Supplementary Table 6. Genbank accession numbers for haplotypes from different data sets. All individuals with unique combinations of mycobiont and photobiont haplotypes are listed. Hyphens indicate that we were unable to obtain the particular sequence for that individual. Abbreviations in individual names indicate their places of origin, as follows: Ant—Antarctica, Chi—Chile, Fal—Falkland Islands, Ice—Iceland, Sva—Svalbard, Spa—Spain, Tur—Turkey and Kaz—Kazakhstan.

	Mycobiont			Photobiont		
Individual	ITS	GPD	mtLSU	ITS	Actin	COX2
1081_Kaz1	EU924121	HM573601	HM573622	GQ375345	-	HM573634
1087_Ant1	EU880586	HM573602	HM573613	GQ375320	GQ375390	HM573627
1088_Ant1	EU880586	-	-	GQ375321	-	-
1090_Ant1	EU880586	HM573602	HM573613	GQ375320	GQ375388	HM573627
1091_Fal2	GQ375371	HM573602	HM573613	GQ375358	GQ375394	HM573628
1092_Fal2	EU880586	HM573602	HM573613	GQ375386	GQ375394	HM573628
1093_Fal2	GQ375371	HM573602	HM573613	GQ375358	HM573597	HM573628
1094_Fal2	EU880586	HM573602	HM573613	GQ375358	GQ375394	HM573629
1102_Ant1	EU880586	HM573602	HM573613	GQ375319	GQ375388	HM573627
1110_Ant1	EU880586	-	HM573613	GQ375319	-	HM573627
1115_Ant1	EU924110	HM573602	-	GQ375320	-	-
1117_Kaz1	EU924121	HM573601	HM573622	GQ375346	-	HM573634
1121_Fal2	EU880586	HM573602	-	GQ375354	GQ375394	HM573628
1123_Fal2	-	HM573602	-	GQ375361	GQ375394	-
1125_Fal2	EU880586	-	-	GQ375356	GQ375394	HM573628
1127_Fal2	EU880586	HM573602	-	GQ375360	GQ375394	HM573628
1134_Fal2	EU924111	-	-	GQ375358	-	-
1135_Fal2	EU880586	HM573602	-	GQ375355	GQ375394	HM573628
1141_Tur1	-	-	HM573622	-	-	-
1146_Spa1	EU924118	HM573601	HM573622	GQ375342	GQ375406	HM573634
1148_Spa1	-	HM573601	HM573622	GQ375345	GQ375407	HM573634
1150_Spa1	EU924114	HM573603	HM573622	GQ375338	GQ375396	-
1151_Spa1	EU924114	-	HM573618	GQ375345	GQ375407	HM573634
1153_Spa1	EU924115	HM573601	HM573622	GQ375338	GQ375396	HM573635
1155_Spa1	EU924116	HM573601	HM573622	GQ375350	GQ375409	-
1157_Spa1	EU924114	-	HM573622	GQ375344	GQ375407	HM573635
1159_Spa1	EU924114	HM573601	HM573621	GQ375338	GQ375398	HM573635
1161_Spa1	EU924114	HM573601	HM573622	GQ375343	GQ375406	-
1162_Spa1	EU924119	HM573601	HM573622	GQ375338	GQ375399	-
1164_Spa1	EU924114	HM573601	HM573617	GQ375344	GQ375400	-
1165_Spa1	EU924114	HM573601	HM573616	GQ375338	GQ375406	-
1167_Spa1	EU924114	HM573601	HM573622	GQ375348	GQ375408	-
1224_Ant3	EU880586	HM573604	HM573613	GQ375319	GQ375388	HM573627
1225_Ant3	EU880586	HM573602	-	GQ375320	GQ375388	-
1230_Ant3	EU880586	HM573602	HM573613	GQ375319	GQ375389	-
1231_Ant3	EU880586	HM573602	HM573613	GQ375322	GQ375390	-
1242_Ant3	EU880586	HM573602	HM573613	GQ375320	GQ375391	HM573627
1335_Tur1	EU924114	HM573601	-	GQ375340	GQ375401	-

