

A Catalogue of the Piscicolidae, Ozobanchidae, and Arhynchobdellida (Annelida, Clitellata, Hirudinea) from South America

Catálogo das famílias Piscicolidae, Ozobanchidae e Arhynchobdellida (Annelida, Clitellata, Hirudinea) da América do Sul

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Abstract

A catalogue of the families Americobdellidae, Cyclobdellidae, Cylicobdellidae, Erpobdellidae, Euhirudinea, Hirudinidae, Macrobdellidae, Ozobanchidae, Piscicolidae, Salifidae, Semiscolecidae, and Xerobdellidae produced 66 nominal species reported to date from South America. 86% of this fauna is endemic to the South American continent. Synonyms and detailed South American occurrences are provided. This is the first reassessment of South American leeches other than Glossiphoniidae in 26 years. An inventory of this little-studied group may be important from an applied point of view. Leeches have very high endemism rates in South America, perhaps unparalleled in freshwater environments. Arguably these animals could serve as important model organisms for ecological studies, particularly as environmental indicators.

Key words: biodiversity, environmental indicators, leeches, Neotropical region.

Resumo

Um catálogo das famílias de Americobdellidae, Cyclobdellidae, Cylicobdellidae, Erpobdellidae, Euhirudinea, Hirudinidae, Macrobdellidae, Ozobanchidae, Piscicolidae, Salifidae, Semiscolecidae e Xerobdellidae produziu 66 espécies nominais assinalados até o momento para a América do Sul. Do total, 86% desta fauna é endêmica para o continente sul-americano. Sinonímias e ocorrências detalhadas para a América do Sul são fornecidas. Esta é a primeira reavaliação da fauna de hirudíneos não-glossifonídeos da América do Sul em 26 anos. Um inventário deste grupo pouco estudado poderá ser importante de um ponto de vista aplicado. Sanguessugas têm um índice muito alto de endemismo na América do Sul, talvez sem paralelo em ambientes aquáticos. Estes organismos poderiam servir como um importante modelo para estudos ecológicos de ambientes aquáticos, particularmente como indicadores de qualidade ambiental.

Palavras-chave: biodiversidade, indicadores ambientais, sanguessugas, região Neotropical.

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Introduction

The diversity and endemism of neotropical hirudineans, which are a result of limited dispersal range of the majority of species, is well known (Moore, 1911; Siddall and Borda, 2004, p. 14). South America is especially important because of the large number of endemic species.

Monotypic South American *Americobdella* lies at the base of the erpobdellid leeches, being an example of the importance of South America in leech evolution and diversification (Siddall *et al.*, 2001, p. 346). The widespread Asian *Barbronia weberi*, on the other hand, is an example of an accidental introduction of leeches. This species feeds predominantly on chironomid larvae (Siddall and Budinoff, 2005, p. 470). The mostly New World 'medical leeches', Macrobodellidae and Semiscollescidae, originated about 85 Mya ago, with the opening of the South Atlantic (Phillips and Siddall, 2005, p. 559).

Ringuelet (1981a, p. 192) lists *Ichthyobdella* (?) *cichlae* Diesing, 1850 for Rio de Janeiro, Brazil. However, *Ichthyobdella* De Blainville, 1827 is a synonym of *Piscicola* De Blainville, 1818 (Pinto, 1923, p. 902). This species is not listed in later revisions of Sawyer (1986) and Epshtein *et al.*, 1994). Since the efforts of Ringuelet (1981a), no species inventories of the leeches and their allies from South America have been attempted.

Piscicolidae and Ozobranchidae form the sister group to the Arhynchobdellida (Apakupakul *et al.*, 1999, p. 356). The ozobranchids are distinguished by the presence of lateral digitiform branchiae (MacCallum and MacCallum, 1918), being the only non-piscicolid leeches to live in the sea, but they are unique in being permanent ectoparasites of sea turtles (Sawyer, 1986, p. 700). Among the arrhynchobdellidans, the Erpobdellidae have long been used as model organisms for ecological studies and species interactions, and as indicators for freshwater toxicology (Siddall, 2002, p. 1). Their taxonomy is

difficult, because even very inconspicuous external characters may sometimes be reliable for species separation, while some anatomical characters appear to be highly variable within the species and sometimes even among individuals (Sket, 1968).

