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Original article

Diversity of Euglenophyceae from the Pantanal dos Marimbus (Bahia, Brazil): a check list of new records

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ABSTRACT: The class Euglenophyceae includes unicellular, autotrophic, mixotrophic, and heterotrophic flagellates, with variable morphology and a wide distribution within continental aquatic ecosystems. The present study aimed to undertake a floristic survey of Euglenophyceae in the Pantanal dos Marimbus, a flood plain in the Caatinga biome, located in the Chapada Diamantina National Park. The region suffers from periodic flooding; the samples were realized from a large area of interconnected lagoons during May and September 2014, April 2015, and August 2016, during the lower rainfall periods before the dry season, when the lagoons were isolated from each other. A total of 38 taxa were identified; 35 taxa are new occurrences for Bahia, 25 for the Northeast region, and 2 for Brazil. The data collected increases our knowledge on the distribution of this taxonomic group in Brazilian aquatic environments and shows the considerable diversity of microalgae in the Pantanal dos Marimbus.
Keywords: Chapada Diamantina, Euglenales, Flagellates, Phytoplankton.

RESUMO (Diversidade de Euglenophyceae do Pantanal dos Marimbus (Bahia, Brasil): uma check list de novos registros): A classe Euglenophyceae inclui flagelados unicelulares, autotróficos, mixotróficos e heterotróficos, com morfologia variável e ampla distribuição em ecossistemas aquáticos continentais. O presente estudo teve como objetivo realizar um levantamento florístico de Euglenophyceae no Pantanal dos Marimbus, uma planície de inundação no bioma Caatinga, localizada no Parque Nacional da Chapada Diamantina. A região sofre inundações periódicas; as amostras foram realizadas a partir de uma grande área de lagoas interligadas durante maio e setembro de 2014, abril de 2015 e agosto de 2016, durante os períodos de menor precipitação antes da estação seca, quando as lagoas estavam isoladas umas das outras. Um total de 38 táxons foram identificados; 35 táxons são novas ocorrências para a Bahia, 25 para a região Nordeste e 2 para o Brasil. Os dados coletados aumentam nosso conhecimento sobre a distribuição deste grupo taxonômico nos ambientes aquáticos brasileiros e mostram a considerável diversidade de microalgas no Pantanal dos Marimbus.
Palavras-chave: Chapada Diamantina, Euglenales, Flagelados, Fitoplâncton.

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INTRODUCTION

Euglenids (Euglenophyceae, Euglenophyta) are usually flagellated, pigmented organisms. They are predominantly phototrophic with green chloroplasts (chlorophylls a and b), but several genera are heterotrophs, having lost their photosynthesizing capability (Bicudo & Menezes 2016). They are distributed globally and occur in continental aquatic systems (Alves-da-Silva & Bridi 2004) and are more abundant in shallow waters with an acidic to alkaline pH rich in nitrogen and phosphorus (Friedrich & Alves-da-Silva 2008). They play a fundamental role in the ecological functioning of rivers, lakes, dams, and wetlands, and are important indicators of organic matter contamination (Oliveira-da-Silva & Silva 2010).

Approximately 3,000 species have been described and are part of the plankton in freshwater, marine, and brackish Brazilian environments (Bicudo & Menezes 2016). Most of the recorded species are concentrated in the continental environments of Brazil's South and Southeast regions (Alves-da-Silva & Hahn 2003, Alves-da-Silva & Tamanaha 2008, Alves-da-Silva & Friedrich 2008, Alves da Silva *et al.* 2011) and the Northern region (Oliveira da Silva & Silva 2010). Previous research in the Northeast region occurred mainly in Pernambuco (Keppeler *et al*. 1998, Rosevel da Silva *et al*. 2005, Leão *et al*. 2008, Aquino *et al*. 2011). In the Bahia freshwater environments, Martins *et al*. (1988) performed a qualitative phytoplankton study in the Dique do Tororó (Salvador) between 1982 and 1987. Severiano *et al*. (2012) analyzed the microphytoplankton of Rio de Contas (Chapada Diamantina) between 2007 and 2010. Alcântara *et al*. (2011) undertook a limnological study of the Cascão Dam (Salvador), and Ramos *et al*. (2017) researched phytotelmata habitats in different regions of the state.

The locations for this study were the Environmental Protection Area of Marimbus/Iraquara in the central region of Bahia (Chapada Diamantina) and Pantanal dos Marimbus in the eastern portion of the Chapada Diamantina National Park. These locations correspond to an extensive plane at the confluence of the Santo Antônio and Utinga Rivers that periodically forms a large, flooded area (Funch 2002, França *et al*. 2010). Floods enable the connection of isolated water bodies with distinct hydrological characteristics. It allows biological communities and processes across the different habitats of a floodplain system to become more alike (Mihaljevic *et al*. 2014). Knowledge of the phytoplankton community in these ecosystems, especially in the Caatinga region characterized by long periods of drought, is essential. Additionally, a record of the species that can tolerate these changes in hydrodynamics and researching their functionality is required. Therefore, our objective was to undertake a floristic survey of the Euglenophyceae in the waters of Pantanal dos Marimbus to increase our knowledge of the group's diversity and distribution.

MATERIAL AND METHODS

Study area and sampling design

The Pantanal dos Marimbus (12°39'13.51″ S to 12°46'48.88″ S and 41°17 °'0.4″ W to 41°21'25″ W) is an extensive floodplain that is characteristically swampy (Funch 2002; França *et al*. 2010). It is located in Chapada Diamantina, in the municipalities of Andaraí and Lençóis, state of Bahia, Brazil, and part of a Caatinga biome. The floodplain is formed by the confluence of the Santo Antônio, Utinga and São José rivers, and can be subdivided into four areas: Baiano, Ferreira, Fazenda Velha and Remanso (Ramos *et al.* 2012), the first being the study area of this research (Figure 1).

