NOTES ON ANTARCTIC LICHENS: I. NEW RECORDS FOR *Buellia* AND *Rinodina*

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ABSTRACT. New locality and habitat data are presented for 12 species of *Buellia* and three of *Rinodina*. A new combination, *Buellia granulosa* f. *incrassata* (Hue) D. C. Lindsay is reported.

LAMB (1968) has recently published a monograph of the representatives of the genera *Buellia* and *Rinodina* occurring in the Antarctic botanical zone, in which he described and illustrated 22 species of *Buellia* and seven of *Rinodina*. Of these, 19 species of *Buellia* and three of *Rinodina* are considered to be endemic to the Antarctic continent and the Scotia Ridge–Antarctic Peninsula sector of the Antarctic, showing a tendency to be continental in their distribution. Dodge (1968) described three new species of *Buellia* (*B. llanoi*, *B. nigricans* and *B. stipitata*) and one *Rinodina* (*R. stipitata*) from localities in Antarctica. The affinities of these new species are not stated, but it appears from the descriptions that they could be forms of nitrophilous species already known from the Antarctic Peninsula.

Examination of the lichen collections in the British Antarctic Survey herbarium, at present housed in the Department of Botany, University of Birmingham, has provided some additional data on the geographical distribution and ecology of 12 species of *Buellia* and three of *Rinodina*. Since these two crustose genera are not a very prominent component of Antarctic vegetation, it is not surprising that they are poorly represented in the collections, particularly from localities in the Antarctic Peninsula, where relatively few collections have been made.

Nomenclature follows that of Lamb (1968) but for convenience genera and species are arranged alphabetically. All specimens examined are cited under the appropriate species heading with distribution data briefly summarized by island group or coasts, the latter including all offshore islands. Full data are given for those specimens which form the basis of new distribution records. An asterisk (*) after a specimen citation indicates that the identification has been confirmed by Dr. I. M. Lamb.

Buellia anisomera Vain.

This is an endemic species recorded by Lamb (1968) from the South Orkney Islands, the South Shetland Islands and both east and west coasts, with associated offshore islands, of the Antarctic Peninsula. It is now known from the South Sandwich Islands, a northward extension of its range, and from some further islands in the South Shetland Islands (Table I).

It is found on rocks, varying in size from pebbles to boulders, consisting of quartz-mica-schist or volcanic rocks from 1 to 120 m. above sea-level. *B. anisomera* is more or less constantly associated with *Buellia russa* (Hue) Darb. in highly nitrogenous habitats, such as boulders at the periphery of penguin rookeries. In the South Sandwich Islands, the specimens collected were either growing solitarily or with *Lecanora aspidophora* Vain. and a species of *Candelariella*.

According to Lamb (1968) a protothallus is "normally absent, or rarely present as an inconspicuous narrow black margin". In several specimens, a prominent protothallus was noted, up to 2 mm. wide, fimbriate, black at the outer edge, but fading in colour to a light brown near the metathalline areoles. Several concentric colour bands, each about 0·5 mm. wide, may occur on the protothallus. These features are shown by those thalli growing over rock but very rarely by those on *Buellia russa*.

Specimens examined

South Sandwich Islands:

Candlemas Island	Longton 668
Vindication Island	Longton 743

South Orkney Islands:

Signy Island	Lindsay 1053

TABLE I. COLLECTION DATA FOR *Buellia* SPECIES FROM NEW LOCALITIES

Species	*Locality*	*Habitat*	*Collection number*	*Date of collection*
B. anisomera	*South Sandwich Islands:* Candlemas Island	Boulders and lava cliffs (16 m.)	Longton 668	13 March 1964
	Vindication Island	Flat boulders on east-facing slope (120 m.)	Longton 743	17 March 1964
	South Shetland Islands: English Strait, Cecilia Island	Pebbles on raised beach (1 m.)	Lindsay 676	8 January 1966
	Greenwich Island, Yankee Harbour	Gravel on level part of outcrop (8 m.)	Lindsay 541	3 January 1966
	King George Island, Barton Peninsula	Quartz-pyrite outcrop (3 m.)	Lindsay 719	18 January 1966
	Livingston Island, Barnard Point	Pebbles on raised beach (10 m.)	Lindsay 50	26 November 1965
	Byers Peninsula	Outcrop on raised beach (10 m.)	Lindsay 179	7 December 1965
B. clado-carpiza	*South Orkney Islands:* Signy Island, Thule Islands	Quartz-mica-schist boulders (6 m.)	Lindsay 1069	26 August 1966
	South Shetland Islands: Livingston Island, Byers Peninsula	Rocks (8 m.)	Lindsay 153	8 December 1965
	Penguin Island	North-facing volcanic rocks (10 m.)	Lindsay 813	27 January 1966
B. coniops f. *coniops*	*South Georgia:* Bay of Isles, Paul Beach	On dry rocks by shore (3 m.) [Grid ref. 074 148]	Greene 1276a	22 January 1961
B. fulvoni-tescens	*South Orkney Islands:* Signy Island, Berntsen Point	Dry quartz-mica-schist pebbles (12 m.)	Lindsay 1529	23 January 1967
B. granulosa	*South Shetland Islands:* Livingston Island, Byers Peninsula	On rocks (6 m.)	Lindsay 244a	10 December 1965
B. inordinata	*South Sandwich Islands:* Candlemas Island	Pebbles lying on ash slope (70 m.)	Longton 658	12 March 1964
B. isabellina	*South Orkney Islands:* Signy Island, Knife Point	On rock inundated with nitrogenous melt (6 m.)	Lindsay 1489	20 January 1967
B. punctata	*South Orkney Islands:* Signy Island, Berntsen Point	On wood forming part of old station hut (6 m.)	Lindsay 1045	17 August 1966
B. russa var. *russa*	*South Sandwich Islands:* Candlemas Island	On boulders on rocky slope (90 m.)	Longton 737	17 March 1964

TABLE I—*contd.*

Species	*Locality*	*Habitat*	*Collection number*	*Date of collection*
B. russa var. *cycloplaca*	*South Orkney Islands:* Signy Island, Berntsen Point	On dry quartz-mica-schist pebbles (12 m.)	Lindsay 1527	23 January 1967
B. subconcava	*South Georgia:* Undine South Harbour, Ducloz Head	On rocks (*c.* 2 m.) [Grid ref. 125 099]	Greene 2505	10 March 1961
B. subpedicellata	*South Orkney Islands:* Lynch Island	Quartz-mica-schist boulders (10 m.)	Lindsay 1057a	16 March 1966
	Signy Island, Berntsen Point	Vertical cliff face above the sea (5 m.)	Lindsay 1238	28 September 1966

South Shetland Islands:
- Cecilia Island — Lindsay 676
- Greenwich Island — Lindsay 541*
- King George Island — Lindsay 719
- Livingston Island — Lindsay 50, 179

Antarctic Peninsula (east coast):
- Trinity Peninsula — Taylor 486

Buellia cladocarpiza M. Lamb

This Antarctic endemic species was previously known from two collections, one from the South Shetland Islands and the other from the Danco Coast of the Antarctic Peninsula (Lamb, 1968, table VII). The collection of five more specimens from the South Orkney Islands and the South Shetland Islands shows that it is fairly widespread in its distribution but, like other inconspicuous lichens in this region, has been overlooked.

B. cladocarpiza grows on mineral soil in rock crevices, forming small clumps along the edges of cracks. It has been found in both nitrogenous and non-nitrogenous habitats in the South Orkney Islands, in the former situation being associated with *Ramalina terebrata* Hook. & Tayl., *Lecania brialmontii* (Vain.) Zahlbr. and *Xanthoria candelaria* (L.) Th. Fr. In non-nitrogenous situations, it occurs with species of *Andreaea*, *Collema* and *Stereocaulon*.

Its altitudinal range is from 6 to 35 m. in the South Orkney and South Shetland Islands.

Specimens examined

South Orkney Islands:
- Signy Island — Lindsay 1069, 1289, 1589

South Shetland Islands:
- Livingston Island — Lindsay 153
- Penguin Island — Lindsay 813

Further details of specimens from the new localities are given in Table I.

Buellia coniops (Wahlenb. ex Ach.) Th. Fr.

B. coniops has been recorded from the South Orkney Islands, South Shetland Islands and the west coast of the Antarctic Peninsula (Lamb, 1968, tables XVIII–XXII), a distribution confirmed by the specimens in the British Antarctic Survey collections. It can now be recorded from the sub-Antarctic island of South Georgia (Table I).

