Proc. NIPR Symp. Polar Biol., **6**, 106–120, 1993

FLORISTIC NOTES ON LICHENS IN THE FILDES PENINSULA OF KING GEORGE ISLAND AND HARMONY COVE OF NELSON ISLAND, SOUTH SHETLAND ISLANDS, THE ANTARCTIC

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Abstract: Floristic interests of lichens in the Fildes Peninsula of King George Island and Harmony Cove of Nelson Island belonging to the maritime Antarctic zone are mentioned. A total number of species occurring in the present region is discussed comparing it with the estimations of previous authors. Preliminary contributions to a phytogeography are mentioned. The lichens enumerated from the present region are classified into three major groups by their distribution patterns; 1) species known only from the maritime Antarctic, 2) species often reported from the maritime Antarctic, but hardly known from the continental Antarctic, and 3) species known to occur in the maritime and continental Antarctic. Concerning the distributions of four species not belonging to these major groups are briefly discussed.

1. Introduction

King George Island (lat. 62°S, long. 58°30'W) and neighboring Nelson Island lie about 800 km southeast of Cape Horn and about 150 km northwest of the Antarctic Peninsula. The South Shetland Islands, which both islands belong to, extends in a southwest to northeast direction parallel with the trend of the Antarctic Peninsula. In the islands two phanerogams *Colobanthus quitensis* and *Deschampsia antarctica* grow with luxuriant macrolichens such as *Cladonia*, *Himantormia*, *Sphaerophorus*, *Usnea*, etc. This region belongs to the maritime Antarctic botanical zone as defined by HOLDGATE (1964), because of the occurrence of the herbs and rich liverworts besides the macrolichens mentioned above.

The author was able to participate in the 5th Chinese Antarctic Research Expedition which involved a collaboration between Japanese and Chinese biologists at Great Wall Station, King George Island. The lichenological field works were made from November 1988 to March 1989. Collections comprising about 1800 herbarium packets were made.

A preliminary assessment of the lichen flora indicated that about 198 species (INOUE, 1991) are present. However, many species are still unreliably determined because of the unavailability of the type collections or lack of adequate collections (see also HALE, 1987; HERTEL, 1988).

Undoubtedly, we have to elucidate a reasonable taxonomic conclusion as soon as possible, though more evidences should be accumulated before the final conclusion. But we cannot look on with folded arms until then, because lichens of the Antarctic, which is situated at far distances from other continents and has an extremely cold cli-

mate prevailing there, may offer various biological implications to us.

This article discusses features of floristic interest concerning lichens of the Fildes Peninsula of King George Island and Harmony Cove of Nelson Island belonging to the maritime Antarctic zone, pending critical taxonomic conclusions.

2. Outline of the Region Investigated

A vast bulk of snow and ice covers most of King George Island and Nelson Island including the summit range, which reaches more than 600 m above the sea level. The ice-free areas are limited and scattered along the coastline.

The Fildes Peninsula (about 30 km^2 wide) and the Harmony Cove (about 5 km^2 wide) are two of the larger ice-free areas in the islands (Figs. 1, 2). They are hilly (highest peak is 156 m above the sea level) and "volcanic necks" as well as precipitous cliffs occur everywhere. The coastal areas of the Fildes Peninsula show geomorphological features such as raised beaches and raised marine platforms. Around the Fildes Peninsula there are many offshore islets and rocks which are less than 450 m in diameter. None of these smaller islets, including Geologist Island and Two Summit Island visited by the author, supports ice cap or rises 60 m above the sea level.

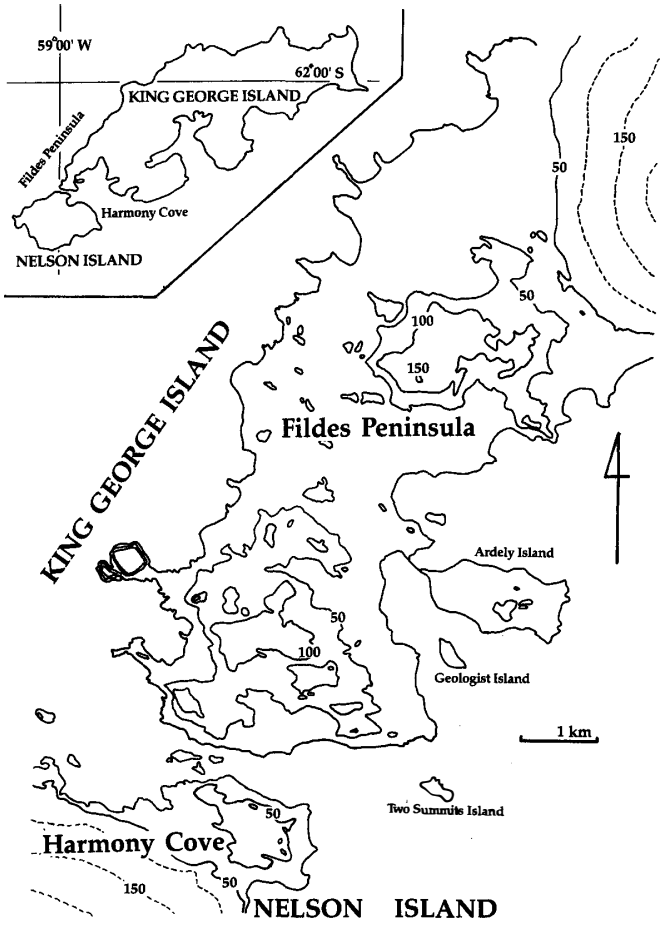

Fig. 1. A map showing the Fildes Peninsula and Harmony Cove. Broken lines indicate the contour lines of ice or snow area.

