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Diatoms (Bacillariophyceae) of Iguaçu National Park, Foz do Iguaçu, Brazil

Elaine Cristina Rodrigues Bartozek[1,5], Norma Catarina Bueno[1,2], Thelma Alvim Veiga Ludwig[3], Priscila Izabel Tremarin[3], Margaret Seghetto Nardelli[2] and Angélica Cristina Righetti da Rocha[3]

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ABSTRACT

This study represents a taxonomic survey of class Bacillariophyceae diatoms found in samples collected in the Iguaçu River (Iguaçu National Park, municipality of Foz do Iguaçu, in the state of Paraná, Brazil) between August 2007 and July 2008. Two sampling stations were utilized, the first located upstream of Iguaçu Falls (Cais Bananeiras Station) and second downstream of the falls (Cais Macuco Safari Station). The study resulted in the identification of 86 taxa, including 74 at the specific level and seven taxonomic varieties. Two of these had never before been documented in the state of Paraná: *Gomphonema gibberum* Hustedt and *Pinnularia meridiana* Metzeltin & Krammer. Nine are first--time records for Brazil: *Cymbella charrua* Metzeltin, Lange-Bertalot & García-Rodríguez, *Placoneis ovillus* Metzeltin, Lange-Bertalot & García-Rodríguez, *Gomphonema affinopsis* Metzeltin, Lange-Bertalot & García-Rodríguez, , *Gomphosphenia lingulatiformis* (Lange-Bertalot & Reichardt) Lange-Bertalot, *Luticola aequatorialis* (Heiden) Lange-Bertalot & Ohtsuka, *Sellaphora garciarodriguezii* Metzeltin & Lange-Bertalot, *Eolimna submuralis* (Hustedt) Lange-Bertalot Kulikovskiy, *Geissleria neosubtropica* Metzeltin, Lange-Bertalot & García-Rodríguez and *Stauroneis* cf. *sylviabonillae* Metzeltin, Lange-Bertalot & García-Rodríguez.

Key words: taxonomy, microalgae, lotic system, state of Paraná

Introduction

The class Bacillariophyceae is comprised of pennate diatoms having a raphe in one or both valves (Round *et al.* 1990). This constitutes the largest group of diatoms (ca. 98 genera) and is constantly expanding due to the proposal of new genera (Lange-Bertalot 1995; Round & Bukhtiyarova 1996; Krammer 1999). Members of this class are predominant in lotic environments due to their various forms of fixation and adaptations to high-turbulence environments (Round *et al.* 1990).

In Brazil, floristic and ecological studies on diatoms are concentrated mainly in the south and southeast. However, works on lotic Bacillariophyceae are scarce (Brassac & Ludwig 2006, Fontana & Bicudo 2009). In the state of Paraná, Soares *et al.* (2011) conducted studies of lotic systems in the Ribeirão Camberley basin and identified nine taxa within the family Amphipleuraceae; and Ferrari & Ludwig (2007) inventoried 32 taxa from the classes Coscinodiscophyceae, Fragilariophyceae and Bacillariophyceae (Achnanthales) in the Ivaí River basin. In the coastal basin, Landucci & Ludwig (2005) recorded 20 species from the classes Coscinodiscophyceae and Fragilariophyceae. Tremarin *et al.* (2008a, 2008b) found 40 taxa under *Eunotia* Ehrenberg and 28 from the order Thalassiosirales. In a study on the Pinnulariaceae of the Guaraguaçu River, also in the coastal basin, Tremarin *et al.* (2010) recorded 51 taxa.

The Iguaçu River basin is the lotic system with the best known diatom flora in the state of Paraná. The floristic surveys began with Moreira-Filho *et al.* (1973), who conducted sampling in the water catchment region of Curitiba. Subsequently, Ludwig & Flôres (1995, 1997) conducted surveys in rivers in the areas near the Segredo hydroelectric plant, and Brassac *et al.* (1999) identified centric diatoms in rivers in the region surrounding the Salto Caxias hydroelectric plant. Later, Brassac & Ludwig (2003, 2005, 2006) conducted a survey of the pennate diatoms of the Iguaçu River and of some tributaries in the Salto Caxias hydroelectric plant region. In the most recent taxonomic study of the Iguaçu River basin (in the Maurício River), Tremarin *et al.* (2009a)

[1] Universidade Estadual do Oeste do Paraná, Programa de Pós-Graduação em Recursos Pesqueiros e Engenharia de Pesca, Toledo, PR, Brazil
[2] Universidade Estadual do Oeste do Paraná, Programa de Pós-Graduação em Conservação e Manejo de Recursos Naturais, Cascavel, PR, Brazil
[3] Universidade Federal do Paraná, Centro Politécnico, Setor de Ciências Biológicas, Curitiba, PR, Brazil
[4] Universidade Estadual Paulista, Rio Claro, SP, Brazil
[5] Author for correspondence: elaine.bartozek@gmail.com

identified 19 taxa of *Gomphonema* Ehrenberg and one of *Gomphosphenia* Lange-Bertalot.

The present work aims to continue the survey of the taxonomic composition of the class Bacillariophyceae diatoms of the Iguaçu River, in the area encompassed by Iguaçu National Park, in order to broaden knowledge about the taxonomic diversity of these organisms in the area of study.

Material and methods

The Iguaçu National Park comprises approximately 169,765 ha and includes 14 of the municipalities of Paraná. The park represents the largest conservation area in the Atlantic Forest biome, and is considered one of the last remnants of this vegetation type in the southern region of the country. The climate is temperate (a mild, extremely humid, mesothermal climate with no dry season), with an average annual temperature between 18°C and 20°C. The maximum temperature ranges from 34°C to 36°C, and the minimum temperature ranges from 4°C to 8°C. The average annual rainfall varies between 1,500 and 1,750 mm (IBAMA 1999).

The Iguaçu River basin (25°05'S to 26°45'S; 48°57'W to 54°50'W) is located in the southern portion of the state of Paraná, crossing over into the state of Santa Catarina, as well as into some parts of Argentina (Silva *et al.* 2001; SUDERHSA 1997; Maack 1981). It has 70,800 km^2 of drainage area and stretches 1,275 km from east to west. In the portion preceding Iguaçu Falls, the river is 1,200 m across, narrowing to 65-100 m wide downstream (IAP 2011).

We selected two sampling stations, both located in the municipality of Foz do Iguaçu, on the Iguaçu River. The first, situated upstream of Iguaçu Falls (Fig. 1) and called Cais Bananeiras, has an average water speed of 0.42 m s^{-1} and a depth that varies from 0.90 m when conditions are relatively dry to 4.62 m in the months of higher water volume. The second station, located downstream of the Falls and called Cais Macuco Safari, has an average water speed of 6.80 m s^{-1} and a depth that varies from 4.62 to 27.0 m.

Phytoplankton samples were collected monthly between August 2007 and July 2008 at the two sampling stations, for a total of 24 samples (Tab. 1). Samples were collected in 500 ml of river water, obtained by immersing a beaker below the surface of the water. The samples were preserved with Transeau solution (Bicudo & Menezes 2006) and oxidized according to technique devised by Simonsen (1974), modified by Moreira-Filho & Valente-Moreira (1981), and deposited in the *Universidade Estadual do Oeste do Paraná* (UNOP, Western Paraná State University) Herbarium.

To analyze the material under light microscopy, permanent slides were made using Naphrax® mountant (refractive index, 1.74; Brunel Microscopes Ltd., Chippenham, UK). Photomicrographs were obtained through the use of an Olympus BX60 microscope coupled to an Olympus DP71 digital camera (Olympus, Tokyo, Japan). For all taxa, valves measures were provided (L: length W: width, S: striae; DS: dorsal striae; VS: ventral striae, MS: median striae; AS: apical striae; AC: alar canals; F: fibulae; A: areolae). For new records for the state of Paraná, or for Brazil, and for

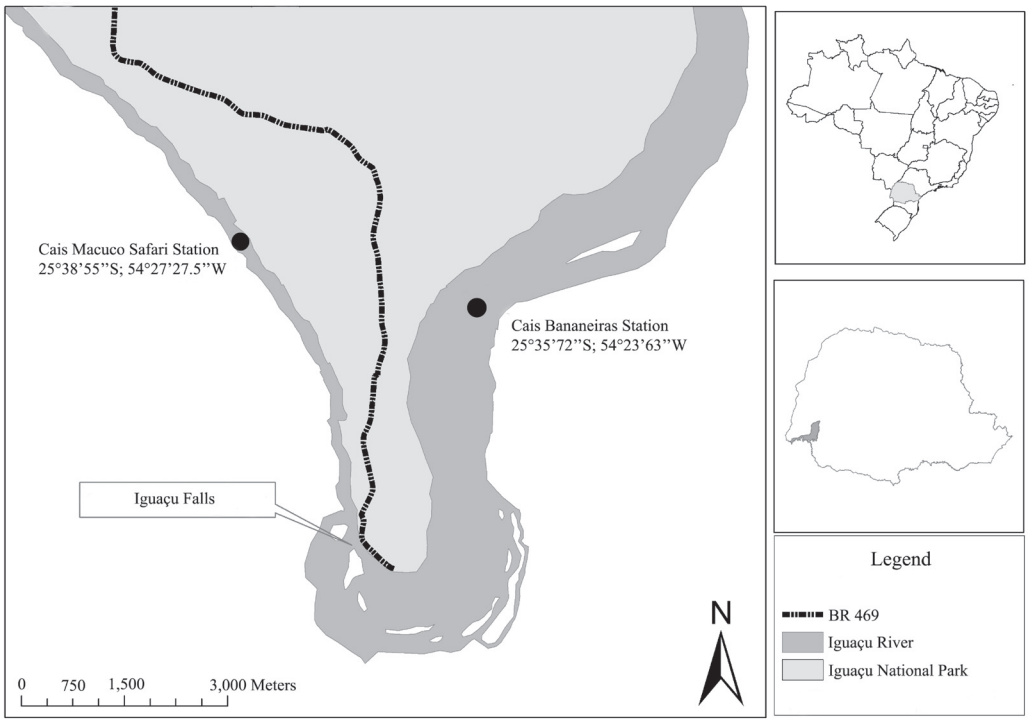


Figure 1. Location of the Cais Macuco Safari and Cais Bananeiras collection stations, Iguaçu National Park, in the state of Paraná, Brazil. Source: Iguaçu National Park Geoprocessing Department 2011.

