THE FRESHWATER FAUNA OF THE SOUTH POLAR REGION: A 140-YEAR REVIEW.

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(with one text-figure, one table and one appendix)

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The metazoan fauna of Antarctic and sub-Antarctic freshwaters is reviewed. Almost 400 species, notably rotifers, tardigrades and crustaceans have been identified. Sponges, molluscs, amphibians, reptiles and fishes are absent though salmonid fishes have been successfully introduced on some of the sub-Antarctic islands. Other alien introductions include insects (Chironomidae) and annelid worms (Oligochaeta). The fauna is predominately benthic in habitat and becomes increasingly depauperate at higher latitudes. Endemic species are known but only a few are widely distributed. Planktonic species are rare and only one parasitic species has been noted.
Keywords: freshwater, fauna, Antarctica, sub-Antarctic Islands, maritime Antarctic, continental Antarctica.

INTRODUCTION

The first collections of Antarctic freshwater invertebrates were made during the "Transit of Venus" expeditions of 1874 (Brady 1875, 1879, Studer 1878). Since then many Antarctic expeditions have collected limnological material as part of their scientific programs. The results of these surveys, which range from single-line observations to detailed reports, written in a number of languages, are scattered throughout the literature. The objective of this paper is to bring together these reports, to consider the validity of the identifications, to update the taxonomy where necessary, and assess the thoroughness of the sampling in order to both review current knowledge and highlight areas for future investigation.

Some definitions and limitations

The scope and limitations of this compilation are defined as follows. Within the context of this paper the Antarctic region is defined as the area approximately delimited by the Antarctic Polar Front Zone (APFZ), including the sub-Antarctic islands that lie on, or just to the north of, this front (fig. 1). The Antarctic region is divided into four distinct zones –

- the sub-Antarctic islands,
- the maritime Antarctic,
- the Antarctic coastal fringe, and
- the ice-covered centre of continental Antarctica.

The sub-Antarctic islands comprise the six groups of treeless Southern Ocean islands – South Georgia, the Prince Edward Islands, Îles Crozet, Îles Kerguelen, Heard Island and the McDonald Islands, and Macquarie Island – that lie on or just to the north of the Antarctic Polar Front. Here the vegetation is abundant and often waterlogged. Water bodies are common and include lakes, rivers and streams. [Note that the Falkland Islands and the islands to the south and east of New Zealand – namely Campbell, Auckland, Snares, Antipodes, Bounty, and Chatham islands – that some authorities label sub-Antarctic, are not included in this definition. While these cool-temperate islands have a similar verdant vegetation and numerous water bodies they are warmer and some are vegetated with woody shrubs and trees.]

The maritime Antarctic zone includes Graham Land, the Antarctic Peninsula north of the Antarctic Circle, as well as the off-lying island groups of the South Atlantic/Weddell Sea including the South Shetland Islands, South Orkney Islands, South Sandwich Islands, and Bouvetøya (Bouvet Island), that are often enclosed by the maximum extent of the winter sea-ice. Lakes here are shallow and ice-covered for much of the year. Mosses and liverworts (bryophytes) and lichens are common and reasonably widespread, together with two flowering plants – the hair grass *Deschampsia antarctica* Desv. and the pearlwort *Colobanthus quitensis* (Kunth) Bartl.

The Antarctic coastal fringe, as its name implies, includes the narrow strip of land up to a couple of hundred kilometres wide around Continental Antarctica. Here, "oases" – areas of ice-free ground – occur, and bryophytes, lichens and algae can grow though are generally sparse. Rivers are ephemeral, lakes can be locally common and encompass landlocked fresh to hypersaline water bodies. Epishelf lakes are large bodies of fresh water floating on the sea and sandwiched between permanent ice shelves and coastal rock of both the maritime Antarctic and Antarctic coastal fringe. Proglacial lakes – meltwater bodies on the surface and alongside glaciers – are ultra-oligotrophic.

Surface lakes do not occur on the ice-covered centre of Antarctica. However, this area does support a number of subglacial lakes buried under thousands of metres of ice which are in the very early stage of investigation.

Many freshwater invertebrates can tolerate water of increased salinity, however, in this paper I do not consider water bodies with a salinity >5.5‰ after Dartnall (2000) who determined that this was the natural upper salinity tolerance of freshwater invertebrates in the Vestfold Hills. All permanent freshwater habitats – rivers and streams, wallows, pools, ponds, lagoons and lakes including epishelf, glacial and subglacial lakes that have a salinity of <5.5‰

will be considered. Casual water or soaks are not included as these areas of temporary standing water or flooded vegetation are considered to be terrestrial habitats. Similarly, species found in the intertidal zone or in pools just above the high tide mark, which are considered brackish, will not be included.

In the Antarctic (specifically the Antarctic coastal fringe and maritime Antarctic zone) pools are defined as shallow bodies of water that freeze solid in the winter and lakes as deeper bodies of water that do not. This is an important biological distinction often leading to quite separate floras and faunas. On the sub-Antarctic islands where it is not cold enough to cause even the smallest water bodies to freeze completely, the floras and faunas of the various water bodies are essentially similar; here the terms lake, lagoon, pool, pond and tarn are often applied arbitrarily. Fringing terrestrial vegetation can mask the edge of such water bodies so it is not always possible to determine where dry land ends and the lake begins.

This study is confined to metazoan groups and does not include the Protozoa. All truly freshwater species including those that only complete part of their life cycle aquatically will be included; while the validity of terrestrial and marine interlopers that drop in or are blown in and continue to function once immersed in freshwater will also be considered.

PRESENTATION OF THE RESULTS

Earlier reviews have divided the Antarctic continent into four or six segments considering the results from each 90° or 60° arc (Pugh 1993, Andrássy 1998, Pugh *et al.* 2002). In this paper I include the six sub-Antarctic island groups and track westwards from Macquarie Island to South Georgia picking up the intervening sub-Antarctic islands, before tracking southwards through the islands of the Scotia Arc and south along the Antarctic Peninsula then returning eastwards along the coast of the Antarctic continent to McMurdo Sound (fig. 1). This sequence, reflected in the order of columns in the table, not only keeps adjacent sampling locations together but broadly speaking follows a slow increase in latitude of the major freshwater sampling stations.

In figure 1 a solid red circle indicates the location of an area of particular interest. On the figure, the table and key references in the text **MqI** stands for Macquarie Island, **HI** is Heard Island, **K** is Îles Kerguelen, **C** is Îles Crozet, **PE** is Prince Edward Islands, **SG** is South Georgia, **SO** is South Orkney Islands, **SS** is South Shetland Islands, **AP** is Antarctic Peninsula, **Sch** is Schirmacher Oasis, **TH** is Thala Hills, **PCM** is the Prince Charles Mountains, **LH** is the Larsemann Hills, **VH** is the Vestfold Hills, **Has** is Haswell Island, **OH** is the Obruchev Hills, **BH** is the Bunger Hills, **WL** is Wilkes Land and **McM** is the McMurdo Sound region. Here McMurdo Sound is taken to include Ross Island and the Dry Valleys; the Antarctic Peninsula is taken to include Alexander Island and the southern end of the Peninsula (Palmer Land); while the South Shetland Islands also include the Argentine Islands and Graham Land, the northern tip of the Peninsula. Other locations where freshwater studies have been carried out but the results are too few to warrant a column of their own in the distribution tables are mentioned in the text.

The following symbols have specific meaning throughout the distribution table (see page 22):

- \+ the presence of a particular species at a given location
- × an interloping terrestrial or brackish water species that has strayed into freshwater and continues alive in the "wrong" environment
- ‡ a record that warrants verification, based on an unexpected observation and/or very few specimens
- ? a questionable or dubious record
- ( ) an anthropogenic/introduced species
- † a species that is no longer present or extinct at a location
- numeral – the number of recognised but not identified taxa, e.g., "the collector noted three unidentified species of nematode"

Finally, the total number of identified species found at each location is given for some groups in the table though this may not represent a true "total" if there are multiple entries of unidentified or partially identified records. A blank entry indicates an absence of data. A zero ('0') indicates definitive or suspected absence of that group.

The Fauna

As is appropriate for this review only metazoan groups that are normally found in freshwater will be considered. Exclusively marine or terrestrial phyla, classes, orders and families are excluded (following the taxonomy as detailed in Anderson 2001).

Phylum: Porifera

There is just one mention of freshwater sponges in the Antarctic literature. Thomson (1895) reported that amongst the material of a sponge taken from a freshwater pool on Macquarie Island there were two very imperfectly preserved specimens of a species of calanoid copepod *Guernea antarctica*. He considered that this copepod, now known as *Boeckella brevicaudata* (see appendix 1 for a list of synonyms and mistaken identities) might have lived in the cavities of the sponge. *B. brevicaudata* is a free-swimming copepod that does not hide in crevices and Thomson is mistaken in implying his sponge is of freshwater origin. It undoubtedly came from the nearby inshore marine environment, probably dropped by a passing seabird. Consequently it is not a legitimate freshwater inhabitant.

Points of interest (Porifera)

No freshwater sponges have been reported from the Antarctic region.

Phylum: Cnidaria

The only record of a freshwater coelenterate from the Antarctic region is the green hydra reported from South Georgia by Headland (pers. comm.) (table 1: Cnidaria). With only one specimen seen in 1987 confirmation of

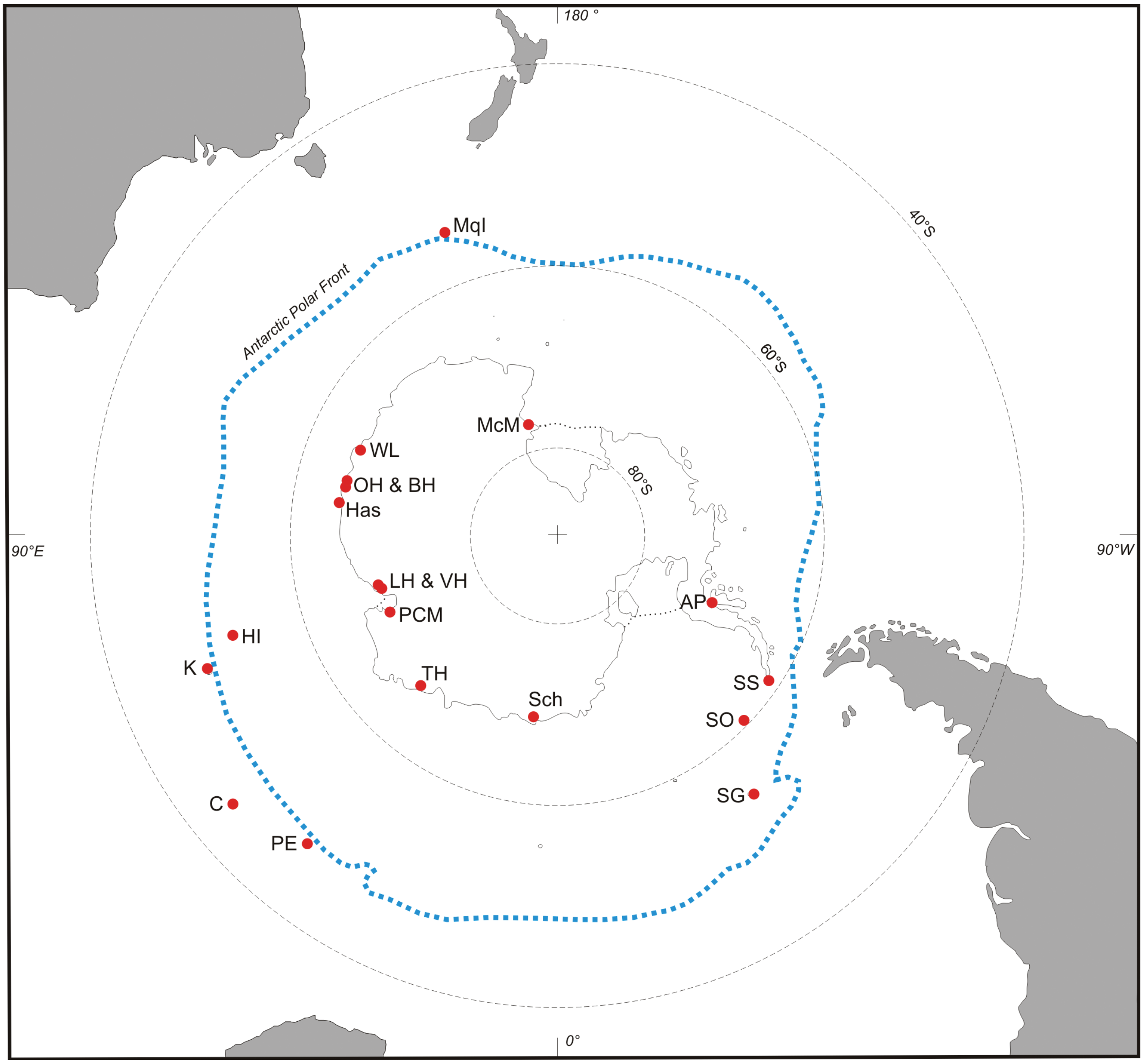

FIG. 1 — Map of the Antarctic and sub-Antarctic regions showing the Antarctic Polar Front (dotted blue line) and the locations where freshwater surveys have been made (red spots). On this map **MqI** is Macquarie Island, **HI** is Heard Island, **K** is Îles Kerguelen, **C** is Îles Crozet, **PE** is Prince Edward Islands, **SG** is South Georgia, **SO** is South Orkney Islands, **SS** is South Shetland Islands, **AP** is Antarctic Peninsula, **Sch** is Schirmacher Oasis, **TH** is Thala Hills, **PCM** is the Prince Charles Mountains, **LH** & **VH** is the Larsemann Hills and Vestfold Hills, **Has** is Haswell Island, **OH** & **BH** is the Obruchev Hills and Bunger Hills, **WL** is Wilkes Land and **McM** is the McMurdo Sound region including the Dry Valleys.

its continuing presence would be valuable. Note that the anthomedusa (*Rathkea lizzioides* O'Sullivan, 1984) reported from the Vestfold Hills by Bayly (1986) and Bayly & Eslake (1989) together with a ctenophore that was found in Lake Burton are not included in this study. These are marine species that have only been found in Lake Burton, a meromictic saline lake with a salinity of 40+‰ (Dartnall 2000) and consequently are not within the "freshwater limitations" of this survey.

Points of interest (Coelenterata)
Just one specimen of a green hydra has been reported from the Antarctic region at South Georgia. Confirmation of the continuing presence of this hydra would be valuable.

Phylum: Platyhelminthes
While no parasitic flatworms (Trematoda, Monogenea and Cestoda) have been reported from freshwater in the Antarctic region a few free-living species (Turbellaria) have been identified (table 1: Platyhelminthes). Poorly known and with patchy distributions, flatworms are nevertheless an important component of the freshwater ecosystem particularly on the sub-Antarctic islands and are probably far more common than has been recorded. The reported "freshwater" records include a mixture of terrestrial species that favour damp habitats and interloping marine/brackish species. It is well known that when freshwater planarians are absent from oceanic islands they may be "replaced" by marine taxa (Ball & Hay 1977).

At least four species of flatworm are known from Macquarie Island. Evans (1970) mentions several *en passant*. Ball & Hay (1977) described the endemic *Duplominona amnica* from streams and lakes. Winsor & Stevens (2005) describe *Arthurdendyus vegrandis* and confirm *Kontika andersoni* from damp habitats, while Dartnall *et al*. (2005) note a large unidentified species with an arrow-shaped head, two conspicuous eyespots and a broad diamond-shaped tail at one of Evans' sampling sites as well as confirming the widespread presence of *D. amnica*. *Arthurdendyus vegrandis* and *K. andersoni* which are *(sensu stricto)* terrestrial predators of earthworms normally occur in damp moss and under stones rather than truly immersed in streams. Therefore both are marked as interlopers in table 1. Both *Duplominona amnica* and the unidentified species of Dartnall *et al*. (2005) are freshwater species. The abundance and wide range of the marine *D. amnica* in the lakes of Macquarie Island was noted as "a surprise" to Ball & Hay (1977).

Points of interest (Platyhelminthes)

There are no parasitic flatworms reported from freshwater habitats in the Antarctic region.

