LICHENS AND LICHEN PARASITES

By

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(Received for publication 18th April, 1946.)

INTRODUCTION.

Through the kindness of Sir Douglas Mawson, leader of the Australasian Antarctic Expedition (1911-1914), I have had an opportunity to study the large and interesting botanical collections of that Expedition from King George V Land, Queen Mary Land and Macquarie Island, a few specimens gathered by him while a member of the first Shackleton Expedition (1907-1909) to South Victoria Land, in the party which sought the South Magnetic Pole, as well as the lichens from two voyages of the *Discovery* (1929–1931) of the British, Australian and New Zealand Antarctic Research Expedition (also led by Sir Douglas Mawson) which visited MacRobertson Land, King George V Land, and the Crozets, Kerguelen, Heard and Macquarie Island groups. The most complete set of plants has been deposited in the herbarium of the Missouri Botanical Garden and the duplicates returned to Sir Douglas Mawson.

I wish to express my appreciation to the Curator of Plants of the Boston Society of Natural History for the privilege of studying Kerguelen plants, collected by Sir J. D. Hooker of the "Erebus & Terror" Expedition, in Thomas Taylor's herbarium (later transferred to the Farlow Herbarium); to Dr. David H. Linder, Curator of the Farlow Herbarium of Harvard University for the privilege of studying Kerguelen plants of the U.S. Transit of Venus Expedition in Tuckerman's herbarium, as well as authentic specimens of various species necessary for the interpretation of species under discussion; to A. W. Jessep and P. Bibby of the National Herbarium of Victoria, Melbourne Botanic Gardens, for the privilege of studying material from Kerguelen collected by Robert Hall; to members of the scientific staff of the American Museum of Natural History for identification of fragments of weathered skin of the sea elephant (*Macrorhinus leoninus*) on which lichens were growing; to Mr. Timothy Murphy, formerly my laboratory assistant, who prepared a large part of the 1,800 microscopic preparations used in this study; and to Dr. George T. Moore, Director of the Missouri Botanical Garden, for his kindly interest and generous support of this study.

I regret that war conditions throughout the period while this report was in preparation, have made it impossible to consult the types of species described by Nylander from the (British) Venus Transit Expedition in the British Museum with presumably duplicates in Nylander's herbarium at Helsinki, nor have I seen Stirton's types in the Glasgow Art Galleries, nor Müller-Argau's types in Geneva. I have learned with great regret of the complete destruction of the Aubert de la Rüe collections from Kerguelen in the herbarium of M. Bouly de Lesdain in Dunkerque, France. Fortunately the large amount of material available for study and the clarity of Bouly de Lesdain's and Zahlbruckner's descriptions, have enabled me to recognize most of the species which they reported.

Technique.

This study is based almost entirely on free hand sections, mounted in lacto-phenol to which 10–20 drops of a 1 per cent. solution of acid fuchsin were added. Measurements expressed in fractions of millimetres were made by means of a micrometer disc inserted in one of the oculars of a binocular dissecting microscope, calibrated for the various objectives. Measurements expressed in micra (μ) were made similarly with a micrometer disc inserted in the 10× ocular of a compound microscope. As the material of many of the species was scanty, fewer measurements were made than is usual, and since many times the only ascospores found were still in the ascus, the measurements may be somewhat smaller than they would have been, had more material been available with more mature spores.

Morphology.

There is little to add to the discussion given in the author's report of the Second Byrd Antarctic Expedition (Dodge and Baker, 1938) beyond the finding of two species with Myxophyceae as symbionts, although both these and the Trentepohliaceae are quite abundant as symbionts in the subantarctic islands studied.

Parathecium has been used in the descriptions to include tissues of the same structure under the apothecium as well as on its sides, while *hypothecium* has been used for the tissue of a different structure lying between the thecium and the parathecium (or the medulla, where the parathecium is not differentiated below). *Amphithecium* has been used for thalline tissue around the apothecium, usually containing algae (in a few cases the algae apparently die out early, leaving lacunae in the medullary tissue). *Perithecium* has been restricted to the structures similar to the perithecium of the Sphaeriales (Pyrenomycetes) not as a synonym for parathecium, a usage common in the last century.

Spermogonia are more frequently encountered and are often larger and more highly developed than in more temperate climates or in the species reported from Marie Byrd Land, and in many cases have enabled me to refer sterile thalli, where otherwise it would have been impossible. Spermogonia are especially abundant in many species from the subantarctic islands.

Ecology.

The Antarctic material here reported adds no new features to those discussed by Siple (1938) for the Second Byrd Antarctic Expedition, although it affords abundant illustrations of the various factors.

Citation of Specimens.

Much of the material has scanty field data which has been amplified from the reports of the various expeditions for the printed labels which I have supplied for the specimens. Fortuneately, the various field parties did not happen to collect specimens on the same day, so if a date were given, the locality and collector's name could be supplied. Where no collector's name was evident it has been cited as A.A.E. (Australasian Antarctic Expedition). Many of the rock specimens from Cape Denison were without further data and are assumed to be from the vicinity of Winter Quarters; unnumbered specimens have been arbitrarily numbered 121–194.

The material here reported from Queen Mary Land was received with only symbols L/I to L/VII. In his letter of April 4, 1939, Sir Douglas Mawson wrote as follows: "With regard to the lichen material included under Queen Mary Land in my locality list, I have to state that there is some doubt as to whether this material did come from Queen Mary Land or not. Unfortunately, the data handed over to Mr. Cheel many years ago with the original collections has, for the most part, been lost. None of the material received from Mr. Cheel was labelled as from

Queen Mary Land. Nevertheless, a very fine collection of lichens was made from that locality by our man, Harrisson, and was forwarded with other material to Mr. Cheel, at the Botanical Gardens, Sydney. It is almost certain, therefore, that the Queen Mary Land material is amongst that sent back to us by Mr. Cheel. Our man Harrisson was very methodical and it appears to me that he labelled his lichen collection with the letter "L" and followed it by I—VII referring to the various nunataks from which he collected the material. On this basis, I have entered all material in collection thus printed as of Harrisson's Queen Mary Land collection."

Acting on this assumption, the narrative of the Western Base Party (Mawson, 1914) was carefully read and assuming further that the Roman numerals referred to nunataks in the order visited, rather than to separate nunataks, they are so reported here, I and VI being Hippo Nunatak, II David Island, III and V Possession Nunatak, IV Mt. Barr-Smith and VII Alligator Nunatak. This seems to be confirmed by the fact that collections from IV contain 4 species (out of 5) different from those of other localities, as one might expect if it referred to Mt. Barr-Smith, 4,000 feet elevation, as contrasted with the fairly uniform flora of the low coastal nunataks.

No collector was indicated for the material from the British, Australian and New Zealand Antarctic Research Expedition, although most of it was collected by Professor T. Harvey Johnston, chief Biologist, Dr. J. W. S. Marr assisting him during the first expedition (1929–30). It has been cited B.A.N.Z.A.R.E. in this report. In most cases the numbers originally with the specimens refer to a locality rather than to a single specimen, hence the specimens have been arbitrarily and serially numbered for each locality; e.g. in B177–12, B177 refers to the locality (upper part of Greenland Harbour, Kerguelen), while 12 arbitrarily distinguishes a rock specimen from other rocks from the same locality.

LOCALITIES FROM WHICH LICHENS WERE COLLECTED

In the following list of localities, latitude and longitude are only approximate to the nearest minute as they have mostly been read from available maps.

Macquarie Island.

Wind Desert, top of hill, H. Hamilton, A.A.E., January, 1912.

Featherbed Flats, ca. 54° 29′ S., 158° 57′ E. B.A.N.Z.A.R.E. B531, B532, B533, 3rd December, 1930.

Highland, ca. 54° 30′ S., 158° 57′ E. B.A.N.Z.A.R.E. B534, 3rd December, 1930.

North end of Island, ca. 54° 29′ S., 158° 58′ E. B.A.N.Z.A.R.E. B540, 3rd December, 1930.

Crozet Group.

Possession Island, American Bay, ca. 46° 20′ S., 51° 50′ E.

From volcanic rock, 20 ft. above sea level. B.A.N.Z.A.R.E. B20, 2nd November, 1929.

On scoria from side of main valley above stream, half a mile above the beach. B.A.N.Z.A.R.E. B27, 2nd November, 1929.

On decomposed volcanic rock on beach about 5 feet above sea level. B.A.N.Z.A.R.E. B31, 3rd November, 1929.

On volcanic rock. B.A.N.Z.A.R.E. B32, B33, 3rd November, 1929.

Kerguelen Island.

Baie de l'Oiseau (Christmas Harbour), ca. 48° 41′ S., 69° 03′ E. Anderson (Cook's 3rd Voy.) in British Museum; J. D. Hooker (Voy. "Erebus & Terror") at Kew, duplicates in Thomas Taylor's Herbarium at Farlow Herb., Harvard Univ.

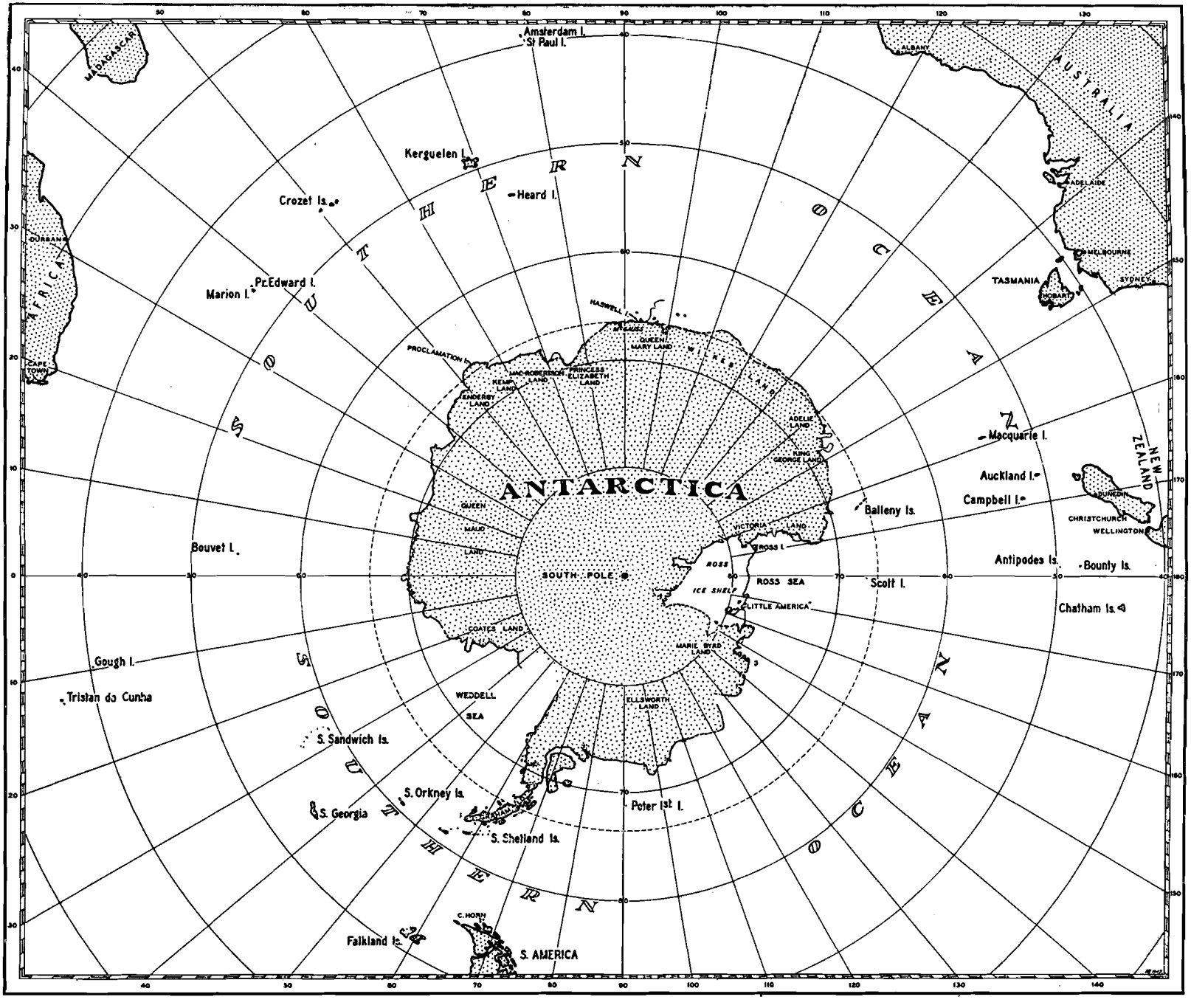
ANTARCTICA
SOUTH POLE
SOUTHERN OCEAN
Amsterdam I.
St Paul I.
Kerguelen I.
Heard I.
Crozet Is.
Marion I.
Pr. Edward I.
Bouvet I.
Gough I.
Tristan da Cunha
S. Sandwich Is.
S. Orkney Is.
S. Georgia
S. Shetland Is.
Falkland Is.
S. AMERICA
C. HORN
Peter Ist. I.
Balleny Is.
Scott I.
Macquarie I.
Auckland I.
Campbell I.
Antipodes Is.
Bounty Is.
Chatham Is.
MADAGASCAR
AFRICA
DURBAN
CAPE TOWN
AUSTRALIA
ALBANY
ADELAIDE
MELBOURNE
SYDNEY
TASMANIA
HOBART
NEW ZEALAND
DUNEDIN
CHRISTCHURCH
WELLINGTON
HASWELL I.
PROCLAMATION I.
ENDERBY LAND
KEMP LAND
MAC-ROBERTSON LAND
PRINCESS ELIZABETH LAND
QUEEN MARY LAND
WILKES LAND
ADELIE LAND
KING GEORGE LAND
QUEEN MAUD LAND
VICTORIA LAND
ROSS I.
ROSS ICE SHELF
ROSS SEA
LITTLE AMERICA
MARIE BYRD LAND
COATES LAND
ELLSWORTH LAND
WEDDELL SEA

Fig. 1.

Betsy Cove in Accessible Bay, ca. 49° 09′ S., 70° 12′ E. E. Naumann (Voy. "Gazelle") studied by Müller-Argau and in his herb. at Herb. Bossier, Univ. Genève.

Molloy (Molly) Point, Sta. 49° 21′ S., 70° 15′ E., 130 ft. elevation. J. H. Kidder (U.S. Transit of Venus Exp.) in Tuckerman herb. at Farlow Herb., Harvard Univ. Tuckerman does not cite localities, hence it is possible that some lichens may have come from the lower levels near Mt. Crozier, ca. 49° 17′ S., 70° E., as this locality is cited for flowering plants and one moss is cited from 1,500 ft. elevation, too high for the vicinity of the station.

Observatory Bay, ca. 49° 25′ S., 69° 53′ E. A. E. Eaton (British Venus Transit Exp.) in British Mus.; Valdivia Exp.; Deutsche Südpolar Exp. (Drygalski) in Vienna; and B.A.N.Z.A.R.E. B188, B192, B195, 19th–21st February, 1930.

Swain's Bay, ca. 49° 32′ S., 69° 46′ E. A. E. Eaton (British Venus Transit Exp.) in British Mus.

Port Jeanne d'Arc and nearby mountains, ca. 49° 33′ S., 69° 50′ E. Aubert de la Rüe, studied by Maurice Bouly de Lesdain (collection destroyed in the bombing of Dunkerque). B.A.N.Z.A.R.E. B109, 18th November, 1929; B176, 11th February, 1930; B200, B201, B203 and B217, all 20th February, 1930; 1,400–1,600 ft. Either the date or the elevation with B.A.N.Z.A.R.E. B200–B203, and B217 are erroneous. On 20th February, the *Discovery* was proceeding to Observatory Bay where the elevations are below 200 ft. If the elevations be correct, the specimens must have been collected while the *Discovery* was near Port Jeanne d'Arc. Since the species are not characteristic of such high elevations, it seems likely they are from Sta. 56A, ca. 49° 23′ S., 69° 55′ E., Rivett Arm, near high point on north peninsula between eastern end of latter and High Island, under high precipitous cliffs, where a shore collection was made. No material bearing these data was received.

