

AUSTRALIAN NATIONAL ANTARCTIC RESEARCH EXPEDITIONS

ANARE RESEARCH NOTES 89

The Rotifers of Macquarie Island

H.J.G. Dartnall



ANTARCTIC DIVISION
DEPARTMENT OF THE ENVIRONMENT,
SPORT AND TERRITORIES

ANARE RESEARCH NOTES (ISSN 0729-6533)

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Published May 1993
ISBN: 0 642 19286 3

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THE ROTIFERS OF MACQUARIE ISLAND

by

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ABSTRACT

Thirty-nine species (31 Monogononta and 8 Bdelloidea) are described from Macquarie Island. Thirty-eight of these are new records for the island.

1. INTRODUCTION

This report describes the rotifers collected at Macquarie Island during the 1989-90 summer. Macquarie Island ($54^{\circ}30'S$, $158^{\circ}57'E$) is a subantarctic island approximately 1500 km SSE of Tasmania, and 1100 km SSW of New Zealand (Figure 1). The island, which is 35 km long and up to 5 km wide, consists of an elevated and undulating central plateau (200 to 300 m asl) that falls away steeply to a narrow coastal platform. Situated in the Southern Ocean, the island has a wet, windy and foggy climate typical of mid-latitude oceanic islands with a north-west to westerly air flow, a cool and narrow temperature range ($-5.7^{\circ}C$ to $13.6^{\circ}C$), and a moderate and regular amount of precipitation (913 mm on 303 days in 1989). As a consequence the island is green and wet with many large lakes, streams and much standing water.

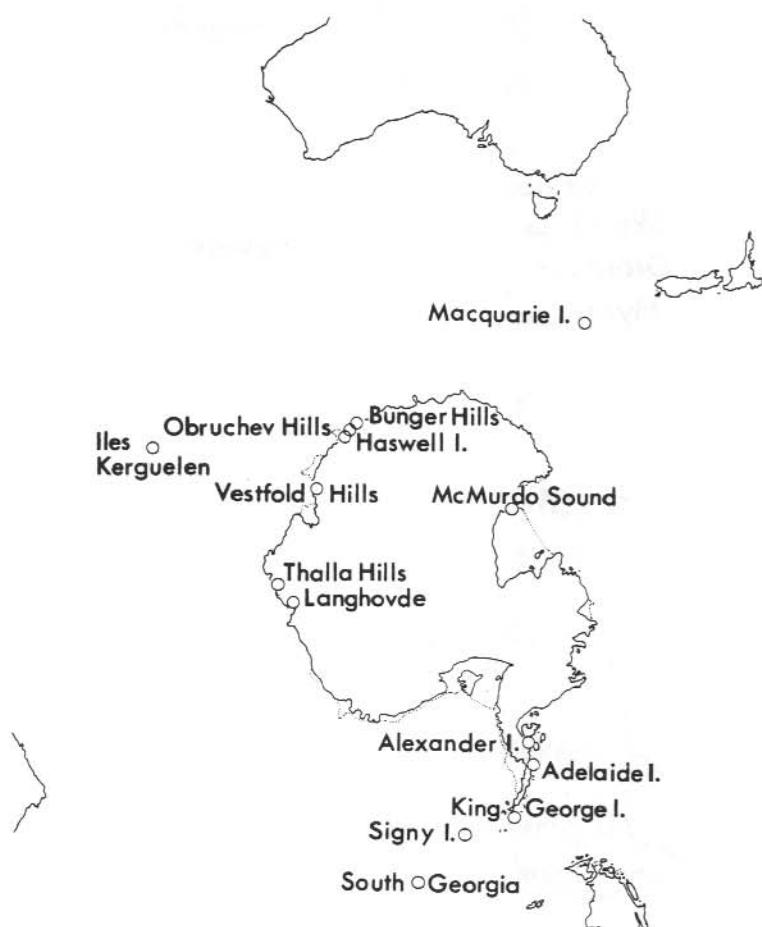


Figure 1. The location of Macquarie Island and other Antarctic and subantarctic locations mentioned in the text.

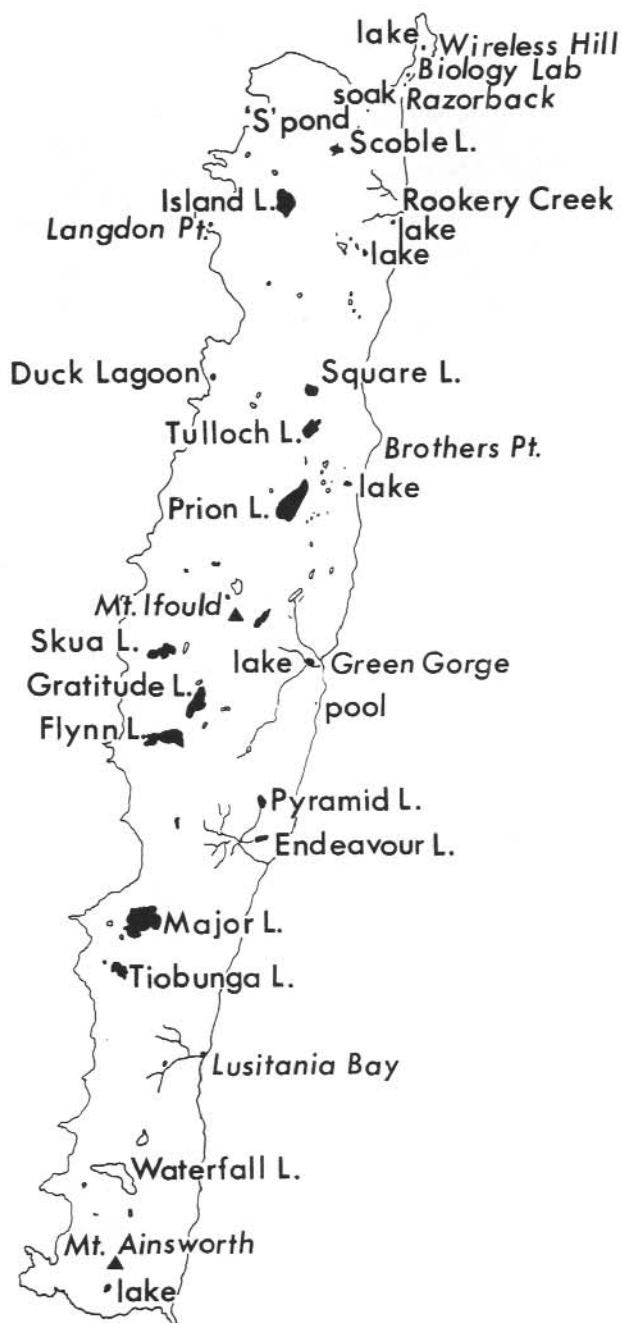


Figure 2. Macquarie Island showing the principle lakes (in-filled lakes were sampled). Further sampling locations are described in the text either by reference to their location relative to these main sites, or by their vegetative content.

2. MATERIALS AND METHODS

Planktonic specimens were collected using a fine net (25 μ m mesh). Samples from streams, pools and lake shallows were taken from the water's edge as scoops of benthic vegetation plus surrounding water. Deep-water bottom samples were obtained by means of a hand-operated baling pump and rigid plastic tubing (after Dartnall and Hollowday 1985). This apparatus was hung over the side of an inflatable rubber boat or deployed from the shore.

The samples were examined in the laboratory using a binocular dissecting microscope, and a high-powered compound microscope. Drawings were made from free-swimming specimens, from living specimens kept under slight compression by means of a coverslip mounted on vaseline, from specimens relaxed and narcotised with tetra-sodium pyrophosphate (Robotti and Lovisolo 1972), and from permanent slides which were examined under phase-, and differential-interference contrast (Nomarski). Permanent slides were made using polyvinyl-lactophenol. This method while ideal for rotifer trophi (Russell 1961) is not generally recommended for whole mounts as some lorica details are lost as the polyvinyl-lactophenol clears. It can be mitigated by examining the specimen under phase and Nomarski. The method does guarantee a specimen slide which, in view of the rarity of some specimens, was deemed to be important.

Conductivity and pH measurements were made with a Hanna water test meter.

3. LAKE AND POOL NAMES

Thirty-four lakes and pools are referred to in this survey but only fourteen of them have names approved by the Nomenclature Board of Tasmania. The unnamed lakes are identified by their proximity to natural features or by other notable properties e.g. the lake to the south of Mount Ainsworth, the lake at Green Gorge, and the lake with two rafts of floating vegetation. Unofficial names based on local usage have in the past been given and have even found their way into the literature. The three examples given above are commonly known as Ainsworth Lake, Green Gorge Tarn, and Floating Island Lake (Selkirk, Seppelt and Selkirk 1990).

The locations of the pools are similarly fixed e.g. the pool 1 km south of Green Gorge, the pool outside the biology laboratory, and the stream running into Lusitania Bay. Exceptions are the 'soak', a flooded carpet of vegetation close to the track leading to, and on top of plateau at the north end of the island; and 'S' pond, another trackside pool further south, sampled and so-named by Evans (1970).

The locations of the water bodies sampled are shown in Figure 2.

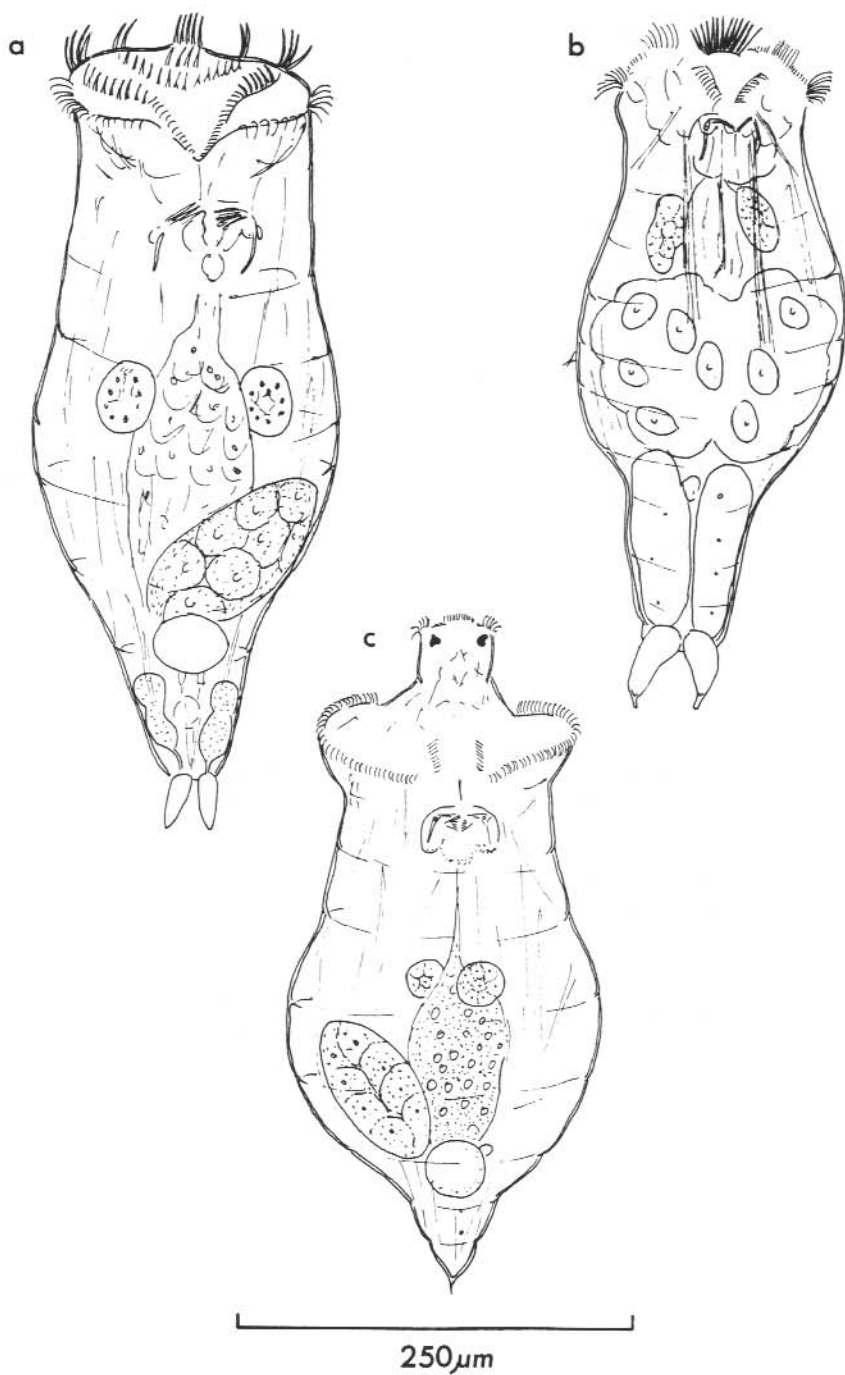


Figure 3.
Epiphanes senta: a) ventral view, b) Duck Lagoon specimen.
Rhinoglena frontalis: c) ventral view.

4. TAXONOMY

Descriptions and drawings of the 39 species found follow. Those species that are well-known are only briefly described and identification is based on the drawings. In general the drawings in individual figures are all to the same scale, as indicated by the horizontal scale bar. Exceptions are indicated by the vertical scale bars that are drawn to the left of the relevant figure.

The term worldwide is used, where appropriate, after reference to the following authorities: Bartos (1951), Chengalath (1984), de Ridder (1972, 1986), Hussey (1981), Koste (1978), Koste and de Paggi (1982), Koste and Shiel (1987), Kutikova (1970), Russell (1960) and Shiel and Koste (1979). Specific references to subantarctic and Antarctic records are always quoted.

Microscope slides of some of the rotifers found at Macquarie Island have been deposited with the Tasmanian Museum and Art Gallery in Hobart. They have been given registration numbers from K1149 to K1257.

Class MONOGONONTA
Order PLOIMA
Family BRACHIONIDAE
Genus *Epiphanes* Ehrenberg

Members of this genus are large illoricate rotifers with a conical, cylindrical or sack-shaped body. The corona bears several combs of stiff cilia. The mastax has malleate trophi. Only one species was found.

