



Biota Neotropica
ISSN: 1676-0611
cjoly@unicamp.br
Instituto Virtual da Biodiversidade
Brasil

Falci Theza Rodrigues, Luciana; Silveira Leite, Felipe; da Gama Alves, Roberto
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Biota Neotropica, vol. 13, núm. 1, 2013, pp. 244-254
Instituto Virtual da Biodiversidade
Campinas, Brasil

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Rodrigues, L.F.T. et al.

Biota Neotrop. 2013, 13(1): 245-254.

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<http://www.biotaneotropica.org.br/v13n1/pt/abstract?inventory+bn02313012013>

Received/ Recebido em 25/06/12 -

Revised/ Versão reformulada recebida em 01/11/12 - Accepted/ Publicado em 22/02/13

ISSN 1676-0603 (on-line)

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Inventory and distribution of Oligochaeta (Annelida, Clitellata) in first-order streams in preserved areas of the state of Minas Gerais, Brazil

Luciana Falci Theza Rodrigues^{1,2}, Felipe Silveira Leite¹ & Roberto da Gama Alves¹

¹Laboratório de Invertebrados Bentônicos, Departamento de Zoologia, Instituto de Ciências Biológicas, Universidade Federal de Juiz de Fora – UFJF, Campus Universitário, s/n, CEP 36036 900, Juiz de Fora, MG, Brasil

²Corresponding author: Luciana Falci Theza Rodrigues, e-mail: biofalci@hotmail.com

RODRIGUES, L.F.T., LEITE, F.S. & ALVES, R.G. **Inventory and distribution of Oligochaeta (Annelida, Clitellata) in first-order streams in preserved areas of the state of Minas Gerais, Brazil.** Biota Neotrop. 13(1): <http://www.biotaneotropica.org.br/v13n1/en/abstract?inventory+bn02313012013>

Abstract: Data resulting from species inventories shed light on the richness and distribution of various groups. In Minas Gerais, work on inventory and distribution of the oligochaetes of lotic environments in preserved areas are non-existent. Therefore, this study aimed to inventory the limnic oligochaetes fauna of first-order streams located in four preserved areas, to expand knowledge of the ecology and distribution of this group. In total, 19 taxa were inventoried, belonging to the families Naididae and Enchytraeidae and the superorder Megadrili (earthworms), with the genus *Pristina* having the largest number of species. The number of species found in this investigation corresponds to 22% of oligochaetes species recorded in Brazilian aquatic environments. The results obtained add important knowledge of the distribution of some oligochaetes species in Brazil, represent the first records of species for the four preserved areas studied and confirm the first occurrence of various species in the state.

Keywords: biodiversity, Rock Fields, Atlantic Forest, Naididae, litter, oligochaetes, Enchytraeidae.

RODRIGUES, L.F.T., LEITE, F.S. & ALVES, R.G. **Inventário e distribuição de Oligochaeta (Annelida, Clitellata) em córregos de primeira ordem localizados em áreas preservadas do estado de Minas Gerais, Brasil.** Biota Neotrop. 13(1): <http://www.biotaneotropica.org.br/v13n1/pt/abstract?inventory+bn02313012013>

Resumo: Os dados resultantes de um levantamento fornecem informações sobre a riqueza e distribuição de diversos grupos. Em Minas Gerais, trabalhos sobre inventário e distribuição de oligoquetas de ambientes lóticos em áreas preservadas são inexistentes. Dessa forma, este estudo objetivou inventariar a fauna de oligoquetas límnicas de córregos de primeira ordem localizados em quatro áreas preservadas, visando ampliar as informações sobre ecologia e distribuição deste grupo. Foram inventariados 19 taxa pertencentes às famílias Naididae, Enchytraeidae e à superordem Megadrili, sendo o gênero *Pristina* o de maior número de espécies. O número de espécies encontradas neste trabalho corresponde a 22% das espécies de oligoquetas registrados em ambientes aquáticos brasileiros. Os resultados obtidos ampliam o conhecimento sobre a distribuição de algumas espécies de oligoquetas no Brasil, representam os primeiros registros de espécies para as quatro áreas preservadas estudadas e confirmam a primeira ocorrência de várias espécies no Estado.

Palavras-chave: biodiversidade, Campos Rupestres, Mata Atlântica, Naididae, folhiço, oligoquetas, Enchytraeidae.

Introduction

Species inventories are of great importance because they provide information on the richness and distribution of various groups. When carried out in preserved areas in particular they generate scientific knowledge to support formulation of management plans (Silveira et al. 2010). The data resulting from a study in preserved areas can be compared against those obtained in places subject to different levels of anthropic impact, to serve as reference for making decisions on investments in restoration and conservation of watersheds (Callisto et al. 2002).

In the state of Minas Gerais, studies in freshwater ecosystems have been carried out regarding various groups composing the community of benthic macroinvertebrates in preserved areas, such as the works of Callisto et al. (2001), Goulart & Callisto (2005), Tupinambás et al. (2007) and Rosa et al. (2011). Nevertheless, none until now have focused on the Oligochaeta.

