Supplement B

Table S1. Previously described tardigrade and rotifer species or genera from cryoconites. Dominant species and their contribution to the population of tardigrades or rotifers are marked in bold and planktonic or predatory species are shown in brackets**.**

Study	Genus/ species	Site
	Tardigrada	
Von Drygalski 1897	*Macrobiotus hufenlandi*	Greenland, McMurdo (8)
Steinböck 1957	Cf. *Macrobiotus* (predator)	Alpes
Ramazotti 1968	*Hypsibius janetscheki*	Himalaya
	Hypsibius convergens	Himalaya
Dastych 1985	*Diaphascon recamieri*	Svalbard
	Hypsibius dujardini	Svalbard
	Hypsibius arcticus	Svalbard
De Smet and van Rompu 1994	*Diphascon recamieri* (10%)	Hyrnebreen (Svalbard)
	***Isohypsibius granulifer* (90%)**	Hyrnebreen (Svalbard)
Groongard et al., 1999	*Diphascon scoticum*	Greenland
	Hypsibius arcticus	Greenland
	Hypsibius dujardini	Greenland
	Isohypsibius sp.	Greenland
	***Diphascon recamier i* (80-85%)**	Greenland
Porazinska et al., 2004	*Hypsibius* spp.	McMurdo (Antarctica)
	Acutuncus antarcticus	McMurdo (Antarctica)
personal observation	*Hypsibius convergens*	Petunia (Svalbard)
	Diphascon recamieri	Petunia (Svalbard)
	Isohypsibius granulifer	Petunia (Svalbard)
	Rotifera	
Von Drygalski 1897	*Brachionus* sp.	Greenland
Steinböck 1957	*Philodina aculeata*	Alpes
	Philodina reseolata	Alpes
Gerdel Drouet 1960	*Philodinavus paradoxus*	Greenland
	Philodinavus paradoxus	Greenland
De Smet and van Rompu 1994	***Macrotrachella insolita* (99%)**	Hyrnebreen (Svalbard)
	Philodina acuticornis adiosa	Hyrnebreen (Svalbard)
	Dicranophorus permullis permullis(predator)	Hyrnebreen (Svalbard)
	Encentrum mucronatum	Hyrnebreen (Svalbard)

Table S1 (continued)

	Keratella cochleri (plankton)	Hyrnebreen (Svalbard)
	Keratella quadrate (plankton)	Hyrnebreen (Svalbard)
	Lecane closteocerca	Hyrnebreen (Svalbard)
Groongard et al., 1999	*Philodina* cf. *roseola*	Greenland
Porazinska et al., 2004	*Philodina gregaria*	McMurdo (Antarctica)
	Cephalodella catellina	McMurdo (Antarctica)
pers. observations	*Adineta vaga*	Petunia (Svalbard)
	Macrotrachella musculosa	Petunia (Svalbard)
	Encentrum lutra (predator)	Petunia (Svalbard)

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Table S2. Species and genera of microalgae, including cyanobacteria in previously found in Arctic cryoconites. Study 1: Kastovska et al. (2005), study 2: Mueller et al. (2001), study 3: Stibal et al. (2006), study 4: Uetake et al.(2010). Dominant species are marked in bold.

Taxon	study
Chroococcales	
Chlorogloea sp.	1
Chamaesiphon sp.	3
Oscillatoriales	
***Leptolyngbya* sp. long cells**	1,2
Leptolyngbya sp. short cells	1
Leptolyngbya foveolarum (Rabenh. ex Gom.) Anagn. & Kom.	3
Leptolyngbya cf. *notate*	3
Lyngbya spp.	2
Oscillatoria spp.	2
Microcoleus sp.	2
Microcoleus vaginatus (Vauch.) Gom. Journ.	3
***Phormidium* sp.**	1,2,3
Phormidium amoenum (Kütz.) Anagn. & Kom	3
cf. *Pseudanabaena* sp.	1,3
Plectonema nostrocorum	2
Nostocales	
Nostoc sp.	2,3
cf. *Scytonema*	2
Calothrix parietina	2
Pseudoanabaenales	
Schizothrix spp.	2
Chlorophyceae	
***Chlorella* sp.**	1,3
Chlorella homeosphaera (Skuja)	1
Chlorella minutissima (Fott & Novakova)	1,3
Chlorella homosphaera (Skuja)	3
Chlorella vulgaris Beij.	3
Bracteacoccus sp.	3
Trochiscia sp.	3
Chlamydomonadales	
cf. *Chlorococcum*	1,2
Coleochlamys cuccumis (Reisigl) Ettl & Gaertner	1,2
Chlamydomonas spp.	1,3
Chlamydomonas nivalis (Bauer) Wille	3
cf. *Chloromonas*	2
Palmella sp.	2
Protococcus nivalis (Bauer)	2

