

ON THE MICROFAUNA OF THE ANTARCTIC REGION III. MICROBIOTA OF THE TERRESTRIAL INTERSTICES

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Abstract: Some investigations on the samples from Vestfold Hills (79°E, 68°S), Gaussberg (87°E, 67°S), Bunger Hills (101°E, 66°S) and Langhovde (39°5'E, 69°S) have revealed *ca.* 60 taxa of the species. Of the species found, *Anisonema* sp., *Monas* spp., *Pleuromonas* sp., *Tetramitus* sp., *Arcella arenaria* v. *compressa*, *Cochliopodium tentaculatus*, *Corythion dubium* v. *aerophila*, *Geopyxiella?*, *Hyalodiscus?*, *Microcorycia bryophila?*, *Trinema contraria*, *Bryophrya?*, *Bryophyllum tegularum*, *Colpoda californica*, *C. inflata*, *C. steini*, *Microthorax elegans*, *Spathidium breve?*, *Trichoderum sphagnetorum*, *Habrotracha gulosa?*, *Macrotrachela nixa*, *Echiniscus* sp. and *Hypsibius convergens* are regarded as a new record for the Antarctic region. Besides, the numbers of both individuals and species per 1.0 cm³ at class level were roughly estimated on the basis of the polyurethane foam buried in the moss carpet or sand samples from Langhovde.

1. Introduction

The studies of the Antarctic microbiota seem to be historically divisible into three periods. The first may be a period of 1900–'15 when RICHTERS (1904, 1907, 1908), MURRAY (1910) and PENARD (1911) appeared. In this period the main aim of the studies was put exclusively on faunology rather than on ecology or physiology. The second period could be 1955–'70 when BORUTZSKY and VINOGRADOV (1957), KUTIKOVA (1958, 1964a, b), DECLOITRE (1960), MORIKAWA (1962), SUDZUKI (1964a, b), KIRYANOVA (1964), HADA (1965, 1967) and DILLON (1967) published their works in connection with the International Geophysical Year. In this period, the main interests were in reexamination of the studies made in the first period (1900–15). Nevertheless, some modernized approaches were made, such as the analysis of the adaptation of the biota to the Antarctic life. The subject was studied from the two points of view, namely, the autecological one by DOUGHERLY (1960, 1964) and AOKI (personal communication), and the synecological one by HEAL (1965), SUDZUKI (1967) and DILLON *et al.* (1968).

We are now in the turning point and already some excellent papers have been published by DONNER (1972), SMITH (1973) and BARKER (1977) and some others are in press (*cf.* CARRUTHERS and BURTON). This period is characterized by the

studies which review the old samples from a more modernized and newer angle in reference to recent works done by a specialist of each animal group.

By a series of these studies, the following has become clear:

1) The terrestrial microhabitats of Antarctica are occupied exclusively by such interstitial animal classes as Zoomastigophora, Actinopoda, Amoebida, Holotricha, Spirotricha, Gastrotricha, Nematoda, Rotatoria, Heterotardigrada and Eutardigrada.

2) Of these animal classes listed above order Testacea under Amoebida, order Bdelloidea under Rotatoria and order Macrotardigrada under Eutardigrada are the dominant groups.

3) In certain animal groups, their taxonomy or the identification at the species level is still open to discussion for two reasons: (i) The taxonomic criteria customarily used are valid no longer, according to some recent specialists. (ii) There are no specialists available for some of the animal groups collected.

Recently, the present writer has received a number of samples from Mr. H. BURTON, biologist of the Antarctic expedition and member of Antarctic Division, Melbourne, Australia, for the identification of the Antarctic Rotifera. At the same time, more samples were supplied by Mr. K. WATANABE of Toho University, through the courtesy of Dr. T. MATSUDA, National Institute of Polar Research, Tokyo. Thus, reexamination of the Antarctic microbiota became possible.

2. Materials and Methods

2.1. Samples from BURTON

2.1.1. Vestfold Hills (79°E, 68°S)

(1) Tryne Fiord, (2) Middle tarn

2.1.2. Gaussberg (87°E, 67°S)

(1) Outcrop A, (2) Scree slope, (3) Site 23, (4) Site 1

2.1.3. Bunger Hills (101°E, 66°S)

(1) Site 1, (2) Site 2, (3) Site 3, (4) Site 4, (5) Site 7, (6) Site 8, (7) Site 10, (8) Figurnoe outlet stream

2.2. Sample from WATANABE and MATSUDA

2.2.1. Langhovde (39.5°E, 69°S)

(1) A mass of moss, (2) Sandy soil

All the living samples from BURTON were already wet enough in a small glass tube when received and most of them went bad, even smelling rotten. The sample from WATANABE and MATSUDA, on the contrary, was dried up perfectly. In both cases, the cooled rain water but once boiled was added before observation.

As for the samples from the Bunger Hills the rotifers are noted to have been picked up and treated with 4% paraformalin, then with 5% glycerol to 95% ethanol. But, unfortunately, except for the samples from site 2 (Bunger Hills) not a single

specimen of rotifers was detected. As for the biomass estimation a polyurethane foam, $1.0 \times 1.0 \times 0.5$ mm in size, was buried in both parts, *i.e.*, a moss carpet and sand sample by WATANABE and MATSUDA, and the number of individuals per 1 cm^3 at the class level was calculated.

3. Results and Discussion

3.1. The species found

3.1.1. Vestfold Hills

(1) Tryne Fiord

Testacea: *Arcella arenaria* v. *compressa*, *Assulina muscorum*, *Corythion aerophila*, *Pyxidicula*?

Rotatoria: gen.? (Bdelloidea).

(2) Middle tarn

Zoomastigophora: *Bodo* spp.

Amoebina: *Amoeba* spp., *Astramoeba* sp., *Cochliopodium tentaculatus*, *Thecamoeba verrucosa*, *Trichamoeba* sp.

Testacea: *Parmulina*?, *Trinema contraria*, *T. lineare*.

Holotricha: *Trichoderum sphagnetorum*.

Spirotricha: *Holosticha* sp., *Microthorax* sp., *Keronopsis* sp., *Strombilidium*?

3.1.2. Gaussberg.

(1) Outcrop A

Zoomastigophora: *Anisonema*?, *Bodo angusta*, *B. globosa*, *Cercobodo* sp., *Monas* spp. *Trigonomonas*?

Amoebina: gen.? (Pl. 1, Fig. 6)

Testacea: *Corythion aerophila*, *Corythion* sp., *Leptochlamys*?, *Microcorycia bryophila*, *Pyxidicula*?, *Trinema contraria*, *T. lineare*.

Holotricha: *Bryophyllum tegularum*, *Trichoderum sphagnetorum*.

Spirotricha: *Microthorax elegans*, *Microthorax* sp.

Nematoda: gen.?

Rotatoria: *Habrotrocha* species resembling *gulosa* rather than *elusa vegata*., *Macrotrachela insolita*, *M. nixa*, *Philodina* sp.

Eutardigrada: *Hypsibius convergens* cf. RAMAZZOTTI (1968).

(2) Scree slope

Zoomastigophora: *Bodo* spp.

Testacea: *Assulina muscorum*, *Euglypha compressa*?, *Parmulina*?

Holotricha: *Colpoda inflata*.

Nematoda: gen.?

Rotatoria: gen.? (Bdelloidea).

(3) Site 23

Testacea: *Corythion aerophila*, *Parmulina*?

- Holotricha: *Colpoda steini*.
 Rotatoria: gen.? (Bdelloidea).
- (4) Site 1
 Zoomastigophora: *Bodo* spp., *Cercobodo longicauda*.
 Amoebina: *Amoeba* spp., *Cochliopodium*?
 Testacea: *Corythion* sp., *Parmulina*?, *Pyxidicula cymbalum*?, *Microcorycia*?
 Holotricha: *Microthorax* sp.
 Nematoda: gen.?
 Rotatoria: *Macrotrachela* sp.
 Eutardigrada: *Hypsibius* sp.
- 3.1.3. Bungler Hills
- (1) Site 1
 Testacea: *Microcorycia*?, *Parmulina*?, *Trinema lineare*.
 Heterotardigrada: *Echiniscus* species resembling *actomys* and *bigranulata*.
- (2) Site 2
 Zoomastigophora: *Anisonema* sp., *Bodo globosa*.
 Testacea: *Assulina muscorum*, *Assulina* sp., *Corythion* sp.
 Two bdelloids were found in the bottle already sorted out by Mr. BURTON.
 But the identification was not possible owing to the strong contraction of the animals.
- (3) Site 3
 Zoomastigophora: *Bodo* spp., *Pleuromonas* sp., *Tetramitus* sp.
 Amoebina: *Amoeba* spp.
 Testacea: *Parmulina*?
 Holotricha: *Bryophrya*?, *Chilodonella* sp., *Trochilia*?, *Spathidium breve*?
 Spirotricha: *Keronopsis* sp., *Oxytricha* sp., *Paruroleptus* sp., *Strombilidium* sp.,
 gen.? (Euplotida).
- (4) Site 4
 Amoebina: *Thecamoeba* sp.
 Testacea: *Corythion aerophila*, *Assulina* sp.
- (5) Site 7
 Zoomastigophora: *Bodo globosa*.
 Amoebina: *Cochliopodium* sp.
 Testacea: *Assulina muscorum*, *Corythion aerophila*, *Corythion* sp., *Hyalodiscus*
 sp., *Leptochlamys*?, *Microcorycia bryophila*?, *Parmulina*?
- (6) Site 8
 Zoomastigophora: *Bodo* spp.
 Testacea: *Assulina muscorum*, *Centropyxis* sp. (cf. Pl. 1, Fig. 10), *Diffugiella*?,
Microcorycia?, *Physochia*?, *Parmulina*?
 Nematoda: gen.?
 Rotatoria: gen? (Bdelloidea).

(7) Site 10

Zoomastigophora: *Bodo* spp.

Testacea: *Centropyxis aerophila*, *Parmulina*?

3.1.4. Langhovde

(1) Bryosystem

In a day after adding rain water:

Amoebina: *Amoeba* sp., *Mayorella* sp., *Trichamoeba* sp.