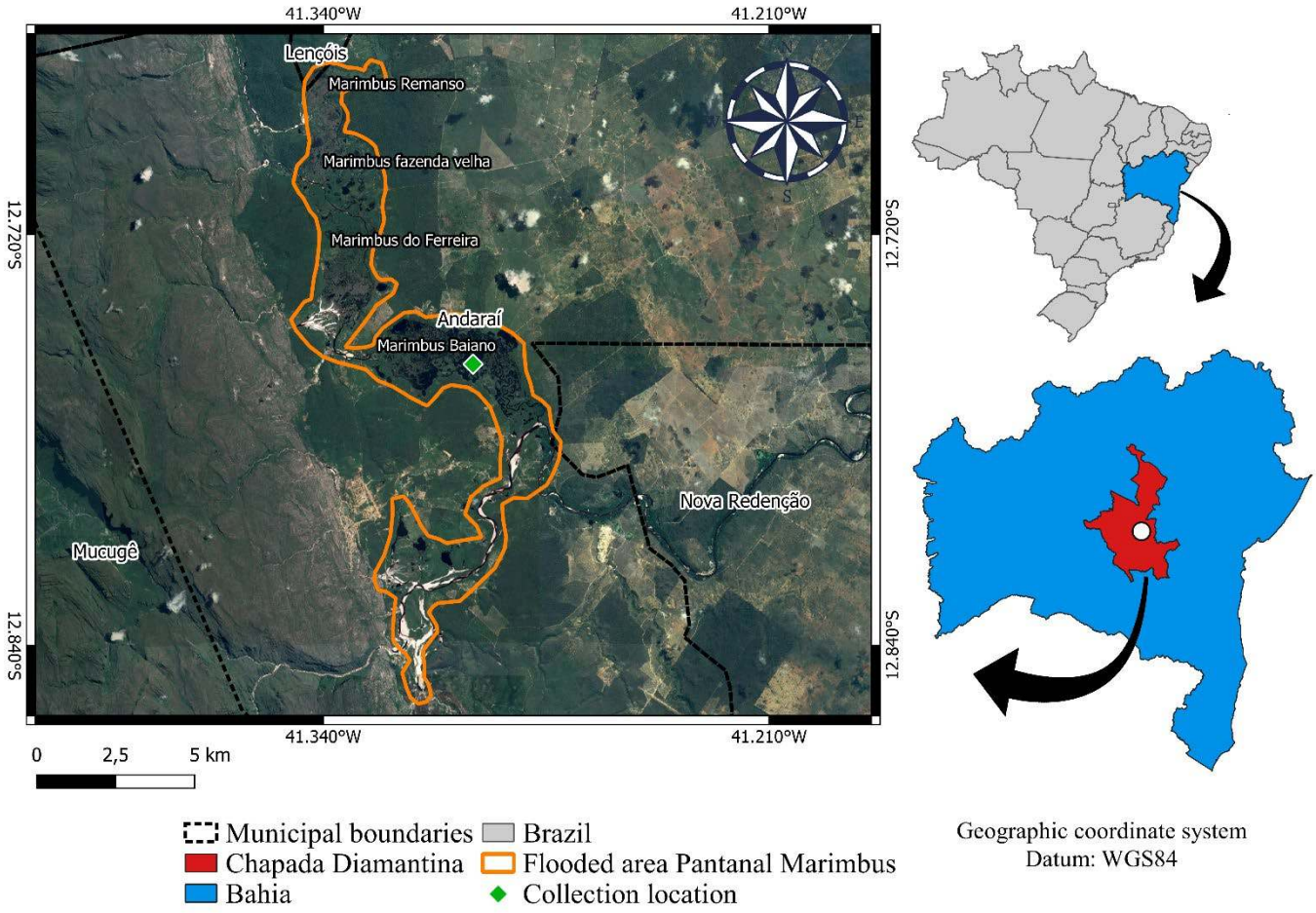


Figure 1. Location of the Pantanal dos Marimbus, in the Chapada Diamantina (municipality of Andaraí), Bahia state, Brazil. The study area at Marimbus do Baiano is marked by a diamond.

The Marimbus do Baiano area presents a range of climates from sub-humid to dry, with an average temperature of 24.2 °C. It has an average annual rainfall of 1,049 mm, with defined periods of flooding (December to March) and drought (May to September) (Bahia 2006; Moura & Marques, 2007). This area includes the following lakes: Lagoa do Baiano, Lagoa da Isca, Lagoa dos Paus and Olho D'Agua do Peri (Rocha *et al.* 2021).

The floodplain has aquatic macrophytes and *Utricularia foliosa* L., *Cabomba haynesii* Wiersema, *Eichhornia azurea* (Swartz) Kunth. and *Nymphaea ampla* (Salisb.) DC. have been observed here.

Samples were collected in May and September 2014, April 2015, and August 2016, following the procedures described by Bicudo & Menezes (2010). A total of 48 samples were collected from 12 random collection points using a graduated bucket and plankton net (20 µm). Each sample was concentrated by filtering 10 L of water. Samples were stored in inert polyethylene bottles and preserved with formaldehyde (4%), according to Friederich & Alves-da-Silva (2009). In addition, 200-mL samples were collected at each collection point and were not treated. This allowed observation of the characteristics and structures of the organisms that are altered by the fixation process (Alves da Silva 1998).

Composition analysis

A species composition analysis was carried out using ten slides per sample. Slides were observed

under an optical microscope (Olympus CX31) and a digital camera to microphotograph the species and carry out taxonomic identification. The data collated included morphometric characteristics such as size and shape of the organisms, shape and number of chloroplasts per cell, and number and arrangement of the paramilo grains in the protoplast. All identification data was recorded following specialized literature (Thienemann 1955, Keppeler *et al*. 1998, Alves-da-Silva & Hahn 2003, Alves-da-Silva & Tamanaha 2008, Alves-da-Silva & Friedrich 2008, Mirtha & Bicudo 2013). The distribution of the taxa in Brazil followed Alves-da-Silva and Menezes (2015) (List of Brazilian Flora Species), Ramos *et al*. (2017) and Severiano *et al*. (2012) were used to establish new occurrences for the state of Bahia, Northeast, and Brazil. The taxonomic update of the worldwide geographical distribution followed the methods of Guiry & Guiry (2021).

The following categories were used to define the frequency of occurrence (FO) (Matteucci & Colma, 1982) of the taxa: very frequent (> 80%), frequent (50%–80%), uncommon (20%–50%), or rare (< 20%). Samples were stored at the Limnological Collection of the Multidisciplinary Institute in Health, Campus Anísio Teixeira (CLCAT), Universidade Federal da Bahia, Bahia, Brazil.

RESULTS AND DISCUSSION

A total of 38 taxa were identified, of the genera *Euglena* Ehrenberg, *Lepocinclis* Perty, *Phacus* Dujardin, *Strombomonas* Deflandre, and *Trachelomonas* Ehrenberg. The genus *Trachelomonas* presented the greatest species number and richness (15 *taxa*), followed by *Phacus* (8) and *Lepocinclis* (7). In addition, there were four taxa of *Euglena* and four of *Strombomonas.* From the total *taxa* registered, 35 *taxa* are new occurrences for Bahia, 25 for the Northeast, and 2 for Brazil. (Table 1).

Trachelomonas armata (Ehrenberg) F. Stein (80%) was the most frequent taxon throughout the study and was classified as very frequent. Among the frequent species, two taxa stood out. The most prolific was *Trachelomonas hispida* var. *crenulatocollis* (Maskell) Lemmermann, occurring in 77% of the samples. The other species were classified as uncommon (21 taxa) or rare (14 taxa) (Table 1).

Table 1. List of Euglenophyceae species recorded in Marimbus do Baiano – Andaraí, Bahia, Brazil. Frequency of Occurrence (FO%) of species and their respective categories according to Matteucci & Colma (1982). Cell length variation (Min. Minimum and Max. Maximum) with mean and standard deviation (SD) and the number of cells counted are also presented.* Indicate new occurrences. 1. Bahia, 2. Northeast, 3. Brazil

Taxa	Frequency of Occurrence		cells length (µm)		Count	New Occurrences		
	(%)	Categories	Min - Max	Mean ± SD	Nº	1	2	3
Class Euglenida								
Order Euglenales								
Family Euglenaceae								
Genus *Euglena* Ehrenberg 1830								
Euglena caudata Hübner	48	uncommon	60-85	69.97 ± 9.77	10	*		
Euglena ehrenbergii G.A.Klebs	50	uncommon	83-113	97.43 ± 9.72	10	*	*	
Euglena hemichromata Skuja	18	rare	85-122	100.12 ± 14.81	9	*	*	
Euglena sanguinea Ehrenberg	38	uncommon	92-112	98.92 ± 8.91	10	*	*	
Genus *Lepocinclis* Perty 1852								