Table S2(continued)

Oocystales	
Pseudococcomyxa simplex Kors.	1
cf. *Pseudococcomyxa*	1
Trebuxiophyceae	
Stichococcus bacilaris Näg.	1,3
Stichococcus cf. *Chlorelloides*	1,3
cf. *Trochisciopsis*	1,3
Muriella sp.	3
Muriella terrestris J.B.Petersen	3
Pseudococcomyxa simplex Korsh.	3
Klebsormidiales	
***Klebsormidium* sp.**	1,3
Klebsormidium flaccidum (Kütz.) Silva, Mattox, Blackwell	1,3
Tribophyceae	
Heterococcus sp.	3
Zygnematophyceae (=desmids)	
Cylindrocystis sp.	1,2,3,4
Cylindrocystis brebissonii	2,4
Mesotaenium berggrenii	2,4
Ancylonema nordenskioldii	4
Bacillariophyceae (=diatoms)	
unidentified	1,2
Navicula sp.	2
Pennate diatoms	3

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Stibal, M., Šabacká, M., and Kaštovská, K.: Microbial communities on glacier surfaces in Svalbard: impact of physical and chemical properties on abundance and structure of cyanobacteria and microalgae. Microbial ecology, 52, 644-654, 2006.

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Table S3. Description of the abbreviations used for the sampling sites and their geographical location in gps coordinates and altitude (error 25m). Each ID represents one cryoconite, if a cryoconite is sampled several times the number is added (eg. NC1.1, NC1.2…). The main sites (eg. Hørbye main) are the sites with repeated sampling over the season. The moraine is located in front of Nordenskiöldbreen. Hørbye transect are additional samples on Hørbyebreen in order to get variation in the altitudes. All samples of Hørbyebreen are summarized as HC for the analysis in the paper.

ID	site	glacier	latitude	longitude	error (m)	altitude (m)
E1	Ebbabreen	Ebbabreen	78°43.695N	16°51.440E	10	260
E2	Ebbabreen	Ebbabreen	78°43.823N	16°52.458E	10	306
E3	Ebbabreen	Ebbabreen	78°44.072N	16°52.836E	10	356
E4	Ebbabreen	Ebbabreen	78°44.499N	16°54.630E	10	525
E5	Ebbabreen	Ebbabreen	78°43.866N	16°51.268E	10	286
E6	Ebbabreen	Ebbabreen	78°43.730N	16°48.827E	10	160
HC1	Hørbye main	Hørbyebreen	78°45.417N	16°19.533E	10	230
HC2	Hørbye main	Hørbyebreen	78°45.414N	16°19.536E	10	230
HC3	Hørbye main	Hørbyebreen	78°45.414N	16°19.5E	10	230
HC4	Hørbye main	Hørbyebreen	78°45.521N	16°19.521E	10	230
HC5	Hørbye main	Hørbyebreen	78°45.413N	16°19.507E	10	230
HC6	Hørbye main	Hørbyebreen	78°45.414N	16°19.475E	10	230
HC7	Hørbye main	Hørbyebreen	78°45.412N	16°19.46E	10	230
HC8	Hørbye main	Hørbyebreen	78°45.419N	16°19.38E	10	230
HC9	Hørbye main	Hørbyebreen	78°45.418N	16°19.345E	10	230
HC10	Hørbye main	Hørbyebreen	78°45.428N	16°19.462E	10	230
HT1	Hørbye transect	Hørbyebreen	78°45.255N	16°19.950E	10	224
HT2	Hørbye transect	Hørbyebreen	78°45.642N	16°17.745E	10	290
HT3	Hørbye transect	Hørbyebreen	78°46.090N	16°13.926E	10	398
HT4	Hørbye transect	Hørbyebreen	78°45.847N	16°15.555E	10	346
HT5	Hørbye transect	Hørbyebreen	78°45.255N	16°20.597E	10	170
HT6	Hørbye transect	Hørbyebreen	78°45.282N	16°14.441E	10	370
NC1	Nordenskiöld main	Nordenskiöldbreen	78°38.336N	16°59.346E	10	150
NC2	Nordenskiöld main	Nordenskiöldbreen	78°38.336N	16°59.351E	10	150
NC3	Nordenskiöld main	Nordenskiöldbreen	78°38.325N	16.59.493E	10	150
NC4	Nordenskiöld main	Nordenskiöldbreen	78°38.327N	16°59.38E	10	150
NC5	Nordenskiöld main	Nordenskiöldbreen	78°38.299N	16°59.469E	10	150
NC6	Nordenskiöld main	Nordenskiöldbreen	78°38.296N	16°59.466E	10	150
NC7	Nordenskiöld main	Nordenskiöldbreen	78°38.312N	16°59.396E	10	150
NC8	Nordenskiöld main	Nordenskiöldbreen	78°38.313N	16°59.34E	10	150
NC9	Nordenskiöld main	Nordenskiöldbreen	78°38.331N	16°59.384E	10	150
NC10	Nordenskiöld main	Nordenskiöldbreen	78°38.339N	16°59.351E	10	150
NR1	Retretørya	Nordenskiöldbreen	78°39.4N	16°56.514E	50	50
NR2	Retretørya	Nordenskiöldbreen	78°39.368N	16°56.514E	50	50
NR3	Retretørya	Nordenskiöldbreen	78°39.3N	16°56E	50	50
NR4	Retretørya	Nordenskiöldbreen	78°39N	16°57E	150	20
NR5	Retretørya	Nordenskiöldbreen	78°39.368N	16°56.514E	10	50
NR6	Retretørya	Nordenskiöldbreen	78°39.3N	16°56E	50	50
NI1	Nordenskiöld inner	Nordenskiöldbreen	78°39.103N	17°03.306E	10	200
NI2	Nordenskiöld inner	Nordenskiöldbreen	78°39.063N	17°03.196E	10	200
NI3	Nordenskiöld inner	Nordenskiöldbreen	78°39N	17°03.2E	100	200
NI4	Nordenskiöld inner	Nordenskiöldbreen	78°39N	17°03.2E	100	200

