Freshwater invertebrates of subantarctic South Georgia

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Abstract
Twenty-one lakes, ten pools, seven coastal pools, three streams, two seal wallows, a penguin wallow, and three flooded moss carpets on South Georgia were sampled for aquatic invertebrates. More than 100 invertebrate species were found comprising 59 species of Rotifera, 29 Arthropoda (including five Anomopoda, three Calanoida, two Harpacticoida, three Ostracoda, 12 Acarina and four Insecta) and at least 22 other invertebrate species (including four Platyhelminthes, three Gastrotricha, six Tardigrada, six Nematoda, and two species of Annelida). The fauna of South Georgia, although similar to that of the other Scotia Arc Islands, particularly Signy Island, is much richer by virtue of its lower latitude and milder climate.

Keywords: Arthropods, freshwater invertebrates, rotifers, South Georgia, subantarctic

Introduction
This paper describes the results of a three-month (3 November 1992 to 23 January 1993) limnological survey of South Georgia. The work was prompted by an earlier, and clearly incomplete, opportunistic study that yielded 27 species (Dartnall and Heywood 1980). At least four additional species of aquatic arthropods were then known to inhabit the island, and while Signy Island, which lies 6° further south, supports 38 species of rotifer (Dartnall and Hollowday 1985), only 15 species of rotifer had been found at South Georgia. As 11 of the rotifers were recorded from both locations, Dartnall and Heywood (1980) speculated that subsequent surveys at South Georgia would find many more rotifer species common to both locations, as well as many “new” ones. The objective of this paper was to produce a definitive list of freshwater invertebrates for comparison with other subantarctic and Antarctic locations.

South Georgia and the collection sites
South Georgia, a crescent-shaped island (Figure 1), 170 km long and from 3 to 40 km wide, lies within the Antarctic Convergence, some 2000 km east of Cape Horn. The island is
extremely rugged with a central spine of snow-capped mountains, 13 of which exceed 2000 m. More than half of the island is covered with permanent snow and ice, with some glaciers reaching down to the sea. The climate is harsh, deemed subantarctic, with vegetation restricted to altitudes below 300 m. The flora is dominated by Festuca contracta grasslands with localized areas of tussock grass (Parodiochloa flabellata) and moss banks (Greene 1964; Lewis-Smith and Walton 1975). These vegetated coastal lowlands harbour hundreds of lakes and pools.

**Materials and methods**

Four different habitat-specific sampling methods were utilized. In large lakes plankton nets (53μm mesh) were thrown into deep water and allowed to sink before being slowly retrieved. Benthic samples were obtained using rigid plastic tubes and a bilge pump.
(Dartnall and MacAlister 1999), while streams and shallow-water sites were sampled with hand nets (53 µm mesh). In seal and penguin wallows, and highly vegetated areas that precluded the use of nets, small plastic bottles (125 ml) were plunged into the water and/or hand-filled with vegetation.

Water pH was measured in the laboratory before the samples were concentrated by filtration (20 µm mesh) and examined using dissection and compound microscopes. Drawings were made from live, free-swimming specimens held under slight compression of a coverslip mounted on Vaseline, from specimens relaxed and narcotized with tetra-sodium pyrophosphate (Robotti and Lovisolo 1972), and from specimens permanently mounted in polyvinyl-lactophenol. This latter method, which is ideal for rotifer trophi (Russell 1961) and the preservation of heavily loricated species, is less successful with illoricate and partially loricated species where some surface details are lost when the polyvinyl-lactophenol clears.

Results

Samples were collected around the abandoned whaling stations at Grytviken and Husvik (Figures 1, 2). Just one day was spent at Grytviken where it proved impossible to sample the Maiviken Lakes, the location of Dartnall and Heywood's (1980) samples, and two lakes closer to the old whaling station at Grytviken were sampled instead (Figure 1). These—Gull Lake and the lower Hamberg Lake—were ice-covered and plankton net sampling was consequently restricted to small areas of open water, close to their outflows (Table I).

The majority of samples were taken from in and around Husvik Harbour, Stromness Bay (Figures 1, 2) and have been divided into three groups—brackish pools, freshwater pools, and freshwater lakes. Brackish pools included rock pools that lie just above the high tide mark at Tønsberg Point, Kanin Point and Olsen Valley, that are periodically inundated by the sea, and contain a predominately inshore-marine biota (Table II).

The freshwater pools are for the most part small, with ill-defined edges, and occupy shallow vegetated depressions. The Karrakatta pool, a man-made/deepened pool only 5 m across, is at 3 m considerably deeper than the others and is now completely overgrown. The results of these collections are given in Table III.

All of the lakes on the Tønsberg Peninsula are small (<20,000 m²) and shallow (2–8 m deep) and occupy small catchment areas (Figure 2). Block, Parochlus and the Grytviken Lakes are larger (but <30,000 m²) and deeper, while Gulbrandsen Lake may exceed 200,000 m² (Hansson et al. 1996). The results of the collections made in these lakes are given in Table IV.

A few samples were obtained, away from the Husvik harbour region (Figure 1), by colleagues on field trips using "plunge pots". The results of these opportunistic collections, plus those similarly obtained from penguin and seal wallows, are given in Table V.

The fauna

Protozoa

Small motile ciliates were observed in most samples. A few large ciliates were encountered including Bursaria? sp. and a Stentor sp. Vorticellids decorated the shells and carapaces of many crustaceans. Other common species included testate amoebae (Arcella sp., Diflugia sp., and two Nebela spp.), and large solitary radiolarians.
Platyhelminthes

Four species of freshwater flatworms were observed: (1) a common, eyed vermiform acoel with a slightly grooved ventral surface; (2) a large-eyed species with a broad chisel-shaped head, which was restricted to the Karrakatta pool; (3) a common eyeless species with a mid-ventral
Table I. Occurrence of freshwater invertebrates in the lakes at Grytviken.

