12th International Symposium on Aquatic Oligochaeta

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Book of Abstracts

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12th International Symposium on Aquatic Oligochaeta

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Welcome to the Symposium

Dear friends and colleagues, welcome to the latest in a series of triennial symposia that began in 1979 when 31 researchers met for four days in British Columbia, Canada. That meeting was hosted by Ralph Brinkhurst whose enthusiasm for oligochaetes I found contagious when I worked with him in Tennessee in 1991/92 and who has collaborated with many subsequent symposium delegates. That first meeting set the scene for regular collegiate gatherings of oligochaetologists that have spawned many collaborations and scientific advances over the past 33 years. I am pleased to see that four of those that attended the 1979 symposium are joining us in Fremantle.

I would like to thank those that have travelled a long way to be here in Fremantle, whether you are old hands or relatively new to oligochaete research. While we are fewer in number at this meeting than at previous symposia, I hope this means that you will find it an intimate meeting with ample opportunity to discuss research with colleagues. A strong focus on a few themes (primarily systematics, biogeography and toxicology) will encourage some engaging exchanges of ideas during the days and evenings of the symposium.

We have been fortunate to have generous sponsors that have enabled us to minimize the cost of the symposium. These are:

Science Division, Western Australian Department of Environment and Conservation
Phoenix Environmental Sciences
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Biota Environmental Sciences
Ecologia Environment
Australian Society for Limnology (for student prizes)

I would also like to thank the administrative team at the Woodvale Wildlife Research Centre (Kathy Salonga, Sandy Grose, Rod Mell, Vicki Hartshorn and Marissa Mallia) for helping us with financial arrangements. A special thanks also to Mark Wetzel and others amongst our number that have provided advice and virtual cups of tea while we were planning this meeting.

Finally, a huge thankyou to my fellow organisers (listed opposite) who have done a magnificent job of bringing this symposium to fruition.

Adrian Pinder
Convener
12th International Symposium on Aquatic Oligochaeta

Contents

Programme

Sunday

18.00 Welcome drinks at the *Sail and Anchor Pub*

Monday

07.30 Registration desk open

09.00 Welcome to Country, Wadumbah Dance Group, Opening by special guest.

10.00 Obituaries and History of International Aquatic Oligochaete Symposia - **Mark WETZEL**

10.30 Morning tea (30 minutes)

Session 1: Chaired by Pilar Rodriguez

11.00 **Christer ERSÉUS (Keynote Lecture)**
DNA barcoding and clitellates

12.00 **Svante MARTINSSON & Christer ERSÉUS**
Species delimitation and phylogeny of Nordic *Cognettia* (Clitellata: Enchytraeidae)

12.20 **Alessandro L PRANTONI, Maikon DI DOMENICO, Christer ERSÉUS & Paulo C LANA**
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Session 2: Chaired by Patrick Martin

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A re-evaluation of morphological characters in the taxonomy of the Lumbriculidae (Clitellata) and a discussion of the genus category in the family

14.20 **Ainara ACHURRA, Pilar RODRIGUEZ & Christer ERSÉUS**
Contribution to the taxonomic status of several species of the genus *Stylodrilus* Claparède, 1862

14.40 **Yong-De CUI, Xue-Bao HE & Hong-Zhu WANG**
Aquatic Oligochaeta from Tibet, China, with descriptions of three new species

15.00 **Adrian PINDER**
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15.40 Microscopy session

Programme

Tuesday

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9.20 **Naime ARSLAN, Seval KÖKMEN & Deniz KARA**
Oligochaeta limnofauna of Lake Büyük Akgöl (Turkey) and their relation with environmental variables

9.40 **Mark J. WETZEL**
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The aquatic Oligochaeta (Annelida) of Lakes Hazar and Van (Turkey)

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Horizontal distribution of aquatic oligochaeta in Lake Kizaki, central Japan

11.30 **Akifumi OHTAKA**
Profundal oligochaete fauna (Annelida, Clitellata) in Japanese freshwater lakes

11.50 **Maria BATURINA, Tarmo TIMM & Olga LOSKUTOVA**
Communities of Oligochaeta in Ural Mountains lakes (Russia)

12.10 **Synopses of poster presentations (see page 9 for titles)**

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13.40 **Poster session**

15.30 Meet in Esplanade Hotel foyer for group photo

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Wednesday

9.00 Meet in Esplanade Hotel Foyer for bus departure to Rottnest Island ferry terminal (details page 8)

Programme

Thursday

8.30 Housekeeping

Session 5: Chaired by Kimio Hirabayashi

8.40 **Adrian M. PINDER (Keynote lecture)**
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9.20 **Mark J. WETZEL**
Natural history collections: status, critical issues, recommendations

9.40 **Göran MILBRINK**
Where have all the ”vejdovskies” gone (*Potamothrix vejdovskyi* Hrabe)? Invasive PontoCaspian tubificid oligochaete species in Lake Mälaren, south-central Sweden, in a 100 year perspective

10.00 **Stefania DEL PIERO, Luciano MASIERO & Sandra CASELLATO**
Fluoride toxicity and bioaccumulation in *Branchiura sowerbyi* Beddard (Oligochaeta, Tubificidae)

10.20 Morning tea (30 minutes)

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10.50 **Haroldo LOBO & Evaldo L. G. ESPÍNDOLA.**
Branchiura sowerbyi as test-species in ecotoxicological researches: a review

11.10 **Yong-De CUI, Zeng-Hui PENG & Hong-Zhu WANG**
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11.30 Free time

12.00 Lunch (45 minutes)

12.45 **Business meeting**

14.15 **Afternoon tea and symposium close**

15.45 Meet in Esplanade Hotel Foyer for bus departure to Kings Park and dinner

18.30 Pre-dinner drinks at *Frasers* in Kings Park (details page 8)

19.00 Dinner commences

23.00 Bus returns to Esplanade Hotel

Symposium Information

Presentations and Posters

Oral Presentations
Please take your presentations to the symposium room (Carnac Room) and hand to the organising committee **before the first session** on the day you are going to present.

Posters
Posters will need to be put onto the poster boards **Tuesday morning** in the Garden Room (next to symposium room). Velcro dots are available at the registration desk if needed.

Symposium Photograph (Tues 11th).

Smile! A photographer has been organised for **Tuesday** afternoon after the poster session. Please be ready in the Foyer at **3:30pm** for the photo (which will be taken at a historic location about 10 minutes walk from the hotel).

Mid Symposium Excursion to Rottnest Island (Wed 12th)

Are you ready to explore? Please meet in the Foyer at the **Esplanade Hotel at 9:00am,** for the bus to take you to the ferry terminal.

Please take a hat, drink and walking shoes. There is a lot to see and do on Rottnest, including swimming, snorkeling, walking, cycling, bird watching, exploring the salt lakes and taking in the island's history. More information and maps of Rottnest are in your symposium bags so please take these with you. You will need to provide your own lunch but there are shops on the island where food and drinks can be purchased.

We will meet at the ferry terminal at 3.45pm for the voyage back to Fremantle (dont be late).

Symposium Dinner (Thurs 13th)

Beautiful view and fabulous food. Please meet in the Foyer at the **Esplanade Hotel at 3:45pm** for the bus to take you to Kings Park, where we will have dinner at Fraser's Restaurant. There will be time for you to explore the botanic gardens at Kings Park on a guided walk or by yourself. There are excellent views of the city from the park.

The bus will return to Fremantle about 11:00pm.

We hope you enjoy the symposium and if you have any questions please ask the organising committee (the ones with the blue badges!).

Posters

1. Ainara ACHURRA & Pilar RODRIGUEZ

Is narrow endemicity a general pattern for stygobiont oligochaete fauna?

