

Freshwater microturbellarians (Platyhelminthes) from Rio Grande do Sul, Brazil

Jacinto Gamo ¹ & Ana Maria Leal-Zanchet ²

¹ Departamento de Biología Animal, Universidad de Alcalá. Ctra. N-II, Km 33,6, 28871 Alcalá de Henares, Madrid, Spain. E-mail: jacinto.gamo@uah.es

² Instituto de Pesquisas de Planárias, Universidade do Vale do Rio dos Sinos. Avenida Unisinos 950, 93022-000 São Leopoldo, Rio Grande do Sul, Brasil. E-mail: zanchet@bios.unisinos.br

ABSTRACT. Ten species of freshwater microturbellarians of three orders, Catenulida, Macrostomida and Rhabdocoela, were collected in seven sites situated in the Northeast region of Rio Grande do Sul, Brazil. Two species, *Macrostomum johni* Young, 1972 and *Mesostoma productum* (Schmidt, 1848), are cited for the first time for Brazil, the citation of *M. johni* being also the first one for the Neotropical Region. All species are cited for the first time for the state of Rio Grande do Sul.

KEY WORDS. Neotropical, new records.

RESUMO. Dez espécies de microturbelários dulciaquícolos, pertencentes a três ordens, Catenulida, Macrostomida e Rhabdocoela, foram coletados em sete localidades situadas no Nordeste do estado do Rio Grande do Sul, Brasil. Duas dessas espécies, *Macrostomum johni* Young, 1972 e *Mesostoma productum* (Schmidt, 1848), são registradas pela primeira vez para o Brasil, sendo o registro de *M. johni* o primeiro também para a Região Neotropical. Todas as espécies são registradas pela primeira vez para o estado do Rio Grande do Sul.

PALAVRAS CHAVE. Neotropical, novos registros.

Compared to other geographical regions, the diversity and distribution of continental turbellarians from the Neotropical Region are poorly known. Besides, most of these studies focused, however, on macroturbellarians of the order Tricladida, suborders Paludicola and Terricola (see KAWAKATSU *et al.* 1992, SEITENFUS & LEAL-ZANCHET in press). Referring to freshwater Neotropical microturbellarians, the studies are scarcer, the MARCUS' studies (1943, 1944, 1945a, b, 1946, 1949) being very important. More recently, PONCE DE LEÓN (1984, 1986), NOREÑA-JANSSEN (1995), NOREÑA-JANSSEN & FAUBEL (1996) and BRUSA *et al.* (2003), among others, have increased the knowledge on the diversity and distribution of this group in South-America as showed by NOREÑA *et al.* (2003).

The main purpose of the present work is to report on the results of the first survey of freshwater microturbellarians from Southern Brazil (state of Rio Grande do Sul, Brazil).

MATERIAL AND METHODS

The sample sites (Fig. 1, Tab. I) were visited once between March and April 2003. Turbellarians were collected by means of a conical hand net (mesh width 335 µm), which was used to sweep through vegetation of the margins of the water bodies. In the laboratory, samples were examined and the microturbellarians were extracted for observations *in vivo* by the method of progressive squash (GAMO 1987a). If necessary for species determination, part of the material was fixed with neutral formaline or Bouin (ROMEIS 1989), embedded in Paraplast

(Sigma) and sectioned at 5 µm. Sections were stained with Mallory/Cason (ROMEIS 1989).

The material was determined based on the taxonomic keys of GAMO (1987b) and YOUNG (2001) as well as by comparison with the material described by FARIAS *et al.* (1995), GAMO & SCHWANK (1987), GAMO & NOREÑA-JANSSEN (1998), LUTHER (1955, 1960, 1963), MARCUS (1945a, b, 1946) and NOREÑA-JANSSEN (1995).

RESULTS AND DISCUSSION

All species herein reported are cited for the first time for the state of Rio Grande do Sul, Brasil. Two citations, *Macrostomum johni* Young, 1972 and *Mesostoma productum* (Schmidt, 1848), are the first ones for Brazil, the citation of *M. johni* being also the first one for the Neotropical Region.

