STUDIES IN ANTARCTIC LICHENS II:
Lichens from the Windmill Islands, Wilkes Land.

by

Rex B. Filson*

SUMMARY

The lichen collections from the Windmill Islands are enumerated together with a key and description of each species. Two new species, Buellia soredians and Lecidea andersonii, are described and figured. Figures are provided for those species not already illustrated in the author’s The Lichens and Mosses of Mac. Robertson Land (Filson, 1966).

INTRODUCTION

The Windmill Islands are a group of islands and peninsulas on the eastern side of Vincennes Bay on the Budd Coast, Wilkes Land, at approximately 66° 20’S and 110° 30’E. They were first visited by U.S. Navy Survey ships during “Operation Windmill” in 1947–48 and later on by the Australian National Antarctic Research Expedition (ANARE) in 1956. In 1956, the Russian Survey Expedition also visited these islands. The U.S. National Academy of Sciences chose this locality for a station during the International Geophysical Year, and the construction of “Wilkes” Station at the western tip of the Clarke Peninsula was completed by U.S. Operation Deepfreeze II early in 1957. The United States operated Wilkes Station until 1959 when it was handed over to ANARE for use by Australian scientists. Wilkes was used by ANARE until 1969 when it was replaced by the more modern “Casey” station on the northern side of the Bailey Peninsula.

VEGETATION

The vegetation of the area consists almost entirely of lichens but a few mosses occur there also. Llano (1959 : 11) reported: “The area around IGY Wilkes Station was biologically the richest of all those investigated. The dominant lichen, Umbilicaria was well represented by the cosmopolitan Umbilicaria decussata, . . . . . . . The wide variety and extent of the cryptogamic flora suggests that the land area around Vincennes Bay has been exposed for a long time.”

Apart from these notes, no comprehensive report on the flora has been published. As part of his Lichenological Notes on the Flora of the Antarctic Continent and the Subantarctic Islands series, Dodge (1965 : 528) described Physcia llanoi as a

* National Herbarium of Victoria.

Fig. 1.—Map of part of the Budd Coast showing the Windmill Islands.
new species from Wilkes Station. The present author has not seen the type material of this species but suggests that it might prove to be conspecific with *Physcia caesia* (Hoffm.) Hampe because ample material of this latter species was collected in the same locality by K. S. White in 1966. According to the type description, *Physcia llanoi* seems to be a non-sorediose species, but many non-sorediose lobes have been noted amongst the present collections and this condition could lead to confusion.

In a further issue of this series, Dodge (1968) described two more new species, *Buellia llanoi* which from the description appears to be a colour variation of *Buellia frigida* Darb., and *Thelidium llanoi* which represents a genus unrepresented in our collections.

**GEOLOGY**

The geology of the Windmill Islands has been treated in a preliminary report on the Bedrock Geology (Robertson, 1959) and the following summary of each of the collecting areas is based on this report.

*Clarke Peninsula* is composed of migmatite which consists of approximately 65 per cent gneiss and 35 per cent granitic material. The migmatite exhibits many small folds which are
superimposed on the southern limb of the large syncline, the axis of which lies north of the peninsula. Bailey Peninsula is almost entirely migmatite and the rest is slightly garnetiferous biotite granite. The migmatite consists of approximately 80 per cent granitic phase and 20 per cent biotite or hornblende gneiss. Mitchell Peninsula has low rolling hills on the southern limb of the anticline and consists of migmatite in similar proportions to Bailey Peninsula. The migmatite is cut by a sub-parallel system of diabase dykes. The granite phase of the migmatite is granitoid, creamy coloured and slightly foliated. Robertson Ridge consists of igneous rocks in the central portion, but north and south sides consist of altered metamorphic rocks while the south-west corner exhibits a variety of altered rocks. This area shows the best exposure of the contact of the gneiss and the intermediate rocks of the stock. Odbert Island lies to the west of Robertson Ridge. Its bedrock is quartz diorite and represents the northern limit of the stock. Two wide vertical fine-grained black diabase dykes altered to a more basic rock type occur here. Browning Peninsula and Peterson Island are separated from one another by a narrow channel developed along a fault. The most abundant rocks are grey, coarse porphyritic diorites, quartz diorite and granite which are all weathered to rusty brown. They are part of a stock which is intruded by gabbro dykes. The Haupt Nunataks cover about 16 hectares and consist mainly of gneisses and gneissic granite. They are fine-to-medium-grained buff to black and white rocks that weather to a rusty brown.

ARRANGEMENT OF THE GENERA
Acarosporaceae: Biatorella
Lecanoraceae: Lecanora
Lecideaceae: Lecidea
Physciaceae: Buellia, Physcia, Rinodina
Teloschistaceae: Caloplaca, Protoblastenia, Xanthoria
Umbilicariaceae: Umbilicaria
Usneaceae: Alectoria, Usnea

KEY TO THE WILKES LAND LICHENS
1. Thallus foliose or fruticose

2. Thallus more than 1·5 cm tall
   3. Soredia pulvinate to subglobose.................................24 Usnea acromelana

3. Soredia eroded, convexed, abundant in the upper parts.........................25 Usnea antarctica

2. Thallus less than 1·5 cm tall

4. Thallus umbilicate, usually a smooth or rugulose disc, mono-or polyphyllous
5. Lower surface with a few tufts of rhizines at the margins, thallus small, upper surface smooth or verrucose. ...............21 Umbilicaria cristata
5. Lower surface without rhizines, upper surface reticulately rugose. .......20 Umbilicaria decussata
4. Thallus neither umbilicate nor monophyllous
6. Thallus greenish-orange to flame-scarlet. ...............19 Xanthoria mawsonii
6. Thallus not greenish-orange to flame-scarlet
7. Thallus lobes broad, imbricate, pale grey to brownish-grey, esorediose. .........11 Physcia caesia
7. Thallus lobes narrow terete, pale brownish to black, esorediose
8. Thallus branches loosely entangled, never forming rosettes. .......23 Alectoria pubescens
8. Thallus branches adnate to the substrate, forming rosettes. .......22 Alectoria minuscula

1. Thallus crustose or squamulose
9. Thallus orange, yellow or greenish-yellow
10. Upper cortex K—
11. Thallus granular-sorediose; apothecia small and immersed in granules; ascus 8-spored. ........ 18 Protoblastenia citrina
11. Thallus esorediose; apothecia large, hemispheric; ascus polyspored. ........1 Biatorella antarctica
10. Upper cortex K+ purple
12. Thallus effigurate, forming large orange to flame scarlet rosettes; apothecia usually abundant ..........17 Caloplaca elegans var. pulvinata
12. Thallus neither effigurate nor forming large rosettes, greenish-yellow to orange
13. Thallus sorediose; apothecia rare. .................16 Caloplaca citrina
13. Thallus absent; apothecia abundant. .................15 Caloplaca athallina
9. Thallus never orange, yellow nor greenish-yellow
14. Spores brown
15. Apothecia lecanorine
16. Thallus growing on rock. .........................13 Rinodina petermannii
16. Thallus growing over mosses or other lichens
17. Apothecia 1.0—1.5 mm diam., spores $25 - 30\mu \times 10 - 11\mu$.

