



A database of aquatic Oligochaeta (Annelida, Clitellata) with updated order names

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Abstract

An electronic database, “World Distribution of Aquatic Oligochaeta”, is recently completed and available on the Internet. This database contains all available published cases of finding microdrile oligochaetes (about 130,000 records of separate species) together with their literature sources, geographical coordinates, and distribution maps. A currently updated systematic list of taxa, with synonyms, is also presented. Classification follows the order level of Schmelz *et al.* (2021).

Key words: Oligochaeta, distribution, mapping, system, orders

A new database

I began to study Oligochaeta about sixty-five years ago, as a student at the Tartu State University, Estonia, but under the supervision of Dr. Olga Čekanovskaja from the Zoological Institute, Leningrad. Since that time, my aim has been to study all (particularly, faunistic) available literature sources on these worms in the scientific libraries of several towns, and also to obtain reprints or copies directly from colleagues. Now, the number of reprints and books on Oligochaeta in my library has amounted to about 5,500, while the card file with all sources is much larger. This material covers a great majority of all findings of aquatic Oligochaeta worldwide.

Based on these data, I have drawn up world distribution maps for all species, in A4 format, and continuously updated the maps until now. Some of these maps were demonstrated and published at the First Symposium on Aquatic Oligochaetes in Canada, 1979 (Timm 1980), as well as at the Seventh Symposium in the USA, 1997 (Timm 1999, Milbrink 1999). Their main drawback was small format and low accuracy. The smaller countries, e. g. Estonia and Belgium, were already covered by 3–4 dots, despite the numerous actual localities. It was also physically impossible to supply these hundreds of spots with references to literature sources.

The situation improved in the 21st century. An electronic system called PlutoF was launched at the University of Tartu in 2005, first for storing various biodiversity data in Estonia. This is an electronic workbench developed and served by the Zoological Museum and Botanical Garden of the University of Tartu for preserving biodiversity data of Estonia and the whole world (Abarenkov *et al.* 2010). From 2011 on, it allows direct publishing of datasets in GBIF (Global Biodiversity Information Facility).

Using PlutoF, I launched the project “World Distribution of the Aquatic Oligochaeta” in 2015. This is a database of the finds of all aquatic Oligochaeta (Annelida, Clitellata) species published in the different literature sources, and their distribution maps with geographical coordinates. Data on the Aphanoneura (Annelida, Polychaeta), Branchiobdellida (Annelida, Clitellata), and terrestrial Enchytraeidae (Annelida, Clitellata, Oligochaeta) are included as well. The database presenting about 130.000 findings was completed in 2023, and is available through GBIF (Timm & Abarenkov 2023) and PlutoF platform.

As an example, a map of the world distribution of *Potamothrix hammoniensis* (Michaelsen, 1901) is demonstrated in Fig.1. For a more detailed view, a part of this map is zoomed (Fig. 2).



FIGURE 1. Published findings of *Potamothrix hammoniensis* (Michaelsen, 1900) in the world.

To retrieve the same map in PlutoF, user should apply the following search filters in the Reference Based Search module (<https://app.plutof.ut.ee/search?module=referencebased>)—project: World distribution of the aquatic Oligochaeta, taxon name: *Potamothrix hammoniensis*, Include taxon synonyms: True. The visualisation of the distributions is obtained by clicking on “Map view” and not forgetting to click on “Load all” at the top right of the map. By varying the zoom level, the user can then see the same maps as shown in Figures 1 and 2. Link to a map showing the same taxon occurrence records in GBIF—https://www.gbif.org/occurrence/map?dataset_key=e1539f14-f749-4f73-8c18-3355277f94f4&taxon_key=2308608.

When we click on a red dot on the map on “Map view” page, a label with the name and coordinates of the sampling spot will appear (unfortunately, except in the case of several finds at the same spot; their number is then marked on the dot). Clicking on a respective line on the List View page, we can move to the description of every separate record of a species in every country, including its literature source. Unfortunately, this process can advance slowly and need some skill and endurance, due to the large amount of data. Accidental failures can happen, but the PlutoF is ever more updating the program.

From the page with the keyword “Taxon occurrences” (or instead of it), we can skip to the search history “Laboratories—Taxonomy lab—Classifications” leading to a systematic list of the taxa, from where we can follow the history Metazoa—Bilateria—Annelida incertae sedis—Clitellata. In this list, the names of the (mainly aquatic) Oligochaeta and Branchiobdellida among the Clitellata, plus the Aphanoneura among the Polychaeta, with synonyms, are maintained and currently updated by me.