Table S3 (continued)

NI5	Nordenskiöld inner	Nordenskiöldbreen	78°39N	17°03.2E	100	200
NI6	Nordenskiöld inner	Nordenskiöldbreen	78°39.103N	17°03.344E	10	200
NL1	Nordenskiöld lake	Nordenskiöldbreen	78°39.250N	17°03.744E	10	200
NL2	Nordenskiöld lake	Nordenskiöldbreen	78°38.892N	17°02.521E	10	200
NL3	Nordenskiöld lake	Nordenskiöldbreen	78°38.89N	17°02.52E	25	200
NL4	Nordenskiöld lake	Nordenskiöldbreen	78°39.103N	17°03.393E	10	200
NL5	Nordenskiöld lake	Nordenskiöldbreen	78°39N	17°03.4E	50	200
NL6	Nordenskiöld lake	Nordenskiöldbreen	78°39.2N	17°03.4E	50	200

Table S4. Environmental impacts on each sampling site. Remarks give special properties of the sample: a normal hole is considered as a cylindrical cryoconite between 10 and 40 cm long in diameter with cryoconite granules on the bottom, bigger holes are considered as ponds, precipitate is mainly iron precipitation on the granules, crevasse formed holes are within crevasses and formed by different processes, segmented holes are multiple holes connected by a shared water surface, V-shaped holes were typical for the supraglacial lake, proglacial ponds are either fed by glacier melt or moraine melt. Bird impacts are ranked between 0 (no impact) and 3 (high impact) depending on birds observed in the area, distances of bird colonies and the sea and observed resting places on the glacier, including their remains (carcasses, guano). The observed animals are F: Northern fulmar (*Fulmarus glacialis*), G: Glaucous gull (*Larus hyperboreus*), I: ivory gull (*Pagophila eburnea*), K: black-legged kittiwake (*Rissa tridactyla*) and A: Arctic terns (*Sterna paradisae*a). The letters are sorted after their numbers of observations. Additionally, polar bears (*Ursus maritimus*) (P) were observed on one location (NR). The vegetation near the glacier is either moss (M) ,*Nostoc* mats (N) or the higher plant *Saxifraga oppositifolia* (S). The sediment cover is ranked between 0 (all sediments trapped in cryoconites) and 3 (high sediment cover on the glacier surface). The system is given as a code of the bigger hydrological system in the first three letters: Eba: Ebbabreen, Hor: Hørbyebreen, Nor: Nordenskiöldbreen, Ret: Retrettøya, Lak: supraglacial lake on Nordenskiöldbreen and mor: proglacial moraine. The last letter indicates whether the holes are directly connected by meltwater flow. The closest sediment source (closest sed) indicates the closest source of locally borne, aeolian or meltwater transported sediments for the cryoconites. It is either moraines originating from nunataks (nunatak mor), moraines originating from adjacent slopes (slope mor), the glacier margin as moraine or peninsula (margin mor/penin), possible subglacial origin due to seasonal upwelling processes (subgl?) or from the proglacial moraines (moraine). The distance to the closest slope as source of new input of sediments and biota and the distance to the sea as a source of nutrients and organisms is given in m (error 100 m).