According to Christoffersen (2007), of the 171 species of aquatic Microdrili distributed in South America, of which 86 species occur in Brazil, only three – *Dero lutzi* Michaelsen, 1926, *Chaetogaster limnei* K. von Baer, 1927 and *Pristina osborni* (Walton 1906) – had been recorded in Minas Gerais. With the works of Martins & Alves

(2008), Martins et al. (2008, 2011) and Suriani-Affonso et al. (2011), the number in the state has increased to 23. The true number is probably even higher, because ecological studies often record new species not considered in official records.

In this context, the present study aimed to inventory the limnic oligochaete fauna in first-order streams in preserved areas, to expand the information about the ecology and distribution of this group.

Materials and Methods

1. Study areas

The study was carried out in four preserved areas: Fazenda Floresta (21° 43' to 21° 44' S and 43° 16' to 43° 17' W), Poço D'Anta Municipal Biological Reserve (21° 44' to 21° 45' S and 43° 18' to 43° 19' W), Santa Cândida Municipal Biological Reserve (21° 41' to 21° 42' S and 43° 20' to 43° 21' W) and Ibitipoca State Park (21° 40' to 21° 43' S and 43° 52' to 43° 54' W) (Figure 1). The first three are located on the urban perimeter of the municipality of Juiz de Fora and are composed of remaining fragments of Atlantic Forest (Semideciduous Seasonal Forest). Ibitipoca State Park is located in the Conceição de Ibitipoca district of the municipality of Lima Duarte and

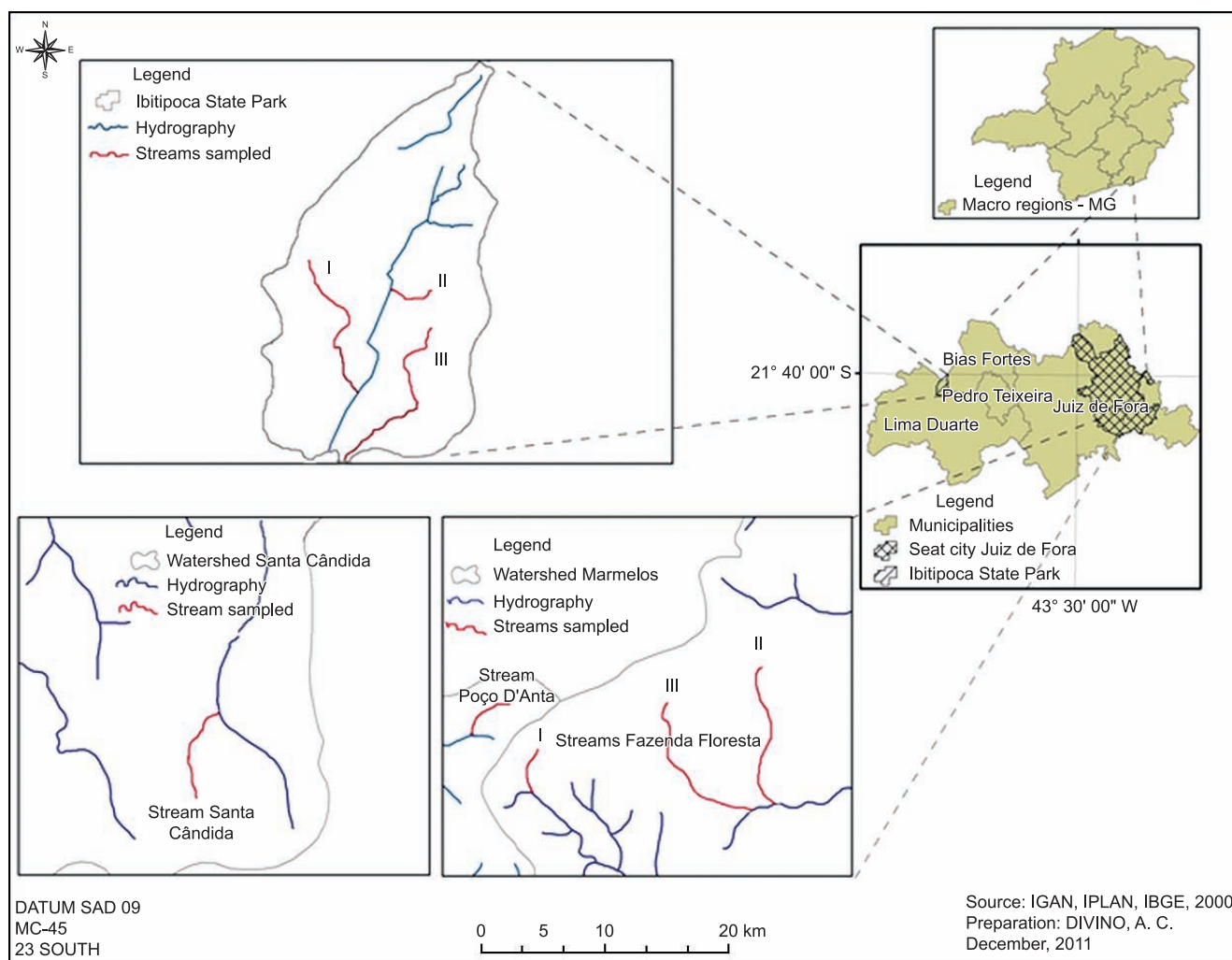


Figure 1. Location of the four areas studied (Fazenda Floresta, Poço D'Anta Municipal Biological Reserve, Santa Cândida Municipal Biological Reserve and Ibitipoca State Park) and their respective streams.

presents two phytophysiognomies: Rock Fields, making up most of the park's vegetation, and Semideciduous Seasonal Forest (Instituto... 1991, Salimena-Pires 1997). The number of streams sampled in each area and their characteristics can be seen in Table 1.