17. Apothecia 0.3—1.0 mm diam., spores $16 - 21\mu \times 8 - 9\mu$.

14. Rinodina turfacea

12. Rinodina archaeoides

15. Apothecia lecideoid

18. Thallus effigurate

19. Hypothallus not developed.

7. Buellia latemarginata

18. Thallus not effigurate

20. Thallus growing on rock, usually with a dark radiate hypothallus

10. Buellia soredians

21. Thallus not sorediose.

8. Buellia lignoides

22. Thallus growing over mosses

6. Buellia grimmiae

9. Buellia cf. papillata

14. Spores hyaline

23. Apothecia brown or black

24. Apothecia black, margin concolorous with the thallus.

4. Lecidea andersonii

3. Lecanora rubina var. melanophthalma forma exsulans

DESCRIPTION OF THE SPECIES


Thallus in cerebriform humped areoles up to 3 cm diam., and up to 10 mm thick, bright sulphur-yellow, greenish in sheltered areas, held to the substratum by thin white hyphae which sometime penetrate deeply into the cracks in the rock. Cortex up to 50 $\mu$ thick. Algal cells 8—13 $\mu$ diam., forming scattered colonies throughout the medulla. Medulla of moderately woven hyaline branched hyphae 2.5—3.0 $\mu$ diam. Apothecia up to 1.5 mm diam., convex to hemispheric, margin visible at first but disappearing at maturity. Disk sulphur-yellow or sometimes yellow-green, waxy. Hymenium hyaline, 65—85 $\mu$ high including
the epithecium. *Epithecium* pale yellow, heavily encrusted with yellow crystals. Paraphyses regularly branched once or twice near the tips, 2\(\mu\) diam., apical cell slightly expanded. Asci 50 \(\times\) 16\(\mu\) broadly clavate, with over 150 spores. Ascospores hyaline, ellipsoidal, unicellular, 2 - 3 \(\times\) 2\(\mu\).


**Specimen Examined:** Bailey Peninsula, 1·5 km south of Casey Station, *D. J. Bishop*, 15.iii.1970 (MEL 1012061).

**Discussion:** The only specimen collected in this area is represented by eight small areae, each up to 1·5 mm in diameter. Although these are sterile, they agree in detail with those found elsewhere. The apothecial measurements, quoted in the above description, are based on specimens from Mac.Robertson Land and are included here because the author feels certain that fertile specimens will eventually be located in this present study area.


Thallus of small granules formed into rugose chunky areoles in areas up to 5 mm diam., greyish white, cinereous, eocorticate. Algal cells up to 25\(\mu\) diam., densely packed and forming a layer below the apothecia. Apothecia up to 1·2 mm diam., round to irregular, pruinose, disk reddish-brown to black. Margin concolorous with the thallus, crenulate, pruinose, inrolled at first, expanding but remaining elevated well above the disk. Cortex continuous with the thallus, up to 30\(\mu\) thick. Hymenium 50-65\(\mu\) high including the brownish epithecium. Paraphyses straight, septate, simple, apical cell slightly expanded and covered by a large dark, gelatinous sheath 7\(\mu\) diam. and 10\(\mu\) long. Ascus 30-60 \(\times\) 12-16\(\mu\), clavate, 8-spored. Ascospores 12-17 \(\times\) 5-7\(\mu\), ellipsoid, slightly reniform, hyaline.

Reactions: K-, hymenium I+ deep blue, medulla I-, epithecium HNO\(_3\)-.

**Specimen Examined:** Bailey Peninsula, near Rx site, *D. J. Luders CB72/05d*, 8.xi.1972 (MEL 1011990).

**Discussion:** The only specimen seen in this present study was typical of the species and it is represented by a small colony 1·3 cm diam. growing over moss.


*Squamaria chrysoleuca* (Sm.) Ach. var. *melanophthalma* (Ram.) Zahlbr. forma *exsulans* (Th.Fr.) in *Nytt Mag. Naturv.* 40 : 208 (1902)


Thallus composed of more or less round-lobed irregular and elongated frequently imbricated squamules 0-3-0.6mm × 0.2-0.5mm, light ochraceous buff to greenish-grey, in scattered colonies amongst other lichens. Cortex 25-30μ thick. Algal layer up to 200μ thick, cells 6-10μ diam. Apothecia 0-5-4-0mm diam., ochraceous buff, nickel green to greenish-black, concave. Margin concolorous with the thallus, smooth, crenulate and irregular, becoming folded into cerebriform masses. Hymenium 75-100μ high. Paraphyses simple or rarely branched. Asci clavate 60-75 × 10-17μ. Ascospores simple, ellipsoid, hyaline 12-15 × 4-6μ.

Reactions: K−, C−, P−, KC+ yellowish, medulla I−, hymenium+ deep blue, epithecium HNO3+ pale brownish red.

Chemistry: Usnic acid only in G.E.

