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LICHENS OF THE TERRA NOVA BAY AREA, NORTHERN VICTORIA LAND (CONTINENTAL ANTARCTICA)

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Abstract: 57 lichen species are reported from the Terra Nova Bay area (northern Victoria Land, continental Antarctica), on the basis of collections from the Italian Antarctic Expeditions 1987-1996. 51 of them were identified to species level. A key for their identification is provided. Morpho-anatomical descriptions and nomenclatural, taxonomic and phytogeographical remarks are given for each taxon. *Blastenia viridans* Js. Murray is reduced to synonymy with *Caloplaca athallina* Darb.

Introduction

Lichenological research in Antarctic regions has experienced a new development in the last decades, mainly thanks to Antarctic research programmes by several countries. The lichenological activity within the Italian National Antarctic Research Programme (PNRA) has aimed at analysing the lichen flora and vegetation of the Terra Nova Bay area, northern Victoria Land, starting from 1987. The taxonomic knowledge of Antarctic lichens was very unsatisfactory, the only extant lichen Flora (Dodge 1973) being based on rather odd taxonomic criteria (see Almborn 1974, Hertel 1987a, Castello & Nimis 1997a). The original project was focused on four main topics: 1) retrieval of information on Antarctic lichens from the literature; 2) revision of critical taxa; 3) creation of an Antarctic lichen herbarium; 4) floristic and vegetational studies.

A comprehensive synthesis of earlier floristic, vegetational and distributional information on Antarctic lichens was provided by Nimis (1991). These data were updated by Castello & Nimis (1997a), and were organized in a database, VICTORIA (Castello & Nimis 1997b). The latter is a specimen and literature based information system, created in 1994 to manage the Antarctic Lichen Herbarium (ELA) of TSB and to retrieve literature data for all lichen species reported from Antarctica from the late sixties onwards, excluding Dodge's papers.

Several critical taxa were revised: yellow *Acarosporaceae* (Castello & Nimis 1994a), *Candelariella* (Castello & Nimis 1994b), *Xanthoria* (Castello 1995) and *Sarcogyne* (Seppelt *et al.* 1998). Furthermore, Castello & Nimis (1995a) published a revision of 152 of the 186 taxa described by C.W. Dodge and accepted in his Flora (Dodge 1973), based on the analysis of type material. The results of these studies showed a new phytogeographical image of Antarctic lichens (Castello & Nimis 1997a): the role of Antarctica as a refugial centre for old, Gondwanaland species as postulated by Dodge (1964, 1973) requires a re-assessment. The endemic element is much less important than hitherto assumed while bipolar and cosmopolitan taxa are common. The lichen flora of Antarctica seems to be a young one, which mainly originated by long-distance dispersal in the Quaternary period.

All samples collected by the Italian Expeditions to Victoria Land from 1987 to 1996 are in the Antarctic Lichen Herbarium (ELA) of TSB, which at present hosts more than a thousand specimens, with ca. 2500 records of individual species.

The lichen flora and vegetation of Victoria Land were treated by few authors: Murray (1963), Kappen (1985), Hale (1987), Green *et al.* (1992) and Seppelt *et al.* (1995, 1996). The recent Flora by Øvstedal & Lewis Smith (2001), covering the lichens of Antarctica and South Georgia, takes into account several collections from continental Antarctica, and in particular from Victoria Land, and constitutes a rich source of information which was considered in this paper.

The lichen vegetation of Terra Nova Bay was discussed by Castello & Nimis (1995b) on the basis of microrelevés carried out in the laboratory on 297 herbarium specimens kept in TSB, following the "méthode du prélèvement integral" (Roux 1990). Nine "community" types were recognized, corresponding to variants

of three main formation types described by Longton (1973, 1979): a) fruticose and foliose lichen subformation, b) crustaceous lichen subformation and c) short moss cushion and turf subformation. Floristic composition and ecology of the communities were discussed, stressing the overall similarity with lichen communities described from other areas of continental Antarctica (Nakanishi 1977, Seppelt & Ashton 1978, Kappen 1985, Engelskjøn 1986, Lewis Smith 1988).

A preliminary key to the lichens of Terra Nova Bay was published by Castello & Nimis (2000).

This paper provides an annotated flora of lichens presently known from the Terra Nova Bay area, with detailed descriptions of Antarctic material and nomenclatural, taxonomic, distributional and ecological notes.

Survey area

The survey area (Fig. 1) is in the sector of northern Victoria Land (Continental Antarctica) between 71°-76°S and 162°-170°E. The Italian Research Station is located in Terra Nova Bay (74°41'42" S, 164°07'23"E), on the coastal area of the Northern Foothills. Northern Victoria Land lies at the Pacific end of the Transantarctic Mountains; large outlet glaciers cross them flowing from the East Antarctic ice sheet toward the Ross Sea (David, Reeves, Priestley, Campbell, Tinker, Aviator glaciers). The East Antarctic ice sheet lies at 30-60 km far from the coast, with an elevation of more than 2000 m. The outlet glaciers delimit the interior mountains of the Eisenhower Range (Timber Peak, 3070 m, Mt Nansen, 2737 m) and the Deep Freeze Range, with elevations of more than 2500 m and 2000 m, respectively, and the Southern Cross Mts. In the northern part of the area are the rugged Mountaineer Range (Mt Murchinson, 3501 m), the Victory Mts and Admiralty Mts (Mt Minto, 4163 m), which support a large ice field with névés and valley glaciers flowing toward the sea. The coastal mountains of the Terra Nova Bay are the Prince Albert Mts (Mt Bellingshausen 1380 m), Inexpressible Island and Northern Foothills (Mt Abbott 1020 m), which are hills rising gently from the coast to the interior mountains, and the Mt Melbourne volcano (2732 m). Ice-free areas occur along the coast, in the areas among the outlet glacier valleys and on more internal nunataks (Orombelli 1986).

The northern part of Victoria Land has a great diversity of substrata: different types of granites, schistose metamorphites, amphibolites, basalt and volcanic rocks (Orombelli 1986). Near bird colonies there is a considerable eutrophication of rock surfaces and soil, which favours the establishment ofnitrophyticlichen communities.

The climate is quite typical of coastal stations in continental Antarctica. According to Grigioni *et al.* (1992) average monthly temperatures range from -2°/-5°C (January) and -26°/-30°C (August), average yearly temperature being of ca. –17/-19°C. Coastal stations in deglaciated areas have a somewhat milder climate than those in the interior, which are strongly influenced by catabatic winds blowing from the interior of the Continent. Precipitation is very low, being always in the form of snow, and equalling ca. 100/200 mm of water per year. Air humidity tends to increase during summer, due to humid air masses coming from the sea (Grigioni *et al.* 1992). The presence of several glaciers connecting the internal plateau with the coast makes Terra Nova Bay one of the windiest areas in Antarctica: the cold and dry catabatic winds often reach a speed of more than 160 km/h, and blow from the west and from the north.

Lichens were collected by members of the Italian Expeditions from 1987 to 1996 in 41 localities (Fig. 1).

List of localities (in alphabetical order):

Apostrophe Island, Lady Newnes Bay, 73°34'S 167°30'E; - *Baker Rocks*, Mt Melbourne, Wood Bay, 74°24'S 164°49'E; - *Black Ridge*, Deep Freeze Range; - *Browning Pass*, Deep Freeze Range; - *Campo Icaro*, Northern Foothills, Terra Nova Bay, 74°43'S 164°06'E; - *Cape Irizar*, Lamplugh Island; - *Cape King*, Lady Newnes Bay, 73°35'S 166°35'E; - *Cape Phillips*, Daniell Peninsula, 73°05'S 169°35'E; - *Cape Ross*, Tripp Bay, 76°45'S 163°00'E; - *Cape Sastrugi*, Deep Freeze Range, 74°37'S 143°63'E; - *Cape Washington*, Terra Nova Bay; - *Carezza Lake*, Northern Foothills, Terra Nova Bay, 74°43'S 164°03'E; - *Coulman Island*, 73°19'S 169°45'E; - *Crater Cirque*, Victory Mts, Hallett Peninsula, 72°37'E 169°22'E; - *Daniell Peninsula*, 72°42'S 169°36'E; - *Edmonson Point*, Mt Melbourne, Wood Bay, 74°21'S 165°06'E; - *Football Saddle*, Football Mt, Hallett Peninsula, 72°31'S 169°45'E; - *Gondwana Station*, Terra Nova Bay, 74°37'S 164°13'E; - *Harrow Peaks*, Wood Bay, 74°04'S 164°48'E; - *Index Point*, Lady Newnes Bay, 73°22'S 167°55'E; - *Inexpressible Island*, Terra Nova Bay, 74°55'S 163°42'E; - *Kay Island*, Wood Bay, 74°04'S 165°19'E; - *Lamplugh Island*, 75°34'S 162°55'E; - *Lowry Bluff*, Priestly Glacier, Deep Freeze Range; - *Markham Island*, Terra Nova Bay; - *Morozumi Range*, Rennick Glacier, 71°40'S 161°45'E; - *Mt Dickason*, Deep Freeze Range; - *Mt Keinath*, Deep Freeze Range; - *Mt Moriarty*, Mountaineer Range, Lady Newnes Bay, 73°41'S 165°59'E; - *Prior Island*, 75°40'S 162°50'E; - *Skua Lake*, Northern Foothills, Terra Nova Bay; - *Starr Nunatak*, Harbord Glacier, Whitmer Peninsula, 75°54'S 162°35'E; - *Stefania Cirque*, Admiralty Mts, Hallett

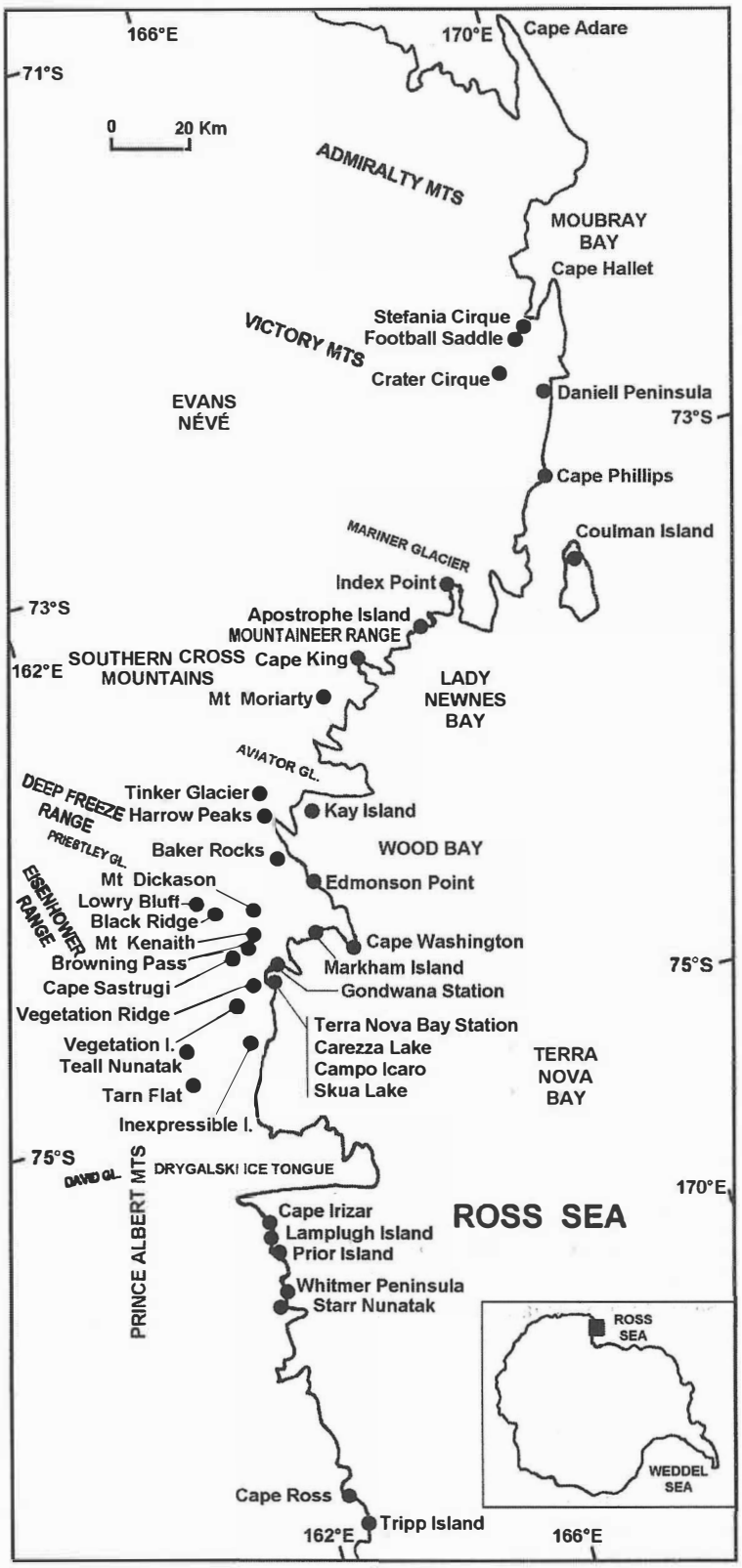

Fig. 1 – Map of the survey area and location of the sampling localities.

Peninsula, 72°29'S 169°42'E; - *Tarn Flat*, Reeves Glacier, Terra Nova Bay, 74°58'S 162°31'E; - *Teall Nunatak*, Reeves Glacier, Terra Nova Bay, 74°50'S 162°20'E; - *Terra Nova Bay Station*, Terra Nova Bay, 74°42'S 164°07'E; - *Tinker Glacier*, Wood Bay, 73°59'S 164°29'E; - *Tripp Island*, Tripp Bay, 76°40'S 162°45'E; - *Vegetation Island*, Terra Nova Bay, 74°47'S 163°38'E; - *Vegetation Ridge*, Northern Foothills, Terra Nova Bay; - *Whitmer Peninsula*, 75°50'S 162°50'E.

Data and methods

Lichens were collected by members of the Italian Expeditions from 1987 to 1996; the main collections are from Terra Nova Bay and Wood Bay (74°S). The collections are by G. Del Frate (1987-1988), P. Modenesi (1988-1989), S. Sedmak (1989-1990, 1990-1991), R. Bargagli (1993-1994) and F. Bersan (1995-1996).

All specimens are kept in TSB. Identification was based on careful examination of the samples, compared with revisions of type material, and of specimens of several species coming from the following herbaria BG, BM, FH, GZU, HA-KIEL, LE, MEL, PC, S, TSB, TUR, UPS, US, WELT, and on literature information. Taxa identified at generic level only were indicated by the generic epithet and a number. For each herbarium specimen the list of all lichens present in the envelope was reported.

Data were organized in a database (VICTORIA) (Castello & Nimis 1997b), created to manage specimen records of the Antarctic Lichen Herbarium of TSB and to retrieve literature data concerning all lichen taxa hitherto known from Antarctic regions.

In this paper the following information is reported for each species:

1) list of synonyms, referred to Antarctic taxa only, arranged in alphabetical order, including references to literature in which synonymies were proposed; when a synonym was proposed only on the basis of the description (without the examination of material), then synonymy is marked with '?';

2) description, based on the analysis of Antarctic material. The following main features were considered: a) general morphological characters as observable with a stereo-microscope; b) anatomical characters of thallus and reproductive structures, studied by light microscopy of hand-cut sections, mounted in deionized water or dilute potassium hydroxide solution; all measurements were made in water mounts; c) chemical spot tests with the usual reagents: solutions of potassium hydroxide (K), sodium hypochlorite (C), paraphenylenediamine (P), nitric acid (N) and iodine (I) solutions. In special cases, thin-layer chromatography was used to identify particular lichen substances;

3) discussion of ecological and taxonomic aspects;

4) distribution in the survey area, including the total number of samples kept in TSB and the list of localities (Tab. 1);

5) known distribution in Antarctica, based on literature data. The subdivision into continental and maritime Antarctic and subantarctic regions follows Lewis Smith (1984).

The key to species is primarily based on reproductive characters and chemical reactions, because of the extremely high morphological variability of Antarctic lichens. Authors' abbreviations follow Brummitt & Powell (1992).

Some critical taxa represented by scanty material were not included in this paper; further investigations on larger collections are needed.

Results

Key to the species

1 Thallus fruticose or foliose.....**2**
1 Thallus crustose, squamulose, or crustose-substipitate to pulvinate **15**

2 Thallus fruticose, shrub-like, consisting of erect to decumbent, terete or flattened branches, attached to the substratum only at the base.....**3**
2 Thallus foliose, leaf-like, dorsiventral, attached to the substratum by rhizines, hapters or by a small central part.....**7**

3 Thallus yellow to yellowish-green with variable dark pigmentation, clearly fruticose, erect, with terete branches with a central axis of compacted hyphae.....**4**
3 Thallus not as above; branches without a central axis of compacted hyphae..... **5**

4 Central axis thick, occupying half or more of the branch diameter; medulla compact in main branches; soralia flat to concave, rarely pulvinate, often with a distinct margin; branches subpapillate to grossly papillate; thallus surface usually matt..... *Usnea antarctic*a
4 Central axis thin, occupying less than half of the branch diameter; medulla lax or sublax; soralia flat, becoming convex-pulvinate to globose with age, emarginate; branches more or less scabrid with small papillae; thallus surface subnitid or matt, smooth to foveolate .....*Usnea sphacelata*

5 Thallus dark brown to black, prostrate, fruticose or in extreme conditions subcrustose; branches somewhat flattened.....*Pseudephebe minuscula*
5 Thallus yellow or orange, subfruticose, with flattened branches up to 5 mm long..... **6**

6 Thallus yellow-orange or reddish, K+red..... ..... *Xanthoria mawsonii*
6 Thallus yellow, K - ..... *Candelaria murrayi*

7 Thallus umbilicate..... **8**
7 Thallus not umbilicate..... **11**

8 Thallus cream to greenish cream or dark green, squamulose to foliose-umbilicate, sometimes pulvinate; apothecia lecanorine, frequent and crowded ....*Rhizoplaca melanophthalma*
8 Thallus dark grey, brown to blackish; apothecia lecideine, rather rare and not crowded..... **9**

9 Thallus without rhizinomorphs on lower side..... *Umbilicaria decussata*
9 Thallus with rhizinomorphs..... **10**

10 Lower side dark brown to black throughout, sometimes with a pale marginal part; rhizinomorphs simple to moderately branched, usually white to pale grey, or black but with pale tips; thalloconidia uni- or bicellular; apothecia not seen..... *Umbilicaria aprina*
10 Lower side pale, cream to pinkish near the umbilicus, darker only in the outer parts; rhizinomorphs moderately branched, light-coloured; thalloconidia not seen; apothecia omphalodisc.....*Umbilicaria* cf. *saviczii*

11 Thallus bright yellow to orange or reddish, K + purple-red..... **12**
11 Thallus variously coloured, never K + purple-red..... **13**

12 Thallus without soredia, foliose to pulvinate or subcrustose, effigurate, often incomplete in central parts, consisting of radiating peripheral, more or less contiguous and branched lobes and verrucose central parts covered by numerous apothecia; epilithic..... .....*Xanthoria elegans*
12 Thallus with soredia (blastidia), foliose to subfruticose, rosette-shaped, consisting of plane or convex, horizontal to ascending, 2-5 mm long lobes, with irregularly incised terminal parts; blastidia yellow or orange-yellow, on the lower side of apical and marginal parts; epilithic or muscicolous .... *Xanthoria mawsonii*

13 Thallus yellow, K-, squamulose to foliose, subfruticose, forming small, often adpressed rosettes of ascending, flattened, 1-3 mm long lobes with crenulate margins; soredia on the lower side of terminal parts of lobes .....*Candelaria murrayi*
13 Thallus whitish to grey, K + yellow, foliose, orbicular..... **14**

14 Medulla K + yellow; upper side densely white-maculate, sometimes weakly pruinose; soralia capitate or crateriform, rarely labriform..... *Physcia caesia*
14 Medulla K-; upper side not or faintly white-maculate, sometimes pruinose; soralia usually marginal and labriform, rarely laminal and crateriform..... .....*Physcia dubia*

15 Thallus with apothecia..... **16**
15 Thallus sterile..... **59**

16 Asci > 8-spored..... **17**
16 Asci 2-8-spored..... **22**

17 Spores 12-32 per ascus, unicellular to more or less clearly 1-septate; thallus yellow, K + orange..... ..... *Candelariella vitellina*
17 Spores 100-300 per ascus, unicellular, colourless; thallus K -.....**18**

18 Thallus yellow..... **19**
18 Thallus pale to dark brown..... **21**

19 Medulla yellow at least in the lower part; thallus clearly effigurate, with scabrid and wrinkled surface. Apothecia immersed, with brown, umbonate disc; spores 5-6(-7) x 1.5-2 µm, ellipsoid .... *Acarospora flavocordia*
19 Medulla white throughout, with usually smooth surface.....**20**

20 Apothecia immersed, flat; disc brownish to dark brown; asci *Acarospora* – type; spores 3-4 x 1.5-2(-2.5) µm, ellipsoid to broadly ellipsoid; thallus of squamulose to substipitate, scattered to contiguous areoles, centrally attached and with free margins..... ..... *Acarospora gwynnii*
20 Apothecia not immersed, flat to convex or almost globose, disc yellow to greenish yellow; asci *Pleopsidium*-type; spores 3.5-4.5 x 1.5-2 µm, ellipsoid; thallus areolate, areolate-stipitate and squamulose-pulvinate to effigurate, of subglobose, smooth to verrucose-cerebriform areoles..... *Pleopsidium chlorophanum*

21 Spores 3-4 (-4.5) x 2-3 µm, broadly ellipsoid to

subglobose..... *Acarospora williamsii*
21 Spores 3-4.5(-5) x 1-2 µm, ellipsoid.....
..... *Acarospora* cf. *nitrophila*

22 Spores unicellular..... **23**
22 Spores pluricellular..... **39**

23 Thallus yellow to yellow-orange, K- or K+ orange, of ecorticate or corticate crowded granules.....
..... *Candelariella flava*
23 Thallus not as above..... **24**

24 Apothecia lecanorine..... **25**
24 Apothecia lecideine..... **34**

25 On mosses or soil..... **26**
25 On rock..... **27**

26 Thallus whitish to grey, rimose-areolate, forming a more or less continuous crust, often ecorticate, inconspicuous and almost completely covered by apothecia, K-, C-, KC-; apothecia with flat, dark brown to black disc; spores narrowly ellipsoid, (13-) 14-17(-18) x 4-5 µm; on mosses..... *Lecanora expectans*
26 Thallus cream to whitish or yellowish cream, crustose-squamulose, forming more or less placodioid circular patches up to 4 cm diam., K+ yellow, C-, KC+ yellow; apothecia with flat to convex, pale brown to greenish, dark brown or blackish disc; spores ellipsoid to broadly ellipsoid, (8-)10-13 x 5-7 µm, with thick wall; on mosses or soil..... *Lecanora* aff. *geophila*

27 Thallus squamulose- to foliose-umbilicate or pulvinate **28**
27 Thallus crustose, areolate..... **30**

28 Thallus grey, dark brown to black, of small peltate squamules with cream to pale brown lower side; apothecia usually terminal on margins of squamules, with thin, reduced margin and dark to black disc, sometimes hardly distinguishable from the squamules.....
.....*Rhizoplaca* sp. 1
28 Thallus cream to greenish cream to dark green or black; apothecia sessile or substipitate, not marginal...
.....**29**

29 Thallus squamulose- to foliose-umbilicate, of well-developed to rarely reduced squamules; apothecia concave to flat, sessile to substipitate, to 5 mm diam., with a thick and persistent, smooth to crenulate thalline margin; spores broadly ellipsoid, 9-12 x (5-)6-7 µm
.....*Rhizoplaca melanophthalma*
29 Thallus crustose, consisting of granular to squamulose, sometimes substipitate areoles, scattered or crowded in pulvinate clumps; apothecia sessile, flat to convex, to 1.6 mm diam., with a thin to disappearing smooth thalline margin; spores ellipsoid to narrowly ellipsoid, (9-)10-14 x 4-5 µm.....
..... *Lecanora fuscobrunnea*

30 Epithecium and hymenium violet-brown, K+ violet, hypothecium yellow-brown, K+ yellow; paraphyses strongly coherent, covered by a gelatinous coat; asci *Bacidia* – type..... *Tephromela atra*
30 Epithecium, hymenium and hypothecium of another colour, paraphyses not as above, asci *Lecanora* - type
.....**31**

31 Thallus yellowish cream, greenish, pale brownish or dark olivaceous, usually well-developed; disc of apothecia cream to greenish, dark brown or black..... **32**
31 Thallus and apothecia never yellowish or greenish, usually scarcely developed..... **33**

32 Apothecia sessile, flat to convex, to 1.5 mm diam., thalline margin thin and evident only in young apothecia, smooth, disappearing at maturity; spores (9-)10-14 x 4-5 µm, ellipsoid to narrowly ellipsoid.....
.....*Lecanora fuscobrunnea*
32 Apothecia sessile to substipitate, concave to flat, to 5 mm diam.; thalline margin usually thick and persistent, smooth to crenulate; spores 9-12 x (5-)6-7 µm, broadly ellipsoid..... *Rhizoplaca melanophthalma*

33 Thalline margin pale to dark brown, often with a whitish pruina; apothecia stipitate; thallus cream to pale brown, of small verrucose areoles; spores 10-13 x 6-8 µm, broadly ellipsoid..... *Lecanora sverdrupiana*
33 Thalline margin whitish to grey, crenulate; apothecia sessile; thallus whitish or grey, of scattered or adpressed granular areoles or inconspicuous; spores 10-14 x 4-6 µm, ellipsoid .....*Lecanora mons-nivis*

34 Thallus effigurate, areolate, yellowish to greenish cream, rarely whitish, 1-4 cm diam. .....
..... *Lecanora physciella*
34 Thallus not effigurate, never yellowish cream..... **35**

35 Asci *Rimularia*-type; epithecium K + violet; medulla K + red; apothecial disc umbonate or gyrose.....
.....*Rimularia psephota*
35 Asci not *Rimularia*–type; epithecium and medulla-not as above; disc of apothecia smooth.....**36**

36 Asci *Lecanora*-type.....**37**
36 Asci *Lecidea*-type.....**38**

37 Exciple dark brown to black throughout; hypothecium dark brown; paraphyses coherent; thallus endolithic to epilithic, of white, angular, substipitate areoles; spores (8-)9-12 x 4-5 µm, ellipsoid..... *Carbonea vorticosa*
37 Exciple pale in inner part; hypothecium colourless to pale brownish; paraphyses simple, not strongly coherent; thallus mainly muscicolous, rarely terricolous or epilithic, continuous, rimose to areolate, whitish to greyish or dark green; spores 10-16 x 6-9(-10) µm, ellipsoid to broadly ellipsoid..... *Lecidella siplei*

38 Medulla I -; apothecia flat to subglobose, to 1.2 mm diam.; margin thin, disappearing with age; thallus composed of brown to dark brown or black, strongly convex and corrugate, substipitate or subsquamulose, angular areoles with smooth and shiny surface, or reduced, whitish and necrotic, granular or inconspicuous..... *Lecidea cancriformis*
38 Medulla I + violet-blue; apothecia flat to slightly convex, to 2 mm diam.; margin thick to thin, persistent, sometimes flexuose; thallus poorly developed, composed of white or brownish, granular, angular areoles and covered by apothecia..... *Lecidea andersonii*

39 Spores polarilocular..... **40**
39 Spores not polarilocular..... **45**

40 Thallus and apothecia yellow-orange, K+ red..... **41**
40 Thallus whitish to greyish, K- or K + violet; apothecia yellow or not, often blackish..... **43**

41 Thallus placodiod, forming more or less rounded and regular, yellow- to red-orange rosettes, or reduced, but with at least some evident peripheral lobes; spore septum more than 2 µm wide; epilithic..... **42**
41 Thallus not placodioid, areolate; spore septum less than 2 µm wide; on mosses..... *Caloplaca approximata*

42 Thallus with a whitish lower cortex developed at least in some parts; peripheral lobes strongly convex, more or less discrete or overlapping, more than 1 mm long, not pruinose; central parts of thallus covered by numerous apothecia, or incomplete or missing; apothecia flat, with a thick, smooth to crenulate, persistent margin; spores (9-)10-13 x (5-)6-7 µm, ellipsoid to broadly ellipsoid; septum 3-4 µm wide..... *Xanthoria elegans*
42 Thallus not corticate below; peripheral lobes to 1 mm long, flat to convex, more or less contiguous, often pruinose; central parts of thalli never missing or incomplete, covered by strongly adpressed apothecia; thallus often reduced to crowded apothecia and few small peripheral lobes; apothecia flat to convex with a usually thin to thick margin, disappearing at maturity; spores 11-15 x 5-6 µm, ellipsoid to narrowly ellipsoid; septum 2-3(-4) µm wide..... *Caloplaca saxicola*

43 Epilithic. Thallus granular to areolate, whitish to brown, K-; apothecia flat to subglobose, 0.2-1 mm diam., with a cream to black, disappearing thalline margin and a yellowish, pale to dark brown or black disc, often covered by a yellow pruina ..... *Caloplaca conversa*
43 Muscicolous..... **44**

44 Apothecia zeorine, numerous, crowded; disc yellow to orange-yellow, olivaceous yellow or blackish; margin more or less prominent, persistent, with inner part concolorous with the disc or lighter and outer part grey to black; spores (12-) 14-17(-18) x (7-)8-10 µm; septum 4-6 µm wide..... *Caloplaca athallina*
44 Apothecia lecanorine, scattered; disc dark brown to black; margin thick and persistent, whitish grey to bluish dark grey; spores 12-16 x 7-8 µm, septum 3-4.5 µm wide..... *Caloplaca lewis-smithii*

45 Spores colourless, 1-to 5- transversely septate.... **46**
45 Spores brown to dark brown, bicellular or submuriform..... **47**

46 Hypothecium dark reddish brown; spores 12-16 µm long, 1-3-septate..... *Bacidia* sp. A
46 Hypothecium colourless to pale brown; spores 16-23(-27) µm long, 3-5-septate..... *Bacidia johnstonii*

47 Apothecia lecideine; spores bicellular or submuriform..... **48**
47 Apothecia lecanorine; spores bicellular..... **58**

48 Spores bicellular or submuriform, halonate at least when young..... **49**
48 Spores bicellular, not halonate, *Buellia*-type..... **51**

49 Thallus grey to dark grey; asci 2-spored..... *Rhizocarpon geminatum*
49 Thallus yellow to greenish yellow; asci 8-spored.... **50**

50 Spores bicellular; medulla I-; epithecium with dark brown granules..... *Rhizocarpon adarense*
50 Spores submuriform, medulla I+ violet-blue, epithecium without dark brown granules..... *Rhizocarpon geographicum*

51 Thallus effigurate; on rock..... *Buellia frigida*

51 Thallus not effigurate; on rock or mosses..... **52**

52 Epithecium N+ red, olivaceous brown or green; hypothecium colourless to pale brown..... **53**
52 Epithecium N-, brown; hypothecium dark brown... .....**56**

53 On mosses; thallus continuous, rimose to areolate, whitish to greyish, with black wrinkles and pruinose and scabrid surface. Medulla I+ violet..... .....*Buellia grimmiae*
53 On rock, thallus areolate..... **54**

54 Thallus K+ red, of small, scattered, isolated, dark brown to black, flat to convex, areoles 0.2-0.3 mm diam., on an extensive radiating-dendritic prothallus. Medulla I-..... *Buellia pycnogonoides*
54 Thallus K-, areoles larger, scattered to adpressed.... .....**55**

55 Medulla I+ violet; thallus very variable, consisting of scattered to adpressed, flat to convex, grey or dark brown to black areoles, usually with smooth and glossy surface..... *Buellia lignoides*
55 Medulla I-; thallus of whitish to grey or blackish, convex to subglobose areoles, with often eroded surface with black thin wrinkles..... *Buellia pallida*

56 On mosses; thallus white to greyish, rimose to areolate, sometimes eroded and more or less leprose..... .....*Buellia papillata*
56 On rock; thallus not as above..... **57**

57 Thallus greenish cream, crustose to pulvinate, composed of coalescent areoles often on whitish branched stipes, 3-4 mm tall in central parts of thallus; conidia bacilliform..... *Buellia darbishirei*
57 Thallus brown to dark brown, areolate; areoles not as above; conidia filiform, curved, 20-25 x 0.5-0.7 µm; thallus very variable, rimose-areolate, verrucose-areolate or subsquamulose, composed of adpressed, smooth to granular or verrucose areoles..... ..... *Amandinea coniops*

58 Thallus muscicolous or growing at the base of thalli of *Usnea sphacelata*, reduced and granular, cream to dark brown or black; spores *Physcia*-type..... ..... *Rinodina olivaceobrunnea*
58 Thallus epilithic, clearly lobate-effigurate to areolate and reduced, pale to dark brown; spores *Pachysporaria*-type..... *Rinodina* sp. 1

59 Thallus bright yellow to orange..... **60**
59 Thallus not as above..... **62**

60 Thallus K+ red, composed of granular to squamulose, scattered to contiguous, yellow-orange areoles, with sorediate-blastidiate margins..... *Caloplaca citrina*
60 Thallus K – or K + weakly orange..... **61**

61 Thallus granular, yellow to yellow-orange, K- or K+ orange, composed of usually ecorticate crowded granules..... *Candelariella flava*
61 Thallus squamulose to foliose or subfruticose, yellow, K-, composed of corticate, more or less ascending lobes, with more or less distinctly crenulate or blastidiate-granular margins..... *Candelaria murrayi*

62 Thallus leprose, completely ecorticate. On mosses .....*Leproloma cacuminum*
62 Thallus not leprose, at least partly corticate..... **63**

63 Thallus muscicolous, rimose-areolate, sometimes eroded..... **64**
63 Thallus epilithic, areolate or pulvinate..... **65**

64 Thallus whitish grey to bluish dark grey, K+ and C+ violet-red..... *Caloplaca lewis-smithii*
64 Thallus white to greyish white, K+ yellow, C-..... ..... .*Buellia papillata*

65 Thallus orbicular or effigurate..... **66**
65 Thallus not as above..... **67**

66 Thallus yellowish to greenish cream, sometimes whitish, K-, clearly effigurate; soralia blackish, rounded, flat to slightly convex .... *Lecanora physciella* var. *sorediata*
66 Thallus pale brown to grey, K+ red, orbicular to effigurate; soralia whitish, on top of subglobose areoles, clearly convex at maturity..... *Buellia subfrigida*

67 Thallus areolate, K+ yellow then reddish orange, sorediate; areoles cream, pale brown or greenish, convex to subglobose, smooth, often pruinose, scattered or adpressed..... *Lecanora* aff. *orosthea*
67 Thallus pulvinate, subfruticulose, forming adpressed clumps to 1.5-2 cm diam. and to 1 cm tall, K- or K+ pale yellow, not sorediate; areoles cream to more or less dark brown, granulate-verrucose, on whitish stipes..... .....*Buellia cladocarpiza*

The Species

Acarospora flavocordia Castello & Nimis
Lichenologist 26: 284 (1994). Type: Victoria Land, Wood Bay, Kay Island, 74°05'S 165°17'E, top of ridge, on gneiss, 5 Jan.1989, *P. Modenesi* (TSB A351 holotype; GZU isotype).