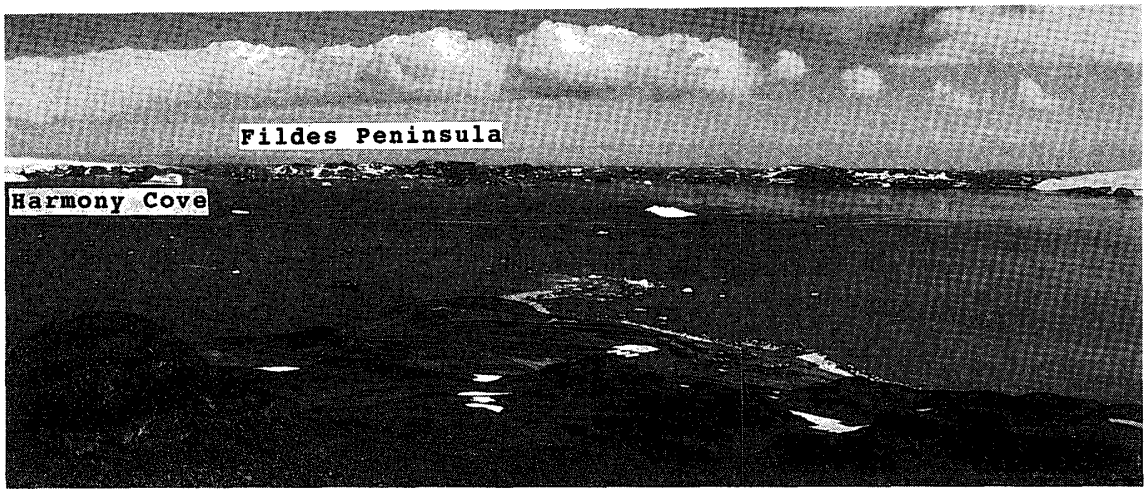

Fig. 2. A landscape of the Fildes Peninsula and Harmony Cove. Ice caps of King George Island and Nelson Island are seen at right and left sides respectively (from the Barton Peninsula of King George Island, 27. I. 1989).

In this region there are rookeries of Adélie penguin (*Pygoscelis adeliae*), Chinstrap penguin (*P. antarctica*), Gentoo penguin (*P. papua*) and Giant petrel (*Macronectes giganteus*), or are scattered nests of many sea-birds such as South polar skur (*Catharacta maccormicki*) and concomitant organic debris rich in nitrogenous matter.

Table 1 shows climatological data recorded at Deception Station (62°59'S, 60°43'W) in Deception Island about 130 km southwest of King George Island from 1944 to 1967. It is interesting that the monthly mean of daily minimum temperatures in the austral summer season is lower than mean winter temperatures, while at Syowa Station (1957–1987) situated on the Antarctic Continent the former is –6.3°C and the latter –23.2°C. This may be caused by the well-known bad weather during summer in the South Shetland Islands region (Fig. 3).

Table 1. Temperature and wind speed at Deception Station in Deception Island, South Shetland Islands, 1944–1967.

Climatological elements	Mean values
Annual mean temperatures (°C)	–3.0
Mean summer temperatures (°C)	1.0
Mean winter temperatures (°C)	–6.6
Monthly mean of daily maximum temperatures in summer (°C)	8.5
Monthly mean of daily minimum temperatures in summer (°C)	–6.8
Annual mean of wind speed (m/s)	6.1

After NATIONAL INSTITUTE OF POLAR RESEARCH (1985).
Summer: December–January, winter: August–September.