ID	Remarks	Bird impact	Birds observed	veg nearby	sed cover	System	Closest sed	Slope dist (m)	Sea dist (m)
E1	normal	1			2	EbaA	nunatak mor	100	6000
E2	normal	1			2	EbaB	nunatak mor	150	6400
E3	pond	1			2	EbaC	nunatak mor	600	6700
E4	normal	0			1	EbaD	nunatak mor	1400	7600
E5	precipitates	2	F,G		3	EbaE	slope mor	50	6100
E6	normal	2	F,G		3	EbaF	slope mor	100	5250
HC1	normal	0		M,N	3	HorA	slope mor	400	6150
HC2	normal	0		M,N	3	HorA	slope mor	400	6150
HC3	normal	0		M,N	3	HorA	slope mor	400	6150
HC4	normal	0		M,N	3	HorA	slope mor	400	6150
HC5	normal	0		M,N	3	HorA	slope mor	400	6150
HC6	normal	0		M,N	3	HorA	slope mor	400	6150
HC7	normal	0		M,N	3	HorB	slope mor	400	6150
HC8	normal	0		M,N	3	HorC	slope mor	400	6150
HC9	normal	0		M,N	3	HorD	slope mor	400	6150

Table S4 (cont.)

HC10	normal	0		M,N	3	HorE	slope mor	400	6150
HT1	normal	0		N	3	HorF	slope mor	300	5900
HT2	normal	0			3	HorG	slope mor	500	6750
HT3	normal	0			3	HorH	slope mor	350	8300
HT4	normal	0		N	3	HorI	slope mor	400	7600
HT5	normal	1		M,N	3	HorJ	margin mor	20	5650
HT6	normal	0		N	2	HorK	slope mor	230	7800
NC1	normal	2	I,K,A,F		1	NorA	nunatak mor	850	800
NC2	normal	2	I,K,A,F		1	NorA	nunatak mor	850	800
NC3	normal	2	I,K,A,F		1	NorB	nunatak mor	850	800
NC4	normal	2	I,K,A,F		1	NorC	nunatak mor	850	800
NC5	normal	2	I,K,A,F		1	NorD	nunatak mor	850	800
NC6	normal	2	I,K,A,F		1	NorE	nunatak mor	850	800
NC7	normal	2	I,K,A,F		1	NorF	nunatak mor	850	800
NC8	normal	2	I,K,A,F		1	NorG	nunatak mor	850	800
NC9	normal	2	I,K,A,F		1	NorH	nunatak mor	850	800
NC10	normal	2	I,K,A,F		1	NorA	nunatak mor	850	800
NR1	crev. & prec.	3	A,K		1	RetA	margin penin	150	150
NR2	crevasse	3	A,K		1	RetB	margin penin	150	150
NR3	precipitates	3	A,K		1	RetC	margin penin	150	150
NR4	normal	3	A,K		1	RetD	margin penin	50	50
NR5	normal	3	A,K		1	RetA	margin penin	150	150
NR6	normal	3	A,K		1	RetC	margin penin	150	150
NI1	normal	1			0	NorI	nunatak mor	2800	1800
NI2	normal	1			0	NorJ	nunatak mor	2800	1800
NI3	normal	1			0	NorK	nunatak mor	2800	1800
NI4	normal	1			0	NorL	nunatak mor	2800	1800

Table S4 (cont.)

NI5	normal	1	0	NorN	nunatak mor	2800	1800
NI6	pond	1	0	NorO	nunatak mor	2800	1800
NL1	segmented	1	0	LakA	nunatak/ subgl?	3300	2000
NL2	V-shaped	1	0	LakB	nunatak/ subgl?	3300	2000
NL3	V-shaped	1	0	LakB	nunatak/ subgl?	3300	2000
NL4	V-shaped	1	0	LakB	nunatak/ subgl?	3300	2000
NL5	normal	1	0	LakC	nunatak/ subgl?	3300	2000
NL6	V-shaped	1	0	LakD	nunatak/ subgl?	3300	2000

Table S5 Abundances of the main invertebrates (ind. g^{-1} dw^{-1}.) and microalgae (cm^3 g^{-1} dw^{-1}) x 10^6. and the mean values and standard deviations for each site and for all cryoconites.

