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Special Study on Sediment Discharge and Its Consequences (SedSS)

Technical Report Number 15

REVIEW OF TAXONOMIC KNOWLEDGE OF THE BENTHIC INVERTEBRATES OF LAKE TANGANYIKA

by
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Pollution Control and Other Measures to Protect Biodiversity in Lake Tanganyika (RAF/92/G32)
Lutte contre la pollution et autres mesures visant à protéger la biodiversité du Lac Tanganyika (RAF/92/G32)

Le Projet sur la diversité biologique du lac Tanganyika a été formulé pour aider les quatre Etats riverains (Burundi, Congo, Tanzanie et Zambie) à élaborer un système efficace et durable pour gérer et conserver la diversité biologique du lac Tanganyika dans un avenir prévisible. Il est financé par le GEF (Fonds pour l'environnement mondial) par le biais du Programme des Nations Unies pour le développement (PNUD)"	The Lake Tanganyika Biodiversity Project has been formulated to help the four riparian states (Burundi, Congo, Tanzania and Zambia) produce an effective and sustainable system for managing and conserving the biodiversity of Lake Tanganyika into the foreseeable future. It is funded by the Global Environmental Facility through the United Nations Development Programme.

Burundi: Institut National pour Environnement et Conservation de la Nature
D R Congo: Ministrie Environnement et Conservation de la Nature
Tanzania: Vice President's Office, Division of Environment
Zambia: Environmental Council of Zambia

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1. Introduction

This report comprises a review of taxonomic knowledge of the benthic invertebrates of Lake Tanganyika and its associated waters, as well as including species checklists of benthic invertebrate groups found in the lake. Unfortunately, a number of potentially useful references have proved difficult to obtain, and we await their delivery. A list of these references follows. In the event that other papers gave information regarding these references, this information has been included in the review. All such references are cited in Coulter (1991), unless otherwise stated. A third list of references is included, which comprise papers that have proved difficult to obtain and did not seem to merit the finances or the time that would have been necessary in order to obtain them.

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2. Information collated on benthic taxa

2.1 Platyhelminthes

Class: Turbellaria

Laidlaw (1906) describes a single species of Turbellarian, *Planaria tanganyikae*, which was collected from both the northern and southern ends of the lake. Baylis (1927) refers to this species, as well as describing one other, *Plagiostomum lacustre*, in his comments on the Turbellaria from Lake Tanganyika that were collected on an expedition in 1926. Both species were found living under stones in shallows of the littoral. Cunnington (1920) in his account on the Turbellaria of the African lakes states that "there can be little doubt that Turbellarians are relatively uncommon in the lakes as well as in other parts of Central Africa". According to this paper, of all the lakes that were sampled, only Lakes Tanganyika and Victoria had any Turbellarians present, and apparently, *Planaria tanganyikae* was the only species found by Cunnington in Lake Tanganyika.

Table 1. List of species of Platyhelminthes (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Platyhelminthes		
Class	Turbellaria	
Family	Planariidae	
	Planaria tanganyikae (E)	Laidlaw
Family	Plagiostomidae	
	Plagiostomum lacustre	Baylis

2.2. Nematoda

All the species of nematode that have been found in the catchment of the lake are free-living and collected mostly in waters adjacent to the lake (Coulter, 1991). Cunnington (1920) reported that numerous parasitic nematodes were collected from the gut and body cavity of fishes on an expedition to the lake, but no more information is given. Mehl (1955) described four species of nematode worms that he found in the sand near the shore of the lake, and one of these species, *Dorylaimus stagnalis,* was also found in a river. Both Meyl (1955) and Decraemer & Coomans (1994) considered further study of African free-living nematodes necessary in order to increase knowledge on endemism, speciation, faunal affinities and evolution in ancient lake nematofauna. Gerlach & Riemann (1973, 1974) provide checklists of all known aquatic nematodes and their authorities. The studies of Tsalolikhin (1981, 1988, 1989, cited in Decraemer & Coomans (1994)) further increased the number of free-living aquatic nematode species known from Lake Tanganyika. Decraemer & Coomans (1994) gives the most recent species list of the free-living nematodes, which is based on Tsalolikhin (1989). It contains 14 species belonging to 12 genera. Four species are provisionally listed as endemic to Lake Tanganyika. Tsalolikhin (1989) noted that six species (*Anonchus paleaotropicus, Penzancia bujumbura, Epitobrilus meyli, Dorylaimus stagnalis, Actinolaimus chappuisi* and *Metactinolaimus leloupi*) were abundant, with the other species represented only by a single specimen.

Table 2. List of species of Nematoda (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Nematoda	
Family Tripylidae	
Monochromadora monhysteroides	Schneider
Family Dorylaimidae	
Actinolaimus chappuisi (E)	Meyl
Actinolaimus straeleni	Meyl
Actinolaimus tenuis	Schneider
Actinolaimus tenuis var. *brevicaudatus*	Schneider
Actinolaimus schuurmansstekhoveni	Meyl
Neactinolaimus sp. aff. *N. omercooperi*	(Filipjev) Baqri, Coomans & Van Der Heyden
Chrysonema luettichaui	Meyl
Dorylaimus stagnalis	Dujardin
Mesodorylaimus acris	(Thorne)
Mesodorylaimus conurus	(Thorne)
Mesodorylaimus flavomaculatus	(von Linstow)
Metactinolaimus leloupi (E)	Meyl
Paractinolaimus ruwenzorii	(De Coninck) Meyl
Parastomachoglossa taylori (E)	(Meyl) Coomand & Loof
Family Ironidae	
Ironus paludicola	Schneider
Family Iotonchiidae	
Iotonchus schneideri	Meyl
Family Monhysteridae	
Eumonhystera mwerazii	(Meyl)
Family Mononchidae	
Mononchus (Mononchus) allgeni	Meyl
Mononchulus nodicaudatus	(Daday) Cobb
Family Plectidae	
Plectus sambesii	Micoletzky
Family Tripylidae	
Brevitobrilus graciloides	(Daday) Tsaloikhin
Family Unknown	
Anonchus paleaotropicus	Tsalolikhin
Paraphanolaimus longicera	Tsalolikhin
Penzancia bujumbura	Tsalolikhin
Monhystera afromacramphis	Jacobs
Epitobrilus meyli (E)	Tsalolikhin