2. Sampling and sample processing

Samples of submerged leaf litter were obtained from each stream in May, June, July and September 2010 and June 2011, from 10 riffles and 10 pools, located at different points of the bed, using a Surber sampler with 210 µm mesh and area of 0.04 m², totaling 160 samples (IBAMA Collection License no. 24154-1). The material collected was fixed in 4% formaldehyde, washed in a 210 µm sieve and sorted under a stereoscopic microscope and the oligochaetes were preserved in 70% alcohol. Semi-permanent slides were analyzed under a common optical microscope and a bright-field microscope with Differential Interference Contrast (DIC) to identify the oligochaetes down to the lowest taxonomic level possible, according to the keys of Righi (1984) and Brinkhurst & Marchese (1989).

To characterize the streams, water temperature, dissolved oxygen, pH and electrical conductivity were measured *in situ* with a multiparameter meter (Horiba U-10).

Results

The streams contained highly oxygenated water (10.41 ± 0.94 mg/L), with low conductivity (18.09 ± 3.34 µS/cm), alkaline pH (8.11 ± 0.43) and temperature varying from 13.1 to 18.5 °C (Table 2).

There were 19 taxa inventoried from the total of 4,311 specimens collected, belonging to the families Naididae (69.35%) (including representatives of the former family Tubificidae) (Erséus et al. 2008) and Enchytraeidae (30.60%). The Enchytraeidae were identified only as a family and the Megadrili (0.05%) only as a superorder. The Naididae specimens identified were distributed within the following subfamilies: Naidinae (53.85%), Pristininae (39.20%), Tubificinae

(6.25%) and Rhyacodrilinae (0.70%), with the greatest number of species in the subfamily Pristininae.

1. List and distribution of the Oligochaeta species

SUPERORDER MICRODRILI

FAMILY NAIDIDAE

Subfamily Naidinae

Chaetogaster diastrophus (Gruithuisen, 1828) (Figure 2a)

This is a cosmopolitan species, recorded in South America (Argentina, Brazil, Colombia and Uruguay), North America, Europe, Asia and Australia. In Brazil, its occurrence has only been reported in the state of São Paulo. It is a predatory species, associated with clean water environments (Dumnicka 1994), having been found in various habitats, such as lakes (Collado & Schmelz 2001a, Ohtaka 2001), low-order tropical streams (Gorni & Alves 2008b) and mountain streams in temperate regions (Dumnicka 1994, Lencioni et al. 2004), associated with bryophytes (Linhart et al. 2002), sponges (Gorni & Alves 2008a) and on the backs of Odonata nymphs (Corbi et al. 2004). In the present study it was found in streams flowing through Rock Field and Semideciduous Seasonal Forest areas, in pools and riffles.

Dero (Aulophorus) furcatus (Müller, 1773) (Figure 2b)

This species is distributed across Central America, North America, Europe, Africa and Asia. In South America, it has been recorded in Argentina, Uruguay, Venezuela, Bolivia, Guiana, Suriname and Brazil, where there are records of the species in the states of São Paulo, Paraná, Mato Grosso do Sul, Pernambuco, Pará and Amazonas. It is found in lakes (Montanholi-Martins & Takeda 2001), reservoirs (Pamplim et al. 2005) and polluted rivers (Lin & Yo 2008). This species was only found in one stream in a Semideciduous Seasonal Forest, in a pool area.

Dero (Dero) sp. (Figure 2c)

This species was found under the same conditions as *D. (A.) furcatus*. It was not possible to count the number of gills, which prevented its identification at the species level.

Nais communis Piguet, 1906 (Figure 2d)

Table 1. Characterization of the eight streams sampled. The altitude values refer to the starting and ending collection points; the width, depth and current speed values refer to the average of ten points along each stream segment sampled.

