

THE ROTIFERS OF HEARD ISLAND: PRELIMINARY SURVEY, WITH NOTES ON OTHER FRESHWATER GROUPS

by Herbert Dartnall

(with two tables and seven text-figures)

DARTNALL, H. J. G., 1995 (30:vi): The rotifers of Heard Island: Preliminary survey, with notes on other freshwater groups. *Pap. Proc. R. Soc. Tasm.* 129: 7–15. <https://doi.org/10.26749/rstpp.129.7> ISSN 0080-4703. Copper Beeches, 76 Lewes Road, Ditchling, Sussex BN6 8TY, UK; formerly Australian Antarctic Division, Kingston, Tasmania.

Twenty rotifers (three Bdelloidea and 17 Monogononta, including new species of *Encentrum* and *Notholca*), a platyhelminth, gastrotrich, two nematodes, two tardigrades, one enchytraeid worm, four cladocerans, two copepods and three species of mites were recovered from five small pools on Heard Island. The results indicate that the Heard Island fauna is closer to that of Signy Island and Macquarie Island than to that of the much nearer Kerguelen archipelago.

Key Words: rotifers, Heard Island, zoogeography, sub-Antarctic islands.

INTRODUCTION

Heard Island (52°58'–53°12'S; 73°15'–73°51'E) is a small “turtle-shaped” island situated in the southern Indian Ocean, approximately halfway between South Africa (4850 km to the west) and Australia (4350 km to the east), and 1650 km north of the Antarctic Continent (fig. 1). The main body of the island consists of a mountain, Big Ben, topped by a volcanic peak rising to 2745 m. Much of the island is heavily glaciated, the climate severe and, at sea-level, average temperatures only marginally above freezing. The island was first sighted 1833 and was subsequently exploited by sealers (Headland 1989).

A number of the early Antarctic expeditions visited the island, and from 1948 until 1955, a small meteorological base was maintained there by the Australian National Antarctic Research Expeditions (ANARE). Since then, several private expeditions, as well as periodic visits by members of ANARE, have taken place (Headland 1989). On one of the latest of these (January 1991), five freshwater pools were sampled, and the results obtained are presented here.

MATERIALS AND METHODS

Collection and Examination Procedures

In very shallow pools, the plastic collecting bottles (1 litre) were filled simply by immersing them. In deeper water (>0.3 m), the bottles were filled from a handnet (0.36 m cone made of 53 µm mesh), which was swirled through the water. In both cases, the samples were augmented with small scoops of benthic vegetation. All of the samples were collected on 31 January 1991 and were stored at 4°C prior to examination five days later at Davis Station, where they were filtered through a 20 µm mesh and then examined under a dissecting microscope.

Permanent slides were made using polyvinyl-lactophenol, following the method of Russell (1961). The pH (Corning pH meter model 240) and the conductivity (Microprocessor Conductivity Meter model LK196) of the filtrate was determined.

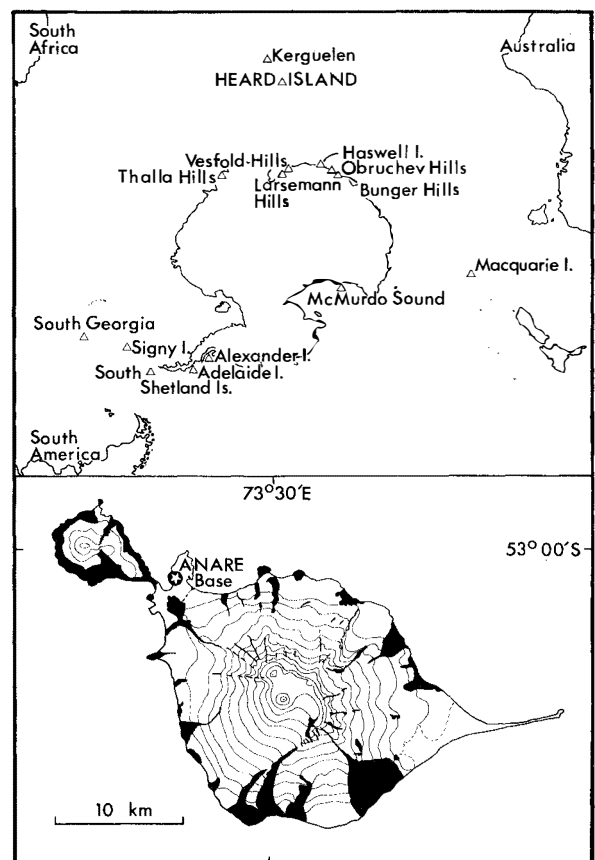


FIG. 1 — Upper: map showing Heard Island and all the other Antarctic and sub-Antarctic locations mentioned in the text. Lower: map of Heard Island showing the position of the old ANARE base; the black areas are exposed rock; the thin lines mark the 200 m ice contours and the broken line the limit of the ice field.

