

## Aquatic Oligochaeta (Annelida: Clitellata) of the Department of Antioquia, Colombia, South America

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### Abstract

Surveys for freshwater Oligochaeta (Annelida, Clitellata) conducted during the years 2002-2006 increase to 10 the number of species recorded from lentic and lotic habitats in the Department of Antioquia, Colombia, South America. Of the 10 species collected during this study, eight represent new records for the Department: *Dero (Aulophorus) lodeni*, *D. (Dero) botrytis*, *Nais communis*, *N. variabilis*, *Pristina aequisetata*, *P. macrochaeta*, *P. proboscidea*, and *P. synclites*. Two of these species, *D. botrytis* and *P. synclites*, are new records for Colombia.

### Introduction

Historical studies on the aquatic Oligochaeta of Colombia include those by Wilhelm Michaelsen, who first reported the occurrence of the *Pristina aequisetata* Bourne, 1891, *P. leidy* Smith, 1896, *Slavina appendiculata* Udekem, 1855 (family Naididae), Enchytraeidae (species undetermined), and *Drilocrius breymanni* Michaelsen, 1897 and *D. burgeri* Michaelsen, 1900 (family Glossoscolecidae – megadriles) (Michaelsen, 1900, 1914, as cited in Gavrilov, 1981). Schmarda (1861) described *Aeolosoma pictum* (Aeolosomatidae) from the Rio Cauca basin near the city of Cali, Department of Valle del Cauca (as cited in Gavrilov, 1981). This species was later transferred to the genus *Hystriochosoma* by Michaelsen (1933), but is now considered a species inquirenda (Brinkhurst & Jamieson, 1971). The family Aeolosomatidae (Aphanoneura), formerly aligned with the Oligochaeta, is now aligned with the Polychaeta (Fauchald & Rouse, 1997; Rouse & Fauchald, 1997).

Several other historical records of Oligochaeta in Colombia were noted in Brinkhurst & Jamieson (1971). All megadriles in the family Glossoscolecidae, include *Periscollex profuga* (Cognetti, 1904) [as *Diporo-*

*chaeta profuga*], *Quimbaya cameliae* (Michaelsen, 1914) [as *Rhinodrilus (Thamnodrilus) cameliae*, then *Thamnodrilus cameliae*], *Rhinodrilus paradoxus* Perrier, 1872, and *Thamnodrilus gulielmi* Beddard, 1887.

More recent publications reporting the presence of Oligochaeta in Colombia include Howmiller (1974), who first noted the occurrence of *Tubifex tubifex* Müller, 1774 in the city of Bogotá (department of Cundinamarca) based upon a collection he had made; Gaviria (1993), who studied the Oligochaeta fauna of the Departments of Boyacá, Casanare, Cauca, Chocó, Cundinamarca, Meta, Santander, and Valle del Cauca, and first reported the occurrence of 31 taxa in the country; and Acevedo-Pérez (1992), who first reported the occurrence of *Limnodrilus hoffmeisteri* Claparède, 1862 and *L. udekemianus* Claparède, 1862 in the Department of Antioquia.

Because the biodiversity of the region has not been evaluated extensively, our knowledge of freshwater flora and fauna occurring in Colombia is limited at best. The principal objective of this study was to identify the freshwater Oligochaeta occurring in the Department of Antioquia, Colombia.

### Materials and methods

This study, conducted during the years 2002-2006, focused on the freshwater Oligochaeta fauna occurring in lentic and lotic habitats in 11 of the 125 municipalities in the Department of Antioquia (area 63,612 km<sup>2</sup>) in northwestern Colombia, one of the 32 departments in the country. Aquatic habitats sampled during this study ranged in elevation from 18 to 2500 meters above sea level (masl), and were characterized by diverse trophic conditions.