	Phytophysiognomies	Coordinates	Width (m)	Depth (cm)	Current speed (m/s)	Altitude (m)
Floresta I	S.S.F.	21°44'7"S 43°18'2"W	1.63 ± 1.05	4.4 ± 2.3	0.26 ± 0.09	833-898
Floresta II	S.S.F.	21°44'59"S 43°17'28"W	1.47 ± 1.09	4.5 ± 2.0	0.38 ± 0.13	769-852
Floresta III	S.S.F.	21°44'9"S 3°17'33"W	0.53 ± 0.36	2.5 ± 1.0	0.32 ± 0.12	816-855
Poço D'Anta	S.S.F.	21°44'32"S 3°18'56"W	1.84 ± 0.70	4.5 ± 1.2	0.25 ± 0.10	862-870
Santa Cândida	S.S.F.	21°45'38"S 43°24'2"W	1.25 ± 0.36	4.2 ± 2.4	0.35 ± 0.11	694-734
Ibitipoca I	R.F.	21°42'11"S 3°53'34"W	1.47 ± 0.65	2.4 ± 1.1	0.37 ± 0.10	1374-1394
Ibitipoca II	R.F.	21°42'7"S 43°53'5"W	1.91 ± 0.95	4.5 ± 2.6	0.33 ± 0.10	1381-1398
Ibitipoca III	S.S.F.	21°42'25"S 43°53'9"W	1.46 ± 0.51	2.9 ± 1.9	0.25 ± 0.13	1299-1369

S.S.F.= Semideciduous Seasonal Forest; R.F.= Rock Field.

Table 2. Mean and standard deviation of the limnological variables obtained for the Fazenda Floresta, Poço D'Anta, Santa Cândida and Ibitipoca streams.

	Water temperature (°C)	Oxygen (mg/L)	pH	Conductivity (µS/cm)
Floresta I	18.5 ± 0.10	10.8 ± 0.90	8.23 ± 0.57	21.16 ± 7.59
Floresta II	18.3 ± 0.26	11.07 ± 0.66	8.12 ± 0.52	16.60 ± 1.60
Floresta III	18.16 ± 0.35	10.80 ± 0.90	8.20 ± 0.57	21.40 ± 7.25
Poço D'Anta	17.03 ± 0.56	9.50 ± 1.12	8.49 ± 0.03	19.70 ± 2.19
Santa Cândida	17.96 ± 0.49	8.43 ± 0.15	8.85 ± 0.57	19.43 ± 3.06
Ibitipoca I	14.4 ± 0.17	10.83 ± 0.05	7.60 ± 0.26	11.1 ± 0.96
Ibitipoca II	13.1 ± 0.60	10.8 ± 0.40	7.70 ± 0.10	18.73 ± 2.20
Ibitipoca III	15.2 ± 1.00	11.06 ± 0.90	7.66 ± 0.30	16.63 ± 5.60