Study Sites

Five pools, located some 200–400 m to the east of the old ANARE meteorological base on Atlas Cove (fig. 1), were sampled. Here, there were numerous bodies of water amongst the cushion plants (*Azorella selago*) and tussock grass (*Poa cookii*). All were small and shallow, the largest one sampled being some 4 m × 6 m and just 0.5 m deep. Details of the size of each pool, its approximate distance from the old ANARE meteorological base and other pertinent information are given in table 1.

RESULTS

Identification of the Fauna

The collection, which was made as an adjunct to a survey of rotifers from the Australian Antarctic Territories, contained a number of other invertebrates. Since the freshwater fauna of Heard Island is very poorly known, brief notes on all species found are included. Their distribution in the five pools is given in table 2.

Protozoa

Protozoa were observed in all of the samples with benthic vegetation and mostly consisted of small spherical, and elongate, colourless ciliates. A few large paramecium-type ciliates were seen; testate amoebae (*Arcella* sp.) were observed amongst algal filaments (*Spirogyra* sp., *Vaucheria* sp. and *Zygnema* sp.). Suctorina and vorticellids decorated the shells of many of the cladocerans.

Platyhelminthes

Several specimens of a large non-eyed acoel were seen in three of the pools (Nos 1, 4 and 5).

Gastrotricha

Only two specimens were seen in sample 4. Both were covered in fine sensory bristles (*Chaetonotus* sp.).

Tardigrada

Tardigrades were found amongst the benthic vegetation. Two species have subsequently been identified: a *Dactylobiotus* sp. and *Hypsibius* sp. (probably *H. antarcticus*).

Nematoda

Nematodes were found in all of the scoops of benthic vegetation. Two species were recognised but have not yet been identified.

Rotifera

Twenty species of rotifer were found — seventeen Monogononta and three Bdelloidea. Only *Habrotrocha* sp. was found in every sample. Eleven species were found at just one location.

Monogononta

Epiphanes senta (O. F. Muller) (fig. 2A)

This large (>600 µm) illoricate species was found only in sample 5, where it was fairly common. The corona bears several tufts of strong cilia. The mastax has malleate trophi, and each uncus bears five principal teeth and several minor ones (fig. 2A). Males were not seen. The specimens found are in close agreement with the published descriptions and measurements for this species (Koste 1978).

Epiphanes senta is cosmopolitan and is usually found in small pools enriched with excreta of domestic animals. In

TABLE 1
Details of the five pools sampled

Pool no.	Distance to east of ANARE base (m)	Size (m)	Depth (m)	Sampling method*	Pool environment
1	200	2 x 1	0.35	A, B	Surrounded by tussock grass and cushion plants
2	200	6 x 4	0.50	C	Surrounded by tussock grass and cushion plants
3	400	4 x 1	0.30	2 x A,C	—
4	400	3 x 1	0.30	2 x A,C	Pool rich with filamentous green algae
5	400	4 x 1	0.10	2 x A,B	Surrounded by cushion plants, bare earth/mud, frequented by elephant seals

* A = benthic scoop, B = immersion sample, C = plankton net.

TABLE 2
Distribution* of invertebrates in the five pools on Heard Island

Pool	No. 1	No. 2	No. 3	No. 4	No. 5
pH	7.01	6.52	6.05	6.48	6.53
Conductivity $\mu\text{S}/\text{cm}$	161	135	184	174	265
Protozoa	+	+	+	+	+
Plathyhelminthes	+	-	-	+	+
Gastrotricha					
<i>Chaetonotus</i> sp.	-	-	-	+	-
Tardigrada					
<i>Dactylobiotus</i> sp.	-	-	+	+	+
<i>Hypsibius antarcticus</i> ?	+	-	+	+	-
Nematoda	+	-	+	+	+
Rotifera					
<i>Cephalodella sterea</i>	+	-	-	-	-
<i>C. ventripes</i>	-	-	-	+	-
<i>Collotheca ornata cornuta</i>	-	-	-	+	+
<i>Colurella colurus compressa</i>	-	-	-	+	-
<i>Encenterum heardensis</i>	+	-	-	-	+
<i>E. mustela</i>	+	-	-	+	+
<i>Epiphanes senta</i>	-	-	-	-	+
<i>Euchlanis</i> sp.	-	-	-	+	+
<i>Lepadella patella</i>	-	-	-	+	-
<i>L. triptera</i>	-	-	-	+	-
<i>Lindia torulosa</i>	+	-	-	+	-
<i>Notholca hollowdayi</i>	+	-	+	+	-
<i>Notommata glyphura</i>	-	-	-	+	-
<i>Ptygura</i> sp.	-	+	-	-	+
<i>Resticula gelida</i>	-	-	-	-	+
<i>Rhinoglena frontalis</i>	-	+	+	-	+
<i>Trichocerca brachyura</i>	-	-	+	+	-
<i>Adineta</i> sp.	-	-	-	+	-
<i>Habrotrocha</i> sp.	+	+	+	+	+
<i>Rotatoria rotatoria</i>	-	-	-	+	-
Annelida					
<i>Enchytraid</i> worm	+	-	+	+	+
Arthropoda					
"Chydorid" 2 spp.	-	+	+	+	+
<i>Macrothrix</i> sp.	-	+	+	-	-
<i>Daphniopsis studeri</i>	-	+	+	+	-
<i>Pseudoboeckella remotissima</i>	+	+	+	+	-
Harpacticoid†	-	-	-	+	-
<i>Alophagus antarcticus</i>	+	+	+	-	+
<i>Halozetes marinus</i> ?	+	-	-	+	-
<i>P. auberti occidentalis</i>	+	-	-	-	-