Epiphanes senta (OF Muller)
(Figures 3a and 4a) (Tasmanian Museum Nos K1149 to K1152)

This species was found in the lakes on the west coast at Duck Lagoon, the small lake alongside Duck Lagoon, at Langdon Point, and in the wallow sites at Razorback, the wallow pool outside the Biology Laboratory, and at Lusitania Bay (Table 2). It had a maximum length in excess of 550 μm . Males sampled from Duck Lagoon and the pool alongside the Biology Laboratory were approximately half this size and lacked trophi and digestive organs. Eggs were circular (180 μm in diameter) and brown. The Macquarie Island specimens agree closely with published descriptions for this species (Koste 1978).

At the end of February a return visit was made to Duck Lagoon with the object of obtaining males for illustration. None was found and the '*Epiphanes senta*' collected then showed considerable differences from those collected earlier. They were smaller (>450 μm) with a well-defined foot, two massive toes and extremely large pedal glands. The toes are curved and capped by a small cylinder with ducts leading to the paired pedal glands that occupied the whole of the foot (Figure 3b). The trophi though of the same pattern as *E. senta* were considerably smaller and finer (Figure 4b and 4c). The taxonomic position of the Duck Lagoon specimens is not clear and warrants further study.

Epiphanes senta has a worldwide distribution and is normally found in small pools that are enriched with the excreta of domesticated fowls and cattle. It has also been reported from the Antarctic: from the McMurdo Sound area (Murray 1910, Armitage and House 1962, Dougherty and Harris 1963), from fresh and brackish habitats in the Bunker Hills (Korotkevich 1958), and at Haswell Island (Kutikova 1958, Donner 1972), and from the off-lying islands of King George, one of the South Shetland Islands (de Paggi 1982), and at Signy, one of the South Orkney Islands (Dartnall and Hollowday 1985).

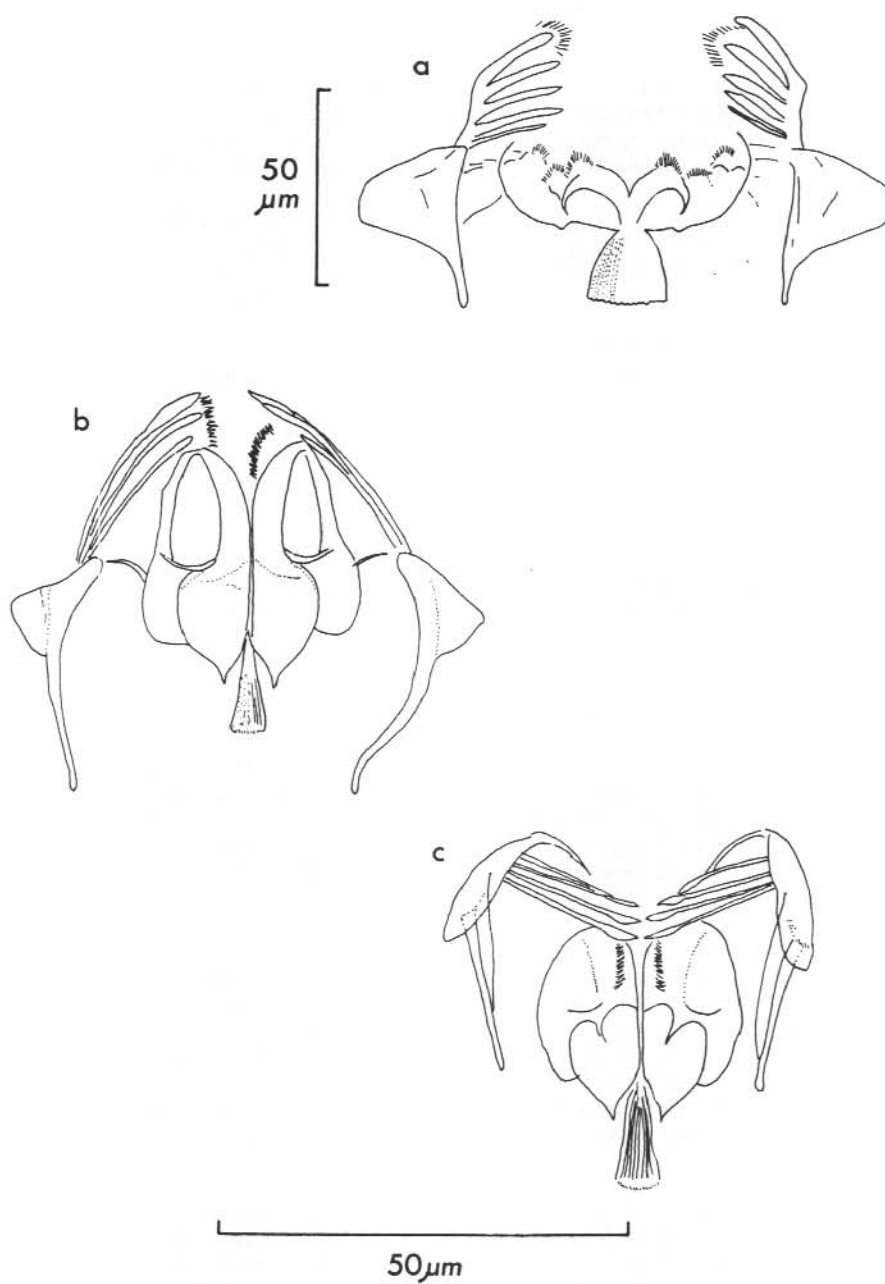


Figure 4.
Epiphanes senta; a) trophi; b and c) Duck Lagoon specimens trophi, ventral view.

Genus *Rhinoglena* Ehrenberg

The members of this genus are large and illoricate although the foot and toes are very small. The corona is dorsally elongated to a rostrum bearing two prominent eye spots. The mastax has malleate trophi. Only one species was found.

Rhinoglena frontalis Ehrenberg

(Figure 3c) (Tasmanian Museum Nos K1156 and K1157)

Rhinoglena frontalis is a cold stenotherm inhabiting shallow water and has been reported from New Zealand (Russell 1960). The closely related *R. fertoensis* has been reported from Antarctica in the Bunger Hills (Korotkevich 1958).

This species was only found in two lakes – the lake with floating vegetation to the north of Mt Elder and the lake below Mt Ainsworth. At nearly 450 μm this was one of the larger Macquarie Island species. The broad proboscis bears two red eyes. Very few specimens of this slow-swimming species were found. Resting (mictic) eggs, and males were not seen.

Genus *Keratella* (Bory St Vincent)

In this genus the body is strongly loricate, flattened ventrally and either rectangular or pointed. The dorsal plate is domed and faceted, and bears six spines on the anterior margin. There is no foot. The mastax has large malleate trophi. One species was found.

Keratella sancta Russell

(Figure 5a) (Tasmanian Museum Nos K1158 and K1159)

Four specimens were found in Flynn Lake. The lorica was 190 μm long and 105 μm wide at its widest point. The two Macquarie Island specimens measured, though marginally larger than those reported from New Zealand (Russell 1944), fall within the size range quoted by Lair and Koste (1984) for Iles Kerguelen. The median anterior spines are both larger and stronger than both the Iles Kerguelen and New Zealand specimens. They are gently curved like those at Iles Kerguelen and are not bent at their distal end like those from New Zealand. The posterior spines are also longer and thicker. The pattern of plates on the dorsal surface of the lorica is closer to that shown for the New Zealand specimens (Russell 1944) than that from Lake Studer, Iles Kerguelen (Lair and Koste 1984). In general terms (overall size, shape of the facets etc.) the Macquarie Island specimens agree with the described examples (Table 1).

Table 1. Comparative measurement of *Keratella sancta* from New Zealand, Iles Kerguelen and Macquarie Island.

	Iles Kerguelen ¹	Macquarie Island	New Zealand ²
Lorica length*	90 - 177 μm	144 - 147 μm	130 - 140 μm
Lorica width	60 - 120 μm	90 - 105 μm	90 - 100 μm
<i>Length of spines</i>			
Median	35 - 38 μm ⁺	41 μm	32 - 37 μm
Intermediate		17 - 20 μm	17 - 21 μm
Lateral		17 μm	16 - 20 μm
Posterior	5 - 15 μm	20 - 21 μm	8 - 12 μm

¹ Lair and Koste (1984); ² Russell (1944). *Length of Lorica without spines

⁺ given as 15 - 18 in Lair and Koste (1984), but this is obviously a typographical error from their drawings of *K. sancta*.

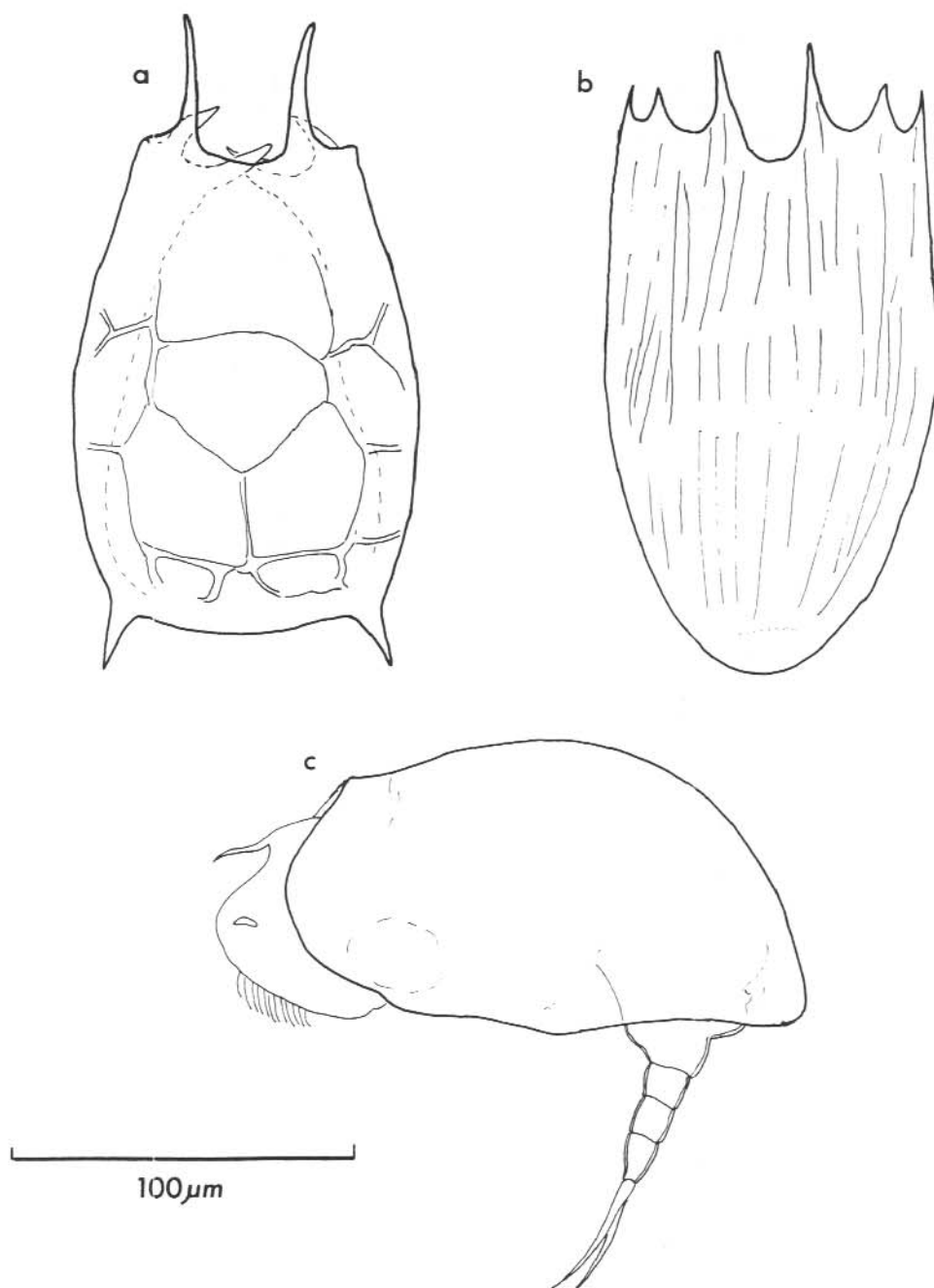


Figure 5.
Keratella sancta; a) dorsal view of lorica.
Notholca jugosa; b) lorica dorsal view.
Colurella colurus compressa; c) lateral view.

Keratella sancta has been reported from two locations; the South Island of New Zealand (Russell 1944), where it was found in warm (12°-23°C) alkaline waters (pH 9-10); and from Iles Kerguelen (Russell 1959, Lair and Koste 1984). The surface waters of Lake Studer on Iles Kerguelen have an annual temperature range of 0° to 8°C and pH of 7.05. Flynn Lake on Macquarie Island has a similar temperature range and recorded pH value of 7.8.

Genus *Notholca* Gosse

In this genus the lorica is a box-like structure of two plates. The anterior margin of the dorsal plate has two or three pairs of spines. Lacking a foot and/or ventral attachment disc the members of this genus are free swimming. The mastax has malleate trophi. Most members feed on diatoms. Only one species was found.

Notholca jugosa Gosse (Figure 5b) (Tasmanian Museum Nos K1160 to K1168)

This species was found in practically every lake and pool sampled (Table 2), and thus tolerates a very wide pH and salinity range at Macquarie Island. The dorsal plate (maximum length 180 µm, width 100 µm) has three pairs of spines on the anterior margin. Males were not seen.

The taxonomic status of *Notholca jugosa* has been questioned by many authors, who have considered it a synonym of *N. squamula* (Muller). Whilst acknowledging that the two are very closely related, and that the dimensions of the lorica are not a good taxonomic basis for identification due to their plasticity; the two are nevertheless considered to be separate species. Detail of the trophi may be the identification key for the future.

Because many authors have considered them synonymous, the distribution of *Notholca jugosa* cannot be accurately determined. Originally described from marine tidal pools in Scotland, this species has also been reported from lakes in Asia including one at an elevation of 4000 m (Kutikova 1970) and from a brackish lake on Iles Kerguelen (Lair and Koste 1984).

Genus *Colurella* Bory de St Vincent

The lorica of this genus is flattened laterally so that it appears mussel-shaped. The head is decorated with a small, retractable, semi-circular shield dorsal to the corona. The foot is made up of three or four segments and there are two slender toes, which are normally longer than the foot. The mastax has malleate trophi. A grazing genus, most members nibble at the algal cells found on the surfaces over which they move. Most species have two lateral eyes. Only one species was found at Macquarie Island.