Catenulida Meixner, 1924

Catenulidae Graff, 1905

Catenula lemnae Dugés, 1832

Numerous individuals (more than 100) formed by chains of up to 20 zooids (Fig. 2) were collected in one site only (Tab. II). The species was previously recorded by MARCUS (1945a) for the city of São Paulo and vicinities, state of São Paulo, and the vicinities of Curitiba, state of Paraná, Brazil, and by NOREÑA-JANSSEN (1995) for Santa Fé, Argentina. This is the fourth record for the Neotropical Region and the third one for Brazil.

Table I. Description and location of sampling sites in the Northeast region of Rio Grande do Sul, Brazil. ¹ Artificial pond, ² stream.

Collecting site	Description	Latitude/Longitude
São Leopoldo ¹	Artificial pond (approx. 23.000 m ²) in the Campus of UNISINOS	29°47'42"S, 51°09'25"W
São Leopoldo ²	Small stream (approx. 11m wide) in the Campus of UNISINOS	29°47'36"S, 51°09'18" W
Lomba Grande (Novo Hamburgo)	Small lagoon (approx. 43 x 20m) in the Sinors river floodplain	29°43'19.7"S, 51°01'26"W
Tramandaí	Small channel between two coastal lagoons 1000m far from the litoral	30°00'14"S, 50°09'31"W
Nova Tramandaí	Two small coastal lagoons (approx. 30 x 10 m) 2000m far from the litoral	30°01'01"S, 50°09'16"W
Nova Petrópolis	Small artificial pond (approx. 70 x 30m) in the "Parque do Imigrante"	29°22'17" S, 51°06'25"W
Santo Antônio da Patrulha	Small coastal lagoon (30 x 10m) partially covered by a road	29°50'32"S, 50°37'53"W

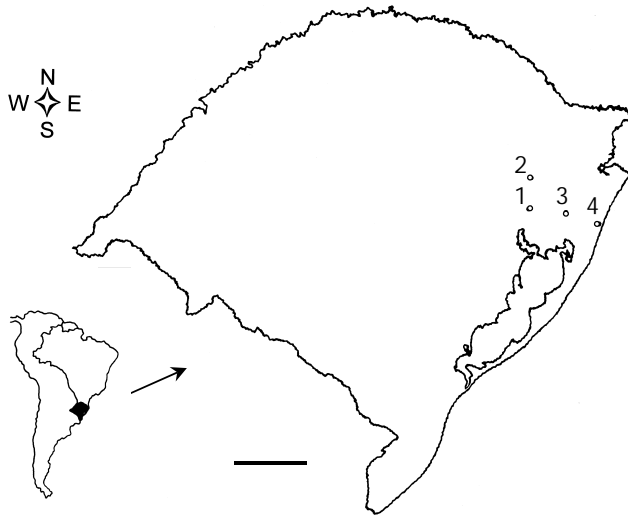


Figure 1. Location of sampling sites in the Northeast region of Rio Grande do Sul: (1) São Leopoldo and Lomba Grande, (2) Nova Petrópolis, (3) Santo Antônio da Patrulha, (4) Tramandaí and Nova Tramandaí. Bar: 100 Km.

Stenostomidae Vejdvovsky, 1880

Stenostomum bicaudatum Kennel, 1888

In all four collection sites (Tab. II) more than five individuals were collected. They were constituted by one or two zooids (Figs 3-4) between 1 to 2 mm long. All collected individuals show four spherules in the third pair of light refracting organs instead of two spherules as in the case of the specimens studied by MARCUS (1945a).

