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Contribution to the Rotifers and aquatic Tardigrada of Edgeøya (Svalbard).

W. H. DE SMET, E. A. VAN ROMPU, L. BEYENS

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A preliminary account of the monogonont Rotifers and aquatic Tardigrada of Edgeøya is presented. Twenty-two taxa of Rotifera and nine taxa of Tardigrada are reported. All records are new for Edgeøya; six rotifer taxa and two tardigrada taxa are new for Svalbard.

W.H. De Smet & E. A. Van Rompu, Laboratorium voor Plant- en Dierkundige Algemene Biologie; L. Beyens, Laboratorium voor Algemene Plantkunde, Universiteit Antwerpen, R.U.C.A.-Campus, Groenenborgerlaan 171, 2020 Antwerpen, Belgium.

1. INTRODUCTION

The monogonont rotifer fauna of Svalbard has been treated by Bryce (1897, 1922), Richard (1898), Murray (1908), Olofsson (1918), Summerhayes & Elton (1923), Thomasson (1958, 1961), Amrén (1946a,b,c) and Pejler (1974). Most of these studies deal with collections from Spitsbergen, the main island of Svalbard. No study seems to have been devoted to the rotifer fauna of Edgeøya.

Major contributions to the tardigrade fauna are by Scourfield (1897), Murray (1907), Richters (1903, 1904, 1911a,b) and more recently by Weglarska (1965). Except for some records from the Ryke Yseøyane and Kong Ludvigøyane (Richters 1911b) there is no information on the Tardigrada from Edgeøya.

The present paper is based on aquatic samples and submerged mosses from Edgeøya, collected by one of us (L.B.) during august 1984.

2. LOCALITIES

Plankton and permanently submerged moss was sampled in some small to medium-sized ponds at Russebukta, Rosenbergdalen, Berrflöta, Semenovfjella and Blåfjordflya (Fig. 1). The dates of collection, watertemperature, hydrogen-ion concentration, measured conductivity and nature of the samples are shown in Table 1.

3. SYSTEMATIC SURVEY

In the following surveys an alphabetical arrangement has been adopted for the genera and for the species within each genus.

The abbreviations used are:

le = length; wi = width; he = height; diam = diameter; C = common; CC = very common; CCC = abundant; R = few; RR = rare; RRR = very rare.

3.1 Rotifera

The nomenclature follows Koste (1978).

Bdelloidea indeterm. Samples 48 (R), 54 (R), 55 (CCC), 67 (CCC), 70 (CC), 73 (CCC), 78 (CCC), 84 (C), 88 (C), 90 (C), 92 (R), 93 (RRR).

Cephalodella catellina (O.F. Müller, 1786) (Pl. II, fig. 5a-e)

Samples 48 (RRR), 78 (RR). Distal loops of manubria open.

Dimensions: body le 100—121 μm, body he 49—66μm, toe le 20—21 μm, mastax le 36 μm (fulcrum 26 μm, manubria 27 & 23 μm, uncus 10 μm).

Cephalodella gibba (Ehrenberg, 1838) (Pl. II, fig. 3)

Samples 55 (RRR), 73 (RRR). The specimens show the typical mastax with axe-shaped manubria.

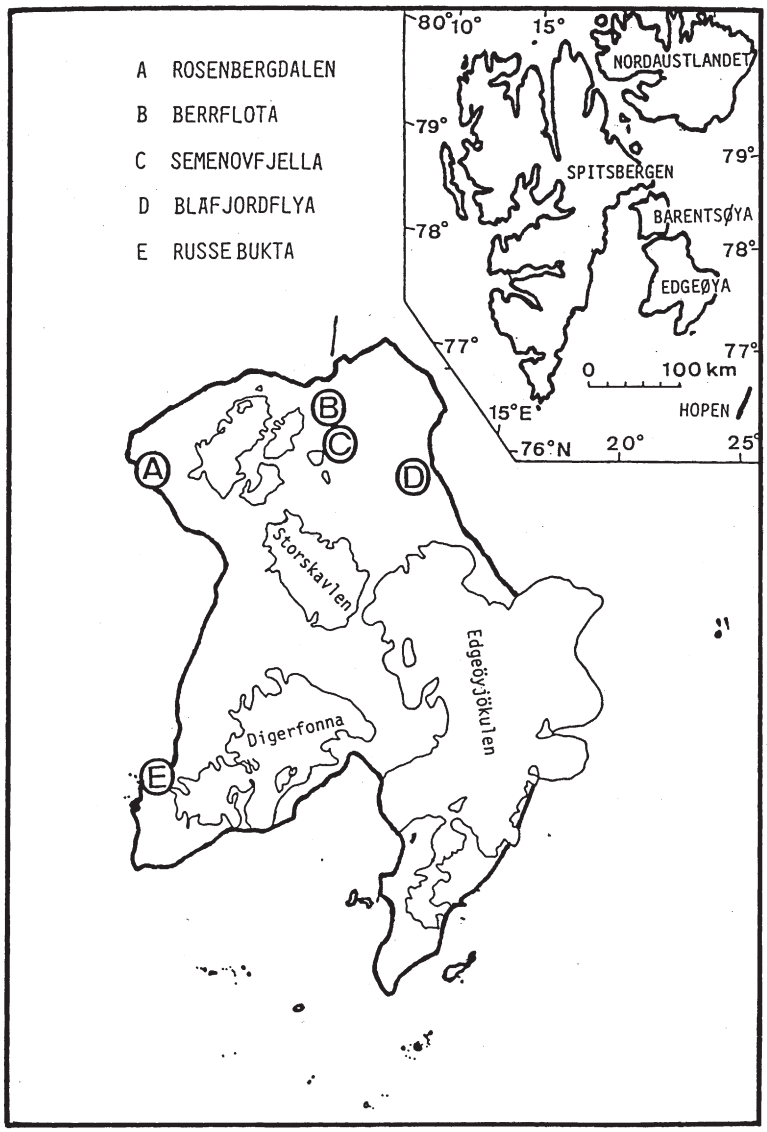

Fig. 1: Map of Edgeøya with sampling localities.