2.3 Annelida

Class: Oligochaeta

Eleven species of oligochaete worms are described from the lake, belonging to six families (Beddard, 1906; Cunnington, 1920; Brinkhurst, 1964, 1970; Martin & Brinkhurst, 1994; Martin & Giani, 1995a, 1995b). Cunnington (1920) listed the oligochaete fauna found in five African Lakes, Lakes Tanganyika, Malawi, Victoria, Albert and Kivu, in which he included a species endemic to Lake Tanganyika that was described by Michaelsen (1912). Brinkhurst (1964) included a key to the Family Alluroididae, of which one species, *Alluroides tanganyikae,* occurs in Lake Tanganyika. A possible explanation for the relative deficiency of oligochaete species in Lake Tanganyika, comparison with Lake Baikal (11 in Tanganyika, 152 in Baikal), relates to the large proportion of the lake which is anoxic, as well as to the relatively low oxygen penetration into the lake sediments (Martin & Brinkhurst, 1994).

Recent work by Martin & Giani (1995a, b) has increased the number of new species of oligochaete worms known from the lake by two. One of these species, *Epirodrilus tanganyikae,* is the only member of the family Tubificidae known from the lake (Martin & Giani, 1995a). Martin & Giani (1995b) cast doubt on the placement of *Insulodrilus tanganyikae* in the genus *Insulodrilus,* and argues that the creation of a new genus might resolve its ambiguous taxonomic position, straddling the genera *Astacopsidrilus* and *Insulodrilus.* Martin (1996) offers two probable explanations for the lack of oligochaete species that are described from African lakes; firstly, an "obvious lack of studies", and secondly, that the environment in this region may be less favourable to oligochaete worms, relative to, for example, Lake Baikal. The scarcity of oxygen availability in the tropics could be the main reason for limiting oligochaete species richness (Martin & Brinkhurst, 1994). The most recent list of oligochaetes known from Lake Tanganyika include 5 presently undescribed species (Martin, 1996).

Table 3. List of species of Oligochaeta (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Annelida	
Class Oligochaeta	
Order Haplotaxida	
Family Alluroididae	
Alluroides tanganyikae	Beddard
Family Eudrilidae	
Stuhlmannia inermis (E)	Beddard
Metschaina tanganyikae (E)	Beddard
Family Naididae	
Dero digitata	(Müller)
Dero pectinata	Aiyer
Family Ocnerodrilidae	
Ocnerodrilus (Iiyogenia) cunningtoni (E)	Beddard
Pygmaeodrilus grawerti (E)	Michaelson
Family Phreodrilidae	
Insulodrilus genitalisetifera (E)	Martin & Brinkhurst
Insulodrilus martensi (E)	Martin & Giani
Insulodrilus (Astacopsidrilus) tanganyikae (E)	Brinkhurst
Family Tubificidae	
Epirodrilus tanganyikae (E)	Martin & Giani

Class: Hirudinea

In his paper on the fauna of the African lakes, Cunnington (1920) states his regret that no report concerning the leeches that he collected on an expedition to Lakes Tanganyika, Victoria and Nyasa / Malawi had been received from the expert concerned. To the best of my knowledge, this information has never been published. Cunnington does, however, note that most of the leeches collected "will in all probability prove to belong to some five or six different species of which the greater number come from Tanganyika". Cunnington observed that leeches are neither minute nor inconspicuous around Lake Tanganyika. It is also noted that most of the leeches were found in shallow water, under stones or on shells, but some were dredged from deeper waters. Moore (1938) described 12 species of leeches belonging to 4 families that had been collected from Lake Tanganyika. In this paper, Moore criticised the paper of Sciacchitano (1935), which names 21 species and subspecies as new. Moore stated "unfortunately nearly all of the accompanying figures are so inadequate and the "descriptions" so brief and undiagnostic, consisting chiefly of a statement regarding general color and size, that I have been compelled regretfully to ignore them as unrecognizable and practically as *nomina nuda*". The members of the family Erpobdellidae were all found free and unattached to any host, living in shallows on sand, mud or stony bottoms. Moore (1938) also indicated aspects of the morphology of *Salifa elongata* that seem likely to be associated with burrowing habits. Coulter

(1991) in his compilation of taxonomic knowledge known from the lake stated that nineteen species and one variety of leeches are known from L. Tanganyika, of which twelve are, provisionally, listed as endemics.

Table 4. List of species of Hirudinea (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Annelida	
Class Hirudinea	
Order Rhynchobdellida	
Family Glossiphoniidae	
Batracobdella nilotica	(Johansson)
Placobdella jaegerskioeldi	(Johansson)
Placobdella multistriata	(Johansson)
Placobdella pulchra	Moore
Family Piscicolidae	
Phyllobdella maculata (E)	Moore
Order Gnathobdella	
Family Hirudinidae	
Hirudo grisea (E)	Sciacchitano
Hirudo incospicua (E)	(Johansson) Sciacchitano
Hirudo protoclepsoides (E)	(Johansson) Sciacchitano
Hirudo schoutedeni	(Johansson) Sciacchitano
Hirudo speciosa (E)	(Johansson) Sciacchitano
Hirudo stappersi (E)	(Johansson) Sciacchitano
Hirudo tanganyikensis (E)	(Johansson) Sciacchitano
Hirudo tanganyikensis var. *aequalis* (E)	(Johansson) Sciacchitano
Hirudo urundensis (E)	Sciacchitano
Limnatus nilotica	(Savigny)
Limnatus oligodonta	Johansson
Order Pharyngobdellida	
Family Erpobdellidae	
Barbronia delicata (E)	Moore
Mimobdella africana (E)	Moore
Salifa elongata (E)	Moore
Salifa perspicax	Blanchard

