Species richness and geographic distribution of testate amoebae (Rhizopoda) in Brazilian freshwater environments

Fábio Amodêo Lansac-Tôha*, Maria Cláudia Zimmermann-Callegari, Geziele Mucio Alves, Luiz Felipe Machado Velho and Leandro Junio Fulone

*Núcleo de Pesquisa em Limnologia, Ictiologia e Aqüicultura, Pós-graduação em Ecologia de Ambientes Aquáticos Continentais, Universidade Estadual de Maringá, Av. Colombo, 5790, 87020-900, Maringá, Paraná, Brasil. *Author for correspondence. E-mail: fabio@nupelia.uem.br*

ABSTRACT. The present study aimed to analyze the species richness of testate amoebae, as well as to describe their geographic distribution and different habitat types in Brazilian freshwater environments. Until now, 346 infrageneric taxa have been recorded, belonging to 13 families and 40 genera. In the Center-West region, 267 taxa were recorded; 188 taxa in the Southeast; 129 taxa in the South, 53 taxa in the North; and 18 taxa in Northeast region. A total of 282 taxa were recorded in plankton; 80 taxa in aquatic macrophytes; 81 taxa in sediment; and 73 taxa in moss/sphagnum. The results regarding testate amoebae species richness are not yet conclusive, given that most research on these organisms was carried out in central, southeastern and southern Brazil. The higher number of taxa observed in plankton may be due to the fact that most studies on testate amoebae in Brazil had been carried out in the planktonic compartment, including reservoirs, floodplain lagoons, channels, tributaries and rivers. In addition, the majority of studies with sediment samples were conducted in estuaries or coastal lagoons, where salinity is a restricting factor for the occurrence of these organisms.

Key words: testate amoebae, geographical distribution, plankton, aquatic macrophytes, sediment, moss.

RESUMO. Riqueza de espécies e distribuição geográfica de amebas testáceas (Rhizopoda) em ambientes aquáticos continentais brasileiros. Este trabalho visa realizar um levantamento da riqueza de espécies de amebas testáceas, bem como descrever a distribuição geográfica e a distribuição em diferentes tipos de habitats desses organismos em ambientes aquáticos continentais brasileiros. Até o momento, são registrados 346 táxons infragenéricos, pertencentes a 13 famílias e 40 gêneros. São registrados 267 táxons na região centro-oeste, 188 táxons na região sudeste, 129 táxons na região sul, 53 táxons na região norte e 18 táxons na região nordeste. São registrados 282 táxons no plâncton; 131 táxons em macrófitas aquáticas, 81 táxons no sedimento e 73 táxons em musgos/esfágnos. Os resultados sobre a riqueza de tecamebas não é ainda conclusiva, visto que a maioria das pesquisas foi conduzida nas regiões centro-oeste, sudeste e sul. O maior número de táxons registrados no plâncton pode ser em virtude de que a maioria dos estudos sobre tecamebas, no Brasil, ter sido realizada no compartimento planctônico, incluindo reservatórios, lagoas de várzeas, canais, tributários e rios. Além disso, a maior parte dos estudos, em amostras de sedimento, foi conduzida em estuários ou lagoas costeiras, onde a salinidade é um fator limitante para a ocorrência desses organismos.

Palavras-chave: tecamebas, distribuição geográfica, plâncton, macrófitas aquáticas, sedimento, musgo.

Introduction

Brazil presents great animal and plant biodiversity, as pointed out by presenting, for example, the highest number of species of superior plants, insects, freshwater fish and mammals. On the other hand, information about Brazilian microbial diversity is still scarce or inexistent (Thompson *et al.*, 2005). In our country, there must exist a great microbial diversity, which is still practically unexplored.

Among the groups belonging to microbial organisms, there are the testate amoebae (Amoebozoa, Rhizopoda). The term "testate amoebae" refers to a group of organisms that are essentially artificial, heterogeneous and widely polyphyletic, in which the cytoplasm is inserted in a shell (Vucetich, 1973).

These organisms are basically aquatic and their presence is registered in a wide range of freshwater and humid environments (Lansac-Tôha *et al.*, 2004a). According to Bonnet (1974), about 80% of

the known species occupy aquatic biotopes associated with marginal vegetation and sediment. Recent surveys have shown, however, that these organisms are not only frequent but abundant in plankton samples from lakes and rivers (Arndt, 1993; Green, 1994; Velho *et al.*, 2003; Lansac-Tôha *et al.*, 2004a, among others).

Testate amoebae are still relatively poorly known in Brazil, and knowledge about their occurrence, distribution and species diversity is still scarce. The first records were made by Ehrenberg (1841), Daday (1905), Prowazek (1910), Wailes (1913), Cunha (1913, 1916) and Pinto (1925). These studies had basically a taxonomic and species distribution approach. After a time span of approximately twenty-five years, Hoogenraad and Groot (1951) identified testate amoebae species collected in moss and *Sphagnum* from South American environments, including Brazil. About ten years later, new studies were carried out with these organisms, in sediment samples collected in coastal lagoons from Rio Grande do Sul State (Closs and Madeira, 1962 and 1967; Closs and Medeiros, 1965 and 1967), focusing on, as pioneer researches, essentially taxonomic and distribution aspects.

The first study on testate amoebae developed in Brazil considering ecological aspects was Green´s research (1975), which surveyed organisms collected in plankton samples from floodplain lagoons from the Suia Missu River watershed, in Mato Grosso State.

Later, during the last twenty years, some representative studies were carried out on testate amoebae species richness, composition, abundance and distribution in different habitat types, such as plankton, sediments, moss/*Sphagnum* and fauna associated with aquatic macrophytes (Godinho-Orlandi and Barbieri, 1983; Neumann-Leitão and Nogueira-Paranhos, 1987; Barbieri and Godinho-Orlandi, 1989; Rolla *et al.*, 1992; Torres and Jebran, 1994; Dabés, 1995; Hardoim and Heckman, 1996; Landa, 1997; Rhoden and Pitoni, 1999; Dabés and Velho, 2001; Bini *et al.*, 2003; Lansac-Tôha *et al.*, 1992; 1993; 1997; 2004a; Velho *et al.*, 1996; 1999; 2003; 2004a; b; Fulone *et al.*, 2005; Souza, 2005; among others). These studies increased the knowledge on testate amoebae occurrence in Brazil, considering the distribution in different types of studied habitats.

Recently, some studies were performed that provide more detailed information about the occurrence, taxonomical aspects and distribution of testate amoebae in different Brazilian geographical regions (Velho, 1999; Lansac-Tôha *et al.*, 2000a, 2001a; b; Velho *et al.*, 2000; 2001).

This present study aimed to carry out a survey on testate amoebae species richness, and describe the occurrence of these organisms in Brazil, considering geographic distribution and distribution in different habitat types, in Brazilian inland aquatic environments. We also intended to identify regions in Brazil that are lacking in information on the occurrence and distribution of these organisms.

Material and methods

When registering the occurrence and distribution of testate amoebae species, only scientific publications (complete articles in journals and complete annals from scientific meetings), dissertations and theses were considered (Tables 1 and 2). The adopted taxonomic classification was basically that proposed by Loeblich and Tappan (1964).

Table 1. Studies carried out on testate amoebae, authors and respective habitat types studied in the Brazilian Southern, Center-West, Northeast and North regions.