Table 1. Collection dates, accession numbers and names of collectors of samples deposited at the Western Paraná State University Herbarium.

Collection date	Cais Bananeiras Station (UNOP accession no.)	Cais Macuco Safari Station (UNOP accession no.)	Collector(s)
August 2007	2702	2703	F.A. Gurski *s.n.*
September 2007	2704	2705	M.X. Silva *s.n.*
October 2007	2706	2707	M.X. Silva *s.n.*
November 2007	2708	2709	M.X. Silva *s.n.*
December 2008	2710	2711	M.X. Silva *s.n.*
January 2008	2712	2713	F.A. Gurski *s.n.*, M.X. Silva, *s.n.*
February 2008	2714	2715	F.A. Gurski *s.n.*, M.X. Silva, *s.n.*
March 2008	2716	2717	F.A. Gurski *s.n.*, M.X. Silva, *s.n.*
April 2008	2726	2727	F.A. Gurski *s.n.*, M.X. Silva, *s.n.*
May 2008	2728	2729	F.A. Gurski *s.n.*, M.X. Silva, *s.n.*
June 2008	2730	2731	F.A. Gurski *s.n.*, M.X. Silva, *s.n.*
July 2008	2799	2800	F.A. Gurski *s.n*

UNOP – *Universidade Estadual do Oeste do Paraná* (Western Paraná State University) Herbarium.

those specimens that were particularly difficult to identify, descriptions and relevant comments were added. The terminology employed was that used by Round *et al.* (1990) and Barber & Haworth (1981). The identification of taxa was based on classic and recent works, including Krammer (2002), Metzeltin & Lange-Bertalot (1998, 2007), Metzeltin *et al.* (2005), Reichardt (2005) and Siver *et al.* (2005).

Results and discussion

In this study, we found 86 diatom taxa in 16 families and 28 genera, with five at the generic level, 74 at the specific level and seven taxonomic varieties. Those taxa whose occurrence had already been documented for the state of Paraná are listed in Tab. 2, along with the morphometric and frequency data. The newly documented taxa for the state and for Brazil, as well as those taxa that were particularly difficult to identify, are described below, by family.

Cymbellaceae

Cymbella chaurra Metzeltin, Lange-Bertalot & García-Rodríguez, Iconogr. Diatomol. 15: 39, pl. 120, fig. 1-4; 121: 1-2, 2005.
Fig. 10-11

Dorsiventral valves, dorsal margin distinctly convex, ventral margin gently swollen medially; ends truncated; raphe sternum linear and narrow, central area elliptical with a ventral stigma; raphe arched, distal ends dorsally deflected and proximal ends straight to slightly dorsally deflected; radiate striae in the median region and along the ventral valve edge, converging near the dorsal edge; conspicuous areolae. L: 61.4-75 µm; W: 19.3-24 µm; DS: 8-10 µm; VS: 10 in 10 µm; A: 15-16 in 10 µm.

The species differs from *Cymbella australica* (A. Schmidt) Cleve, which has a greater length and width (100-142 µm and 24-30 µm, respectively) and from *C. tumida* (Brébisson) Van Heurck, because of its radiate dorsal striae near the valve edges (Krammer 2002, Metzeltin *et al.* 2005). In addition, Metzeltin *et al.* (2005) pointed out that, under electron microscopy, the areolae of *C. charrua* are branched and those of *C. australica* have a horseshoe shape.

Material examined: UNOP 2714, 2715, 2800.

Occurrence: first citation for Brazil.

Placoneis cf. ***serena*** (Frenguelli) Metzeltin in Lange-Bertalot, Iconogr. Diatomol. 15: 195, pl. 72: 1, 1', 2; 73:25, 2005.
Fig. 25-26

Valves broadly lanceolate; margins convex; ends cuneate; raphe sternum linear, expanding towards the central area; central area elliptical with isolated stigma; raphe straight; proximal raphe ends dilated in a pore shape; striae radiate, regularly spaced, shortened in the median region; two or three additional shortened striae interspersed among the others, on each side of the valve, in the median region; conspicuous and rounded areolae. L: 52.5-68.6 µm; W: 26.8-33.5 µm; MS: 8-10 in 10 µm; AS: 9-12 in 10 µm; A: 16-18 in 10 µm.

Placoneis serena was previously cited for the state of Paraná, in the São João River in the Ivaí River basin, by Ferrari (2004) and documented by Tremarin *et al.* (2009b). Specimens observed in that study showed 2-3 and 1-2 shortened striae, respectively, in the median valve region, as did those illustrated by Ferrari (2004). However, the specimens described by Frenguelli (1941) and Metzeltin *et al.* (2005) showed no shortened striae in the median valve region. Therefore, further studies are needed in order to determine whether this difference implies the proposal of a new taxon or can be considered variability of the species.

Material examined: UNOP 2711, UNOP 2712, UNOP 2713, UNOP 2714, UNOP 2726, UNOP 2727, UNOP 2728, UNOP 2729 and UNOP 2730.

Table 2. Morphometric and frequency data for diatoms at Cais Bananeiras and Cais Macuco Safari collection stations, Iguaçu River, Iguaçu National Park.

Species	Dimensions (µm) and striae (in 10 µm)	Frequency in samples (UNOP accession no.)
EUNOTIACEAE	-	-
Eunotia camelus Ehrenberg (Fig. 2)	L: 32.3; W: 8; S: 10	2715
Eunotia epithemioides Hustedt (Fig. 3)	L: 43-75; W: 8.5-13; S: 11-12	2708, 2712, 2726, 2727
Eunotia formica Ehrenberg (Fig. 4)	L: 73.3; W: 12.4; S: 10	2731
Eunotia incisa Gregory (Fig. 8)	L: 31-32; W: 7.5-10; S: 11-12	2712, 2714
Eunotia major (Wm. Smith) Rabenhorst (Fig. 5)	L: 91.3-96; W: 12-14; S: 7-8	2712, 2729, 2731
Eunotia pseudosudetica Metzeltin, Lange-Bertalot and García-Rodriguez (Fig. 6)	L: 35.5-51.5; W: 6.2-7.3; S: 10-12	2709, 2727, 2729, 2800
Eunotia rabenhorstii Cleve & Grunow var. *triodon* Cleve & Grunow (Fig. 7)	L: 27.6-38.3; W: 8.7-11.8; S: 9-13	2708, 2714, 2726
CYMBELLACEAE	-	-
Cymbella australica (Schimdt) Cleve (Fig. 9)	L: 82.4-92.5; W: 20.7-27; MS: 7-8; AS: 9-10; A: 14	2717, 2727, 2728
Cymbella tropica Krammer (Fig. 12 & 13)	L: 43.5-50; W: 12.3-15; DS: 6-10; VS: 8-10; A: 14-18	2702, 2703, 2705, 2707, 2708, 2714, 2716, 2717, 2726, 2727, 2729, 2800
Encyonema minutum (Hilse) Mann (Fig. 14 & 15)	L: 20.1-26.5; W: 6.7-9.5; DS: 8-9; VS: 9	2703, 2708, 2712, 2713, 2715, 2717, 2729, 2800
Encyonema perpusillum (Cleve) Mann (Fig. 16-18)	L: 18.5-23.7; W: 5-7.3; DS: 8-11; VS: 7-9	2703, 2705, 2708, 2714, 2717, 2726, 2727, 2729, 2800
Encyonema silesiacum (Bleisch) Mann (Fig. 19-22)	L: 31.3-42.8; W: 8.5-11.6; DS: 8-9; VS: 7-9	2707, 2708, 2709, 2712, 2714, 2715, 2716, 2726, 2727, 2728, 2729, 2730, 2731, 2800
Placoneis disparilis (Hustedt) Metzeltin & Lange-Bertalot (Fig. 23 & 24)	L: 40-61.7; W: 17.5-20.5; MS: 9-13; AS: 12-14; A: 18-20	2704, 2707, 2708, 2710, 2712, 2713, 2714, 2715, 2726, 2727, 2728, 2729, 2730, 2800
GOMPHONEMATACEAE	-	-
Gomphonema gracile Ehrenberg (Fig. 35)	L: 28.8-63.8; W: 6.1-12.2; S: 10-12	2709, 2712, 2714, 2715, 2717, 2727
Gomphonema hawaiiense Reichardt (Fig. 44 & 45)	L: 29.3-42; W: 8.4-10; S: 12-13	2702, 2708, 2709, 2712, 2729
Gomphonema laticollum Reichardt (Fig. 46)	L: 47.3-48; W: 13.5-14.3; S: 9-10	2711, 2712
Gomphonema mexicanum Grunow (Fig. 47)	L: 28.5-37.2; W: 11.4-14.5; S: 9-10	2702, 2703, 2712, 2715, 2717, 2729
Gomphonema parvulum (Kützing) Kützing (Fig. 48-50)	L: 16.7-33.5; W: 6.5-8.9; S: 10-15	2707, 2708, 2709, 2712, 2713, 2715, 2717, 2726, 2727, 2728, 2729, 2730, 2800
ACHNANTHIDIACEAE	-	-
Achnanthidium exiguum var. *constrictum* (Grunow) Andresen. Stoermer & Kreis (Fig. 60 & 61)	L: 8.5-19.5; W: 4.3-8.5; S: 10-15	2702, 2703, 2726, 2707, 2708, 2709, 2712, 2714, 2715, 2717, 2726, 2727, 2729, 2800
Achnanthidium minutissimum (Kützing) Czarnecki (Fig. 55-57)	L: 11.9-18.7; W: 2.6-4.2; Striae inconspicuous	2703, 2707, 2708, 2709, 2712, 2714, 2715, 2717, 2727, 2708, 2729, 2730, 2800
Planothidium heteromorphum (Grunow) Lange-Bertalot (Fig. 68 & 69)	L: 33.6-62; W: 16-22.2; S: 8-11	2708, 2710, 2711, 2712, 2714, 2715, 2726, 2727, 2728
Planothidium lanceolatum (Brébisson) Round & Bukhtiyarova (Fig. 62 & 63)	L: 9.3-26.4; W: 6-9.3; S: 7-12	2704, 2705, 2706, 2707, 2708, 2710, 2711, 2712, 2714, 2715, 2716, 2717, 2726, 2727, 2728, 2729, 2730, 2799, 2800
Planothidium rostratum (Östrup) Round & Bukhtiyarova – morfotipo I (Fig. 64 & 65)	L: 13.6-19.5; W: 8.2-9.5; S: 10-12	2707, 2711, 2712, 2714, 2715, 2717, 2726, 2727, 2729, 2730, 2800
Planothidium rostratum (Östrup) Round & Bukhtiyarova – morphotype II (Fig. 66 & 67)	L: 15.2-18; W: 6.7-9; S: 10-12	2708, 2712, 2715, 2717, 2727, 2729, 2800
COCCONEIDACEAE	-	-
Cocconeis fluviatilis Wallace (Fig. 70 & 71)	L: 28.2-33.6; W: 15.5-19.5; S: 8-10; A: 6-8	2708, 2712, 2714, 2717, 2726, 2730
Cocconeis placentula Ehrenberg var. *acuta* Meister (Fig. 72)	L: 40-55; W: 23.7-26.1; S: 14-16; A: 4-5	2712, 2727, 2800