Free-living flatworms are poorly known, warrant further study, and are widespread in Antarctic freshwaters.

Key references

MqI: Evans (1970), Ball & Hay (1977), Marchant & Lillywhite (1994), Dartnall *et al.* (2005), Winsor & Stevens (2005), Greenslade (2006). **HI**: Dartnall (1995a, 2003, 2006). **C**: Beauchamp (1939, 1940), Jeannel (1940), Davies & Young (1974). **PE**: Dartnall & Smith (2012). **SG**: Dartnall & Heywood (1980), Headland (1984, pers. comm.), Dartnall (2005c). **SO**: Heywood *et al.* (1979, 1980), Priddle & Dartnall (1978). **SS**: Simonov (1973). **Sch**: Ingole & Parulekar (1990, 1993). **PCM**: Dartnall (unpublished). **LH**: Dartnall (1995b). **VH**: Dartnall (2000). **McM**: Murray (1910a), Armitage & House (1962), Dougherty & Harris (1963), Bierle (1969), Webster-Brown *et al.* (2010).

Phylum Nemertea

No freshwater nemerteans have been reported from the Antarctic region.

Phylum Entoprocta

No freshwater entoprocts have been reported from the Antarctic region.

Phylum Rotifera

Fast breeding rates, the production of resting eggs and the ability to withstand dehydration and freezing means that some species of rotifer are ideally suited to life in the Antarctic (Dartnall 1992). With some 150 species so far known rotifers are easily the most numerous freshwater group present (table 1: Rotifera). Large though this number is, it is less than one quarter of the species currently known for the United Kingdom and less than one fifth of those known from Australia. Detailed studies have been carried out at several locations but there are considerable gaps. For example, from Crozet just four genera of rotifers (*Cephalodella, Lecane, Lepadella* and *Proales*) have been recorded, identified from the gut contents of the predatory freshwater amphipod *Pseudingolfiella possessionis* (De Smet 2015). Interestingly De Smet (2002a) recorded nine species from the littoral zones of both Îles Kerguelen and Crozet. This habitat is outside the scope of this paper but two of the species De Smet found (*Colurella colurus* and *Lindia torulosa*) are frequently found in freshwater and as such have been added to table 1 as interlopers. One of the others (*Proales reinhardti*), generally considered to be a marine species, has been reported from the ultra-freshwater Crooked Lake in the Vestfold Hills (Korotkevich 1958, Kutokova 1958b) and has similarly been included. However, it should be noted that Dartnall (2000) only found it at the eastern end of Ellis Fjord where the massive freshwater outflow from Lake Druzby flows into Ellis Fjord in the Vestfold Hills at a salinity of 22‰, suggesting a euryhaline and/or new species.

Until very recently the rotifers from the Antarctic region were thought to be benthic with just a few planktonic examples notably belonging to the genus *Notholca*. Different species of *Notholca* were noted across a range of locations (table 1: Rotifera: Brachionidae) variously characterised by striations, circular pits and the presence or absence of a tab on the posterior edge of the dorsal plate. Hannson *et al.* (2012) identified nine species of rotifer including seven planktonic species and a solitary copepod from samples taken at the ice-water interface and mid-water of Lake Hoare, a permanently ice-covered lake in one of the Dry Valleys of the McMurdo Sound region.

While a few rotifers – e.g., *Collotheca ornata cornuta*, *Epiphanes senta*, *Lepadella patella*, *Ptygura crystallina*, *Resticula gelida* – are truly cosmopolitan, the majority are restricted to the sub-Antarctic islands and maritime Antarctic. *Adineta grandis*, *Philodina alata*, *P. antarctica* and *P. gregaria* are endemic to Antarctica. Neither *A. grandis* nor *P. gregaria* have been found on the South Shetland islands, an archipelago apparently well within their range. The South Shetland islands have been subjected to numerous rotifer studies (de Paggi 1982, Kuczynski 1987, Janiec 1993, Janiec & Salwicka 1996, Downie *et al.* 2000, Toro *et al*. 2007, Nędzarek & Pociecha, 2010), but neither bdelloid has been reported from there; indeed Susanna de Paggi (pers. comm.) specifically looked for *Philodina gregaria* but did not find it.

The Digononta or Bdelloidea are poorly known (table 1: Rotifera: Bdelloidea) and are undoubtedly far more common than indicated. Recent molecular genetic studies have enabled Velasco-Castrillón *et al.* (2014) and Iakovenko *et al.* (2015) to identify a number of new species. Working with samples from Victoria Land (McMurdo Sound region) and from the South Shetland Islands and the northern tip of the Antarctic Peninsula Iakovenko *et al.* (2015), recognised 60 morphospecies. Twenty were only identified to the generic level and could not be attributed; no data were available for thirteen others that showed no discernible differences from known cosmopolitan species, while ten possessed minor differences from presumed cosmopolitan bdelloids. This left seventeen Antarctic endemics, six of which were previously known, plus eleven new (described) species. Although Iakovenko *et al.* (2015) worked predominately with soil samples several of their species had been described as cosmopolitan freshwater inhabitants in earlier studies (Murray 1910b, Dougherty & Harris 1963, Donner 1972, Dartnall & Hollowday 1985). Thus species previously identified as *Adineta barbata*, *A. gracilis*, *Habrotrocha constricta*, *Macrotrachela insolata* have been renamed *A. coatsae*, *A. editae*, *H. antarctica* and *M. donneri* respectively. *Adineta* sp. A from Heard Island (Dartnall 1995a) becomes *A. emsliei* and *Philodina* sp. A from the South Orkney Islands (Priddle & Dartnall 1978, Dartnall & Hollowday 1985) is now *Philodina dartnallis* (Iakovenko *et al.* 2015). Confirmation of the identity of other sub-Antarctic bdelloid species will have to wait until they are clarified by molecular genetics.

Recently De Smet (2009) reported the first case of parasitism in Antarctic freshwaters; that of the rotifer *Pourriotia carcharodonta* parasitising the xanthophyte *Vaucheria geminata* (Vaucher) de Candolle by causing it to produce galls.

Points of interest (Rotifera)

Rotifers are found throughout the Antarctic region.

The endemic bdelloids *Philodina gregaria* and *Adineta grandis* have circumpolar distributions and are not found on the sub-Antarctic islands.

The endemic bdelloids *Philodina alata,* and *P. antarctica* have limited distribution in eastern Antarctica.

Clarification of the interrelationships and distributions of *Notholca* species is required.

Clarification of the various species of Brachionidae is required.

Key references

MqI: Dartnall (1990, 1993), Dartnall *et al.* (2005), Fontaneto *et al.* (2015). **HI**: Dartnall (1995a, 2003, 2006). **K**: Beauchamp (1940), Russell (1959), Lair & Koste (1984), De Smet (2001, 2003). **C**: De Smet (2015). **PE**: Dartnall & Smith (2012). **SG**: Dartnall & Heywood (1980), Dartnall & Hollowday (1985), Dartnall (2005a, 2005c). **SO**: Dartnall & Hollowday (1985). **SS**: de Paggi (1982), Kuczynski (1987), Janiec (1993), Janiec & Salwicka (1996), Downie *et al.* (2000), Toro *et al.* (2007), Nędzarek & Pociecha (2010). **AP**: Schmitt (1945), Heywood (1977b), Dartnall (1980), Kuczynski (1987). **Sch**: Ingole & Parulekar (1987), Kutikova (1991), Mitra (1999). **TH**: Opalinski (1972b), Sharov *et al.* (2015). **PCM**: Dartnall (unpublished). **LH**: Dartnall (1995b). **VH**: Korotkevich (1958), Kutikova (1958b), Everitt (1981), Dartnall (1997, 2000). **Has**: Opalinski (1972a), Donner (1972). **OH**: Korotkevich (1958), Kutikova (1958b). **BH**: Korotkevich (1958), Kutikova (1958a, 1958b), De Smet & Gibson (2008). **WL**: Thomas (1965, 1972), Dartnall (2005b). **McM**: Murray (1910b), Armitage & House (1962), Dougherty & Harris (1963), Donner (1972), Spurr (1975), Cathey *et al.* (1981), Suren (1990), Hansson *et al.* (2012). **General references**: Koste (1978), de Paggi & Koste (1984), Sudzuki (1988), Segers (2007), Fontaneto *et al.* (2015).

Phylum Micrognathozoa

Just one species of this rare recently-described group of aschelminthes-like animals akin to the Rotifera and Acanthocephala has been reported from the Antarctic region. De Smet (2002b) found *Limnognathia maerski* amongst submerged mosses in stagnant and running water on Îles Crozet (table 1: Micrognathozoa). The only other record of this species is from the Arctic at Disko Island, West Greenland (Kristensen & Funch 1995, 2000).

Phylum Gastrotricha

These small solitary worms are easily overlooked. There are few casual Antarctic records principally from the sub-Antarctic islands (table 1: Gastrotricha). Several genera have been variously identified according to the presence of "scales" (*Lepidodermella*) and "hairs or spines" (*Chaetonotus*) and their shape and size. Gastrotrichs were not observed during an extensive survey of the freshwater lakes of the Vestfold Hills (Dartnall 2000) nor from the nearby Larsemann Hills (Dartnall 1995b), but they have been noted elsewhere in continental Antarctica, including Coast Lake in the McMurdo Sound area (Murray 1910a, Bierle 1969) and from a moss water community at Langhovde near the Japanese Syowa Station (Sudzuki 1964), though this last report is a terrestrial record (table 1: Gastrotricha).

Points of interest (Gastrotricha)

Rarely reported, gastrotrichs are undoubtedly more widespread in the Antarctic region than current studies would indicate.

Key references

MqI: Dartnall *et al.* (2005). **HI**: Dartnall (1995a, 2003, 2006). **PE**: Dartnall & Smith (2012). **SG**: Dartnall & Heywood (1980), Dartnall (2005c). **SO**: Heywood *et al.* (1979), McInnes & Pugh (1999). **SS**: Downie *et al.* (2000). **McM**: Murray (1910a), Bierle (1969).

Phylum Acanthocephala

There are no freshwater Antarctic records for this parasitic group.

Phylum Nematoda

Nematodes are a ubiquitous group that include specialised feeders on bacteria, fungi and algae as well as omnivores and predators. They are unusual in that some species can tolerate anoxic conditions. In the freshwater ecosystems of the Antarctic region nematodes are poorly known, especially from the sub-Antarctic islands with many surveys only mentioning their presence (table 1: Nematoda). Improved sampling techniques that focus on benthic sediments should increase the tally.

In 1998 Andrássy reviewed the free-living nematodes of Antarctica, reporting distinct maritime Antarctic and continental Antarctic populations. Since then a considerable number of new, predominately terrestrial species have been added to this list (Boström 1997, 2005, Nędelchev & Peneva 2000, Downie *et al.* 2000, Sohlenius *et al.* 2004, Ghosh *et al.* 2005, Ryss *et al.* 2005, Andrássy & Gibson, 2007, Andrássy 2008, Bohra *et al.* 2010). The total number of named species of terrestrial, freshwater and saline nematodes from the Antarctic region south of 60°S currently stands at 68. Some 34 of these are recorded from continental Antarctica and 37 from the maritime Antarctic with just three species common to both, thus corroborating Andrássy's two distinct Antarctic populations (Velasco-Castrillo *et al.* 2014). Currently the freshwater species of nematodes from the sub-Antarctic islands are too poorly known to contribute to this discussion.

The Schirmacher Oasis list of nematodes is composed of species collected in and around the lakes (Ingole & Parulekar 1987, Sanyal 2004, Bohra *et al.* 2010, Gantait & Chandra 2017 and others) from both shallow freshwater and terrestrial habitats. Collections from clearly terrestrial habitats (Bohra *et al*. 2010) have been excluded from this review, leaving the remainder whose precise habitats are unspecified but include soil samples as well as floating algae and submerged lake mosses (table 1: Nematoda).

From penguin rookery pools on Marion Island Dartnall & Smith (2012) recovered a small number of large nematodes each with an impressive buccal cavity comprising three double hooks. They considered these nematodes to be gut parasites of marine origin that had been voided from their penguin hosts. If this is the case no nematodes parasitic on freshwater animals or plants have been reported from the Antarctic region.

Points of interest (Nematoda)

An important freshwater group but poorly known due to the difficulties of sampling benthic habitats in deep water. More samples required especially from the sub-Antarctic islands.

Free-living freshwater nematodes occur throughout the region.

No parasitic species are reported from sub-Antarctic or Antarctic freshwaters.

The nematode faunas of continental Antarctica and the maritime Antarctic are markedly different. When more is known of the sub-Antarctic nematode fauna it will be interesting to see where its relationships lie.

Key references

MqI: Marchant & Lillywhite (1994), Nicholas & Marples (1995), Dartnall *et al.* (2005). **HI**: Dartnall (1995a, 2003, 2006), Maslen (pers. comm.). **C**: Kir'yanova (1964). **PE**: Dartnall & Smith (2012). **SG**: Dartnall & Heywood (1980), Dartnall (2005a). **SO**: Heywood *et al.* (1979), Dartnall (1992). **SS**: Maslen (1979), Janiec (1993), Downie *et al.* (2000), Toro *et al.* (2007), Nędzarek & Pociecha (2010). **AP**: de Man (1904), Heywood (1977b), Maslen (1982). **Sch**: Ingole & Parulekar (1990), Bohra *et al.* (2010), Gantait & Chandra (2017). **PCM**: Dartnall (unpublished). **LH**: Dartnall (1995b). **VH**: Everitt (1981), Dartnall (2000), Andrássy & Gibson (2007). **OH**: Korotkevich (1958). **BH**: Korotkevich (1958), Kir'yanova (1964), Maslen (pers. comm.). **McM**: Murray (1910a), Suren (1990), Webster-Brown *et al.* (2010).

Phylum Nematomorpha

No freshwater nematomorphs have been reported from the Antarctic region.

Phylum Mollusca

Terrestrial gastropods are known from a number of the sub-Antarctic islands (Pugh & Scott 2002) occuring in the vicinity of freshwater lakes and pools but they are not aquatic. While *Notodiscus hookeri* (Reeve, 1854) has been reported as a major food source of the trout (*Salmo trutta*) on Marion Island (Cooper *et al.* 1992), these snails never venture into the water but were plucked off the vegetation that overhung the stream into which these fishes had been introduced. Dartnall & Smith (2012) found the introduced slug, *Deroceras panormitanum* (Lessona & Pollonera, 1882), in some numbers in a mire and a lake on Marion Island following a heavy downpour and while they were alive at the time of collection the slugs did not survive immersion leading to the conclusion that they had been washed in. Shells of limpets and several inshore marine snails were occasionally seen in shallow water in freshwater lakes and pools on Macquarie Island and the South Orkney Islands (Dartnall unpublished) but again these are cases of accidental introduction, dropped by passing seabirds.

Points of interest (Mollusca)

No freshwater snails or bivalves have been recorded from the Antarctic region.

Phylum Annelida

The phylum Annelida comprises three classes – Polychaeta, Oligochaeta, and Hirudinea. Most polychaete worms are marine; a few freshwater species are known elsewhere but none has been reported in freshwater from the Antarctic region. Similarly leeches (Hirudinea) are not known from freshwater or indeed from terrestrial habitats in the Antarctic. This leaves only the oligochaetes to consider.

Representatives of six oligochaete families have been found in the region – the larger, predominantly terrestrial "earthworms" Acanthodrilidae and Lumbricidae; and the smaller, thinner, predominantly aquatic Tubificata families Enchytraeidae, Naididae, Phreodrilidae and Tubificidae.

The Acanthodrilidae is a small group of closely related southern hemisphere earthworms. The genus *Microscolex* is predominately terrestrial with different species occurring on many of the sub-Antarctic and cool-temperate islands. They usually occur in damp conditions amongst moss, in the soil and/or under stones. Kok (1977) reported *Microscolex kerguelensis*, a terrestrial species, previously known from Îles Kerguelen (Tétry 1947, Lee 1968, Sims 1971, Duchêne 1989), on Heard Island (Lee 1968), and in a number of the freshwater lakes on the east coast of Marion Island. It was not found by Dartnall & Smith (2012) in their survey of the freshwater lakes of Marion Island and has been recorded as a terrestrial interloper in table 1: Annelida: Acanthrodrilidae. Evans' (1970) record of *M. macquariensis* from Scoble Lake, a plateau lake some 200 m above sea level on Macquarie Island, is also considered to be a terrestrial interloper as neither Marchant & Lillywhite (1994) nor Dartnall *et al.* (2005) found it in their surveys of streams and lakes on Macquarie Island.

