Introduction

Myxomycetes are not considered phytopathogenic organisms (Agrios 1997; Nieves-Rivera 2000), but records are found in the literature regarding their occasionally harmful presence on some plant species of economic importance, such as living trunks of *Acer rubrum* L. (Ostrofsky & Shigo 1981), the terminal buds of *Paulinia cupana* Kunth. (Pereira 1984), and stems and leaves of *Solanum lycopersicum* L. (Cavalcanti et al. 1985; Cabrera-de-Alvarez et al. 1993), *Fragaria* sp. (Metlitskii et al. 2001), *Allium cepa* L. (Wordell Filho 2006), *Lactuca sativa* L. and *Petroselinum* sp. (Silva & Bezerra 2005).

A number of studies have addressed the association of myxomycetes with phanerogam families, genera and species, such as living or decomposing palm trees (Mobin & Cavalcanti 1998/1999; 2000; Cavalcanti & Mobin 2004; Stephenson 2003) and species of *Quercus* L. (Wrigley de Basanta 1998), *Rizophora* L. (Stephenson 1988) and *Terminalia* L. (Bezerra & Cavalcanti 2007). Some of these studies have been conducted in northeastern Brazil with introduced species employed in urban tree-planting programs or native species found in different ecosystems. The Ambay pumpwood (*Cecropia adenopus* Mart. ex Miq.) is a native species frequently found on the edges of woods and clearings, distributed from Mexico to Argentina and appearing in greater abundance in the Amazon region. It is considered a pioneer species in re-colonized areas. It belongs to the Cecropiaceae family, which encompasses six...
genera and 170 species and is characterized by a hollow, curly stem that ants (myrmecophila) use for shelter; spiral phyllotaxis; peltate, palmatilobed leaves, divided radially; and long petioles with a glandular pulvinule at the base (Braga 1953).

Leaves and fruit from the Ambay pumpwood are used in folk remedies for the treatment of diabetes as well as for coughs and bronchitis. The juice extracted from the root is a powerful diuretic. Juice from the buds is often used in the treatment of diarrhea, gonorrhea and is employed by indigenous peoples on wounds produced by venomous insects. Ash from the stem is used to whiten clothes, make soap and purify sugarcane sap in the fabrication of sugar. In Brazil, the plant is normally known as “imbaúba”, originating from the term “ambaiba”, meaning “tree with orifice” or “tree that does not serve for construction” (Braga 1953).

In studies on the soil and shoot debris carried out on the myxobiota in Atlantic Rainforest conservation units on the coast of the state of Rio Grande do Norte (Brazil), greater attention has been given to this species due to the frequent occurrence of myxomycetes on its leaves and branches.

Materials and methods

Study areas

Sampling was carried out in two areas. The first is the Estrela Woods Natural Heritage Private Reserve (06°22’10” - 06°22’43” S and 35°58’29” - 35°00’28” W, 1,833.12 ha, 4 m alt.) located in the city of Baía Formosa, state of Rio Grande do Norte. The location has a rainy tropical climate, with annual precipitation of 1400 mm and average relative humidity of 79% (IDEMA 2007). The physiognomy of the vegetation is typical of the Atlantic Rainforest, with large trees and contiguous crowns forming a canopy approximately 20 meters in height, with C. adenopus individuals in more illuminated areas, such as along the Gameleira trail (06° 22’ 26” - 06° 23’ 00” S and 35° 01’ 25” - 35° 00’ 55” W) and some points of the Pau-brasil, (06° 22’ 43” - 06° 23’ 19” S and 35° 00’ 46” - 35° 01’ 04” W), Pagão (06° 23’ 11” - 06° 23’ 19” S and 35° 00’ 46” - 34° 59’ 57” W) and Coca-cola (06° 24’ 50” - 06° 25’ 45” S and 34° 59’ 57” - 34° 58’ 32” W) trails.

The other sampling area was the Natal Dunes State Park (05°48’S - 05°53’S and 35°09’W - 35°12’W, 1,172.80 ha, 80 - 120 m alt.), the second largest urban park in Brazil, located in the city of Natal, Rio Grande do Norte. The climate is humid, with annual precipitation of 1200 mm. The park contains formations of dunes densely covered by sub-humid Atlantic Rainforest and a small stretch of the coastal tieland (Freire 1990). It has large trees forming a canopy approximately 20 meters in height, with C. adenopus individuals in the lower arboreal stratum, particularly in more illuminated locations, such as the entrance of the Perobinha trail.