Testacea: *Arcella* sp., *Corythion* sp., *Cyclopyxis* sp., *Diffugia* sp.

Holotricha: *Colpoda inflata*, *C. steini*.

In a week after adding rain water:

Testacea: *Arcella* sp., *Assulina* sp., *Cyclopyxis* sp., *Corythion* sp., *Euglypha* sp., *Heleopera* sp.

Holotricha: *Colpoda cucullus*, *C. inflata*, *C. steini*.

Spirotricha: *Microthorax* sp., *Oxytricha setigera*.

In a month after adding rain water:

Testacea: *Assulina* sp., *Cochliopodium* sp., *Corythion* sp., *Heleopera* sp., *Parmulina*?

Holotricha: *Colpoda californica*, *C. inflata*, *Strombilidium* sp.

Spirotricha: gen? (cf. Pl. 6, Figs. 1 and 2).

(2) Chalikosystem

In a day after adding rain water:

Rotatoria: Bdelloidea, *Encentrum bryocolum*.

Eutardigrada: *Hypsibius* sp.

In a week after adding rain water:

Amoebina: *Thecamoeba* sp., *Trichamoeba* sp.

Testacea: *Assulina muscorum*, *Cyclopyxis* sp.

Holotricha: *Colpoda inflata*, *Urotricha*?

Eutardigrada: *Hypsibius* sp.

In a month after adding rain water:

Amoebina: *Thecamoeba* sp.

Testacea: *Assulina* sp., *Heleopera* sp.

Holotricha: *Colpoda inflata*.

Spirotricha: *Oxytricha* sp.

3.2. *Densities of the microbiota*

The number of individuals per 1 cm³ at class level was investigated together with the number of species which was extracted from the polyurethane foam buried in the sample taken from Langhovde. The result is shown in Table 1.

From Table 1, it may be said as follows:

1) Even in an older sample, if it did not undergo dry-wet conditions repeatedly, such animal classes as Zoomastigophora, Amoebina, Holotricha and Spiro-

Table 1. Densities of microbiota in an older sample from Langhovde. Left: Number of individuals per 1 cm³, Right: Number of species per 1 cm³, (): Dead.

Classes	Habitats	
	Bryosystem	Chalikosystem
Zoomastigophora	4/1–6/1	6/1
Amoebina	288/1–644/1	14/1–420/2
Testacea	(2)/1	(8)/2
Holotricha	54/2–316/2	22/2–204/3
Spirotricha	0–4/1	0–2/1
Rotatoria	0	(1)/1
Nematoda	0	0
Tardigrada	0	0–(2)/1

tricha can maintain their lives for a longer period.

2) The lasting power is remarkably strong in Amoebina and Holotricha.

3) The lasting power is not so strong, in larger microbiota like Testacea, Nematoda, Rotatoria and Tardigrada. The last-mentioned fact is extremely interesting since those animalcules are very often demonstrated in the paper to be the fittest to the coldest condition under laboratory experiments.

3.3. Distribution of terrestrial Testacea, Holotricha and Spirotricha

In aid of the far reaching and complicated studies, that is to say, the studies on the “pioneer” species and on the analysis of the colonization by microbiota of Antarctica, distribution pattern of commonest terrestrial Testacea, Holotricha and Spirotricha is shown in Tables 2, 3 and 4.

From Tables 2, 3 and 4, the following may be pointed out:

1) Of 430 terrestrial species under 66 genera of Testacea, 77 species under 38 genera have been recovered from the Antarctic region. And, no endemic species to Antarctica has been reported. It means that 18% of the species and 58% of the genera of the terrestrial Testacea could live in Antarctica, although they are regarded as bryophilous species.

2) Of 119 terrestrial species under 47 genera of Holotricha 29 species under 20 genera have been found in the Antarctic region. And, not a single specimens of the endemic species has been reported. It means that 24% of the species and 43% of the genera of the terrestrial Holotricha are now living in Antarctica.

3) Of 59 terrestrial species under 31 genera of Spirotricha 21 species under 15 genera have been detected from the Antarctic region. And, no endemic species has been reported. It means that 36% of the species and 48% of the genera of the terrestrial Spirotricha are now living in Antarctica.

As regards rotifers some 700 species under 25 genera have been hitherto

Table 2. Data for analyzing the colonization by Testacea of terrestrial habitats of Antarctica.

M: Moss, T: Soil, S: Sand, W: Aquatic, WM: Sphagnum, AM: Antarctic moss, AT: Antarctic sandy soil, +: Common, *: Very common, ?: Doubtful, PD: PENARD, DC: DECLOITRE, HD: HADA, SM: SMITH, SD: SUDZUKI.

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Amphitrema?</i>						+		SD
<i>Amphizonella flava</i>	+	+	+					
<i>A. minima</i>		+	+					
<i>A. violacea</i>		+	+					
<i>Antarcella pseudarcella</i>			+					
<i>Apogromia muscicola</i>	+		+					
<i>Arcella arenaria</i>			+			+	*	PD, SD
<i>A. a. v. compressa</i>			+			+		SD
<i>A. artocera</i>						+		HD
<i>A. catinus</i>	+	+	+					
<i>A. c. v. megastoma</i>	+		+					
<i>A. c. v. spaerocysta</i>	+		+					
<i>A. discoides</i>						+		SD
<i>A. hemisphaerica</i>	+		+					
<i>A. jurrassica</i>			+					
<i>A. megastoma congolensis</i>			+					
<i>A. polypora</i>	+		+					
<i>A. p. v. curvata</i>	+		+					
<i>A. pygmaea</i>			+					
<i>A. rotunda</i>			+					
<i>A. r. v. aplanata</i>	+		+					
<i>A. r. v. a. f. elliptica</i>	+		+					
<i>A. r. v. stenostoma f. aplanata</i>			+	+				
<i>A. r. v. s. f. undulata</i>	+		+					
<i>A. vulgaris</i>	*					+		SM, PD
<i>Assulina collaris</i>			+					
<i>A. muscorum</i>			+			*	*	PD, HD, SM, SD
<i>A. m. v. denticulata</i>	+		+					
<i>A. m. v. stenostoma</i>				+				
<i>A. seminulum</i>		+	+					
<i>Bullinularia gracilis</i>			+	+				
<i>B. indica</i>			+	+		+		DC, PD
<i>B. i. v. minor</i>			+					
<i>B. minor</i>			+					
<i>B. pulchella</i>				+				
<i>Capsellina bryorum</i>			+					
<i>C. timida</i>			+					
<i>C. sp.</i>						+		SD
<i>Centropyxis aculeata</i>						+		PD

Table 2. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Centropyxis aerophila</i>			+			+		SD
<i>C. a. v. constricta</i>				+				
<i>C. a. v. grandis</i>	+							
<i>C. a. v. minuta</i>	+		+					
<i>C. a. v. sphagnicola</i>		+	+					
<i>C. bacillifera</i>			+			+	+	DC, SD
<i>C. cassis</i>			+			+		DC
<i>C. c. v. minima</i>		+	+					
<i>C. constricta</i>						+		SD, DC, PD
<i>C. cordiformis</i>				+				
<i>C. cornuta</i>				+				
<i>C. crustulata</i>				+				
<i>C. cryptostoma</i>				+				
<i>C. c. v. cornuta</i>				+				
<i>C. deflandriana</i>				+				
<i>C. d. v. minima</i>				+				
<i>C. discoides</i>	+							
<i>C. ecornis v. minuta</i>			+					
<i>C. elongata</i>			+	+				
<i>C. gauthieri</i>			+	+				
<i>C. gibba</i>		+	+					
<i>C. globulosa</i>			+	+				
<i>C. halophila</i>				+				
<i>C. h. v. gigas</i>			+					
<i>C. horrida</i>			+					
<i>C. kolkwitzi</i>			+					
<i>C. k. v. grandis</i>	+		+					
<i>C. laevigata</i>	+	+	+					
<i>C. l. f. lobostoma</i>	+	+	+					
<i>C. lapponica</i>			+					
<i>C. latior</i>			+					
<i>C. linguaeformis</i>			+					
<i>C. longispina</i>			+					
<i>C. marsupiformis</i>	+	+	+					
<i>C. m. f. ecornis</i>			+					
<i>C. minuta</i>	+		+	+		+		SD
<i>C. orbicularis</i>	+	+	+					
<i>C. orinokii</i>			+					
<i>C. ovata</i>			+					
<i>C. ovuliformis</i>				+				
<i>C. plagiostoma</i>				+				
<i>C. p. v. oblonga</i>				+				
<i>C. p. v. terricola</i>				+				

Table 2. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Centropyxis platystoma</i>	+		+			+		SD
<i>C. pontifera</i>			+					
<i>C. protecta</i>			+					
<i>C. reversa</i>			+					
<i>C. sacciformis</i>	+		+					
<i>C. serrahni</i>				+				
<i>C. sylvatica</i>	+	+	+					
<i>C. s. v. globulosa</i>				+				
<i>C. s. v. microstoma</i>				+				
<i>C. s. v. minor</i>		+		+				
<i>C. transversa</i>			+					
<i>C. trigonostoma</i>			+					
<i>C. vandeli</i>				+				
<i>C. v. v. globulosa</i>				+				
<i>C. v. v. sinuata</i>				+				
<i>C. ventricosa</i>			+					
<i>C. villiersi</i>			+					
<i>Clypeolina</i> sp.	+					+		SM
<i>Cochliopodium granulatum</i>						+		HD
<i>C. tentaculatus</i>						+		SD
<i>Corythion constricta</i>	+		+	+				
<i>C. delamarei</i>				+				
<i>C. dubium</i>	+	+	+			*		PD, HD, SM, SD
<i>C. d. v. aerophila</i>		+	+			+		SD
<i>C. d. v. gigas</i>	+	+	+					
<i>C. d. v. orbicularis</i>			+					
<i>C. d. v. terricola</i>				+				
<i>C. nebeloides</i>				+				
<i>C. pulchellum</i>		+	+			+		HD
<i>C. sp.</i>						+		SD
<i>Cryptodiffugia angulata</i>		+	+	+				
<i>C. compressa</i> f. <i>angusticoris</i>	+	+		+				
<i>C. sacculus</i>						+		SD
<i>C. sp.</i>						+		SD
<i>Cyclopyxis ambigua</i>				+				
<i>C. a. aplanata</i>				+				
<i>C. amplecta</i>				+				
<i>C. aplanata</i>				+				
<i>C. a. v. microstoma</i>				+				
<i>C. arcelloides</i>	+	+	+					
<i>C. armata</i>			+					
<i>C. crucistoma</i>			+					
<i>C. eurystoma</i>	+	+						