Continues

Table 1. Continuation.

Species	Dimensions (μm) and striae (in 10 μm)	Frequency in samples (UNOP accession no.)
Cocconies placentula Ehrenberg var. *euglypta* Ehrenberg (Fig. 73 & 74)	L: 13.5-19.1; W: 7.3-10.7; S: 18-20; A: 15	2708, 2726, 2729
Cocconeis placentula Ehrenberg var. *lineata* (Ehrenberg) Van Heurck (Fig. 75 & 76)	L: 17.9-34; W: 8.5-19; S: 17-20; A: 15-18	2702, 2703, 2704, 2705, 2706, 2707, 2708, 2709, 2710, 2711, 2712, 2713, 2714, 2715, 2716, 2717, 2726, 2727, 2728, 2729, 2730, 2731, 2799, 2800
DIADESMIDACEAE	-	-
Diadesmis contenta (Grunow *ex* Van Heruck) Mann (Fig. 58 & 59)	L: 9.2-13.5; W: 2.7-4.2; Striae inconspicuous	2708, 2715, 2717, 2729, 2800
Luticola mutica var. *lanceolata* (Frenguelli) Aboal (Fig. 78)	L: 31.5-39.2; W: 10.3-11.7; S: 14-16; A; 14-15	2708, 2709, 2712, 2714, 2728, 2729, 2730, 2800
Luticola muticoides (Hustedt) Mann (Fig. 81)	L: 14.8; W: 8.9; S: 20	2707
Luticola simplex Metzeltin. Lange-Bertalot & García-Rodriguez (Fig. 83)	L: 15.5-24; W: 6.5-9.2; S: 16-18	2708, 2711, 2712
SELLAPHORACEAE	-	-
Sellaphora laevissima (Kützing) Mann (Fig. 79 & 80)	L: 31.8-51.5; W: 9.5-11.6; S: 14-18	2703, 2708, 2709, 2712, 2714, 2715, 2727, 2729, 2730, 2800
Sellaphora pupula (Kützing) Mereschkowsky (Fig. 82)	L: 15.8; W: 6.1; S: 25	2712
Sellaphora rhombicarea Metzeltin, Lange-Bertalot & García-Rodriguez (Fig. 90 & 91)	L: 36-54.8; W: 11-13.7; S: 14-19	2708, 2709, 2713, 2714, 2715, 2726, 2729, 2800
AMPHIPLEURACEAE	-	-
Amphipleura lindheimeri Grunow (Fig. 89)	L: 164-185; W: 25.2-29.7; Striae delicate	2712, 2717, 2726, 2727, 2729, 2930, 2800
Frustulia neomundana Lange-Bertalot & Rumrich (Fig. 105)	L: 44.4-47.3; W: 9.2-10.7; Striae delicate	2708, 2712
NEIDIACEAE	-	-
Neidium infirmum Metzeltin & Krammer (Fig. 106)	L: 45.5-62.1; W: 16.5-19.4; S: 17-20	2708, 2709, 2712, 2714, 2726, 2727, 2799
DIPLONEIDACEAE	-	-
Diploneis subovalis Cleve (Fig. 107)	L: 22.4-33.7; W: 12-20.5; S: 8-11; A: 14-16	2708, 2710, 2800
NAVICULACEAE	-	-
Navicula cryptocephala Kützing (Fig. 108)	L: 17.9-38.2; W: 5-8.5; S: 10-16	2708, 2712
Navicula cryptotenella Lange-Bertalot (Fig. 109)	L: 27.8-36; W: 6-7.8; S: 10-13	2703, 2704, 2705, 2707, 2708, 2709, 2712, 2714, 2715, 2716, 2717, 2726, 2727, 2728, 2729, 2731, 2800
Navicula escambia (Patrick) Metzeltin & Lange-Bertalot (Fig. 110)	L: 35.2-49.3; W: 8.1-10; S: 10-12	2702, 2706, 2708, 2709, 2712, 2714, 2715, 2716, 2729, 2800
Navicula neomundana (Lange-Bertalot & Rumrich) Lange-Bertalot. Jarlman & Van de Vijver (Fig. 111)	L: 56-88.7; W: 11.4-15.9; S: 7-8	2702, 2705, 2706, 2712, 2713, 2714, 2715, 2716, 2726, 2727, 2729, 2730
Navicula rostellata Kützing (Fig. 112)	L: 44.7-53.5; W: 9.3-13; S: 10-11	2707, 2708, 2710, 2712, 2714, 2715, 2717, 2726, 2727, 2729, 2731, 2800
Naviculadicta nanogomphonema Lange-Bertalot & Rumrich (Fig. 87 & 88)	L: 13.6-16.7; W: 5.9-7.3; S: 14-16	2708, 2712
Geissleria aikenensis Patrick (Fig. 114 & 115)	L: 18.7-27.2; W: 6-7.6; S: 10-15	2702, 2703, 2706, 2707, 2708, 2709, 2712, 2713, 2714, 2717, 2726, 2727, 2800
Adlafia drouetiana (Patrick) Metzeltin & Lange-Bertalot (Fig. 118 & 119)	L: 20-25.6; W: 5.5-6.7; S: 20	2706, 2708, 2712, 2714
Nupela praecipua (Reichardt) Reichardt (Fig. 97 & 98)	L: 15.7-18.7; W: 6.1-7.5; Striae inconspicuous	2708, 2712, 2800
PINNULARIACEAE	-	-
Pinnularia butantanum (Krasske) Metzeltin (Fig. 123)	L: 61-131; W: 13.8-22.5; S: 10-14	2708, 2714, 2717, 2726, 2727, 2729, 2730
Pinnularia divergens W. Smith (Fig. 121)	L: 69-74; W: 13-13.7; S: 11-12	2708

Continues

Table 1. Continuation.

Species	Dimensions (µm) and striae (in 10 µm)	Frequency in samples (UNOP accession no.)
PLEUROSIGMATACEAE	-	-
Gyrosigma acuminatum (Kützing) Rabenhorst (Fig. 125)	L: 118.3-135.3; W: 16-18.7; S: 14-18	2702, 2706, 2708, 2709, 2711, 2712, 2713, 2714, 2715, 2716, 2726, 2727, 2729, 2730, 2800
Gyrosigma obtusatum (Sullivan & Wormley) Boyer (Fig. 126)	L: 83.2-175.1; W: 11-21.2; S: 20-22	2702, 2704, 2706, 2707, 2708, 2711, 2712, 2714, 2716, 2726, 2727, 2728, 2729, 2730, 2800
STAURONEIDACEAE	-	-
Capartograma crucicola (Grunow ex Cleve) (Fig. 113)	L: 33.6-39; W: 10.2-11.7; S: 18-20	2708, 2712, 2714, 2715, 2726
Craticula ambigua (Ehrenberg) Mann (Fig. 122)	L: 78.1; W: 21; S: 14	2708
BACILLARIACEAE	-	-
Nitzschia amphibia Grunow (Fig. 127-129)	L: 23.5-39.5; W: 5.3-7.6; S: 12-14; F: 6-9	2703, 2707, 2708, 2712, 2714, 2715, 2716, 2717, 2726, 2727, 2728, 2729, 2730, 2731, 2800
Nitzschia clausii Hantzsch (Fig. 130)	L: 41.2; W: 5.7; Striae inconspicuous; F: 10	2703
Nitzschia dissipata (Kützing) Grunow (Fig. 133 & 134)	L: 60.5-68.5; W: 5.4-7.3; Striae inconspicuous; F: 7-8	2708, 2712, 2714, 2716, 2726
Nitzschia palea (Kützing) Wm. Smith (Fig. 131 & 132)	L: 25.7-51.7; W: 4.4-7.2; Striae inconspicuous; F: 9-13	2705, 2708, 2709, 2714, 2717, 2728, 2800
Hantzschia amphioxys (Ehrenberg) Grunow (Fig. 135)	L: 35.6-67.9; W: 6.6-11.8; S: 17; F: 8-10	2729, 2800
Tryblionella coarctata (Grunow) Mann (Fig. 137 & 138)	L: 48.7-55.6; W: 18-22.4; S: 11-13; A: 12-16	2702, 2706, 2708, 2711, 2712, 2714, 2729, 2800
Tryblionella hungarica Grunow (Fig. 136)	L: 52.3-53.2; W: 12.1-13.1; S: 9-10	2708, 2714
Tryblionella victoriae Grunow (Fig. 139)	L: 34.1-63.3; W: 17.2-25; S: 6	2712, 2727, 2729
SURIRELLACEAE	-	-
Surirella angusta Kützing (Fig. 145)	L: 28-39; W: 9.8-15.1; AC: 6-8	2708, 2712, 2800
Surirella kittoni Schmidt (Fig. 141)	L: 122.5-139.5; W: 51.4-53.7; AC: 2	2712, 2714, 2730
Surirella linearis Smithii (Fig. 142 & 143)	L: 86.8-166.9; W: 22.5-33.8; AC: 2-3	2708, 2714
Surirella linearis var. *constricta* Grunow (Fig. 144)	L: 95.4-127.4; W: 19.1-21.8; AC: 2-3	2704, 2708, 2709, 2710, 2712, 2714, 2716, 2726
Surirella splendida (Ehrenberg) Kützing (Fig. 140)	L: 113.2-141; W: 45.3-53.9; AC: 2	2708, 2712, 2714, 2726, 2729, 2799