Collection, culturing and analysis of myxobiota

Myxomycete sporocarps were collected from branches and dead leaves (either fallen on the ground or stuck in bushes approximately 2 m above the ground) of C. adenopus (Figs. 1-3) individuals distributed in the interior and along the trails of the study areas between June 2004 and September 2006. Two hundred moist-chamber cultures were set up, with blades and petioles placed in disposable Petri dishes (9 cm) lined with sterilized filter paper soaked in distilled water. The cultures were maintained at room temperature (22º to 25ºC) and examined on a weekly basis for a period of three months with the aid of a stereomicroscope (Schnittler & Stephenson 2002). Exsiccates representative of the material obtained in the field and laboratory were deposited in the UPF Herbarium of the Pernambuco Federal University. Identification of the specimens was based on morphological characters, following descriptions by Lister (1925), Martin & Alexopoulos (1969), Farr (1976), Lado & Pando (1997) and Mitchell (2004). Illustrations were based on the collected material. Taxonomic nomenclature and abbreviations of the names of the authors follow Hernández-Crespo & Lado (2005).

Results and discussion

The specimens obtained belong to species distributed among the genera of five families and are characterized below:

Trichiaceae

**Arcyria cinerea** (Bull.) Pers., Syn. Meth. Fung. 184 (1801) ≡ *Trichia cinerea* Bull., Herb. France pl. 477, f. 3 (1790) Fig. 4


**Hemitrichia pardinia** (Minakata) Ing, Myxomycetes Britain and Ireland 132 (1999) ≡ Hemitrichia minor var. pardinia Minakata, in G.Lister, Trans. Brit. Mycol. Soc. 5:82 (1915) Fig.
Myxomycetes occurring on *Cecropia adenopus* (Cecropiaceae) in fragments of Atlantic Rainforest

Table 1. Myxomycetes recorded (field/moist-chamber culture) on dead leaves from *Cecropia adenopus* Mart. ex Miq. in the Natal Dunes State Park and Estrela Woods Natural Heritage Private Reserve, Rio Grande do Norte, Brazil.

<table>
<thead>
<tr>
<th>Species</th>
<th>Petioles</th>
<th>Blades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arcyria cinerea (Bull.) Pers.</td>
<td>-/2</td>
<td>-/7</td>
</tr>
<tr>
<td>Arcyria insignis Kalchbr. &amp; Cooke</td>
<td></td>
<td>1/-</td>
</tr>
<tr>
<td>Cribraria violacea Rex</td>
<td>-/2</td>
<td>-/19</td>
</tr>
<tr>
<td>Comatricha tenerrina (M. A. Curtis) G.Lister</td>
<td></td>
<td>-/1</td>
</tr>
<tr>
<td>Craterium leucocephalum (Pers. ex J.F.Gmel.) Ditmar</td>
<td></td>
<td>1/-</td>
</tr>
<tr>
<td>Didderma deplanatum Fr.</td>
<td></td>
<td>-/1</td>
</tr>
<tr>
<td>Didderma hemisphaericum (Bull.) Hornem</td>
<td></td>
<td>-/4</td>
</tr>
<tr>
<td>Didymium columnella-cavum Hochg., Gottsb. &amp; Nann.-Bremek</td>
<td>-/3</td>
<td>-/22</td>
</tr>
<tr>
<td>Didymium squamulosum (Alb. &amp; Schwein.) Fr.</td>
<td></td>
<td>1/-</td>
</tr>
<tr>
<td>Hemitrichia pardina (Minakata) Ing</td>
<td></td>
<td>-/-</td>
</tr>
<tr>
<td>Lycogala epidendrum (L.) Fr.</td>
<td>1/-</td>
<td>-/-</td>
</tr>
<tr>
<td>Perichaena chrysosperma (Curr.) Lister</td>
<td></td>
<td>-/1</td>
</tr>
<tr>
<td>Perichaena depressa Lib.</td>
<td>-/2</td>
<td>-/1</td>
</tr>
<tr>
<td>Physarum melleum (Berk. &amp; Broome) Massee</td>
<td></td>
<td>-/-</td>
</tr>
<tr>
<td>Physarum stellatum (Massee) G. W. Martin</td>
<td></td>
<td>1/-</td>
</tr>
<tr>
<td>Total</td>
<td>1/9</td>
<td>5/77</td>
</tr>
</tbody>
</table>


**Perichaena chrysosperma** (Curr.) Lister, Monogr. Mycetozoa 196 (1894)
≡ **Ophiotheca chrysosperma** Curr., Quart. J. Microscop. Sci. 2:241 (1854)  
Fig. 6