Taxa	Frequency of Occurrence		cells length (µm)		Count	New Occurrences		
	(%)	Categories	Min - Max	Mean ± SD	Nº	1	2	3
Lepocinclis acus (O.F.Müll.) Marin & Melkonian var. *acus*	25	uncommon	134-138.4	135.88 ± 1.80	10	*	*	
Lepocinclis acus var. *longissima* (Deflandre) D.A.Kapustin	45	uncommon	233.3-280	259.36 ± 18.68	10	*	*	
Lepocinclis boseensis S.L.Xie, L.C.Qiu & Y.J.Ling	45	uncommon	36-47	40.66 ± 4.06	10	*	*	
Lepocinclis fusiformis (H.J.Carter) Lemmerm. emend. W.Conrad var. *fusiformis*	18	rare	30-43	37.4 ± 5.42	10	*		
Lepocinclis ovum var. *globula* G. A. Klebs	15	rare	30-43	36.90 ± 5.85	10	*		
Lepocinclis playfairiana var. *striata* Conforti	45	uncommon	32-42	38.2 ± 3.58	10	*	*	
Lepocinclis ovum var. *obesa* Chu	50	uncommon	30-53	45.90 ± 7.44	10	*	*	*
Genus *Phacus* Dujardin 1841								
Phacus contortus Bourrelly	25	uncommon	40-48.5	44.44 ± 3.83	9	*	*	
Phacus curvicauda Swirenko var. *curvicauda*	15	rare	26-28	27.12 ± 0.83	8	*	*	
Phacus longicauda (Ehrenb.) Dujard. var. *longicauda*	38	uncommon	80-116	103.10 ± 13,83	10	*		
Phacus onyx Pochmann	40	uncommon	40-55	48.60 ± 6.65	10	*	*	
Phacus onyx var. *symetrica* Tell & Zalocar	45	uncommon	30-45	38.60 ± 6.02	10	*	*	
Phacus orbicularis Hübner	35	uncommon	32-40	36.10 ± 2.96	10			
Phacus pleuronectes (O.F.Müller) Nitzsch ex Dujardin	10	rare	36-46	41.33 ± 3.74	9	*	*	
Phacus salinus (F.E.Fritsch) E.W.Linton & Karnkowska	38	uncommon	40-50	37.50 ± 5.42	10	*	*	
Genus *Strombomonas* Deflandre 1930								
Strombomonas acuminata var. *amphora* (Playfair) Deflandre	40	uncommon	42-50	46.90 ± 2.55	10	*	*	
Strombomonas conspersa (Pascher) Tell & Conforti	12	rare	30-35	32.90 ± 2.33	10	*	*	
Strombomonas deflandrei (Y.V.Roll) Deflandre	30	uncommon	33-45	39.90 ± 4.55	10	*	*	
Strombomonas giarardiana var. *triondulata* Tell & Domitrovic	12	rare	40-50	46.20 ± 3.67	10	*	*	
Genus *Trachelomonas* Ehrenberg emend. Deflandre 1926								
Trachelomonas abrupta var. *obesa* (Playfair) Deflandre	50	uncommon	25-30.6	27.87 ± 1.60	10	*	*	
Trachelomonas acanthophora A. Stokes	25	uncommon	38-61	49.90 ± 7.73	10			
Trachelomonas allia Drezep. emend. Deflandre	10	rare	32-45	39.10 ± 5.02	10	*	*	
Trachelomonas armata (Ehrenberg) F. Stein	80	very frequent	40-67	56.22 ± 10.34	9			
Trachelomonas armata var. *javanica* (Huber-Pestalozzi) Tell & Couté	25	uncommon	40-45	42.40 ± 1.95	10	*	*	*
Trachelomonas armata var. *longispina* Playfair emend. Deflandre	30	uncommon	30-55	47.25 ± 10.74	8	*		
Trachelomonas armata var. *steinii* Lemmerm. emend. Deflandre	10	rare	35-55	44.40 ± 7.82	10	*	*	
Trachelomonas hispida var. *coronata* Lemmerm	58	frequent	36-40	38.30 ± 1.63	10	*		
Trachelomonas hispida var. *crenulatocollis* (Maskell) Lemmermann	77	frequent	26-33	29.90 ± 2.37	10	*		
Trachelomonas hispida var. *duplex* Deflandre	15	rare	35-45	38.40 ± 2.50	10	*	*	
Trachelomonas kellogii Skvortzov emend. Deflandre	50	uncommon	30-38	34.80 ± 2,85	10	*	*	
Trachelomonas lacustris Drezepolski	18	rare	33-42	37.55 ± 3.43	9	*		

Taxa	Frequency of Occurrence		cells length (µm)		Count	New Occurrences		
	(%)	Categories	Min - Max	Mean ± SD	Nº	1	2	3
Trachelomonas magdaleniana Deflandre	12	rare	61-78	70.10 ± 7.18	10	*		
Trachelomonas robusta (Swirenko) Deflandre	10	rare	24-33	28.60 ± 3.65	10	*	*	
Trachelomonas raciborskii Woloszynska	13	rare	26-35	31.00 ± 3.65	10	*		

Check list

***Euglena caudata* Hübner** 1886: 13 **(Figure 2a)**

Cell dimensions: length 60-85 µm, breadth 20-22 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 14 Abr 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT391) e 26 Set 2014, *C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT 507).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, North America and South America.

Geographic distribution in Brazil: Amazonas, Distrito Federal, Rio de Janeiro, Rio Grande do Sul, Paraíba and Tocantins.

Note: Fusiform cell; rounded anterior pole; pole posterior attenuated in a long flow process; helical streaks. Double pyrenoid; grains of paramido numerous and small; discoid and numerous chloroplasts. The taxon presents curvatures assuming a shape similar to the letter "C" observed in live samples.

***Euglena ehrenbergii* G.A.Klebs** 1883:304 **(Figure 2b)**

Cell dimensions: length 83-133 µm, breadth 12-20 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT462, 464, 465).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Central America, North America, Oceania and South America.

Geographic distribution in Brazil: Distrito Federal, Rio de Janeiro, Rio Grande do Sul and São Paulo.

Note: Both poles rounded; spiral streaks; ovoid nucleus in the central part of the cell. Numerous and discoid chloroplasts; paramido grains in the form of a rod.

***Euglena hemichromata* Skuja** 1948: 185 **(Figure 2c)**

Cell dimensions: length 85-122 µm, breadth 18-24 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT382, 400, 418).

Habitat: plankton.

Worldwide geographical distribution: Asia, Europe, North America and South America.

Geographic distribution in Brazil: Rio Grande do Sul.

Note: Cylindrical-spindle cell; rounded anterior pole; posterior pole terminated in a short, tapered caudal process; spiral streaks. Numerous chloroplasts.

***Euglena sanguinea* Ehrenberg** 1832: 71 **(Figure 2d)**

Cell dimensions: length 92-110 µm, breadth 15-32 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT381).

Habitat: plankton.

Worldwide geographical distribution: Asia, Europe, North America, Oceania and South America.

Geographic distribution in Brazil: Santa Catarina.

Note: Posterior pole attenuated in a tapered caudal process. Elongated chloroplasts; elliptical paramido grains; granules hematochromes numerous and distributed over the entire cell surface.

Lepocinclis acus **(O.F.Müll.) Marin & Melkonian** var. ***acus*** (2003:104) **(Figure 2e)**

Cell dimensions: length 134-138.4 µm, breadth 9-15 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT434, 440, 441) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT464, 576, 588).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Central America, North America, Oceania and South America.

Geographic distribution in Brazil: Acre, Goiás, Minas Gerais, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina and São Paulo.