3. Previous Reports on Lichens in King George Island and Nelson Island

DARBISHIRE (1912) reported 9 species from Harmony Cove of Nelson Island based

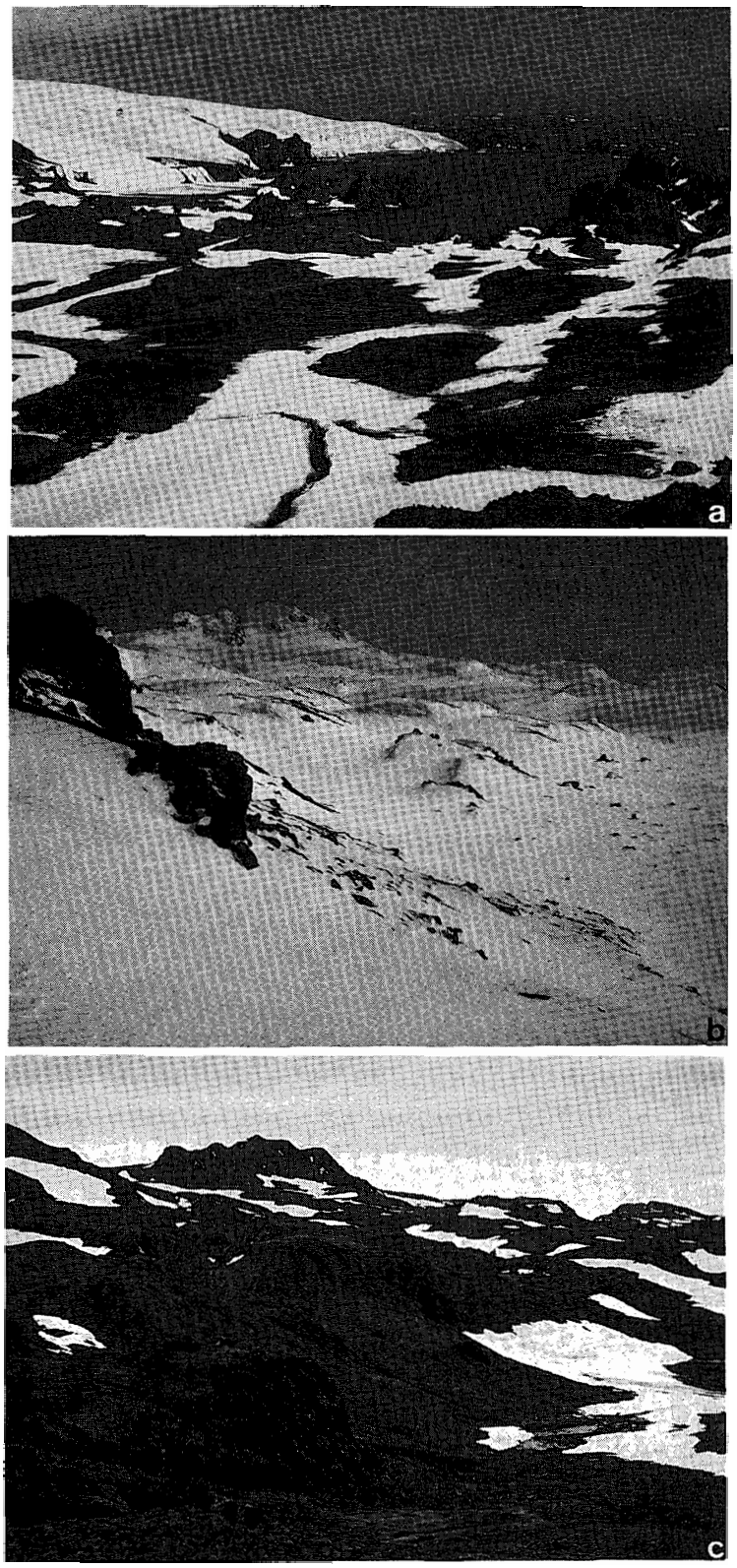

Fig. 3. a: Northwestern part of Harmony Cove; b, c: Southeastern part of the Fildes Peninsula. They have heavy snow in winter, but snow melts rapidly during spring to summer. (a: 4. I. 1989; b: 14. XI. 1988; c: 21. I. 1989).

on the collections by SKOTTSBERG who was a member of the Swedish South Polar Expedition, 1901–1913 (SKOTTSBERG, 1912). Subsequently various authors, namely LAMB (1948, 1964, 1968), DODGE (1965, 1973), LINDSAY (1969a, b, 1971a, 1973), GUZMÁN and REDON (1981), HERTEL (1984), WALKER (1985), KÄRNEFELT (1986), ANDREEV (1988), JACOBSEN and KAPPEN (1988), OLECH and ALSTRUP (1990), and POELT and OBERMAYER (1991), added species to a flora of the region. Amongst the reports mentioned above, the following are conspicuous; GUZMÁN and REDON (1981) reported 46 species from the Ardely Island (or Peninsula) of the Fildes Peninsula, ANDREEV (1988) 119 species from the Fildes Peninsula, and JACOBSEN and KAPPEN (1988) 50 species from Admiralty Bay of King George Island.

LINDSAY (1971b) mentioned various plant associations recognized in the South Shetland Islands including King George Island, and simultaneously summarized the historical survey on the vegetation of the region. KAPPEN and REDON (1984) investigated the microclimate influencing the lichen vegetation on different aspects of a coastal rock in the Fildes Peninsula. INOUE (1991) discussed the differences in flora and habitat of lichens between the Syowa Station area in the continental Antarctic and King George Island in the maritime Antarctic.

4. Method

The author carried out a field survey in the present region as follows: KING GEORGE ISLAND; Fildes Peninsula and Ardely Peninsula (14 November 1988–4 March 1989), Geologist Island (20 December 1988, 24 January 1989), Two Summit Island (13, 14 February 1989), NELSON ISLAND; Harmony Cove (17, 21 December 1988, 4, 29 January 1989).

Since most lichens are not well circumscribed taxonomically, the author checked carefully morphological-, anatomical- and chemical features. The lichen substances in all species were identified or estimated by means of thin-layer chromatography (TLC) using the techniques given by CULBERSON and KRISTINSSON (1970) with a slight modification. In recognizing species, the author employed taxonomic characters introduced by monographers of each taxa as far as possible.

The database files of Antarctic lichens have been made from the previous reports by using a software package called dBASE IV vers. 1.1J (Borland).