2. Deniz A ODABAŞI, Serpil ODABAŞI, Naime ARSLAN & Mehmet AKBULUT

The first record of *Chaetogaster limnaei* (Annelidae: Oligochaeta) on *Pseudobithynia* sp. (Gastropoda: Prosobranchia)

3. Naime ARSLAN, Tarmo TIMM, Christer ERSÉUS & Cansev AKKAN

The aquatic Oligochaeta (Annelida) of Lake Sapanca, Turkey

4. Naime ARSLAN, Deniz KARA, Melih Rüzgar & Cansev Akkan

Aquatic Oligochaeta (Annelida) of Dam Lakes Çatören and Kunduzlar (Turkey)

5. Sandra CASELLATO, Stefania DEL PIERO & Valeria COVRE

Effects of fluoride dissolved in water on the life cycle and gametogenesis of *Branchiura sowerbyi* Beddard (Oligochaeta, Tubificidae)

6. Lucas D. SANTANA, Luciana F. T. RODRIGUES, Haroldo LOBO & Roberto G.. ALVES

Aquatic Oligochaeta associated with bryophytes in a first-order stream in the Atlantic Forest, Southeast Brazil

7. Kirsty QUINLAN, David CALE & Adrian PINDER

Aquatic oligochaetes of the Western Australian Wheatbelt

8. Steven FEND & Jim CARTER

A (possibly) endemic oligochaete fauna in Upper Klamath Lake, Oregon, USA (note: no abstract)

ABSTRACTS
(in alphabetical order by presenter's surname)

Contribution to the taxonomic status of several species of the genus *Stylodrilus* Claparède, 1862

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The genus *Stylodrilus* Claparède, 1862 is a mostly Palearctic freshwater lumbriculid genus with more than 30 species known to date. During the last years, we have studied several *Stylodrilus* species using both morphological and molecular approaches. First, we aim to establish whether a sample of *Stylodrilus heringianus* Claparède, 1862 from different parts of North-west Europe represents a single metapopulation or a number of separately evolving lineages, i.e. cryptic species. We examine sequences of the barcoding gene (COI) and two nuclear markers, the ITS region and H3, using pairwise distances, Bayesian inference and network analysis. Second, we aim to test whether individuals of *Stylodrilus parvus* (Hrabe & Cernosvitov, 1927) collected in groundwaters of the northern Iberian Peninsula represent various cryptic species. We integrate a morphological approach focused on characters of the reproductive organs and molecular data (pairwise distances of COI, ITS and H3 sequences). Results show that studied populations of *S. heringianus* are part of the same metapopulation. On the contrary, cryptic speciation is suggested for *S. parvus*. The taxonomic status of *Bichaeta sanguinea* Bretscher, 1900 as well as the synonymy of *Bythonomus* Grube, 1880 and *Stylodrilus* are discussed.

Keywords: *Stylodrilus heringianus, Stylodrilus parvus*, DNA.

ORAL presentation

Is narrow endemicity a general pattern for stygobiont oligochaete fauna?

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Oligochaetes are a common and diversified component of the groundwater fauna, there being at present >100 species of described stygobiont oligochaetes in the world (des Chatelliers *et al.* 2009). Endemism is very high in subterranean faunas (e.g. Culver and Sket 2000) and it has been shown that ranges over 200 km are extremely rare, e.g. several amphipod and decapod species and the cave salamander (Trontelj *et al.* 2009). Regarding the oligochaetes, des Chatelliers *et al.* (2009) calculated that 60% of known stygobiont species are type locality endemics, while 14% show a wide geographic range and 26% are found at many sites within a region. Thus, is narrow endemicity a general pattern for stygobiont oligochaete fauna? In this study, we analyze the range sizes of the stygobiont oligochaetes reported from the northern Iberian Peninsula, Europe. We utilize our own dataset of species collected from the area and data from the literature. The number of known stygobiont oligochaete species in the area is 20, of which 7 species are type locality endemics, 3 species are endemic of the same karst unit, 4 species have a maximum range of 260 km and 6 species exceed 585 km. Therefore, small distribution ranges (<260 km) appear to be a general pattern for stygobiont oligochaetes in the northern Iberian Peninsula (if sufficient sampling is supposed). We suggest that the taxonomy of the species with large distributions, i.e., several species of the lumbriculid genus *Trichodrilus* Claparede 1862 and the phallodriline *Gianius aquaedulcis* (Hrabe, 1960) should be revised since they could constitute a complex of species.

Keywords: endemicity, groundwater, Iberian Peninsula.

POSTER presentation

The first record of *Chaetogaster limnaei* (Annelidae: Oligochaeta) on *Pseudobithynia* sp. (Gastropoda: Prosobranchia)

Deniz A ODABAŞI[1] Serpil ODABAŞI[1] Naime ARSLAN[2] & Mehmet AKBULUT[1]

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An intimate association between the oligochaete worm *Chaetogaster limnaei* (K. von Baer, 1827) and many aquatic snail species has long been recognized as commensal or parasitic in several North American and European freshwater ecosystems. However, *C. limnaei* has not yet been recorded on *Pseudobithynia* species. In the present study, the gastropod fauna of Tuzla River (Çanakkale-Ayvacık, Turkey) was investigated . Although, several freshwater snails were determined along the river, only *Pseudobithynia* sp. was found to be infected by *C. limnaei* and at only one sampling station. A total of 31 snails (21 female and 10 male) were dissected within this study to reveal the occurrence of *C. limnaei*. It was observed that *C. limnaei* was present in a relatively higher number (8-10 individuals) in the pallial cavity of female *Pseudobithynia* sp. In conclusion, these results show the ability of *C. limnaei* to use different organisms present in an aquatic environment as hosts and they show the preference of this naidid for gastropods of the genus *Pseudobithynia* in this river.

Key Words: *Chaetagaster limnaei, Pseudobithynia*, symbiosis.

POSTER Presentation

The aquatic Oligochaeta (Annelida) of Lake Sapanca, Turkey

Naime ARSLAN[1], Tarmo TIMM[2], Christer ERSÉUS[3] & Cansev AKKAN[1]

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Lake Sapanca is located in the Marmara region of north-west Turkey (40°41' to 40°30' N, 30°09' to 30°20' E), at an elevation of 30 m above sea level and is the second largest lake in the region. Its surface area is 46.8 km^2 with a maximum depth of 55 m. Samples were collected from nine stations between June 2011 and March 2012. Duplicate Ekman grab samples (surface area 225 cm^2) were taken for species composition and abundance of aquatic Oligochaeta. Surface water temperature, hydrogen ion concentration (as pH) and dissolved oxygen (DO) were measured in the field, and water samples were analyzed in the laboratory for biochemical and chemical oxygen demand. Oligochaetes, comprising 73.23% abundance of the total specimens, were the largest component of the benthic invertebrate fauna. The oligochaete fauna of the lake consisted of widely distributed tubificinae taxa *Potamothrix hammoniensis, Psammoryctides albicola, P. barbatus, P. moravicus, Limnodrilus udekemianus, Embolocephalus velutinus, Tubifex tubifex* and *T. blanchardi.* Of the total number of oligochaetes, the four first species commonly occurred at all sampling stations while *P. hammoniensis* was found to have the highest abundance within the oligochaete fauna. *Embolocephalus velutinus* had the lowest abundance in this group. Species diversity (*H'*, according to Shannon-Wiener), dominance (Dm= 100 ($n\ N^{-1}$)), and frequency (F= ($m\ M^{-1}$)) were calculated. According to Shannon-Wiener diversity index, the 1st station was determined to have the widest diversity (H'=1.722, Evenness 0.55), whereas the 8th station was determined to have the poorest (H'=1.007, Evenness 0.68). According to two-way Simpson Cluster Analysis, stations 1, 2 and 5 are the most different for the dynamics (distribution both in terms of species and the number of individuals) of oligochaetes in Lake Sapanca.