Note: Fusiform cell; anterior pole rounded and thinner than the rest of the cell; posterior pole attenuated in a hyaline, conical and long caudal process; longitudinal streaks. Discoid and numerous chloroplasts, grains of paramido from 4 to 7, bastoniformes. The taxon has a rapid displacement and can assume an "S" shape, observed in live samples.

Lepocinclis acus var. ***longissima*** **(Deflandre) D.A.Kapustin** (2011:138) **(Figure 2f)**

Cell dimensions: length 233.3-280 µm, breadth 10-20 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT380, 382, 383) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT464, 467).

Habitat: plankton.

Worldwide geographical distribution: Asia, Europe, Central America, North America and South America.

Geographic distribution in Brazil: Acre, Mato Grosso, Paraná, Rio de Janeiro, Rio Grande do Sul and Santa Catarina.

Note: Spindle cells; anterior pole rounded and thinner than the rest of the cell; posterior pole attenuated in hyaline and conical caudal process. Discoid and numerous chloroplasts, grains of paramido of 8 to 10, rod-shaped.

Lepocinclis boseensis **S.L.Xie, L.C.Qiu & Y.J.Ling** 1996:226 **(Figure 2g)**

Cell dimensions: length 36-47 µm, breadth 15-19 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT425).

Habitat: plankton.

Worldwide geographical distribution: Asia and South America.

Geographic distribution in Brazil: Rio Grande do Sul.

Note: Quadratic anterior pole ending in a truncated pole with opening of the apical canal; posterior pole attenuated in a tapered caudal process. Numerous and discoid chloroplasts, and lateral and opposite paramido grains.

Lepocinclis fusiformis **(H.J.Carter) Lemmerm. emend. W.Conrad** var. ***fusiformis*** (1934:225) **(Figure 2h)**

Cell dimensions: length 30-43 µm, breadth 20-25 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT417, 418, 420).
Habitat: plankton.
Worldwide geographical distribution: Africa, Asia, Europe, Central America, North America, Oceania and South America.
Geographic distribution in Brazil: Amazonas, Distrito Federal, Mato Grosso, Pará, Paraíba, Paraná, Rio de Janeiro, Rio Grande do Sul, Rondônia, Santa Catarina and São Paulo.
Note: Anterior pole and posterior pole slightly acuminated. Two elongated paramido grains, lateral and ring-shaped; chloroplasts numerous, discoid to ellipsoid.

Lepocinclis ovum var. ***globula*** **G. A. Klebs** 1883:314 **(Figure 2i)**
Cell dimensions: length 30-43 µm, breadth 20-32 µm.
Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT4392, 418).
Habitat: plankton.
Worldwide geographical distribution: Europe and South America.
Geographic distribution in Brazil: Amazonas, Distrito Federal, Goiás, Mato Grosso, Paraíba, Paraná, Pernambuco, Goiás, Rio de Janeiro, Rio Grande do Sul and São Paulo.
Note: Subglobous cell; rounded anterior pole with apical canal opening; posterior pole ending in a short, tapered caudal process. Chloroplasts numerous and discoid, paramido grains lateral, and annular.

Lepocinclis playfairiana var. ***striata*** **Conforti** 1991:79 **(Figure 2j)**
Cell dimensions: length 32-42 µm, breadth 20-22 µm.
Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT423).
Habitat: plankton.
Worldwide geographical distribution: South America.
Geographic distribution in Brazil: Amazonas and Rio Grande do Sul.
Note: Fusiform cell; asymmetric anterior pole; posterior pole attenuated in a straight caudal process. Chloroplasts numerous and discoid.

Lepocinclis ovum var. ***obesa*** **Chu (Figure 2k)**
Cell dimensions: length 30-53 µm, breadth 30-40 µm.
Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT423).
Habitat: plankton.
Worldwide geographical distribution: Asia.
Geographical distribution in Brazil: First citation for the country.
Note: Globose to ovoid cell; rounded lateral margins; conical, narrow and short projection on the anterior pole; posterior pole with straight tail. Numerous chloroplasts; rounded paramido grains.

Phacus contortus **Bourrelly** 1952:177 **(Figure 3a)**
Cell dimensions: length 40-48.5 µm, breadth 30-32 µm.
Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT394, 430) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT467, 480).
Habitat: plankton.
Worldwide geographical distribution: Asia, Africa, Europe, Central America and South America.

Geographical distribution in Brazil: Amazonas, Goiás, Mato Grosso, Paraná, Rio de Janeiro, Rio Grande do Sul, Rondônia, Santa Catarina and São Paulo.

Note: Asymmetric, ovate, twisted cell, divided into two unequal parts, one later expanded and oblique.