2.4 Mollusca

The molluscs are one of the best-studied faunal groups of Lake Tanganyika. Early expeditions supplied a lot of information and species descriptions (*e.g.* Woodward, 1859; Smith, 1881; Moore, 1899a; 1899c; 1899d; 1899e; 1901; Digby, 1902). The main reason for this early interest in the Tanganyikan molluscs was because of the remarkable “thalassoid”marine-like appearance of some of the prosobranchs, all of

which are endemic to the lake. Moore (1903) attempted to explain the thalassoid nature of these prosobranchs by hypothesising that Lake Tanganyika had once been linked to the sea from which these molluscs originated. This theory was later abandoned (Cunnington, 1920), and as the Tanganyika molluscs were better studied, their phylogenetic relationships with freshwater families found elsewhere in Africa became apparent. Both Smith (1904) and Cunnington (1920) strongly criticised the work of Bourguignat (who described 242 'species'), who, according to Smith "multiplied both the genera and the species in an absurd manner". Smith (1904) offers an interesting summary of all knowledge of the Tanganyikan Mollusca for the time, as well as revising much of the taxonomy. Cunnington (1920) noted that the Gastropoda are "among the most remarkable of the peculiar animal forms which inhabit Tanganyika". Eighty-four species are listed in this paper, of which 76 were unknown elsewhere. Of these 76 endemic species, the great majority were thalassoid. Cunnington (1920) also remarked that the "Lamellibranchs of the African lakes fall far short of the Gastropods in point of general interest, since there do not exist in Tanganyika or elsewhere any of those types which have been described as thalassoid." The number of species of bivalves known from the lake at that time was 17. Pilsbry & Bequaert (1927) divided the Mollusca of Tanganyika into three groups, based upon "the degree of relationship to the usual fresh-water types". These groups are:

1. Forms that belong to the usual fluviatile genera, also found elsewhere in African freshwaters.

2. Strictly endemic genera "whose affinities to the usual Ethiopian fresh-water genera are still beyond dispute".

3. The thalassoid shells.

Pilsbry & Bequaert (1927) also provided several keys to the different molluscan groups, as well as offering descriptions of a number of newly discovered species. A revision of the taxa lists of Leloup (1950, 1953) was done by Brown & Mandahl-Barth (1987). Brown (1994) compiled a very useful book, which includes keys to the main molluscan groups, a systematic synopsis of prosobranchs and pulmonates as well as checklists of Tanganyikan species, which follows the list of Brown & Mandahl-Barth (1987). This list is divided into two catagories – the "non-thalassoid" species, which is further subdivided into prosobranchs and pulmonates, and secondly, the thalassoid species, which are all endemic prosobranchs. This list comprises 60 molluscs, of which 37 are listed as endemic to Lake Tanganyika. The most recent discussion of Tanganyikan molluscs and the strange morphologies of some of its shells is by West (1997) and West & Cohen (1994), who postulated that predator-prey coevolution between the lakes potamonautid crabs and its thiarid gastropods resulted in the heavily calcified and ornamented shells of the molluscs. West (1997) described two new molluscs endemic to the lake, providing the first contributions of new gastropod species from Lake Tanganyika since the early expeditions that took place at the beginning of this century.

Table 5. List of species of Mollusca (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Mollusca	
Class Gastropoda	
Sub-Class Streptoneura (Prosobranchia)	
Order Mesogasteropoda	
Family Ampullariidae (Pilidae)	
Lanistes graueri	Thiele
Lanistes ovum	Peters
Pila ovata	(Olivier)
Family Bithyniidae	
Gabbiella humerosa tanganyikicensis (E)	Mandahl-Barth
Family Pomatiopsidae	
Tomichia (?) guillemei (E)	Leloup
Family Tharidae	
Sub-Family Paludominae	
Cleopatra ferruginea	I & H.C. Lea
Cleopatra guillemei	Bourguignat
Lavigeria grandis (E)	(Smith)
Lavigeria nassa (E)	(Woodward)
Potadomoides pelseneeri (E)	Leloup

Table 5 (continued). List of species of Mollusca (and authorities) known from Lake Tanganyika and its associated waters.

Sub-Family Paramelaniiae	
Bathanalia howesii (E)	Moore
Bridouxia giraudi (E)	Bourguignat
Bathanalia straeleni (E)	Leloup
Bridouxia leucoraphe (E)	(Ancey)
Bridouxia ponsonbyi (E)	(Smith)
Bridouxia praeclara (E)	(Bourguignat)
Bridouxia rotundata (E)	(Smith)
Bridouxia smithiana (E)	(Bourguignat)
Chytra kirki (E)	(Smith)
Hirthia globosa (E)	Ancey
Hirthia littorina (E)	Ancey
Limnotrochus thomsoni (E)	Smith
Mysorelloides multisulcata (E)	(Bourguignat)
Paramelania damoni (E)	(Smith)
Paramelania iridescens (E)	(Moore)
Reymondia horei (E)	(Smith)
Reymondia pyramidalis (E)	Bourguignat
Reymondia tanganyicensis (E)	Smith
Spekia coheni (E)	West
Spekia zonata (E)	(Woodward)
Stanleya neritinoides (E)	(Smith)
Stormsia minima (E)	(Smith)
Tanganyicia michelae (E)	West
Tanganyicia rufofilosa (E)	(Smith)
Tiphobia horei (E)	Smith
Sub-Family Syrnolopsinae	
Anceya giraudi (E)	Bourguignat
Anceya terebriformis (E)	(Smith)
Martelia tanganyicensis (E)	Dautzenberg
Syrnolopsis gracilis (E)	Pilsbry & Bequaert
Syrnolopsis lacustris (E)	Smith
Syrnolopsis minuta (E)	Bourguignat
Sub-Family Thiarinae	
Melanoides admirabilis (E)	Smith
Melanoides tuberculata	(Müller)
Family Viviparidae	
Bellamya capillata	(Frauenfeld)
Neothauma tanganyicense (E)	Smith

Table 5 (continued). List of species of Mollusca (and authorities) known from Lake Tanganyika and its associated waters.