Key words: Oligochaeta, Lake Sapanca, Turkey.

Poster Presentation

Aquatic Oligochaeta (Annelida) of Dam Lakes Çatören and Kunduzlar (Turkey)

Naime ARSLAN[1], Deniz KARA[1], Melih Rüzgar[1] , Cansev Akkan[1]

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Çatören and Kunduzlar Dam Lakes, located on Seydi River, are the main irrigation water resources of Seyitgazi (Eskişehir), Turkey. The river and the reservoirs are both under the threat of pollution primarily originating from several domestic point sources and land-based diffuse sources. The numerical and proportional distributions of oligochaetes in Çatören and Kunduzlar Dam Lakes were surveyed seasonally from 2009 to 2011 at four different stations. According to the results, the Çatören Dam Lake benthic invertebrate fauna consisted of Oligochaeta (42.5 %), Chironomidae larvae (30.5 %) and other groups (27 %); Kunduzlar Dam Lake benthic invertebrate fauna consisted of Oligochaeta (54.6 %), Chironomidae larvae (18.8 %) and and other groups (26.6%). By evaluating the data via a Shannon-Wiener diversity index it was found that the Çatören Dam Lake had an index of 2.32); while Kunduzlar Dam Lake had an index of 3.27. In addition, some physicochemical parameters of the water were analyzed. The relationships between the dynamics of organisms and environmental parameters were supported by Pearson Correlation Index and Canonical Correspond Analysis. We found that the Dam Lakes' water is polluted with some metals such as Cu, Cr, Ni and partly with Fe and Mn. High pH and second quality levels of NO_3-N, and third quality levels of NO_2-N, third quality levels of Cu, Cr, Ni and, low species richness showed that similar studies should be repeated periodically in these Dam Lakes so as to predict the future of the Çatören and Kunduzlar Dams.

Key words: Oligochaeta, Çatören and Kunduzlar Dam Lakes, Turkey.

POSTER presentation

The aquatic Oligochaeta (Annelida) of Lakes Hazar and Van (Turkey)

Naime ARSLAN[1], Christer ERSÉUS[2], Tarmo TIMM[3] , Melih RÜZGAR[1]

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Lake Hazar is located in the Eastern Anatolia region in Turkey (at about 39.2 ^{o}E longitude and 38.2 ^{o}N latitude), formed tectonically by the Eastern Anatolia Fault, is one of the largest and deepest lakes in this region. The lake is 1248 m above sea level; the surface area of the lake and its basin are 80 km^2 and 73 km^2 respectively. The average depth of the lake is 93 m. The lake and its surroundings have been under state protection since 1991 as a place with historical value. In addition, the lake is included in B type of International Wetlands according to the Ramsar Agreement. During the present study (August 2011 – June,2012), 4522 specimens representing 5 species of aquatic Oligochaeta were collected from Lake Hazar, from 15 stations with differing depths (2–200 m). Some physico-chemical parameters of surface water were measured in situ. Oligochaetes comprised 69.3% of the total invertebrate abundance. The oligochaete fauna of the lake consisted of the tubificinae taxa *Potamothrix* sp. I, *Potamothrix* sp. II, *Psammoryctides barbatus* and (?)*Ilyodrilus* sp. At least two of them, *Potamothrix* sp. I and sp. II., may represent species new to science.

The saline, 450 m deep Lake Van (Eastern Anatolia, Turkey, at about 43 ^{o}E longitude and 38.5 ^{o}N latitude) is one of the largest hydrologically closed lakes by volume (600 km^3), and the world's largest soda lake by area (3570 km^2). It has a drainage basin of 12 500 km^2 and the lake surface averages about 3600 km^2. The surface is approximately 1650 m above mean sea level. According to bathymetric data the lake shows three distrinct physiographic provinces: lacustrine shelf, sublacustrine slope and lake basin. The lake water is highly alkaline, with a pH of up to 9.8, and the salinity is 22 ppt. During the study (October, 2011–June, 2012), 1519 specimens representing 6 invertebrate groups (Oligochaeta, Chironomidae, Ceratopagonidae, Copepoda, Bivalvia and Gastropoda) were collected from the lake, from 32 stations with differing depths (3–400 m). Some physico-chemical parameters of the surface water (temperature, conductivity, ORP, pH, DO) were measured in situ. Oligochaetes comprised 30.6% of the total invertebrate abundance. The oligochaete fauna of the lake consisted of only one species of Enchytraeidae (*Enchytraeus* sp.), which probably is endemic to the lake and thus new to science.

Key words: Oligochaeta, Lake Hazar, Lake Van, Turkey.

ORAL presentation

Effects of fluoride dissolved in water on the life cycle and gametogenesis of *Branchiura sowerbyi* Beddard (Oligochaeta, Tubificidae)

Sandra CASELLATO, Stefania DEL PIERO & Valeria COVRE

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Studies of the life cycle and gametogenesis of *Branchiura sowerbyi* and biological effects related to exposure to some xenobiotics have been reported by many authors in the past. Fluoride concentration in many aquatic ecosystems is significantly increasing as a consequence of human activities (agrochemical, pharmaceutical, refrigerant, pesticide, surfactant compounds). The main goal of this study was to examine the effects of fluorides on life cycle and gametogenesis, exposing *B. sowerbyi* specimens to water concentrations from 50 to 100 times higher than natural one (0.1-03 mg F^-/L) for a long period. A recent study (Del Piero et al., this symposium) showed that *Branchiura sowerbyi* is more resistant to fluoride than other freshwater invertebrates, especially in presence of sediment. Considering that concentrations which did not result toxic in short-term experiments can induce effects when the exposure time was increased, numerous individuals were exposed to fluoride dissolved in water from the end of February to the beginning of July. That is the period of gametes maturation in *B. sowerbyi* in natural environment, and monitored up to the period of cocoons deposition to investigate possible effects of fluoride on the gametes maturation. Little aquaria (10 L) were prepared in order to realize a microcosm, where the same conditions of the original sampling site were reproduced (original water and its temperature range, original sediment: a layer of 8 cm etc.). Numerous specimens were reared and exposed to the concentrations of 15 and 30 mg/L (weekly renewed), vs. a control without fluoride. Periodical controls (weekly) on treated and no-treated specimens, made us to follow the gametes maturation both of the male and female germinal line, revealed temporal differences of gametogenesis phases in treated specimens which did not complete spermatozoans maturation, particularly at the highest fluoride concentration exposition. Exposed animals were thinner and shorter than control ones and cocoons deposition did not occur for these animals.

Keywords: fluoride toxicity, gametogenesis, *Branchiura sowerbyi.*

POSTER Presentation

Aquatic Oligochaeta from Tibet, China, with descriptions of three new species

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Formed in the Medio-Pleistocene Epoch of the Quaternary Period, the Tibetan Plateau is known to have a unique fauna, from which many endemic insects and fishes have been found. However, the knowledge regarding aquatic Oligochaeta in this plateau is still limited. The earliest taxonomic work on oligochaetes in Tibet was the records of six species by Stephenson (1909), which were re-described by Cernosvitov in 1941. Later, Liang (1963) described a species of *Pristina*, and Liang et al. (1979) recorded a glacial enchytraeid. In 2010-2011, an investigation of oligochaetes in Tibet was carried out. A total of 26 species, belonging to 16 genera of Lumbriculidae and Naididae (including tubificids), were identified from six waterbodies, i.e. Yarlung Zangbu River, Lhasa River, Niyang River, Lake Yamzhao Yumco, Lake Namco and Lalu Wetland. Among them, three species, *Tubfiex conicus*, *Isochaetides palmatus* and *Nais longidentatus* are new to science, and 12 species are new to Tibet. The genus *Isochaetides* Hrabě, 1966 is recorded from China for the first time. The fauna of oligochaetes in Tibet is similar to that of northern China, belonging to the Holarctic.