* Key: + present, - not found

† According to Smith & Sayers (1971) the Heard Island harpacticoid is *Epactophanes richardi antarcticus* (Richters).

the Antarctic, it is found in pools enriched by penguins and seals. It has been reported from the McMurdo Sound area (Murray 1910, Armitage & House 1962, Dougherty & Harris 1963); from fresh and brackish pools in eastern Antarctica, in the Bunger Hills (Korotkevich 1958), at Haswell Island (Kutikova 1958, Donner 1972), and in the Larsemann Hills (Dartnall 1995); from the South Shetland Islands (de Paggi 1982) and the South Orkney Islands (Dartnall & Hollowday 1985); and from the sub-Antarctic Macquarie Island (Dartnall 1993)

Rhinoglena frontalis Ehrenberg (fig. 2B, C)

This was the commonest species in sample 2. A few specimens were also seen in samples 3 and 5. It is a large (>400 μm), slow-swimming species with two tiny toes. The corona is elongated dorsally into a rostrum that bears two prominent eye-spots. The mastax has malleate trophi and each uncus has seven teeth. This is a viviparous species and many specimens were carrying a single developing young. The specimens found are in close agreement with the published descriptions

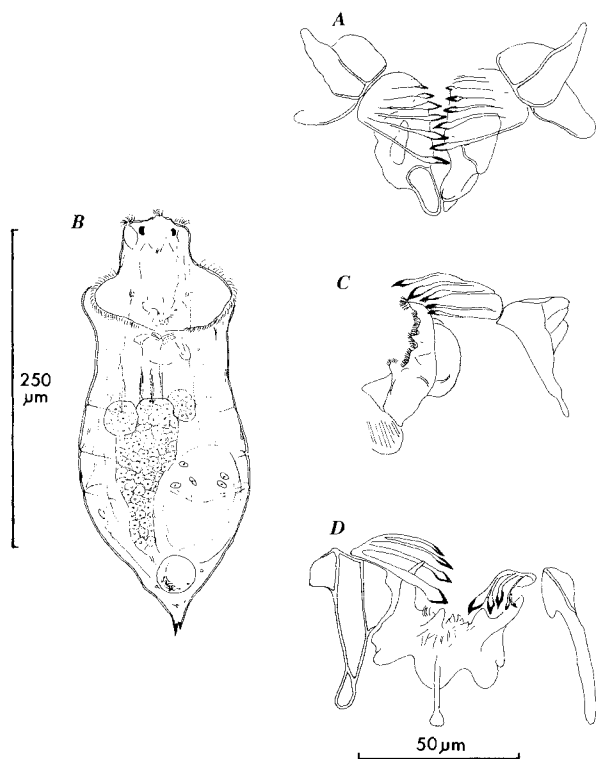


FIG. 2 — (A) *Epiphanes senta*: trophus. (B, C) *Rhinoglena frontalis*: (B) frontal view of whole animal; (C) trophus only left half shown. (D) *Euchlanis* sp.: trophus — note that the left manubrium has been twisted through 90°.

and measurements for this species (Koste 1978). Resting eggs and males were not seen.

Rhinolena frontalis is a cold stenotherm inhabiting shallow water. In the Southern Hemisphere, it has been reported from the Australian mainland by Shiel & Koste (1979), from Tasmania (Koste *et al.* 1988), from New Zealand (Russell 1960) and from Macquarie Island (Dartnall 1993). The closely related *R. ferroensis* Ehrenberg has been reported from the Antarctic in the Bunger Hills (Korotkevich 1958, Kutikova 1958).

Euchlanis sp. (fig. 2D)

Just two specimens of this rotifer were found — one in each of samples 4 and 5. The larger specimen had a dorsal plate 215 µm long and long, slender toes of 83 µm. A single, red eye-spot is present and the mastax has malleate trophi (fig. 2D). Males and resting eggs were not seen. These specimens are very probably *E. dilatata parva* Rousselet, but confirmation of this will have to await the examination of more specimens.

Euchlanis dilatata parva has been reported previously from the Antarctic and Subantarctic at Signy Island and South Georgia (Dartnall & Hollowday 1985). The Signy specimens exhibited a considerable range in size (from 240 to nearly 500 µm) while those from South Georgia were considerably smaller. Both specimens satisfy the original description by Rousselet (1892), who separated *E. dilatata* from *E. parva* on the basis of its small size, greater length and slenderness of the toes, and conspicuous lateral antennae. Considerable confusion exists in the literature

over the differentiation into two species; indeed, Koste (1978), while retaining them as separate species, remarks that *E. parva* resembles a small form of *E. dilatata*. The situation is further confused given the fact that *E. dilatata* grows considerably in its first 24 hours of life (Liebers 1937). Dartnall & Hollowday (1985) considered them one and the same species.