Mt. de l'Abri, Aubert de la Rüe, not found on his map, perhaps mountain south-west of Cap de l'Abri, ca. 49° 23′ S., 68° 46′ E.

Volage Bay, ca. 49° 30′ S., 69° 42′ E. A. E. Eaton (British Venus Transit Exp.) in British Mus.; and Aubert de la Rüe.

Mt. P. Termier, ca. 49° 37′ S., 69° 55′ E. Aubert de la Rüe.

Point de la Géodesie, ca. 49° 34′ S., 69° 53′ E. Aubert de la Rüe.

Royal Sound, region between Port Jeanne d'Arc and Boissière Arm, ca. 49° 33′–49° 25′ S., 69° 50′–69° 40′ E. B.A.N.Z.A.R.E. B90, 16th November–22nd November, 1929. Johnston (1937) mentions shore collections from Sta. 9, Islands in lower reaches of Bras Boissière, ca. 49° 26′ S., 69° 45′ E., 20th November, 1929, but in other cases specimens are present on dates and localities when no shore collection is mentioned.*

Long Island, west end, near Sta. 6, ca. 49° 33′ S., 69° 47′ E. B.A.N.Z.A.R.E. B93, 19th November, 1929; and near Sta. 49? ca. 49° 30′ S., 69° 50′ E., B.A.N.Z.A.R.E. B166, B167, B168 (538), B169 (535), all 11th February, 1930, and B953.

Grave Island, Sta. 12, ca. 49° 28′ S., 70° 04′ E. B.A.N.Z.A.R.E. B91, 22nd November, 1929.

Royal Sound, various localities, B.A.N.Z.A.R.E. B126. No date with any specimen. As apparently the B.A.N.Z.A.R.E. localities were numbered serially probably these specimens are from the first visit in November 1929 and may be from Cat, Hog, or Grave Islands about Island Harbour, ca. 49° 28′ S., 70° 05′ E., where marine collections from Sta. 10–14 were made 22nd and 23rd November, 1929 [probably Grave Island, T. H. Johnston].

Greenland Harbour, upper part, ca. 49° 37′ S., 70° 09′ E. A. E. Eaton (British Venus Transit Exp.) in British Mus.; B.A.N.Z.A.R.E. B177 (Sta. 54, 13th February, 1930), B204.

* Collecting was carried on ashore whenever opportunity offered, the localities visited including the shore, rivulets, swamps and tableland adjacent to Port Jeanne d'Arc. [T. H. Johnston.]

Murray Island district. B.A.N.Z.A.R.E. B210, B211, B212, 23rd February, 1930. From the date, these probably came from Suhm Island ca. 49° 29′ S., 70° 10′ E., or Sharbaw Island, ca. 49° 30′ S., 70° 11′ E., as shore collections are mentioned by Johnston for both Islands 25th February, although no specimens bearing this date were received.* Antares Island was not reached until 27th February, while they reached the vicinity of Suhm Island on 22nd February.

Poincaré Peninsula opposite Murray Island and lying between Martin Point and Cat's Ears and adjacent Mt. Wyville Thompson 1,000–1,500 ft. elevation, Sta. 62, ca. 49° 32′ S., 60° 17′ E., B.A.N.Z.A.R.E. B246; and edge of crater lake, B.A.N.Z.A.R.E. B248, 1st March, 1930.

Heard Island.

Along beach of Atlas Cove and West Beach; from steep hill slopes, pools and bogs in the region between Rogers Head, Corinthian Bay, West Beach and the foot of the glacier from Big Ben; ca. 53° 05′ S., 73° 24′ E. B.A.N.Z.A.R.E. B140, 28th November–2nd December, 1929.

South Victoria Land.

McMurdo Sound, Ross Island and Cape Royds, ca. 77° 30′ S., 166° 20′ E., Douglas Mawson, 1908, Shackleton Expedition.

Cape Irizar, ca. 75° 30′ S., 163° 03′ E., Nov. 26, 1908, Douglas Mawson, Shackleton Expedition. Northern Sledging Party under Edgeworth David.

King George V. Land.

Commonwealth Bay, Cape Denison, Winter Quarters, A.A.E. 67° S., 142° 36′ E., J. G. Hunter and others, various dates, 1911–1913; B.A.N.Z.A.R.E. Sta. 88, 5th–6th January, 1931.

McKellar Islets, Cape Denison, ca. 67° S., 142° 45′ E., J. G. Hunter 21st December, 1913.

Madigan Nunatak, 2,400 ft., 67° 07′ S., 143° 20′ E., 30 miles east of Winter Quarters, C. F. Laseron, 15th December, 1912.

Aurora Peak, 1,750 ft. 67° 24′ S., 144° 12′ E., A. L. McLean, 22nd November, 1912, Eastern Sledging Party.

Penguin Point, ca. 67° 35′ S., 146° E., A. L. McLean, 31st December, 1912, Eastern Sledging Party.

Horn (Dreadnought) Bluff, ca. 68° 25′ S., 149° 50′ E., A. L. McLean, 21st December, 1912, Eastern Sledging Party.

Queen Mary Land.

L/I. Hippo Nunatak, ca. 66° 25′ S., 98° E., C. T. Harrisson, 6th–10th November, 1912.

L/II. David Island, ca. 66° 25′ S., 98° 30′ E., C. T. Harrisson, 19th–23rd November, 1912.

L/III. Possession Nunatak, ca. 66° 45′ S., 98° 30′ E., C. T. Harrisson, 15th December, 1912.

L/IV. Mt. Barr-Smith, 4,000 ft., ca. 67° 12′ S., 99° E., C. T. Harrisson, 22nd December, 1912.

L/V. Possession Nunatak, C. T. Harrisson, 25th December, 1912.

L/VI. Hippo Nunatak, C. T. Harrisson, 29th December, 1912.

L/VII. Alligator Nunatak, ca. 66° 36′ S., 97° 30′ E., C. T. Harrisson, 2nd January, 1913.

MacRobertson Land.

Cape Bruce, 67° 26′ S., 60° 49′ E. B.A.N.Z.A.R.E. Sta. 108, 18th February, 1931.

* The date 23rd February is an error for 25th. The locality was probably Suhm Island where three hours were spent in collecting ashore. [T. H. Johnston.]

GEOGRAPHICAL DISTRIBUTION.

The lichens herewith reported, represent three distinct floras, apparently unrelated and will be discussed separately.

MACQUARIE ISLAND. (For a complete account of the geography and geology, see Mawson, 1943). This flora seems very uniform with that of the islands of the New Zealand Submarine Plateau (Auckland and Campbell Islands and usually the mountains of the South Island of New Zealand). Only five fragmentary specimens of conspicuous species from the Australasian Antarctic Exhibition, collected by Mr. H. Hamilton, were received,* the rest of the specimens cited being from the British, Australian, and New Zealand Antarctic Research Expedition, collected in two days in the vicinity of Hasselborough and Buckle's Bays. Hence the sampling error is very large, as only four localities are represented, all in the north end of the island from the younger basic group of rocks, most of the material coming from Featherbed Flats (Mawson, 1943, 47). Our knowledge of the Auckland Islands is almost wholly based on collections of Sir. J. D. Hooker (Voy. "Erebus & Terror") over a century ago (Hook. f. & Tayl., 1844, 1845, 1847). The lichens of Campbell Island are known from collections of Hooker f. (*loc. cit.*) and of Filhol on the French Transit of Venus Expedition Nylander, 1876). Some collections have been made since, but have not been published so far as I can learn. The literature on the lichens of the South Island of New Zealand is extensive but very scattered. In the genera concerned, I have read all the descriptions of New Zealand, Tasmanian and Australian species listed in Zahlbruckner (1921–1940) before describing Macquarie Island species as new.

About one-third of the species have been described as endemic, although I expect many if not most of them will later be found on other islands of the New Zealand Submarine Plateau, as we have more knowledge of their floras. Fifteen families, twenty-three genera and thirty-eight species are represented in Macquarie Island, five of the latter in such fragmentary state as to be unidentifiable beyond genus.

The present flora is of comparatively recent origin as the present Island seems to have been completely denuded by an ice sheet during the Glacial Epoch (Mawson, 1943, 92). Since the lichens of Macquarie Island seem wholly unrelated to those of Antarctica (except for *Mastodia* sp. with another species in MacRobertson Land), they furnish no ancillary evidence that Macquarie Island was "land coëxtensive with Antarctica, and that it was the Antarctic ice sheet that over-rode it" as Blake suggested (Mawson, 1943, 92, footnote), although a submarine ridge extends most of the way to South Victoria Land via the Balleny Islands.

The source of the species for re-population, presents a difficult problem. The submarine ridge connecting the island to the New Zealand Submarine Plateau is submerged about 1,200 fathoms, if one can rely on the relatively few soundings available along the ridge. Probably it did not supply a land bridge or a chain of islands by which Macquarie Island could be re-populated from the Auckland Islands. Unless wind direction has reversed in recent times, there seems little likelihood that it has served to re-populate Macquarie Island. Wind might have served to bring in species from Tasmania, and five of the thirty-eight species also occur in Tasmania. Four of these are wide ranging species, also occurring in New Zealand and the Auckland group and the fifth is so fragmentary that it can only be referred to a species group, members of which also occur in New Zealand and the Auckland group, hence there is no clear evidence that Tasmania has been the source.

* Hamilton's collection, erroneously labelled "algae", was included by mistake with the Expedition's main botanical collection which was forwarded to the British Museum for report. Unfortunately the lichens thus forwarded in error have not been recoverable for reference to Dr. Dodge for they were destroyed by bomb blast during the blitz.

If prior to the Glacial Epoch, the Macquarie Island mass was more elevated as has been suggested (Mawson, 1943, 92), it would seem possible that the islands of New Zealand Submarine Plateau were also more elevated, as they seem to have had a parallel geological development and may have developed a uniform flora. In such a case, it is also possible that small nunataks projected above the ice sheet with species capable of withstanding the severe climatic conditions, similar to conditions found in Antarctica at present, but somewhat less severe, owing to lower latitude. After the Glacial Epoch, these species would be able to spread over the island again. "Invertebrates apparently not capable of migrating across the sea" (Mawson, 1943, 93) may have survived in a similar manner, perhaps using the lichens as food.

Another possibility is transport by land birds, either accidental or migratory. "There have been suggestions made from time to time that certain of the Macquarie Island birds migrate between the Auckland Islands and Macquarie. It is only 350 miles from Macquarie Island to the Auckland Islands" (Mawson, letter of 22nd September, 1945). This might account for the presence of some of the families such as the Cladoniaceae, Parmeliaceae and Usneaceae, which reproduce easily by fragmentation and in which sexual reproduction is rare and which have not been reported from such severe climatic conditions as occur on a nunatak surrounded by an ice sheet. There seems to be little likelihood that sea birds could carry lichen fragments successfully, as the algal component at least, would be very quickly killed by exposure to the greater osmotic concentration of sea water. Ocean currents would present the same difficulty.

KERGUELIA. This geographic term, originally proposed by Tuckerman (1877), may be extended to include Heard Island to the south-east and the Crozet and Prince Edward Island groups to the north-west. The flora seems uniform when allowance has been made for differences in climate resulting from a difference of six degrees of latitude between the ends. The Gaussberg-Kerguelen Ridge connects Heard Island with Kerguelen, extending to the Gribb Bank at nearly 63° S. It probably extends westerly from Kerguelen to the Crozet Swell, a submarine ridge connecting the Crozet Group and Prince Edward and Marion Islands at 1,000 to 1,200 fathoms depth. Except for a bank at about 50° S., 64° E., soundings are unavailable in the probable region of the ridge between Kerguelen and the Crozet group, the nearest soundings being about 2° north and 4–8° south. Since 30′-1° are sufficient to pass from the 500 to the 2,000 fathom lines over most of the Gaussberg-Kerguelen Ridge and the Crozet Swell, it seems quite possible that an undiscovered ridge connects Kerguelen with the Crozet Group. An elevation of 100 fathoms would connect all the islands of the Crozet Group into a single large island, and 400 fathoms elevation would connect Heard and Kerguelen into a large land mass. Even if no such great elevation took place, they would be separated by only a relatively small expanse of sea.

Aubert de la Rüe (1930) gives an excellent history of exploration and an account of the geography of this region. Such meagre data as are available suggest a similar geological history for all of Kerguelia. All the islands are primarily volcanic with beds of globigerina ooze, dense and recrystallized, indicating that igneous outbursts have broken through pelagic sediments (see also Mawson, 1933; 1934). Aubert de la Rüe (1932) gives a full account of the geology of Kerguelen Island and lists fossil plants from the Eocene or Oligocene (see also Seward, 1934).

PRINCE EDWARD GROUP. The flora is little known. The "Challenger" visited Marion Island, collecting five lichens, one of which also occurs on Heard Island, two species reported by the same author from Kerguelen, a species of *Coenogonium*, a widespread tropical genus with one species reaching Macquarie Island, and a sterile *Stereocaulon* which may be the same as *Argopsis cymosa* from Kerguelen.

CROZET GROUP. Only Possession Island has been studied botanically. It ranges from low areas clothed in moorland vegetation growing on peat soils to high snow-clad peaks reaching about 5,000 feet above sea level. Ice-worn valleys deeply dissect the flows of basic lava and beds of tuff which compose the island (Mawson, 1932). Philippi suggests that the basalts are from the end of the Tertiary or Quarternary, but no detailed studies are available. The climate is reported as having a minimum temperature of —5° C., a maximum of 15° C., and a mean annual temperature of 5° C.

The officers of the "Monongahela" visited the island in 1874, collecting 6 species of flowering plants and one moss but no lichens. The Deutsche Südpolar Expedition spent a few hours there, collecting four species of lichens; and the B.A.N.Z.A.R.E. spent one day, collecting 11 families, 20 genera and 24 species, only two of which have not yet been found elsewhere in Kerguelia. Four of the families of more temperate and sub-tropical distribution are also well represented in Kerguelen but do not reach Heard Island with its severer climate. The Lecideaceae found in Kerguelia belong in genera characteristic of cooler regions and are represented by fewer species in the Crozet Group than in Kerguelen or Heard Island.

KERGUELEN. The following account of the geology is summarized from Aubert de la Rüe (1932). The oldest basic lava appears to be Mesozoic or earlier, followed in the Eocene by acid rocks, trachytic and phonolitic domes and thick flows. These in turn are covered by a very thick (1,000 m.) layer of basic rocks corresponding to the Hawaiian Oligocene with intercalated fluviatile sediments. These suffered prolonged erosion in part of the Miocene and the Pliocene with renewed volcanic activity (Mt. Ross) at the end of the Pliocene into the Pleistocene, followed by Pleistocene glaciation. A few hot springs and fumaroles occur. Glaciers still cover about one one-sixth of the surface with perpetual snow at about 400 m. except in isolated peaks. A central icefield about 40 x 20 km. with no nunataks feeds 15 ice streams. The minimum temperature is about —10° C., the maximum about 20° C., a mean winter temperature about —2° C., and mean summer temperature about 6° C.

The flora has been studied from Anderson's collections at Christmas Harbour (Capt. Cook's third voyage, 1776) to those of Aubert de la Rüe in the last decade. The principal expeditions which collected lichens are listed in the following table (Table 1). The number of species given is only approximate, as it is difficult to evaluate the synonymy from lists of species without descriptions of the Kerguelen plants.

Only the south-eastern portion has been explored botanically except for Anderson's and Hooker's collections at Christmas Harbour (Baie de l'Oiseau) near the north-west tip of the main island and Naumann's collections at Betsy Cove in Accessible Bay on the north-east coast. The B.A.N.Z.A.R.E. spent thirty-two days in its two visits (1929–30), collecting more species than previous expeditions which spent much more time there. At present, 22 families, 51 genera and 124 species of which at least 118 are endemic to Kerguelia, are known. Two species of *Cladonia* and four species of *Peltigera* have been referred to European species in the 19th century by British botanists who were inclined to refer exotic collections to the nearest European species before the microscope came into general use in identifying lichens. In all cases where I have seen material previously referred to European species, the Kerguelen material has been a distinct species from the European, hence it is possible that the six species of which I have seen no material, may also be distinct, making the flora completely endemic to Kerguelia. In any case, such a high degree of endemism points to a very long period of isolation with few, if any, recent additions. Ten species are common to the whole region, thirteen are common to Kerguelen and the Crozet group, thirteen common to Kerguelen and Heard Island, and seventy-three so far known only from Kerguelen. Since the sampling error is so high on the other islands, it is probable that many fewer species are strictly endemic to Kerguelen. One species has been tentatively

TABLE 1.