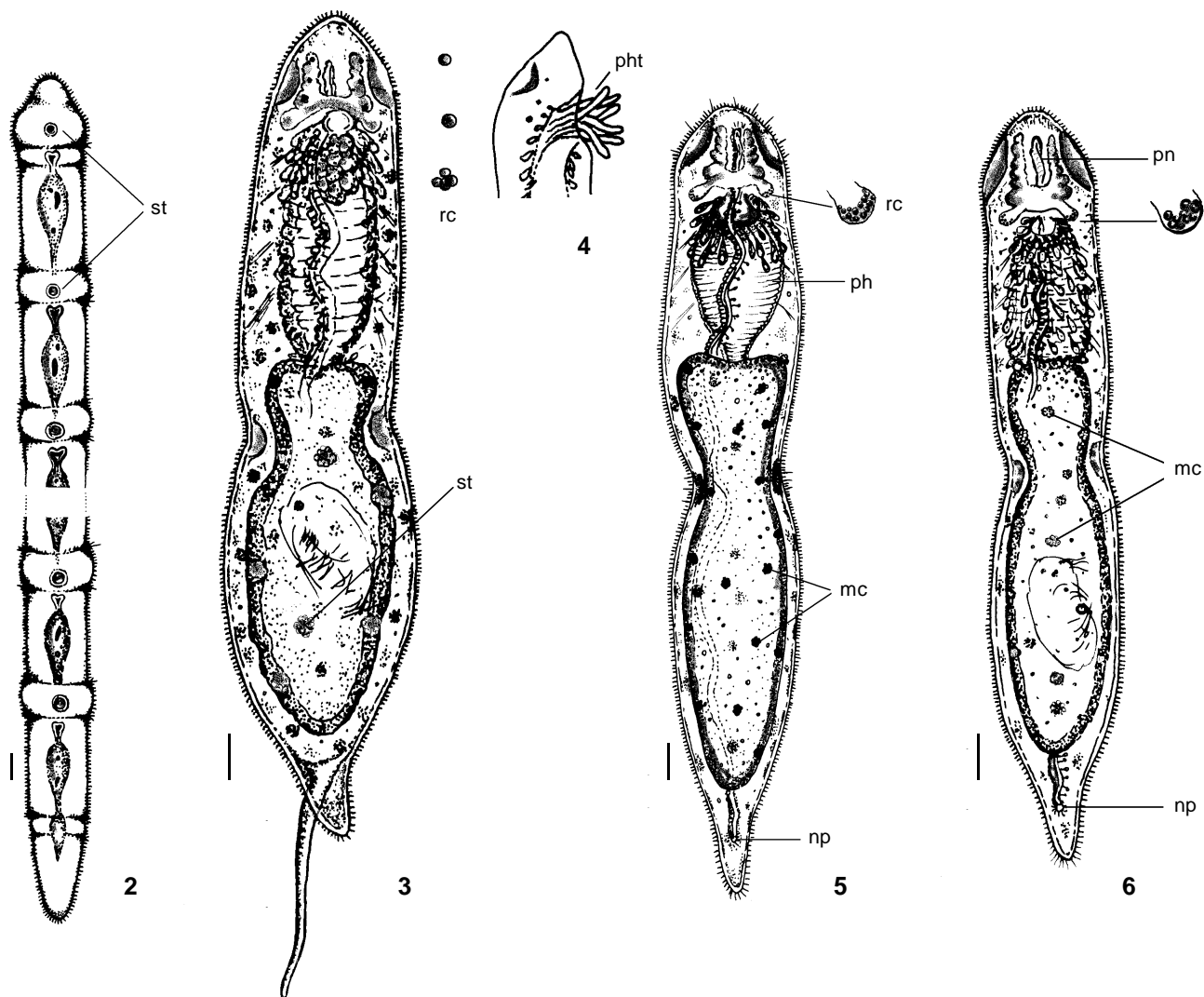
The species was previously registered by MARCUS (1945a) for the city of São Paulo, Brazil, and by NOREÑA-JANSSEN (1995) for Santa Fé, Argentina. This is the third record for the Neotropical Region and the second one for Brazil.

Stenostomum grande Child, 1902

In the three collection sites (Tab. II), where *S. grande* was registered, more than five individuals were collected, which are constituted almost always by two zooids (Fig. 5) with length between 1.7 to 2.0 mm long. The species was previously recorded by MARCUS (1945a) for the city of São Paulo as well as for Curitiba, state of Paraná, Brazil, the present record being the third one for the Neotropical Region and Brazil.

Table II. Registered species (x) in each sampling site in the northeast region of Rio Grande do Sul, Brazil. ¹ Artificial pond, ² stream.