Colurella colurus compressa Lucks (Figure 5c) (Tasmanian Museum Nos K1169 and K1170)

The distribution of *Colurella colurus compressa* is difficult to determine as many authors have not differentiated it from the widely distributed *C. colurus* (Ehrenberg). Both have been reported from the Antarctic; *C. colurus* from Jenny Island, south of Adelaide Island, where it was identified as *C. amblytela* (Beauchamp 1913); and from Iles Kerguelen (Russell 1959). *C. compressa* was reported from Signy Island (Dartnall and Hollowday 1985). The form *compressa* is now attributed to the *C. colurus* reported from Adelaide Island (Dartnall 1980) and to the *Colurella* sp. found at Ablation Point, Alexander Island (Heywood 1977).

This species was found in brackish habitats – the small lake by Duck Lagoon, the wallows outside the Biology Laboratory, the wallows at Razorback, and in the tiny coastal pool 1 km south of Green Gorge. It is a small rotifer, with a lorica length of 150 µm and depth of 75 µm. The foot has three segments and two slightly curved toes approximately the same length as the foot (40 µm).

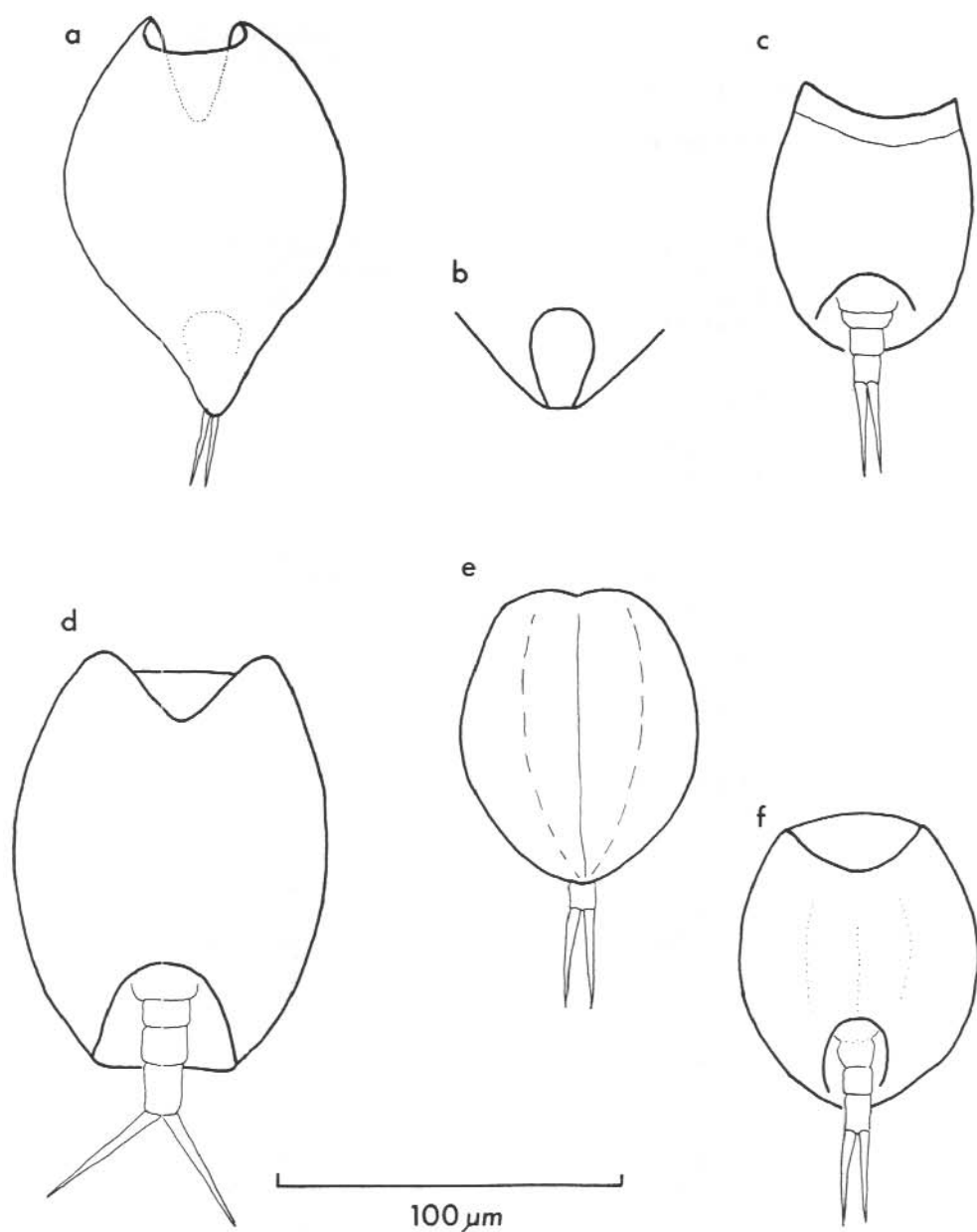


Figure 6.

Lepadella acuminata; a) dorsal view of lorica; b) ventral view of foot aperture.

Lepadella minuta; c) ventral view of lorica.

Lepadella patella; d) ventral view of lorica.

Lepadella triptera; e) dorsal view of lorica; f) ventral view of lorica.

Genus *Lepadella* Bory de St Vincent

In this genus the lorica, which is composed of a single piece, completely encloses the body and is compressed dorso-ventrally. The foot opening is large, and situated between the middle and the posterior end of the ventral surface. The foot is composed of three or four segments and there are two long, slender toes. The head has a pair of lateral eyes. The mastax has malleate trophi. Four species were found at Macquarie Island.

Lepadella acuminata (Ehrenberg)
(Figure 6a and 6b) (Tasmanian Museum Nos K1171 and K1172)

Three specimens of this species were found in the material collected as *Lepadella patella* (Muller). Two of the specimens were unmistakable with the posterior end of the lorica characteristically pointed, and anterior margin with its deep ventral sinus (Figure 6a). The other (Figure 6b) had a bluntly rounded posterior resembling the transitional forms to *Lepadella patella* reported by Pejler (1962) for pools and lakes of Lapland.

Lepadella acuminata has a worldwide distribution including New Zealand (Russell 1960). It has also been reported from Iles Kerguelen (Russell 1959).

Lepadella minuta Montet
(Figure 6c) (Tasmanian Museum No K1173)

This very small species was found in Pyramid, Gratitude and Tiobunga Lakes, and the lake below Mt Ainsworth. The specimens were small; length of lorica 56 - 60 μm , width 35 - 45 μm , with very long toes (17 - 19 μm). The cross section is 'D' shaped, and the foot aperture semicircular. The small *Lepadella patella oblonga* (Ehrenberg) reported from Signy Island, and South Georgia (Dartnall and Hollowday 1985) are now thought to be specimens of *L. minuta*. The Macquarie Island specimens are fractionally larger and have longer toes, while the foot aperture in the Signy and South Georgia specimens is 'U' shaped. These variations are within the limits generally accepted for this species.

Lepadella patella (Muller)
(Figure 6d) (Tasmanian Museum Nos K1174 to K1180)

One of the commonest Macquarie Island rotifers, this species was recorded at practically every location (Table 2). Eggs were not found but a solitary male, thought to be of this species, was recorded from the lake below Mt Ainsworth.

Lepadella patella has a worldwide distribution, and has been reported from both Macquarie Island and Iles Kerguelen by Russell in 1959. Other locations in the Antarctic include the Obruchev and Bunger Hills (Kutikova 1958, Korotkevich 1958), the Thala Hills (Opalinski 1972) and Langhovde (Sudzuki 1964).

Lepadella triptera Ehrenberg
(Figure 6e and 6f) Tasmanian Museum Nos K1181 to K1184

This very small species was recorded from Major, Square, Prion, Gratitude and Scoble Lakes and the lake below Mt. Ainsworth. The toes of the Macquarie Island specimens, at a maximum length of 30 μm , are longer than usually reported. In all other respects, length of trophi (12 μm), length of lorica (65 μm) and width (57 μm), they are in close agreement to those quoted for the USA (Harring 1916), Russia (Kutikova 1970) and Iceland (de Ridder 1972).

Lepadella triptera has a worldwide distribution and has been reported from the Antarctic once before at Signy Island (Dartnall and Hollowday 1985).

Family LECANIDAE
Genus *Lecane* Nitzsch

In this genus the smaller ventral plate of the lorica projects beyond the posterior margin of the dorsal plate. The two plates are joined by a flexible membrane. The foot is short and the toes are long. The mastax has malleate trophi. Only one species was recorded.

Lecane glypta Harring and Myers
(Figure 7a and 7b) (Tasmanian Museum Nos K1185 to K1188)

This species was found in Skua, Prion, Flynn, Tiobunga and Scoble Lakes, the lake below Mt. Ainsworth and in the 'S' pond and the pool by Prion Lake. The dorsal and ventral plates are flexible and intricately patterned. The dorsal anterior margin is slightly convex and there are two small spines at the frontal corners. The ventral margin is straight or slightly concave. The toes, at 26 μm , are approximately 1/4 the total length of the body and bear a small acute claw at their distal end. The malleate trophi are large (35 μm) with pronounced anchor-shaped manubria.

Lecane glypta has a worldwide distribution and has recently been reported from Tasmania (Koste and Shiel 1987).

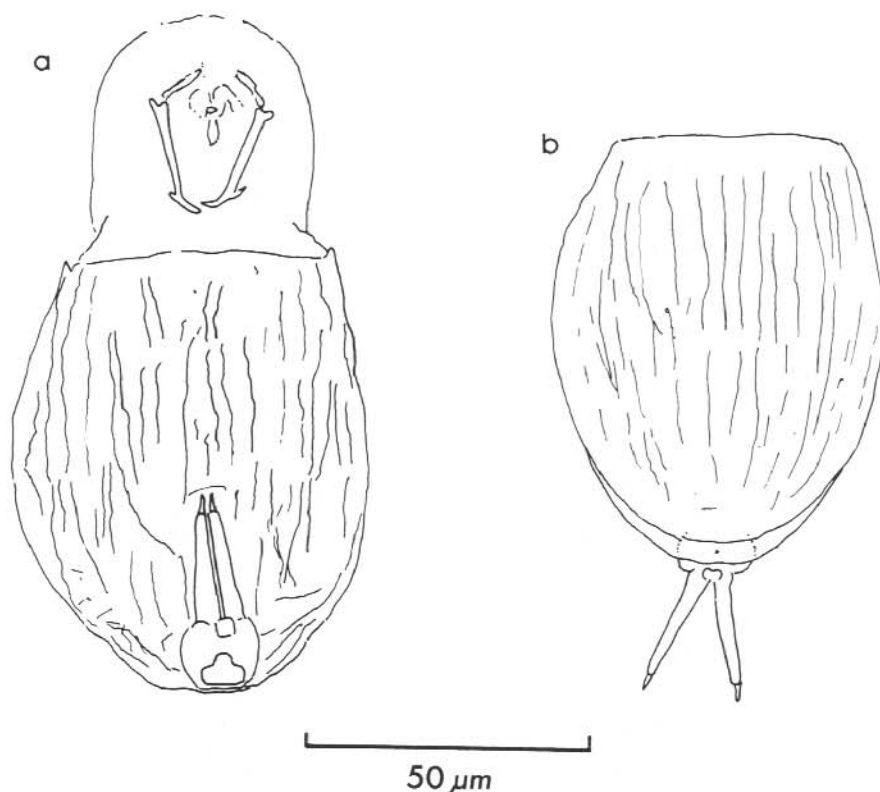


Figure 7.
Lecane glypta; a) ventral view, b) dorsal view.

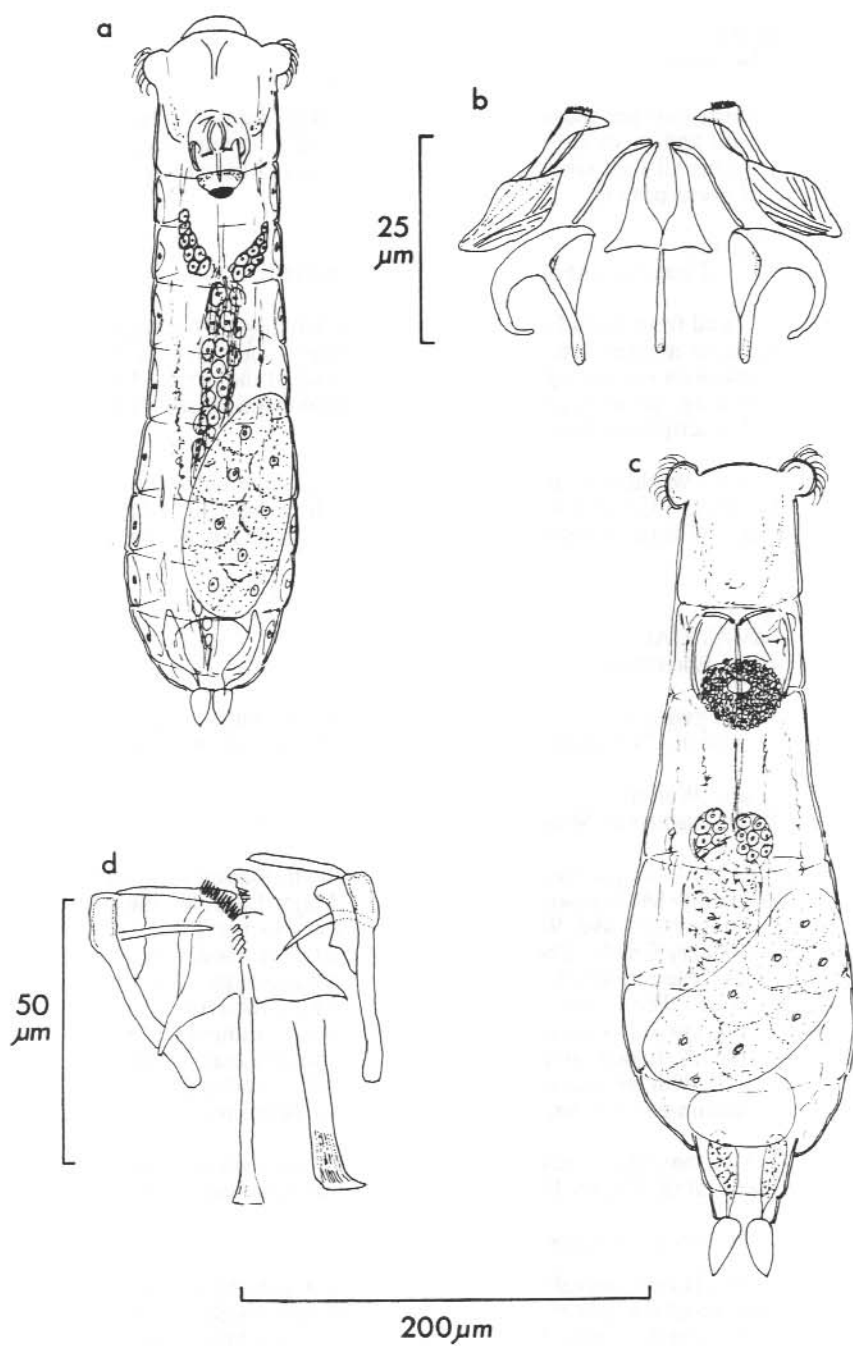


Figure 8.
Lindia torulosa; a) dorsal view, b) trophi.
Notommata glyphura; c) dorsal view, d) trophi.