5. Results and Discussion

5.1. A total number of species occurring in the region investigated

DODGE (1973) reported 429 species of lichens from the Antarctic. Some authors believe this number is excessive. One experienced worker, HERTEL (1988), estimated that there were 160 species of lichens in the Antarctic. On the contrary, INOUE (1991) provisionally enumerated 198 species of lichens from a part of King George Island and Nelson Island using his collections during 1988–1989.

Concerning the reason for such a discrepancy—429 *versus* 160—HERTEL (1988) based his position on the following example; "In his lichen flora of the Antarctic Continent DODGE (1973) recognizes no less than 21 different species of *Neuropogon* in the

Antarctic. In WALKER's detailed monograph (1985), 17 of these 21 "species" are considered as synonyms. One of the remaining four species was excluded, being based on incorrect identifications. Although WALKER accepted two additional species not included in DODGE's treatment, even so the total number of species for Antarctica is reduced from 23 to 5".

However, there is another example which implies that the reduction may not be as great. From the Antarctic Peninsula, South Orkney and South Shetland Islands, LAMB (1968) reported, in his monograph, 22 species of *Buellia*, one of the most common genera in the Antarctic. Previously 60 were recognized from the Antarctic including the Continent according to LAMB (1968).

The author agrees that few species are present than recognized by DODGE (1973) in the Antarctic region, but supposes that a realistic assessment of the numbers may be somewhat higher than that HERTEL (1988) accepted. For example, the "reduction rate" in case of the antarctic *Buellia* by LAMB (1968) was substantially lower than that of *Neuropogons* by WALKER (1985). Moreover, the author, who has been working on crustose lichens since 1972 especially on lecideoid ones which are one of the major assemblages in the Antarctic, estimated that 18 species of *Buellia* and 24 species of *Lecidea* (*s. lat.*) are present in King George Island and Nelson Island (INOUE, 1991); he might look for crustose lichens including lecideoid ones more precisely than other

Table 2. Species of Buellia *and* Rinodina *reported by* LAMB *(1968) from the Antarctic Peninsula, the South Orkney and South Shetland Islands with the specimens numbers cited.*

Species	Collector*1		Species	Collector	
	LAMB	Others		LAMB	Others
Buellia anisomera	22	28(10)*2	*B. coniops*	7	17(9)
B. inordinata	3	2(2)	f. *areolata*	2	8(5)
B. nelsonii	0	2(2)	f. *verrucosa*	1	4(3)
B. granulosa	7	11(8)	f. *incrassata*	0	2(2)
B. subpedicellata	9	20(3)	f. *cervinogranulata*	2	3(2)
B. darbishirei	1	1	*B. augusta*	8	34(11)
B. cladocarpiza	1	1	*B. latemarginata*	12	26(12)
B. punctata	1	1	*B. babingtonii*	0	7(4)
B. pycnogonoides	1	1	*B. fulvonitescens*	2	0
B. evanescens	0	2(1)	*B. frigida*	0	3(1)
B. illaetabilis	2	1	*Rinodina turfacea*	9	6(5)
B. papillata	1	0	*R. archaeoides**3	0	2(2)
B. russa	51	65(16)	*R.* cf. *diplocheila*	0	1
var. *liouvillei*	3	4(3)	*R. deceptionis*	2	0
var. *cycloplaca*	6	0	*R. petermannii*	10	6(4)
B. melanostola	4	5(5)	*R. endophragmia*	9	7(5)
B. perlata	11	8(4)	*R. nimbosa*	6	0
B. isabellina	16	21(4)	f. *sphaerocarpa*	1	0
			Total	210	299

*1: The LAMB's collections were from West and East Graham Land and the South Shetland Islands during the years 1944–1945, while others were collected by more than 35 persons of various expeditions during the year 1897–1958.

*2: Figures in parentheses indicate the numbers of collectors.

*3: Species known only from the Antarctic Continent.

workers. In addition, most collectors, who participated in the previous antarctic expeditions, were not lichenologists. They collected only at odd moments. Table 2 shows that a total number of species based on the collections by only one lichenologist is similar to that based on those collected by many non-lichenologists (Dr. LAMB visited only a few localities, but collected about 70% of the collections made by more than 35 people). The author is confident that crustose lichens are not adequately collected at odd moments, because most are saxicolous (to collect saxicolous lichens is hard) and show extraordinary phenotypic variations caused by the extreme climatic conditions. This is another problematic difficulty for studying antarctic lichens; there might be rich taxonomically superfluous names as well as unknown species.

A final decision in this regards, however, is best postponed until more experience and knowledge are accumulated.

5.2. Lichen vegetation

Most lichens growing in the Fildes Peninsula and Harmony Cove seem to prefer semi-hydrophilic or drier conditions such as screes with local dry plains and even drier habitats like small hills or peaks where snow disappears early in summer, while bryophytes are remarkably lush in the hydrophilic conditions such as wet bands along talus channels and around snow-melt water rock pools, where they are seasonally inundated, or well-irrigated rocky slopes. This kind of difference in habitat between lichens and bryophytes is also found in the Syowa Station area in the continental Antarctic (INOUE, 1989), although the latter lacks liverworts in its flora.