Species	São Leopoldo ¹	São Leopoldo ²	Lomba Grande	Tramandaí	Nova Tramandaí	Nova Petrópolis	Santo Antônio da Patrulha
<i>Catenula lemnae</i>		x					
<i>Stenostomum bicaudatum</i>		x	x		x		x
<i>Stenostomum grande</i>	x	x	x				
<i>Stenostomum leucops leucops</i>	x	x	x		x		
<i>Macrostomum johni</i>							x
<i>Macrostomum tuba</i>	x					x	
<i>Gieysztorina ornata</i>				x			
<i>Gieysztorina trisolena</i>							x
<i>Mesostoma ehrenbergii</i>			x		x		
<i>Mesostoma productum</i>	x				x	x	



Figures 2-6. Catenulella: (2) *Catenula lemnae* from a small stream at UNISINOS in dorsal view; (3-4) *Stenostomum bicaudatum* from a lagoon at "Lomba Grande": (3) dorsal view of whole specimen; (4) cephalic region in lateral view; (5) *Stenostomum grande* from a lagoon at "Lomba Grande" in dorsal view; (6) *Stenostomum leucops leucops* from a lagoon at "Lomba Grande" in dorsal view. (mc) Minot cells, (np) nephridiopore, (ph) pharynx, (pht) pharyngeal tentacles, (pn) protonephridium, (rc) light refracting corpuscles, (st) statocyst. Bars: 100 μ m.

Stenostomum leucops leucops (Dugés, 1828)

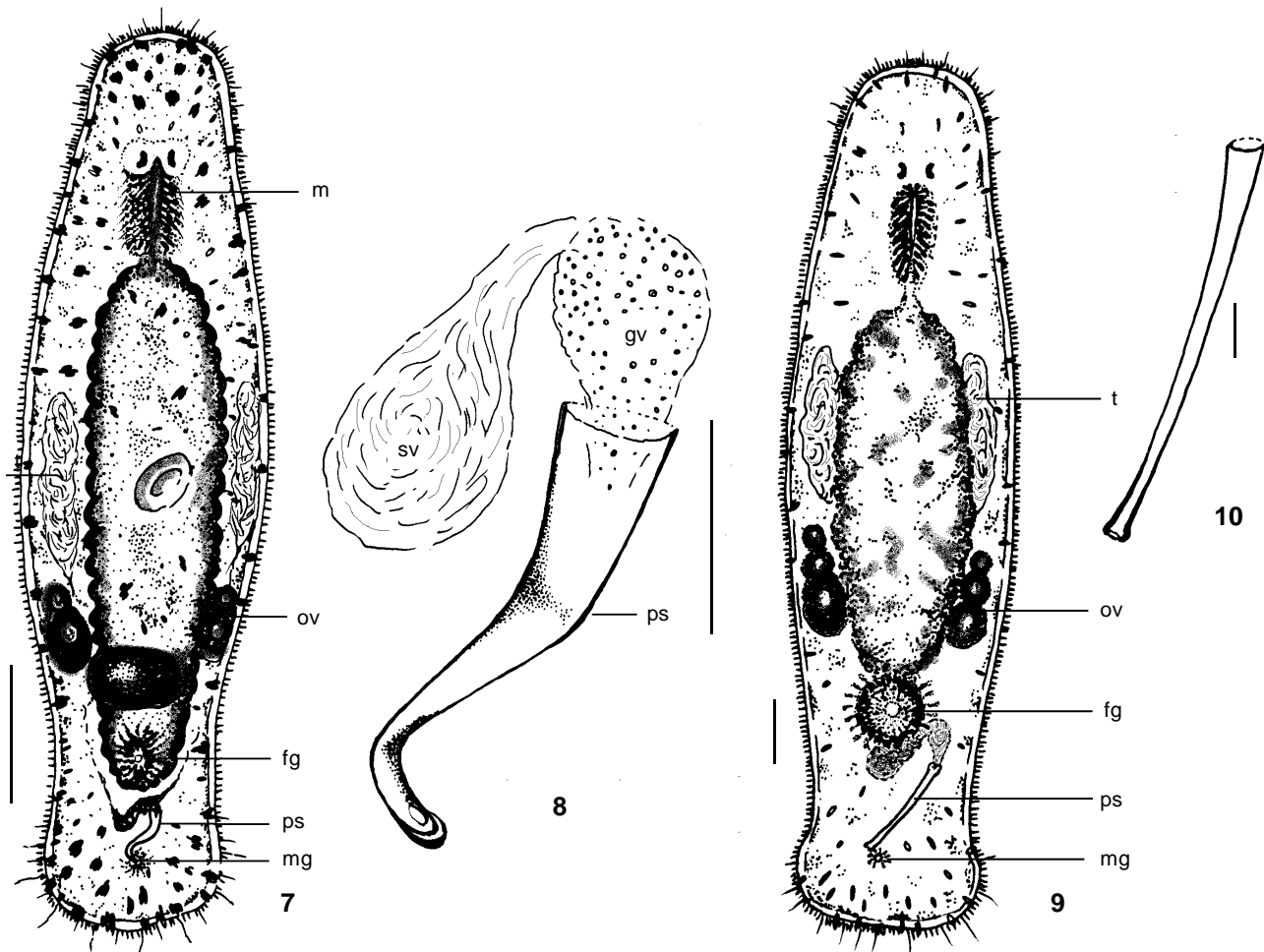
In all four collection sites (Tab. II) more than five individuals were collected. They are constituted by two zooids (Fig. 6) with length between 1.5 and 2.0 mm. The species was registered by MARCUS (1945a), as *Stenostomum tenuicauda* Graff, 1912, for the city of São Paulo, and as *Stenostomum amphotum* Marcus, 1945, for the cities of São Paulo and Campinas, state of São Paulo, both having been synonymised by LUTHER (1960) with *S. leucops leucops*. The present record is the fourth one for the Neotropical Region and Brazil.