Specimens Examined: Clarke Peninsula, Wilkes Station, W. A. Groom, 1966 (with Umbilicaria decussata, MEL 26105); Clarke Peninsula, at the head of Powell Cove, B. M. Allwright, 15.i.1972 (with Umbilicaria decussata, MEL 1012018); Bailey Peninsula, 1.5km south of Casey Station, D. J. Bishop, 15.iii.1970 (with Biatorella antarctica, MEL 1012061); Bailey Peninsula, downhill to north-east of GII, R. Anderson, 27.ii.1969 (with Usnea antarctica, MEL 1012026); rock outcrop on the north coast of Mitchell Peninsula, due south of small island in O'Brien Bay, R. Anderson, 2.i.1969 (MEL 1012021); Peterson Island, D. J. Luders CB72/17 (in part), 21.xi.1972 (with Buellia frigida, MEL 1012009); northern site, Peterson Island, R. Anderson, 5.i.1970 (MEL 1012045); Browning Peninsula, near plateau, R. Anderson, 5.i.1970 (with Umbilicaria decussata, MEL 1012041); eastern side, Haupt Nunataks, R. Anderson, 3.i.1970 (with Buellia lignoides, MEL 1012030).

Discussion: This species in most instances grows in association with other lichens. The individual samples are typical and show the same variation in colour as those occurring in Mac. Robertson Land (Filson, 1966: 50). Apothecia of those growing in direct sunlight range from deep sea-green to blackish-green, but those in shaded situations are pinkish-buff and all colour variations between the two may be found in a single colony.

The epithet exsulans was altered to exulans in Zahlbruckner, Catalogus Lichenum Universalis 5: 660 and many authors have perpetuated this form of the word.

4. Lecidea andersonii R. Filson sp. nov. [Fig. 3.]

Species nova ex affinitate L. phillipsianae differt sic: apothecium grande, marginatum, nunquam hemisphaericum; hypothecium pallidiore et commutatio iodina in medulla positiva.

Thallus crustose, brownish to greyish-white, irregular, often developing below the surface of the cracks in rocks so that the
Studies in Antarctic Lichens II

Fig. 3.—Lecidea andersonii R. Filson: a—portion of the TYPE specimen (MEL 1012035); b—section of an apothecium from MEL 1012074, c—e—
from a crushed mount of MEL 1012035, c—a paraphysis; d—a developing
and an empty ascus; e—ascospores.

apothecia appear to fill them. Upper cortex 10–12μ thick, of
blackish aeruginose cells which terminate the hyphae of the
medulla and with an amorphous covering 8–10μ thick. Algal
layer 60–75μ thick, composed of cells up to 15μ diam. Medulla
closely woven, hyphae 3–5μ thick. Apothecia black, up to
1.5mm diam. Margin thick, black, persistant. Disk flat to
slightly convex, never hemispheric to subspherical. Hypothecium
thin up to 45μ thick in the centre, pale brownish. Hymenium
50–60μ high capped by a dark aeruginose epithecium 10–15μ
thick. Paraphyses 2μ diam. slightly expanded at the apical cell
to 4μ, concrete in hymenial gel which will not separate easily in
water under pressure. Asci 8-spored, 25–45 × 12μ. Ascospores
9–10 × 4–5μ, simple, ellipsoidal, hyaline.

Reactions: K—, C—, P—, KC—, I+ deep violet-purple,
cortex I+ violet, HNO₃+ crimson, hypothecium I+ violet, asci
I+ pale blue, epithecium HNO₃+ crimson.

Discussion: This Lecidea appears totally different from any other described from Antarctic regions. It is similar to Lecidea phillipsiana from the Mac.Robertson Land region but differs in the large maragine apothecia which never become hemispheric, the paler hypothecium, and in the reaction of iodine on the medulla. The author has much pleasure in naming this lichen after its first collector, Ross Anderson, glaciologist at Casey during 1969.


Thallus crustose, effigurate, up to 15cm diam., variable, sometimes thick, sometimes very thin, varying in colour from white to black, sometimes cream to buff and where shaded deeply cut with cracks, the whole surface breaking up into angular areoles, marginal lobes 0.5-1.2mm long and 0.2-0.4mm wide. Cortex 25-40μ thick of fastigate hyphae capped by an upper cortex of greenish brown cells 5-7μ diam., and up to 12μ thick, covered by a hyaline decomposed layer 10-12μ thick. Algal layer 57-75μ thick with cells 7-15μ diam. Apothecia black, dull, sometimes shining, sessile or subsessile, immersed, with the thallus forming a greyish margin. Disk flat, convex to hemispheric 0.6-0.8mm diam. Medulla of loosely woven brownish hyphae. Hypothecium 25-30μ thick faintly brownish. Hymenium 50-100μ high. Paraphyses branched or unbranched with apical cells 5μ diam., forming a greenish-brown epithecium. Ascii clavate 12-20 × 35-55μ. Ascospores 6-10 × 8-15μ, elliptical, slightly constricted or not constricted at the septum, uniseptate or rarely undivided, thin-walled, dark grey, becoming dark brown at maturity.

Reactions: K–, C–, P–, medulla I–, hymenium 1+ deep blue, Epithecium HNO₃+ purple-red.

Specimens Examined: Clarke Peninsula, Wilkes Station, K. S. White, xi.1966 (MEL 26102); Clarke Peninsula, east of Whitney Point, R. Anderson, 15.i.1970 (with Xanthoria mawsonii, MEL 1012053); Clarke Peninsula, near NMA/S/39, B. M. Allwright, 15.i.1972 (with Alectoria minuscula, MEL 1012010); Bailey Peninsula, near Rx site, D. J. Luders CB72/03, 8.xi.1972 (MEL 1011985); Bailey Peninsula, near the Receivers Hut, D. J. Luders CB72/02, 19.ix.1972 (MEL 1011996); Odbert Island, D. J. Luders CB72/09 13.xi.1972 (MEL 1011998); Peterson Island, D. J. Luders CB72/17, 21.xi.1972 (MEL 1012009); Peterson Island, northern site, R. Anderson, 5.i.1970 (MEL 1012046); Peterson Island, southern site, R. Anderson, 5.i.1970 (MEL 1012043); Browning Peninsula, near plateau, R. Anderson,


*Thallus* continuous, forming a crust over mosses, smooth, divided into areolae by fine black wrinkles. *Cortex* 10\(\mu\) thick, blackish. *Medulla* of closely woven brownish hyphae. *Apothecia* sessile, 0·5–1·0mm diam., at first concave becoming flat to slightly convex. *Disk* black, carbonaceous. *Margin* prominent, crenulate, black, shining. *Hypothecium* hyaline or faintly brownish 60–80\(\mu\) thick. *Paraphyses* simple or branched, 2\(\mu\) thick, expanded at the apices to 5\(\mu\), the last 2 or 3 cells darkening forming a dark epithecium up to 20\(\mu\) thick. *Asci* 60–90 \(\times\) 16–20\(\mu\). *Ascospores* 15–25 \(\times\) 10–12\(\mu\) at first grey becoming brownish at maturity.