**Lycogala epidendrum** (L.) Fr., Syst. Mycol. 3: 80 (1829)  
≡ **Lycoperdon epidendrum** L., Sp. Pl.: 1184. (1753)  


**Liceaceae**

Fig. 8


**Perichaena depressa** Lib., Pl. Crypt. Arduenna 378 (1837)  
Fig. 7


**Lycogala epidendrum** (L.) Fr., Syst. Mycol. 3: 80 (1829)  
≡ **Lycoperdon epidendrum** L., Sp. Pl.: 1184. (1753)  


**Physaraceae**

**Craterium leucocephalum** (Pers. ex J.F.Gmel.) Ditmar, in Sturm, Deutschl. Fl. Pilze 1(1):21 (1813)  
≡ **Stemonitis leucocephala** Pers. ex J.F.Gmel., Syst. Nat. 2:1467 (1792)  


**Physarum melleum** (Berk. & Broome) Massee, Monogr. Myxogast. 278 (1892)

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**Arcyria cinerea** (Bull.) Pers.  
**Arcyria insignis** Kalchbr. & Cooke  
**Cribraria violacea** Rex  
**Comatricha tenerrina** (M. A. Curtis) G.Lister  
**Craterium leucocephalum** (Pers. ex J.F.Gmel.) Ditmar  
**Didderma deplanatum** Fr.  
**Didderma hemisphaericum** (Bull.) Hornem  
**Didymium columnella-cavum** Hochg., Gottsb. & Nann.-Bremek  
**Didymium squamulosum** (Alb. & Schwein.) Fr.  
**Hemitrichia pardina** (Minakata) Ing  
**Lycogala epidendrum** (L.) Fr.  
**Perichaena chrysosperma** (Curr.) Lister  
**Perichaena depressa** Lib.  
**Physarum melleum** (Berk. & Broome) Massee  
**Physarum stellatum** (Massee) G. W. Martin  

**Liceaceae**

Fig. 8

**Physarum melleum** (Berk. & Broome) Massee, Monogr. Myxogast. 278 (1892)

**Physarum stellatum** (Massee) G. W. Martin, Mycologia 39(4):461 (1947)


**Didymiaceae**

**Didymium melleum** Berk. & Broome, J. Linn. Soc., Bot. 14:83 (1873)

Fig. 9


**Didymium squamulosum** (Alb. & Schwein.) Fr., Symb. Gasteromyc. 19 (1818)


**Stemonitaceae**

**Comatricha tenerrina** (M.A.Curtis) G.Lister, Guide Brit. Mycetozoa, ed. 4 39 (1919)


On eight expeditions to the study areas between 2004 and 2006, five specimens and one plasmodium were obtained directly from the field on *C. adenopus* leaves that had fallen to the ground and 87 specimens were developed in 43.7% of the moist-chamber cultures set up separately with blades and petioles. On these collections, 10 genera and 15 species were represented, mostly belonging to Physarales (47%) and Trichiales (33%). In the cultures set up with leaf blades, *H. pardina*, *C. violacea* and *D. columella-cavum* predominated (Fig. 5; 8; 11), representing 80.5% of the specimens. More than half (60%) of the species were recorded only once either in the field or in the laboratory. Most of the species recorded in the present study are commonly cited as foliicolous, except *Arcyria cineria* (Fig. 4), which does not have a substrate preference.

The specimens form a set of species that are associated with *C. adenopus* for the first time. However, some species of the myxobiota studied can be considered rare or at least uncommon in microenvironments. *Didymium columella-cavum*, for example, is recorded for the second time for both Brazil and the world and was previously known only from a description made by Hochgesand *et al.* (1989) at two sites in São Paulo state on palm leaves and mosses. Nonetheless, this was one of the species with the greatest number of records in the present study (over 20 specimens). The relative diversity of myxomycetes fructifying on *C. adenopus* leaves may be attributed to the long, hollow petiole and palmed venation blade as well as lobed margins that, upon drying, roll up and form a natural moist chamber, similar to that observed by Stephenson (2003) studying...
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myxomycetes associated with the palm tree *Rhopalostylis* in New Zealand. In collections carried out at the Tapacurá Ecological Station in Pernambuco state (Brazil) in 2007, (I. N. Ferreira, personal communication), five species of myxomycetes were obtained from a single dead unidentified *Cecropia* individual. However, despite possessing such characteristics and being distributed from Mexico to Argentina, particularly in the Amazon region, no studies were found in the literature reporting that *C. adenopus* or any other species of the genus has served as substrate for the development of myxomycetes.

**Acknowledgments**

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References


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