In this paper, we report the taxa found in 20 sites

located in the municipalities of Amagá (6°02'4"N, 75°42'13"W), Apartadó (7°52'4"N, 76°37'44"W), Caldas (6°05'2"N, 75°37'52"W), Chigorodó (7°39'3"N, 76°41'07"W), Don Matías (6°29'0"N, 75°23'53"W), Girardota (6°22'3"N, 75°27'08"W), Jardín (5°35'05"N, 75°50'05"W), Medellín (6°13'5"N, 75°34'05"W), Mutatá (7°14'5"N, 76°25'47"W), Santa Rosa de Osos (6°38'4"N, 75°41'40"W) and Santo Domingo (6°28'1"N, 75°10'02"W) (Fig. 1).

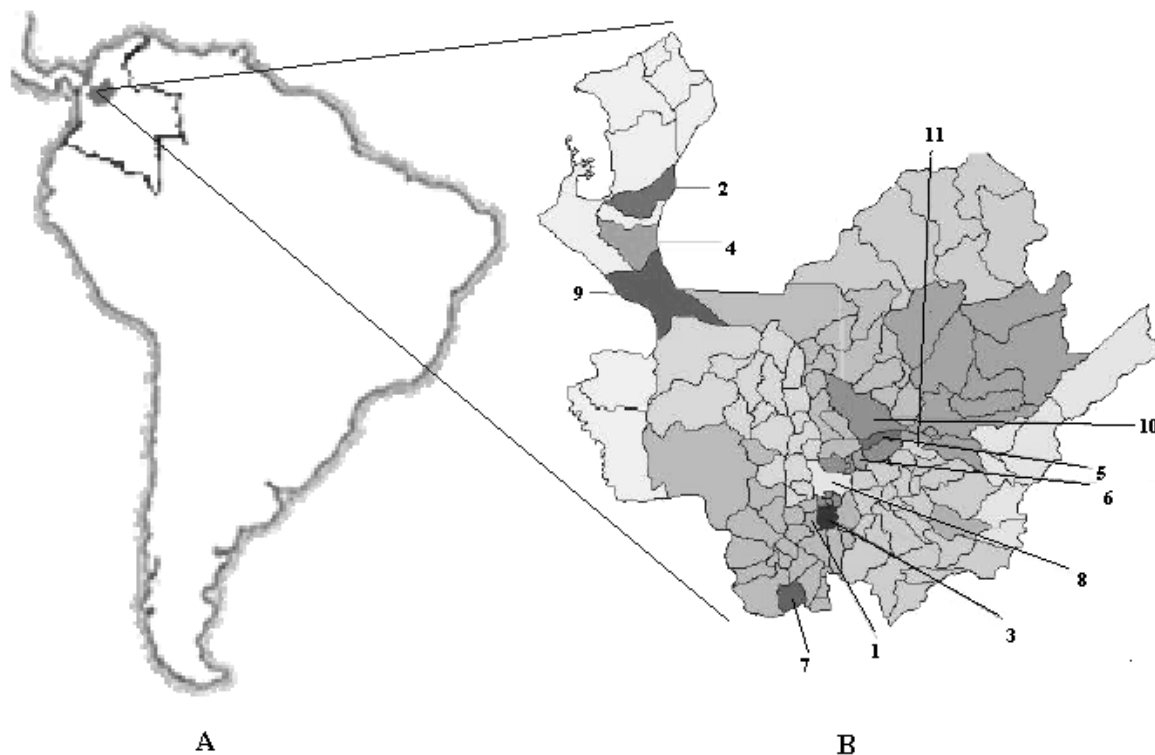


Figure 1. Sampling areas in the Department of Antioquia, Colombia, Map A: Antioquia and Colombia in South America. Map B: Department of Antioquia with sampling areas: 1. Amagá; 2. Apartadó; 3. Caldas; 4. Chigorodó; 5. Don Matías; 6. Girardota; 7. Jardín; 8. Medellín; 9. Mutatá; 10. Santa Rosa de Osos; 11. Santo Domingo