Table 2. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Cyclopyxis e. v. gauthieriana</i>				+				
<i>C. e. v. parvula</i>				+				
<i>C. gigantea</i>			+					
<i>C. humilis</i>				+				
<i>C. kahli</i>	+		+					
<i>C. k. v. cyclostoma</i>				+				
<i>C. pernana</i>			+					
<i>C. plana</i>			+					
<i>C. profundistoma</i>			+					
<i>C. pseudolaevigata</i>	+		+					
<i>C. puteus</i>				+				
<i>C. p. v. golemanskyi</i>			+	+				
<i>C. trilobata</i>			+					
<i>C. sp.</i>						+		SD
<i>Cyphoderia ampulla</i>	+							
<i>C. a. v. major</i>	+							
<i>Diffflugia bombycina</i>				+				
<i>D. bryophila</i>		+	+					
<i>D. bulla</i>				+				
<i>D. echinulata</i>			+					
<i>D. levanderi</i>	+		+					
<i>D. lucida</i>	+	+	+			+	+	PD, HD, SD
<i>D. manicata</i>	+		+					
<i>D. m. v. langhovdensis</i>						+		SD
<i>D. oblonga atricolor</i>						+		DC
<i>D. o. v. nodosa</i>			+					
<i>D. o. v. n. f. tricornis</i>			+					
<i>D. o. v. parva</i>			+					
<i>D. o. v. rocki</i>			+					
<i>D. penardi</i>	+					+		SM
<i>D. pulex?</i>						+		SD
<i>D. rubescens</i>		+	+					
<i>D. r. f. major</i>		+	+					
<i>D. r. f. minor</i>		+	+					
<i>D. spp. 1-3</i>						+		SD
<i>Diffugiella apiculata</i>	+		+					
<i>D. crenulata</i>	+	+	+					
<i>D. c. v. globosa</i>	+	+	+					
<i>D. oviformis</i>	+	+	+	+				
<i>D. o. v. fusca</i>		+	+	+				
<i>D. sacculus</i>	+	+	+	+				
<i>D. s. v. sakotschawi</i>		+		+				
<i>D. sp.</i>						+		SM, SD

Table 2. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Diplochlamis gruberi</i>	+		+				+	PD
<i>D. leidyi</i>	+		+			+		PD
<i>D. timica</i>						+		PD
<i>D. vestita</i>	+		+					
<i>Diplophrys archeri</i>	+					+		SM
<i>Distimatopyxis couillardi</i>				+				
<i>Euglypha acanthophora</i>	+	+	+					
<i>E. a. v. brevispina</i>	+	+	+					
<i>E. anodonta</i>				+				
<i>E. a. magna</i>				+				
<i>E. bryophila</i>			+					
<i>E. ciliata</i>	+	+	+			+		PD, SM
<i>E. c. f. glabra</i>	+	+	+	+				
<i>E. compressa</i>	+	+	+	+		+	+	SD, PD
<i>E. c. f. glabra</i>	+	+	+	+				
<i>E. crista</i>		+	+					
<i>E. c. f. decora</i>		+	+					
<i>E. cuspidata</i>				+				
<i>E. denticulata</i>			+	+				
<i>E. dolioliformis</i>				+				
<i>E. filifera</i>	+	+	+					
<i>E. loevis</i>	+	+	+	+		*	+	PD, SD, HD
<i>E. l. v. lanceolata</i>			+	+				
<i>E. macrodentata</i>			+					
<i>E. megastoma</i>				+				
<i>E. polylepis</i>				+				
<i>E. pseudociliata</i>				+				
<i>E. p. f. glabra</i>				+				
<i>E. rotunda</i>		+	+	+		+		DC
<i>E. r. v. dorsalis</i>				+				
<i>E. r. v. madera</i>				+				
<i>E. r. v. palma</i>				+				
<i>E. r. v. spinosa</i>				+				
<i>E. scutigera</i>	+	+	+					
<i>E. strigosa</i>		+	+					
<i>E. s. f. glabra</i>		+	+	+				
<i>E. s. v. heterospina</i>	+	+	+					
<i>E. s. v. muscorum</i>			+					
<i>E. tuberculata</i>	+	+	+			+		PD
<i>E. t. v. minor f. subcylindrica</i>			+					
<i>E. t. v. subcylindrica</i>	+		+					
<i>E. umbilicata</i>				+				
<i>Euglyphella compacta</i>				+				

Table 2. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Euglyphella elegans</i>				+				
<i>E. lineare</i>				+				
<i>Euglyphidion enigmaticum</i>				+				
<i>Geamphorella lucida</i>				+				
<i>Geoplagiopyxis declivus</i>				+				
<i>Geopyxiella sylvicola</i>				+				
<i>G. s. v. globulosa</i>				+				
<i>G. s. v. parva</i>				+				
<i>G. sp.</i>						+		SD
<i>Gromia fluviatilis</i>	+		+					
<i>G. oviformis</i>	+		+					
<i>G. saxicola</i>			+					
<i>G. terricola</i>			+					
<i>Heleopera penardi</i>				+				
<i>H. petricola</i>	+	+		+		+		SD, PD, DC
<i>H. p. v. humicola</i>			+	+		+	+	SD, DC
<i>H. p. v. major</i>		+	+	+				
<i>H. picta</i>	+		+	+				
<i>H. rosea</i>		+		+				
<i>H. sabauda</i>	+	+	+					
<i>H. sphagni</i>						+		DC, PD
<i>H. sylvatica</i>			+			+		DC, PD
<i>H. sp.</i>						+		SM
<i>Hyalina neta</i>		+	+					
<i>Hyalodiscus?</i>						+		SD
<i>Hyalosphenia elegans</i>		+		+		+		SM
<i>H. e. v. cylindracollis</i>		+	+					
<i>H. insecta</i>		+		+				
<i>H. minuta</i>		+		+				
<i>Jungia intermedia</i>		+	+					
<i>J. magnifica</i>			+					
<i>J. nux</i>			+					
<i>J. sundanensis</i>			+					
<i>J. s. v. ovoidalis</i>			+					
<i>Lecythium hyalinum</i>	+					+		SM
<i>Leptochlamys ampullacea</i>						+		HD
<i>L. sp.</i>						+		SD
<i>Lesquereusia epistomium</i>	+	+	+					
<i>L. modesta</i>						+		DC
<i>L. ovalis</i>	+		+					
<i>L. o. v. acuminata</i>	+		+					
<i>L. o. v. decloitrei</i>	+		+					
<i>L. spiralis</i>			+					

Table 2. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Lesquereusia s. f. arcuata</i>		+	+					
<i>Metaheleopera ovalistoma</i>			+					
<i>Microchlamys patella</i>		+	+					
<i>Microcorycia aculeata</i>			+					
<i>M. bartosi</i>			+					
<i>M. bryophila?</i>						+		SD
<i>M. corona</i>			+					
<i>M. c. v. simplex</i>			+					
<i>M. flava</i>			+			+	+	PD
<i>M. penardi</i>						+	+	DC
<i>M. physalis</i>			+					
<i>M. radiata</i>			+					
<i>M. spiculata</i>			+					
<i>M. spinosa</i>			+					
<i>M. spp.</i>						+		SD
<i>M. suctorifera</i>			+					
<i>M. tessellata?</i>			+					
<i>Microgromia elegantula</i>						+		HD
<i>Nebella bohémica</i>		+	+					
<i>N. caudata</i>						+		DC, PD
<i>N. circulata</i>			+					
<i>N. collaris</i>		+	+					
<i>N. c. v. galeata</i>		+	+					
<i>N. columbiana</i>		+	+					
<i>N. deflandrei</i>	+	+	+					
<i>N. dentatula</i>		+	+					
<i>N. d. f. longula</i>		+	+					
<i>N. dentistoma</i>	+		+			+		DC, PD
<i>N. d. v. major</i>		+	+					
<i>N. duttoni</i>			+					
<i>N. gertrudeana</i>		+	+					
<i>N. globulosa</i>			+					
<i>N. guinensis</i>			+					
<i>N. intermedia</i>			+					
<i>N. lageniformis</i>		+	+			+		DC, PD
<i>N. l. v. cordiformis</i>		+	+					
<i>N. l. v. elegans</i>		+	+					
<i>N. longitubulata</i>	+	+	+					
<i>N. martiali</i>						+		DC, PD
<i>N. militaris</i>		+	+	+				
<i>N. m. v. bryophila</i>		+	+					
<i>N. minor</i>		+	+					
<i>N. nobilis v. compressa</i>			+					
<i>N. parula</i>		+	+					

Table 2. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Nebella rampii</i>			+					
<i>N. semimarginata</i>			+					
<i>N. sinuosa</i>			+					
<i>N. speciosa</i>			+					
<i>N. tincta</i>		+	+					
<i>N. t. v. major</i>		+	+					
<i>N. t. v. rotunda</i>		+	+					
<i>N. t. f. stenostoma</i>		+	+	+				
<i>N. tubulata v. spatha</i>				+			+	
<i>N. vas</i>						+	+	PD
<i>N. vitraea v. elongata</i>			+					
<i>N. v. v. sphagni</i>		+	+					
<i>N. waillesi</i>		+	+			+		SM
<i>N. w. v. magna</i>		+	+					
<i>Paracentropyxis mimetica</i>				+				
<i>Paraquadrulla discoides</i>	+		+					
<i>P. irregularis</i>		+	+			+	+	PD
<i>P. pachylepis</i>				+				
<i>Parmulina cyathus</i>			+			+		SM
<i>P. oblecta</i>			+					
<i>P. sp.</i>						+	+	SD
<i>Penardochlamys arcelloides</i>	+		+					
<i>Phryganella acropodia</i>	+		+	+		+		SM, DC
<i>P. a. v. alta</i>				+				
<i>P. a. v. penardi</i>	+		+	+				
<i>P. hemisphaerica</i>						+		PD
<i>P. paradoxa v. alta</i>				+				
<i>P. sp.</i>						+		SD
<i>Physochila griseda</i>			+					
<i>P. tenella</i>		+	+					
<i>P. t. f. acollis</i>		+	+					
<i>P. t. f. longicollis</i>		+	+					
<i>P. sp.</i>						+		SD
<i>Placocista glabra</i>		+	+					
<i>Plagiopyxis angularis</i>				+				
<i>P. barrosi</i>				+				
<i>P. bathystoma</i>				+				
<i>P. callida</i>	+	+	+	+				
<i>P. c. v. grandis</i>		+	+	+				
<i>P. c. v. pusilla</i>				+				
<i>P. declivis</i>		+		+				
<i>P. glyphostoma</i>				+				
<i>P. intermedia</i>				+				
<i>P. i. v. cyrtostoma</i>				+				