Authors/Years	State	Habitat
	Southern Region	
Barbosa (1995)	Paraná	Sediment
Cardoso and Motta Marques (2004)	Rio Grande do Sul	Plankton
Closs (1962)	Rio Grande do Sul	Sediment
Closs and Madeira (1962; 1967)	Rio Grande do Sul	Sediment
Closs and Medeiros (1965, 1967)	Rio Grande do Sul	Sediment
Cunha (1916)	Paraná	Plankton
Ferreira *et al.* (2005)	Rio Grande do Sul	Sediment
Hansen *et al.* (2005)	Rio Grande do Sul	Sediment
Hoogenraad and Groof (1951)	Paraná	Moss/*Sphagnum*
Jaworski (2001)	Paraná	Sediment
Lansac-Tôha *et al.* (1997; 2004a; 2005)	Paraná	Plankton
Leão *et al.* 2005	Rio Grande do Sul	Sediment
Lopes (1993)	Paraná	Plankton
Madeira-Falcetta (1974)	Rio Grande do Sul/Santa Catarina/Paraná	Sediment
Nunes *et al.* (1996)	Paraná	Plankton
Rhoden e Pitoni (1999)	Rio Grande do Sul	Moss/*Sphagnum*
Torres (1996a; b; c; 1998)	Rio Grande do Sul	Aquatic Macrophytes
Torres and Jebran (1994)	Rio Grande do Sul	Aquatic Macrophytes
Torres and Schwarzbold (2000)	Rio Grande do Sul	Aquatic Macrophytes
Velho and Lansac-Tôha (1996)	Paraná	Plankton
Velho *et al.* (1996; 1999)	Paraná	Plankton
	Center-West Region	
Alves *et al.* (2007)	Mato Grosso do Sul	Plankton
Bini *et al.* (2003)	Mato Grosso do Sul	Plankton
Bonecker *et al.* (1998)	Mato Grosso do Sul	Plankton
Daday (1905)	Mato Grosso do Sul	Plankton
Green (1975)	Mato Grosso	Plankton
Hardoim (1997)	Mato Grosso	Aquatic Macrophytes
Hardoim and Heckman (1996)	Mato Grosso	Sediment/Aquatic Macrophytes
Lansac-Tôha *et al.* (1997; 2004a; b)	Mato Grosso do Sul	Plankton
Lansac-Tôha *et al.* (1999; 2000b)	Goiás	Plankton
Leipnitz (2005)	Mato Grosso do Sul	Sediment

(continua...)

(...continuação)

Authors/Years	State	Habitat
Missawa (2000)	Mato Grosso	Plankton
Silva-Neto (2001)	Mato Grosso	Plankton
Velho and Lansac-Tôha (1996)	Mato Grosso do Sul	Plankton
Velho *et al.* (1996; 1999; 2003)	Mato Grosso do Sul	Plankton
Northeast and North Regions		
Cunha (1913)	Ceará	Plankton
Cunha (1916)	Bahia/Piauí	Plankton
Neumann-Leitão and Nogueira-Paranhos (1987)	Bahia/Pernambuco	Plankton
Rocha *et al.* (1998)	Maranhão	Plankton
Zucon and Loyola e Silva (1992)	Sergipe	Sediment
Robertson *et al.* (subm.)	Pará	Plankton
Walker (1978)	Amazonas	Sediment

Table 2. Studies carried out on testate amoebae, authors and respective habitat types studied in the Brazilian Southeast region.

Authors/Years	State	Habitat
Southeast Region		
Bonecker *et al.* (1996; 1997)	Minas Gerais	Plankton
Bonnetti and Eichler (1997)	São Paulo	Sediment
Brant-Ribeiro (1970)	Minas Gerais	Sediment
Cunha (1913; 1916)	São Paulo/ Rio de Janeiro/ Minas Gerais	Plankton
Dabés (1995; 1999)	Minas Gerais	Plankton
Dabés and Velho (2001)	Minas Gerais	Aquatic Macrophytes
Duleba (2004)	São Paulo	Sediment
Durigan *et al.* (1992)	São Paulo	Plankton
Eichler and Bonnetti (1995)	São Paulo	Sediment
Eichler-Coelho *et al.* (1996; 1997)	São Paulo	Sediment
Fulone *et al.* (2005)	São Paulo	Plankton
Gomes (1991)	São Paulo	Plankton
Gomes and Godinho (2003)	São Paulo	Plankton
Hoogenraad and Groof (1951)	Minas Gerais	Moss/*Sphagnum*
Jaworski and Eichler (2005)	São Paulo	Sediment
Landa (1997)	Minas Gerais	Plankton
Landa and Ferreira (1995)	Minas Gerais	Plankton
Landa and Mourgués-Schurter (1999; 2000a; b)	Minas Gerais	Plankton
Lopez and Sampaio (2003)	Minas Gerais	Plankton
Maia-Barbosa *et al.* (2003)	Minas Gerais	Plankton
Neumann-Leitão and Nogueira-Paranhos (1987)	Minas Gerais	Plankton
Neumann-Leitão *et al.* (1991)	São Paulo	Plankton
Oliveira (1999)	São Paulo	Sediment
Oliveira *et al.* (1992)	São Paulo	Plankton
Panarelli *et al.* (2003)	São Paulo	Plankton
Prowazek (1910)	Rio de Janeiro/ São Paulo	Plankton
Rolla *et al.* (1990; 1992)	Minas Gerais/ São Paulo	Plankton
Sipaúba-Tavares *et al.* (1995)	São Paulo	Plankton
Souza (2004)	Minas Gerais	Plankton
Souza (2005)	Minas Gerais	Aquatic Macrophytes
Wailes (1913)	Rio de Janeiro	Moss/*Sphagnum*

Results

Until now, 346 infrageneric taxa have been registered, belonging to 13 families and 41 genera. In relation to Brazilian geographic regions, 267 taxa have been recorded in the Center-West region, 188 taxa in the Southeast region, 129 in the Southern region, 53 taxa in the Northern region and 18 in the Northeast region (Figure 1).

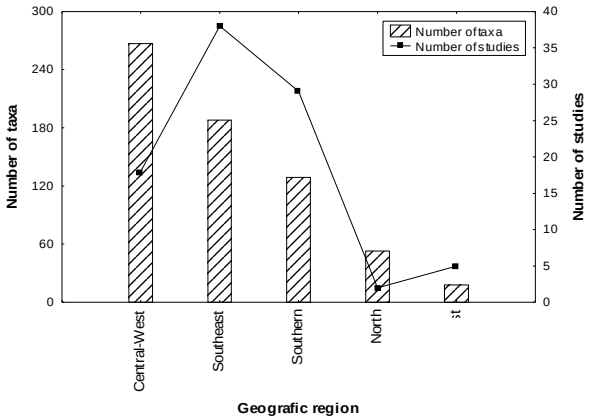

Figure 1. Number of testate amoebae infrageneric taxa and the number of studies carried out in distinct Brazilian geographic regions.

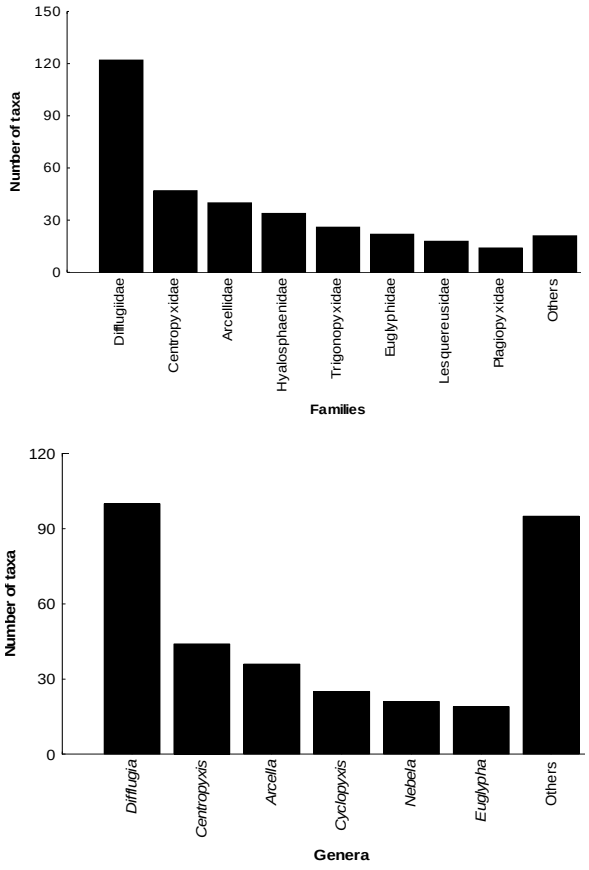

Figure 2. Number of infrageneric taxa of testate amoebae families (a) and genera (b) registered in Brazilian inland aquatic environments.