Thallus epilithic, yellow, effigurate, K-, C-, KC-, P-, to 3 cm diam., with scabrid and wrinkled surface; peripheral lobes to 2 mm long and 0.5-1 mm wide; cortex greenish yellow, 30 µm thick; algal layer discontinuous, 100-250 mm tall, algae organized in clumps; medulla yellow throughout, or white in the uppermost parts below the algal colonies, K-.

Apothecia lecanorine, often crowded, immersed, to 1-1.5 mm diam., 1 or more per areole, with brown, umbonate disc; thalline margin more or less evident, proper margin pale yellow to brown, crenulate. Epithecium brown, 10-25 µm tall; hymenium colourless, 200-300 µm tall, hypothecium colourless, 25-30 µm tall; parathecium 30-40 µm thick. Paraphyses simple, thin, to 1.5 µm wide, apices not swollen. Asci 150-200 x 12-30 µm, with 200-300 spores. Spores unicellular, colourless, 5-6(-7) x 1.5-2 µm, ellipsoid.

Pycnidia immersed, to 150 µm diam.; conidia 2-3 x 1-1.5 µm, straight.

Chemistry: The cortex and the medulla contain rhizocarpic acid; traces of epanorin (TLC, HPLC).

Discussion. This yellow *Acarospora*, characterized by the placodioid thallus and the yellow medulla, was discussed by Castello & Nimis (1994a).

Distribution in the survey area. A rather rare species; it occurs in eutrophicated stands, near bird colonies, with nitrophytic species such as *Buellia frigida, Candelaria murrayi, Candelariella flava, Lecanora fuscobrunnea* and *Xanthoria mawsonii*.

Total number of samples: 23, from Kay Island, Harrow Peaks and Apostrophe Island.

Distribution. Endemic to continental Antarctica. Victoria Land (Castello & Nimis 1994a, 1995b, 2000).

Selected specimens examined: **Victoria Land:** Wood Bay, Kay Island, *P. Modenesi* (TSB A343), *S. Sedmak* (TSB A130, A136, A183, A221); Wood Bay, Harrow Peaks, *F. Bersan* (TSB A706); Lady Newnes Bay, Apostrophe Island, *R. Bargagli* (TSB A526, A527).

Acarospora gwynnii C.W. Dodge & E.D. Rudolph
Ann. Mo. Bot. Gard. 42: 144 (1955). Type: MacRobertson Coast, Mawson, 67°36'21"S, 62°52'48"E, *A.M. Gwynn* AB/S4/Li21 (FH-Dodge! holotype).

Acarospora emergens C.W. Dodge, Trans. Amer. Microsc. Soc. 84: 515 (1965). Type: Victoria Land, Gondola Ridge, foot of Mt Suess, Mackay Glacier, 77°01'S 161°48'E, 1800' alt., Nov. 1960, *J. Mulligan* 11 (FH-Dodge! holotype). *Fide* Hale 1987: 272.

Acarospora knowlesii C.W. Dodge, Nova Hedwigia 15: 313 (1968). Type: Bowman Coast, mountain adjoining glacier, 68°04'S 66°57'W, 2000 ft, 20 Aug. 1940, *P.H. Knowles* 9 (FH-Dodge! holotype). *Fide* Castello & Nimis 1994a: 286.

Acarospora petalina N.S. Golubk. & Savicz, Nov. Sys. Pl. Non Vasc., 12: 173 (1965). Type: Queen Maud Land, Oasis Schirmacher, on rocks, 1961, *I.M. Simonov & V.I. Fedotov* (LE! holotype). *Fide* Castello & Nimis 1994a: 286.

Thallus epilithic, of squamulose to substipitate yellow areoles to 2-3 mm diam., scattered to contiguous, centrally attached to the substratum with free margins, K-, C-; upper surface smooth to fissured or rugose; lower surface pale to white; upper cortex 30-60 µm thick; algal layer continuous; medulla white.

Apothecia 2-20 per areole, immersed, flat, to 0.5 mm diam., often crowded, punctiform to oblong or rounded; disc yellowish to brownish or dark brown; margin concolorous with thallus or darker, thick, fissured to crenulate. Epithecium yellowish brown, *c.* 25 µm tall; hymenium colourless, 180-250 µm tall; hypothecium colourless, 25-30 µm tall; parathecium 20-30 µm thick. Paraphyses simple or sparsely branched and anastomising, 1.5-2 µm wide at the base; apices *c.* 3 µm wide. Asci *Acarospora*-type, 60-180 x 15-25 µm, with more than 200 spores. Spores unicellular, colourless, 3-4 x 1.5- 2 (-2.5) µm, ellipsoid to broadly ellipsoid.

Pycnidia immersed, 60-80 µm diam.; conidia 3-4 x 1-1.5 µm.

Chemistry: Epanorin, traces of rhizocarpic acid and of two unidentified substances (TLC, HPLC).

Discussion. A widespread and common species throughout Antarctica, with a great morphological variability. It is characterized by the squamulose, usually smooth areoles and the immersed brown, flat apothecia. For a discussion see Castello & Nimis (1994a). This species was formerly considered as endemic to Antarctica, but examined material collected from the central Andes of northern Chile (TSB) conforms with Antarctic specimens.

Distribution in the survey area. A. gwynnii is common throughout the survey area, on granites and other siliceous substrata, being associated with anitrophytic or weakly nitrophytic species, such as *Buellia frigida, B. lignoides, Lecanora fuscobrunnea, Pleopsidium chlorophanum, Pseudephebe minuscula, Rhizocarpon adarense* and *Umbilicaria decussata*.

Total number of samples: 64, from: Black Ridge, Campo Icaro, Cape Sastrugi, Carezza Lake, Index Point, Inexpressible Island, Lowry Bluff, Morozumi Range, Tarn Flat, Teall Nunatak, Vegetation Island, Vegetation Ridge.

Distribution. Antarctic regions and South America (central Andes, northern Chile). Probably common in Antarctica, with a circumpolar distribution. Continental

Antarctica: Victoria Land (type of *A. emergens*, Castello & Nimis 1994a, 1995b, 2000, Hale 1987, Murray 1963, Seppelt *et al.* 1995), Wilkes Land (Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (type, Castello & Nimis 1994a, Filson 1966, 1975c, Seppelt & Ashton 1978), Enderby Land (Inoue 1995, Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (type of *A. petalina*, Engelskjøn 1986, Øvstedal 1983a, 1983b, 1986a, Thor 1995, 1997), Coats Land (Lindsay 1974b); the maritime Antarctic: Antarctic Peninsula (type of *A. knowlesii*, Øvstedal & Lewis Smith 2001), South Shetland Is. (Sancho *et al.* 1999); subantarctic region: South Georgia (Lindsay 1974a, 1977b, Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Gondola Ridge, North foot of Mt Suess, Mackay Glacier, 77°01'S 161°48'E, *J. Mulligan 5, 15* (FH-Dodge), as *A. emergens*; Hill near Mackay Glacier, 76°57'S 162°30'E, *J. Mulligan 21* (FH-Dodge), as *A. emergens;* Terra Nova Bay, Reeves Glacier, Teall Nunatak, *P. Modenesi* (TSB A1); Terra Nova Bay, Inexpressible Island, *P. Modenesi* (TSB A13); Terra Nova Bay, Northern Foothills, Campo Icaro, *S. Sedmak* (TSB A159). - **MacRobertson Coast:** Amundsen Bay, Mawson, *J. Bunt Li* A/56/ Li 4b, *J. Bunt* A/56/ jLi 5 (FH-Dodge); *R. Filson*, Lich. Antarct. Exsiccati fasc. I, n°1 (BM). - **Chile:** Central Andes, La Coipa, *c.* 3800 m (TSB).

Acarospora cf. **nitrophila** H. Magn.
Göteb. K. Vetensk. Vitterh. Samh. Handl. 4, 28, 2: 74 (1924).

Thallus epilithic, composed of brown areoles or squamules, scattered to contiguous in small groups; areoles flat to slightly convex, to 1.5-2 mm diam., rounded, never angular; upper surface smooth to slightly wrinkled, shiny, K-, C-, KC-, upper cortex 15-25 µm thick; algal layer continuous and irregular.

Apothecia 1 or more per areole, immersed, concave to flat, to 1-1.2 mm diam., K-, KC-; disc dark brown, smooth to wrinkled, with a thick, prominent, dark brown margin. Epithecium brownish; hymenium colourless, 120-150 µm tall, hypothecium colourless, 25-30 µm tall; parathecium 20-30 µm thick. Paraphyses 1.5-2 µm diam. at the base, simple or sparsely branched, with brown apices 3-5 µm diam. Asci 90-120 x 15-20 µm, with 200-300 spores. Spores unicellular, colourless, 3-4.5(-5) x 1-2 µm, ellipsoid.

Discussion. The material does not correspond to any brown *Acarospora* reported by Øvstedal & Lewis Smith (2001), nor described from Antarctica (Dodge 1973) or from the Southern Hemisphere (Magnusson 1929, 1956). It has the essential characters of the *A. nitrophila* group, known from cold regions of Eurasia, from the Arctic zone to the mountains of the Temperate zone. This group was revised by Clauzade & Roux (1981), who reduced several species described by Magnusson to infraspecific level. The identification of Antarctic material is tentative as all collected specimens consist of poorly-developed thalli; further studies on larger collections are needed.

This material superficially resembles badly–developed forms of *A. williamsii* Filson, which is distinguished by the largely ellipsoid to subglobose spores.

Distribution in the survey area. This lichen seems to be rather common, but it can be easily overlooked; it is usually found on granites and diorites, often in small fissures and cracks, with anitrophytic or weakly nitrophytic species, such as *Acarospora gwynnii, Buellia lignoides, Pleopsidium chlorophanum*, *Pseudephebe minuscula*, *Rhizocarpon geographicum, Rh. adarense* and *Umbilicaria decussata.*

Total number of samples: 24, from: Campo Icaro, Cape Sastrugi, Gondwana Station, Harrow Peaks, Kay Island, Skua Lake, Stefania Cirque, Teall Nunatak, Vegetation Island.

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Gondwana Station, *S. Sedmak* (TSB A208, A416), *F. Bersan* (TSB A 799); Terra Nova Bay, Deep Freeze Range, Cape Sastrugi, *S. Sedmak* (TSB A200); Terra Nova Bay, Reeves Glacier, Teall Nunatak, *P. Modenesi* (TSB A4); Hallett Peninsula, Admiralty Mts, Edisto Glacier, Stefania Cirque, *P. Modenesi* (TSB A331).

Acarospora williamsii Filson
ANARE Sci. Rep. Ser. B (II) Bot. 82: 31 (1966). Type: MacRobertson Land, Forbes Glacier Tongue, west of Ring Rock, *RF & JW* 4400 (MEL 31295! holotype).

Thallus epilithic, areolate; areoles pale brown to reddish brown or brown, pale below, scattered to contiguous, convex to subglobose, with smooth surface, to 1.5 mm diam., irregularly shaped, not angular; upper cortex yellowish brown, 25-30 µm thick; algal layer continuous.

Apothecia 1 or more per areole, to 1.2 mm diam.; disc reddish brown, slightly darker than the thallus, concave to flat; thalline margin prominent. Epithecium reddish brown; hymenium colourless, *c.* 120 µm tall; hypothecium colourless, weakly developed; parathecium 10-30 µm thick. Paraphyses simple or sparsely branched, 1.5-2 µm diam. at the base, with dark apices 3-4 µm diam. Asci 100-110 x 15 µm, with 100-200 spores. Spores unicellular, colourless, 3-4 (-4.5) x 2-3 µm, broadly ellipsoid to subglobose.

Discussion. The material is not well-developed, but it agrees in all essential characters with the type of *A. williamsii* and with specimens from Dronning Maud Land identified by Øvstedal (UPS). Poorly-developed forms of this species can be easily confused with *A.* cf.

nitrophila, but *A. williamsii* differs in the broadly ellipsoid to subglobose spores.

Distribution in the survey area. A rare species collected on metasediments, along rock crevices, with *Acarospora gwynni* and *Buellia lignoides.*

Total number of samples: 5, from: Cape Sastrugi, Edmonson Point, Vegetation Ridge.

Distribution. Endemic to continental Antarctica and Antarctic Peninsula. Victoria Land (Castello & Nimis 1995b, 2000), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (Filson 1966, 1975c), Enderby Land (Inoue 1995), Dronning Maud Land (Øvstedal 1986a (cf.)); Antarctic Peninsula (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Wood Bay, Edmonson Point, *P. Modenesi* (TSB A473); Terra Nova Bay, Deep Freeze Range, Cape Sastrugi, *P. Modenesi* (TSB A472), *S. Sedmak* (TSB A197). - **Dronning Maud Land:** Skorpgerget F., *O. Wilson* 42 c (UPS); Pyramiden II, *O. Wilson* 8 (UPS).

Amandinea coniops (Wahlenb. *in* Ach.) M. Choisy *ex* Scheid. & H. Mayrhofer

Lichenologist 25: 342 (1993). - *Lecidea coniops* Wahlenb. *in* Ach., Meth. Lich. Suppl.: 8 (1803). - *Buellia coniops* (Wahlenb. *in* Ach.) Th. Fr., Nova Acta Reg. Soc. Scient. Upsal., Ser. 3, 3: 331 (1861).

?Lecidea conspicua Hue, Deux. Expéd. Antarct. Fr. Lich.: 143 (1915). - *Buellia conspicua* (Hue) Darb., Brit. Antarct. Terra Nova Exped. Nat. Hist. Rep. Bot. 3: 62 (1923). Type: Goudier Islet, 64°50'S 63°31'W, on diorite, *L.Gain 88. Fide* Lamb 1968: 43.

? Buellia subconcava Müll. Arg., Flora, 69, 8: 127 (1886). Type: South Georgia. *Fide* Lindsay 1973b: 82.

? Buellia subviolascens Zahlbr., K. Svenska VetenskAkad Handl., 57, 6: 51 (1917). Type: South Georgia. *Fide* Lindsay 1973b: 82.

Thallus epilithic, grey, brown to dark brown, effuse, rimose-areolate or verrucose-areolate, consisting of contiguous areoles with granular to verrucose surface forming a crust up to few centimetres wide, or of subsquamulose areoles with smooth to verrucose surface, 1-3 mm diam., dispersed or crowded in small pulvinate clumps, to 1-2 mm tall; thallus K – or + reddish, C-; hypothallus brown, prothallus not evident; cortex brown, *c.* 10 µm thick; medulla I-.

Apothecia lecideine, black, scattered to numerous and adpressed on the areoles, sessile, slightly constricted at the base, matt, flat with a thin margin to convex and immarginate, 0.3–1 mm diam. Epithecium dark brown, N-; hymenium colourless, 60-80 µm tall; hypothecium dark brown. Paraphyses simple or sparsely branched, with swollen dark brown apices, 4-5 µm diam. Asci *c.* 60 x 15 µm, 8-spored. Spores bicellular, brown, (12-) 14-17(-18) x 6-7(-8) µm, finely warted.

Conidia filiform, curved, 15-25 x 0.5-1 µm.

Discussion. This taxon was discussed by Lamb (1968), Lindsay (1973b) and Scheidegger (1993). It is characterized by the I- medulla, the N- dark brown epithecium, the dark brown hypothecium and the filiform conidia.

Antarctic material is very variable, and many forms and closely related taxa were discussed by Lamb (1968). According to this author *Buellia subconcava* and *B. subviolascens* are very closely related species, belonging to the *A. coniops* group; Øvstedal & Lewis Smith (2001) studied the type material of *B. subconcava* and found it to be similar to *B. isabellina* (Hue) Darb. A revision of Antarctic material of *Amandinea*, *Buellia* and *Rinodina* is badly needed.

Distribution in the survey area. A. coniops is common in eutrophicated stands; it occurs with *Buellia frigida*, *B. cladocarpiza, Candelaria murrayi, Candelariella flava*, *Lecanora fuscobrunnea*, *Physcia caesia* and *Xanthoria mawsonii.*

Total number of samples: 25, from: Campo Icaro, Cape King, Edmonson Point, Kay Island, Prior Island, Stefania Cirque, Tripp Island.

Distribution. Bipolar, with a probable wide distribution in Antarctica. Continental Antarctica: Victoria Land (Castello & Nimis 1995b, 2000), Queen Mary Land (Andreev 1990); the maritime Antarctic: Antarctic Peninsula (De Leeuw *et al.* 1998, Lamb 1968, Lindsay 1971a, Øvstedal & Lewis Smith 2001, Redon 1985), South Shetland Is. (Allison & Lewis Smith 1973, Andreev 1988, Aptroot & van der Knaap 1993, Lamb 1968, Lindsay 1971a, 1971b, Olech 1989b, Øvstedal & Lewis Smith 2001, Redon 1985, Sancho & Valladares 1993, Sancho *et al.* 1999), South Orkney Is. (Lamb 1968, Lewis Smith 1972, Lindsay 1971a, Øvstedal & Lewis Smith 2001, Redon 1985); subantarctic region: South Georgia (Lindsay 1971a, 1973b, Øvstedal & Lewis Smith 2001), Prince Edward Is. (Lindsay 1977a).

Selected specimens examined: **Victoria Land:** Wood Bay, Kay Island, *P. Modenesi* (TSB A83, A343, A393, A468), *G. Del Frate* (TSB A48), *S. Sedmak* (TSB A150, A239); Wood Bay, Edmonson Point, *F. Bersan* (TSB A708, 709).

Bacidia johnstonii C.W. Dodge

BANZ. Antarct. Res. Exped. Rep. B, 7: 109 (1948). Type: King George V Land, Cape Denison, 67°00'S 142°40'E, B.A.N.Z.A.R.E. 536-6 (FH).

Thallus epilithic, crustose, effuse, granular; granules *c.* 0.1 mm diam., more or less adpressed, often on whitish stipes; hypothallus whitish; thallus C-, K-, KC-.

Apothecia lecideine, cream to brownish or black, up to 0.6 mm diam., convex to subglobose, with a thin pale margin to immarginate. Epithecium olivaceous brown, K-, N+ red; hymenium colourless, 40-80 µm tall; hypothecium colourless to pale brown. Paraphyses sparsely

branched, *c.* 2 µm diam.; apices *c.* 4 µm diam. Asci 35-50 x 10 µm, 8-spored. Spores colourless, 3-5(-7)-septate, 16-23(-27) x 2-3.5 µm, bacilliform to acicular, often curved. Pycnidia not seen.

Discussion. The material is characterized by the colourless hypothecium and the spores up to 23 µm long. According to Øvstedal & Lewis Smith (2001), *B. johnstonii* is closely related to *Bacida stipata* I.M. Lamb, differing in the more reduced thallus, the colour of epithecium and the slightly smaller spores (*B. stipata* has a blue-black epithecium and 25-35 x 2.5-3.5 µm, 7-10-septate spores); further investigations are needed to clarify their relationship.

Distribution in the survey area. Two specimens, from Vegetation Ridge and Lowry Bluff, growing with *Pleopsidium chlorophanum, Pseudephebe minuscula, Umbilicaria decussata* and *Bacidia sp. A*.

Distribution. Endemic to continental Antarctica. King George V Land (Øvstedal & Lewis Smith 2001), Victoria Land.

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Northern Foothills, Vegetation Ridge, *P. Modenesi* (TSB A33); Priestly Glacier, Nash Ridge, Lowry Bluff, *R. Bargagli* (TSB A584).

Bacidia sp. A sensu Øvstedal & Lewis Smith (2001)

Thallus epilithic, crustose, effuse, cream to pale brown, granular to rimose, sometimes forming pulvinate clumps up to 1 mm high on whitish stipes; hypothallus whitish; thallus K-, C-, KC-.

Apothecia lecideine, pale to dark brown or black, 0.3-0.6 mm diam., convex to subglobose, immarginate. Epithecium colourless to olivaceous green, K-, N+ red; hymenium colourless, 50-80 µm tall; hypothecium dark reddish brown, 50-70 µm tall, K+ purplish. Paraphyses simple or sparsely branched above, *c.* 2 µm diam., apices not or slightly swollen. Asci 35-40 x 10-12 µm, 8-spored. Spores colourless, 1-3-septate, 12-16 x 3-4 µm, fusiform. Pycnidia not seen.

Discussion. Our specimens agree in all characters with material from Dronning Maud Land investigated by Øvstedal (UPS) and previously reported as *Bacidia trachona* (Ach.) Lettau (Øvstedal 1986a, Castello & Nimis 1995b, 2000); according to Øvstedal & Lewis Smith (2001) Antarctic material does not correspond to *Bacidia trachona*. A revision of Antarctic material of this genus including the taxa listed by Dodge (1973) is badly needed.

Distribution in the survey area. This lichen is apparently rare; it was collected on volcanic rocks or granites, growing with *Pseudephebe minuscula* and *Usnea sphacelata*.

Total number of samples: 5, from Coulman Island, Mt Moriarty, Vegetation Ridge.

Distribution. Endemic to the continental and maritime Antarctic. Victoria Land (Castello & Nimis 1995b, 2000), Dronning Maud Land (Øvstedal 1986a, Øvstedal & Lewis Smith 2001); South Shetland Is. (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Coulman Island, *P. Modenesi* (TSB A102). - **Dronning Maud Land:** *O. Wilson* 5A, 5, 45 bis (UPS L-16062, 45015; L-16064, 45017; L-16063, 45016).

Buellia cladocarpiza I.M. Lamb

Br. Antarct. Surv. Sci. Rep. 61: 24 (1968). - *Redonia cladocarpiza* (I.M. Lamb) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 354 (1973). Type: Wiencke Island, Noble Peak, 64°48'S 63°25'W, 135 m, on south facing, sligthly overhanging face of granodioritic rocks in an outcrop, *I.M. Lamb* FIDS A1782 (BM).

Thallus pulvinate, subfruticulose, epilithic, sometimes growing on *Buellia frigida*, forming adpressed clumps to 1.5-2 cm diam. and to 1 cm tall; clumps consisting of cream-coloured to more or less dark brown, granulose to-verrucose areoles, on whitish or cream stipes; hypothallus dark brown, prothallus not evident; cortex brown in section, K- or K+ pale yellow, C+ yellow; medulla I+ violet-blue.

Apothecia and pycnidia not seen.

Discussion. The Antarctic taxa of *Buellia*, *Rinodina* and *Amandinea* are still very poorly understood and in urgent need of revision; unfortunately many of these species are very common and widespread throughout Antarctic regions. The investigation of material is mainly based on Lamb (1968), Øvstedal & Lewis Smith (2001) and on the following taxonomic characters: morphology and chemical reactions of thallus, reaction of medulla to I, morpho-anatomical and chemical characters of the apothecia (epithecium, hymenium and hypothecium) and spore features.

The specimens of this *Buellia* agree with material from Birthday Ridge (Herb. Kappen) and Wilkes Land (KIEL-HA) identified by Kappen (1985) as *Buellia cladocarpiza*. These specimens have the pulvinate subfruticulose thallus characteristic of *B. cladocarpiza* (Lamb 1968), a species described from the Antarctic Peninsula: they agree in morphological characters with the description of this species, differing mainly in the C + yellow reaction of the cortex. Unfortunately no fertile material was found in investigated collections, and it is on account of morphological features only that this characteristic material is attributed to *Buellia cladocarpiza*.

Distribution in the survey area. This species is

rather common in eutrophicated stands; it often grows on other lichens, especially on *Buellia frigida*, or directly on rocks (granites and gneiss), with *Acarospora flavocordia, Candelariella flava, Candelaria murrayi, Lecanora fuscobrunnea* and *Xanthoria mawsonii*.

Total number of samples: 33, from: Apostrophe Island, Cape King, Harrow Peaks, Inexpressible Island, Kay Island, Mt Kenaith.

Distribution. Endemic to the continental and maritime Antarctic. Continental Antarctica: Victoria Land (Castello & Nimis 1995b, 2000 (cf.), Kappen 1985, Øvstedal & Lewis Smith 2001, Redon 1985), Wilkes Land (Lewis Smith 1986 (cf.), 1988 (cf.), Øvstedal & Lewis Smith 2001), Queen Mary Land (Olech 1989a); the maritime Antarctic (Redon 1985): Antarctic Peninsula (Lamb 1968, Øvstedal & Lewis Smith 2001), South Shetland Is. (Jacobsen & Kappen 1988, Lamb 1968, Lindsay 1971a, Olech 1989b, Øvstedal & Lewis Smith 2001), South Orkney Is. (Lindsay 1971a, Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Inexpressible Island, *P. Modenesi* (TSB A448); Wood Bay, Kay Island, *P. Modenesi* (TSB A459), *R. Bargagli* (TSB A642, A643, A658); Birthday Ridge, *L. Kappen* (Herb. Kappen 232). - **Wilkes Land:** Clarke Peninsula, Whitney Point, *L. Kappen* (KIEL-HA A1256); Shirley Island, *L. Kappen* (KIEL-HA A1218).

Buellia darbishirei I.M. Lamb
Brit. Antarct. Surv. Sci. Rep. 61: 23 (1968).

Rinodina crassa Darb., Wiss. Ergebn. Schwed. Südpol.-Exped. 1901-1903, 4 (11): 13 (1912). Type: Hope Bay, 63°24'S 57°00' W, saxicole, *C. Skottsberg* 170 (S). *Fide* Lamb 1968: 23.

Thallus epilithic, greenish cream, crustose to pulvinate, forming patches up to 6 cm diam., 3-4 mm tall; areoles up to 0.2-0.5 mm diam., smooth to granular and verrucose, convex to globose, coalescent, often on whitish short branched stipes in central parts of thallus; hypothallus whitish or brownish; cortex K + yellowish or K-, C-, KC-; medulla faintly I + violet or I-.

Apothecia lecideine, black, sessile and constricted at the base, to 0.5 mm diam., often in crowded groups, flat to convex, with an evident margin disappearing at maturity. Epithecium dark brown, N-; hymenium colourless, 75-90 µm tall; hypothecium dark brown, 170-200 µm tall. Paraphyses simple or sparsely branched, with brown swollen apices, 4-5 µm diam. Asci clavate, 70-80 x 15-20 µm, 8-spored. Spores *Buellia* – type, (13-)15-20 x 6-8 µm, slightly constricted at septum.

Conidia bacilliform, 4-5 x 0.8-1 µm.

Discussion. The specimens fit all essential characters of the description of *B. darbishirei*, differing in the faint or negative iodine reaction of the medulla; the iodine reaction of the medulla is generally a reliable taxonomic character in *Buellia*, being very constant and closely correlated with other characters, but it is known that it can vary greatly in some *Buellia* species (Scheidegger 1993). No other pulvinate *Buellia* species known from Antarctica conforms with the examined material.

Distribution in the survey area. A rare species, collected on volcanic rocks, with *Lecanora* aff. *orosthea, Buellia frigida, Tephromela atra.*

Total number of samples: 9, from: Coulman Island, Edmonson Point, Tripp Island.

Distribution. Endemic to continental Antarctica and Antarctic Peninsula. Victoria Land (Castello & Nimis 1995b (aff.)), Dronning Maud Land (Øvstedal & Lewis Smith 2001); Antarctic Peninsula (Lamb 1968, Redon 1985).

Selected specimens examined: **Victoria Land:** Tripp Bay, Tripp Island, *P. Modenesi* (TSB A117); Coulman Island, *P. Modenesi* (TSB A105, A313, A363, A431).

Buellia frigida Darb.
Nat. Antarct. Exped. 1901-1904 Nat. Hist., 5: 7 (1910). - *Rinodina frigida* (Darb.) C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 259 (1948). - *Beltraminia frigida* (Darb.) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 366 (1973). Type: Victoria Land, Granite Harbour, 76°57'S 162°40'E, on granite, Brit. Nat. Antarct. Exp., *E. Koettlitz* (BM).

Bacidia skottsbergii C.W. Dodge, Trans. Amer. Microsc. Soc. 84: 512 (1965). Type: Paulet Island 63°35'S 55°47'W saxicole, *C. Skottsberg* (FH!-Dodge holotype). *Fide* Castello & Nimis 1995a: 74.

Buellia llanoi C.W. Dodge, Nova Hedwigia 15: 327 (1968). - *Diploicia llanoi* C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 351 (1973). Type: Knox Coast, Wilkes Station, 66°15'S 110°31'W, on granite, *G.A. Llano* 1a (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 79.

Buellia quercina Darb., Nat. Antarct. Exped. 1901-1904 Nat. Hist., 5: 8 (1910). - *Diploicia quercina* (Darb.) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 352 (1973). Type: Victoria Land, Granite Harbour, 76°57'S 162°40'E, on volcanic rock, Nat. Antarct. Exp.(BM). *Fide* Lamb 1968: 55.

Lecania schofieldi C.W. Dodge, Nova Hedwigia 15: 318 (1968). Type: Victoria Land, Cape Hallett, 72°25'S 170°55'E, top near Northern end next to Seabee Hook, on reddish lava pebbles, *E. Schofield* AA-44 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 81.

Rinodina rudolphi C.W. Dodge, Trans. Amer. Microsc. Soc. 84: 528 (1965). - *Beltraminia rudolphi* (C.W. Dodge) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 369 (1973). Type: Victoria Land, Cape Hallett, 72°18'S 170°18'E, on small rock at base of scree slope, *E.D. Rudolph* 61025 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 75.

Rinodina sordida C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 657 (1938). Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, 76°50'S 145°30'W, *P.A. Siple & S. Corey* 72W-6 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 88.

Thallus epilithic, effigurate, usually bicolorous, black and whitish-grey or grey and whitish, sometimes brown, to 8-10 cm diam., K- or K + slowly red; peripheral lobes radiating and contiguous, up to 2 mm long and 0.8 mm wide, with smooth or scabrid surface, usually dark grey, brown or black; central part of the thallus rimose to areolate, whitish grey or grey, some-

times dark or black; hypothallus not evident, prothallus absent; cortex dark brown, *c.* 25 µm thick; medulla I-.

Apothecia lecideine, black, on central parts of the thallus, immersed to sessile and slightly constricted at the base, flat to convex with a thin proper margin to subglobose and immarginate, 0.4-1 mm diam., matt; a thin thalline margin is sometimes present. Epithecium olivaceous green, N+ red; hymenium colourless, (50-) 60-80(-100) µm tall, without oil droplets; hypothecium dark brown, 70-120 µm tall; exciple dark brown or olivaceous brown, 30-50 µm thick. Paraphyses *c.* 3 µm diam., simple or sparsely branched, with dark swollen apices 4-5 µm diam. Asci clavate, 60-70 x 15-20 µm, 8-spored. Spores *Buellia*- type, (9-)10-14 x 6-7 µm, slightly constricted at the septum and finely warted.

Pycnidia immersed, globose; conidia 5-6 x 1-1.5 µm, ellipsoid.

Discussion. This taxon was widely discussed by Lamb (1968). It is generally easy to recognize by the clearly lobate thallus. It is very variable in colour, depending on environmental conditions, and brown or brown-grey thalli are not rare in the survey area. According to Øvstedal & Lewis Smith (2001), *B. frigida* has a brown, N- epithecium, but all examined material has a clearly olivaceous green, N+ slowly red epithecium, fitting the description by Lamb (1968). *Rinodina* sp. 3 in Castello & Nimis (2000) is a reddish brown form of *Buellia frigida* with anomalous apothecia and spore characters.

Distribution in the survey area. B. frigida is one of the commonest species throughout the survey area, with a wide ecological range. It occurs on different types of rocks, both in strongly nitrophytic communities with *Candelariella flava*, *Physcia caesia, Xanthoria elegans* and *X. mawsonii*, and in weakly nitrophytic communities with *Acarospora gwynnii, Pleopsidium chlorophanum, Usnea sphacelata* and *Umbilicaria decussata.*

Total number of samples: 215, from: Apostrophe Island, Browning Pass, Campo Icaro, Cape King, Cape Phillips, Carezza Lake, Coulman Island, Crater Cirque, Edmonson Point, Football Saddle, Gondwana Station, Harrow Peaks, Inexpressible Island, Kay Island, Lamplugh Island, Mt Kenaith, Prior Island, Skua Lake, Starr Nunatak, Stefania Cirque, Tarn Flat, Teall Nunatak, Terra Nova Bay Station, Tripp Island, Vegetation Island, Vegetation Ridge.

Distribution. Endemic to continental Antarctica and Antarctic Peninsula, with a circumpolar distribution (Lamb 1968, Redon 1985). Marie Byrd Land (type of *R. sordida*, Lamb 1968), Victoria Land (type of *R. rudolphi*, *L. schofieldi*, Castello & Nimis 1995b, 2000, Kappen 1985, Lamb 1968, Murray 1963), King George V Land (Lamb 1968), Wilkes Land (type of *B. llanoi*, Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Lamb 1968, Olech 1989a), MacRobertson Land (Filson 1966, 1975c, Lamb 1968, Seppelt & Ashton 1978), Enderby Land (Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (Engelskjøn 1986, Lindsay 1972a, Øvstedal 1983a, 1983b); Antarctic Peninsula (type of *B. skottsbergii*, Lamb 1968, Øvstedal & Lewis Smith 2001, Redon 1985).

Selected specimens examined: **Victoria Land:** Lamplugh Island, *S. Sedmak* (TSB A287); Terra Nova Bay, Inexpressible Island, *S. Sedmak* (TSB A249); Hallett Peninsula, Victory Mts, Crater Cirque, *P. Modenesi* (TSB A306).

Buellia grimmiae Filson

ANARE Sci. Rep. Ser. B (II) Bot. 82: 37 (1966). Type: MacRobertson Land, Field Rock, *R. Filson* 4456 (MEL 26125! holotype).

Thallus muscicolous, continuous, rimose to areolate, greyish or whitish grey, with black wrinkles and pruinose, scabrid surface, K-, C-, KC-; medulla I+ violet-blue.

Apothecia sessile, flat or slightly convex, to 1 mm diam., with a persistent, crenulate margin. Epithecium olivaceous brown, N+ red; hymenium colourless, 120-150 µm tall; hypothecium colourless to pale brown. Paraphyses simple to sparsely branched, *c.* 2 µm diam., with dark swollen apices, *c.* 5 µm diam. Asci clavate, 70-100 x 15-20 µm, 8-spored. Spores *Buellia* – type, 13-18 x 6-8 µm, with smooth wall.