Family LINDIIDAE
Genus *Lindia* (Dujardin)

The members of this genus are usually large, illoricate and segmented. The corona consists of a simple ciliated band and there are two ciliated tufts usually on auricles for swimming. The members of this genus all feed on cyanobacteria. The mastax has cardate trophi. The toes are small. A large red eye is present.

Lindia torulosa Dujardin
(Figure 8a and 8b) (Tasmanian Museum Nos K1254 to K1257)

This species was found from Prion Lake, Rookery Creek and the pool by Major Lake. Extremely flexible, the specimens measured were from 280 to 340 μm long with very small toes (17 μm). A large and conspicuous red eye spot is present on the end of the brain. The auricles are only visible when swimming. In all respects the Macquarie Island specimens are in close agreement with the published descriptions (Koste 1978).

Lindia torulosa has a worldwide distribution and has been reported from the Antarctic twice before. Beauchamp (1913) found it at Jenny Island, south of Adelaide Island, while Heywood (1977) reported a new form, *Lindia torulosa antarctica*, from Ablation Point on the nearby Alexander Island.

Family NOTOMMATIDAE
Genus *Notommata* Ehrenberg

The members of this genus have virgate trophi, modified for sucking and seizing prey. Paired auricles are often present. The foot is poorly defined and short, with two small toes.

Notommata glyphura (Wulfert)
(Figure 8c and 8d) (Tasmanian Museum Nos K1189 to K1192)

This large species (350 - 425 μm) was found in the lake with floating vegetation to the north of Mt Elder, the lake below Mt Ainsworth, Pyramid Lake, Major Lake, the track lake between Mt Power and Blair, Endeavour Lake, Waterfall Lake and Green Gorge Tarn; in the soak alongside the track, and in Rookery Creek. The head is yellowish and crowned by a simple corona and a pair of large auricles. The retrocerebral organ is dark brown and large. The single red eye spot is also very conspicuous. The trophi are large (66 μm) and characteristic. The fulcrum is long (40 μm) and slightly curved at its lower end. The rami are triangular (29 - 30 μm) and the manubria large and club shaped (40 μm). The unci are similarly massive (30 μm). The second uncial tooth articulates with the base of the head of the manubria and reaches across the rami. The Macquarie Island specimens conform in all respects with the published figures (Koste 1978).

Notommata glyphura has previously only been reported from littoral pools in Europe (Koste 1978) and from Senegal (de Ridder 1986) so that its presence here was unexpected.

Genus *Cephalodella* Bory de St Vincent

In this genus the body is compressed laterally and curved towards the ventral surface. The lorica is delicate and made up of four plates. The foot is short, and the single segment bears two curved toes. The mastax has virgate trophi. Seven species were found at Macquarie Island.

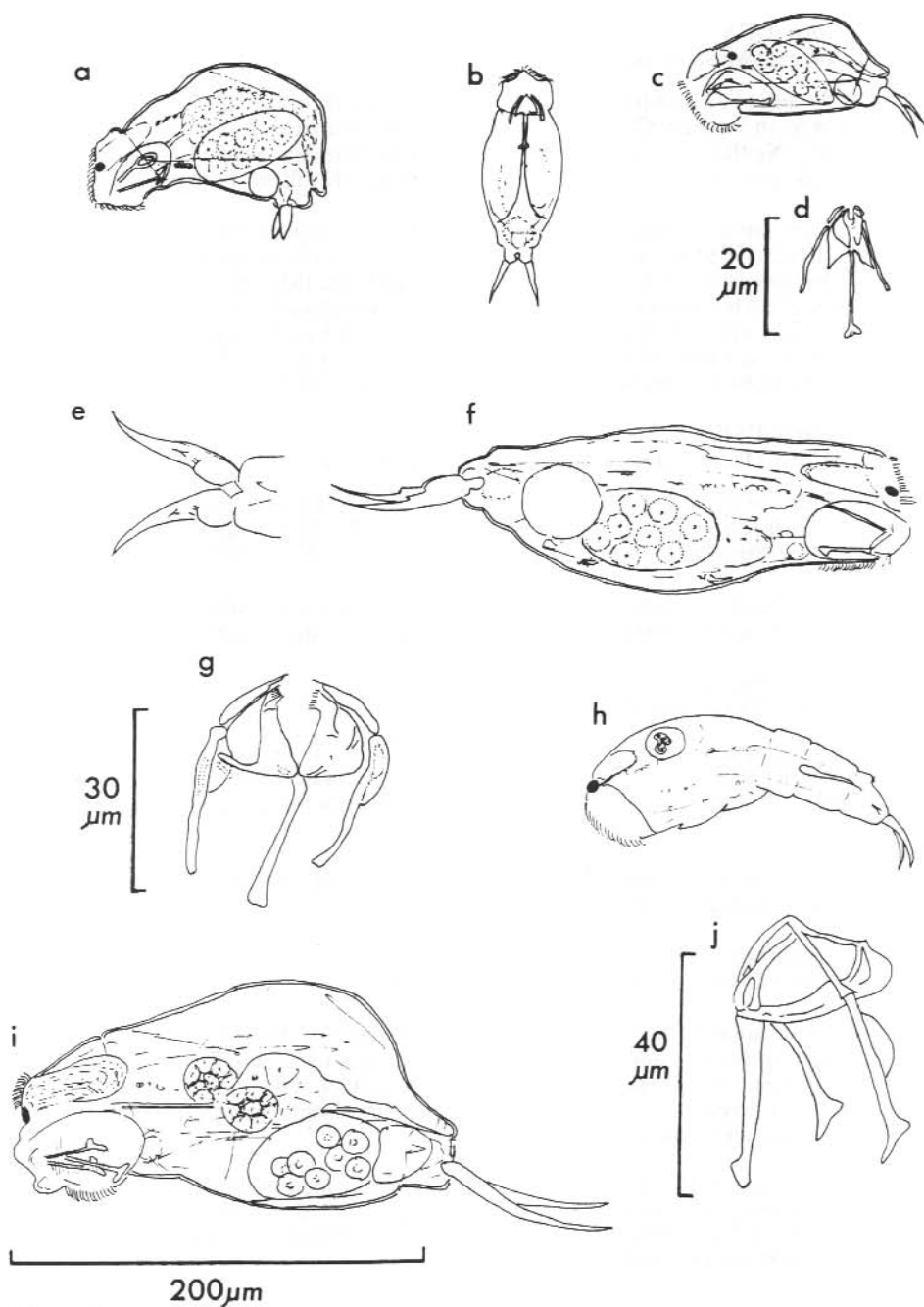


Figure 9.
Cephalodella catellina; a) lateral view.
Cephalodella delicata; b) dorsal view, c) lateral view, d) trophi.
Cephalodella forficula; e) toes, f) lateral view, f) trophi.
Cephalodella gibba; i) lateral view, j) trophi.

Cephalodella catellina (OF Muller)

(Figure 9a) (Tasmanian Museum Nos K1193 to K1198)

This species was found in brackish habitats periodically enriched by seals – the coastal pool 1 km south of Green Gorge, in Rookery Creek and the wallows at Razorback. It is a small rotifer with a length of 120 μm . Neither eggs nor the males were seen. The Macquarie Island specimens agree closely with the published descriptions and measurements (Kutikova 1970, Koste 1978).

Cephalodella catellina has a worldwide distribution, and has been reported from the subantarctic at Îles Kerguelen (Russell 1959). It has also been reported from the Antarctic at Signy Island (Dartnall and Hollowday 1985) and from the McMurdo Sound area (Murray 1910). Murray (loc cit) mistakenly identified his specimens as *Diaschiza* (syn *Cephalodella*) *tenuior* (Dartnall and Hollowday 1985). This mis-identification has been perpetuated by subsequent workers in this area – the *Cephalodella tenuior* of Dougherty and Harris (1963), *Cephalodella* sp. of Armitage and House (1962), *Diaschiza* sp. by Spurr (1975) and Cathey et al. (1981).

Cephalodella delicata (OF Muller)

(Figure 9b, 9c and 9d) (Tasmanian Museum Nos K1199 to K1201)

This species was found in most of the large lakes examined and in the pool alongside Prion Lake (Table 2). It is a small rotifer some 150 μm long with toes 25 - 28 μm long. The Macquarie Island specimens are slightly larger than the published descriptions (Koste 1978).

Cephalodella delicata has a very limited distribution so that its presence at Macquarie Island was surprising. It was originally described from small brackish pools in the Danube delta.

Cephalodella forficula (Ehrenberg)

(Figure 9e, 9f and 9g) (Tasmanian Museum Nos K1202 to K1207)

This tube-constructing species was found in five lakes (Table 2). It was most numerous in Pyramid Lake. The toes of this species are large, curved and decorated with hooks on the dorsal surface that enable the animals to 'about turn' in their narrow tubes which are patrolled ceaselessly.

Cephalodella forficula has a worldwide distribution and has been reported from Tasmania (Koste and Shiel 1987) and New Zealand (Russell 1960).

Cephalodella gibba (Ehrenberg)

(Figure 9h, 9i and 9j) (Tasmanian Museum Nos K1208 to K1211)

This species was found amongst the vegetation of most of the lakes and pools sampled (Table 2). It is a medium-sized rotifer just under 300 μm long. The maximum length of the body was 220 μm , with toes 90 μm . The mastax was 50 μm long. A solitary male was found. It was 180 μm long with a pair of curved toes 25 μm long. The Macquarie Island specimens agree closely with the published descriptions and drawings.

Cephalodella gibba has a worldwide distribution. It has been recorded from the Maiviken Lakes of South Georgia (Dartnall and Heywood 1980, Dartnall and Hollowday 1985), from King George Island, one of the South Shetland Islands (de Paggi 1982) and from Signy Island, South Orkney Islands (Dartnall and Hollowday 1985).

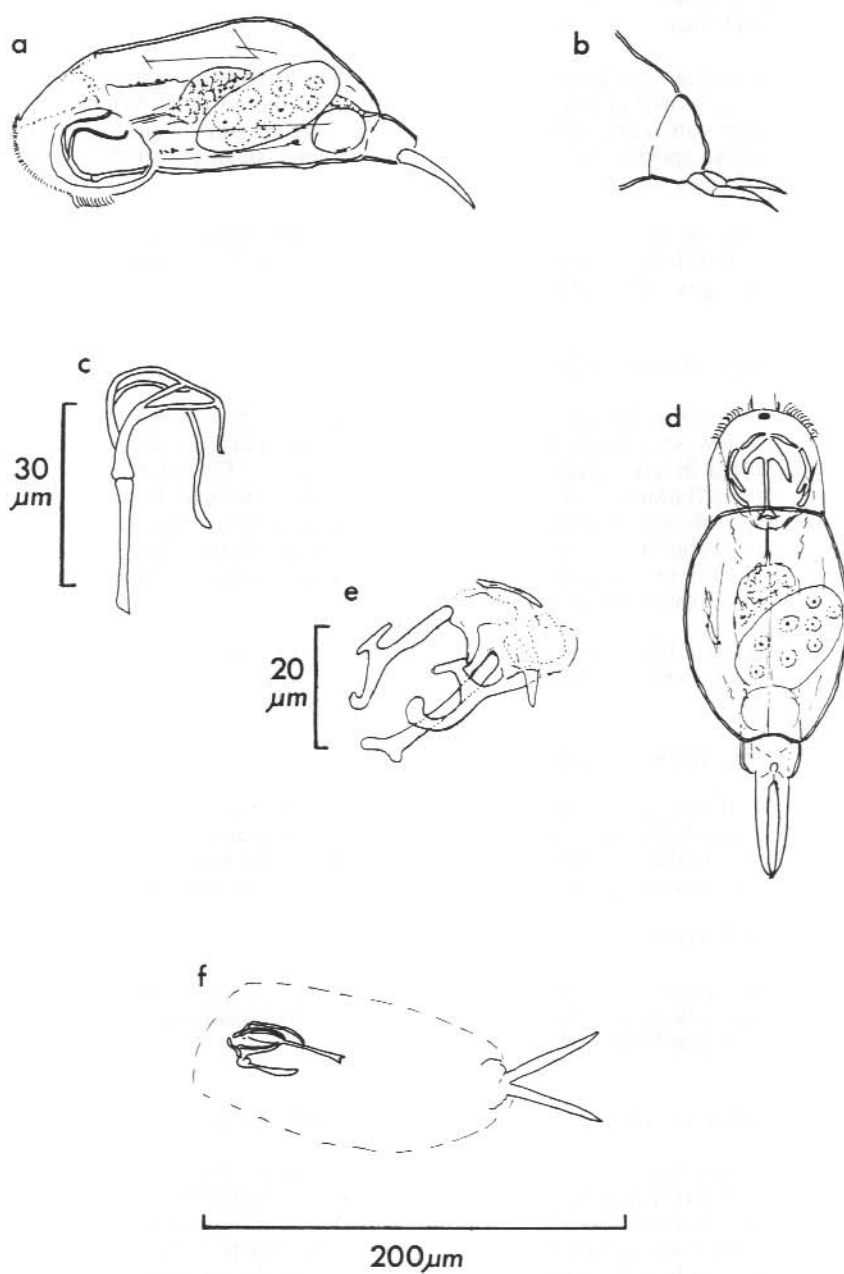


Figure 10.
Cephalodella megaloccephala; a) lateral view, b) toes, c) trophi right manubrium not shown.
Cephalodella sp 1; d) dorsal view, e) trophi.
Cephalodella sp 2; f) ventral view.