Dimensions: body le 175—186 μm, body he 78—95 μm, body wi 75 μm, toe le 70—75 μm.

Svalbard records: Spitsbergen (Olofsson 1918, sub *Diaschiza gibba* (Ehrbg.)).

Cephalodella intuta Myers, 1924 (Pl. II, fig. 4a-c)

Samples 60 (RRR), 70 (C), 73 (R). Gut content: small diatoms and *Cosmarium* spp.

Dimensions: body le 112—137 μm, body he 60—66 μm, toe le 45—49 μm, mastax le 34 μm (fulcrum 21—24 μm, manubria 20—22 μm).

Collotheca campanulata (Dobie, 1849) (Pl. III, fig. 8a-c)

Sample 73 (RRR). Coronal funnel with 5 distinct lobes. Dorsal lobe broadly rounded. Uncus with two teeth. Gut content: *Trachelomonas* sp. and diatoms.

Dimensions: body le contracted 457 μm, body he 90 μm.

Table 1. List of samples examined.

Sample n°	Locality	Date	Water temperature (°C)	pH	Conductivity ($\mu S.cm^{-1}$)	Nature of sample
46	Russebukta	11.08.1984	9	7.7	83	plankton
48	Russebukta	11.08.1984	9	6.5	110	plankton
52	Russebukta	11.08.1984	9	7.6	285	plankton
54	Bläfjordflya	14.08.1984	8	7.9	155	plankton
55	Bläfjordflya	14.08.1984	8.5	7.9	155	plankton
56	Bläfjordflya	14.08.1984	9	8.1	195	plankton
60	Bläfjordflya	14.08.1984	10	8.6	130	plankton
67	Berrflöta	16.08.1984	8	8.0	145	plankton
70	Semenovfjella	16.08.1984	7.5	8.2	43	plankton
73	Semenovfjella	16.08.1984	7.5	8.8	64	plankton
75	Semenovfjella	16.08.1984	8	8.3	39	subm.moss
78	Rosenbergdalen	22.08.1984	3	7.2	110	subm.moss
87	Rosenbergdalen	22.08.1984	3.5	7.3	78	plankton
88	Rosenbergdalen	22.08.1984	3.5	7.3	78	subm.moss
90	Rosenbergdalen	27.08.1984	1.5	7.1	110	subm.moss
92	Rosenbergdalen	27.08.1984	2	7.5	61	plankton
93	Rosenbergdalen	27.08.1984	2	7.5	61	subm.moss

Collotheca sp. 1 (Pl. III, fig. 3a-c)

Samples 55 (RRR), 67 (RRR). The specimens belong to the Formenkreis *ornata* (Ehrenberg, 1832) on basis of the coronal funnels with short clearly knobbed lobes. No cilla between the knobs (? *C. wiszniewski* Varga, 1938). Uncus with two teeth.

Dimensions: body le contracted 155 μm.

Collotheca sp. 2 (Pl. III, fig. 7)

Samples 54 (RRR), 70 (RRR), 73 (RRR). Cilia long. Uncus with two teeth. Gut content: small diatoms.

Dimensions: body le contracted 127—175 μm, eggs 65 x 42 μm.

Colurella adriatica Ehrenberg, 1831 (Pl. II, fig. 1a-c)

Samples 54 (empty loricas), 55 (RRR), 67 (C), 73 (RRR), 92 (RRR).

Outline of lorica extremely variable, dorsally smoothly curved (fig. 1a) or posteriorly with an obtuse angle (fig. 1b,c). Toes apparently fused or slightly spread.

Dimensions: lorica le 91—99 μm, lorica wi μm, lorica he 53—59 μm, toe le 28—30 μm, index lorica le/lorica he = 1.7.

Svalbard records: Spitsbergen (Bryce 1897, sub *Colurus caudatus* Ehr., Olofsson 1918).

Colurella hindenburgi Steinecke, 1917 (Pl. II, fig. 2a-b)

Samples 54 (R), 55 (C), 67 (RRR), 70 (RRR), 73 (C), empty loricas in 48, 52A and 56. Although the distinction between *C. obtusa* (Gosse) and *C. hindenburgi* is extremely vague, the specimens met with are classed as *C. hindenburgi* on basis of the rather slender shape of the lorica, and the length of the toes which is, according to Voigt (1956—57) 14—18 μm for *C. obtusa* and 21—23 μm for *C. hindenburgi.*

Dimensions: lorica le 67—71 μm, lorica wi 36 μm, lorica he 40—41 μm, toe le 20—22 μm, index lorica le/lorica he = 1.7.

Svalbard records: Spitsbergen (Thomasson 1961).

Colurella uncinata (O.F. Müller, 1773) (Pl. II, fig. 1d)

Sample 73 (RRR).

Dimensions: lorica le 93 μm, lorica he 62 μm, lorica wi 47 μm, toe le 26 μm, index lorica le/lorica he = 1.5.

Dicranophorus uncinatus (Milne, 1886) (Pl. II, fig. 6a-b)

Sample 67 (RRR). Terminal end of toes slightly inflated. Gut content: diatoms.

Dimensions: body le 160—170 μm, body he 86 μm, toe le 72—75 μm, mastax le 38 μm (fulcrum 8 μm, manubrium 24 μm, ramus 18 μm, uncus 6.4 μm, intramallei 8.4 μm).

Keratella hiemalis (Carlin, 1943) (Pl. I, fig. 7)

Samples 60 (3 empty loricas), 87 (RRR). All specimens show strongly developed and diverging posterior spines.

Dimensions: lorica le 134—139 μm, lorica wi 90—96 μm, postero-lateral spines 37—48 μm, median spines 35—38 μm, submedian spines 22—24 μm, antero-lateral spines 18—25 μm.