Macrostomida Meixner, 1924

Macrostomidae Beneden, 1870

Macrostomum johni Young, 1972

Two individuals of *M. johni* were collected in one site only (Tab. II). They are 0.6 and 0.7 mm long showing penis stylet with a length of 40 and 45 μ m, respectively (Figs 7-8). In England, the individuals of *M. johni*, that have a length of up to 1.3 mm, show a penis stylet measuring 86 μ m long (YOUNG 1972). This is the first record for the Neotropical Region.



Figures 7-10. Macrostomida. (7-8) *Macrostomum johni* from a coastal lagoon at "Santo Antônio da Patrulha": (7) dorsal view of whole specimen; (8) detail of copulatory apparatus; (9-10) *Macrostomum tuba* from a pond at "Nova Petrópolis": (9) dorsal view of whole specimen; (10) detail of penis stylet. (fg) Female gonopore, (gv) granulum vesicle, (m) mouth, (mg) male gonopore, (ov) ovary, (ps) penis stylet, (t) testes, (sv) seminal vesicle. Bars: (7, 9) 100 μ m, (8, 10) 20 μ m.

Macrostomum tuba (Graff, 1882)

One specimen in each collection site (Tab. II) was registered; a 1.3 mm long adult (Fig. 9) in Nova Petrópolis and a 0.6 mm long juvenile specimen in São Leopoldo. The adult showed a penis stylet 155 μ m long (Fig. 10). However, the length of the stylet registered for the species varies between 280 and 420 μ m (YOUNG 2001). The species was previously registered by MARCUS (1946), as *Macrostomum gigas* Okugawa, 1930, having been synonymised by HYMAN (1955) with *M. tuba*, for the city of São Paulo and vicinities, and by HYMAN (1955) for Cabagua Island, near Venezuela. The present record is the third one for the Neotropical Region and the second one for Brazil.