Table 2. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Plagiopyxis labiata</i>		+		+				
<i>P. minuta</i>			+	+				
<i>P. m. v. phanerostoma</i>				+				
<i>P. m. v. oblonga</i>				+				
<i>P. m. v. o. f. grandis</i>				+				
<i>P. oblonga</i>				+				
<i>P. o. v. cryptostoma</i>				+				
<i>P. penardi</i>	+			+				
<i>P. p. v. oblonga</i>				+				
<i>P. pentagonostoma</i>			+					
<i>Pontigulasia bryophila</i>	+		+					
<i>P. b. v. elachys</i>	+		+					
<i>Proplagiopyxis nuda</i>				+				
<i>Protoplagiopyxis delamarei</i>				+				
<i>Pseudawerintzewia calcicola</i>				+				
<i>Pseudodiffugia gracilis</i>	+					+		SM
<i>P. g. v. muscicola</i>			+					
<i>P. g. v. terricola</i>				+				
<i>P. sylvarum</i>	+		+					
<i>Pyxidicula cymbalum</i>	+		+					
<i>P. invisitata</i>	+		+					
<i>P. patens</i>	+		+					
<i>P. stenostoma</i>			+					
<i>P. spp. 1-2</i>						+		SD
<i>Quadrullella camerounensis</i>			+					
<i>Q. lageniformis</i>			+					
<i>Q. quadrigera</i>			+					
<i>Q. scutellata</i>		+	+					
<i>Q. symmetrica</i>	+	+	+					
<i>Q. s. v. curvata</i>	+	+	+					
<i>Q. s. v. irregularis</i>	+	+	+					
<i>Q. s. v. longicollis</i>	+	+	+					
<i>Schoenbornia humicola</i>				+				
<i>Schwabia regularis</i>				+				
<i>S. robustus</i>				+				
<i>S. terricola</i>				+				
<i>S. t. v. thomasi</i>				+				
<i>Sexangularia parvula</i>	+		+					
<i>S. polyedra</i>	+	+	+					
<i>Sphenoderia fissirostris</i>		+	+					
<i>S. labiata</i>			+					
<i>S. lenta</i>		+				+		DC
<i>S. splendida</i>	+		+					
<i>S. truncata</i>			+					

Table 2. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Tracheleuglypha acolla</i>				+				
<i>T. a. v. aspera</i>				+				
<i>T. a. f. stenostoma</i>				+				
<i>T. dentata</i>	+	+				+		DC, PD
<i>T. d. v. elongata</i>			+					
<i>T. d. v. e. f. duplicata</i>			+					
<i>T. selachiostoma</i>			+					
<i>Trigonopyxis arcula</i>			+	+		+		DC
<i>T. a. v. major</i>			+	+				
<i>T. a. v. microstoma</i>			+					
<i>T. bathystoma</i>			+					
<i>T. bullinulariaformis</i>		+	+					
<i>Trinema ciliata</i>			+					
<i>T. complanatum</i>		+	+	+				
<i>T. c. v. aerophila</i>			+					
<i>T. c. v. a. f. punctata</i>				+				
<i>T. c. v. globulosa</i>				+				
<i>T. contraria</i>				+		+		SD
<i>T. cornuta</i>				+				
<i>T. enchelys</i>	+	+	+			+	+	PD, SM, DC
<i>T. e. f. biconvexa</i>	+	+	+	+				
<i>T. gradis</i>	+	+	+					
<i>T. lineare</i>	+	+	+	+		+		SM, SD
<i>T. l. v. terricola</i>				+				
<i>T. l. f. truncatum</i>	+	+	+					
<i>T. galeata</i>			+	+				
<i>T. penardi</i>			+	+				
<i>Wailesella eboracensis</i>		+	+					
<i>W. sp. ?</i>						+		SD
<i>Zonomyxa violacea</i>		+	+					

reported from the terrestrial habitats. However, only 15 known species under 8 genera have been observed in the samples from the Antarctic region. It means that only 2% of the known species and 32% of the genera of Rotatoria are living in Antarctica.

As for Tardigrada some 500 species under 20 genera have hitherto been reported from the terrestrial habitats. Of these 28 species under 7 genera have been recovered from the Antarctic region. It means that now 6% of the species and 35% of the genera are living in Antarctica.

The facts mentioned above would suggest that more than half of the com-

Table 3. Data for analyzing the colonization by *Holotricha* of terrestrial habitats of Antarctica.

M: Moss, T: Soil, S: Sand, W: Aquatic, WM: Sphagnum, AM: Antarctic moss, AT: Antarctic sandy soil, +: Common, *: Very common, ?: Doubtful, HD: HADA, SM: SMITH, SD: SUZUKI.

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Bresslaa discoidea</i>			+	+				
<i>Bryophrya bavariensis</i>			+	+				
<i>B.</i> sp.						+		SD
<i>Bryophyllum loxophylliforme</i>			+	+				
<i>B.</i> <i>tegularum</i>						+		SD
<i>B.</i> <i>vorax</i>			+	+				
<i>B.</i> sp.						+		SD
<i>Chaenea vorax</i>			+					
<i>Chilodonella bavariensis</i>			+	+				
<i>C.</i> <i>convexa</i>			+	+				
<i>C.</i> <i>cucullulus</i>			+	+				
<i>C.</i> <i>gouraudi</i>			+	+				
<i>C.</i> <i>uncinata</i>			*	*				
<i>C.</i> <i>u. v. dentata</i>				+				
<i>C.</i> <i>wisconsinensis</i>			+	+				
<i>Chilodontopsis depressa</i>			+	+				
<i>C.</i> <i>muscorum</i>			+	+				
<i>Cinetochilum margaritaceum</i>			*	*				
<i>Cohnilembus anguilla</i>			+	+				
<i>C.</i> <i>fusiformis</i>			*	*				
<i>C.</i> <i>stichotricha</i>			+	+				
<i>Colpidium colpoda</i>			+	+				
<i>Colpoda acuta</i>				+				
<i>C.</i> <i>aspera</i>			+	+				
<i>C.</i> <i>californica</i>						+		SD
<i>C.</i> <i>colpidiopsis</i>				+				
<i>C.</i> <i>cucullus</i>			*	*		+		HD, SD
<i>C.</i> <i>inflata</i>			*	*		+		SD
<i>C.</i> <i>irregularis</i>			+	+				
<i>C.</i> <i>patella</i>			+	+				
<i>C.</i> <i>reniformis</i>			+	+				
<i>C.</i> <i>steini</i>			*	*		+		SD
<i>C.</i> sp.						+		SD
<i>Craspedothorax gracilis</i>			+	+				
<i>Ctedoctema acanthocrypta</i>		+						
<i>Cyclidium citrullus</i>			+	+				
<i>C.</i> <i>curvatum</i>			+	+				
<i>C.</i> <i>elongatum</i>			*	*				
<i>C.</i> <i>glaucoma</i>			*	*		+		SM
<i>C.</i> <i>musciola</i>			*	*				

Table 3. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Cyclidium opisthostoma</i>			+	+				
<i>C.</i> sp.						+		SD
<i>Cyrtolophosis elongata</i>				+				
<i>C.</i> <i>mucicola</i>			+	+				
<i>Didinium balbiani</i> v. <i>nanum</i>						+		HD
<i>Dileptus alpinus</i>			*	*				
<i>D.</i> <i>amphileptoides</i>			+	+				
<i>D.</i> <i>anser</i>			+	+				
<i>D.</i> <i>conspicuus</i>			+	+				
<i>D.</i> <i>falciformis</i>			+	+				
<i>D.</i> <i>tenuis</i>			+	+				
<i>D.</i> sp.						+		SD
<i>Drepanomonas exigua</i>			*	*				
<i>D.</i> <i>revoluta</i>			*	*				
<i>Enchelys gasterosteus</i>			+	+				
<i>E.</i> <i>mutans</i>			+	+				
<i>E.</i> <i>variabilis</i>			+	+				
<i>E.</i> sp.						+		SM
<i>Frontonia depressa</i>			*	*				
<i>F.</i> <i>parameciiformis</i>			+	+				
<i>Glaucoma macrostoma</i>			+	+				
<i>G.</i> <i>maupasi</i>			+	+				
<i>G.</i> <i>pyriformis</i>						+		SM
<i>Hemiophrys muscicola</i>			+	+				
<i>Histiculus similis</i>				+				
<i>Holophrya saginata</i>				+				
<i>H.</i> sp.						+		SM
<i>Homalogastra setosa</i>			+	+				
<i>Lacrymaria cohni</i>				+				
<i>L.</i> <i>pulchra</i>			+	+				
<i>L.</i> <i>vermicularis</i>			+	+				
<i>Lagynophrya</i> sp.						+		SM
<i>Leptopharynx sphagnetorum</i>				+		+		SM
<i>Lionotus lamella</i>			+	+				
<i>L.</i> sp.						+		SM
<i>Loxophyllum utriculariae</i>			+	+				
<i>Microdiaphanosoma arcuata</i>			*	*				
<i>Microthorax elegans</i>			+			+		SD
<i>M.</i> <i>scutiformis</i>			+	+				
<i>M.</i> <i>simulans</i>			+	+		+		SM
<i>M.</i> sp.						*		SD
<i>Nassula exigua</i>			+	+				
<i>N.</i> <i>picta</i>			+	+				
<i>N.</i> sp.						+		SD