Sub-Class Euthyneura	
Order Basommatophora	
Family Ancylidae	
Burnupia caffra	(Krauss)
Ferrissia tanganyicensis (E)	(Smith)
Family Lymnaeidae	
Lymnaea (Radix) natalensis	Krauss
Family Planorbidae	
Sub-Family Bulininae	
Bulinus africanus (?)	(Krauss)
Bulinus forskalii	(Ehrenberg)
Bulinus globosus	(Morelet)
Bulinus natalensis	(Kuster)
Bulinus scalaris	(Dunker)
Bulinus truncatus	(Audouin)
Sub-Family Planorbinae	
Afrogyrus coretus	(De Blainville)
Biomphalaria pfeifferi	(Krauss)
Biomphalaria sudanica	(Martens)
Ceratophallus natalensis	(Krauss)
Gyraulus costulatus	(Krauss)
Lentorbis (?) junodi	(Connolly)
Segmentorbis angustus	(Jickeli)
Segmentorbis kanisaensis	(Preston)

2.5 Arachnida

Order: Acari

Halbert (1906), Daday (1910) and Soar (1910) published early descriptions of hydrachnid species. Cunnington (1920), considered that the "exceptional position held by Tanganyika in the case of other animal groups is not in evidence here". At the time only six species were known from the lake, of which three were noted as being endemic, whereas fourteen species were known from Lake Nyasa / Malawi, five of which were endemic. Bader (1964, 1967) recorded later hydrachnid collections from Lake Tanganyika, while Bader (1968) provided a useful review of water mites in Central Africa. Viets (1969) reviewed the hydrachnids of the entire African continent. The Tanganyikan water mite assemblage has a high degree of taxonomic diversity at family and generic level relative to the total number of taxa present. There are 12 families, 21 genera, and 45 lower taxa known from the lake (Coulter, 1991). While most genera are polyspecific, the level of endemism is not high relative to many other faunal groups (Coulter, 1991).

Table 6. List of species of Arachnida (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Arthropoda	
Subphylum Chelicerata	
Class Arachnida	
Order Acari	
Family Arreniridae	
Arrenurus convexus	Thor
Arrenurus (Megaluracarus) insectus	Viets
Arrenurus (Micruracarus) calamifer	Nordenskiöld
Arrenurus (Micruracarus) limbatus	Koenike
Arrenurus (s. str.) *chappuisi chappuisi*	Walter
Family Elaidae	
Eylais degenerata	Koenike
Eylais paski (E)	Soar & Williamson
Family Hydrachnellidae	
Hydrachna (Bargena) mirifica	(Koenike)
Hydrachna(Rhabdohydrachna)murati	Walter
Hydrachna(Rhabdohydrachna)spinosa subtilis (E)	Walter
Family Hydrodromidae	
Diplodontis schaobi	(Koenike)
Hydrodroma capensis	(Viets)
Family Hydryphantidae	
Teratothyasides (Teratothyasides) clathratus	Lundblad

Table 6 (continued). List of species of Arachnida (and authorities) known from Lake Tanganyika and its associated waters.

Family Hygrobatidae	
Atractides (s. str.) *immodestus*	(Walter & Bader)
Atractides (s. str.) *levipalpis* (E)	Bader
Hygrobates edentipalpis (E)	Soar
Hygrobates (s. str.) *marlieri* (E)	Bader
Hygrobates (s. str.) *soari*	Viets
Hygrobates (s. str.) *terminalis* (E)	Bader
Hygrobates (Hygroteterabates) uvirensis (E)	Bader
Family Limnohalacaridae	
Limnohalacarus major (E)	Bader
Limnohalacarus portmanni (E)	Bader
Soldanellonyx marlieri (E)	Bader
Family Mideopsidae	
Mideopsis minuta (E)	Soar
Family Oxidae	
Oxus curvisetus	Viets
Oxus stuhlmanni	(Koenike)
Family Pionidae	
Forelia liliacea	(Müller)
Piona (s. str.) *acuminata*	Walter & Bader
Piona (s. str.) *tridens*	(Thor)
Piona (Piona) caligifera	(Koenike)
Family Torrenticolidae	
Torrenticola (Monatractides) extensa (E)	Bader
Torrenticola (Monatractides) ventriosa	(Viets)
Family Unionicolidae	
Ecpolus (s. str.) claviger (E)	Bader
Encentridophorus acutipes	Viets
Encentridophorus falcatus (E)	Bader
Encentridophorus koenikei	Daday
Encentridophorus spinifer	(Koenike)
Encentridophorus walteri (E)	Bader
Heteratax falcipes (E)	Lundblad
Koenikea dadayi	Viets
Koenikea tesselata	Daday
Neumania (Allolemienia) fissiseta	Lundblad
Neumania (Lemienia) curvata	Lundblad
Neumania (Lemienia) falcipes polypora	Lundblad
Neumania papillosa (E)	(Soar)
Unionicola figuralis	(Koch)

2.6 Crustacea

Class: Ostracoda

Sars (1910) gives a very detailed and useful account of the Tanganyikan Ostracoda collected on the third Tanganyika expedition of 1904–1905. In this paper, 29 species are described, belonging to 7 genera, of which only 2 species had previously been described. A principal feature of the Tanganyikan ostracod assemblage is the remarkably high proportion of endemic species relative to the total number of species (Cunnington, 1920). Kiss (1959a; 1959b; 1960; 1961) added greatly to the list of ostracods known from the lake, but the principal contributor of knowledge about Tanganyikan ostracods in recent times was Rome (1962) who took part in the 1946-1947 "Exploration Hydrobiologique". More recently, Wouters (1979) and Martens (1985) have described two new genera from the same material. A discussion of the phylogeny and biogeography of the subfamily Megalocypridinae, which belongs to the family Cyprididae, took place in Martens & Coomans (1989). Six species belonging to this subfamily are present in Lake Tanganyika. The taxonomy of this subfamily is further discussed in Martens (1985) and Wouters, Martens & De Dekker (1989). According to Wouters & Martens (1992), the cytheracean ostracod fauna of the lake is largely unknown, and also poorly understood. Wouters & Martens (1994) describe three new ostracod species from Lake Tanganyika, as well as providing an extensive redescription of the type species of the genus *Tanganyikacythere* Ducasse & Carbonel, 1993, *T. burtonensis*.. The most recent list of African non-marine Ostracoda, including a very useful key to genera is in Martens (1997).