Cephalodella megalcephala (Glassott)

(Figure 10a, 10b and 10c) (Tasmanian Museum Nos K1212 to K1217)

This species was found in Skua Lake, Prion Lake, a little lake by the track between Mt Power and Mt Blair, Flynn Lake, Green Gorge Tarn and in a pool to the north of Major Lake. It is a medium-sized rotifer with a total length of 250 μm . The toes are jointed and up to 50 μm long. The Macquarie Island specimens, like those found at Signy Island (Dartnall and Hollowday 1985), are marginally larger than those reported elsewhere.

Although *Cephalodella megalcephala* has a worldwide distribution and is present on New Zealand (Russell 1960) it has not been reported from Australia. It has been reported from the Antarctic before, at Signy Island (Dartnall and Hollowday 1985).

Cephalodella sp. 1

(Figure 10d and 10e) (Tasmanian Museum No K1218)

This medium-sized species (250 μm long) was only found in the elevated lake to the north of Mt Pyramid. Only a few specimens were found. They were characterised by two stout toes (57 μm), a single red frontal eyespot and large trophi (36 μm). The fulcrum is long (26 μm) and has a swollen and flattened base. The rami are triangular plates and the unci are stout. The free ends of each manubrium bifurcate, the two arms almost making a complete circle. A number of Cephalodellids, including *C. catellina*, have this circular feature. The Macquarie Island specimens most closely resemble *C. obvia* Donner but they are considerably larger and each manubrium appears to feature a second circle.

Although the Macquarie Island specimens undoubtedly belong to a new species it is considered unwise to erect one on so few examples.

Cephalodella sp. 2

(Figure 10f) (Tasmanian Museum No K1219)

A single example of this species was found amongst the *Cephalodella forficula* specimens collected from Pyramid Lake. Only the trophi and toes could be examined. The toes are long and straight (50 μm) and similar to other unnamed cephalodellids. The trophi are markedly different with the fulcrum long and straight with a notched distal end (33 μm), and the manubria are stout.

Genus *Monommata* Bartsch

The members of this genus have unequal toes, the smaller of which is considerably longer than the trunk. The body is illoricate and therefore very flexible. The mastax has virgate trophi. Only one species was present at Macquarie Island.

Monommata sp.

(Figure 11a, 11b and 11c) (Tasmanian Museum Nos K1220 to K1222)

This very rare species was found at 'S' Pond and Prion Lake. It is a medium-sized rotifer 300 μm long, but the larger right toe at 160 μm constitutes more than half its total length. The left toe is approximately two-thirds the size of the right. The foot segment is 15 μm long. There was a conspicuous black eyespot on the brain. The trophi are very fine. The fulcrum is long and very thin. The rami are broad, triangular and without teeth on the inner margins. The unci are long and very thin. The manubria are similarly fine and gently curved at their free end. There is a small 'heel' or swelling at the base of the curve of the manubria.

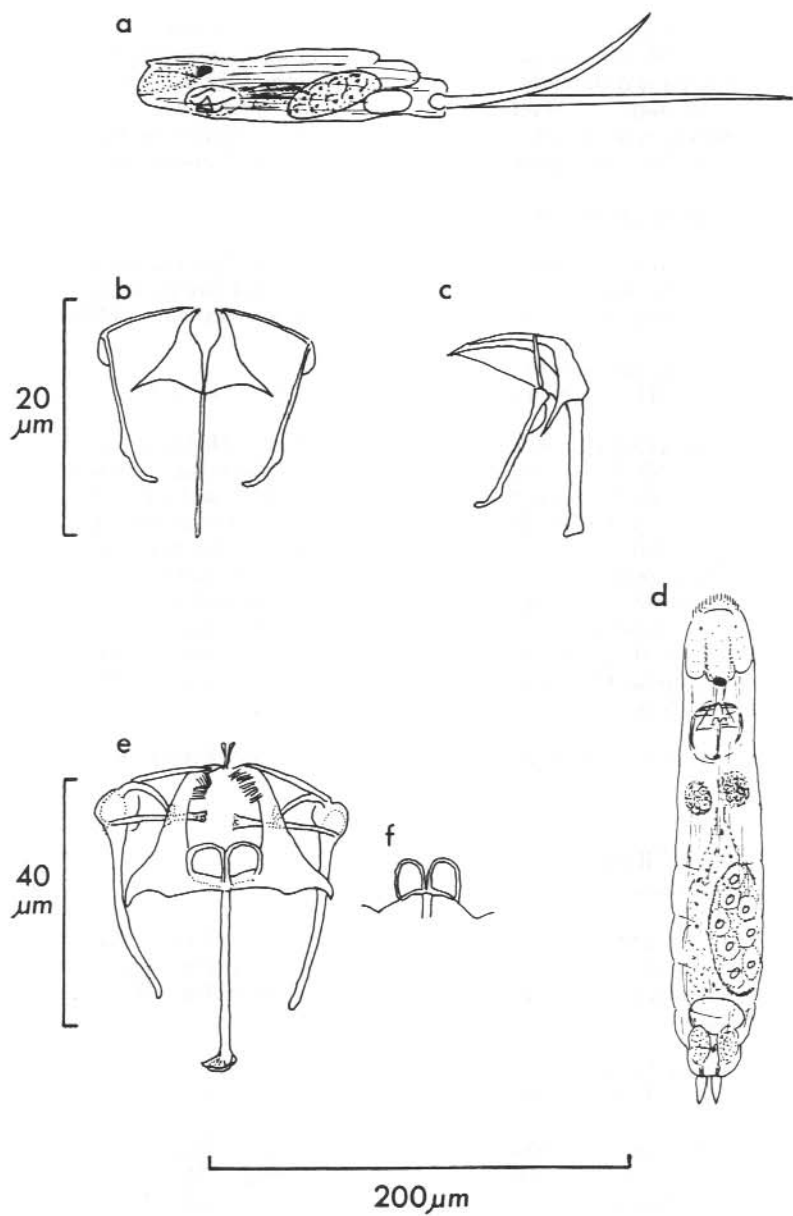


Figure 11.
Monommata sp. ; a) lateral view, b) trophi, ventral view; c) trophi, lateral view.
Reticula nyssa; d) dorsal view, e) trophi, f) rami.

At first the Macquarie Island specimens were thought to be *Monommata dentata* Wulfert but the trophi are dissimilar. *M. dentata* has a forwardly projecting spine on the fulcrum, teeth on the rami, and the manubria is differently shaped. The manubria of the Macquarie Island specimens resemble those of *M. diaphora* Wulfert (but the rami and fulcrum are wrong); and *M. actices* Myers (but the fulcrum is too long). The Macquarie Island specimens probably belong to a new species but in view of the small number examined it is considered unwise to erect one.

Genus *Resticula* Harring and Myers

A small genus of illoricate notommatid rotifers. The mastax has virgate trophi modified for grasping prey. The uncus has one principal and between one and five preuncial teeth. The foot is well-developed and carries two short, strong toes. One species was found at Macquarie Island.

Resticula nyssa (Harring and Myers)

(Figure 11d, 11e and 11f) (Tasmanian Museum Nos K1223 and K1224)

This was a solitary species found at a number of sites: Wireless Hill pond, the lake with floating vegetation, and below Mt Ainsworth, a pool to the north of Major Lake, Skua Lake, Prion Lake, Green Gorge Tam, Rookery Creek, the soak alongside the track and a pool by Major Lake. Its transparent body was very flexible, long and thin with a rounded head and a pair of short, stubby toes. The red-pigmented area on the brain is not a true eye spot but a mass of red pigment granules. A predatory species, some specimens had sets of trophi in their stomachs. The mastax has virgate trophi modified for grasping (62 μ m long). The fulcrum (33 μ m) is long and slender with an expanded posterior end. The rami are triangular with very prominent circular basal features below the ventral opening between the rami. There are grooves on the dorsal surface in which the secondary uncial teeth rest. In all respects the Macquarie Island specimens conform to the published details (Koste 1978).

Resticula nyssa has a worldwide distribution and has recently been reported from Tasmania (Koste et al. 1988).

Family TRICHOCERCIDAE

Genus *Trichocerca* Lamarck

All the members of this genus are asymmetrical. The trunk is usually cylindrical and arched. The foot is short and ends in one or two toes. When two toes are present the left is usually longer than the right. The mastax has virgate trophi that are also asymmetric. Three species were found at Macquarie Island.

Trichocerca brachyura (Gosse)

(Figure 12a and 12b) (Tasmanian Museum Nos K1225 and K1226)

One of the commoner species at Macquarie Island *Trichocerca brachyura* was recorded from practically every site (Table 2). The lorica is kidney shaped (125 μ m long) and the anterior margin is devoid of spines and protuberances. The curved toes are of equal size – just under 50 μ m long. The mastax is also 50 μ m long and the trophi contained therein are very asymmetric. The left manubrium and fulcrum are both crutch-shaped. The right manubrium is greatly reduced.

Trichocerca brachyura has a worldwide distribution and has been reported from South Georgia and Signy Island (Dartnall and Hollowday 1985).

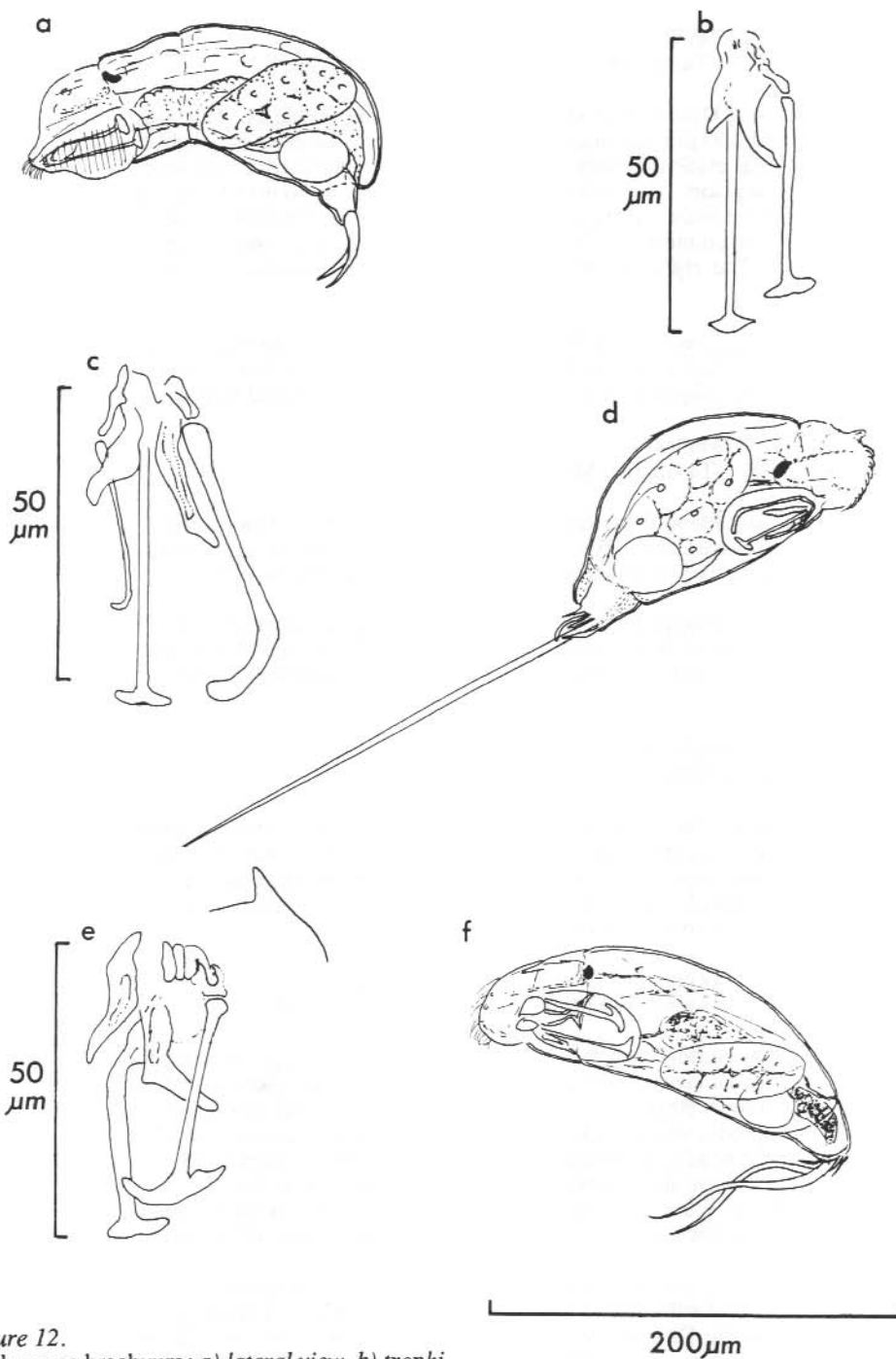


Figure 12.
Trichocerca brachyura; a) lateral view, b) trophi.
Trichocerca rattus; c) trophi, d) lateral view.
Trichocerca tigris; e) trophi, f) lateral view.

Trichocerca rattus (OF Muller)

(Figure 12c and 12d) (Tasmanian Museum Nos K1227 to K1232)

This large species (>400 µm) had a very patchy distribution (Table 2). The body is ellipsoid with maximum length of 150 µm and diameter 90 µm. The cross section is roughly circular though a slight dorsal keel was evident in some specimens. The anterior edge of the lorica is plain, lacking protuberances of any sort. The left toe at 225 µm long is between one, and one and a quarter times the length of the body. At the base of the toe there are at least five substyles. The trophi are large (65 µm) and asymmetric. The left manubrium is 45 µm long and gently rounded at its lower extremity. The right manubrium was similarly shaped but is much reduced in size (33 µm).

Trichocerca rattus has a worldwide distribution and has been reported from New Zealand (Russell 1960) and Tasmania (Koste and Shiel 1987). The closely related subspecies *T. rattus globosa* has been reported from Signy Island and South Georgia (Dartnall and Hollowday 1985).

