic organisms of the Universidade Federal do Piauí (UFPI). Water samples were placed directly into sterile Petri dishes with organic cellulose substrates (corn straw, *Sorgum* sp. seeds, filter paper, cellophane, and onion cataphyll), chitinous substrates (snake skin and hair) and keratin substrates (termite wings and shrimp exoskeletons). Fractions of 20g were removed from the soil samples, and placed in Petri dishes with sterile distilled water. The soil was mixed with the water and, after allowing it to settle for 30 minutes, organic substrates were added. After seven days of incubation at room temperature, the bait was observed under an optical microscope Olympus BX 40. The substrates colonized by zoosporic organisms were transferred to new Petri dishes and new substrates similar to the colonized ones were added. After seven days of incubation, they were once again examined under an optical microscope to verify the formation of the reproductive structures. The species were then identified using specialized literature. The selected cultures were deposited in the Coleção de Culturas de Organismos Zoospóricos (ZFBR), of the Universidade Federal do Piauí (Milanez 1989).

Results

Taxonomy

Monoblepharella taylori Sparrow Allan Hancock Pacific Expeditions, Publ. Univ. S. Calif. 3(6), 103 1940 Figs 1A–1H

Mycelium well-developed branched, with tenuous hyphae, 3–6 µm in diameter, with reticulate content, frequently presenting various types of dilations, with vacuolated content. Zoosporangia siliquiform, fusiform or cylindrical, thin-walled, of variable size, 20–100 µm in length by 6–21 µm in diameter, single or formed in pairs at the tip of the hyphae, or with sympodial branching, presenting an apical papilla, rarely presenting lateral papillae. Zoospores ovoid or cylindrical, 7–10 µm × 5–6 µm, posteriorly flagellate. During the formation of the gametangia, the oogonium is formed first followed by the antheridium which is hypogynous or formed terminally in a short branch below the oogonium. The oogonium is usually terminal, clavate or obpyriform, apex round and wide base, cylindrical, 10–18 µm × 7–14 µm, base 3–4 µm, content at maturity forming

an oosphere (up to four), containing several refractive globules. Antheridium hypogynous, consisting of a cylindrical segment of suboogonial hyphae, $10\text{--}14 \mu\text{m} \times 3\text{--}6 \mu\text{m}$. Antherozoides, two to five, amoeboid or actively mobile, posteriorly uniflagellate, $5 \mu\text{m} \times 4 \mu\text{m}$, containing some refractive globules, released through a pore formed at the tip of the antheridium, swimming until the pore of the oogonium, where it is absorbed, forming the zygote. Zygote ovoid or spherical, posteriorly uniflagellate, immobile in the release pore of the oogonium or free swimming, content featuring several refractive globules, $10\text{--}12 \mu\text{m} \times 7\text{--}11 \mu\text{m}$. Oospore formed free in the water, spherical, $9\text{--}11 \mu\text{m}$ in diameter, smooth wall, containing some refractive globules.

Material examined – Brazil, Piauí, Teresina, Parque Ambiental Zoobotânico, on *Sorgum* sp seeds, 06 Oct 2006, BSV Barros & LMA Sousa, S3/2–S4/2, voucher ZFBR 26, $503^{\circ}26'11''\text{S}$, $042^{\circ}77'08.5''\text{W}$. Teresina, Foz rio Poti, 05 Jul 2014, LA Santos & NDC Sousa, A1/3, S2/8.3, ZFBR 159, $505^{\circ}02'123''\text{S}$, $042^{\circ}50'293''\text{W}$. Maranhão, Timon, povoado Bacuri, 06 Oct 2008, AS Gomes & PCL Sales, S7/2, $05^{\circ}05'32.0''\text{S}$, $042^{\circ}55'53.7''\text{W}$. Timon, povoado Pinto, 05 Out 2009, MFV Costa & DFM Silva, S1/2, ZFBR 148, $505^{\circ}03'37.9''\text{S}$, $042^{\circ}53'56.3''\text{W}$.

Notes – In Teresina, samples of water and soil from the Parque Ambiental Zoobotânico, which is a nature conservation area housing a zoo, were taken from tanks around the monkey breeders. Samples of water and soil from the second area of study, the Parque Ambiental Encontro dos Rios, situated at the confluence of the Parnaíba and Poti rivers, were collected from the banks of the left side of the river. In Timon, water and soil samples were collected in water holes, used by the local population to obtain water for human consumption and irrigation. The second collection area in Timon was in Pinto, and samples of water and soil were collected in fish farms. The description of the isolates (figs. 1A–1H) agrees with the original description of Sparrow (1940). According to the list of plants and fungi of Brazil there are no references regarding the occurrence of *M. taylori* in the country (Pires-Zottarelli 2014). *Monoblepharis mexicana* Shanor is the only species of the genus referred to for Brazil, occurring in soil samples from the state of São Paulo (Joffily 1947). In South America, *M. Mexicana* also occurs in Argentina and is the only species of the genus occurring in that country (Steciow & Arambarri 2000, Steciow et al. 2012).

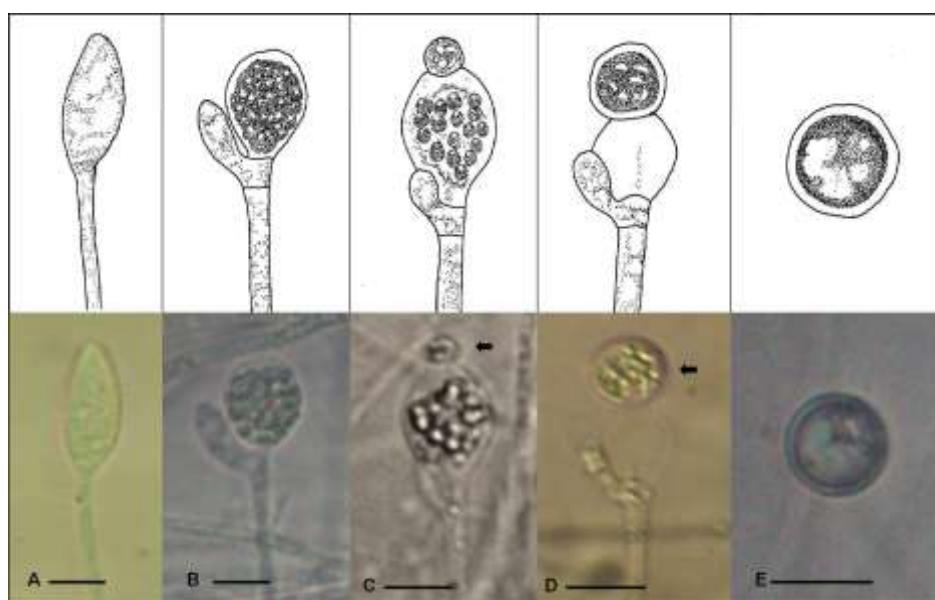


Fig. 1 – *Monoblepharella taylori* Sparrow. A Zoosporangium fusiform. B Young oogonium presenting content with refractive globules and formation of antheridium laterally just below the oogonium. C Antherozoid containing refractive globules, at the beginning of its absorption by the oogonium (arrow); oosphere with large refractive globules within the oogonium. D Empty oogonium after the emergence of the zygote; zygote immobile in the release pore of the oogonium, content featuring several refractive globules (arrow). E mature encysted oospores lying free in the water with a smooth wall and numerous refractive globules. – Bars = $10\mu\text{m}$.

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