Table 3. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Ophryoglena</i> sp.				+				
<i>Paraglaucoma rostrata</i>			*	*				
<i>Plagiocampha metabolica</i>			+					
<i>P. rouxi</i>			+					
<i>Platyophrya angusta</i>			*	*				
<i>P. lata</i>			+	+				
<i>P. nana</i>			+	+				
<i>P. spumacola</i>			+	*				
<i>P. vorax</i>			+	+				
<i>P.</i> sp.						+		SD
<i>Prorodon teres</i>						+		HD
<i>Pseudoglaucoma labiata</i>			+	+				
<i>P. muscorum</i>			*	*				
<i>P.</i> sp.						+		SD
<i>Pseudoprorodon armatus</i>			+	+				
<i>Saprophilus muscorum</i>			*	*				
<i>S. putrinus</i>				+				
<i>Spathidium amphoriforme</i>			*	*				
<i>S. bavariense</i>			+	+				
<i>S. chlorelligerum</i>			+	+				
<i>S. holsatiae</i>				+				
<i>S. lieberkühnii</i>			+	+				
<i>S. longicaudatum</i>			+	+				
<i>S. muscicola</i>			*	*				
<i>S. papilliferum</i>			+	+				
<i>S. scalpriforme</i>			+	+				
<i>S. serpens</i>			+	+				
<i>S. spathula</i>			+	+				
<i>S.</i> sp.						+		SD
<i>Stammeriella kahli</i>			*	*				
<i>Tetrahymena pyriformis</i>				+				
<i>Trichoderum eurystoma</i>			+	+				
<i>T. sphagnetorum</i>			*	*		+		SD
<i>Trochiloides?</i>						+		SD
<i>Uronema marinum</i>				+		+		
<i>Urotricha agilis</i>						+		SM
<i>U.</i> sp.						+		SD

monest genera have been transported but the so-called speciation has not yet occurred in the Antarctic region.

Table 4. Data for analyzing the colonization by *Spirotricha* of terrestrial habitats of Antarctica.

M: Moss, T: Soil, S: Sand, W: Aquatic, WM: Sphagnum, AM: Antarctic moss, AT: Antarctic sandy soil, +: Common, *: Very common, ?: Doubtful, SM: SMITH, HD: HADA, SD: SUDZUKI.

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Amphisiella raptans</i>				+				
<i>Balantidioides bivacuolata</i>			+	+				
<i>Blepharisma elongatum</i>			+	+				
<i>B. hyalinum</i>			*	*				
<i>B. sphagni</i>			+	+				
<i>B. steini</i>			+	+				
<i>Bryometopus pseudochilodon</i>			*	*				
<i>B. sphagni</i>			+	+				
<i>Epistylis</i> sp.						+		HD
<i>Euplotes affinis</i>		+	+					
<i>E. muscicola</i>			*	*				
<i>Gonostomum affine</i>			*	*		+		SM
<i>Halteria grandinella</i>			+	+		+		SM
<i>Histrio similis</i>				+				
<i>Holosticha intermedia</i>						+		HD
<i>H. multistilata</i>				+				
<i>H. tetracirrata</i>				+				
<i>H. vernalis?</i>						+		SD
<i>H. sp.</i>						+		SD
<i>Keronopsis muscorum</i>			*	*				
<i>K. monilata</i>				+				
<i>K. wetzeli</i>				+				
<i>K. sp.</i>						+		SD
<i>Opisthotricha</i> sp.						+		SD
<i>Oxytricha agilis</i>				+				
<i>O. fallax</i>				+		+		SM
<i>O. rubra</i>				+		+		
<i>O. pellionella</i>				+				SM
<i>O. setigera</i>				+		+		SM, SD
<i>Paraholosticha herbicola</i>			+	+				
<i>P. muscicola</i>			+	+				
<i>P. terricola</i>				+				
<i>Paraurostyla pulchra</i>				+				
<i>P. terricola</i>				+				
<i>Paruroleptus caudatus</i>			+	+				
<i>P. lepisma</i>			+	+				
<i>P. sp.</i>						+		SD
<i>Phacodinium metchnikoffi</i>			+	+				
<i>Pleurotricha lanceolata</i>						+		SM

Table 4. (Continued)

Species	Habitats							Authors
	W	WM	M	T	S	AM	AT	
<i>Pseudomicrothorax</i> sp.				+				
<i>Pyxidium?</i>						+		SD
<i>Sphaerophrya?</i>						+		SD
<i>Steinia muscorum</i>			+	+				
<i>Strombilidium gyrans</i>						+		HD
<i>S.</i> sp.						+		SD
<i>Strongylium californicum</i>			+	+				
<i>Tachysoma?</i>						+		SD
<i>Trachelostyla affine</i>				+				
<i>T.</i> <i>canadensis</i>				+				
<i>Uroleptoides kihni</i>			+	+				
<i>Uroleptus kahli</i>				+				
<i>U.</i> <i>matthesi</i>			+	+				
<i>U.</i> <i>muscorum</i>			*	*				
<i>U.</i> sp.						+		SM
<i>Urostyla muscorum</i>			+	+				
<i>Vorticella microstoma</i>				+		+		HD
<i>V.</i> <i>pussilla?</i>						+		HD
<i>V.</i> <i>striata</i>						+		SM

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Plate 1

- Figs. 1-2. *Trichamoeba* spp.
 Figs. 3-4. *Cochliopodium tentaculatum*
 Figs. 5-6. gen.?
 Fig. 7. *Mayorella* sp.
 Fig. 8. gen.?
 Fig. 9. *Cyclopyxis* sp.
 Fig. 10. *Centropyxis aerophila*?
 Fig. 11. *Geopyxiella*?
 Fig. 12. *Centropyxis* sp.
 Figs. 13-14. *Heleopera petricola*

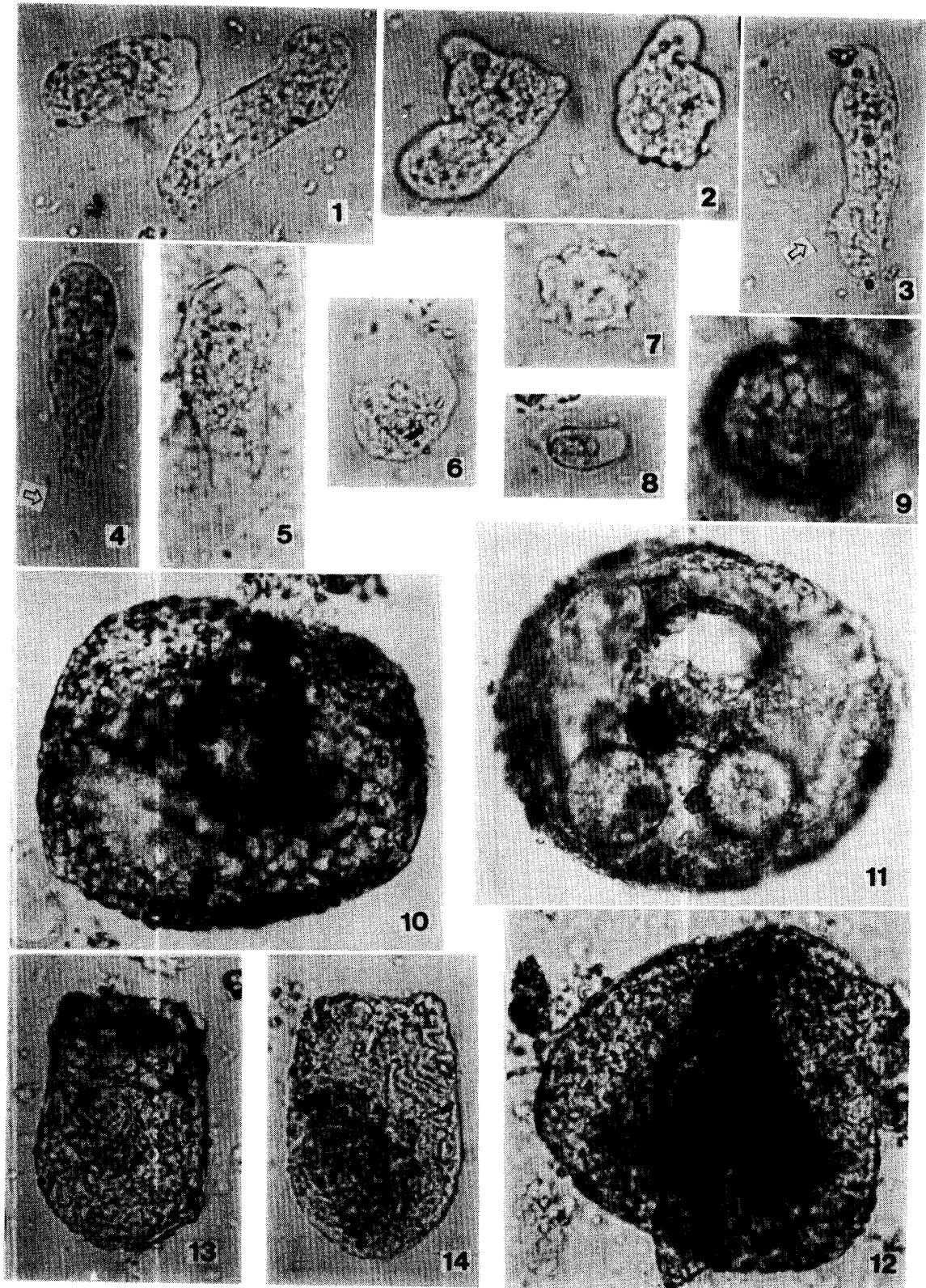


Plate 2

- Figs. 1–2. *Arcella arenaria* v. *compressa*?
Fig. 3. gen.?
Figs. 4–11. *Microcorycia bryophila*?
Fig. 12. gen.?
Figs. 13–14. Cyst (*Parmulina*?)
Fig. 15. gen.?
Figs. 16–17. *Euglypha compressa*?