Two genera of Lumbricidae have been reported from the Antarctic region – *Dendrodrilus rubidus* and *Eiseniella tetraedra* (table 1: Annelida: Lumbricidae). *D. rubidus* is Holarctic and has been introduced to the southern hemisphere including the sub-Antarctic islands (Blakemore 2002, Greenslade 2006). It has been recovered from the freshwater lakes and streams on Heard Island (Dartnall 2003), while on Îles Kerguelen (Duchêne 1989), Îles Crozet (Frenot 1985) and Macquarie Island (Lee 1968) it occurs in damp terrestrial habitats (note that these terrestrial records are not included in table 1: Annelida: Lumbricidae while the Heard Island record is shown as an introduced species in the "wrong environment"). *E. tetraedra* is a semi-aquatic worm inhabiting wells, springs and underground waters elsewhere in the world. In the Antarctic region (table 1: Annelida: Lumbricidae) it has been recorded in freshwater at Îles Kerguelen (Lee 1968, Duchêne, 1989) where it is cited as an introduced species by Frenot *et al.* (2005). It has also been reported from Macquarie Island as a single specimen (Lee 1959). It has not been recorded subsequently suggesting it is no longer present (Greenslade 2006).

The four families that comprise the subclass Tubificata (table 1: Annelida: Tubificata) contain numerous freshwater inhabitants; most of the species from the Naididae, Phreodrilidae and Tubificidae are aquatic while the Enchytraeidae also include terrestrial and littoral examples.

In the Antarctic region two species from the family Naididae have been reported in freshwater – *Nais elinguis*, and a species of *Vejdovskyella*. *N. elinguis* is a cosmopolitan species that is very common in the streams on Macquarie Island (Marchant & Lillywhite 1994) and has also been found in freshwater on Îles Kerguelen (Tétry 1947). Dartnall & Smith (2012) reported *Vejdovskyella* amongst the algae in most of the lakes they sampled on Marion Island (table 1: Annelida: Naididae).

Three species of Phreodrilidae have been found in freshwater on the sub-Antarctic islands (table 1: Annelida: Phreodrilidae). Marchant & Lillywhite (1994) recorded an unidentified *Astacopsidrilis*, subsequently identified as *A. campbellianus* by Pinder & Brinkhurst (1997), from a number of streams on Macquarie Island while *Neodrillus crozetensis* and *N. kerguelensis* have been found amongst emergent plants in streams and in the run-off from bird colonies by the sea shore at a number of sub-Antarctic islands (table 1: Annelida: Phreodrilidae). Sludge worms (Tubificidae) can survive in heavily polluted conditions. Four species have been recorded in freshwater from the Antarctic region including endemic species on Macquarie Island and South Georgia (table 1: Annelida: Tubificidae).

Known as sewage worms or pot-worms, Enchytraeidae are often associated with dead and decaying material, many occupying the marine littoral zone below the high water mark. Only a few species have been found in freshwater including *Cognettia antipodum* from streams and algae above the high water mark on Macquarie Island (Benham 1922, Stephenson 1932) though it was not found by Marchant & Lillywhite (1994). The cosmopolitan white worm *Enchytraeus albidus* was found in freshwater, under stones and in shore collections on South Georgia (Stephenson 1932), but only in wet soil beside a stream on Kerguelen (Tétry 1947) and from rocks and crevices on Îles Crozet (Lee 1968). It is considered an introduced species on Macquarie Island where it has been found in the marine littoral and amongst the rotting timbers of a sealers hut (Benham 1905, Greenslade 2006).

Bona fide freshwater enchytraeids include *Cernosvitovia* sp. and *Mesenchytraeus* sp. from Macquarie Island (Marchant & Lillywhite 1994) plus a number of species of *Lumbricillus* (table 1: Annelida: Enchytraeidae).The latter includes *L. healyae* and *L.* sp. from freshwater streams on Livingstone Island (Rodriguez & Rico 2008), *L. incisus* from the nearby King George Island (Wang & Liang 1997), and an unidentified *Lumbricillus* sp. from a polluted pool on Marion Island (Dartnall & Smith 2012), possibly different from that found on Livingstone Island (Rodriguez & Rico 2008). *L. lineatus* has a wide ecological range and may occur in or near freshwater. It was regularly encountered by Marchant & Lillywhite (1994) during their survey of the streams on Macquarie Island but does not normally occur in freshwater (Greenslade 2006). Elsewhere it has been found amongst decomposing kelp on Macquarie Island (Lee 1968), Heard Island and Îles Kerguelen (Rota 2001) and from shore collections at Port Lockroy, Antarctic Peninsula, on the South Orkney Islands and on South Georgia (Stephenson 1932). *L. macquariensis* was found in freshwater streams on Macquarie Island (Benham 1905, 1915, 1922) but was not reported by Marchant & Lillywhite (1994). Elsewhere it has been found in damp soil at the edge of pools on Heard Island (Lee 1968) and from under stones at the edge of the beach on South Georgia (Stephenson 1932).

The kick-sampling techniques employed by Marchant & Lillywhite (1994) on Macquarie Island yielded six species of freshwater oligochaetes, considerably more than known from the other sub-Antarctic islands (table 1: Annelida). Employing this novel sampling method on other islands should yield many more freshwater oligochaetes with the cosmopolitan *Dendrodrilus rubidus*, *Nais elinguis,* and *L. lineatus* being likely candidates.

Finally an unidentified oligochaete worm has been reported from samples taken from in and around the periphery of the lakes and pools and swampy areas of the Schirmacher Oasis (Ingole & Parulekar 1987, 1993, Barman 2000). Ingole *et al.* (1987) found it in shallow water of Priyadarshini Lake. Not mentioned in subsequent reports (Mandal 2013, Gantait & Chandra 2017) the identity of this oligochaete and continuing presence wants verification.

Points of interest (Annelida)

Leeches and polychaete worms are not known from freshwater habitats in the Antarctic region.

Oligochaete worms from six families have been found in freshwater in the Antarctic region. Most are terrestrial or littoral species that favour damp conditions that may lead them occasionally to be found in freshwater.

Freshwater oligochaete worms have been found on the sub-Antarctic islands and at the northern end of the

Antarctic Peninsula but not from continental Antarctica (subject to the verification of the Schirmacher Oasis sighting).

The apparent abundance of tubifid worms on Macquarie Island is believed to be due to the kick-sampling techniques employed by Marchant & Lillywhite (1994) and when such techniques are employed on the other sub-Antarctic islands it is predicted that many more oligochaete worms will be found.

Key references

MqI: Michaelsen (1900), Benham (1905, 1915, 1922), Stephenson (1932), Jamieson (1968), Lee (1959, 1968), Evans (1970), Marchant & Lillywhite (1994), Pinder & Brinkhurst (1997), Erséus & Grimm (2002), Dartnall *et al.* (2005), Greenslade (2006). **HI**: Lee (1968), Dartnall (2003). **K**: Michaelsen (1902, 1905b, 1914), Černosvitov (1935), Tétry (1947), Lee (1968), Sims (1971), Duchêne (1989). **C**: Michaelsen (1905b, 1914), Tétry (1947). **PE**: Tétry (1947), Sims (1971), Kok (1977), Dartnall & Smith (2012). **SG**: Michaelsen (1888, 1905a, 1921), Stephenson (1932), Erséus & Grimm (2002). **SO**: Stephenson (1932), Block *et al.* (1984), Heywood (1987). **SS**: Brinkhurst & Marchese (1987), Wang & Liang (1997), Downie *et al.* (2000), Toro *et al.* (2007), Rodriguez & Rico (2008). **Sch**: Ingole & Parulekar (1987).

Phylum Tardigrada

Tardigrades are microscopic animals that use piercing mouthparts to extract the contents of plant and animal cells. Best known as inhabitants of lichens, liverworts and mosses (hence colloquial "moss piglets") they also occur in marine and freshwater habitats (hence also "water bears") amongst the benthic vegetation. Their ability to withstand adverse conditions such as dehydration and freezing makes them ideally suited to Antarctic conditions. The phylum comprises two major classes – Heterotardigrada and Eutardigrada (Anderson 2001). The Heterotardigrada are largely marine but include both armoured terrestrial and a few freshwater species characterised by a thick cuticle. Freshwater and terrestrial Eutardigrada have a thin cuticle. All 910 known terrestrial species inhabit a film of water surrounding soil samples or on the surface of plants, and while many of these are occasionally found in freshwater only 62 species from 13 genera are true freshwater inhabitants (Garey *et al*. 2008).

Tardigrades occur throughout the Antarctic region as documented by Richters (1908a, 1908b, 1908c, 1909), Jennings (1976a, 1976b), Dastych (1984), Miller & Heatwole (1995), Miller J. *et al.* (1988) and Miller W. *et al.* (1994). Terrestrial habitats are much easier to sample than benthic sediments at the bottom of lakes. A list of the species found in freshwaters of the Antarctic region is given in table 1: Tardigrada. Here the hydrophilic genera (*Acutuncus, Dactylobiotus*, *Diphascon* and *Isohypsibius*), are separated from lake margin interlopers (*Echiniscus*, *Macrobiotus* and *Milnesium*), those that favour wet habitats (*Echiniscus* and *Mopsechiniscus*) or damp conditions (*Hypsibius*). *Diphascon pingue, Hypsibius dujardini, Isohypsibius papillifer* and *Ramazzottius oberhaeuseri* are all probably species groups rather than the single species nominated (McInnes pers. comm.).

Points of interest (Tardigrada)

Tardigrades are present throughout the Antarctic region where they are an important component of the freshwater fauna.

They are poorly known, especially in freshwater, and require further taxonomic and ecological studies.

Key references

MqI: Dartnall *et al.* (2005). **HI**: Dartnall (1995a, 2003, 2006). **PE**: McInnes *et al.* (2001), Dartnall & Smith (2012). **SG**: Dartnall & Heywood (1980), McInnes & Pugh (1999), Dartnall (2005c). **SO**: McInnes & Ellis-Evans (1987), McInnes (1995). **SS**: Janiec (1993), Downie *et al.* (2000), Toro *et al.* (2007), Nędzarek & Pociecha (2010). **AP**: Heywood (1977b), McInnes (pers. comm.). **Sch**: Ingole & Parulekar (1987, 1990, 1993), Mitra (1999), Hazra & Mitra (2002), Sanyal (2004). **TH**: Sharov *et al.* (2015). **PCM**: McInnes (pers. comm.). **LH**: Dartnall (1995b). **VH**: Dartnall (2000). **WL**: Thomas (1965). **McM**: Murray (1910c), Dougherty & Harris (1963), Suren (1990), Webster-Brown *et al.* (2010).

Phylum Arthropoda

The phylum is divided into four subphyla – Myriapoda, Hexapoda, Crustacea and Chelicerata (Anderson 2001). The exclusively terrestrial Myriapoda (centipedes and millipedes) are not considered further in this review. Some of the largely terrestrial Hexapoda have aquatic larvae. The Crustacea (crabs, shrimps and their kin) include numerous freshwater species while the Chelicerata (scorpions, spiders, ticks and mites) are predominantly terrestrial.

Hexapoda: comprises three classes – Ellipura, Diplura and Insecta. Neither the Ellipura nor Diplura are aquatic. Springtails (Ellipura: Collembola) have been noted in a number of freshwater surveys at Heard Island (Dartnall 1995a, 2003, 2006), South Georgia (Dartnall 2005c), Macquarie Island (Dartnall *et al.* 2005) and Marion Island (Dartnall & Smith 2012), but in every instance they were simply using the water surface as a substrate and so have been excluded from this review.

None of the following insects (Insecta) that have aquatic larvae – mayflies (Ephemeroptera), dragonflies and damsel flies (Odonata), stone flies (Plecoptera), water striders (Hemiptera), dobson and alder flies (Megaloptera), scorpion flies (Mecoptera) or caddis flies (Trichoptera) – have been found anywhere in the Antarctic region. This leaves just the beetles (Coleoptera) and true flies (Diptera) to consider. Only one species of aquatic beetle is known from the Antarctic region, the diving beetle *Lancetes angusticollis* from South Georgia (table 1: Arthropoda: Coleoptera).

A number of Diptera – midges, kelp flies, beach flies, crane flies, fungal flies, moth flies, etc – have been recorded from the sub-Antarctic islands and the northern tip of the Antarctic Peninsula. Many of these have moisture-loving larvae that commonly occur at low altitudes in swampy areas, amongst decaying kelp and vegetation or in mud, often close to the shore, alongside streams, in wallows and brackish pools, and include a number of introduced species. As such they have occasionally been reported in freshwater though they are clearly brackish (littoral) or terrestrial interlopers.

Kelp flies occur around rotting beached kelp on the seashore. Marchant & Lillywhite (1994) recorded the larvae of both *Schoenophilus pedestris* and *Ephydrella macquariensis* in a number of the streams they sampled on Macquarie Island. They also found the crane fly *Erioptera pilipes* (= *Trimica pilipes*), but failed to secure larvae of the three species of moth flies – *Psychoda alternata* Say, 1824, *P. parthenogenetica* Tonnoir, 1940 and *P. surcoufi* Tonnior, 1922 – known from mud and wet earth on Macquarie Island (Greenslade 2006).

Midges (chironomid larvae) are restricted to moist environments (table 1: Arthropoda: Diptera), cannot survive even brief periods of desiccation (Ring *et al.*1990) and occur in damp moss and peat, freshwater and brackish pools. *Eretmoptera murphyi* Schaeffer, 1914 has terrestrial larvae that live in damp moss and peat while *Belgica antarctica* Jacobs, 1900, *Listriomastax litorea* Enderlein, 1909, *Telmatogeton amphibious* (Eaton, 1875) and *T. macquariensis* (Brundin, 1962) and other *Halirytus* spp. inhabit brackish water at low tide on rocks and in pools above the high tide mark and in amongst algal debris. The larvae of any of these species may occur in coastal freshwater streams and lake edges as accidental contaminants. To date only the larvae of two introduced species *Limnophyes pusillus* and *Parochlus steinenii* have been found in freshwater (table 1: Arthropoda: Insecta: Diptera). *Parochlus steinenii* is reported from South Georgia (Brundin 1970) and the South Shetland Islands (Edwards & Usher 1985, Toro *et al.* 2007) where it has survived since being introduced from the Falkland Islands. A sibling species *Parochlus crozetensis* has been described from Îles Crozet (Serra-Tosio 1986). *Limnophyes pusillus* was probably introduced from Europe to the sub-Antarctic where it has successfully colonised freshwater habitats on Marion Island (Crafford 1986) and wet areas on Îles Kerguelen (Delettre & Tréhen 1977) (table 1: Arthropoda: Insecta: Diptera), while an unidentified species of *Limnophyes* has been reported from South Georgia (Brundin 1970). Two species of chironomid midge *Smittia* sp. and *Telmatogeton macquariensis* (Brundin, 1962) are known from Macquarie Island (Greenslade 2006). While larvae of neither species have been reported from freshwater their ecdysed larval cases were recovered from "the soak" at the northern end of Macquarie Island during the rotifer survey (Dartnall *et al.* 2005), suggesting they are blown in. Various species of *Telmatogeton* are known from many of the Southern Ocean islands, indeed Delettre *et al.* (2003) collected the larvae and pupae of an unidentified *Telmatogeton* sp. from mid-littoral epilithic algae at Spit Bay and Atlas Cove on Heard Island. They have not been found in freshwater and are not included. Similarly the midge *Forcipemyia* (*sic*) sp. (= *Forcipomyia*)is not included in table 1; apparently a single specimen was extracted using a Tullgren funnel from a moss sample from the Schirmacher Oasis (Sanyal 2004), here deemed to be terrestrial.

Points of interest (Hexapoda)

Just one species of diving beetle is known from the sub-Antarctic island of South Georgia.