Table 7. List of species of Ostracoda (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Arthropoda	
Subphylum Crustacea	
Class Ostracoda	
Order Popocopida	
Family Candoniidae	
Candonopsis anteroacuta (E)	Rome
Candonopsis depressa (E)	Rome
Candonopsis dorsorecta (E)	Rome
Family Cyclocyprididae	
Allocypria aberrans (E)	Rome
Allocypria claviformis (E)	(Sars) Rome
Allocypria flexuosa (E)	(Sars)
Allocypria humilis (E)	(Sars)
Allocypria inclinata (E)	Rome
Allocypria mucronata (E)	Rome
Allocypria navicula (E)	Rome
Allocypria oculata (E)	(Kiss)
Allocypria reniformis (E)	(Sars)
Cypria benoiti (E)	Kiss
Mecynocypria complanta (E)	(Sars)
Mecynocypria conoidea (E)	(Sars)
Mecynocypria curta (E)	(Sars)
Mecynocypria declivis (E)	(Sars)
Mecynocypria deflexa (E)	(Sars) Rome
Mecynocypria emaciata (E)	Rome
Mecynocypria lata (E)	Rome
Mecynocypria obtusa (E)	(Sars) Rome
Mecynocypria opaca (E)	(Sars) Rome
Mecynocypria ovata (E)	Rome
Mecynocypria parvula (E)	Rome
Mecynocypria perlonga (E)	Rome
Mecynocypria subangulata (E)	(Sars)
Mecynocypria tumidosa (E)	Rome
Physocypria capensis	(Sars) Klie
Physocypria stricta (E)	Rome
Family Cyprididae	
Acocypris acuminata (E)	Rome
Cypretta cordata	Klie
Cypridopsis colorata (E)	Rome
Cypridopsis congenera (E)	Sars
Cypridopsis ellipsoidalis (E)	Rome
Cypridopsis lacustris (E)	Rome
Cypridopsis longa (E)	Rome
Cypridopsis monodonta (E)	Sars
Cypridopsis obliquata (E)	Sars
Cypridopsis ovalis (E)	Rome
Cypridopsis pusilla (E)	Sars

Table 7 (continued). List of species of Ostracoda (and authorities) known from Lake Tanganyika and its associated waters.

Family Cyprididae (continued)	
Cypridopsis raripila (E)	Rome
Cypridopsis serrata (E)	Sars
Cypridopsis sinuata (E)	Sars
Cypridopsis tumidula (E)	`Sars
Cypris decaryi	Gauthier
Cypris labiata (E)	Rome
Cypris lattissima	(Müller) Müller
Hemicypris kissi (E)	(Kiss) Martens
Heterocypris capensis	(Müller) Sars
Neozonocypris globosa (E)	Rome
Neozonocypris mirabilis	Rome
Parastenocypris perarmata	(Brady) McKenzie
Prionocypris serratamarginata (E)	(Kiss) Danielopol & McKenzie
Sclerocypris multiformis (E)	(Kiss)
Stenocypris icosacantha	Lowndes
Stenocypris maxillaris (E)	Rome
Stenocypris pseudoelongata (E)	(Kiss)
Stenocypris quadridentata (E)	Rome
Strandesia asymmetros (E)	Rome
Strandesia diversicolor	(Klie)
Strandesia dorsolonga	Rome
Strandesia postica (E)	Rome
Strandesia regularis (E)	Rome
Strandesia ujijiensis (E)	Rome
Tanganyikacypridopsis anomala (E)	(Rome) Martens
Tanganyikacypridopsis calcerata (E)	(Rome) Martens
Tanganyikacypridopsis depressa (E)	(Kiss) Martens
Tanganyikacypridopsis matthesi (E)	Kiss
Tanganyikacypridopsis stappersi (E)	Wouters, Martens & De Dekker
Zonocypris pilosa (E)	Rome
Neocypridella fossulata	Daday

Table 7 (continued). List of species of Ostracoda (and authorities) known from Lake Tanganyika and its associated waters.

Family Cytheridae	
Cyprideis mastai (E)	Wouters & Martens
Cyprideis rumongensis (E)	Wouters & Martens
Mesocyprideis irsacae (E)	(Kiss)
Tanganyikacythere banzaensis (E)	Ducasse & Carbonel
Tanganyikacythere burtonensis (E)	Ducasse & Carbonel
Tanganyikacythere caljoni (E)	Wouters & Martens
Tanganyikacythere mondegueri (E)	Ducasse & Carbonel
Family Cytherideidae	
Kavalacytheris braconensis (E)	Wouters
Neocytheridea tenuisculpta (E)	Rome
Family Darwinulidae	
Darwinula marlieri (E)	Kiss
Family Ilyocypridae	
Ilyocypris alta (E)	Sars
Family Limnocytheridae	
Gomphocythere alata (E)	Rome
Gomphocythere cristata (E)	Rome
Gomphocythere curta (E)	Rome
Gomphocythere levis (E)	Rome
Gomphocythere simplex (E)	Rome
Family Notodromatidae	
Oncocypris euglypha (E)	Rome

Class: Malacostraca

Order: Bathynellacea

The Bathynellacea comprise blind interstitial species. Only one species, *Thermobathynella leleupi,* belonging to this order is known from Lake Tanganyika (Delamere Debouttevillle & Chappuis, 1955). This species then became the type species of a new genus, *Cteniobathynella* (Schminke, 1973), after previously being put in the genus *Parabathynella.* The taxonomy of this group is not yet settled, and a lot of further research into these interesting organisms is required (Schminke, 1987).