Keywords: *Nais*, *Tubifex*, *Isochaetides*, aquatic Oligochaeta, new species, taxonomy, Tibet.

ORAL presentation

Fluoride toxicity and bioaccumulation in *Branchiura sowerbyi* Beddard (Oligochaeta, Tubificidae)

Stefania DEL PIERO, Luciano MASIERO & Sandra CASELLATO

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Fluoride concentrations are increasing significantly in many aquatic ecosystems as a consequence of human activities (agrochemicals, pharmaceuticals, refrigerants, pesticides, surfactant compounds)

Several investigations have revealed that sensitivity to fluorides and safe concentrations vary greatly within classes, families, and genera. Aquatic oligochaetes have often been used for pollution assessment and bioaccumulation testing, but no information has been given about fluoride tolerance. Among endobenthic tubificids, *Branchiura sowerbyi* is easily identifiable (evident posterior gills, large size) and particularly useful for tissue requirements in chemical analysis. The purpose of this study is to examine the tolerance of this tubificid to fluoride toxicity and its bioaccumulation capacity by performing short (LC50 96h) and long-term experiments (18-d) at different temperatures (17°C and 22 °C). LC_{50} values showed that *B. sowerbyi* is more resistant to fluorides than other freshwater invertebrates, especially in the presence of sediment. Fluoride became more toxic with the increased temperature, demonstrating that seasonal temperature changes could influence the sensitivity of this freshwater tubificid. Bioaccumulation was lower when the organisms were exposed to sodium fluoride in the absence of sediment, indicating that this animal also accumulates fluoride by ingesting sediment. As *B. sowerbyi* is food for many less tolerant fishes, its bioaccumulation ability can represent a risk in view of fluoride magnification in the freshwater aquatic food web.

Keywords: *Branchiura sowerbyi*, fluoride toxicity, bioaccumulation, temperature influence.

ORAL presentation

DNA barcoding and clitellates

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DNA barcoding is a technique for characterising and identifying species of organisms using a short DNA sequence from a standard and agreed-upon position in the genome. The cytochrome c oxidase subunit 1 mitochondrial region (COI) is emerging as the standard barcode region for higher animals. It is 658 nucleotide base pairs long in most taxa. In this talk, DNA barcoding as such will be briefly introduced, and its application in clitellate taxonomy and identification will be discussed, and demonstrated by examples. A key message will be that, while COI sequences can be used for initial sorting of large collections of worm specimens, their accuracy and usefulness is not straight forward, until species have been properly delimited using a combination of mitochondrial and nuclear genetic data. That is, for DNA barcoding to work in routine identification processes and for all species, the interspecific variation in the barcoding gene must be clearly larger than the intraspecific variation of the same gene. This also means that DNA barcoding is closely associated with what a species is, and that problems will appear when speciation is recent or ongoing. Nevertheless, evidence of cryptic speciation in some common clitellate taxa will be used as both an argument and an encouragement for using the barcoding technique in taxonomic research, as well as in applied biodiversity work, such as ecosystem assessment and bio-monitoring.

Keywords: DNA barcoding, Clitellata, oligochaetes, cytochrome c oxidase subunit 1, cryptic species, species delimitation.

KEYNOTE lecture

A (possibly) endemic oligochaete fauna in Upper Klamath Lake, Oregon, USA.

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Upper Klamath Lake is a large (232 km^2), shallow (mean depth 2.4 m), freshwater lake in southern Oregon, USA. The lake is considered hypereutrophic, and has summer cyanobacteria blooms. The upper Klamath basin has several endemic fishes, two of which are listed as endangered. Aquatic annelids were collected in benthic samples from several studies (2007-present). The focus of most of these collections was estimating potential contributions of invertebrates to nutrient flux between sediment and water column through metabolism or bioturbation. Sites included lake, wetland, and tributary stream habitats, as well as recently-flooded farmland in transition to lake/wetland habitat. Benthic assemblages at two open-water lake sites influenced by the Williamson River were somewhat different from a mid-lake site, but the most distinctive lake site was in a deep (15 m) trench. The lake annelid fauna differed greatly from that of the surrounding watershed. Except for one spring-fed stream, marshes and tributaries were dominated by widespread species. Unusual dominant worms in lake habitats included a very large *Rhynchelmis* (*Sutroa*) species without a proboscis, a very small *Altmanella* species tentatively attributed to *A. freidris*, a large *Varichaetadrilus* related to *V. pacificus*, and a *Limnodrilus* similar to *L. spiralis*. Each of these populations had a "typical" counterpart in the surrounding watershed. Different morphotypes of the tubificid *Ilyodrilus frantzi*, with and without hair chaetae, dominated the western and eastern sides of the lake, while *I. templetoni* was more frequent in marsh samples. Two unusual leeches, both in the genus *Helobdella*, dominated open-water lake habitats, in contrast to typical *H. stagnalis* in the watershed. Most species were seasonal, with *Rhynchelmis* sp. reproducing in the fall, *Limnodrilus* sp. in summer, and most others in the spring.

Keywords: oligochaete, leech, lake, endemic

POSTER presentation

Horizontal distribution of aquatic Oligochaeta in Lake Kizaki, central Japan

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Horizontal distribution of aquatic oligochaetes was studied at 8 stations with different depths (mean depth 16.7 ± 9.4 m, min. 5.3m, max. 29.4 m) in July 2012 in mesotrophic Lake Kizaki, Nagano prefecture, Central Japan. The average density was 10492 ± 4276 ind./m^2. Oligochaetes were numerically dominant at all sampling stations. High density, sometimes more than 10000 ind./m^2, was recorded in 3 stations (Stations 4, 5, and 6) deeper than 18 m. Maximum density was 20561±13864 ind./m^2 at Station 4 (depth 29.4 m, ignition loss of sediment 13.5%, bottom water temperature 8.1 °C and DO of bottom water 0.12 mg/L). An earlier study by Hirabayashi and Hayashi (1994) showed that in 1985 the average density of aquatic oligochaetes was 435 ± 428 ind./m^2, oligochaetes dominated in only four locations and were distributed over the whole lake approximately equally. In 2005, Oga et al. (2006) reported that the average density was 6266±6576 ind./m^2 and oligochaetes were numerically dominant at 27 of the 32 stations. Comparisons of our data with the earlier studies have shown that oligochaete density has increased greatly and a change in horizontal distribution has occurred during the 26 years. We suggest that a decrease in dissolved oxygen concentration of bottom water was due to an increase in organic matter content of the sediment.

Keywords: aquatic oligochaeta, benthic macroinvertebrates, density, horizontal distribution, Lake Kizaki.