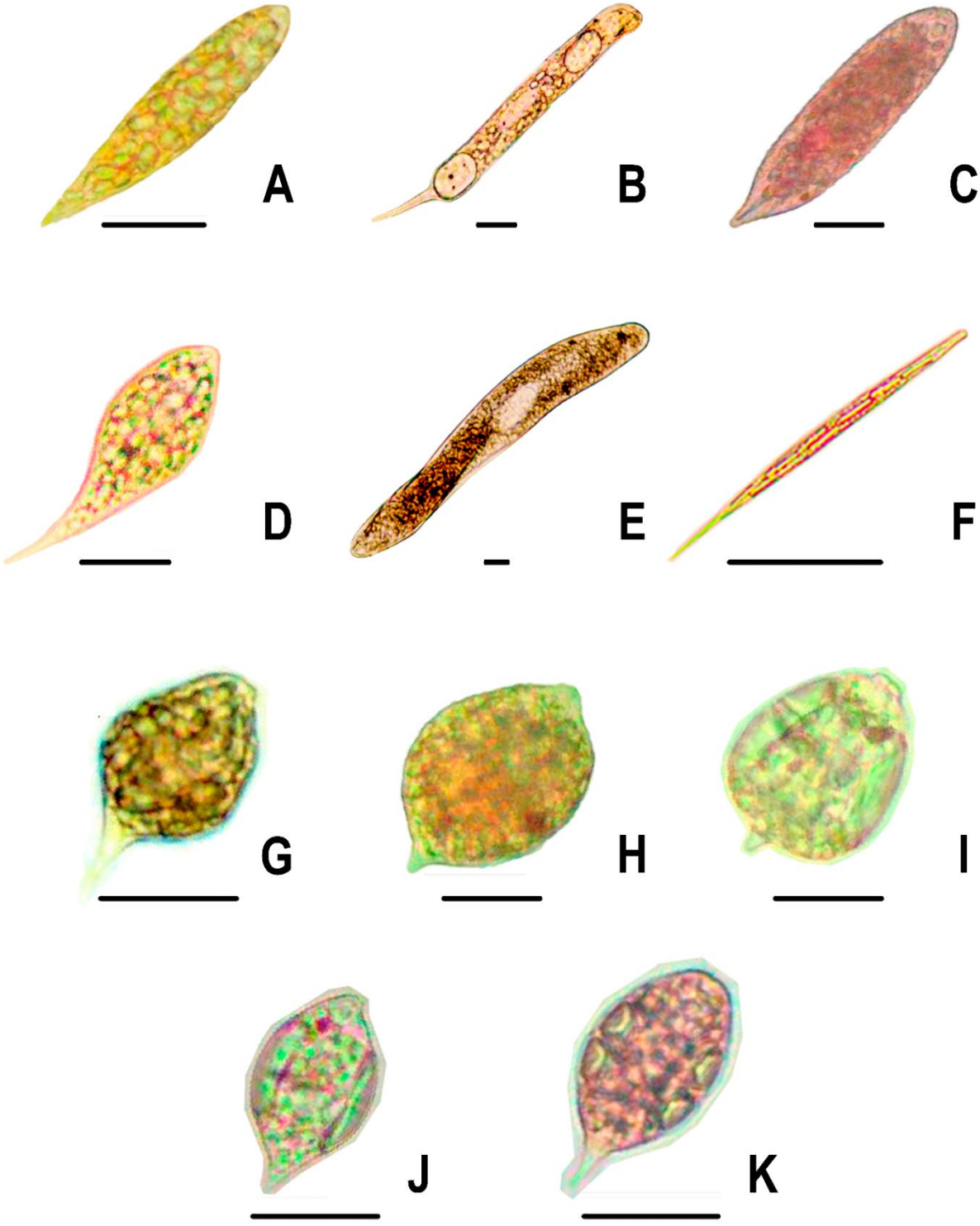


Figure 2. a) *Euglena caudata* (E.F.W.Hübner) Karnkowska & E.W.Linton; b) *Euglena ehrenbergii* G.A.Klebs; c) *Euglena hemichromata* Skuja; d) *Euglena sanguinea* Ehrenberg.; e) *Lepocinclis acus* (O.F.Müll.) Marin & Melkonian var. *acus*; f) *Lepocinclis acus* var. *longissima* (Deflandre) D.A.Kapustin, g) *Lepocinclis boseensis* S.L.Xie, L.C.Qiu & Y.J.Ling; h) *Lepocinclis fusiformis* (H.J.Carter) Lemmerm; emend. W.Conrad var. *fusiformis*; i) *Lepocinclis ovum* var. *globula* G.A.Klebs; j) *Lepocinclis ovum* var. *obesa* Chu; k) *Lepocinclis playfairiana* var. *striata* Conforti. Scale bar = a) the g) 20 µm, except f) = 100 µm.

Phacus curvicauda* Swirenko** var. ***curvicauda 1915:333 **(Figure 3b)**

Cell dimensions: length 26-28 µm, breadth 20-23 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT383, 387, 393, 394, 397, 403) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT460, 467, 468).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Central America, Oceania and South America.

Geographical distribution in Brazil: Santa Catarina and São Paulo.

Note: Ovary cell, asymmetric; equal or unevenly thickened margins; rounded poles; posterior pole attenuated in a short and curved caudal process; longitudinal streaks following the twist of the cell. Chloroplasts, numerous, discoid to rod-shaped; paramido grains 2, discoids.

Phacus longicauda* (Ehrenb.) Dujard**. var. ***longicauda (1841: 337) **(Figure 3c)**

Cell dimensions: length 80-116 µm, breadth 30-35 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT381, 385, 400, 425, 428, 434, 437, 439) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT460, 472).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Central America, North America, Oceania and South America.

Geographical distribution in Brazil: Acre, Amazonas, Mato Grosso do Sul, Paraíba, Rio Grande do Sul, Rondônia, Santa Catarina and São Paulo.

Note: Elliptical or ovate cell; rounded anterior pole; posterior pole attenuated in a long caudal process; longitudinal streaks following the twist of the cell. Chloroplasts discoids, numerous; paramido grains central and concentric, the smallest eccentrics distributed in the cytoplasm.

***Phacus onyx* Pochmann** 1942:192 **(Figure 3d)**

Cell dimensions: length 40-55 µm, breadth 30-36 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT424).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Oceania and South America.

Geographical distribution in Brazil: Amazonas, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Rio Grande do Sul, Rondônia and Tocantis.

Note: chloroplasts numerous and discoids; paramido grains numerous; posterior nucleus.

Phacus onyx var. ***symetrica* Tell & Zalocar** 1985: 360 **(Figure 3e)**

Cell dimensions: length 30-45 µm, breadth 27-30 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT512, 516).

Habitat: plankton.

Worldwide geographical distribution: South America.

Geographical distribution in Brazil: Rio Grande do Sul.

Note: chloroplasts numerous and discoids.

***Phacus orbicularis* Hübner** 1886: 5 **(Figure 3f)**

Cell dimensions: length 32-40 µm, breadth 21-38 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R.*

Figueiredo & M.B. Silva s/nº (CLCAT404, 410) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT509, 510, 516, 520).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, North America, Oceania and South America.

Geographical distribution in Brazil: Amazonas, Bahia, Distrito Federal, Maranhão, Mato Grosso , Mato Grosso do Sul, Pará, Paraná, Rio de Janeiro, Rio Grande do Sul, Rondônia, and Santa Catarina.

Note: Ovate cell; rounded anterior pole; posterior pole attenuated in a short, tapered and slightly curved caudal process; streaks following the twisting of the cell. Chloroplasts discoids, numerous; rounded, one on each side of the cell.

***Phacus pleuronectes* (O.F.Müller) Nitzsch ex Dujardin** (1841:336) **(Figure 3g)**

Cell dimensions: length 36-46 µm, breadth 27-38 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT397, 428).

Habitat: plankton.

Worldwide geographical distribution: Asia, Africa, Europe, Central America, North America, Oceania and South America.

Geographical distribution in Brazil: Amazonas, Distrito Federal, Goiás, Mato Grosso, Mato Grosso do Sul, Paraná, Rio de Janeiro, Rio Grande do Sul, Rondônia, Santa Catarina and São Paulo.

Note: chloroplasts numerous and discoids; 2 paramidos centrals, overlapping.

***Phacus salinus* (F.E.Fritsch) E.W.Linton & Karnkowska** (2010:609) **(Figure 3h)**

Cell dimensions: length 40-50 µm, breadth 29-40 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT388).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Central America, North America, Oceania and South America.

Geographical distribution in Brazil: Paraná, Rio de Janeiro, Rio Grande do Sul and São Paulo.

Note: Elliptical to ovoid cell; rounded poles, with subapical canal opening. Numerous and discoid chloroplasts; paramido grains numerous.

***Strombomonas acuminata* var. *amphora* (Playfair) Deflandre** (1930:572)**(Figure 3i)**

Cell dimensions: length 42-50 µm, breadth 22-24 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT434) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT469, 470, 479, 481, 484, 486, 516, 520, 559, 551).

Habitat: plankton.

Worldwide geographical distribution: Asia, Oceania and South America.

Geographical distribution in Brazil: Amazonas and Rio Grande do Sul.

Note: Anterior pole attenuated in a cylindrical collar of 3.0µm length; posterior pole attenuated in a conical straight caudal process. Chloroplasts numerous and discoids.

***Strombomonas conspersa* (Pascher) Tell & Conforti** (1824:124) **(Figure 3j)**

Cell dimensions: length 30-35 µm, breadth 20-25 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT459).

Habitat: plankton.

Worldwide geographical distribution: Asia, Europe and South America.

Geographical distribution in Brazil: Rio Grande do Sul.

Note: Anterior pole ending in a straight to slightly oblique collar of 4µm length, rounded posterior pole. Chloroplasts numerous and discoids.

***Strombomonas deflandrei* (Y.V.Roll) Deflandre** (1930:575) **(Figure 3k)**

Cell dimensions: length 33-45 µm, breadth 20-30 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT434, 435, 444, 448) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT459, 463, 467, 468, 478, 479, 485, 494).

Habitat: plankton.