**Reactions:** Thallus and medulla *K*–, *C*–, *P*–, *KC*–, medulla 1+ intense violet, *hymenium* 1+ pale blue, *epithecium* HNO.– purple-red.

**Specimen Examined:** Haupt Nunataks, D. J. Bishop, 24.x.1970 (MEL 1012078).

**Discussion:** When more collections of moss cushions are gathered it is most likely that more specimens of this species will be found. The specimen from Haupt Nunataks was typical though in parts badly eroded. It formed a crust up to three centimetres in diameter over the top of a cushion of *Bryum* sp.

7. **Buellia latemarginata** Darb. in Wiss. Ergebn. schwed. Sudpöllarexped., 4: 15 (1912). [Fig. 4 h–l.]

*Thallus* crustose, discontinuous, subequaretate at the margins, dark grey to blackish, matt, non-sorediate. *Cortex* thin, hardly differentiated. *Algal cells* scattered throughout the areole, up to 12\(\mu\) diam. *Medulla* compact. *Hypothallus* black, thin, narrow, discontinuous. *Apothecia* rare, 0·5–0·8mm diam., black. *Margin* black, thin, disappearing at maturity. *Hypothecium* brown to dark brown. *Hymenium* up to 75\(\mu\) high, hyaline with a thin, dark brown epithecium. *Paraphyses* simple or branched, apical cell expanded to 6\(\mu\). *Asci* clavate, 8-spored, 45 \(\times\) 21\(\mu\). *Ascospores* dark brown, ellipsoid, thinly septate, 12–15 \(\times\) 7–9\(\mu\), occasionally slightly curved and constricted at the septum.

**Reactions:** *Medulla* *K*–, *C*–, *P*–, *KC*–, *I*–, *asci* 1+ blue fading, *epithecium* HNO.–.

**Specimens Examined:** Clarke Peninsula at G5, R. Anderson, 15.i.1970 (MEL 1012052); Bailey Peninsula, downhill to north-east of G11, R. Anderson, 27.ii.1969 (MEL 1012028).

**Discussion:** The author has not seen any authenticated material of this species but it agrees well with the key and descriptions in Lamb (1968: 14, 50). The specimens from our area do not show the white zone around the outermost edge of 10645/73.–3
the hypothallus as described by Lamb, but in his discussion (1968: 52) of Lecidea actinobola Hue, Lamb states that his specimens from Vega Island, Graham Land also lacked this feature.


Thallus crustose, composed of small squamules 0·5–1·0mm diam., varying in colour from pale brownish to dark grey and black. Hypothallus extensive, black, confervoid, openly reticulate or sometimes more or less continuous. Cortex 15μ thick, of large, dark spherical cells. Algal cells scattered 10–15μ diam. with a sheath. Medulla thickly woven. Apothecia up to 0·5mm diam., small, immersed at first, becoming sessile, slightly flattened to subspherical, sometimes covering the whole areole, black, sometimes appearing pruinose. Hypothecium up to 100μ thick in the centre, hyaline or faintly tinged with brown. Hymenium 45–60μ high including the dark epithecium, 10–15μ thick. Paraphyses 1·5–2·0μ thick, expanding into heads of 5μ diam. Asci 35–40μ, clavate with 8 spores. Ascospores 2-celled, 10–12 × 6–9μ, thin-walled, slightly constricted at the septum, at first grey becoming brown.

REACTIONS: K–, C–, P–, KC–, I+ intense violet, hymenium I+ blue fading, epithecium HNOa– purple-red.


DISCUSSION: These two specimens from different localities on the Haupt Nunataks are macroscopically identical with the samples from Mac.Robertson Land. Internally the present collection agrees well with the type material with the one exception that the spores are slightly smaller. This species was previously collected in the Vestfold Hills, Princess Elizabeth Land, by G. W. Johnstone, and the present collections extend the range a little further around eastern Antarctica.

9. Buellia cf. papillata (Sommerf.) Tuck. Lichens of California 26 (1866). [Fig. 5.]

Thallus crustaceous, forming an irregular crust over mosses, eroded, thick, white or greyish-white. Apothecia minute, 0·2–0·5mm diam. black, margin prominent and becoming thin but not disappearing. Hypothecium brown to dark brown. Hymenium up to 60μ high, hyaline. Asci 40 × 18μ, 8-spored. Ascospores 12–18 × 7–9μ, 2-celled, brown, walls and septum of equal thickness though rarely thickened at the septum.

REACTIONS: Medulla K–, C–, P–, KC–, I–, hymenium I+ blue fading, epithecium HNOa–.

SPECIMEN EXAMINED: Bailey Peninsula, near Rx site, D. J. Luders CB72/05c, 19.ix.1972 (MEL 1011989).
Fig. 4.—a–g- *Buellia soredians* R. Filson (from the TYPE specimen MEL 1012012); a–c-habitat details: a-young areolae on dendritic hypothallus; b-apothecia and areolae without visible hypothallus; c-sorediose areolae one with apothecia on radiate hypothallus; d-section of apothecium; d-developing asci; f-a branched paraphysis; g-ascospores. h–l-*Buellia latemarginata* Darb; h-habitat detail from MEL 1012028 showing areolae and apothecia; i-section of an apothecium; j-stages in development of asci (in KOH); k-ascospores; l-a branched paraphysis.
DISCUSSION: This specimen appears very similar to *B. grim-miae* but differs in having smaller apothecia, smaller spores, and a negative reaction of the medulla with iodine. According to the key in Lamb (1968: 14) it would be referred to *B. punctata* (Hoffm.) Mass. or *B. papillata* (Sommerf.) Tuck. It is similar to *B. punctata* in most of its measurements, apothecia, asci, and spores but differs in its general appearance. *B. punctata* is described as having a very thin effuse thallus, and certainly specimens found in Australia agree with this. On the other hand *B. papillata* is described as being thick, nodulose- verrucose. Macroscopically our material fits the latter description. The

Fig. 5—*Buellia cf. papillata* (Sommerf.) Tuck.: a—habitat details of MFL 1011989 growing amongst mosses; b—section of apothecia and areolae on a moss; c—two stages in the development of an ascus and a cluster of spores from the hymenium; d—ascospores showing thickening at the septa.

spores, although slightly smaller than those given for *B. papillata*, agree well with the figure in Lynge (1928: pl. IV, f. 15–17) where in fig. 17, he shows a slight thickening at the septum. More specimens must be collected before we can be certain if this is a modification of either of the aforementioned species or is in fact a separate entity.