ORAL presentation

Oligochaeta limnofauna of Lake Büyük Akgöl (Turkey) and their relation with environmental variables

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Lake Büyük Akgöl, a protected area, is located in the northwest part of Turkey (41°01' N, 30°33' E) at an altitude of 10 m above sea level with a surface area of 3.6 km^2. Density and species composition of oligochaeta from five sampling sites of Lake Büyük Akgöl were investigated. Seasonally, sampling was done from August 2009 to April 2010. In addition, simultaneously, physical and chemical parameters of water were measured. A total of 2063 oligochaeta samples were examined and a total of nine species *(Potamothrix hammoniensis, Tubifex tubifex, Limnodrilus hoffmeisteri, Potamothrix bedoti, Dero digitata, Nais communis, Ophidonais serpentina, Stylaria lacustris and Pristina aeguiseta)* were identified. Oligochaetes were the third dominant group, constituting an average 13% of total zoobenthos density. *Potamothrix hammoniensis* was the most abundant species contributing about 43.2% to the total oligochaete limnofauna. It was followed by *Tubifex tubifex*, *Ophidonais serpentina*, *Nais communis* and *Potamothrix bedoti* comprising 6.6%, 4%, 3.6% and 2.8% abundance respectively. The relationships between the dynamics of the Oligochaeta and the physicochemical variables were supported by the Pearson Correlation Analysis and the Canonical Correspondence Analysis (CCA). CCA showed significant correlations between the abundance of *Dero digitata* and dissolved oxygen, pH, temperature, biological oxygen demand, and the abundance of *P. bedoti* and salinity, conductivity and NO_3-N.

Key words: Oligochaeta, Büyük Akgöl Lake, Turkey.

Student ORAL presentation

Branchiura sowerbyi as test-species in ecotoxicological researches: a review

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Branchiura sowerbyi (Oligochaeta; Naididae; Rhyacodrilinae) is an oligochaete species with great potential to be used as a test-species in toxicology bioassays. Since 1950, its life cycle has been studied and nowadays it's well described in the literature. *B. sowerbyi* has a cosmopolitan distribution and can be found in places where *Tubifex tubifex* (normally used in toxicity bioassays) doesn't occur, especially in tropical regions. Due its high biomass, *B. sowerbyi* is suitable for use in bioaccumulation bioassays. The present work reviews papers that have used this species in toxicology bioassays and were published between 1950 and the first semester of 2012. In the first part, a brief revision of the culture methodologies in laboratory conditions and the life cycle parameters of *B. sowerbyi* is presented. In the second part, acute and chronic bioassays are discussed and in the third and last part, conclusions about the research made until now and perspectives about futures works are presented. With the research made, it was possible to find a total of 37 papers that tested about 65 different substances (28 pesticides, 9 metals, 6 industrial chemicals and others). The majority of the run bioassays are 96-h acute water-only tests, of which only five were chronic bioassays and only two involved bioaccumulation. The lack of research and the low number of substances tested compared with the standardized species *T. tubifex* (i.e. 9 and 44 metals tested, approximately, for *B. sowerbyi* and *T. tubifex*, respectively) could be explained by the absence of a bioassay protocol for *B. sowerbyi*, causing the researchers to choose other species. It is necessary to undertake additional methodological research to find a better and common methodology for the bioassays.

Keywords: ecotoxicology; tubificid; bioassays; Oligochaeta.

Student ORAL presentation

Aquatic Oligochaeta associated with bryophytes in a first-order stream in the Atlantic Forest, Southeast Brazil

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The aquatic bryophytes present in lotic ecosystems are colonized by various groups of invertebrates, including Oligochaeta. The present study analyzed the Oligochaeta fauna in bryophytes adhered to stones in a first-order stream in a remnant of the Atlantic Forest, located in Southeast Brazil. Samples of the bryophytes adhered to stones of different sizes along the stream were obtained in July, August and September 2007 (dry season) and January, February and March 2008 (rainy season). Two samples were obtained in each month in 200 ml jars, for a total of 12 samples. The bryophytes belonged mainly to the Pilotrichaceae and Hypnaceae (mosses) and Geocalycaceae (Hepaticae) families. A total of 422 specimens of Oligochaeta were identified, belonging to the Naididae and Enchytraeidae families. The most abundant taxa were *Pristina* sp1 (29.38%), Enchytraeidae (27.48%) and *Pristina jenkinae* (18.95%). There was greater abundance in the rainy season (232 individuals) than in the dry season (190 individuals), but there was no significant difference between the diversity values found in the two periods (H'=1.762-rainy; H'=1.612-dry). The results indicate that the bryophytes may provide refuge and protection for the Oligochaeta, especially during the rainy season when the water flow is stronger. Besides refuge, the bryophytes also accumulate fine detritus, which can serve as a food source for detritivorous fauna. The study showed that bryophytes adhered to stones in low-order streams are important substrates for colonization and shelter of Oligochaeta.

Keywords: Lotic environments, preserved areas, association.

POSTER presentation

Origin and patterns of biodiversity of subterranean aquatic Clitellata

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Subterranean ecosystem biodiversity is characterized by a unique combination of four features that may account for its global patterns and fluctuations at a global scale: (1) a low number of lineages due to environmental harshness, (2) a high proportion of endemic species as a result of habitat fragmentation and isolation, (3) a high level of relict taxa, best explained by the relative stability and antiquity of the habitat compared with most superficial habitats, and (4) food webs that are truncated at both the bottom (no primary producers) and the top (few or no predators and no specialized ones). In this review, we present a synthesis of the current state of knowledge of groundwater oligochaetes, and we investigate to what extent their biodiversity meets these criteria. The present knowledge is strongly biased in favour of the West-Palaearctic region, in particular the karst of Southern Europe. While our understanding of groundwater biodiversity in Europe and the United States has gained much during these last decades, many areas are undersampled in the world. To date, more than 300 nominal species have been found in ground waters all over the world (out of about 1,700 and 1,100 aquatic and freshwater oligochaete species, respectively). Most of these species should be considered as incidentals or waifs; however, about one-third of them are found exclusively in this environment (stygobionts). Among the 21 families that are fully aquatic or include species occurring in aquatic habitats, 16 families are present in ground water. Stygobiont species belong to only 7 different families, harbouring 42 genera among which 17 are represented by a single species. Thirty-four per cent of the species are representatives of only two genera: *Trichodrilus* (Lumbriculidae) and *Rhyacodrilus* (Naididae). With 9 species, all stygobiont, the Parvidrilidae is unique in being the only family, worldwide, comprising taxa that are restricted to groundwater habitats.
Data on the distribution of stygobiont oligochaetes suggest pronounced endemism, nearly 60% of the species being known only from their type locality. The origins of subterranean oligochaete biodiversity probably involve multiple and successive colonization processes, both from marine and freshwater environments. The current distribution of Parvidrilidae, *Rhyacodriloides* (Rhyacodriloidinae), *Delaya* (Haplotaxidae), or species belonging to primarily marine genera, may be explained when assuming that these species are palaeoendemics or relicts. Aquatic oligochaetes appear to be pre-adapted to live in the subterranean environment. In the absence of genuine troglomorphic characters, their stygobiotic status can only be inferred from their exclusive presence in the subterranean environment. Valuable studies to enhance knowledge of subterranean aquatic oligochaetes will probably take more advantage of investigating adaptations that enable them to face scarceness of food and oxygen in groundwater, rather than focussing on an uncertain quest for morphological adaptations. Promising approaches would be to compare related hypogean and epigean species within a genus, such as in *Trichodrilus* and *Rhyacodrilus*, or ecosystems the most similar to the underground such as lake hypolimnia and the deep sea.

Keywords: ground water, Clitellata, biodiversity, patterns, endemism, relictuality, adaptation.