Notholca hollowdayi sp. nov. (fig. 3A–D)

This new species was found in three of the five pools (table 2). It is a medium-sized rotifer more than 210 µm long. The stiff dorsal lorica (200 µm) is oval and more than twice as long as it is wide (92 µm), the greatest width being just posterior of the midpoint. It is decorated with broad striations and series of small pits in the posterior region (Fig 3C). The median and lateral spines are long and are of similar length (22–25 µm). The ventral plate is somewhat smaller (165 µm), flat and undecorated. The anterior margin bears the median notch present in all members of this genera. There is a single, red eye-spot. The mastax has malleate trophi used for eating diatoms and their frustules were seen in a number of stomachs. The unci have three main teeth and up to two vestigial ones.

Notholca hollowdayi belongs to the walterkosteii group but lacks the posterior tab of that species (de Paggi 1982, Dartnall & Hollowday 1985). A new/different species of *Notholca* has been described from almost every Antarctic/sub-Antarctic location sampled, which poses some interesting speciation and biogeographical questions. This is an area for further study.

Holotype

A microslide of a loricate female has been deposited at the Natural History Museum, London — museum registration number 1993.5119. *N. hollowdayi* is named after my colleague and rotifer mentor Eric D. Hollowday.

Colurella colurus compressa Lucks (fig. 4A)

This subspecies was only found in sample 4, where it was fairly common. It is a small species with lorica length c. 100 µm. All of the specimens exhibited the lateral compression characteristic of the subspecies *compressa*. The foot has three segments and two recurved toes which were longer than the foot segments. Overall, the measurements are in close agreement with the published descriptions and measurements for this species (Koste 1978).

Many authors have not differentiated *C. c. compressa* from the *sensu-stricto* *C. colurus*, so that it is difficult to determine their distribution. Both have been reported from the Antarctic before (for review, see Dartnall & Hollowday 1985) and, more recently, Dartnall (1993) reported *C. c. compressa* from Macquarie Island.

Lepadella patella (Müller) (fig. 4B)

This small species was found only in sample 4. It has an overall length of 140 µm and breadth of 65 µm. The small number of specimens found agrees closely with the published descriptions (Koste 1978).

Lepadella patella is cosmopolitan and has been reported

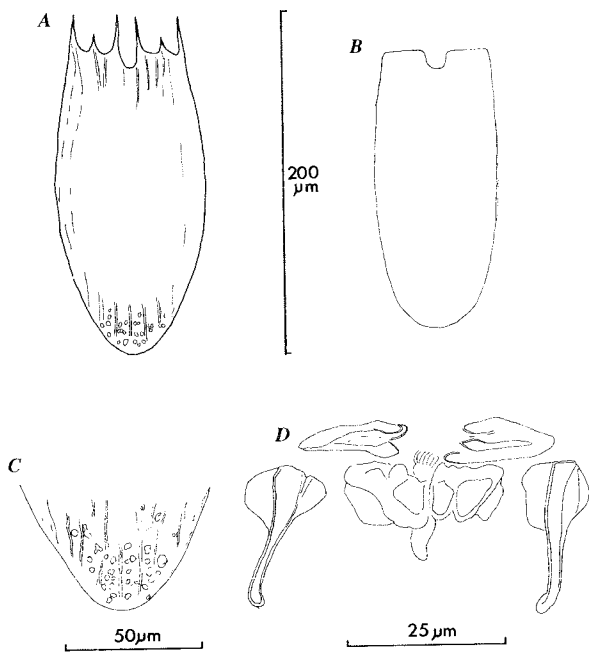


FIG. 3 — *Notholca hollowdayi*: (A) lorica — dorsal plate; (B) ventral plate of lorica; (C) detail dorsal lorica; (D) trophus.

from both Macquarie Island and Iles Kerguelen by Russell (1959). Other locations in the Antarctic include the Obruchev and Bunger Hills (Kutikova 1958, Korotkevich 1958), the Thalla Hills (Opalinski 1972), Langhovde (Sudzuki 1964), the Vestfold Hills (Everitt 1981) and the Larsemann Hills (Dartnall 1995).

Lepadella triptera Ehrenberg (fig. 4C)

This small species was found only in sample 4, where it was rare. The single specimen measured had a lorica length of 75 µm, width 46 µm and toes 21 µm long, all of which are in the accepted range for this species (Koste 1978).

Lepadella triptera is cosmopolitan and has been reported from the Antarctic at Signy Island (Dartnall & Hollowday 1985) and from the sub-Antarctic at Macquarie Island (Dartnall 1993)

Lindia torulosa Dujardin (Fig. 5A)

This large rotifer (>500 µm) was found in two of the pools, where it was fairly common. It is a flexible rotifer with two small toes and a very large, red eye-spot on the brain. The specimens were only observed crawling over the bottom, so that the auricles which appear when the animal swims were not observed.