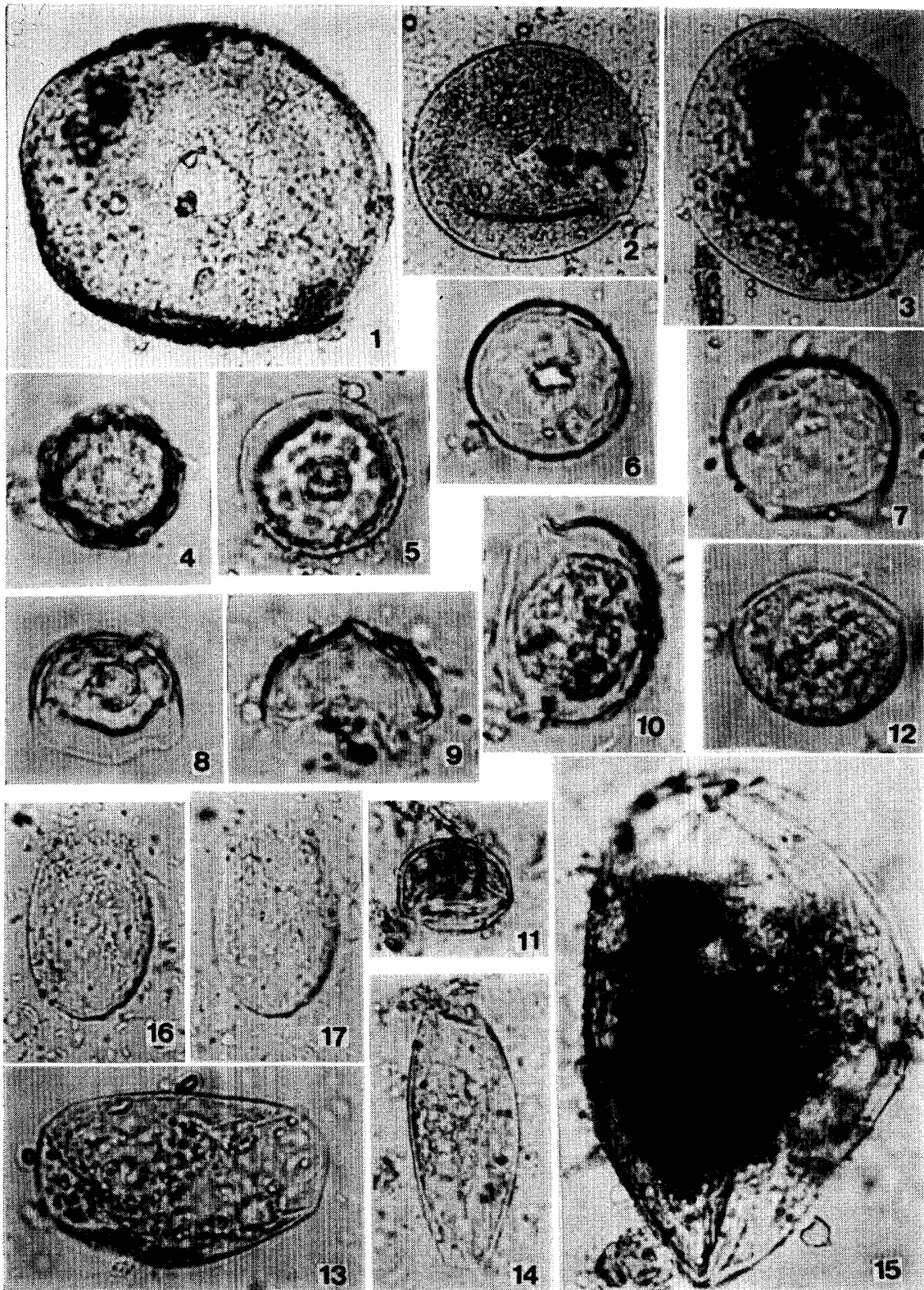


Plate 3

- Figs. 1–4. *Assulina muscorum*
Figs. 5–8. *Euglypha compressa?* (Fig. 8: lateral)
Figs. 9–13. *Trinema contraria* (Figs. 12–13: lateral)
Figs. 14–21. *Trinema lineare* (Figs. 18–21 : lateral)

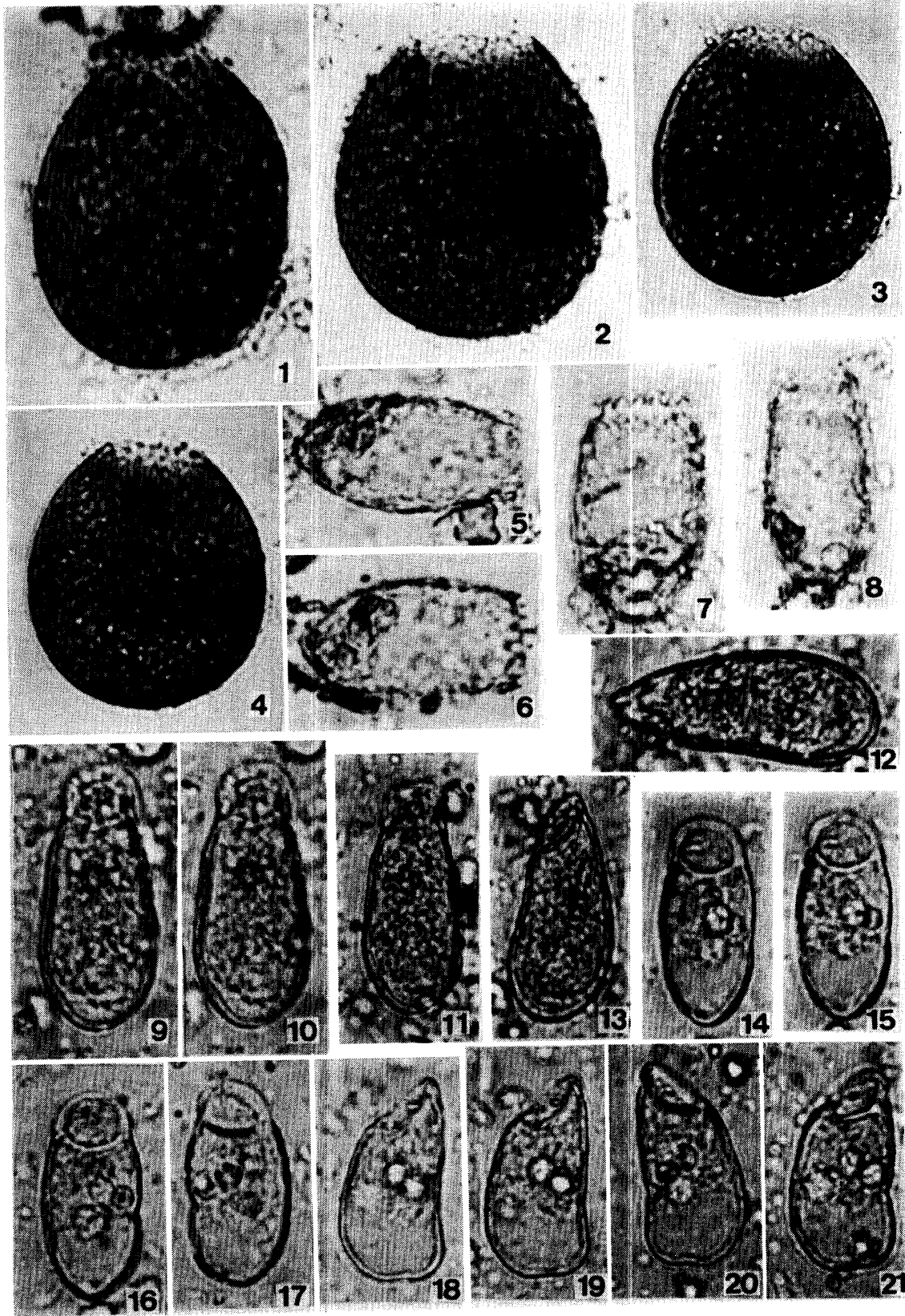


Plate 4

- Figs. 1–13. *Corythion aerophila* (Figs. 4–6, 10: lateral)
Figs. 14–24, 26. *Corythion dubium?* (Figs. 16, 23: lateral)
Fig. 25. *Corythion* sp.