Svalbard records: Bjørnøya (Pejler 1974), Nordaustlandet (Thomasson 1958), Spitsbergen (Olofsson 1918, sub *Anuraea aculeata* Ehrbg. (fig. 67, 69, p. 612), Thomasson 1961, Amrén, 1964c).

Lepadella acuminata (Ehrenberg, 1834) (Pl. I, fig. 5)

Samples 73 (C), empty loricas in 56 and 70. Posterior half of dorsal plate with 6 longitudinal stripes.

Dimensions: lorica le 90 μm, lorica wi 61 μm, lorica he 36 μm, depth of ventral sinus 16—19 μm, depth of dorsal sinus 5—6 μm, toe le 23—27 μm, foot groove 25—29x16 μm.

Svalbard records: Spitsbergen (Olofsson 1918 sub *Metopidia acuminata* Ehrbg.).

Lepadella patella (O.F. Müller, 1786) Pl. I, fig. 6a-b)

Samples 55 (RRR), 67 (RRR), 70 (RR), 73 (RRR), empty loricas in 48, 78 and 92. Foot groove with indented base-line and antero-lateral margins thickened as in the f. *similis* (Luczs), the overall dimensions are however closer to those of the typical *patella.*

Dimensions: lorica le 105—122 μm, lorica wi 83—95 μm, lorica le 43—44 μm, depth of ventral sinus 20—21 μm, depth of dorsal sinsus 5—8 μm, toe le 24—33 μm, foot groove 28—31x20—24 μm, index lorica le/lorica wi = 1.29.

Svalbard records: Nordaustlandet (Thomasson 1958), Spitsbergen (Bryce 1897 sub *Metopidia lepadella* Ehr, Bryce 1922, Olofsson 1918 sub *Metopidia oblonga* (Ehrbg.) (fig. 57, p. 598) and *Metopidia lepadella* Ehrbg., Summerhayes & Elton 1923 sub *L. patella* and *Metopidia patella* Ehrbg., Thomasson 1961).

Mytilina mucronata (O.F. Müller, 1773) (Pl. I, fig. 4a-c)

Samples 48 (RRR), empty loricas in 55 and 56. Uncus with 6 teeth, the first one with additional toothlet (fig. 4c). Koste (1978) mentions only 5 uncinal teeth.

Dimensions: lorica le 210 μm, lorica he 96 μm, lorica wi 92 μm, toe le 56 μm, mastax le 34 μm (fulcrum 6 μm, manubrium 34 μm, ramus 24 μm, uncus 18 μm).

Svalbard records: Nordaustlandet (Thomasson 1958), Spitsbergen (Olofsson 1918).

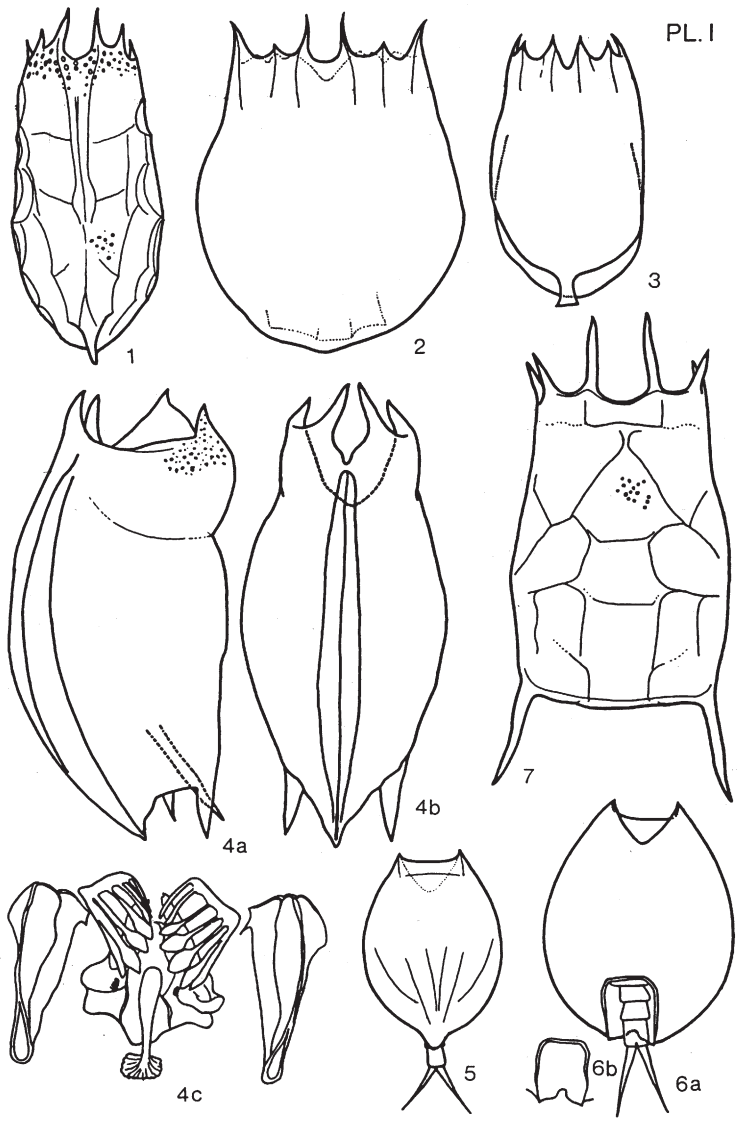

Plate I: Fig. 1 *Notholca foliacea;* 2 *Notholca squamula;* 3 *Notholca latistyla;* 4a-c *Mytilina mucronata;* 5 *Lepadella acuminata;* 6a-b *Lepadella patella;* 7 *Keratella hiemalis.*

Notholca foliacea (Ehrenberg, 1838) (P1. I, fig. 1)

Samples 46 (CCC), 48 (R), 52A (CCC), 52B (RRR), 54 (CC), 55 (C), 56 (C). A morphological variation as regards the posterior projection, which was found by Amrén (1964c), was not noticed.