KEYNOTE Lecture

Species delimitation and phylogeny of Nordic *Cognettia* (Clitellata: Enchytraeidae)

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Cognettia Nielsen & Christensen is a semi-aquatic Enchytraeidae genus that is commonly found in acidic environments such as coniferous forests and bogs where they play a key role in nutrient cycling and decomposition of organic matters. From Sweden four species are known, *Cognettia cognettii, C. glandulosa, C. lapponica and C. sphagnetorum.* In this study the diversity within the genus in Sweden is explored using molecular methods. Four molecular markers, COI, 16S, H3 and ITS were used. The COI dataset was used for testing for the existent of a barcoding-gap and for preliminary delimitation into clusters. Single gene-trees were estimated using Bayesian Inference, and a species-tree was estimated using *BEAST. *Cognettia sphagnetorum* was found to be a non-monophyletic assembly of four species and within *C. glandulosa* two species were found, *C. cognettii* and *C. lapponica* were found monophyletic, but few specimens of these species were included. There seem to be small morphological differences between the species, but more studies are needed before they can be properly revised.

Keywords: Cryptic species, DNA-barcoding, Enchytraeidae.

Student ORAL presentation

Where have all the ”vejdovskies” gone (*Potamothrix vejdovskyi* Hrabe)? Invasive PontoCaspian tubificid oligochaete species in Lake Mälaren, south-central Sweden, in a 100 year perspective

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Potamothrix vejdovskyi is one of several PontoCaspian species presently invading Europe and the New World. It has been suggested that its invasive success is dependent upon the trophic degree of the water, and that the species is considered to be particularly indicative of mesotrophy (Lang, 2000). Bottom fauna surveys performed by Swedish Fisheries in 1915 and 1916 and in 1933, 1934 and 1935 did not reveal the existence of *P. vejdovskyi* in Lake Mälaren, whereas extensive bottom fauna programs in the lake in 1967-1976 demonstrated a wide distribution of the species in the central, least polluted basins. Strict quantifications of the distribution of oligochaetes in those basins in 1974 showed that *P. vejdovskyi* then made up on average 28 % of the total abundance of oligochaetes.

However, in later bottom fauna surveys in Lake Mälaren performed by the Swedish Environment Protection Agency (in 1981 and in 2009-2011) *P. vejdovskyi* could not be found at all. Sewage treatment around Lake Mälaren accelerated in the late 60’s and the phosphorus load is nowadays considerably lower than before treatment (about 30 % less in terms of total-P concentrations in the water). However, the question why this species today seems to have more or less disappeared from the lake remains unsolved.

Keywords: PontoCaspian species, invasive species, *Potamothrix vejdovskyi*, Lake Mälaren, distribution.

ORAL presentation

A preliminary survey of aquatic oligochaetes from Eastern Tamil Nadu, India

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A random survey of aquatic Oligochaeta was conducted at Chennai, Villupuram, Dindugal, Thiruvallur and Sivagangai districts of Tamil Nadu from Nov 2010 to Mar 2012. Twelve species were identified from a total of 644 aquatic Oligochaeta examined from various random samples of aquatic vegetation and sediments. Chennai district was represented by 3 families: Naididae, Pristinidae and Tubificidae. The naidids were most diverse with 5 species namely *Branchiodrilus semperi*, *Aulophorus furcatus*, *Dero dorsalis*, *D. indica* and *D. zeylanica*, the pristinids were represented by *Pristina breviseta* and *P. jenkinae* and the tubificids by 3 species, namely *Branchiura sowerbyi*, *Limnodrilus hoffmeisteri* and *Aulodrilus* sp. Out of the 10 species collected from Chennai nine were already reported while *Aulodrilus* sp. constitutes the first report for the district. Two naidids, namely *Branchiodrilus semperi* and *D. indica*, along with the tubificid *Branchiura sowerbyi*, were collected from Villupuram district. *Branchiodrilus semperi* and *Branchiura sowerbyi* constitute the first reports for Villupuram district. *Limnodrilus udekemianus* from Kodaikanal, Dindugal district constitutes the first report for that region of Tamil Nadu. Megadriles belonging to the family Octochaetidae (*Dichogaster bolaui*?) and Megascolecidae sp., collected from Thiruvallur and Sivagangai districts respectively, were found to occur in aquatic habitats.

Keywords: Aquatic Oligochaeta, Naididae, Pristinidae, Tubificidae, Octochaetidae, Megascolecidae, India

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ORAL presentation

Profundal oligochaete fauna (Annelida, Clitellata) in Japanese freshwater lakes

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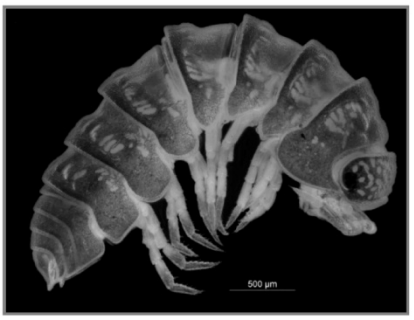
Thirty-eight species of oligochaetes (Annelida, Clitellata) belonging to five families were recorded from profundal depths of 50 freshwater lakes on Japanese islands. They were mostly composed of widely distributed species derived from surrounding waters, and compositions are well explained by the scheme of Timm (2012), with parallel replacement with European species. Oxygen, temperature and surrounding fauna could be the main factors determining the profundal fauna. Lumbriculids (*Styloscolex japonicus, Yamaguchia toyensis* and *Lumbriculus variegatus*), a haplotaxid (*Haplotaxis gordioides*) and an enchytraeid (*Marionina klaskisharum*) were restricted to several deep and oligotrophic lakes located in Hokkaido and northern Honshu, where *Rhyacodrilus komarovi* often accompanied. *Tubifex tubifex* and *Limnodrilus hoffmeisteri* were the commonest species, both of which occurred irrespective of the trophic status of the lake, and became abundant in meso- and eutrophic lakes. However, *T. tubifex* has never been found in non-stratified shallow lakes where the bottom temperature exceeds 15 °C, where *L. hoffmeisteri*, *Branchiura sowerbyi* and several *Aulodrilus* species were the main representatives.

Changes in composition and abundance of the profundal oligochaetes can be detected in several lakes. In the ancient Lake Biwa, Stephenson (1917) once recorded unidentified lumbriculids and a biwadrilid (*Biwadrilus bathybates*) from the profundal bottom. However, recent repeated surveys since 1980s have never found them in such deep habitats. In former monomictic caldera Lake Ikeda in Kyushu, which had been typically oligotrophic and harbored oligochaetes throughout the depths until 1940s, profundal zoobenthos completely disappeared since 1990s due to stagnation of anoxic waters in the hypolimnion. This was connected with eutrophication triggered by nutrient loading and change in the circulation system caused by climatic warming, especially mild winters. In some eutrophic lakes in urban areas, the biomass of profundal oligochaetes has decreased in accordance with recent improvement in water quality.

Keywords: oligochaete fauna, lake profundal, Japan.

ORAL Presentation



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Global diversity and distribution of the Phreodrilidae (Annelida: Clitellata)

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Phreodrilids were first recorded from groundwater in New Zealand, with the description of *Phreodrilus subterraneous* by Frank Beddard in 1891. There are now 51 species described, but there are potentially dozens more undescribed (there are at least 17 undescribed in Australia and probably many more). Almost all of these inhabit Gondwanan landmasses, including South America (3 species), New Zealand (5), Australia (32), Africa (5), Arabian Peninsula (2), Sri Lanka (1) or southern oceanic islands (Falklands, South Georgia, Kerguelen, Crozets, Campbell and Macquarie, with a total of 7 species). Exceptions to Gondwanan pattern are unidentified worms from Northern Ireland and a species known only from Japan. As for many groups of Gondwanan origin, phreodrilids are most diverse in cooler mesic climates and where they occur elsewhere they usually inhabit relictual and/or refugial habitats that may provide protection from drought and/or high temperatures. Thus, in Africa they are found in deep rift valley lakes, high altitude or in groundwater. The Sri Lankan species is also found at high altitude and in Australia greatest diversity is found in temperate Tasmania and south-western Australia, though curiously not in south-eastern Australia which is generally cooler and wetter than south-western Australia. In arid and subtropical Australia phreodrilids are strongly associated with groundwater or groundwater fed surface habitats and contribute to the spectacularly diverse stygofauna of in inland and northern Western Australia. An exception to the generally mesic or refugial habitat association is the occurrence of several species in temporary habitats, such as moss beds and associated seepages and pools, on granite inselbergs in semi-arid south-western Australia. Very little is known about the biology and ecology of phreodrilids other than their habitat associations. Three are commensal on crayfish but the rest are free living and appear to be sediment dwelling detritivores.