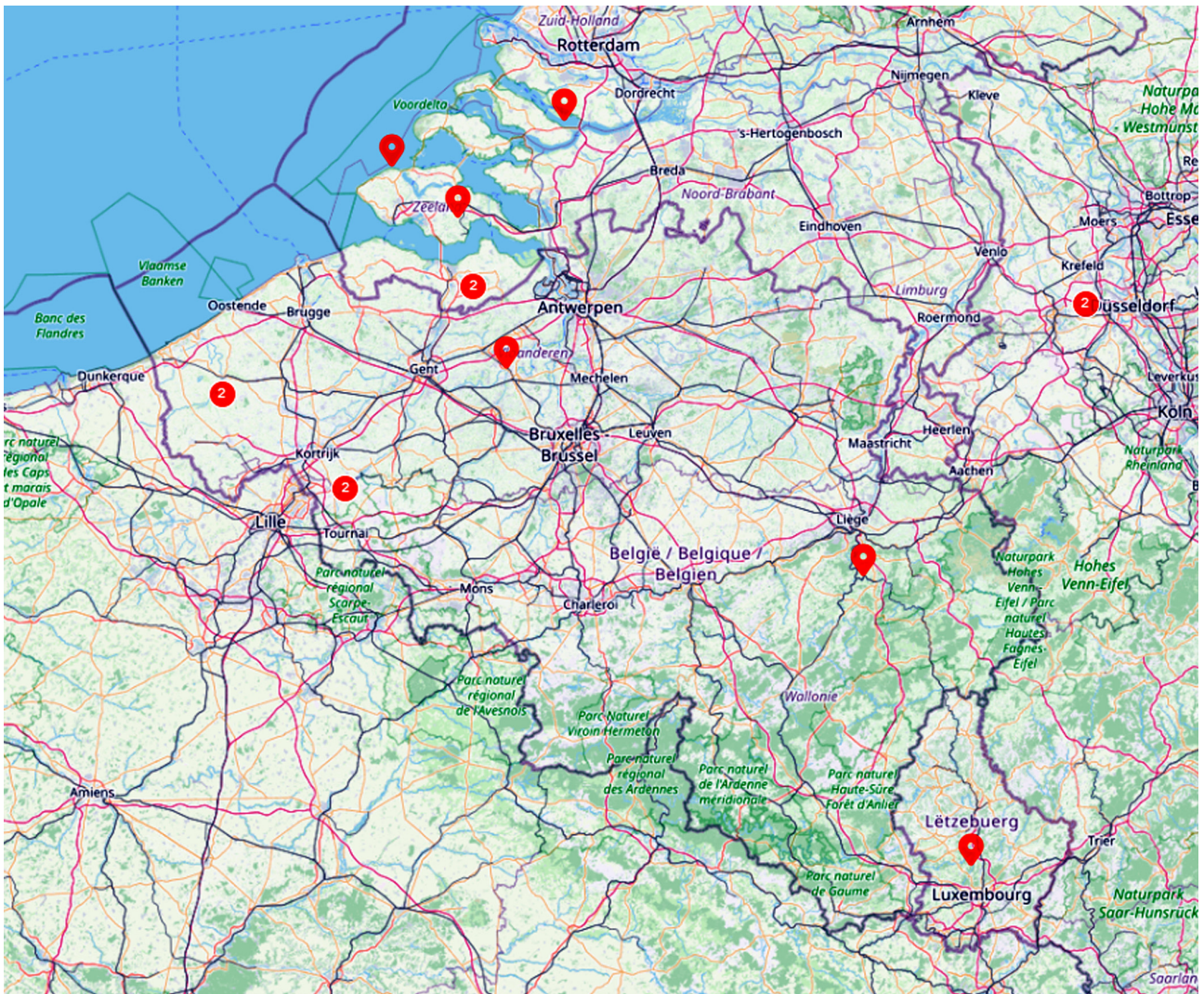


FIGURE 2. Published findings of *Potamothenrix hammoniensis* in Belgium and adjacent regions, zoomed from the Fig. 1.

This checklist requires established formal (and phylogenetically sound, if possible) valid names for all taxa on the basic taxonomic levels (class, order, family, genus, species). Some nomenclatural inconsistencies have appeared as a result of controversies between the phylogenetic and practical approach to system, e.g., Erséus *et al.* (2008). A disorder was revealed particularly among the oligochaete nomenclature at the order level in the literature.