10. **Buellia soredians** R. Filson sp. nov. [Fig. 4 a–g.]

Thallus crustaceus, squamulæ pulvinatae, hemisphaericae, laeves, nunc soraliis erosio concavis nunc omnino sorediosus atque pulvinos hemisphaericos formantibus.

*Thallus* crustose, composed of squamules up to 1.5 mm diam., pulvinate, hemispherical, pale brown to dark isabelline in exposed
positions, smooth, sometimes with an eroded concave soralia, sometimes completely sorediate and forming pulvinate clumps up to 4mm diam. Cortex 15–20μ thick. Algal layer discontinuous up to 120μ thick. Algal cells up to 15μ diam. Medulla compact. Hypothallus well developed, black, carbonaceous, aeruginose at the extreme margin, at first dendritic becoming continuous at maturity. Apothecia 0·3–0·7mm, sessile, black. Margin prominent. Hypothecium thick, dark brown. Hymenium up to 60μ thick, brownish. Epithecium up to 10μ thick, dark brown. Paraphyses 2μ thick, branched, apical cell expanded to 4μ diam. Asci 35 × 12μ with 8 spores. Ascospores 4–6 × 9–10μ, thin walled, septate, not constricted at the septum, pale grey to brown.

RECTIONS: Medulla K–, C–, P–, KC–, I–, hymenium I+ blue, epithecium HNO₃–, hypothallus HNO₃+ purple-red.


DISCUSSION: This new species is distinctive because it is the first sorediose Buellia recorded from the Antarctic continent. Although as yet known from only one collection, the material is ample. Unfortunately there were only four apothecia on the specimen and one was sectioned for the above descriptions.


Thallus of narrow, branching, imbricate lobes, 140–260μ thick and 0·5–3·0mm broad, smooth becoming verrucose, light grey to grey-brown, sorediose. Underside of thallus buff, darkening to nearly black with scattered tufts of branched rhizines, varying from light buff to dark brown. Cortex 15–20μ (70μ) thick. Algal layer 50–80μ thick, sometimes extending to the top of the cortex and occasionally with odd cells embedded in the medulla. Algal cells up to 20μ diam. Medulla up to 25μ thick of hyphae not too tightly packed hyaline or faintly tinged with brown. Lower cortex 25–60μ thick, of compactly woven thick-walled hyphae, hyaline with the outer 10μ darkening, rhizines outgrowing from these hyphae. Rhizines formed of compactly woven, thick walled hyphae 50–100μ diam., cells elongated, 7–15 × 4μ. Apothecia not seen.

RECTIONS: Thallus K+ yellow, C–, P+ pale yellow, medulla K+ yellow, P–.

SPECIMEN EXAMINED: Clarke Peninsula, Wilkes Station, K. S. White, xi. 1966 (with Protoblastenia citrina MEL 26104).

DISCUSSION: The specimens here are a little more brownish in appearance than in the typical form but the author considers them to be referable to this species because of the shape of the
lobes and the formation of the soredia. Possibly this colour may be attributed to the locality near melt pools and to the degree of exposure.


*Thallus* subsquamulose, covering areas up to 12cm in diam., spreading over mosses or amongst loose gravel gravel gravel, olive brown to dark brown, with a thick amorphous layer covering the outside sometimes giving the whole plant a white gelatinous appearance. *Apothecia* abundant, irregularly shaped by pressure, up to 1.0mm in diam. *Margin* crenulate, concolorous with the thallus or slightly lighter. *Disk* dark brown to black. *Cortex* 25–40μ thick, continuous and of the same structure as the thallus. *Algal cells* up to 12μ diam. continuing under the hymenium. *Hymenium* 80–100μ high. *Paraphyses* thin, branched, apical cell slightly expanded. *Ascii* 60–90 × 16–20μ, clavate 8-spored. *Ascospores* 16–21 × 8–9μ, 2-celled, dark brown.

**Reactions:** K–, C–, P–, KC–, medulla 1–, Hymenium I–, hypothecium I±, pale blue, epithecium HNO₃–.

**Specimens Examined:** Bailey Peninsula, west of Casey Station near nest site S16, D. J. Luders CB72/15b, 7.xii.1972 (MEL 1011992); Browning Peninsula, D. J. Bishop, 26.x.1970 (with Caloplaca athallina MEL 1012070).

**Discussion:** Amongst the collections brought back from the study area there are very few collections of moss cushions thus accounting for the lack of specimens of this lichen. The samples here cited are typical and agree in every detail with other collections examined by the author from elsewhere in Antarctica.


*Thallus* crustose, lobate-effigurate at the margins, centre parts pulvinate, verrucose, fawn to pale brown in sheltered places, brownish-to blackish-brown in exposed places, matt, often pruinose, up to 8mm thick in the centre. *Cortex* up to 30μ thick. *Medulla* loosely compacted of hyphae up to 5μ diam. *Apothecia* 0.3–1.0mm diam. *Margin* prominent, concolorous with the thallus, persistent. *Disk* concave, brownish-black to black, matt, sometimes pruinose. *Hypothecium* hyaline, up to 75μ thick in the centre. *Hymenium* up to 90μ high. *Paraphyses* simple, apical cell reddish-brown, expanded to 4–5μ. *Ascii* 50–80 × 21–27μ, 8-spored. *Ascospores* 16–22 × 9–10μ brown, 2-celled, sometimes slightly constricted at the septum.
Reactions: K-, C-, P-, KC-, I-, hymenium I + blue fading in the upper parts but remaining constant in the lower.


Discussion: The single specimen in this collection represents the only sample of Rinodina found growing on rock in the region. Unfortunately it was removed from the rock and only the central parts of the thallus remain, but these are clearly lobate and agree exactly with the description and figures in Lamb (1968: 30, plate XIV).

14. Rinodina turfacea (Wahlenb.) Körb., Syst. Lich. Germ. 123 (1855). [Fig. 6 a–f.]

Lichen turfaceus Wahlenb. Flora Lapponica 408 (1812).