Discussion. This species can be easily confused with *Buellia papillata*, the other muscicolous *Buellia* species collected in the survey area, but it differs in the grey to whitish grey, corticate, K - thallus, the I + violet-blue reaction of the medulla, the N + red reaction of the epithecium and the smaller spores. Investigated specimens have smaller spores than those reported in the description by Filson (1966) (15-25 x 10-12 µm) and Øvstedal & Lewis Smith (2001), but they agree in all characters with the type material. *B. grimmiae* is related with *B. pallida*, but it mainly differs in the I – reaction of medulla, the brown parathecium and the larger spores (Filson 1966).

Distribution in the survey area. Apparently a rare muscicolous species.

Total number of samples: 3, from: Gondwana Station, Tinker Glacier, Vegetation Island.

Distribution. Endemic to continental Antarctica. Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994),

Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (Filson 1966, 1975c, Seppelt & Ashton 1978), southern Antarctic Peninsula (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Gondwana Station, *S. Sedmak* (TSB A238); Terra Nova Bay, Vegetation Island, *G. Del Frate* (TSB A73); Wood Bay, Tinker Glacier, *R. Bargagli* (TSB A731). - **Wilkes Land**: Budd Coast, growing over moss in sheltered locality, 24.10.1970, *D.J. Bishop* (MEL 1012078). - **MacRobertson Land:** *R. Filson*, Lich. Antarct. Exsiccati fasc. 1, n. 6 (BM).

Buellia lignoides Filson

ANARE Sci. Rep. Ser. B (II) Bot. 82: 38 (1966). Type: MacRobertson Land, rocky outcrop 10 miles East of Mt Twintop, *R. Filson* 4552 (MEL 26122! holotype).

Thallus epilithic, very variable, consisting of scattered to adpressed, smooth and glossy areoles, 0.5-1 mm diam.; areoles flat to convex, grey or dark brown to black, often whitish or brownish, K-, KC-, C-; hypothallus black, continuous and well-delimited to dendritic or inconspicuous; medulla I+ violet-blue.

Apothecia lecideine, immersed to sessile, 0.3-0.6 mm diam., usually flat with an evident or thin margin, to convex and immarginate. Epithecium olivaceous green, N+ red; hymenium colourless to greenish, 50-100 µm tall; hypothecium colourless to pale brown, to 70 µm tall. Paraphyses *c.* 2 µm diam., simple or sparsely branched, with swollen dark apices, 4-5 µm diam. Asci 8-spored. Spores *Buellia* – type, 9-12 x (5-)6-7 µm, slightly constricted at septum, finely warted.

Discussion. Buellia specimens with the following combination of characters were identified as *B. lignoides*: areolate to squamulose, grey or brown to black thallus with smooth and glossy surface, medulla I+ violet-blue, apothecia immersed to sessile, epithecium and exciple N+ red, hypothecium colourless to pale brown, spores with ornamentation, 9-12 x (5-)6-7 µm. Thallus and prothallus development and thallus colour are highly variable even in the same specimen. The material was compared with the type of *B. lignoides,* which has a great morphological variability in thallus and prothallus features as well, and was found to agree in all essential characters. According to Øvstedal & Lewis Smith (2001) *B. lignoides* may resemble *B. grisea* C.W. Dodge & G.E Baker, a species characterized by the I- reaction of medulla, a pale brown hypothecium and narrower spores (9-15 x 5-7µm in *B.grisea*, 10-14 x 8-9 µm in *B. lignoides*); however, Filson (1974b) reports a spore size of 10-12 x 6-9 µm for *B. lignoides*, which agrees with investigated material.

Distribution in the survey area. B. lignoides is an anitrophytic species, very common throughout the survey area; it generally occurs on granites or diorites with *Umbilicaria decussata*, *Pseudephebe minuscula*, *Usnea sphacelata*, *Pleopsidium chlorophanum* and *Acarospora gwynnii*; it is replaced by *Buellia frigida* in more nutrient-enriched situations.

Total number of samples: 84, from: Campo Icaro, Cape Sastrugi, Carezza Lake, Daniell Peninsula, Football Saddle, Gondwana Station, Index Point, Inexpressible Island, Kay Island, Morozumi Range, Prior Island, Starr Nunatak, Stefania Cirque, Tarn Flat, Teall Nunatak, Terra Nova Bay Station, Vegetation Island, Vegetation Ridge.

Distribution. Endemic to continental Antarctica. Probably a widespread species throughout the continent. Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986 (cf.), 1988 (cf.)), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (Filson 1966, 1975c); Dronning Maud Land (Thor 1995, 1997), south-eastern Antarctic Peninsula (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Vegetation Island, *S. Sedmak* (TSB A163, A174); Terra Nova Bay, Reeves Glacier, Teall Nunatak, *S. Sedmak* (TSB A189, A213); Terra Nova Bay, Northern Foothills, Carezza Lake, *R. Bargagli* (TSB A487); Birthday Ridge, *L. Kappen* (KIEL-HA 215). - **Wilkes Land:** Haupt Nunataks, Budd Coast, *R. Anderson* (MEL 1012037); Clarke Peninsula, Whitney Point, *L. Kappen* (KIEL-HA 1467, 1505).

Buellia pallida C.W. Dodge & G.E. Baker

Ann. Mo. Bot. Gard. 25: 638 (1938). Type: Marie Byrd Land, Edsel Ford Range, Haines Mts, *P. Siple & F.A. Wade* H-3 (FH-Dodge holotype).

Buellia foecunda Filson, ANARE Sci. Rep. Ser. B (II) Bot. 82: 34 (1966). Type: MacRobertson Land, Van Hulssen Nunatak, South Masson Range, 1330 m, *R. Filson* 4574 (MEL 26117! holotype). *Fide* Øvstedal & Lewis Smith 2001: 124.

Thallus epilithic, areolate; areoles whitish to grey or blackish, often with eroded surface and black wrinkles, convex to subglobose and subplicate, often adpressed in clumps, to 2 mm diam., K-, C-, KC-; hypothallus and prothallus not evident; medulla K-, C-, KC-, I-.

Apothecia lecideine, sessile, black, to 0.5-0.7 mm diam., often crowded, flat to convex with a thin margin disappearing at maturity. Epithecium olivaceous green, N+ red; hymenium colourless, 60-80 µm tall; hypothecium colourless to pale brown; exciple dark olivaceous, N+ red. Paraphyses simple to sparsely branched, *c.* 2 µm diam., with swollen dark apices, 3-4 µm diam. Asci 40-50 x 15 µm, 8-spored. Spores *Buellia*-type, (8-)10-13 x 5-7 µm, slightly constricted at the septum.

Discussion. The material consists of a few scanty specimens. They agree in all characters with the type material of *B. foecunda* (MEL), with another specimen

from Dronning Maud Land, identified and discussed by Øvstedal (1983a) (BG), and with several specimens identified by Hale as *B. pallida* (US). The species can be confused with *B. lignoides*; it is characterized by the strongly convex, whitish to grey areoles with black thin wrinkles, the small, numerous, usually crowded apothecia forming scattered clumps and by the I – medulla.

Distribution in the survey area. A rare species; it occurs on granites with anitrophytic species, such as *Acarospora gwynnii, Buellia lignoides, Pleopsidium chlorophanum, Rhizocarpon adarense* and *Umbilicaria decussata.*

Total number of samples: 3, from: Cape Sastrugi and Teall Nunatak.

Distribution. Endemic to continental Antarctica. Marie Byrd Land, King Edward VII Land (Øvstedal & Lewis Smith 2001), Victoria Land (Castello & Nimis 1995b, 2000, Hale 1987, Kappen 1985, Øvstedal & Lewis Smith 2001), MacRobertson Land (Filson 1966, Øvstedal & Lewis Smith 2001), Dronning Maud Land (Øvstedal 1983a, 1983b, 1986a, Øvstedal & Lewis Smith 2001); southern Antarctic Peninsula (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Reeves Glacier, Teall Nunatak, *P. Modenesi* (TSB A445); Terra Nova Bay, Deep Freeze Range, Cape Sastrugi, *S. Sedmak* (TSB A203); Linnaeus Terrace, Asgard Range, *Hale* 59702, 59721, 59755 (US). - **Dronning Maud Land:** Vestfjella, *Haugerud & Winsnes* (BG).

Buellia papillata (Sommerf.) Tuck.
Lich. of Calif.: 26 (1866). - *Lecidea papillata* Sommerf., Fl. Lapp.: 154 (1826).

Thallus muscicolous, rimose to areolate, sometimes eroded and leprose, forming a white to greyish white continuous crust, at least partly corticate; prothallus and hypothallus not evident; cortex K+ yellow, KC-; medulla I-.

Apothecia lecideine, black, sessile, 0.5-0.9 mm diam., often crowded in groups, flat with an evident margin to convex and immarginate; disc rough and often white-pruinose. Epithecium dark brown to olive-brown, N-; hymenium colourless to pale brownish, 70-100 µm tall; hypothecium dark brown, olivaceous in the upper part, reddish below; exciple olivaceous brown. Paraphyses with swollen apices, 3-4 µm diam. Asci 8-spored. Spores *Buellia*-type, 16-22 x 7-10 µm, often curved, finely warted.

Discussion. This species was treated by Lamb (1968), Filson (1974b) and Botnen & Øvstedal (1988). Antarctic samples agree in all essential characters with material from Spitzbergen and the Alps (TSB), with the exception of the thallus, which, in Antarctic material, is often almost leprose. This character is probably due to wind abrasion; at least some protected parts of thallus are, however, always corticate. Sterile forms that forms a large whitish crust over mosses can be confused with other lepraroid species, in particular with *Leproloma* spp., but they differ in the always partly corticate thallus (Botnen & Øvstedal 1988).

Distribution in the survey area. A rather rare species in the survey area, growing on mosses with *Candelariella flava, Caloplaca lewis-smithii, Lecidella siplei* and *Physcia caesia.*

Total number of samples: 8, from: Cape Irizar, Cape King, Harrow Peaks, Terra Nova Bay Station, Tinker Glacier.

Distribution. Bipolar. Continental Antarctica: Victoria Land (Castello & Nimis 1995b, 2000), Wilkes Land (Filson 1974b (cf.), Hovenden & Seppelt 1995, Melick *et al.* 1994), Queen Mary Land (Andreev 1990), Dronning Maud Land (Botnen & Øvstedal 1988, Thor 1995); the maritime Antarctic: Antarctic Peninsula (Botnen & Øvstedal 1988, Lamb 1968, Redon 1985), South Shetland Is. (Andreev 1988, Olech 1989b, Sancho *et al.* 1999).

Selected specimens examined: **Victoria Land:** Wood Bay, Harrow Peaks, *R. Bargagli* (TSB A514); Lady Newnes Bay, Cape King, *G. Del Frate* (TSB A429), *R. Bargagli* (TSB A552).

Buellia pycnogonoides Darb.
Brit. Antarct. Terra Nova Exped. 1910, Nat. Hist. Rep. Bot. 3: 41 (1923). Type: Victoria Land, Evans Cove, Cape Sastrugi, 74°44'S 163°32'E, on quartzite, *R.E. Priestley* (BM lectotype).

Buellia brunnescens C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 646 (1938). Type: Marie Byrd Land, Mt Cooper, 77°07'S 145°30'W, on granite, *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* R-7. *Fide* Lamb 1968: 26 (probable synonym).

Buellia dendritica C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 651 (1938). Type: Edward VII Peninsula, Mt Helen Washington, 78° 05'S 155°20'W, *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* HW-18. *Fide* Lamb 1968: 26 (probable synonym).

Thallus epilithic, composed of scattered, dark brown to black areoles; areoles plane to convex, rounded, 0.2-0.3 mm diam.; prothallus black, extensive, dendritic; thallus K + red (norstictic acid); medulla I-.

Apothecia lecideine, sessile, 1-3 per areole, 0.1-0.2 mm diam., plane with a thin margin. Epithecium dark olivaceous green, N+ red; hymenium colourless, 60-70 µm tall; hypothecium colourless to pale brown, *c.* 20 µm tall. Asci 8-spored. Spores *Buellia*-type, 11-14 x 6-7-µm, slightly constricted at septum.

Discussion. For a discussion on this taxon and its probable synonyms see Lamb (1968). It is characterized by the scattered, mostly isolated, small, brown areoles on an extensive radiating-dendritic prothallus, the N + epithecium (Lamb 1968), and by the presence of nor-

stictic acid (Øvstedal & Lewis Smith 2001).

Distribution in the survey area. One specimen, from Mt Moriarty, growing with *Umbilicaria decussata* and *Usnea sphacelata*.

Distribution. Endemic to the continental and maritime Antarctic. Marie Byrd Land (type of *B. brunnescens*, Lamb 1968), King Edward VII Land (type of *B. dendritica*, Lamb 1968), Victoria Land, Queen Mary Land (Andreev 1990), Enderby Land (Inoue 1995, Olech 1989a), Dronning Maud Land (Øvstedal 1986a, Øvstedal & Lewis Smith 2001), north-eastern Antarctic Peninsula (Lamb 1968, Redon 1985); South Shetland Is. (Jacobsen & Kappen 1988).

Selected specimens examined: **Victoria Land:** Mountaineer Range, Mt Moriarty, *R. Bargagli* (TSB A497).

Buellia subfrigida May. Inoue
Antarctic Record, 37: 20 (1993). Type: Antarctica, Lützow-Holm Bay area, Soya Coast, Skallevikhalsen, on rock, *M. Inoue* 18077 (NIPR holotype).

Thallus epilithic, rimose-areolate to areolate, pale brown to grey, thick, forming more or less orbicular patches up to 3 cm diam., sterile; areoles convex to subglobose in the central parts of thallus; prothallus not evident; thallus K+ red (norstictic acid). Soralia located on top of subglobose areoles, whitish, concave to plane at first, then convex.

Apothecia absent.

Discussion. This species is characterized by the subeffigurate to effigurate sterile thallus and the soralia which are concave to clearly convex at maturity (Inoue 1993, Øvstedal & Lewis Smith 2001); specimens from Victoria Land have orbicular rather than lobate-effigurate thalli.

Distribution in the survey area. Rare; it occurs with *Buellia frigida, Lecanora fuscobrunnea, Lecidea andersonii* and *Rhizocarpon geographicum*.

Total number of samples: 2, from Gondwana Station, Harrow Peaks.

Distribution. Endemic to continental Antarctica and Antarctic Peninsula. Victoria Land, Enderby Land (Inoue 1993, 1995, Kanda & Inoue 1994), Dronning Maud Land; Antarctic Peninsula (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Wood Bay, *F. Bersan* (TSB A715); Gondwana Station, *S. Sedmak* (TSB A416).

Caloplaca approximata (Lynge) H. Magn.
Ark. Bot. 33A (1): 130 (1946). – *Caloplaca vitellinula* f. *approximata* Lynge, Lich. Novaya Zemlya: 222 (1928).

Thallus muscicolous, consisting of orange, convex areoles, sparse among the apothecia, 0.2-0.4 mm diam., K+ red.

Apothecia zeorine, sessile, numerous and crowded, to 0.5 mm diam.; margin thick and crenulate, persistent, orange; disc flat, scabrid, orange. Epithecium yellowish brown; hymenium colourless, 70-100 µm tall; hypothecium colourless, *c.* 30 µm tall. Paraphyses simple or sparsely branched, *c.* 2 µm diam., apices 5-6 µm diam., encrusted with yellowish granules. Asci 60-75 x 10-15 µm, 8-spored. Spores polarilocular, colourless, 12-15 x 5-6.5 µm; septum 1-1.5(-2) µm wide.

Discussion. The material fits the description of *Caloplaca approximata* by Søchting & Øvstedal (1992); it is characterized by the orange thallus and apothecia, and the spores with a short septum. The relationships with the recently described epilithic *Caloplaca frigida* Søchting are discussed by Søchting & Olech (2000).

Distribution in the survey area. One specimen from Campo Icaro, growing on mosses with *Caloplaca citrina* and *Lecanora expectans*.

Distribution. Bipolar. Continental Antarctica: Victoria Land (Søchting & Øvstedal 1992), Dronning Maud Land (Thor 1997 (aff.)); the maritime Antarctic: South Orkney Is. (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Northern Foothills, Campo Icaro, *F. Bersan* (TSB A796).

Caloplaca athallina Darb.
Wiss. Ergebn. Schwed. Südpol.-Exped. 1901-1903, 4 (11): 9 (1912). - *Pyrenodesmia athallina* (Darb.) C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 621 (1938). Type: Paulet Island, 63°35'S 55°47'W, muscicole, *C. Skottsberg* 221 (S).

Polycauliona leechii C.W. Dodge, Nova Hedwigia 15: 325 (1968). Type: Eights Coast, Thurston Island, 71°54'S 100°43'W, on small granitic island, *R.E. Leech* 1 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 86.

New synonym:

Blastenia viridans Js. Murray, Trans. Roy. Soc. N. Z. 2: 63 (1963). Type: Victoria Land, Cape Hallett Area, Crater Hill, Hallett Base, 1.600 ft, on mosses, 11-12 Jan. 1958, *Croll, Fitzgerald, McKellar & Harrington* (WELT 70! holotype).

Thallus muscicolous, scarcely developed, granular, pale grey to dark grey or black, usually densely covered by apothecia.

Apothecia zeorine, numerous, crowded, 0.1-0.3 to 0.8 mm diam., K + red; disc yellow or orange-yellow to olivaceous yellow or blackish, firstly concave, then flat to convex; margin entire, persistent, more or less prominent to level with the disc, with the inner part concolorous with the disc or lighter and the outer part dark grey to black. Epithecium greenish yellow; hymenium colourless, 60-70 µm tall; hypothecium colourless, 20-40 µm tall; thalline margin persistent with many algae

and cortex *c.* 25 µm thick, outer edge dark, internally colourless. Paraphyses *c.* 2 µm diam., simple or sparsely branched at the apices, apices 5-6 µm diam., encrusted with dark granules. Asci 50-70 x 12-18 µm, 8-spored. Spores polarilocular, colourless, (12-)14-17 x (7-)8-10 µm; septum 4-6 µm wide.

Discussion. This taxon and the related *C. tiroliensis* Zahlbr. were discussed by Søchting & Øvstedal (1992); the two species are distinguished by apothecial and spore characters, *C. tiroliensis* having more dispersed apothecia over a less solid thallus, with an always prominent margin and larger spores (17-19 x 9-12 µm). The spore sizes of investigated specimens (20 spores for 10 samples measured) are slightly longer than those reported by these authors for *C. athallina* (13-15 x 6.5-10 µm, septum 3-5 µm), but still smaller than those of *C. tiroliensis*.

The type of *Blastenia viridans* Js. Murray agrees in all characters with *C. athallina*; according to Murray' s description the spores should be bicellular without a septum, but the analysis of the type confirms that they are clearly polarilocular, 12-16 x 6-7 µm, with a 4-5 µm wide septum.

Distribution in the survey area. C. athallina is rather common on mosses; it usually occurs with *Candelariella flava*, *Physcia caesia, Lecidella siplei* and *Xanthoria mawsonii.*

Total number of samples: 41, from: Apostrophe Island, Campo Icaro, Cape King, Crater Cirque, Gondwana Station, Harrow Peaks, Kay Island, Prior Island, Terra Nova Bay Station, Tinker Glacier, Tripp Island.

Distribution. Endemic to the continental and maritime Antarctic. Continental Antarctica: Eights Coast (type of *P. leechii*), Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985, Murray 1963, Seppelt *et al.* 1995), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a, Søchting & Øvstedal 1992), MacRobertson Land (Filson 1975c), Enderby Land (Inoue 1995); the maritime Antarctic: Antarctic Peninsula (Darbishire 1912, Øvstedal & Lewis Smith 2001, Redon 1985, Søchting & Øvstedal 1992), South Orkney Is. (Øvstedal & Lewis Smith 2001), South Shetland Is. (Andreev 1988, Olech 1989b, Øvstedal & Lewis Smith 2001, Redon 1985, Sancho *et al.* 1999).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Northern Foothills, Campo Icaro, *S. Sedmak* (TSB A158); Wood Bay, Kay Island, *R. Bargagli* (TSB A627); Hallett Peninsula, Crater Cirque, *F. Bersan* (TSB A 822); Hallett Peninsula, Crater Hill, Hallett Base, *Croll, Fitzgerald, McKellar & Harrington* (WELT 100), as *Blastenia viridans*.

Caloplaca citrina (Hoffm.) Th. Fr.

N. Acta Reg. Soc. Sc. Upsal. 3, 3: 218 (1861). - *Verrucaria citrina* Hoffm., Deutschl. Flora: 198 (1796).

Pyrenodesmia darbishirei C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 620 (1938). - *Caloplaca darbishirei* (C.W. Dodge & G.E. Baker) Cretz., Bul. Grăd. Bot. Mus. Univ. Cluj 21: 140 (1941). Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, 76°50'S 145°30'W, muscicole, *P. Siple & S. Corey* 72W-14 (FH-Dodge! holoytpe). *Fide* Castello & Nimis 1995a: 77.

Pyrenodesmia mawsonii C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 232 (1948). - *Caloplaca mawsonii* (C.W. Dodge) D.C. Linds., Meddr. Norsk Polarinst. 101:12 (1972). - *Caloplaca mawsonii* (C.W. Dodge) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 260 (1973). Type: MacRobertson Coast, Cape Bruce, 67°25'S 60'25'E, muscicole, B.A.N.Z.A.R.E. 108-27. *Fide* Filson 1974a: 1.

Thallus epilithic and muscicolous, yellow-orange, K+ red, consisting of granular to squamulose, scattered to contiguous areoles; areoles up to 1 mm diam., often peltate, attached to the substratum by strands of parallel hyphae; margins of the areoles often upwardly recurved; upper cortex 20-30 µm thick, upper edge brownish; lower side usually ecorticate or occasionally with cortex similar to the upper side. Margins and lower parts of areoles sorediate or blastidiate; blastidia 40-60 µm diam. Apothecia absent.

Discussion. C. citrina is a very variable taxon and it probably includes several species; material from Antarctica falls in variation range of the taxon (Søchting & Øvstedal 1992).

The type of *Pyrenodesmia mawsonii* was not located in FH, while other specimens correspond to different species (Castello & Nimis 1995a): as this name should be best abandoned, the synonymy proposed by Filson (1974a) based on the description of *Pyrenodesmia mawsonii* is accepted here.

Distribution in the survey area. C. citrina is very common on eutrophicated substrata all over the survey area; it occurs on mosses or rocks with *Candelaria murrayi, Candelariella flava*, *Lecanora expectans*, *Lecidella siplei, Physcia caesia*, *Xanthoria mawsonii* and *X. elegans.*

Total number of samples: 72, from: Apostrophe Island, Baker Rocks, Campo Icaro, Cape King, Cape Washington, Carezza Lake, Crater Cirque, Edmonson Point, Gondwana Station, Harrow Peaks, Inexpressible Island, Kay Island, Markham Island, Prior Island, Terra Nova Bay Station, Tripp Island.

Distribution. Cosmopolitan. The species occurs throughout the continent and in the maritime Antarctic. Continental Antarctica: Marie Byrd Land (type of *P. darbishirei*), Victoria Land (Castello & Nimis 1995b, 2000, Green *et al.* 1992, Kappen 1985), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), Princess Elizabeth Land

(Filson 1974a), MacRobertson Land (type of *P. mawsonii*, Filson 1966, 1974a, 1975c, Seppelt & Ashton 1978), Enderby Land (Inoue 1995), Dronning Maud Land (Lindsay 1972a, Øvstedal 1983a, 1983b, 1986a, Søchting & Øvstedal 1992), Coats Land (Lindsay & Brook 1971 (cf.)); the maritime Antarctic: Antarctic Peninsula (Øvstedal & Lewis Smith 2001), South Shetland Is. (Andreev 1988, Olech 1989b, Øvstedal & Lewis Smith 2001), South Orkney Is. (Lewis Smith 1972 (cf.), Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Marie Byrd Land:** Skua Gull Peak, 76°50'S 145°30'W, *P. Siple, F.A. Wade, S. Corey & O.D. Stancliff* 72W-7 (FH-Dodge), as *C. darbishirei*. - **Victoria Land:** Ross Island, Hut Point Peninsula, Point and Scott Base, *E. Schofield* AA-152 (FH-Dodge), as *C. darbishirei*; Ross Island, Cape Crozier, 77°29'S 169°34'E, *O.Holm-Hansen* 30 (FH-Dodge), as *Biatorella chrysea.*; Terra Nova Bay, Inexpressible Island, *P. Modenesi* (TSB A9); Wood Bay, Edmonson Point, *S. Sedmak* (TSB A235, A236); Hallett Peninsula, Victory Mts, Crater Cirque, *P. Modenesi* (TSB A77, A79). - **Wilkes Land**: Knox Coast, Wilkes Station 66°15'S, 110°31' E, *G.A. Llano* 2796b (FH-Dodge), as *C. darbishirei*; Knox Coast, Wilkes Station, 66°15'S 110°31'E, *G.A. Llano* 2835 (FH-Dodge), as *Caloplaca mawsonii*; Budd Coast, 66°26'S 110°29'E, *D.C. Nutt* 78 (FH-Dodge), as *C. mawsonii*.

Caloplaca conversa (Kremp.) Jatta *s. lat.*
Sylloge Lich. Ital.: 254: (1900). – *Callopisma conversum* Kremp., Denkschr. K. Bayer. Bot. Ges. 4: 162 (1861).

Thallus epilithic, inconspicuous to granular to areolate, K-, C-, forming patches up to 3 cm diam., consisting of flat to subglobose, whitish to dark brown or blackish, more or less adpressed areoles, 1-1.5 mm diam.; prothallus black, dendritic; cortex colourless to dark olivaceous brown, 20-30 µm thick, K-.

Apothecia lecanorine to lecideine, flat to subglobose, 0.2-0.8 mm diam., sessile; thalline margin smooth to crenulate, disappearing in mature apothecia, cream to dark brown and black; disc yellowish, pale brown to dark brown and black, sometimes covered by a yellowish pruina. Epithecium olivaceous or dark blue-green, K + violet-red or K -, with yellowish brown, K+ red epipsamma, more or less developed and often not evident in black apothecia; hymenium colourless, 50-80 µm tall; hypothecium colourless to pale brown, inspersed, 50-80 µm tall; parathecium 30-60 µm broad; cortex of the thalline exciple dark olivaceous at outer edge, K-. Paraphyses simple or branched at the apices, *c.* 2 µm diam., apices swollen, olivaceous, 4-6 µm diam. Asci 40-60 x 10-15 µm, 8-spored. Spores polarilocular, colourless, (10-)12-14(-16) x 5-7(-8) µm; septum 3-5 µm wide.

Discussion. The material belongs to the *Caloplaca* group with ochre-brown- to black-coloured apothecia, whose systematic position is not very clear (Wunder 1974). The specimens are highly variable in thalline and apothecial features, probably influenced by different exposures: apothecia are clearly lecanorine with a cream margin and yellow to ochre-brown disc to lecideine with a thin, black, disappearing margin and a black strongly convex disc. The material most corresponds to *Caloplaca conversa,* a variable taxon known from the mountains of central and southern Europe and North America, on calcareous or siliceous rocks (Wunder 1974, Clauzade & Roux 1985). The Antarctic material differs from *C. conversa s. str.* in the K – reaction of the apothecial margin and in the inspersed hymenium; furthermore *C. conversa* has a mainly southern distribution both in North America and Europe, preferring particularly dry areas, and seems to be absent from Arctic regions. The relation of *C. conversa* and the related *C. exsecuta* (Nyl.) Dalla Torre & Sarnth., a strongly variable species with a more or less holarctic distribution known from Europe, North America, Siberia and Antarctica (Wunder 1974, Søchting & Olech 1995, Øvstedal & Lewis Smith 2001), needs further investigation (Søchting, *pers. comm.*).

Caloplaca sp. 1 in Castello & Nimis (1995b) corresponds to very reduced forms of this lichen, consisting of small scattered blackish areoles with black lecideine apothecia.

Distribution in the survey area. Rare, on granites, with anitrophytic and weakly nitrophytic species, such as *Buellia lignoides, Umbilicaria decussata*, *Pseudephebe minuscula*, *Usnea sphacelata* and *Rhizocarpon* spp.

Total number of samples: 11, from: Cape Phillips, Gondwana Station, Kay Island, Stefania Cirque, Tripp Island, Vegetation Ridge.

Distribution. Bipolar. Continental Antarctica: Victoria Land (Castello & Nimis 2000).

Selected specimens examined: **Victoria Land:** Tripp Bay, Tripp Island, *P. Modenesi* (TSB A95); Terra Nova Bay, Gondwana Station, *S. Sedmak* (TSB A240); Daniell Peninsula, Cape Phillips, *F. Bersan* (TSB A830, A831).

Caloplaca lewis-smithii Søchting & Øvstedal
Mycotaxon 69: 448 (1998). Type: Antarctica: Ross Sector, Victoria Land, Harrow Peaks, 74°04'S 164°45'E, 85 m alt., on moribund moss, 15 Jan. 1996, *R.I.L. Smith* 9867C (AAS holotype, C isotype).

Thallus muscicolous, rimose-areolate, whitish grey to bluish dark grey, often eroded, forming a continuous crust, 1-3 cm wide; areoles granular to verrucose, with a more or less white pruina on the surface, K + violet-red, C+ violet-red.

Apothecia lecanorine, sessile, up to 1.2 mm, often absent; disc flat, dark brown to black; thalline margin thick and persistent, usually pruinose. Epithecium dark

olivaceous green, K+ violet; hymenium colourless, 60 µm tall; hypothecium colourless; amphitecial cortex colourless to dark, 20-30 µm thick, paraplectenchymatous. Paraphyses simple or sparsely branched, *c.* 2 µm diam., with dark bluish grey apices, 5-6 µm diam. Asci 45-50 x 15-16 µm, 8-spored. Spores polarilocular, colourless, 12-16 x 7-8 µm, broadly ellipsoid; septum 3-4.5 µm wide.

Discussion. This species was recently described by Søchting & Øvstedal (1998). Sterile thalli can be often found in the survey area, forming a grey to dark brown or bluish grey, verrucose, K+ violet red-crust on mosses. This material was cited as *Caloplaca* sp. 2 in Castello & Nimis (1995b, 2000).

Distribution in the survey area. This species is rather common on mosses in eutrophicated stands, associated with *Caloplaca athallina*, *C. citrina, Candelariella flava, Lecanora expectans, Lecidella siplei*, *Physcia caesia* and *Xanthoria mawsonii*.

Total number of samples: 24, from: Apostrophe Island, Campo Icaro, Cape Irizar, Cape King, Crater Cirque, Harrow Peaks, Kay Island, Prior Island.

Distribution. Endemic to continental Antarctica. Marie Byrd Land, Victoria Land (Søchting & Øvstedal 1998).

Selected specimens examined: **Victoria Land:** Lamplugh Island, Cape Irizar, *R. Bargagli* (TSB A494); Terra Nova Bay, Northern Foothills, Campo Icaro, *S. Sedmak* (TSB A156); Wood Bay, Kay Island, *R. Bargagli* (TSB A633), *F. Bersan* (TSB A777); Wood Bay, Harrow Peaks, *F. Bersan* (TSB A775); Lady Newnes Bay, Cape King, *R. Bargagli* (TSB A549, 551).

Caloplaca saxicola (Hoffm.) Nordin
Calopl. Sect. Gasparr. I Nordeur.: 87 (1972). – *Psora saxicola* Hoffm., Descr. Adumbr. Pl. Crypt. Lich., 1, 3: 82 (1794).

Thallus placodioid, forming rosettes up to 2 cm diam., yellow to reddish orange, K + red, pruinose or not, sometimes confluent, with more or less contiguous, convex, short peripheral lobes, up to 1 mm long, and central parts of convex areoles with adpressed numerous apothecia, or thallus reduced, consisting of crowded apothecia and only some more or less evident peripheral lobes; medulla of loosely interwoven hyphae; prothallus not seen.

Apothecia up to 1 mm diam., frequent and adpressed, often completely covering the central part of thallus, sessile to constricted at the base, concolorous with the thallus, K + red; disc flat to convex, orange to reddish, pruinose or not, margin thin to thick, excluded at maturity, often paler than the disc. Epithecium with yellowish brown granules; hymenium colourless, 40-70 µm thick; hypothecium colourless. Paraphyses *c.* 2 µm diam., with swollen apices, 5-6 µm diam., encrusted by yellowish granules. Asci clavate, 50-60 x 10-15 µm, 8-spored. Spores polarilocular, colourless, 11-15 x 5-6 µm, ellipsoid to narrowly ellipsoid; septum 2-3(-4) µm wide.

Discussion. The material belongs in the widespread and extremely variable *Caloplaca saxicola* complex; investigated specimens fit the description of material studied by Hansen *et al.* (1987) from Greenland.

Very reduced forms consist of scattered to adpressed, orange to reddish apothecia, usually with slightly convex disc and thin margin, with few small peripheral lobes or areoles evident.

Caloplaca saxicola is often associated with *Xanthoria elegans*, and it can be easily confused with placodioid forms of this species. *C. saxicola* differs in the absence of a lower cortex, the small rosette-like thalli with central parts completely covered by crowded apothecia and small, flat to convex, adpressed, often pruinose peripheral lobes, the apothecia with a usually thin to disappearing margin and the ellipsoid to narrowly ellipsoid spores with a short septum.

According to Søchting all specimens of *Gasparrinia harrissonii* C.W. Dodge kept in Dodge's herbarium are *Caloplaca saxicola* (see Castello & Nimis 1995a).

Distribution in the survey area. Not common. It occurs with rather nitrophytic species, such as *Buellia frigida*, *Caloplaca citrina*, *Candelaria murrayi*, *Lecanora fuscobrunnea* and *Xanthoria elegans*.

Total number of samples: 8, from Cape King, Edmonson Point.

Distribution. Cosmopolitan. Previously reported from Antarctica (Søchting & Ølech 1995), continental Antarctica, Dronning Maud Land (Thor 1997) and the maritime Antarctic, Antarctic Peninsula and South Shetland Is. (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Wood Bay, Mt Melbourne, Edmonson Point, *F. Bersan* (TSB A740).

Candelaria murrayi (C.W. Dodge) Poelt
Phyton 16 (1-4): 203 (1974). - *Polycauliona murrayi* C.W. Dodge, Trans. Amer. Micros. Soc. 84: 526 (1965).

Candelaria concolor (L.) Vain. var. *antarctica* Js. Murray, Trans. Roy. Soc. N.Z. 2: 68 (1963). Type: Victoria Land, Cape Hallett Area, Crater Cirque, 1,600 ft., on moss or as scraps, *Croll, Fitzgerald, Harrington & McKellar* (WELT 96). *Fide* Dodge 1973: 281, Poelt 1974: 210.

Thallus epilithic or muscicolous, yellow, squamulose to foliose, subfruticose, K-, forming small, often confluent rosettes, consisting of flattened, more or less ascending, 1-3 mm long and 0.1-0.3 mm wide lobes; margins of the lobes entire, more or less distinctly

crenulate or blastidiate-granular; upper side weakly pruinose, lower side usually white; rhizines absent but sometimes white strands of hyphae attaching the thallus to the substratum are present; upper cortex 15-30 µm thick, with outer edge encrusted with brownish yellow granules, consisting of more or less isodiametric cells 5-8 µm wide, algal layer discontinuous; medulla of 5-8 µm diam. hyphae; lower cortex similar to the upper one, but without granules. Blastidia present on the lower side of the lobes. Apothecia absent.