On the other hand, there exists a remarkable difference in the overall distribution pattern within each region (INOUE, 1991). Both macro- and microlichens are everywhere in the Fildes Peninsula and Harmony Cove, while extensive sites lack lichen cover in the Syowa Station area, even where the ground is normaly snow-free in summer. INOUE (1989, 1991) concluded that lichens of the continental Antarctic with a very low summer precipitation were absent or poorly developed at the dry sites that are buffeted by cyclonic winds through the surface of sea ice. But lichens grow well at the sites where an adequate moisture is maintained due to snow and ice brought by the "katabatic wind" over the surface of ice cap; wind-blown sea spray (salinity) was one of the unfavorable factors for lichens in the cold desert, on the contrary high precipitation in the present region seems to dilute the salinity.

5.3. Preliminary contributions to a phytogeography

According to DODGE (1973) 429 species are known to occur in the Antarctic as mentioned above, but a great number of species were reported only one time or merely known. Even so, it is true that there are a number of lichens often reported from the Antarctic by various authors. Lichens enumerated by the present author from the Fildes Peninsula and Harmony Cove are classified into three major groups based on the distribution pattern within the Antarctic.

5.3.1. Species so far known only from the maritime Antarctic

Table 3 shows the species known only from the maritime Antarctic. Macrolichens as well as microlichens assembles in this group, and the species of this group may be the major ones occurring in the present region. Amongst the lichens the

Table 3. Species known only from the maritime Antarctic including the Fildes Peninsula and Harmony Cove.

Acarospora convoluta DARB.	DARBISHIRE, 1912, 1923a; DODGE, 1973; ANDREEV, 1988
Bryolia chalybeiformis (L.) BRODO & HAWKSWORTH	LAMB, 1964, 1970; LINDSAY, 1969a, 1974; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; ANDREEV, 1988
Buellia anisomera VAINIO	VAINIO, 1903; DARBISHIRE, 1923a; LAMB, 1968; LINDSAY, 1971b, 1973; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; ØVSTEDAL, 1986b; ANDREEV, 1988; JACOBSEN & KAPPEN, 1988
Buellia granulosa (DARB.) DODGE	DARBISHIRE, 1912, 1923a; LAMB, 1968; LINDSAY, 1971b, 1973; GUZMÁN & REDON, 1981; ANDREEV, 1988.
Buellia russa (HUE) DARB.	DARBISHIRE, 1923a; LAMB, 1968, 1970; LINDSAY, 1971b; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; and others
Cornicularia aculeata (SCHREB.) ACH.	LAMB, 1964; LINDSAY, 1969a, 1974, 1977; GUZMÁN & REDON, 1981; ANDREEV, 1988
Cornicularia epiphorella (NYL.) DR.	LAMB, 1964; LINDSAY, 1969a, 1974; REDON, 1985; ANDREEV, 1988
Cystocoleus niger (HUDS.) HARIOT	LINDSAY, 1971b; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; ANDREEV, 1988
Haematomma erythromma (NYL.) ZAHLBR.	ALLISON & SMITH, 1973; HUNECK *et al.*, 1984; GUZMÁN & REDON, 1981; ANDREEV, 1988; JACOBSEN & KAPPEN, 1988
Himantormia lugubris (HUE) LAMB	HUE, 1915; DARBISHIRE, 1923a; LAMB, 1964; LINDSAY, 1969a; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981, and others
Hypogymnia lugubris (PERS.) KROG	DARBISHIRE, 1923a; LAMB, 1964; LINDSAY & OCHYRA, 1982; ANDREEV, 1988
Leptogium puberulum HUE	DARBISHIRE, 1923a; JØRGENSEN, 1986; ANDREEV, 1988; and other
Mastodia tesselata HOOKER & HARVEY	LAMB, 1948; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; ANDREEV, 1988
Ochrolechia antarctica (MÜLL. ARG.) DARB.	LINDSAY, 1971a, 1977; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; ANDREEV, 1988
Pannaria hookeri (BORR.) NYL.	JØRGENSEN, 1986; ANDREEV, 1988
Parmelia saxatilis (L.) ACH.	DARBISHIRE, 1912; LINDSAY, 1973; ALLISON & SMITH, 1973; ANDREEV, 1988
Placopsis contortuplicata LAMB	ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; ANDREEV, 1988; JACOBSEN & KAPPEN, 1988
Psoroma hypnorum (VAHL) GRAY	HENSSEN & RENNER, 1981; JØRGENSEN, 1986; ANDREEV, 1988; and others
Ramalina terebrata HOOKER f. & TAYLOR	VAINIO, 1903; DARBISHIRE, 1912; LAMB, 1964; LINDSAY, 1969a; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; ANDREEV, 1988
Sphaerophorus globosus (HUDS.) VAINIO	VAINIO, 1903; LINDSAY, 1972; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; ANDREEV, 1988
Thamnolecania brialmontii (VAINIO) ZAHLBR.	VAINIO, 1903; LAMB, 1970; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; JACOBSEN & KAPPEN, 1988; and others
Thelenella antarctica (LAMB) ERIK.	LAMB, 1948; DODGE, 1973; GUZMÁN & REDON, 1981; MAYRHOFER, 1987
Tremolechia atrata (ACH) HERTEL	HERTEL, 1984, 1987; ANDREEV, 1988; JACOBSEN & KAPPEN, 1988
Umbilicaria antarctica FREY & LAMB	FREY & LAMB, 1939; ALLISON & SMITH, 1973; GUZMÁN & REDON, 1981; ANDREEV, 1988
Umbilicaria propagulifera (RÄS.) LLANO	DODGE, 1948; LINDSAY, 1969b; ANDREEV, 1988; FILSON, 1987
Usnea aurantiacoatra (JACQ.) BORRY	WALKER, 1985 (many species reported from the Antarctic were synonymized under this species in this monograph)