Dimensions: lorica le 130 μm, lorica wi 72 μm.

Svalbard records: Bjørnøya (Pejler 1974 sub *Argonotholca foliacea* (Ehrbg.), Nordaustlandet (Thomasson 1958 sub *Argonotholca),* Spitsbergen (Olofsson 1918, Thomasson 1961 sub *Argonotholca,* Amrén 1964a,b sub *Argonotholca).*

Notholca latistyla (Olofsson, 1918) (P1. I, fig. 3)

Samples 54 (RRR), 55 (R), 67 (R), 73 (RRR), 70 (empty loricas). All specimens with short and broad caudal projection.

Dimensions: lorica le 104—115 μm, lorica wi 66—68 μm, antero-median spine 13 μm, caudal projection 13 μm.

Svalbard records: Spitsbergen (Olofsson 1918 sub *Notholca foliacea* (Ehrbg.) var. *latistyla* n.var., Amrén 1964c).

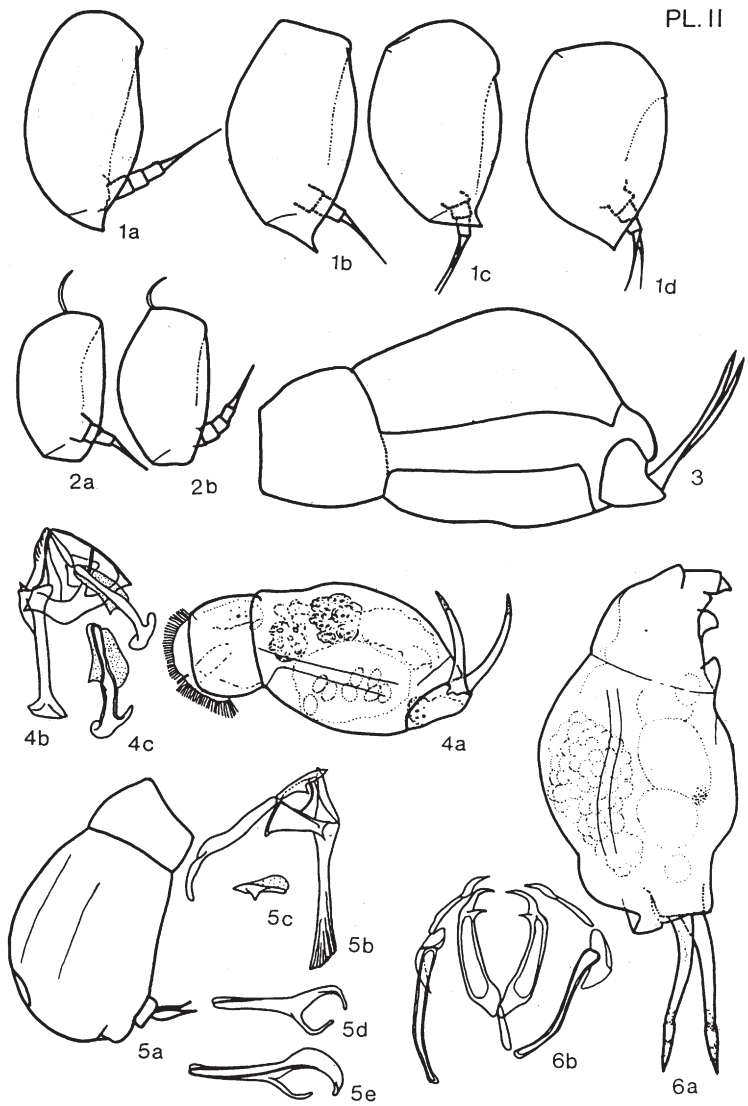

Plate II: Fig. 1a-c *Colurella adriatica;* 1d *Colurella uncinata;* 2a-b *Colurella hindenburgi;* 3 *Cephalodella gibba;* 4a-c *Cephalodella intuta;* 5a-e *Cephalodella catellina;* 6a-b *Dicranophorus uncinatus.*

Notholca squamula (O.F. Müller, 1786) (Pl. I, fig. 2)

Samples 54 (RRR), 70 (RRR), 73 (C).

Dimensions: lorica le 132—144 μm, lorica wi 98—120 μm, median spine 21 μm, submedian spine 6 μm, lateral spine 17 μm.

Svalbard records: Nordaustlandet (Thomasson 1958), Spitsbergen (Richard 1898 sub *Anuraea scapha* Gosse?, Olofsson 1918 sub *Notholca striata* (O.F. Müller) (fig. 64 p. 606), Thomasson 1961, Amrén 1964c).

Polyarthra dolichoptera Idelson, 1925 (Pl. III, fig. 4)

Samples 48 (CC), 52A (RRR), 54 (RRR).

Dimensions: body le 132 μm, body wi 95 μm, fin le 150—158 μm, fin wi 10.5 μm, ventral appendage 64 μm, ratio fin wi/fin le = 0.07, ratio fin le/body le = 1.17.

Svalbard records: Bjørnøya (Pejler 1974), Nordaustlandet (Thomasson 1958), Spitsbergen (Thomasson 1961, Amrén 1964c). In the older litterature probably included sub *P. platyptera* Ehrbg. (Richard 1898, Summerhayes & Elton 1923) and *P. trigla* Ehrbg. (Olofsson 1918).

Ptygura sp. (Pl. III, fig. 6)

Sample 55 (RRR). Unci with 13 teeth, gradually decreasing in length.

Dimensions: body le contracted 170 μm, body wi 83 μm, mastax le 18 μm.