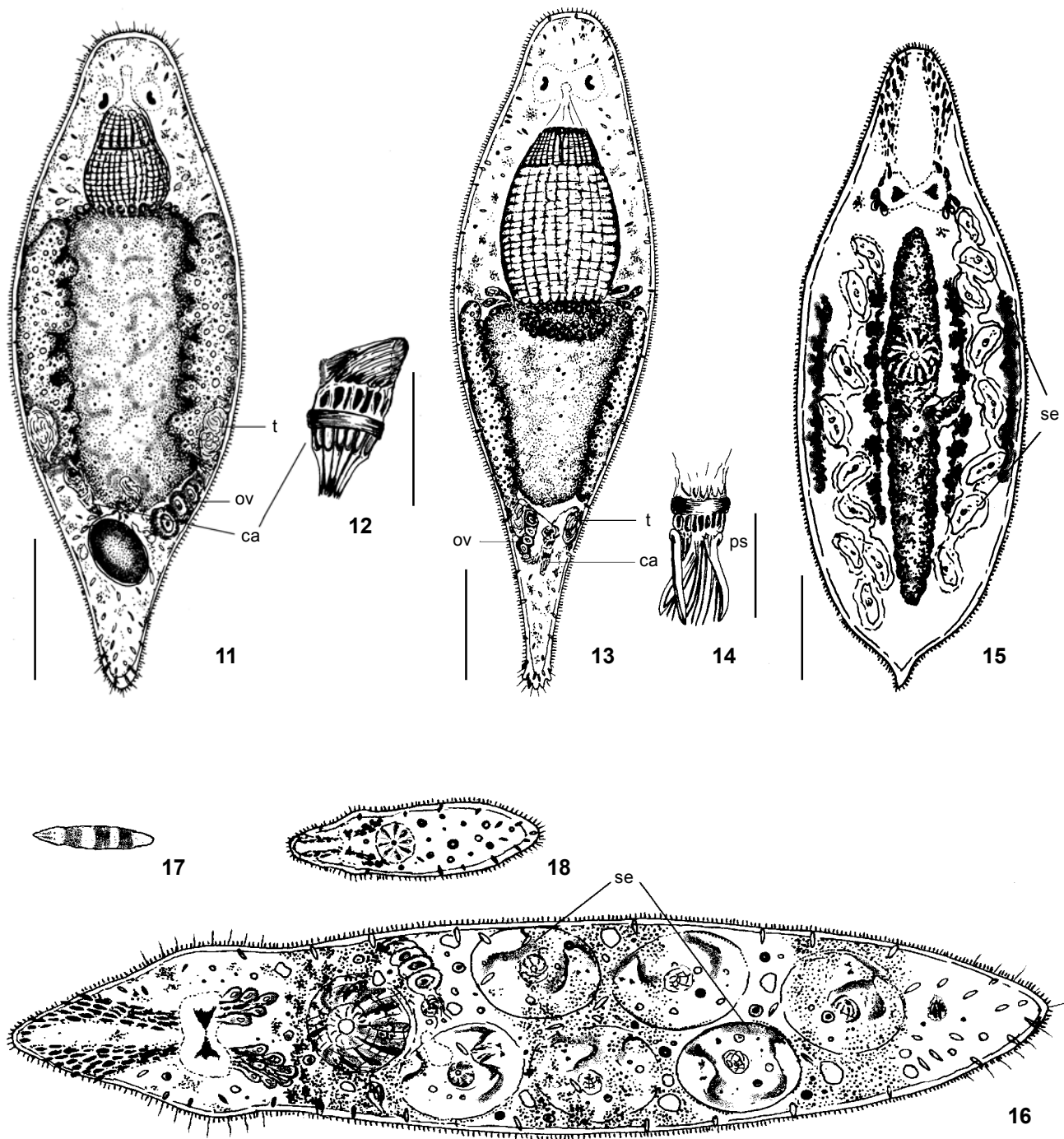
Rhabdocoela Meixner, 1925

Dalyellioida Bresslau, 1928-34

Dalyelliidae Graff, 1903

Gieysztoria ornata Hofsten, 1907

Two specimens were collected in only one collection site (Tab. II, Figs 11-12), presenting lengths of 0.5 and 0.6 mm with penis stylet of 25 and 30 μ m long, respectively, that are close to the length for the species registered by LUTHER (1955) for specimens from Brännskär and Tümpel (Northern Europe) (between 0.8 and 1.0 mm), and by MARCUS (1946) for specimens from the city of São Paulo (0.8 mm). The present record is the second one for the Neotropical Region and Brazil.



Figures 11-18. Rhabdocoela. (11-12) *Gieysztoria ornata* from a coastal lagoon at "Tramandaí": (11) dorsal view of whole specimen; (12) detail of copulatory apparatus; (13-14) *Gieysztoria trisolea* from a coastal lagoon at "Santo Antônio da Patrulha": (13) dorsal view of whole specimen; (14) detail of copulatory apparatus; (15) *Mesostoma ehrenbergi* from a coastal lagoon at "Nova Tramandaí" in dorsal view; (16-18) *Mesostoma productum* from a coastal lagoon at "Nova Tramandaí": (16) dorsal view of whole adult specimen, (17) dorsal view of external morphology of adult specimen; (18) dorsal view of whole juvenile. (ca) Copulatory apparatus, (ov) ovary, (ps) penis stylet, (se) subitaneous eggs with developing embryos, (t) testes. Bars: (11, 13, 16) 100 μ m, (15) 1000 μ m, (12, 14) 20 μ m.