Among the studied habitats, the highest number of taxa has been recorded in plankton, followed by aquatic macrophytes, sediment and moss/*Sphagnum* (Figure 3).

Of the 282 taxa registered in plankton, 92 belong to *Difflugia*, 44 to *Centropyxis*, 36 to *Arcella* and 21 to

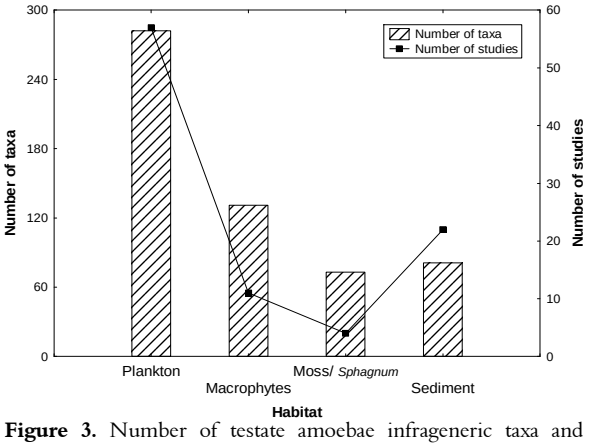

Figure 3. Number of testate amoebae infrageneric taxa and number of studies performed on this group in distinct habitats from Brazilian aquatic environments.

Cyclopyxis (Figura 4a). The most frequent and abundant taxa in this type of habitat are: *Centropyxis aculeata* (Ehrenberg), *C. ecornis* (Ehrenberg), *Arcella vulgaris* Ehrenberg, *A. discoides* Ehrenberg, *A. gibbosa* Pénard, *A. megastoma* Pénard, *Difflugia acuminata* Ehrenberg, *D. corona* Wallich, *D. lobostoma* Leidy, *Lesquereusia spiralis* (Ehrenberg) and *Euglypha acantophora* (Ehrenberg).

In regard to the aquatic macrophytes habitat, from 131 registered taxa, the most plentiful genera are *Difflugia* (34 taxa), *Arcella* (23 taxa), *Centropyxis* (15 taxa), *Nebela* (11 taxa), *Euglypha* (9 taxa), *Cyclopyxis* (6 taxa) and *Quadrulella* (6 taxa) (Figure 4b), with the following taxa as the most frequent and abundant: *C. aculeata, C. discoides* (Pénard) , *A. conica* (Playfair), *A. discoides, A. hemisphaerica* Perty, *D. corona, D. lobostoma, D. elegans* Pénard, *Netzelia tuberculata* (Wallich), *N. wailesi* (Ogden), *L. spiralis* and *E. acantophora*.

As for the sediment habitat, from 81 registered taxa, 36 belong to *Difflugia*, 8 to *Arcella*, 5 to *Centropyxis* and 5 to *Euglypha* (Figure 4d), with *C. constricta* (Ehrenberg), *Cyclopyxis arenata* (Cushman), *D. capreolata* Pénard, *D. corona, D. oblonga* Ehrenberg, *D. urceolata* Carter, *N. tuberculata* and *Pontigulasia compressa* (Carter) as the most frequent and abundant.

On the other hand, in samples collected in moss and *Sphagnum*, from 73 taxa recorded, 16 belong to *Nebela,* 13 to *Euglypha* and 6 to *Difflugia* (Figure 4c). The most frequent and abundant taxa are *Nebela caudata* Leidy, *Assulina muscorum* Greeff, *Trinema enchelys* (Ehrenberg) and *E. strigosa* (Ehrenberg).

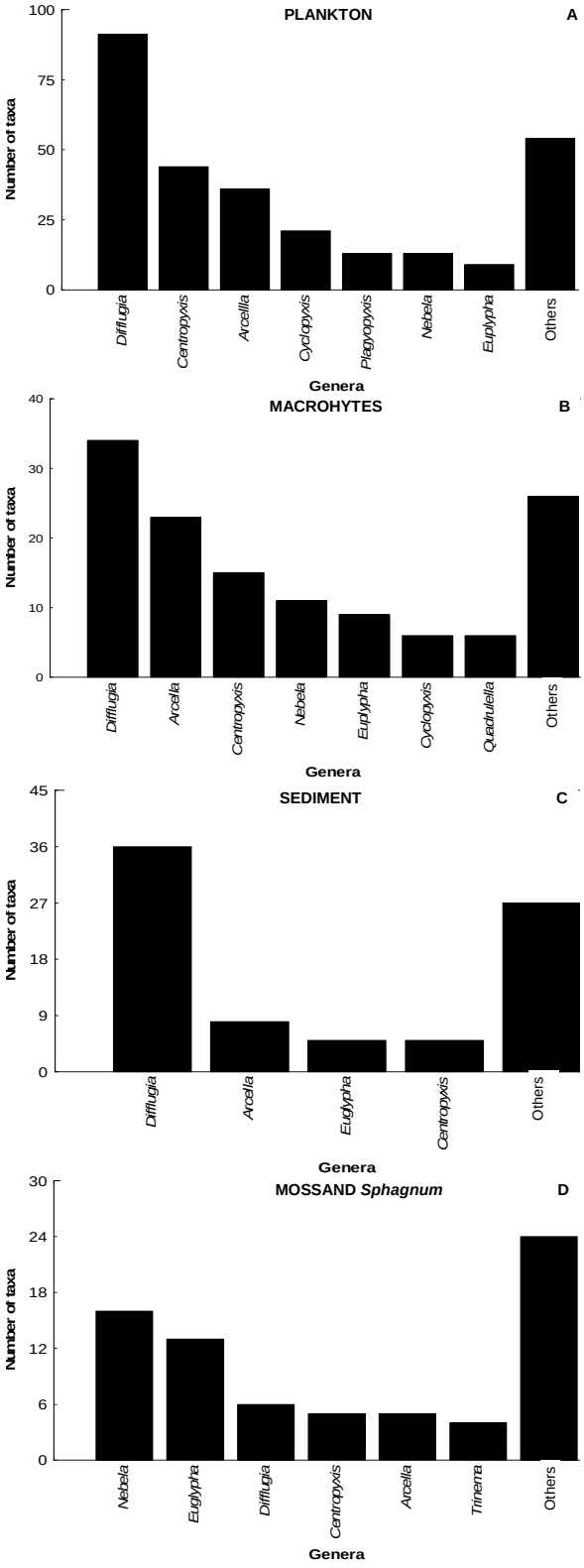

Figure 4. Number of infrageneric taxa of testate amoebae genera in each habitat type, in distinct Brazilian aquatic environments.

Discussion

Research on testate amoebae composition and species richness in Brazil are still in early stages. Even though in the last few years studies on different aquatic communities, including testate amoebae in the surveys have increased, comprising different aquatic habitats (sediment, river and lakes plankton, fauna associated to aquatic macrophytes and *Sphagnum*/moss), these studies are practically restricted to Southern, Southeast and Center-West regions.

Currently, these organisms are scarcely known in the Northern and Northeast regions, with two and five studies including testate amoebae, respectively, However, we must emphasize that a study performed in small streams in the Amazonian forest (Amazonas State) showed that these environments present a high biodiversity (Walker, 1982). Although this author had not identified the species, he found an expressive number of morphotypes (129). Still in Northern region, the identification of 50 testate amoebae taxa by Robertson *et al.* (submitted) in plankton samples collected in Curuá-Una Reservoir (Pará State) evidences the need for researches to improve the knowledge of testate amoebae biodiversity in this region.

In terms of species richness, the Center-West region is the most abundant in surveys carried out until now. Contributing to this fact, studies were developed in the Upper Paraná River floodplain (Mato Grosso do Sul State), in plankton samples (Lansac-Tôha *et al.*, 1997; 2004a; Velho and Lansac-Tôha, 1996; Velho *et al.*, 1996; 1999; Alves *et al.*, 2007; among others) and in Pantanal do Poconé (Mato Grosso State), in sediment and aquatic macrophytes samples (Hardoim and Heckman, 1996; Hardoim, 1997), as well as in Cuiabá River (MT), in plankton samples (Missawa, 2000; Silva-Neto, 2001).