| Protozoa                  | Gull Lake | Gull Lake outflow pool | Gull Lake lower pool | Lower Hamberg Lake | Hamberg Lakes stream | Hamberg Lakes pool |
|--------------------------|-----------|------------------------|----------------------|-------------------|----------------------|-------------------|
| Ciliated Protozoa        | +         | +                      | –                    | –                 | +                    | –                 |
| Radiolaria               | +         | +                      | –                    | –                 | –                    | –                 |
| Stentor sp.              | +         | +                      | –                    | –                 | +                    | –                 |
| Arcella sp.              | +         | +                      | +                    | –                 | +                    | –                 |
| Gastrotricha             |           |                        |                      |                   |                      |                   |
| Various gastrotrichs     | –         | –                      | –                    | +                 | –                    | –                 |
| Nematoda                 |           |                        |                      |                   |                      |                   |
| Monhystera sp.           | –         | –                      | +                    | +                 | –                    | –                 |
| Unidentified Nematoda    | +         | –                      | –                    | –                 | –                    | –                 |
| Rotifera                 |           |                        |                      |                   |                      |                   |
| Monogononta              |           |                        |                      |                   |                      |                   |
| Cephalodella gibba (Ehrenberg) | –    | –                      | –                    | +                 | +                    | –                 |
| Encentrum mustela (Milne) | –         | –                      | –                    | +                 | –                    | –                 |
| Eosphora najas (Ehrenberg) | +         | –                      | +                    | –                 | –                    | –                 |
| Ehrenberg                |           |                        |                      |                   |                      |                   |
| Euchlanis dilatata       | –         | –                      | +                    | –                 | –                    | –                 |
| Rousselet                |           |                        |                      |                   |                      |                   |
| Lepadella patella oblonga (Ehrenberg) | + | –                      | –                    | –                 | –                    | –                 |
| Nototholca walterkostei  | –         | –                      | –                    | +                 | –                    | +                 |
| Paggi                    |           |                        |                      |                   |                      |                   |
| Notommatia glyphura (Wulfert) | +         | –                      | –                    | –                 | –                    | –                 |
| Reticula gelida          |           |                        |                      |                   |                      |                   |
| Harring and Myres        |           |                        |                      |                   |                      |                   |
| Reticula nyassa          |           |                        |                      |                   |                      |                   |
| Harring and Myres        |           |                        |                      |                   |                      |                   |
| Bdelloidea               |           |                        |                      |                   |                      |                   |
| Adineta sp.              | +         | +                      | –                    | –                 | –                    | –                 |
| Rotaria rotatoria (Pallas) | –         | +                      | –                    | –                 | –                    | –                 |
| Arthropoda               |           |                        |                      |                   |                      |                   |
| Crustacea                |           |                        |                      |                   |                      |                   |
| Chydorus sphaericus (O. F. Müller) | –    | –                      | +                    | –                 | –                    | +                 |
| Macrothrix hirsuticornis Brady and Norman | – | – | – | + | – | – |
| Boeckella poppei         | –         | –                      | –                    | +                 | +                    | –                 |
| Mrazek                   |           |                        |                      |                   |                      |                   |
| Various                  | +         | +                      | +                    | –                 | +                    | –                 |
| Harpacticoda             |           |                        |                      |                   |                      |                   |
| Various Ostracoda        | –         | –                      | –                    | +                 | +                    | –                 |
| Insecta                  |           |                        |                      |                   |                      |                   |
| Diptera larvae           | +         | +                      | +                    | +                 | –                    | –                 |
| Acarina                  |           |                        |                      |                   |                      |                   |
| Various Acarina          | +         | –                      | +                    | –                 | –                    | –                 |

Key: +, present; –, not recorded.
sucker observed feeding on dead *Boeckella poppei* nauplii and copepodite larvae; and (4) a rare eyeless species only found in Lakes 2, 4 and 6 on the Tønsberg Peninsula.

**Gastrotricha**

The presence of solitary specimens in most samples suggests that gastrotrichs are probably ubiquitous. Observed taxa include “long-haired” and “short-haired” *Chaetonotus* spp., along with a scaly *Leptodermella* sp.

**Tardigrada**

Six tardigrade species including *Dactylobiotus* sp., *Echiniscus jenningsi* Dastych, *E. macronyx* Richters, two species of *Macrobiotus*, and *Mopsechiscus imberis* (Richters) have been identified (S. McInnes, personal communication). They were not differentiated in the field, but are ubiquitous and, with the possible exception of Gulbrandsen Lake, probably occur in all of the freshwater lakes and pools.
Table III. Occurrence of freshwater invertebrates in the Husvik pools.

|                     | Karrakatta Pool | Met Station Pool | “Dot” Lake | “Banana” lake | Husdal pools | Husdal stream | Weaner wallows | High-altitude pool |
|---------------------|-----------------|------------------|------------|--------------|--------------|---------------|----------------|-------------------|
| **Protozoa**        |                 |                  |            |              |              |               |                |                   |
| *Arcella* sp.       | −               | −                | −          | −            | +            | +             | −              | +                 |
| *Nebella* spp.      | +               | +                | +          | +            | +            | −             | −              | −                 |
| *Vorticellids*      | +               | −                | −          | −            | −            | −             | −              | −                 |
| *Gastrellidae*      | −               | −                | −          | −            | +            | +             | +              | +                 |
| **Platyhelminthes** |                 |                  |            |              |              |               |                |                   |
| Eyed platyhelminth  | −               | −                | +          | −            | −            | −             | −              | −                 |
| Eyeless platyhelminth | −          | +                | −          | −            | −            | +             | −              | +                 |
| Chisel-head platyhelminth | + | −            | −          | −            | −            | −             | −              | −                 |
| **Gastrotricha**    |                 |                  |            |              |              |               |                |                   |
| Various Gastrotricha | +             | −                | −          | −            | +            | −             | −              | −                 |
| **Tardigrada**      |                 |                  |            |              |              |               |                |                   |
| *Echiniscus jenningsi* Dastych | + | +                | +          | +            | +            | +             | −              | +                 |
| *Various Tardigrada* | +             | +                | +          | +            | +            | +             | +              | +                 |
| **Nematoda**        |                 |                  |            |              |              |               |                |                   |
| *Monhystera* sp.    | +               | +                | +          | +            | +            | −             | +              | +                 |
| Unidentified Nematoda | −             | −                | −          | +            | −            | +             | +              | +                 |
| **Rotifera**        |                 |                  |            |              |              |               |                |                   |
| Monogononta         |                 |                  |            |              |              |               |                |                   |
| *Bryceella* stylosa Milne | +         | +                | +          | −            | −            | −             | −              | −                 |
| *Cephalodella auriculata* (O. F. Müller) | −                | −                | −          | +            | +            | −             | −              | −                 |
| *Cephalodella delicata* Wulfert | +        | +                | −          | −            | +            | −             | +              | +                 |
| *Cephalodella forficata* (Ehrenberg) | −          | +                | −          | −            | −            | −             | −              | −                 |
| *Cephalodella gibba* (Ehrenberg) | −               | +                | +          | −            | +            | −             | −              | −                 |
| *Cephalodella* sp. “A” (Ehrenberg) | −         | −                | −          | −            | −            | −             | −              | −                 |
| *Collotheca ornata cornuta* (Dobie) | −          | +                | +          | −            | −            | −             | −              | −                 |
| *Colurella* obtusa (Gosse) | −         | −                | −          | −            | −            | −             | −              | −                 |
| *Dicranophorus leutkeni* (Bergendal) | −          | −                | +          | −            | −            | −             | −              | +                 |
| *Encentrum* mustela (Milne) | −         | −                | +          | −            | −            | −             | +              | +                 |
| *Encentrum salinum* (Dartnall) | −          | −                | +          | −            | −            | −             | −              | −                 |
| *Eosphora* najas Ehrenberg | −         | +                | −          | −            | −            | −             | +              | +                 |
| *Epiphanes* senta (O. F. Müller) | −        | −                | −          | −            | −            | −             | −              | +                 |
| *Euchlanis* dilatata parva (Rousselet) | −          | −                | −          | −            | −            | −             | −              | −                 |
| *Lecane* closeocerca (Schmarra) | −         | +                | −          | −            | −            | +             | +              | −                 |
| *Lecane* flexilis Gosse | −         | −                | −          | −            | −            | +             | −              | +                 |
| *Lecane* lunaris (Ehrenberg) | −        | +                | +          | −            | −            | −             | +              | −                 |
| *Lecane* latisinna Yamamoto | −        | +                | +          | −            | −            | −             | −              | −                 |
| *Lepadella* patella oblonga (Ehrenberg) | −          | +                | −          | −            | −            | −             | −              | −                 |
| *Lepadella* ovalis (O. F. Müller) | −          | −                | −          | −            | −            | −             | −              | +                 |
Table III. (Continued)