EXPEDITIONS TO KERGUELIA.

Date.	Leader.	Ships.	Collector.	Publication.	Herbarium.	Marion.	Crozets.	Kerguelen.	Heard I.
1776	Cook	Resolution Discovery	Anderson	Crombie 1877	Brit. Mus.	——	——	1– 1*	——
1840	Ross	Erebus Terror	Hooker MacCormick	Hook. f. & Tayl. 1844 Hook. f. 1845, 1847 Crombie 1877	Farlow Hb. Kew	——	——	16– 5	——
1874	Nares	Challenger	Moseley	Nylander in Crombie 1877	Helsinki Brit. Mus.	5–0	——	14– 1	——
1874–5	Schleinitz	Gazelle	Naumann	Müller-Argau 1883, 1884	Geneva	——	——	25– 6	——
1874–5	——	Volage Supply	Eaton	Nylander Crombie 1875, 1876	Helsinki Brit. Mus.	——	——	58–35	——
1874–5	——	Monongahela	Kidder	Tuckerman 1875	Farlow Hb.	——	0	18– 4	——
1898	Chun	Valdivia	Reinisch	Schenck 1905		——	——	4– 0	——
1898	——	——	R. Hall	Wilson 1900	Melbourne	——	——	28– 2	——
1902–3	Drygalski	Gauss	Werth Vanhoeffen Luyken Ensperger	Zahlbruckner 1906	Vienna	——	3–2	41– 5	2–0
1928–29	——	sealer	Aubert de la Rüe	Bouly de Lesdain 1931	destroyed	——	——	23– 6	0
1929–30	Mawson	Discovery	Johnston	Dodge 1947	Mo. Bot. Gard.	——	24–5	127–33	34–6

* Under the above localities, the first number reports the total number of species collected; the second indicates the number of species described as new.

referred to a species described from St. Paul Island to the north, but Nylander's description is so brief that I cannot be sure without seeing the type. The central and western portions with their highlands and mountains have not been explored botanically. The presence on the low eastern mountains of species not found at lower levels, suggests that exploration of the highlands below the snow line would yield many more species, particularly in the genus *Usnea,* section *Roccellinae,* which is at present unknown from the Crozet group, with a single collection from Marion Island, relatively seldom collected on the south-eastern mountains of Kerguelen and abundant in the B.A.N.Z.A.R.E. collections from Heard Island.

HEARD ISLAND. Aubert de la Rüe (1930a) has given a brief history of exploration and account of the geography. Glaciers cover the whole of the north-western end except a narrow border of cliffs. East of this a low sandy area extends across the island, where the only botanical collections have been made. To the south-east Mt. Andrée Aubert de la Rüe, 170 m. is a volcano from which the western side of the crater has been eroded by the sea. Mt. Drygalski (225 m.) to the east has sand up to 50 m., *Azorella* extending up to 100 m. and only mosses above. From this point the land rises to Big Ben Peak with perpetual snow about 200–300 m. Old sealers state the temperature from March to December is below zero Centigrade, the summer mean about 3° C. and the mean annual about —1° C. *Acaena,* so common on Kerguelen, was not found.

The seven volcanoes are subsequent to glaciation which covered the island. The rocks seem younger than those of Kerguelen (Aubert de la Rüe, 1929) but no specimens of clear stratigraphic importance were collected. Rogers Peak and Red Island are the most recent volcanoes, Mt. Andrée Aubert de la Rüe and Mt. Drygalski are older. No traces of activity of Big Ben Peak were noted, although Lt. Hobart Seymour of the "Wakefield" reported clouds of smoke in 1910.

The Deutsche Südpolar Expedition made a short visit, collecting two species of lichens. If Aubert de la Rüe made collections they have not been reported on. The B.A.N.Z.A.R.E. collected 11 families, 20 genera and 34 species. The families are all found in Kerguelen, but four of the families not found in the Crozet Group are characteristic of somewhat cooler regions than the four families of the Crozet Group not found in Heard Island. Six species are at present endemic to Heard Island, probably of little significance as three of the species are inconspicuous and easily overlooked in collecting and the other three are in *Usnea,* sect. *Roccellinae,* which probably will be found in the higher elevations of Kerguelen, perhaps already represented in Eaton's (British Venus Transit Exp.) collections in the British Museum, but unavailable to me at present.

All the evidence so far available for Kerguelia, points to a very old lichen flora with five endemic genera and one genus having a distantly related species in the Auckland Islands. The Phyllopyreniaceae has one genus in Kerguelen and one in Fuegia, each with a single species. The Mastodiaceae has a single species in Kerguelen, one in Macquarie Island, one in MacRobertson Land, various species in the Graham Land Archipelago, South Georgia and from Fuegia northward in very high alpine regions to Alaska and across Bering Strait to north-eastern Siberia. In most of the larger genera, the species are more closely related to each other than they are to species from other regions. In very rare cases, there are suggestions of distant relationships with species in the mountains of South Africa and of Australia.

The origin of the flora is a difficult problem, for which the various theories proposed are briefly reviewed by Aubert de la Rüe (1932, 214–216). None of the classical methods of transport give a clue. Only a single species of *Mastodia* suggests a relationship with Antarctica, the nearest continent, or with Macquarie Island, the westernmost island of the New Zealand Plateau, with a climate no more severe than Heard Island. The distantly related species of *Argopsis,* one each in Auckland Island and Kerguelia and *Pertusaria perrimosa* of New Zealand

related to *P. subperrimosa* of Kerguelia, are the only other suggestions of relationship to the New Zealand region, while the more characteristic smaller genera of each have failed to penetrate the other region. Intriguing suggestions of very distant relationships exist, perhaps via the Atlantic-Indian Swell with Bouvet Island (flora wholly unknown) the south end of the Mid-Atlantic Swell, the South Sandwich Swell, South Georgia, the Falkland Islands and Fuegia.

If on the other hand, one accepts the Wegener hypothesis of continental drift in modified form, one might suggest that Kerguelia arose from the stresses at the fractures during the break-up of Gondwana Land when the Australia-New Zealand land masses separated at the close of the Jurassic, since Aubert de la Rüe suggests that the oldest basic lava is Mesozoic. Perhaps the Australia-New Zealand land mass contributed a few elements which have persisted (greatly modified) before it had moved too far away. The chief part of the flora of Kerguelia was supplied from Fuegia with perhaps some elements from South Africa until the Eocene. On the separation of Fuegia, Kerguelia also moved away to the south-eastward and was soon too far away to receive further contributions. The present distribution of *Usnea* sect. *Roccellinae* (which perhaps should be regarded as a separate genus) is suggestive of this view. The more primitive species (those most closely related to other sections of *Usnea*) are found in Fuegia, with one line of divergence moving up the Andes at elevations of 2,500–4,300 m. as far as Colombia, with one species each in Mexico and Jamaica, while the other line is represented by one (or two closely related) species in South West Africa, two in the mountains of East Africa, four in the mountains of South India and Ceylon, and several in Kerguelia. Such an interpretation would account for the very high degree of endemism in Kerguelia (practically all the species and one tenth of the genera).

ANTARCTICA. In considering distribution on the Antarctic continent, some difficulties are necessarily present in greater degree than in more temperate regions. Owing to the physical hardships in collecting, the sampling error is bound to be higher. In all the localities reported here, collecting was limited to one or two days in each locality, except at the main base at Cape Denison in King George V Land. Man-hauled transport in the mountains east of Cape Denison necessitated the collection of a small amount of material and the removal of specimens from the rocks with consequent fragmentation and the probability that many of the smaller species were overlooked. This in turn places a greater burden on the botanist who studies the material in reconstructing what the whole plant may have looked like from the fragments. When fragments of several species exist in the same packet, one must first go over the hundreds of fragments under a high-power dissecting microscope and sort them approximately, with uncertainties of interpretation that such a process involves.

Another source of error in considering geographical distribution, is the relatively large amount of sterile material. Fortunately long experience in working over the collection, has enabled me to place most of it approximately. Curiously the commonest species of *Lecidea* and most of the scant material referred to *Catillaria* had well developed ascocarps, but no asci nor ascospores, although collected over such a wide area and in different months of the growing season. Such characters as are observable, place the *Lecideae* in *L. cancriformis* or *L. Blackburni* or in closely related species, but further collections of better material will be necessary to establish certainty. The references of material to *Catillaria* are even less certain. Material of *Parmelia variolosa, P. Coreyi* and *P. grisea* is scant and fragmentary; references to these species are also uncertain. Consequently one should not rely on these determinations in considering distributional problems and they have been disregarded is computing percentage endemism. Any conclusions should be regarded as tentative and will probably be modified as the lacunae of our knowledge of the region are filled in.

TABLE 2.

EXPEDITIONS TO ANTARCTICA.

Date.	Leader.	Ships.	Botanists.	Publications.	Herbarium.	Species.	Locality.
1839–43	Ross	Erebus Terror	J. D. Hooker	Hook. f. & Tayl. 1844 Hook. f. 1845	Farlow Kew	9*– 3	Cockburn Island Graham Land
1897–99	Gerlach de Gommery	Belgica	Racovitsa	Vainio 1903	Turku	55–29	Graham Land
1898–00	Borchgrevink	Southern Cross	Hanson *et al.*	Th. Fries 1902 Blackman 1902	Oslo Brit. Mus.	4– 1	S. Victoria Land
1901–03	Drygalski	Gauss	Vanhoeffen	Zahlbruckner 1906	Vienna	3– 0	K. Wilhelm II Land
1901–03	Nordenskjöld	Antarctic	Skottsberg	Darbishire 1912	Stockholm	47– 9	Graham Land
1901–04	Scott	Discovery		Darbishire 1910	Brit. Mus.	24– 5	S. Victoria Land
1902–04	Bruce	Scotia	Rudmose-Brown	Darbishire 1905	Brit. Mus.	11– 0	Graham Land
1903–05	Charcot	Français	Turquet	Hue 1908	Paris	16– 4	Graham Land
1907–09	Shackleton	Nimrod	Priestley Mawson	Darbishire 1923 Dodge 1947	Brit. Mus. Mo. Bot. Gard.	13– 1 3– 0	S. Victoria Land
1908–10	Charcot	Pourquoi Pas	Gain, Liouville	Hue 1915	Paris	112–89	Graham Land
1910–11	Scott	Terra Nova		Darbishire 1923	Brit. Mus.	17– 8	S. Victoria Land
1911–14	Mawson	Aurora	Hunter, McLean, Laseron, Harrisson	Dodge 1947	Mo. Bot. Gard.	35–12 34–20	K. George V Land Q. Mary Land
1914–16	Shackleton	Endurance		Darbishire 1923	Brit. Mus.	2– 0	Elephant Island
1929–31	Mawson	Discovery	Johnston	Dodge 1947	Mo. Bot. Gard.	22– 5 16– 5	K. George Land MacRobertson Land
1933–35	Byrd	J. Ruppert Bear of Oakland	Siple *et al.* Blackburn *et al.*	Dodge & Baker 1938	Mo. Bot. Gard.	89–84	Marie Byrd Land K. Edward VII Land S. Victoria Land

* The first number reports the total number of species collected; the second indicates the number described as new.

In Table 2, the results of expeditions which have collected plants south of 60° S. are summarized for the lichens. The number of species given is only approximate, as it is very difficult to evaluate the synonymy from lists of species without descriptions.

The various expeditions here reported (see Table 2) brought back a total of ten families, 25 genera and 64 species, 40 species from King George V Land, 33 from Queen Mary Land and 15 from MacRobertson Land. Probably the two latter Lands will be found to have much richer floras than King George V Land when an equal amount of collecting has been done (only seven days in Queen Mary Land and one day in MacRobertson Land).

The flora suggests that Queen Mary and MacRobertson Lands have a less rigorous climate, e.g. *Heppia, Bacidia, Dermatiscum* and *Parmelia* sect. *Hypotrachyna* are characteristic of warmer climates than genera usually found in the Antarctic and here occur farther south than they have previously been known. *Heppia* as a whole is characteristic of hot, dry deserts with a few species in more temperate climates, hence was wholly unexpected here, although Lynge (1937) described a new genus *Fernaldia,* perhaps belonging in the Heppiaceae, from Disco, Greenland. One species of *Heppia* occurs in King George V Land and MacRobertson Land, with a second species in MacRobertson Land. *Bacidia* extends from the tropics to the subarctic and subantarctic, but the presence of two species in King George V Land and two others in Queen Mary Land was a surprise. *Dermatiscum* is represented by a species each in King George V Land and Queen Mary Land. One species occurs in South Africa and Madagascar and one in South Carolina, a very anomalous and unexpected distribution. *Parmelia,* sect. *Hypotrachyna,* abundant from the tropics to the temperate zones has one species in Queen Mary Land and in MacRobertson Land and another in the Graham Land Archipelago.

The conspicuous Umbilicariaceae, Arctic, alpine and Antarctic, are curiously absent from the MacRobertson Land collections, although well developed in Queen Mary Land. The Verrucariaceae with 8 species of *Verrucaria* in the Graham Land Archipelago, 3 species of *Thelidium* in Marie Byrd Land, and a large development in Kerguelia to the north are surprisingly absent from our area. *Buellia,* usually the genus with the largest number of species in Antarctic regions, is surprisingly absent from MacRobertson Land, although represented by 3 species in Queen Mary Land and 5 species in King George V Land. *Mastodia,* subantarctic, high alpine to subarctic, and previously found in the Graham Land archipelago, has a new species in MacRobertson Land.

While it is difficult to express accurately, one gains the impression that King George V Land is a meeting place of a flora to the east, fairly uniform over Marie Byrd Land (including the King Edward VII Peninsula) and South Victoria Land, making allowances for differences of nearly 15° of latitude and consequent variation in the rigours of climate, and a flora to the west through Queen Mary Land, Wilhelm II Land and MacRobertson Land, where the climate is rather less rigorous and where there is more relationship with the flora of the Graham Land Archipelago. In several instances we have pairs of related species, e.g. *Alectoria antarctica* in Marie Byrd Land and South Victoria Land and *A. congesta* in King George V, Queen Mary, Wilhelm II, and MacRobertson Lands; *Lecanora quarta* in South Victoria Land and *L. McLeani* in King George V Land. *Rinodina frigida* is the only species so far found all the way from Marie Byrd Land to MacRobertson Land.

GEOGRAPHICAL DISTRIBUTION OF SPECIES IN THE SUB-ANTARCTIC (EXCLUDING THE AMERICAN SECTOR) AND THE ANTARCTIC (AUSTRALIAN SECTOR).

In the following lists, species treated in this work are preceded by an asterisk (*). The others are listed for the sake of completeness, but have not been taken into consideration in discussing geographical distribution. As the literature on the subantarctic islands south of New Zealand is very scattered, the lists are probably incomplete. As I have seen little material except some of that from the voyage of the *Erebus* & *Terror*, the identifications and synonymy are often doubtful.

KERGUELIA.

MARION ISLAND.

COENOGONIACEAE.

**Coenogonium confervoides* Nyl. "Challenger."

PELTIGERACEAE.

Peltigera polydactyla f. *hymenina* Nyl. "Challenger."

CLADONIACEAE.

**Cladonia phyllophora* (Tayl.) Dodge. "Challenger" (sub *C. fimbriata* f. *costata*).

**Argopsis cymosa* (Cromb.) Dodge. "Challenger" (sub *Stereocaulon* sp., fragmentary and indeterminable).

USNEACEAE.

**Usnea insularis* (Lamb) Dodge. "Challenger."

CROZET ARCHIPELAGO.

PYRENULACEAE.

**Coccotrema kerguelensis* Dodge. B.A.N.Z.A.R.E.

**Porina Werthii* Zahlbr. B.A.N.Z.A.R.E.

XANTHOPYRENIACEAE.

**Xanthoporina kerguelensis* Dodge. B.A.N.Z.A.R.E.

GRAPHIDACEAE.

**Encephalographa cerebrinella* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.

LICHINACEAE.

**Steinera Werthii* Zahlbr. B.A.N.Z.A.R.E.

PANNARIACEAE.