Trichocerca bidens (Lucks, 1912) (Pl. III, fig. 5a-b)

Sample 73 (C). Specimens differ from the type (length of lorica exceeding 132 μm following Carlin (1939) or 175—205 μm according to Koste (1978)) in being smaller (118—128 μm). Accordingly they should be classified as *T. cavia* Gosse. Donner (1950) and Hauer (1958), however, observed the

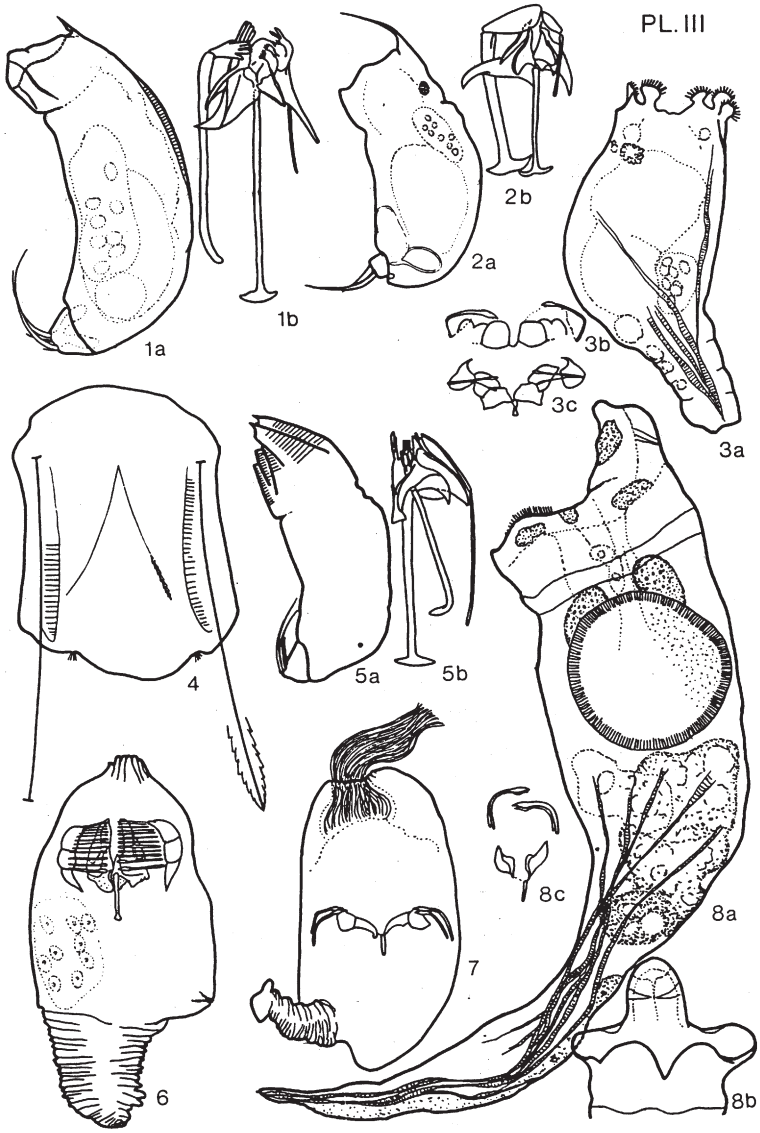

Plate III: Fig. 1a-b *Trichocerca weberi;* 2a-b *Trichocerca uncinata;* 3a-c *Collotheca* sp. 1; 4 *Polyarthra dolichoptera;* 5a-b *Trichocerca bidens;* 6 *Ptygura* sp.; 7 *Collotheca* sp. 2; 8a-c *Collotheca campanulata.*

existence of transitional forms between the two size groups, and Olofsson (1917, 1918) reported that specimens from Murmansk and Spitsbergen are smaller (125—136 μm) than those (170 μm) described by Lucks (1912). We finally classified our specimens as *T. bidens* on basis of the left manubrium which end is simply bent in *T. bidens* and not axe shaped as in *T. cavia.*

Dimensions: body le 118—128 μm, body he 40—45 μm, toe le 27 & 33 μm, mastax le 42 μm (fulcrum 33 μm, manubria 30 & 23 μm).

Svalbard records: Spitsbergen (Olofsson 1918 sub. *Diurella bidens* Lucks).

Trichocerca uncinata (Voigt, 1902) (P1. III, fig. 2a-b)

Samples 54 (RRR), 55 (CC).

Dimensions: body le 105 μm, body he 47 μm, spine 35 μm, toe le 35 & 14 μm, mastax le 30 μm (fulcrum 19 μm, manubria 26 & 15 μm, unci 10.8 & 5.6 μm).

Svalbard records: Nordaustlandet (Thomasson, 1958), Spitsbergen (Olofsson 1918, sub *Diurella uncinata* Voigt).

Trichocerca weberi Jennings, 1903 (P1. III, fig. 1a-b)

Samples 48 (RRR), 70 (C), 73 (R). The specimens are rather slender. Their size is larger than earlier recorded by Koste (1978: 95—133 μm) but agrees with that of the specimens collected in Iceland by De Ridder (1972: 115—155 μm).

Dimensions: body le 150—158 μm, body he 50—52 μm, spine 10 μm, toe le 56 & 37 μm, mastax le 50 μm (fulcrum 38 μm, manubria 38 & 13μm).

3.2 Tardigrada

The nomenclature follows Ramazzotti & Maucci (1983)

Amphibolus smreczinskii (Weglarska, 1970) (Pl. IV, fig. 1a-e)

Sample 93 (RRR). Large animals with distinct eyespots; oval bulbus with 3 macroplacoids, the two first macroplacoids are closely fused together; no microplacoid; pharyngeal tube straight and wide. Claws typical, the branches of claw IV joined at the base and symmetrically with respect to the leg-axis; the main branches provided with well developed secondary tips; the other three pairs of claws of the *Isohypsibius* type.

Dimensions: body le 892 μm; bulbus le 97 μm, diam 72 μm; pharyngeal tube le 77 μm, diam 9 μm.

Svalbard records: the species was described from the Canadian arctic (Axel Heiberg Island). Erroneously reported from Spitsbergen by Ramazzotti & Maucci (1983).