Sediment, which is regarded by some authors (Bonnet, 1974; Green, 1975; Lena and Zaindenwerg, 1975), as a preferential habitat for testate amoebae, presents lower diversity when compared with plankton and macrophytes habitats, according to studies carried out in Brazil. However, these results must be met with caution, because most of studies performed in sediment samples were conducted in coastal lagoons or estuaries, where salinity is a limiting factor for these organisms. The studies developed in coastal environments have shown that testate amoebae are more frequent in regions with higher fluvial influence, and that they are then substituted by foraminifers in regions with higher marine environment influence (Closs and Madeira, 1967; Zucon and Loyola e Silva, 1992; Barbosa, 1995; Eichler-Coelho *et al.*, 1997; Oliveira, 1999; Jaworski and Eichler, 2005). The relatively expressive number of studies about testate amoebae in coastal/estuarine environments is explained by the fact that these organisms are considered indicators of fluvial inflow in these environments (Jaworski and Eichler, 2005).

Moreover, the great number of morphotypes found by Walker (1982) in sediments of small streams in the Amazonian forest shows that we can find a high diversity of testate amoebae in this habitat type. We must emphasize that only six studies on testate amoebae have been performed with sediment samples from non-coastal environments, one in the Piranga River, Minas Gerais State (Brant-Ribeiro, 1970), another at the Pantanal Matogrossense, Mato Grosso State (Hardoim and Heckman, 1996), yet another in lagoons of the Paraná River (Leipnitz *et al.*, 2005) and three in lagoons from the Coastal Plain in Rio Grande do Sul State (Ferreira *et al.*, 2005; Hansen *et al.*, 2005; Leão *et al.*, 2005).

As already mentioned, despite the fact that testate amoebae are not considered by several authors as typically planktonic, a higher taxa richness was registered until now in plankton samples, especially in floodplain environments as those found in Paraná River, which were broadly sampled – from marginal lagoons and small channels and tributaries up to the main rivers. These environments are, in their majority, shallow and with high development of marginal vegetation, with proximity between pelagic and littoral regions and daily water column mixing, which can intensify the fauna exchange between different habitats (Lansac-Tôha *et al.*, 2003). Thus, the water column can function as an information collector about present fauna in the entire system, not only from plankton, but also from marginal vegetation and sediment (Velho, 1999).

In addition, recent studies performed in the Upper Paraná River floodplain have evidenced that testate amoebae can colonize plankton environments during their life cycle, contributing to their dispersion and the success of their populations (Velho *et al.*, 1999; 2003). Thus, for these authors, the presence of these organisms in plankton must not be faced as accidental, as argued by other authors (Green, 1963; 1975; Lena and Zaindenwerg, 1975).

According to Velho *et al.* (1999; 2003), the dimension of environments, the presence of aquatic macrophytes stands and water flow, which promotes marginal vegetation and sediment washout, seem to be important factors in determining patterns of

testate amoebae richness in plankton of distinct environments from floodplains. However, these authors argue that the occurrence of testate amoebae in plankton can not be ascribed only to those hydrodynamic processes; although they are preferentially associated to a substrate, in some life cycle stage they must occur in plankton in order to guarantee their population success, as previously discussed.

In this way, testate amoebae produce gaseous vacuoles for fluctuation (Stepanék and Jiri, 1958), and some species produce low density shell shapes (Schönborn, 1962). According to Velho *et al.* (1999), these characteristics may allow access of these organisms to the plankton compartment.

However, we must also consider that the higher number of studies carried out on testate amoebae in our country were done in plankton habitat; thus, the higher species richness in this habitat can be due to differences in sampling effort and a higher number of explored environments.

The three most representative families in terms of species richness, Difflugiidae, Arcellidae and Centropyxidae, are, in general, the most commonly registered in other South American aquatic environments (Vucetich, 1973; Lena and Zaindenwerg, 1975; Modenutti and Vucetich, 1987) and in other parts of the world (Green, 1963; Moraczewski, 1964; Opravilová, 1974; Beyens *et al.*, 1995; Todorov and Golemansky, 1998; Alekperov and Snegovaya, 2000).

Considering the species richness for different testate amoebae genera in the distinct habitats studied, *Difflugia* is the most abundant in plankton, sediment and aquatic macrophytes samples, followed by *Arcella* and *Centropyxis*. The higher species richness of these genera in these three habitat types can be explained by their shell shape and composition, which are more stiff and resistant, allowing their presence and permanence in this habitat type.

Conversely, in moss/*Sphagnum* habitats, the most abundant genera are *Nebela* and *Euglypha*, which are less representative in the other environments, especially in the planktonic one. This observation can be explained by the fact of these two genera possess fragile shells, which limit their occurrence in plankton, especially in lotic environments.

Furthermore, according to Mackinlay (1936) and Rhoden and Pitoni (1999), the *Sphagnum* inferior portion constitutes a favorable place for organisms of the *Nebela* genus, because it avoids direct light projection upon them. Because the shells of *Nebela* and *Euglypha* species are hyaline, exposition to light in plankton habitats could be harmful to their protoplasm. However, although this argument can be used to explain the low species richness of these two genera in plankton, it does not justify their reduced occurrence in sediment, since these habitats provide low luminosity conditions for them. Higher species richness of *Nebela* and *Euglypha* in moss/*Sphagnum* was also observed in researches performed in other countries (Heal, 1962; Gracia, 1972; Todorov, 1998).

Other factor explaining the higher species richness of *Nebela* and *Euglypha* in moss/*Sphagnum* would be the low availability of water in these habitats, which could be limiting for population development of species of other testate amoebae genera.

Heal (1962), studying the testate amoebae microdistribution in *Sphagnum*, evidenced that *Nebela* species were distributed in different portions of this plant according to water availability, since xerophilous species inhabit superior regions, higrophilous ones were found in the intermediary region, while hydrophilous were observed in the inferior region. Based on these results, we can suggest that the dominance of determined genera in different aquatic habitats (sediment, plankton, aquatic macrophytes, moss/*Sphagnum*) is directly related to the water quantity available. In synthesis, a higher species richness of *Difflugia, Arcella* and *Centropyxis* occurs where water is not limited, and *Nebela* and *Euglypha*, where water availability is reduced.

References

ALEKPEROV, I.; SNEGOVAYA, N. The fauna of testate amoebae (Rhizopoda, Testacea) in freshwater basins of Apsheron peninsula. *Protistology*, St. Petersburg, v. 1, n. 4, p. 135-147, 2000.

ALVES, G.M. *et al.* Novos registros de amebas testáceas (Rhizopoda-Sarcodina) para a planície de inundação do alto rio Paraná. *Acta Limnol. Bras.*, Botucatu, v. 19, n. 2, 2007 (in press).

ARNDT, H. A critical review of the importance of rhizopods (naked and testate amoebae) and actinopods (Heliozoa) in lake plankton. *Mar. Microb. Food Webs*, Paris, v. 7, n. 1, p. 3-29, 1993.

BARBIERI, S.M.; GODINHO-ORLANDI, M.J.L. Ecological studies on the planktonic protozoans of a eutrophic reservoir (Rio Grande Reservoir – Brazil). *Hydrobiologia*, Dordrecht, v. 183, p. 1-10, 1989.

BARBOSA, C.F. Foraminifera e Arcellacea ("thecamoebia") recentes do estuário de Guaratuba, Paraná, Brasil. *An. Acad. Bras. Cienc.*, Rio de Janeiro, v. 67, n. 4, p. 465-492, 1995.

BEYENS, L. *et al.* The aquatic testate amoebae fauna of the Stromness Bay area, South Georgia. *Antarctic Sci.,* Oxford, v. 7, n. 1, p. 3-8, 1995.

BINI, L.M. *et al.* The effect of connectivity on the relationship between local and regional species richness of testate amoebae (Protozoa, Rhizopoda) in floodplain lagoons of the Upper Paraná River, Brazil. *Acta Oecol.*, Paris, v. 24, p. 145-151, 2003.