**Pannaria dichroa* (Hook. f. & Tayl.) Cromb. B.A.N.Z.A.R.E.

LECIDEACEAE.

**Lecidea phaeostoma* Nyl. B.A.N.Z.A.R.E.

**Lecidea superjecta* Nyl. B.A.N.Z.A.R.E.

**Catillaria basaltica* Müll.-Arg. B.A.N.Z.A.R.E.

CLADONIACEAE.

**Argopsis cymosa* (Cromb.) Stzbgr. B.A.N.Z.A.R.E.

PERTUSARIACEAE.

**Lecanidium crozeticum* Dodge. B.A.N.Z.A.R.E.

**Pertusaria ochrolechioides* Zahlbr. B.A.N.Z.A.R.E.

**Pertusaria subperrimosa* Nyl. B.A.N.Z.A.R.E.

**Urceolina kerguelensis* Tuck. B.A.N.Z.A.R.E.

LECANORACEAE.

**Aspicilia endochlora* (Hook. f. & Tayl.) Dodge. B.A.N.Z.A.R.E.

**Aspiciliopsis macrophthalma* (Hook. f. & Tayl.) Dodge. B.A.N.Z.A.R.E.

**Placopsis bicolor* (Tuck.) B. de Lesd. B.A.N.Z.A.R.E.

**Candelariella parasitica* Dodge. B.A.N.Z.A.R.E.

BLASTENIACEAE.

**Blastenia Johnstoni* Dodge. B.A.N.Z.A.R.E.

**Blastenia keroplasta* Zahlbr. Deutsche Südpolar Exp. v. *athallina* Zahlbr. B.A.N.Z.A.R.E.

**Gasparrinia lucens* (Nyl.) Dodge & Baker. Deutsche Südpolar Exp.

**Kuttlingeria crozetica* (Zahlbr.) Dodge. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.

BUELLIACEAE.

**Buellia subplicata* (Nyl.) Müll.-Arg. B.A.N.Z.A.R.E.

**Buellia tristiuscula* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.

**Rinodina aspicilina* Zahlbr. B.A.N.Z.A.R.E.

KERGUELEN.

VERRUCARIACEAE.

**Verrucaria evanida* Nyl. Zeye.

**Verrucaria hebena* Dodge. B.A.N.Z.A.R.E.

**Verrucaria kerguelensis* Dodge. B.A.N.Z.A.R.E.

**Verrucaria obfuscata* Nyl. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Gazelle"; Venus Transit Exp.

**Verrucaria tessellatula* Nyl. B.A.N.Z.A.R.E.; Venus Transit Exp.

**Verrucaria Werthii* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.

**Thrombium kerguelanum* Dodge. B.A.N.Z.A.R.E.

**Thelidium praevalescens* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.; Venus Transit Exp.

**Microglaena kerguelena* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.; Venus Transit Exp.

**Microglaena Mawsoni* Dodge. B.A.N.Z.A.R.E.

**Verrucaria congestula* Strtn. "Challenger."

PYRENULACEAE.

**Acrocordia platyseptata* (Zahlbr.) Dodge. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.

**Coccotrema kerguelensis* Dodge. B.A.N.Z.A.R.E.; U.S. Transit of Venus Exp.

**Porina insueta* (Nyl.) Müll.-Arg. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Gazelle"; Venus Transit Exp.

**Porina Werthii* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; U.S. Transit of Venus Exp.; Venus Transit Exp.

PHYLLOPYRENIACEAE.

**Phyllopyrenia tessellata* Dodge. B.A.N.Z.A.R.E.

XANTHOPYRENIACEAE.

**Xanthoporina kerguelensis* Dodge. B.A.N.Z.A.R.E.

MASTODIACEAE.

**Mastodia tessellata* Hook f. & Harv. B.A.N.Z.A.R.E.; "Erebus & Terror."

GRAPHIDACEAE.

**Encephalographa cerebrinella* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus & Terror"; U.S. Transit of Venus Exp.; Venus Transit Exp.

LECANACTIDACEAE.

**Lecanactis kerguelensis* Dodge. B.A.N.Z.A.R.E.; Venus Transit Exp. ?

**Lecanactis Mawsoni* Dodge. B.A.N.Z.A.R.E.

GYALECTACEAE.

**Ionaspis kerguelensis* Dodge. B.A.N.Z.A.R.E.

**Ionaspis Mawsoni* Dodge. B.A.N.Z.A.R.E.

LICHINACEAE.

**Steinera glaucella* (Tuck.) Dodge. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus and Terror"; U.S. Transit of Venus Exp.; Venus Transit Exp.

**Steinera nigra* Dodge. B.A.N.Z.A.R.E.

**Steinera Werthii* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.

**Lichina antarctica* Cromb. Hall; Venus Transit Exp.

COLLEMACEAE.

**Physma kerguelense* Dodge. B.A.N.Z.A.R.E.

PANNARIACEAE.

**Leprocollema obscurius* (Nyl.) Dodge. B.A.N.Z.A.R.E.; Venus Transit Exp.

**Pannaria dichroa* (Hook. f. & Tayl.) Cromb. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus & Terror"; U.S. Transit of Venus Exp.; Venus Transit Exp.

**Coccocarpia kerguelensis* Dodge. B.A.N.Z.A.R.E.

**Psoroma hirsutulum* Nyl. Aubert de la Rüe; Hall; Venus Transit Exp.

STICTACEAE.

Stricta crocata (L.) Ach. Deutsche Südpolar Exp.

PELTIGERACEAE.

Peltigera polydactyla v. *hymenina* (Ach.) Fw. "Erebus & Terror"; Venus Transit Exp.

Peltigera scutata (Dicks.) Duby. "Gazelle."

Peltigera spuria (Ach.) DC. "Erebus & Terror; "Gazelle"; Venus Transit Exp.

Peltigera rufescens (Weis) Baumg. Aubert de la Rüe.

Peltigera sp. Hall.

LECIDEACEAE.

**Lecidea asbolodes* Nyl. B.A.N.Z.A.R.E.; Venus Transit Exp.

**Lecidea assentiens* Nyl. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus & Terror"; Venus Transit Exp.

**Lecidea Auberti* B. de Lesd., Aubert de la Rüe; B.A.N.Z.A.R.E.

**Lecidea Eatoni* Cromb. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; Hall; Venus Transit Exp.

**Lecidea endocyanella* Zahblr. Deutsche Südpolar Exp.

**Lecidea intersita* Nyl. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; Venus Transit Exp.

**Lecidea kerguelensis* B. de Lesd. Aubert de la Rüe; B.A.N.Z.A.R.E.

**Lecidea Mawsoni* Dodge. B.A.N.Z.A.R.E.

**Lecidea phaeostoma* Nyl. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; Hall; Venus Transit Exp.

**Lecidea rhizocarpiza* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus and Terror"?

**Lecidea Sancti-Pauli* B. de Lesd. Aubert de la Rüe; U.S. Transit of Venus Exp.

**Lecidea sincerula* Nyl. Deutsche Südpolar Exp.; Venus Transit Exp.

**Lecidea subassentiens* Nyl. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Gazelle"; Transit of Venus Exp.

*v. *brachybasidia* Zahlbr. Deutsche Südpolar Exp.

**Lecidea subcontinua* Nyl. B.A.N.Z.A.R.E.; Venus Transit Exp.
**Lecidea subdisjunguenda* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; Hall.
**Lecidea sublygomma* Zahlbr. Deutsche Südpolar Exp.
**Lecidea subplana* Nyl. B.A.N.Z.A.R.E.; Venus Transit Exp.
**Lecidea superjecta* Nyl. B.A.N.Z.A.R.E.; "Challenger"; Deutsche Südpolar Exp.; Hall.
**Lecidea Urbanskyana* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.
**Lecidea variatula* Nyl. Venus Transit Exp.
**Lecidea Werthii* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.
**Mykoblastus perustus* (Nyl.) Dodge. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus and Terror"; U.S. Transit of Venus Exp.; Venus Transit Exp.
**Mykoblastus stephanodes* (Strtn.) Dodge. B.A.N.Z.A.R.E.; "Challenger."
**Biatorina sublutescens* Nyl. B.A.N.Z.A.R.E.; "Gazelle"; U.S. Transit of Venus Exp; Venus Transit Exp.
**Catillaria basaltica* Müll.-Arg. "Gazelle."
**Catillaria kerguelensis* Dodge. B.A.N.Z.A.R.E.
**Thalloidima kerguelensis* Dodge. B.A.N.Z.A.R.E.
**Bacidia kerguelensis* Dodge. U.S. Transit of Venus Exp.; Venus Transit Exp.
**Toninia kerguelensis* Dodge. B.A.N.Z.A.R.E.; "Gazelle"?; Venus Transit Exp.?
**Rhizocarpon candidum* Dodge. B.A.N.Z.A.R.E.
**Rhizocarpon Johnstoni* Dodge. B.A.N.Z.A.R.E.; Aubert de la Rüe?
**Rhizocarpon kerguelense* Dodge. Aubert de la Rüe; B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus & Terror"; Hall; U.S. Transit of Venus Exp.; Venus Transit Exp.
**Rhizocarpon Mawsoni* Dodge. B.A.N.Z.A.R.E.; U.S. Transit of Venus Exp.
**Rhizocarpon urceolinum* Dodge. B.A.N.Z.A.R.E.

CLADONIACEAE.

Cladonia cornuta (L.) Schaer. "Challenger."
Cladonia gracilis v. *turbinata* Schaer. "Gazelle."
**Cladonia Johnstoni* Dodge. B.A.N.Z.A.R.E.
**Cladonia kerguelensis* Dodge. B.A.N.Z.A.R.E.
**Cladonia phyllophora* (Tayl.) Dodge. Aubert de la Rüe; B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus & Terror"; "Gazelle"; Hall; U.S. Transit of Venus Exp.; Venus Transit Exp.
**Argopsis cymosa* (Cromb.) Dodge. "Erebus & Terror"; "Gazelle."

ACAROSPORACEAE.

**Acarospora Kidderi* Dodge. U.S. Transit of Venus Exp.; "Erebus & Terror"?

PERTUSARIACEAE.

**Lecanidium subfoliosum* Dodge. B.A.N.Z.A.R.E.
**Pertusaria Auberti* B. de Lesd. Aubert de la Rüe.
**Pertusaria cineraria* Nyl. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; Venus Transit Exp.
**Pertusaria kerguelana* Zahlbr. B.A.N.Z.A.R.E., Deutsche Südpolar Exp.
**Pertusaria ochrolechioides* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.
**Pertusaria subperrimosa* Nyl. B.A.N.Z.A.R.E.; "Erebus & Terror"; Deutsche Südpolar Exp.; Venus Transit Exp.
**Pertusaria Werthii* Zahlbr. Deutsche Südpolar Exp.; "Erebus & Terror."
**Urceolina kerguelensis* Tuck. Aubert de la Rüe; B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Gazelle"; U.S. Transit of Venus Exp.; Venus Transit Exp.

LECANORACEAE.

**Aspicilia disjunguenda* (Nyl.) Dodge. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus & Terror"; Venus Transit Exp.

**Aspicilia endochlora* (Hook. f. & Tayl.) Dodge. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus & Terror"; Venus Transit Exp.

**Aspicilia lygomma* (Nyl.) Dodge. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; Hall; Venus Transit Exp.

**Lecanora atrocaesia* Nyl. Aubert de la Rüe; B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus & Terror"; "Valdivia"?; Venus Transit Exp.

**Lecanora broccha* Nyl. B.A.N.Z.A.R.E.; "Erebus & Terror"; "Gazelle"; Hall; U.S. Transit of Venus Exp.; Venus Transit Exp.

**Aspiciliopsis macrophthalma* (Hook f. & Tayl.) Dodge. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Erebus & Terror"; "Gazelle"; Hall; U.S. Transit of Venus Exp.; Venus Transit Exp.

**Aspiciliopsis antarctica* (Müll.-Arg.) Dodge. Deutsche Südpolar Exp.; "Gazelle."

**Placopsis bicolor* (Tuck.) B. de Lesd. Aubert de la Rüe; B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Gazelle"; Hall; U.S. Transit of Venus Exp.; "Valdivia"?; Venus Transit Exp.

**Placopsis vitellina* (Bab.) Dodge. Aubert de la Rüe; B.A.N.Z.A.R.E.; "Erebus & Terror."

**Lecania kerguelensis* Dodge. B.A.N.Z.A.R.E.; "Gazelle"?; Venus Transit Exp.?

**Thamnolecania antarctica* Tuck. in Dodge. "Erebus & Terror."

PARMELIACEAE.

**Parmelia stygioides* Nyl. Deutsche Südpolar Exp.; Venus Transit Exp.

**Parmelia kerguelensis* Wils. B.A.N.Z.A.R.E.; Hall.

USNEACEAE.

**Usnea Crombiei* Dodge. Deutsche Südpolar Exp.?; Hall; Venus Transit Exp.; "Valdivia"?

**Usnea Taylori* Hook f. Aubert de la Rüe; B.A.N.Z.A.R.E.; "Erebus & Terror"; "Gazelle"; Hall; "Challenger"; "Valdivia"; Venus Transit Exp.

**Usnea trachycarpa* (Strtn.) Müll.-Arg. B.A.N.Z.A.R.E.; "Challenger"; Deutsche Südpolar Exp.; "Gazelle"; Hall; "Valdivia"?; Venus Transit Exp.

BLASTENIACEAE.

**Blastenia Auberti* (B. de Lesd.) Dodge. Aubert de la Rüe; B.A.N.Z.A.R.E.

**Blastenia Johnstoni* Dodge. B.A.N.Z.A.R.E.; "Gazelle"?; Venus Transit Exp.

**Blastenia keroplasta* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.

*v. *athallina* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; Hall.

**Blastenia Wilsoni* Dodge. B.A.N.Z.A.R.E.; Hall.

**Gasparrinia depauperata* (Müll.-Arg.) Dodge. "Gazelle."

**Gasparrinia lucens* (Nyl.) Dodge & Baker. Aubert de la Rüe; Deutsche Südpolar Exp.; Venus Transit Exp.

**Kuttlingeria crozetica* (Zahlbr.) Dodge. B.A.N.Z.A.R.E.; "Erebus & Terror"?

**Huea diphyella* (Nyl.) Dodge. B.A.N.Z.A.R.E.; Venus Transit Exp.

**Pyrenodesmia kerguelensis* (B. de Lesd.) Dodge. Aubert de la Rüe; B.A.N.Z.A.R.E.; "Gazelle"?

**Pyrenodesmia vitellinella* (Nyl.) Dodge. B.A.N.Z.A.R.E.; "Erebus & Terror"; Venus Transit Exp.

BUELLIACEAE.

**Buellia subplicata* (Nyl.) Müll.-Arg. Aubert de la Rüe; B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.; "Gazelle"; Hall; U.S. Transit of Venus Exp.?; Venus Transit Exp.

*v. *Joannae* B. de Lesd. Aubert de la Rüe; B.A.N.Z.A.R.E.

**Buellia tristiuscula* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.; Venus Transit Exp.

**Rinodina aspicilina* Zahlbr. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.

HEARD ISLAND.

VERRUCARIACEAE.

**Verrucaria aethioboliza* Nyl. B.A.N.Z.A.R.E.

**Verrucaria Mawsoni* Dodge. B.A.N.Z.A.R.E.

**Thelidium heardensis* Dodge. B.A.N.Z.A.R.E.

**Thelidium praevalescens* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.

**Microglaena kerguelena* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.

PYRENULACEAE.

**Porina insueta* (Nyl.) Müll.-Arg. B.A.N.Z.A.R.E.

PHYLLOPYRENIACEAE.

**Phyllopyrenia tessellata* Dodge. B.A.N.Z.A.R.E.

GRAPHIDACEAE.

**Encephalographa cerebrinella* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.

GYALECTACEAE.

**Ionaspis kerguelensis* Dodge. B.A.N.Z.A.R.E.

PANNARIACEAE.

**Pannaria dichroa* (Hook. f. & Tayl.) Cromb. B.A.N.Z.A.R.E.

LECIDEACEAE.