Trichocerca tigris (OF Muller)

(Figure 12e and 12f) (Tasmanian Museum Nos K1233 to K1239)

This species was only found from three locations – 'S' pond, Green Gorge Tarn and a lake full of *Myriophyllum* by Skua Lake. The Macquarie Island specimens agree very closely with the published descriptions and measurements for this species (Kutikova 1970).

Trichocerca tigris is a widely distributed species and is usually reported from acid water habitats. It has been reported from New Zealand (Russell 1960), Tasmania (Koste and Shiel 1987) and from the subantarctic island of South Georgia (Dartnall and Hollowday 1985).

Family DICRANOPHORIDAE

Genus *Dicranophorus* (Nitzsch)

In this genus the mastax has protrusible forcipate trophi. In every species, except *Dicranophorus permollis*, intra-mallei are absent and the manubrium is directly attached to the uncus. The uncus and rami join near their tips. The retrocerebral sac is unusually large and sub-cerebral glands are absent. There are usually two eyes on the brain. The foot ends in two strong toes. It is a predatory group that is partially loricated.

Dicranophorus permollis gigantea Dartnall and Hollowday

(Figure 13a and 13b) (Tasmanian Museum Nos K1240 to K1244)

This large, predatory rotifer, though rare, was recorded from a range of habitats. It was found in Duck Lagoon, the small coastal lake nearby Duck Lagoon, Skua Lake, Prion Lake, in the streams at Lusitania Bay and in Rookery Creek. The Macquarie Island specimens were in excess of 450 µm long. The body, which is elongate and very flexible, is dorsally swollen over two-thirds of the posterior. The head is large and though not well-defined is marked by a slight constriction. The pedal glands are large and roughly the same size as the conical foot segment. The toes are of medium length (30 µm) and relatively straight. The size and shape of the trophi are even larger than the Signy Island specimens, rami 28 µm, fulcrum 20 µm, unci 18 µm and manubria 45 µm.

Dicranophorus permollis gigantea would appear to have a circumpolar distribution. It has been reported from the McMurdo Sound area at Cape Royds on Ross Island by Murray (1910) and from the same area by Dougherty and Harris (1963) and Spurr (1975). All these authors identified their specimens as a *Pleurotrocha* sp. but Dartnall and Hollowday (1985) have concluded that they were *Dicranophorus permollis gigantea*. It has also been reported from a number of the lakes on Signy Island (Dartnall and Hollowday 1985).

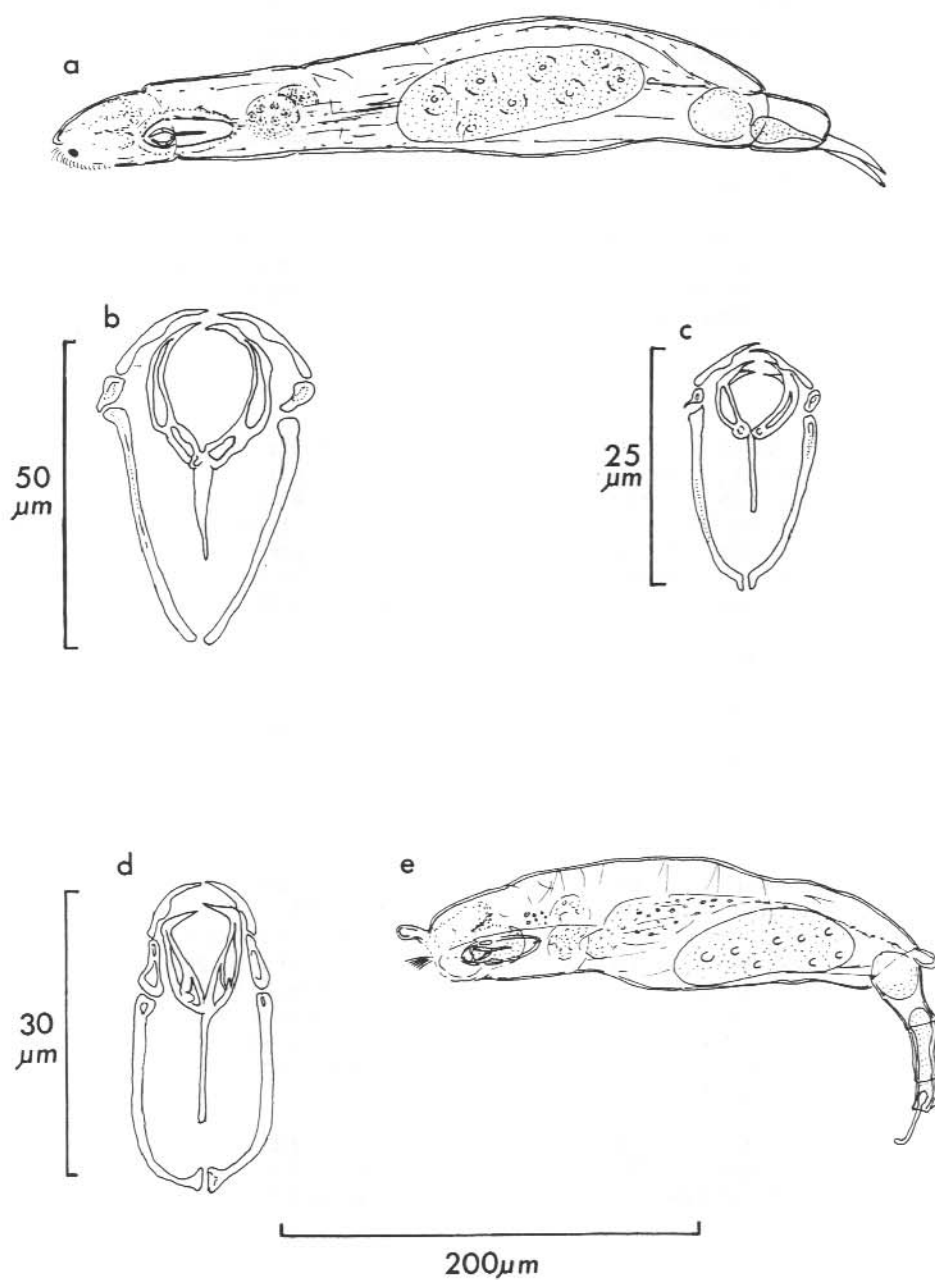


Figure 13.
Dicranophorus permollis gigantea; a) lateral view, b) trophi.
Encentrum mustela?; c) trophi.
Wierzejeskiella sp.; d) trophi, e) lateral view.

Dicranophorus permollis has been reported from Iles Kerguelen (Beauchamp 1940). This identification was based on the trophi of a single contracted specimen. It should be noted that the trophi of *D. permollis* and the subspecies *giganthea* are virtually identical. Dartnall and Hollowday (1985) separated the two on the grounds that the body of the Signy and Cape Royds specimens were twice the size of the *sensu stricto* species (Harring and Myers 1928). The subspecies *giganthea* possesses a single front eyespot which is absent in the *sensu stricto* species.

Genus *Encentrum* Ehrenberg

The members of this genus are usually illoricate, or partially loricated. The mastax has protrusible forcipate trophi with a small intercalating piece (the intra-mallei) between each unci and manubrium. Retrocerebral glands are present. The foot ends in two small toes. It is a predatory group. One species was found at Macquarie Island.

Encentrum mustela? (Milne) (Figure 13c)

The identification of this species is tentative because it depends on the trophi of a single specimen found in the intestine of a predatory nematode (Dartnall 1990). The trophi of this single specimen are 27 μm long. The fulcrum is short at 8 μm which is the same size as the unci and rami. The unci are fine with a slight swelling on the lower surface. The intra-mallei are 2 μm long and link the unci with the manubria. The manubria are long (19 μm) and gently curved. The Macquarie Island trophi are identical with those of *Encentrum mustela* from Signy Island (Dartnall and Hollowday 1985). In Europe it is regarded as a cold stenotherm (de Ridder 1972).

Genus *Wierzejskiella* Wisniewski

Members of this small genus, which is closely related to *Encentrum*, have a long, segmented foot and blunt, stick-like toes. The foot is at least one quarter the size of the body. A frontal rostrum is present. The mastax has forcipate trophi.

Wierzejskiella sp. (Figures 13d and 13e)

This species is known from a single specimen from Skua Lake, and two sets of trophi found in the gut of a predatory nematode from Duck Lagoon (Dartnall 1990). The body is 260 μm long; the foot and toes which are carried at right angles to the body are a further 96 μm . The foot is large and made up of three segments. The first and second segment are approximately the same size at 30 μm . The third segment, which bears the toes, is much smaller at 13 μm . The toes are thin, 20 μm long and shaped like a hockey stick. The manubria are stout 'J' shaped and 20 μm long. The intramallei are large and ovoid with an anterior constriction. The unci are short and stout at 9 μm . The rami are short and powerful (11 μm) with a single tooth. The fulcrum is fairly long and thin (12 μm).

Only a few species of *Wierzejskiella* are known. The Macquarie Island specimens belong to no described species though they closely resemble *W. elongata* (Glassott). Description of the Macquarie Island specimens as a new species will have to wait until further specimens have been examined.

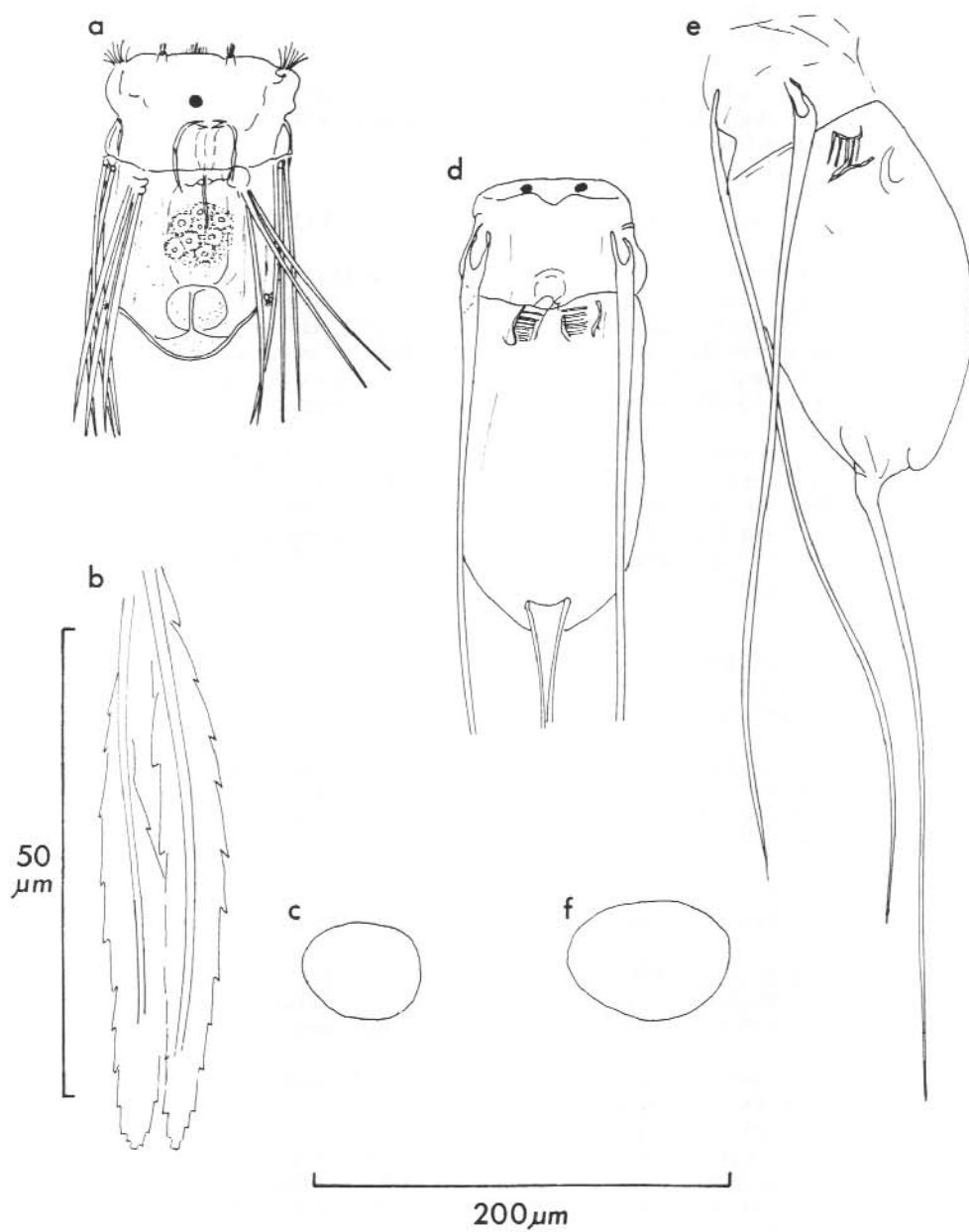


Figure 14.
Polyarthra sp.; a) ventral view, b) skipping blades, c) egg.
Filinia terminalis; d) ventral view, e) lateral view, f) egg.

Family SYNCHAETIDAE
Genus *Polyarthra* Ehrenberg

The members of this genus are small illoricate animals without a foot. Twelve skipping blades are arranged, in four groups, round the upper body. The mastax, which is very large, has virgate trophi. One species was found at Macquarie Island.

Polyarthra sp.
(Figures 14a, 14b and 14c) (Tasmanian Museum Nos K1245 to K1250)

This species was found in a number of the larger lakes viz Major, Prion, Flynn, Gratitude and Scoble, in the two small lakes to the south of Waterfall Lake, and in the pool alongside Prion Lake. The body is 150 μm long and very flexible. The skipping blades or fins are the same size and at 125 μm long, shorter than the length of the body. They are sword-shaped, the midrib and slightly serrated edge being visible only under high power. The small pair of ventral appendages, characteristic of some *Polyarthra* species, were not seen. The vitellarium has eight nuclei.

Identification of the various species of *Polyarthra* depends upon the presence or absence of ventral appendages, the number of nuclei in the vitellarium, the size of the body, and the ratios of width to length of the fins, and length of the fins to length of the body. The Macquarie Island specimens share the characteristics of a number of species and appear to resemble a transitional form between *P. vulgaris* Carlin and *P. dolichoptera* Idelson so that final identification needs the examination of further specimens.