Dactylobiotus ambiguus (J. Murray, 1907) (Pl. VI, fig. 2a-d)

Sample 78 (RRR). Bulbus with 2 macroplacoids, the first twice as long as the second and divided in the middle; there is a connection between the second and third macroplacoid; no microplacoid. Claws large, the main branches very long in proportion to the size of the animal and with a broad bridge between the pairs of claws.

Dimensions: body le 426 μm; bulbus le 70 μm, diam 52 μm; pharyngeal tube le 62 μm, diam 6 μm.

Svalbard records: Prins Karls Forland (Murray 1907, sub *Macrobiotus ambiguus* Murr.).

Diphascon alpinum J. Murrey, 1906 (Pl. IV, fig. 2a-d)

Sample 73 (RRR). The animals show the typical features of the species.

Dimensions: body le 250 μm; bulbus le 24 μm, diam 18 μm; pharyngeal tube le 48 μm, diam 1.2 μm.

Svalbard records: Prins Karls Forland (Murray 1907); Spitsbergen (Weglarska 1965, sub *Hypsibius (D) alpinus* (J. Murr.).

Diphascon spitzbergense Richters, 1903 (Pl. V, fig. 1a-e)

Sample 93 (RRR). Although the shape of the body seems characteristic for *D. angustatum* J. Murr. (Ramazzotti & Maucci 1983, Petersen 1951), all other characteristics are typical for *D. spitzbergense* Richters: no eyespots, bulbus with two thin macroplacoids and a microplacoid, the second macroplacoid is more (nearly 3x) than twice as long as the first; pharyngeal tube with ring annulations. Our specimens have all claws, claw I excepted, with distinct secondary tips. No cuticular bar between the bases of the claws on leg IV as observed by Hallas (1977).

Dimensions: body le 526 μm; bulbus le 53 μm, diam 24 μm; pharyngeal tube le 68 μm, diam 3.2 μm.

Svalbard records: Prins Karls Forland (Murray 1907), Spitsbergen Richters 1903, 1904, (Murray 1907, Weglarska 1965 sub *Hypsibius (D) spitzbergensis* (Richt.)).

Diphascon scoticum J. Murray, 1905 (Pl. IV, fig. 3a-c)

Sample 75 (RRR).

Dimensions: body le 277 μm; bulbus le 33 μm, diam 18 μm; pharyngeal tube le 71 μm, diam 1 μm.

Svalbard records: Prins Karls Forland (Murray 1907), Spitsbergen Richters 1903, 1904, (Murray 1907, Weglarska 1965 sub *Hypsibius (D) scoticus* (J. Murr.)).

Hypsibius dujardini (Doyere, 1840) (Pl. V, fig. 233a-c)

Samples 48 (RRR), 55 (C), 75 (RRR), 88 (RR), 90 (RR), 93 (R). All individuals found have an oval bulbus with 2 macroplacoids of nearly equal length and a distinct microplacoid. Petersen (1951) found animals without microplacoid.

Dimensions: body le 233 μm; bulbus le 26 μm, diam 18 μm; pharyngeal tube le 25 μm, diam 1.2 μm.

Svalbard records: Spitsbergen (De Smet *et al.,* 1988, Richters, 1911a, sub *Makrobiotus Murrayi,* Weglarska 1965).

Isohypsibius granulifer Thulin, 1928 (Pl. VI, fig. 1a-d)

Samples 60 (RRR), 78 (CCC), 87 (CCC), 88 (CCC), 90 (CCC), 93 (CCC). Cuticula with distinct granulation, more and more pronounced up to the back end; long and big claws in proportion to the size of the body.

Dimensions: body le 294 μm; bulbus le 36 μm, diam 29 μm; pharyngeal tube le 33 μm, diam 1.6 μm.