Lindia torulosa is cosmopolitan and has been reported from one sub-Antarctic and four Antarctic locations. On the Antarctic Peninsula, Beauchamp (1913) recorded it at Jenny Island, while Heywood (1977) reported a new form, *L. torulosa antarctica*, from the nearby Alexander Island. Since then, it has been found in the Larsemann Hills (Dartnall 1995) and from Macquarie Island (Dartnall 1993). Interestingly, it has not been found at Signy Island.

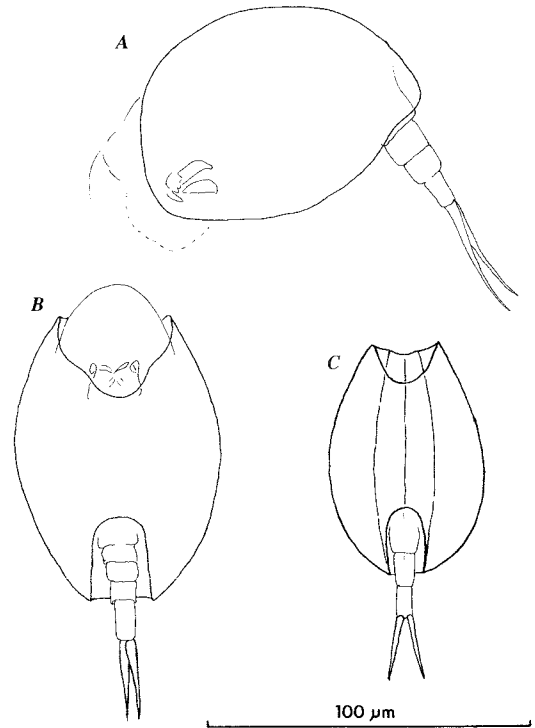


FIG. 4 — (A) *Colurella colurus compressa*: lateral view of lorica and foot. (B) *Lepadella patella*: ventral view of lorica and foot. (C) *Lepadella triptera*: ventral view of lorica and foot.

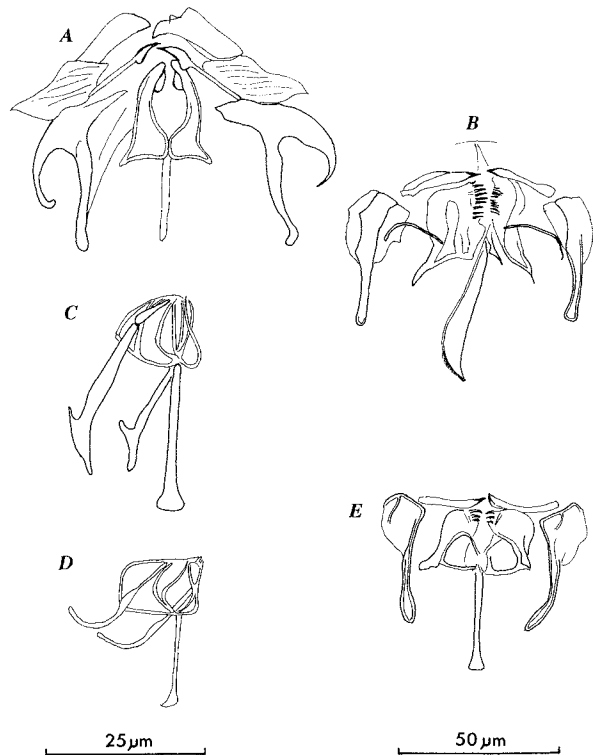


FIG. 5 — (A) *Lindia torulosa*: trophus. (B) *Notommata glyphura*: trophus. (C) *Cephalodella sterea*: trophus. (D) *Cephalodella ventripes*: trophus. (E) *Resticula gelida*: trophus.

Notommata glyphura Wulfert (fig. 5B)

This large species (>400 µm) was found only in sample 4. The species was yellow in colour with a brown tinge and had a large, conspicuous, red eye-spot. The virgate trophi are relatively large: 65 µm deep and 75 µm across — fulcrum 38 µm, rami 28–30 µm, manubria 38 µm and unci 24 µm.

Notommata glyphura has been reported from Europe (Koste 1978), Saudi Arabia (Segers & Dumont 1993), Senegal (de Ridder 1986), Australia (Koste & Shiel 1980) and Macquarie Island (Dartnall 1993).

Cephalodella sterea (Gosse) (fig. 5C)

Just one specimen of this small cephalodellid was found in sample 1. This specimen had an overall length of 168 µm. The body, including the foot, was 136 µm long and the toes were 31 µm long. The mastax has virgate trophi; the fulcrum is 21 µm long, rami 10 µm and manubrium 21 µm.

Cephalodella sterea has been reported from the Antarctic before — in the Obruchev Hills (Korotkevich 1958) and in the Larsemann Hills (Dartnall 1995).