Arhynchobdellid evolution involved a move to land. They contain large, aquatic hirudinids with serrate muscular jaws, or smaller terrestrial blood-feeding groups. Many arhynchobdellidans possess multiple eyespots for 3-dimensional vision. The eggs of arrhynchobdellidans (*Erpobdella* and *Hirudo*) are small (circa 100 μm), and their development and gastrulation undergoes modifications parallel to those of megadrile eggs in relation to microdriles (Omodeo, 1998, p. 63), a clear evolutionary response to a terrestrial existence. Arhynchobdellidans deposit cocoons with a hard surface, inherited from their oligochaete ancestors. Nevertheless, in *Erpobdella punctata*, a large proportion of the unprotected cocoons were destroyed by predators, primarily by snails (Sawyer, 1971, p. 202). The habit of cementing the protective cocoon to a substrate of some sort appears to be the original state in leech evolution, exhibited in acanthobdellidans and branchiobdellidans, and retained in piscicolids and erpobdellids alike (Siddall and Burreson, 1996, p. 282). The aquatic habits of the erpobdellids appear to represent a secondary return to water. Those groups that return to water retain some aspects of terrestriality, particularly those involved in cocoon deposition and early ontogeny. The terrestrial deposition of cocoons in Hirudinidae is interpreted as a means to reduce the destruction of the offspring by aquatic predators such as snails, insect larvae, and fish (Kutschera and Wirtz, 2001, p. 132).

A dominant feature of the South American leech fauna is the presence of terrestrial predaceous forms, virtually lacking in Africa. *Semiscollex* represents a totally predaceous species (Sawyer, 1986, p. 701). Erpobdellidae is a group of non-sanguivorous macrophagous

leeches that prey mainly on invertebrates, swallowing and smashing them with a long muscular pharynx (Trontelj *et al.*, 1999, p. 141), having abandoned the blood feeding habits of their ancestors (Siddall, 2002, p. 1). Sanguivorous hirudinids feed primarily on blood, assisted by their toothed jaws (Trontelj *et al.*, 1999, p. 141). They make tripartite incisions in the skin of their hosts, from which they draw on the upwelling blood. *Hirudo medicinalis* sucks blood directly through external mammalian skin, usually until gorged, and then drops off from its host. The blood ingested by starved leeches amounts from six to nine times their weight in one meal. Occasionally, *H. medicinalis* invades the nostrils of its mammalian host. This species has been used in medicine since ancient times (Orevi *et al.*, 2000, p. 122). No fewer than 7 medically useful substances have already been identified from the medical leech: hirudin, preventing coagulation of ingested blood, an anaesthetic, a spreading factor, an anti-plasma, an anti-trypsin, an anti-inflammatory, and an anti-biotic (Sawyer *et al.*, 1982, p. 412).

In this paper I provide a catalogue of the piscicolids, ozobranchids, and arhynchobdellidans cited to date from the South American continent. The remaining leeches of South America, belonging to the Glossiphoniidae, have been treated in another paper.

Material and methods

I have used 3-letter abbreviations for South American countries (ARG, Argentina; BOL, Bolivia; BRA, Brazil; CHI, Chile; COL, Colombia; ECU, Ecuador; FRG, French Guyana; PAR, Paraguay; PER, Peru; URU, Uruguay; VEN, Venezuela) and 2-letter abbreviations for sampled States in Brazil (AM, Amazonas; ES, Espírito Santo; GO (Goiás); MG, Minas Gerais; PA, Pará; PB, Paraíba; RJ, Rio de Janeiro; RS, Rio Grande do Sul; SC, Santa Catarina; SP, São Paulo).

Results

Species marked with an asterisk (*) are previously only reported from South America. A systematic index is provided in Appendix 1.

Order RHYNCHOBDELLIDA R. Blanchard, 1894

PISCICOLIDAE Johnston, 1865
Syn: Ichthyobdellidae Leuckart, 1863

Bathybdella Burreson, 1981
Type: *B. sawyeri* Burreson, 1981

**B. sawyeri* Burreson, 1981
Distribution. ECU: Galapagos rift, 2447 m deep (Burreson, 1981, p. 486; Burreson and Segonzac, 2006, p. 15).

Branchellion Savigný, 1822
Type: *B. torpedini* Savigný, 1822

B. lobata Moore, 1952
Distribution. CHI (Sawyer, 1986, p. 675).
Further distribution. Eastern Pacific up to California (Sawyer, 1986, p. 675).

**B. gnesios* Ringuelet, 1985
Distribution. CHI, host *Myliobatis chilensis* Philippi (Pisces) (Ringuelet, 1985, p. 168).