Occurrence: see Tremarin *et al.* (2009b).

Placoneis ovillus Metzeltin, Lange-Bertalot & García--Rodríguez in Lange-Bertalot, Iconogr. Diatomol. 15: 187, pl. 74, fig. 20-26, 2005.
Fig. 27-28

Valves lanceolate; ends slightly cuneate and protracted; raphe sternum straight and narrow; central area small, irregularly bounded by few striae, alternating between short and long; raphe filiform, straight, with proximal ends dilated; striae radiate. L: 18.1-21.3 µm; W: 9.3-10.9 µm; MS: 12-10 µm, AS: 14-16 in 10 µm.

Metzeltin *et al.* (2005) stated that *Placoneis ovillus* is similar to *P. ignorata* (Schimanski) Lange-Bertalot, a common species in the Holarctic, having a wide central area without delineation by alternating striae.

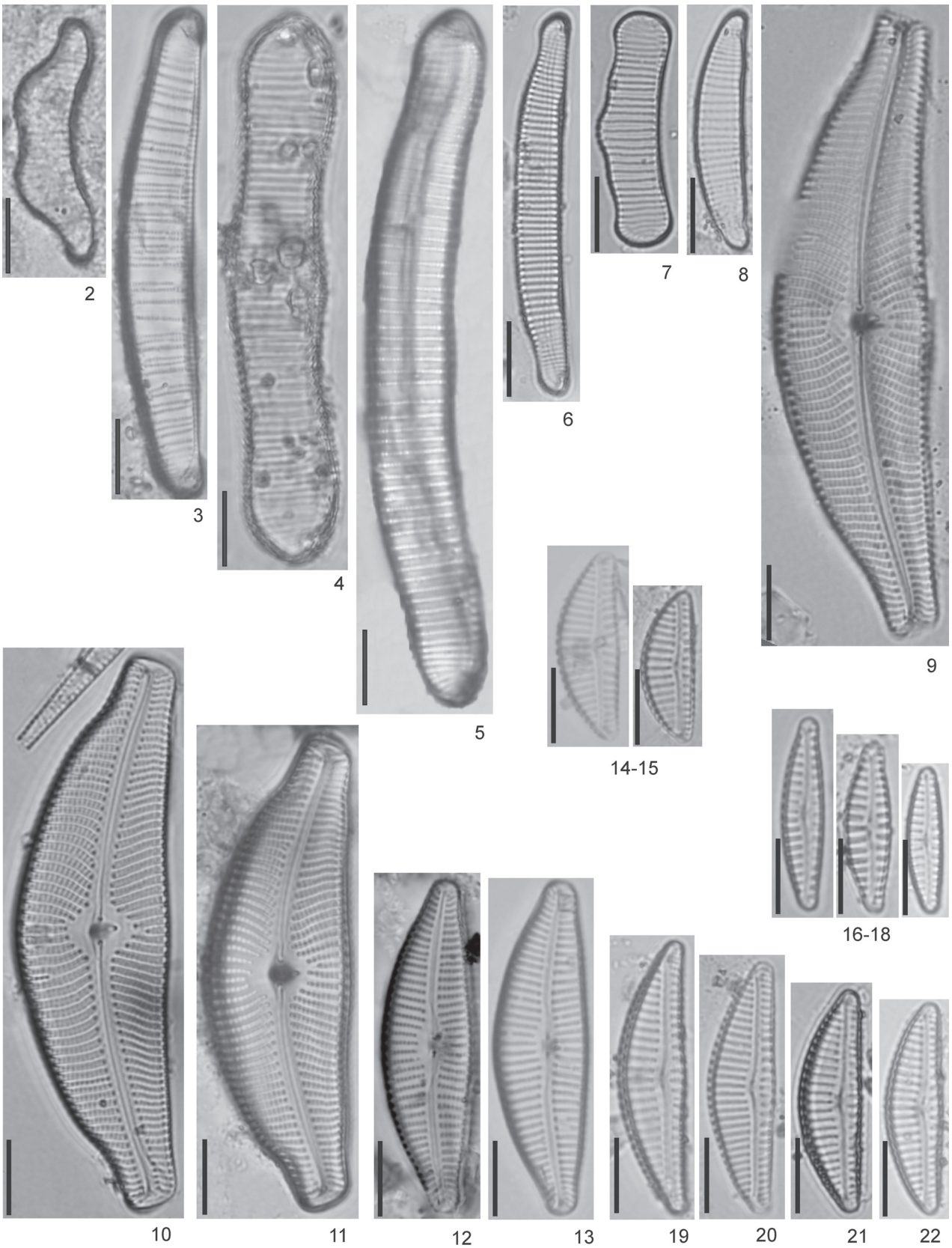
Material examined: UNOP 2702, UNOP 2705, UNOP 2707, UNOP 2708, UNOP 2709, UNOP 2711, UNOP 2712, UNOP 2714, UNOP 2726, UNOP 2727, UNOP 2729, UNOP 2731 and UNOP 2800.

Occurrence: first citation for Brazil.

Placoneis cf. ***uruguayensis*** Metzeltin, Lange-Bertalot & García-Rodríguez in Lange-Bertalot, Iconogr. Diatomol. 15: 197, pl. 78, fig. 1-4, 2005.
Fig. 29-31

Valves elliptical to elliptic-lanceolate; ends rostrate; raphe sternum linear; central area small, slightly expanded in larger specimens; presence of stigma; raphe filiform; striae radiate in the median region, becoming curved and converging at the ends; areolae evident, rounded, regularly spaced. L: 80-113.5 µm; W: 33-43.2 µm; S: 13 in 10 µm; A: 14-17 in 10 µm.

The population of *Placoneis* cf. *uruguayensis* presented metric variation, density of striae and density of areolae higher than those described by Metzeltin *et al.* (2005) upon proposal of the species (L: 62-80 µm, W: 29-32 µm, 16 striae/10 µm, 20-23 areolae/10 µm). However, other



Figures 2-22. 2. Diatoms of Iguaçu National Park. *Eunotia camelus* Ehrenberg. 3. *Eunotia epithemioides* Hustedt. 4. *Eunotia formica* Ehrenberg. 5. *Eunotia major* (Wm. Smith) Rabenhorst. 6. *Eunotia pseudosudetica* Metzeltin, Lange-Bertalot e García-Rodriguez. 7. *Eunotia rabenhorstii* Cleve & Grunow var. *triodon* Cleve & Grunow. 8. *Eunotia incisa* Gregory. 9. *Cymbella australica* (Schmidt) Cleve. 10-11. *Cymbella charrua* Metzeltin, Lange-Bertalot & García-Rodríguez. 12-13. *Cymbella tropica* Krammer. 14-15. *Encyonema minutum* (Hilse) Mann. 16-18. *Encyonema perpusillum* (Cleve) Mann. 19-22. *Encyonema silesiacum* (Bleisch) Mann. Scales: 10 µm.

morphological characteristics coincided with the original description. Similar species, such as *Cosmioneis delawarensis* (Grunow) Mann, have been documented in the state by Brassac (1999) and published by Tremarin *et al.* (2009b).

Material examined: UNOP 2709, UNOP 2712, UNOP 2714, UNOP 2726 and UNOP 2729.

Occurrence: see Tremarin *et al.* (2009b).

Gomphonemataceae

Gomphonema affinopsis Metzeltin, Lange-Bertalot & García-Rodriguez in Lange-Bertalot, Iconogr. Diatomol. 15: 77, pl. 147, fig. 9-14, 2005.
Fig. 36-37

Valves clavate with apices broadly rounded; bases shorter in specimens of medium and small size; raphe sternum linear; central area bilateral and bounded by the shortening two medial striae; stigma transapically elongated; raphe straight with proximal ends dilated to pores and deflected toward the stigma side; striae slightly radiate; areolae rounded to elliptical. L: 30.2-50 μm; W: 7.4-12.3 μm; S: 8-10 in 10 μm; A: 18-19 in 10 μm.

Gomphonema affinopsis differs from *G. mexicanum* in the shape of the stigma, which is transapically elongated in the former and punctiform in the latter, as well as in that it has a lower density of areolae in the striae (15-18 in 10 μm) (Metzeltin *et al.* 2005).

Material examined: UNOP 2702, UNOP 2706, UNOP 2707, UNOP 2708, UNOP 2712, UNOP 2715, UNOP 2729, UNOP 2730, UNOP 2731 and UNOP 2800.

Occurrence: first citation for Brazil.