ID	Tardigrades	Bdelloids	Oscillatoriales	Chlorococcales	Zygnemales	coc_cyano
E5	623.70	33.58	638.19	309.50	93.77	23.44
E6	67.82	11.30	215.43	0.00	28.58	38.77
E mean	**345.76**	**22.44**	**426.81**	**154.75**	**61.18**	**31.10**
E sd	**393.06**	**15.75**	**298.94**	**218.85**	**46.09**	**10.84**
HC1.2	4.05	4.05	710.21	27.77	0.00	910.56
HC1.3	8.96	2.24	780.91	63.47	0.00	2280.50
HC1.4	11.30	5.65	513.85	159.49	0.00	758.77
HC2.2	2.53	30.36	824.88	119.23	0.00	2489.54
HC2.4	9.31	23.26	290.56	89.46	97.62	990.08
HC3.4	0.00	0.00	1032.30	62.89	91.60	988.28
HC4.2	7.25	19.34	751.10	112.20	109.27	1439.78
HC4.3	57.91	72.38	334.34	81.97	101.20	2119.92
HC4.4	0.00	10.12	470.52	26.75	24.32	714.69
HC5.4	63.97	12.18	2350.19	112.29	47.02	1687.62
HC6.4	28.64	17.19	1587.47	35.07	183.81	2499.32
HC7.2	6.27	8.78	80.61	59.85	58.39	136.91
HC7.3	6.81	13.62	177.05	1.11	125.77	740.82
HC7.4	39.34	43.27	277.14	18.83	324.79	642.52
HC8.4	64.28	6.89	1187.43	80.77	66.71	2525.72
HC9.4	6.73	0.00	412.83	293.94	115.56	793.49
HC10.2	2.60	33.81	857.02	187.59	264.84	1293.68
H10.4	31.18	15.59	679.80	68.76	71.40	1684.51
HC mean	**19.51**	**17.71**	**739.90**	**88.97**	**93.46**	**1372.04**
HC sd	**21.83**	**17.64**	**536.82**	**68.55**	**87.31**	**728.33**
HT1	12.45	6.22	360.77	36.56	34.99	1138.24
HT3	18.92	30.74	782.36	255.99	42.53	768.37
HT4	39.25	36.23	201.81	644.65	9.34	394.43
HT5	10.14	25.36	462.28	14.62	0.00	624.07
HT mean	**23.54**	**24.40**	**448.31**	**312.40**	**28.95**	**767.01**
HT sd	**13.24**	**13.06**	**245.06**	**292.21**	**20.29**	**311.96**
NC1.1	7.60	22.22	193.04	192.10	0.00	160.72
NC1.3	23.49	11.75	599.98	881.81	22.09	569.33
NC1.4	21.44	60.02	1146.45	294.69	196.89	441.18
NC2.1	4.64	3.55	644.81	306.48	0.00	86.45
NC2.4	36.27	32.98	486.91	92.43	89.13	394.49
NC3.1	82.37	10.15	389.62	52.47	3.76	51.86
Nc3.3	237.50	118.75	154.13	217.09	953.02	244.04

Table S5 (cont.)