B. parkeri Richardson, 1949
Synonym. *B. callorhynchus* Szidat, 1972.
Distribution. ARG: Buenos Aires Prov: Punta Redonda, piscine host (Tanzola and Botté, 1998, p. 65).
Further distribution. Australia and New Zealand (Sawyer, 1986, p. 675).

**B. ravenelii* (Giard, 1851)
Distribution. CHI: Concepcion bay, piscine host (Morillas *et al.*, 1987, p. 342).

Johanssonia Selensky, 1914
Type: *J. kolaensis* Selensky, 1914

J. arctica (Johansson, 1898)
Synonym. *Ichthyobdella pantopodum* Selensky, 1914.

Distribution. BRA (Pinto, 1923, p. 1011).
Further distribution. Arctic seas (Sawyer, 1986, p. 676).

Myzobdella Leidy, 1851
Type: *M. lugubris* Leidy, 1851
Syn: *Illinobdella* Meyer, 1940

**M. platense* (Cordero, 1933)
Original name. *Piscicola platensis* Cordero, 1933.
Distribution. URU: Rio de la Plata, on *Hoplias malabaricus* (Bloch) (Pisces) (Cordero, 1933, p. 450); on fish (Ringuelet, 1968, p. 378; Volonterio *et al.*, 2004, p. 21).

**M. uruguayensis* Mañé-Garzón and Monteiro, 1977
Distribution. URU, on fish (Volonterio *et al.*, 2004, p. 21).
Remarks. This species parasites the gills of the yellow catfish *Rhamdia sapo* (Vallenciennes, 1840) (Mañé-Garzón and Monteiro, 1977, p. 59).

Platybdella Malm, 1863
Type: *P. anarrhichae* (Diesing, 1859)
Synonym. *Crangonobdella* Selensky, 1914; *Sanguinothus* De Silva and Burdon-Jones, 1961

**P. chilensis* Moore, 1910
Previous name. *Cryobdella chilensis* (Moore, 1910).
Distribution. CHI (Sawyer, 1986, p. 663).
Remarks. The species was collected in Valparaíso, on the catfish *Aphos porosus* (Vallenciennes, 1837) (Moore, 1910, p. 28).

P. patagonica Ringuelet, 1945
Previous name. *Cryobdella patagonica* (Ringuelet, 1945).
Distribution. ARG (Ringuelet 1945, p. 109).

Further distribution. Sandwich Islands (Sawyer, 1986, p. 663).

**P. tentaculata* (Cordero, 1937)
Original name. *Ichthyobdella tentaculata* Cordero, 1937.

Distribution. S. America (Cordero, 1937a, p. 16). ARG (Ringuelet, 1968, p. 378).

Pontobdella Leach, 1915
Type: *Pontobdella muricata* Linnaeus, 1758 (= *P. verrucosa* Fleming, 1811)
Synonym. *Albione* Savigný, 1820

**P. variegata* Baird, 1859
Distribution. ARG: Patagonia (Weber, 1915, p. 21).

**P. zonata* Apáthy, 1905
Distribution. CHI: Calbuco: Ancud gulf (Weber, 1915, p. 20).

Stibarobdella Leigh-Sharpe, 1925
Type: *Pontobdella macrothela* Schmarda, 1861
Synonym. *Pontobdellina* Harding and Moore, 1927 (part); *Pentabdella* Llewellyn, 1966

**S. dispar* (Cordero, 1937)
Original name. *Pontobdella dispar* Cordero, 1937.
Distribution. BRA (Cordero, 1937a, p. 13).

**S. loricata* (Harding, 1924)
Original name. *Pontobdella loricata* Harding, 1924.
Distribution. BRA: South, parasitic on Angel shark (Soto, 2003, p. 691).

**S. macrothela* (Schmarda, 1861)
Original name. *Pontobdella macrothela* Schmarda, 1861.
Distribution. S. Amer. (Cordero, 1937a, p. 5). BRA: SC: parasitic on the whaler shark (Pisces) (Soto, 2000, p. 713).

**S. planodiscus* Baird, 1859
Original name. *Pontobdella planodiscus* Baird, 1859.
Distribution. ARG: Patagonia (Weber, 1915, p. 21).

Trachelobdella Diesing, 1850
Type: *T. mulleri* Diesing, 1850

**T. australis* R. Blanchard, 1900
Distribution. ARG: Ushuaia, Tierra del Fuego (Weber, 1915, p. 23).

**T. mulleri* Diesing, 1850

Synonym. *Tracheobdella kollari* Diesing, 1850.