Discussion. This taxon was discussed by Poelt (1974). It often occurs with *Candelariella flava*, and young thalli of *C. murrayi* may be confused with sterile thalli of *Candelariella flava*, differing in the completely corticate areoles or squamules, while *C. flava* has usually ecorticate granules (Castello & Nimis 1994b).

Distribution in the survey area. C. murrayi is common on mosses or rocks in eutrophicated stands throughout the survey area, near penguin and skua colonies, in nitrophytic communities with *Candelariella flava, Buellia frigida, B. cladocarpiza, Physcia caesia, Xanthoria elegans* and *X. mawsonii.*

Total number of samples: 54, from: Baker Rocks, Cape King, Coulman Island, Harrow Peaks, Kay Island, Mt Kenaith, Prior Island.

Distribution. Endemic to the continental and maritime Antarctic regions. Probably a common species throughout the continent. Victoria Land (Castello & Nimis 1995b, 2000, Murray 1963), Enderby Land (Inoue 1995, Kashiwadani 1970 (as *Xanthoria* sp.), Nakanishi 1977, Poelt 1974), Dronning Maud Land (Øvstedal 1983b); Antarctic Peninsula (Gremmen *et al.* 1995, Øvstedal & Lewis Smith 2001), South Shetland Is. (Jacobsen & Kappen 1988, Olech 1989b, Redon 1985).

Selected specimens examined: **Victoria Land:** Wood Bay, Kay Island, *R. Bargagli* (TSB A628, A631, A664); Lady Newnes Bay, Cape King, *R. Bargagli* (TSB A546).

Candelariella flava (C.W. Dodge & G.E. Baker) Castello & Nimis

Acta Bot. Fennica 150: 6 (1994). - *Protoblastenia flava* C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 605 (1938). Type: King Edward VII Land, Mt Helen Washington, Rockefeller Mts, 78°05'S 155°20'W, on pink granite, 1934, *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* HW-8 (FH-Dodge! holotype).

Blastenia autenboeri C.W. Dodge, Bull. Jard. Bot. Bruxelles 32: 305 (1962). Type: Princess Ragnhild Coast, Petrel Egg Nunatak, north of Tanngarden, 72°00'S 22°49'E, *T. Van Autenboer* 1a (FH!-Dodge holotype). *Fide* Castello & Nimis 1994b: 6.

Candelariella antarctica Filson, Muelleria 3 (2): 152 (1975). *Fide* Filson 1975c: 152, Øvstedal 1983a: 221, Castello & Nimis 1994b: 6.

Lecidea hallettensis Js. Murray, Trans. Roy. Soc. N.Z. 2 (5): 67 (1963). - *Protoblastenia hallettensis* (Js. Murray) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 246 (1973). - *Candelariella hallettensis* (Js. Murray) Øvstedal, Cryptogamie, Bryol. Lichénol. 4: 221 (1983). Type: Cape Hallett Area, Crater Cirque, 1.600 ft, *Croll, Fitzgerald, Harrington and Mckellar* 94 (WELT! holotype). *Fide* Øvstedal 1983a: 221, Castello & Nimis 1994b: 6.

Protoblastenia citrina C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 222 (1948). Type: Queen Mary Land, Alligator Nunatak, 66°36'S 97°30'E, 2 Jan. 1913, *C.T. Harrisson* 28-2 (FH-Dodge! holotype). *Fide* Filson 1975c: 152, Castello & Nimis 1994b: 6.

Thallus muscicolous or epilithic, of ecorticate to corticate crowded granules, 60-100 µm diam., yellow to yellow-orange, K- or K+ orange.

Apothecia sessile, flat to convex, up to 0.8 mm diam., margin thin and crenulate, disappearing at maturity. Epithecium encrusted with yellow-brown granular crystals; hymenium 70-80 µm tall, colourless; hypothecium colourless, 40-60 µm tall. Paraphyses simple or sparsely branched, 1.5-2 µm diam., apices not swollen. Asci clavate, 50-60 x 15-16 µm, 8-spored, *Candelaria*-type. Spores unicellular, colourless, (11-)12-16(-20) x 4-6 µm, ellipsoid, straight or curved, sometimes containing oil drops.

Discussion. This taxon was discussed by Castello & Nimis (1994b). It shows affinities with *C. aurella* (Hoffm.) Zahlbr., differing in thallus features: *C. flava* has a well-developed thallus consisting of crowded granules, whereas *C. aurella* has a weakly developed thallus of scattered areoles. *C. aurella* was so far reported from the South Shetland Islands (Aptroot and van der Knaap 1993, Castello & Nimis 1994b, Sancho *et al.* 1999) and South Orkney Is. (Øvstedal & Lewis Smith 2001). *C. flava* differs from the other *Candelariella* species known from Antarctica, *C. vitellina*, in thallus features and in the 8-spored asci. In the survey area sterile thalli of *C. flava* are common, and resemble young thalli of *Candelaria murrayi* (see comment to this species).

Distribution in the survey area. Very common in nutrient-enriched stands, on mosses or directly on rocks, near penguins or skua colonies, with *Buellia frigida, Lecanora fuscobrunnea, Lecidella siplei, Physcia caesia, Xanthoria elegans* and *X. mawsonii.* It can be often found also at the base of thalli of *Usnea sphacelata*, with *Buellia lignoides, Pseudephebe minuscula* and *Umbilicaria* spp. (see also Kappen 1985).

Total number of samples: 141, from: Apostrophe Island, Campo Icaro, Cape Irizar, Cape King, Cape Phillips, Coulman Island, Crater Cirque, Football Saddle, Gondwana Station, Harrow Peaks, Inexpressible Island, Kay Island, Lamplugh Island, Prior Island, Starr Nunatak, Terra Nova Bay Station.

Distribution. Endemic to Antarctic regions. Continental Antarctica: King Edward VII Land (type), Victoria Land (Castello & Nimis 1994b, 1995b, 2000,

Kappen 1985, Murray 1963), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Castello & Nimis 1994b, Olech 1989a), Princess Elizabeth Land (Castello & Nimis 1994b), MacRobertson Land (Castello & Nimis 1994b, Filson 1966, 1975c, Seppelt & Ashton 1978), Enderby Land (Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (type of *B. autenboeri*, Engelskjøn 1986, Lindsay 1972a, Øvstedal 1983a, 1983b, 1986a, Thor 1995, 1997); the maritime Antarctic: Antarctic Peninsula (Øvstedal & Lewis Smith 2001), South Shetland Is. (Andreev 1988, Olech 1989b, Øvstedal & Lewis Smith 2001), South Orkney Is. (Øvstedal & Lewis Smith 2001); subantarctic region: South Georgia (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **King Edward VII Land:** Mt Helen Washington, Rockefeller Mts, 78°05'S 155°20'W, *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* HW-13 (FH-Dodge), as *Protoblastenia flava.* - **Victoria Land:** Wood Bay, Kay Island, *P. Modenesi* (TSB A26); Terra Nova Bay, Terra Nova Bay Station, *G. Del Frate* (TSB A41); Hallett Peninsula, Crater Hill, Hallett Base, 1.600 ft, *Croll, Fitzgerald, Harrington and Mckellar* (WELT 93), as *Lecidea hallettensis*; Gneiss Point, 77°24'S 163°40'E, *G.A. Llano* 2194, 2195a, 2196b (FH-Dodge), as *Protoblastenia flava.* - **Queen Mary Land:** L/II David Island, ca 66°25'S 98°30'E, *Harrisson* 73 (FH-Dodge), as *Protoblastenia citrina*; L/VI, Hippo Nunatak, 66°25'S 98°E, *Harrisson* 78-1 (FH-Dodge), as *Protoblastenia citrina.* - **MacRobertson Land:** Mawson, *R.O. Summers Lichen type H* (FH-Dodge), as *Protoblastenia citrina.* - **Princess Elizabeth Land:** Ingrid Christensen Coast, SandefjordBay, Lorton I, *J.M. Bechervaise* (FH-Dodge), as *Protoblastenia citrina.*

Candelariella vitellina (Hoffm.) Müll. Arg.
Bull. Herb. Boissier, 2: 47 (1894). - *Verrucaria vitellina* Hoffm., Deutschl. Flora: 197 (1796).

Candelariella chrysea C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 580 (1938). - *Biatorella chrysea* (C.W. Dodge & G.E. Baker) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 137 (1973). Type: Marie Byrd Land, Chester Mts, 76°40'S, 145°20'W, on coarse-grained granodiorite and quartzite, 1934, *P. Siple & S. Corey* 97A-1 (FH-Dodge! holotype). *Fide* Castello & Nimis 1994b: 8.

Eklundia antarctica C.W. Dodge, Nova Hedwigia 15: 311 (1968). Type: No data received: probably Batterbee Mountains, ca 72°17'S 69°57'W, up to 1000 ft., 7 Dec. 1940, *C. Eklund* 93b [B-8-A] (FH-Dodge! holotype). *Fide* Castello & Nimis 1994b: 8.

Thallus epilithic, composed of granular to squamulose yellow areoles, 0.1 to 0.5(-1) mm broad, K+ orange.

Apothecia sessile, flat, up to 0.6-0.7 mm diam.; disc concolorous with the thallus or darker; margin thin, smooth to crenulate, disappearing at maturity, concolorous with the thallus. Epithecium yellow-brown; hymenium colourless, 80-100 µm tall; hypothecium colourless, 30-60 µm. Paraphyses simple or sparsely branched, 2-3 µm diam., apices slightly swollen. Asci clavate, 60-90 x 12-20 µm, *Candelaria*-type, 16-32-spored. Spores colourless, unicellular to more or less clearly 1-septate, 9-12 x 4-5 µm, ellipsoid, containing oil drops.

Pycnidia frequent, immersed, *c.* 100 µm diam.; conidia 3-4 x 1-5-2 µm, bacilliform.

Discussion. C. vitellina is an extremely variable species, probably including several taxa (Poelt & Vezda 1977): the thallus may consist of granules, areoles or squamules, the margin of apothecia can be well-developed to disappearing and the spores are 12-16 per ascus, unicellular to pseudodiblastic or rarely clearly bicellular. A discussion of Antarctic material of *C. vitellina* is in Castello & Nimis (1994b).

Distribution in the survey area. Rather rare, on mosses or rocks in eutrophicated stands with *Candelariella flava, Caloplaca athallina, Buellia frigida, Lecidella siplei, Physcia caesia, Usnea sphacelata* and *Xanthoria mawsonii*.

Total number of samples: 13, from Campo Icaro, Cape King, Carezza Lake, Gondwana Station, Harrow Peaks, Kay Island, Starr Nunatak, Terra Nova Bay Station, Tinker Glacier.

Distribution. Cosmopolitan. Continental Antarctica: Marie Byrd Land (type of *C. chrysea*), Victoria Land (Castello & Nimis 1994b, 1995b, 2000), south-western Antarctic Peninsula (type of *E. antarctica*); the maritime Antarctic (Redon 1985): Antarctic Peninsula (Øvstedal & Lewis Smith 2001), South Shetland Is. (Andreev 1988, Aptroot & van der Knaap 1993, Jacobsen & Kappen 1988, Olech 1989b), South Orkney Is. (Lewis Smith 1972, Øvstedal & Lewis Smith 2001); subantarctic region: South Georgia (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Wood Bay, Kay Island, *S. Sedmak* (TSB A222), *P. Modenesi* (TSB A356); Ross Island, Cape Crozier, 77°29'S 169°34'E, *O.Holm-Hansen* 30 (FH-Dodge), as *Biatorella chrysea.*

Carbonea vorticosa (Flörke) Hertel
Mitt. Bot. Staatssamml. München, 19: 442 (1983). – *Lecidea sabuletorum* v. *vorticosa* Flörke, Mag. Natf. Fr. Berlins, 2: 311 (1808).

Carbonea capsulata (C.W. Dodge & G.E. Baker) Hale, Lichenologist 19 (3): 279 (1987). - *Lecidea capsulata* C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 533 (1938). Type: Marie Byrd Land, Edsel Ford Range, Mt Stancliff, *P. Siple & S. Corey* 72A-2. Neotype: Ellsworth Land, Johnson Nunatak, c. 3 m below survey point, 1 m above snow line, 74°52'S 74°02'W, *J.T.R. Molholm* 7 (US!). *Fide:* Øvstedal & Lewis Smith 2001: 153.

Huea smaragdula C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 228 (1948). Type: Queen Mary Coast, Mt Barr-Smith, 1220 m, 67°10'S 99°03'E, *C.T. Harrison* A.A.E. 10-2 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 80.

Lecidea blackburni C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 540 (1938). Type: Victoria Land, Queen Maud Mts, Scudder Mt, 86°08'S 150°40'W, on granite, *Q.A. Blackburn, R.S. Russell Jr. & S.D.L. Paine* QM-6(1) (FH-Dodge! isotype). *Fide* Inoue, see Castello & Nimis 1995a: 83.

'Lecidea' oroantarctica Øvstedal, Cryptogamie, Bryol., Li-

chénol.: 67 (1986). Type: Dronning Maud Land, Førsterfjell, 1951, *O. Wilson* (UPS). *Fide:* Øvstedal & Lewis Smith 2001: 153.

Thallus endolithic, not evident or epilithic, consisting of white angular substipitate areoles, areoles up to 0.7 mm wide and 1.2 mm high, or granular and reduced, forming an amorphous white crust, with many crowded apothecia; thallus reactions negative; prothallus not evident; medulla I-.

Apothecia black, lecideine, constricted at the base, 0.2-0.5 mm diam., scattered to adpressed, irregular in shape; disc flat and margin thick, smooth, persistent. Epithecium blue-green, N+ violet; hymenium colourless to pale blue-green, 40-50 µm tall; hypothecium dark brown, 60-80 µm tall; exciple dark brown to black, 50-70 µm thick, composed of radiating hyphae. Paraphyses simple, *c.* 3 µm diam., with slightly swollen apices. Asci *Lecanora*-type, 8-spored. Spores unicellular, colourless, (8-)9-12 x 4-5 µm, ellipsoid.

Discussion. Antarctic material with well-developed substipitate areoles was described as *Carbonea capsulata* (see Hale 1987, Inoue 1991a), differing from *C. vorticosa* mainly by thallus development. Both species show a great variability in this character: *C. capsulata* usually has a well-developed epilithic thallus, but sometimes this is reduced or absent, while *C. vorticosa* in the Northern Hemisphere usually has a strongly reduced thallus, but it was found with substipitate thalli in Antarctica (Hertel 1988). According to Inoue (1991a) *C. capsulata* differs in having thicker hyphae in the exciple but, following Øvstedal & Lewis Smith (2001), *C. capsulata* is here considered as an Antarctic population of *C. vorticosa* with an usually conspicuous thallus.

Distribution in the survey area. Rather common; this lichen generally grows along rock crevices on granites, with anitrophytic or weakly nitrophytic species, such as *Acarospora nitrophila, Buellia lignoides, Lecanora fuscobrunnea, Pseudephebe minuscula, Umbilicaria decussata* and *Usnea sphacelata.*

Total number of samples: 12, from: Cape Sastrugi, Vegetation Island, Vegetation Ridge.

Distribution. Bipolar. Continental Antarctica: Ellsworth Land (neotype), Marie Byrd Land (type), Victoria Land (isotype of *L. blackburni*, Castello & Nimis 1995b, 2000, Green *et al.* 1992, Hale 1987, Kappen 1985, Seppelt *et al.* 1995), Queen Mary Land (type of *H. smaragdula*, Andreev 1990, Olech 1989a), MacRobertson Land (Filson 1966), Enderby Land (Inoue 1991a, 1995), Dronning Maud Land (Hertel 1989); the maritime Antarctic: Antarctic Peninsula (Øvstedal & Lewis Smith 2001), South Shetland Is. (Andreev 1988, Hertel 1984, Olech 1989b, Sancho *et al.* 1999), South Orkney Is. (Øvstedal & Lewis Smith 2001); subantarctic region: South Georgia (Hertel 1989, Øvstedal & Lewis Smith 2001), Prince Edward Is. (Hertel 1984, Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Deep Freeze Range, Cape Sastrugi, *S. Sedmak* (TSB A300); Terra Nova Bay, Vegetation Island, *S. Sedmak* (TSB A164); Hallett Peninsula, Admiralty Mts, Stefania Cirque, *P. Modenesi* (TSB A316, A325).

Lecanora expectans Darb.

Nat. Antarct. Exped. 1901-1904 Nat. Hist. 5: 5 (1910). -Type: Ross Island, Winter Harbour, 77°51'S 166°37'E, over mosses, Scott's Voy. Discovery.

Lecanora griseomarginata C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 572 (1938). Type: Marie Byrd Land, Edsel Ford Range, Mt Donald Woodward, 77°18'S 145°45'W, *P. Siple, F.A. Wade, S. Corey & O.D. Stancliff* DW-1 (FH-Dodge! holotype). *Fide* Filson 1966: 47, Castello & Nimis 1995a: 82.

Lecanora lilacinofusca C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 575 (1938). Type: Marie Byrd Land, Lichen Peak, 76°55'S 145°20'W, *P.A. Siple & S. Corey* 73-4 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 82.

Lecania llanoi C.W. Dodge, Trans. Amer. Microsc. Soc. 84: 519 (1965). Type: Ross Island, McMurdo, Crater Hill 77°50'S 166°41'E, growing over tops of mosses on steep slope, *G.A. Llano* 2217d (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 81.

Thallus muscicolous, whitish to pale grey, rimose-areolate, forming a more or less continuous crust, with scabrid surface, often ecorticate, inconspicuous and almost completely covered by apothecia, K-, C-, KC-, P-; medulla I-.

Apothecia lecanorine, up to 0.8-1.2 mm diam., sessile and constricted at base, closely adpressed and covering the thallus, irregular by compression; margin whitish, crenulate and pruinose, rough, persistent; disc flat, dark brown to black, pruinose or not. Epithecium olivaceous brown, N+ reddish; hymenium 50-80 µm tall, colourless; hypothecium 40-50 µm tall, colourless. Paraphyses simple or sparsely branched, 1.5-2 µm diam., with dark brown swollen apices, 3-5 µm diam. Asci *Lecanora* - type, 40-50 x 10-12 µm, 8-spored. Spores unicellular, colourless, (13-)14-17(-18) x 4-5 µm, narrowly ellipsoid, straight or slightly curved.

Discussion. L. expectans belongs in the critical *L. hagenii-L. dispersa* complex, and it shows affinities with *L. mons-nivis* Darb., an epilithic species with a scarcely developed thallus described from Antarctica; these taxa mainly differ in thallus development and ecological features, while their anatomical and chemical reactions are similar. The taxonomic position of Antarctic material of this complex needs a careful revision.

According to Filson (1974a), *L. expectans* has a N- reaction of the epithecium, but all our specimens show a N+ red reaction: however, this difference may be

influenced by different exposure of thalli to sun light.

Distribution in the survey area. Common on mosses throughout the survey area, occurring with *Caloplaca citrina*, *Xanthoria mawsonii*, *Physcia caesia*, *Lecidella siplei* and *Candelaria murrayi*.

Total number of samples: 56, from: Apostrophe Island, Campo Icaro, Cape King, Carezza Lake, Crater Cirque, Edmonson Point, Harrow Peaks, Inexpressible Island, Kay Island, Prior Island, Starr Nunatak, Terra Nova Bay Station.

Distribution. Endemic to the continental and maritime Antarctic, with a circumpolar distribution. Marie Byrd Land (type of *L. griseomarginata*, *L. lilacinofusca*), Victoria Land (type, Castello & Nimis 1995a, 1995b, 2000, Green *et al.* 1992, Kappen 1985, Murray 1963, Seppelt *et al.* 1995), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (Filson 1966, 1975c), Enderby Land (Inoue 1995a, Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (Botnen & Øvstedal 1988, Engelskjøn 1986, Øvstedal 1983a, 1983b, 1986a, Thor 1995, 1997); southern Antarctic Peninsula (Øvstedal & Lewis Smith 2001), South Shetland Is. (Andreev 1988, Olech 1989b).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Inexpressible Island, *R. Bargagli* (TSB A591); Lady Newnes Bay, Cape King, *G. Del Frate* (TSB A56); Hallett Peninsula, Victory Mts, Crater Cirque, *P. Modenesi* (TSB A361, A362); Ross Island, McMurdo, Crater Hill 77°50'S 166°41'E, *Holm Hansen* bag 31-3 (FH-Dodge).

Lecanora fuscobrunnea C.W. Dodge & G.E. Baker
Ann. Mo. Bot. Gard. 25: 577 (1938). Type: South Victoria Land, Queen Maud Mts, Durham Point, 85°31'S 151°15'W, northeast portal of Thorne Glacier, *Q.A. Blackburn, R.S. Russel Jr. & S.D.L. Paine* QM-4 (FH-Dodge! holotype).

Candelariella albovirens C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 582 (1938). Type: Marie Byrd Land, Mt Corey, 76°40'S 145°08'W, *P.A. Siple & S. Corey 112E-2* (FH-Dodge! holotype). *Fide* Castello & Nimis 1994b: 9.

Lecidea acerviformis Js. Murray, Trans. R. Soc. N.Z. 2: 66 (1963). Type: Victoria Land, Cape Hallett, 72°25'S 170°55'E, Crater Hill, 490 m, *Croll, Fitzgerald, Harrington & McKellar* (WELT 84). *Fide* Hertel 1984: 415.

Lecanora subolivacea C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 578 (1938). Type: Marie Byrd Land, Mt Cooper, 77°07'S 145°24'W, *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* R-7 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 82.

Protoblastenia alba C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 607 (1938). Type: Marie Byrd Land, Mt Woodward, 77°18'S 145°50'S, *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* DW-5 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 87.

Protoblastenia aurea C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 608 (1938). Type: Marie Byrd Land, Skua Gull Peak, 76°50'S 145°30'W, *P.A. Siple & S. Corey* 72W-15 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 87.

Protoblastenia citrinigricans C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 610 (1938). Type: South Victoria Land, Queen Maud Mts, Scudder Mt, 86°03'S 150°40'W, on granite, 1934, *Q.A. Blackburn, R.S. Russell Jr. & S.D.L. Paine* QM-2 (FH-Dodge! holotype). *Fide* Castello & Nimis 1994b: 9.

Thallus epilithic, yellowish cream, greenish, pale brown or dark olivaceous, of granular to squamulose areoles, 0.5-1 mm diam.; areoles scattered or crowded in pulvinate clumps up to 3 mm tall, with smooth surface, sometimes substipitate; thallus K + yellow, C-, KC + yellow.

Apothecia lecanorine, sessile, often crowded, flat to strongly convex, up to 1.6 mm diam.; margin concolorous with the thallus, thin and smooth, evident in young apothecia, disappearing at maturity; disc darker than the margin, yellowish cream to greenish, dark brown to black. Epithecium encrusted with yellowish green to olivaceous small granules, N+ reddish; hymenium colourless, 50-70 µm tall; hypothecium of loose hyphae, colourless, 40-100 µm tall. Paraphyses simple or sparsely branched, 1-1.5 µm diam., apices olivaceous green, slightly swollen, 2.5-3 µm diam. Asci *Lecanora*-type, 35-40 x 10-15 µm, 8-spored. Spores unicellular, colourless, (9-)10-14 x 4-5 µm, ellipsoid to narrowly ellipsoid.

Pycnidia forming black spots in thallus; conidia filiform, 15-20 x 1 µm, straight or curved.

Discussion. This taxon was discussed by Hale (1987). *L. fuscobrunnea* clearly belongs in the *L. polytropa* complex, a highly variable taxon with a wide ecological range; as this taxon needs a worldwide revision, the Antarctic material is here considered as a distinct species, differing from *L. polytropa s.str.* by the cream to greenish, finally dark brown, black apothecia. According to Hertel (1984) *Lecidea acerviformis*, a species described from Victoria Land, is a synonym of *Lecanora polytropa s. lat.*

L. fuscobrunnea is often associated with *Rhizoplaca melanophthalma* (Ramond) Leuckert & Poelt, and well-developed forms of *L. fuscobrunnea* may be easily confused with *Rh. melanophthalma*, the two species showing the same colour of thallus and apothecia: *Rh. melanophthalma* is characterized by the broadly ellipsoid to subglobose spores, 9-12 x 5-6 µm, and the thick, crenulate and persistent thalline margin of apothecia.

Distribution in the survey area. Very common throughout the Terra Nova Bay area, with a wide ecological range, growing in weakly nitrophytic communities, with *Usnea sphacelata*, *Pseudephebe minuscula*, *Buellia lignoides*, *Rhizocarpon adarense*, *Pleopsidium chlorophanum*, *Acarospora gwynnii*, or nitrophytic communities, with *Buellia frigida*, *Candelariella flava*, *Caloplaca citrina* and *Xanthoria mawsonii*.

Total number of samples: 114, from: Apostrophe Island, Campo Icaro, Cape King, Cape Phillips, Cape Sastrugi, Carezza Lake, Crater Cirque, Edmonson

Point, Gondwana Station, Harrow Peaks, Inexpressible Island, Kay Island, Mt Kenaith, Prior Island, Skua Lake, Starr Nunatak, Stefania Cirque, Tarn Flat, Teall Nunatak, Terra Nova Bay Station, Tripp Island, Vegetation Island, Vegetation Ridge.

Distribution. Endemic to continental Antarctica. Marie Byrd Land (type of *C. albovirens*, *L. subolivacea*, *P. alba*, *P. aurea*), King Edward VII Land (Castello & Nimis 1994b), Victoria Land (type, type of *P. citrinigricans*, *L. acerviformis,* Castello & Nimis 1995b, 2000, Hale 1987, Seppelt *et al.* 1995), Enderby Land (Inoue 1995). The reports of *L. polytropa* from Queen Mary Land by Olech (1989a) and Andreev (1990) probably refer to this taxon; *L. polytropa* is known also from the maritime and subantarctic regions.

Selected specimens examined: **King Edward VII Land:** Mt Helen Washington, Rockefeller Mts, 78°05'S 155°20'W, on pink granite, 1934, *P. Siple, F.A. Wade, S. Corey & O.D. Stancliff* HW-11, HW-13, HW-15 (FH-Dodge), as *Candelariella albovirens.* - **Victoria Land:** Scudder Mt, Queen Maud Range, 86°03'S 150°40'W, 1934, *Q.A. Blackburn, R.S. Russell, Jr & S.D.L. Paine* QM-1 (FH-Dodge), as *Protoblastenia citrinigricans*; Terra Nova Bay, Gondwana Station, *S. Sedmak* (TSB A208); Wood Bay, Kay Island, *P. Modenesi* (TSB A30).

Lecanora aff. **geophila** (Th. Fr.) Poelt
Int. J. Mycol. Lichenol., 3: 55-65 (1986). - *Placodium geophilum* Th. Fr., Acta Reg. Soc. scient. Ups., ser III, 3: 85 (1860).

Thallus muscicolous or on soil, forming more or less placodioid, circular patches up to 4 cm diam., crustose-squamulose, thick, whitish to yellowish cream, with smooth to verrucose, sometimes rough surface; peripheral squamules corticate below, with a pale brown lower surface; thallus K + yellow, KC + yellow, C-.

Apothecia lecanorine, flat to convex, up to 2 mm diam., constricted below, often closely adpressed; thalline margin thick to thin or disappearing, smooth to crenulate, concolorous with the thallus; disc pale brown to greenish, dark brown or blackish. Epithecium olivaceous green; hymenium colourless, 50 60 µm tall; hypothecium colourless, *c.* 20 µm tall. Paraphyses simple, 1.5-2 µm diam., with not swollen apices. Asci *Lecanora* – type, 8-spored. Spores unicellular, colourless, (8-)10-13 x 5-7 µm, ellipsoid to broadly ellipsoid, with thick wall.

Pycnidia forming black spots in thallus; conidia filiform, 12-16(-18) x 0.5-1 µm, curved.

Discussion. Investigated material of this *Lecanora* occurring on soil and mosses fits the description of *Lecanora* aff. *geophila* reported by Øvstedal & Lewis Smith (2001) from continental Antarctica (Victoria Land, Kay Land).

Distribution in the survey area. A rare species, growing on soil and mosses.

Total number of samples: 5, from Cape King, Cape Sastrugi, Tinker Glacier, Vegetation Island.

Selected specimens examined: **Victoria Land:** Wood Bay, Tinker Glacier, *R. Bargagli* (TSB A728); Lady Newnes Bay, Cape King, *R. Bargagli* (TSB A541); Deep Freeze Range, Cape Sastrugi, *S. Sedmak* (TSB A193), *R. Bargagli* (TSB A566).

Lecanora mons-nivis Darb.
Wiss Ergebn. Schwed. Südpol. - Exped. 1901-1903, 4 (11): 9 (1912). Type: Snow Hill Island, 64°28'S 57°12'W, 13 Feb. 1903, *C. Skottsberg* (S! holotype).

Lecanora carbonacea C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 576 (1938). Type: Marie Byrd Land, Skua Gull Peak, 76°50'S 145°30'W, *P.A. Siple & S. Corey* 72W-6, 72W-14 (not seen). *Fide* Castello & Nimis 1995a: 82.

Lecidea stancliffi C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 538 (1938). Type: Marie Byrd Land, Lichen Peak, 76°53'S 145°12'W, *P.A. Siple & S. Corey* 73-10 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 84.

Thallus epilithic, scarcely developed, covered by apothecia, composed of scattered or adpressed areoles forming groups 3-7 mm diam., or inconspicuous; areoles granular, whitish, grey to brownish; thallus K-, KC-, C-; medulla I-.

Apothecia lecanorine, sessile, constricted at the base, up to 1-2 mm diam., dispersed or adpressed and angular by compression; disc flat, dark brown or black, sometimes pruinose; thalline margin whitish to dark grey, pruinose, thick and crenulate to thin or reduced. Epithecium dark olivaceous brown, N+ red; hymenium colourless, 40-60 µm tall; hypothecium colourless, 30-50 µm tall, consisting of loose hyphae; cortex of the margin dark, colourless in the inner part. Paraphyses simple or sparsely branched, 1-2 µm diam., apices dark, swollen, 4-5 µm diam. Asci *Lecanora*- type, 40-50 x 12-15 µm, 8-spored. Spores unicellular, colourless, 10-14 x 4-6 µm, ellipsoid.

Discussion. L. mons-nivis belongs in the *L. dispersa* group, with affinities with the muscicolous *L. expectans. L. mons-nivis* differs from *L. dispersa* (L.) Sommerf. in the apothecial disc colour, the N+ reaction of epithecium and the secondary chemistry (Øvstedal & Lewis Smith 2001).

Distribution in the survey area. Rather common; it occurs in cracks of rocks, with nitrophytic species, in particular *Xanthoria elegans* and *Caloplaca citrina*, or with weakly nitrophytic lichens, such as *Buellia lignoides, Rhizocarpon* spp. and *Umbilicaria decussata.*

Total number of samples: 39, from: Baker Rocks, Browning Pass, Cape King, Cape Sastrugi, Cape Washington, Carezza Lake, Crater Cirque, Edmonson Point, Kay Island, Stefania Cirque, Teall Nunatak, Terra Nova Bay Station, Vegetation Ridge.

Distribution. Endemic to continental Antarctica and Antarctic Peninsula. Ellsworth Land (Castello & Nimis 1995a), Marie Byrd Land (type of *L. stancliffi*), Victoria Land (Castello & Nimis 1995b, 2000); Antarctic Peninsula (type, Øvstedal & Lewis Smith 2001, Redon 1985).

Selected specimens examined: **Victoria Land:** Lady Newnes Bay, Cape King, *S. Sedmak* (TSB A254); Wood Bay, Mt Melbourne, Edmonson Point, *S. Sedmak* (TSB A237), *G. Del Frate* (TSB A40); Hallett Peninsula, Victory Mts, Crater Cirque, *P. Modenesi* (TSB A312). - **Ellsworth Land:** Eastern Thiel Range, 75°00'S 72°53'W, *Molholm* 21 (FH-Dodge), as *L. carbonacea*.

Lecanora aff. **orosthea** (Ach.) Ach.
Lich. Univ.: 400 (1810). - *Lichen orostheus* Ach., Lich. Suec. Prodr.: 38 (1799).

Thallus epilithic, areolate, sorediate, composed of cream to pale brown, pinkish or greenish, more or less adpressed areoles forming patches up to 2-3 cm diam.; areoles smooth and shiny, sometimes pruinose, rounded, convex to subglobose or substipitate, scattered or adpressed, to 1 mm diam., K+ yellow then reddish orange, C-, KC + yellow, P-; medulla I-. Soralia whitish cream or darkening to black, initially well-delimited, then confluent and convex; soredia up to 40 µm diam.; prothallus dendritic, whitish to pale brown, hypothallus N-; medulla I-.

Apothecia and pycnidia not seen.

Discussion. In the keys to sterile epilithic taxa by Øvstedal & Lewis Smith (2001) investigated material keys best out as *Lecanora* aff. *orosthea* and agrees in thallus and soredia features with this taxon, recorded from Antarctica from continental and maritime regions (Victoria Land, Dronning Maud Land, southern Antarctic Peninsula, South Shetland Is., South Orkney Is). This material was reported as "? *Buellia* sp." by Castello & Nimis (1995b, 2000).

Distribution in the survey area. This species occurs on volcanic substrata, with *Buellia darbishirei, B. frigida, Tephromela atra* and *Usnea sphacelata*.

Total number of samples: 14, from: Cape Phillips, Coulman Island, Prior Island.

Selected specimens examined: **Victoria Land:** Prior Island, *S. Sedmak* (TSB A295); Coulman Island, *P. Modenesi* (TSB A104, A105, A107, A108). - **Wilkes Land:** Browning Peninsula, *L. Kappen* (KIEL-HA 1399).

Lecanora physciella (Darb.) Hertel
Beih. Nova Hedwigia 79: 447 (1984). - *Lecidea physciella* Darb., Brit. Antarct. Terra Nova Exped. 1910 Nat. Hist. Rep. Bot. 3: 33 (1923). Type: Victoria Land, Cape Adare, 71°17'S 170°14'E, Terra Nova Exped., on shale and grit, *R.E. Priestly* (BM).

Thallus epilithic, effigurate, areolate, yellowish to greenish cream, sometimes whitish, 1-4 cm diam., sometimes with no or few apothecia and with black rounded soralia on the central parts; peripheral areoles 0.5-1.5 mm long and 0.3-0.6 mm wide; central areoles 0.4-1 mm diam., up to 1.5(-2) mm thick; hypothallus black; prothallus black, narrow, well-delimited and continuous, *c.* 0.2 mm wide; thallus K-, C-, KC-, P-; medulla I-, K-, C-, KC-, P-.