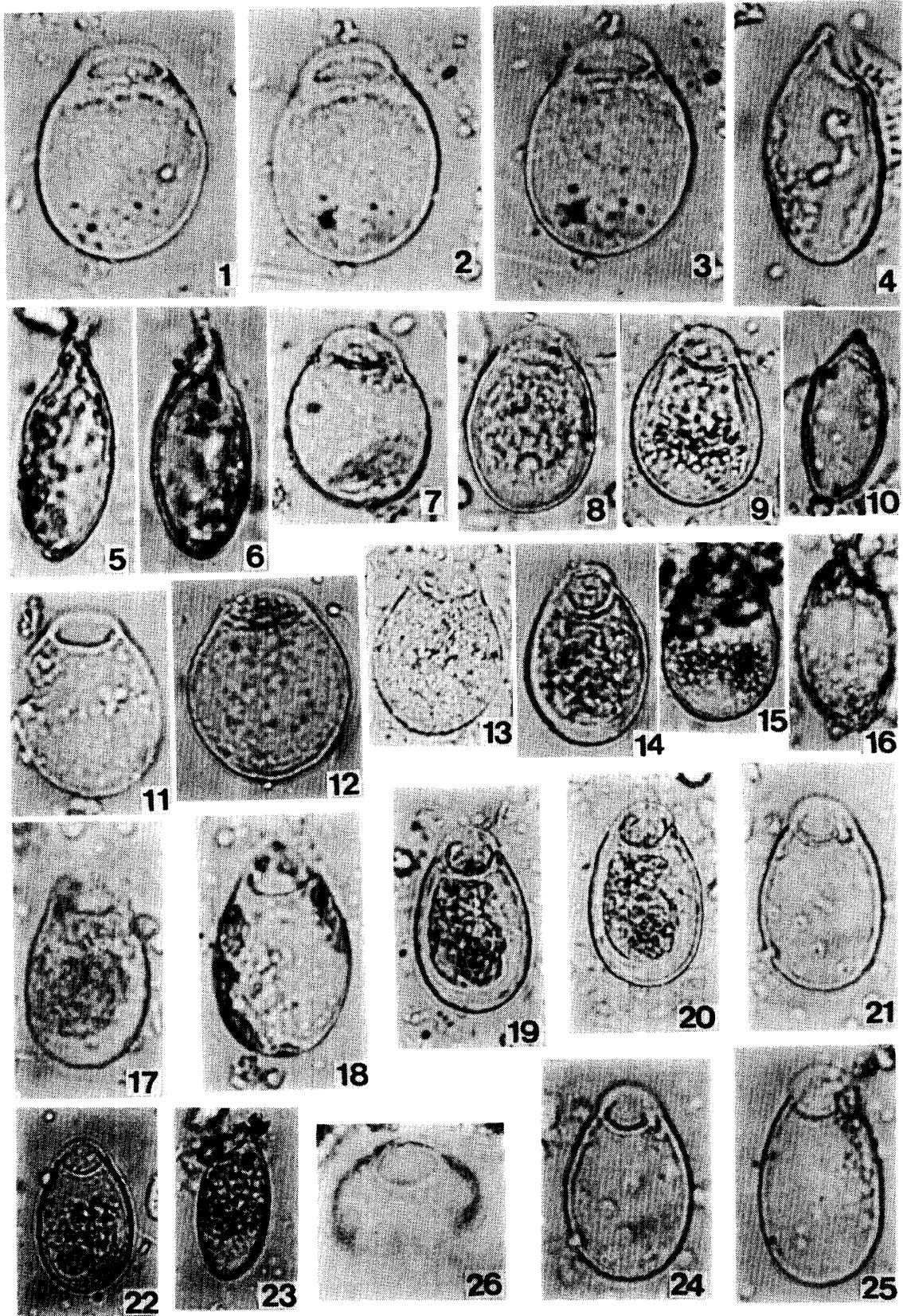


Plate 5

- Figs. 1–3. *Bodo angustas*
Figs. 4–7. *Monas* spp.
Fig. 8. *Colpoda californica*
Figs. 9–10. *Colpoda steini*
Fig. 11. *Colpoda* sp.
Fig. 12. *Colpoda inflata*
Figs. 13–14. *Bryophrya*?
Figs. 15–16. gen.?
Fig. 17. *Trichoderum sphagnetorum*
Figs. 18–19. *Microthorax* sp.
Figs. 21–26. *Bryophyllum tegularum*

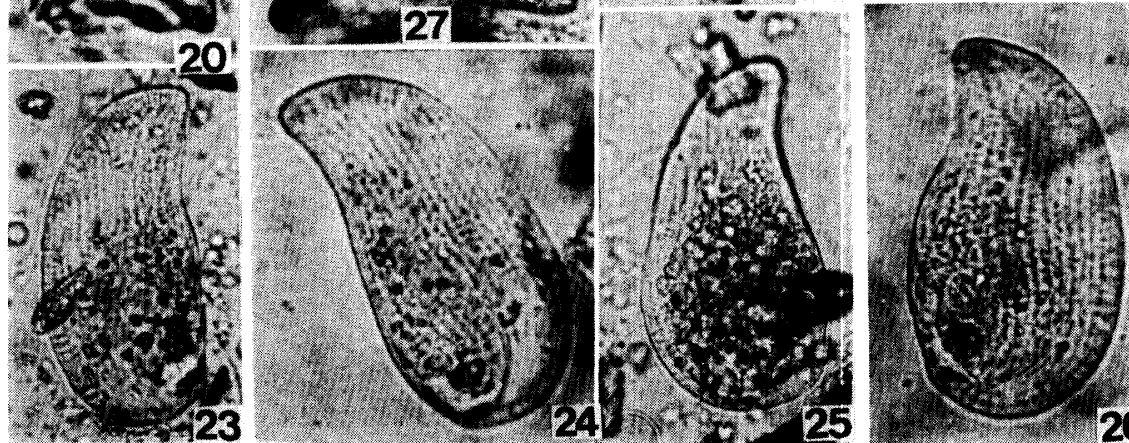
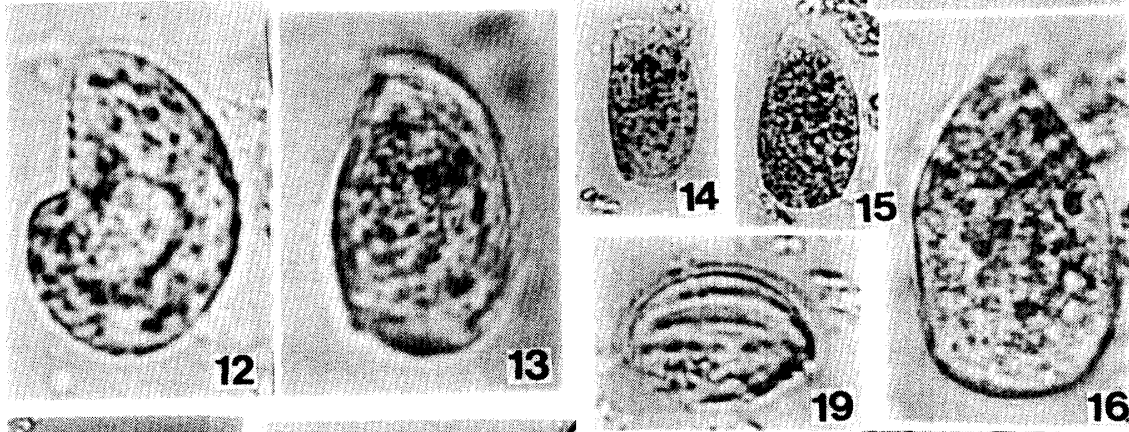
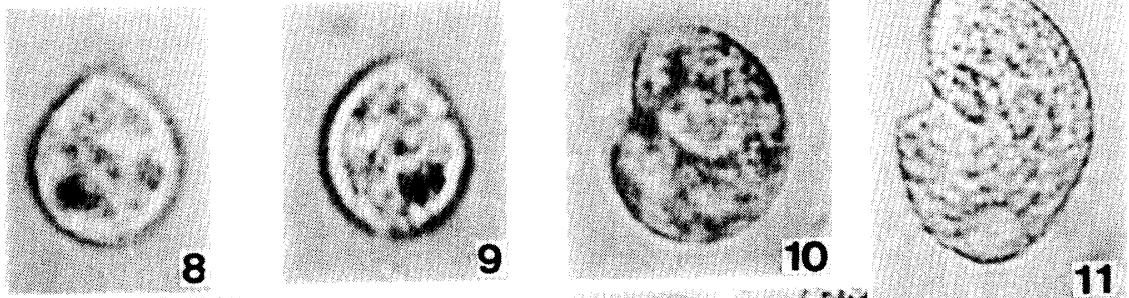
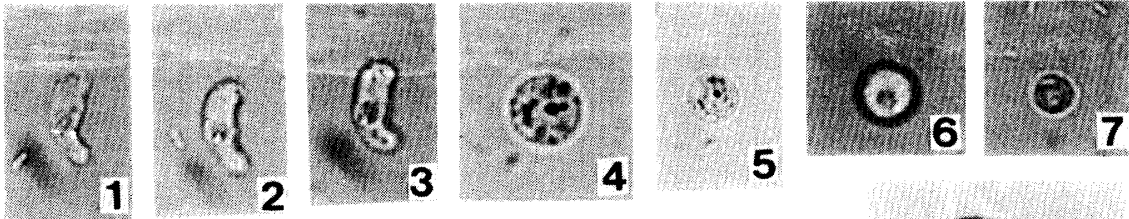


Plate 6

- Figs. 1–2. gen.?
Fig. 3. *Strombilidium?*
Figs. 4–5. gen.?
Figs. 6–7. *Paruroleptus* sp.
Fig. 8. gen.? (Spirotricha)
Figs. 9–12. gen.?
Figs. 13–14. *Tachysoma?*
Figs. 15–18. *Oxytricha* sp.