Distribution. BRA (Pinto, 1923, p. 1023).

OZOBANCHIDAE Pinto, 1921

Bogabdella Richardson, 1969

Type. *Bogabdella diversa* Richardson, 1969

Synonym. *Colombobdella* Mañé-Garzón, 1973

**B. ringueleti* (Mané Garzón, 1973)

Original name. *Colombobdella ringueleti* Mané-Garzón, 1973.

Distribution. COL: Meta Dep: Villavicencso Mun: Peralonso: Pavitos dam, on the tortoise *Podocnemis vogli* Wagler (Mané-Garzón, 1973, p. 129).

Ozobranthus De Quatrefages, 1852

Type. *O. branchiatus* (Menzies, 1791)

Synonym. *Lophobdella* Poirer and Rochebrune, 1884

O. margo (Apáthy, 1890)

Original name. *Pseudobranchellion margo* Apáthy, 1890.

Distribution. ARG: La Plata, on dolphin *Pontoporia blainvillei* (Gervais and D'Orbigny) (Soto, 2001, p. 173).

Further distribution. Italy, parasitizing turtle *Thalassochelis corticata* (Pinto, 1923, p. 1093).

Unoculubranchiobdella Solano Lobo Peralta, Rodrigues Matos and Maues Serra-Freire, 1998

**U. expansa* Solano Lobo Peralta, Rodrigues Matos and Maués Serra-Freire, 1998

Distribution. BRA: PA: Belém: Zoobotanical Park, parasite of *Podocnemis expansa* (Chelonia) (Solano Lobo Peralta *et al.*, 1998, p. 161).

Order ARRHYNCHOBDELLA R. Blanchard, 1894

AMERICOBDELLIDAE Caballero, 1956

Americobdella Caballero, 1956

Type. *Macrobdella valdiviana* De Philippi, 1872

Synonym. *Cardea* R. Blanchard, 1917; *Macrobdella* De Philippi, 1872 (non Verrill, 1872); *Philippia* Apáthy, 1905 (non Gray, 1840, mollusk; non Signoret, 1869, hemipteran).

**A. valdiviana* (De Philippi, 1872)

Previous names. *Macrobdella valdiviana* De Philippi, 1872; *Philippia valdiviana* (De Philippi, 1872); *Cardea valdiviana* (De Philippi, 1872).

Distribution. CHI (Moore, 1931, p. 1220): Corral (Weber, 1915, p. 112); Valdivia (Pinto, 1923, p. 1078); Parque Oncol, near Santiago, 495 m (Siddall and Borda, 2004, p. 3).

CYCLOBDELLIDAE Ringuelet, 1972

Orchibdella Ringuelet, 1945

Type. *O. pampeana* Ringuelet, 1945

**O. diaguita* Ringuelet, 1978

Distribution. ARG: Subandean region (Ringuelet, 1978, p. 264).

**O. pampeana* Ringuelet, 1945

Distribution. ARG: Subtropical and pampean domains (Ringuelet, 1945, p. 122; 1949, p. 155; 1976a, p. 101): Rio de la Plata (Paggi *et al.*, 2006, p. 5).

**O. peruviana* Ringuelet, 1976

Distribution. PER: Andean región (Ringuelet, 1976a, p. 101); San Gerónimo stream (Ringuelet, 1981a, p. 193).

CYLIBDELLIDAE Ringuelet, 1972

Blanchardiella M. Weber, 1913

Type. *B. fuhrmanni* M. Weber, 1913)

Synonym. *Hypsobdella* M. Weber, 1913 (Type: *H. columbiensis* M. Weber, 1913); *Bibula* R. Blanchard, 1917 (Type: *Blanchardiella fuhrmanni* M. Weber, 1913) (non *Blanchardella* Moniez, fish cestode); *Clepsine* (part) Savigny, 1822

**Blanchardiella adaiophthalma* Ringuelet, 1980

Previous names. *Helobdella adaiophthalma* (Ringuelet, 1980); *Bibula adaiophthalma* (Ringuelet, 1980).

Distribution. COL (Ringuelet, 1980, p. 6).

Blanchardiella biolleyi Dequal, 1916

Original name. *Helobdella biolleyi* (Dequal, 1916).

Distribution. ECU: Pun (Ringuelet, 1981a, p. 193).

Further distribution. Costa Rica (Ringuelet, 1981a, p. 193).