Cephalodella ventripes Dixon-Nuttall (fig. 5D)

Two specimens of this small *Cephalodella* were found. The larger specimen had an overall length of 129 µm, with a body length, including the foot, of 98 µm and toes of 31 µm. This is a new record for the sub-Antarctic and has now also been found in the Larsemann Hills (Dartnall 1995).

Cephalodella ventripes has been recorded from New Zealand (Hilgendorf 1902) and Tasmania (Koste & Shiel 1987).

Resticula gelida (Harring & Myers) (fig. 5E)

Another large, soft-bodied rotifer; the specimens found in sample 5 were up to 400 µm long and are in close agreement with the published drawings and descriptions (Koste 1978).

Resticula gelida has a worldwide distribution and has been reported from the Antarctic at Adelaide Island (Dartnall 1980), from brackish pools at Signy Island (Dartnall & Hollowday 1985), and from the Larsemann Hills (Dartnall 1995).

Trichocerca brachyura (Gosse) (fig. 6A, B)

This small, kidney-shaped rotifer was found in samples 3 and 4. The right toe was much thinner than the left and approximately two-thirds in length (21 µm against 31 µm). The trophi of all the specimens measured (five) were 38 µm long and very asymmetrical. The left manubrium was crutch-shaped and 31 µm long; the right manubrium was much shorter and spindly. The specimens found agree very closely with the published descriptions and drawings (Koste 1978)

Trichocerca brachyura is cosmopolitan and has been reported from three Antarctic and sub-Antarctic locations; from South Georgia and Signy Island (Dartnall & Hollowday 1985) and from Macquarie Island (Dartnall 1993).

Encentrum beardensis sp. nov. (fig. 6C, D)

This new species was found in two pools (Nos 1 and 5). The body is illoricate and very flexible (up to 300 µm long) and bears two short, stubby toes (17.5 µm long). The mastax has forcipate trophi which are distinctive — 50 µm long and 25 µm wide. The manubria have swollen bases and are 33 µm long. The intramallei are small (c. 4.5 µm), and the unci powerful, curved (20 µm long) and pointed. The fulcrum is short (14 µm long) and spindly, while the rami are massive (20 µm long), with a deep body and a pointed edge to the inner median edge. No teeth were seen on the inner edge of the rami. *E. beardensis*, though distinct, bears some similarities to *E. mucronatum* Wulfert and *E. tobyhannaensis* Myers.

Holotype

A microslide of a female showing the trophus has been deposited at the Natural History Museum, London — museum registration number 1993.5118

Encentrum mustela (Milne) (fig. 6E)

This species was one of the commonest, occurring at three locations (table 2). The body is illoricate and very flexible. The mastax has forcipate trophi. The intramallei of most

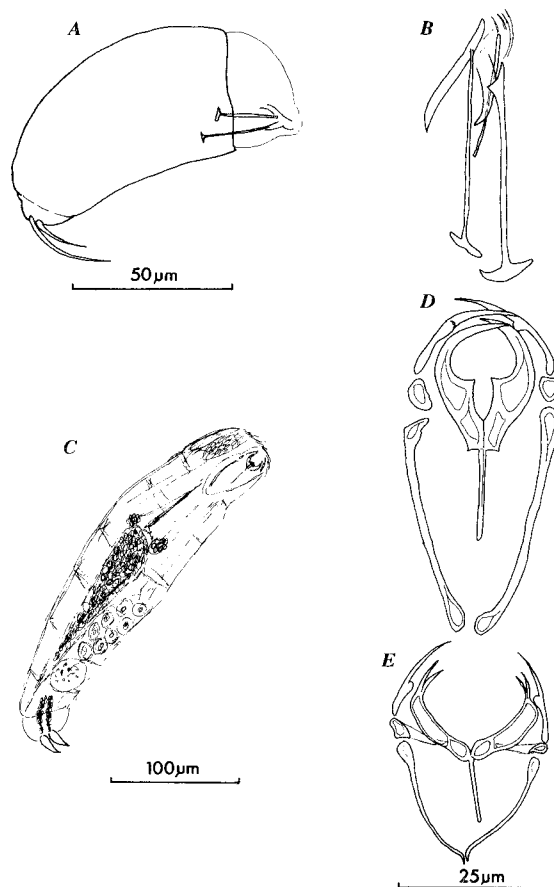


FIG. 6 — (A, B) *Trichocerca brachyura*: (A) lateral view; (B) trophus. (C, D) *Encentrum beardensis*: (C) lateral view; (D) trophus. (E) *Encentrum mustela*: trophus.

specimens have a delicate curved "tail" extending almost to the midline (fig. 6E). This structure, though present in many *Encentrum* species, has not been noted before in *E. mustela*. Previously the trophi were dissolved out in bleach — a practice that may have led to the loss of these delicate "tails"; it was not followed with the Heard Island specimens, where the whole animal was mounted in polyvinyl-lactophenol.

In Europe, *E. mustela* is regarded as a cold stenotherm. A solitary species, it probably has a circumpolar distribution. It has been reported from Signy Island (Dartnall & Hollowday 1985), from Macquarie Island (Dartnall 1993) and from the Larsemann Hills (Dartnall 1995).