Gomphonema brasiliensoide Metzeltin, Lange-Bertalot & García-Rodríguez in Lange-Bertalot, Iconogr. Diatomol. 15: 70, pl. 91, fig. 20-23; 76:5, 2005.
Fig. 38-43

Valves lanceolate with apices cuneate to attenuated--rounded and bases attenuated-rounded; central area indistinct; raphe sternum broad and lanceolate, bounded by regular shortening of the striae; absence of stigma; raphe straight with proximal ends dilated into small pores; striae parallel to slightly radiate at the ends, shortened regularly throughout the length of the valve; areolae inconspicuous. L: 28.4-63 μm; W: 6.7-10.5 μm; S: 9-11 in 10 μm.

Gomphonema brasiliensoide differs from *G. brasiliense* Grunow in its larger cell size (L: 24-60 μm vs. 22-44 μm; W: 6.6-9 μm vs. 5.5-6.7 μm) and lower striae density (10-12 in 10 μm vs. 14-15 in 10 μm). In addition, as can be seen under electron microscopy, *G. brasiliensoide* has biseriate striae, whereas those of *G. brasiliense* are uniseriate (Metzeltin *et al.* 2005).

Material examined: UNOP 2702, UNOP 2707, UNOP 2708, UNOP 2711, UNOP 2712, UNOP 2714, UNOP 2715, UNOP 2726, UNOP 2727, UNOP 2728, UNOP 2729, UNOP 2730 and UNOP 2800.

Gomphonema gibberum Hustedt, Int Rev. Hydrobiol. 50th: 400, 50: 400, figs. 35-39, 1965.
Fig. 32-34

Valves elliptic-lanceolate, apices rostrate; bases rostrate to capitate; raphe sternum broad, elliptic-lanceolate; central area indistinct; stigma absent; raphe filiform, straight, proximal ends dilated into pores, deflected to the side of the terminal fissures; striae slightly radiate in the median region and more sharply radiate near the ends. L: 20-22.2 μm; W: 8.4 μm; S: 10-11 in 10 μm.

Material examined: UNOP 2709 and UNOP 2712.

Occurrence: first citation for the state of Paraná.

***Gomphonema* sp.**
Fig. 51-52

Valves clavate; apices cuneate; bases attenuated-rounded; raphe sternum lanceolate; central area indistinct; presence of stigma in the central area, near the medial striae; raphe straight, filiform; proximal raphe ends dilated into pores and slightly deflected to the stigma side; striae slightly radiate; areolae inconspicuous. L: 20-34.3 μm; W: 4.7-7.7 μm; S: 7-10 in 10 μm.

Gomphonema sp. resembles *G. pumilum* (Grunow) Reichardt & Lange-Bertalot with regard to the valve shape and measures, although the latter has longer and more densely arranged striae (11-12 in 10 μm) than *Gomphonema* sp. (Krammer & Lange-Bertalot 1991). Further studies are needed in order to determine whether the taxon constitutes a new species.

Material examined: UNOP 2712, UNOP 2714, UNOP 2726, UNOP 2729 and UNOP 2800

Gomphosphenia lingulatiformis (Lange-Bertalot & Reichardt) Lange-Bertalot, Nova Hedwigia 60: 243, 1995.
Fig. 53-54

Valves clavate; apices cuneate; bases attenuated-rounded; raphe sternum lanceolate; central area indistinct; stigma absent; raphe straight, filiform, proximal raphe ends dilated into pores; terminal fissures absent; striae slightly radiate, shortened in the median region; areolae evident, transapically elongated. L: 40.4-40.8 μm; W: 6.3-8.2 μm; S: 10-13 in 10 μm.

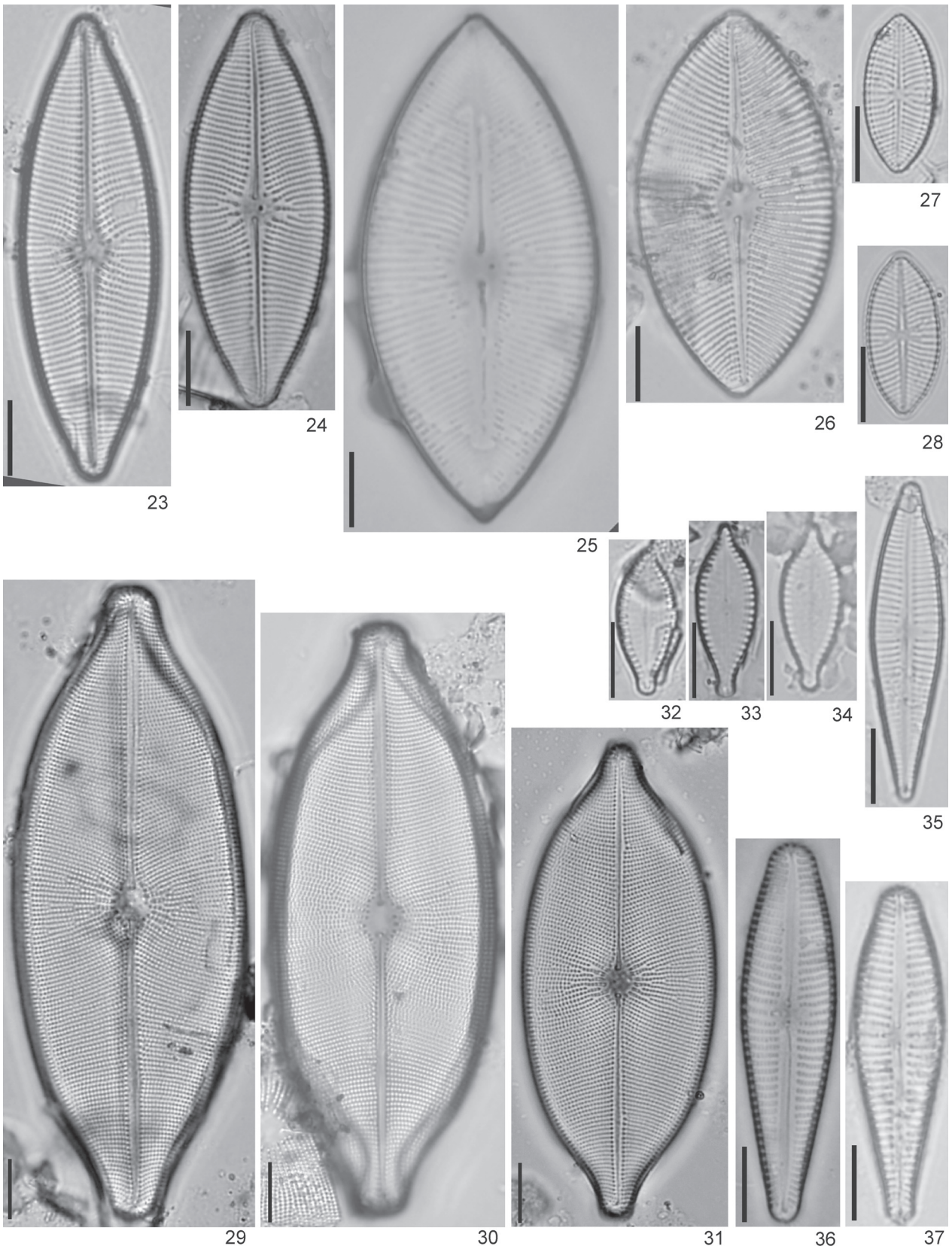
Material examined: UNOP 2727 and UNOP 2800.

Occurrence: first citation for Brazil.