**Blanchardiella cameliae* M. Weber, 1913

Previous names and synonym. *Helobdella cameliae* (M. Weber, 1913); *Blanchardiella bogotaensis* M. Weber, 1913; *Bibula cameliae* (M. Weber, 1913).

Distribution. COL: Cundinamarca: Bogotá; Tolima: La Camelia coffee plantation; Popayán: Tambo (Weber, 1915, p. 120).

**Blanchardiella columbiensis* M. Weber, 1913

Previous names. *Dacnobdella columbiensis* (M. Weber, 1913); *Macrobdella columbiensis* M. Weber, 1913; *Hypsobdella columbiensis* (M. Weber, 1913); *Bibula columbiensis* (M. Weber, 1913).

Distribution. COL (Weber, 1913, p. 731).

**Blanchardiella ecuadoriensis* Dequal, 1916

Previous name. *H. ecuadoriensis* (Dequal, 1916).

Distribution. ECU: León: Vallevecioso (Ringuelet, 1981a, p. 193).

**Blanchardiella festai* Dequal, 1916

Previous name. *Oxyptychus festai* (Dequal, 1916).

Distribution. ECU (Dequal, 1916, p. 1).

**Blanchardiella fuhrmanni* M. Weber, 1913

Previous name. *Bibula fuhrmanni* (M. Weber, 1913).

Distribution. COL: Eastern cordillera; Boca del Monte (Weber, 1913, p.

731); Páramo Cruz Verde; Del Ruiz cordillera (Weber, 1915, p. 117). VEN: Merida (Ringuelet, 1981b, p. 226).

**Blanchardiella octoculata* M. Weber, 1913

Previous names. *Helobdella octoculata* (M. Weber, 1913); *Bibula octoculata* (M. Weber, 1913); *Erpobdella octoculata* (M. Weber, 1913).

Distribution. COL: Cundinamarca: near Santa Isabel (Ringuelet, 1980, p. 6): Eastern cordillera: Bogotá (Weber, 1915, p. 125).

**Blanchardiella paramoensis* M. Weber, 1913

Previous names. *H. paramoensis* (M. Weber, 1913); *Bibula paramoensis* (M. Weber, 1913).

Distribution. COL: Eastern Cordillera: Ruiz and Paramo Cruz Verde (Weber, 1915, p. 122).

**Blanchardiella peruana* Ringuelet, 1960

Previous names. *H. peruana* (Ringuelet, 1960a); *Bibula peruana* (Ringuelet, 1960).

Distribution. PER (Ringuelet, 1960a, p. 253): Huanuco: between Tingo Maria and Carpfish (Ringuelet, 1981a, p. 193).

**Blanchardiella tamboensis* M. Weber, 1913

Previous names. *Helobdella tamboensis* (M. Weber, 1913); *Bibula tamboensis* (M. Weber, 1913).

Distribution. COL: Popayán: Eastern Cordillera: Tambo: (Weber, 1915, p. 124).

Cylicobdella Grube, 1871

Type. *Centropygus joseensis* Grube and Örsted, 1859

Synonym. *Liostomum* R. Blanchard, 1896 (non Wagler, 1931, nom. rej. Ringuelet, 1948); *Centropygus* Grube and Örsted, 1859; *Cylicobdella* Grube, 1871

C. coccineum (Wagler, 1831)

Original and previous name. *Liostomum coccineum* Wagler, 1831; *Centropygus coccineus* (Wagler, 1831).

Distribution. BOL: Apolobamba ran-

ge: Piara (Siddall, 2001a, p. 11). PER: near Huarón (Ringuelet, 1960, p. 251). ECU: Cajamarca: between Huarón and Cahunayos. COL: Aquacatal; Suiza; Cafetal La Camelia (Weber, 1915, p. 106); Cundinamarca (Ringuelet, 1981a, p. 193). VEN: Mérida (Ringuelet, 1981b, p. 226); Mucuchies desert: Lake Mucubaji (Ringuelet, 1981a, p. 191). BRA (Ringuelet, 1971a, p. 99). **Further distribution.** Trinidad (Weber, 1915, p. 107).

**C. intermedium* (Nonato, 1946)

Original name. *Liostomum intermedia* Nonato, 1946.

Distribution. ARG. PAR (Ringuelet, 1981a, p. 193). BRA: Central and southern (Nonato, 1946, p. 287).

**C. joseense* (Grube and Örsted, 1859)

Original and previous names. *Centropygus joseensis* Grube and Örsted, 1859; *Liostomum joseensis* Grube and Örsted, 1859; *Centropygus jocensis* (Grube and Örsted, 1959); *Centropygus joscencis* (Grube and Örsted, 1859); *Nepheleis tergestina* R. Blanchard, 1892.