BONECKER, C.C. *et al.* Zooplankton composition under the influence of liquid wastes from a pulp mill in middle Doce river (Belo Oriente/MG – Brazil). *Arq. Biol. Tecnol.,* Curitiba, v. 39, n.4, p. 893-901, 1996.

BONECKER, C.C. *et al.* Limnological characterization of Marola lake, a pound in the middle Doce valley river – Belo Oriente, State of Minas Gerais, Brazil. *Braz. Arch. Biol. Technol.*, Curitiba, v. 40, n. 4, p. 817-828, 1997.

BONECKER, C.C. *et al.* Composition of zooplankton in different environments of the Mato Grosso do Sul, Brazil. *In:* SEMINÁRIO REGIONAL DE ECOLOGIA, 8., 1998, São Carlos. *Anais...* São Carlos: UFSCar, 1998, v. 3, p. 1123-1135.

BONNET, L. Lés thecamoebiens. *In*: BONNET, L. (Ed.). *Quelques aspects de la faune des mousses.* Clermont-Ferrand: Ann. C. D. P., 1974. p. 21-30.

BONETTI, C.; EICHLER, B.B. Benthic Foraminifera and Thecamoebians as indicators of river/sea gradients in the estuarine zone of Itapitangui river – Cananéia/SP, Brazil. *An. Acad. Bras. Cienc.*, Rio de Janeiro, v. 69, n. 4, p. 545-563, 1997.

BRANT-RIBEIRO, A. Contribuição ao estudo das tecamebas do rio Piranga (Ponte Nova-MG) e ensaio mineralógico e granulométrico preliminar dos respectivos sedimentos e das condições hidrológicas da área de coleta. *Bol. Mus. Hist. Nat. UFMG, sér. Zool.*, Belo Horizonte, v. 5, p. 1-25, 1970.

CARDOSO, L.S.; MOTTA MARQUES, D. Structure of the zooplankton community in a subtropical shallow lake (Itapeva Lake – South of Brazil) and its relationship to hydrodynamic aspects. *Hydrobiolgia*, Dordrecht, v. 518, p. 123-134, 2004.

CLOSS, D. Foraminíferos e tecamebas da lagoa dos Patos (RS). *Bol. Esc. Geol.*, Porto Alegre, Porto Alegre, n. 11, p. 1-130, 1962.

CLOSS, D.; MADEIRA, M. Tecamebas e foraminíferos do arroio Chuí (Santa Vitória do Palmar, Rio Grande do Sul, Brasil). *Iheringia, sér. Zool.*, Porto Alegre, v. 19, p. 1-44, 1962.

CLOSS, D.; MADEIRA, M. Foraminíferos e tecamebas aglutinadas da lagoa de Tramandaí, no Rio Grande do Sul. *Iheringia, sér. Zool.*, Porto Alegre, v. 35, p. 7-31, 1967.

CLOSS, D.; MEDEIROS, U.M.F. New observations on the ecological subdivision of the Patos Lagoon in Southern Brazil. *Bol. Inst. Cienc. Nat.*, Porto Alegre, v. 24, p. 1-35, 1965.

CLOSS, D.; MEDEIROS, U.M.F. Thecamoebina and Foraminefera from the Mirim Lagoon, Southern Brazil. *Iheringia, sér. Zool.*, Porto Alegre, v. 35, p.75-88, 1967.

CUNHA, A.M. Contribuição para o conhecimento da fauna de protozoários do Brasil. *Mem. Inst. Oswaldo Cruz*, Rio de Janeiro, v. 5, p. 101-122, 1913.

CUNHA, A.M. Contribuição para o conhecimento da fauna de protozoários do Brasil. *Mem. Inst. Oswaldo Cruz*, Rio de Janeiro, v. 8, p. 66-73, 1916.

DABÉS, M.B.G.S. Composição e descrição do zooplâncton de 5 (cinco) lagoas marginais do rio São Francisco, Pirapora, Três Marias, Minas Gerais - Brasil. *Rev. Bras. Biol.*, Rio de Janeiro, v. 55, n.4, p. 831-845, 1995.

DABÉS, M.B.G.S. Microfauna aquática no rio Peruaçu, na gruta do Jamelão, A.P.A. Cavernas do Peruaçu, Minas Gerais. *Informativo SBE* (Sociedade Brasileira de Espeleologia), Campinas, v. 77, p. 6-7, 1999.

DABÉS, M.B.G.S.; VELHO, L.F.M. Testate amoebae (Protozoa, Rhizopoda) associated to littoral aquatic macrophytes in a marginal lake of the São Francisco river, MG, Brazil. *Acta Sci. Biol. Sci.*, Maringá, v. 23, n. 2, p. 299-304, 2001.

DADAY, E. Untersuchungen über die Süsswasser Mikrofauna Paraguaya. *Zoologica*, Stuttgart, v. 18, n. 44, p. 1-342, 1905.

DULEBA, W. Foraminíferos e tecamebas como bioindicadores da circulação hidrodinâmica do estuário do rio Verde e do lago Itacolomi. *In*: MARQUES, O.A.V.; DULEBA, W. (Ed.). *Estação Ecológica Juréia-Itatins:* ambiente físico, flora e fauna. Ribeirão Preto: Holos, 2004. p. 86-102.

DURIGAN, J.G. *et al.* Estudo limnológico em tanques de piscicultura. Parte I: variação nictemeral de fatores físicos, químicos e biológicos. *Acta Limnol. Bras.*, São Paulo, v. 4, n. 211-223, 1992.

EHRENBERG, C.G. Verbreitung und Einfluss des mikroskopischen Lebens in Süd-und Nord Amerika. *Abh. K. Akad. Wiss.,* Berlin, p. 291-446, 1841.

EICHLER, B.B.; BONETTI, C. Distribuição dos foraminíferos e tecamebas ocorrentes no manguezal do rio Baguaçu, Cananéia, São Paulo - relações com parâmetros ambientais. *Pesquisas*, Porto Alegre, v. 22, n. 1/2, p. 32-37, 1995.

EICHLER-COELHO, P.B. *et al.* Influência do rompimento da barragem do Valo Grande (Iguape-SP) nas associações de foraminíferos e tecamebas. *Pesquisas*, Porto Alegre, v. 23, n. 1/2, p. 35-40, 1996.

EICHLER-COELHO, P.B. *et al.* Determinação do impacto ecológico do Valo Grande (Iguape – SP) a partir das associações de foraminíferos e tecamebas. *Rev. Bras. Biol.,* Rio de Janeiro, v. 57, n. 3, p. 463-477, 1997.

FERREIRA, F. *et al.* Tecamebas do rio Tramandaí e lagoa do Passo, planície costeira Norte do Estado do Rio Grande do Sul, Brasil. In: CONGRESSO DA ABEQUA, 10, 2005, Guarapari. *Anais...* Rio de Janeiro: Associação Brasileira de Estudos do Quaternário (Abequa), 2005. Disponível em: <*http://www.abequa2005.geologia.ufrj.br/nukleo/pdfs/0062_abequa_fab.pdf*>. Acesso em: 11 nov. 2005.

FULONE, L.J. *et al.* Composição de amebas testáceas (Protozoa-Rhizopoda) de dois córregos do Estado de São Paulo, incluindo novos registros para o Brasil. *Acta Sci. Biol. Sci.,* Maringá, v. 27, n. 2, p. 113-118, 2005.

GODINHO-ORLANDI, M.J.L.; BARBIERI, S.M. Observação de microorganismos perifíticos (bactérias,

protozoários e algas) na região marginal de ecossistemas aquáticos. *In*: SEMINÁRIO REGIONAL DE ECOLOGIA, 3, 1983, São Carlos. *Anais...* São Carlos: Universidade Federal de São Carlos, 1983, p. 135-155.

GOMES, E.A.T. *Microorganismos planctônicos (bactérias e protozoários) em um reservatório tropical*: densidade, biomassa, composição e distribuição temporal e espacial. 1991. Dissertação (Mestrado em Ecologia e Recursos Naturais)– Universidade Federal de São Carlos, São Carlos, 1991.