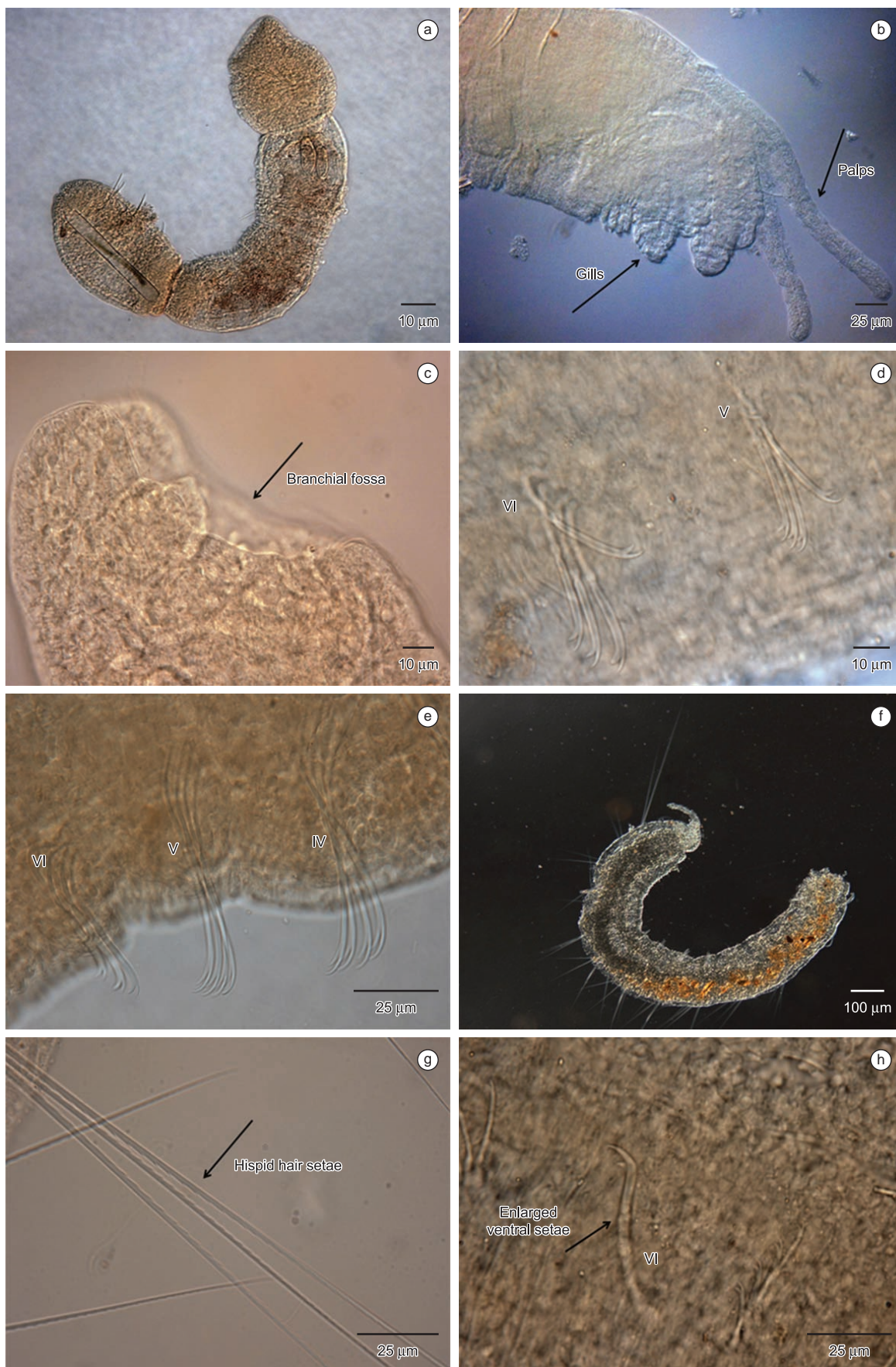


Figure 2. a) *Chaetogaster diastrophus*; b) posterior region of *Dero (Aulophorus) furcatus*; c) posterior region of *Dero (Dero)* sp.; d) ventral setae of *Nais communis*; e) ventral setae of *Nais variabilis*; f) *Pristina leidy*; g) hair setae of *Pristina proboscidea*; h) enlarged ventral setae of *Pristina aequisetia*.

This is a cosmopolitan species, found in various water bodies. It is common in mountain streams in Europe (Dumnicka 2000), shallow lakes (Uzunov & Varadinova 2000), polluted rivers (Lin & Yo 2008) and preserved streams (Gorni & Alves 2008b). It has an affinity for substrates composed of fine sand and finely fragmented organic matter (Verdonschot 1999). According to Lin & Yo (2008), even though it is a species that is intolerant of pollution, it can be considered the most tolerant within the *Nais* genus. In South America it has been reported in Argentina, Peru, Ecuador, Colombia and Brazil (São Paulo, Alagoas and Pará). In this study, it was found in Semideciduous Seasonal Forest streams, mainly in riffles.

Nais variabilis Piguet, 1906 (Figure 2e)

This species is common in mountain water bodies and has also been reported in Australian tropical streams (Pinder 2001), Mexican lakes (Peralta et al. 2002) and streams in Dutch plains (Verdonschot 1999). In South America it has been recorded in Argentina, Bolivia, Peru, Colombia and Brazil (Mato Grosso do Sul and São Paulo). It prefers sediments with fine sand and medium quantities of organic matter or coarse sand with low concentration of organic matter (Verdonschot 1999). This species isn't generally associated with *N. communis* (Uzunov & Varadinova 2000). These two species were found associated for the first time by Dumnicka (2000). Nevertheless, in the eight streams studied here, although *N. variabilis* was found in all, *N. communis* was only found in one Poço D'Anta stream, where the two species were recorded, but there was only one *N. variabilis* specimen. Among the streams studied, *N. variabilis* did not occur in those flowing through Rock Fields. This is the first occurrence reported in the state.

Subfamily Pristininae

Pristina leidyi Smith, 1896 (Figure 2f)

This species occurs in surface waters of Central America, North America, Europe, Asia, Australia and South America (Chile, Argentina, Uruguay, Paraguay, Bolivia, Peru, Colombia, Venezuela, Suriname and Brazil). In Brazil it occurs in São Paulo, Alagoas, Pernambuco and Amazonas. It has been found by Reeves & Reynolds (1999) and Wetzel & Taylor (2001) in North American caves, by Strayer et al. (2003) associated with macrophytes and by Gorni & Alves (2006) associated with *Pomacea bridgesii* (Reeve, 1856). It can reach high densities, especially in spring and summer, due to its capacity to reproduce asexually (Bely & Sikes 2010). It has affinity for areas with fast-flowing water and rocky substrates with accumulation of organic matter (Dumnicka 1982, Learner et al. 1978). In this study it was found in all the streams except one in Poço D'Anta Reserve, both in segments with fast and slow current. This is the first occurrence reported in the state.

Pristina proboscidea Beddard, 1896 (Figure 2g)

In South America this species has been reported in Chile, Argentina, Paraguay, Peru, Colombia, Suriname and Brazil, where it has been reported by Corbi et al. (2005) and Gorni & Alves (2008a) on the state of São Paulo, by Takeda (1999) in the upper Paraná River and by Takeda et al. (2000) in the Pantanal in Mato Grosso do Sul. It has also been reported in North America, Asia, Africa and Australia. In this study it was found in both vegetation physiognomies in pools and riffles.

Pristina aequisetula Bourne, 1891 (Figure 2h)

This species has been recorded in North America, Central America, Europe, Asia and Australia. In South America it has been reported in Chile, Argentina, Bolivia, Peru, Ecuador, Venezuela, Colombia, Guiana, Suriname and Brazil (São Paulo, Mato Grosso do Sul and Pará). It has been found in a wide range of environments, such as the upper Paraná River (Montanholi-Martins & Takeda 1999, 2001), urban streams (Alves & Lucca 2000), lakes with different trophic states (Collado & Schmelz 2001a) and reservoirs (Pamplim et al. 2005). In the present study it was only found in streams flowing through Semideciduous Seasonal Forest areas.