Table 8. List of species of Bathynellacea (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Arthropoda	
Subphylum Crustacea	
Class Malacostraca	
Order Bathynellacea	
Family Parabathynellidae	
Cteniobathynella leleupi (E)	(Delamere Debouttevillle & Chappuis)

Order: Decapoda

Infraorder: Caridia

Most of the taxonomic work done on this group took place a relatively long time ago (Calman 1899, 1906, 1910, 1928; Sars, 1912; Bouvier 1913; Gordon, 1930; Roth-Woltereck, 1958). There are 16 species of shrimp known from Tanganyika, belonging to 3 families and 6 genera. Cunnington (1920) reports that, of the twelve species of prawn known from the lake at the time, all were endemic to Tanganyika. Indeed, all but one genera, that of the genus *Palaemon,* were known only from the lake. Another striking characteristic of the caridian species assemblage of the lake is that *Caridina nilotica* var. *typica,* a prawn common to nearly all the big lakes of Africa, is conspicuous in that it is present only in rivers and ponds in the lake's catchment. Cunnington (1920) remarked on the similarities between the radiation of the Macrurous Crustacea with the speciation exhibited by the cichlids of Tanganyika. The most recent paper on the subject of caridean taxonomy relating to Tanganyika is that of Bruce (1997), which designates a new genus, *Thorina*, to accommodate the

hippolytid shrimp *Thor maldivensis*. This species is a member of the family Hipploytidae, and is widely distributed around tropical waters, being known from throughout the Indo-West Pacific region. The species has just recently been recorded from Lake Tanganyika, and is the only member of this family known from the lake.

Table 9. List of species of Decapoda (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Arthropoda	
Subphylum Crustacea	
Class Malacostraca	
Order Decapoda	
Suborder Natantia	
Infraorder Caridea	
Family Palaemonidae	
Macrobrachium moorei (E)	(Calman)
Family Atyidae	
Atyella brevirostris (E)	Calman
Atyella longirostris (E)	Calman
Caridella cunningtoni (E)	Calman
Caridella minuta (E)	Calman
Caridella paski (E)	Calman
Caridina nilotica var. *typica*	(Roux)
Limnocaridina iridinae (E)	Roth-Woltereck
Limnocaridina latipes (E)	Calman
Limnocaridina parvula (E)	Calman
Limnocaridina retiarius (E)	Calman
Limnocaridina similis (E)	Calman
Limnocaridina socius (E)	Calman
Limnocaridina spinipes (E)	Calman
Limnocaridina tanghanyikae (E)	Calman
Family Hippolytidae	
Thorina maldivensis	(Borradaile)

Infraorder: Brachyura

The first species of crab recorded from Lake Tanganyika was called *Limnothelphusa maculata* by Cunnington (1899); now known as *Potamonautes (Platythelphusa) maculata.* The collections of crabs that were made during the Third Tanganyika Expedition contained five species (Cunnington, 1907), two of which were previously known from the lake (Milne-Edwards, 1887; Cunnington, 1899). Cunnington (1907) remarked that the Tanganyikan species of crabs were "not merely of an unusual type, but were different from those living in other big African lakes". Cunnington (1920) also noted that, apart from *Potamon (Potamonautes) orbitospinus*, a species endemic to Lake Nyasa/Malawi, that the other big African lakes possessed a common African species assemblage of Brachiura. Ten species of crab, all belonging to the family

potamonautidae, are now known from the lake (Bott, 1970). Following Bott (1955), they are all placed within four sub-genera of the genus *Potamonautes.* Eight species are endemic to the lake. *Platythelphusa* was recognised as a distinct genus, unique to Tanganyika (Cunnington, 1920), and it is now the most polyspecific Brachyuran sub-genus in the lake with seven species. Coulter (1991) summarises the mean sizes and known habitats of the Tanganyikan crabs. A possible explanation for the relatively large body size and robust claws possessed by the Tanganyikan potamonautid crabs is put forward by West & Cohen (1994), where it is hypothesised that predator-prey coevolution between the Tanganyikan crabs, and the gastropod fauna of the lake resulted in the morphologies of these groups.

Table 10. List of species of Brachyura (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Arthropoda	
Subphylum Crustacea	
Class Malacostraca	
Order Decapoda	
Infraorder Brachyura	
Family Potamonautidae	
Potamonautes (Platythelphusa) armata (E)	Milne-Edwards
Potamonautes (Platythelphusa) conculata (E)	Cunnington
Potamonautes (Platythelphusa) denticulata (E)	Capart
Potamonautes (Platythelphusa) echinata (E)	Capart
Potamonautes (Platythelphusa) maculata (E)	Cunnington
Potamonautes (Platythelphusa) polita (E)	Capart
Potamonautes (Platythelphusa) tuberculata (E)	Capart
Potamonautes (Platypotamonautes) platynotus (E)	(Cunnington)
Potamonautes (Lirrangopotamonautes) lirrangensis	(Rathbun)
Potamonautes (Tripotamonautes) loveridgei	(Rathbun)

2.7 Insecta

The definition of an aquatic, or semi-aquatic insect used here follows Coulter (1991); the insect must be dependent on passing one or more stages of its life in an aquatic environment. Coulter (1991) lists all insect species known from the lake.

Order: EphemeropteraLestage (1917) describes one emphemeropteran species of the family Oligoneuriidae found in the lake, as well as nymphs of four species belonging to the genus *Baetis,* and one other belonging to the genus *Cloeon*, although species names were not included, and are still unassigned.