Apothecia lecideine, to 0.8 mm diam., on the central parts of the thallus, dispersed or crowded, flat with thin margin to convex or subglobose and immarginate. Epithecium olivaceous green; hymenium colourless, 60-70 µm tall; hypothecium colourless, 80-100 µm tall; exciple olivaceous, *c.* 30 µm thick. Paraphyses coherent, *c.* 2 µm diam., apices olivaceous green, swollen, 4-6 µm diam. Asci *Lecanora* -type, 40-50 x 12-15 µm, 8-spored. Spores unicellular, colourless, 8-12 x 4-5 µm, ellipsoid.

Pycnidia immersed, indicated by slightly prominent dark spots in thallus, 300-350 µm diam.; conidia filiform, 18-20 x 1 µm, straight or curved.

Discussion. A very characteristic species due to the effigurate yellowish cream thallus and the black lecideine apothecia. Damaged thalli by wind and snow, with whitish areoles and scarcely or not developed apothecia are frequent in the survey area. Sterile morphs of *L. physciella*, characterized by black circular soralia in central parts of the effigurate yellowish thalli and recently described as var. *sorediata* Øvstedal (Øvstedal & Lewis Smith 2001), are rather common in the Terra Nova Bay area.

L. physciella has strong affinities with *Lecidea woodberryi* Filson: according to Filson (1966), *L. woodberryi* differs from the other *Lecidea* species of Antarctica in the colourless hypothecium, the effigurate thallus and the thickness of the hymenium (100 µm) and the epithecium (up to 30 µm). All characters reported in the description of *L. woodberryi* fit those of *L. physciella*, with a slight difference in the thickness of the hymenium, which is 45-60 µm (Hertel 1984) to 90 µm (original description) tall in *L. physciella.* An investigation of the type material of *L. woodberryi* could clarify the relationships between these two taxa.

Distribution in the survey area. L. physciella is rather common in the survey area, on granites and cornubianites, with *Umbilicaria* spp., *Pleopsidium chlorophanum* and *Buellia frigida.*

Total number of samples: 41, from: Browning Pass, Cape Phillips, Crater Cirque, Daniell Peninsula, Football Saddle, Index Point, Kay Island, Mt Kenaith, Stefania Cirque, Teall Nunatak, Tripp Island.

Distribution. Endemic to Antarctic regions. Conti-

nental Antarctica: Victoria Land (Castello & Nimis 1995b, 2000, Hertel 1984, 1989, Kappen 1985, Øvstedal & Lewis Smith 2001), Wilkes Land (Øvstedal & Lewis Smith 2001); the maritime Antarctic: Antarctic Peninsula (Hertel 1987b, 1989, Øvstedal & Lewis Smith 2001), South Shetland Is. (Andreev 1988, Olech 1989b, Øvstedal & Lewis Smith 2001, Sancho *et al.* 1999), South Sandwich Is. (Lewis Smith 1995); South Orkney Is. (Øvstedal & Lewis Smith 2001); subantarctic region: South Georgia (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Wood Bay, Kay Island, *P. Modenesi* (TSB A28); Hallett Peninsula, Football Mt, Football Saddle, *P. Modenesi* (TSB A420); Reeves Glacier, Teall Nunatak, *S. Sedmak* (TSB A216).

Lecanora sverdrupiana Øvstedal
Nova Hedwigia 37: 685 (1983). Type: Dronning Maud Land, Sverdrupfjella, Brekkerista, 28.01.1971, *J. Angard* 11 (BG L-4028! holotype).

Thallus epilithic, areolate; areoles verrucose, scattered or aggregated in small groups, covered by apothecia, cream to pale brown, K-, C-, KC-.

Apothecia lecanorine, stipitate, up to 0.5-0.8 mm diam.; thalline margin pale brown, darkening, thick and flexuous, with a whitish pruina; disc brown to dark brown or black, concave to flat. Epithecium brown, N-; hymenium colourless, 50-60 µm tall; outer edge of the cortex of exciple dark brown, internally colourless, 15-20 µm thick. Paraphyses simple or sparsely branched, *c.* 2 µm diam., with swollen apices *c.* 3 µm diam. Asci 40-50 x 15-18 µm, 8-spored. Spores unicellular, colourless, 10-13 x 6-8 µm, broadly ellipsoid, with a thick wall.

Discussion. The material agrees in all characters with the type of *L. sverdrupiana* (BG), a species described by Øvstedal (1983b) from Dronning Maud Land, characterized by stipitate apothecia, brown thalline margin and broadly ellipsoid spores.

Distribution in the survey area. One specimen from the area of Terra Nova Bay Station, growing with *Physcia caesia* and *Xanthoria mawsonii*.

Distribution. Endemic to continental Antarctica and Antarctic Peninsula. Previously known from Dronning Maud Land (Engelskjøn 1986, Øvstedal 1983b, Øvstedal & Lewis Smith 2001), Antarctic Peninsula, Graham Land (Øvstedal 1983b).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Terra Nova Bay Station, *P. Modenesi* (TSB A368).

Lecidea andersonii Filson
Muelleria 3 (1): 16 (1974). Type: Windmill Is., Western side of the Haupt Nunataks, 3 Jan. 1970, *R. Anderson* (MEL 1012035).

Thallus epilithic, areolate, poorly developed and covered by apothecia; areoles white to brownish, granular to angular, usually along rock crevices; medulla I+ violet-blue.

Apothecia lecideine, up to 2 mm diam., scattered or crowded in groups; disc flat to slightly convex, sometimes with a thin whitish pruina; margin thick to thin, persistent, sometimes flexuous. Epithecium olive or dark bluish green, N+ red; hymenium colourless to green or blue, 50-75 µm tall; hypothecium brown, 70-100 µm tall; exciple 70-90 µm thick, outer edge blue or dark greenish, internally colourless. Paraphyses simple or sparsely branched, coherent, with swollen apices, 4-5 µm diam. Asci *Lecidea* - type, 30-40 x 12 µm, 8-spored. Spores unicellular, colourless, 9-10(-12) x 3-4 µm, ellipsoid, sometimes pseudodiblastic.

Discussion. Lecidea andersonii was discussed by Filson (1974b) and Inoue (1991a); according to Filson (1974b), *L. andersonii* has a pale brown hypothecium and spores measuring 9-10 x 4-5 µm, while Inoue (1991a) distinguishes a violet-brown, 50-70 µm tall subhymenium and a colourless, I + violet-blue, 100-150 µm tall hypothecium, and 6-11 x 3-4 µm spores. *L. andersonii* generally has poorly developed thalli, completely covered by apothecia, forming rows of areoles and apothecia along rock crevices. It resembles *L. cancriformis*, a rather common species in the survey area, differing in the larger, never convex or subglobose apothecia, with thick to thin, persistent margin, and in the I+ violet-blue medulla. Another related species from continental Antarctica is *Lecidea soyaensis* May. Inoue, which has a different chemistry (stictic acid and constictic acid), smaller apothecia (up to 0.5 mm diam.), shorter spores (6-9 x 3-4 µm), and a colourless subhymenium and dark hypothecium gradually merging into the colourless medulla (Inoue 1991a).

Distribution in the survey area. A rather rare species in Victoria Land: *L. andersonii* seems to be more nitrophytic than *L. cancriformis*, and occurs with *Buellia frigida*, *Xanthoria elegans, X. mawsonii*, *Physcia caesia*, *Candelariella flava* and *Lecanora fuscobrunnea.*

Total number of samples: 12, from: Cape King, Gondwana Station, Harrow Peaks, Inexpressible Island, Kay Island, Stefania Cirque, Terra Nova Bay Station, Vegetation Island.

Distribution. Endemic to continental Antarctica. Victoria Land (Castello & Nimis 1995b, 2000), Wilkes Land (Filson 1974b), Enderby Land (Inoue 1991a, 1995, Kanda & Inoue 1994), southern Antarctic Peninsula (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Inexpressible Island, *P. Modenesi* (TSB A357); Wood Bay, Kay Island, *P. Modenesi* (TSB A356); Lady Newnes Bay, Cape King, *S. Sedmak* (TSB A261).

Lecidea cancriformis C.W. Dodge & G.E. Baker

Ann. Mo. Bot. Gard. 25: 539 (1938). Type: South Victoria Land, Queen Maud Mts, Scudder Mt, 86°03'S 150°40'W, *Q.A. Blackburn, R.S. Russell Jr. & S.D.L. Paine* QM-6(2) (FH-Dodge! holotype).

Lecidea laseroni C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 98 (1948). Type: George V Land, Madigan Nunatak, 67°08'S 143°22'E, on rock, *C.F. Laseron* A.A.E. 41-1 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 83.

Lecidea mcleani C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 100 (1948). Type: George V Coast, Aurora Peak, 570 m, 67°23'S 144°12'E, *A.L. McLean* A.A.E. 91 (not seen). *Fide* Castello & Nimis 1995a: 84.

Lecidea phillipsiana Filson, ANARE Sci. Rep. Ser. B (II) Bot. 82: 51 (1966). Type: MacRobertson Land, mountains North of Chapman Ridge, *R.F. J.W. 4300*. *Fide* Hale 1987: 283.

Toninia johnstoni C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 113 (1948). Type: MacRobertson Land, Cape Bruce, 67°26'S 60°49'E, *T.H. Johnston*, BANZARE 108-7 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 89.

Thallus epilithic, thick and delimited, areolate, or reduced, developed along rock crevices; areoles brown to dark brown or black, sometimes subsquamulose, with smooth and shiny surface, strongly convex and corrugate to substipitate, angular, up to 1 mm, usually adpressed in groups up to 5 mm diam., sometimes whitish and necrotic, granular or inconspicuous; prothallus sometimes evident, black, 0.5-1 mm wide; cortex K-, C-, KC-, P-; medulla K-, C-, KC-, P-, I-.

Apothecia lecideine, sessile to moderately constricted at the base, flat to subglobose, up to 1.2 mm diam.; margin thin, disappearing with age. Epithecium olive to brownish green or bluish, N + red; hymenium colourless to green or pale blue, 60-80 µm tall; hypothecium dark brown, 70-100 µm tall; exciple 70-80 µm thick, outer edge blue or dark greenish, internally almost colourless. Paraphyses simple to sparsely branched, coherent, 2 µm diam., apices bluish green, 4-5 µm diam. Asci clavate, 40-60 x 10-12 µm, *Lecidea* - type, 8-spored. Spores unicellular, colourless, (8-)9-12 x (2-)3-4 µm, narrowly ellipsoid.

Discussion. This taxon was discussed by Hale (1987) and Inoue (1991a). According to the original description *L. cancriformis* is characterized by the scarcely developed, whitish grey thallus. Type material and collected specimens are highly variable in thallus development: well-developed forms of *L. cancriformis* have an "*atrobrunnea*" – type thallus, of squamulose areoles, varying in colour from pale brown to black, with a shiny surface; the thallus surface often becomes whitish and necrotic and thallus development can be strongly reduced by environmental factors. *L. cancriformis* differs from the closely related *L. atrobrunnea* (Lam. & DC.) Schaer., which is known from the maritime Antarctic (Hertel 1984, Redon 1985, Andreev 1988, Olech 1989b) and South Georgia (Lindsay 1972b), in the I-reaction of the medulla and in the chemistry (Inoue 1991a). The affinities with *L. andersonii* are discussed under this species.

Hale (1987) maintained the synonymy between *L. cancriformis* and *L. phillipsiana* based on a comparison of the type material of *L. cancriformis* and specimens of *L. phillipsiana* of the Lichenes Antarctici Exsiccati (Filson 1975a). The main difference is in thallus development, *L. cancriformis* having endolithic or scarcely evident thalli and *L. phillipsiana* well-developed ones (Filson 1966, Hertel 1984); according to Hertel (1984) *L. cancriformis* can develop conspicuous thalli in favourable situations, corresponding in all characters to *L. phillipsiana*.

Distribution in the survey area. L. cancriformis is rather common in the survey area, growing along rock crevices in rows; it seems to be a weakly nitrophytic lichen, occurring with *Acarospora gwynnii, Buellia frigida, B. lignoides, Lecanora physciella, Pleopsidium chlorophanum, Pseudephebe minuscula* and *Umbilicaria decussata.*

Total number of samples: 36, from: Apostrophe Island, Cape Sastrugi, Carezza Lake, Crater Cirque, Football Saddle, Inexpressible Island, Kay Island, Mt Moriarty, Prior Island, Stefania Cirque, Teall Nunatak, Terra Nova Bay Station, Vegetation Island.

Distribution. Endemic to the continental and maritime Antarctic. Victoria Land (type, Castello & Nimis 1995b, 2000, Hertel 1984, Kappen 1985, Hale 1987, Seppelt *et al.* 1995), King George V Land (type of *L. laseroni*), Wilkes Land (Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (type of *T. johnstonii*, Filson 1966, 1975c), Enderby Land (Inoue 1991a, 1995), Dronning Maud Land (Bowra *et al.* 1966, Lindsay 1971c); Antarctic Peninsula (Øvstedal & Lewis Smith 2001), South Shetland Is. (Andreev 1988).

Selected specimens examined: **Victoria Land:** Prior Island, *S. Sedmak* (TSB A297); Terra Nova Bay, Inexpressible Island, *P. Modenesi* (TSB A12, A14, A350); Freiburg Mts, Moawhango Neve, *Hale* 59644, 59780, 59785 (US); Linnaeus Terrace, Asgard Range, *Hale* 59643, 59644 (US); Wright Valley, Dais, Hale 59828 (US); Taylor Valley, Nussbaum Riegel, *Hale* 59809 (US).

Lecidella siplei (C.W. Dodge & G.E. Baker) May. Inoue

Nankyoku Shiryo (Antarctic Record) 35: 282. *Lecidea siplei* C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 530 (1938). Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey* 72W-4 (FH-Dodge! holotype).

Lecidea wadei C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard.

25: 532 (1938). Type: Marie Byrd Land, Mt Cooper, 77°07'S 145°30'W, muscicole, *P.A. Siple, F.A. Wade, S. Corey & Stancliff* R-6 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 84.

Thallus muscicolous, terricolous or epilithic, continuous, rimose to areolate or subsquamulose, whitish, cream to greyish or dark grey, forming patches up to 5-6 cm diam., with a granular to verrucose, well-corticate to decomposed surface; thallus K- or K + yellow, C-, KC- or + yellow; medulla I -.

Apothecia lecideine, up to 1.5 mm diam., constricted at the base, round or flexuose, often adpressed in groups, at first flat with a thick prominent margin, shiny, later convex and thinly marginate or immarginate, matt. Epithecium bluish to blue-green; hymenium colourless to pale blue-green, 50-80 µm tall, more or less inspersed; subhymenium *c.* 30 µm tall; hypothecium colourless to pale brownish, up to 150 µm tall, with large crystals, K- or K + pale yellowish; exciple 40-50 µm thick, often inspersed, of radiating, 5-7 µm thick hyphae; outer part dark olivaceous to blackish, inner part paler, K-, C-. Paraphyses simple, thin, *c.* 1.5 µm diam., not coherent, apices slightly swollen, dark, *c.* 3 µm diam. Asci *Lecanora*-type, 40-50 x 12-20 µm, 8-spored. Spores unicellular, colourless, 10-16 x 6-9 (-10) µm, ellipsoid to broadly ellipsoid.

Discussion. This taxon was treated by Hale (1987) and Inoue (1991a). It seems to be rather variable both in ecological and morphological features: according to the original description (Dodge & Baker 1938), *L. siplei* (and *L. wadei* too) grows on loose sandy soil with mosses, Dodge (1973) reports it as muscicolous, Hale (1987), Inoue (1991a) and Øvstedal & Lewis Smith (2001) as growing on loose sand and rock. Thallus development is highly variable (Øvstedal & Lewis Smith 2001), from granular-areolate forms with a more or less amorphous, decomposed and scabrid, whitish to dark grey surface (described by Hale 1987), to areolate, verrucose or subsquamulose forms, consisting of smooth, white to cream, darkening, well-corticate areoles (see Inoue 1991a). The spores are ellipsoid to broadly ellipsoid, with a rather wide size range: 9-13 x 5-8 µm according to Inoue (1991a), 11-14 x 7-10 µm according to Hale (1987). Øvstedal & Lewis Smith (2001) report a spore size of 10-14 x 6-7 µm for *L. siplei*, while material from continental Antarctica growing on soil and rocks with squamulose thalli and slightly larger spores (10-14 x 7-8 µm), is distinguished as *Lecidella* sp. E. The only muscicolous *Lecidella* recorded by Øvstedal & Lewis Smith (2001) from continental Antarctica is *Lecidella* sp. B, but its relationships with *L. siplei* are not discussed.

Investigated specimens growing on mosses in the survey area have all the essential characters of those occuring on sandy soil or rocks, and spore size is highly variable in specimens collected on the different substrata: all material is here attributed to *L. siplei*, waiting for a clarification of this taxon.

Distribution in the survey area. Rather common in the survey area, on different substrata, mainly on mosses and sandy soil, rarely on rocks, in eutrophicated stands, with *Caloplaca athallina, C. citrina, Candelariella flava, C. vitellina, Lecanora expectans, Physcia caesia* and *Xanthoria mawsonii.*

Total number of samples: 35, from: Apostrophe Island, Campo Icaro, Cape Irizar, Cape King, Carezza Lake, Crater Cirque, Harrow Peaks, Inexpressible Island, Kay Island, Prior Island, Terra Nova Bay Station, Tinker Glacier, Tripp Island.

Distribution. Endemic to the continental and maritime Antarctic. Continental Antarctica (Øvstedal & Lewis Smith 2001): Marie Byrd Land (type, type of *L. wadei*), Victoria Land (Castello & Nimis 1995b, 2000, Hale 1987, Seppelt *et al.* 1995), Enderby Land (Inoue 1991a, 1995, Kanda & Inoue 1994), Dronning Maud Land (Thor 1997); the maritime Antarctic: Antarctic Peninsula, South Shetland Is., South Orkney Is., Bouvetøya (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Terra Nova Bay Station, *P. Modenesi* (TSB A17); Terra Nova Bay, Northern Foothills, Campo Icaro, *P. Modenesi* (A413); Moawhango Neve, Freiburg Mts, *Hale* 59709 (US).

Leproloma cacuminum (Massal.) Laundon

Lichenologist 24: 345 (1992). - *Diploicia cacuminum* Massal., Symm. Lich. Nov.: 52 (1855). – *Rinodina cacuminum* (Massal.) Anzi, Lich. Rar. Veneti exs. No. 48 (1863). – *Buellia epigaea* var. *cacuminum* (Massal.) Jatta, Syll. Lich. Ital.: 385 (1900).

Crocynia antarctica Hue, Deux. Expéd. Antarct. Fr. Lich.: 8 (1915). Type: Antarctica, South Shetland Islands, King George Island, Admiralty Bay, on nunatak, 300 m, 25 Dec. 1909, *L. Gain.* 301 p.p. (PC holotype). *Fide* Laundon 1992: 345.

Crocynia caerulescens Hue, Deux. Expéd. Antarct. Fr. Lich.: 11 (1915). – *Lepraria caerulescens* (Hue) Botnen & Øvstedal, Polar Res. 2, 6: 130 (1988). Type: Antarctica, off Graham Land, [Booth-] Wandel Island, 'sur les mousses dans les fentes des rochers de la Colline Jeanne', 30 Dec. 1908, *L. Gain* 125 (PC lectotype). *Fide* Laundon 1992: 346.

Crocynia candidissima Hue, Deux. Expéd. Antarct. Fr. Lich.: 7 (1915). Type: Antarctica, Graham Land, Cap des Trois-Perez, on mosses on acid rock, 6 March 1909, *Deux. Expéd. Antarct. Fr.* 273 (PC holotype). *Fide* Laundon 1992: 346.

Crocynia minima Hue, Deux. Expéd. Antarct. Fr. Lich.: 10 (1915). Antarctica, off Graham Land, Petermann Island, 'sur les rochers du sommet', 14 March 1909, *L. Gain* 286 (PC holotype). *Fide* Laundon 1992: 346.

Crocynia nivea Hue, Deux. Expéd. Antarct. Fr. Lich.: 9 (1915), nom. illeg. (Art. 64.1), non *Crocynia nivea* (Mont.) Hue, Mém. Soc. nat. Sci. Math. Cherbourg 37: 244 (1909). Type: Antarctica, off Graham Land, Petermann Island, 'sur les rochers au nord de l'ile', 1 Jan. 1909, *J. Liouville* 144 (PC holoytpe). *Fide* Laundon 1992: 346.

Lepraria angardiana Øvstedal, Nova Hedwigia 37: 687 (1983). - *Leproloma angardianum* (Øvstedal) Laundon, Lichenologist 21: 19 (1989). Type: Antarctica, Dronning Maud Land, Sverdrupfjella, Sørhausane, on soil, 31 Dec. 1970, *J. Angard* (BG holotype). *Fide*

Laundon 1992: 346.

Thallus crustose-leprose, effuse, forming a thick, white to cream or greyish crust, usually delimited but without lobes; thallus surface composed by a mass of spherical granules, up to 120-180 µm diam., or eroded and consisting of a leprose membrane; granules covered by interwoven hyphae, often projecting outwards; medulla white; hypothallus whitish. Thallus K + yellow, C-, KC-, P- or P+ yellowish.

Discussion. This taxon was discussed by Øvstedal (1983b), Botnen & Øvstedal (1988) and Laundon (1989, 1992). In Antarctica there are several lepraríod taxa occurring mainly on moss cushions: their taxonomic treatment is difficult, because of the relative few morphological features and chemical characters become essential for identification (Botnen & Øvstedal 1988, Laundon 1992). Sterile thalli of other muscicolous lichens can be easily confused with *Lepraria* and *Leproloma* species: they can be best distinguished by thin-layer chromatography. In the survey area sterile thalli of *B. papillata* may resemble *L. cacuminum*, the two species having white to whitish cream thalli, K+ yellow, C-, KC-, P- or + yellowish, forming a more or less wide delimited crust. All sterile, completely lepraríod thalli were included in *L. cacuminum*, while at least partly corticate thalli were treated as sterile forms of *Buellia papillata.*

Distribution in the survey area. Total number of samples: 24, from: Apostrophe Island, Browning Pass, Cape King, Crater Cirque, Edmonson Point, Gondwana Station, Harrow Peaks, Starr Nunatak, Tinker Glacier, Vegetation Island.

Distribution. Bipolar. Continental Antarctica: Enderby Land (Inoue 1995), Dronning Maud Land (type *of L. angardiana*, Øvstedal 1983b, 1986a, Engelskjøn 1986, Botnen & Øvstedal 1988); the maritime Antarctic: Antarctic Peninsula (type of *C. caerulescens, C. candidissima, C. minima, C. nivea*, Botnen & Øvstedal 1988, Laundon 1989), South Shetland Is. (type of *C. antarctica*, Aptroot & van der Knaap 1993, Laundon 1989, Øvstedal & Lewis Smith 2001), South Orkney Is., South Sandwich Is. (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Deep Freeze Range, Browning Pass, *P. Modenesi* (TSB A484); Whitmer Peninsula, Harbord Glacier, Starr Nunatak, *R. Bargagli* (TSB A604).

Physcia caesia (Hoffm.) Fürnrohr

Natur. Topogr. Regensburg, 2: 250 (1839). - *Lichen caesius* Hoffm., Enum. Lich.: 65 (1788).

Dermatiscum harrissonii C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 153 (1948). Type: Queen Mary Land, Possession Rocks, 66°47'S 98°50'E, muscicole, *C.T. Harrisson* A.A.E. 56-1 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 78.

Pannoparmelia delicata C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 587 (1938). Type: Marie Byrd Land, Lichen Peak, 76°53'S 145°12'W, *P.A. Siple & S. Corey* 73-1 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 85.

Pannoparmelia pellucida C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 586 (1938). Type: Marie Byrd Land, Lichen Peak, 76°53'S 145°12'W, *P.A. Siple & S. Corey* 73-1 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 85.

Parmelia austrogeorgica C.W. Dodge, Nova Hedwigia 15, 2-4: 498 (1970). *Fide* Lindsay 1973a: 113.

Parmelia coreyi C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 595 (1938). Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, 76°50'S 145°30'W, *P.A. Siple & S. Corey* 72W-3 (FH-Dodge! holotype). *Fide* Filson 1974a: 4; Castello & Nimis 1995a: 85.

Parmelia griseola C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 596 (1938). Type: Marie Byrd Land, Skua Gull Peak, 76°50'S 145°30'W, *P.A. Siple & S. Corey* 72W-3 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 85.

Parmelia johnstoni C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 191 (1948). Type: MacRobertson Coast, Cape Bruce, 67°25'S 60°50'E, B.A.N.Z.A.R.E. B108-16 (FH-Dodge! holotype). *Fide* Filson 1974a: 4; Castello & Nimis 1995a: 85.

Parmelia leucoblephara C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 592 (1938). Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, 76°53'S 145°12'W, *P.A. Siple & S. Corey* 73-7 (FH-Dodge! holotype). *Fide* Øvstedal 1983a: 222; Castello & Nimis 1995a: 85.

Parmelia rennellii C.W. Dodge, Nova Hedwigia 15: 319 (1968). Type: Eights Coast, Jones Mts, Intrusive Spur, 73°30'S 94°25'W, on decayed moss, *K.P. Rennell, E. Schofield* AA-155 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 85.

Parmelia starrii C.W. Dodge, Nova Hedwigia 15: 320 (1968). Type: Gneiss Islet, 71°45'S 97°33'W, near Thurston Island, on decayed moss, *R.B. Starr* 4, 8 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 85.

Parmelia variolosa C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 593 (1938). Type: Marie Byrd Land, Edsel Ford Range, Mt Rea-Cooper, 77°07'S 145°24'W, *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* R-3 (FH-Dodge! isotype). *Fide* Filson 1974a: 4; Castello & Nimis 1995a: 85.

Physcia autenboeri C.W. Dodge, Nova Hedwigia 15: 331 (1968). - *Dirinaria autenboeri* C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 378 (1973). Type: Princess Ragnhild Coast, Viking Heights, 72°04'S 23°24'E, on moss cushions, *T. van Autenboer* 6 (FH!-Dodge holotype). *Fide* Castello & Nimis 1995a: 79.

Physcia caesioides N.S. Golubk. & Savicz, Nov. Sys. Pl. Non Vasc., 12: 283-285 (1967). Type: Enderby Land, Molodezhnaya, 67°45'S 45°15'E, *I.M. Simonov* (LE). *Fide* Dodge 1973: 215.

Physcia llanoi C.W. Dodge, Trans. Amer. Microsc. Soc. 84: 528 (1965). Type: Knox Coast, Wilkes, 66°15'S 110°31'E, muscicole, *G.A. Llano* 2828 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 86.

Thallus epilithic or muscicolous, foliose, orbicular, up to 6-7 cm diam., usually confluent with other thalli, more or less adpressed to the substratum, whitish grey to dark grey, densely white-maculate, sometimes pruinose; lobes 0.2-3 mm wide, separate to imbricate, convex to concave, with dark margins; central parts of thallus consisting of densely imbricate small lobes; lower side dark brown, outer edge pale; rhizines simple, black, sometimes with almost white terminal parts, and very long and protruding. Upper cortex K + yellow, slowly reddish, paraplectenchymatous; medulla K + yellow; lower cortex prosoplectenchymatous. Soralia

frequent and confluent, usually terminal on short lobes, capitate to crateriform, rarely labriform, sometimes laminal.

Apothecia not seen.

Discussion. Antarctic material of this variable lichen was discussed by Nakanishi & Kashiwadani (1976). The great number of synonyms is due to the high polymorphism of this taxon. *Ph. caesia* is very common in Antarctica; it is usually sterile, but a description of apothecia and spores of Antarctic material is provided by Nakanishi & Kashiwadani (1976). It can be easily confused with *Physcia dubia*, but differs in the broad, rarely narrow, lobes, the white-maculate upper side, the capitate or crateriform, rarely labriform soralia, the K+ yellow medulla. The two species often occur together.

Distribution in the survey area. Very common in eutrophicated stands, on rocks and bryophytes, in association with *Buellia frigida*, *Xanthoria mawsonii*, *Candelariella flava*, *Candelaria murrayi*, *Caloplaca citrina* and *Lecanora expectans.*

Total number of samples: 115, from: Apostrophe Island, Campo Icaro, Cape King, Crater Cirque, Edmonson Point, Gondwana Station, Harrow Peaks, Inexpressible Island, Kay Island, Prior Island, Starr Nunatak, Terra Nova Bay Station, Tinker Glacier, Tripp Island.

Distribution. Cosmopolitan. Widespread in Antarctic and subantarctic regions. Continental Antarctica: Eights Coast (type of *Parmelia rennellii, P. starrii*), Marie Byrd Land (type of *Parmelia coreyi, P. griseola, P. leucoblephara, P. variolosa, Pannoparmelia delicata, P. pellucida*), Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985, Murray 1963, Seppelt *et al.* 1995), King George V Land (Filson 1974a), Wilkes Land (type of *Ph. llanoi*, Filson 1974a, 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (type of *D. harrissonii*, Andreev 1990, Filson 1974a, Olech 1989a), Princess Elizabeth Land (Filson 1974a), MacRobertson Land (type of *P. johnstonii*, Filson 1966, 1974a, 1975c, Seppelt & Ashton 1978), Enderby Land (Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977, Nakanishi & Kashiwadani 1976), Dronning Maud Land (type of *Ph. autenboeri*, Engelskjøn 1986, Lindsay 1972a, Øvstedal 1983a, 1986a, Thor 1995, 1997); the maritime Antarctic: Antarctic Peninsula (Gremmen *et al.* 1995, Lewis Smith & Corner 1973, Redon 1985), South Shetland Is. (Andreev 1988, Aptroot & van der Knaap 1993, Jacobsen & Kappen 1988, Olech 1989b, Redon 1985, Sancho *et al.* 1999), South Orkney Is. (Lewis Smith 1972, Redon 1985), South Sandwich Is., Bouvetøya (Øvstedal & Lewis Smith 2001); subantarctic region: South Georgia (Lindsay 1973a, 1974c, Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Prior Island, *S. Sedmak* (TSB A280); Terra Nova Bay, Terra Nova Bay Station, *P. Modenesi* (TSB A22, A24, A70); Wood Bay, Kay Island, *P. Modenesi* (TSB A29).

Physcia dubia (Hoffm.) Lettau
Hedwigia, 52: 254 (1912). - *Lobaria dubia* Hoffm., Deutschl. Flora: 156 (1796).

Thallus muscicolous or epilithic, foliose, irregular to orbicular, up to 1 cm diam., whitish grey to dark grey or brownish, sometimes pruinose; lobes distinctly separate, narrow, elongate and slightly ascending, up to 1.5 mm wide; lower side pale brown to brownish, with dark simple rhizines. Upper cortex paraplectenchymatous, K + yellow; medulla K-; lower cortex prosoplectenchymatous. Soralia labriform.

Apothecia not seen.

Discussion. This species can be confused with *P. caesia*, and it has probably been misinterpreted in Antarctic regions (Jørgensen 1986). *P. dubia* differs from *P. caesia* mainly in the K- reaction of the medulla, the narrower lobes, which are never white-maculate, and the marginal and labriform soralia (Moberg 1977); the two species are often associated. For a discussion of Antarctic material see Nakanishi & Kashiwadani (1976).

Distribution in the survey area. Few collections on siliceous rocks and mosses, with nitrophytic species, *Candelaria murrayi, Candelariella flava, Ph. caesia, Xanthoria mawsonii.*

Total number of samples: 7, from: Apostrophe Island, Edmonson Point, Kay Island.

Distribution. Bipolar. Continental Antarctica: Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985, Seppelt *et al.* 1996), Queen Mary Land (Olech 1989a), Enderby Land (Inoue 1995, Nakanishi 1977, Nakanishi & Kashiwadani 1976); the maritime Antarctic: Antarctic Peninsula (De Leeuw *et al.* 1998, Øvstedal & Lewis Smith 2001), South Shetland Is. (Aptroot & van der Knaap 1993, Olech 1989b, Øvstedal & Lewis Smith 2001, Sancho *et al.* 1999), South Sandwich Is. (Øvstedal & Lewis Smith 2001), Bouvetøya (Engelskjøn 1987, Jørgensen 1986, Øvstedal & Lewis Smith 2001); subantarctic region: South Georgia (Jørgensen 1986, Lindsay 1974c (as *Ph.* cf. *wainioi*), Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Terra Nova Bay Station, *F. Bersan* (TSB A804); Wood Bay, Mt Melbourne, Edmonson Point, *S. Sedmak* (TSB A417).

Pleopsidium chlorophanum (Wahlenb.) Zopf
Ann. Chem. 284: 117 (1895). - *Parmelia chlorophana* Wahlenb., *in* Ach., Meth. Lich. Suppl.: 44 (1803). - *Acarospora chlorophana* (Wahlenb.) Ric. Auton. Lich. Crost.: 27 (1852).

Biatorella antarctica Js. Murray, Trans. Roy. Soc. N.Z. 2: 60 (1963). - *Biatorellopsis antarctica* (Js. Murray) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 138 (1973). Type: Victoria Land, Football Mt, Hallett Base, 2700 ft., *E.B. Fitzgerald & W.G. Croll* (WELT 138! holotype). *Fide* Øvstedal 1983a: 218.

Biatorellopsis eklundii C.W. Dodge, Nova Hedwigia 15: 312 (1968). Type: Antarctic Peninsula, Batterbee Mts, 71°23'S 66°55'W, on rock, *C.Eklund* 94 [B-3-4] (FH-Dodge! holotype). *Fide* Castello & Nimis 1994a: 288.

Candelariella cerebriformis C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B. 7: 184 (1948). - *Biatorellopsis cerebriformis* (C.W. Dodge) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 139 (1973). - *Biatorella cerebriformis* (C.W. Dodge) Filson, Muelleria 3 (2): 149 (1975). Type: George V Land, Cape Denison, Commonwealth Bay, 67°00'S 142°36'E, on rocks, 1912-13, A.A.E. 1052 (FH-Dodge! holotype). *Fide* Øvstedal 1983a: 218; Castello & Nimis 1994a: 288.

Polycauliona citrina C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B. 7: 238 (1948). Type: Queen Mary Coast, L/V Possession Nunatak, 66°45'S 98°30'E, 25 Dec. 1912, *C.T. Harrisson* 42 (FH-Dodge! holotype). *Fide* Castello & Nimis 1994a: 288.

Thallus epilithic, yellow, K-, KC-, very variable and ranging from areolate to areolate-stipitate and squamulose-pulvinate, to effigurate, a few cm broad and up to 1 cm tall; areoles smooth to verrucose-cerebriform, up to 2-4 mm diam.; medulla white, K-, KC-.