**Lecidea Auberti* B. de Lesd. B.A.N.Z.A.R.E.

**Lecidea intersita* Nyl. B.A.N.Z.A.R.E.

**Lecidea phaeostoma* Nyl. B.A.N.Z.A.R.E.

**Lecidea subassentiens* Nyl. B.A.N.Z.A.R.E.

**Lecidea sublygomma* Zahlbr. B.A.N.Z.A.R.E.

**Lecidea subplana* Nyl. B.A.N.Z.A.R.E.

**Lecidea superjecta* Nyl. B.A.N.Z.A.R.E.

**Lecidea Werthii* Zahlbr. B.A.N.Z.A.R.E.

**Rhizoncarpon kerguelense* Dodge. B.A.N.Z.A.R.E.

LECANORACEAE.

**Aspicilia disjunguenda* (Nyl.) Dodge. B.A.N.Z.A.R.E.

**Aspicilia endochlora* (Hook. f. & Tayl.) Dodge. B.A.N.Z.A.R.E.

**Lecanora atrocaesia* Nyl. B.A.N.Z.A.R.E.

**Aspiciliopsis macrophthalma* (Hook. f. & Tayl.) Dodge. B.A.N.Z.A.R.E.

**Placopsis bicolor* (Tuck) B. de Lesd. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.

**Lecania heardensis* Dodge. B.A.N.Z.A.R.E.

USNEACEAE.

**Usnea Crombiei* Dodge. B.A.N.Z.A.R.E.; Deutsche Südpolar Exp.

*v. *sublaevis* Dodge. B.A.N.Z.A.R.E.

**Usnea floriformis* Dodge. B.A.N.Z.A.R.E.

**Usnea insularis* (Lamb) Dodge. B.A.N.Z.A.R.E.

**Usnea propagulifera* Dodge. B.A.N.Z.A.R.E.

BLASTENIACEAE.

Gasparrinia depauperata (Müll.-Arg.) Dodge. B.A.N.Z.A.R.E.
**Pyrenodesmia vitellinella* (Nyl.) Dodge. B.A.N.Z.A.R.E.

BUELLIACEAE.

**Buellia subplicata* (Nyl.) Müll.-Arg. B.A.N.Z.A.R.E.
**Buellia tristiuscula* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.
**Rinodina aspicilina* Zahlbr. B.A.N.Z.A.R.E.

SUBANTARCTIC ISLANDS SOUTH OF NEW ZEALAND.

ANTIPODES ISLAND.

STICTACEAE.

Pseudocyphellaria Freycinetii (Del.) Malme. Cockayne.
Stictina filicina (Ach.) Nyl. Cockayne.

CLADONIACEAE.

Cladina pycnoclada (Gaudich.) Leight. Cockayne.
**Cladia aggregata* (Sw.) Nyl. Cockayne.
Cladonia verticillata Hoffm. Cockayne.
Stereocaulon ramulosum (Sw.) Raeusch. Cockayne.
Stereocaulon argodes Nyl. Cockayne.

PARMELIACEAE.

**Menegazzia circumsorediata* Santesson. DuRietz.

USNEACEAE.

**Usnea xanthopoga* Nyl. Cockayne (sub *U. articulata*).

CAMPBELL ISLAND.

SPHAEROPHORACEAE.

Sphaerophorus australis Laur. "Erebus & Terror"; Filhol.
Sphaerophorus compressus Ach. "Erebus & Terror."
Sphaerophorus fragilis (L.) Pers. Cockayne.
Sphaerophorus stereocauloides Nyl. Laing.
Sphaerophorus tener Laur. Filhol.

GRAPHIDACEAE.

Opegrapha atra Pers. "Erebus & Terror."

COLLEMACEAE.

Collema flaccidum Ach. Chilton.

PANNARIACEAE.

Pannaria rubiginosa (Ach.) Del. "Erebus & Terror."
Psoroma araneosum (Bab.) Nyl. Filhol.
Psoroma Hypnorum (Ach.) S. Gray. "Erebus & Terror."
Psoroma pholidotoides (Nyl.) Trev. f. *crispellum* Nyl. Filhol.
Psoroma sphinctrinum (Mont.) Nyl. Filhol.
v. *leprolomum* Nyl. Filhol.
Psoroma xanthomelaenum Nyl. Filhol.
Thelidea corrugata Hue. Filhol.

STICTACEAE.

Pseudocyphellaria cellulifera (Hook. f. & Tayl.) Gyeln. "Erebus & Terror."
Pseudocyphellaria Freycinetii (Del.) Malme. Filhol.
**Pseudocyphellaria glabra* (Hook. f. & Tayl.) Dodge. "Erebus & Terror."
Pseudocyphellaria orygmaea (Ach.) Malme. "Erebus & Terror"; Filhol; Tennant.
Pseudocyphellaria physciospora (Nyl.) Malme. Filhol.

PELTIGERACEAE.

Peltigera polydactyla Hoffm. "Erebus & Terror."

LECIDEACEAE.

Lecidea cladonioica Nyl. Filhol. (parasite on *Cladonia subdigitata* Nyl.)
**Mykoblastus Campbellianus* (Nyl.) Zahlbr. Filhol.
Biatorina caesiopallens (Nyl.) Hellb. Filhol.
Megalospora marginiflexa (Tayl.) Zahlbr. Filhol.
Lopadium pezizoideum (Ach.) Koerb. v. *muscicola* (Smrft.) Koerb. Cockayne.

CLADONIACEAE.

Cladina pycnoclada (Gaudich) Leight. "Erebus and Terror."
**Cladia aggregata* (Sw.) Nyl. (inc. *Dufourea collodes* Hook. f. & Tayl.). "Erebus & Terror"; Filhol.
Cladia retipora (Ach.) Nyl. Filhol; Laing.
Cladonia bacillaris (Ach.) Nyl. Filhol.
**Cladonia rigida* (Hook. f. & Tayl.) Hampe. Filhol.
Cladonia firma Laur. Chilton.
**Cladonia subdigitata* Nyl. Filhol.
v. *pachydactyloides* Nyl. Filhol.
Cladonia interhiascens Nyl. (near *C. capitellata* Tayl. *fide* Vainio). Filhol.
Cladonia subsubulata Nyl. Filhol.
**Cladonia sarmentosa* Tayl. Filhol (sub *C. gracilis* v. *Campbelliana* and *C. cornuta* f. *gracilentior* Nyl.); Laing (sub *C. cornuta* f. *gracilentior* Nyl.)
Cladonia pyxidata (L.) Fr. Filhol.
Cladonia fimbriata (L.) Fr. f. *subcornuta* Nyl. Filhol.
Cladonia verticillata Hoffm. Filhol.
Cladonia carneopallida Flk. Filhol.
Stereocaulon argodes Nyl. Filhol.
Stereocaulon macrocarpum Rich. Filhol.
Stereocaulon ramulosum (Sw.) Raeusch. v. *elegans* Th. Fr. "Erebus & Terror"; Filhol?
**Stereocaulon submollescens* Nyl. Filhol.
**Argopsis megalospora* Th. Fr. "Erebus & Terror"; Filhol.

LECANORACEAE.

Placopsis subgelida Nyl. Filhol.

PERTUSARIACEAE.

Pertusaria thelioplaca Nyl. Filhol.
**Pertusaria tyloplaca* Nyl.

PARMELIACEAE.

**Menegazzia circumsorediata* Santesson. DuRietz; Filhol?
**Parmelia sublugubris* Dodge. "Erebus & Terror"?

USNEACEAE.

**Usnea xanthopoga* Nyl. Filhol.

Usnea torquescens Stirton. "Erebus & Terror" (sub *U. plicata*?)

Usnea tenerior Nyl. "Erebus & Terror" (sub *U. plicata* v. *hirta*?)

AUCKLAND ISLANDS .

SPHAEROPHORACEAE.

Sphaerophorus australis Laur. "Erebus & Terror"; Tennant.

Sphaerophorus compressus Ach. "Erebus & Terror."

Sphaerophorus curtus Hook. f. & Tayl. "Erebus & Terror" (later reduced to variety of *S. tener* Laur.)

Sphaerophorus fragilis (L.) Pers. Tennant.

Sphaerophorus tener Laur. Tennant.

THELOTREMACEAE.

Thelotrema lepadinum Ach. "Erebus & Terror."

PANNARIACEAE.

Psoroma araneosum (Bab.) Nyl. "Erebus & Terror."

Psoroma sphinctrinum (Mont.) Nyl. "Erebus & Terror."

**Psoroma versicolor* (Hook. f. & Tayl.) Müll.-Arg. "Erebus & Terror."

STICTACEAE.

Pseudocyphellaria cellulifera (Hook. f. & Tayl.) Gyeln. "Erebus & Terror."

**Pseudocyphellaria glabra* (Hook. f. & Tayl.) Dodge. "Erebus & Terror."

Pseudocyphellaria homoeophylla (Nyl.)? "Erebus & Terror" (sub *Sticta glabra*).

Pseudocyphellaria impressa (Hook. f. & Tayl.) Vainio. "Erebus & Terror."

Pseudocyphellaria linearis (Hook. f. & Tayl.) Dodge. "Erebus & Terror."

Pseudocyphellaria orygmaea (Ach.) Malme. "Erebus & Terror."

Crocodia Richardi (Mont.) Trev. "Erebus & Terror."

Sticta damaecornis (Sw.) Ach. "Erebus & Terror" (probably an incorrect determination as Hook. f. omits it in later publications on this flora).

Sticta Menziesii Hook f. & Tayl. "Erebus & Terror."

Stictina filicina (Ach.) Nyl. Cockayne.

PELTIGERACEAE.

Peltigera polydactyla Hoffm. "Erebus & Terror."

LECIDEACEAE (synonymy confused, perhaps both species belong in *Bacidia*).

Lecidea incana Hook. "Erebus & Terror."

Lecidea geomaea Tayl. "Erebus & Terror."

CLADONIACEAE.

Cladina pycnoclada (Gaudich) Leight. "Erebus & Terror" (sub *C. rangiferina*).

**Cladia aggregata* (Sw.) Nyl. "Erebus & Terror" (sub *Dufourea collodes* Hook. f. & Tayl.); Tennant.

Cladia retipora (Labill.) Nyl. Tennant.

Cladonia uncialis Ach. d'Urville.

**Cladonia rigida* (Hook. f. & Tayl.) Hampe. "Erebus & Terror."

**Cladonia sarmentosa* (Hook f. & Tayl.) Dodge. "Erebus & Terror."

Cladonia pyxidata (L.) Fr. "Erebus & Terror."
Cladonia fimbriata (L.) Fr. v. *simplex* (Weis) Fw. Tennant.
Stereocaulon ramulosum v. *elegans* Th. Fr. "Erebus & Terror."
**Argopsis megalospora* Th. Fr. "Erebus & Terror."

PERTUSARIACEAE.
Pertusaria granulata (Hook. f. & Tayl.) Müll.-Arg.

LECANORACEAE.
Ochrolechia parella (Ach.) Mass. "Erebus & Terror."
Ochrolechia tartarea (Ach.) Mass. "Erebus & Terror."

PARMELIACEAE.
**Menegazzia circumsorediata* Santesson. DuRietz.
**Parmelia sublugubris* Dodge. "Erebus & Terror."

USNEACEAE.
**Ramalina inflata* Hook. f. & Tayl. "Erebus & Terror."
Usnea tenerior Nyl. Sinclair; "Erebus & Terror."
Usnea torquescens Stirton. "Erebus & Terror"?

MACQUARIE ISLAND.

PYRENULACEAE.
**Microthelia macquariensis* Dodge. B.A.N.Z.A.R.E.

MASTODIACEAE.
**Mastodia sp.* B.A.N.Z.A.R.E.

COENOGONIACEAE.
**Coenogonium subtorulosum* Müll.-Arg. B.A.N.Z.A.R.E.

LICHINACEAE.
**Siphulastrum cladinoides* Dodge. B.A.N.Z.A.R.E.
**Siphulastrum usneoides* Dodge. B.A.N.Z.A.R.E.

PANNARIACEAE.
**Pannaria* sp. B.A.N.Z.A.R.E.
**Psoroma versicolor* Müll.-Arg. B.A.N.Z.A.R.E.
?*Coccocarpia kerguelensis* Dodge.
**Thelidea* sp. B.A.N.Z.A.R.E.

STICTACEAE.
**Pseudocyphellaria glabra* (Hook. f. & Tayl.) Dodge. A.A.E.; B.A.N.Z.A.R.E.

PELTIGERACEAE.
**Peltigera* sp. B.A.N.Z.A.R.E.

LECIDEACEAE.
**Mykoblastus campbellianus* (Nyl.) Zahlbr. B.A.N.Z.A.R.E.

CLADONIACEAE.
**Cladia aggregata* (Sw.) Nyl. B.A.N.Z.A.R.E.
**Cladonia subdigitata* Nyl. v. *subalbinea* Dodge. B.A.N.Z.A.R.E.
**Cladonia Mawsoni* Dodge. B.A.N.Z.A.R.E.
**Cladonia sarmentosa* (Tayl.) Dodge. B.A.N.Z.A.R.E.
**Cladonia floriformis* Dodge. B.A.N.Z.A.R.E.

**Stereocaulon leptaleum* Nyl. B.A.N.Z.A.R.E.
**Stereocaulon corticatulum* Nyl. A.A.E.; B.A.N.Z.A.R.E.
**Stereocaulon submollescens* Nyl. B.A.N.Z.A.R.E.
**Stereocaulon pulvinare* Dodge. B.A.N.Z.A.R.E.
**Stereocaulon* sp. A.A.E.

PERTUSARIACEAE.
**Pertusaria tyloplaca* Nyl. B.A.N.Z.A.R.E.

LECANORACEAE.
**Lecania Johnstoni* Dodge. B.A.N.Z.A.R.E.

PARMELIACEAE.
**Menegazzia circumsorediata* Santesson. B.A.N.Z.A.R.E.
**Parmelia sublugubris* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Parmelia tenuirima* Hook. f. & Tayl. B.A.N.Z.A.R.E.

USNEACEAE.
**Ramalina banzarensis* Dodge. B.A.N.Z.A.R.E.
**Ramalina inflata* Hook f. & Tayl.
**Usnea xanthopoga* Nyl. B.A.N.Z.A.R.E.
**Usnea contexta* Mot. B.A.N.Z.A.R.E.
**Usnea arida* Mot. v. *muscicola* Dodge. B.A.N.Z.A.R.E.
**Usnea torulosa* (Müll.-Arg.) Zahlbr. B.A.N.Z.A.R.E.

BLASTENIACEAE.
**Gasparrinia macquariensis* Dodge. B.A.N.Z.A.R.E.
**Pyrenodesmia inclinans* (Strtn.) Dodge. B.A.N.Z.A.R.E.
**Pyrenodesmia subpyracea* (Nyl.) Dodge. B.A.N.Z.A.R.E.

BUELLIACEAE.
**Buellia Mawsoni* Dodge. B.A.N.Z.A.R.E.
**Rinodina peloleuca* Nyl. B.A.N.Z.A.R.E.
**Rinodina subbadioatra* (Knight) Dodge. B.A.N.Z.A.R.E.

ANTARCTICA.

KING GEORGE V LAND.

HEPPIACEAE.
**Heppia antarctica* Dodge. A.A.E.; B.A.N.Z.A.R.E.

LECIDEACEAE.
**Lecidea Blackburni* Dodge & Baker. A.A.E.
**Lecidea cancriformis* Dodge & Baker. A.A.E.
**Lecidea Laseroni* Dodge. A.A.E.
**Lecidea McLeani* Dodge. A.A.E.
**Catillaria floccosa* Dodge & Baker. A.A.E.
**Bacidia Johnstoni* Dodge. B.A.N.Z.A.R.E.
**Bacidia Laseroni* Dodge. A.A.E.
**Toninia Johnstoni* Dodge. A.A.E.; B.A.N.Z.A.R.E.

CLADONIACEAE.
**Stereocaulon Laseroni* Dodge. A.A.E.; B.A.N.Z.A.R.E.

UMBILICARIACEAE.

**Umbilicaria Hunteri* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Umbilicaria rugosa* Dodge & Baker. A.A.E.; B.A.N.Z.A.R.E.
**Umbilicaria subcerebriformis* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Charcotia cerebriformis* (Dodge & Baker) Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Dermatiscum Mawsoni* Dodge. B.A.N.Z.A.R.E.