The current accepted classification divides phreodrilids into eight genera, most of which are represented on multiple continents, the exceptions being two monospecific genera: *Phreodriloides* of south-western Australia and *Gondwanadrilus* of southern Africa. *Nesodrilus* is notable for occurring primarily on islands. Molecular work would most likely likely to lead to a substantial revision of the current classification and help to resolve some of the outstanding taxonomic issues such as the vague separation of *Insulodrilus* from *Astacopsidrilus*. It may also help to resolve the *lacustris/litoralis* species complex and determine whether widespread 'species' such as *Antarctodrilus niger* and *Phreodrilus branchiatus* really are.

Keywords: Phreodrilidae, diversity, biogeography.

KEYNOTE Lecture

First record of achaetous *Marionina* spp. Michaelsen, 1889 (Annelida: Clitellata: Enchytraeidae) for Southern Atlantic

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The genus *Marionina* comprises about 100 nominal species. Many achaetous *Marionina* spp. are cryptic and can only be distinguished by molecular analysis. *M. cana* and *M. nea* Marcus, 1965 are the only species of this genus described for Brazil. However, no achaetous *Marionina* have been previously reported for the South Atlantic. In a recent survey along the coast of São Paulo State, Southeastern Brazil, we collected sixteen achaetous individuals of *Marionina* in an upper intertidal pool with shelly coarse sand at Ponta do Baleiro (S 23º49.689' W 45º 25.392'). Three species of achaetous *Marionina* are known to live in upper intertidal and supralittoral beach habitats, namely *M. achaeta*, *M. arenaria* and *M. nevisensis*. The species from São Sebastião is close to *M. nevisensis*, described from Nevis Island in the Caribbean and from British Columbia, due the structural similarity of the spermathecae, unilateral seminal vesicles, number of segments (31- 42), and total length (3.6 – 5.5 mm). However, these observations are based only on morphological analysis. DNA analysis will be performed to confirm our observations. This is the first record of the genus *Marionina* in the South Atlantic after the original Marcus description. The close resemblance to a species previously described from British Columbia stresses the importance of detailed morphological studies, preferably including scanning electron microscopy, as well as DNA data, in order to describe and identify species of achaetous *Marionina*. Future studies of the phylogeny of *Marionina* will test whether the shared traits of geographically distant species are homologous or convergent environmental adaptations.

Keywords: Oligochaeta, Southern Brazil, achaetous *Marionina*, cryptic species.

Student ORAL presentation

Aquatic oligochaetes of the Western Australian Wheatbelt

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The Wheatbelt region in the south-west of Western Australia falls between the 300 and 600 mm annual rainfall isohyets and covers approximately 25 million hectares. Approximately 30,000 wetlands of varying types have been mapped in the region and include freshwater swamps, lakes, claypans, springs and granite outcrop pools, as well as natural salt lakes and floodplains. The dataset that we analysed included aquatic invertebrate and environmental data collected from several surveys and monitoring projects undertaken in the Wheatbelt. Of the 21 described species of aquatic oligochaetes from the region, the six commonest species and their distributions were mapped, and relationships between species presence and environmental variables were investigated. The six species investigated were *Ainudrilus nharna*, *Dero digitata*, *Dero furcata*, *Insulodrilus bifidus*, *Paranais litoralis* and *Pristina longiseta/Pristina leidyi*. A constrained (Redundancy Analysis-RDA) ordination of sites illustrated that *P. litoralis* is associated with more saline sites (high Electrical Conductivity, EC). Similarly *P. longiseta/P. leidyi, I. bifidus, and D. furcata* are associated with sites having a lower pH, moderately high colour and lower salinity (low EC), conditions characteristic of freshwater swamps. It is evident from the RDA ordination that salinity strongly influences oligochaete species occurrence, however water chemistry variables explained only 13% of variation in oligochaete species composition across the wetlands studied, and therefore a number of other variables are also likely to influence aquatic oligochaete distribution.

Keywords: Oligochaetes, salinity, Wheatbelt, Western Australia

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POSTER presentation

A re-evaluation of morphological characters in the taxonomy of the Lumbriculidae (Clitellata) and a discussion of the genus category in the family

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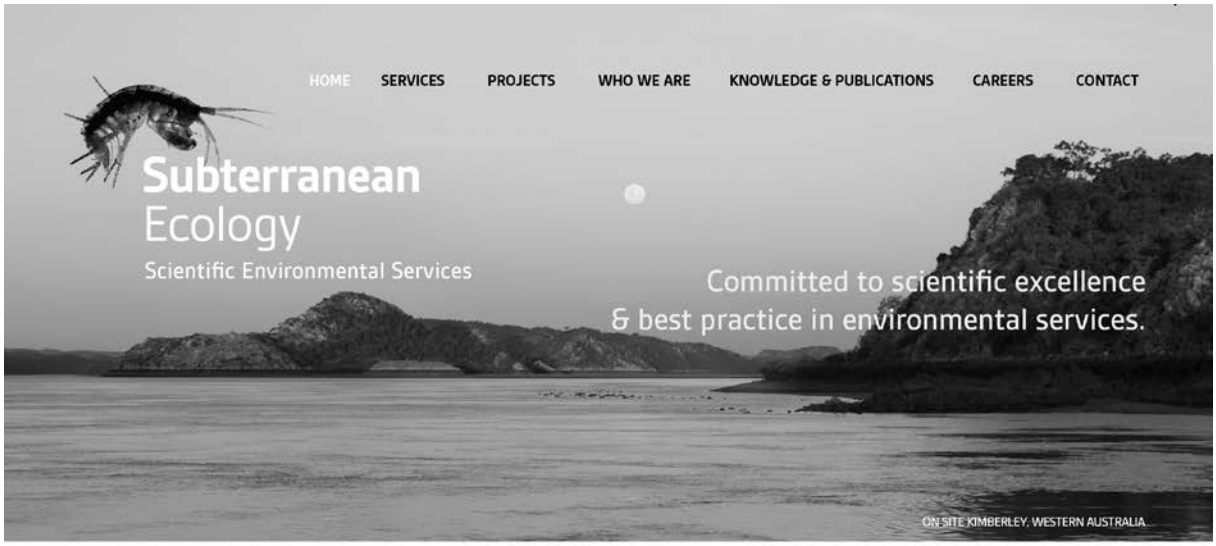
A 1989 phylogenetic analysis by Ralph Brinkhurst codified and evaluated for the first time the morphological characters and character states that traditionally had been used for the diagnosis of genera within the family Lumbriculidae (Clitellata) . After more than 20 years, and with the proposal of 11 additional genera, a new family-level phylogenetic analysis is needed for an objective approach to the diagnosis of genera. In practice, some genera have been more inclusive than others, depending on the interpretation and availability of diagnostic characters. Nevertheless, a high proportion of lumbriculid genera (12) are monotypic, probably reflecting the still-limited knowledge of the family, whose members typically inhabit groundwaters or cold, unpolluted (usually remote) headwaters or lakes. The new lumbriculid taxa described since 1989 are mainly from North America and provide new insights to the systematics of the family. The 1989 paper detailed the many subjective compromises involved in determining morphological characters and assigning character states to diverse or poorly-known genera. As in that earlier study, a re-evaluation of these characters is a necessary first step towards future analyses. We have re-analysed the diagnostic characters of the 27 genera considered valid at present, as well as *Neoscolex* as a subgenus of *Styloscolex*, 3 subgenera of *Eclipidrilus* and *Rhynchelmis*. Among them, 11 (plus 1 subgenus) have a geographic distribution restricted to the Nearctic Region and 10 (plus 1 subgenus) to the Palearctic. Some characters used in systematics of the family, such as the position of spermathecae relative to the atrium or the general position of the reproductive organs, were prone to reversal or convergence in the earlier analysis. We propose that complex structural characters, particularly those related to the male duct (e.g. penial sacs, muscular bulbs and glandular masses associated with the penis, prostatic glands diffusely covering the atria versus in clumps) may have higher taxonomic value than some of those traditionally used for classification. Complex, unique structures have been unevenly applied as secondary characters in generic diagnoses: e.g., odd male pores distinguishing the monotypic *Tenagodrilus* and *Spelaedrilus*, while similarly unusual copulatory structures have been used as species-level apomorphies within large genera, such as the widely distributed *Stylodrilus* and *Trichodrilus*. The aim of this study is to evaluate the morphological characters for the classification of lumbriculid genera, using both comparative anatomy and preliminary phylogenetic analysis of the characters, with the perspective provided by the new findings in the Nearctic region.