Distribution. ARG (Weber, 1915, p. 105; Ringuelet, 1944, p. 55). PAR: San Bernardino; Asuncion; San José. VEN: Puerto Cabello; Caracas. COL: Bogotá (Weber, 1915, p. 104). BRA (Badham, 1923, p. 243); RS; SC: Blumenau; Florianópolis (Desterro) (Weber, 1915, p. 104); SP: Barueri, in ant colonies (Lenko, 1972, p.10); RJ; ES; GO; AM (Pinto, 1923, p. 1074).

**C. lumbricoides* Grube, 1871

Previous name. *Liostomum lumbricoides* (Grube, 1871).

Distribution. ECU: Sigsig. COL: Cundinamarca. VEN. FRG. BRA: Northeast (Ringuelet, 1981a, p. 193).

Remarks. *Liostomum lumbricoides* was synonymized with *L. joseensis* by Pinto (1923, p. 1072), but revalidated as *Cylicobdella lumbricoides* by Ringuelet (1981a, p. 193).

ERPOBDELLIDAE R. Blanchard, 1894

Erpobdella De Blainville, 1818

Synonym. *Trochaeta* Dutrochet, 1817 (Type: *T. subviridis* Dutrochet, 1817); *Nepheleis* Savigný, 1822; *Herpobdella* Agassiz, 1846; *Nephelopsis* Verrill, 1872 (Type: *N. obscura* Verrill, 1872); *Archaeobdella* Grimm, 1876 (Type: *A. esmonti* Grimm, 1876); *Dina* R. Blanchard, 1892 (Type: *D. lineata* (O. F. Müller, 1774)); *Mooreobdella* Pawlowski, 1955 (Type: *Hirudo octoculata* Linnaeus, 1758); *Fadejewobdella* Lukin, 1962 (Type: *F. quinqueannulata* Lukin, 1929)

**E. dubia* (Ringuelet, 1958)

Original name. *Bathracobdella dubia* Ringuelet, 1958.

Distribution. ARG: Santa Cruz Prov: Argentine lake (Ringuelet, 1958, p. 121). CHI: Antofagasta (Ringuelet, 1972b, p. 345).

**E. wuttkei* Kutschera, 2004

Distribution. South America (Kutschera, 2004, p. 153).

Lumbricobdella Kennell, 1886

Type. *L. schaefferi* Kennell, 1886

**L. chamensis* Dequal, 1917

Distribution. VEN: Chama: between Mérida and Zulia (Ringuelet, 1981a, p. 193).

HIRUDINIDAE Whitman, 1886

Hirudo Linnaeus, 1758

Type. *H. medicinalis* Linnaeus, 1758

H. medicinalis Linnaeus, 1758

Distribution. PER: San Martin Dep; Ayacucho Dep (Beltran *et al.*, 1998, p. 1123). BRA: RJ (Pinto, 1923, p. 1033).

Further distribution. Throughout Europe (Kutschera and Utevsky, 2006, p. 1).

Remarks. The South American records of this species are doubtful, as there is now uncertainty about the identity of material referred to the two sister species in Europe, *H. medicinalis* and *H. verbana* Carena, 1820 (Trontelj and Utevsky, 2005). There is now molecular

evidence that commercially available European medical leeches are not *Hirudo medicinalis* (Siddall *et al.*, 2007).

MACROBDELLIDAE Richardson, 1969

Limnobdella R. Blanchard, 1893
Type. *L. mexicana* R. Blanchard, 1893
Synonym. *Potamobdella* Caballero, 1932

L. mexicana (R. Blanchard, 1893)
Distribution. VEN: Puerto Cabello. BRA: MT: Cuiabá (Weber, 1915, p. 82).
Further distribution. Mexico (Blanchard, 1893, p. 1).

Oxyptychus Grube, 1851
Type. *O. striatus* Grube, 1851
Synonym. *Argyrobdelella* Cordero, 1937 (Type: *Nepheleis ornata* Weyenbergh, 1883); *Limnobdella* R. Blanchard, 1893; *Diplobdella* Pinto, 1920 (Type: *Limnobdella brasiliensis* Pinto, 1920).