LECANORACEAE.

**Lecanora exsulans* (Th. Fr.) Dodge & Baker. A.A.E.; B.A.N.Z.A.R.E.
f. *minor* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Lecanora Johnstoni* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Lecanora McLeani* Dodge. A.A.E.
**Lecanora Mawsoni* Dodge. A.A.E.
**Thamnolecania Mawsoni* Dodge. A.A.E.

PARMELIACEAE.

**Parmelia variolosa* Dodge & Baker. A.A.E.

USNEACEAE.

**Alectoria congesta* (Zahlbr.) Dodge. A.A.E.
**Usnea antarctica* DR. A.A.E.
**Usnea pustulata* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Usnea scabridula* (Lamb) Dodge. A.A.E.; B.A.N.Z.A.R.E.

BLASTENIACEAE.

**Protoblastenia citrina* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Gasparrinia Harrissoni* Dodge. A.A.E.
**Xanthoria Mawsoni* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Polycauliona citrina* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Polycauliona Johnstoni* Dodge. A.A.E.

BUELLIACEAE.

**Buellia Johnstoni* Dodge. B.A.N.Z.A.R.E.
**Buellia grisea* Dodge & Baker. B.A.N.Z.A.R.E.
**Buellia McLeani* Dodge. A.A.E.
**Buellia pernigra* Darb. B.A.N.Z.A.R.E.
**Buellia pinnicola* Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Rinodina fecunda* Dodge. A.A.E.
**Rinodina frigida* (Darb.) Dodge. A.A.E.; B.A.N.Z.A.R.E.
**Rinodina sordida* Dodge & Baker. A.A.E.

QUEEN MARY LAND.

LECIDEACEAE.

**Lecidea Harrissoni* Dodge. A.A.E.
**Catillaria inconspicua* Dodge & Baker. A.A.E.
**Bacidia Harrissoni* Dodge. A.A.E.
**Bacidia proliferans* Dodge. A.A.E.
**Toninia Johnstoni* Dodge. A.A.E.

UMBILICARIACEAE.

Charcotia cerebriformis (Dodge & Baker) Dodge. A.A.E.
Dermatiscum Harrissoni Dodge. A.A.E.
Umbilicaria cristata Dodge & Baker. A.A.E.
Umbilicaria rugosa Dodge & Baker. A.A.E.
Umbilicaria spongiosa Dodge & Baker. A.A.E.
Umbilicaria subcerebriformis Dodge. A.A.E.

LECANORACEAE.

Lecanora Johnstoni Dodge. A.A.E.

PARMELIACEAE.

Parmelia Coreyi Dodge & Baker. A.A.E.
Parmelia griseola Dodge & Baker. A.A.E.
Parmelia Johnstoni Dodge. A.A.E.
Parmelia leucoblephara Dodge & Baker. A.A.E.
Parmelia variolosa Dodge & Baker. A.A.E.

USNEACEAE.

Alectoria congesta (Zahlbr.) Dodge. A.A.E.
Usnea laxissima Dodge. A.A.E.
Usnea picata (Lamb) Dodge. A.A.E.
Usnea pustulata Dodge. A.A.E.
Usnea subfoveolata Dodge. A.A.E.
Usnea subpapillata Dodge. A.A.E.

BLASTENIACEAE.

Protoblastenia citrina Dodge. A.A.E.
Huea smaragdula Dodge. A.A.E.
Gasparrinia Harrissoni Dodge. A.A.E.
Polycauliona citrina Dodge. A.A.E.
Mawsonia Harrissoni Dodge. A.A.E.

BUELLIACEAE.

Buellia dendritica Dodge & Baker. A.A.E.
Buellia muscicola Dodge & Baker. A.A.E.
Buellia podocarpa Dodge. A.A.E.
Rinodina fecunda Dodge. A.A.E.
Rinodina frigida (Darb.) Dodge. A.A.E.

KAISER WILHELM II LAND.

USNEACEAE.

Alectoria congesta (Zahlbr.) Dodge. Deutsche Südpolar Exp.

BLASTENIACEAE.

Gasparrinia Harrissoni Dodge? Deutsche Südpolar Exp. (sub *Caloplaca (Gasparrinia) elegans*).

MACROBERTSON LAND.

MASTODIACEAE.

**Mastodia Mawsoni* Dodge. B.A.N.Z.A.R.E.

HEPPIACEAE.

**Heppia antarctica* Dodge. B.A.N.Z.A.R.E.

**Heppia* sp. B.A.N.Z.A.R.E.

LECIDEACEAE.

**Lecidea cancriformis* Dodge and Baker. B.A.N.Z.A.R.E.

**Catillaria cremea* Dodge and Baker. B.A.N.Z.A.R.E.

**Toninia Johnstoni* Dodge. B.A.N.Z.A.R.E.

LECANORACEAE.

**Lecanora exsulans* (Th. Fr.) Dodge and Baker. B.A.N.Z.A.R.E.

**Lecanora* sp. B.A.N.Z.A.R.E.

PARMELIACEAE.

**Parmelia Johnstoni* Dodge. B.A.N.Z.A.R.E.

**Parmelia leucoblephara* Dodge and Baker. B.A.N.Z.A.R.E.

**Parmelia variolosa* Dodge and Baker. B.A.N.Z.A.R.E.

USNEACEAE.

**Alectoria congesta* (Zahlbr.) Dodge. B.A.N.Z.A.R.E.

BLASTENIACEAE.

**Protoblastenia critrina* Dodge. B.A.N.Z.A.R.E.

**Pyrenodesmia Mawsoni* Dodge. B.A.N.Z.A.R.E.

**Xanthoria Mawsoni* Dodge. B.A.N.Z.A.R.E.

**Polycauliona Johnstoni* Dodge. B.A.N.Z.A R.E.

BUELLIACEAE.

**Rinodina frigida* (Darb.) Dodge.

KEY TO FAMILIES.

Perithecia present .. .. PYRENOCARPEAE

Algae Palmellaceae, heteromerous, crustose, ecorticate .. .. *Verrucariaceae*

Algae *Trentepohlia*

Thallus crustose, ecorticate or with almost amorphous cortex from periclinal hyphae, perithecia not in pseudostromata .. .. *Pyrenulaceae*

Thallus foliose, corticate on both surfaces .. .. .. *Phyllopyreniaceae*

Algae *Xanthocapsa* .. .. *Xanthopyreniaceae*

Algae *Prasiola*, thallus foliose, umbilicate, polyphyllous .. .. *Mastodiaceae*

Lirellae present, not united into stromata, parathecium well developed; thallus crustose, ecorticate *Graphidaceae*

Apothecia present

Algae *Trentepohlia*

Paraphyses branched and anastomosing; apothecia immersed or sessile, with dark, often rudimentary parathecium .. .. *Lecanactidaceae*

Paraphyses simple, unbranched; apothecia biatorine, lecideine or lecanorine *Gyalectaceae*

Algae Rivulariaceae (often appearing like Scytonemaceae); thallus crustose, squamose or dwarf fruticose; ascospores hyaline, 1–4-celled .. .. .. *Lichinaceae*

Algae Nostocaceae (occasionally Stigonemataceae)
- *Nostoc* cells clearly in chains imbedded in a gel; homoeomerous or nearly so *Collemaceae*
- *Nostoc* chains not clearly seen; gel reduced to a sheath surrounding individual colonies
  - Homoeomerous, pseudoparenchymatous; medulla scarcely developed *Heppiaceae*
  - Heteromerous, medulla well developed
    - Apothecia marginate, at least either amphithecium or parathecium well developed, sessile or short stalked
      - Thallus squamose or microphylline on a hypothallus; upper cortex pseudoparenchymatous, lower cortex absent or filamentous .. *Pannariaceae*
      - Thallus foliose, both upper and lower cortex pseudoparenchymatous, with lacunae, pseudocyphellae or cyphellae .. .. .. *Stictaceae*
    - Apothecia immarginate, without amphithecium or parathecium, slightly margined by remnants of upper cortex, or immersed .. .. .. *Peltigeraceae*

Algae *Palmella, Trebouxia* (*Cystococcus* Chodat non Naegli) or *Protococcus*
- Ascospores essentially thin-walled (sometimes in a thick, gelified sheath) unicellular to muriform, hyaline or brown, septa thin; spermatiophores exobasidial
  - Apothecia biatorine or lecideine, i.e. parathecium highly developed and not surrounded by thalline tissues
    - Thallus crustose, indeterminate or effigurate
      - Asci usually 8-spored .. .. *Lecideaceae*
      - Asci many spored .. .. *Biatorella* (Acarosporaceae)
    - Thallus crustose to squamose, giving rise to upright podetia bearing apothecia and spermogonia .. .. *Cladoniaceae*
    - Thallus foliose, attached by a central hapteron .. .. *Umbilicariaceae*
  - Apothecia lecanorine, i.e. parathecium poorly developed or surrounded by an amphithecium of thalline tissue
    - Thallus microphylline (habit of Pannariaceae); ascospores with inner wall roughened, surrounded by a relatively thick, gelified sheath, unicellular *Psoroma* (Pannariaceae)
    - Thallus crustose, indeterminate to effigurate
      - Ascospores small, many per ascus; apothecia mostly immersed in areoles *Acarosporaceae*
      - Ascospores very large, with a thick, gelified wall, often less than 8 per ascus, multinucleate, mostly unicellular .. .. *Pertusariaceae*
      - Ascospores of medium size, usually 8 per ascus, unicellular or variously septate .. .. *Lecanoraceae*
    - Thallus foliose
      - Attached by a central hapteron, spermatiophores septate *Umbilicariaceae*
      - Attached by rhizinae, or without organs of attachment; spermatiophores not septate .. .. *Parmeliaceae*
    - Thallus fruticose .. .. *Usneaceae*
- Ascospores essentially thick-walled, often polarilocular; spermatiophores septate; ascospores mostly 2-celled, rarely unicellular, or 3–4-celled, or even few-celled muriform
  - Ascospores hyaline .. .. *Blasteniaceae*
  - Ascospores brown to black .. .. *Buelliaceae*

VERRUCARIACEAE.

Thallus crustose, growing either in or upon stones, more rarely upon bark, ecorticate, with *Palmella* or Pleurococcoid algae. Perithecia simple, erect, ostiole at the top, never lateral.

Spermatia endobasidial.

Spores unicellular, relatively large and thin-walled

Paraphyses evanescent or absent	*Verrucaria*
Paraphyses persistent	*Thrombium*
Spores 2–4–celled, paraphyses evanescent	*Thelidium*
Spores muriform, paraphyses persistent, branched; asci 2–8–spored ..	*Microglaena*

VERRUCARIA Schrader.

Verrucaria Schrader, Spicil. Fl. Germ., 1, 108; 1794. Pers., Neue Ann. Bot., 1, 23; 1794. Ach., Meth. Lich., 113–124; 1803. Pro parte min. non Wigg.; Prim. Fl. Holsat., 85; 1780. Hoffman, Descript. Adumbrat., Pl. Lich. pl. 11, 12, 15, 17, 19, 20, 22; 1789–91. Deutschl. Fl., 169–200; 1796.

The type species may be considered *Verrucaria rupestris* Schrad. Wiggers (1780) first proposed the name *Verrucaria* for 14 species arranged in four groups. In his first group, we have species now referred to *Graphis, Rhizocarpon* and *Lecidea* and two which I have been unable to trace. The second group of species is now commonly referred to the Blasteniaceae. The third and fourth groups are now referred to *Pertusaria* and *Ochrolechia*. Thus it will be seen that the first application of the name did not include a single pyrenocarp lichen and if a type species should be chosen, it should be taken from the *Lecanora-Ochrolechia-Pertusaria* group. Since *Verrucaria* has been in continuous use for a very large genus and family of pyrenocarp lichens since the beginning of the 19th century, it is obvious that its use by a later author in the modern sense should be adopted as a *nomen genericum conservandum*.

Hoffman in the *Descriptio* published in fascicles 1789–1801, does not discuss the genus as such but includes 14 species in the fascicles between 1789 and 1791 of which *V. purpurascens*, now considered a synonym of *V. marmorea* (Scop.) Arn., is available as a type to conserve *Verrucaria* in its modern sense. The other 13 species are mostly scattered through the Lecideaceae and Lecanoraceae, showing that Hoffman's generic concept was undoubtedly that of Wiggers, for in the *Deutschlands Flora* in 1796 he includes 223 names of species and varieties of which his *V. purpuraescens* is the only pyrenocarp. Acharius in the *Dianome* (K. Vetensk. Acad. Nya Handl., 244–246; 1794) included species belonging to various modern families, probably none of them pyrenocarps, in his subsection *Verrucaria* of Section 2 of the genus *Lichen*.

Schrader (1794) applied the name strictly to pyrenocarp lichens. He characterized the genus: *Receptacula subglobosa, clausa, crusta innata* and included four species, two later segregated in *Porina*, one in *Arthopyrenia* and one universally retained in *Verrucaria* (*V. rupestris*). In the same year Persoon used *Verrucaria* for three species, characterizing his genus as: *Verrucis subglobosis, prominentibus intus cavis subgelatinosis* and included *V. immersa* (Web) now usually referred to *Protoblastenia*; *V. subfusca*, a renaming of *Lichen fusco-ater* Wulf. probably also of Hagen 1782 (now referred to *V. nigrescens* Pers.1795) *and V. pertusa* (L.) Pers. which later became the type of *Pertusaria* D.C.

By 1803 Acharius had taken up Schrader's concept of *Verrucaria* including 26 species of which five are still retained in *Verrucaria* and 18 belong in other genera of pyrenocarps, while only three are found in other groups of lichens. *V. Schraderi* was based on *V. rupestris* Schrad. and with *V. muralis* is included in his *Lichenographia* (1810) and *Synopsis* (1814). *V. umbrina* was included in 1810 but omitted in 1814, while *V. acrotella* omitted in 1810, was restored in 1814.

Actinothecium Fw. was based on *Sagedia fuscella* Fr., *Verrucaria catalepta* Schaer, and *V. alutacea* Wallr., all now included in *Verrucaria*. *Tichothecium* Fw. (nom. nud.) was proposed to include *Verrucaria fuscellum* Turn, and *V. nigrescens* Pers.
E. glebulosa) are now included in *Verrucaria*.

Encliopyrenia Trev. included six species, five being pyrenocarps of which two (*E. fuscula* and

Thallus endo- or epi-lithic, powdery to crustose with a well developed hypothallus in the epilithic species. Perithecia immersed semi-emersed or sessile, wall either hyaline or carbonaceous, often the upper portion of different texture and breaking away in old specimens; ostiole simple, periphyses present or absent; paraphyses evanescent or absent; asci ovoid to ovoid-clavate, 8-spored; ascospores long ellipsoid to broad ellipsoid (rarely spherical), unicellular, usually hyaline; spermogonia subspherical, dark, immersed in the thallus; spermatiophores little branched, septate, the lower cells short, the upper longer; spermatia pleurogenous, acicular, straight or curved.

This large saxicolous genus is widely distributed in the cooler regions of both hemispheres, occupying a wide variety of habitats from marine forms at the shore to alpine forms on the tops of mountains. It is usually divided into three subgenera as follows:

Perithecia semi-emersed to sessile, the upper portion not covered by the thallus, involucrellum usually well developed; hypothecium not extending up the sides of the perithecium (at least not in our species) .. .. *Euverrucaria*
- Involucrellum not well developed
  - Thallus greyish olive, continuous; ascospores 20–24 × 7–10μ *V. kerguelensis* Dodge
  - Thallus olive, very thin or evanescent; ascospores 9 × 2·5μ .. *V. evanida* Nyl.
- Involucrellum well developed
  - Thallus umber, blackening, continuous or sometimes slightly rimulose; ascospores 20–32 × 10–14μ .. .. *V. obfuscata* Nyl.
  - Thallus tartareous, ashy-umber to rufescent ashy, subareolate rimulose; ascospores 16–22 × 6–8μ .. .. *V. Werthii* Zahlbr.