GOMES, E.A.T.; GODINHO, M.J.L. Structure of the protozooplankton community in a tropical shallow and eutrophic lake in Brazil. *Acta Oecol.*, Paris, v. 24, p. S153-S161, 2003.

GRACIA, M.P. Contribución al estudio de las Tecamebas (Protozoa, Thecamoeboidea): Tecamebas muscícolas de la Península Ibérica. *Publ. Inst. Biol. Apl.*, Barcelona, v. 53, p. 5-16, 1972.

GREEN, J. Zooplankton of the River Sokoto, the Rhizopoda Testacea. *Proc. Zool. Soc. Lond.*, London, v. 141, p. 497-514, 1963.

GREEN, J. Freshwater ecology in the Mato Grosso, central Brazil. IV. Associations of testate Rhizopoda. *J. Nat. Hist.*, London, v. 9, p. 545-560, 1975.

GREEN, J. The temperate tropical gradient of planktonic Protozoa and Rotifera. *Hydrobiologia*, Dordrecht, v. 272, p. 13-26, 1994.

HANSEN, M.A.F. *et al.* Influência de algumas variáveis ambientais sobre a fauna de tecamebas das lagoas do Marcelino e do Peixoto, Osório, RS, Brasil. In*:* CONGRESSO DA ABEQUA, 10, 2005, Guarapari. *Anais...* Rio de Janeiro: Associação Brasileira de Estudos do Quaternário(Abequa), 2005. Disponível em: <h*ttp://www.abequa2005.geologia.ufrj.br/nukleo/pdfs/0131_abequa_hansen_pronto.pdf*>. Acesso em: 11 nov. 2005.

HARDOIM, E.L. *Taxonomia e ecologia de Testacea (Protista, Rhizopoda) do Pantanal do Poconé – rio Bento Gomes e vazante Birici, Mato Grosso, Brasil*. 1997. Tese (Doutorado em Ecologia e Recursos Naturais)–Universidade Federal de São Carlos, São Carlos, 1997.

HARDOIM, E.L.; HECKMAN, C.W. The seasonal sucession of biotic communities in wetlands of the tropical wet and dry climatic zone: IV. Free living sarcodines and ciliates of the Pantanal of Mato Grosso, Brazil. *Int. Rev. Ges. Hydrobiol.*, Berlin, v. 81, n. 3, p. 367-384, 1996.

HEAL, O.W. The abundance and micro-distribution of testate amoebae (Rhizopoda: Testacea) in *Sphagnum*. *Oikos*, Copenhagem, v. 13, p. 35-47, 1962.

HOOGENRAAD, H.R.; GROOT, A.A. Thekamoebe Moosrhizopoden aus Südamerika. *Arch. Hydrobiol.*, Stuttgart, v. 45, p. 346-366, 1951.

JAWORSKI, K.S. *Distribuição de foraminíferos e tecamebas no complexo estuarino da Baía de Paranaguá-PR.* 2001. Dissertação (Mestrado em Geologia)–Universidade Federal do Paraná, Curitiba, 2001.

JAWORSKI, K.S.; EICHLER, B.B. Distribuição espacial de arcellaceans (tecamebas) no sistema estuarino lagunar Cananéia-Iguape e a relação desta microfauna com os fatores abióticos. *In:* CONGRESSO DA ABEQUA, 10., 2005, Guarapari. *Anais...* Rio de Janeiro: Associação Brasileira de Estudos do Quaternário (Abequa), 2005. Disponível em: <*http://www.abequa2005.geologia.ufrj.Br /nukleo/pdfs/0066_resumo_abequa_2005.pdf*>. Acesso em: 11 nov. 2005.

LANDA, G.G. Contribuição ao estudo da comunidade zooplanctônica em uma área sob influência de mineração na bacia do rio Jequitinhonha-MG. *Bios*, Belo Horizonte, v. 5, n. 5, p. 69-80, 1997.

LANDA, G.G.; FERREIRA, H.L.M. Composição quali-quantitativa do potamozooplâncton da sub-bacia do rio Araçuaí-MG. *Bios*, Belo Horizonte, v. 2, n. 3, p. 15-26, 1995.

LANDA, G.G.; MOURGUÉS-SCHURTER, L.R. Composição e abundância do zooplâncton em um sistema artificial raso (Represa Pomar) no câmpus da Universidade Federal de Lavras-Minas Gerais. *Bios*, Belo Horizonte, v. 7, n. 7, p. 21-31, 1999.

LANDA, G.G.; MOURGUÉS-SCHURTER, L.R. Composição e abundância do zooplâncton de duas represas do campus da Universidade Federal de Lavras-MG. *Acta Limnol. Bras.*, Botucatu, v. 12. n. 2, p. 29-43, 2000a.

LANDA, G.G.; MOURGUÉS-SCHURTER, L.R. Caracterização da comunidade zooplanctônica de um sistema artificial (represa Zootecnia) no campos da Universidade Federal de Lavras – MG. *Acta Limnol. Bras.*, Botucatu, v. 12, p. 63-68, 2000b.

LANSAC-TÔHA, F.A. *et al.* Zooplâncton de uma planície de inundação do rio Paraná. I. Análise qualitativa e estrutura da comunidade. *Rev. Unimar*, Maringá, v. 14, suplemento, p. 35-55, 1992.

LANSAC-TÔHA, F.A. *et al.* Zooplâncton de uma planície de inundação do rio Paraná. II. Variação sazonal e influência dos níveis fluviométricos sobre a comunidade. *Acta Limnol. Bras.,* São Paulo, v. 6*,* p. 42-55, 1993.

LANSAC-TÔHA, F.A. *et al.* Composição, distribuição e abundância da comunidade zooplanctônica. *In*: VAZZOLER, A.E.A.M. *et al.* (Ed.). *A planície de inundação do alto rio Paraná*: aspectos físicos, biológicos e socioeconômicos. Maringá: Eduem, 1997. p. 117-155.

LANSAC-TÔHA, F.A. *et al.* Estrutura da comunidade zooplanctônica antes e após a formação do reservatório de Corumbá – GO. *In*: HENRY, R. (Ed.). *Ecologia de reservatórios*: estrutura, função e aspectos sociais. Botucatu: Universidade Estadual Paulista/Fapesp, 1999. p. 347-374.

LANSAC-TÔHA, F.A. *et al.* On the occurrence of testate amoebae (Protozoa, Rhizopoda) in Brazilian inland waters. I. Family Arcellidae. *Acta Sci. Biol. Sci.,* Maringá, v. 22, n. 2, p. 355-363, 2000a.

LANSAC-TÔHA, F.A. *et al.* Horizontal distribution patterns of testate amoebae (Protozoa, Rhizopoda) in plankton samples of Corumbá reservoir area, State of Goiás, Brazil. *Acta Sci. Biol. Sci.*, Maringá, v. 22, n. 2, p. 347-353, 2000b.

LANSAC-TÔHA, F.A. *et al.* On the occurrence of testate amoebae (Protozoa, Rhizopoda) in Brazilian inland

waters. III Family Difflugiidae: genus *Difflugia*. *Acta Sci. Biol. Sci.*, Maringá, v. 23, p. 305-319, 2001a.

LANSAC-TÔHA, F.A. *et al.* On the occurrence of testate amoebae (Protozoa, Rhizopoda) in Brazilian inland waters. V. Families Hyalospheniidae, Plagiopyxidae, Microcoryciidae, Cryptodifflugiidae, Phryganelidae, Euglyphidae, Trinematiidae and Cyphoderiidae. *Acta Sci. Biol. Sci.*, Maringá, v. 23, p. 333-347, 2001b.

LANSAC-TÔHA, F.A. *et al.* Influência de macrófitas aquáticas sobre a estrutura da comunidade zooplanctônica. *In*: THOMAZ, S.M.; BINI, L.M. (Ed.). *Ecologia e manejo de macrófitas aquáticas*. Maringá: Eduem, 2003. p. 231-242.