| Species | Karrakatta Pool (O. F. Müller) | Met Station Pool (Ehrenberg) | "Dot" Lake | "Banana" Lake | Husdal pools | Husdal stream | Weaner wallows | High-altitude pool |
|---------|-------------------|---------------------|-----------|--------------|---------------|---------------|----------------|------------------|
| Lepadella patella | + | - | + | + | + | + | + | + |
| Lepadella triptera | - | - | - | - | + | - | - | - |
| Lindia torulosa Dujardin | - | - | - | - | - | + | - | - |
| Monommata sp. | + | - | - | - | - | + | - | - |
| Mytilina mucronata longicaua H. J. G. Dartnall | - | - | - | - | + | - | - | - |
| Notholca labis Gosse | - | - | - | - | - | + | + | + |
| Notholca salina Foche | + | - | - | - | - | - | - | - |
| Notholca walterkostei Paggi | - | - | - | - | + | - | - | - |
| Notomnata glyphura (Wulfert) | - | - | - | - | + | + | + | + |
| Proales fallacia Wulfert | - | + | + | - | - | - | - | - |
| Ptygura crystallina (Ehrenberg) | - | - | - | - | + | - | - | - |
| Resticula gelida Harring and Myres | - | - | + | - | - | + | + | - |
| Trichocerca brachyura (Gosse) | + | + | + | + | + | - | - | - |
| Trichocerca rattus globosa Dartnall and Hollowday | - | + | + | + | - | - | - | - |
| Trichocerca tigris (O. F. Müller) | - | - | + | - | - | - | - | - |
| Bdelloidea | | | | | | | | |
| Adineta barbata Janson | + | - | - | - | - | - | - | - |
| Adineta sp. | + | - | - | - | - | - | - | - |
| Habrotrocha consticta (Dujardin) | + | - | - | - | - | - | - | - |
| Habrotrocha sp. “A” | - | - | - | + | - | - | - | - |
| Habrotrocha sp. “B” | - | - | - | + | - | - | - | - |
| Macrotrachela sp. “B” | - | - | - | - | - | - | - | + |
| Philodina sp. “A” | - | + | - | - | + | - | - | + |
| Philodina sp. “B” | - | - | - | - | + | - | - | + |
| Rotatoria rotataria (Pallas) | + | + | - | - | + | + | + | + |
| Annelida | | | | | | | | |
| Enchytraeidae | + | - | - | - | - | - | - | + |
| Arthropoda | | | | | | | | |
| Crustacea | | | | | | | | |
| Alona weinecki Studer | - | + | + | + | + | + | + | - |
| Chydrorus sphaericus (O. F. Müller) | + | + | + | + | + | + | + | - |
| Macrothrix hirsuticornis | - | + | + | + | + | + | + | - |
| Norman and Brady | | | | | | | | |
| Boeckella michaelseni | - | + | - | - | - | - | - | - |
| Mrazek | | | | | | | | |
| Boeckella poppei Mrazek | - | + | + | + | + | + | + | + |
| Parabroteus sarsi (Daday) | - | - | - | - | + | - | - | - |
| Freshwater Harpacticoid | + | + | + | - | + | + | + | + |
Nematoda

At least six species have been tentatively identified (using Maslen’s 1979 key). The small black Monhystera spp. were ubiquitous while the vast majority of the larger Mononchidae, not differentiated in the field, belong to the genera Coomansus, Eudorylaimus, Mesodorylaimus, Plectus, and Tylenchus.

Rotifera

Fifty-nine species of rotifer (47 Monogononta and 12 Bdelloidea) were identified. The majority are common cosmopolitan species that require little or no comment. Keratella heywoodi is new and is described elsewhere (Dartnall 2005), while the two unidentified Cephalodella spp. and the unidentified Testudinella are possibly “new” and currently under investigation. Insufficient specimens were obtained to comment on the status of the other unidentified Monogononta. Most of the unidentified bdelloid rotifers are familiar, and were noted on Signy Island (Dartnall and Hollowday 1985).

Annelida

At least two species of enchytraeid worm are now known to be present, Lumbricillus antarcticus Stephenson (K. Dozsa-Farkas, personal communication) and a recently described tubificid Ainudrilus dartnalli (Erseus and Grimm 2002). They were not differentiated in the field so details of their distributions are unavailable.

Arthropoda

Twenty-seven arthropod species were recognized including 13 Crustacea, four Insecta and 10 Acarina.

Crustacea

Anomopoda. Ilyocryptus brevidentatus from Lake 11 on the Tønsberg Peninsula were unusually red in colour presumably from feeding on dead copepods. Macrothrix hirsuticornis

Table III. (Continued)

|                      | Karrakatta Pool | Met Station Pool | “Dot” Lake | “Banana” lake | Husdal pools | Husdal stream | Weaner wallows | High-altitude pool |
|----------------------|-----------------|------------------|------------|---------------|--------------|---------------|-----------------|---------------------|
| Ostracoda            | −               | −                | −          | −             | +            | +             | +               | −                   |
| Insecta              |                 |                  |            |               |              |               |                 |                     |
| Diptera larvae       | +               | −                | −          | −             | +            | +             | +               | −                   |
| Angusticolis clausii (Müller) | +       | +                | −          | −             | +            | −             | −               | +                   |
| Collembola           | −               | −                | −          | −             | −            | −             | −               | +                   |
| Acarina              |                 |                  |            |               |              |               |                 |                     |
| Various Acarina      | −               | +                | +          | +             | +            | −             | +               | +                   |