Perithecia immersed, usually completely covered by the thallus
- Perithecia without involucrellum, wholly carbonaceous (not yet found in our area) *Amphoridium*
- Perithecia with well developed involucrellum; hypothecium extending up the sides of the perithecium or not clearly differentiated from the perithecial wall (at least in our species) *Lithoicea*
  - Thallus ashy greenish, subrimulose; ascospores 12–15 × 4–6μ *V. aethioboliza* Nyl.
  - Thallus ashy fuscescent, areolate diffract; ascospores 10–15 × 7–8μ *V. tessellatula* Nyl.
  - Thallus black, minutely areolate; ascospores 15–16 × 7–8μ .. *V. hebena* Dodge
  - Thallus thick, cartridge buff, continuous, minutely pitted; ascospores 15–18 × 7–9μ *V. Mawsoni* Dodge

VERRUCARIA (EUVERRUCARIA) KERGUELENSIS Dodge, sp. nov.

Type: Kerguelen, upper part of Greenland Harbour, B.A.N.Z.A.R.E. B177–1.

Thallus tenuis, gelifactus ubi madefactus, continuus, griseo-olivaceus vel obscurior, indeterminatus, ecorticatus; algae palmelloideae, cellulis polyhedricis, 6–8μ diametro metientibus. Perithecia ampulliformia, 220μ altitudine, 180μ diametro, emergentia, strato thalloideo 20μ crassitudine dimidia parte inferiore tecta; murus perithecialis carbonaceus, 35μ crassitudine ad 70μ sub hypothecio incrassatus, pseudoparenchymaticus, cellulis pachydermaticis fuscis; periphyses tenues, ad 1μ diametro, flexuosae, ramosae apicibus brevibus cellulis bacilliformibus abjunctis; hypo-

thecium centro circa 20μ crassitudine ad latera tenuescens, hyphis tenuibus plus minusve periclinalibus, sub basibus ascorum densius contextis; asci late clavatae, 62 × 22μ deliquescentes; ascosporae octonae hyalinae, ellipsoideae leptodermaticae, 20–24 × 7–10μ.

Thallus thin, gelified when moist, continuous, greyish olive indeterminate; ecorticate; algae palmelloid, cells polyhedral, 6–8μ in diameter. Perithecia flask-shaped, 220μ tall, about 180μ in diameter, emergent, the thallus continuing about half-way up the perithecium as a thin layer about 20μ thick; perithecial wall carbonaceous. 35μ thick, thickening to about 70μ below the hypothecium, pseudoparenchymatous, of thick-walled dark brown cells; periphyses slender about 1μ in diameter, flexuous, branched, cutting off small short bacilliform cells at their tips; hypothecium about 20μ thick in the centre, thinning toward the sides and not extending up them, of slender more or less periclinal hyphae, densely woven just below the bases of the asci; asci broadly clavate, about 62 × 22μ early gelifying; paraphyses slender, branched, soon gelified; ascospores hyaline, ellipsoidal, thin-walled, 20–24 × 7–10μ.

Growing on the underside of a flat, water-worn pebble, which has a well developed thallus of *Steinera glaucella* above.

Kerguelen: Upper part of Greenland Harbour, B.A.N.Z.A.R.E. B177–1.

VERRUCARIA (EUVERRUCARIA) EVANIDULA Nyl., Flora 70, 136; 1887.

Type: Kerguelen, on chalcedony, Richard Zeye.

Thallus olivaceous, very thin or evanescent; perithecia dimidiate, black, convex, about 0.2 mm. in diameter; ascospores unicellular, oblong, 9 × 2·5μ. Hymenial gelatin I-.

Not represented in our collections. The systematic position of this species is not clear as Nylander included most of the Verrucariaceae in his concept of *Verrucaria*. The ascospores are very small for a species of *Verrucaria*, nearer the range for *Thrombium*. If it should be found to belong in the latter genus, it differs from *T. kerguelanum* (see p. 42) in its dimidiate rather than completely carbonaceous perithecia and its somewhat longer, narrower ascospores.

VERRUCARIA (EUVERRUCARIA) OBFUSCATA Nyl.

Verrucaria (Euverrucaria) obfuscata Nyl. in Crombie, Journ. Bot. Brit. For., 14, 22; 1876. Journ. Linn. Soc. Bot., 15, 191; 1876. Phil. Trans. Roy. Soc. [London], 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 240; 1885. Zahlbr. Deutsche Südpolar Exp., 8, 31; 1906.

? *Verrucaria ceuthocarpa* Müll.-Arg., Bot. Jahrb. [Engler], 4, 139; 1884.

Type: Kerguelen, hill north-west of Mt. Crozier, Royal Sound, A. E. Eaton (Venus Transit Exp.).

Thallus fuscous, thin, continuous or very slightly rimulose. Perithecia dimidiate, carbonaceous, 0·3–0·4 mm. in diameter, semi-emersed; involucrellum about 90μ thick, pseudoparenchymatous, cells relatively thin-walled, 7–10 × 4–5μ, the outer 25–30μ of smaller, thicker-walled cells, carbonaceous; perithecial wall 20μ thick, of dark periclinal hyphae, becoming carbonaceous below the hypothecium; periphyses moniliform, 20μ long and about 3μ in diameter; hypothecium of densely woven slender hyphae, 15–20μ thick at the centre, thinning somewhat toward the margin of the thecium; thecium 100μ tall, paraphyses relatively thick and early gelifying; asci cylindric, 90–100 × 24–30μ with a thick, gelified wall, soon evanescent; ascospores ellipsoidal, hyaline, 20–32 × 10–14μ, thin-walled.

On rocks with *Thelidium praevalescens, Microglaena kerguelena, Coccotrema kerguelensis, Porina insueta, Xanthoporina kerguelensis, Steinera glaucella, Coccocarpia kerguelensis, Lecidea*

subassentiens, Rhizocarpon kerguelense, Pertusaria cineraria, Aspicilia endochlora, Lecanora atrocaesia, Aspiciliopsis macrophthalma, Placopsis bicolor and *Pyrenodesmia vitellinella.*

The measurements given by Crombie and Zahlbruckner for the thecium and asci are somewhat larger than in our material while the spore measurements agree well. Müller-Argau's report of *V. ceuthocarpa* was based on a specimen from Castle Mount, 2,000 ft., Naumann ("Gazelle" Exp.), in which no spores were seen. Since *V. ceuthocarpa* was described from maritime rocks, wet by spray, in Norway, it seems unlikely that Naumann's collection belongs to that species.

Kerguelen: upper end of Greenland Harbour, B.A.N.Z.A.R.E. B177–2, B177–3, B177–4; Observatory Bay, B.A.N.Z.A.R.E. B192–1, B192–2, B192–3, B192–4; Murray Island, B.A.N.Z.A.R.E. B210–1 (very old specimen).

VERRUCARIA (EUVERRUCARIA) WERTHII Zahlbr.

Verrucaria (Euverrucaria) Werthii Zahlbr., Deutsche Südpolar Exp., 8, 31; 1906.

? *Verrucaria aethiobola* Crombie, Journ. Linn. Soc. Bot., 15, 193; 1876. Phil. Trans. Roy. Soc. [London], 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 240; 1885: non Ach.

Type: Kerguelen, Penguin Bay, Werth (Deutsche Südpolar Exp.).

Thallus thin, tartareous, minutely rimose subareolate, olive buff and light mineral grey to olive brown and clove brown with a darker line at the margin, K–; cortex not clearly differentiated, but the hyphae of the thallus are more or less vertical, forming a palisade at the surface, which is very dark and somewhat decomposed; algae palmelloid, cells more or less angular, 9–11μ in diameter. Perithecia immersed when young, erumpent and becoming sessile, spherical at first, much flattened in age, 0·3–0·5 mm., involucrellum 75–85μ thick, becoming 150μ thick below the perithecium but not extending far under it; perithecial wall of periclinal hyphae, merging with the involucrellum at the sides, 21–25μ thick below, outer hyphae hyaline, inner 7–8μ deep brown to black; periphyses extending down the sides of the perithecium, merging with the hypothecium below, moniliform, 35μ long, slender; hypothecium covering only the base of the perithecium, about 35μ thick, of closely packed, vertical hyphae, appearing almost pseudoparenchymatous; paraphyses slender, branched, soon evanescent; asci 30–35 $\times$ 10–12μ (somewhat immature) 8-spored; ascospores 12–15 $\times$ 7–8μ, ellipsoid, hyaline, unicellular, thin-walled.

On rocks with *Verrucaria tessellatula, Phyllopyrenia tessellata, Lecidea Eatoni, Mykoblastus stephanodes, Pertusaria kerguelana, Aspiciliopsis macrophthalma,* and *Buellia subplicata.*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–11, B204–1, B204–2; mainland off Murray Island, Sta. 62, B.A.N.Z.A.R.E. B246–1; Observatory Bay, B.A.N.Z.A.R.E. B192–5, B192–6 (immature).

VERRUCARIA (LITHOICEA) AETHIOBOLIZA Nyl.

Verrucaria (Lithoicea) aethioboliza Nyl., C. R. Acad. Sci., 81, 726; 1875.

Type: St. Paul Island, bottom of the crater, G. de l'Isle (Miss. Observ. Pass. Vénus), not seen. The following description is based on a specimen from Heard Island which is referred here as it has all the characters of Nylander's very brief description.

Thallus thin, 185–190μ thick, crustose, uniform, minutely rimulose areolate, greyish olive to deep greyish olive when dry; outer layer 15μ thick of minute spherical cells appearing as a more or less decomposed cortex; algal layer about 40μ thick, a palisade of chains of algal cells, probably *Palmella,* between rows of vertical hyphae below which are irregular black masses apparently the proliferation of the hypothallus, interspersed with masses of hyaline tissue containing occa-

sional algal cells; hypothallus about 40μ thick in the thinner places. Perithecia wholly immersed in the thallus, about 150μ in diameter inside the wall; perithecial wall coalesced with the black masses proliferating from the hypothallus above and on the sides, base much thinner, only 7–8μ thick, carbonaceous; hypothecium lining the bottom and sides of the cavity, 20–25μ thick, of slender, periclinal hyphae, very compact; periphyses short, slender, dichotomous, cutting off minute bacilliform cells; paraphyses slender, branched, early disappearing; asci clavate, 25 × 10μ (immature) 8-spored; ascospores ellipsoidal, hyaline, thin-walled, unicellular, contents rather granular, 11–15 × 4–6μ.

Growing on same rock with *Phyllopyrenia tessellata*.

Nylander's description is so brief that it is with some hesitation that I have referred our material here without seeing the type.

Heard Island: Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–1.

Verrucaria (Lithoicea) hebena Dodge, sp. nov.

Type: Kerguelen, upper end of Greenland Harbour, B.A.N.Z.A.R.E. B177–1.

Thallus niger, minute areolatus, ecorticatus, algae palmelloideae cellulis ellipsoideis, 11–12 × 4–5μ, breviter catenulatis; perithecia hemisphaerica, ostiolo excepto a thallo tecta; involucrellum latera peritheciorum tegens, carbonaceum pseudoparenchymaticum variabili crassitudine, rugis exterioribus fere ad superficiem thalli attingentibus; murus perithecialis ab hypothecio male distinctus, hyphis tenuibus gelifactis; ostiolum depressum; periphyses tenues, ramosae, 35–40μ longitudine, cellulis bacilliformibus abjunctis; hypothecium 55μ crassitudine (muro peritheciali incluso) hyphis tenuibus dense contextis; paraphyses evanescentes, tenues, ramosae; asci ellipsoidei, subclavative, 35–40 × 15μ; ascosporae octonae hyaline, leptodermaticae, unicellulares, 15–16 × 7–8μ.

Thallus black, minutely areolate, covering large areas on the sides of pebbles, ecorticate; algae palmelloid, ellipsoidal, 11–12 × 4–5μ, arranged in short chains, forming a more or less regular palisade; perithecia hemispheric covered by thallus except at the ostiole; involucrellum covering the sides as well as the top of the perithecium, carbonaceous, pseudoparenchymatous, of variable thickness with outer ridges reaching nearly to the surface of the thallus; perithecial wall not clearly differentiated from the hypothecium, of slender, gelified periclinal hyphae; ostiole depressed; periphyses slender, branched, 35–40 μ long, cutting off small bacilliform cells; hypothecium about 55μ thick (including perithecial wall), of densely woven, slender, hyphae; paraphyses early gelified, slender, branched; asci ellipsoidal to subclavate, 35–40 × 15μ, 8-spored; ascospores hyaline, unicellular, thin-walled, ellipsoidal, 15–16 × 7–8μ.

On rock with *Kuttlingeria crozetica* and *Rinodina aspicilina*.

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–5.

Verrucaria (Lithoicea ?) Mawsoni Dodge, sp. nov.

Type: Heard Island, between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–2.

Thallus, 240μ crassitudine vel crassior, albidus, viridi-maculatus ubi contuses, continuus, minute foveolatus, superficie opaca, marginibus irregulariter lobatis, crassis; ecorticatus; algae palmelloideae, cellulis subsphaericis, 7–8μ diametro, hyphis inter algis verticalibus. Perithecia thallo immersa, 0·4–0·5 mm. diametro, involucrellum carbonaceum 75μ crassitudine, 250–400μ ab ostiolo radians, parte dimidia inferiore a thallo tecta; ostiolo 40μ diametro, non depresso; murus perithecialis hyalinus, hyphis tenuibus pachydermeis supra in involucrellum mergens; periphyses circa 1μ diametro, sparsim ramosae, cellulis bacilliformibus apicibus abjunctis; hypo-

thecium 25μ crassitudine, basim lateraque peritheciorum tegens, hyphis tenuibus dense contextum; paraphyses sparsim septatae, perpendiculariter ramosae, flexuosae, circa 1μ diametro; asci cylindrici-clavati, 140 × 20μ, leptodermei; ascosporae octonae, subdistichae, hyalinae, ellipsoideae, unicellulares, 15–18 × 7–9μ.

Thallus more than 240μ thick, cartridge buff, stained greenish where bruised, continuous, minutely pitted, surface dull, margins irregularly lobed, thick; ecorticate, algae extending throughout the thallus except for some periclinal hyphae at the base where torn from the rock for sectioning, palmelloid, cells subspherical 7–8μ in diameter, hyphae more or less vertical between the algae. Perithecia immersed in the thallus, 0·4–0·5 mm. in diameter; involucrellum carbonaceous, 75μ thick, extending about 250–400μ from the ostiole, about half covered by the thallus; ostiole 40μ in diameter, not depressed; perithecial wall hyaline, of slender, thick-walled hyphae merging with the involucrellum above; periphyses about 1μ in diameter, sparingly branched, cutting off bacilliform microconidia (spermatia?) at the tips; hypothecium 25μ thick, extending up the sides of the perithecial wall, of slender, densely woven hyphae; paraphyses sparingly septate, branched at nearly right angles, flexuous, not abundant, about 1μ in diameter; asci cylindric clavate, 140 × 20μ, thin-walled; ascospores subdistichous, 8 per ascus, hyaline, thin-walled, ellipsoidal, unicellular, 15–18 × 7–9μ. I–.

Growing with *Phyllopyrenia tessellata* and *Placopsis bicolor*.

The thallus contains irregular masses of carbonaceous material similar in texture to the involucrellum, mostly on the upper surface, sometimes deeply imbedded. This species may belong in *Euverrucaria* as the thallus does not cover the perithecia as much as in most species referred to the subgenus *Lithoicea*.

Heard Island, vicinity of Corinthian Bay and Atlas Cove, B.A.N.Z.A.R.E. B140–2, B140–3.

Verrucaria (Lithoicea) tessellatula Nyl.

Verrucaria (Lithoicea) tessellatula Nyl. apud Crombie Journ. Bot. Brit. For., 13, 335, 1875. Journ. Linn. Soc. Bot., 15, 191; 1876. Phil. Trans. Roy. Soc. [London], 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 240; 1885.

Type: Kerguelen, Swain's and Volage Bay, Royal Sound, A. E. Eaton (Venus Transit Exp.).