Worldwide geographical distribution: Asia, Europe, Central America, North America, Oceania and South America.

Geographical distribution in Brazil: Amazonas and Rio Grande do Sul.

Note: Short, extended collar at the distal of 2.9 µm length, attenuated posterior pole in tapered caudal process, wall slightly rough. Chloroplasts numerous and discoids.

***Strombomonas giarardiana* var. *triondulata* Tell & Zallocar de Domitrovic** 1985: 373 **(Figure 3l)**

Cell dimensions: length 40-50 µm, breadth 23-27 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT400) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT457, 461).

Habitat: plankton.

Worldwide geographical distribution: South America.

Geographical distribution in Brazil: Paraná, Rio de Janeiro, Rio Grande do Sul.

Note: Sub-hexagonal cell, sides with recesses in the lateral margins. Short, attenuated pole in oblique and short collar, 3µm long, polo posterior ends in tapered caudal process; grainy wall. Chloroplasts numerous and discoids.

***Trachelomonas abrupta* var. *obesa* (Playfair) Deflandre** (1926:685) **(Figure 4a)**

Cell dimensions: length 25-30,6 µm, breadth 19-25,3 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT406, 408, 417) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT462).

Habitat: plankton.

Worldwide geographical distribution: Asia, Europe, Oceania and South America.

Geographical distribution in Brazil: Amazonas, Paraná and Rio Grande do Sul.

Note: Sub-hexagonal cell, sides with recesses in the lateral margins. Rounded poles; pole anterior with short collar; densely punctuated wall. Chloroplasts numerous.

***Trachelomonas acanthophora* A. Stokes** 1894: 340 **(Figure 4b)**

Cell dimensions: length 38-61 µm, breadth 18-22 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT417) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT483, 484, 487, 502, 521).

Habitat: plankton.

Worldwide geographical distribution: South America.

Geographical distribution in Brazil: Amazonas, Bahia, Mato Grosso, Mato Grosso do Sul, Pará, Paraiba, Paraná, Rio de Janeiro and Rio Grande do Sul.

Note: Front polo with collar cylindrical with 4 to 6 spines; Posterior pole attenuated in a sub-conical caudal process that ends in 4 to 6 long and divergent spines; the periplast is also ornamented with thorns.

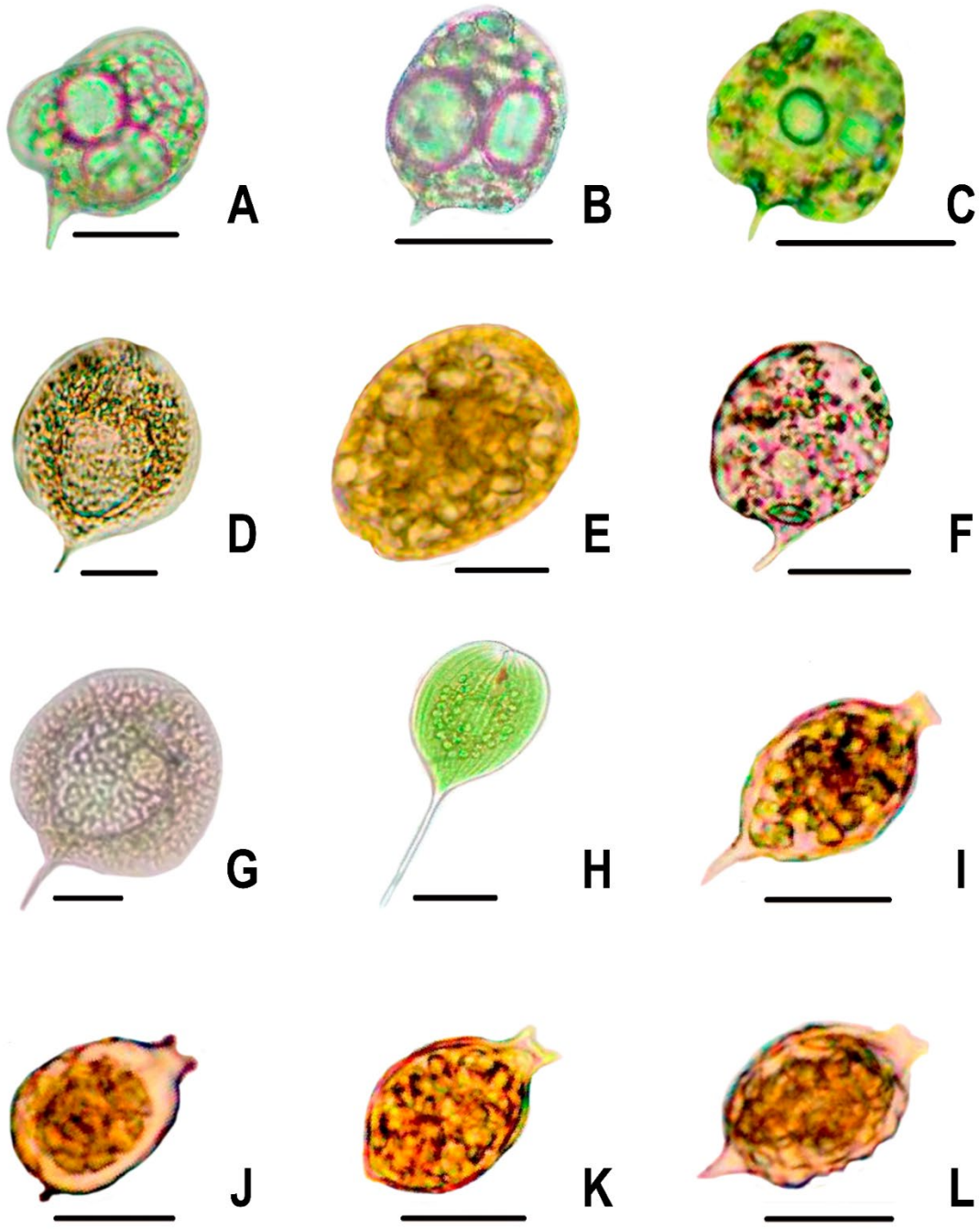


Figure 3. a) *Phacus contortus* Bourrelly; b) *Phacus curvicauda* Swirenko var. *curvicauda* c) *Phacus longicauda* (Ehrenb.) Dujard. var. *longicauda*; d) *Phacus onyx* Pochmann; e) *Phacus onyx* var. *symmetricus* Tell & Domitrovic; f) *Phacus orbicularis* Hübner; g) *Phacus pleuronectes* (O. F. Müller) Nitzsch ex Dujardin; h) *Phacus salinus* (F. E. Fritsch) E.W.Linton & Karnkowska; i) *Strombomonas acuminata* var. *amphora* (Playfair) Deflandre; j) *Strombomonas conspersa* (Pascher) Tell & Conforti; k) *Strombomonas deflandrei* (Y. V. Roll) Deflandre; l) *Strombomonas giarardiana* var. *triondulata* Tell & Domitrovic. Scale bar = 20 µm.

Trachelomonas allia **Drezepepolski** 1925: 211 **(Figure 4c)**

Cell dimensions: length 32-45 µm, breadth 30-35 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT417, 418, 426, 434, 441) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT462, 478, 483, 484, 490, 492).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, North America, Oceania and South America.

Geographic distribution in Brazil: Amazonas, Distrito Federal, Mato Grosso and Paraná.

Note: Short thorn by all the lorica; absent collar; borders between the cell and the lorica present. Chloroplasts numerous.