Insects with moisture-loving larvae have been reported from the sub-Antarctic Islands and northern tip of the Antarctic Peninsula but very few have been reported from freshwater.

No insects have been reported from freshwater on the Antarctic continent if the midge *Forcipomyia* sp. from the Schirmacher Oasis is terrestrial.

Key references

MqI: Alexander (1962), Marchant & Lillywhite (1994). **K**: Delettre & Tréhen (1977). **C**: Serra-Tosio (1986). **PE**: Crafford (1986). **SG**: Brundin (1970), Nicolai & Droste (1984), Arnold & Convey (1998), Dartnall (2005c). **SO**: Block *et al.* (1984). **SS**: Edwards & Usher (1985), Toro *et al.* (2007). **Sch**: Sanyal (2004).

Crustacea: These are, when present the most obvious, diverse and well-documented of the Antarctic freshwater invertebrates. All eight major orders are represented (table1: Arthropoda: Crustacea) but with only a few records of Amphipoda and Isopoda (table 1: Arthropoda: Crustacea: Amphipoda and Isopoda). While crustaceans occur in all types of lake, there is a marked species decline with increasing latitude. The freshwater species of continental Antarctica are of particular interest being diverse and fragmented (table 1: Arthropoda). In 1994 Bayly found *Gladioferens antarcticus* alongside *Diacyclops mirnyi* in White Smoke Lake, a freshwater lake in the Bunger Hills. This lake is tidal, connected to the sea, but freshwater from top to bottom and therefore cannot be classified as a typical epishelf lake. *G. antarcticus* is believed to occur in greatest abundance close to the bottom at 90 m. *D. mirnyi* was originally described from a freshwater lake in the Bunger Hills (Borutzky & Vinogradov 1957), confirmed by Borutsky (1962) and Brodsky & Zvereva (1976), and subsequently reported from the Vestfold Hills in the ultra freshwater Lake Krutvatnet (Crooked Lake) and Lebed' Lake, which has a salinity 6.5 times higher than sea water (Korokevich 1958, Borutsky 1962), though the latter record is due to contamination. Dartnall (2000) did not find it on two visits to Lebed' Lake but found it in eight large freshwater lakes and six smaller fresh/slightly brackish lakes in the Vestfold Hills. Dartnall (1995b) also reported it from a number of freshwater lakes in the Larsemann Hills. Dartnall & Hollwedel (2007) ascribed this species to the smaller *Diacyclops* they found in the Falkland Islands, but acknowledged the species is inadequately described and in need of revision. More recently Karanovic *et al.* (2013) examined cyclopoid copepods from three ice covered lakes on Continental Antarctica and erected three new species – *Diacyclops kaupi* from the epishelf Transkriptsii Gulf, Bunger Hills, *D. walkeri* from epishelf Pineapple Lake, Vestfold Hills, and *D. joycei* from proglacial Lake Joyce, McMurdo Sound Dry Valleys. With the loss of the *D. mirnyi* type specimens new material is required to elucidate the status of all these records.

Other crustaceans with interesting distributions include *Boeckella poppei* from South Georgia, the South Orkney Islands, South Shetland Islands and on the Antarctic Peninsula (Pugh *et al.* 2002). These records should be coupled with Bayly & Burton's 1993 report of dwarf specimens from Beaver Lake, Prince Charles Mountains along with the juvenile *Boeckella* sp. from Lake Hoare (Hansson *et al*. 2012) (table 1: Arthropoda: Crustacea: Calanoida) and the exceptionally variable specimens reported from the Falkland Islands (Dartnall & Hollwedel 2007). The unusual Continental Antarctic and sub-Antarctic distribution of *Daphniopsis studeri* also requires further investigation (table 1: Arthropoda: Crustacea: Cladocera).

The benthic dwelling harpacticoid copepods are primarily confined to the sub-Antarctic islands. The two ecdysed skins of a small harpacticoid, a member of the family Canthocamptidae, were recoverd from deep in Blue Lake on Ross Island (Murray 1910a) and are believed to have been blown in as they have not been recorded since. *Zaus contactus* is believed to be a mistaken identification according to Pugh *et al*. (2002) since it has not been reported from Macquarie Island for more than 100 years (Chilton 1909, Smith & Sayers 1971). Pugh *et al*. (2002) think that *Bryocamptus zschokkei* likely refers to *Antarctobiotus robustus*. *Tigriopus angulatus* occurs in brackish pools on coastal terraces while *Epactophanes richardi* and *Marionobiotus jeanneli* are common in freshwater streams and pools.

Ostracods are not known from the Antarctic continent, but have been reported from the South Orkney Islands and most sub-Antarctic islands. Their apparent absence from Heard Island is surprising; it is not yet clear whether this is a true observation or a sampling omission (table 1: Arthropoda: Ostracoda).

There are records of only three amphipods from the region (table 1: Arthropoda: Crustacea: Amphipoda). Both the unidentified amphipod on South Georgia (Weller 1975) and *Kergueleniola macra*, known only as a single specimen from the gut of the introduced brook trout (*Salvelinus fontinalis*), on Îles Kerguelen (Ruffo 1970) need confirmation (Pugh *et al.* 2002). Recently, De Smet (2015) described a new species, *Pseudingolfiella possessionis*, from streams on the Crozet Archipelago (table 1: Arthropoda: Crustacea: Amphipoda).

The unidentified *Iais* species found at Macquarie Island (Evans 1970) belongs to a large family of predominantly marine isopods (Wilson & Wägele 1994). The genus is usually ecto-commensal on marine isopods, though free-living freshwater species have been found on Amsterdam (Chappuis 1958) and Gough (Holdgate 1961) islands suggesting the genus may have (repeatedly) invaded freshwater on Macquarie and other remote islands. Evans' (1970) Macquarie Island specimens were only found in freshwater streams, the habitat subsequently confirmed by Marchant & Lillywhite (1994). Wilson & Wägele (1994) suggested the specimens occurring interstitially at sea level in brackish pools and in freshwater streams on Macquarie Island actually comprise three unidentified species.

The distributions of the various freshwater crustaceans shown in table 1: Arthropoda: Crustacea are largely uncontentious. *Pleuroxus truncatus* was recorded by Pesta (1928) from freshwater lakes on South Georgia but has not been reported since, suggesting it is a possible misidentification or an ephemeral introduction (Pugh *et al.* 2002).

Points of interest (Arthropoda: Crustacea)

Both the anostracan *Branchinecta gaini* and the anomopodan *Macrothrix oviformis* are restricted to the islands of the Scotia arc.

Ovalona weinecki is known from the South Orkney, South Shetland and sub-Antarctic islands.

Daphniopsis studeri has a very unusual and wisespread distribution. It has been found on the sub-Antarctic islands of Heard, Kerguelen, Crozet and Marion, and on the Antarctic continent immediately to the south of these islands at the Colbeck Archipelago, and in the Larsemann and Vestfold Hills.

Various ostracods are restricted to the South Orkney and sub-Antarctic islands.

The distribution and taxonomy of the calanoid copepod *Boeckella* spp., and of the cyclopoid copepod *Diacyclops* spp. warrant further study.

Freshwater harpacticoid copepods are restricted to the sub-Antarctic islands.

Amphipods and isopods are poorly known and represented in the Antarctic region.

Key references

MqI: Evans (1970), Tyler (1978), Dartnall (1993), Marchant & Lillywhite (1994), Dartnall *et al.* (2005). **HI**: Bayly (1992), Dartnall (1995a). **K**: Brady (1875, 1879), Eaton (1876), Studer (1878), Brehm (1954), Dreux (1970), Ruffo (1970), Gay (1981, 1982). **C**: Dreux (1970), De Smet (2015). **PE**: Kiefer (1944), Kok & Grobbelaar (1978), Dartnall & Smith (2012). **SG**: Mrázek (1892), Poppe & Mrázek (1894), Ekman (1905), Pesta (1928), Harding (1941), Heywood (1970a), Weller (1975), Weller (1977), Dartnall & Heywood (1980), Hessen *et al.* (1989), Dartnall (2005c). **SO**: Harding (1941), Heywood (1967, 1970a, 1970b, 1977a), Weller (1977), Clarke *et al.* (1989), Ellis-Evans & Walton (1990). **SS**: Campos *et al.* (1978), Jurasz *et al.* (1983), Janiec (1993), Paggi (1983, 1987, 1996), Toro *et al.* (2007), Pociecha (2007), Nędzarek & Pociecha (2010). **AP**: Bryant (1945), Schmitt (1945), Heywood (1977b), Dartnall (1980). **TH**: Sharov *et al.* (2015). **PCM**: Bayly & Burton (1993). **LH**: Dartnall (1995b). **VH**: Borutzky (1962), Dartnall (2000), Karanovic *et al.* (2013). **BH**: Borutzky & Vinogradov (1957), Bayly (1994), Bayly *et al.* (2003), Karanovic *et al.* (2013). **McM**: Murray (1910a), Hansson *et al.* (2012), Karanovic *et al.* (2013). **General References**: Lofthouse (1967), Smith & Sayers (1971), Frey (1987, 1988, 1993), Kotov (2007).

Chelicerata: Few of the *circa* 400 free-living and largely terrestrial and marine mites reported from the Antarctic region (Pugh 1993) have been recorded from freshwater. Pugh & Dartnall (1994) concluded that most mites collected from streams, lakes and brackish pools of the region were either terrestrial species blown in by the wind or interlopers from the littoral environment that had invaded coastal brackish pools. This tenet has been endorsed by subsequent studies on the sub-Antarctic islands Macquarie (Dartnall *et al.* 2005), Heard (Dartnall 2006), Prince Edward (Dartnall & Smith 2012) and South Georgia (Dartnall 2005c). There are no bona fide records of freshwater mites on the Antarctic continent (table 1: Arthrodopa: Arachnida: Acarida).

Those species noted from freshwater but usually associated with the marine littoral zone include the genera *Gamasellus* (Rhodacaridae: Mesostigmata), *Alaskozetes*, *Antarcticola* and *Halozetes* (Podocaridae: Cryptostigmata), *Hyadesia* and *Neohyadesia* (Hyadesiidae: Astigmata) (Hughes & Goodman 1969, Lee 1970, Fain 1975, Schenker 1986, Luxton 1990, Pugh 1993). Note that *Antarcticola georgiae* Wallwork, 1970 (Cryptostigmata) and *Hyadesia halophila* Fain, 1975 (Astigmata), both of which were collected on South Georgia (Dartnall 2005c) have not been included in this survey as they were only found in brackish pools outside the freshwater limits of this analysis.

The remaining mites – *Bryobia practiosa*, a *Tetranynchus* sp. (Prostigmata); *Globoppia intermedia longiseta*, *Halozetes belgica*, *Magellozetes antarcticus*, *Platynothrus skottsbergii*, *Trimalaconothrus flagelliformis*, and an unknown larva, all Cryptostigmata listed in the Pugh & Dartnall 1994 survey, together with two oribatid mites, *Edwardzetas elongatus* and *Trimaloconothrus flagelliformis*, subsequently recorded by Pugh (1996) – are terrestrial species that were accidentally washed or blown into freshwater. Of these *Bryobia pratiosa* and *Tetranychus* sp. (Tetranychidae: Prostigmata) together with the two unidentified Acaridae (Astigmata) are probably non-indigenous aliens (Pugh 1993, 1994). *Algophagus antarcticus* (Hyadesiidae: Astigmata) from Heard Island (Pugh & Dartnall 1994) is probably a bona fide aquatic mite having been recorded from numerous brackish and freshwater pools close to the shore (Hughes 1955, Pugh & Dartnall 1994), but this species has also been recorded from amongst vegetation and humus (Fain 1975), which makes its exact status uncertain. The unknown species of *Glycyphagus*, recorded from Heard Island (Dartnall 2006) is now believed to be an accidental contaminant and has been eliminated from this survey.

The 16+ species of mite reported from the Schirmacher Oasis (Barman 2000, Sanyal 2004, Gantait & Chandra 2017) are similarly either terrestrial species blown in by the wind or interlopers from the littoral environment. These samples were obtained with a small hand-held scoop from floating algae, submerged mosses and soil samples collected in and around the peripheries of the lakes (table 1: Arthropoda: Arachnida) – a mixture of terrestrial and very shallow water habitats. These mites, none of which appears to be true freshwater inhabitants include a puzzling mix of mites that are elsewhere found as pests of stored food, inhabitants of bird's nests and on rocks and lichens.

The three specimens of the spider (*Myro kerguelensis* Pickard-Cambridge, 1876) found in the preserved samples from Scholes Lagoon on Heard Island are terrestrial interlopers that have undoubtedly been washed or blown into that lake (Dartnall 2006) as is the single specimen of *Prinerigone vagans* Andouin,1826 from Marion Island (Dartnall & Smith 2012). Whereas some terrestrial mites can withstand prolonged immersion in freshwater the life expectancy of these submerged spiders was short and consequently they have not been included in this survey.

Points of interest (Chelicerata)

Mites found in freshwater habitats on the sub-Antarctic islands and on the Antarctic Peninsula are predominantly littoral species that have invaded the near-shore brackish pools, or terrestrial species that have been washed or blown into the lakes and pools.

There are no records of aquatic spiders from the Antarctic region.

Key references

MqI: Pugh & Dartnall (1994), Dartnall *et al.* (2005). **HI**: Pugh & Dartnall (1994), Dartnall (2006). **PE**: van Pletzen & Kok (1971), Marshall *et al.* (1999), Bartsch (1999), Marshall *et al.* (2003), Dartnall & Smith (2012). **SG**: Pugh & Dartnall (1994), Dartnall (2005c). **SO**: Goodman (1969), Dartnall (1992), Pugh & Dartnall (1994). **SS**: Trägårdh (1907). **AP**: Ewing (1945). **Sch**: Ingole & Parulekar (1987, 1990, 1993), Barman (2000), Sanyal (2004), Gantait & Chandra (2017). **General reference**: Pugh (1993).

Phylum Ectoprocta

No freshwater ectoprocts have been reported for the Antarctic region.

Phylum Vertebrata

Most of the vertebrates found in the Antarctic region are marine and fall outside the scope of this study. There are no native Antarctic freshwater fishes, though a number of salmonid fishes have been introduced into sub-Antarctic lakes and a couple of inshore benthic fishes are reported from epishelf lakes. The reports of fish scales from the benthic sediments of freshwater lakes in the Vestfold Hills (Dartnall 2000) are by-product of seabird (skua and/or gull) regurgitations and/or droppings. There are two recorded incidents of fishes being caught in epishelf lakes. Heywood & Light (1975) caught four specimens of the emerald rockcod (*Trematomus bernacchii* Boulenger, 1902) in a fish trap lowered down to 70 m into 117 m-deep Ablation Lake, Alexander Island. Here seawater (salinity of 32‰) occurs below 66.5 m; the top 53 m are fresh (0.1–1‰) with a steep halocline between 66 m and 66.25 m where the salinity increases from 18–31.5‰. These fish were presumed to have been caught on the bottom, below this depth, rather than while the fish trap was being lowered or raised as they exhibited signs of acute distress on being hauled up to the surface (Heywood 1977b). The fact that their stomachs were full of recently ingested marine fish and invertebrates (Heywood 1977b) confirms their seawater habitat and would appear to deny any adaption to freshwater. Cromer *et al.* (2005) caught a single specimen of the Crowned Rockcod (*Trematomus scotti* (Boulenger, 1907)) from Beaver Lake more than 100 km from the open sea. The fish was from the brackish-water zone of this epishelf lake and while it did not appear to have suffered any ill-effects from being hauled up to the surface it is a common inshore marine fish, and, like the Emerald Rockcod, it is deemed to fall outside the scope of this survey.