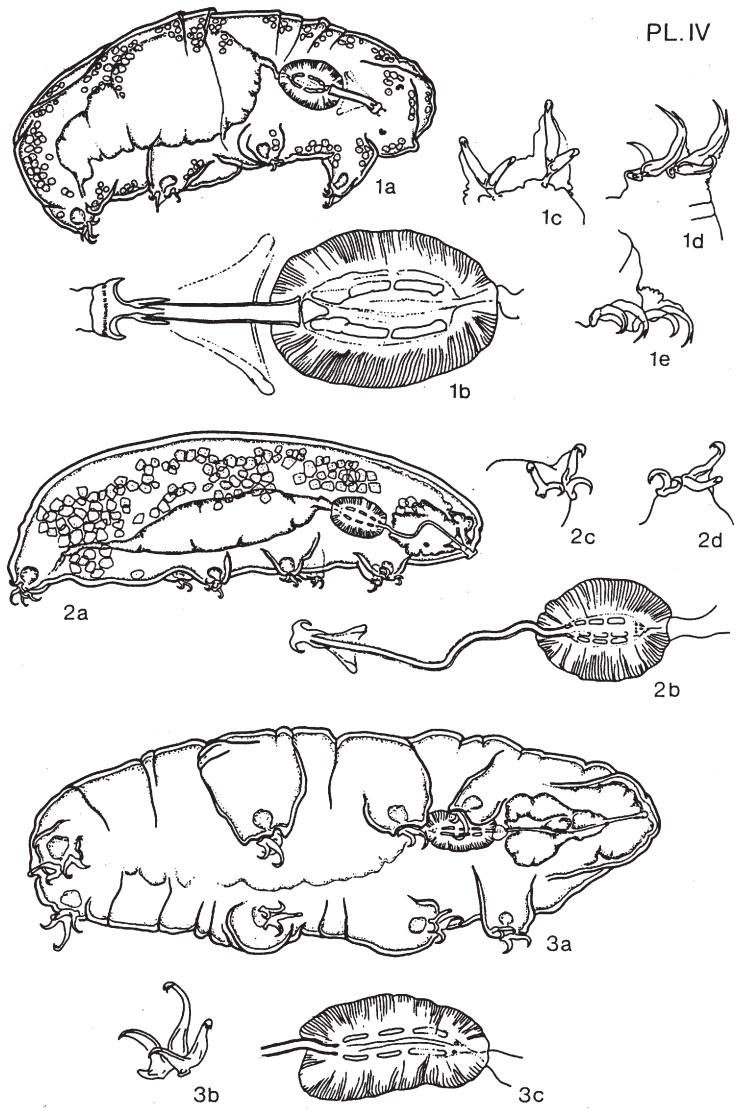

Plate IV: Fig. 1 *Amphibolus smreczinskii:* a general view, b buccal apparatus, c,d,e claws of leg III, IV, I; 2 *Diphascon alpinum:* a general view, b buccal apparatus, c,d claws of leg III, IV; 3 *Diphascon scoticum:* a general view, b claws of leg IV, c buccal apparatus.

Macrobiotus echinogenitus Richters, 1904 (P1. VII, fig. 1a-c)

Sample 55 (RRR).

Dimensions: body le 335 μm; bulbus le 30 μm, diam 24 μm; pharyngeal tube le 70 μm, diam 1.2 μm.

Svalbard records: Bjørnøya (Richters 1911b), Hopen (Richters 1911a, sub. *Makrobiotus echinogenitus* Richt.), Prins Karls Forland (Murray 1907), Spitsbergen (Murray 1907, Richters 1904, 1911a *Macrobiotus echinogenitus* Richt., 1911b, Weglarska 1965).

Macrobiotus pullari J. Murray, 1907 (P1. VII, fig. 2a-c)

Samples 60 (RRR), 73 (RRR), 78 (RRR).

Dimensions: body le 125 μm; bulbus le 23 μm, diam 17 μm; pharyngeal tube le 21 μm, diam 1.2 μm.

Svalbard records: Prins Karls Forland (Murray 1907); Spitsbergen (Tuxen 1941, Weglarska 1965, De Smet *et al.* 1988).

4. CONCLUDING REMARKS

Twenty-two rotifer and nine tardigrade taxa were found in a series of 12 plankton samples and 5 samples of permanently submerged mosses.

Nineteen of the rotifer taxa were identified to species level and two to genus level. All records are new for Edgeøya, and six of them were not previously mentioned from Svalbard. They are: *Cephalodella catellina, C. intuta, Collotheca campanulata, Colurella uncinata, Dicranophorus uncinatus* and *Trichocerca weberi.* The number of true plankton species (De Ridder 1972, Koste 1978) captured is very small: *Keratella hiemalis, Notholca foliacea, N. latistyla, N. squamula* and *Polyarthra dolichoptera.* Most of the other species encountered in the plankton samples are known as littoral or periphytic *(Cephalodella gibba, Collotheca campanu-*

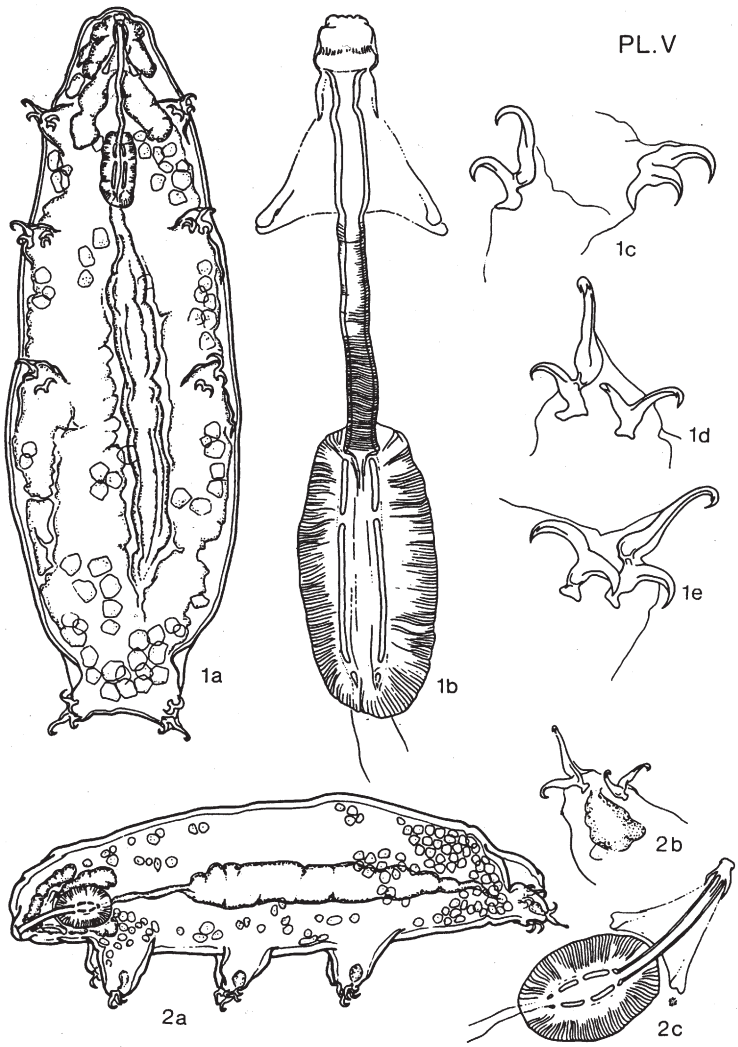

Plate V: Fig. 1 *Diphascon spitzbergense:* a general view, b buccal apparatus, c claws of leg I, d,e claws of leg IV; 2 *Hypsibius dujardini:* a general view, b claws of leg IV, c buccal apparatus.

lata, Dicranophorus uncinatus, Mytilina mucronata, Trichocerca uncinata, T. weberi) and benthic *(Colurella adriatica, C. hindenburgi, C. uncinata, Lepadella acuminata, L. patella).* The high number of periphytic-benthic taxa is probably due to the shallow character of the ponds studied. The submerged moss samples show a poor rotifer fauna: only *Cephalodella catellina* and *Lepadella patella* are met with. There are two species characteristic for cold waters: *Keratella hiemalis* and *Notholca latistyla.* The latter is only known from Spitsbergen and Novaya Zemlya; the other rotifer species collected are cosmopolitan.