Key: +, present; −, not recorded.
Table IV. Occurrence of freshwater invertebrates in the lakes around Husvik.

| Lake 1 | Lake 1a | Lake 2 | Lake 3 | Lake 4 | Lake 5 | Lake 6 | Lake 7 | Lake 8 | Lake 9 | Lake 10 | Lake 11 | Block | Parochlus | Lake Gulbrandsen |
|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|----------|-----------------|
| pH     |         |        |        |        |        |        |        |        |        |        |         |        |          |                 |
| 7.4    | 6.9     | 8.7    | 7.1    | 6.1    | 8.0    | 5.7    | 5.2    | 5.4    | 5.7    | 6.0    | 6.3     | 8       | 8        | –              |
| Conductivity (µS cm⁻¹) |         |        |        |        |        |        |        |        |        |        |         |        |          |                 |
| 59     | 39      | 64     | 46     | 43     | 62     | 29     | 29     | 39     | 35     | 48     | 42      | 53      | 45       | –              |
| **Protozoa** |         |        |        |        |        |        |        |        |        |        |         |        |          |                 |
| *Arcella* sp | – | + | + | + | + | – | + | + | – | – | – | + | + | + | – |
| *Difflugia* sp | – | + | – | – | – | – | – | – | – | – | – | – | – | – | – |
| *Nebella* spp. | + | – | + | + | – | + | – | + | – | – | – | + | – | – | – |
| Ciliates | + | + | + | + | + | + | + | + | + | + | + | + | – | – | – |
| Radiolaria | – | – | + | + | – | – | – | – | – | – | – | – | – | – | – |
| Vorticellid | – | + | – | – | + | – | – | – | – | – | – | – | – | – | – |
| Dinoflagellate | + | + | – | – | – | – | + | + | + | + | + | – | – | – | – |
| **Platymelminthes** |         |        |        |        |        |        |        |        |        |        |         |        |          |                 |
| Eyed platyhelminth | – | – | + | + | – | – | + | – | – | – | – | + | – | – | – |
| Common eyeless platyhelminth | + | – | + | – | – | – | + | – | – | – | – | + | + | – | – |
| Rare eyeless platyhelminth | – | – | + | – | + | – | + | – | – | – | – | – | – | – | – |
| **Gastrotricha** |         |        |        |        |        |        |        |        |        |        |         |        |          |                 |
| Various Gastrotricha | – | – | + | + | + | + | – | – | – | – | + | + | + | + | – |
| **Tardigrada** |         |        |        |        |        |        |        |        |        |        |         |        |          |                 |
| *Echiniscus jenningsi* | – | – | – | – | – | – | – | – | – | – | – | – | + | – | – |
| *Dastych* | – | + | + | – | – | + | + | + | + | + | – | + | + | – | – |
| Various Tardigrada | – | + | + | – | – | + | + | + | + | + | – | + | + | – | – |
| **Nematoda** |         |        |        |        |        |        |        |        |        |        |         |        |          |                 |
| *Monhystera* sp. | + | – | + | + | + | + | + | + | + | – | + | + | + | + | – |
| Various Nematoda | + | + | + | + | – | + | – | – | – | – | – | + | + | – | – |
| **Rotifera** |         |        |        |        |        |        |        |        |        |        |         |        |          |                 |
| *Bryceella* stylata Milne | – | – | + | – | – | – | – | – | – | – | – | – | – | – | – |
| *Cephalodella auriculata* (O. F. Müller) | + | + | – | – | – | – | + | + | – | – | – | – | – | – | – |
| *Cephalodella* sp. “B” | – | – | – | – | – | – | – | – | – | – | – | + | – | – | – |
| *Cephalodella delicata* Wulfert | + | + | + | + | + | – | + | + | + | + | + | + | – | + | – |
Table IV. (Continued)

| Lake  | Lake 1 | Lake 2 | Lake 3 | Lake 4 | Lake 5 | Lake 6 | Lake 7 | Lake 8 | Lake 9 | Lake 10 | Lake 11 | Block Lake | Parochlus Lake | Lake Gulbrandsen |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|----------|-------------|------------------|-----------------|
| Lake 1a | -      | -      | -      | -      | -      | +      | +      | +      | +      | +       | +        | -           | -               | -               |
| Lake 2 | -      | -      | +      | +      | -      | -      | -      | +      | +      | +       | -         | +           | -               | -               |
| Lake 3 | -      | +      | +      | +      | -      | +      | +      | +      | +      | -       | +         | +           | -               | -               |
| Lake 4 | -      | -      | -      | -      | -      | -      | -      | -      | +      | -       | +         | +           | +               | -               |
| Lake 5 | -      | -      | -      | -      | -      | -      | -      | -      | -      | -       | -         | -           | -               | -               |
| Lake 6 | -      | -      | -      | -      | -      | -      | -      | -      | -      | -       | -         | -           | -               | -               |
| Lake 7 | -      | -      | -      | -      | -      | -      | -      | -      | -      | -       | -         | -           | -               | -               |
| Lake 8 | -      | -      | -      | -      | -      | -      | -      | -      | -      | -       | -         | -           | -               | -               |
| Lake 9 | -      | -      | -      | -      | -      | -      | -      | -      | -      | -       | -         | -           | -               | -               |
| Lake 10| -      | -      | -      | -      | -      | -      | -      | -      | -      | -       | -         | -           | -               | -               |
| Lake 11| -      | -      | -      | -      | -      | -      | -      | -      | -      | -       | -         | -           | -               | -               |
| Block Lake | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Parochlus Lake | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Lake Gulbrandsen | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