A number of attempts were made to introduce salmon and trout into the lakes and streams of several sub-Antarctic islands with various degrees of success during the second half of the twentieth century (table 1: Chordata: Osteichthyes: Salmonidae). Brown Trout (*Salmo trutta*) and Brook Trout (*Salvelinus fontinalis*) were introduced at Îles Crozet and Marion Island (Prince Edward Islands). The Brown Trout survived on Marion Island for at least 20 years but the impoverished nature of the local habitat led to dwarfing of the resident population and those fish that successfully migrated to sea were unable to re-enter their home stream up a waterfall and eventually died out (Cooper *et al.* 1992). The Brook Trout on Marion Island have died out as the small lake they were released into has now become completely overgrown. Both species introduced to Crozet (table 1: Chordata: Osteichthyes: Salmonidae) are believed to be thriving (Frenot, pers. comm.). The experiment at South Georgia was "preliminary" with only ten Rainbow Trout (*Oncorhynchus mykiss*) introduced into Gull Lake in 1964 (Headland 1984). None has been seen since and the species is believed to have died out there.

A concerted and long-term program of fish introductions (1958–1990) was carried out at Îles Kerguelen in an attempt to establish a fishing industry. In some cases these introductions have proved viable though uneconomic. Of the eight alien species that have been introduced, the Lake Trout (*Salvelinus namaycrush*), Rainbow Trout (*Oncorhynchus mykiss*) and Chinook Salmon (*Oncorhynchus tshawytscha*) are now extirpated, and the Atlantic Salmon (*Salmo salar*) is becoming rare and will probably die out in the near future (table 1 Chordata: Osteichthyes). The Brown Trout (*Salmo trutta*), Brook Trout (*Salvelinus fontinalis*) and Coho Salmon (*Oncorhynchus kisutch*) are all breeding well while the Arctic Char (*Salvelinus alpinus)* is proving to be a very invasive alien (Davaine *et al.*1997, Frenot *et al.* 2005, Frenot pers. comm.) (table 1: Chordata: Osteichthyes).

No amphibians or reptiles have been found in the Antarctic region.

There are just five species of water fowl that are legitimate freshwater inhabitants of the sub-Antarctic islands (table 1: Chordata: Aves). Most of the birds found in the Antarctic region are marine and therefore not considered part of this survey. However, they all come ashore to breed and effluent run off from penguin breeding colonies into nearby lakes and pools has a marked effect on the water chemistry, dramatically affecting the flora and fauna.

Similarly, there are no freshwater mammals anywhere in the Antarctic region though when present elephant seals and fur seals can not only affect the topography of pools and wallows sites but radically alter the water chemistry of nearby water bodies with their effluent.

Points of interest (Vertebrata)
The only vertebrates occurring in freshwater in the Antarctic region are eight species of salmonid fishes that have been introduced into the sub-Antarctic islands, plus a few native and introduced waterfowl on the sub-Antarctic islands.

There are no native freshwater fish, amphibians, reptiles or mammals known from the Antarctic.

Seal wallows and the run-off from penguin breeding colonies can dramatically alter adjacent lakes and pool water chemistry and affect the flora and fauna.

Key references (fishes)
K: Lesel *et al.* (1971, 1972), Davaine & Beall (1982), Davaine *et al.* (1997), Duchêne (1989), Frenot *et al.* (2005). **C**: Watkins & Cooper (1986). **PE**: Cooper *et al.* (1992), Dartnall & Smith (2012). **SG**: Headland (1984).
Key references (aquatic birds): **MqI**: Frenot *et al.* (2005).
General references: Watson (1975).

DISCUSSION

This paper collates published information on the Antarctic freshwater fauna. Not everyone will agree with the definitions and limitations I have imposed in the introduction and indeed many elements of the fauna sit astride more than one category. Ideally one would like to compare like with like, using similar sampling equipment in a similar way at each location but the range of different water body types – streams, pools, lakes, epishelf lakes, etc – makes this impossible even before one considers confounding geographic and climatic differences. Even when one has seemingly similar locations varying sampling techniques can influence the results and live samples are invariably more productive in terms of numbers of species found than preserved samples.

Limnological studies in the Schirmacher Oasis have taken a different approach from those at other Antarctic sites. Here, concentration has been on hand corer and scoop samples of soil and moss turfs in and around the periphery of lakes, in marked contrast to net, deepwater and benthic samples widely used in studies elsewhere. Ingole & Parulekar (1987, 1990, 1993) sampled a number of lakes in the Schirmacher Oases and recorded protozoan species, two species of turbellarian, one species of rotifer, two species of nematode, two of tardigrade, an oligochaete and a springtail. They also reported that the maximum faunal density occurred in moss turf samples (Ingole & Parulekar 1987). Subsequent studies in the Schirmacher Oasis have focused on these moss turves enabling Gantait & Chandra (2017) to compile a faunal list of 17 species of protozoa, one species of rotifer, two species of tardigrade, 16 species of nematode, 16 species of mite, five of springtail and a midge for the area. From the descriptions of how these samples were collected and processed it is possible to conclude that many were taken alongside the lakes rather than from the water. Even after excluding the obviously terrestrial records the faunistic record of the area remains terrestrial in nature with little in common with the other oases.

From the information assembled it is clear that there are still gaps in our knowledge. Most freshwater samples have been collected from rock-bound lakes and pools close to expedition bases. These freshwater habitats are typically oligotrophic though some are enriched with the run-off from nearby penguin rookeries and/or seal wallows. The fauna is predominately benthic in habitat and generally becomes more depauperate with increasing latitude (Dartnall & Heywood 1980). Planktonic species are rare and in some instances are suspected of being contaminants (Fontaneto *et al.* 2015). Only one case of parasitism has so far been identified.

The Antarctic continent's ice-covered centre, the continent's coastal fringe, the Antarctic Peninsula and sub-Antarctic islands that constitute the Antarctic region have a diverse range of water bodies to engage the limnologist. The presentation of the results as a continuum of slowly increasing latitude (table1) rather than as a set of segments divided by longitude segments keeps the various regions – sub-Antarctic, maritime Antarctic and continental Antarctic – together. From the table it is clear that, for example, the freshwater fauna of Macquarie Island has far more in common with that of South Georgia at comparable latitude than with that of McMurdo Sound, at comparable longitude and considerably closer (fig. 1).

Sub-Antarctic islands

On the sub-Antarctic islands lakes, rivers and pools are small and shallow and support similar floras and faunas. Terrestrial vegetation encroaches most of these water bodies so that it is sometimes difficult to identify the water/ dry land boundary resulting in some terrestrial species being found in the "wrong" environment. During the winter a thin film of ice may form on the surface of some of these water bodies but not even the shallowest freeze solid. None of these sub-Antarctic water bodies are brackish or saline with the exception of those in close proximity to the sea that are periodically inundated.

Volcanically-heated ground is known to exist, for example on Îles Kerguelen, but no heated water bodies from there have been sampled thus far.

Antarctic Peninsula

On the Antarctic Peninsula lakes, rivers and pools are again generally small and shallow. The water is generally oligotrophic though nearby seal wallows and/or the run off from penguin rookeries may turn some eutrophic. Lake edges are usually clearly defined with limited surrounding terrestrial vegetation and consequently limited contamination by terrestrial interlopers. During the winter the shallowest water bodies freeze solid and remain frozen for the winter months. These pools have a distinct summer fauna (tardigrades, nematodes and rotifers notably *Philodina gregaria*, *Adineta grandis*, *Epiphanes senta* but no crustaceans). The surface waters of larger water bodies freeze to a depth of approximately two metres and remain frozen for 8–10 months of the year.

Volcanically heated ground is known to exist, for example at Deception Island, and unidentified nematodes are particularly abundant in Kroner Lake (Downie *et al.* 2000) but no further details are available. As this lake is directly linked to the sea via a breached dam, it is classified as brackish and outside the scope of this paper. The faunas of the freshwater portions of epishelf lakes have remarkably few species. Even so epishelf lakes are considered by many to act as refugia – reservoirs of species for recolonisation following glacial maxima (De Smet & Gibson 2008).

Antarctic coastal fringe

On the Antarctic coastal fringe areas known as oases have brackish, saline and supersaline bodies of water that fall outside the scope of this review, as well as numerous freshwater lakes, rivers and pools dotted around the coast (fig. 1). Here the freshwater lakes may be considerably larger than those on the sub-Antarctic islands and on the Antarctic Peninsula. Again they are oligotrophic, with clearly defined lake edges, very limited surrounding terrestrial vegetation (the occasional moss bank), so that there is very little contamination by terrestrial invertebrate species.

During the winter the shallowest water bodies freeze solid and these pools have a distinct and limited summer fauna; rotifers, nematodes and tardigrades are present but no crustaceans. Small, shallow lakes that do not quite freeze solid become anoxic and are principally populated by nematodes during the summer open water period. The surface waters of the large southerly lakes may remain permanently ice-covered. These lakes have only recently been sampled and in several instances have yielded unexpected results. The planktonic rotifers reported from the Dry Valleys (Hansson *et al.* 2012) are presumably feeding on the diatom bloom found on the under surface of the ice of Lake Hoare.

Volcanically-heated ground is known to exist high up on Mt Erebus and Mt Terror on Ross Island and also on Mt Melbourne and Mt Rittman in Northern Victoria Land, but water bodies in these areas are currently unknown.

Epishelf lakes around the Antarctic continent are coastal and, like those on the Antarctic Peninsula, are depauperate. Cryoconite holes and proglacial lakes occur on and adjacent to glaciers. These water bodies are invariably ultra-oligotrophic and seemingly devoid of metazoans though they have been little sampled. Recently, however, Porazinska *et al.* (2004) reported two species of rotifer from cryoconite holes in glaciers in Victoria Land – *Philodina gregaria* which is normally found in eutrophic pools and *Cephalodella catellina* normally found in freshwater/ brackish pools.

Continental Antarctica

Finally, the Continental Antarctic ice cap covers at least 379 (often very large) subglacial lakes sitting on underlying bedrock, under thousands of metres of ice (Laybourn-Parry & Wadham 2014). Lake Vostok, the largest of these, is ca. 250 km long, 50 km wide and under 4 km of ice. Media reports of bacteria in this lake, when it was sampled in 2013, have yet to be confirmed and may turn out to be contaminants rather than endemics. Supraglacial lakes formed from meltwater on the surface of the ice cap are unlikely to have much of a flora and fauna.

Various hypotheses have been put forward to explain the distributions of invertebrates in the Antarctic region, including colonisation via land bridges, continental drift, airborne, animal-mediated, and anthropogenic introductions, and relict (cryoconite/epishelf lake) faunas, but no single explanation fits all. Colonisation should be seen as an ongoing process by a continual stream of potentially invasive plants and animals. Most are transient and fail to establish breeding populations. The sub-Antarctic islands surrounded by vast inhospitable seas represent a very small target for any potential freshwater invader and whilst the Antarctic continent represents a much bigger target, suitable freshwater habitats are more remote, rare and tiny. The wealth of species present in the Antarctic region as a whole is a tribute to the tenacity of nature. Global climate change offers already established species the opportunity of extending their range and increases the likelihood of new species gaining a foothold. Recently a number of non-native or alien species – midges and mosquitos – have been reported. Chironomids are thought to have been introduced to the Scotia arc islands during the 1960s (see Hexapoda above). Black fungus midges, mushroom gnats and mosquitos have been noted at several Antarctic research stations (Hughes *et al.* 2005, Peter *et al.* 2013), but have not been included in this survey as they are confined within sewage treatment plants and other station buildings (Hughes *et al.* 2015). They are either not believed to constitute an invasive threat (Peter *et al.* 2013), or have already been eradicated (Convey *et al.* 2006).

As early scientists were armed with European keys (usually the only ones available) it is not surprising that many northern hemisphere species have been recorded from the Antarctic region thereby reinforcing the then long-held belief in the ubiquitous nature of the fauna. While some species are truly cosmopolitan, notably amongst the pliomate rotifers, modern improvements and modifications in taxonomy mean that some earlier identifications are now being challenged and old mistakes corrected.

Boeckella poppei (Calanoida: Arthropoda), for example, was erroneously identified as *Pseudoboeckella silvestrii* by Harding in 1941, a noted copepod expert of his time, and was not corrected until 1977 (Heywood 1977a). In 1957 Borutzky & Vinogradov described a new species *Acanthocyclops mirnyi* (now known as *Diacyclops mirnyi*) from a number of freshwater lakes in the Bunger Hills. Borutzky (1962) subsequently recorded this species from the Vestfold Hills. When I came to study the freshwater invertebrates of the Vestfold Hills I had no reason to query this identification, indeed I extended its then known range to include the Larsemann Hills (Dartnall 1995b). Dartnall & Hollwedel (2007) recorded both *Diacyclops mirnyi* and *D. michaelseni* from the Falkland Islands while calling for a review of this genus. More recently Karanovic *et al.* (2013) described three new species – *D. kaupi* from Transkriptsii Gulf, an epishelf lake in the Bunger Hills close to where *D. mirnyi* was first recorded; *D. walkeri* from Pineapple Lake, an epishelf lake in the Vestfold Hills; and *D. joycei* from Lake Joyce, a permanently ice-covered lake in the McMurdo Sound region (table 1: Arthropoda: Crustacea: Cyclopoida). It is clear that a review of this genus is urgently needed.

The late David Frey considered all Antarctic identifications of *Macrothrix hirsuticornis* (Anomopoda: Arthropoda) as dubious as this is a northern hemisphere species (Frey 1987). Smirnov (1992) called for a review of this taxon, which had been reported from all sub-Antarctic islands, together with the South Orkney and South Shetland Islands and the northern Antarctic Peninsula (table 1: Arthropoda: Cladocera). Kotov's (2007) taxonomic review demonstrated that the southern hemisphere "*hirsuticornis*-like" complex actually equated to five related species – *M. flagellata* from Tasmania and Macquarie Island, *M. boergeni* from the Kerguelen Archipelago, *M. ruehei* from Îles Crozet, New Amsterdam and Prince Edward Islands, *M. sarsi* from the Cape region of South Africa and *M. oviformis* from southern South America, Falklands, South Georgia, South Orkney and South Shetland islands and the Antarctic Peninsula (table 1: Arthropoda: Cladocera) – leaving just the identity of the Heard Island *Macrothrix* to be determined. The inter-relationships of these five species is clearly a target for future study via molecular taxonomy. This technology should also be applied to *Boeckella poppei*, *Daphniopsis studeri*, *Branchinecta gaini*, *Ovalona weinecki*, *Acutuncus antarcticus*, *Adineta grandis*, *Philodina antarctica*, *P. gregaria, P. alata, Habrotrocha antarctica* and the *Notholca* cohort because of its "anomalous" distribution data.

Clearly modern developments in imaging, molecular taxonomy and computer analysis will reshape future re-appraisals of Antarctic limnology. Exciting as these new approaches will undoubtedly be, their very foundation lies in the work of the many scientists who have experienced and reported on all aspects of Antarctic limnology over the last 140 years.

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TABLE 1 — Distribution of the freshwater fauna of the south polar region. + the presence of a particular species at a given location; × an interloping terrestrial or brackish water species that has strayed into freshwater and continues alive in the “wrong” environment; ‡ a record that warrants verification, based on an unexpected observation and/or very few specimens; ? a questionable or dubious record; ( ) an anthropogenic/ introduced species; † a species that is no longer present or extinct at a location; numeral the number of recognised but not identified taxa, e.g., “the collector noted three unidentified species of nematode”; the total number of identified species found at each location is given for some groups in the table though this may not represent a true “total” if there are multiple entries of unidentified or partially identified records. A blank entry indicates an absence of data. A zero (‘0’) indicates definitive or suspected absence of that group.