Trachelomonas armata **(Ehrenberg) F. Stein** (1878:23) **(Figure 4d)**

Cell dimensions: length 40-67 µm, breadth 30-40 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT387, 390, 407) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT502, 504, 506, 507, 511, 513, 517, 518, 522).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Central America, North America, Oceania and South America.

Geographic distribution in Brazil: Amazonas, Acre, Bahia, Espírito Santo, Goiás, Minas Gerais, Mato Grosso, Mato Grosso do Sul, Pará, Paraíba, Paraná, Rio Grande do Sul, Rio de Janeiro, Rondônia, Santa Catarina, São Paulo, and Tocantins.

Note: Ovate cell; anterior pole has a collar; lorica covered with spines, the spines of the posterior pole being more robust. Chloroplasts numerous.

Trachelomonas armata var. ***javanica*** **(Huber-Pestalozzi) Tell & Couté** 2008:29 **(Figure 4e)**

Cell dimensions: length 40-45 µm, breadth 30-35 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT426, 434) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT482, 493).

Habitat: plankton.

Worldwide geographical distribution: South America.

Geographic distribution in Brazil: First citation for the country.

Note: Ovate to rectangular cell; bigger thorns present in the posterior pole and minor spines in the anterior pole; present collar. Chloroplasts numerous.

Trachelomonas armata var. ***longispina*** **Playfair emend. Deflandre** 1915:25 **(Figure 4f)**

Cell dimensions: length 38-55 µm, breadth 30-35 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT385, 386, 390) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT 459, 470, 475, 481).

Habitat: plankton.

Worldwide geographical distribution: Asia, Europe, North America, Oceania and South America.

Geographic distribution in Brazil: Amazonas, Mato Grosso, Mato Grosso do Sul, Paraíba, Rio Grande do Sul.

Note: Elongated oval cell; front polo with collar with few short spines; posterior pole with small and long spines. Chloroplasts numerous.

Trachelomonas armata var. ***steinii*** **Lemmermann** 1905:65 **(Figure 4g)**

Cell dimensions: length 35-55 µm, breadth 25-40 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT381) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT414, 415, 417).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, North America, Central America, Oceania and South America.

Geographic distribution in Brazil: Acre, Amazonas, Distrito Federal, Mato Grosso do Sul, Mato Grosso, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Rio Grande do Sul, Santa Catarina.

Note: Rounded poles; thickening ring present; collar absent; presence of smaller spines at the anterior pole and larger and curved at the rear pole; Numerous paramido grains; discoid chloroplasts.

Trachelomonas hispida var. ***coronata*** **Lemmermann** 1913:150 **(Figure 4h)**

Cell dimensions: length 36-40 µm, breadth 24-22 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT405, 406, 416, 417, 418) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT465, 475).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, North America, Central America, Oceania and South America.

Geographic distribution in Brazil: Acre, Amazonas, Centro-Oeste, Distrito Federal, Goiás, Mato Grosso do Sul, Pará, Paraíba, Rio Grande do Sul and São Paulo,

Note: Widely elliptical cell; wall covered by small conical and irregularly distributed spines throughout the cell; anterior pole with a crown of spines of 3.5 µm in length; thickening between the cell and the present lorica. Numerous paramido grains; discoid chloroplasts.

Trachelomonas hispida var. ***crenulatocollis*** **(Maskell) Lemmermann** (1910:526) **(Figure 4i)**

Cell dimensions: length 26-33 µm, breadth 20-23 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT390, 409, 417, 418, 426, 436, 441) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT465, 466, 467, 470, 473, 475, 477, 478, 479, 483).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, North America and South America.

Geographic distribution in Brazil: Acre, Amazonas, Distrito Federal, Mato Grosso, Mato Grosso do Sul, Paraíba, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina and São Paulo.

Note: Elliptical cell; rounded poles, ring thickening present, 2 µm length collar; conical spines distributed over the entire surface of the loric; elliptical and numerous chloroplasts.

Trachelomonas hispida var. ***duplex*** **Deflandre** 1926:652 **(Figure 4j)**

Cell dimensions: length 35-45 µm, breadth 30-35 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT382, 383, 384, 390, 393, 398, 405, 424, 425, 427, 428, 429, 433, 435, 434, 435, 437, 439) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT465, 466, 467, 483, 485, 487, 488, 491, 497, 503).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Central America, North America, Oceania and South America.

Geographic distribution in Brazil: Goiás, Mato Grosso, Paraná, Rio de Janeiro, Rio Grande do Sul, Rondônia.

Note: Oval cell; presence of defined edge between the cell and lorica; short spines present only at the poles; rounded poles; absent collar; wall punctuated with conical spines, located only at the poles; chloroplasts discoids; numerous and elliptical paramido grains.

Trachelomonas kellogii **Skvortzov** 1919:99 **(Figure 4k)**

Cell dimensions: length 30-38 µm, breadth 30-35 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT384, 425, 429) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT482, 485, 489).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Central America, North America and South America.

Geographic distribution in Brazil: Amazonas, Mato Grosso do Sul, Paraná, Rio de Janeiro and Rio Grande do Sul.

Note: Rounded cell; rounded poles; spines present throughout the lorica, but more concentrated in the poles, visible flagellar pore, border between the cell and the present lorica; numerous chloroplasts.

Trachelomonas lacustris **Drezepolski** 1925: 217 **(Figure 4l)**

Cell dimensions: length 33-42 µm, breadth 12-32 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT42, 417, 434) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT442, 461, 467).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, North America, Central America and South America.

Geographic distribution in Brazil: Distrito Federal, Mato Grosso, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Rondônia, Santa Catarina and São Paulo.

Note: Cylindrical or oblong cell; rounded anterior and posterior poles; thickening ring present; presence of the collar; discoids chloroplasts.

Trachelomonas magdaleniana **Deflandre** 1927: 81 **(Figure 4m)**

Cell dimensions: length 61-78 µm, breadth 18-20 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT501, 508, 514, 519, 520).

Habitat: plankton.

Worldwide geographical distribution: Asia, North America and South America.

Geographic distribution in Brazil: Amazonas, Mato Grosso, Pará, Paraíba and Paraná.

Note: Spindle cell; front polo with collar elongated, straight with 4-5 thick spines; posterior pole attenuated in a tapered caudal process, ornamented with spines distributed over its entire surface, with 3 long spines that converge at their distal ends; conical periplast with pointed spines.

Trachelomonas robusta **Swirenko** 1914: 636 **(Figure 4n)**

Cell dimensions: length 24-33 µm, breadth 17-24 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R.*

Figueiredo & M.B. Silva s/nº (CLCAT381, 382, 383, 387, 391, 395, 396, 399, 408, 412, 421, 425, 426, 428, 437) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT459, 470, 471, 472, 473, 474, 475, 476, 480, 482, 487, 489, 490, 492, 494, 496, 498).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Asia, Africa, North America, Oceania and South America.

Geographic distribution in Brazil: Amazonas, Distrito Federal, Mato Grosso, Pará, Rio de Janeiro, Rio Grande do Sul and São Paulo.

Note: Elliptical cell; rounded poles; collar absent; densely punctuated; conical spines, irregularly distributed across the surface the wall. Discoid chloroplasts.

***Trachelomonas raciborskii* Woloszynska** 1912: 696 **(Figure 4o)**

Cell dimensions: length 26-35 µm, breadth 18-25 µm.