*Lake 1, Lake 2, etc.*

*Cephalodella forficata* (Ehrenberg)
*Cephalodella gibba* (Ehrenberg)
*Cephalodella megaloecephala* (Glascott)
*Collotheca ornata cornuta* (Dobie)
*Colurella obtusa* (Gosse)
*Dicranophorus luetkeni* (Bergendal)
*Encentrum mustela* (Milne)
*Eosphora najas* (Ehrenberg)
*Euchlanis dilatata parca* Rousselet
*Keratella heywoodi* Dartnall
*Lecane closterocerca* (Schmarda)
*Lecane flexilis* Gosse
*Lecane lunaris* (Ehrenberg)
*Lecane latusissima* Yamamoto
*Lepadella intermedia* Dartnall and Hollowday
*Lepadella ovalis* (O. F. Müller)
|                             | Lake 1 | Lake 1a | Lake 2 | Lake 3 | Lake 4 | Lake 5 | Lake 6 | Lake 7 | Lake 8 | Lake 9 | Lake 10 | Lake 11 | Block Lake | Parochlus Lake | Lake Gulbrandsen |
|-----------------------------|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|------------|---------------|------------------|
| *Lepadella patella* (O. F. Müller) | +      | +       | +      | +      | +      | +      | +      | +      | +      | +      | +       | +       | -          | -              | -                |
| *Lepadella patella oblonga* (Ehrenberg) | -      | -       | -      | -      | -      | -      | -      | -      | -      | -      | -       | -       | +          | -              | -                |
| *Lepadella triptera* (Ehrenberg) | -      | -       | +      | +      | -      | -      | -      | -      | -      | -      | -       | -       | -          | -              | -                |
| *Lindia torulosa* Dujardin | -      | -       | -      | -      | -      | -      | -      | -      | -      | -      | -       | -       | +          | -              | -                |
| *Monommata sp.*            | -      | -       | +      | -      | -      | -      | +      | -      | -      | -      | -       | +       | -          | -              | -                |
| *Mytilina mucronata longicauda* Dartnall and Hollowday | -      | -       | +      | -      | -      | -      | +      | -      | +      | -      | -       | -       | -          | -              | -                |
| *Notholca labis* Gosse      | -      | -       | -      | -      | -      | -      | -      | -      | -      | -      | -       | -       | +          | +              | -                |
| *Notholca walterkostei* Paggi | -      | +       | +      | +      | +      | +      | +      | +      | +      | +      | +       | +       | +          | +              | -                |
| *Notommata glyphura* (Wulfert) | -      | -       | -      | +      | +      | +      | -      | -      | -      | -      | -       | +       | -          | +              | -                |
| *Proales fallaciosa* Wulfert | -      | -       | +      | -      | -      | -      | +      | -      | +      | -      | -       | -       | -          | -              | -                |
| *Proales sp.*              | -      | -       | -      | -      | -      | -      | -      | -      | -      | -      | +       | -       | -          | -              | -                |
| *Ptygura crystallina* (Ehrenberg) | -      | -       | -      | -      | -      | -      | -      | -      | -      | -      | -       | -       | -          | -              | -                |
| *Resticula gelida* Harring and Myres | -      | -       | +      | +      | +      | -      | -      | -      | -      | +      | -       | +       | +          | -              | -                |
| *Resticula nyassa* Harring and Myres | -      | -       | -      | -      | -      | +      | -      | -      | -      | -      | -       | -       | -          | -              | -                |
| *Testudinella sp.*         | -      | +       | +      | +      | -      | -      | -      | +      | +      | +      | +       | +       | -          | -              | -                |
| *Trichocerca brachura* (Gosse) | +      | +       | +      | +      | +      | +      | +      | +      | +      | +      | +       | +       | +          | -              | -                |
| *Trichocerca rattus globosa* Dartnall and Hollowday | -      | +       | +      | +      | -      | -      | -      | -      | -      | -      | -       | -       | +          | -              | -                |
Table IV. (Continued)

| Freshwater invertebrates of South Georgia |
|-------------------------------------------|
| Lake 1 | Lake 1a | Lake 2 | Lake 3 | Lake 4 | Lake 5 | Lake 6 | Lake 7 | Lake 8 | Lake 9 | Lake 10 | Lake 11 | Block Lake | Parochlus Lake | Lake Gulbrandsen |
|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|-------------|-----------------|-----------------|
| **Trichocerca tigris**  
(O. F. Müller) | – | + | + | + | + | – | + | – | – | + | + | – | – | – |
| Bdelloidea | | | | | | | | | | | | | | | |
| **Adineta gracilis** Janson | – | + | – | – | – | – | – | – | – | – | – | – | – | – | – |
| **Adineta sp.** | – | – | – | – | – | – | + | – | – | – | + | – | – | – | – |
| **Habrotocha constricta**  
(Dujardin) | – | – | – | – | – | – | – | – | + | + | – | – | – | – | – |
| **Macrotrachella concinna** Bryce | – | + | – | – | – | + | – | – | + | – | + | – | – | – | – |
| **Macrotrachella** sp. “A” | – | – | – | – | – | + | – | – | – | – | + | – | – | – | – |
| **Macrotrachella** sp. “B” | – | – | + | + | + | + | + | – | + | + | + | – | + | – | – |
| **Philodina** sp. “A” | – | + | + | + | + | – | – | + | + | + | + | – | – | – | – |
| **Philodina** sp. “B” | – | + | – | – | – | – | – | – | – | + | + | + | – | – | – |
| **Rotaria rotatoria**  
(Pallas) | – | – | + | + | – | + | + | + | – | + | + | + | – | – | – |
| **Annelida** | | | | | | | | | | | | | | | |
| **Enchytraeidae** | + | – | + | + | – | – | + | + | – | + | + | + | + | + | – |
| **Arthropoda** | | | | | | | | | | | | | | | |
| **Crustacea** | | | | | | | | | | | | | | | |
| **Alona zeinecki** Studer | + | + | + | + | + | + | – | + | – | – | + | + | – | – | – |
| **Chydorus sphaericus**  
(O. F. Müller) | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| **Ilyocryptus brevidens** | – | – | + | – | – | + | + | + | – | – | + | + | – | – | – |
| **Ekman** | + | – | + | + | + | + | + | + | – | + | + | + | – | – | – |
| **Macrothrix hirsuticornis**  
(Norman and Brady) | + | – | + | + | + | + | + | + | – | + | + | + | – | – | – |
| **Boeckella michaelesi**  
(Mrazek) | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| **Boeckella poppei**  
(Mrazek) | + | + | + | + | + | + | + | + | + | + | + | + | + | + | + |
| **Parabroteus sarsi**  
(Boeckella) | + | – | – | – | + | – | – | + | + | + | + | + | – | – | – |
| **Harpacticoid** | + | + | + | + | + | + | + | + | – | + | + | + | + | + | – |
### Table IV. (Continued)

| Lake 1 | Lake 1a | Lake 2 | Lake 3 | Lake 4 | Lake 5 | Lake 6 | Lake 7 | Lake 8 | Lake 9 | Lake 10 | Lake 11 | Block Lake | Parochlus Lake | Lake Gulbrandsen |
|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|-------------|-----------------|
| Ostracoda | + | + | + | + | + | – | – | – | – | + | + | + | + | – |
| Insecta | | | | | | | | | | | | | | |
| Diptera larvae | – | – | + | + | + | – | – | – | – | + | + | + | + | – |
| *Angusticolis claussi* (Müller) | + | + | + | + | + | + | + | + | + | + | + | – | – | – |
| Collembola | – | – | – | + | – | – | – | – | – | – | – | + | – | – |
| Acarina | | | | | | | | | | | | | | |
| Various Acarina | + | + | + | + | – | + | + | + | + | – | – | + | – | – |

Key: +, present; –, not recorded.