Thallus granulose or verruculose, growing over the tops of mosses or amongst fruticose lichens, drab brown, matt. Apothecia abundant, up to 1.5 mm diam. Margin entire or crenulate, concolorous with the thallus. Disk brownish-black, matt. Hypothecium hyaline up to 30 μ thick. Hymenium hyaline, up to 90 μ high, with a reddish-brown epithecium. Paraphyses branched, slightly expanded at the tips. Asci 5–8-spored, 65–75 × 21–30 μ. Ascospores 24–33 × 12–15 μ, 2-celled, dark brown.

Reactions: K-, C-, P-, I-, hymenium I + blue fading, hypothecium I + violet becoming dark blue, epithecium HNO₃-.

Specimens Examined: Clarke Peninsula, Wilkes Station, W. A. Groom, 1966 (with Usnea antarctica MEL 26100); Clarke Peninsula, near NMA/S/39, B. M. Allwright, 15.i.1972 (MEL 1012011); rock outcrop on the north coast of Mitchell Peninsula due south of small island in O'Brien Bay, R. Anderson, 2.iii.1969 (with Protoblastenia citrina MEL 1012023).

Discussion: The specimens from Clarke Peninsula were all growing in association with other lichens. One sample had almost covered a rosette of Alectoria minuscula whilst other rosettes had numerous colonies amongst their filaments. Another sample had encrusted the holdfasts and lower parts of several thalli of Usnea antarctica. The specimens from Mitchell Peninsula are typical, growing over mosses and fine gravels.

None of the specimens examined by the author showed any reaction with iodine on the apothecial cortex. Variable reports have been discussed: Magnusson (1947: 203, 263) says that it has a faint but distinct blue coloration, Poelt (1969: 591) also gives the cortex as blue with iodine but M. Lamb (1968: 63) reports a faint, and apparently inconsistent fleeting reaction in some specimens.
Fig. 6—a-f: *Rinodina turfacea* (Wahlb.) Korb.: a—habitat detail from MEL 1012011 showing thallus growing on *Alectoria minuscula*; b—habitat showing thallus growing with *Protoblastenia citrina* at the base of *Usnea antarctica*; c–f: from MEL 1012011; c—section of apothecia; d—stages in development of asci; e—ascospores; f—branched paraphysis; g–j-*Rinodina petermanii* (Hue) Darb; g—habitat detail from MEL 1012047; h—section of apothecia; i—development of the ascus; j—ascospores.
15. Caloplaca athallina Darb. in Wiss. Ergeb. Schwed. Südpolarexped. 1901–1903 4 (11): 9 (1912). [Fig. 7.]


Thallus forming patches up to 2 cm diam. over mosses, not well developed, almost covered by crowded apothecia, grey to yellowish-grey. Cortex discontinuous, formed by dark outer cells up to 30 μ thick, capped by a hyaline amorphous layer up to 8 μ thick. Algal layer continuous, up to 20 μ thick, consisting of cells up to 18 μ diam. Apothecia numerous, round, sometimes deformed by mutual pressure, 0.3–0.75 mm diam. Disk flame-orange, concave to slightly hemispheric. Margin slightly raised at maturity, concolorous with the disk. Hypothecium thin hyaline.

Fig. 7—Caloplaca athallina Darb.: a—habitat detail from MEL 1011991 showing crowded apothecia growing over mosses; b—section of apothecia; c—branched paraphysis; d—development of asci; e—ascospores.

Hymenium hyaline up to 90 μ high. Paraphyses simple or branched 2 μ thick; apical cell expanded to 6 μ, thickly encrusted with yellowish crystals. Asci 8-spored, 60 × 21 μ. Ascospores 15–16 × 9–10 μ, hyaline, polaribilocular.

Reactions: Cortex K+ purple, medulla K—, epithecium K+, red, hymenium 1+ blue, medulla 1—.

Specimens Examined: Bailey Peninsula west of Casey Station near nest Nr. 16, D. J. Luders CB72/15a, 7.xii.1972 (MEL 1011991); Browning Peninsula, D. J. Bishop, 25.x.1970 (MEL 1012070).

Discussion: The author has not examined the type material of this species but specimens from the Australian Antarctic
Studies in Antarctic Lichens II

Territory agree with Darbishire's description and figure. The spore sizes given by Darbishire are slightly smaller than those in the present material but they are still considered to be within an acceptable range.


*Thallus* squamulose, up to 1cm diam., growing over the tops of mosses or in pulvinate clumps on rock. *Squamules* up to 1mm diam., Florida gold to yellow-orange, smooth, becoming sorediose until squamule is completely enveloped in yellow-green soredia. Cortex up to 35μ thick. Algal cells up to 20μ diam., scattered throughout the medulla. *Medulla* of thin-walled hyphae 4μ diam. *Apothecia* not seen.

**Reactions:** Thallus *K*+ purple, medulla *K*—, *C*—, *P*—.

**Specimens Examined:** Bailey Peninsula, Casey Station near transmitter hut, D. J. Bishop, 24.ii.1970 (MEL 1012056); Bailey Peninsula, near Rx site, D. J. Luders CB72/05b, 8.xi.1972 (MEL 1011988); Peterson Island, D. J. Luders CB72/14e, 21.xi.1972 (MEL 1012008).


*Thallus* bright orange-red to yellow-chrome in shaded places, up to 11cm in diam., with radiating appressed or imbricate lobes, lobes hollow or filled with loosely woven hyaline thin-walled hyphae, esorediose, sometimes forming clumps up to 2cm high. Algal layer evenly distributed around the lobes and varying in thickness up to 100μ. Algal cells 8–10μ diam. Lower cortex 25μ thick, consisting of subspherical cells 5–7μ diam., the lower 5–10μ, yellowish. *Apothecia* up to 2mm diam., at first concave, later becoming flat or moderately convex. Margin smooth or slightly crenulate, concolorous with the thallus. Disk deep orange-red. Hymenium 60–75μ high, Asci 50–65 × 14–20μ, clavate, becoming long-ellipsoid. Ascospores ellipsoid, hyaline, polaribilocular, canal mostly present in mature spores, very variable in size, 7–10 × 11–16μ.