Apothecia up to 2-3 mm diam., flat to convex or almost globose, sometimes with a corrugated disc; thalline margin thin, disappearing at maturity. Epithecium brownish yellow, 15-20 µm tall; hymenium colourless, 60-100 µm tall; hypothecium colourless, 50-80 µm tall. Paraphyses simple or sparsely branched, *c.* 2 µm diam., apices not swollen. Asci 70-80 x 15-20 µm, *Pleopsidium*-type, with 100-200 spores. Spores unicellular, colourless, 3.5-4.5 x 1.5-2 µm, ellipsoid.

Pycnidia immersed; conidia ellipsoid, 3-3.8 x 1.5-1.8 µm.

Discussion. P. chlorophanum is very variable, and was described from Antarctica under several specific or generic epithets, that were found to be just morphotypes induced by environmental conditions. For a discussion see Castello & Nimis (1994a).

Distribution in the survey area. Common in the survey area, in association with anitrophytic or weakly nitrophytic species, such as *Acarospora gwynnii*, *Buellia lignoides*, *B. frigida*, *Lecanora fuscobrunnea*, *L. physciella*, *Lecidea cancriformis*, *Pseudephebe minuscula* and *Umbilicaria decussata*.

Total number of samples: 54, from: Campo Icaro, Cape Phillips, Cape Sastrugi, Carezza Lake, Coulman Island, Daniell Peninsula, Edmonson Point, Football Saddle, Gondwana Station, Lowry Bluff, Mt Moriarty, Stefania Cirque, Tarn Flat, Teall Nunatak, Terra Nova Bay Station, Vegetation Island, Vegetation Ridge.

Distribution. Bipolar. Widespread with a circumpolar distribution. Continental Antarctica: Victoria Land (Castello & Nimis 1994a, 1995b, 2000, Kappen 1985, Murray 1963), King George V Land (type of *C. cerebriformis*, Castello & Nimis 1994a), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (type of *P. citrina*, Andreev 1990, Castello & Nimis 1994a, Olech 1989a), MacRobertson Land (Castello & Nimis 1994a, Filson 1966, 1975c), Enderby Land (Inoue 1995), Dronning Maud Land (Engelskjøn 1986, Lindsay 1971c, 1972a, Øvstedal 1983a, 1986a, Thor 1995, 1997), Coats Land (Lindsay 1974b), south-western Antarctic Peninsula (type of *B. eklundii*); the maritime Antarctic: W Peninsula (Lewis Smith & Corner 1973, Øvstedal & Lewis Smith 2001), South Shetland Is. (Olech 1989b, Øvstedal & Lewis Smith 2001), South Orkney Is. (Lewis Smith 1972, Øvstedal & Lewis Smith 2001, Redon 1985); subantarctic region: South Georgia (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Vegetation Island, *P. Modenesi* (TSB A66), *G. Del Frate* (TSB A52); Terra Nova Bay, Reeves Glacier, Teall Nunatak, *P. Modenesi* (TSB A68); Coulman Island, *P. Modenesi* (TSB A103); Hallett Peninsula, Admiralty Mts, Edisto Glacier, Stefania Cirque, *P. Modenesi* (TSB A75); Snowdome, Hallett Base, *E.B. Fitzgerald* (WELT 116), as *Biatorella antarctica*; Football Mt, Hallett Base, *E.B. Fitzgerald & W.G. Croll* (WELT 134), as *B. antarctica*; Cape Crozier, 76°59'S 169°34'E, right below camp, *Holm-Hansen Bag 35 c* (FH-Dodge), as *P. citrina*; Skelton Glacier, moraine bluff, 78°45'S 161°42'E, *John Mulligan 24* (FH-Dodge), as *P. citrina*. - **George V Coast:** Madigan Nunatak, 30 miles east of Winter Quarters, 67°7'S 143°20'E, *C.F. Laseron, 25-7* (FH-Dodge), as *P. citrina*. - **Queen Mary Coast:** L/IV, Mt Barr. Smith, 67°12'S 99°E, *Harrison* 75-1 (FH-Dodge), as *P. citrina*. - **MacRobertson Land:** Fischer Nunatak, *R. Filson & C. Austin*, Lich. Antarct. Exsiccati, fasc. I, n° 4 (BM), as *Biatorella cerebriformis*.

Pseudephebe minuscula (Nyl. *ex* Arnold) Brodo & Hawksworth
Opera Botanica 42: 140 (1977). - *Imbricaria lanata* var. *minuscula* Nyl. *ex* Arnold, Ver. Zool.-Bot. Ges. Wien 28: 293 (1878). – *Parmelia minuscula* (Nyl. *ex* Arnold) Nyl., Bull. Soc. Linn. Normand., sér. 4,1: 205 (1887). - *Cornicularia lanata* var. *minuscula* (Nyl. *ex* Arnold) Hue, Deux. Exped. Antarct. Fr. Lich.: 41 (1915). - *Alectoria minuscula* (Nyl. ex Arnold) Degel., Nyt Mag. Naturvid. 78: 286 (1938).

Alectoria antarctica C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 599 (1938). Type: Antarctica, Marie Byrd Land, Edsel Ford Range, Mt Rea Cooper, *P. Siple & al.* R-1 (FH). *Fide* Lamb 1964: 27; Brodo & Hawksworth 1977: 141.

Alectoria intricata Hue, Deux. Exped. Antarct. Fr. Lich.: 41 (1915). - *Alectoria bicolor* var. *intricata* (Hue) Gyelnik, Ann. hist. nat. Mus. hung., 29: 3 (1935). - *Bryopogon bicolor* var. *intricatus* (Hue) Gyelnik, Repert. nov. Spec. Regn. veg., 38: 238 (1935). Type: Marguerite Bay, FAE 1908-10/269. *Fide* Lamb 1948: 243.

Parmelia minuscula f. *applanata* Lynge, *in* Lynge & Scholander, Skr. Svalbard Ishavet 41: 71 (1932). - *Alectoria minuscula* f. *applanata* (Lynge) I.M. Lamb, Nyt Mag. Naturvid. 80: 264 (1939). *Fide* Brodo & Hawksworth 1977: 141.

Parmelia pubescens f. *biformis* Vain., Exped. Antarct. Belge Rés. Voy. S.Y. Belgica 1897-99, Rap. Sci. Bot.: 14 (1903). - *Alectoria minuscula* f. *biformis* (Vain.) I.M. Lamb, Lilloa 14: 243 (1948). -

Alectoria biformis (Vain.) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 219 (1973). Type: Antarctica: Brabant Island, *E. Racovitza* BAE 246 (TUR). *Fide* Brodo & Hawksworth 1977: 141.

Parmelia pubescens var. *congesta* Zahlbr., Dtsch. Südpol. Exped. 8: 52 (1928). - *Alectoria congesta* (Zahlbr.) C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 195 (1948). - *Alectoria minuscula* f. *congesta* (Zahlbr.) I.M. Lamb, Lilloa 14: 244 (1948). Type: Antarctica, Kaiser Wilhelm II Land, Gaussberg, Drygalskey's Expedition, 1901-03 (BM lectotype). *Fide* Brodo & Hawksworth 1977: 141.

Thallus epilithic, fruticose, prostrate, or in extreme forms almost subfoliose or crustose, dark brown to black, sometimes with pale brown basal parts, often shiny, forming circular adpressed cushions up to 3 cm diam., attached to the substratum by short hapters; lobes always somewhat flattened, up to 1 mm broad, usually dichotomically and irregularly branched, with numerous short lateral branches; internodal distance not exceeding 0.5 mm.

Apothecia and pycnidia not seen.

Discussion. This taxon, monographed by Lamb (1964) and Brodo & Hawksworth (1977), is very variable, especially in extreme ecological conditions.

Distribution in the survey area. Common on granites and diorites, in anitrophytic to weakly nitrophytic communities, with *Acarospora gwynnii, Buellia lignoides, Lecanora fuscobrunnea, Lecidea cancriformis, Pleopsidium chlorophanum, Rhizocarpon* spp., *Umbilicaria decussata* and *Usnea* spp.

Total number of samples: 59, from: Campo Icaro, Cape Irizar, Cape King, Cape Sastrugi, Carezza Lake, Coulman Island, Crater Cirque, Football Saddle, Gondwana Station, Inexpressible Island, Lamplugh Island, Prior Island, Starr Nunatak, Stefania Cirque, Terra Nova Bay Station, Tripp Island, Vegetation Island, Vegetation Ridge, Whitmer Peninsula.

Distribution. Bipolar. Circumpolar in Antarctica. Continental Antarctica: Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985, Murray 1963), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), Enderby Land (Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977), MacRobertson Land (Filson 1966, 1975c, Seppelt & Ashton 1978), Dronning Maud Land (Bowra *et al.* 1966, Engelskjøn 1986, Lindsay 1971c, 1972a, Øvstedal 1983a, 1983b, 1986a, Thor 1995, 1997); the maritime Antarctic: Antarctic Peninsula (Gremmen *et al.* 1995, Lamb 1964, Lewis Smith & Corner 1973, Øvstedal & Lewis Smith 2001, Redon 1985), South Shetland Is. (Lindsay 1969a, Olech 1989b, Øvstedal & Lewis Smith 2001, Redon 1985), South Orkney Is. (Lindsay 1969a, Øvstedal & Lewis Smith 2001, Redon 1985); subantarctic region: South Georgia (Lindsay 1972b, 1974c, Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Whitmer Peninsula, *S. Sedmak* (TSB A285); Terra Nova Bay, Northern Foothills, Vegetation Ridge, *P. Modenesi* (TSB A91); Terra Nova Bay, Deep Freeze Range, Cape Sastrugi, *S. Sedmak* (TSB A198, A412); Hallett Peninsula, Football Mt, Football Saddle, *P. Modenesi* (TSB A92).

Rhizocarpon adarense (Darb.) I.M. Lamb

Lilloa 14: 217, 221 (1948). - *Buellia adarensis* Darb., Brit. Antarct. Terra Nova Exped. 1910 Nat. Hist. Rep. Bot. 3: 35 (1923). Type: Victoria Land, Cape Adare, 71°17'S 170°15'E, *R.E. Priestley* (BM).

Buellia flavoplana Darb., Brit. Antarct. Terra Nova Exped. 1910 Nat. Hist. Rep. Bot. 3: 38 (1923). Type: Victoria Land, Cape Adare, 71°17'S 170°15'E, *R.E. Priestley* (BM). *Fide* Lamb 1948: 221.

Buellia superba Darb., Brit. Antarct. Terra Nova Exped. 1910 Nat. Hist. Rep. Bot. 3: 42 (1923). Type: Victoria Land, Cape Sastrugi, 74°44'S 163°32'E (BM). *Fide* Lamb 1948: 221.

Buellia tristis Darb., Brit. Antarct. Terra Nova Exped. 1910 Nat. Hist. Rep. Bot. 3: 43 (1923). Type: Victoria Land, Cape Sastrugi, 74°44'S 163°32'E (BM). *Fide* Lamb 1948: 221.

Buellia variabilis Darb., Brit. Antarct. Terra Nova Exped. 1910 Nat. Hist. Rep. Bot. 3: 44 (1923). Type: Victoria Land, Cape Sastrugi, 74°44'S 163°32'E (BM). *Fide* Lamb 1948: 221.

Thallus epilithic, areolate, yellow, greenish yellow or whitish, forming orbicular patches up to 4 cm diam.; areoles contiguous, flat to convex or subglobose, 0.5-2 mm diam., sometimes squamulose up to 3-4 mm wide and 2 mm thick; edges of the areoles black; surface scabrid to verrucose, matt; hypothallus black; prothallus black and thick, delimited, *c.* 1 mm wide; cortex 100 µm thick, K-, C-, KC-, P-; medulla I-, K-, C-, KC-, P-.

Apothecia lecideine, black, sessile, among the areoles, round or angular, flat to slightly convex, up to 1.5 mm diam., with a distinct margin becoming whitish and necrotic and disappearing with age; disc finely verrucose. Epithecium dark brown, K+ violet, with granules; hymenium colourless to reddish brown, 80-110 µm tall; hypothecium dark brown, 60-130 µm tall; exciple 25-30 µm thick, outer edge dark brown, internally paler. Paraphyses thin, septate, simple or sparsely branched, up to 3 µm diam., apices dark brown, up to 5 µm diam., strongly conglutinate. Asci clavate, 50-70 x 15-22 µm, 8-spored. Spores brown, bicellular, with a rather evident halo when immature, (13-) 14-17 x 6-8 µm, not or only slightly constricted at the septum.

Discussion. This taxon was formerly included by Runemark (1956) in the variable *Rh. superficiale* (Schaer.) Malme. Øvstedal & Lewis Smith (2001) maintain *Rh. adarense* as distinct, differing from *Rh. superficiale* in chemistry (with rhizocarpic acid, without the stictic acid complex) and in the longer spores (11-12 x 8-9 µm in *Rh. superficiale*). *Rh. adarense* seems to be restricted to continental Antarctica, while *Rh. superficiale* is reported from the Antarctic Peninsu-

la. According to these authors further investigations are needed the clarify the relationships between these two species, which could belong to one variable taxon.

Distribution in the survey area. Rather common; it occurs on granites and diorites, with *Buellia lignoides*, *Pseudephebe minuscula*, *Umbilicaria decussata*, *Acarospora gwynnii* and *Pleopsidium chlorophanum*.

Total number of samples: 21, from: Cape Sastrugi, Index Point, Kay Island, Morozumi Range, Teall Nunatak, Vegetation Island, Vegetation Ridge.

Distribution. Endemic to continental Antarctica (Øvstedal & Lewis Smith 2001): Marie Byrd Land (Lamb 1948), Victoria Land (type of *B. adarensis, B. flavoplana, B. superba, B. tristis, B. variabilis*, Castello & Nimis 1995b, 2000), Dronning Maud Land (Øvstedal 1986a), southern Antarctic Peninsula (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Wood Bay, Kay Island, *S. Sedmak* (TSB A137); Terra Nova Bay, Deep Freeze Range, Cape Sastrugi, *S. Sedmak* (TSB A195); Terra Nova Bay, Index Point, *S. Sedmak* (TSB A230); Terra Nova Bay, Northern Foothills, Vegetation Ridge, *P. Modenesi* (TSB A371).

Rhizocarpon geminatum Körb.
Syst. Lich. Germ.: 259 (1855).

Thallus epilithic, areolate, grey to dark grey, to 1 cm diam.; areoles convex to subglobose, up to 1 mm diam., adpressed, with scabrid surface; prothallus black; medulla I-.

Apothecia lecideine, sessile, up to 0.8 mm diam., often adpressed, plane with a prominent margin, to slightly convex with thin margin. Epithecium reddish brown, K+ violet-red; hymenium colourless, 100-130 µm tall; hypothecium dark brown, *c.* 150 µm tall. Paraphyses *c.* 2 µm diam., with dark swollen apices. Asci *c.* 80 x 20 µm, 2-spored. Spores muriform, dark brown, halonate, 35-55 x 20 25 µm.

Discussion. This *Rhizocarpon* is well characterized by the grey thallus, the K + red epithecium, the 2-spored asci and the dark brown spores. The relationships with *Rh. griseolum* (Hue) Dodge, reported by Dodge (1973) from several localities of the maritime Antarctic, and by Kappen (1985) from northern Victoria Land, are to be clarified.

Distribution in the survey area. One specimen from Kay Island, growing with nitrophytic species: *Buellia frigida, Candelariella flava, Physcia caesia* and *Xanthoria mawsonii*.

Distribution. Bipolar. This is the first record from continental Antarctica. Known from the maritime Antarctic, Antarctic Peninsula (Øvstedal & Lewis Smith 2001), South Shetland Is. (Olech 1989b, Øvstedal & Lewis Smith 2001, Sancho *et al.* 1999).

Selected specimens examined: **Victoria Land:** Wood bay, Kay Island, *F. Bersan* (TSB A771).

Rhizocarpon geographicum (L.) DC. *s. lat.*
Buellia lutea C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 326 (1973). Type: Victoria Land, Scott Glacier area, McDonald Nunataks, 85°28'S 157°38'W, on quartz, *G.G. Claridge* 4 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 76.
? Rhizocarpon antarcticum (Räs.) Räs., Ann. Bot. Soc. Zool.-Bot. Fenn. Vanamo, 21: 4 (1947). *Fide* Runemark 1956: 90.
Rhizocarpon flavum C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 552 (1938). Type: Marie Byrd Land, Mt Stancliff, 76°49'S 145°23'W, *P. Siple & S. Corey* 72A-2 (FH-Dodge! holotype). *Fide* Øvstedal & Lewis Smith 2001: 299.
Rhizocarpon johnstonii C.W. Dodge, Antarct. Res. Exped. Rep. B, 7:118 (1948). *Fide* Runemark 1956: 90.
Rhizocarpon kerguelense C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7:116 (1948); *Rhizocarpon geographicum* var. *kerguelense* (C.W. Dodge) Räs. *Fide* Runemark 1956: 90.

Thallus epilithic, areolate, delimited, yellow to yellow-green; areoles flat to strongly convex, up to 1-2 mm diam., usually contiguous or more or less dispersed, up to 2 mm tall, sometimes crowded in groups up to 3 mm tall, P-; surface usually scabrid and matt, rarely smooth and glossy, more or less fissured; hypothallus black, scarcely visible among areoles; prothallus black, thick, well-delimited and continuous, up to 1 mm wide or not evident; medulla I + violet-blue, P + pale yellow.

Apothecia lecideine, black, sessile, numerous, usually on margins of areoles, up to 1.5-2 mm diam., flat to slightly convex, more or less angular, with a thin and persistent margin. Epithecium dark reddish brown, K + violet, without granules; hymenium colourless or pale brown, 90-100 µm tall; hypothecium dark brown, 120-150 µm tall. Paraphyses branched, *c.* 3 µm diam., apices dark brown, not swollen. Asci clavate, 70 x 25 µm, 8-spored. Spores bicellular to submuriform, with (1-) 3 transverse septa and 1-3 longitudinal septa, with (2-) 3-7 cells, 18-28(-30) x 10-12(-14) µm.

Discussion. The material clearly belongs in the poorly understood *Rhizocarpon geographicum* complex, which includes many variable taxa (Poelt 1969, 1988), mostly treated by Runemark (1956) at subspecific rank. Antarctic material is characterized by the usually scabrid and matt (but smooth and glossy in some parts), irregular thallus surface (Runemark 1956), and by the spores with fewer cells (3-7 against 6-10 cells), and was formerly described as *Rh. flavum*. These differences, however, seem insufficient to justify a separation at species rank: it is well-known that the extreme environmental conditions of the Antarctic continent can strongly affect thallus morphology, while the cell number in the spores of the *Rh. geographicum* group is highly

variable (see Øvstedal & Lewis Smith 2001).

According to Runemark (1956) *Rh. antarcticum* is probably identical with *Rh. flavum.*

Another widespread, yellow *Rhizocarpon* species recorded from Antarctic regions and collected in the survey area is *Rhizocarpon adarense* (see below); *Rh. geographicum* is characterized by the submuriform spores, the I+ violet-blue medulla, and the epithecium without granules.

Distribution in the survey area. Rather rare, collected with *Buellia lignoides, Acarospora* spp. and *Umbilicaria* spp.

Total number of samples: 9, from: Cape Sastrugi, Football Saddle, Harrow Peaks, Stefania Cirque, Teall Nunatak, Vegetation Island.

Distribution. Cosmopolitan. Continental Antarctica (Øvstedal & Lewis Smith 2001): Marie Byrd Land (type), Victoria Land (type of *B. lutea*, Castello & Nimis 1995b, 2000, Kappen 1985, Seppelt *et al.* 1995), Wilkes Land (Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (Filson 1966, 1975c), Enderby Land (Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (Engelskjøn 1986, Øvstedal 1983b, 1986a, Thor 1997), Coats Land (Lindsay 1974b); the maritime Antarctic: Antarctic Peninsula (De Leeuw *et al.* 1998, Lewis Smith & Corner 1973, Øvstedal & Lewis Smith 2001, Redon 1985), South Shetland Is. (Allison & Lewis Smith 1973, Andreev 1988, Aptroot & van der Knaap 1993, Jacobsen & Kappen 1988, Olech 1989b, Øvstedal & Lewis Smith 2001, Redon 1985, Sancho & Valladares 1993, Sancho *et al.* 1999), South Orkney Is. (Lewis Smith 1972, 1995, Øvstedal & Lewis Smith 2001, Redon 1985), Bouvetøya (Engelskjøn 1987, Øvstedal 1986b, Øvstedal & Lewis Smith 2001); subantarctic region: Prince Edward Is., Kerguelen I., Heard I. (Lindsay 1977a), South Georgia (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Deep Freeze Range, Cape Sastrugi, *S. Sedmak* (TSB A434); Hallett Peninsula, Admiralty Mts, Edisto Glacier, Stefania Cirque, *P. Modenesi* (TSB A345, A314).

Rhizoplaca melanophthalma (Ramond) Leuckert & Poelt

Nova Hedwigia, 28: 72 (1977). - *Lichen melanophthalmus* Ramond, *in* Lam. & DC., Fl. Franç. 3 éd., 2: 377 (1805). - *Lecanora melanophthalma* (Ramond) Ramond, Memoir. Acad. Roy. Sc. de l'Instit. de France 6: 133 (1823). - *Lecanora rubina* Ach. var. *melanophthalma* (Ramond) Zahlbr., Cat. Lich. Univ. 5: 660 (1928).

Lecanora chrysoleuca (Sm.) Ach. var. *melanophthalma* (Ramond) Th.Fr. f. *exsulans* Th. Fr., Nyt Mag. Naturvid. 40: 208 (1902). - *Lecanora rubina* Ach. var. *melanophthalma* (Ramond) Zahlbr. f. *exsulans* (Th. Fr.) Zahlbr., Cat. Lich. Univ. 5: 660 (1928).- *Lecanora exsulans* (Th. Fr.) C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 570 (1938).- *Omphalodina exsulans* (Th. Fr.) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 184 (1973). Type: Victoria Land, Geikie Land, 71°40'S 170°E, *C.E. Borchgrevink* (UPS, O). *Fide* Filson 1975c: 153.

Lecanora chrysoleuca var. *daltoni* Hook. f. & Taylor, *in* Hook, Flora Antarctica 2: 534 (1847). *Fide* Zahlbr. 1928, 5: 660.

Lecanora daltoniana Hook. f. & Taylor, London Journ. Bot. 3: 641 (1844). - *Omphalodina daltoniana* (Hook. f. & Taylor) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 182 (1973). Type: Cockburn Island, 64°12'S 56°50'W, J.D Hooker, Voy. Erebus & Terror (Taylor herb, 981, FH). *Fide* Zahlbruckner 1928, 5: 659.

Lecanora exsulans f. *minor* C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 172 (1948). Type: George V Coast, Cape Denison, 67°00'S 142°40'E, A.A.E. 158, 159. *Fide* Filson 1974b: 15.

Thallus epilithic, squamulose to foliose umbilicate or pulvinate, cream to greenish cream, yellowish green to brown, dark green to black, up to 3 cm diam., K- or + yellow, KC – or + yellow, C-; lower side cream; upper cortex 30-80 µm thick, with a yellowish brown outer layer and a colourless inner layer; medulla I-, K-, C-, KC-, hyphae very thick and loosely interwoven, 5-8 µm diam.; lower cortex, 10-60 µm thick, with olive outer layer.

Apothecia lecanorine, concave to flat, substipitate, crowded, up to 5 mm diam.; thalline margin usually thick and persistent, smooth to crenulate, often flexuous; disc darker than the margin, cream to greenish cream to dark green or black. Epithecium encrusted with olive-green granules dissolving in K; hymenium colourless, 50-60 µm tall; subhymenium pale yellowish or colourless, 20-30 µm tall, hypothecium 40-60 µm tall, of loosely interwoven hyphae. Cortex of exciple well-developed, 35-80 µm thick, with a brownish outer layer; algae in clumps, forming two distinct layers, under the hypothecium and under the exciple cortex; medulla loose, of very thick hyphae. Paraphyses simple, *c.* 2 µm diam., apices *c.* 3 µm diam., encrusted with dark granules. Asci clavate, 40-55 x 10-12 µm, *Lecanora* - type, 8-spored. Spores unicellular, colourless, 9-12 x (5-)6-7 µm, broadly ellipsoid.

Pycnidia forming black spots on thallus surface; conidia filiform, curved or arc-like, 18-30 x 0.7-1 µm.

Discussion. A rather variable species with respect to thallus and apothecia development and colour: the thallus varies from scarcely developed forms, where it is hardly detectable under the apothecia, to pulvinate, squamulose or clearly umbilicate forms, its colour changing from pale cream, more or less yellowish, to greenish cream, brown, dark green or finally black. The apothecia are usually numerous, covering the thallus, large and concave to flat, with a disc darker than the thallus and a well-developed, thick, smooth to crenulate margin, concolorous with the thallus, but they can become convex and immarginate. Many *Omphalodina* (*Rhizoplaca*) species described by Dodge (1973) main-

ly on the basis of morphological features of thallus and apothecia are probably different morphotypes of this variable taxon (Øvstedal 1986b). The relationships with the other *Rhizoplaca* species recently reported from Victoria Land, *Rh. priestleyi* (C.W. Dodge) Seppelt, characterized by a pulvinate thallus completely covered by apothecia, remains to be clarified.* Taxonomic aspects of Antarctic material of *Rh. melanophthalma* are discussed by Øvstedal (1986b).

Rh. melanophthalma can be easily confused in the field with well-developed, pulvinate to subsquamulose forms of *Lecanora fuscobrunnea* C.W. Dodge & G.E. Baker: these two species often grow together, but they can be distinguished by chemical characters (Seppelt *et al.* 1995) and by apothecia and spores characters, *L. fuscobrunnea* having apothecia with a thin and disappearing margin and ellipsoid, never broadly ellipsoid or subglobose spores.

Distribution in the survey area. Rather common in eutrophicated stands of the survey area, occurring with nitrophytic species, such as *Buellia frigida*, *Xanthoria mawsonii*, *X. elegans*, *Candelariella flava*, *Candelaria murrayi* and *Lecanora fuscobrunnea*; it grows with weakly nitrophytic species too, such as *Acarospora gwynii*, *Umbilicaria decussata* and *Usnea antarctica*.

Total number of samples: 25, from: Apostrophe Island, Baker Rocks, Cape King, Crater Cirque, Football Saddle, Harrow Peaks, Kay Island, Stefania Cirque, Vegetation Island.

Distribution. Bipolar, with a very wide range in both hemispheres. Continental Antarctica (Øvstedal & Lewis Smith 2001): Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985, Murray 1963, Seppelt *et al.* 1995), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (Filson 1966, 1975c, Seppelt & Ashton 1978), Enderby Land (Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (Engelskjøn 1986, Lindsay 1971c, 1972a, Øvstedal 1983a, 1983b, 1986a, Thor 1995, 1997), Coats Land (Lindsay & Brook 1971); the maritime Antarctic (Redon 1985): Antarctic Peninsula (De Leeuw *et al.* 1998, Øvstedal & Lewis Smith 2001), South Shetland Is. (Andeev 1988, Olech 1989b, Øvstedal & Lewis Smith 2001, Sancho *et al.* 1999), Bouvetøya (Engelskjøn 1987, Øvstedal 1986b, Øvstedal & Lewis Smith 2001); South Sandwich Is., South Orkney Is. (Øvstedal & Lewis Smith 2001); subantarctic region: South Georgia (Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Wood Bay, Kay Island, *P. Modenesi* (TSB A348), *G. Del Frate* (TSB A46); Lady Newnes Bay, Cape King, *S.Sedmak* (TSB A257), *G. Del Frate* (TSB A53), *R. Bargagli* (TSB A541); Hallett Peninsula, Football Mt, Football Saddle, *P. Modenesi* (TSB A346); Cape Hallett, *E. Schofield* AA145a, AA 158 (FH-Dodge), *T.P. Gannutz* 190A (FH-Dodge), *G.A. Llano* 2712 (FH-Dodge), all as *Omphalodina exsulans*.

Rhizoplaca sp. 1

Thallus epilithic, squamulose, umbilicate, small, up to 0.5-1 cm, K-, C-, KC-; squamules peltate, cream soon darkening to brown, dark brown, grey or black, glossy, up to 3-4 mm diam.; lower side cream or pale brown, with darker margins; upper cortex 60-70 µm thick, outer edge olive to dark bluish green or brown, internally colourless; medulla K-, C-, KC-, P-, of loosely interwoven hyphae, 5-7 µm diam.; lower cortex loose, 40-60 µm thick.

Apothecia lecanorine, sessile, usually terminal on margins of squamules, sometimes hardly detectable from the thallus, flat to convex, up to 2-2.5 mm diam.; margin thick to thin or disappearing, dark to black, level with the disc; disc concolour with the margin or slightly darker. Epithecium dark olive or bluish green; hymenium colourless, 50-60 µm tall; hypothecium colourless, 20-40 µm tall; thalline exciple often not differentiated from the thallus cortex. Paraphyses simple or sparsely branched, *c.* 2 µm diam., apices swollen, 3-5 µm diam., encrusted with olive granules. Asci *Lecanora*-type, 30-40 x 10-15 µm, 8-spored. Spores unicellular, colourless, 7-10(-11) x 5-7 µm, broadly ellipsoid.

Discussion. The material is well characterized by morpho-anatomical and ecological features: the thallus is small, usually very dark or black but in some parts cream and distinctly squamulose; the apothecia are terminal on areoles, black, slightly convex and often immarginate, and usually not clearly distinct from the squamules; the spores are broadly ellipsoid, 7-10(-11) x 5-7 µm. This species seems to be linked to non-eutrophicated conditions and occurs on granites. In the field it can somewhat resemble a *Lecidea*; reduced dark forms of *Rh. melanophthalma* can be confused with this species, but they differ in apothecial, spore and ecological characters. This material shows affinities with *Lecanora pringlei* (Tuck.) I.M. Lamb from alpine California (Poelt, *pers. comm.*).

The material agrees in many aspects with the description of *Omphalodina mcLeanii* (C.W. Dodge) C.W. Dodge, a species described from George V Coast and reported from many areas of continental Antarctica (Dodge 1973): *O. mcLeanii* has a small brown umbilicate thallus, covered by stipitate, dark brown apothecia, with an amphithecium not distinguished from the cortex of the squamules, and broadly ellipsoid spores, 6-7 x 3-4 µm with a moderately thick wall. The revision of

Antarctic material of *Rhizoplaca* (*Omphalodina*) species reported by Dodge (1973) will clarify the taxonomic position of this material. This taxon was erroneously cited as *Rh. mcLleanii* in Castello & Nimis (2000).

Distribution in the survey area. Rather rare in the survey area; probably anitrophytic or weakly nitrophytic, growing with *Acarospora gwynnii*, *Buellia frigida, B. lignoides, Carbonea vorticosa* and *Lecanora physciella.*

Total number of samples: 13, from: Carezza Lake, Football Saddle, Stefania Cirque, Tarn Flat, Teall Nunatak, Vegetation Island.

Selected specimens examined: **Victoria Land:** Ross Island, McMurdo, *G.A. Llano 2135* (FH-Dodge), as *Omphalodina exsulans*; Terra Nova Bay, Reeves Glacier, Teall Nunatak, *S. Sedmak* (TSB A179); Terra Nova Bay, Vegetation Island, *S. Sedmak* (TSB A162); Hallett Peninsula, Football Mt, Football Saddle, *P. Modenesi* (TSB A430); Hallett Peninsula, Admiralty Mts, Edisto Glacier, Stefania Cirque, *P. Modenesi* (TSB A321, A323, A338, A347).

Rimularia psephota (Tuck.) Hertel & Rambold
Mitt. Bot. Staatssamml. München 23: 334 (1987). – *Lecidea psephota* Tuck., Proc. Amer. Acad. Arts 12: 181 (1877). – *Lambiella psephota* (Tuck.) Hertel, Beih. Nova Hedwigia 79: 460 (1984).

Thallus epilithic, areolate, to 3 cm diam.; areoles cream, pale brown to grey, plane to convex or subglobose, more or less contiguous, with smooth surface, 0.1-0.3 mm diam.; prothallus black, dendritic; thallus K + red, C-; medulla I+, K + red (norstictic acid).

Apothecia lecideine, sessile, up to 0.6 mm diam., irregular in shape, plane with thick to thin, prominent margin and rough, matt disc with umbonate structures. Epithecium olivaceous green-brown, K + violet; hymenium colourless, 50-70 µm tall; subhymenium colourless, *c. 25* µm tall; hypothecium dark brown, to 40 µm tall; exciple dark brown, 35-40 µm thick. Paraphyses 2 µm diam., branched and anastomised, apices dark, *c.* 4 µm diam. Asci broadly clavate, 30-40 x 20 µm, *Rimularia*-type, 8-spored. Spores unicellular, colourless, 10-15 x 6-9 µm, broadly ellipsoid.

Discussion. This taxon was discussed by Hertel (1984) and Hertel & Rambold (1990). It is characterized by the amyloid medulla, the presence of norstictic acid, the K+ violet epithecium and the more or less gyrodisc apothecia.

Distribution in the survey area. Rare; it occurs on granites with anitrophytic species: *Umbilicaria decussata, Pseudephebe minuscula, Carbonea vorticosa, Lecidea cancriformis* and *Buellia lignoides.*

Total number of samples: 4, from Vegetation Island, Prior Island.

Distribution. Bipolar. This is the first record from continental Antarctica; known from Antarctic Peninsula, South Georgia (Hertel 1989, Øvstedal & Lewis Smith 2001), Kerguelen Is. (Hertel 1984), Macquarie I. (Hertel 1987b, Kantvilas & Seppelt 1991).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Vegetation Island, *S.* Sedmak (TSB A169), *R. Bargagli* (TSB A624).

Rinodina olivaceobrunnea C.W. Dodge & G.E. Baker
Ann. Mo. Bot. Gard. 25: 659 (1938). Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, 76°50'S 145°30'W, *P. Siple & S. Corey* 72W-13 (FH-Dodge! holotype).

Rinodina archaeoides H. Magn., Acta Horti Gothoburg, 17: 278 (1947). *Fide* Filson 1975a: 119.

Rinodina fecunda C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 257 (1948). Type: Queen Mary Coast, Hippo Islet, 66°26'S 98°06'E, parasitic on mosses, *C.T. Harrisson*, A.A.E. 78-2 (FH-Dodge! holotype). *Fide* Castello & Nimis 1995a: 87.

Thallus muscicolous or growing at the base of thalli of *Usnea sphacelata*, reduced and granular, cream to dark brown or black; cortex 30 µm thick, I-; medulla I-.

Apothecia lecanorine, constricted below, substipitate, up to 1-1.2 mm diam.; disc flat, dark brown or black; thalline margin thick and persistent, usually crenulate, or smooth, concolorous with the thallus. Epithecium dark brown; hymenium colourless, 70-100 µm tall; hypothecium colourless, inspersed with oil drops, 10-20 µm tall; cortex of the exciple colourless to dark brown, I-. Paraphyses simple, *c.* 2 µm diam., apices swollen up to 3-4 µm diam. Asci clavate, 70-80 x 15-18 µm, 8-spored. Spores *Physcia*-type, 19-25(-28) x (8-)9-10(-12) µm, with apical and septum thickenings up to 4 µm.