### Table V. Occurrence of freshwater invertebrates in seal and penguin wallows, and at locations away from Husvik.

| Penguin colony | Fortuna Bay seal and penguin wallows | Carlita Bay vegetation samples | Hercules Bay moss squeezings | Mossy falls | Freshwater stream | Olsen Valley “S” pond | Leith | Jason Harbour and Jumbo Cove pools | Col to Fortuna Bay | Stromness Lake |
|----------------|--------------------------------------|-------------------------------|-----------------------------|-------------|-----------------|-----------------------|-------|-----------------------------------|------------------|---------------|
| Protozoa | | | | | | | | | | | |
| Testate amoebae | + | – | + | + | + | + | + | + | – | – | + | – |
| Ciliates | – | + | + | – | – | – | – | – | – | – | – | – |
| Vorticellids | – | + | + | – | – | – | – | – | – | – | – | – |
| Radiolaria | – | + | – | – | – | – | – | – | – | + | – | – |
| Platyhelminthes | | | | | | | | | | | | |
| Eyed platyhelminth | – | – | + | – | – | – | – | – | – | – | – | – |
| Eyeless platyhelminth | + | + | – | + | – | – | – | – | – | + | – | – |
| Gastrotricha | | | | | | | | | | | | |
| Various Gastrotricha | + | + | + | – | – | – | – | – | – | + | – | – |
| Tardigrada | | | | | | | | | | | | |
| Various Tardigrada | + | – | + | + | – | + | + | + | – | – | – | – |
| Nematoda | | | | | | | | | | | | |
| *Monhystera* sp. | + | + | + | + | + | + | – | – | – | + | + |
| Various Nematoda | + | – | + | – | – | + | – | – | – | – | – | – |
|                             | Penguin colony | Fortuna Bay seal and penguin wallows | Carlita Bay vegetation samples | Hercules Bay moss squizzings | Mossy falls | Freshwater stream | Olsen Valley “S” pond | Leith | Jason Harbour and Jumbo Cove pools | Col to Fortuna Bay | Stromness Lake |
|-----------------------------|----------------|-------------------------------------|--------------------------------|----------------------------|------------|------------------|----------------------|-------|-----------------------------|-----------------|---------------|
| **Rotifera**                |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| **Monogononta**             |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Cephalodella catellina*    | –              | +                                   | –                              | –                          | –          | –                | –                    | +     | +                          | +               | –             |
| (O. F. Müller)              |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Cephalodella delicata*     | –              | +                                   | +                              | –                          | –          | –                | –                    | –     | +                          | –               | –             |
| Wulfert                     |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Cephalodella forficata*    | –              | –                                   | +                              | –                          | –          | –                | –                    | –     | –                          | –               | –             |
| (Ehrenberg)                 |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Cephalodella gibba*        | +              | +                                   | +                              | –                          | –          | +                | +                    | –     | +                          | –               | +             |
| (Ehrenberg)                 |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Colotheca ornata cornuta*  | +              | –                                   | +                              | –                          | –          | –                | –                    | –     | –                          | –               | –             |
| (Dobie)                     |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Encentrum mustela*         | –              | +                                   | +                              | +                          | –          | –                | –                    | –     | +                          | +               | –             |
| (Milne)                     |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Encentrum salinum*         | –              | –                                   | +                              | –                          | –          | –                | –                    | –     | –                          | –               | –             |
| Dartnell                    |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Eosphora najas*            | +              | –                                   | –                              | –                          | –          | –                | –                    | –     | +                          | +               | –             |
| Ehrenberg                   |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Epiphanes senta*           | –              | +                                   | –                              | –                          | –          | –                | +                    | –     | –                          | –               | –             |
| (O. F. Müller)              |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Euchlanus dilatata parva*  | –              | –                                   | –                              | –                          | –          | –                | –                    | +     | +                          | +               | –             |
| Rousselet                  |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Lecane closterocerca*      | –              | –                                   | –                              | –                          | –          | –                | +                    | –     | –                          | –               | –             |
| (Schmarda)                  |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Lecane flexilis*           | –              | –                                   | –                              | –                          | –          | –                | +                    | –     | –                          | –               | –             |
| Gosse                       |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Lecane lunaris*            | +              | –                                   | –                              | –                          | –          | +                | +                    | –     | –                          | –               | –             |
| (Ehrenberg)                 |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Lepadella acuminata*       | –              | –                                   | –                              | +                          | –          | –                | –                    | –     | –                          | –               | +             |
| (Ehrenberg)                 |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| *Lepadella patella*         | +              | +                                   | +                              | –                          | –          | –                | +                    | +     | –                          | –               | +             |
| (O. F. Müller)              |                |                                     |                                |                            |            |                  |                      |       |                             |                 |               |
| Penguin colony Olsen Valley | Fortuna Bay seal and penguin wallows | Carlita Bay vegetation samples | Hercules Bay moss squeezeings | Mossy falls | Freshwater stream | Olsen Valley “S” pond | Leith | Jason Harbour and Jumbo Cove pools | Col to Fortuna Bay | Stromness Lake |
|-----------------------------|------------------------------------|-------------------------------|-------------------------------|------------|------------------|----------------------|------|-------------------------------|---------------------|--------------|
| *Lepadella patella* oblonga (Ehrenberg) | – | + | – | + | + | – | – | – | – | + | – |
| *Lepadella ovalis* (O. F. Müller) | – | + | – | – | – | – | – | – | + | + | – |
| *Lepadella triptera* (Ehrenberg) | – | – | – | – | – | – | – | – | + | – | + |
| *Lindia torulosa* Dujardin | – | – | – | – | – | – | + | – | – | – | + |
| *Monommata* sp. | – | – | – | – | – | – | – | + | – | – | – |
| *Mytilina mucronata longicauda* Dartnall and Hollowday | – | – | – | – | – | – | – | – | – | – | – |
| *Notholca labis* Gosse | – | + | – | – | – | + | – | – | + | + | – |
| *Notholca walterkostei* Paggi | + | – | + | – | – | + | – | + | – | – | – |
| *Trichocerca brachyura* (Gosse) | + | + | + | – | – | + | – | – | – | – | – |
| *Trichocerca rattus globosa* Dartnall and Hollowday | – | – | + | – | – | – | – | – | – | – | – |
| *Trichocerca trigris* (O. F. Müller) | + | – | + | – | – | + | + | – | – | – | – |
| **Bdelloidea** | | | | | | | | | | | |
| *Adineta barbata* Janson | – | – | – | + | + | – | – | – | + | – | – |
| *Adineta* sp. | – | – | – | + | – | – | – | – | – | – | – |
| *Macrotrachela* sp. “B” | – | – | + | – | – | – | – | – | – | – | + |
| *Philodina* sp. “A” | – | – | – | – | – | – | – | – | + | – | – |
| *Philodina* sp. “B” | – | – | – | + | – | – | – | – | – | – | – |
| *Rotaria rotatoria* (Pallas) | – | – | – | + | – | + | + | – | – | – | – |
| Unidentified bdelloid rotifers | + | + | – | – | – | – | – | – | + | – | – |
|                                | Penguin colony Olsen Valley | Fortuna Bay seal and penguin wallows | Carlita Bay vegetation samples | Hercules Bay moss squeezing | Mossy falls | Freshwater stream | Olsen Valley “S” pond | Leith | Jason Harbour and Jumbo Cove pools | Col to Fortuna Bay | Stromness Lake |
|--------------------------------|----------------------------|-------------------------------------|--------------------------------|---------------------------|-------------|------------------|-----------------------|-------|-----------------------------|-----------------|----------------|
| **Annelida**                   |                            |                                     |                                |                           |             |                  |                       |       |                             |                 |                |
| **Enchytraeidae**              |                            |                                     |                                |                           |             |                  |                       |       |                             |                 |                |
| **Arthropoda**                 |                            |                                     |                                |                           |             |                  |                       |       |                             |                 |                |
| **Crustacea**                  |                            |                                     |                                |                           |             |                  |                       |       |                             |                 |                |
| *Alona weinecki* Studer        | –                          | –                                   | –                              | –                         | +           | –                | +                     | –     | +                           | –               |                |
| *Chydorus sphaericus* (O. F. Müller) | +                        | –                                   | –                              | –                         | +           | +                | +                     | –     | +                           | –               |                |
| *Macrothrix hirsuticornis*      | +                          | –                                   | –                              | –                         | –           | –                | –                     | +     | –                           | –               |                |
| Norman and Brady               |                            |                                     |                                |                           |             |                  |                       |       |                             |                 |                |
| *Boeckella poppei* Mrazek      | +                          | –                                   | +                              | –                         | –           | –                | +                     | +     | –                           | –               |                |
| **Harpacticoda**               | –                          | +                                   | +                              | +                         | +           | –                | –                     | –     | +                           | –               |                |
| **Ostracoda**                  | –                          | –                                   | –                              | –                         | –           | –                | –                     | –     | –                           | –               |                |
| **Insecta**                    |                            |                                     |                                |                           |             |                  |                       |       |                             |                 |                |
| **Diptera larvae**             | –                          | –                                   | –                              | +                         | +           | –                | +                     | –     | –                           | +               | +              |
| *Angusticolis claussi* (Müller) | –                          | –                                   | +                              | –                         | –           | –                | –                     | –     | –                           | –               | –              |
| **Collembola**                 | –                          | –                                   | –                              | +                         | –           | –                | –                     | –     | –                           | –               | –              |
| **Acarina**                    |                            |                                     |                                |                           |             |                  |                       |       |                             |                 |                |
| **Various Acarina**            | –                          | –                                   | +                              | –                         | –           | –                | –                     | –     | –                           | +               | –              |