**Reactions:** Thallus *K*+ purple, medulla *K*—, *I*—, hymenium *I*+ deep blue, epithecium *K*+ red-purple.

**Specimens Examined:** Peterson Island, southern site, R. Anderson, 5.i.1970 (MEL 1012044); Peterson Island, D. J. Luders CB72/16, 21.xi.1972 (MEL 1012003).
DISCUSSION: This is a coastal species and it is expected to occur on the adjacent Browning Peninsula and on Odbert Island.


Thallus granular, composed of spherical granules in clumps up to 5mm diam., lemon-yellow to yellow-orange, granules up to 100µ diam., ecorcitate. Algal cells 8–12µ diam., scattered throughout the medulla. Medulla loosely packed, containing granules. Apothecia up to 0·4mm diam. concolorous with the thallus. Disk convex, yellow-orange. Margin thin, not elevated. Hymenium up to 65µ high. Paraphyses slender, 2µ diam., simple or branched, tips slightly thickened and encrusted with yellowish crystals. Ascii clavate, 50–65 × 12–16µ. Ascospores unicellular, hyaline, ellipsoidal, 18 × 6µ.

REATIONS: K–, C–, P–, medulla I–, hymenium and hypothecium I– pale bluish-green fading.

SPECIMENS EXAMINED: Clarke Peninsula, 800m north-east of old Wilkes Station, B. M. Allwright, 15.i.1972 (MEL 1012017); Clarke Peninsula, to the east of Whitney Point, R. Anderson, 15.i.1970 (with Xanthoria mawsonii, MEL 1012053); Bailey Peninsula, near Rx site, D. J. Luders CB72/06, 8.xi.1972 (MEL 1011986); rock outcrop on the north coast of Mitchell Peninsula, due south of small island in O'Brien Bay, R. Anderson, 2.iii.1969 (MEL 1012023); Odbert Island, D. J. Luders CB72/08 (in part), 13.xi.1972 (with Buellia frigida, MEL 1011999); Peterson Island, D. J. Luders CB72/13, 21.xi.1972 (MEL 1012002); Browning Peninsula, D. J. Bishop, 26.x.1970 (MEL 1012068).


Thallus in pulvinate tufts up to 2cm diam. and up to 1cm high, lobes irregularly palmate, 0·1–1·0mm wide and up to 2mm long, Florida gold in exposed places, greenish buff in sheltered positions, attached to the substratum by small holdfasts, with or without rhizines. Upper cortex up to 20µ thick, outer 8µ heavily-encrusted with yellowish-brown crystals. Algal layer discontinuous and consisting of cells up to 25µ diam., scattered or in small colonies throughout the medulla. Medulla of loosely-woven branched and anastomosing hyphae. Lower cortex similar in thickness and structure to the upper cortex. Apothecia not seen.

REATIONS: Thallus K+ purple.

SPECIMENS EXAMINED: Clarke Peninsula, Wilkes Station, K. S. White, xi. 1966 (MEL 26106); Clarke Peninsula, to the east of Whitney Point, R. Anderson, 15.i.1970 (MEL 1012053); Odbert Island, D. J. Luders CB72/12, 13.xi.1972 (MEL 1012000).
20. **Umbilicaria decussata** (Vill.) Zahlbr. *Cat. Lich. Univ.* 8: 490 (1942). [Fig. 8 a–c.]


Thallus monophyllous, sometimes polyphyllous, 0.5–5.0 cm diam., variable, rugose to cerebriform and deeply folded, rugi elevated into fine reticulate patterns or broadly or laterally compressed into strongly formed ridges. Upper surface rimose, areolate, pruinose, dull, varying in colour from light grey olive, wood brown to grey and black. Lower surface brown to sooty black, dull, without rhizines. Decomposed layer discontinuous, hyaline, up to 25 μ thick. Upper cortex 20–40 μ thick, continuous. Algal cells 8–12 μ diam. Medulla of thick walled, septate, branched hyphae 6 μ diam., very loosely packed. Lower cortex 40–115 μ thick, with outermost layer dark brown. Apothecia very rare, 0.3–1.4 mm diam., black, carbonaceous, adnate to the thallus. Disk flat, sometimes fissured, older specimens appearing gyrose. Hypothecium dark brown. Hymenium up to 70 μ high, pale brown. Paraphyses simple or branched, apical cell slightly expanded. Ascii c. 45 × 18 μ. Ascospores hyaline, simple, c. 9 × 7 μ.

**Reactions:** K –, C –, P –, hymenium I –, asci outer sheath I + blue, asci inner sheath and contents I + red, medulla I –.


**Discussion:** The specimens from Clarke Peninsula, at the head of Powell Cove, are the first fertile specimens that the author has seen from the Antarctic Continent. On the sample
Fig. 8—a-c-Umbilicaria decussata (Vill.) Zahlbr.: a—apothecia on separate thalli from MEL 1012018; b—section of apothecia; c—three asci from the hymenium in Melzers reagent, d-f-Umbilicaria cristata Dodge and Baker: d—thallus from MEL 1012077; e—underside of thallus and sparse rhizines and a detail of rhizines.
were twenty-five thalli and of these only three were fertile. One thallus contained eight, one six and the other two apothecia. Three apothecia were sectioned but it was not possible to separate the hymenium sufficiently to accurately measure the asci and spores. However the measurements that were obtained compared favourably with those obtained from Australian specimens. The reactions on the asci with iodine (Melzers reagent) were the same in both specimens from Australia and the Antarctic—the outer sheath stained blue whilst the inner sac and spores took up the iodine colour.


Thallus small, up to 8mm diam., monophyllous, smooth or rugose, margin entire or deeply lacerate with tufts of rhizinae; upper surface dull and varying in colour from wood brown to blackish; lower surface dark brown lighter towards the margins. Apothecia not seen.


Discussion: This species could have been overlooked by inexperienced collectors because the seven thalli represented in this collection were growing in very close association with Umbilicaria decussata. Owing to the small number of thalli none were sectioned nor chemically examined. The specimens agree with the type description in Dodge (1938) and also agree with the description and key in Llano (1950, pp. 113, 118). Llano gives thalline measurements as up to 3cm diam. The material from the study area is much smaller than this but further collecting may yield larger examples.