Phylum - (sub-Phylum)	**Order or Family**	**Species**	**MqI**	**HI**	**K**	**C**	**PE**	**SG**	**SO**	**SS**	**AP**	**Sch**	**TH**	**PCM**	**LH**	**VH**	**Has**	**OH**	**BH**	**WL**	**McM**
CNIDARIA	HYDRIDAE	*Hydra viridissima* Pallas, 1766						‡													
PLATYHELMINTHES	LECITHOEPITHELIATA	*Prorhynchus insularis* Beauchamp, 1940				+															
	NEORHABDOCOELA	*Neophora* sp.										+									
	RHABDOCOELA	*Kalyptorhynchia* sp.										+									
	SERIATA	*Arthurdendyus vegrandis* Winsor & Stephens, 2005	x																		
		Curtisia seclusa (Beauchamp, 1940)				+															
		Duplominona amnica (Ball & Hay, 1977)	+																		
		Kontikia andersoni Jones, 1981	x																		
		unidentified species	1	1			5	4	2					1	1	1					1
		Number of species (Platyhelminthes)	4	1		2	5	4	2			2		1	1	1					1
ROTIFERA -	EPIPHANIDAE	*Epiphanes* cf. *daphnicola*	+																		
MONONOGONTA		*Epiphanes senta* (O F Müller, 1773)	+	+			+	+	+	+			+		+	+	+		+	+	+
		Rhinoglena frontalis Ehrenberg, 1853	+	+	+																
		Rhinoglena kutikovae de Smet & Gibson, 2008																	+		
	BRACHIONIDAE	*Brachionus angularis* Gosse, 1851																			+
		Brachionus bidentatus Anderson,1889								+											
		Brachionus bidentatus inermis Rousselet, 1906									+										
		Brachionus calyciflorus Pallas, 1766																		+	
		Brachionus havanaensis Rousselet, 1911								+											
		Brachionus quadridentatus Hermanns, 1783										+								+	
		Brachionus urceolaris O F Müller, 1773								+											+
		Kellicottia longispina (Kellicott, 1879)																			+
		Keratella americana Carlin, 1943								+											
		Keratella cochlearis (Gosse, 1851)								+			+			‡					+
		Keratella kostei de Paggi,1981						+													
		Keratella quadrata (O F Müller, 1786)											+								+

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
		Keratella sancta Russell, 1944	+		+																
ROTIFERA -	BRACHIONIDAE - cont	*Keratella* sp.								+											
MONONOGONTA		*Notholca foliacea* (Ehrenberg, 1838)																			+
		Notholca caudata Carlin, 1943						+													
		Notholca hollowdayi Dartnall, 1995		+	+																
		Notholca labis Gosse, 1887			+		+	+													
		Notholca salina Foche, 1961						+	+	+											
		Notholca squamula (O F Müller, 1786)	+		+								+								
		Notholca verae Kutikova, 1958														+			+		
		Notholca walterkostei de Paggi, 1982						+	+	+	+										
		N. walterkostei reducta Dartnall & Hollowday, 1985							+												
		Notholca sp.		+	+										+	+			+	+	
	EUCHLANIDAE	*Euchlanis dilatata* Ehrenberg, 1832					+														
		Euchlanis oropha Gosse, 1887						+	+			+									
		Euchlanis sp.		+																	
	MYTILINIDAE	*Lophocharis oxysternon* (Gosse, 1851)			+																
		Mytilina mucronata longicauda Dartnall & Hollowday, 1985						+													
	TRICHOTRIDAE	*Trichotria tetractis* (Ehrenberg, 1830)					+														
	COLURELLIDAE	*Colurella adriatica* Ehrenberg, 1831			+																
		Colurella colurus (Ehrenberg, 1830)			x	x				+											
		Colurella colurus compressa (Lucks, 1912)	+	+			+	+	+		+										
		Colurella geophyla Donner, 1951						+													
		Colurella obtusa (Gosse, 1886)						+													
		Colurella sp.						+													
		Lepadella acuminata (Ehrenberg, 1834)	+		+			+							+						
		Lepadella elliptica Wulfert, 1939																			+
		Lepadella intermedia Dartnall & Hollowday, 1985						+	+												
		Lepadella minuta Weber & Montet, 1918	+										+								
		Lepadella ovalis (O F Müller, 1786)						+													
		Lepadella patella (O F Müller, 1786)	+	+	+		+	+		+			+		+	+		+	+	+	

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
ROTIFERA -continued	BRACHIONIDAE - cont	*Lepadella patella oblonga* (Ehrenberg, 1834)			+			+	+												
		L. rhomboides signiensis Dartnall & Hollowday, 1985							+												
		Lepadella triptera (Ehrenberg, 1832)	+	+	+		+	+	+												+
		Lepadella sp.				+										+					+
	LECANIDAE	*Lecane closterocerca* (Schmarda, 1859)			+			+													x
		Lecane flexilis (Gosse, 1886)	+		+		+	+													
		Lecane hamata (Stokes, 1896)			+																
		Lecane latissima Yamamota, 1955						+													
		Lecane lunaris (Ehrenberg, 1832)						+	+	+											
		Lecane tenuiseta Harring, 1914			+																
		Lecane mawsoni Russell, 1959			+																
		Lecane sp.				+		+													
	PROALIDAE	*Bryceella stylata* (Milne,1886)						+													
		Proales fallaciosa Wulfert, 1937			+			+													
		Proales minima (Montet, 1915)			+																
		Proales reinhardti (Ehrenberg, 1834)			x											+			+		
		Proales sp.				+		+													
		Wulfertia sp.							‡												
	LINDIIDAE	*Lindia torulosa* Dujardin, 1841	+	+		x	+	+			+					+					
	NOTOMMATIDAE	*Cephalodella auriculata* (O F Müller, 1773)						+													
		Cephalodella catellina (O F Müller, 1786)	+		+			+	+	+											+
		Cephalodella delicata Wulfert, 1937	+		+			+	+												
		Cephalodella eva (Gosse, 1887)					+														
		Cephalodella evabroedae De Smet, 1988	+																		
		Cephalodella forficata (Ehrenberg, 1832)						+	+	+											
		Cephalodella forficula (Ehrenberg, 1830)	+		+							+									
		Cephalodella gibba (Ehrenberg, 1830)	+	+	+		+	+	+	+											
		Cephalodella megalocephala (Glasscott, 1893)	+					+	+												
		Cephalodella stenroosi Wulfert, 1937			+																
		Cephalodella sterae (Gosse, 1887)		+											+			+			

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
ROTIFERA - continued	NOTOMMATIDAE - cont.	*Cephalodella ventripes* (Dixon-Nuttall, 1901)		+											+						
		Cephalodella ventripes angustior Donner, 1950			+																
		Cephalodella sp.	+			+	+	2		+						2					+
		Eosphora najas Ehrenberg, 1830						+	+												
		Monommata sp,	+					+													
		Notommata cyrtopus Gosse, 1886			+																
		Notommata glyphura Wulfert, 1935	+	+	+			+													
		Pourriota carcharodonta De Smet, 2003			+																
		Resticula gelida (Harring & Myres, 1922)		+			+	+	+	+	+				+	+					
		Resticula nyssa Harring & Myres, 1924	+					+		+											
		Scaridium longicaudum (O F Müller, 1786)			+		+		+												
	TRICHOCERCIDAE	*Trichocerca bidens* (Lucks, 1912)	+		+																
		Trichocerca brachyura (Gosse, 1851)	+	+			+	+	+												
		Trichocerca obtusidens (Olofsson, 1918)			+																
		Trichocerca rattus (O F Müller, 1776)	+		+																
		Trichocerca rattus globosa Dartnall & Hollowday, 1985						+	+												
		Trichocerca tigris (O F Müller, 1786)	+					+													
	ASPLANCHNIDAE	*Polyarthra* sp.	+																		
	DICRANOPHORIDAE	*Dicranophorus forcipatus* (O F Müller, 1786)			+																
		Dicranophorus luetkeni (Bergendal, 1892)						+													
		Dicranophorus sp.		+			+														
		Encentrum forcipatum Dartnall, 1997														+					
		Encentrum gulo Wulfert, 1936					+														
		Encentrum heardensis Dartnall, 1995		+																	
		Encentrum limicola Otto, 1936			x																
		Encentrum lutra Wulfert, 1936					+						+								
		Encentrum martes Wulfert, 1939										+									
		Encentrum mustela (Milne, 1885)		+	+			+	+	+					+	+					
		Encentrum permolle (Gosse, 1886)			+																

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
ROTIFERA - continued	DICRANOPHORIDAE - cont.	*Encentrum permolle gigantheum* (Dartnall & Hollowday, 1985)	+						+												+
		Encentrum salinum Dartnall, 1997	+					+						+		+					
		Encentrum spatiatum Wulfert, 1936						+							+	+					
		Encentrum uncinatum (Milne, 1886)		+	+				+	+											
		Encentrum sp.								+	+					+					+
		Paradicranophorus sordidus Donner, 1968														+					
		Wierzejeskiella sp.	+																		
	TESTUDINELLIDAE	*Testudinella patina* (Hermann, 1783)			+																
		Testudinella sp.						+													
	FLOSCULARIIDAE	*Ptygura crystallina* (Ehrenberg, 1834)	+				+	+	+						+	+					
		Ptygura longicornis (Davis, 1867)					+														
		Ptygura melicerta Ehrenberg, 1832							+												
		Ptygura sp.		+	+											+					
	FILINIIDAE	*Filinia pejleri* Hutchinson, 1964			+																
		Filinia terminalis (Plate, 1886)	+																		
		Filinia sp.																			+
	COLLOTHECIDAE	*Collotheca companulata* Dobie, 1847							+												
		Collotheca ornata (Ehrenberg, 1832)					+														
		Collotheca ornata cornuta (Dobie, 1849)	+	+			+	+	+						+	+		+	+	+	+
		Collotheca sp.			+																+
		unidentified species							1							2					2
		Number of species (Rotifera: Monogononta)	33	21	43	4	22	48	30	21	6	4	7	1	11	21	1	3	7	6	19
ROTIFERA	ADINETIDAE	*Adineta barbata* Janson, 1893					x	x													
BDELLOIDEA		*Adineta gracilis* Janson, 1893						x													
		Adineta coatsae Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015							x	x						x					x
		Adineta editae Iakovenko, 2015							x	x											x

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
ROTIFERA - continued	ADINETIDAE - cont.	*Adineta emsliei* Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015		+						x							x				x
		Adineta grandis Murray, 1910							+					+	+	+	+		+	+	+
		Adineta vaga (Davis, 1873)	x	x																	x
		Adineta sp.	+		+		+	+						+	+	+			+		+
	HABROTROCHIDAE	*Habrotrocha angularis* (Murray, 1910)																			+
		Habtrotrocha antarctica Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015							+						+	+				+	+
		Habrotrocha constricta (Dujardin, 1841)		x				x													
		Habrotrocha elusa Milne, 1916															x				
		Habrotrocha sp.	+					2						+				+	+		+
	PHILODINIDAE	*Macrotrachela concinna* (Bryce, 1912)	x					x	x												
		Macrotrachela donneri Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015																			+
		Macrotrachela quadricornifera Milne, 1886														+					
		Macrotrachela sp.	2				+	2	+				+	+		+					+
		Mnobia russeola (Zelinka, 1891)														+					
		Mnobia sp.											+					+			
		Philodina alata Murray, 1910														+		+	+		+
		Philodina antarctica Murray, 1910									+										+
		Philodina dartnallis Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015							+	x											+
		Philodina gregaria Murray, 1910							+		+	+		+	+	+	+		+	+	+
		Philodina jeanneli Beauchamp, 1940			+																
		Philodina sp.	2		+		+	2	+		+		+	+	2	2		+	+		2
		Rotaria rotatoria (Pallas, 1766)	+	+			+	+													
	PHILODINAVIDAE	*Philodinavus* sp.																			+
		unidentified bdelloids			6		1			3									1		

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
		Number of species (Rotifera: Bdelloidea)	9	4	6		4	10	8	4	3	1	3	6	5	9	4	4	6	3	15
MICROGNATHOZOA		*Limnognathia maerski* Kristensen & Funch, 2000				+															
GASTROTRICHA	CHAETONOTIDAE	*Chaetonotus disjunctus* Greuter, 1917	+																		
		Chaetonotus sp.		+			+	>1	>2												+
		Lepidodermella squamata Dujardin, 1841	+																		
		Lepidodermella sp.						>1	>1	+											
		unidentified 'long spines' species							+												?
		Number of species (Gastrotricha)	2	1			1	2	3	1											1
NEMATODA	ARAEOLAIMIDA	*Plectus antarcticus* de Man, 1904									+					+			+		
		Plectus belgicae de Man, 1904									+										
		Plectus frigophilus Kiryanova, 1958														+			+		+
		Plectus globilabiatus Kiryanova, 1958																	+		
		Plectus parientinus Bastain, 1865								+	+										
		Plectus parvus Bastain, 1865								+											
		Plectus sp.	+	+				+	+	2						+		+	+		2
	CHROMADORIDA	*Teratocephalus* cf. *lirellus*								+											
		Teratocephalus tilbrooki Maslen, 1979										x									
		Teratocephalus sp.								2											
	DORYLAIMIDA	*Dorylaimus* sp.	+								2										
		Enchodelus sp.		+																	
		Eudorylaimus antarcticus (Steiner, 1916)									+										
		Eudorylaimus frigidus (Steiner, 1916)				+															
		Eudorylaimus gaussi (Steiner, 1916)				+															
		Eudorylaimus spaulli Loof, 1975								+											
		Eudorylaimus sp.	+					+	+	+											
		Mesodorylaimus sp.	+	+				+			3										
		Mononchus gerlachei de Man, 1904				+					+										
		Mononchus sp.	+							+		+									
	ENOPLIDA	*Enoplodes stewarti* Nicholas, 1993	+																		
		Prismatolaimus sp.	x																		

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
NEMATODA - cont.	MONHYSTERIDA	*Geomonhystera antarcticola* Andrássy, 1998																	+		
		Halomonhystera continenalis Andrássy, 2006														x					
		Monhystera sp.		+				+	+	2											
	MONONCHIDA	*Coomansus gerlachei* (de Man, 1904)							+	+											
		Coomansus sp.						+													
		Paramylonchulus sp.										x									
	RHABDITIDA	*Cervidellus* sp.	+																		
	TYLENCHIDA	*Antarctenchus motililus* Ghosh, Chatterjee, Mitra & De, 2005										x									
		Aphelenchoides sp.								2		x									
		Ditylenchus sp.								+											
		Rotylenchus sp.										x									
		Tylenchorhynchus sp.										x									
		Tylenchus sp.						+													
		unidentified species		1		3	6			1				1	2	2				2	1
		Number of species (Nematoda)	8	5		6	6	6	4	15	7	7		1	2	5		1	5	2	4
ANNELIDA -	ACANTHRODRILIDAE	*Microscolex kerguelarum* (Grube, 1877)			x		x														
DIPLOTESTICULATA		*Microscolex macquariensis* (Beddard, 1896)	x																		
	LUMBRICIDAE	*Dendrodrilus rubidus* (Savigny, 1826)		(x)																	
		Eiseniella tetraedra (Savigny, 1826)	(†)		(x)																
TUBIFICATA	NAIDIDAE	*Nais elinguis* Müller, 1774	+		+																
		Vejdovskyella sp.					+														
	PHREODRILIDAE	*Astacopsidrilus campbellianus* (Benham, 1909)	+																		
		Nesodrilus crozetensis (Michaelsen, 1905)				+		+													
		Nesodrilus kerguelenensis (Michaelsen, 1903)			+		+														
	TUBIFICIDAE	*Ainudrilus dartnalli* Erséus & Grimm, 2002						+													
		Aulodrilus pigueti Kowalewski, 1914								+											
		Macquaridrilus bennettae Jamieson, 1968	+																		
		Rhyacodrilus coccineus Vejdovský, 1875				+		+													
	ENCHYTRAEIDAE	*Cernosvitoviella* sp.	+																		

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
ANNELIDA - cont.	ENCHYTRAIDAE - cont.	*Cognettia antipodum* (Benham, 1905)	+																		
		Enchytraeus albidus Henle, 1837						x													
		Lumbricillus antarcticus Stephenson, 1932						+													
		Lumbricillus healyae Rodrigues & Rico, 2008								+											
		Lumbricillus incisus Liang & Wang, 1997								+											
		Lumbricillus lineatus (Müller, 1774)	(x)																		
		Lumbricillus macquariensis Benham, 1915	x																		
		Lumbricillus sp. 1					+														
		Lumbricillus sp. 2								+											
		Mesenchytraeus sp.	(+)																		
		unknown enchytraeid								2		‡									
		Number of species (Annelida)	9		3	2	4	5		4	0	0	0	0	0	0	0	0	0	0	0
TARDIGRADA -	ECHINISCIDAE	*Echiniscus jenningsi* Dastych, 1984						x	x												
HETEROTARDIGRADA		*Echiniscus macronyx* Richters, 1907						x													
		Echiniscus spp.					x			x	x	x									
		Echinoscoides sp.										x									
		Mopsechiniscus imberis (Richters, 1908)						x													
TARDIGRADA -	HYPSIBIIDAE	*Acutuncus antarcticus* (Richters, 1904)		+					+	+					+	+					+
EUTARDIGRADA		*Adropion greveni* Dastych, 1984								+	+										
		Adropion cf. *greveni*							+												
		Diphascon langhovdense (Sudzuki, 1964)										x									
		Diphascon pengue (Marcus, 1936)							+		+			+							+
		Diphascon sp.							+		+					+					+
		Hypsibius dujardin (Doyère, 1840)	x				x				x										
		Hypsibius sp.										x			x	x					
		Isohypsibius asper (Murray, 1906)							+	+	+										
		Isohypsibius laevis McInnes, 1995							+												
		Isohypsibius papillifer (Murray, 1905)							+												
		Isohypsibius sp.					+			+						+					
		Mesobiotus furciger Murray, 1907							x		x										
		Ramajendas frigidus Pillato & Bind, 1991									x										