Order FLOSCULARIACEA
Family TESTUDINELLIDAE
Genus *Filinia* Bory de St Vincent

In this genus the spindle-shaped body lacks a foot and is truncated anteriorly. There is a pair of skipping bristles situated either side of and just below the head and a rigid caudal bristle (sometimes two) at the posterior end. The mastax has malleoramate trophi. One species was found at Macquarie Island.

Filinia terminalis (Plate)
(Figures 14d, 14e and 14f) (Tasmanian Museum Nos K1251 to K1253)

This species was found only in Flynn Lake and Prion Lake where it was rare. The body is 225 μm long and the caudal bristle some 310 μm . The skipping bristles are just under 400 μm long. Single oval eggs (75 by 60 μm) were carried by some specimens.

Filinia terminalis, is a cold stenotherm, and has a worldwide distribution. It has been reported from New Zealand and the off lying Chatham Island (Russell 1960) and from Tasmania (Koste and Shiel 1987). Russell (1959) reported *F. major* (Colditz) (syn *F. terminalis*) from Iles Kerguelen. Since then Lair and Koste (1984) have described a new subspecies from there. *Filinia terminalis kergueleniensis*, which is much larger than the *sensu-stricto* *F. terminalis* and the caudal bristle is very thickened at its base. The Macquarie Island specimens do not have this thickening and fall within the size range of *F. terminalis sensu stricto*.

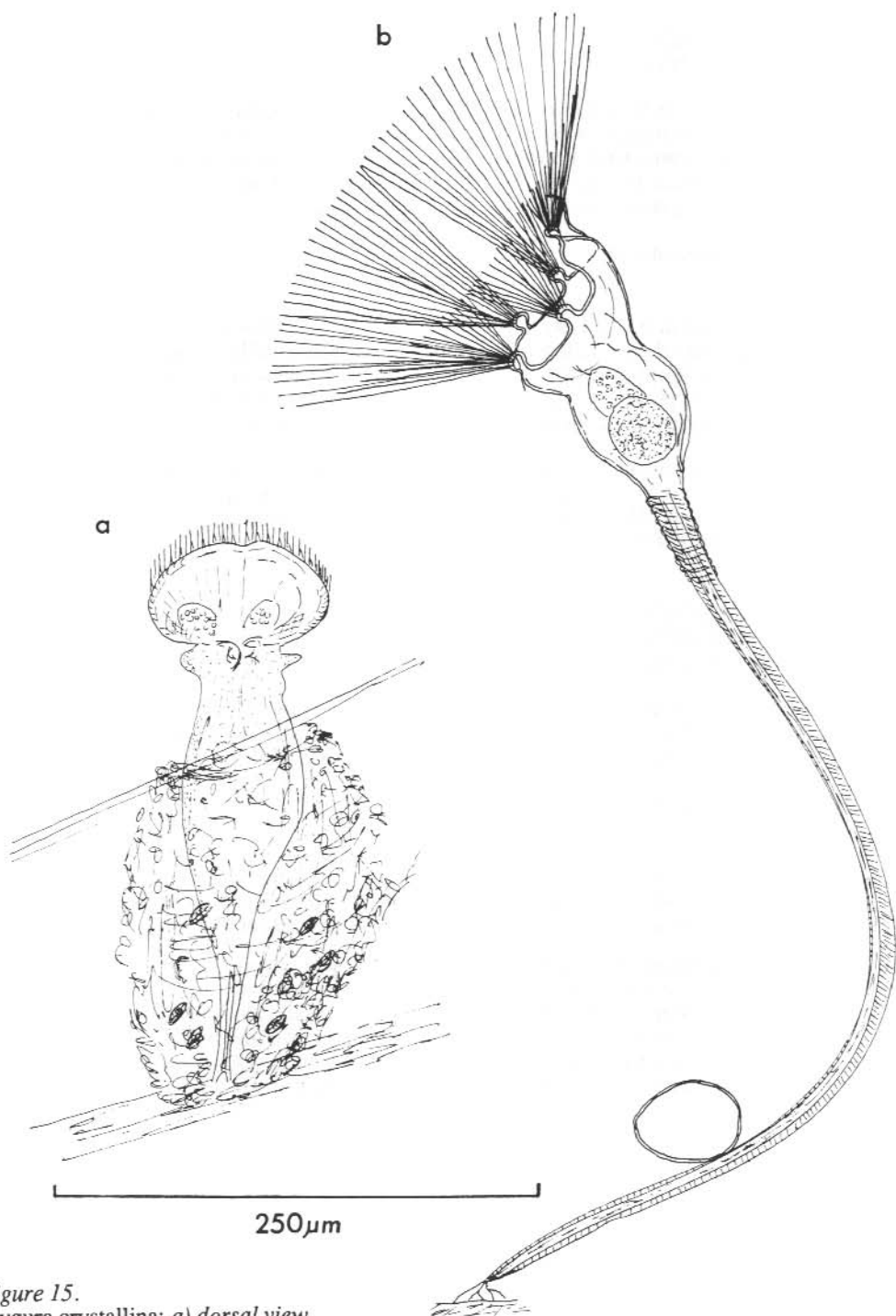


Figure 15.
Ptygura crystallina; a) dorsal view.
Collothea ornata cornuta; b) lateral view.

Family FLOSCULARIIDAE

Genus *Ptygura* Ehrenberg

The corona of this genus is, when fully expanded, circular or kidney-shaped, with a shallow ventral indentation. The margin of the corona is ciliated. Situated just below the corona are a pair of small tubercles from which the ventro-lateral antennae arise. The dorsal antenna is small. The mastax has malleoramate trophi. Most of the members of this genus are sessile and live in gelatinous tubes. One species was found at Macquarie Island.

Ptygura crystallina (Ehrenberg)
(Figure 15a)

This species was found in Island Lake, the lake with floating vegetation, Skua Lake, Scoble Lake and Waterfall Lake, and the pool alongside Prion Lake. It was usually found in the axils of moss stems. A large extensible species it quickly withdraws into its semi-opaque tube when disturbed. The tube is untidy in appearance and covered with a diverse assortment of debris and epiphytes. Transparent circular eggs, 60 μm in diameter, were observed in the tubes.

The Macquarie Island specimens agree closely with the published descriptions and drawings. *Ptygura crystallina* has a worldwide distribution and has been reported from Signy Island (Dartnall and Hollowday 1985). An unidentified *Ptygura* species has also been reported from the Vestfold Hills (Everitt 1981).

Order COLLOTHECACEAE

Family COLLOTHECIDAE

Genus *Collotheca* Haring

In this genus the margin of the corona is produced into five lobes that are furnished with very long and fine setae. The foot ends in a peduncle. Most species are found in clear gelatinous tubes. The mastax has uncinat trophi. Only one species was found.

Collotheca ornata cornuta (Dobie)
(Figure 15b)

This species was only found in Major Lake. It was a large species in excess of 1000 μm when fully extended. This subspecies is characterised by a finger-like projection on the largest (dorsal) lobe. A number of eggs were seen. They were light brown in colour and oval (55 by 45 μm).

Collotheca ornata cornuta has a worldwide distribution and has also been recorded from the Antarctic. Murray (1910) recorded it at Cape Barne and Cape Royds (as *Floscularia cornuta*) and it has subsequently been reported from near there by Armitage and House (1962). Their record is for *C. ornata*; no mention being made of the subspecies *cornuta*; and by Dougherty and Harris (1963). *C. ornata cornuta* has also been recorded from pools in the Obruchev Hills (Korotkevich 1958, Kutikova 1958) and from Signy Island (Dartnall and Hollowday 1985).

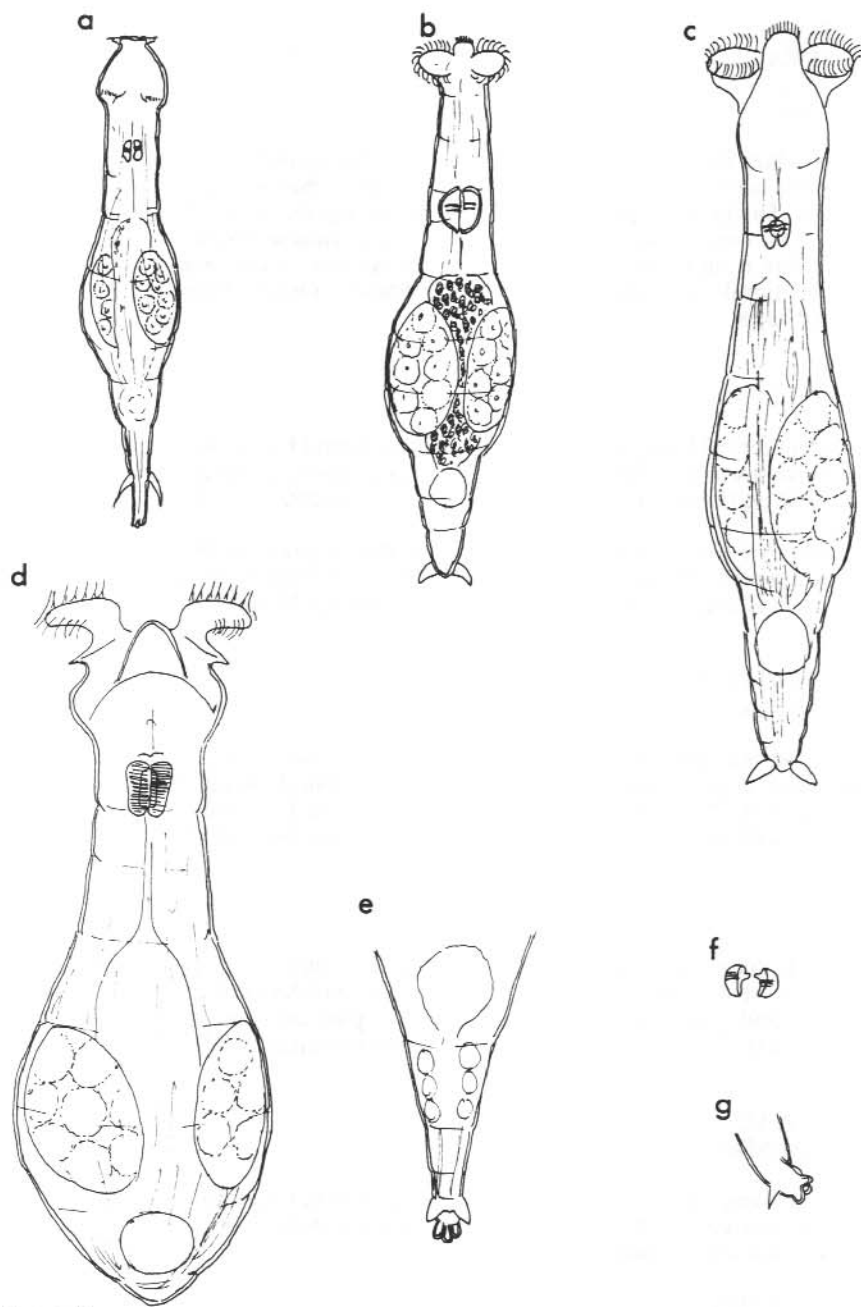


Figure 16.
Adineta vaga; a) ventral view.
Habrotrocha sp.; b) ventral view.
Macrotrachella concinna; c) dorsal view.
Macrotrachella sp. 1.; d) ventral view, e) foot.
Macrotrachella sp. 2.; f) trophi, g) foot.

200 μ m

Class BDELLOIDEA
Order BDELLOIDEA
Family ADINETIDAE
Genus *Adineta* Gosse

Rotifers of this genus lack the normal bdelloid wheel organ of separate trochal discs on pedicels. The ventral side of the corona consists of two, flat, ciliated areas that are separated by a narrow longitudinal groove. The head is spindle-shaped and wider than the neck. The foot is narrow and fairly long with two spurs and three toes. Eyespots are usually absent. Apart from one viviparous species this is an oviparous group. The mastax has ramate trophi with a dental formula of 2/2. Adinetids do not swim but glide over the bottom. Only one species was found in the Macquarie Island lakes.

Adineta vaga Davis
(Figure 16a)

This medium-sized rotifer (325 µm) was found in Scoble and Island Lakes and in the pool alongside Prion Lake, where it was very rare. The spurs, which are almost as long as the joint to which they are fixed, are long and heavy. The teeth on the trophi have a dental formula of 2/2.

Adineta vaga is usually reported from drying mosses so that its presence in the lakes may be accidental. It has a worldwide distribution (Bartos 1951), and has been reported from the McMurdo Sound area (Murray 1910) and at Signy Island (Jennings 1976, Donner 1980).

Family HABROTROCHIDAE
Genus *Habrotrocha* Bryce

In this genus the food is compressed into pellets giving the stomach its characteristic frothy appearance. The wheel organ is narrow and usually narrower than the neck. The neck is often long with a large upper lip that is bluntly triangular in shape. The foot is short and bears three toes. A number of species are tube dwellers. Only one species was found at Macquarie Island.

Habrotrocha sp.
(Figure 16b)

This species was only found in the pool alongside Prion Lake and is represented by just two juvenile (350 µm long) specimens. The trochal discs are not much larger than the neck, and the body, which is long and thin, has a citrine colour. The spurs are stout and triangular and separated by a slight boss. The teeth on the trophi have a dental formula of 2/2.

Family PHILODINIDAE
Genus *Macrotrachela* Milne

In this genus the foot always has three toes of equal size. The wheel organ is usually wider than the head. The upper lip is large and often bilobed. Eyespots are absent. The genus is oviparous. Three species were found in the Macquarie Island lakes.

Macrotrachela concinna? Bryce
(Figure 16c)

This species is represented by a single specimen from Major Lake. The pale brown body is 450 µm long. The wheel-organ is fractionally larger than the neck and the upper lip large and protruding. The spurs are short conical and diverging. The teeth on the trophi have a dental formula of 2/2.

Macrotrachela concinna is usually found in drying mosses and has been reported from most of Europe and North America (Bartos 1951). It has also been reported in the Antarctic from the terrestrial sampling sites at Signy Island (Jennings 1976, Donner 1980) as well as from the Gourlay pool (Dartnall and Hollowday 1985).

Macrotrachela sp. 1
(Figures 16d and 16e)

This large (600 μm) pale brown rotifer was found only in the wallows outside the Biology Laboratory. The wheel-organ is large, well-developed and almost twice the width of the neck. The dorsal antenna is prominent and almost 25 μm long. The teeth on the trophi have dental formula of 3/3.