### Fieldwork

Qualitative benthic samples were collected from substrates in the littoral zones of lentic and lotic freshwater habitats using a short hand shovel. All samples were collected from depths ranging from 0-20 cm, during the dry season as well as during periods of low to moderate precipitation. Unfixed samples (inclusive of the benthic sample, water, debris, and macrophytes) were immediately placed in plastic bags, then into chests with dry ice for transport back to the laboratory. Water samples collected at each site were

also placed on dry ice in the field prior to transport back to the laboratory for analysis of hydrogen ion concentration (pH), and conductivity ( $\mu\text{mhos cm}^{-1}$ ). The following physical and chemical parameters were measured in the field whenever possible: oxygen concentration ( $\text{mg L}^{-1}$ ) (Oxygen Test, Winkler Method); water hardness (as  $\text{CaCO}_3$ ,  $\text{mg L}^{-1}$ ) (Calcium Test, Titrimetric Method); current velocity ( $\text{m s}^{-1}$ ); water temperature (degrees Celsius); elevation (meters above sea level – masl), geographical position (latitude / longitude coordinates) and substrate characterization. Anthropogenic influences such as those associated

with residential and commercial buildings, cattle pastures, trash dumps, and drainages were also taken into account.

#### *Laboratory studies*

Immediately upon return to the lab, all substrate samples were transferred to an individual acrylic container, then allowed to settle, at room temperature (20° Celsius), for several weeks. The opening of each container was covered with a mesh screen (pore diameter 1 mm); all samples were oxygenated using a commercial air device; still water was added to each container periodically to maintain a standard water level. The extraction of live oligochaete specimens from each sample was performed using a stereo-microscope. The specimens were preserved in 95° ethanol, then identified after clearing and mounting in Berlese's Medium on microscope slides. Other specimens were stained with Borax Carmine, cleared in Berlese's Medium, then mounted whole for microscopical examination, identification, and illustration using a compound microscope equipped with a camera lucida system.

Taxonomic determinations were made using the keys of Brinkhurst & Jamieson (1971), Brinkhurst & Marchese (1991), and Gaviria (1993).

Specimens collected and identified during this study are deposited in the Collection of Limnology, Oligochaeta Collection (CLUA-OL), at the Institute of Biology, Faculty of Exact and Natural Sciences, University of Antioquia, Medellín, Colombia.

#### **Taxonomy**

Ten oligochaete taxa were identified from our samples: *Pristina synclites* and *Dero (Dero) botrytis* – both new records for Colombia, and *Pristina aequiseta*, *P. macrochaeta*, *P. proboscidea*, *Nais variabilis*, *N. communis*, and *Dero (Aulophorus) lodeni* – all new records for the department of Antioquia. *Limnodrilus hoffmeisteri* and *L. udekemianus*, two species previously reported from the Department of Antioquia by Acevedo-Pérez (1992), were also collected in this study.

Based on sequences of 18S rDNA and other molecular and morphological data, Erséus and Gustavsson (2002) and Erséus et al. (2002) concluded that the family Naididae is more correctly placed

within a subfamily Naidinae of the Tubificidae, with 'Naididae' thus becoming a junior synonym of the family Tubificidae. A petition was then submitted by Erséus et al. (2005) to the International Commission of Zoological Nomenclature (ICZN, the Commission), requesting the family-group name Tubificidae Vejdovský, 1876, be given precedence over Naididae Ehrenberg, 1828. The Commission recently voted against this proposal, maintaining precedence for Naididae over Tubificidae (ICZN 2007); we adhere to this ruling. The subfamilies of the Tubificidae are now included within the Naididae (Erséus et al. 2008, in press).

#### **Family Naididae Ehrenberg, 1828**

##### **Subfamily Naidinae Lastockin, 1921**

##### **Genus *Dero* Oken, 1815**

##### ***Dero (Dero) botrytis* Marcus, 1943.**

*Material:* Collected in the municipality of Medellín. Six specimens examined.

*Collection Numbers:* CLUA-OL 250, 251, 252, 253, 254, 255.

*Remarks:* In South America, previously recorded from Brazil (Marcus, 1943), Uruguay (Cordero, 1951, as cited in Di Persia, 1980) and Argentina (Di Persia, 1980).