Material examined: BRAZIL. Bahia: Andaraí, Pantanal dos Marimbus, 01 Mai 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT398, 402, 407, 432) e 27 Set 2014*, C.F. Sena, K.V. Silva, J. R. Figueiredo & M.B. Silva* s/nº (CLCAT459, 467, 469).

Habitat: plankton.

Worldwide geographical distribution: Africa, Asia, Europe, Central America, North America, Oceania and South America.

Geographic distribution in Brazil: Amazonas, Pernambuco, Rio Grande do Sul and São Paulo.

Note: Oval cell; spines present in both poles, 5µm height, missing edge.

This floristic survey presents an important increase in the knowledge of Euglenophyceae in Bahia, considering previous works on this group. Martins *et al*. (1988) identified only four taxa in Dique do Tororó (Salvador). Alcantâra *et al*. (2011) also identified four taxa in the Represa do Cascão (Salvador). Severiano *et al*. (2012) recorded the group's greatest wealth in Rio de Contas (Andaraí), where they identified 14 taxa. A survey of the occurrence records of each species (and variety) on the list of Flora do Brasil (2020) revealed many new occurrences of Euglenophyceae, with 14 new occurrences in Bahia, 24 in the Northeast, and 4 in Brazil. Among the new occurrences in the Northeast region is the species *Euglena sanguinea* Ehrenberg which was previously only registered in the Northeast region (Ramos *et al*. 2007), and *Phacus ocellatus* (Pringsheim) Marin & Melkonian, which was only registered in the bromeliad tanks in the Sapiranga Reserve (Salvador) (Ramos *et al*. 2017).

In general, organisms of the Euglenophyceae class have the highest abundance during rainy periods in environments rich in organic matter (Round 1983, Taniguchi 2005, Nabout 2009) with large concentrations of aquatic macrophytes. Vegetation decomposition leads to high input of organic matter and nutrients to the system, favoring the development of euglenophytes (Torgan *et al*. 2003). This is evident in the Pantanal dos Marimbus, where we observed *Utricularia foliosa* L., *Cabomba haynesii* Wiersema, *Eichhornia azurea* (Swartz) Kunth. e *Nymphaea ampla* (Salisb.) DC in large populations. Our results support Ramos *et al*. (2021), indicating that this area has an extremely rich algal biodiversity.

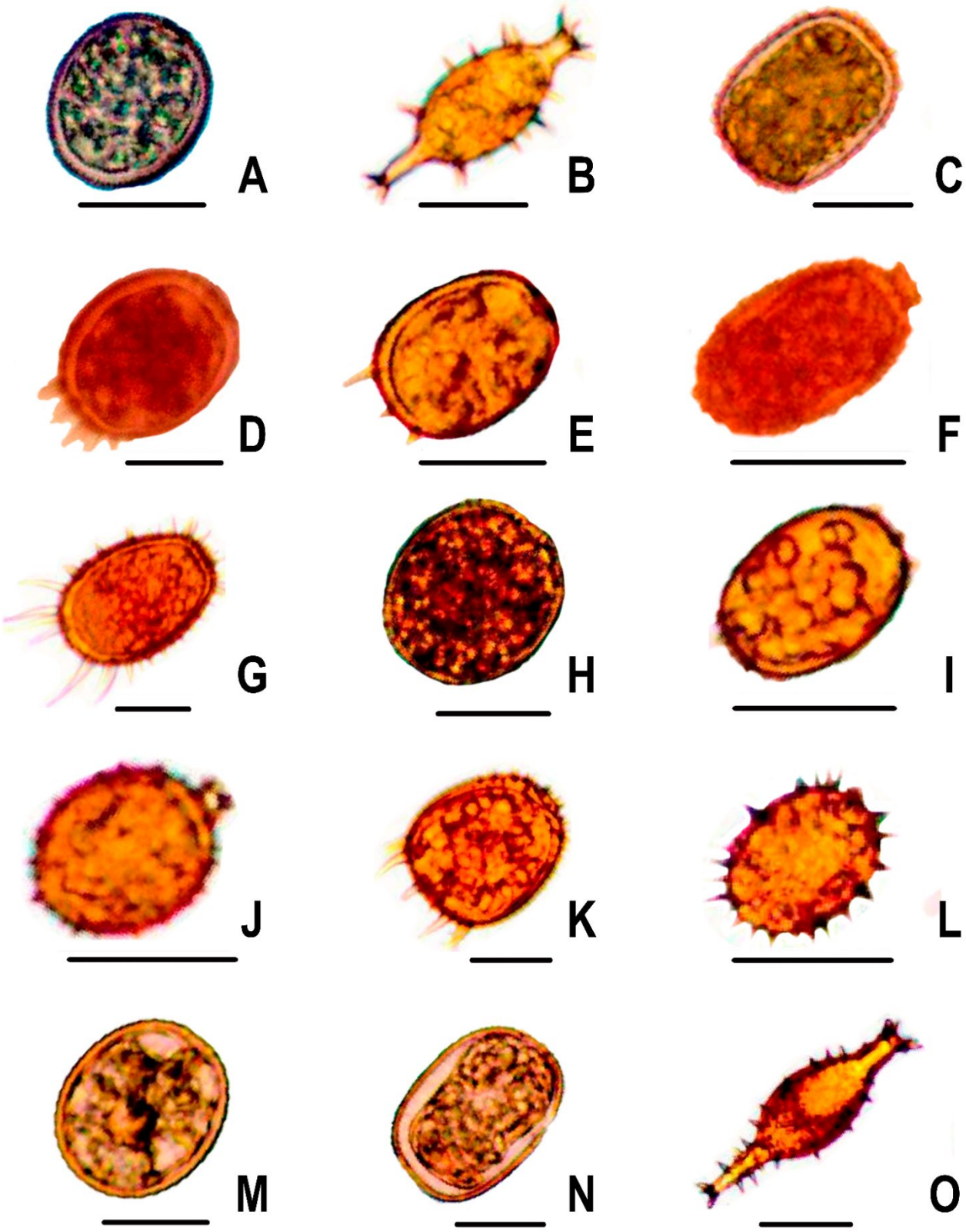


Figure 4. a) *Trachelomonas abrupta* var. *obesa* (Playfair) Deflandre; b) *Trachelomonas acanthophora* A. Stokes; c) *Trachelomonas allia* Drezepolski; d) *Trachelomonas armata* var. *javanica* (Huber-Pestalozzi) Tell & Couté; e) *Trachelomonas armata* var. *steinii* Lemmermann; f) *Trachelomonas armata* var. *longispina* Playfair emend. Deflandre; g) *Trachelomonas armata* (Ehrenberg) F. Stein; h) *Trachelomonas hispida* f. *coronata* Hortobágyi; i) *Trachelomonas hispida* var. *crenulatocollis* (Maskell) Lemmermann; j) *Trachelomonas hispida* f. *duplex* (Deflandre) H. Fukushima; k) *Trachelomonas kelloggii* Skvortsov.; l) *Trachelomonas lacustris* Drezepolski; m) *Trachelomonas magdaleniana* Deflandre; n) *Trachelomonas robusta* Svirenko; o) *Trachelomonas raciborskii* Woloszynska. Scale bar = 20 µm.

CONCLUSION

Considering the emerging studies on Euglenophyceae in freshwater environments in Bahia, this work highlights the importance of floristic inventories. Our research improves knowledge on the taxonomic composition and geographic distribution of these organisms in tropical environments.

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