Conidia curved, 2-3 x 0.5 µm.

Discussion. Antarctic populations of *R. olivaceobrunnea* show a great variability in apothecial and spore features; this variability and the relationships with *R. turfacea* (Wahlenb.) Körb., the other *Rinodina* species occurring on plant debris, mosses and soil of Antarctic regions, are discussed by Jacobsen & Kappen (1989). According to these authors these species can be mainly distinguished by spore characters: *R. turfacea* has *Physcia*-type spores, with very thick apical and septum walls (8 µm and 6.5 µm respectively) and a distinct convex apical thickening, while *R. olivaceobrunnea* usually has spores with thinner apical and septum walls (always less than 4.5 µm) and lumen shape intermediate between *Physcia*- and *Milvina*- type. Spores and apothecia sizes, previously considered as differential characters by Filson (1975a) and Øvstedal (1983a), are of minor taxonomic importance. Moreover *R. turfacea* has an I+ apothecial margin, while *R. olivaceobrunnea* usually reacts I- (Wirth 1995).

Distribution in the survey area. Rather rare. It grows

on mosses or plant debris, with nitrophytic species such as *Physcia caesia*, *Candelariella athallina* and *C. flava,* or at the base of thalli of *Usnea sphacelata.*

Total number of samples: 15, from: Cape King, Crater Cirque, Harrow Peaks, Kay Island, Lamplugh Island, Prior Island, Tinker Glacier.

Distribution. A bipolar species, with an arctic-alpine distribution. In Antarctica it displays a circumpolar distribution. Continental Antarctica (Øvstedal & Lewis Smith 2001): Marie Byrd Land (Filson 1975a), Victoria Land (Castello & Nimis 1995b, 2000, Jacobsen & Kappen 1989, Kappen 1985, Lamb 1968), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Jacobsen & Kappen 1989, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (type of *R. fecunda*, Andreev 1990, Olech 1989a), MacRobertson Land (Lamb 1968, Filson 1966, 1975c), Enderby Land (Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (Øvstedal 1983a, 1983b, Thor 1995); the maritime Antarctic: Antarctic Peninsula (Øvstedal & Lewis Smith 2001), South Shetland Is. (Andreev 1988, Aptroot & van der Knaap 1993), South Orkney Is., Bouvetøya (Øvstedal & Lewis Smith 2001); subantarctic region: South Georgia (Lindsay 1973b, Øvstedal & Lewis Smith 2001).

Selected specimens examined: **Victoria Land:** Prior Island, *S. Sedmak* (TSB A274, A279); Lamplugh Island, *S. Sedmak* (TSB A290), *R. Bargagli* (TSB A538); Lady Newnes Bay, Cape King, *R. Bargagli* (TSB A545).

Rinodina sp. 1

Thallus epilithic, pale to dark brown, clearly lobate-effigurate, to 1 cm diam., with contiguous, strongly convex, peripheral lobes to 1 mm long and 0.8 mm wide, and verrucose-nodulose central parts, or reduced to small scattered areoles completely covered by adpressed apothecia, with few or no peripheral lobes; thallus K-, C-, KC-; medulla I-, K-, C-.

Apothecia lecanorine, constricted below, 0.3-1 mm diam.; disc dark brown to black, flat; thalline margin concolorous with the thallus, thick to thin, persistent. Epithecium brown to dark brown; hymenium colourless, 70-100 µm tall; hypothecium colourless to pale brown, 60-80 µm tall; thalline exciple 50-80 µm thick, cortex with outer edge brown, internally colourless. Paraphyses branched, *c.* 2 µm diam., with swollen, dark brown apices, 4-5 µm diam. Asci 45-80 x 15-20 µm, *Lecanora* - type, 8-spored. Spores *Pachysporaria*- type, 15-20 x 8-10 µm.

Conidia 9-15 x 0.5-1 µm, straight.

Discussion. This material does not correspond to any *Rinodina* species reported from Antarctic regions. It fits the description of *Rinodina (Amandinea) petermannii* by Filson (1974b) from Wilkes Land but, according to the revision by Matzer *et al.* (1994), this material is a species of *Rinodina.* Antarctic species of this genus are still in need of a thorough revision (Mayrhofer, *in litt.*).

Distribution in the survey area. Apparentely rather nitrophytic, growing with *Buellia frigida, Caloplaca citrina, Xanthoria elegans, X. mawsonii* and *Lecanora mons-nivis.*

Total number of specimens 5, from: Carezza Lake, Edmonson Point, Inexpressible Island, Kay Island, Terra Nova Bay Station.

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Inexpressible Island, *R. Bargagli* (TSB A596); Terra Nova Bay, Northern Foothills, Carezza Lake, *P. Modenesi* (TSB A479); Terra Nova Bay, Terra Nova Bay Station, *P. Modenesi* (TSB A480); Wood Bay, Kay Island, *R. Bargagli* (TSB A660).

Tephromela atra (Huds.) Hafellner
[*in* Kalb] Lich. Neotrop., 7: 297 (1983). - *Lichen ater* Huds., Fl. Angl., 1: 445 (1762).

Thallus epilithic, areolate to rimose-areolate, whitish to cream, greyish or blackish, thick, K+ yellow, C-, up to 2-3 cm diam.; areoles up to 2-3 mm diam., well-corticate to eroded, irregular in shape, usually angular with darker edges, and smooth to granular or verrucose surface; prothallus blackish.

Apothecia lecanorine, sessile, constricted at the base or not, up to 2.5 mm diam., round or irregular; thalline margin thick to thin, flexuous and crenulate, concolorous with the thallus or darker to blackish, with cream lower parts, sometimes disappearing; disc flat to convex, black. Epithecium dark violet-brown, K + violet; hymenium violet-brown, 80-120 µm tall, K+ weakly violet-red; subhymenium pale violet to colourless, 40-70 µm tall; hypothecium yellow-brown, 50-80 µm tall, K+ yellow; cortex of the exciple pale to dark brown or bluish green. Paraphyses sparsely branched, strongly coherent, covered by a gelatinous coat, *c.* 4 µm diam., with dark apices. Asci 60-80 x 15-20 µm, *Bacidia* - type, 8-spored. Spores unicellular, colourless, 9-12 x 6-8 µm, ellipsoid to broadly ellipsoid, with thick wall.

Discussion. The collected material shows all essential characters of the polymorphic *Tephromela atra.* The material has a peculiar thallus consisting of thick, irregular, angular areoles with smooth to verrucose or granular and eroded surface; apothecia are lecanorine but can become lecideoid as the thalline margin disappears. This material is related to *Tephromela antarctica* Øvstedal, known from the maritime Antarctic, which

differs in chemistry, having no secondary products. Further investigations on the chemistry of larger collections are needed. To the best of our knowledge, this is the first report of the genus *Tephromela* from continental Antarctica.

Distribution in the survey area. This species only occurs on volcanic rocks, with *Buellia* spp., *Lecanora physciella*, *Pleopsidium chlorophanum* and *Usnea sphacelata*.

Total number of samples: 8, from: Cape Phillips, Coulman Island, Daniell Peninsula.

Distribution. Cosmopolitan. Continental Antarctica: Victoria Land (Castello & Nimis 1995b, 2000); the maritime Antarctic: Antarctic Peninsula (Gremmen *et al.* 1995, Øvstedal & Lewis Smith 2001), South Shetland Is. (Allison & Lewis Smith 1973, Andreev 1988, Jacobsen & Kappen 1988, Olech 1989b, Øvstedal & Lewis Smith 2001, Redon 1985, Sancho & Valladares 1993, Sancho *et al.* 1999), South Orkney Is. (Lewis Smith 1972, Øvstedal & Lewis Smith 2001, Redon 1985); subantarctic region: South Georgia (Hertel 1989, Lindsay 1974a, Øvstedal & Lewis Smith 2001), Kerguelen I. (Hertel 1989), Macquarie I. (Hertel 1989, Kantvilas & Seppelt 1991).

Selected specimens examined: **Victoria Land:** Coulman Island, *P. Modenesi* (TSB A107, A109, A363, A456); Daniell Peninsula, Cape Phillips, *R. Bargagli* (TSB A576), *F. Bersan* (TSB A834, A835).

Umbilicaria aprina Nyl.

Synops. Lich. 2: 12 (1863).

Gyrophora korotkeviczii N.S. Golubk., Nov. Sys. Pl. Non Vasc. 17: 261 (1966). Type: Antarctida Orientalis, litus Pravda, Bunger Hills, ad saxa, 3 III 1957, *E.S. Korotkevicz* (LE). *Fide* Filson 1987: 338.

Umbilicaria antarctica var. *subvirginis* Frey & I.M. Lamb, Trans. Br. Mycol. Soc. 22: 272 (1939). - *Umbilicaria spongiosa* var. *subvirginis* (Frey & I.M. Lamb) C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 148 (1948). - *Gyrophora spongiosa* var. *subvirginis* (Frey & I.M. Lamb) N.S. Golubk. & Savicz, Nov. Sys. Pl. Non Vasc. 17: 260 (1966). - *Omphalodiscus spongiosus* var. *subvirginis* (Frey & I.M. Lamb) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 124 (1973). Type: South Victoria Land, Cape Sastrugi, Evans Cove, leg. British Antarctic Exped. Terra Nova 1910 (BM). *Fide* Filson 1975b: 131.

? Umbilicaria saviczii Llano, Bryologist 69: 110 (1966). Type: Antarctica, Princess Astrid Coast, Novolazarevskaya, 70°46'S 11°50'E, *Meyer* 6. *Fide* Filson 1987: 338.

Umbilicaria spongiosa C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 566 (1938). - *Omphalodiscus spongiosus* (C.W. Dodge & G.E. Baker) Llano, Monogr. Lich. Fam. Umbilic.: 91 (1950). - *Gyrophora spongiosa* (C.W. Dodge & G.E. Baker) N.S. Golubk. & Savicz, Nov. Sys. Pl. Non Vasc. 17: 259 (1966). Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, *P. Siple & S. Corey* 73-9 (Herb. Dodge). *Fide* Filson 1975b: 131.

Thallus epilithic, foliose, thick, monophyllous, very variable in size and form, ranging from small-rosulate, closely adpressed thalli to large foliose thalli up to 10 cm diam.; margin flexuous, sometimes revolute, often ascending, sometimes necrotic and whitish; upper side pale to dark brown or grey, or almost black, often paler above the umbilicus, matt, pruinose or granular, rugulose and cracked, smooth to wrinkled and weakly ridged; lower side dark brown or black, with a paler marginal band, sometimes pale brown. Rhizinomorphs simple to moderately branched, absent in the zone around the umbilicus and rarely reaching the margins, more or less dense, usually white to pale grey, or with black base, or black at thallus margin but with pale tips. Thalloconidia uni- or bicellular, sphaerical to ovoid, forming a thin layer of 2-3 sublayers on the lower side of thallus; thalloconidia completely covering the lower side, but typically scarce or absent on rhizinomorphs or restricted to basal parts, and on the marginal pale part of lower side.

Apothecia not seen.

Discussion. A discussion of Antarctic material of *U. aprina* can be found in Filson (1975b, 1987), Sancho *et al.* (1992) and Øvstedal & Lewis Smith (2001). According to Filson (1987), *U. aprina* is highly variable, in particular as far as the variability of the colour of the lower side is concerned. Among the synonyms of *U. aprina* there is *U. saviczii* Llano, a species characterized by the pale, only partially coloured lower side and by branched rhizines. In the absence of a clarification of the taxonomy of this complex, all collected specimens morphologically similar to *U. aprina* with light pinkish brown lower side are considered as *U.* cf. *saviczii* (see comment to this species).

Sancho *et al.* (1992) pointed out that in the field *U. aprina* can be easily confused with *U. africana*, a species known from the continental and maritime Antarctic regions: the thalloconidia of *U. africana* are globose and multicellular (4 to 10-celled or more), and the rhizinomorphs always reach the margin of the thallus. No specimen with these characters was found in the survey area.

Material of this taxon collected in the survey area is very variable in morphological features. Young thalli may have completely smooth upper side and revolute margins, and some specimens have small cracks through which black rhizinomorphs project from the lower side, and they were considered by Castello & Nimis (1995b, 2000) as *Umbilicaria antarctica* Frey & Lamb. According to Sancho (*in litt.*), who investigated several specimens from ELA (TSB), all material belongs in *U. aprina*: this taxon differs from *U. antarctica* in the usually clearly wrinkled upper side, the longer, more branched, usually ivory white to pale grey rhizinomorphs, sometimes with black base, and the often oviform thalloconidia, not developed in columns

(Hestmark 1990). Furthermore, according to Øvstedal & Lewis Smith (2001), *U. aprina* is characterized by the rhizines never being strap-like.

Distribution in the survey area. Rather common, often collected along streams, sometimes completely immersed in water; it often occurs with *Buellia frigida*, *Candelariella flava*, *Lecanora fuscobrunnea*, *Physcia caesia* and *Xanthoria* spp.

Total number of samples: 26, from: Cape King, Crater Cirque, Edmonson Point, Football Saddle, Gondwana Station, Harrow Peaks, Kay Island, Stefania Cirque, Teall Nunatak, Terra Nova Bay Station.

Distribution. Bipolar. Reported in Antarctica from the continental and maritime regions; distribution map in Filson (1987). Continental Antarctica (Filson 1987): Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985, Seppelt *et al.* 1995), Wilkes Land (Hovenden & Seppelt 1995, Lewis Smith 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (Filson 1975c, Seppelt & Ashton 1978), Enderby Land (Inoue 1995, Kanda & Inoue 1994), Dronning Maud Land (Engelskjøn 1986, Lindsay 1969b, 1971c, 1972a, Øvstedal 1983a, 1983b, 1986a, Thor 1995), NE Peninsula (Lewis Smith & Øvstedal 1994 (cf.), Lindsay 1969b), S Peninsula (Øvstedal & Lewis Smith 2001); the maritime Antarctic (Filson 1987): South Shetland Is. (Olech 1989b).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Terra Nova Bay Station, *P. Modenesi* (TSB A390); Terra Nova Bay, Gondwana Station, *R. Bargagli* (TSB A518, A519); Wood Bay, Mt Melbourne, Edmonson Point, *P. Modenesi* (TSB A37); Wood Bay, Kay Island, *G. Del Frate* (TSB A372), *P. Modenesi* (TSB A374, A391).

Umbilicaria decussata (Vill.) Zahlbr.

Cat. Lich. Univ. 8: 490 (1942). - *Lichen decussatus* Vill., Hist. Plant Dauphiné 3: 964 (1789). - *Gyrophora decussata* (Vill.) Zahlbr., Cat. Lich. Univ., 4: 678 (1927) - *Omphalodiscus decussatus* (Vill.) Schol., Nyt Mag. Naturvid. 75: 23 (1934).

Dermatiscum mawsonii C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 152 (1948). Type: King George V Land, Cape Denison, 67°00'S 142°36'E, saxicole, BANZARE 536 (AD 12682 lectotype). *Fide* Filson 1987: 340.

? Omphalodiscus decussatus var. *tortuosus* Llano, J. Wash. Acad. Sci. 46: 185 (1956). Type: Antarctica, MacRobertson Land, ANARE, Base Mawson, 67°36'21"S 62°52'48"E, *R.O. Summers*, Jan. 1955. *Fide* Filson 1987: 340.

Umbilicaria cerebriformis C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 562 (1938). - *Charcotia cerebriformis* (C.W. Dodge & G.E. Baker) C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 150 (1948). - *Omphalodiscus decussatus* var. *cerebriformis* (C.W. Dodge & G.E. Baker) Llano, Monogr. Umbil.: 83 (1950). - *Llanoa cerebriformis* (C.W. Dodge & G.E. Baker) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 127 (1973). Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey* 72W-15. *Fide* Llano 1950: 78; Filson 1987: 340.

Umbilicaria eximia Hue, Deux. Expéd. Antarct. Fr. 1908-10, Lich.: 55 (1915). - *Omphalodiscus eximius* (Hue) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 122 (1973). Type: Ile Jenny, baie Marguerite, sur les pierres des éboulis, très abondant, XIIe excursion, no 226 altitude 380 métres et no 227, altitude 75 métres, no 228, 15 janvier 1909 (PC lectotype). *Fide* Filson 1987: 339.

Umbilicaria hunteri C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 148 (1948). Type: King George V Land, Cape Denison, *J.G. Hunter* 21, *A.A.E. 21*. *Fide* Llano 1950: 78.

Umbilicaria leiocarpa var. *nana* Vain., Exped. Antarct. Belge Rés. Voy. S.Y. Belgica 1897-99, Rap. Sci. Bot.: 9 (1903). - *Agyrophora leiocarpa* var. *nana* (Vain.) Llano, Monogr. Umbil.: 56 (1950). - *Agyrophora nana* (Vain.) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 118 (1973). Type: Détroit de Gerlache: sur un rocher isolé au milieu d'un glacier, 300 m. d'altitude au-dessus du niveau de la mer, a l'Ilé Brabant, 64°21'S (10e debarquement, n. 250) (TUR 00554 Herb Vainio 200 lectotype, BR isolectotype). *Fide* Øvstedal 1983a: 224.

Umbilicaria parvula Hue, Deux. Expéd. Antarct. Fr. 1908-10, Lich.: 56 (1915). - *Gyrophora parvula* (Hue) Zahlbr., Cat. Lich. Univ. 4: 720 (1927). Type: Petite ile dans la baie Marguerite, sur les rochers (diorites), XVe excursion, no 267, 24 janvier 1909 (PC lectotype). *Fide* Filson 1987: 340.

Umbilicaria pateriformis C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 564 (1938). Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, *P. Siple & S. Corey* 72W-13. *Fide* Llano 1950: 78; Filson 1987: 340.

Umbilicaria rugosa C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 561 (1938). - *Omphalodiscus bakeri* C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 120 (1973). Type: King Edward VII Land, Rockefeller Mts, Mt Helen Washington, *P. Siple, F.A. Wade, S. Corey & O.D. Stancliff* HW-12. *Fide* Llano 1950: 78.

Umbilicaria subcerebriformis C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 149 (1948). - *Omphalodiscus subcerebriformis* (C.W. Dodge) C.W. Dodge, Bull. Jard. bot. Etat. Brux. 32: 302 (1962). Type: King George V Land, Cape Denison, *J.G. Hunter, A.A.E. 70*. *Fide* Llano 1950: 78; Filson 1987: 340.

Thallus foliose, monophyllous, variable in size, up to several cm diam., pale to dark grey or brown to almost black; margin sometimes laciniate; upper side matt, pruinose, smooth to rugulose and deeply folded; lower side matt, pale pinkish brown to brown or sooty black; without rhizinomorphs. Thalloconidia unicellular, completely covering the lower side.

Apothecia not seen.

Discussion. This species is very variable morphologically and different morphotypes were described as new taxa. For a detailed description and discussion see Filson (1987), Hestmark (1990) and Sancho *et al.* (1992).

Distribution in the survey area. Very common and widespread, occurring on granites and diorites, in non or weakly nitrophytic communities of the fruticose and foliose subformation, growing with *Usnea sphacelata*, *Pseudephebe minuscula*, *Buellia lignoides*, *Rhizocarpon adarense*, *Pleopsidium chlorophanum* and *Acarospora* spp.

Total number of samples: 122, from: Apostrophe Island, Black Ridge, Campo Icaro, Cape Sastrugi, Carezza Lake, Crater Cirque, Football Saddle, Gondwana Station, Harrow Peaks, Inexpressible Island, Kay Island, Lamplugh Island, Mt Kenaith, Mt Moriarty, Prior Island, Starr Nunatak, Stefania Cirque, Tarn Flat, Teall Nunatak, Terra Nova Bay Station, Vegetation

Island, Vegetation Ridge, Whitmer Peninsula.

Distribution. Bipolar. Widespread in the continental and maritime Antarctic; distribution map in Filson (1987). Continental Antarctica (Filson 1987, Øvstedal & Lewis Smith 2001): Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985, Murray 1963), King George V Land (type of *D. mawsonii*), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (Filson 1966, 1975c, Seppelt & Ashton 1978), Enderby Land (Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (Bowra *et al.* 1966, Engelskjøn 1986, Lindsay 1969b, 1971c, 1972a, Øvstedal 1983a, 1983b, 1986a, Thor 1995, 1997), Coats Land (Lindsay 1969b, Lindsay & Brook 1971), E Peninsula (Lindsay 1969b); the maritime Antarctic (Filson 1987): W Peninsula (Lewis Smith & Corner 1973, Lindsay 1969b, Øvstedal & Lewis Smith 2001, Redon 1985), NE Peninsula (Lindsay 1969b), South Shetland Is. (Jacobsen & Kappen 1988, Lindsay 1969b, Olech 1989b, Øvstedal & Lewis Smith 2001, Redon 1985, Sancho *et al.* 1992, 1999), South Orkney Is. (Lewis Smith 1972, Lindsay 1969b, Øvstedal & Lewis Smith 2001, Redon 1985).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Vegetation Island, *P. Modenesi* (TSB A379, A380); Terra Nova Bay, Reeves Glacier, Teall Nunatak, *S. Sedmak* (TSB A214); Wood Bay, Kay Island, *P. Modenesi* (TSB A385).

Umbilicaria cf. **saviczii** Llano

Bryologist 69: 110 (1966). Type: Antarctica, Princess Astrid Coast, Novolazarevskaya, 70°46'S 11°50'E, *Meyer* 6 (US).

Thallus foliose, monophyllous, up to 3 cm diam.; upper side smooth to rugose or weakly wrinkled, pale brown to grey; lower side smooth, pinkish near the umbilicus to pale brown; rhizinomorphs light-coloured, moderately branched; thalloconidia not seen.

Apothecia omphalodisc, *c.* 1.2 mm diam. Spores 8 per ascus, unicellular, colourless, 22-25 x 10 µm.

Discussion. According to Llano (1966) *U. saviczii* is morphologically similar to the '*virginis-crustulosus-spodochrous*' complex, and is distinguished by the partly coloured lower side and highly branched rhizinomorphs. No fertile material was examined by the this author: he states that if omphalodisc apothecia were found, the affinities with this complex would be confirmed. This species is known only from Dronning Maud Land (Llano 1966). Filson (1987) lists *U. saviczii* as a synonym of *U. aprina*, adopting a wide concept of *U. aprina* and including forms with cream to pale brown to black lower side, but *U. aprina* has gyrodisc apothecia. The holotype of *U. saviczii* was sought for in US but it could not be located.

In the survey area two specimens of *Umbilicaria* with pale lower side were collected, one of which is with omphalodisc apothecia. This material belongs in the *U. crustulosa* group (Codogno, Sancho, *in litt.*) and is tentatively attributed to *Umbilicaria saviczii.*

Distribution in the survey area. Total number of samples: 2, from: Edmonson Point, Football Saddle.

Selected specimens examined: **Victoria Land:** Wood Bay, Mt Melbourne, Edmonson Point, *P. Modenesi* (TSB A477); Hallett Peninsula, Football Mt, Football Saddle, *P. Modenesi* (TSB A375).

Usnea antarctica Du Rietz

Svensk Bot. Tidskr. 20: 93 (1926). - *Neuropogon antarcticus* (Du Rietz) I.M. Lamb, J. Linn. Soc. (Bot.) 52: 210 (1939). Type: Regio Antarctica, South Victoria Land, Admiralty Range, 2000' s.m., 1900, *C.R. Borchgrevink* (UPS holotype, S, O isotypes).

Neuropogon insularis I.M. Lamb, J. Linn. Soc. (Bot.) 52: 215 (1939). - *Usnea insularis* (I.M. Lamb) C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 211 (1948). Type: Prince Edward Group: Marion I., 26 Dec. 1873, *Challenger Exped.* (BM holotype). *Fide* Walker 1985: 55.

Neuropogon melaxanthus var. *sorediifer* Cromb., J. Linn. Soc. (Bot.) 15: 182 (1876). - *Usnea melaxantha* var. *sorediifera* (Cromb.) Müll. Arg., J. Linn. Soc. (Bot.) 32: 200 (1896). - *Usnea sulphurea* var. *sorediifera* (Cromb.) Vain., Exped. Antarct. BelgeRés. Voy. S.Y. Belgica 1897-99, Rap. Sci. Bot.: 11 (1903). - *Neuropogon antarcticus* f. *sorediifer* (Cromb.) I.M. Lamb, J. Linn. Soc. (Bot.) 52: 213 (1939). Type: Kerguelen Land, Royal Sound, Venus Transit Expedition, *A.E. Eaton* (BM lectotype, BM, M, UPS isolectopytes). *Fide* Lamb 1964: 5.

Usnea crassa Zammuto, *in* Dodge, Trans. Amer. Micros. Soc. 84: 521 (1965). Type: Antarctica, Melchior Is., Eta (Bailey), 64°19'S 62°55'W, 5 March 1941, *P.A. Siple* 349 (US isotype). *Fide* Walker 1985: 56.

Usnea crombiei ['*Crombii*'] C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 212 (1948). nom. inval. (Art. 36.1). Spec. orig.: Heard I., between Atlas Cove and Corinthian Bay, BANZARE B140-36. *Fide* Lamb 1964: 5.

Usnea crombiei var. *sublaevis* C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 213 (1948). nom. inval. (Art. 36.1). Spec. orig.: Heard I., between Atlas Cove and Corinthian Bay, BANZARE B140-40. *Fide* Lamb 1964: 5.

Usnea floriformis C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 214 (1948). Type: Heard I., between Atlas Cove and Corinthian Bay, BANZARE B140-41 (AD holotype). *Fide* Walker 1985: 55.

Usnea propagulifera C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 213 (1948). Type: Heard I., between Atlas Cove and Corinthian Bay, BANZARE B150-42 (AD holotype). *Fide* Walker 1985: 56.

Usnea pseudofruticosa Zammuto, *in* Dodge, Trans. Amer. Micros. Soc. 84: 521 (1965). Type: Antarctica, Melchior Is., Gordon Lien I., 7 March 1941, *P. Siple* 352 (US isotype). *Fide* Walker 1985: 56.

Usnea pustulata C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 203 (1948). Type: Queen Mary Land, Possession Nunatak, *C.T. Harrisson* A.A.E. 85-1. *Fide* Lamb 1964: 7.

Usnea sulphurea var. *granulifera* Vain., Exped. Antarct. Belge Rés. Voy. S.Y. Belgica 1897-99, Botan., Lichenes: 11 (1903). - *Usnea melaxantha* var. *granulifera* (Vain.) Hue, Deux. Expéd. Antarct. Fr. Lich.: 27 (1915). - *Usnea granulifera* (Vain.) Motyka, Lich. Gen. Usn. Stud. Monogr. 1: 35 (1936). Type: Détroit de Gerlache: dans les fentes d'une falaise rocheuse, Cap Anna Osterrieth, 64°33' de latitudine sud, Terre de Danco (9e débarquement, 197 p.p.), *M.E.G.*

Racovitza (TUR 443 herb. Vainio 358, lectotype). In Walker 1985: 56.

? *Usnea subfoveolata* C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 202 (1948). Type: Queen Mary Land, Hippo Nunatak, 66°26'S 98°06'E, *C.T. Harrisson* A.A.E. 82-2. In Walker 1985: 56.

? *Usnea subpapillata* C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 204 (1948). Type: Queen Mary Land, Hippo Nunatak, *C.T. Harrisson* A.A.E. 82-3. *Fide* Lamb 1964: 5.

Thallus epilithic, fruticose, 2-5(-10) cm tall, arising from a more or less delimited, rarely pigmented holdfast, erect, richly and more or less dichotomically branched, with numerous branches; branches terete, yellow-green, variegated above with black bands and with dark apices; surface matt, subpapillate to grossly papillate, sometimes smooth; cortex variable in thickness; medulla compact; axis thick, occupying 0.5-0.7 of the principal branch diameter. Soralia common throughout thallus, flat to concave, rarely pulvinate, arising from papillae, delimited, often with a crateriform margin. Soredia granular.

Apothecia not seen.

Discussion. This taxon was treated by Lamb (1964) and Walker (1985).

Distribution in the survey area. Rather rare; it grows in more or less eutrophicated stands, with nitrophytic species such as *Buellia frigida*, *Candelariella flava*, *Xanthoria mawsonii*, *X. elegans* and *Physcia caesia*. *U. antarctica* seems to be more nitrophytic than *U. sphacelata*.

Total number of samples: 25, from: Apostrophe Island, Campo Icaro, Crater Cirque, Football Saddle, Harrow Peaks, Kay Island, Prior Island, Stefania Cirque, Vegetation Island.

Distribution. Antarctica, southern South America and New Zealand mountains (Walker 1985). *U. antarctica* is a circumpolar species, with main centre of distribution in the Antarctic Peninsula and associated islands (Walker 1985). Continental Antarctica (Øvstedal & Lewis Smith 2001): King Edward VII Land (Walker 1985), Victoria Land (Castello & Nimis 1995b, 2000, Murray 1963, Seppelt *et al.* 1995, Walker 1985), King George V Land (Walker 1985), Wilkes Land (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994, Walker 1985), Queen Mary Land (Andreev 1990, Olech 1989a, Walker 1985), Kaiser Wilhelm II Land (Walker 1985), MacRobertson Land (Filson 1966, 1975c, Seppelt & Ashton 1978, Walker 1985), Enderby Land (Walker 1985), Dronning Maud Land (Øvstedal 1983a, Walker 1985), north-eastern Peninsula (Lindsay 1969a); the maritime Antarctic: Antarctic Peninsula (De Leeuw *et al.* 1998, Gremmen *et al.* 1995, Lamb 1964, Lewis Smith & Corner 1973, Lindsay 1969a, Øvstedal & Lewis Smith 2001, Redon 1985, Walker 1985), South Shetland Is. (Allison & Lewis Smith 1973, Andreev 1988, Aptroot & van der Knaap 1993, Jacobsen & Kappen 1988, Lamb 1964, Lindsay 1969a, 1971b, Olech 1989b, Øvstedal & Lewis Smith 2001, Redon 1985, Sancho & Valladares 1993, Walker 1985), South Orkney Is. (Lamb 1964, Lewis Smith 1972, Lindsay 1969a, 1995, Øvstedal & Lewis Smith 2001, Redon 1985, Walker 1985), South Sandwich Is. (Lindsay 1969a, Øvstedal & Lewis Smith 2001), Bouvetøya (Engelskjøn 1987, Jørgensen 1986, Lindsay 1969a, Øvstedal & Lewis Smith 2001, Walker 1985); subantarctic region: South Georgia (Lindsay 1974c, Øvstedal & Lewis Smith 2001, Walker 1985), Prince Edward & Marion Is. (Lindsay 1977a, Øvstedal & Lewis Smith 2001, Walker 1985), Kerguelen I. (Lamb 1964, Walker 1985), Heard I. (Øvstedal & Lewis Smith 2001, Redon 1985, Walker 1985), Macquarie I. (Kantvilas & Seppelt 1991, Øvstedal & Lewis Smith 2001, Walker 1985).

Selected specimens examined: **Victoria Land:** Terra Nova Bay, Northern Foothills, Campo Icaro, *S. Sedmak* (TSB A155); Wood Bay, Kay Island, *G. Del Frate* (TSB A47), *P. Modenesi* (TSB A61, A62, A64); Hallett Peninsula, Football Mt, Football Saddle, *P. Modenesi* (TSB A63).

Usnea sphacelata R. Br.

Chloris melvilliana: 49 (1823 ["1821"]). - *Usnea melaxantha* var. *sphacelata* (R. Br.) Hook f., Bot. Ant. Voy. "Erebus & Terror" 1: Fl. Antarct. 2: 520 (1847). - *Usnea sulphurea* var. *sphacelata* (R. Br.) Vain., Exped. Antarct. Belge Rés. Voy. S.Y. Belgica 1897-99, Rap. Sci. Bot.: 11 (1903). Type: Melville I., *Mr J. Ross* 114 (BM holotype).

Lichen pallidus Retz., Fl. Scandin. Prodrom.: 234 (1779), non *Lichen pallidus* Schreb. (1771). Type: *Lichen sulphureus* J. König. *Fide* Walker 1985: 92.

Lichen sulphureus J. König, *in* Olafsen & Povelsen, Reise igien. Island: 16 (1772), non *Lichen sulphureus* Retz. (1769). - *Usnea sulphurea* Th. Fr., K. svenska VetenskAcad. Handl. 7 (2): 9 (1867). - *Neuropogon melanoxanthus* f. *sulphurea* (Th. Fr.) Hue, Nouv. Archs Mus. Hist. nat. Paris Ser. 3, 2: 272 (1890). - *Neuropogon sulphureus* (Th. Fr.) Hellb., Bih. K. svenska VetenskAkad. Handl. 21 (3/13): 21 (1896). *Fide* Walker 1985: 92.

Neuropogon acromelanus var. *inactivus* f. *picatus* I.M. Lamb, J. Linn. Soc. (Bot.) 52: 220 (1939). - *Usnea picata* (I.M. Lamb) C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 205 (1948). Type: [South Victoria Land] Cape Adare or Sastrugi, Br. Antarct. 'Terra Nova' Exped. 1910 (BM holotype). *Fide* Walker 1985: 92.

Neuropogon acromelanus var. *inactivus* f. *scabridulus* I.M. Lamb, J. Linn. Soc. (Bot.) 52: 220 (1939). - *Usnea scabridula* (I.M. Lamb) C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 204 (1948). Type: Antarctica, *Campbell D. Mckellar* (BM holotype). *Fide* Walker 1985: 92.

Neuropogon ciliatus var. *subpolaris* I.M. Lamb, J. Linn. Soc. (Bot.) 52: 217 (1939). - *Usnea subpolaris* (I.M. Lamb) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 237 (1973). Type: South Victoria Land, Cape Sastrugi, Evans Cove, Br. Antarct. 'Terra Nova' Exped. 1910 (BM holotype). *Fide* Walker 1985: 92.

Usnea frigida C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 603 (1938). Type: Marie Byrd Land, Edsel Ford Range, Mt Rea-Cooper, *P. Siple, F.A. Wade, S. Corey & O.D. Stancliff* R l. *Fide* Lamb 1964: 14.

Usnea laxissima C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 198 (1948). - *Neuropogon antarcticus* var. *laxissima* (C.W. Dodge) Js. Murray, Trans. R. Soc. N.Z. 2: 71 (1963). Type: Queen

Mary Land, Possession Nunatak, 15 Dec. 1912, *C.T. Harrisson* A.A.E. 84 (MEL 1012296 isotype, CHR isotype). *Fide* Walker 1985: 92.

? *Usnea striata* Zammuto, *in* Dodge, Trans. Amer. Micros. Soc. 84: 522 (1965). Type: Edward VII Peninsula, Rockefeller Mountains, Mt Breckinridge, 78°03'S 155°28'W, *R.G. Frazier & F.A. Wade* 315. *Fide* Walker 1985: 93.