Pristina biserrata Chen, 1940 (Figure 3a)

It occurs in East Asia and South America (Argentina, Ecuador, Venezuela, Chile, Brazil and Guiana). In Brazil it has been reported by Alves & Gorni (2007) associated with macrophytes in reservoirs in the state of São Paulo, by Gorni & Alves (2008b) in low-order streams, by Gorni & Alves (2008a) associated with sponges in a reservoir in São Paulo and by Montanholi-Martins & Takeda (1999) in segments of the upper Paraná River. This species was only found in a riffle of one stream in a Semideciduous Seasonal Forest area.

The species of *Pristina* that follow, according to the key of Brinkhurst & Marchese (1989), are included in the *Pristinella* genus. The criterion used by those authors to distinguish the two genera is the presence of a proboscide in *Pristina* and its absence in *Pristinella*. But at least two other characteristics can be indicated to distinguish the two genera: the presence of spermathecae and prostatic cells in *Pristina* and their absence in *Pristinella*. However, Collado & Schmelz (2000), in describing a new species encountered in soil in the Amazon region (Brazil), verified that the species found did not have a proboscide but did have prostatic cells, leading them to identify it as belonging to the *Pristina* genus. Further according to those authors, the combination of these characteristics (absence of a proboscide and presence of prostatic cells) invalidates *Pristinella* as a separate genus from *Pristina*. Therefore, the nomenclature used for the next six species follows the proposal of Collado & Schmelz (2000), which is the same used by Christoffersen (2007).

Pristina osborni (Walton, 1906) (Figure 3c)

This species has been recorded in North America, Central America, Asia, Africa, Australia and South America, where it occurs in Argentina, Peru, Venezuela, Suriname and Brazil (São Paulo, Minas Gerais, Mato Grosso do Sul and Amazonas). It is common in low-order streams of preserved areas (Armendáriz & César 2001, Gorni & Alves 2008b), lakes (Spencer & Hudson 2003) and associated with submersed macrophytes (Alves & Gorni 2007). According to Martínez-Ansemil (1984), it has affinity for moderate to fast currents. In the present study, it was found in riffles and pools, but only in the Ibitipoca streams.

Pristina minuta (Stephenson, 1914) (Figure 3b)

According to Brinkhurst & Kathman (1983) and Brinkhurst & Marchese (1989), *P. minuta* can be a synonym of *P. osborni* due to the similarities in the setae. In Christoffersen (2007) it appears as a synonym of *P. osborni*, thus having the same geographic distribution. In the present study, the criterion used to separate the two species was size of the teeth of the needle setae (smaller in *P. minuta*), length of the hair setae (smaller in *P. minuta*) and thickness of the ventral setae (smaller in *P. minuta*) [according to the measurements presented by Brinkhurst & Marchese, (1989)]. This species was found in all the streams sampled, predominantly in pool areas. This is the first reported occurrence in the state.

Pristina sima (Marcus, 1944) (Figure 3d)

Brinkhurst & Marchese (1989) also suggested that *P. sima* and *P. osborni* are synonyms, but Rodriguez (2002) indicated that *P. sima* can be clearly separated from *P. osborni* because although the two species can present needle with two to three intermediate teeth, the characteristic bayonet shape of the needle setae of *P. sima*, with longer teeth, is markedly different in comparison with *P. osborni*. In South America, this species has been reported in Chile, Colombia, Argentina, Guiana and Brazil (only the state of São Paulo). It also occurs in Central America, North America, Asia and Africa. This species was collected in pools and riffles, in streams flowing through Semideciduous Seasonal Forest areas. This is the first occurrence reported in the state.

Pristina jenkiniae (Stephenson, 1931) (Figure 3e)

This species is widely distributed, occurring in Europe, Asia, Africa, Australia, North America and South America, where it has