following genera occur in the Fildes Peninsula and Harmony Cove, but are not reported from the continental Antarctic in spite of growing in common here: (figures in parentheses show a number of species enumerated tentatively in the present region) *Aspicilia* (7), *Cladonia* (6), *Cornicularia* (2), *Cystocoleus* (1), *Haematomma* (2), *Himantormia* (1), *Hypogymnia* (1), *Leptogium* (1), *Massalongia* (3), *Micarea* (2), *Pannaria* (2), *Porina* (2), *Psoroma* (1), *Ramalina* (1), *Sphaerophorus* (1), *Staurothele* (1), *Thelocarpon* (1), and *Trapelia* (1).

5.3.2. Species often reported from the maritime Antarctic, but hardly known from the continental Antarctic

Table 4 shows the species often reported from the maritime Antarctic, however scarcely known in the continental Antarctic. Most lichens except *Physconia muscigena* are crustose ones.

Table 4. Species often reported from the maritime Antarctic including the Fildes Peninsula and Harmony Cove, but hardly known from the Continental Antarctic (parentheses).

Acarospora macrocyclos VAINIO	VAINIO, 1903; DARBISHIRE, 1912; ANDREEV, 1988 and others. (KAPPEN, 1985: North Victoria Land)
Bacidia stipata LAMB	LAMB, 1954, 1970; DODGE, 1973; LINDSAY, 1977; REDON, 1985; ANDREEV, 1988. (ØVSTEDAL, 1986a: Dronning Maud Land)
Buellia cladocarpiza LAMB	LAMB, 1968; LINDSAY, 1971b; GUZMÁN & REDON, 1981; JACOBSEN & KAPPEN, 1988. (KAPPEN, 1985: North Victoria Land)
Catillaria corymbosa (HUE) LAMB	HUE, 1908; LAMB, 1954, 1970; LINDSAY, 1977; GUZMÁN & REDON, 1981; and others (KAPPEN, 1985: North Victoria Land)
Ochrolechia frigida (SW.) LYNGE	LINDSAY, 1971a; ALLISON & SMITH, 1973; ANDREEV, 1988; and others (BOTNEN & ØVSTEDAL, 1988: Dronning Maud Land)
Physconia muscigena (ACH.) POELT	GUZMÁN & REDON, 1981; ANDREEV, 1988; JACOBSEN & KAPPEN, 1988. (LINDSAY, 1971c: Dronning Maud Land)
Polycauliona regalis (VAINIO) HUE	HUE, 1908; LAMB, 1970; ALLISON & SMITH, 1973; ANDREEV, 1988; and others. (DARBISHIRE, 1910: Cape Royds)
Rhizoplaca aspidophora (VAINIO) REDON	VAINIO, 1903; HUE, 1908; ALLISON & SMITH, 1973; ANDREEV, 1988; and others. (LINDSAY, 1971c: Dronning Maud Land)
Rinodina petermannii (HUE) DARB.	DARBISHIRE, 1923a; LAMB, 1968; GUZMÁN & REDON, 1981; and others. (FILSON, 1974: Wilkes Land)

5.3.3. Species known to occur in the maritime and continental Antarctic

Table 5 shows the species that occur in both the maritime and continental Antarctic. It is interesting that most species except *Usnea antarctica* occur in the Syowa Station area situated on the Enderby Land of continental Antarctic. The author collected many samples belonging to the genus *Usnea* in the Syowa Station area, but all are not *Usnea antarctica/aurantiacoatra* but *Usnea sphacelata* R. BR. which is one of the bipolar species.

5.4. Lichens showing particular distribution patterns

The following four species do not belong to the three major groups separated by the distribution in the Antarctic and their distribution patterns are briefly summarized below.

Table 5. Species known to occur in the maritime and continental Antarctic.

	Maritime	Continental
Buellia pycnogonoides DARB.	LAMB, 1968; REDON, 1985; JACOBSEN & KAPPEN, 1988	DARBISHIRE, 1923a; ØVSTEDAL, 1986b; INOUE (Enderby Land:mi-19650)
Caloplaca athallina DARB.	DARBISHIRE, 1912; ANDREEV, 1988; REDON, 1985	DODGE & BAKER, 1938; KASHIWADANI, 1979; KAPPEN, 1985; and others
C. citrina (HOFFM.) TH. FR.	ANDREEV, 1988 and others	DARBISHIRE, 1910; and others
Physcia caesia (HOFFM.) HAMPE	VAINIO, 1903; HUE, 1908; ANDREEV, 1988; and others	FILSON, 1974; KASHIWADANI, 1982; KAPPEN, 1985; and others
P. dubia (HOFFM.) LETTAU	JØRGENSEN, 1986	KASHIWADANI, 1982; KAPPEN, 1985
Pseudephebe pubescens (L.) CHOISY	VAINIO, 1903; LAMB, 1964; ANDREEV, 1988; and others	FILSON, 1974; KASHIWADANI, 1982
Rhizocarpon geographicum (L.) DC	DARBISHIRE, 1905; ALLISON & SMITH, 1973; and others	DARBISHIRE, 1910, 1923b; ØVSTEDAL, 1983, 1986b; and others
Usnea antarctica DR.	VAINIO, 1903; and others	FILSON, 1974; and others
Xanthoria elegans (LINK) TH. FR.	GUZMÁN & REDON, 1981; and others	KAPPEN, 1985; and others
X. mawsonii DODGE (= *candelaria*)	JØRGENSEN, 1986; and others	KASHIWADANI, 1970; and others