LANSAC-TÔHA, F.A. *et al.* Composition, species richness and abundance of the zooplankton community. *In*: THOMAZ, S.M. *et al.* (Ed.). *The upper Paraná river and its floodplain*: physical aspects, ecology and conservation. Leiden: Backhuys Publishers, 2004a. p. 145-190.

LANSAC-TÔHA, F.A. *et al.* Zooplankton in the Upper Paraná River floodplain: Composition, richness, abundance and relationships with the hydrological level and the connectivity. *In*: AGOSTINHO, A.A. *et al.* (Ed.). *Structure and functioning of the Paraná River and its floodplain*. LTER – site 6: (PELD sítio 6). Maringá: Eduem, 2004b. p. 75-84.

LANSAC-TÔHA, F.A. *et al.* Estrutura da comunidade zooplanctônica em reservatórioa. *In*: RODRIGUES, L. *et al.* (Ed.). *Biocenoses em reservatórios*: padrões espaciais e temporais. São Carlos: RiMa, 2005, p. 115-127.

LEÃO, C.J. *et al.* Amebas testáceas (Protozoa, Rhizopoda) do capão do Leão: um estudo sazonal da fauna. *In*: CONGRESSO DA ABEQUA, 10, 2005, Guarapari. *Anais...* Rio de Janeiro: Associação Brasileira de Estudos do Quaternário (Abequa), 2005. Disponível em: *<http://www.abequa2005.geologia.ufrj.br/nukleo/pdfs/0060_abequa_carol_final.pdf*>.Acesso em: 18 nov. 2005.

LEIPNITZ, I.I. *et al.* Amebas testáceas em sedimentos quaternários do sistema lacustre de três Lagoas, MS. *GAEA*, São Leopoldo, v. 1, n. 2, p. 82-93, 2005.

LENA, H.; ZAIDENWERG, S.J. Tecamebas del delta del Paraná (Argentina). *Rev. Esp. Micropaleont.*, Madrid, v. 7, n. 3, p. 519-537, 1975.

LOEBLICH, A.R.; TAPPAN, H. Thecamoebians. *In*: *Treatise on invertebrate paleontology*. Part C. Protists 2, v. 1. Lawrence: The Geological Society of America, University of Kansas Press, 1964. p. C16-C54.

LOPES, R.M. Zooplankton spatial and seasonal distribution in the Tibagi River (Paraná State, Brazil). *Semina*, Londrina, v. 14, n. 2, p. 95-101, 1993.

LOPEZ, C.M.; SAMPAIO, E.V. A comunidade zooplanctônica no reservatório de Três Marias e no trecho do São Francisco a jusante. *In*: GODINHO, H.P.; GODINHO, A.L. (Org.). *Águas, peixes e pescadores do São Francisco das Minas Gerais*. Belo Horizonte: PUC Minas, 2003. p. 93-112.

MACKINLAY, R.B. Observations on *Nebela collaris* Leidy, a testate amoebae of moorland waters. *J. R. Microsc. Soc.*, London, v. 1, p. 307-325, 1936.

MADEIRA-FALCETTA, M. Ecological distribution of the thecamoebal and foraminiferal associations in the mixohaline environments of the Southern Brazilian littoral. *An. Acad. Bras. Cienc.*, Rio de Janeiro, v. 46, n. 3/4, p. 667-687, 1974.

MAIA-BARBOSA, P.M. *et al.* Zooplâncton de uma lagoa marginal do alto São Francisco. *In:* GODINHO, H.P.; GODINHO, A.L. (Ed.). *Águas, peixes e pescadores do São Francisco das Minas Gerais*. Belo Horizonte: PUC Minas, 2003. p. 105-113.

MISSAWA, N.A. *Influência das alterações físicas e químicas provocadas por poluentes orgânicos na estrutura de comunidades de Testacea (Protozoa: Rhizopoda) no rio Cuiabá, Cuiabá – Mato Grosso.* 2000. Dissertação (Mestrado em Ecologia e Conservação da Biodiversidade)–Universidade Federal do Mato Grosso, Cuiabá, 2000.

MODENUTTI, B.E.; VUCETICH, M.C. Variacion espacial de los tecamebianos del zooplâncton del Arroyo Rodriguez (Prov. de Buenos Aires). *Limnobios*, La Plata, v. 2, n. 2, p. 671-675, 1987.

MORACZEWSKI, J. Testacea du seston des riviéres Wkra et Narew. *Acta Protozool.*, Warszawa, v. 2, n. 9, p. 103-112, 1964.

NEUMANN-LEITÃO, S. *et al.* Distribuição e aspectos ecológicos do zooplâncton da represa do Lobo (Broa) - São Paulo. *In*: ENCONTRO BRASILEIRO DE PLÂNCTON, 4, 1991, Recife. *Anais...* Recife*:* Sociedade Brasileira de Plâncton, 1991. p. 393-414.

NEUMANN-LEITÃO, S.; NOGUEIRA-PARANHOS, J.D. Zooplâncton do rio São Francisco, região nordeste do Brasil. *Trab. Oceanogr. Univ. Fed. PE*, Recife, v. 20, p. 173-196, 1987.

NUNES, M.A *et al.* Composição e abundância do zooplâncton de duas lagoas do Horto Florestal Dr. Luiz Teixeira Mendes, Maringá, Paraná. *Acta Limnol. Bras.*, São Paulo, v. 8, p. 207-220, 1996.

OPRAVILOVÁ, V. Testacea (Protozoa: Rhizopoda) of the River Brobrava in Moravia. *Vest. Cesk. Spol. Zool.,* Prague, v. 38, n. 2, p. 127-147, 1974.

OLIVEIRA, D. *Análise ambiental dos canais da bacia hidrográfica do rio Itanhaém – SP, Brasil, com base em tecamebas e foraminíferos*. 1999. Dissertação (Mestrado em Geociências)–Universidade Estadual Paulista, Rio Claro, 1999.

OLIVEIRA, D.B.S. *et al.* Estudo limnológico em tanques de piscicultura. Parte II: variação semanal de fatores físicos, químicos e biológicos. *Acta Limnol. Bras.*, São Paulo, v. 4, p. 123-137, 1992.

PANARELLI, E. *et al.* A comunidade zooplanctônica ao longo de gradientes longitudinais no rio Paranapanema/Represa de Jurumirim (São Paulo, Brasil). *In*: HENRY, R. (Org.). *Ecótonos nas interfaces dos ecossistemas aquáticos.* São Carlos: RiMa, 2003. p. 129-160.

PINTO, C. Protozoários observados no Brasil. *Mem. Inst. Oswaldo Cruz,* Rio de Janeiro, v. 18, p. 211-302, 1925.

PROWAZEK, S. VON. Contribuição para o conhecimento da fauna de protozoários do Brasil. *Mem. Inst. Oswaldo Cruz*, Rio de Janeiro, v. 2, n. 2, p. 149-158, 1910.

RHODEN, R.; PITONI, V.L.L. Amebas testaceas (Protista, Sarcomastigophora, Rhizopoda) em *Sphagnum recurvo* P.

Beauev e *Sphagnum perichartiale* Hampe (turfeira), no Município de São Francisco de Paula, Rio Grande do Sul, Brasil. *Biociências*, Porto Alegre, v. 7, n. 1, p. 91-120, 1999.

ROBERTSON, B. *et al.* Testate amoebae composition and species richness in Curuá-Uma reservoir, State of Pará, Brazil. *Acta Limnol. Bras.*, Botucatu (submitted).

ROCHA, O. *et al.* Diversity of fauna in sand dune lakes of Lençóis Maranhenses, Brazil, I: The zooplankton community. *An. Acad. Bras. Cienc.*, Rio de Janeiro, v. 70, n. 4, p. 793-795, 1998.

ROLLA, M.E. *et al.* Aspectos limnológicos do reservatório de Volta Grande, Minas Gerais / São Paulo. *Acta Limnol. Bras.*, São Paulo, v. 3, p. 219-244, 1990.

ROLLA, M.E. *et al.* Inventário limnológico do rio Grande na área de influência da futura usina hidrelétrica (UHE) de Igarapava. *Acta Limnol. Bras.*, São Paulo, v. 4, p. 139-162, 1992.