This is the first report of *Dero (Dero) botrytis* from Colombia.

***Dero (Aulophorus) lodeni* Brinkhurst, 1986 [=*Dero (Aulophorus) pectinatus* Stephenson, 1931; =*Dero intermedia* Loden & Harman, 1982].**

*Material:* Collected in the municipalities of Don Matías, Medellín, and Mutatá. Ten specimens examined.

*Collection Numbers:* CLUA-OL 22, 24, 27, 31, 43, 48, 180, 181, 182, 189.

*Remarks:* Reported from Africa (Brinkhurst, 1966, as stated in Harman, 1974). In South America, recorded from Paraguay (Carter and Beadle, 1931), and Brazil (Du Bois-Reymond Marcus, 1949, as noted in Di Persia, 1980), Republic of Suriname (as 'Surinam' in Harman, 1974), and Argentina (Brinkhurst & Marchese, 1991). Recorded from Colombia

by Gaviria (1993). This is the first report of *Dero* (*Aulophorus*) *lodei* for the Department of Antioquia.

### **Genus *Nais* Müller, 1773**

#### ***Nais communis* Piguet, 1906.**

*Material:* Collected in the municipality of Don Matías. Two specimens examined.

*Collection Numbers:* CLUA-OL 39, 49.

*Remarks:* Cosmopolitan. In Central America, reported from Guatemala (Howmiller, 1974), and Costa Rica (Harman, 1982). In South America, recorded from Peru by Piguet (1928), Argentina (Michaelsen & Boldt, 1932), Brazil (Marcus, 1943) (as noted in Di Persia, 1980), Ecuador (Coates & Stacey, 1994). Previously reported for Colombia by Gaviria (1993). This is the first report of *Nais communis* for the Department of Antioquia.

#### ***Nais variabilis* Piguet, 1906.**

*Material:* Collected in the municipalities of Don Matías and Jardín. Nine specimens examined.

*Collection Numbers:* CLUA-OL 35, 45, 50, 71, 140, 141, 143, 145, 146.

*Remarks:* Cosmopolitan. In South America, recorded from Perú (Piguet, 1928), Argentina (Cernosvitov, 1937, as cited in Di Persia, 1980), Bolivia (Brinkhurst & Marchese, 1991) and Brazil (Takeda et al., 2000). Previously recorded from Colombia by Gaviria (1993). This is the first report of *Nais variabilis* for the Department of Antioquia.

### **Subfamily Pristininae Lastockin, 1921**

#### **Genus *Pristina* Ehrenberg, 1828**

#### ***Pristina aequisetata* Bourne, 1891.**

*Material:* Collected from sites located in the municipality of Don Matías. Six specimens examined.

*Collection Numbers:* CLUA-OL 59, 60, 62, 63, 64.

*Remarks:* Cosmopolitan. In South America, previously reported for Brazil (Marcus, 1943), Surinam (Harman, 1974), Bolivia, Peru, Argentina, Chile (as cited in Brinkhurst & Marchese, 1991), and

Ecuador (Coates & Stacey, 1994). Previously reported for Colombia by Michaelsen (1914, as stated in Gavrilov, 1981). This is the first record for the Department of Antioquia.

#### ***Pristina macrochaeta* Stephenson, 1931.**

*Material:* Collected from sites located in the municipalities of Chigorodó and Mutatá. Six specimens examined.

*Collection Numbers:* CLUA-OL 28, 29, 30, 32, 184, 185.

*Remarks:* Previously known from Afghanistan (as stated in Brinkhurst & Jamieson, 1971). In South America (as stated in Di Persia, 1980), originally described from Paraguay by Stephenson (1931), and soon after reported from Paraguay (Carter & Beadle, 1931); also reported from Brazil (Marcus, 1943), Uruguay (Cordero, 1951). Reported for Surinam (Harman, 1974), Argentina (Di Persia, 1980), and Colombia (Gaviria, 1993). This is the first report of *Pristina macrochaeta* for the Department of Antioquia.