5.4.1. *Umbilicaria decussata* (VILL.) ZAHLBR.

Specimens examined. King George Island, Fildes Peninsula, 50 m alt., 14.II. 1989, M. INOUE 20363; Barton Peninsula, 170 m alt., 27.I.1989, M. INOUE 21592.

The author also visited the Barton Peninsula of King George Island and collected some lichens there. However, the results from that Peninsula are not included in the present article because of his short stay of *ca.* 3 hours.

LINDSAY (1971b) reported that *Umbilicaria decussata*, which is distributed on both the Antarctic Peninsula as well as the adjacent islands and the Continent, was found at only one locality in the South Shetland Islands in spite of its being a prominent lichen of the *Usnea antarctica*–crustose lichen communities of the South Orkney Islands and localities on the west coast of the Antarctic Peninsula. FILSON (1987) also regarded this species as a ubiquitous species occurring in the Antarctic, Australia and Greenland. While surveying in the ice-free areas along the Prince Olav Coast and Sôya Coast of Enderby Land, East Antarctica from January 1986 to February 1987 the author recognized that *U. decussata* is one of the commonest lichens in the ice-free areas attached to the continental ice-cap.

Accordingly it is noteworthy that after this extensive field survey of the Fildes Peninsula and Harmony Cove *U. decussata* was found at only one site and it was developed poorly (Fig. 4). LINDSAY (1971b) assumed that *U. decussata* and *Polytrichum alpestris*, which showed similar distribution pattern in the region investigated, may have been overlooked in several localities which were only cursorily examined during his survey. However, the author infers that *U. decussata* in the South Shetland Islands is truly rare.

5.4.2. *Dermatocarpon* cf. *intestiniforme* (Körber) HASSE

Specimen examined. King George Island, Fildes Peninsula, 80 m alt., 24.II.1989, M. INOUE 20189.

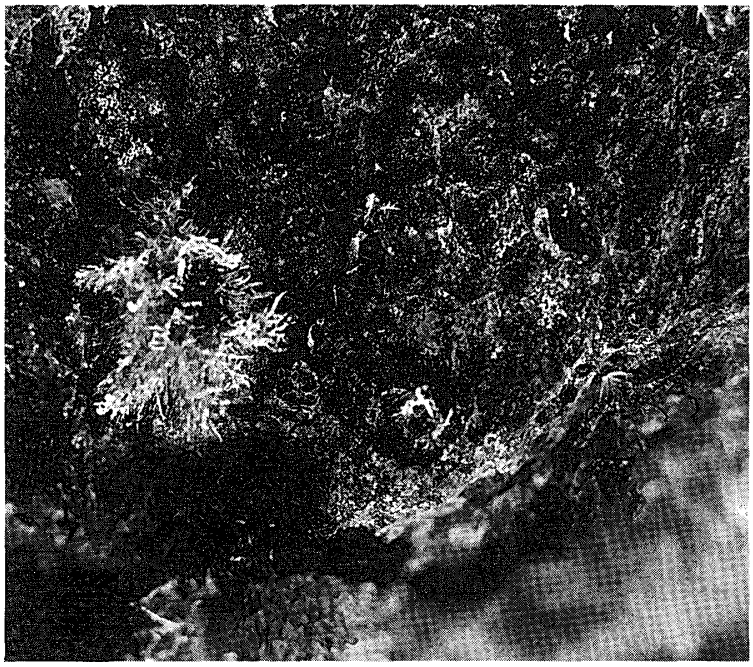

Fig. 4. Umbilicaria decussata *(foliose) growing with* Himantormia lugubris *(fruticose, black) and* Usnea aurantiacoatra *(fruticose, whitish). (Fildes Peninsula, 16. II. 1989).*

Unfortunately the author did not have a chance to see any authentic specimens or any syntypes of the species. But it appears to be justifiable to refer this macrolichen resembling *Dermatocarpon miniatum* (L.) MANN, one of the well-known representatives in the Northern Hemisphere including Japan, to *D. intestiniforme* because of the agreement with a LAMB's critical discussion which added this species to the flora of the Antarctic (LAMB, 1948). *D. intestiniforme* is a bipolar species known to occur in Europe, Greenland, Arctic Canada and the Antarctic.

This species was known only from James Ross Island of the Antarctic Peninsula sector (LAMB, 1948) and South Georgia (LINDSAY, 1974), and is the only macro assemblage belonging to *Dermatocarpon* known to occur in the Antarctic. This is a third report of the species from the Antarctic if the identification is correct.