Keywords: Morphological characters, genus concept, Lumbriculidae.

KEYNOTE Lecture



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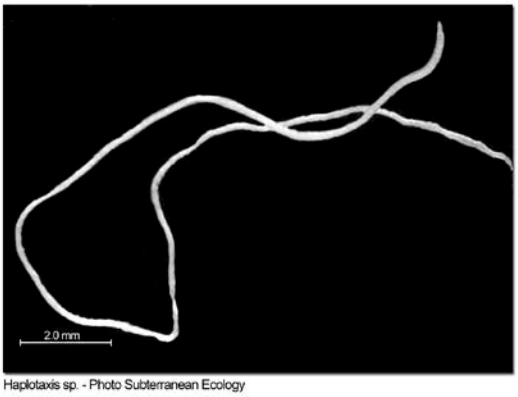
Phreodrilidae indet - Photo Subterranean Ecology

Naididae-Enchytraeidae-Phreodrilidae - Photo Subterranean Ecology



Haplotaxis sp. - Photo Subterranean Ecology

Pristina sp. - Photo Subterranean Ecology

Communities of Oligochaeta in Ural Mountains lakes (Russia)

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This study compares the communities of oligochaetes in lakes of the Polar and Subpolar Ural Mountains, located in the extreme Northeast of Europe between the 68°08` and 64°00` N, 65°21` and 59°40` E. These lakes vary according to surrounding relief, altitude (250 – 1000 m), flow through, shape, average depth (3– 5 m), and water transparency (5–11 m). They are characterized by low turbidity, electrical conductivity, temperature and water mineralization, the water is typically saturated with oxygen while pH varies from acid to weakly alkaline. The lakes are frozen for the most part of year, their ice-free period lasting approximately from June to September. The majority of the lakes are free from human impact.

During a hydrobiological study of 29 lakes in 1998– 2010, 46 taxa of oligochaetes were found, 32 of them identified to species level. Naididae was the most diverse group (19 taxa) in these lakes; the other taxa belonged to Pristinidae (2), Enchytraeidae (6), Tubificidae (10), Lumbriculidae (8) and Lumbricidae (1). Geographical location affects the structure of oligochaete community: the Naididae represented 53.7 % of total oligochaete abundance of Polar Ural lakes (*Nais barbata*, *N. pseudobtusa*, *Chaetogaster diaphanus* were dominating) while Tubificidae (with *Spirosperma ferox*, *Tubifex tubifex* and *Lophochaeta ignota* as dominants) and Enchytraeidae formed 35.4% and 32.2 % of oligochaetes' total abundance in Subpolar Ural lakes. Abundance, biomass and species number of the oligochaetes decreased with increasing latitude and were lowest in higher altitudes.

Keywords: oligochaete communities, mountain lakes, Northeast Europe, Ural Mountains .

ORAL presentation

Bioindicator system of a large river in southern China using benthic macroinvertebrates

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Previously, ecosystem health assessment using macrobenthos focused upon small to medium-sized rivers, but little was done about large rivers. In 2009-2011, we investigated benthic macroinvertebrates in Dongjiang River, one of the three large tributaries of the Pearl River in southern China, with the purpose to establish a bioindicator system. Altogether, 209 taxa of 77 families were recorded, including 26 oligochaetes, 32 molluscs, 133 insects and 18 miscellaneous animals. Five optimum metrics, i.e. total taxa number, number of EPT taxa, relative abundance of oligochaetes, relative abundance of molluscs, and BI index, were selected from 51 candidate indices, and the reference was set as benthos of pristine river segments and branches. To assess the river health, we first calculated the O/E (observed/expected) score for each metric of each segment, and then summed weighted scores of the five metrics. According to the summed scores, we classified the river segments into five health levels, i.e. very poor (0-0.20), poor (0.21-0.40), fair (0.41-0.60), good (0.61-0.80) and very good (0.81-1.0).

Key words: Bioindicator system, large river, Dongjiang River, southern China, benthic macroinvertebrates.

ORAL presentation

Natural history collections: status, critical issues, recommendations

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Natural history collections are assemblages of organisms, both living and dead, that are organized and curated by scientists to provide the formal documentation of the world's known biological diversity. They include national, regional, and local museums, private and public research collections, zoological parks, arboreta, and botanical gardens. Collections are used to understand and document the variability of the earth's biodiversity, summarize historical changes, and monitor current trends of species. Several critical issues face natural history collections worldwide: funding to maintain the infrastructure of collections, wildlife legislation, permits, security, and the loss of taxonomists, systematists, and curators. I will outline recommendations for natural history collections that focus on baseline maintenance of existing and newly acquired specimens, preservation of type series, georeferencing of locality information, database management and outreach education. Finally, I will summarize a collection profiling exercise as a tool to measure the "health" of natural history collections, focusing on annelid collections that include wet (alcohol storage) and dry (slide-mounted) specimens, and their associated records (field notes, journals, electronic databases).

Key Words: Natural history collections, curation, preservation, management, taxonomy, systematics, type specimens, records, accession, georeferencing, database management, collection profiling, oligochaetes.

ORAL presentation

Vignettes on current projects focusing on North American freshwater oligochaetes

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In this presentation I will briefly summarize some of my current research projects focusing on freshwater oligochaetes in North America. These include: a) *Nomenclatura Oligochaetologica* - current status of supplements, and second edition; b) ITIS - Integrated Taxonomic Information System: nomenclature of freshwater oligochaetes of North America; c) the biodiversity of freshwater oligochaetes of the Huron Mountain Club, Michigan, USA; d) current status of several recent introductions of freshwater oligochaetes to North America, including *Branchiodrilus hortensis*, *Slavina evelinae* and *Ripistes parasita*; e) oligochaetes associated with phytotelmata in southern Florida, USA; and f) freshwater oligochaetes associated with aquatic habitats in Grand Canyon National Park, Arizona, Great Smoky Mountains National Park, North Carolina and Tennessee, USA.

Key Words: North America, freshwater, oligochaetes, current research, biodiversity, nomenclature.

ORAL presentation

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