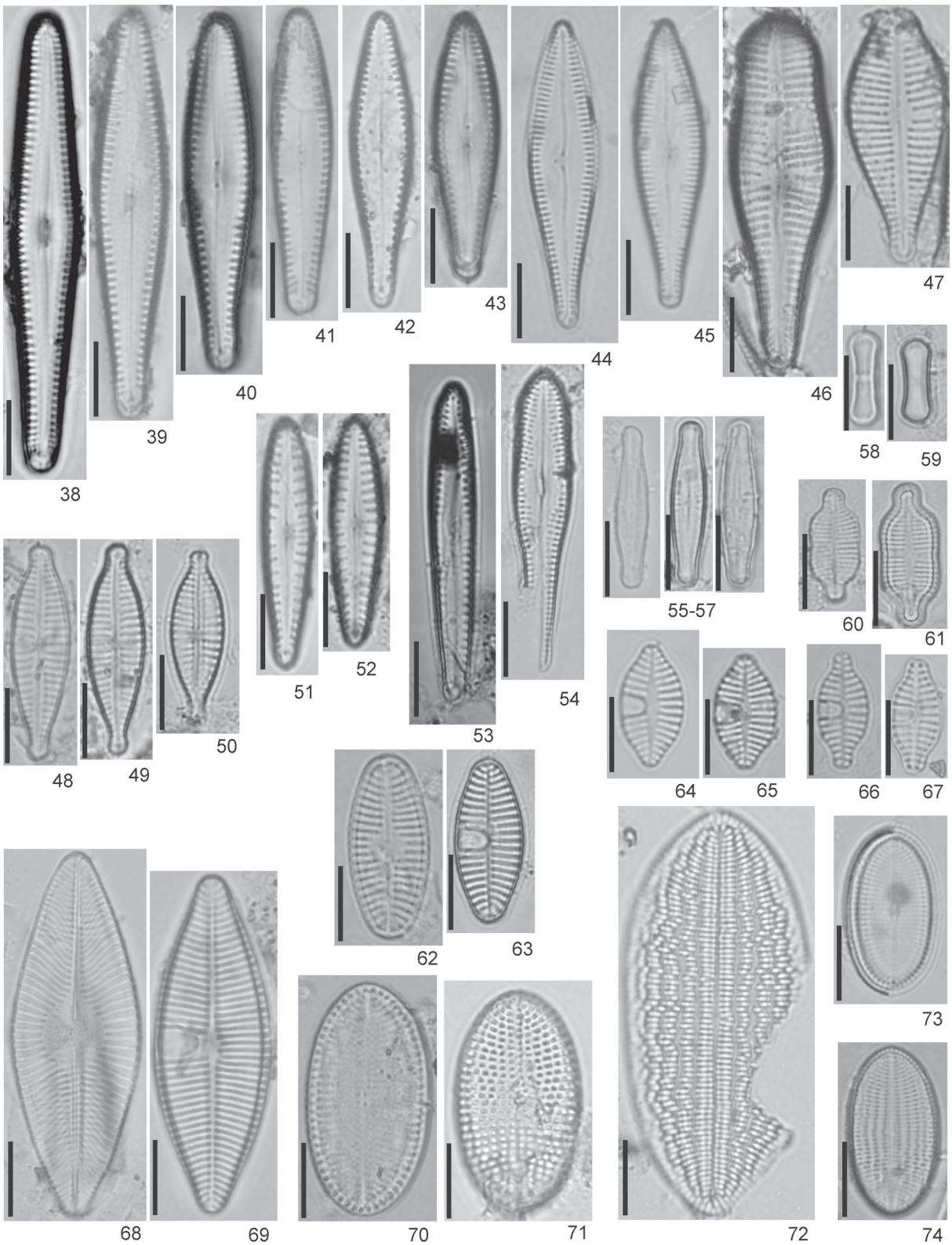
Diadesmidaceae

Luticola aequatorialis (Heiden) Lange-Bertalot & Ohtsuka in Ohtsuka, Diatom 18: 35, 2002.
Fig. 77

Valves rhombic-lanceolate, ends rounded; raphe sternum linear, narrow; central area linear, expanded laterally, bounded by the shortening of medial striae; stigma marginal; raphe straight, proximal ends deflected to the side



Figures 23-37. Diatoms of Iguaçu National Park. 23-24. *Placoneis disparilis* (Hustedt) Metzeltin & Lange-Bertalot. 25-26. *Placoneis* cf. *serena* (Frenguelli) Metzeltin in Metzeltin, Lange-Bertalot & García-Rodríguez. 27-28. *Placoneis ovillus* Metzeltin, Lange-Bertalot & García-Rodríguez. 29-31. *Placoneis* cf. *uruguayensis* Metzeltin, Lange-Bertalot & García-Rodríguez. 32-34. *Gomphonema gibberum* Hustedt. 35. *Gomphonema gracile* Ehrenberg. 36-37. *Gomphonema affinopsis* Metzeltin, Lange-Bertalot & García-Rodriguez. Scales: 10 µm.



Figures 38-74. Diatoms of Iguaçu National Park. 38-43. *Gomphonema brasiliensoide* Metzeltin, Lange-Bertalot & García-Rodríguez. 44-45. *Gomphonema hawaiiense* Reichardt. 46. *Gomphonema laticollum* Reichardt. 47. *Gomphonema mexicanum* Grunow. 48-50. *Gomphonema parvulum* (Kützing) Kützing. 51-52. *Gomphonema* sp. 53-54. *Gomphosphenia lingulatiformis* (Lange-Bertalot & Reichardt) Lange-Bertalot. 55-57. *Achnanthidium minutissimum* (Kützing) Czarnecki. 58-59. *Diadesmis contenta* (Grunow *ex* Van Heruck) Mann. 60-61. *Achnanthidium exiguum* var. *constrictum* (Grunow) Andresen, Stoermer & Kreis. 62-63. *Planothidium lanceolatum* (Brébisson) Round & Bukhtiyarova. 64-65. *Planothidium rostratum* (Östrup) Round & Bukhtiyarova (morphotype I). 66-67. *Planothidium rostratum* (Östrup) Round & Bukhtiyarova (morphotype II). 68-69. *Planothidium heteromorphum* (Grunow) Lange-Bertalot. 70-71. *Cocconeis fluviatilis* Wallace. 72. *Cocconeis placentula* Ehrenberg var. *acuta* Meister. 73-74. *Cocconeis placentula* Ehrenberg var. *euglypta* Ehrenberg. Scales: 10 µm.

opposite of the stigma; striae radiate; areolae rounded. L: 25 µm; W: 9.8 µm; S: 16 in 10 µm; A: 15 in 10 µm.

Material examined: UNOP 2707 and UNOP 2708.

Occurrence: first citation for Brazil.

Sellaphoraceae

Sellaphora garciarodriguezii Metzeltin & Lange-Bertalot in Lange-Bertalot, Iconogr. Diatomol. 15: 207, pl. 68, fig. 8-11, 2005.

Fig. 85-86

Valves linear, margin slightly convex in the median part; ends slightly subcapitate; raphe sternum linear, ends enlarged; central area rhombic, bounded by striae alternating between long and short; raphe filiform, straight, striae curved and radiate, more widely spaced about the central area. L: 50.4-72.6 µm; W: 15.8-18 µm; S: 15-18 in 10 µm.

The sample analyzed presented individuals somewhat smaller than those described for the species (66-75 µm in length). *Sellaphora madagascariensis* Metzeltin & Lange-Bertalot and *S. parapupula* Lange-Bertalot are species similar to *S. garciarodriguezii*, although their valves are narrower, being < 14 µm in width (Metzeltin *et al.* 2005).

Material examined: UNOP 2712, UNOP 2714 and UNOP 2716.

Occurrence: first citation for Brazil.

***Sellaphora* sp.1**

Fig. 84

Valves elliptic-lanceolate; ends capitate; raphe sternum linear, central area circular; raphe straight, filiform; proximal raphe ends slightly dilated and unilaterally deflected; striae delicate, radiate and regularly shortened about the central area; areolae inconspicuous. L: 45 µm; W: 13.2 µm; S: 16 in 10 µm.

Sellaphora sp.1 is similar to *Sellaphora* (? Nov.) sp. no. 6 in Metzeltin & Lange-Bertalot (2002, p. 152, pl. 32, fig. 9). However, the latter presents elliptic-lanceolate valves and broader striae (Metzeltin & Lange-Bertalot, 2002).

Material examined: UNOP 2714.

***Sellaphora* sp.2**

Fig. 92-93

Valves elliptic-lanceolate; ends capitate; raphe sternum linear; central area at an acute angle to the fascia; raphe straight, striae delicate, radiate, widely spaced and irregularly shortened at the valve median; areolae inconspicuous. L: 23.6-30.6 µm, W: 6.7-9.3 µm; E: 20 in 10 µm.

This taxon is similar to *Sellaphora* sp.1 with regard to the elliptic-lanceolate valve shape and the delicate striae. However, *Sellaphora* sp.1 presents more strongly convex margins, larger valves (45 µm) and lower striae density (16 in 10 µm).

Material examined: UNOP 2708 and UNOP 2712.

***Sellaphora* sp.3**

Fig. 94-96

Valves lanceolate; ends rostrate; raphe sternum linear; central area transversely elliptical; raphe straight; proximal raphe ends dilated in a pore shape and slightly unilaterally deflected; striae delicate, radiate and regularly shortened at the valve median; areolae inconspicuous. L: 28.2-38.7 µm; W: 9.8-12.5 µm; S: 16-20 in 10 µm.

The specimens found showed similarity to *Sellaphora* sp.1 and *Sellaphora* sp.2 regarding the presence of delicate, hard-to-see striae, but are differentiated mainly by the capitate shape of the valve ends.

Material examined: UNOP 2708, UNOP 2712 and UNOP 2714.

Eolimna submuralis (Hustedt) Lange-Bertalot & Kulikovskiy, Diatom Research 25(1): 81, 2010.

Fig. 102-104

Valves elliptical; ends attenuated-rounded; raphe sternum narrow, linear; central area slightly laterally expanded; raphe straight, filiform; striae radiate; areolae inconspicuous. L: 7-12.7 µm; W: 4.4-5.8 µm; S: 16-18 in 10 µm.

Eolimna submuralis resembles *Navicula seminuloides* Hustedt and *N. muralis* Grunow mainly in the elliptical shape of the valves. However, *N. seminuloides* has a higher striae density (20-24 in 10 µm). While *N. muralis* presents a smaller central area and striae radiate to parallel at the ends and in higher densities (30 in 10 µm) (Hustedt 1966).

Material examined: UNOP 2708, UNOP 2712, UNOP 2715, UNOP 2717, UNOP 2726, UNOP 2727 and UNOP 2800.

Occurrence: first citation for Brazil.

***Eolimna* sp.**

Fig. 99-101

Valves elliptic-lanceolate; ends attenuated-rounded; raphe sternum linear, narrow; slightly dilated central area bounded by the irregular shortening of medial striae; raphe filiform, straight; striae radiate and more widely spaced near the valve median; areolae inconspicuous. L: 13-18 µm; W: 4.8-6.2 µm; S: 14-18 in 10 µm.