NC3.4	214.51	83.18	641.00	454.10	292.14	592.03
NC4.1	14.45	6.49	1083.55	164.08	0.79	1526.34
NC5.1	1.57	5.50	679.87	123.34	0.90	256.69
NC5.2	19.35	45.15	586.05	137.42	24.54	63.34
NC5.3	5.38	2.69	675.03	0.00	8.37	432.33
NC5.4	13.84	17.80	668.18	430.77	20.33	399.33
NC6.1	40.97	49.16	21.04	0.00	0.05	35.22
NC6.3	102.09	79.04	262.96	0.00	245.51	386.23
NC6.4	170.20	30.39	102.16	53.96	35.53	303.69
NC7.1	1.64	4.92	99.73	0.00	0.00	25.50
NC8.1	0.00	12.93	267.59	51.37	0.00	149.81
NC9.1	61.18	80.01	365.47	19.22	0.63	12.04
NC9.2	21.58	21.58	204.68	210.39	66.21	146.34
NC9.3	62.59	46.94	709.42	719.85	34.86	437.92
NC9.4	167.48	83.74	263.56	634.37	76.98	145.76
NC10.1	23.84	57.22	303.56	4.44	0.00	169.65
NC mean	**58.00**	**38.53**	**458.64**	**219.15**	**90.08**	**305.66**
NC sd	**71.62**	**32.95**	**301.25**	**249.79**	**205.42**	**319.56**
NI2	8.87	44.35	777.42	99.74	47.73	125.92
NI3	16.59	31.11	154.97	37.32	50.80	35.59
NI4	0.00	5.01	529.43	0.00	17.25	29.07
NI6	33.77	42.21	86.01	47.37	0.00	49.74
NI mean	**14.81**	**30.67**	**386.96**	**46.11**	**28.94**	**60.08**
NI sd	**14.34**	**18.06**	**325.14**	**41.15**	**24.53**	**44.73**
NL1	75.00	33.33	131.31	344.73	0.00	127.91
NL4	6.79	3.40	114.90	235.64	314.81	13.78
NL5	0.00	14.27	1041.66	49.88	62.64	57.86
NL6	0.00	6.29	407.03	72.72	104.68	105.92
NL mean	**20.45**	**14.32**	**423.73**	**175.74**	**120.53**	**76.37**
NL sd	**36.51**	**13.48**	**433.20**	**139.76**	**136.48**	**50.96**
NR1	0.00	6.97	71.97	907.31	193.08	36.24
NR2	14.33	39.82	46.17	328.48	391.92	38.55
NR3	24.24	27.70	26.75	378.83	343.33	43.63
NR4	17.45	54.85	515.10	647.59	185.55	398.72
NR6	60.49	194.90	31.89	45.50	250.12	95.80
NR mean	**23.30**	**64.85**	**138.37**	**461.54**	**272.80**	**122.59**
NR sd	**22.59**	**74.78**	**211.32**	**328.24**	**91.71**	**156.30**
total mean	**72.19**	**30.42**	**431.82**	**208.38**	**99.42**	**390.69**
total sd	**114.72**	**18.14**	**208.81**	**134.48**	**163.19**	**477.57**

Table S6 total organic carbon (TOC) and total inorganic carbon (TIC) analysis, using an elemental analyzer for Nordenskiöldbreen (NR) and Hørbyebreen (HC)

Group Name	Vials	Replicates	Rejected	Date and time	TOC (ppb)	IC (ppb)	TC (ppb)	Oxidizer Rate
NR01	1	1	Y	04.11.2014 14:57	2270	641	2910	0.4
NR01	1	2	N	04.11.2014 15:01	2290	637	2930	0.4
NR01	1	3	N	04.11.2014 15:05	2300	634	2930	0.4
NR03	2	1	Y	04.11.2014 15:32	2850	648	3500	0.6
NR03	2	2	N	04.11.2014 15:36	2850	643	3490	0.6
NR03	2	3	N	04.11.2014 15:40	2850	644	3490	0.6
NR08	3	1	Y	04.11.2014 16:08	2520	773	3290	0.5
NR08	3	2	N	04.11.2014 16:12	2520	764	3280	0.5
NR08	3	3	N	04.11.2014 16:16	2520	758	3280	0.5
NR09	4	1	Y	04.11.2014 16:43	2870	691	3560	0.6
NR09	4	2	N	04.11.2014 16:47	2870	691	3560	0.6
NR09	4	3	N	04.11.2014 16:51	2870	689	3560	0.6
NR04	5	1	Y	04.11.2014 17:19	1590	2030	3620	0.3
NR04	5	2	N	04.11.2014 17:23	1570	1970	3540	0.3
NR04	5	3	N	04.11.2014 17:27	1560	1970	3530	0.3
HR06	6	1	Y	04.11.2014 17:54	4330	624	4950	0.9
HR06	6	2	N	04.11.2014 17:58	4290	623	4910	0.9
HR06	6	3	N	04.11.2014 18:02	4240	620	4860	0.9

AVG	IC (ppb)	TC (ppb)	STD	*TOC (ppb)*	*IC (ppb)*	*TC (ppb)*
NR01	637.333333	2923.33333		15.27525232	3.51188458	11.5470054
NR03	645	3493.33333		0	2.64575131	5.77350269
NR08	765	3283.33333		0	7.54983444	5.77350269
NR09	690.333333	3560		0	1.15470054	0
NR04	1990	3563.33333		15.27525232	34.6410162	49.3288286
HR06	622.333333	4906.66667		45.09249753	2.081666	45.0924975

TOC total organic carbon (dissolved)
IC inorganic carbon
TC total carbon
ppm parts per million