B. coniops is found on dry rocks or in crevices which may from time to time be inundated by nitrogenous melt water, usually in very close proximity to the shore. Several specimens were collected on pebbles in or adjacent to penguin rookeries and other bird aggregations, but many, especially those from the South Orkney Islands, were growing with a species of *Caloplaca* just above the spray zone on sea cliffs. In such situations, *Verrucaria ceuthocarpa* Wahlenb. is a frequent associate. On damp boulders near penguin rookeries, it is found with *Prasiola crispa* (Lightf.) Menegh., *Mastodia tesselata* (Hook. f. & Harv.) Hook. f. & Harv., *Xanthoria elegans* (Link) Th. Fr., *X. candelaria*, *Microglaena antarctica* M. Lamb and *Lecanora aspidophora*. On dry boulders inland and at some distance from penguin rookeries, *B. coniops* is found with species of *Andreaea*, *Caloplaca*, *Haematomma* and *Pertusaria*.

No difference in habitat requirement was noted between the various forms collected. The normal altitudinal range of this species is from 2 to 20 m., rarely extending up to 60 m. in the South Shetland Islands.

Specimens examined

f. *coniops*

South Georgia:
Bay of Isles — Greene 1276a

South Orkney Islands:
Signy Island — Lindsay 1112, 1248, 1530a, 1568, 1576

South Shetland Islands:
Livingston Island — Lindsay 18b, 338

f. *areolata* Vain.

South Orkney Islands:
Signy Island — Lindsay 1083, 1114, 1496, 1570

South Shetland Islands:
Livingston Island — Lindsay 155b*

f. *cervinogranulata* M. Lamb

South Orkney Islands:
Signy Island — Lindsay 1506

Antarctic Peninsula (west coast):
Graham Coast — Corner 703

f. *incrassata* M. Lamb

South Shetland Islands:
Livingston Island — Lindsay 279

Buellia fulvonitescens M. Lamb

This species was known previously by only two specimens, one from the South Shetland Islands and one from the west coast of the Antarctic Peninsula (Lamb, 1968, table XXVII). It is therefore of considerable interest to record it from the South Orkney Islands (Table I), indicating a distribution similar to that of *Buellia cladocarpiza*. Presumably it has been overlooked in the field, in a similar manner to many crustose lichens in this region, and will prove to be more widespread.

Little can be said of its habitat requirements, except that it was found on dry pebbles in a non-nitrogenous situation. However, Lamb (1968) stated that the type specimen was growing with *Buellia russa* var. *liouvillei* M. Lamb, a nitrophilous lichen.

Specimens examined

South Orkney Islands:
Signy Island — Lindsay 1529, 1537

Buellia granulosa (Darb.) Dodge

The two specimens examined can be referred to the following form:

Buellia granulosa f. *incrassata* (Hue) D. C. Lindsay **comb. nov.**
Basionym: *Lecidea cremea* Hue f. *incrassata* Hue, 1915, p. 130.
Synonym: *Buellia cremea* (Hue) Darb. f. *incrassata* (Hue) Zahlbr., 1931, p. 346.

This species must now be regarded as being widely distributed in the South Orkney and South Shetland Islands when the present records are considered with those given by Lamb (1968, table IV). Both specimens were found in somewhat nitrogenous situations, in association with *Ramalina terebrata*, *Caloplaca regalis* (Vain.) Zahlbr. and *Lecanora aspidophora*.

Specimens examined

South Orkney Islands:
Signy Island — Lindsay 1526

South Shetland Islands:
Livingston Island — Lindsay 244a

Further data on Lindsay 244a, which is the first record of the species from Livingston Island, are given in Table I.

Buellia inordinata (Hue) Darb.

Lamb (1968, table II) recorded this species from the South Orkney Islands and the west coast of the Antarctic Peninsula, but it can now be reported from the South Sandwich Islands, a considerable northward extension of its range. The only specimen examined, further details of which will be found in Table I, was growing alone, unlike the specimens noted by Lamb which were all associated with *Huea grisea* (Vain.) M. Lamb.

Specimen examined

South Sandwich Islands:
Candlemas Island — Longton 658

Buellia isabellina (Hue) Darb.