#### ***Pristina proboscidea* Beddard, 1896.**

*Material:* Collected from sites located in the municipalities of Caldas, Chigorodó, Jardín, and Mutatá. Nine individuals examined.

*Collection Numbers:* CLUA-OL 1, 4, 7, 17, 21, 23, 127, 128, 129.

*Remarks:* Reported from south and east Asia, Australia, and Zanzibar (Brinkhurst & Jamieson, 1971, and Harman, 1974). In South America, previously reported (as noted in Di Persia, 1980): from Chile (Beddard, 1896), Paraguay (Michaelsen, 1905), Argentina (Cernosvitov, 1937), Brazil (Marcus, 1943), and Surinam (Harman (1974). Previously reported from Colombia by Gaviria (1993). This is the first report of *Pristina proboscidea* for the Department of Antioquia.

#### ***Pristina synclites* Stephenson, 1925.**

*Material:* Collected in the municipality of Santo Domingo.

Ten specimens examined.

*Collection Numbers:* CLUA-OL 121, 122, 123, 124, 152, 155, 156, 157, 158, 159.

*Remarks:* Recorded from Africa, India (as cited in Brinkhurst & Jamieson, 1971), and Indonesia (Ohtaka et al., 2000). In South America, previously reported from Argentina (Brinkhurst & Marchese, 1991), Ecuador (Coates & Stacey, 1994) and Brazil (Takeda et al., 2000). This is the first report of *Pristina synclites* from Colombia.

### Subfamily Tubificinae Vejdovský, 1876

#### Genus *Limnodrilus* Claparède, 1862

##### *Limnodrilus hoffmeisteri* Claparède, 1862.

*Material:* Collected from sites located in the municipalities of Don Matías, Medellín, Santa Rosa de Osos, Santo Domingo. Seven mature individuals were examined.

*Collection Numbers:* CLUA-OL 74, 125, 126, 168, 169, 171, 176.

*Remarks:* Cosmopolitan (Brinkhurst & Jamieson, 1971). In South America, previously reported for Argentina (Cernosvitov, 1939), Perú (Cernosvitov, 1939), and Brazil (Marcus, 1942), as stated in Di Persia (1980). Previously reported for Colombia by Gaviria (1993).

##### *Limnodrilus udekemianus* Claparède, 1862.

*Material:* Collected from sites located in the municipality of Girardota. One mature individual examined.

*Collection Number:* CLUA-OL 270.

*Remarks:* Cosmopolitan. In South America, previously reported for Brazil (Marcus, 1942), as noted in Gavrilov (1981), Argentina (Gavrilov & Paz, 1949, as stated in Di Persia, 1980) and Peru, (Brinkhurst & Marchese, 1991). Previously reported for Colombia by Gaviria (1993).

### Discussion

Prior to this study, 37 oligochaete species had been recorded from Colombia (Table 1), yet only two

– *Limnodrilus hoffmeisteri* and *Limnodrilus udekemianus* (Naididae, Tubificinae) – had previously been reported for the Department of Antioquia (Acevedo-Pérez, 1992); both of these taxa were collected during this present study (Table 1).

Table 1. List of records of aquatic Oligochaeta for Colombia and the Department of Antioquia, in Colombia. A: Acevedo-Pérez; BC&V: Berrío-Cárdenas & Vélez (unpublished records); G: Gaviria; H: Howmiller; M: Michaelsen. \* new records