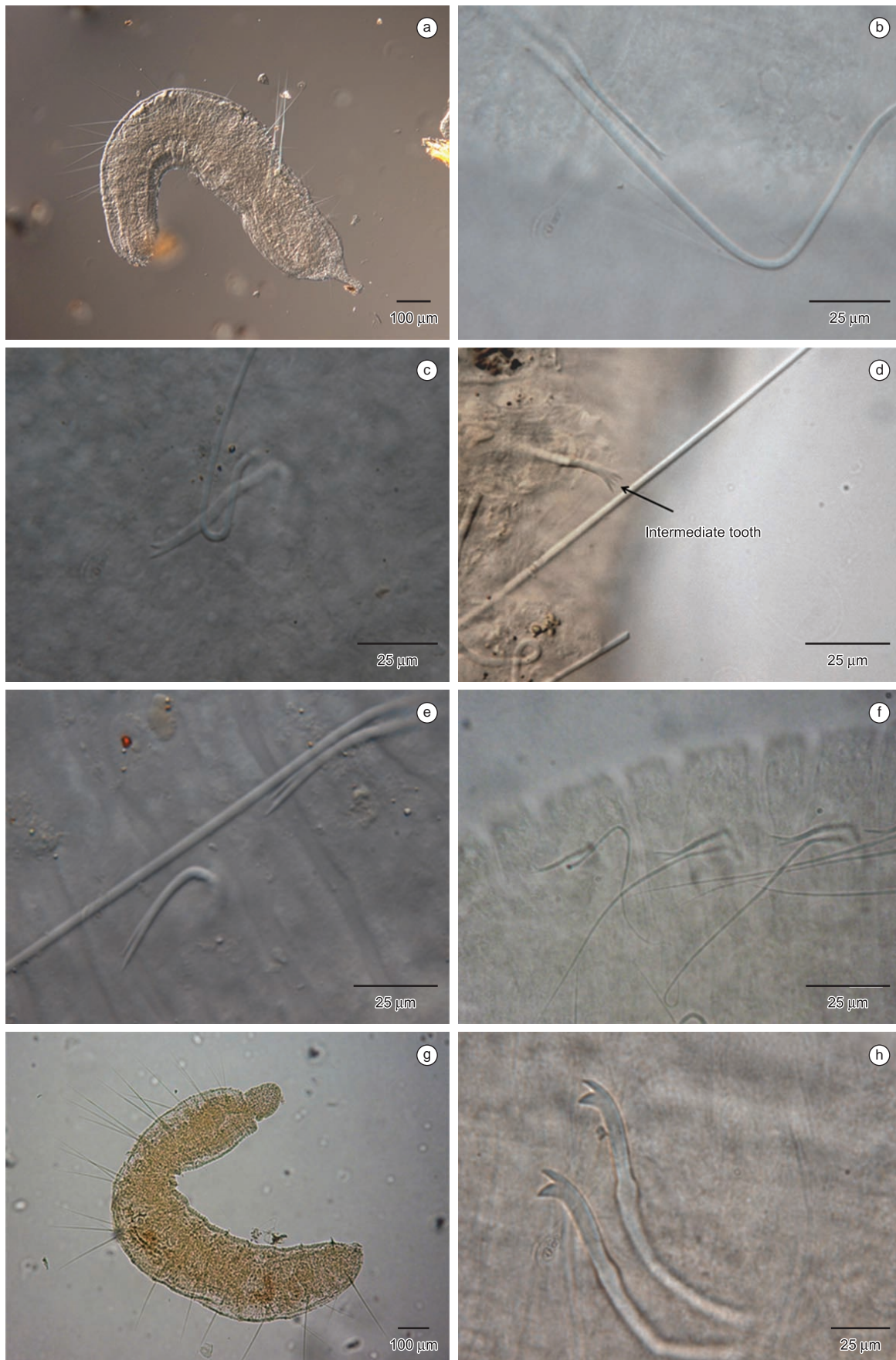


Figure 3. a) *Pristina biserrata*; b) needle setae of *Pristina minuta*; c) needle setae of *Pristina osborni*; d) needle setae with intermediate teeth of *Pristina sima*; e) needle setae of *Pristina jenkiniae*; f) dorsal setae of *Pristina* sp.1; g) *Pristina* sp.2; h) Tubificinae immature.

been reported in Argentina, Peru, Colombia Venezuela, Guiana, Suriname and Brazil (São Paulo, Pernambuco and Amazonas). It occupies a range of habitats, such as low-order streams (Cowell et al. 2004, Gorni & Alves 2008b), soils in the Amazon Forest (Collado & Schmelz 2001b), small reservoirs (Fusari & Fonseca-Gessner 2006), caves (Wetzel & Taylor 2001), lakes (Ohtaka 2001), polluted urban rivers (Lin & Yo 2008) and bryophytes (Gorni & Alves 2007). It has affinity for moderate to rapid currents with the presence of organic matter (Gorni & Alves 2008b). According to Stacey & Coates (1996), it can be found on muddy and sandy bottoms and submersed vegetation. This species was found in all the streams except stream I in Ibitipoca State Park, with greatest abundance in riffles. This is the first occurrence reported in the state.

Pristina sp.1 (Figure 3f)

This species has needle setae with teeth of unequal size, with the proximal larger and more curved than the distal, and the needle setae can have one to two intermediate teeth. It was present in all the streams of Semideciduous Seasonal Forest areas.

Pristina sp.2 (Figure 3g)

This species presents two to four hairs lightly hispid and two to four needles unicuspid per bundle. In the present study, it was present in streams of the two phytophysionomies, with greatest abundance in riffles.

Subfamily Tubificinae

Immature Tubificinae (Figure 3h)

Due to the sexual immaturity, the specimens could not be identified. They were found in all the streams except one in Poço D'Anta Reserve, showing affinity for habitats with slow currents.

Subfamily Rhyacodrilinae

Bothrioneurum sp. (Figure 4a, b)

This genus is characterized by a prostomium with a sensory pit on the dorsal surface. According to Christoffersen (2007), some species of *Bothrioneurum* are restricted to South America, such as *B. americanum*, *B. brauni* and *B. righii*. Alves & Lucca (2000) reported this genus in streams of the state of São Paulo, Gorni & Alves (2008b) found it in low-order streams in the same state and Martins et al. (2008) noted in an urban stream in Minas Gerais. In the present study, the genus was found in streams of the two phytophysionomies, with greater abundance in pools.