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
TARGIGRADA - cont.	MACROBIOTIDAE	*Ramazzottius oberhaeuseri* (Doyère, 1840)									x										+
		Ramazzottius sp.									x										
		Dactylobiotus cf. *ambiguus*							+	+	+										
		Dactylobiotus sp.	+	+			+	+													
		Macrobiotus cf. *liviae*							x												
		Macrobiotus polaris Murray, 1907										x									x
		Macrobiotus sp.						2	x			x		x		x				+	+
		Murrayon hastatus/pullari	x																		
	MILNESIIDAE	*Milnesium antarcticum* Tumanov, 2006								x	x	x									
		Milnesium cf. *tardigradum*					x		x						x						
		unidentified species											x								
		Number of species (Tardigrada)	3	2			5	6	13	7	11	7	1	2	3	5				1	6
ARTHROPODA -	COLEOPTERA	*Lancetes angusticollis* (Curtis, 1839)						+													
INSECTA	DIPTERA	*Ephydrella macquariensis* Wormersley, 1937	+																		
		Limnophyes pusillus Eaton, 1875			(+)	(+)	(+)														
		Limnophyes sp.						+													
		Parochlus crozetensis Serra-Tosio, 1986				+															
		Parochlus steinenii (Gercke, 1889)						(+)		(+)											
		Schoenophilus pedestris Lamb, 1909	+																		
		Trimicra pilipes Fabricius, 1787	+																		
		Number of species (Insecta)	3		1	2	1	3		1		0	0	0	0	0	0	0	0	0	0
ARTHROPODA -	ANOSTRACA	*Branchinecta gaini* Daday de Dées, 1901						+	+	+	+										
CRUSTACEA	CLADOCERA	*Alona quadrangularis* (O F Müller, 1785)	+																		
		Camptocercus aloniceps Ekman, 1901						+													
		Chydorus patagonicus Ekman, 1900	+					+													
		Chydorus sphaericus (O F Müller, 1785)			+	+		+	+												
		Daphnia gelida (Brady, 1918)	+																		
		Daphniopsis studeri Rühe, 1914		+	+	+	+						+	+	+	+					
		Ilyocryptus brevidentatus Ekman, 1905						+	+												
		Macrothrix boergeni Studer, 1878			+																

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
ARTHROPODA - cont.	CLADOCERA - cont.	*Macrothrix flagellata* (Smirnov & Timms, 1983)	+																		
		Macrothrix oviformis Ekman, 1900						+	+	+	+										
		Macrothrix ruehei Kotov, 2007				+	+														
		Macrothrix sp.		+																	
		Ovalona weinecki (Studer, 1878)	+	+	+		+	+	+	+											
		Pleuroxus macquariensis Frey, 1993	+																		
		Pleuroxus truncatus Müller, 1785						(?)													
		Pleuroxus wittsteini Studer, 1878		+	+		+														
	OSTRACODA	*Candona* sp.						+													
		Chlamydotheca pestai (Graf, 1931)						+													
		Cypretta cf. *seurati*	+																		
		Eucypris corpulenta (Sars, 1895)			+																
		Eucypris fontana (Graf, 1931)						+	+												
		Eucypris virens Jurine, 1820	+		+																
		Ilyodromus kerguelensis Müller, 1906			+	+	+														
		Notiocypridopsis frigogena (Graf, 1931)						+	+												
		Tanycypris sp.						+													
ARTHROPODA -	CALANOIDA	*Boeckella poppei* (Mrázek, 1901)						+	+	+	+			+							
CRUSTACEA		*Boeckella michaelseni* (Mrázek, 1901)						+													
		Boeckella brevicaudata (Brady, 1875)	+	+	+																
		Boeckella vallentini (Scott, 1914)			+	+	+														
		Boeckella sp.																			+
		Gladioferens antarcticus Bayly, 1994																	+		
		Parabroteas sarsi (Daday de Dées, 1901)						+	+												
		unidentified Calanoid																			+
	CYCLOPOIDA	*Acanthocyclops michaelseni* (Mrázek, 1901)			+																
		Acanthocyclops robustus (Sars, 1863)			+																
		Acanthocyclops vernalis Fischer, 1853			+																
		Diacyclops joycei Karanovic, Gibson, Hawes, Andersen & Stevens, 2013																			+

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
ARTHROPODA - cont.	CYCLOPOIDA - cont.	*Diacyclops kaupi* Karanovic, Gibson, Hawes, Andersen & Stevens, 2013																	+		
		Diacyclops michaelseni (Mrázek, 1901)			+																
		Diacyclops mirnyi (Borutsky & Vinogradov, 1957)													+	+			+		
		Diacyclops walkeri Karanovic, Gibson, Hawes, Andersen & Stevens, 2013														+					
		Mixocyclops crozensis Kiefer, 1944				+															
		Paracyclops chiltoni (Thompson, 1882)			+	+															
	HARPACTICOIDA	*Antarctobiotus koenigi* (Pesta, 1928)						+													
		Antarctobiotus robustus Richters, 1907			+	+															
		Bryocamptus zschokkei Schmeil, 1893			+																
		Canthocamptidae spp.						2													1
		Epactophanes richardi Mrázek, 1893		+	+	+	+														
		Marionobiotus jeanneli Chappuis, 1940	+		+		+														
		Marionobiotus sp.	+																		
		Tigriopus angulatus Lang, 1933	x		x	x	x														
		Zaus contractus Thompson, 1883	?																		
		unidentified harpacticoid								+											
	AMPHIPODA	*Kergueleniola macra* Ruffo, 1970			‡																
		Pseudingolfiella possessionis de Smet, 2015				+															
		unidentified species						‡													
	ISOPODA	*Iais* sp.	+																		
		Number of species (Arthropoda: Crustacea)	13	6	20	12	9	16	9	5	3		1	2	2	3			3		5
ARTHROPODA - ARACHNIDA	ACARIDIDA	*Acarus siro* Linnaeus, 1758										(x)									
		Algophagus antarcticus Hughes, 1955		+																	
		Algophagus brachytarus Marshall, O'Connor & Pugh 2003					x														
		Algophagus laticollaris Fain, 1975					x														
		Algophagus macrolithus Marshall, O'Connor & Pugh, 2003					x														
		Suidasia nesbitti Hughes, 1948										x									

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
ARTHROPODA - cont.		*Tyrophagus longior* (Grevais, 1844)										x									
		unknown larvae	2	1				1	1												
	ORIBATIDA	*Alaskozetes antarcticus* (Michael, 1903)		x			x		x	x	x										
		Alaskozetes antarcticus grandjeani (Dalenius, 1958)	x																		
		Austroppia crozetensis (Richters, 1908)					x														
		Dometorina marionensis Van Pletzen & Kok, 1971					x														
		Edwardzetes elongatus Wallwork, 1966						x													
		Galumna alata (Hermann, 1804)						x													
		G*loboppia intermedia longiseta* Wallwork, 1970						x													
		Halozetes belgicae (Michael, 1903)	x	x				x	x												
		Halozetes sp.										x									
		Haplochthonius antarcticus Sanyal, Basak & Barman, 2002										x									
		Haplochthonius longisetosus Sanyal, Basak & Barman, 2002										x									
		Haplochthonius maitri Sanyal, Basak & Barman, 2002										x									
		Macquarioppia striata (Wallwork, 1963)		x			x														
		Magellozetes antarcticus (Michael, 1895)						x													
		Maudheimia petronia Wallwork, 1962										x									
		Oppia crozetensis (Richters, 1908)					x														
		Platynothrus skottsbergii Tragårdh, 1931						x													
		Podacarus auberti occidentalis Wallwork,1966		x																	
		Trimalaconothrus flagelliformis Wallwork, 1970						x													
	GAMASIDA	*Gamasellus racovitzai* (Trouessart, 1903)							x	x											
ARTHROPODA -		*Hypoaspis oblonga* Halbert, 1915										x									
ARACHNIDA		*Proctolaelaps antarcticus* Sanyal & Gupta, 2005										x									
		unknown larvae	x																		
	PROSTIGMATA	*Bryobia praetiosa* CL Koch, 1836						(x)													
		Chelacaropsis moorei Baker, 1949										x									
		Nanorchestes antarcticus Strandtmann, 1963										x									

Table 1 — cont.

Phylum - (sub-Phylum)	Order or Family	Species	MqI	HI	K	C	PE	SG	SO	SS	AP	Sch	TH	PCM	LH	VH	Has	OH	BH	WL	McM
ARTHROPODA - cont.	PROSTIGMATA - cont.	*Paratydeus* sp.										x									
		Peregrinacarus reticulatus Bartsch, 1999					+														
		Pronematus sp.										x									
		Raphignathus sp.										x									
		Stereotydeus villosus (Trouessart, 1903)								x											
		Tetranynchus sp.						x													
		Number of species (Arthropoda: Arachnida)	5	6			9	10	4	3	1	14	0	0	0	0	0	0	0	0	0
CHORDATA -	SALMONIDAE	*Oncorhynchus kisutch* (Walbaum, 1792)			(+)																
OSTEICHTHYES		*Oncorhynchus mykiss* (Walbaum, 1792)			(†)			(†)													
		Oncorhynchus tshawytscha (Walbaum, 1792)			(†)																
		Salmo salar Linnaeus, 1758			(+)																
		Salmo trutta Linnaeus, 1758			(+)	(+)	(†)														
		Salvelinus alpinus (Linnaeus, 1758)			(+)																
		Salvelinus fontinalis (Mitchill, 1814)			(+)	(+)	(†)														
		Salvelinus namaycush (Walbaum, 1792)			(†)																
		Number of species (Chordata: Osteichthes)	0	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHORDATA -		*Anas eatoni* (Sharpe, 1875)			+	+															
AVES		*Anas flavirostris* Vieillot, 1816						+													
		Anas georgica Gmelin, 1789						+													
		Anas gibberifrons Müller 1842	+																		
		Anas platyrhynchos Linnaeus, 1758	(+)		(+)																
		Anas superciliosa Gmelin, 1789	+																		
		Number of species (Chordata: Aves)	3	0	2	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX 1 — Synonyms and mistaken identities. Care should be exercised in using this list of synonyms and mistaken identities away from this study. Some of the mistaken identities remain legitimate species both elsewhere and in the Antarctic while other records are only correct at specifc locations. For example the anomopodan previously identified as *Macrothrix hirsuiticornis* is now *M. flagellata* at Macquarie Island, *M. boergeni* at Kerguelen, *M. ruehei* at Crozet and the Prince Edward Islands and *M. oviformis* at South Georgia, the South Orkney islands, South Shetland Islands and down the Antarctic Peninsula. *Macrothrix hirsuiticornis*, a valid species in the northern hemisphere, is entered five times in the Synonyms and mistaken identity column. *Daphniopsis studeri* is a valid identification of the cladoceran present on Heard Island, Kerguelen, Crozet, the Prince Edward Islands, the Prince Charles Mountains, and the Larsemann and Vestfold Hills. Several authors have implied that this is the cladoceran present on Macquarie Island when the cladoceran there is *Daphnia gelida. Daphniopsis studeri* is consequently listed as a mistaken identity for *Daphnia gelida* but only for Macquarie island. This list also contains synonyms and mistaken identities for a number of brackish and terrestrial species that were considered as possible freshwater inhabitant but proved not to be.

Synonyms and mistaken identities	Current identifications
Acanthocyclops mirnyi Borutsky & Vinogradov, 1957	*Diacyclops mirnyi* (Borutsky & Vinogradov, 1957)
Acanthodrilus georgianus Michaelsen, 1888	*Microscolex georgianus* (Michaelsen, 1888)
Acanthodrilus kerguelarum Grube, 1877	*Microscolex kerguelarum* (Grube, 1877)
Acanthodrilus kerguelenensis Lankester, 1879	*Microscolex kerguelarum* (Grube, 1877)
Acanthodrilus macquariensis Beddard, 1896	*Microscolex macquariensis* (Beddard, 1896)
Adineta barbata Janson, 1893	*Adineta coatsea* Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015
Adineta gracilis Janson, 1893	*Adineta editae* Iakovenko, 2015
Adineta sp. A from Heard Island	*Adineta emslie* Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015
Allolobophora tenuis Eisen, 1874	*Dendrodrilus rubidus* (Savigny, 1824)
Alona bukobensis subantarctica Ekman, 1905	*Ovalona weinecki* (Studer, 1878)
Alona diaphana King, 1853	*Ovalona weinecki* (Studer, 1878)
Alona rectangula Sars, 1862	*Ovalona weinecki* (Studer, 1878)
Alona subantarctica Sars, 1909	*Ovalona weinecki* (Studer, 1878)
Alona weinecki Studer, 1878	*Ovalona weinecki* (Studer, 1878)
Alona spp.	*Ovalona weinecki* (Studer, 1878)
Anisomera claussi Müller, 1884	*Lancetes angusticollis* (Curtis, 1839)
Antholaimus antarcticus (Steiner, 1916)	*Eudorylaimus antarcticus* (Steiner, 1916)
Atthyella koenigi Pesta, 1928	*Antarctobiotus koenigi* (Pesta, 1928)
Bimastos tenuis (Eisen, 1874)	*Dendrodrilus rubidus* (Savigny, 1826)
Boeckella brasiliensis Poppe & Mrázek, 1895	*Boeckella poppei* (Mrázek, 1901)
Boeckella dubia Daday de Dées, 1901	*Boeckella poppei* (Mrázek, 1901)
Boeckella entzii Daday de Dées, 1901	*Boeckella poppei* (Mrázek, 1901)
Boeckella pygmaea Daday de Dées, 1901	*Boeckella michaelsini* (Mrázek, 1901)
Boeckella silvestri Daday de Dées, 1901	*Boeckella poppei* (Mrázek, 1901)
Boeckellina michaelsini Mrázek, 1901	*Boeckella michaelsini* (Mrázek, 1901)
Branchinecta granulosa Pesta, 1933	*Branchinecta gaini* Daday de Dées, 1901
Branchinecta sp.	*Branchinecta gaini* Daday de Dées, 1901
Branchiura pleurotheca Benham, 1907	*Rhyacodrilus coccineus* (Vejdovsky, 1875)
Callidina angularis Murray, 1910	*Habrotrocha angularis* (Murray, 1910)
Callidina constricta Dujardin, 1841	*Habrotrocha constricta* (Dujardin, 1841)
Callidina habita Bryce, 1894	*Macrotrachela donneri* Iakovenko *et al.,* 2015
Callidina papillosa Thompson, 1892	*Macrotrachela papillosa* Thompson, 1892
Callidina tridens Milne, 1886	*Habrotrocha tridens* (Milne, 1886)
Callidina spp.	various genera
Camptocercus spp.	*Camptocercus aloniceps* Ekman, 1901
Canadona ahlefeldi Studer, 1879	*Ilyodromus kerguelensis* G W Müller, 1906
Canthocamptus antarcticus Richters, 1907	*Epactophanes richardi antarcticus* Mrázek, 1893
Canthocamptus antarcticus Richters, 1907	*Epactophanes richardi* Mrázek, 1893
Canthocamptus robustus Richters, 1907	*Antarctobiotus robustus* (Sars, 1863)
Centropagus brevicaudatus Brady, 1875	*Boeckella brevicaudata* (Brady, 1875)
Chaetonotus squamatus Dujardin 1841	*Lepidodermella squamata (*Dujardin, 1841)
'Chydorid' spp.	*Ovalona weinecki* (Studer, 1878)
Chydorus maquariensis Brady, 1918	*Chydorus patagonicus* Ekman, 1900
Chydorus minutus Thomson, 1878	*Chydorus patagonicus* Ekman, 1900
Chydorus sphaericoides Sars, 1909	*Chydorus sphaericus* Ekman, 1900
Collotheca gracilipes Edmondson, 1939	*Collotheca companulata* (Dobie, 1849)

Appendix 1 — cont.