Lamb (1968, table XXIII) recorded this species from the South Orkney Islands, the South Shetland Islands and the west coast of the Antarctic Peninsula, the record for the South Orkney Islands being based on a specimen from Laurie Island. As many specimens were collected by the author on Signy Island, it suggests that *B. isabellina* has a wide distribution in this group of islands.

B. isabellina occurs on rocks inundated by nitrogenous melt water or used as bird perches. On wet rocks or boulders, it is associated with *Verrucaria elaeoplaca* Vain. but in dry habitats with *Microglaena antarctica*, *Lecanora aspidophora* and *Rinodina petermannii* (Hue) Darb.

Its altitudinal range in the South Orkney Islands is from 6 to 21 m. above sea-level.

Specimens examined

South Orkney Islands:
Signy Island — Lindsay 1107, 1145, 1489, 1535, 1542, 1577

Details of a collection from Signy Island are given in Table I.

Buellia latemarginata Darb.

There was only one specimen of this species in the collections examined, although Lamb (1968, table XXV) has shown that it is widespread in the South Orkney Islands, South Shetland Islands and along the west coast of the Antarctic Peninsula. However, it is much

more widespread on Signy Island than the single collection suggests, being prominent in various nitrophilous lichen associations with *Buellia coniops*, *Rinodina petermannii* and *Lecanora aspidophora*.

Specimen examined

South Orkney Islands:
Signy Island — Lindsay 1533

Buellia punctata (Hoffm.) Massal.

Previously known from the west coast of the Antarctic Peninsula from two specimens (Lamb, 1968, table VIII), this species can now be recorded from Signy Island in the South Orkney Islands (Table I), where it was found on wood forming part of the old British station hut, a not unusual habitat for this species.

Specimen examined

South Orkney Islands:
Signy Island — Lindsay 1045

Buellia russa (Hue) Darb.

B. russa is an extremely widespread lichen in the Scotia Ridge–Antarctic Peninsula region, being recorded from numerous localities in the South Orkney Islands, the South Shetland Islands and from both east and west coasts of the Antarctic Peninsula (Lamb, 1968, table XIII). It is here recorded from the South Sandwich Islands, a northward extension of its range.

B. russa is a very nitrophilous lichen, typical of boulders adjacent to penguin rookeries or rocks inundated with nitrogenous melt water. On Signy Island, the aspicilioid forms discussed by Lamb (1968) were found only in nitrogenous melt pools at the periphery of penguin rookeries, whereas the other growth states of this species were noted from a range of habitats and rock types. It is fairly constantly associated with *Ramalina terebrata*, *Caloplaca regalis*, *Mastodia tesselata*, *Lecanora aspidophora* and *Microglaena antarctica*. On dry boulders inland and at some distance from bird aggregations, it has been found with *Lecidea atrobrunnea* (Ram.) Schaer. and *L. agellata* Darb.

Its altitudinal range in the South Orkney and South Shetland Islands is from 6 to 100 m. above sea-level but it ascends to 120 m. in the South Sandwich Islands.

Specimens examined

var. *russa*

South Sandwich Islands:
Candlemas Island — Longton 737, 741

South Orkney Islands:
Signy Island — Lindsay 1004, 1005,* 1498, 1503, 1522, 1532, 1540, 1580, 1592a

South Shetland Islands:
Livingston Island — Lindsay 11, 26a, 47a, 51, 169, 189, 273, 399, 483*
Robert Island — Lindsay 621, 622

var. *cycloplaca* M. Lamb

South Orkney Islands:
Signy Island — Lindsay 1527

Further details of the record for the South Sandwich Islands, and the specimen of var. *cycloplaca* which is new to the South Orkney Islands are given in Table I.

Buellia subconcava Müll. Arg.

This species has so far been recorded only by a single specimen from South Georgia. The specimen cited below (further details of which are given in Table I) agrees well with the re-description of the type specimen given by Lamb (1968).

Specimen examined

South Georgia:
Undine South Harbour Greene 2505

Buellia subpedicellata (Hue) Darb.

Recorded from Laurie Island in the South Orkney Islands and from both east and west coasts of the Antarctic Peninsula (Lamb, 1968, table V), *B. subpedicellata* is now known from both Lynch and Signy Islands in the South Orkney Islands. Its absence in collections from the South Shetland Islands is surprising in view of its distribution along the Antarctic Peninsula, and perhaps, like several other species of *Buellia*, it has been overlooked in the field.