**O. brasiliensis* (Pinto, 1920)
Original and previous name. *Limnobdella brasiliensis* Pinto, 1920; *Diplobdella brasiliensis* (Pinto, 1920).
Distribution. ARG. BRA (Cordero, 1937b, p. 40): SP (Ringuet, 1981a, p. 192); RJ: Campo Belo; MG: Lassance; GO: Araguay and Ipé Arcado (Pinto, 1920, p. 1); Pirenópolis (Brandão and Garda, 2000, p. 171).

**O. inexpectatus* Ringuet, 1945
Distribution. URU. ARG (Ringuet, 1945, p. 116; 1949, p. 154; De Avila Goulart, 1963, p. 2).

**O. ornatus* (Weyenbergh, 1883)
Original and previous name. *Nepheleis ornata* Weyenbergh, 1883; *Argyrobdelella ornata* (Weyenbergh, 1883).
Distribution. ARG (Cordero, 1937b, p. 50). BRA: RS (De Avila Goulart, 1963, p. 3).

**O. strenuus* Ringuet, 1948
Distribution. PAR (Ringuet, 1948, p. 236).

**O. striatus* Grube, 1851
Distribution. South America (Corde-

ro, 1937b, p. 44). ARG. URU: Montevideo (Pinto, 1923, p. 1047). VEN: Caracas. BRA (Ringuet, 1972a: 99); South (Ringuet, 1981a, p. 192).

SALIFIDAE Johansson, 1910
Synonym. Trematobdellidae Johansson, 1913

Barbronia Johansson, 1918
Type. *B. rouxi* Johansson, 1918
Synonym. *Vivabdella* Richardson, 1970 (part)

B. weberi (R. Blanchard, 1897)
Previous name. *Alboglossiphonia weberi* (R. Blanchard, 1897).
Distribution. BRA (Pamplin and Rocha, 2000, p. 723).
Further distribution. United States, Afghanistan, India, Southeast Asia, and Australia (Govedich *et al.*, 2002, p. 225).

SEMISCOLECIDAE Scriban and Auctum, 1934

Patagoniobdella Ringuet, 1972
Type. *Semioscolex variabilis* R. Blanchard, 1900

**P. ademonia* Ringuet, 1976
Distribution. ARG: Patagonia: Nahuel Huapi andean lake (Ringuet, 1976b, p. 61).

**P. fraterna* Ringuet, 1976
Distribution. CHI: (Ringuet, 1981b, p. 226; 1985, p. 163); Neltume lake (Siddall and Borda, 2004, p. 6). ARG: Patagonia: Lacar lake (Ringuet, 1976b, p. 61).

**P. variabilis* (R. Blanchard, 1900)
Original name. *Semioscolex variabilis* R. Blanchard, 1900
Distribution. South America (Cordero, 1937b, p. 62). CHI: Fritillar; Concepcion (Weber, 1915, p. 98); Villarica and Huerquehue lakes (Siddall and Borda, 2004, p. 6). ARG (Weber, 1915, p. 100; Ringuet, 1945, p. 121). PAR: San Bernardino (Weber, 1915, 98). BRA: RS (De Avila Goulart, 1963, p. 5).

Semioscolex Kinberg, 1866
Type. *S. juvenilis* Kinberg, 1866
Synonym. *Cyclobdella* Weyenbergh, 1866

**S. coecus* Ringuet, 1936.
Distribution. ARG (Ringuet, 1936, p. 379).

**S. glaber* (Weyenbergh, 1877)
Original name. *Cyclobdella glabra* Weyenbergh, 1877.
Distribution. CHI: Fritillar. ARG: Córdoba. PAR: Asunción; San Bernardino (Weber, 1915, p. 97). BOL/PER: Formosa (Ringuet, 1953a, p. 224).

**S. intermedius* Ringuet, 1942
Distribution. ARG (Ringuet, 1945, p. 122).

**S. juvenilis* Kinberg, 1866
Distribution. CHI. ARG: Córdoba. URU: Montevideo. PAR: Apa River; Asunción; Alto Chaco; San Bernardino (Weber, 1915, p. 95). BRA: RS (De Avila Goulart, 1963, p. 5); BA (Weber, 1915, p. 95).

**S. notatus* Cordero, 1937
Distribution. BRA: PB (Cordero, 1937a, p. 24).

**S. similis* (Weyenbergh, 1877)
Original name. *Nepheleis similis* Weyenbergh, 1877.

Distribution. South America (Cordero, 1937a, p. 60). ARG (Ringuet, 1945, p. 120; 1949, p. 154). URU (Ringuet, 1981a, p. 192). BOL: Cochabamba (Ringuet, 1953a, p. 215); Santa Cruz Dep: Volcán lagune (Siddall, 2001b, p. 2). PAR (Ringuet, 1948, p. 239). PER: Amazon (Shain *et al.*, 2007). BRA: RJ (Ringuet, 1981a, p. 192).