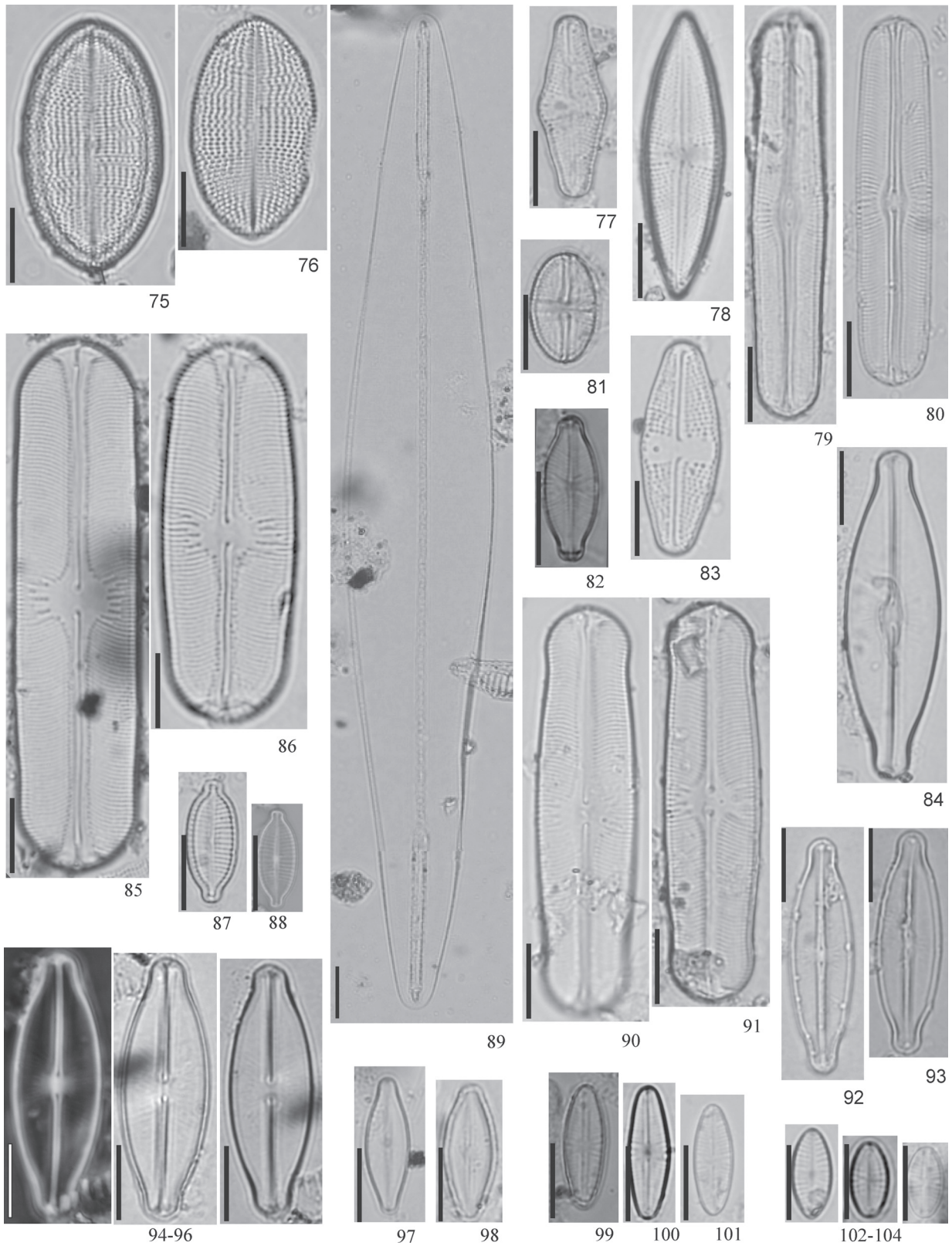
The specimens encountered were similar to *Navicula paanaensis* A. Cleve-Euler with regard to valve shape and size. However, the two species differ in valve width and striae density, as well as in the shape and size of the central area. According to Hustedt (1961-66), *N. paanaensis* presents a width of 6.0-7.5 µm, approximately 20 striae in 10 µm and its central area is smaller than *Eolimna* sp., formed by alternating long and short striae on either side of the valve.

Material examined: UNOP 2712, UNOP 2714, UNOP 2717, UNOP 2727 and UNOP 2800.

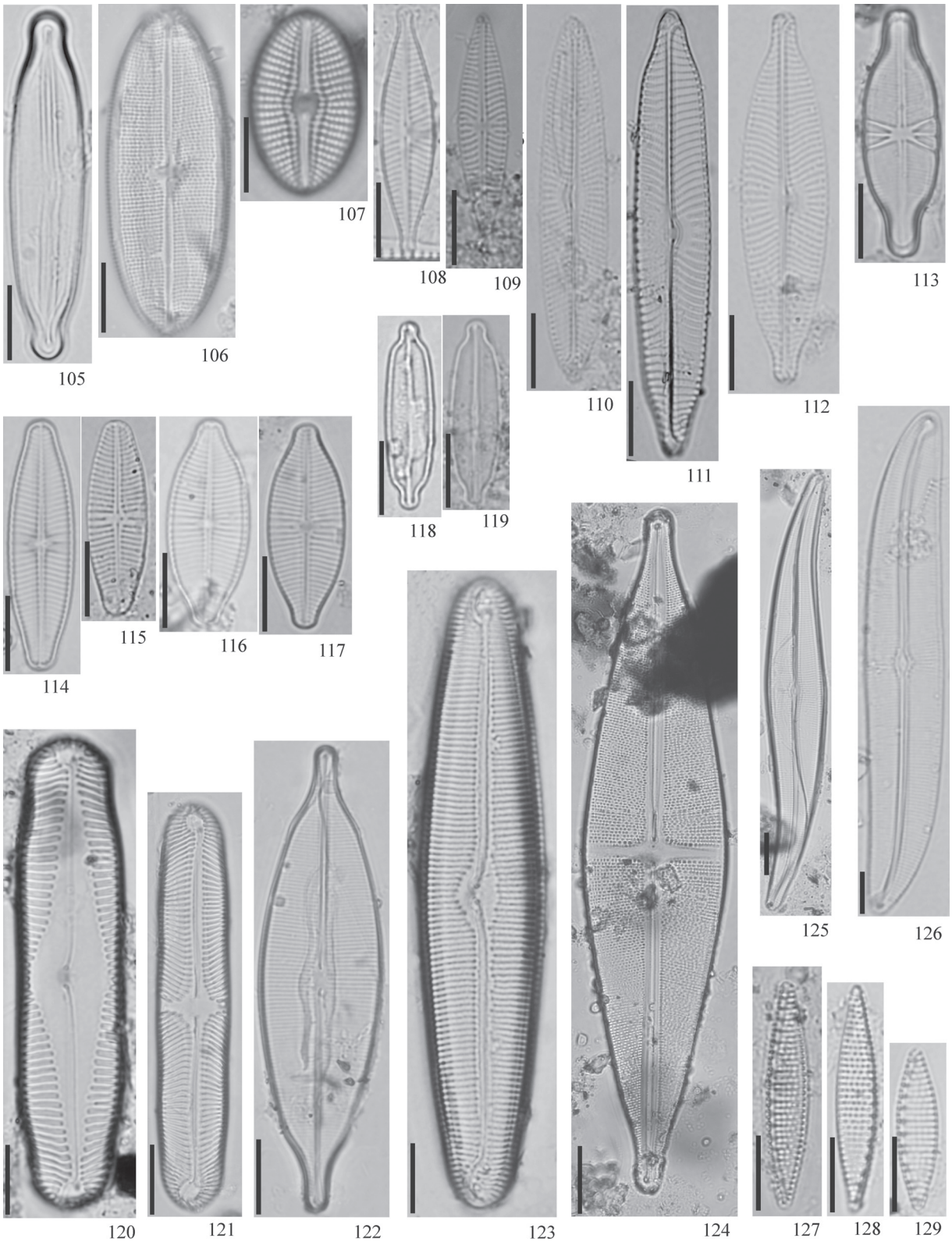
Naviculaceae

Geissleria neosubtropica Metzeltin, Lange-Bertalot & García-Rodríguez in Lange-Bertalot, Iconogr. Diatomol. 15: 70, pl. 91, fig. 20-23; pl. 76, fig. 5, 2005.