Thallus forming intricately branched, dense, flat rosettes up to 3cm diam., sometimes radiating, sometimes completely filling cracks between rocks, the filaments sometimes tend to fuse together [forma congesta] and sometimes form large cerebriform, vernicose masses [forma crustacea]. Filaments up to 0.2mm diam. varying in colour from isabelline to black, from sooty to glossy. Cortex 20µ thick consisting of longitudinal hyphae, outermost 5µ greenish-brown. Medulla of loosely-woven hyphae with numerous air spaces. Algal colonies scattered mostly immediately next to the cortex. Algal cells 10–12µ diam., with a gelatinous sheath. Apothecia not seen.

Reactions: K–, C–, P–.

Specimens Examined: Clarke Peninsula, Wilkes Station, W. A. Groom, 1966 (MEL 26103); Clarke Peninsula, near NMA/S/39, B. M. Allwright, 15.i.1972 (MEL 1012010); Clarke Peninsula, at G5. R. Anderson, 15.i.1970 (MEL 1012051); Bailey

23. **Alectoria pubescens** (L.) Howe jr. Class. Fam. Usneaceae 23 (1912). [Fig. 9.]

*Thallus* prostrate, forming a low felted mat. *Filaments* terete, thread-like, isabelline in the shade, brownish to black in exposed positions. *Cortex* up to 35μ thick of longitudinal hyphae. *Medulla* loosely woven. *Algal colonies* scattered, mostly next to the cortex, cells up to 15μ diam. *Apothecia* not seen.

**Reactions:** K−, C−, P−, KC−.

![Fig. 9](image)

Fig. 9—*Alectoria pubescens* (L.) Howe jr.: a—portion of MEL 1012019; b—cross section of thallus; c—longitudinal section of thallus.

**Specimen Examined:** Rock outcrop on north coast of Mitchell Peninsula, due south of small island in O'Brien Bay, R. Anderson, 2.iii.1969 (MEL 1012019).

**Discussion:** Surprisingly this is the first record of this species in this sector of the Antarctic Continent, but it has a wide distribution in East and West Graham Land (Lamb, 1964: 27). The specimen cited here was growing on an erratic rock with *Alectoria minuscula.*
24. *Usnea acromelana* Stirt. in *Trans. Proc. NZ. Inst.*, 30: 388 (1898). [Fig. 10.]

Thalli tufted, many arising from a common basal holdfast, up to 3cm tall, sparingly branched, rigid, lower parts smooth pale yellow-green, up to 1.5mm thick, upper branches black or with black bands, smooth, shining, sorediose. *Soredia* pulvinate to subglobose. Cortex irregular, 45–120µ thick. Algal cells up to 10µ diam., mostly in colonies next to the cortex. *Medulla* up to 120µ thick, loosely packed with many air spaces. Axis solid, up to 500µ thick in the thicker main branches, composed of longitudinal conglutinate hyphae. *Apothecia* not seen.

Fig. 10—*Usnea acromelana* Stirt.: a—portion of tuft showing a single branch of MEL 1012059; b—an ultimate branch showing pulvinate soralia; c—longitudinal section of thallus; d—cross section of thallus.

**REACTION:** K−, C−, P−, KC−.

**CHEMISTRY:** The specimens from the study area all occur in the inactive phase. Usnic acid was the only constituent demonstrated.

**SPECIMENS EXAMINED:** Bailey Peninsula, downhill to north G11, R. Anderson, 27.ii.1969 (MEL 1012025); Bailey Peninsula, near transmitter hut, D. J. Bishop, 24.ii.1970 (MEL 1012059); Bailey Peninsula, south-west corner, D. J. Bishop, 19.iii.1970 (with *Umbilicaria decussata*, MEL 1012081); Bailey Peninsula near Rx site, D. J. Luders CB72/07a, 8.xi.1972 (MEL 1011983).

**DISCUSSION:** This species appears to be confined to the Bailey Peninsula where it is widely distributed. In most cases it was in association with *Usnea antarctica* so it is possible that it may have been overlooked in other localities.


**Thallus** erect or subprostrate. 1–5cm tall, irregularly branched, rigid, verrucose, rugose, slightly foveolate, straw colour to pale yellow-green, up to 1·5mm thick at the base, at times somewhat constricted at attachment, uppermost tips of the branches black or with black bands, smooth, shining, sorediose, but in old specimens sometimes black, dull and extremely eroded. **Soredia** usually abundant, foveolate, convexed, whitish-yellow. **Cortex** 60μ thick. **Algal cells** up to 8μ diam., scattered in small colonies throughout the medulla. **Medulla** up to 160μ thick, white, dense against the cortex, becoming looser near the axis. **Axis** solid 45–150μ thick, composed of longitudinal conglutinate hyphae 1μ diam. **Apothecia** not seen.

**Reactions:** K–, C–, P–, KC–.

**Chemistry:** All of the specimens from the study area occur in the typical or inactive phase. **Usnic acid** was the only constituent demonstrated.

**Specimens Examined:** Clarke Peninsula, Wilkes Station, W. A. Groom, 1966 (MEL 26100); Clarke Peninsula, near NMA/S/39, B. M. Allwright, 15.i.1972 (with Alectoria minuscula, MEL 1012010); Clarke Peninsula, at G5, R. Anderson, 15.i.1970 (MEL 1012049); Bailey Peninsula, near Rx site, D. J. Luders CB73/07b, 8.xi.1972 (MEL 1011984); Bailey Peninsula, downhill to the north of G11, R. Anderson, 27.i.1969 (MEL 1012026); Casey Station, D. J. Bishop, 6.i.1971 (MEL 1012054); rock outcrop on north side of Mitchell Peninsula due south of small island in O'Brien Bay, R. Anderson, 2.iii.1969 (with Lecanora rubina var. melanophthalma, forma exsulans, MEL 1012021); moraine at east end of Robinson Ridge, R. Anderson, 2.iii.1969 (MEL 1012024); Browning Peninsula, near the plateau, R. Anderson, 5.i.1970 (MEL 1012039); north-east side of Browning Peninsula, D. J. Bishop, 26.x.1970 (MEL 1012066); eastern side of Hautp Nunataks, R. Anderson, 3.i.1970 (MEL 1012034); western side of the Hautp Nunataks, R. Anderson, 3.i.1970 (with Alectoria minuscula, MEL 1012036); Hautp Nunataks, D. J. Bishop, 24.x.1970 (MEL 1012073).

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(1965).—Lichenological notes on the flora of the Antarctic Continent.


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