In the South Orkney Islands, it has been noted in non-nitrogenous or only slightly nitrogenous situations, usually in association with *Usnea antarctica* Du Rietz, *Pertusaria corallophora* Vain. and species of *Cladonia*, *Collema* and *Parmelia*. However, in some localities it was found with *Microglaena antarctica*, *Lecanora aspidophora* and *Buellia russa*, thus indicating a tolerance of, but not a requirement for, nitrogenous situations.

Its altitudinal range is from 4 to 15 m. in the South Orkney Islands.

Specimens examined

South Orkney Islands:
Lynch Island Lindsay 1057a
Signy Island Lindsay 1238, 1265,* 1508

Further details of two of these specimens are given in Table I.

Rinodina nimbosa (Fr.) Th. Fr.

Previously recorded by Lamb (1968, tables XXXIV and XXXV) from a limited area on the east coast of the Antarctic Peninsula, this species can now be reported from the South Orkney Islands from a single specimen referable to f. *nimbosa*, details of which are given in Table II.

Specimen examined

South Orkney Islands:
Signy Island Lindsay 1472

Rinodina petermannii (Hue) Darb.

R. petermannii is a nitrophilous lichen which has been recorded by Lamb (1968, table XXXII) from numerous localities in the South Orkney Islands, South Shetland Islands, and from both east and west coasts of the Antarctic Peninsula. It is now known from Candlemas Island in the South Sandwich Islands and from South Georgia, a northern extension of its geographical distribution. It can also be reported from Livingston Island in the South Shetland Islands (Table II).

It is usually found on boulders adjacent to penguin rookeries and other bird aggregations, associated with *Microglaena antarctica*, *Lecanora aspidophora*, *Buellia isabellina*, *B. coniops* and *B. latemarginata*. However, it has been found in some non-nitrogenous situations, particularly on soil growing with a species of *Caloplaca* (sect. *Caloplaca*).

TABLE II. COLLECTION DATA FOR *Rinodina* SPECIES FROM NEW LOCALITIES

Species	*Locality*	*Habitat*	*Collection number*	*Date of collection*
R. nimbosa	*South Orkney Islands:* Signy Island, Berntsen Point	Over mosses and soil in wet areas (30 m.)	Lindsay 1472	9 January 1967
R. petermannii	*South Georgia:* Stromness Bay, Stromness	North-facing wet rocks by waterfall (*c.* 30 m.) [Grid ref. 117 139]	Greene 3256	23 March 1961
	South Sandwich Islands: Candlemas Island	On boulders and lava cliffs (16 m.)	Longton 672	13 March 1964
	South Shetland Islands: Livingston Island, Byers Peninsula	Crevices in maritime outcrops (10 m.)	Lindsay 87	30 November 1965
R. turfacea	*South Shetland Islands:* Livingston Island, Byers Peninsula	On moss in crevices of maritime outcrops (10 m.)	Lindsay 88	30 November 1965

Specimens examined

South Georgia:
Stromness Bay — Greene 3256

South Sandwich Islands:
Candlemas Island — Longton 672

South Orkney Islands:
Signy Island — Lindsay 1058, 1250, 1401, 1402, 1438, 1565, 1567, 1569, 1571, 1578, 1583

South Shetland Islands:
Livingston Island — Lindsay 87

Antarctic Peninsula (east coast):
Trinity Peninsula — Brading 44

Rinodina turfacea (Wahlenb.) Körb.

There was only one specimen of this species in the collections examined, although it was noted by Lamb (1968, p. 63, table XXIX) to be common in western Antarctica. It was not seen in the South Orkney Islands by the author, although it has been recorded from Laurie Island by Darbishire (1905) and Lamb (1968). It can now be reported from the South Shetland Islands from one locality, details of which are given in Table II. The species is best considered as overlooked in both the South Orkney and South Shetland Islands.

Specimen examined

South Shetland Islands:
Livingston Island — Lindsay 88

ACKNOWLEDGEMENTS

I wish to thank Dr. I. M. Lamb for confirming the identifications of some of the specimens, Dr. S. W. Greene for assistance with the manuscript, and Professor J. G. Hawkes, Mason Professor of Botany, University of Birmingham, for facilities provided in his department.

MS. received 15 January 1970

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