Gieysztoria trisolena Marcus, 1946

Two 0.6 mm long individuals were collected in only one collection site (Tab. II, Figs 13-14), which correspond very well with the description given by MARCUS (1946) for the specimens from the city of São Paulo, being smaller than Marcus' specimens (up to 2.0 mm). This is the second record of *G. trisolena* for the Neotropical Region and Brazil.

Typhloplanoida Bresslau, 1933

Typhloplanidae Graff, 1905

Mesostominae Luther, 1904

Mesostoma ehrenbergii (Focke, 1836)

Two juvenile specimens were collected in Lomba Grande and an adult in Nova Tramandaí (Tab. II, Fig. 15), which are 3 mm, 4 mm and 6 mm long, respectively. Such measurements contrast with the 12-14 mm long adult specimens from Europe as well as with those from São Paulo (15mm long), but are closer to the length (8-10 mm) of the specimens from Argentina (NOREÑA-JANSSEN 1995). The adult specimen showed 17 subteous eggs, each with a developing embryo. This worldwide distributed species was previously registered for São Paulo (MARCUS 1946), Sauce, Uruguai (PONCE DE LEÓN 1984), Lake Titicaca, Peru (BEAUCHAMP 1939), Santa Fé and San Carlos de Bariloche, Argentina (NOREÑA-JANSSEN 1995), the present record being the sixth one for the Neotropical Region, the second one for Brazil.

Mesostoma productum (Schmidt, 1848)

Ten individuals were collected, two in Nova Petrópolis, three in Nova Tramandaí and five in São Leopoldo (Tab. II). They are between 0.6 and 0.8 mm long (Figs 16-18). The species was previously registered by NOREÑA-JANSSEN (1995) for Santa Fé, Argentina, the description and measurements of which coincide with those of the present study. This is the second record for the Neotropical Region and the first one for Brazil.

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REFERENCES

- BEAUCHAMP, P. 1939. Rotifères et Turbellariés. In: The Percy Sladen Trust Expedition to Lake Titicaca in 1937 under the leadership of Mr. Cary Gilson M-A. **Transactions of the Linnean Society London**, London, (3) 1 (1): 51-78.
- BRUSA, E.; C. DAMBORENEA & C. NOREÑA. 2003. A new species of *Gieysztoria* (Platyhelminthes, Rhabdocoela) from Argentina and a kinship analysis of South American species of the genus. **Zoologica Scripta**, Göteborg, 32 (5): 449-457.
- FARIAS, E.; J. GAMO & C. NOREÑA-JANSSEN. 1995. Nuevas aportaciones al conocimiento de los microturbelarios de la Península Ibérica. **Graellsia**, Madrid, 51: 93-100.
- GAMO, J. 1987a. Microturbelarios de la Península Ibérica. **Miscelania Zoologica**, Barcelona, 11: 41-49.
- . 1987b. **Claves de identificación de los turbelarios de las aguas continentales de la Península Ibérica e Islas Baleares**. Madrid, Asociacion Española de Limnología, 34p.
- GAMO, J. & C. NOREÑA-JANSSEN. 1998. Old and new records of turbellarians from the central areas of Spain. **Hydrobiologia**, Dordrecht, 383: 299-305.
- GAMO, J. & P. SCHWANK. 1987. One new species of *Castrada* (Turbellaria, Neorhabdocoela) and four new records of microturbellarians in the Iberian peninsula. **Archiv für Hydrobiologie**, Stuttgart, 110 (4): 605-615.
- HYMAN, L. 1955. Miscellaneous marine and terrestrial flatworms from South America. **American Museum Novitates**, New York, 1742: 1-33.
- KAWAKATSU, M.; J. HAUSER & R. PONCE DE LEÓN. 1992. Freshwater planarians from Uruguay and Rio Grande do Sul, Brazil: *Dugesia urolograndeana* sp. nov. and *Dugesia tigrina* (Girard, 1850) (Turbellaria, Tricladida, Paludicola). **Bulletin of the Biogeographical Society of Japan**, Tokyo, 47: 1-16.
- LUTHER, A. 1955. Die Dalyelliiden (Turbellaria Neorhabdocoela). Eine Monographie. **Acta Zoologica Fennica**, Helsinki, 87: 1-337.
- . 1960. Die Turbellarien Ostfennoscadiens I. Acoela, Catenulida, Macrostromida, Lecithoepitheliata, Prolecithophora und Proseriata. **Fauna Fennica**, Helsinki, 7: 1-155.
- . 1963. Die Turbellarien Ostfennoscadiens IV. Neorhabdocoela 2. Typhloplanoida: Typhloplanidae, Solenopharyngidae und Carcharodopharyngidae. **Fauna Fennica**, Helsinki, 16: 1-163.
- MARCUS, E. 1943. O Turbelário *Mesostoma ehrenbergii* (Focke, 1836) no Brasil. **Boletim da Indústria Animal**, São Paulo, 6 (1-2): 12-15.
- . 1944. Sobre duas Prorhynchidae (Turbellaria), novas para o Brasil. **Arquivos do Museo Paranaense**, Curitiba, 4: 3-46.
- . 1945a. Sobre microturbelários do Brasil. **Comunicaciones de Zoología del Museo de Historia Natural de Montevideo**, Montevideo, 25: 1-74.
- . 1945b. Sobre Catenulida Brasileiros. **Boletim da Fa-**