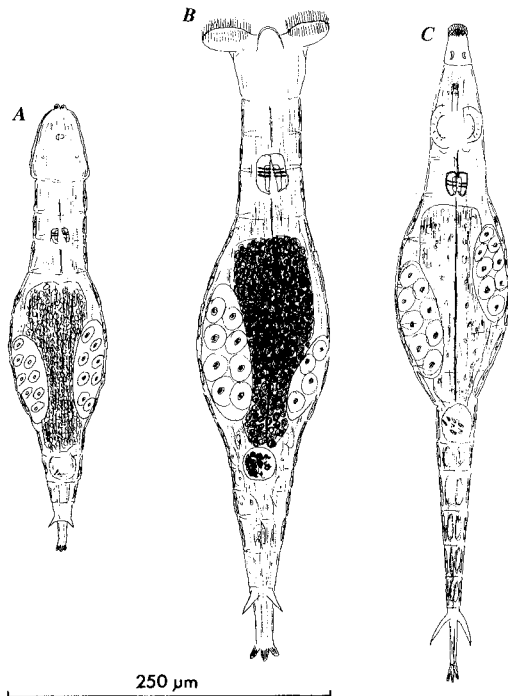


FIG. 7 — (A) *Adineta* sp.: dorsal view. (B) *Habrotrocha* sp.: dorsal view. (C) *Rotaria rotatoria*: dorsal view.

Ptygura sp.

A number of tube-dwelling rotifers were seen in sample 5. They are thought to be *P. crystallina* (Ehrenberg) but confirmation will have to wait examination of additional specimens.

Ptygura crystallina has a worldwide distribution and has been reported from the Antarctic and sub-Antarctic before. It has been found at Signy Island (Dartnall & Hollowday 1985), in the Vestfold Hills (identified as *Ptygura* sp. by Everitt [1981] but now confirmed as *P. crystallina*), in the Larsemann Hills (Dartnall 1995) and Macquarie Island (Dartnall 1993).

Collotheca ornata cornuta (Dobie)

This is one of the easiest rotifers to identify. The margin of the coronal funnel bears five knobs; the dorsal knob is longest, with a short, finger-like projection. A number of the larger specimens (>500 μm) had a single oval egg (45 \times 30 μm) attached to the pedicel.

Collotheca ornata cornuta is cosmopolitan. It has been reported from the Antarctic region several times and undoubtedly has a circumpolar distribution. It was first recorded in 1910 by Murray, who found it at Cape Barne and Cape Royds (reported as *Floscularia cornuta* [Murray 1910]), and has subsequently been reported from there and nearby by Armitage & House (1962 — though their record is for *C. ornata*) and by Dougherty & Harris (1963). It has been reported from eastern Antarctica, from pools in the Obruchev Hills (Korotkevich 1958, Kutikova 1958), from the Larsemann Hills (Dartnall 1995), from Signy Island (Dartnall & Hollowday 1985) and from Macquarie Island (Dartnall 1993).

Bdelloidea

Adineta sp. (fig. 7A)

Just one specimen was seen in sample 4. This specimen was 350 μm long, transparent and appeared to be a juvenile. It bore no characteristic marks.

Habrotrocha sp. (fig. 7B)

This was the only rotifer found in every sample. The largest specimens were almost 600 μm long and yellow-grey in colour. The trochal discs are, when displayed, not much wider than the neck, and eye-spots are absent. The dental formula is 3/3. The dorsal antenna is short and the small conical spurs are joined at their bases. This would appear to be viviparous species — the largest specimen had five young developing within its body cavity.

Rotaria rotatoria Pallas (fig. 7C)

Another large bdelloid (>500 μm), this species was found only in sample 4. It has a smooth cuticle, a large prominent rostrum with two large, red eye-spots and a dental formula of 2/2.

Rotaria rotatoria is cosmopolitan and has been reported from Europe, North, Central and South America, central and South Africa, Australia and New Zealand (Bartos 1951). In the sub-Antarctic it has been recorded from South Georgia by Dartnall & Hollowday (1985 – they identified their single specimen as *Rotaria* sp., but it is now thought to be *R. rotatoria*), and from Macquarie Island (Dartnall 1993).

Annelida

A large enchytraeid worm was common amongst the samples of benthic vegetation. Similar worms have been found at Signy Island in the South Orkneys (Heywood, Dartnall & Priddle 1979), at Macquarie Island (Evans 1970), and at South Georgia.