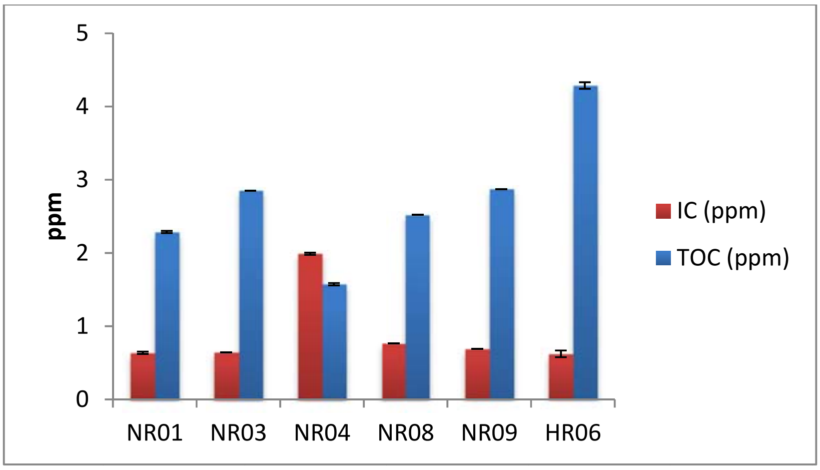

Figure S1. Organic (TOC) and inorganic (TIC) carbon analysis results for Nordenskiöldbreen (NR) and Hørbyebreen (HR). The error bars indicate the standard deviation of technical replicates.

Table S7. Results for nutrient analysis of sediments in mg/kg (top) and mmol/kg (bottom) and relevant ratios of particulate nutrients. P-PO_4: bioavailable phosphate, TP: total phosphate, TN: total nitrogen, TC: total Carbon, OM: organic matter.

Sample ident.	P-PO_4 mg/kg	TP mg/kg^{-1}	TN Mg kg^{-1}	TN : TP	P-PO_4 : TP	TC : TN
H1	18.32	727.69	1127.73	1.55	0.03	0.09
H2	24.23	618.77	1830.42	2.96	0.04	0.05
H3	17.85	594.73	1647.54	2.77	0.03	0.06
N1	19.52	531.16	1924.18	3.62	0.04	0.05
N2	13.50	570.70	1447.58	2.54	0.02	0.07
N3	8.74	806.29	264.38	0.33	0.01	0.38
N4	16.75	414.71	1630.93	3.93	0.04	0.06
N5	17.90	463.30	1525.84	3.29	0.04	0.06
N6	18.68	518.94	1876.06	3.62	0.04	0.05

Sample ID	Sample my ID	OM % d w	water content % weight	P-PO_4 mmol kg^{-1}	TP mmol kg^{-1}	TN mmol kg^{-1}	TN : TP mmol kg^{-1}	P-PO_4 : TP mmol kg^{-1}	TC* : TN mmol kg^{-1}	TC* : TN mg kg^{-1}
H1	HT1	5	46	0.19	7.66	66.34	8.66	0.03	31.41	22.17
H2	HT2	4.6	43-49	0.26	6.51	107.67	16.53	0.04	17.80	12.57
H3	HT3	5	48	0.19	6.26	96.91	15.48	0.03	21.50	15.17
N1	NC	6.8	49-61 (18**)	0.21	5.59	113.19	20.24	0.04	25.03	17.67
N2	NC	NA	NA	0.14	6.01	85.15	14.17	0.02	NA	NA
N3	NC	NA	NA	0.09	8.49	15.55	1.83	0.01	NA	NA
N4	NC	NA	NA	0.18	4.37	95.94	21.98	0.04	NA	NA
N5	NI	6.1	36-59	0.19	4.88	89.76	18.40	0.04	28.32	19.99
N6	NR	6	44-53	0.20	5.46	110.36	20.20	0.04	22.65	15.99

* assuming TC= 0.5 OM

Table S8. Water content and organic matter calculations by drying of sediments and combustion of dry sediments.