The spurs are small and bluntly triangular. The small toes are fed by three pairs of pedal glands. This species is viviparous, the only member of the genus so far described to produce live young.

Macrotrachela sp. 2
(Figures 16f and 16g)

This small red species was found in the lake alongside Mt Itould, south of Mt Ainsworth and in Pyramid, Tiobunga, Endeavour and Gratitude Lakes and in Rookery Creek. The cuticle is smooth without any thickenings or granulations. The spurs are very small as are the toes. The teeth on the trophi have a dental formula of $2+1/2+1$.

Genus *Philodina* Ehrenberg

In this genus, the wheel-organ is perfectly developed and the rostrum is retractable. The foot, which is almost half the length of the body, has two short spurs and four toes. The cuticle, in the majority of cases, is thin and lacks cuticular thickenings and appendages. Two species were found at Macquarie Island.

Philodina sp. 1
(Figure 17a)

This large brown bdelloid (700 μm) was only found in the lake south of Brothers Point. It is pale brown and possesses a pair of conspicuous orange eye spots. The teeth on the trophi have a dental formula of 3/3. The foot bears very small toes and spurs.

Philodina sp. 2
(Figure 17b)

This species was found in a number of lakes (Table 2). Similar to *Philodina* sp. 1, it is the same orange brown colour and size (650 μm), with small toes and spurs. However, eye spots are not present and the teeth have a dental formula of 3/3 or $3+1/3+1$.

Genus *Rotaria* Scopoli

In this genus, all parts of the body, especially the foot, spurs and toes, may be greatly extended. Eyespots, if present, are found on the rostrum. The foot has three toes. All members of the genus are viviparous. Only one species was found.

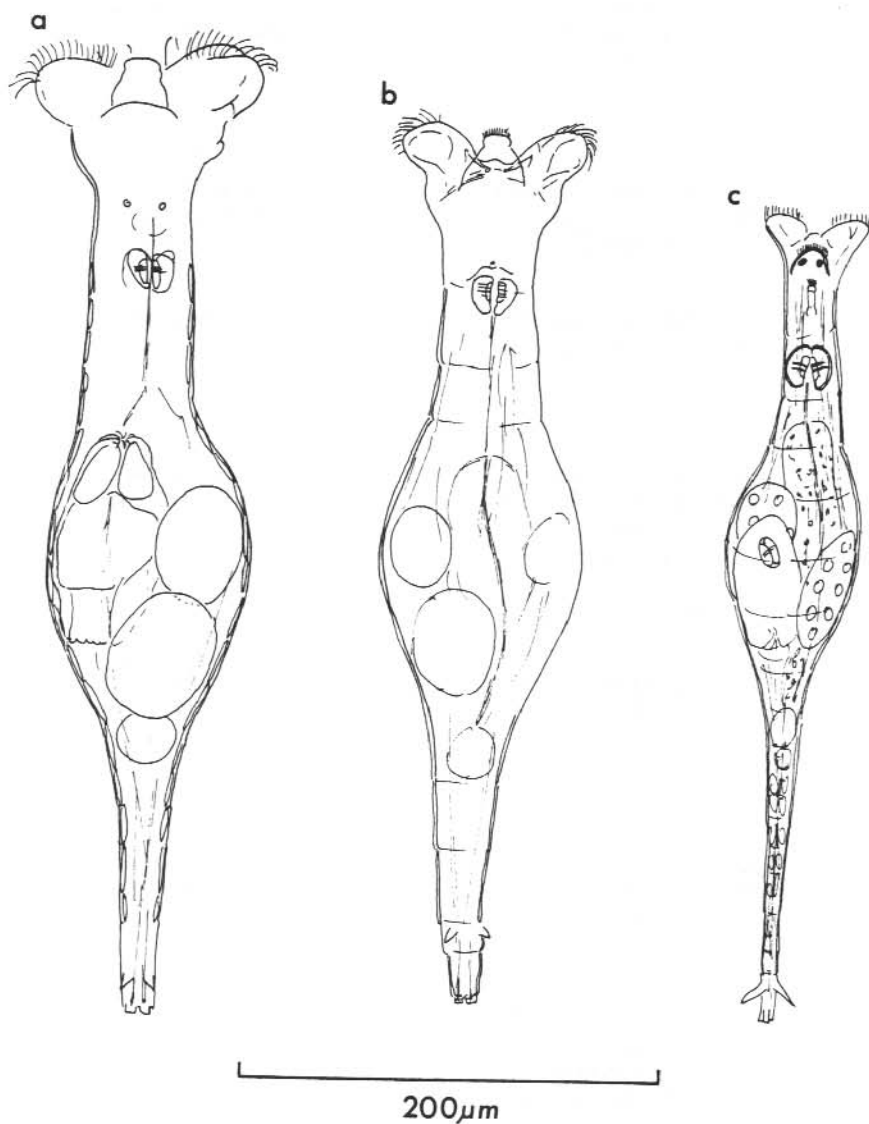


Figure 17.
Philodina sp. 1.; a) dorsal view.
Philodina sp. 2.; b) dorsal view.
Rotaria rotatoria; c) dorsal view.

Rotaria rotatoria Pallas
(Figure 17c)

This species was the commonest — both numerically and by distribution — bdelloid at Macquarie Island (Table 2). The thin body (375 μm long) is virtually transparent. The cuticle is smooth and without adornment of any kind. The rostrum, which is very large, bears two large, red eyespots. In some specimens each eyespot is made up of three pigment-spots. A number of short setae are present on the wheel-discs. The trophi have a dental formula of 2/2.

Rotaria rotatoria has a worldwide distribution and has been reported from Europe, North, Central and South America, South and Central Africa, Australia and New Zealand (Bartos 1951). The *Rotaria* sp. reported by Dartnall and Hollowday (1985) from South Georgia is now thought to be *R. rotatoria*.

5. DISCUSSION

The distribution of rotifers at Macquarie Island is given in Table 2. In this table the freshwater and brackish habitats are shown separately and listed in pH order. From this it can be seen that *Lepadella patella*, *Notholca jugosa* and *Trichocerca brachyura* were found in every type of habitat and that *Dicranophorus permillius gigantea* and *Rotaria rotatoria*, though rarer, were almost as widespread.

Colurella colurus compressa, and *Epiphanes senta* were found only in the brackish habitats. *Cephalodella catellina* is normally found with these two species and indeed in two instances it was. Its presence in a freshwater section of Rookery Creek, however, is not entirely surprising — these specimens having migrated from the low brackish reaches of the creek.

Cephalodella gibba was recorded from most of the freshwater lakes and pools. *Ptygura crystallina* and *Notommata glyphura* also exhibited a wide tolerance of pH; whereas *Cephalodella megaloccephala*, *Lepadella triptera*, *Lindia torulosa*, *Polyarthra* sp. and *Reticula nyassa* preferred alkaline waters.

Rotifers were never very common at Macquarie Island where Crustaceans (cladocerans, ostracods and copepods) were the dominant fauna. This observation has been reported for other subantarctic locations — at South Georgia (J.C. Ellis-Evans personal communication) and at Iles Kerguelen (Lair and Koste 1984). Rotifer populations are known to be suppressed by large species of *Daphnia*, and the presence of *D. carinata* King in most of the Macquarie Island lakes sampled further underlines the observation that they reduce the abundance of some rotifers, thereby radically altering the species distribution. The shallow, highly vegetated lakes such as that to the south of Brothers Point and Square Lake were unexpectedly deficient. The deep lakes such as Prion Lake had markedly fewer *Daphnia* and noticeably more rotifers.

The discovery of new species of rotifer was fairly constant throughout the period of survey, there being no appreciable sign of tailing off. This suggests that many more species have still to be found; a view that is supported by the results of the only previous survey of Macquarie Island rotifers (Russell 1959). Although only three species were identified, *Lepadella patella*, *Trichocerca bidens* (Lucks) and *Cephalodella* sp., two were not found in the present survey.

Similar considerations apply at other subantarctic islands. The collection made at Iles Kerguelen for Russell by the 1929-31 British, Australian and New Zealand Antarctic Research Expedition though more extensive than that made for him at Macquarie Island, are manifestly incomplete. This survey yielded ten species of Monogononta plus a number of bdelloids which could not be identified because of their contracted state (Russell 1959). Five species namely *Cephalodella catellina*, *Filinia terminalis* (identified as *F. major*), *Keratella sancta*, *Lepadella acuminata* and *Lepadella patella* were common to this survey. The collections at Iles Kerguelen were from damp vegetation and aquatic plant material in and around streams and lakelets. A subsequent study there from Lake Studer 2 found just three species (Lair and Koste 1984). These were *Notholca jugosa* which had not been reported by Russell (1959), *Keratella sancta*, and a new subspecies *Filinia terminalis kerguelensis* Lair and Koste.

At South Georgia, Dartnall and Hollowday (1985) recorded fifteen species. This list is undoubtedly incomplete because of the opportunistic nature of the sampling. Four of these species, *Cephalodella gibba*, *Trichocerca brachyura*, *T. tigris* and *Rotaria rotatoria* (identified as *Rotaria* sp.), have been found at Macquarie Island. Of the remaining ten, two, *Trichocerca rattus globosa* and *Lepadella patella oblonga*, are sub-species, the *sensu strictu* form of which was present at Macquarie Island. The work at South Georgia formed part of a much larger survey centred on Signy Island, and Dartnall and Hollowday (1985) consider that many of the rotifers found in the Signy lakes will ultimately be found at South Georgia. Ten of the Signy Island

Table 2. The distribution of rotifers at Macquarie Island.

ROTIFER*		Cephalodella catellina	Cephalodella delicata	Cephalodella forficula	Cephalodella gibba	Cephalodella megalocephala	Cephalodella sp 1	Collotheca ornata cornuta	Colurella colurus compressa	Dicranophorus permollis gigantea	Epiphanes senia	Filinia terminalis	Keratella sancta	Lecane glypta	Lepadalia minuta	Lepadella patella	Lepadella triptera	Lindia torulosa	Monommata sp	Notolca jugosa	Notommata glyphura	Polyarthra sp	Pygura crystallina	Resicula nyssa	Rhinoglena frontalis	Trichocerca brachyura	Trichocerca raitus	Trichocerca tigris	Wierzejskiella sp	Adineta vaga	Habrotrocha sp	Macrotrachella concinna	Macrotrachella sp 1	Macrotrachella sp 2	Philodina sp 1	Philodina sp 2	Rotaria rotatoria				
pH	LOCATION																																								
FRESH WATER		CONDUCTIVITY <250µs																																							
10.4	Square Lake	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
9.4	pool by Major Lake	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
9.3	lake with vegetation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
8.7	Rookery Creek	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	+		
8.4	lake S of Brothers Point	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-		
8.2	Skua Lake	-	+	+	+	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	+	-	+	+	-	+	-	-	-	-	-	-	-	-	+	+	
7.8	Gratitude Lake	-	+	+	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	+	
7.8	Flynn Lake	-	+	+	-	-	-	+	-	-	-	+	+	+	-	-	-	-	-	-	-	-	+	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	
7.6	Major Lake	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	
?	S of Waterfall Lake	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	
7.5	Island Lake	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	+		
7.4	N of Major Lake	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-		
7.2	Prion Lake	-	+	+	+	-	-	-	-	+	-	+	-	-	-	+	+	+	+	-	-	-	+	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	
7.2	Scoble Lake	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	+	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	
7.2	tarn at Green Gorge	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	+	+	-	+	+	+	-	+	-	-	-	-	-	-	-	-	-	+	
?	lake Wireless Hill	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	+	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	
?	Endeavour Lake	-	+	+	+	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	+	+	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	
?	lake by Mt Ifould	-	+	+	+	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	+	+	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	
7.2	Tulloch Lake	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	+	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	
7.1	N of Mt Pyramid	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	
7.1	lake S of Mt Ainsworth	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	+	+	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	
7.0	soak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	+	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	
6.9	pool by Skua Lake	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	
6.8	Pyramid Lake	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	+	+	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	+
6.5	'S' pond	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	+
6.3	Tiobunga Lake	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	+
5.6	pool by Prion Lake	-	+	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	+	+	+	-	-	+	+	-	-	+	+	-	-	-	-	-	-	-	+	+
BRACKISH		CONDUCTIVITY >900µs																																							
7.3	Langdon Point	-	+	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
?	Lusitania Bay	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	
7.5	lake by Duck Lagoon	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	
?	lake below Razorback	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
?	km S of Green Gorge	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
?	Biology Laboratory	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	+	+
9.3	Duck Lagoon	-	-	-	-	-	-	-	-	+	+	+	-	-	-	+	+	+	-	-	-	+	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+

* *Cephalodella* sp 2, *Enicetruncus mustela* and *Lepadella acuminata* not included.

+ Present

- Not found

? No pH measurements made. The lakes are placed in these positions on the basis of their rotifer faunas.

species, not recorded for South Georgia, were found at Macquarie Island. They were *Cephalodella catellina*, *C. megalcephala*, *Collotheca ornata cornuta*, *Colurella colurus compressa*, *Dicranophorus permollis gigantha*, *Encentrum mustela*, *Epiphanes senta*, *Lepadella triptera*, *Macrotrachela concinna* and *Ptygura crystallina*.

These incomplete results and surveys raise a number of interesting questions. Is there such a thing as a 'typical' subantarctic fauna? Comparison of results from different stations have yielded interesting similarities, and equally interesting differences. Are these differences real or the result of incomplete sampling? Why are subspecies found in some locations and only the *sensu strictu* in others? Will the typically Antarctic rotifers, *Adineta grandis* Murray, *Philodina alata* Murray, *P. antarctica* Murray and *P. gregaria* Murray eventually be found? Macquarie Island's formation from uplifted oceanic crust, poses interesting problems in colonisation. It would be premature, however, to engage in discussion on these questions until a more complete assessment of the situation is to hand.

ACKNOWLEDGMENTS

I thank, Dr Patricia M. Selkirk, Dr J. Patrick McBride and Professor Don A. Adamson for their friendship and companionship in the field, the Australian Antarctic Division for logistic support and Eric D. Hollowday for his rotifer expertise and permission to use his trophi drawings of my specimens given in Figures 4, 8 and 11.

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