Order: Hemiptera The collections of aquatic Heteroptera that were made on a British Museum expedition to Lake Tanganyika include two genera that had previously been undescribed, *Idiocoris* and *Paskia* (Esaki & China, 1927). It was proposed to group these two genera, along with the genus *Helotrephes* in the family Helotrephidae. Poisson (1960) described a new species of heteropteran species

endemic to Tanganyika, and the presence of a closely related, and rare, *Aneurocoris insolitus*, is also noted. All four known Tanganyikan hemipterans live on the bottom, or on the underside of stones in shallow water, and probably remain submerged throughout their life cycles.

Order: PlecopteraLestage (1917) describes three specimens of stonefly nymph, all of the genus *Neoperla*, but the specimens described remain un-named.

Order: Trichoptera

Forty-five species of trichopterans, belonging to 7 families are known from the lake (Coulter, 1991), with 11 (possibly 12) endemic to the lake and its catchment waters. The Trichoptera are certainly the best-studied insect group from the lake and includes the endemic *Limnoecetis tanganyikae* Marlier, 1955a, which is probably the best known insect from the lake (see also Verbeke & Jacquemart, 1956). Remarkably, this species is adapted to a pelagic way of life. Its wings are much reduced, and it moves on the surface of the water in a manner similar to that of a gyrinid beetle. The species has also been observed swimming. Females with mature eggs have been observed in the shallows near the beach, and it seems probable that larval stages of the species occur on exposed rocky shores and feed on the algal biocover of rocks (Coulter, 1991). Marlier (1956) described some species of the family Leptoceridae from the region in and around Lake Tanganyika, of which six belong to the lake's trichopteran assemblage. Kimmins (1957a, 1957b, 1962) provided descriptions of a total of 16 species collected from the lake, as well as providing keys to the genera *Ecnomus* and *Psychomyiellodes* (Kimmins, 1957a), and a key to the family Leptoceridae (Kimmins, 1962). Barnard (1980) revised the taxonomy of the Old World species of the tribe Polymorphanisini, a part of the family Hydropsychidae, with descriptions of three species found in Lake Tanganyika. Although the review of Scott (1983) on the Hydropsychidae of Southern Africa is concerned with the region south of the Zambezi River, it is still an extremely useful reference, as it includes numerous keys to imago's, larvae and pupae of the genera of Afrotropical Hydropsychidae. The paper also includes lists of other African species of Hydropsychidae, with information on their biology and ecology.

Table 11. List of species of Insecta (and authorities) known from Lake Tanganyika and its associated waters.

Phylum Arthropoda	
Subphylum Hexapoda	
Class Insecta	
Order Coleoptera	
Family Carabidae	
Sub-family Carabinae	
Ctenosa senegalense	Dejean
Sub-family Omophroninae	
Phrator multiguttatus	Chaudoir
Family Cicindelinae	
Cicindela chrysopyga	Horn
Cicindela dongalensis (Klug) ssp. *imperatrix*	Srnka
Cicindela flavipes	Putzeys
Cicindela nilotica	Dejean
Cicindela nysa (Guerin) ssp. *quedenfeldti*	Horn
Cicindela regalis	Dejean
Lophyra neglecta (Dejean) ssp. *intermedia*	Klug
Tribe Anthiini	
Eccoptoptera cupricollis	
Brachinus armiger	Dejean
Brachinus sexnotatus (Liebke) ssp. *gerardi*	Burgeon
Pheropsophus parallelus	Dejean
Styphlomerus neavei (Liebke) ssp. *katanganus*	Liebke
Tribe Callistini	
Chlaenites (Chlaeniostenus) angustatus	
Chlaenites (Chlaeniostenus) sulcipennis (Dejean)ssp.*sulcatulus*	Boheman
Pachydinodes bipustulatus (Boheman)ssp. *granulipennis*	Chaudoir
Trachychlaenites gonioderus (Laferte)ssp. *nigrofemoralis*	Basilewsky

Table 11 (continued). List of species of Insecta (and authorities) known from Lake Tanganyika and its associated waters.

Tribe Harpalini	
Africobatus harpaloides	Guerin
Bradybaenus opulentus	Boheman
Dichaetochilus incrassatus	Boheman
Dichaetochilus moestus	Chaudoir
Dichaetochilus prolixus	Basilewsky
Eudichirus pseudochropus	Kuntzen
Hyparpalus holosericeus	Dejean
Neosiopelus melancholicus	Boheman
Ooidius dorsiger	Klug
Parasoipelus lucens	Putzeys
Tukyellus ornatus	Peringuey
Xenodochus melanarius (Boheman) ssp. *kivuensis*	Basilewsky
Tribe Lebiini	
Thyreopterus plesius Alluaud) var. *coriaceus*	Burgeon
Tribe Masoreini	
Cyclosomus buqueti	Dejean
Teteragonoderus luridus	Quedenfeldt
Tribe Orthogoniini	
Orthogonius clarkei	Murray
Orthogonius perpuncticollis	Burgeon
Tribe Panagaeini	
Craspedophorus merus (Peringuey) ssp. *pseudofestivus*	Burgeon
Craspedophorus sexmaculatus	Peringuey
Tribe Platynini	
Metagonum patroboides	Murray
Tribe Scaritini	
Clivina natalensis	Putzeys
Distichus picicornis	Dejean
Parallelomorphus nitidulus	Klug
Scarites senegalensis	Dejean
Scarites senegalensis (Dejean) ssp. *simogonus*	Chaudoir
Family Chrysomelidae	
Sub-family Alticinae	
Chaetocnema cupreovirens	Laboissière
Haltica lucida	Allard
Myrcina vandenplasi	Laboissière
Nisotra aruwimiana	Weise
Nisotra dalmani	Jacoby
Sub-family Cassidinae	
Aspidomorpha chlorotica	Olivier
Aspidomorpha dissentanea	Boheman
Aspidomorpha officiosa	Boheman
Aspidomorpha punticosta	Boheman
Cassida suspiciosa	Weise
Conchyloctenia hybridia	Boheman
Conchyloctenia praecox ab. *Obscurella*	Spaeth
Lacoptera corrugata	Sahlberg

Table 11 (continued). List of species of Insecta (and authorities) known from Lake Tanganyika and its associated waters.