1336_Tur1	EU924127	HM573602	HM573621	GQ375352	GQ375405	HM573633
1338_Tur1	EU924114	HM573601	HM573622	GQ375339	GQ375402	HM573636
1339_Tur1	EU924114	HM573601	HM573622	GQ375339	GQ375404	HM573636
1342_Tur1	EU924114	HM573601	HM573622	GQ375340	GQ375404	HM573636
1344_Tur1	EU924114	-	HM573622	GQ375339	-	-
1346_Tur1	EU924114	HM573601	HM573622	GQ375338	GQ375397	HM573635
1347_Tur1	EU924114	HM573601	HM573622	GQ375339	GQ375398	HM573635
1351_Tur1	-	-	-	GQ375351	-	-
1374_Chl1	GQ375371	HM573602	HM573613	GQ375319	-	HM573627
1379_Chl1	EU924109	HM573602	HM573626	GQ375319	-	HM573627
1380_Chi1	EU880586	HM573605	HM573626	GQ375319	GQ375390	HM573627
1383_Chl1	GQ375371	-	-	GQ375341	-	-
1384_Chl1	EU880586	HM573605	-	GQ375363	GQ375395	-
1388_Chl1	EU924113	HM573602	-	GQ375362	-	-
1389_Chl1	EU880586	HM573602	-	GQ375362	GQ375394	-
1390_Chi1	EU880586	HM573602	HM573626	GQ375319	GQ375390	HM573627
1390_Chi1	EU880586	HM573602	HM573626	GQ375319	GQ375390	HM573627
1393_Chl1	GQ375371	-	-	GQ375386	-	-
1394_Kaz1	EU924117	HM573601	-	GQ375349	-	HM573634
1420_Ice1	GQ375371	HM573606	HM573621	GQ375319	HM573593	HM573637
1423_Ice1	GQ375371	HM573606	HM573621	GQ375319	HM573637	HM573637
1424_Ice1	GQ375374	-	-	GQ375319	-	-
1426_Ice1	GQ375383	HM573606	-	GQ375319	-	-
1428_Ice1	GQ375372	HM573607	HM573615	GQ375319	HM573637	HM573637
1429_Ice1	GQ375371	-	HM573625	GQ375318	HM573637	HM573637
1432_Ice1	GQ375372	HM573608	HM573621	GQ375319	-	-
1434_Ice1	-	HM573606	HM573621	GQ375317	-	HM573637
1436_Ice1	GU124725	HM573602	HM573621	GQ375323	HM573637	HM573637
1437_Ice1	GQ375372	HM573602	HM573614	GQ375319	HM573637	HM573637
1438_Ice1	GQ375381	-	-	GQ375319	-	-
1439_Ice1	GQ375372	HM573606	HM573621	GQ375319	HM573637	HM573637
1440_Sva4	GQ375376	-	-	GQ375319	-	-
1441_Sva4	GQ375378	HM573606	-	GQ375368	GQ375390	-
1442_Sva4	GQ375375	HM573606	HM573621	GQ375370	GQ375393	HM573630
1443_Sva4	GQ375377	-	-	GQ375319	-	-
1444_Sva4	GQ375375	HM573606	HM573621	GQ375319	-	HM573632
1446_Sva4	GU124726	HM573606	HM573621	GQ375319	-	HM573632
1447_Sva4	GU124726	HM573606	HM573621	GQ375319	HM573591	HM573632
1448_Sva4	GQ375380	-	-	GU124708	-	-
1451_Sva4	GQ375380	HM573609	HM573621	GQ375364	-	HM573632
1452_Sva4	GU124726	-	-	GQ375365	-	-
1455_Sva4	GQ375379	HM573602	HM573621	GQ375353	-	HM573627
1456_Sva4	GU124726	HM573606	-	GQ375368	-	HM573630
1457_Sva4	GQ375380	HM573602	HM573621	GQ375353	-	HM573627
1458_Sva4	GU124726	HM573606	HM573621	GQ375319	GQ375388	HM573632
1459_Sva4	GU124729	-	-	GQ375369	-	-
1641_Ice8	GU124727	HM573602	HM573621	GQ375319	-	HM573632
1643_Ice8	GU124725	HM573602	HM573623	GQ375319	HM573637	-
1647_Ice8	GQ375380	HM573606	HM573621	GQ375319	HM573593	HM573627
1648_Ice8	GU124727	-	HM573621	GQ375319	HM573594	HM573637