SCHÖNBORN, W. Über planktismus und ziklomorphose bei *Difflugia limnetica* (Levander) Pénard. *Limnologica*, Berlin, v. 1, p. 21-34, 1962.

SILVA-NETO, E.V. *Índices ecológicos de comunidades de Testacea (Protozoa: Rhizopoda) no rio Cuiabá, perímetro urbano de Rosário Oeste, Mato Grosso*. 2001. Dissertação (Mestrado em Ecologia e Conservação da Biodiversidade)–Universidade Federal do Mato Grosso, Cuiabá, 2001.

SIPAÚBA-TAVARES, L.H. *et al.* Variação de alguns parâmetros limnológicos em viveiro de piscicultura em função da luz. *Acta Limnol. Bras.*, São Paulo, v. 7, p. 138-150, 1995.

SOUZA, M.B.G. *Qualidade das águas e a comunidade do zooplâncton: bacia do rio Araguari.* 2004. Dissertação (Mestrado em Saneamento, Meio Ambiente e Recursos Hídricos)–Universidade Federal de Minas Gerais, Belo Horizonte, 2004.

SOUZA, M.B.G. Tecamebas (Protozoa Rhizopoda) associadas às macrófitas aquáticas da bacia do rio Jequitinhonha: Parque Estadual do rio Preto e Parque Estadual do Grão Mogol, MG. *Unimontes Científica*, Montes Claros, v. 7, n. 2, p. 117-130, 2005.

STEPANEK, M.; JIRI, J. Difflugia gramen Pénard, Difflugia gramen var. anchora Pénard and Difflugia gramen f. globulosa f. n. *Hydrobiologia,* The Hague, v. 10, p. 138-156, 1958.

THOMPSON, F.L. *et al. Taxonomia microbiana*. 2005. Disponível em: <*http://www.cria.org.br/cgee/documentos/microtax.doc*>. Acesso em: 11 nov. 2005.

TODOROV, M. Observation on the soil and moss testate amoebase (Protozoa: Rhizopoda) from Pirin Moutain (Bulgaria). *Acta Zool. Bulg.,* Sofia, v. 50, n. 2/3, p. 19-29, 1998.

TODOROV, M.; GOLEMANSKY, V. Testate amoebae (Protozoa, Rhizopoda) of the coastal lakes Shabla and Ezerets (Northeastern Bulgária), with a description of *Pentagonia shablensis* sp. nov. *In*: *Biodiversity of Shabla Lake System*. Sofia: "Prof. Marin Drinov" Academic Publishing House, 1998. p. 69-90.

TORRES, V.S. *Amebas testáceas (Protista, Rhizopoda) associadas à rizosfera de Eichhornia crassipes (Martius) Solomons na represa Lomba do Sabão, Porto Alegre, RS.* 1996. Dissertação (Mestrado em Zoologia)–Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, 1996a.

TORRES, V.S. Estudos sobre *Difflugia lobostoma*. Leidy (Protista, Rhizopoda, Testacealobosea). *Rev. Bras. Zool.,* Curitiba, v. 13, n. 2, p. 475-487, 1996b.

TORRES, V.S. Vacúolos de gás e flutuação em *Difflugia mitriformis* Wallich (Protista, Rhizopoda, Testacealobosea). *Rev. Bras. Zool.,* Curitiba, v. 13, n. 1, p. 67-75, 1996c.

TORRES, V.S. Amebas testáceas ocorrentes na região de Porto Alegre, Rio Grande do Sul. II. Novos registros para a região. *Rev. Bras. Zool.*, Curitiba, v. 15, n. 2, p. 545-552, 1998.

TORRES, V.S.; JEBRAM, D.H.A. Amebas testáceas ocorrentes na região de Porto Alegre, RS. *Biotemas*, Porto Alegre, v. 7, p. 65-78, 1994.

TORRES, V.S.; SCHWARZBOLD, A. Amebas testáceas ocorrentes na região de Porto Alegre-RS. III. Novos registro de Testaceafilosea (Protoctista: Rhizopoda). *Com. Mus. Cienc. Tecnol. PUCRS, ser. Zool.*, Porto Alegre, v. 13, n. 2, p. 139-146, 2000.

VELHO, L.F.M. *Ecologia de tecamebas em ambientes aquáticos continentais brasileiros.* 1999. Monografia (Exame Geral de Qualificação de Doutorado do Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais)–Universidade Estadual de Maringá, Maringá, 1999.

VELHO, L.F.M.; LANSAC-TÔHA, F.A. Testate amoebae (Rhizopodea, Sarcodina) from zooplankton of the High Paraná River floodplain, State of Mato Grosso do Sul, Brazil: II. Family Difflugidae. *Stud. Neotrop. Fauna Environm.*, Lisse, v. 31, p. 179-192, 1996.

VELHO, L.F.M. *et al.* Testate amoebae (Rhizopodea-Sarcodina) from zooplankton of the high Paraná river floodplain, State of Mato Grosso do Sul, Brazil. I. Families Arcellidae and Centropyxidae. *Stud. Neotrop. Fauna Environm.,* Lisse, v. 31, p. 35-50, 1996.

VELHO, L.F.M. *et al.* Spatial and temporal variation in densities of testate amoebae in the plankton of the Upper Paraná River floodplain, Brazil. *Hydrobiologia*, Dordrecht, v. 411, p. 103-113, 1999.

VELHO, L.F.M. *et al.* On the occurrence of testate amoebae (Protozoa, Rhizopoda) in Brazilian inland waters. II. Families Centropyxidae, Trigonopyxidae and Plagiopyxidae. *Acta Sci. Biol. Sci.,* Maringá, v. 22, n. 2, p. 365-374, 2000.

VELHO, L.F.M. *et al.* On the occurrence of testate amoebae (Protozoa, Rhizopoda) in Brazilian inland waters. IV. Families Difflugiidae (genus *Cucurbitella, Lagenodifflugia, Pentagonia*, *Pontigulasia, Protocucurbitella, Suiadifflugia*) and Lesquereusiidae. *Acta Sci. Biol. Sci.*, Maringá, v. 23, p. 320-332, 2001.

VELHO, L.F.M. *et al.* Influence of environmental heterogeneity on the structure of testate amoebae (Protozoa, Rhizopoda) assemblages in the plankton of the Upper Paraná River floodplain, Brazil. *Int. Rev. Hydrobiol.*, Stuttgart, v. 88, p. 154-166, 2003.

VELHO, L.F.M. *et al.* Testate amoebae (Rhizopodea-Sarcodina) diversity in plankton of the upper Paraná River

floodplain, Brazil. *Hydrobiologia,* Dordrecht, v. 523, p. 103-111, 2004a.

VELHO, L.F.M. *et al.* Testate amoebae abundance in plankton samples from Paraná State reservoirs. *Acta Sci. Biol. Sci.,* Maringá, v. 26, n. 4, p. 415-419, 2004b.

VUCETICH, M.C. Estudio de tecamebianos argentinos, en especial los del dominio pampasico. *Rev. Mus. la Plata, sér. Zool.*, La Plata, v. 11, n. 108, p. 287-332, 1973.

WAILES, G.H. Freshwater Rhizopoda from North and South America. *J. Linn. Soc. Zool.*, London, v. 32, p. 201-218, 1913.

WALKER, I. Rede de alimentação de invertebrados das águas pretas do sistema rio Negro. 1. Observações sobre a predação de uma ameba do tipo *Ameba discoides*. *Acta Amaz.*, Manaus, v. 8, n. 3, p. 423-438, 1978.

WALKER, I. The thecamoebae (Protozoa, Rhizopoda) of small Amazonian forest streams and their possible use as indicator organisms for water quality. *Acta Amaz.*, Manaus, v. 12, p. 79-105, 1982.

ZUCON, M.H.; LOYOLA E SILVA, J. Distribuição espacial de foraminíferos e tecamebas do estuário do rio Piauí, Sergipe. *Nerítica*, Curitiba, v. 7, n. 1/2, p. 57-69, 1992.

Received on March 07, 2007.
Accepted on May 08, 2007.