Sub-family Chrysomelinae	
Chrysolina spiloptera	Achard
Mesoplatys ochroptera	Stal
Sub-family Clytrinae	
Clytra fasciata	Fabricius
Melitonoma ligitiosa	Lacordaire
Peploptera ertli	Weise
Sub-family Criocerinae	
Bradylema robusta	Lacordaire
Lema dragei	Lacordaire
Lema inconstans	Clark
Sub-family Cryptocephalinae	
Cryptocephalus gowdeyi	Bryant
Sub-family Eumolpinae	
Colasposoma auripes	Jacoby
Corynodes dejeani	Bertoloni
Dicolectes rugulosus	Léfèvre
Eryxia holosericea	Klug
Meniellus maculicollis immaculatus	Burgeon
Rhembastus mechowi	Weise
Sub-family Galerucinae	
Asbecesta monardi	Labossière
Candezea bicostata	Weise
Candezea gyldenstolpei	Weise
Eupachytoma gigantea	Illiger
Exosoma apicipennis	Jacoby
Megalognatha kapiriensis var. *huberti*	Labossière
Monocida impressifrons	Labossière
Monolepta melanocta	Labossière
Monolepta puncticeps	Chappuis
Monolepta vincta	Gerstaecker
Oides minor	Weise
Sesselia flavicincta	Jacoby
Rudolphia epipleuralis	Labossière
Sub-family Hispinae	
Dactylispa chapuisi	Gestro
Dactylispa spinulosa var. *salaamensis*	Weise
Hispa viridicyanea	Kraatz

Table 11 (continued). List of species of Insecta (and authorities) known from Lake Tanganyika and its associated waters.

Family Dryopidae	
Sub-family Psephenoidinae	
Afrosephenoides marlieri (E)	Basilewsky
Order Ephempotera	
Family Baetidae	
Acentrella sp.	
Baetis sp.	
Cloeon sp.	
Family Caenidae	
Caenis cincta (E)	Demoulin
Caenis sp.	
Family Heptageniidae	
Afronurus sp.	
Family Leptophlebiidae	
Adenophlebia sp.	
Adenophlebiodes (?Hyalophlebia) sp.	
Fulleta dentata	Navas
Fulletomimus marlieri	Demoulin
Family Oligoneuridae	
Elassoneuria trimeniana	McLachan
Famiy Polymitarcidae	
Povilla adjusta	Navas
Order Hemiptera	
Sub-order Heteroptera	
Family Helotrephidae	
Idiocoris lithophilus (E)	Esaki & China
Paskia minutissima (E)	Esaki & China
Family Naucoridae	
Aneurocoris insolitus (E)	Montandon
Aneurocoris (Aneurocorisella) marlieri (E)	Poisson
Order Lepidoptera	
Sub-order Rhopalocera	
Family Hesperiidae	
Sub-family Hesperiinae	
Metisella midas midas	Butler
Family Lycaenidae	
Sub-family Polyommatinae	
Syntarucus pulcher	Murray

Table 11 (continued). List of species of Insecta (and authorities) known from Lake Tanganyika and its associated waters.

Family Pieridae	
Mylothris brenice rubricosta	Mabille
Family Satyridae	
Mashuna upemba	Overlaet
Ypithimomorpha itonia	Hewitson
Order Plecoptera	
Neoperla sp.	
Order Trichoptera	
Family Ecnomidae	
Ecnomus fuscus	Kimmins
Ecnomus kivuensis	Marlier
Ecnomus thomasseti	Mosely
Ecnomus ugandanus	Kimmins
Ecnomus ulmeri	Mosely
Psychomyiellodes dentatus	Kimmins
Family Hydropsychidae	
Aethaloptera dispar	Brauer
Cheumatopsyche afra	(Mosely)
Cheumatopsyche aterrima	Marlier
Cheumatopsyche tenerrima	Marlier
Cheumatopsyche urema	Mosely
Diplectronella medialis	Marlier
Hydropsyche maniemensis	Marlier
Leptonema natalensis	Mosely
Leptonema occidentale	Ulmer
Macrostemum capense	(Walker)
Polymorphiansus bipunctatus	Brauer
Polymorphiansus elisabethae	Navas
Protomacronema tanganikae (E)	Jacquemart
Family Hydroptilidae	
Orthotrichia straeleni	Jacquemart
Ugandatrichia africana	(Marlier & Vaillant)
Family Lepidosomatidae	
Goerodes vicinus (E)	Marlier

Table 11 (continued). List of species of Insecta (and authorities) known from Lake Tanganyika and its associated waters.

Family Leptoceridae	
Adicella contorta (E)	Marlier
Ceraclea batia	(Mosely)
Ceraclea cupreus	(Barnard)
Ceraclea (Athripsodina) exilis (E)	Morse
Ceraclea microbatia (E)	(Marlier)
Ceraclea schoutedeni	(Navas)
Ceraclea spinosa	(Navas)
Leptocerina integra (E)	Marlier
Leptocerina neavei	(Mosely)
Limnoecetis tanganicae (E)	Marlier
Oecetis africana	Kimmins
Oecetis cochleata (E)	Marlier
Oecetis decora	Kimmins
Oecetis fasciata	Lestage
Oecetis ocellata	Jacquemart
Oecetis simplex	Marlier
Oecetis vulgata	(Marlier)
Parasetodes maguirus	(Mosely)
Parasetodes sudanensis tanganicana (E)	Marlier
Family Philopotamidae	
Chimarra berghei (E)	Marlier
Chimarra mushuvae (E)	Marlier
Chimarra uvirana (E)	Marlier
Family Xiphocentronidae	
Abaria electa	Marlier

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