Dermatocarpon intestiniforme was found at only one site in the Fildes Peninsula, but it was well developed (Fig. 5). The author is convinced that this kind of wet, non frozen slope, where lichens are almost always inundated by snow-melt water or precipitation during the austral summer, cannot be found in the continental Antarctic because of its lower temperature. Accordingly this is one of the characteristic habitats in the maritime Antarctic.

5.4.3. *Poeltidea perusta* (NYL.) HERTEL

Representative specimens examined. King George Island, Fildes Peninsula, 29.XI.1988, M. INOUE 20238 and others. Nelson Island, Harmony Cove, 80–100 m alt., 29.I.1989, M. INOUE 21715 and others. Kerguelen's Land, Royal Sound, II.1875, EATON, H-NYL.15321 (holotype!).

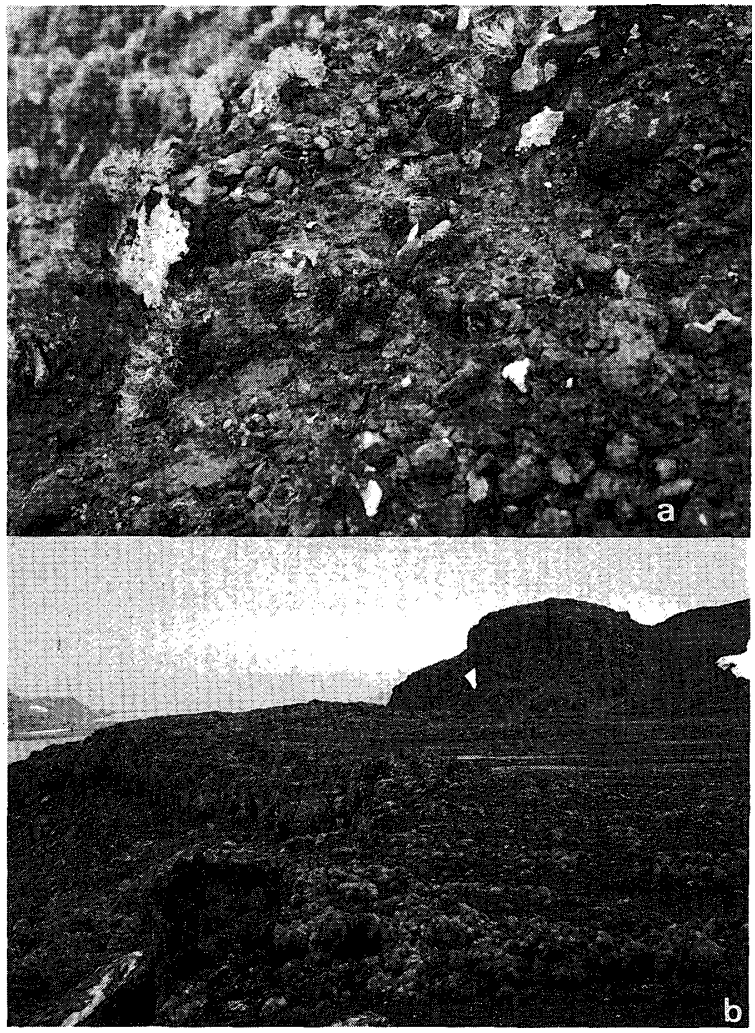

Fig. 5. *a:* Dermatocarpon *cf.* intestiniforme *with* Usnea aurantiacoatra *growing in the well-irrigated rocky slopes. b: Characteristic "irrigated" landscape in the maritime Antarctic, the Fildes Peninsula. (a: 24. II. 1989; b: 22. II. 1989).*

This species has a conspicuous brown thallus with epinecral layer, immersed to subimmpersed apothecia, obsolete excipulum and colorless simple spores that occasionally turn brown. This species was previously known only from Kerguelen Island situated in the subantarctic botanical zone (CROMBIE, 1875; ZAHLBRUCKNER, 1906; HERTEL, 1984), though the range now extends to the maritime Antarctic.

5.4.4. *Trapelia coarctata* (SM.) CHOISY

Specimens examined: KING GEORGE ISLAND, Fildes Peninsula, 50 m alt., 25.XII.1988, M. INOUE 21238; 50 m alt., 23.II.1989, M. INOUE 20268.

HERTEL (1984) reported *Trapelia coarctata*, one of the well known representatives in the Northern Hemisphere, for the flora of Marion Island of the subantarctic zone. The range now extends to the maritime Antarctic.

T. coarctata is one of the minute crustose lichens, and the total distribution in this area has not been fully studied.

Acknowledgments

The author wants to express his thanks to National Committee for Antarctic Research, The People's Republic of China, for the opportunity to visit Great Wall Station in King George Island. He is also indebted to the Ministry of Education, Science and Culture, and to the National Institute of Polar Research, Japan for the research support. Many thanks are extended also to Mr. SHUYAN LIU who was the leader of the 5th Chinese National Antarctic Research Expedition. The last but not the least, the author heartily thanks Dr. T. H. NASH, III of Arizona State University who kindly read the manuscript.

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(Received May 11, 1992; Revised manuscript received August 13, 1992)