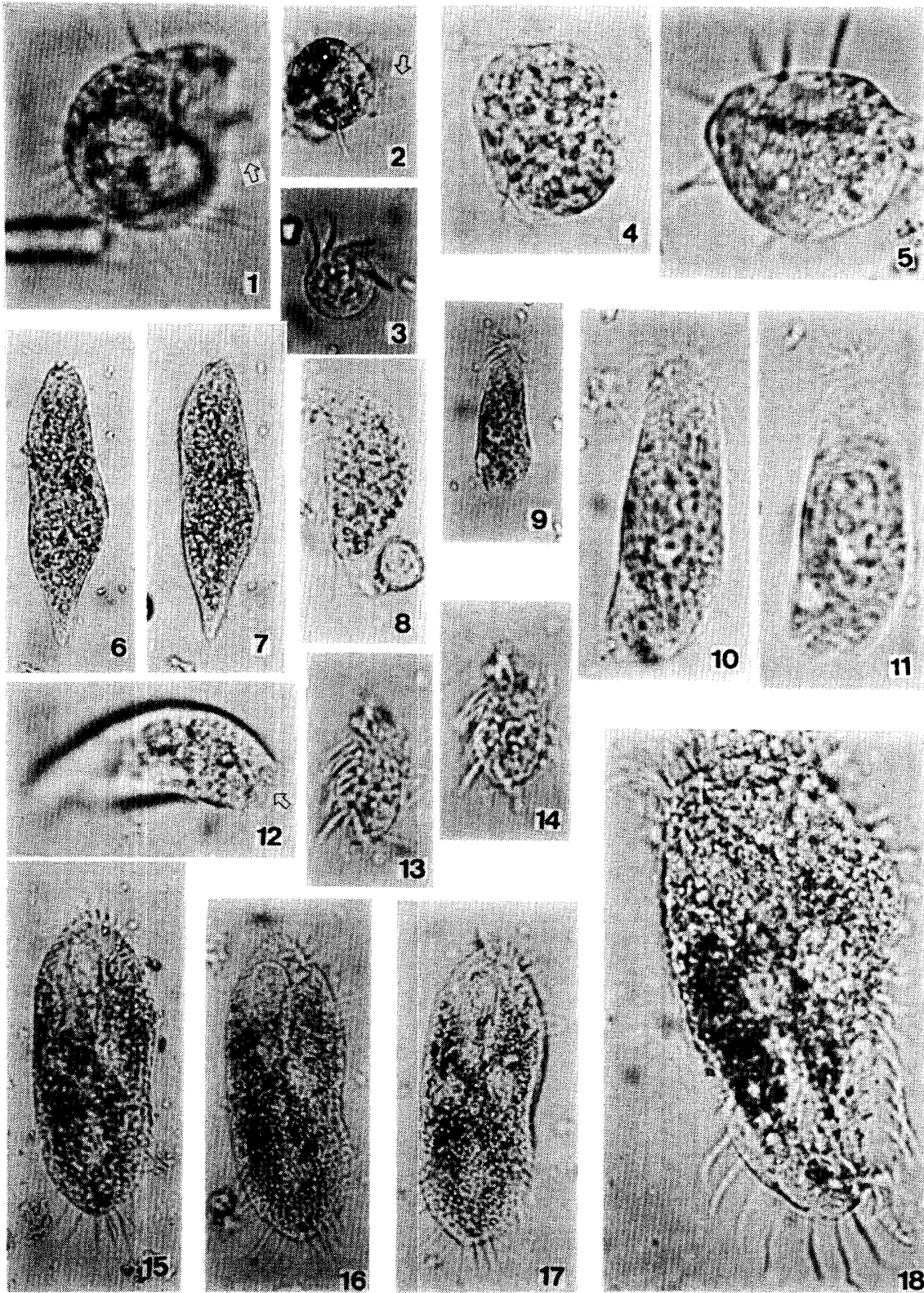


Plate 7

- Figs. 1–2. Spicules of Desmospongiae
Figs. 3–7. gen.? (Nematoda) (Figs. 5–7. Cysts)
Fig. 8. *Lepadella* sp.
Fig. 9. *Macrotrachela* sp.
Figs. 10–11. *Habrotrocha* sp.

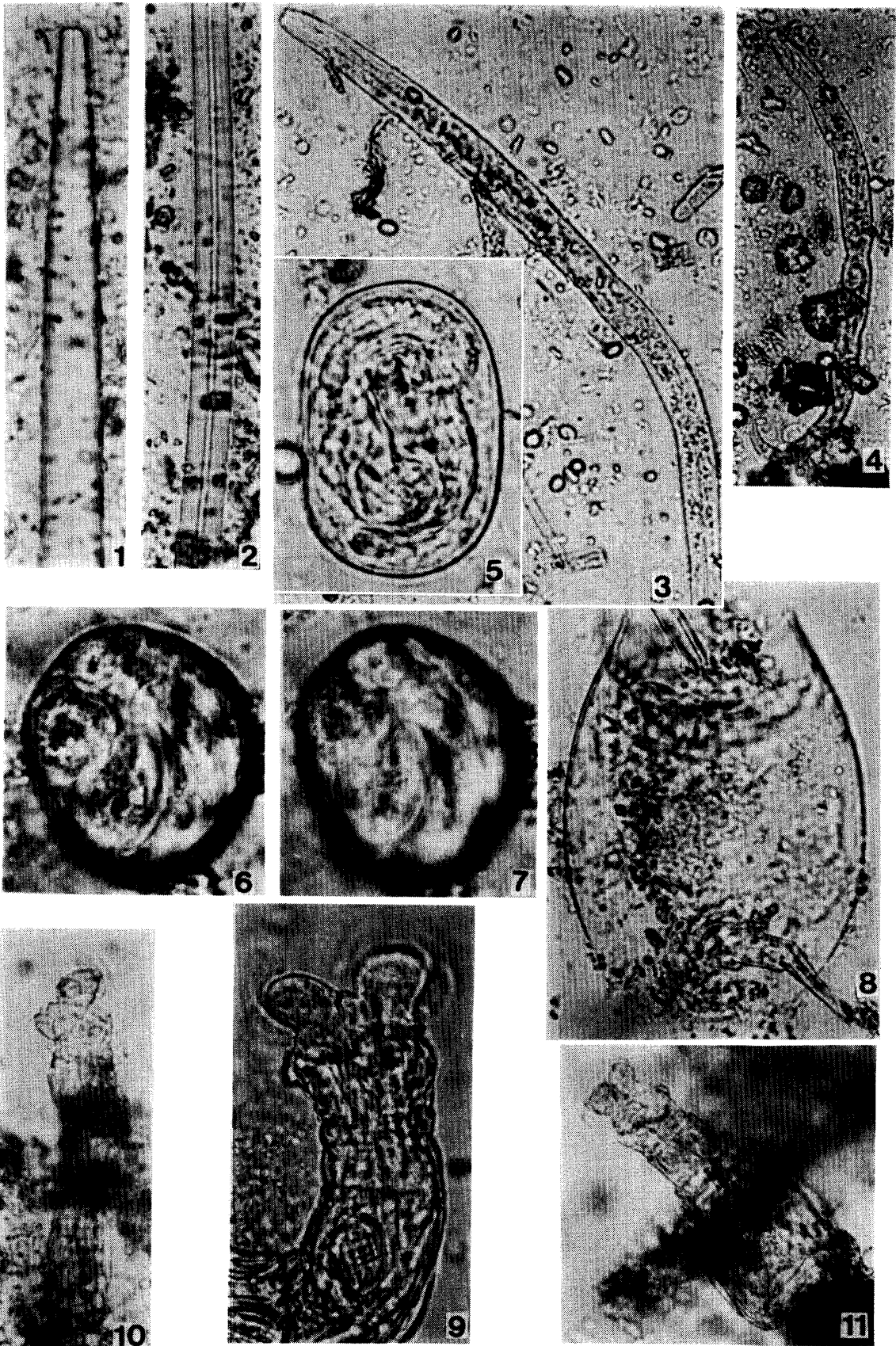


Plate 8

- Figs. 1-2. Bdelloid rotifers in movement
Figs. 3-6. Bdelloid rotifers contracted
Figs. 7-8. *Macrotrachela insolita*
Figs. 9-12. *Habrotrocha gulosa* var.?

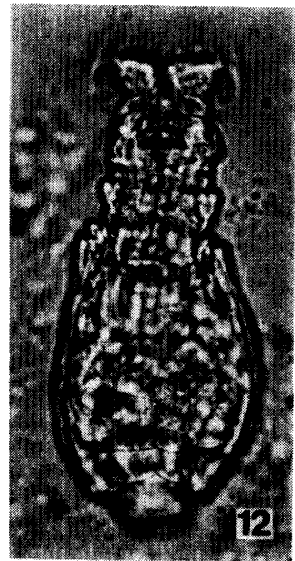
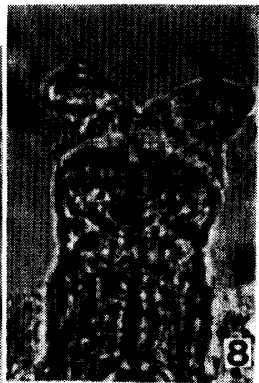
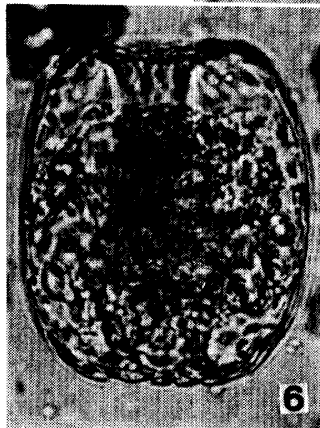


Plate 9

Figs. 1–8. *Echiniscus* sp. resembling *arctomys* and *granulatus*
(Fig. 1. Total, Fig. 2. Head region, Fig. 3. Caudal region, Figs. 4–8. Dorsal sculptures)

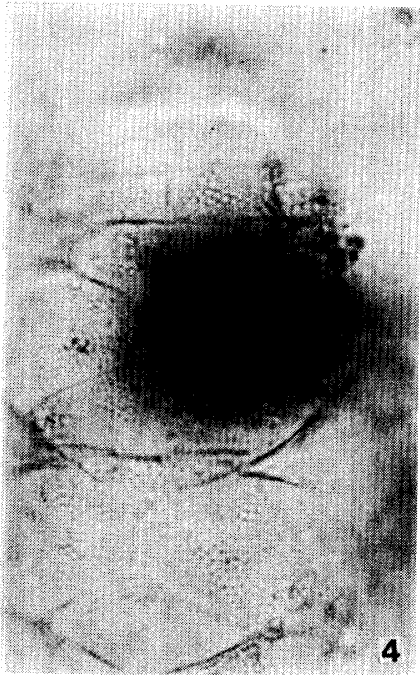
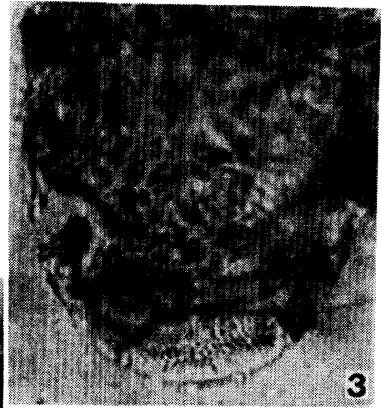
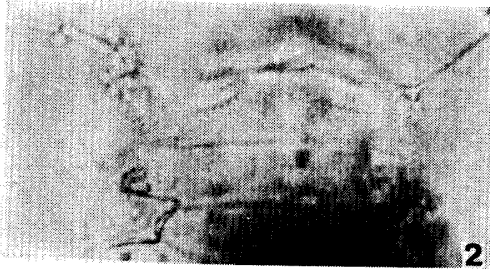


Plate 10

Figs. 1-11. *Hypsibius convergens*

(Figs. 1-2. Eggs, Figs. 3-5. Animals in movement (lateral view), Figs. 6-8. Head region,
Fig. 9. Head (frontal view), Fig. 10. Egg mass, Fig. 11. Pharynx)

Plate 10