Thallus epilithic, fruticose, 1.5-4 cm tall, arising from a more or less delimited or proliferating holdfast, erect, sparsely to richly branched, with thin secondary branches; branches terete, yellow-green, with black bands and black apices, or more or less completely black; surface subnitid or matt, smooth to foveolate, more or less scabrid with small papillae; cortex variable in thickness; medulla lax or sublax; axis thin, occupying 0.2-0.4 of the main branch diameter. Soralia numerous, usually on terminal parts of branches, flat and emarginate to convex-pulvinate or globose with age, yellowish to black. Soredia granular.

Apothecia not seen.

Discussion. This taxon was treated by Lamb (1964) and Walker (1985). *U sphacelata* differs from *U. antarctica* in the subnitid, smooth to foveolate surface of the thallus, the lax medulla, the thin axis, occupying less then half diameter of main branches, and the convex to subglobose soralia which are never crateriform (Walker 1985).

Distribution in the survey area. Widespread: it is characteristic of weakly nitrophytic communities, belonging to the fruticose and foliose lichen subformation, and it grows with *Umbilicaria decussata, Pseudephebe minuscula, Buellia lignoides, B. frigida, Rhizocarpon adarense* and *Acarospora* spp. At the base of the thalli of *U. sphacelata* some nitrophytic species, such as *Candelariella flava* and *Rinodina olivaceobrunnea,* can be found. These communities were described by Kappen (1985) as the *Usneetum sulphureae "mixtum"*: they are characterized by the accumulation of detritus at the base of fruticose lichens, where many nitrophytic or even muscicolous species are able to develop.

Total number of samples: 84, from: Apostrophe Island, Campo Icaro, Cape Irizar, Cape King, Cape Phillips, Coulman Island, Crater Cirque, Daniell Peninsula, Football Saddle, Gondwana Station, Index Point, Kay Island, Lamplugh Island, Mt Moriarty, Prior Island, Starr Nunatak, Stefania Cirque, Tinker Glacier, Tripp Island, Vegetation Island, Whitmer Peninsula.

Distribution. Bipolar. In the Antarctic continent *U. sphacelata* is circumpolar and is more frequent than *U. antarctica*; it is known from the Peninsula, while it seems to be absent from the islands of the maritime and subantarctic regions, where it is replaced by *U. antarctica* (Walker 1985). Continental Antarctica (Øvstedal & Lewis Smith 2001): Ellsworth Land (Walker 1985), Marie Byrd Land (Walker 1985), King Edward VII Land (Walker 1985), Victoria Land (Castello & Nimis 1995b, 2000, Kappen 1985, Murray 1963, Walker 1985), Wilkes Land (Filson 1974b (as *U. acromelana* according to Walker 1985), Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994, Walker 1985), Queen Mary Land (isotype of *U. laxissima*, Olech 1989a, Walker 1985), MacRobertson Land (Filson 1975c (as *U. acromelana* according to Walker 1985), Walker 1985), Enderby Land (Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977, Walker 1985), Dronning Maud Land (Bowra *et al.* 1966, Engelskjøn 1986, Lindsay 1971c, 1972a, Øvstedal 1983a, 1983b, 1986a, Thor 1995, Walker 1985); the maritime Antarctic: (Redon 1985), Antarctic Peninsula (Lamb 1964, Lindsay 1969a, Walker 1985).

Selected specimens examined: **Victoria Land:** Whitmer Peninsula, *S. Sedmak* (TSB A286); Terra Nova Bay, Vegetation Island, *G. Del Frate* (TSB A49), *P. Modenesi* (TSB A387); Coulman Island, *P. Modenesi* (TSB A106).

Xanthoria elegans (Link) Th. Fr.

N. Acta Reg. Soc. Sc. Upsal., ser. 3, 3: 69 (1861). - *Lichen elegans* Link, Ann. Naturges. 1: 37 (1791). *Blastenia sparsa* Js. Murray, Trans. R. Soc. N.Z. 2: 63 (1963). Type: Victoria Land, Cape Hallett, Tombstone Hill, Hallett Base, 3200 ft, *Fitzgerald & Croll* (WELT 143! holotype). *Fide* Castello 1995: 81. *Caloplaca sparsa* v. *latespora* (C.W. Dodge & G.E. Baker) Js. Murray, Trans. R. Soc. N.Z. 2: 65 (1963). Type: Victoria Land, Football Mountain, 2700 ft, on rock, *Croll & Fitzgerald* (WELT 127 holotype). *Fide* Filson 1984: 311.

Candelariella rudolphi C.W. Dodge, Trans. Amer. Microsc. Soc. 84: 520 (1965). Type: [Victoria Land] Ross Island, Cape Crozier, 77°29'S 169°34'E, Pat's Peak, on black lava, *E.D. Rudolph* 64023 (FH-Dodge! holotype). *Fide* Castello & Nimis 1994b: 9.

Gasparrinia adarensis C.W. Dodge, Trans. Amer. Microsc. Soc. 84: 524 (1965). Type: Victoria Land, Cape Adare, 71°17'S 170°15'E, on calcareous grit, *R.E. Priestley* 49, Brit. Antarct. Terra Nova Exped. *Fide* Castello & Nimis 1995a: 79.

Gasparrinia siplei C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 624 (1938). - *Xanthoria siplei* (C.W. Dodge & G.E. Baker) C.W. Dodge, Lich. Fl. Antarct. Cont. Isl.: 274 (1973). Type: Marie Byrd Land, Skua Gull Peak, 76°49'S 145°29'W, on dark greenish gray slate, orthoclase-sericite schist, fine-grained dike, 1934, *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* 72W-6/7 (FH-Dodge! holotype). *Fide* Castello 1995: 81.

Kuttlingeria rufa C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 615 (1938). Type: Marie Byrd Land, Mt Woodward, 77°17'S 145°45'W, *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* DW-4. *Fide* Kärnefelt 1989: 151, 197; Castello 1995: 81.

Kuttlingeria rutilans C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 616 (1938). Type: Marie Byrd Land, Skua Gull Peak, 76°49'S 145°29'W, *P.A. Siple & S. Corey* 72W-9. *Fide* Kärnefelt 1989: 151, 197; Castello 1995: 81.

Polycauliona johnstonii C.W. Dodge, BANZ. Antarct. Res. Exped. Rep. B, 7: 239 (1948). Type: MacRobertson Coast, Cape Bruce, 67°26'S 60°49'E, rocks near shore, B.A.N.Z.A.R.E. B108-28 (FH-Dodge! holotype). *Fide* Filson 1984: 311; Castello 1995: 81.

Polycauliona pulvinata C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 628 (1938). - *Caloplaca elegans* var. *pulvinata* (C.W. Dodge & G.E. Baker) Js. Murray, Trans. R. Soc. N.Z. 2: 64 (1963). Type: Marie Byrd Land, Edsel Ford Range, Mt Rea-Cooper, 77°07'S 145°30'W, on coarse-grained leucogranite, *P.A. Siple, F.A. Wade, S.*

Corey & O.D. Stancliff R-3 (FH-Dodge! holotype). *Fide* Filson 1984: 311; Castello 1995: 81.

Polycauliona sparsa C.W. Dodge & G.E. Baker, Ann. Mo. Bot. Gard. 25: 629 (1938). - *Caloplaca sparsa* (C.W. Dodge & G.E. Baker) Js. Murray, Trans. R. Soc. N.Z. 2: 65 (1963). Type: Marie Byrd Land, Skua Gull Peak, 76°53'S 145°30'W, P. Siple & S. Corey 72W-5. *Fide* Filson 1984: 311; Castello 1995: 81.

Thallus epilithic, foliose to subfoliose, crustose or pulvinate, effigurate, orange to reddish, K + red, usually forming more or less rounded rosettes; peripheral lobes radiating, discrete to more or less contiguous or overlapping, irregularly branched, usually strongly convex, up to 1 mm wide, attached to the substratum by short white hapters; central parts of thallus often with overlapping evident lobes, sometimes incomplete, reduced or missing. Upper cortex 20-30 µm thick, paraplectenchymatous, with an outer layer encrusted with brown-yellowish granules; medulla consisting of loosely interwoven hyphae, *c.* 5 µm diam.; lower cortex more or less developed, similar to the upper cortex.

Apothecia sessile to constricted at the base, concolorous with the thallus, 0.5-2.5 mm diam., rounded, numerous and crowded; disc flat, with a thick, smooth to crenulate, persistent margin. Epithecium yellowish brown, granular; hymenium hyaline, 50-80 µm tall; hypothecium hyaline, 20-30 µm tall. Paraphyses branched, *c.* 2 µm diam., apices 4-5 µm diam., encrusted with brownish granules. Asci clavate, 50-65 x 12-15 µm, 8-spored. Spores polarilocular, colourless, (9-)10-13 x (5-)6-7 µm, ellipsoid to broadly ellipsoid; septum 3-4 µm wide.

Pycnidia immersed in red warts on the upper side of the thallus; conidia ellipsoid, 3.2-4 x 1.2-1.5 µm.

Discussion. X. elegans is a cosmopolitan and highly polymorphic species with a broad ecological range. It is one of the commonest species in Antarctic regions, but the strong variability in thallus characters (growth-form, colour, frequency and development of apothecia) gave rise to the description of a great number of taxa which turned out to be conspecific. In the survey area thallus development varies from pulvinate to subfruticulose forms in nutrient-enriched stands to placodioid crustose thalli or reduced areolate forms with small discrete, convex lobes in less eutrophicated or more wind-exposed conditions. For a discussion and a taxonomic account of *X. elegans* in Antarctica see Castello (1995).

X. elegans is distinguished from the similar *Caloplaca saxicola* by the presence of a lower cortex, the never pruinose, orange or reddish thallus, with longer and strongly convex, often branched, discrete to more or less contiguous peripheral lobes, the central parts of thallus with frequent overlapping lobes, or incomplete or missing, covered by numerous, flat apothecia with a thick and persistent margin, and the ellipsoid to broadly ellipsoid spores with wider septum (see also comment to *C. saxicola*).

X. elegans can be confused with *Caloplaca lucens* (Nyl.) Zahlbr., known from the maritime and subantarctic regions, being well-separated by cortical structure (Søchting & Øvstedal 1992).

Distribution in the survey area. A very common nitrophytic species throughout the survey area; it grows on rocks, usually with *Buellia frigida, Caloplaca citrina, C. saxicola, Candelaria murrayi, Candelariella flava, Physcia caesia, Lecanora fuscobrunnea, L. mons-nivis* and *X. mawsonii.*

Total number of samples: 96, from: Apostrophe Island, Baker Rocks, Campo Icaro, Cape King, Cape Phillips, Carezza Lake, Coulman Island, Crater Cirque, Edmonson Point, Football Saddle, Gondwana Station, Harrow Peaks, Index Point, Inexpressible Island, Kay Island, Mt Dickason, Stefania Cirque Tarn Flat, Teall Nunatak, Terra Nova Bay Station, Tripp Island, Vegetation Island.

Distribution. A cosmopolitan species. *X. elegans* is widespread in Antarctic regions. Continental Antarctica (Øvstedal & Lewis Smith 2001): Marie Byrd Land (type of *P. pulvinata, P. sparsa, G. siplei*, Castello 1995), King Edward VII Land (Castello 1995), Victoria Land (type of *C. rudolphi, G. adarensis, B. sparsa*, Castello 1995, Castello & Nimis 1995b, 2000, Kappen 1985, Murray 1963, Seppelt *et al.* 1995), Wilkes Land (Castello 1995, Filson 1974b, Lewis Smith 1988, Melick *et al.* 1994), Queen Mary Land (Andreev 1990, Olech 1989a), MacRobertson Land (type of *P. johnstonii*, Castello 1995, Filson 1966, 1975c, Seppelt & Ashton 1978), Enderby Land (Castello 1995, Inoue 1995, Kanda & Inoue 1994, Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (Bowra *et al.* 1966, Castello 1995, Engelskjøn 1986, Lindsay 1971c, 1972a, Øvstedal 1983a, 1983b, 1986a, Thor 1995, 1997), Coats Land (Lindsay & Brook 1971); NE Peninsula (Lewis Smith & Østedal 1994); the maritime Antarctic: Antarctic Peninsula (De Leeuw *et al.* 1998, Lewis Smith & Corner 1973, Øvstedal & Lewis Smith 2001, Redon 1985), South Shetland Is. (Allison & Lewis Smith 1973, Andreev 1988, Aptroot & van der Knaap 1993, Jacobsen & Kappen 1988, Lindsay 1971b, Olech 1989b, Øvstedal & Lewis Smith 2001, Redon 1985), South Orkney Is. (Lewis Smith 1972, 1995, Øvstedal & Lewis Smith 2001, Redon 1985), South Sandwich Is., Bouvetøya (Øvstedal & Lewis Smith 2001); subantarctic region: South Georgia (Lindsay 1974c, Øvstedal & Lewis Smith 2001), Prince Edward Is. (Lindsay 1977a), Macquarie I. (Kantvilas & Seppelt 1991).

Selected specimens examined: **Marie Byrd Land:** Skua Gull Peak, 76°50'S 145°30'W, 1934 *P.A. Siple, F.A. Wade, S. Corey & O.D. Stancliff* 72W-9 (FH-Dodge), as *G. siplei*; Edsel Ford Range, *J.E. Perkins* 146 (B46) (FH-Dodge), as *K. rufa*; Mt Woodward, *P. Siple, F.A. Wade, S. Corey & O.D. Stancliff* DW-2 (FH-Dodge), as *K. rutilans*; Edsel Ford Mts, *J.E. Perkins* 142 (FH-Dodge), as *K. Rutilans*. - **King Edward VII Land:** Rockefeller Mountains, Mt Patterson, 18 Dec. 1940, *R.G. Fitzsimmons* 280 (FH-Dodge), as *G. siplei*; Rockefeller Mountains, Mt Patterson, 25 Dec. 1940, *R.G. Fitzsimmons* 325 (FH-Dodge), as *G. siplei*; Rockefeller Mountains, Mt Nielson, Dec. 15 1940, *R.G.Frazier & F.A. Wade* 317b (FH-Dodge), as *P. sparsa*. - **Victoria Land:** Ross Island, Hut Point Peninsula, ca 77°51'S 166°35'E, 26 Jan. 1956, C.R. Lewis HP-12, HP-14 (FH-Dodge), as *P. pulvinata*; Ross Island, Cape Crozier, 77°29'S 169°34'E, Dec. 9 1959, *O. Holm-Hansen* 12-1, 12-2 (FH-Dodge), as *P. pulvinata*; Ross Island, Cape Crozier, 77°29'S 169°34'E, 25 Jan. 1962, *E.D. Rudolph* 62017 (FH-Dodge), as *P. pulvinata*; Terra Nova Bay, Reeves Glacier, Teall Nunatak, *P. Modenesi* (TSB A401); Terra Nova Bay, Reeves Glacier, Tarn Flat, *S. Sedmak* (TSB A180, A188, A299); Wood Bay, Kay Island, *G. Del Frate* (TSB A115); Hallett Peninsula, *E.D. Rudolph* 61050 (FH-Dodge), as *K. rufa*; Mt Suess, Gondola Ridge, *J. Mulligan* 9, 10 (FH-Dodge), as *K. rufa*; Cape Hallett Station, *G.A. Llano* 2729 (FH-Dodge), as *K. rutilans*. - **Wilkes Land:** Knox Coast, *E.A. Midgley* 80 (FH-Dodge), as *K. rutilans*. - **MacRobertson Land:** Mawson, lichen type B, *R.O. Summers* (FH-Dodge), as *P. johnstonii*. - **Prince Olav Coast:** Showa, 69°00'S 39°35'E, Japanese Antarctic Exped., 1957-8, 32a (FH-Dodge), as *P. johnstonii*. - **Princess Ragnhild Coast:** Vengen Spur, 72°04'S 23°40'E, 1966, *T. van Autenboer* 5 (FH-Dodge), as *P. johnstonii*.

Xanthoria mawsonii C.W. Dodge

BANZ. Antarct. Res. Exped. Rep. B, 7: 236 (1948). Type: George V Land, Cape Denison, 67°00'S, 142°36'E, Winter Quarters, A.A.E. 38 (FH-Dodge! holotype).

Thallus epilithic or muscicolous, foliose to subfruticose, rosette-shaped, yellow-orange or reddish, up to 1-1.5 cm diam., often confluent with other thalli, K+ red; lobes plane or convex, horizontal to ascending, 2-5 mm tall and 1-3 mm wide, often with a whitish pruina; terminal parts of the lobes wide, scarcely to irregularly incised; blastidia yellow or orange-yellow, present on the apical and marginal parts of lobes, on the lower surface, often forming labriform "soralia"; lower side yellowish to yellowish orange, with thin veins and sparse whitish hapters; upper cortex paraplectenchymatous, 30-40 µm thick, outer edge with yellowish brown granules; medulla consisting of loosely interwoven hyphae, 4-5 µm diam.; lower cortex 30-40 µm thick, similar to the upper cortex.

Apothecia not seen.

Pycnidia rare, immersed in small orange or reddish warts on the upper side of the thallus; conidia ellipsoid, 3-4.5 x 0.8-1.2 µm.

Discussion. This taxon was discussed by Castello (1995). *X. mawsonii* is characterized by the rosette-shaped orange to reddish thallus consisting of erect subfruticose blastidiate lobes. It belongs in the *X. candelaria* group, and was often treated by many authors as a simple modification of *X. candelaria s.str.*, but it is characterized by different morphological features and longer ellipsoid conidia (see Poelt & Petutschnig 1992). *X. mawsonii* is closely related with *X. borealis* R. Sant. & Poelt, an ornithocoprophilous species known from arctic and subarctic regions (Poelt & Petutschnig 1992), differing in minor morphological features; as no fertile material of *X. mawsonii* has been ever collected from Antarctica, the two taxa are kept separate.

Distribution in the survey area. Very common in eutrophicated stands throughout the survey area, occurring on rocks and mosses, with nitrophytic species, such as *Buellia frigida, Caloplaca athallina, C. citrina, C. lewis-smithii, Candelaria murrayi, Candelariella flava, Lecanora expectans, L. fuscobrunnea, Lecidella siplei, Physcia caesia* and *Xanthoria elegans*.

Total number of samples: 142, from: Apostrophe Island, Campo Icaro, Cape King, Cape Ross, Crater Cirque, Edmonson Point, Harrow Peaks, Inexpressible Island, Kay Island, Mt Kenaith, Prior Island, Terra Nova Bay Station, Tinker Glacier.

Distribution. Endemic to continental Antarctica. This species was often treated as *X. candelaria*: it is likely that *X. mawsonii* is a widespread circum-antarctic species, replacing *X. candelaria s. str.* in continental Antarctica. Continental Antarctica: Victoria Land (Castello 1995, Castello & Nimis 1995b, 2000), King George V Land (type), Wilkes Land (Castello 1995, Filson 1974b), MacRobertson Land (Castello 1995, Filson 1966, 1975c, Seppelt & Ashton 1978), Enderby Land (Kashiwadani 1970, Nakanishi 1977), Dronning Maud Land (Castello 1995, Thor 1995, 1997).

Selected specimens examined: **Victoria Land:** Prior Island, *S. Sedmak* (TSB A273); Terra Nova Bay, Northern Foothills, Terra Nova Bay Station, *P. Modenesi* (TSB A396); Wood Bay, Kay Island, *P. Modenesi* (TSB A398, A458); Wood Bay, Mt Melbourne, Edmonson Point, *P. Modenesi* (TSB A397); Lady Newnes Bay, Cape King, *S. Sedmak* (TSB A262, A414); Birthday Ridge, L. Kappen (KIEL-HA A207). - **Wilkes Land:** Knox Coast, Mitchell Island, 66°20'S 110°30'E, 20 Jan. 1958, *G.A. Llano* 2964 (FH-Dodge); Clarke Peninsula, L. Kappen (KIEL-HA A1491, A1498); Bunger Hills, 66°18'S 100°45'E, *M. Andreev* (GZU 42-93). - **MacRobertson Land:** Mawson Rock, East Bay, *R. Filson* 14993, Lich. Antarct. Exsiccati I, n° 24 (BM). - **Dronning Maud Land:** Heimefrontfjella, Sivorgfjella, 74°33'S 11°15'W, *G. Thor* 10543, 10547 (S).

Discussion

The lichen flora of the Terra Nova Bay area consists of 57 taxa, 51 of which were identified to species level. Most taxa are crustose (47 species, 82.4 % of the total); foliose species are 7 (12.3 %) and fruticose species are only 3 (5.3 %). Most species produce apothecia, and only 10 taxa (17.5 %) are sorediate.

There are 23 genera, all of them widespread in both

Tab. 1 - Distribution, number of samples and occurrence of the 57 lichen species in 41 surveyed localities in the Terra Nova Bay area. EC = endemic to continental Antarctica; ECP = endemic to continental Antarctica and Peninsula; ECM = endemic to continental and maritime Antarctic regions; EA= endemic to Antarctica; ASA = Antarctica and South America; A = austral; B= bipolar; C= cosmopolitan.

	Distribution	Number of Samples	Apostrophe Island	Baker Rocks	Black Ridge	Browning Pass	Campo Icaro	Cape Irizar	Cape King	Cape Phillips	Cape Ross	Cape Sastrugi	Cape Washington	Carezza Lake	Coulman Island	Crater Cirque	Daniell Peninsula	Edmonson Point	Football Saddle	Gondwana Station	Harrow Peaks	Index Point
Acarospora flavocordia	EC	23	+																		+	
Acarospora gwynnii	ASA	64			+		+					+		+								+
Acarospora cf. *nitrophila*	-	24					+					+								+	+	
Acarospora williamsii	ECP	5										+						+				
Amandinea coniops	B	25					+		+									+				
Bacidia johnstonii	EC	2																				
Bacidia sp. A	ECM	5													+							
Buellia cladocarpiza	ECM	33	+						+												+	
Buellia darbishirei	ECP	9													+			+				
Buellia frigida	ECP	215	+			+	+		+	+				+	+	+		+	+	+	+	
Buellia grimmiae	EC	3																		+		
Buellia lignoides	EC	84					+					+		+			+		+	+		+
Buellia pallida	EC	3										+										
Buellia papillata	B	8						+	+												+	
Buellia pycnogonoides	ECM	1																				
Buellia subfrigida	ECP	2																		+	+	
Caloplaca approximata	B	1					+															
Caloplaca athallina	ECM	41	+				+		+							+				+	+	
Caloplaca citrina	C	72	+	+			+		+				+	+		+		+		+	+	
Caloplaca conversa	B	11								+										+		
Caloplaca lewis-smithii	EC	24	+				+	+	+							+					+	
Caloplaca saxicola	C	8							+									+				
Candelaria murrayi	ECM	54		+					+						+						+	
Candelariella flava	EA	141	+				+	+	+	+					+	+			+	+	+	
Candelariella vitellina	C	13					+		+					+						+	+	
Carbonea vorticosa	B	12										+										
Lecanora expectans	ECM	56	+				+		+					+		+		+			+	
Lecanora fuscobrunnea	EC	114	+				+		+	+		+		+		+		+		+	+	
Lecanora aff. *geophila*	-	5							+			+										
Lecanora mons-nivis	ECP	39		+		+			+			+	+	+		+		+				
Lecanora aff. *orosthea*	-	14								+					+							
Lecanora physciella	EA	41				+				+						+	+		+			+
Lecanora sverdrupiana	ECP	1																				
Lecidea andersonii	EC	12							+											+	+	
Lecidea cancriformis	ECM	36	+									+		+		+			+			
Lecidella stipiel	ECM	35	+				+	+	+					+		+					+	
Leproloma cacuminum	B	24	+			+			+							+		+		+	+	
Physcia caesia	C	115	+				+		+							+		+		+	+	
Physcia dubia	B	7	+															+				
Pleopsidium chlorophanum	B	54					+			+		+		+	+		+	+	+	+		
Pseudephebe minuscula	B	59					+	+	+			+		+	+	+			+	+		
Rhizocarpon adarense	EC	21										+										+
Rhizocarpon geminatum	B	1																				
Rhizocarpon geographicum	C	9										+							+		+	
Rhizoplaca melanophthalma	B	25	+		+				+							+			+		+	
Rhizoplaca sp. 1	-	13												+					+			
Rimularia psephota	B	4																				
Rinodina olivaceobrunnea	B	15							+							+					+	
Rinodina sp. 1	-	5												+				+				
Tephromela atra	C	8								+					+		+					
Umbilicaria aprina	B	26							+							+		+	+	+	+	
Umbilicaria decussata	B	122	+		+		+					+		+		+			+	+	+	
Umbilicaria cf. *saviczii*	-	2																+	+			
Usnea antarctica	A	25	+				+									+			+		+	
Usnea sphacelata	B	84	+				+	+	+	+					+	+	+		+	+		+
Xanthoria elegans	C	96	+	+			+		+	+				+	+	+		+	+	+	+	+
Xanthoria mawsonii	EC	142	+				+		+		+					+		+			+	

	Inexpressible Island	Kay Island	Lamplugh Island	Lowry Bluff	Markham Island	Morozumi Range	Mt Dickason	Mt Kenaith	Mt Moriarty	Prior Island	Skua Lake	Starr Nunatak	Stefania Cirque	Tarn Flat	Tent Nunatak	Terra Nova Bay Station	Tinker Glacier	Tripp Island	Vegetation Island	Vegetation Ridge	Whitmer Peninsula
Acarospora flavocordia		+																			
Acarospora gwynnii	+			+		+								+	+				+	+	
Acarospora cf. *nitrophila*		+									+		+		+				+		
Acarospora williamsii																				+	
Amandinea coniops		+								+			+					+			
Bacidia johnstonii				+																+	
Bacidia sp. A									+											+	
Buellia cladocarpiza	+	+						+													
Buellia darbishirei																		+			
Buellia frigida	+	+	+					+		+	+	+	+	+	+	+		+	+	+	
Buellia grimmiae																	+		+		
Buellia lignoides	+	+				+				+		+	+	+	+	+			+	+	
Buellia pallida															+						
Buellia papillata																+	+				
Buellia pycnogonoides									+												
Buellia subfrigida																					
Caloplaca approximata																					
Caloplaca athallina		+								+						+	+	+			
Caloplaca citrina	+	+			+					+						+		+			
Caloplaca conversa		+											+					+		+	
Caloplaca lewis-smithii		+								+											
Caloplaca saxicola																					
Candelaria murrayi		+						+		+											
Candelariella flava	+	+	+							+		+				+					
Candelariella vitellina		+										+				+	+				
Carbonea vorticosa																			+	+	
Lecanora expectans	+	+								+		+				+					
Lecanora fuscobrunnea	+	+						+		+	+	+	+	+	+	+		+	+	+	
Lecanora aff. *geophila*																	+		+		
Lecanora mons-nivis		+											+		+	+				+	
Lecanora aff. *orosthea*										+											
Lecanora physciella		+						+					+		+			+			
Lecanora sverdrupiana																+					
Lecidea andersonii	+	+											+			+			+		
Lecidea cancriformis	+	+							+	+			+		+	+			+		
Lecidella siplei	+	+								+						+	+	+			
Leproloma cacuminum												+					+		+		
Physcia caesia	+	+								+		+				+	+	+			
Physcia dubia		+																			
Pleopsidium chlorophanum				+					+				+	+	+	+			+	+	
Pseudephebe minuscula	+		+							+		+	+			+		+	+	+	+
Rhizocarpon adarense		+				+									+				+	+	
Rhizocarpon geminatum		+																			
Rhizocarpon geographicum													+		+				+		
Rhizoplaca melanophthalma		+											+						+		
Rhizoplaca sp. 1													+	+	+				+		
Rimularia psephota										+									+		
Rinodina olivaceobrunnea		+	+							+							+				
Rinodina sp. 1	+	+														+					
Tephromela atra																					
Umbilicaria aprina		+											+		+	+					
Umbilicaria decussata	+	+	+					+	+	+		+	+	+	+	+			+	+	+
Umbilicaria cf. *saviczii*																					
Usnea antarctica		+								+			+						+		
Usnea sphacelata		+	+						+	+		+	+				+	+	+		+
Xanthoria elegans	+	+					+						+	+	+	+		+	+		
Xanthoria mawsonii	+	+						+		+						+	+				

hemispheres. The number of genera is rather high in comparison with that of species: this is a typical character of long-distance derived floras, and is common to many Antarctic areas (Engelskjøn & Jørgensen 1986).

The number of lichen species collected in the survey area is rather high, but conforms with recent floristic investigations carried out in different parts of continental Antarctica, as summarised by Inoue (1991b, 1995): 41 species from Birthday Ridge, northern Victoria Land (Kappen 1985); 33 species (Olech 1989a), 42 species (Andreev 1990) from Bunger Hills, Queen Mary Land; 32 species from MacRobertson Land (Filson 1966); 57 species from the Syowa region, Enderby Land (Inoue 1991b).

According to the VICTORIA database, the most updated numbers of known species for different areas of continental Antarctica are as follows: Victoria Land, 92 taxa (Kappen 1985, Hale 1987, Murray 1963, Castello & Nimis 1995b, Seppelt *et al.* 1995, 1996); Wilkes Land, 36 (Filson 1974b, Hovenden & Seppelt 1995, Lewis Smith 1986, 1988, Melick *et al.* 1994); Queen Mary Land, 48 (Andreev 1990, Olech 1989a); MacRobertson Land, 30 (Filson 1966, 1975c, Seppelt & Ashton 1978); Dronning Maud Land, 49 (Engelskjøn 1986, Øvstedal 1983a, 1983b, 1986a, Thor 1995, 1997). Lichen diversity of continental areas is very low if compared to that of the maritime Antarctic: *e.g.* 256 lichen taxa are recorded from the South Shetland Is. (Allison & Lewis Smith 1973, Andreev 1988, Aptroot & van der Knaap 1993, Jacobsen & Kappen 1988, Lindsay 1971b, Olech 1989b, Redon 1985, Sancho & Valladares 1993, Sancho *et al.* 1999). These results are not definite, as some publications are not included in VICTORIA database (Øvstedal & Lewis Smith (2001) are not considered as surveyed areas from continental Antarctica are often not specified) and taxonomic knowledge of some genera is still unsatisfactory.

The distribution and development of lichen species in the Terra Nova Bay area is strongly influenced by water and nutrient availability and by the different types of substrata (Castello & Nimis 1995b). Morphological features, such as degree of development, type, colour, shape, size of the thalli, presence of upper amorphous protective layers, are affected by environmental conditions (Lamb 1970, Ahmadjian 1970). In eutrophicated stands crustose lichens have a tendency to form substipitate or fruticulose thalli (Lamb 1968, Jacobsen & Kappen 1988, Olech 1990). Reduced, badly developed thalli with a scabrid or decomposed surface are often induced by the abrasion effect of ice crystals and sand driven by strong winds. Many nitrophytic species occur in the survey area (*Amandinea coniops, Buellia cladocarpiza, B. frigida, Caloplaca athallina, C. citrina, Candelariella flava, Lecanora expectans, Physcia caesia, Ph. dubia, Rhizoplaca melanophthalma, Xanthoria elegans, X. mawsonii*), and their distribution is strongly influenced by bird colonies spread along the coast. The high incidence of ornithocoprophilous species suggests a significant role of birds in lichen distribution all over Antarctic regions (Engelskjøn & Jørgensen 1986).

Distributional information within the Antarctic regions shows that circumpolar species are common in the Terra Nova Bay area (*e.g. Acarospora gwynnii, Amandinea coniops, Buellia frigida, Caloplaca athallina, C. citrina, Candelaria murrayi, Candelariella flava, Carbonea vorticosa, Lecanora expectans, Physcia caesia, Pleopsidium chlorophanum, Pseudephebe minuscula, Rhizocarpon geographicum, Rhizoplaca melanophthalma, Rinodina olivaceobrunnea, Umbilicaria aprina, U. decussata, Usnea antarctica, U. sphacelata* and *Xanthoria elegans*), and that many taxa have wide distributions (*e.g. Acarospora williamsii, Buellia grimmiae, B. lignoides, B. pallida, B. papillata, B. pycnogonoides, Lecanora fuscobrunnea, Lecidea cancriformis, Lecidella siplei* and *X. mawsonii*), or are known from very distant areas (*e.g. Bacidia sp. A, Buellia subfrigida, Caloplaca approximata, Lecanora physciella, L. sverdrupiana* and *Lecidea andersonii*).

The phytogeographical analysis of the flora is based on the 51 taxa identified to species level (Tab. 1): the endemic element to continental Antarctica and Antarctic Peninsula constitutes 31.4% of the total (16 species), whereas the continental endemic species (species restricted to continental Antarctica) are 19.6 % (10 species). Altogether, the Antarctic-subantarctic endemic species make up 51 % of the total (26 species), the Antarctic-South American element 2% (1 species), the austral element 2% (1 species), while the bipolar element represents 31.4 % (16 species) and the cosmopolitan element 13.7 % (7 species).

The lichen flora of the Terra Nova Bay area is characterized by a strong endemic element, but the bipolar and cosmopolitan elements are also significant. Its phytogeographical structure agrees with the phytogeographical image of continental Antarctica sketched by Castello & Nimis (1997a) and with that discussed by Øvstedal & Lewis Smith (2001). The latter authors record 92 species from continental Antarctica, 82 of which are identified to species level: the Antarctic-subantarctic endemic element makes up 50 % of the total, the austral element 2.3 %, while the bipolar element constitutes 27.3 % and the cosmopolitan element 6.8 % of the total.

These results are not definite because of the relatively poor knowledge of species distribution and the taxonomic uncertainty of many taxa (Seppelt 1995,

Øvstedal & Lewis Smith 2001). Many taxa are still not identified to species level, and many widespread genera, such as *Buellia*, *Rinodina*, *Lecanora,* are in urgent need of a revision. Several endemic taxa belong to very polymorphic and widely distributed groups, such as *Lecanora fuscobrunnea* of the *L. polytropa* group, *Lecanora mons-nivis* and *L. expectans* of the *Lecanora dispersa-L. hagenii* complex, or have very closely related counterparts in the Northern Hemisphere, such as *Caloplaca athallina* and *C. tiroliensis, Rhizocarpon adarense* and *Rh. superficiale*, *Xanthoria mawsonii* and *X. borealis*. Their taxonomic position can be assessed only by detailed revisions (*e.g.* see the discussion on *C. athallina* and *C. tiroliensis* by Søchting & Øvstedal 1992). Moreover, the new report of *Acarospora gwynnii* from the Central Andes shows that more extensive floristic investigations in the Southern Hemisphere, and South America in particular, are needed to clarify the phytogeographical affinities of the Antarctic lichen flora (Sancho *et al.* 1999).

The Antarctic continent seems to host a rather poor and uniform flora, with many circum-Antarctic species; in spite of the high incidence of the endemic element, there are remarkable phytogeographical affinities with the Arctic flora.

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