	Author	Year	Colombia*	Author*	Year	Antioquia*
<b>Family Naididae</b>						
<b>Subfamily Naidinae</b>						
<i>Allonais inequalis</i>	G	1993	X			
<i>Chaetogaster diastrophus</i>	G	1993	X			
<i>Chaetogaster langi</i>	G	1993	X			
<i>Dero (Aulophorus) lodeni</i>	G	1993	X	BC&V	2008	X
<i>Dero (Aulophorus) vaga</i>	G	1993	X			
<i>Dero (Dero) botrytis</i>	BC&V	2008	X	BC&V	2008	X
<i>Dero (Dero) digitata</i>	G	1993	X			
<i>Nais andina</i>	G	1993	X			
<i>Nais communis</i>	G	1993	X	BC&V	2008	X
<i>Nais elinguis</i>	G	1993	X			
<i>Nais pardalis</i>	G	1993	X			
<i>Nais pseudobtusa</i>	G	1993	X			
<i>Nais raviensis</i>	G	1993	X			
<i>Nais variabilis</i>	G	1993	X	BC&V	2008	X
<i>Slavina appendiculata</i>	M	1914	X			
<i>Stephensoniana trivandranana</i>	G	1993	X			
<b>Subfamily Pristininae</b>						
<i>Pristina aequisetata</i>	M	1914	X	BC&V	2008	X
<i>Pristina jenkiniae</i>	G	1993	X			
<i>Pristina leidyi</i>	M	1914	X			
<i>Pristina longisetata bidentata</i>	G	1993	X			
<i>Pristina macrochaeta</i>	G	1993	X	BC&V	2008	X
<i>Pristina menoni</i>	G	1993	X			
<i>Pristina proboscidea</i>	G	1993	X	BC&V	2008	X
<i>Pristina sima</i>	G	1993	X			
<i>Pristina synclites</i>	BC&V	2008	X	BC&V	2008	X
<b>Subfamily Tubificinae</b>						
<i>Aulodrilus pigueti</i>	G	1993	X			
<i>Bothrioneurum americanum</i>	G	1993	X			
<i>Bothrioneurum iris</i>	G	1993	X			
<i>Branchiura sowerbyi</i>	G	1993	X			
<i>Limnodrilus claparedeianus</i>	G	1993	X			
<i>Limnodrilus hoffmeisteri</i>	G	1993	X	A	1992	X
<i>Limnodrilus neotropicus</i>	G	1993	X			
<i>Limnodrilus udekemianus</i>	G	1993	X	A	1992	X
<i>Tubifex tubifex</i>	H	1974	X			
<b>Family Glossoscolecidae</b>						
<b>Subfamily Alminae</b>						
<i>Drilocrius breymanni</i>	M	1918	X			
<i>Drilocrius burgeri</i>	M	1918	X			
<b>Family Opistocystidae</b>						
<i>Opistocysta funiculus</i>	G	1993	X			
<b>Family Enchytraeidae</b>						
<i>Achaeta</i> sp.	G	1993	X			
<b>Family Lumbricidae</b>						
<i>Eiseniella tetraedra</i>	G	1993	X			

Two Naididae species collected during this study – *Dero (Dero) botrytis* and *Pristina synclites* – represent new records for Colombia; six other naidid species collected during this study – *Dero (Aulophorus) lodeni*, *Nais communis*, and *N. variabilis* (subfamily Naidinae), *Pristina aequiseta*, *Pristina macrochaeta*, and *P. proboscidea* (Subfamily Pristininae) represent new records for Antioquia (Table 1).

*Dero (Aulophorus) lodeni* was collected in a broad altitudinal range (55-2110 masl) in warm waters (28.9°C). *Dero (Dero) botrytis* was collected from one unique site, an artificial pond. *Nais variabilis* was found at sites in Jardín and Don Matías, Antioquia, with oxygen concentrations ranging from 1.5 mg L<sup>-1</sup> to 9.5 mg L<sup>-1</sup>.

The genus *Pristina* was the most abundant in the present study. *Pristina proboscidea* was the more eurithermic (16-28.9°C) and ubiquitous species (altitudinal range, 55-2500 masl; pH, 5-9). *Pristina synclites*, however, was collected from only one site – from the loose mud at the littoral zone of a eutrophic reservoir in the Municipality of Santo Domingo (altitudinal range, 955-1250 masl).

The absence of aquatic oligochaetes from some areas surveyed during this study could be attributed to 1) poor water quality: vis., very high conductivity (439 µmhos cm<sup>-1</sup>) values measured at one sampling site in the municipality of Apartadó, and/or 2) lack of specific habitat associations (substrate, vegetation).

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