FAMILY ENCHYTRAEIDAE (Figure 4c)

This family has high representation in terrestrial and semi-aquatic environments (Brinkhurst & Marchese 1989) and also occurs in typically aquatic environments, such as the plains of the upper Paraná River (Montanholi-Martins & Takeda 2001, Takeda 1999), preserved low-order streams (Alves et al. 2008, Gorni & Alves 2008b), lakes (Collado et al. 1999) and the ocean (Lasserre 1971). Coates & Stacey (1994) reported that Enchytraeidae are less studied than others in South America and that most information is about semi-aquatic and terrestrial species. In the present study, it was found in all streams, with greatest abundance in riffles. This is the first occurrence reported in the state.

SUPERORDER MEGADRILI (Figure 4d)

The group was found in very low abundance (only two individuals) in riffles of two streams in Semideciduous Seasonal Forest areas.

Table 3 indicates the streams where each species was found.



Figure 4. a) anterior region of *Bothrioneurum* sp.; b) spermatophore of *Bothrioneurum* sp.; c) Enchytraeidae; d) dorsal and ventral setae of Megadrili.

Table 3. Occurrence of the aquatic oligochaete species in streams of Fazenda Floresta, Poço D'Anta Municipal Reserve, Santa Cândida Municipal Reserve and Ibitipoca State Park. Presence (x).

Species	Floresta I	Floresta II	Floresta III	Poço D'Anta	Santa Cândida	Ibitipoca I	Ibitipoca II	Ibitipoca III
NAIDIDAE								
<i>Chaetogaster diastrophus</i>	x	x	x	x	x	x		x
<i>Dero (Aulophorus) furcatus</i>		x						
<i>Dero (Dero) sp.</i>		x						
<i>Nais communis</i>	x		x	x				
<i>Nais variabilis</i>		x		x	x			x
<i>Pristina leidy</i>	x	x	x		x	x	x	x
<i>Pristina proboscidea</i>	x	x	x	x		x	x	
<i>Pristina aequiseta</i>	x	x	x	x	x			x
<i>Pristina biserrata</i>		x						
<i>Pristina minuta</i>	x	x	x	x	x	x	x	x
<i>Pristina osborni</i>	x	x	x	x	x			
<i>Pristina sima</i>			x	x				x
<i>Pristina jenkiniae</i>	x	x	x	x	x		x	x
<i>Pristina sp.1</i>	x	x	x	x	x			x
<i>Pristina sp.2</i>					x	x	x	
<i>Bothrioneurum sp.</i>		x	x		x	x	x	
Tubificinae imaturo	x	x	x		x	x	x	x
ENCHYTRAEIDAE	x	x	x	x	x	x	x	x
MEGADRILI			x		x			

Discussion

The 19 taxa identified in the present study (exclusive of Enchytraeidae and Megadrili) represent 22% of the total of 86 oligochaete species recorded in Brazilian aquatic environments (Christoffersen 2007). Knowledge of the aquatic oligochaetes fauna in Brazil especially in streams located in preserved areas, is still incomplete and the only studies of these environments (Alves et al. 2008, Gorni & Alves 2008b, 2012) are of sites in the state of São Paulo.

In comparison with the fauna found by the authors previously cited, *Allonais paraguayensis*, *Pristina notopora*, *P. longidentata* and *Amphichaeta leydyi* were present in streams in São Paulo state, but not in Minas Gerais. Likewise, *Limnodrilus neotropicus*, which is a species endemic to South America, also was not reported in the present study. In turn, the *Dero* genus, which was not found in streams in São Paulo, was recorded in the present study. Another relevant fact was the high abundance of enchytraeids collected in the streams studied. According to Johnson & Ladle (1989), this condition is rarely found and it is possible that the majority of reports of enchytraeids in streams and rivers are the result of accidental entrance of populations from adjacent land areas, since this family has been described as typically terrestrial, with some aquatic tendencies (Christoffersen 2009).

According to Christoffersen (2010), little is known about the aquatic oligochaetes of South America, so there is much research to be done regarding these worms. Also according to him, the few regional inventories of oligochaetes in Brazil (states of São Paulo, Paraná, Amazonas, Rio Grande do Sul, Mato Grosso and Rondônia) refer to land species. There have been no published inventories of limnic oligochaetes in Minas Gerais. In light of the huge landmass of Brazil, the oligochaete fauna cataloged so far only reflects a small fraction of the diversity in the country. Therefore, more inventories are necessary to facilitate future studies (Christoffersen 2010).

The results obtained from this study expand the knowledge of the distribution of some species of oligochaetes in Brazil, represent the first reports of species of limnic oligochaetes for the four preserved areas in Minas Gerais and confirm the first occurrence of various species in the state.

Acknowledgements

We would like to thank support Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for the financial support and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), (process 303790/2009-1) for constant support.

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Received 25/06/2012

Revised 01/11/2012

Accepted 22/02/2013