Updating the orders in Oligochaeta

The name Oligochaeta was first introduced by Grube (1850), for an order consisting of the families called by him Lumbricina and Naidea. The order rank for Oligochaeta was recognised also by Michaelsen (1900), Stephenson (1930) and others when dividing the group into (then already more numerous) families. Michaelsen (1929) suggested three suborders (Prosopora, Plesiopora and Opisthopora) based on the position of the male pores in relation to the testes. Following this principle, Brinkhurst (1971) defined three separate orders: Lumbriculida, Moniligastrida, and Haplotaxida. The last order was based on the hypothesis that the family Haplotaxidae is close to ancestors for all oligochaetes with the plesiopore or opisthopore arrangement of the male system. The order Haplotaxida sensu Brinkhurst (1971) incorporated most of the diversity of the Oligochaeta, but was certainly not only phylogenetically unjustified, but also unhandy for practical classification in registers. Later on, some researchers attempted to separate

some families, e. g. the Tubificidae, Enchytraeidae or Lumbricidae, from the mega-order Haplotaxida (Jamieson 1978, Timm 1981, Kasprzak 1984, Brinkhurst 1984). In addition, several new families, presumably with primitive features, were discovered, e. g. the Parvidrilidae and Randiellidae.

Jamieson (1988) presented and discussed a phylogenetic classification, aiming to adjust it to the Linnaean ranks. As a result, four orders were defined (the Tubificida, Haplotaxida, Moniligastrida and Opisthopora), while the Randiellata (a primitive group) and the Lumbriculata (including also the Hirudinea!) remained without a formal taxonomic rank. Because of the above-described confusion, some databases, where the order level is mandatory, have used the three-order system (Lumbriculida, Moniligastrida and Haplotaxida) up to now, while many modern authors have ignored the order name in their publications.

Molecular phylogenetic studies have greatly improved our understanding of phylogenetic relationships among most oligochaete families (e. g., Erséus 2005). The majority of the latter, with the apparent exception of the polyphyletic Haplotaxidae, and the large group of “earthworms” (Crassiclitellata) consisting of many families, have been found to be monophyletic. These results needed ranking all oligochaete families into formal orders with valid names, which were not always available. In an electronic database by Martin *et al.* (2016), the numbers of orders already reached seven. The work was recently completed by a team of taxonomists including myself (Schmelz *et al.* 2021). As a result, eleven orders were defined, as presented below. This classification is used also in the above-mentioned GBIF database.

Alluroidida Timm & Martin, 2015

Family Alluroididae Michaelsen, 1900 (amphibious, mainly freshwater)

Family Syngenodrilidae Smith & Green, 1919 (terrestrial?; one genus, one species)

Capilloventrida Timm in Schmelz *et al.*, 2021.

Family Capilloventridae Harman & Loden, 1984 (freshwater, marine)

Crassiclitellata Jamieson, 1988

(at least 21 families of “true earthworms”, mostly terrestrial)

Enchytraeida Kasprzak, 1984

Family Enchytraeidae d’Udekem, 1855 (mostly terrestrial, also freshwater and marine)

Family Propappidae Coates, 1986 (freshwater)

Haplotaxida Brinkhurst, 1971

Family Haplotaxidae Michaelsen, 1900 (freshwater, polyphyletic)

Family Tiguassidae Brinkhurst, 1988 (freshwater, one genus, one species)

Lumbriculida Brinkhurst, 1971

Family Lumbriculidae Claus, 1872 (freshwater; including also the former Dorydrilidae Cook, 1968; in phylogenetic system a sister group for the subclass Hirudinea Savigny in Lamarck, 1818; the latter with orders Acanthobdellida Livanow, 1905, Branchiobdellida Holt, 1963 and Hirudinida Siddall *et al.*, 2001)

Moniligastrida Brinkhurst, 1971

Family Moniligastridae Claus, 1880 (terrestrial, earthworm-like)

Narapida Timm in Schmelz *et al.*, 2021)

Family Narapidae Righi & Varela, 1983 (freshwater, one genus, one species)

Parvidrilida Timm in Schmelz *et al.*, 2021

Family Parvidrilidae Erséus, 1999 (freshwater, one genus)

Randiellida Jamieson, 1988

Family Randiellidae Erséus & Strehlow, 1986 (marine, one genus)

Tubificida Jamieson, 1978

Family Naididae Ehrenberg, 1831 (aquatic; in a phylogenetic system including also Pristinidae, Opistocystidae and Tubificidae, see Erséus *et al.* 2008, 2010)

Family Pristinidae Lastočkin, 1921

Family Opistocystidae Černosvitov, 1936

Family Tubificidae d'Udekem, 1855

Family Phreodrilidae Beddard, 1891

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