1649_Ice8	GU124734	HM573611	HM573621	GQ375319	HM573637	-
1650_Ice8	GQ375380	HM573612	-	GQ375319	-	-
1653_Ice8	GU124727	HM573602	HM573623	GQ375319	HM573594	HM573637
1659_Ice8	GU124727	-	-	GQ375358	-	-
1689_Sva1	GQ375380	HM573602	HM573620	GU124709	-	HM573637
1691_Sva1	GU124726	HM573606	HM573621	GQ375319	GQ375390	HM573632
1697_Sva1	GU124732	HM573609	HM573620	GU124707	HM573595	HM573632
1703_Sva1	GU124726	HM573606	HM573621	GQ375353	-	-
1704_Sva1	GU124732	-	HM573619	GU124707	-	HM573637
1706_Sva1	GU124732	-	-	GU124707	-	-

Supplementary Table 7. Tajima's D test and p-value for all markers used in this study. Significant p-values are marked in boldface.

Gene	Tajima's D	p-value
ITS mycobiont	-1,18341	P > 0.10
mtLSU	-1,62574	0.10 > P > 0.05
GPD	2,55695	P **< 0.05**
ITS photobiont	-0,47268	P > 0.10
Actin	0,89490	P > 0.10
COX2	0,35644	P > 0.10

Supplementary Table 8. Comparison of diversity indices of the ITS marker for the different populations of *Cetraria aculeata* with the two-sided t-test. Numbers above the blank diagonal indicate results for the photobiont, numbers below the blank diagonal are results for the mycobiont.Values in boldface indicate significant differences after Bonferroni correction.

	Ant-arctic 1	Ant-arctic 2	Ant-arctic 3	Chile	Falkland	Kazakh-stan	Spain	Turkey	Icela
Antarctic 1		0.0074	0.3507	0.7415	0.0638	0.1251	0.0185	0.4885	0.3
Antarctic 2	**<0.0001**		**0.0002**	0.0187	**<0.0001**	0.4641	**<0.0001**	0.0048	0.2
Antarctic 3	**<0.0001**	1.000		0.8003	0.1702	0.0193	0.0569	0.9306	0.1
Chile	**<0.0001**	**<0.0001**	**<0.0001**		0.2664	0.1302	0.1494	0.7908	0.2
Falkland	**<0.0001**	**<0.0001**	**<0.0001**	0.1460		0.0057	0.7599	0.3591	0.0
Kazakhstan	1.0000	**<0.0001**	**<0.0001**	**<0.0001**	0.0253		**0.0014**	0.0601	0.6
Spain	**<0.0001**	**<0.0001**	**<0.0001**	**0.0003**	0.5688	0.1563		0.2060	0.0
Turkey	**<0.0001**	1.0000	1.0000	**<0.0001**	**0.0002**	0.2619	0.0186		0.1
Iceland 1	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	0.0598	**<0.0001**	0.0304	**<0.0001**	
Iceland 8	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	0.0183	**<0.0001**	0.0130	**<0.0001**	0.4
Svalbard 1	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	0.1807	**0.0002**	0.0827	**<0.0001**	0.4
Svalbard 4	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	0.0140	**0.0001**	0.0091	**<0.0001**	0.4