Synonyms and mistaken identities	Current identifications
Colurus amblytelus Gosse, 1886	*Colurella colurus* (Ehrenberg, 1830)
Cyclops bospini Studer, 1878	*Acanthocyclops robustus* (Sars, 1863)
Cyclops krillei Studer, 1878	*Acanthocyclops robustus* (Sars, 1863)
Cyclops michaelseni Mrázek, 1901	*Acanthocyclops michaelseni* (Mrázek, 1901)
Cyclops robustus vernalis Fischer, 1853 after Smith & Sayers, 1971	*Acanthocyclops vernalis* (Fischer, 1853)
Cypretta sp.	*Cypretta cf seurati*
Cypridopsis frigogena Graf, 1931	*Notiocypridopsis frigogena* (Graf, 1931)
Cypris fontana Graf, 1931	*Eucypris fontana* (Graf, 1931)
Daphnia carinata King, 1852	*Daphnia gelida* (Brady, 1918)
Daphnia sarsi Daday de Dées, 1902	*Daphnia gelida* (Brady, 1918)
Daphnia studeri Brehm, 1940	*Daphniopsis studeri* Rühe, 1914
Daphniopsis spp.	*Daphniopsis studeri* Rühe, 1914
Daphniopsis studeri Rühe, 1914	*Daphnia gelida* (Brady, 1918)
Deguernea antarctica Thomson, 1895	*Boeckella brevicaudata* (Brady, 1875)
Dendrobaena rubida Savigny, 1826	*Dendrodrilus rubidus* (Savigny, 1826)
Diacyclops michaelseni (Mrázek, 1901) after (Morton, 1985)	*Acanthocyclops michaelseni* (Mrázek, 1901)
Diaschiza sp.	*Cephalodella catellina* (O.F. Müller, 1786)
Diaschiza tenuior Gosse, 1886	*Cephalodella catellina* (O.F. Müller, 1786)
Dicranophorus permollis giganthea Dartnall & Hollowday, 1985	*Encentrum permolle gigantheum*(Dartnall & Hollowday, 1985)
Diglena uncinata Milne, 1886	*Encentrum uncinatum* (Milne, 1886)
Diphascon alpinus/pinguis	*Diphascon pingue* (Marcus, 1936)
Diphascon cf. *greveni*	*Adropion cf greveni*
Diphascon scoticus Murray 1905	*Adropion greveni* Dastych, 1984
Dorylaimus frigidus Steiner, 1916	*Eudorylaimus frigidus* (Steiner, 1916)
Dorylaimus gaussi Steiner, 1916	*Eudorylaimus gaussi* (Steiner, 1916)
Encentrum brevifulcrum Dartnall, 1997	*Paradicranophorus sordidus* Donner, 1968
Enchytraeus antipodum Benham, 1905	*Cognettia antipodum* (Benham, 1905)
Enchytraeus colpites Stephenson, 1932	*Lumbricillus colpites* (Stephenson, 1932)
Enchytraeus monochaetus Michaelsen, 1888	*Grania monochaeta* (Michaelsen, 1888)
Epiphanes sp. (Macquarie Island)	*Epiphanes daphnicola* Thompson, 1892
Erioptera pilipes Fabricius, 1787	*Trimicra pilipes* (Fabricius, 1787)
Erioptera pilipes macquariensis Alexander, 1962	*Trimicra pilipes* (Fabricius, 1787)
Euchlanis dilatata parva Rousselet, 1892	*Euchlanis oropha* Gosse 1887
Eucypris sp.	*Eucypris fontana* (Graf, 1931)
Euplanaria seclusa de Beauchamp, 1940	*Curtisia seclusa* (de Beauchamp, 1940)
Filinia maior (Colditz, 1924)	*Filinia terminalis* (Plate, 1886)
Filinia terminalis kergueleniensis Lair & Koste, 1984	*Filinia pejleri* Hutchinson, 1964
Floscularia cornuta Ehrenberg, 1832	*Collotheca ornata cornuta* (Ehrenberg, 1832)
Gigantella sarsi (Ekman, 1905)	*Parabroteas sarsi (*Daday de Dées, 1901)
Guernea antarctica Thomson, 1895	*Boeckella brevicaudata* (Brady, 1875)
Guernella antarctica Mrázek, 1904	*Boeckella brevicaudata* (Brady, 1875)
Habrotrocha constricta (Murray, 1910)	*Habrotrocha antarctica* Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015
Halirytus amphibius Eaton, 1875	*Telmatogeton amphibius* (Eaton, 1875)
Halirytus macquariensis Brundin, 1962	*Telmatogeton macquariensis* (Brundin, 1962)
Harpacticus brevicornis Giesbrecht, 1902	*Tigriopus angulatus* Lang, 1933
Harpacticus fulvus Brady, 1875	*Tigriopus angulatus* Lang, 1933
Hesperodrilus campbellianus Michaelsen, !924	*Astacopsidrilus campbellianus* (Benham, 1909)
Hesperodrilus crozetensis Michaelsen, 1905	*Nesodrilus crozetensis* (Michaelsen, 1905)
Hesperodrilus kerguelensis Michaelsen, 1903	*Nesodrilus kerguelensis* (Michaelsen, 1903)
Hydatina senta Ehrenberg, 1830	*Epiphanes senta* (O.F. Müller, 1773)
Hydra viridis Linnaeus, 1767	*Hydra viridissima* Pallas, 1766
Hypsibius arcticus Murray, 1907	*Acutuncus antarcticus* (Richters, 1904)
Hypsibius chilensis (Plate, 1889)	*Diphascon langhovdense* (Sudzuki, 1964)
Hypsibius oberhaeuseri (Doyére, 1840)	*Ramazzottius oberhaeuseri* (Doyére, 1840)
Hypsibius papillifer (Murray, 1905)	*Isohypsibius papillifer* (Murray, 1905)
Hypsibius (Isohypsibius) renaudi Ramazzotti, 1972	*Ramajendas frigidus* Pillato & Binda, 1991

Appendix 1 — cont.

Synonyms and mistaken identities	Current identifications
Ilyocryptus spp.	*Ilyocryptus brevidentatus* Ekman, 1905
Isohypsibius granulifer Thulin, 1928	*Isohypsibius asper* (Murray, 1906)
Isohypsibius renaudi Ramazzotti,1972	*Ramajendas frigidus* Pillato & Binda, 1991
Keratella heywoodi Dartnall, 2005	*Keratella kostei* Paggi, 1981
Kerguelenella macra Ruffo, 1970	*Kergueleniola macra* Ruffo, 1970
Lancetes claussi (Müller, 1884)	*Lancetes angusticollis* (Curtis, 1839)
Lecane glypta Harring & Myres, 1926	*Lecane flexilis* (Gosse, 1889)
Lecane mawsoni Russell, 1959	*Lecane* cf. *closterocerca*
Lepadella oblonga (Ehrenberg, 1834)	*Lepadella patella oblonga* (Ehrenberg, 1834)
Limnocalanus sarsi Daday de Dées, 1901	*Parabroteus sarsi* (Daday de Dées, 1901)
Lumbricillus intermedius (Benham, 1909)	*Lumbricillus macquariensis* Benham, 1905
Lumbricillus kerguelarum Grube, 1877	*Microscolex kerguelarum* (Grube, 1877)
Macrobiotus ambiguus Murray, 1907	*Dactylobiotus ambiguus* (Murray, 1907)
Macrobiotius arcticus Murray, 1907	*Acutuncus antarcticus* (Richters, 1904)
Macrobiotus furciger Murray, 1907	*Mesobiotus furciger* (Murray, 1907)
Macrobiotus hastatus/pullari	*Murrayon hastatus/pullari*
Macrothrix ciliata Vávra, 1900	*Macrothrix oviformis* Ekman, 1900
Macrothrix hirsuticornis Norman & Brady, 1861 at K	*Macrothrix boergeni* Studer,1878
Macrothrix hirsuticornis Norman & Brady, 1861 at MqI	*Macrothrix flagellata* (Smirnov & Timms, 1983)
Macrothrix hirsuticornis Norman & Brady, 1861 at SG, SO, SS & AP	*Macrothrix oviformis* Ekman, 1900
Macrothrix hirsuticornis Norman & Brady, 1861 at C & PE	*Macrothrix ruehei* Kotov, 2007
Macrothrix hirsuticornis Norman & Brady, 1861 at South Africa	*Macrothrix sarsi* Kotov, 2007
Macrothrix inflata Daday de Dées, 1902	*Macrothrix oviformis* Ekman, 1900
Macrothrix odontocephala Dadayde Dées, 1902	*Macrothrix oviformis* Ekman, 1900
Macrothrix propinqua Sars, 1909	*Macrothrix oviformis* Ekman, 1900
Macrotrachela habita (Bryce, 1894)	*Macrotrachela donneri* Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015
Macrotrachela insolita De Koning, 1947	*Macrotrachela donneri* Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015
Marionina aestuum Stephenson, 1932	*Lumbricillus aestuum* (Stephenson, 1932)
Marionina antipodum (Benham, 1905)	*Cognettia antipodum* (Benham, 1905)
Marionina grisea Stephenson, 1932	*Lumbricillus griseus* (Stephenson, 1932)
Marionina werthi Michaelsen, 1905	*Lumbricillus werthi* (Michaelsen, 1905)
Michaelsena monochaetus (Michaelsen, 1888)	*Grantia monochaeta* (Michaelsen, 1888)
Microscolex luykeni Michaelsen, 1905	*Microscolex crozetensis* (Michaelsen, 1905)
Milnesium tardigradum Doyére, 1840	*Milnesiun* cf. *tardigradum*
Minona amnica Ball & Hay, 1977	*Duplominona amnica* (Ball & Hay, 1977)
Moraria spp.	*Epactophanes richardi* Mrázek, 1893
Neorhabdocoela sp.	*Neoophora* sp.
Notholca jugosa (Gosse, 1889)	*Notholca squamula* (O F Müller, 1786)
Notholca verae Kutikova, 1958	*Notholca walterkostei* de Paggi, 1982
Notiodrilus crozetensis Michaelsen, 1905	*Microscolex crozetensis* (Michaelsen, 1905)
Notiodrilus kerguelarum Michaelsen, 1900	*Microscolex kerguelarum* (Grube, 1877)
Notiodrilus kerguelenensis Michaelsen, 1910	*Microscolex kerguelarum* (Grube, 1877)
Notiodrilus luykeni Michaelsen, 1905	*Microscolex crozetensis* (Michaelsen, 1905)
Notiodrilus macquariensis Michaelsen, 1900	*Microscolex macquariensis* (Beddard, 1896)
Pachydrilus maximus Michaelsen, 1888	*Lumbricillus maximus* (Michaelsen, 1888)
Pachydrilus georgianus Michaelsen, 1888	*Marionina georgiana* (Michaelsen, 1888)
Pachydrilus intermedius Michaelsen, 1923	*Lumbricillus macquariensis* (Benham,1905)
Pachydrilus macquariensis Benham, 1915	*Lumbricillus macquariensis* (Benham,1905)
Pachydrilus maritimus Ude, 1896	*Lumbricillus maritimus* (Ude, 1896)
Pachydrilus maximus Michaelsen, 1888	*Lumbricillus maximus* (Michaelsen, 1888)
Pachydrilus werthi Michaelsen, 1905	*Lumbricillus werthi* (Michaelsen, 1905)
Paraboeckella brevicaudata (Brady, 1875) in Mrásek, 1901	*Boeckella brevicaudata* (Brady, 1875)
Parabroteus michaelseni Mrázek, 1901	*Parabroteus sarsi* (Daday de Dées, 1901)
Paracyclops fimbriatus (Fischer, 1853)	*Paracyclops chiltoni* (Thompson, 1882)

Appendix 1 — cont.

Synonyms and mistaken identities	Current identifications
Peracantha truncata (Müller, 1785) in Smith & Sayers, 1971	*Pleuroxus truncatus* (Müller, 1785)
Philodina roseola Ehrenberg, 1832	*Philodina gregaria* Murray, 1910
Philodina sp. A from Signy Island	*Philodina dartnallis* Iakovenko, Smykla, Convey, Kašparová, Kozeretska, Trokhymets, Dykyy, Plewka, Devetter, Duriš & Janko, 2015
Phreodrilus campbellianus Benham, 1909	*Astacopsidrilus campbellianus* (Benham, 1909)
Phreodrilus crozetensis Michaelsen, 1905	*Nesodrilus crozetensis* (Michaelsen, 1905)
Phreodrilus kerguelensis Michaelsen, 1923	*Nesodrilus kerguelensis* (Michaelsen, 1903)
Pleurotrocha sp.	*Encentrum permolle gigantheum* Dartnall & Hollowday, 1985
Pleuroxus aduncus Jurine, 1820	*Pleuroxus wittsteini* Studer, 1878
Pleuroxus scopulifer Daday De Dées, 1903	*Pleuroxus wittsteini* Studer, 1878
Pleuroxus scopuliferus Ekman, 1900	*Pleuroxus wittsteini* Studer, 1878
Proales daphnicola Thompson, 1892	*Epiphanes daphnicola* (Thompson, 1892)
Pseudobiotus cf. *augusti*	*Isohypsibius laevis* McInnes, 1995
Pseudoboeckella anderssonorum Ekman, 1905	*Boeckella michaelseni* (Mrázek, 1901)
Pseudoboeckella brevicaudata (Mrázek, 1905)	*Boeckella brevicaudata* (Brady, 1875)
Pseudoboeckella entzii Daday De Dées, 1901	*Boeckella poppei* (Mrázek, 1901)
Pseudoboeckella klutei Brehm, 1926	*Boeckella poppei* (Mrázek, 1901)
Pseudoboeckella poppei Mrázek, 1901	*Boeckella poppei* (Mrázek, 1901)
Pseudoboeckella pygmaea Daday De Dées, 1902	*Boeckella michaelseni* (Mrázek, 1901)
Pseudoboeckella remotissima Brehm, 1953	*Boeckella brevicaudata* (Brady, 1875)
Pseudoboeckella silvestrii Daday De Dées, 1901	*Boeckella poppei* (Mrázek, 1901)
Pseudoboeckella vallentini Scott, 1914	*Boeckella vallentini* (Scott, 1914)
Pseudoboeckella volucris Kiefer, 1944	*Boeckella vallentini* (Scott, 1914)
Psychoda severini parthenogenetica Tonnoir, 1940	*Psychoda parthenogenetica* Tonnoir, 1940
Ramajendas renaudi (Ramazzotti,1972)	*Ramajendas frigidus* Pillato & Binda, 1991
Rhinoglena fertoeensis Varga, 1928	*Rhinoglena kutikovae* De Smet & Gibson, 2008
Salmo gairdneri (Richardson, 1836)	*Oncorhynchus mykiss* Walbaum, 1792
Scaridium bosjani Daems & Dumont, 1974	*Scaridium longicaudum* (O.F. Müller, 1786)
Simocephalus gelidus Brady, 1918	*Daphnia gelida* (Brady, 1918)
Simocephalus intermedius Studer, 1878	*Daphniopsis studeri* Rühe, 1914
Stenhelia gracilis Brady, 1918	*Marionobiotus jeanneli* Chappuis, 1940
Thaslastrid sp.	*Marionobiotus jeanneli* Chappuis, 1940
Tigriopus brevicornis Giesbrecht, 1902	*Tigriopus angulatus* Lang, 1933
Tigriopus californicus Baker, 1912	*Tigriopus angulatus* Lang, 1933
Trichocerca relicta Donner, 1950	*Trichocerca obtusidens* Olofsson, 1918