ID	site	sedmass	drymass	water	om
		g	g	%	%
E1	E	0.186	NA	NA	NA
E2	E	0.136	NA	NA	NA
E3	E	0.206	NA	NA	NA
E4	E	0.249	NA	NA	NA
E5	E	0.251	0.131	48%	4%
E6	E	0.241	0.111	54%	2%
HC1	HC	0.252	0.135667	46%	5%
HC2	HC	0.238	0.1295	48%	5%
HC3	HC	0.147	0.071	52%	4%
HC4	HC	0.207333	0.106667	50%	5%
hc5	HC	0.197	NA	48%	4%
hc6	HC	0.216	NA	49%	5%
HC7	HC	0.369	0.198667	46%	4%
HC8	HC	0.256	NA	46%	5%
HC9	HC	0.244	NA	43%	4%
H10	HC	0.284667	0.144667	49%	5%
HT1	HT	0.15	0.076	49%	4%
HT2	HT	0.249	NA	NA	NA
HT3	HT	0.32	NA	58%	3%
HT4	HT	0.218	0.104	52%	4%
HT5	HT	0.197	NA	39%	3%
HT6	HT	0.265	NA	NA	NA
NC1	NC	0.184667	0.0765	61%	9%
NC2	NC	0.2425	0.115	56%	5%
NC4	NC	0.248	0.107	62%	10%
NC5	NC	0.381	0.209667	48%	6%
NC6	NC	0.35075	0.119	47%	3%
NC7	NC	0.219	0.096	56%	8%
NC8	NC	0.307	0.124	60%	NA
NC9	NC	0.20875	0.087667	56%	8%
NC10	NC	0.253	0.132	48%	8%
NI2	NI	0.153	0.071	54%	6%
NI3	NI	0.238	0.152	36%	7%
NI4	NI	0.153	0.063	59%	8%
NI6	NI	0.172	0.082	52%	4%
NI5	NI	0.311	NA	NA	NA
NL1	NL	0.226	0.113	50%	NA
NL2	NL	0.164	NA	NA	NA
NL3	NL	0.131	NA	NA	1%
NL4	NL	0.121	0.093	24%	NA
NL5	NL	0.155	0.088	43%	NA
NL6	NL	0.167	0.1	40%	3%
NR1	NR	0.939	0.497	47%	7%
NR3	NR	0.19	0.091	52%	7%
NR4	NR	0.224	0.126	44%	4%
NR5	NR	0.458	NA	NA	NA
NR6	NR	0.169	0.093	45%	6%

Figure S2. Bird guano at the Retrettøya sampling site.

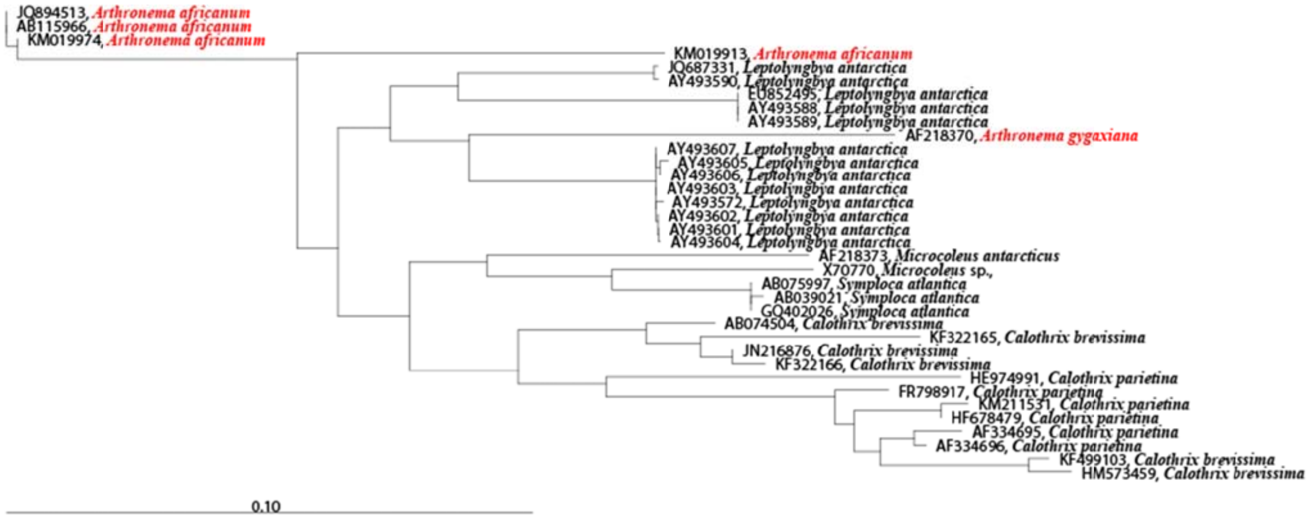

Figure S3. ARB phylogenetic tree based on full 16S sequences of published strains (NCBI). The tree is calculated, using the maximum likelyhood (Phyml) algorithm. For alignments the implemented SINA alignment was used and the results were checked manually. Given are the ARB accession numbers and the genus and species name.