- culdade de Filosofia, Ciências e Letras da Universidade de São Paulo, série Zoologia**, São Paulo, **10**: 3-133.
- . 1946. Sobre Turbellaria Brasileiros. **Boletim da Faculdade de Filosofia, Ciências e Letras da Universidade de São Paulo, série Zoologia**, São Paulo, **11**: 5-254.
- . 1949. Turbellaria Brasileiros (7). **Boletim da Faculdade de Filosofia, Ciências e Letras da Universidade de São Paulo, série Zoologia**, São Paulo, **14**: 7-156.
- NOREÑA-JANSSEN, C. 1995. Studies on the taxonomy and ecology of the turbellarian (Plathelminthes) in the floodplain of the Paraná river (Argentina). II. Taxonomy and ecology of the Turbellaria. **Archiv für Hydrobiologie**, Stuttgart, **Suppl. 107**: 11-262.
- NOREÑA-JANSSEN, C. & A. FAUBEL. 1996. *Myoretronectes paranaensis* n.gen et sp., a new freshwater genus of the family Retronectidae (Turbellaria, Catenulida) from the Paraná, Argentina. **Hydrobiologia**, Dordrecht, **330**: 111-118.
- NOREÑA, C.; F. BRUSA & A. FAUBEL. 2003. Census of "Microturbellarians" (free-living Platyhelminthes) of the zoogeographical regions originating from Gondwana. **Zootaxa**, Auckland, **146**: 1-34.
- PONCE DE LEÓN, R. 1984. Turbellaria del Uruguay II. Sobre *Mesostoma ehrenbergii* (Foche) (Rhabdocoela Typhloplanidae). **Revista de la Facultad de Humanidades y Ciencias, Serie Ciencias Biológicas**, La Plata, **1**: 381-391.
- PONCE DE LEÓN, R. 1986. Turbellaria del Uruguay III. Sobre *Bothromesostoma evelinae* Marcus, 1946 (Rhabdocoela, Typhloplanidae). **Comunicaciones Zoológicas del Museo de Historia Natural de Montevideo**, Montevideo, **11**: 1-17.
- ROMEIS, B. 1989. **Mikroskopische Technik**. München, Urban und Schwarzenberg, 697p.
- SEITENFUS, A.L.R. & A.M. LEAL-ZANCHET. (in press). Uma introdução à morfologia e taxonomia de planárias terrestres (Platyhelminthes, Tricladida, Terricola). **Acta Biologica Leopoldensia**, São Leopoldo, **26** (2).
- YOUNG, J.O. 1972. Further studies on the occurrence of freshwater Microturbellaria in the British Isles. 1. A description of *Macrostomum johni* sp. nov. **Freshwater Biology**, Oxford, **2**: 253-258.
- YOUNG, J. O. 2001. **Keys to the freshwater microturbellarians of Britain and Ireland with notes on their ecology**. Ambleside, The Freshwater Biological Association, 142p.

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