The nine tardigrade taxa found were identified up to species level. All species are new for Edgeøya; *Isohypsibius granulifer* and *Amphibolus smreczynskii* were not previously recorded from Svalbard. *Amphibolus smreczynskii, Dactylobiotus ambiguus, Hypsibius dujardini, Isohypsibius granulifer* and *Macrobiotus pullari* are known as freshwater species (Ramazzotti 1967, Weglarska 1970, Mihelcic 1971). The presence of hygrophilous *(Diphascon alpinum, D. spitsbergense, D. scoticum)* and eurihygrous *(Macrobiotus echinogenitus)* moss-dwelling species in the water samples was unexpected. *Amphibolus smreczynskii* has a northern distribution (Axel Heiberg Island, Spitsbergen); the other tardigrade species are broadly distributed.

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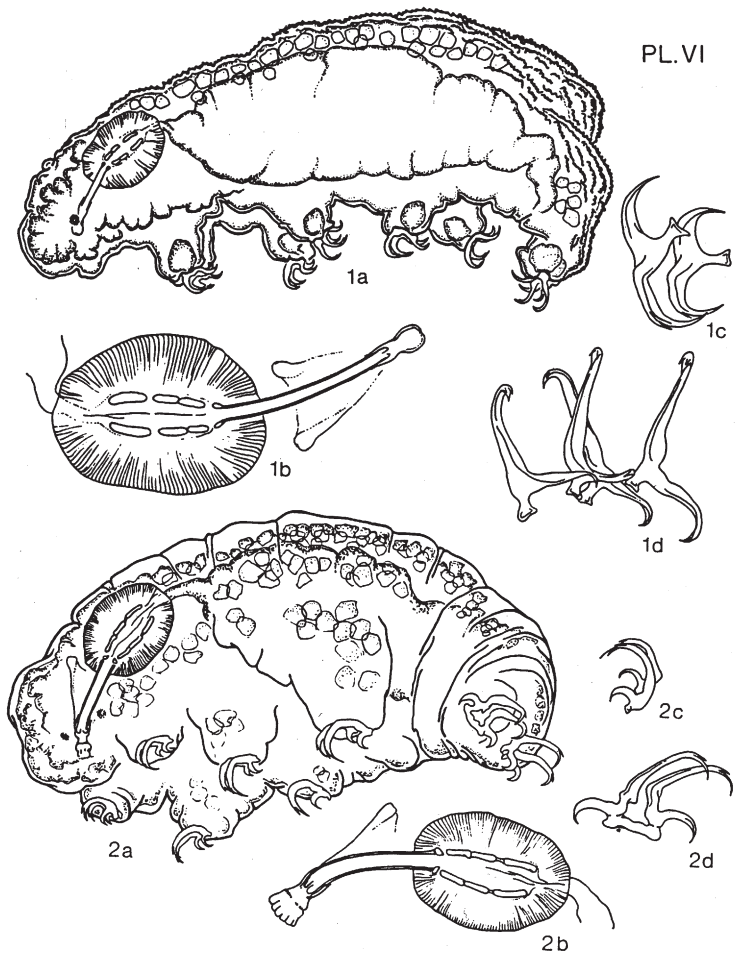

Plate VI: Fig. 1 *Isohypsibius granulifer:* a general view, b buccal apparatus, c,d claws of leg III, IV; 2 *Dactylobiotus ambiguus:* a general view, b buccal apparatus, c,d claws of leg II, IV.

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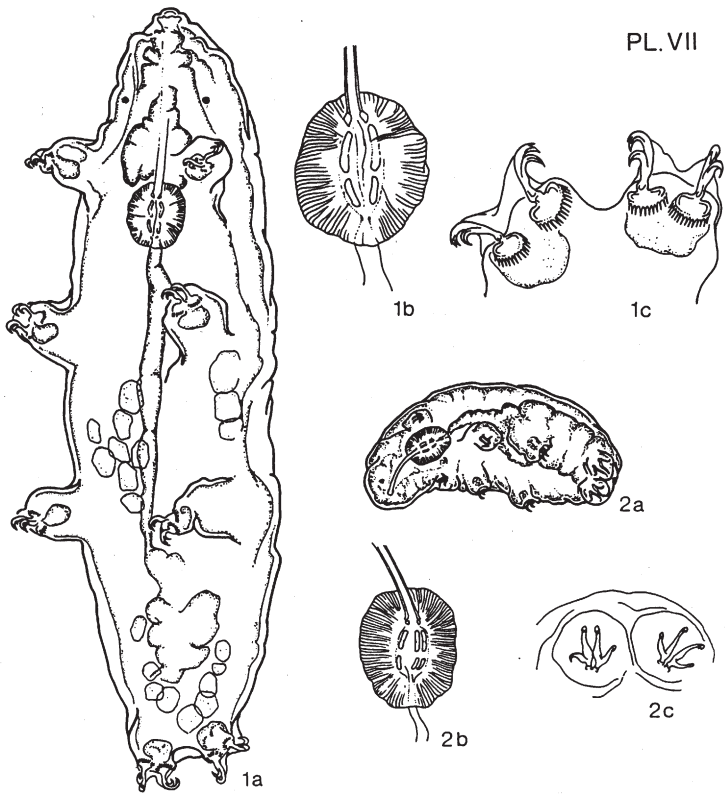

Plate VII: Fig. 1 *Macrobiotus echinogenitus:* a general view, b buccal apparatus, c claws of leg IV; 2 *Macrobiotus pullari:* a general view, b buccal apparatus, c claws of leg IV.

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