Key: +, present; –, not recorded.
was present in most of the pools and lakes. The chydorids *Alona weinecki, Camtocercus aloniceps,* and *Chydorus sphaericus* clamp the valves of their shells on, and browse their way along, algal filaments. *Chydorus sphaericus* outnumbered the other “chydorids”, making up 95% of the specimens collected in most of the pools and all the lakes while *Camtocercus aloniceps,* which was initially confused with *Alona weinecki,* was rare.

Copepoda. Dwarf specimens of *Boeckella poppei* occurred in the lakes and pools on the Husdal plain and in the tiny pools/ponds on the point of Tønsberg Peninsula while normal-sized specimens occurred in most lakes (see also Hessen et al. 1989). Both *Boeckella michaelseni* and the predatory *Parabroteus sarsi* were restricted to lakes.

Harpacticoida. Two species of Canthocamptidae were present in most of the freshwater lakes and pools sampled and probably represent universal distributions. Five common inshore marine species (D. Hamond, personal communication) were found in the brackish pools (Table III).

Ostracoda. The distributions of *Eucypris fontana* (Graf), together with *Tanycypris* sp. and *Candona* sp., both of which are new records for South Georgia (K. Martins, personal communication), were not determined.

Hexapoda

Diptera. Two species of midge (chironomid larvae)—*Parochlus steinenii* (Gerke) and an unidentified species of *Limnophyes*—were collected from rivers and streams (Brundin 1970). *Parochlus steinenii* has also been reported from the South Shetlands Islands (Edwards and Usher 1985). A related species, *Eretmoptera murphi* Schaeffer, was found at Signy Island (Block et al. 1984) where it has survived since being introduced in transplants from South Georgia and/or the Falkland Islands in 1967.

Coleoptera. The beetle *Angusticolis claussi* (Müller) was present in all Tønsberg Peninsula lakes and from a number of other locations. This powerful swimmer is able to avoid the plankton nets, and probably has a much wider distribution on South Georgia (Arnold and Convey 1998) than described here.

Collembola. The springtail *Cryptopygus antarcticus* Willem formed rafts up to 10 cm across comprising hundreds of individuals which were observed floating on several of the coastal pools near seal and penguin colonies while isolated individuals were occasionally observed on the surface of other pools.

Chelicerata

Acarina. Eight species of mite—*Bryobia praetiosa* (C. L. Kock), a *Tetranynchus* sp. (Prostigmata); *Globoppia intermedia longiseta* Wallwork, *Halozetes belgica* (Michael), *Magellozetes antarcticus* (Michael), *Platynothrus skottbergii* Tragardh, *Trimalaconothrus flagelliformis* Wallwork, and an unknown larva, all Cryptostigmata—were found in the present survey (Pugh and Dartnall 1994) together with two oribatid mites, *Edwardzetas elongatus* Wallwork and *Trimalaconothrus flagelliformis* Wallwork, recorded by Pugh (1996), which are terrestrial species that were accidentally washed or blown into freshwater.


**Discussion**

The occurrences of the various aquatic invertebrate taxa found at South Georgia are given in Tables I–V. The Grytviken data (Table I) appear poor when compared with similar habitats at Husvik (Tables III, IV). This can be explained by a reduced sampling effort at an early stage of the season when the lakes were ice-covered, and sampling was restricted to shallow outflows where melting had occurred. All of the species collected from Grytviken were subsequently found at Husvik.

The marine pools (Table II) yielded unique species including marine Crustacea and mites as well as the cosmopolitan brackish water rotifers—*Colurella colurus compressa* and *Encentrum spathetium*—both of which have been reported from a number of other Antarctic and subantarctic locations (Dartnall and Hollowday 1985; Dartnall 1993, 1995, 2000).