**S. zonatus* Oka, 1931
Distribution. South America (Oka, 1931, p. 323). BRA (Oka, 1932, p. 316).

XEROBDELLIDAE Moore, 1946
Synonym. Diestecotomatidae Ringuet

let, 1953; Mesobdellidae Ringuélet, 1972; Nesophilaemonidae Ringuélet, 1982

Diesticostoma Vaillant, 1890

Type. *D. mexicana* (Baird, 1869)

Synonym. *Heterobdella* Baird, 1869 (pre-occupied); *Hygrobdella* Caballero, 1940

**D. trujillensis* Ringuélet, 1976

Distribution. PER: Coastal zone (Ringuélet, 1976c, p. 67); La Libertad: Trujillo (Ringuélet, 1981a, p. 193).

Mesobdella R. Blanchard, 1893

Type. *Hirudo gemmata* C. E. Blanchard, 1849

**M. gemmata* (C. E. Blanchard, 1849)

Original name, synonyms, and previous names. *Hirudo gemmata* C. E. Blanchard, 1849; *Hirudo cylindrica* C. E. Blanchard, 1849; *Hirudo brevis* Grube, 1871; *Mesobdella brevis* (Grube, 1871).

Distribution. CHI (Ringuélet, 1942, p. 364): Puerto Montt; Frutillar; El Huito (Weber, 1915, p. 92); Valdivia and Chiloé (Pinto, 1923, p. 1055); near Santiago: Chan-Chan Alto (Siddall and Borda, 2004, p. 3); Central Chile, between 36°S and 38°S: lakes Chica de San Pedro, Grande de San Pedro, Quiñero, and Lanahue (Munoz *et al.*, 2001, p. 177).

**M. notohilica* Ringuélet, 1953

Distribution. ARG (Ringuélet, 1953b, p. 187).

Nesophilaemon Nybelin, 1943

Synonym. *Philaemon* Lambert, 1898 (Type: *P. pungens* Lambert, 1898); *Xenobdella* Richardson, 1975; *Micobdella* Richardson, 1975; *Castrabdella* Richardson, 1975.

**N. skottsbergi* (Johansson, 1924)

Original name. *Philaemon skottsbergi* Johansson, 1924.

Distribution. CHI: Juan Fernandez Archipelago (Johansson, 1924, p. 442; Ringuélet, 1955, p. 137; Siddall and Borda 2004, p. 16).

Discussion

No less than 66 nominal species of Hirudinea belonging to the Piscicolidae, Ozobanchidae and Arhynchobdellida have been referred in the literature for South America, 56 of which are endemic to the South American continent. Of the eight species that are not restricted to South America, *Cylicobdella coccineum* extends its range into the Caribbean, and the other seven are more widely distributed in the world. More than 1/4 of the known species were described by the Argentinian Raul Adolfo Ringuélet (†1914-1982), who has thus contributed most to our knowledge of South American hirudineans belonging to these groups.

Leeches represent very promising model organism for ecological studies, especially in South America, where their high degree of endemicity and their habitat diversification is very great. By inventariating the leech fauna of South America, I hope to provide a first step towards documenting the diversity of these animals in our megadiverse and faunistically almost unknown continent, particularly with regards to non-vertebrate, non-arthropod groups. Hopefully leeches will prove useful as indicators of environmental conditions, especially in freshwater habitats, where their high rate of endemicity may be shown to be almost unparalleled.

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Appendix 1. Systematic Index

Order Rhynchobdellida

Piscicolidae

Bathybdella
Branchellion
Johanssonia
Myzobdella
Platybdella
Pontobdella
Stibarobdella
Trachelobdella

Ozobranchidae (turtle leeches)

Bogabdella
Ozobranchus
Unoculubranchiobdella

Order Arhynchobdellida

Americobdellidae

Americobdella

Cyclobdellidae

Orchibdella

Cylicobdellidae

Blanchardiella
Cylicobdella
Lumbricobdella

Erpobdellidae

Erpobdella

Hirudinidae

Hirudo

Macrobdellidae

Limnobdella
Oxyptychus

Salifidae

Barbronia
Semiscolescidae
Patagoniobdella
Semiscolax

Xerobdellidae

Diestecostoma
Mesobdella
Nesophilaemon