Arthropoda

Four cladocerans, two copepods and three species of mite were seen. The largest of these is the cladoceran *Daphniopsis studeri* Ruhe, which has been reported before from Heard Island (Smith & Sayers 1971), as well as from Kerguelen (Gay 1982) and in the Vestfold Hills (Korotkevich 1958) and Larsemann Hills (Dartnall 1995). The second largest cladoceran keys down to *Macrothrix hirsuticornis* Norman & Brady, a species which has been reported from a number of Antarctic and sub-Antarctic locations (at Signy Island [Heywood, Dartnall & Priddle 1979]; also at South Georgia [Dartnall & Heywood 1980], and at Macquarie Island [Evans 1970]). The late Prof. D.G. Frey (pers. comm.) has questioned the identification of "*hirsuticornis*" in the Southern Hemisphere, and the true identification of this species will have to await elucidation. The calanoid copepod is *Pseudoboeckella remotissima* Brehm. According to Smith & Sayers (1971), the harpacticoid at Heard Island is *Epactophanes richardi antarcticus* (Richters). Very few examples were found in the present survey and they have not yet been verified. Three species of mite, *Halozetes marinus*? Wallwork, *Podacarus auberti occidentalis* Wallwork and *Algophagus antarcticus* Hughes were found.

DISCUSSION

Although pool No. 4 contained the greatest number and variety of species (table 2), it is not thought to be significantly different from the other pools, when allowance is made for the different sampling methods employed (table 1) and the fact that some species are represented by just one or two specimens.

The wealth of data obtained was surprising, given the opportunistic nature of the sampling — all five pools were sampled within an hour. Similar samplings made at other antarctic locations have not been as successful. Thus, Beauchamp (1940) reported just two species of rotifer from Iles Kerguelen; Russell (1959) added a further ten, when he examined the samples obtained by Sir Douglas Mawson's British, Australian, New Zealand Antarctic Research Expedition of 1929–31, and Lair & Koste (1984) an additional two.

At South Georgia, Dartnall & Hollowday (1985) recorded 15 species from samples collected for them. They had made an extensive study at Signy Island and recorded 38 species, 11 of which were common to both locations (Dartnall & Hollowday 1985). They concluded that an in-depth study at South Georgia would not only find most of the "missing" 27 Signy species but additional temperate ones as well.

Such an expectation would appear to be supported by the most recent results from Macquarie Island. Here, Russell (1959) had originally identified only three species of rotifer from the creek running into Lusitania Bay, but a subsequent and more thorough examination of the major water bodies there identified 39 (Dartnall 1993).

As further evidence of the successful sampling at Heard Island, the collection picked up the larger micrometazoans that had previously been identified from there — i.e. the cladoceran *Daphniopsis studeri* and copepod *Pseudoboeckella remotissima* (Smith & Sayers 1971), the enchytraeid (Lee 1968) and the aquatic mite *Algophagus antarcticus* (Hughes 1955). Indeed, the overall composition of the fauna — an acoel, one species of gastrotrich, two nematodes, two tardigrades, 20 rotifers, one enchytraeid worm, and nine arthropods, made up of four cladocerans, two copepods and three mites — is very similar to the more detailed lists available for Signy and Macquarie Islands. The freshwater fauna list for Signy Island consists of an acoel, one species of gastrotrich, nematodes, tardigrades, 38 rotifers, an enchytraeid worm and 13 arthropods (an anostracan, three cladocerans, two ostracods, two copepods and five mites) (Heywood, Dartnall & Priddle 1979, Dartnall & Hollowday 1985, Pugh & Dartnall 1994). That for Macquarie Island consists of a platyhelminth, two gastrotrichs, nematodes, tardigrades, 39 rotifers, two enchytraeid worms, and 14 arthropods (an isopod, five cladocerans, two ostracods, two copepods and four mites) (Evans 1970, Dartnall 1993, Pugh & Dartnall 1994). The similarities extend to overall numbers for the various groups, even down to the level of genera.

Ostracods are notably absent from the Heard Island list. They are normally found in larger and deeper lakes than were sampled in this study. Rotifers, by virtue of their numbers, afford a more reliable basis for comparison of different locations. At Signy Island, there were 38 species of rotifer belonging to 20 genera (Dartnall & Hollowday 1985) and, at Macquarie Island, 39 species belong to 24 genera (Dartnall 1993), with 12 species and 16 genera common to both locations. At Iles Kerguelen, 14 species belonging to 12 genera have been reported (Beauchamp 1940, Russell 1959, Lair & Koste 1984). Kerguelen shares 11 genera and five species with Macquarie Island, and one species and nine genera with Signy Island. Heard Island, with 20 species belonging to 17 genera, shares 15 genera and 11 species with Macquarie Island, 13 genera and eight species with Signy Island, and only six genera and no species with Kerguelen.

All of this would seem to indicate that only about half the Heard Island rotifers have been found. At present, the fauna at Heard Island seems very dissimilar to its near neighbour Kerguelen and has much more in common with Macquarie Island, to the east, and South Georgia and Signy Island, to the west, but further studies are needed to clarify this.

ACKNOWLEDGEMENTS

My thanks to Tony Flaherty for making the collections at Heard Island, and to the Australian Antarctic Division for their help and support in making this possible. I also thank Dr Geoff Boxhall of the Natural History Museum, London, for identifying the copepods; and Dr Phil Pugh and Ms Sandra McInnes of the British Antarctic Survey, Cambridge, for their help in identifying the mites and tardigrades respectively.

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