The pool fauna, with the possible exception of the artificial and overgrown Karrakatta pool (Table III), is essentially similar to that of the lakes (Table IV). The Karrakatta pool is enigmatic. It is devoid of copepods and ostracods, supports only one species of cladoceran instead of three, and is the only habitat where the rotifers *Notholca salina* and *Lecane latissima* were collected.

Block, Parochlus and the Tønsberg Peninsula lakes (Table IV) have very similar faunas. The paucity of species for Gulbrandsen Lake is undoubtedly true as this lake is very isolated at the bottom of an “amphitheatre” formed by several mountains, and is dammed by the Neumayer Glacier. Prevailing west–east winds across the glacier offer limited colonization opportunities. The lake is ice-covered for much of the year and its size and depth fluctuate dramatically, sometimes by many metres a day, as the glacier moves, causing the lake to periodically fill and drain. No trace of benthic vegetation has been found in this lake. The two *Boeckella* species probably feed on microphytes that grow around the edge of the lake, where sun-warmed stones thaw out the ice cover in still air.

The relatively low number of species recorded for the outlying stations (Table V) is undoubtedly a consequence of the small sample volume of the plunge-pots (125 ml) compared with the tens of litres sampled by a plankton net trawl. Consequently, no significance is attached to the paucity of species from Stromness Lake where the flora and fauna is undoubtedly as rich as the Tønsberg Peninsula lakes. Plunge-pots are normally used to augment other sampling methods rather than as a primary sampling method. Nevertheless, the rotifer *Gephyralodella catellina*, which is specific to seal and penguin wallows in the Antarctic, and *Notholca labis*, *Lindia torulosa* and the tardigrade *Echiniscus jenningsi*, were only recovered using this method.

Three species not recorded in the present survey must also be considered as freshwater inhabitants of South Georgia. They are (1) a green hydra reported by Headland (1984)—the first and only record of a freshwater cnidarian from anywhere in the Antarctic region; (2) the anostracan *Branchinecta gaini* (Daday) (Dartnall and Heywood 1980), noted at Stromness in the 1993/94 season (J. C. Ellis-Evans, personal communication) and is believed to be absent from water bodies populated by the predatory diving beetle *Angusticolis clausii*; and (3) the ostracod *Notiocrypridopsis frigogena* (Graf) reported from a freshwater pond fed by a spring above Grytviken and re-described from there (De Deckker 1981).
The anomopodan *Pleuroxus truncata* (Müller), previously reported from South Georgia (Pesta 1928), has not been included as it is now believed to have died out. According to Frey (1993): “no species of the subgenus *Pleuroxus* or related genera occur on the islands of the Scotia Arc except for the aberrant specimen of *Peracantha (=Pleuroxus) truncata* reported from South Georgia (Pesta 1928) which was obviously introduced in connection with whaling operations”. The unknown amphipod reported by Weller (1975) has also not been included as it has not been reported subsequently and is now considered doubtful.

The 110 invertebrate species reported here from the freshwater lakes and pools of South Georgia (Table VI), although nearly four times greater than that reported by Dartnall and Heywood (1980), contain no surprise taxa. Although this survey only covered a small portion of South Georgia the rest of the island is not expected to support a radically different fauna.

The aquatic meiofauna of South Georgia comprises three distinct elements:

1. ubiquitous species such as the cosmopolitan rotifers *Adineta barbata*, *A. gracilis*, *Cephalodella catellina*, *Epiphanes senta*, *Habrotrocha constricta*, and *Lepadella patella*;
2. common species whose ranges extend to other subantarctic islands (Dartnall 1993, 1995, 2003) and to islands of the Scotia Arc but not into the Antarctic, including the

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**Table VI. Numbers of freshwater invertebrate species on the Scotia Arc islands.**

|                     | South Georgia<sup>a</sup> | Signy Island<sup>b</sup> | South Shetland Islands<sup>c</sup> | Antarctic Peninsula<sup>d</sup> | Notes                                      |
|---------------------|---------------------------|--------------------------|------------------------------------|-------------------------------|--------------------------------------------|
| Coelenterata        | 1                         | 0                        | 0                                  | 0                             |                                            |
| Platyhelminthes     | 4                         | 2                        | –                                  | –                             |                                            |
| Gastrotricha        | 3                         | 2                        | –                                  | 0                             |                                            |
| Tardigrada          | 6                         | 8                        | 6                                  | 10                            |                                            |
| Nematoda            | 6                         | >2                       | 6                                  | 5                             |                                            |
| Rotifera            |                           |                          |                                    |                               |                                            |
| Monogononta         | 47                        | 29                       | 19                                 | 6                             |                                            |
| Bdelloidea          | 12                        | 9                        | –                                  | 3                             |                                            |
| Annelida            | 2                         | 1                        | –                                  | 0                             |                                            |
| Crustacea           |                           |                          |                                    |                               |                                            |
| Branchinecta gaini  | 1                         | 1                        | 1                                  | 0                             |                                            |
| Dioptera            | 2                         | 2                        | 1                                  | 0                             |                                            |
| Coleoptera          | 1                         | 0                        | 0                                  | 0                             |                                            |
| Angusticolis clausii|                           |                          |                                    |                               |                                            |
| Collembola<sup>e</sup> |              |                          |                                    |                               |                                            |
| Acrarina<sup>e</sup> | 10                        | 5                        | 3                                  | 1                             |                                            |

Key: +, present; −, not recorded. <sup>a</sup>This study; <sup>b</sup>Heywood et al. (1979), Dartnall and Hollowday (1985); <sup>c</sup>Paggi (1982), Kuczynski (1987), Paggi (1987), Janiec (1993), Janiec and Salwicka (1996); <sup>d</sup>Heywood (1977), Dartnall (1980), Kuczynski (1987); <sup>e</sup>normally terrestrial species that have been washed or blown into freshwater.

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rotifers *Cephalodella forficata*, *C. megaloccephala*, *Notommata glyphura*, *Resticula nyassa*, and crustaceans *Alona weinecki*, *Branchinecta gaini*, and *Macrothrix hirsuticornis*; and

3. species found elsewhere in the world that are not present elsewhere in the subantarctic or Antarctic including *Bryceella stylata*, *Cephalodella auriculata*, *Lecane latissima*, and *Trichocerca tigris*.

The South Georgia fauna does not have an endemic fauna, nor does it include Antarctic endemics, such as the rotifers *Philodina gregaria* Murray and *Adineta grandis*, Murray (1983).

South Georgia, which shares 28 species of rotifer and six species of crustacea with Signy Island, is part of a continuum within the Scotia Arc (Table VI) that links South America with the Antarctic and illustrates a clear decrease in the number of species with increasing latitude.

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