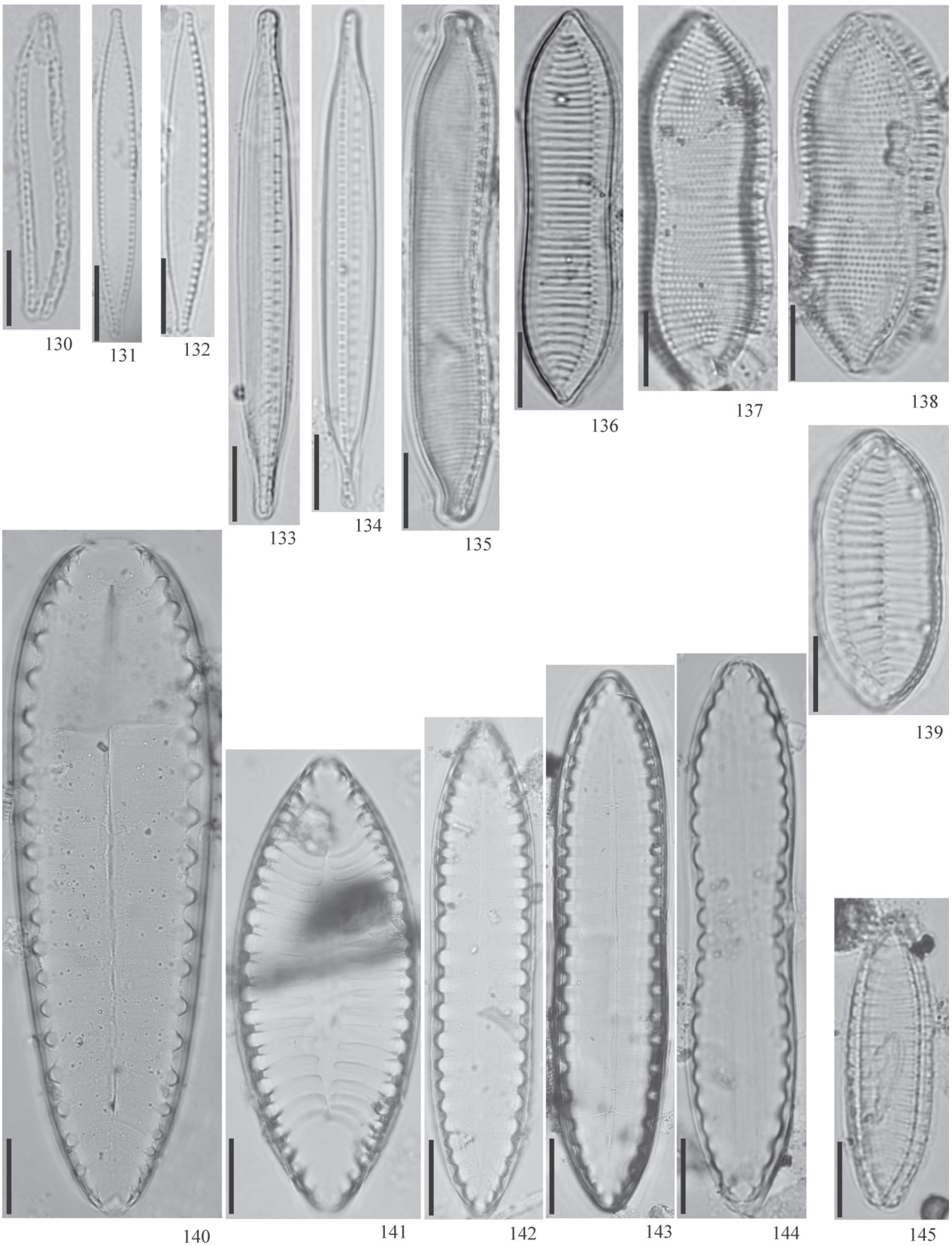
Fig. 116-117



Figures 75-104. Diatoms of Iguaçu National Park. 75-76. *Cocconeis placentula* Ehrenberg var. *lineata* (Ehrenberg) Van Heurck. 77. *Luticola aequatorialis* (Heiden) Lange-Bertalot & Ohtsuka. 78. *Luticola mutica* var. *lanceolata* (Frenguelli) Aboal. 79-80. *Sellaphora laevissima* (Kützing) Mann. 81. *Luticola muticoides* (Hustedt) Mann. 82. *Sellaphora pupula* (Kützing) Mereschkowsky. 83. *Luticola simplex* Metzeltin, Lange-Bertalot & García-Rodriguez. 84. *Sellaphora* sp.1. 85-86. *Sellaphora garciarodriguezii* Metzeltin & Lange-Bertalot. 87-88. *Naviculadicta nanogomphonema* Lange-Bertalot & Rumrich. 89. *Amphipleura lindheimeri* Grunow. 90-91. *Sellaphora rhombicarea* Metzeltin, Lange-Bertalot & García-Rodriguez. 92-93. *Sellaphora* sp.2. 94-96. *Sellaphora* sp.3. 97-98. *Nupela praecipua* (Reichardt) Reichardt. 99-101. *Eolimna* sp. 102-104. *Eolimna submuralis* (Hustedt) Lange-Bertalot & Kulikovskiy. Scales: 10 µm.



Figures 105-129. Diatoms of Iguaçu National Park. 105. *Frustulia neomundana* Lange-Bertalot & Rumrich. 106. *Neidium infirmum* Metzeltin & Krammer. 107. *Diploneis subovalis* Cleve. 108. *Navicula cryptocephala* Kützing. 109. *Navicula cryptotenella* Lange-Bertalot. 110. *Navicula escambia* (Patrick) Metzeltin & Lange-Bertalot. 111. *Navicula neomundana* (Lange-Bertalot & Rumrich) Lange-Bertalot, Jarlman & Van de Vijver. 112. *Navicula rostellata* Kützing. 113. *Capartograma crucicola* (Grunow ex Cleve). 114-115. *Geissleria aikenensis* Patrick. 116-117. *Geissleria neosubtropica* Metzeltin, Lange-Bertalot & García-Rodríguez. 118-119. *Adlafia drouetiana* (Patrick) Metzeltin & Lange-Bertalot. 120. *Pinnularia meridiana* Metzeltin & Krammer. 121. *Pinnularia divergens* W. Smith. 122. *Craticula ambigua* (Ehrenberg) Mann. 123. *Pinnularia butantanum* (Krasske) Metzeltin. 124. *Stauroneis* cf. *sylviabonillae* Metzeltin, Lange-Bertalot & García-Rodríguez. 125. *Gyrosigma acuminatum* (Kützing) Rabenhorst. 126. *Gyrosigma obtusatum* (Sullivan & Wormley) Boyer. 127-129. *Nitzschia amphibia* Grunow. Scales: 10 µm.



Figures 130-145. Diatoms of Iguaçu National Park. 130. *Nitzschia clausii* Hantzsch. 131-132. *Nitzschia palea* (Kützing) Wm. Smith. 133-134. *Nitzschia dissipata* (Kützing) Grunow. 135. *Hantzschia amphioxys* (Ehrenberg) Grunow. 136. *Tryblionella hungarica* Grunow. 137-138. *Tryblionella coarctata* (Grunow) Mann. 139. *Tryblionella victoriae* Grunow. 140. *Surirella splendida* (Ehrenberg) Kützing. 141. *Surirella kittoni* Schmidt. 142-143. *Surirella linearis* Smithii. 144. *Surirella linearis* var. *constricta* Grunow. 145. *Surirella angusta* Kützing. Scales: 10 µm.

Valves elliptical to rhombic-elliptical; ends slightly subrostrate; raphe sternum linear and narrow; central area reduced; one stigma near the central nodule; raphe filiform, straight; striae radiate and more densely arranged at the ends. L: 25.9-28.4 µm; W: 10.3-11.8 µm; MS: 12-14 in 10 µm; AS: 15-16 in 10 µm.

The species is similar to *Geissleria lateropunctata* (Wallace) Potapova & Winter (≈ *G. neotropica* Metzeltin & Lange-Bertalot) in valve morphology, but differs in valve dimensions and striae density. Analyzing the specimens of *Geissleria lateropunctata*, Potapova & Winter (2006) found examples 17-22 µm in length and 8 µm in width, with 22-24 striae in 10 µm. However, *G. neosubtropica* was proposed with 21-28 µm in length, 8.6-10.6 µm in width and 16-18 striae in 10 µm (Metzeltin *et al.* 2005). Moreover, the slight dorsiventrality seen in this taxon is an important characteristic of differentiation with respect to *G. neosubtropica.*

Material examined: UNOP 2708, UNOP 2712, UNOP 2715, UNOP 2729 and UNOP 2800.

Occurrence: first citation for Brazil.

Pinnulariaceae

Pinnularia meridiana Metzeltin & Krammer in Lange-Bertalot, Iconogr. Diatomol. 5: 180; pl. 181, fig. 1- 5, 1998.
Fig. 120

Valves linear; ends largely subcapitate; raphe sternum broad, lanceolate; central area broadly rhombic, reaching the valve margins; raphe straight; proximal raphe fissures unilaterally deflected; striae radiate to converging at the apices. L: 53.8-72.5 µm; W: 15-16.4 µm; S: 8-9 in 10 µm.

Material examined: UNOP 2712 and UNOP 2714.

Occurrence: first citation for the state of Paraná.

Stauroneidaceae

Stauroneis cf. ***sylviabonillae*** Metzeltin, Lange-Bertalot & García-Rodríguez in Lange-Bertalot, Iconogr. Diatomol. 15: 224, pl. 106, fig. 1-2, 2005.
Fig. 124

Valves lanceolate; apices gently protracted, subcapitate--rostrate; raphe sternum straight and narrow; central area laterally dilated, almost linear; raphe straight; proximal ends slightly unilaterally deflected; striae parallel to radiate; areolae evident and irregularly spaced. L: 103-117.8 µm; W: 20-22 µm; S: 20 in 10 µm, A: 16 in 10 µm.

The specimens documented resemble *Stauroneis sylviabonillae* in valve morphology, extremity shape and dimensions. However, they present higher striae density, given that *S. sylviabonillae* presents only 15-16 striae in 10 µm (Metzeltin *et al.* 2005).

Material examined: UNOP 2706 and UNOP 2729.

Occurrence: first citation for Brazil.

The Cais Bananeiras station showed higher species richness, with 79 taxa, while the Cais Macuco Safari station yielded 66. The most well-represented genus was *Gomphonema*, with nine species. Two species represent new records for the state of Paraná: *Gomphonema gibberum* and *Pinnularia meridiana.* Nine species represented new records for Brazil: *Cymbella charrua*, *Placoneis ovillus*, *Gomphonema affinopsis*, *Gomphosphenia lingulatiformis*, *Luticola aequatorialis*, *Sellaphora garciarodriguezii*, *Geissleria neosubtropica*, *Eolimna submuralis* and *Stauroneis* cf. *sylviabonillae.*

Cocconeis placentula var. *lineata* was present in all samples, at both sampling stations. Eighteen species were found only at Cais Bananeiras Station: *Eunotia rabenhorstii* var. *triodon*, *E. sudetica*, *Frustulia neomundana*, *Sellaphora garciarodriguezii*, *S. pupula*, *Sellaphora* sp.1, *Sellaphora* sp.2, *Sellaphora* sp.3, *Navicula cryptocephala*, *Naviculadicta nanogomphonema*, *Adlafia drouetiana*, *Craticula ambigua*, *Pinnularia divergens* var. *divergens*, *P. meridiana*, *Nitzschia dissipata*, *Tryblionella hungarica*, *Surirella kittoni* and *S. linearis*. Seven were exclusive to Cais Macuco Safari Station: *Eunotia camelus*, *E. formica*, *E. pseudosudetica*, *Gomphosphenia lingulatiformis*, *Luticola muticoides*, *Nitzschia clausii* and *Hantzschia amphioxys*. The actual identity of three taxa was in question, when compared with the literature: *Placoneis* cf. *serena*, *Placoneis* cf. *uruguaiensis* and *Stauroneis* cf. *sylviabonillae*. Five were not identified at the infrageneric level due to the absence of illustrations and descriptions of morphologically similar individuals in the available literature: *Gomphonema* sp., *Sellaphora* sp.1, *Sellaphora* sp.2, *Sellaphora* sp.3 and *Eolimna* sp. Studies that are more in--depth should be conducted in order to determine whether these constitute new species.

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