Thallus smooth, rimose areolate, 75–100μ thick, pale smoky grey to deep greyish olive, ecorticate but covered by a thin gelified layer; algae probably palmelloid cells cylindrical 7–8μ in diameter in short filaments of 3–4 cells of varying length (cells remaining cylindrical even when the filament has disintegrated). Perithecia 0·12–0·5 mm. in diameter mostly about 250μ in diameter and 300μ tall, semi-emersed but covered by a layer of thallus about 20μ thick, thinning near the ostiole; involucrellum carbonaceous, 75–90μ thick connate with the perithecial wall above and extending about 250μ from the ostiole, somewhat thickened outward and ending abruptly; perithecial wall 15–20μ thick, carbonaceous of compact periclinal hyphae, completely surrounding the thecium except the ostiole which is about 30μ in diameter; periphyses 30–35μ tall, slender, branched above, closely septate with gelified walls, about 1μ in diameter, cutting of small bacilliform microconidia (spermatia ?) at their tips; hypothecium 30μ thick of densely woven slender hyphae, not sharply differentiated from the perithecial wall; paraphyses early deliquescing, 1μ in diameter, branched, apparently not septate; asci ellipsoidal to cylindric clavate 8-spored 40 × 10–12μ (immature) early disappearing; ascospores long ellipsoidal, unicellular, hyaline, thin-walled, minutely guttulate, filling the perithecial cavity, 11–15 × 9–11μ.

Our material agrees well with the descriptions by Nylander except the size of the algal cells (16–22μ in the type) and spores 10–15 × 7–8μ. In one of our collections with seeming immature

spores, the measurements are 11–12 × 5–6μ. Nylander described the algae as *Trentepohlia* and the arrangement of cylindrical cells in filaments certainly suggest that genus. The structure of the perithecium agrees much more closely with that in *Verrucaria* than in *Monoblastia* and *Coccotrema*, the only genera so far described with *Trentepohlia* algae and unicellular spores.

On rocks with *Verrucaria Werthii*, *Phyllopyrenia tessellata* and *Aspiciliopsis macrophthalma*.

Kerguelen: upper end of Greenland Harbour, B.A.N.Z.A.R.E. B177–6, B204–1; Observatory Bay, B.A.N.Z.A.R.E. B192–7.

VERRUCARIA CONGESTULA Stirton.

Verrucaria congestula Stirton, in Crombie, Journ. Linn. Soc. Bot., 16, 221; 1878. Phil. Trans. Roy Soc. [London] 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 241; 1885.

Type: Kerguelen, Moseley (Voy. "Challenger").

Perithecia black, wrinkled, aggregated in close groups, wall whole, black (about 0·7 mm. in meter); paraphyses few, lax; asci 8-spored, cylindric; ascospores finally brownish, short ellipsoidal, somewhat muriform, 21–25 × 16–18μ. Thecium I–, asci finally vinous fulvous.

Parasitic on the thallus of *Aspiciliopsis macrophthalma* on rocks, very sparingly seen.

We have seen no material referable to this species, hence hesitate to transfer it to *Microglaena* where it would belong if it is regarded as a epiphytic lichen or to *Merismatium* if it is a true parasite.

THROMBIUM Wallr.

Thrombium Wallr., Fl. Crypt. Germ. 3, 298; 1831, p.p. min.; Mass., Ricerch. Autonom. Lich. Crost., 156; 1852.

Verrucaria sect. *Inoderma* Ach., Lichenogr. Univ., 294; 1810, p.p. min.

Inoderma S. F. Gray, Nat. Arrang. Brit., pl. 1, 498; 1821, p.p.

Phaeothrombis Clements, Gen. Fung., 40; 1909.

Type: Wallroth included wholly discordant groups, including many sterile species when he first described the genus. Only *T. epigaea* would conserve the name in its modern sense as re-defined by Massalongo in 1852. *Verrucaria* sect. *Inoderma* Ach. contained five species and two varieties, of which two species and both varieties are now recognized in *Arthonia* and one species each in *Thelidium*, *Thrombium* and *Leptogium*. S. F. Gray in elevating the section to generic rank attributed the name to Acharius and recognized but two species, *I. byssacea*, now recognized in *Arthonia* and *I. epigaea*, later taken by Massalongo as the type of *Thrombium*. *Inoderma* was used by Kuetzing (Phycol. Germ., 150; 1845) for a genus of Palmellaceae, and was recognized by DeToni, Syll. Algar., 1, 677; 1889. *Inoderma* was also used by Berkeley in 1872 for a genus of Gasteromycetes. Berkeley soon discovered that the name was preoccupied and renamed the fungus *Mesophellia*. Clements based his genus *Phaeothrombis* on *P. melaspermiza* Clements (a renaming of *Thrombium melaspermum* Stnr.).

Thallus crustose, uniform, thin or endolithic. Perithecia single, sessile or immersed, spherical, wall horny, black, with a small ostiole; paraphyses slender, persistent; asci slender, clavate to cylindric, 4–8–spored; ascospores ellipsoidal, unicellular, hyaline or brown.

This genus is separated from *Verrucaria* largely on the persistence of the paraphyses.

THROMBIUM KERGUELANUM Dodge, sp. nov.

Type: Kerguelen, near Port Jeanne d'Arc, 1,400 ft., B.A.N.Z.A.R.E. B200–1.

Thallus tenuis, circa 180μ crassitudine, dilute brunneo-olivaceus vel isabellinus, margine laevi, ochroleuco; ecorticatus; algae palmelloideae, cellulis subsphericis, irregulariter distributis, 7–8μ diametro. Perithecia immersa, hemispherica, deinde subspherica, circa 150μ diametro (muro excluso), ostiolo 35–40μ diametro, non prominente; murus perithecialis circa 75μ apice lateribusque, infra ad 55μ tenuescens, pseudoparenchymaticus, carbonaceus; hypothecium 15–20μ crassitudine, hyphis tenuissimis dense contextum, non multo in lateribus extensum; periphyses partem dimidiam superiorem perithecii tegentes, abundanter septatae, pauciramosae, cellulas subsphaericas abjungentes; paraphyses persistentes, tenues, hyalinae; asci cylindrici, evanescentes; ascosporae octonae, hyalinae, unicellulares 7–8 $\times$ 3·5–4μ.

Thallus thin, about 180μ thick, determinate, light brownish olive to isabelline with a honey yellow, smooth margin; ecorticate; algae palmelloid, cells subspherical, irregularly arranged, 7–8μ in diameter with large irregular masses of dark fuscous to black tissue apparently of densely woven slender hyphae (not pseudoparenchymatous as in *Verrucaria aethioboliza* Nyl.).

Perithecia immersed, hemispherical at first becoming nearly spherical, about 150μ in diameter (inside the perithecial wall); ostiole 35–40μ in diameter, not prominent, surrounded by an area about 200μ in diameter not covered by thallus; perithecial wall about 75μ thick on top and sides, thinning to 55μ below, pseudoparenchymatous, carbonaceous; hypothecium 15–20μ thick, of very slender densely woven hyphae, hyaline, not extending much up the sides of the perithecium; periphyses lining the upper half of the perithecium, abundantly septate, little branched, cutting off subspherical cells; paraphyses persistent, slender, hyaline; asci cylindrical, 8-spored, early evanescent; ascospores hyaline, unicellular, 7–8 $\times$ 3·5–4μ.

Growing with *Mykoblastus stephanodes* and *Placopsis bicolor*.

Kerguelen: near Port Jeanne d'Arc, 1,400 ft., B.A.N.Z.A.R.E. B200–1; Observatory Bay, B.A.N.Z.A.R.E. B192–9.

THELIDIUM Massal.

Thelidium Massalongo, Framm. Lich., 15; 1855.

Phragmothele Clements, Gen. Fung., 39; 1909.

The type species was not designated. Of the seven species originally transferred here, Clements and Shear (Gen. Fung., 288; 1931) chose *T. amylaceum* Mass. *Phragmothele* was based on *P. papulare* (Fr.) Clements.

Thallus crustose, simple, ecorticate, poorly developed and often the perithecia sessile to immersed in the crustose thallus of other lichens; algae Protococcoid; perithecium simple, horny, to carbonaceous; paraphyses early gelified and evanescent; asci saccate, 8-spored; ascospores ellipsoid or ovoid, hyaline or brown, 2–4–celled, commonly with large oil droplets.

Various attempts have been made to separate the free-living from the epiphytic and parasitic species, but until we have a monographic treatment of the whole group, it seems best to leave them in *Thelidium*.

THELIDIUM PRAEVALESCENS (Nyl.) Zahlbr.

Thelidium praevalescens (Nyl.) Zahlbr., Deutsche Südpolar Exp., 8, 51; 1906.

Verrucaria praevalescens Nyl. in Crombie, Jour. Linn. Soc. Bot., 15, 192; 1876. Phil. Trans. Roy. Soc. [London], 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 240; 1885.

Type: Kerguelen, Observatory Bay and hill north-west of Mt. Crozier, A. E. Eaton (Venus Transit Exp.).

Thallus about 200μ thick, naphthalene yellow, dull, very minutely rimose areolate; hypothallus thin, concolorous or lighter, margin thick, determinate; ecorticate; algae cystococcoid in ellipsoidal groups, colonies 15–20 × 10–12μ, somewhat vertically arranged dying below and proliferating above; medullary hyphae thin-walled, closely septate, very deeply staining, subvertical, about 3μ in diameter, extending about 20μ above the algae where the walls are somewhat thicker and more gelified but not differentiated into a cortex, enclosing rock crystals about 30–50 × 20μ.

Perithecia dimidiate, sub-hemispheric, 0·6–0·7 mm. in diameter; ostiole depressed; asci 8-spored; ascospores hyaline, ellipsoid, 3-septate, 30–35 × 14–18μ.

This seems to be a fairly common species, usually seen as a pruinose, rimulose, very thin thallus covering large areas of rock, but I have failed to find perithecia in most of the specimens. The single perithecium found and sectioned was much too old for study, the contents had largely disappeared, but one collapsed spore was seen which seemed to indicate this species. In B177–7, there is an old weathered thallus, olive brown, continuous with a thallus of *T. praevalescens* as described above; the old thallus is similar in structure but the colonies of algae up to 35–40 × 25μ, the rock crystals somewhat smaller and the medullary hyphae less deeply staining; with very abundant spermogonia, wall scarcely developed, cavities very irregular, spermatiophores slender, once or twice septate in a dense palisade, 6–8 × 1·5–2μ, spermatia acicular, curved, about 15–18 × 0·5μ.

Growing on rocks with *Verrucaria obfuscata, Lecidea assentiens, L. Auberti, L. superjecta, L. Werthii, Rhizocarpon Johnstoni, R. kerguelense, Pertusaria subperrimosa, Lecanora atrocaesia, Pyrenodesmia vitellinella, Buellia subplicata* and *Rinodina aspicilina.*

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B126–1, B126–2; upper part of Greenland Harbour, B.A.N.Z.A.R.E. B177–7, B177–8, B177–9, B177–10; Observatory Bay, B.A.N.Z.A.R.E. B192–8, B192–66; Murray Island, B.A.N.Z.A.R.E. B210–1, B212, B530–1.

Heard Island, between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–4.

THELIDIUM HEARDENSE Dodge, sp. nov.

Type: Heard Island, Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–5.

Thallus circa 250μ crassitudine, margine tenuescens indeterminatusque, rimoso-areolatus, obscure olivaceus nigrescensque; ecorticatus; algae palmelloideae, cellulis 6–7μ diametro, ad superficiem tenuescentibus, polyhedricis non concatenatis; perithecia, subsphaerica, immersa, ostiolo excepto tota a thallo tecta; involucrellum carbonaceum, 250μ ab ostiolo radians, 100μ crassitudine; murus perithecialis carbonaceus, totum perithecium includens, lateribus 55μ crassitudine, subtus ad 35μ tenuescens; ostiolo 20μ diametro; periphyses dichotome ramosae, tenues cellulas pyriformes abjungentes; hypothecium 10–12μ crassitudine, hyphis majoribus; thecium in basi (non in lateribus) perithecii; asci cylindrici-clavati, 35–40 × 12–15μ; ascosporae octonae, bicellulares, hyaline, 14–16 × 7–8μ.

Thallus about 250μ thick, thinning and more or less indeterminate at the margin, rimose areolate, dark olive and blackening; upper cortex not differentiated; algae palmelloid, cells 6–7μ in diameter, somewhat smaller near the surface, angular but not disposed in rows; perithecia subspherical, immersed, completely covered by the thallus except at the ostiole; involucrellum carbonaceous, extending 250μ from the ostiole and ending abruptly, about 100μ thick; perithecial wall carbonaceous, completely enclosing the perithecium except the ostiole, 55μ thick on the sides, thinning to 35μ thick below; ostiole 20μ in diameter; periphyses dichotomously branched, slender, cutting off pyriform cells; hypothecium 10–12μ thick of relatively coarse hyphae; thecium not extending up the sides of the perithecium; asci cylindric clavate, 35–40 × 12–15μ, 8-spored; ascospores ellipsoidal, 2-celled, hyaline, 14–16 × 7–8μ.

On rock with *Phyllopyrenia tessellata* and *Buellia subplicata*.

Young ascospores are unicellular and rather densely filled with protoplasm. The septum develops late and the spore becomes increasingly hyaline.

Heard Island, Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–5.

MICROGLAENA Koerb.

Microglaena Koerb., Syst. Lich. Germ., 388; 1855.

Thelenella Nyl., Mém. Soc. Sci. Nat. Cherbourg, 3, 1933; 1855. Bot. Not., 153, 1855.

Chromatochlamys Trevis., Consp. Verruc., 7; 1860.

Luykenia Trevis, Consp. Verruc., 19; 1860.

Weitenwebera Koerb., Parerg. Lich., 327; 1863 non Opitz.

Limboria Stein ap. Cohn, Kryptog. Fl. Schlesien II, 2, 334; 1879 non Ach.

Phaeoglaena Clements, Gen. Fung., 40; 1909.

Type: *Microglaena Wallrothiana* Koerb. The type of *Thelenella* is *T. modesta* Nyl. *Chromatochlamys* was based on *Verrucaria gelatinosa Ach.; V. muscicola* Ach. and *V. sphinctrinoides* Nyl. *Luykenia* was based on *V. thelostomoides* Nyl., *V. luridella* Nyl. and *V. modesta* Nyl. *Weitenwebera* Koerber non Opitz was based on *V. muscorum* Fr. and *V. sphinctrinoides* Nyl. The type of *Limboria* Stein is *L. corrosa* Koerb. Stein attributes the genus to (Ach.) Mass. and separates it from *Microglaena* on the asteroid splitting of the ostiole. *Limboria* Ach. was composed of wholly discordant elements, none of which belongs in *Microglaena* as at present understood. *Phaeoglaena* Clements was based on no type and was omitted from his second edition (Clements & Shear).

Thallus crustose, uniform, often slimy, algae palmelloid. Perithecia immersed in thalline warts or more or less free, spherical to conical; wall thin and hyaline, darkened above with umbilicate or asteroid ostiole; paraphyses slender, branched, persistent; asci long, cylindrical, 2–8-spored; ascospores hyaline, yellowish or brownish, ellipsoidal, muriform.

MICROGLAENA KERGUELENA (Nyl.) Zahlbr.

Microglaena kerguelena (Nyl.) Zahlbr., Deutsche Südpolar Exp., 8, 51; 1906 (hoc loco *kerguelana*).

Verrucaria kerguelena Nyl. in Crombie, Jour. Bot. Brit. For., 14, 22; 1876. Jour. Linn. Soc. Bot., 15, 192; 1876.

Verrucaria kerguelina Nyl. in Crombie, Phil. Trans. Roy. Soc. [London] 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot. 1, 2,240; 1885.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus 220μ thick, buffy brown, very smooth, almost shining, continuous, outer 20μ decomposed and gelified, algae occupying a layer 150μ thick, protococcoid, cells spherical, 7–8μ in diameter, irregularly arranged, hyphae very slender, more or less vertical between the algal cells; medulla with hyphae more irregularly arranged and containing an occasional algal cell.

Spermogonia immersed in the thallus, irregularly flask-shaped, wall hyaline about 20μ thick in the venter, thinning toward the ostiole; spermatiophores forming a dense palisade lining the venter, about 10μ long, cutting off slender bacilliform spermatia about $3 \times 1\mu$.

Perithecia semi-emersed, 390μ in diameter, projecting about 225μ above the level of the thallus, ostiole rather wide and not clearly differentiated; perithecial wall about 100μ thick on the sides, filamentous of more or less periclinal hyphae, blackened above the thallus, hyaline below,

where it thins and merges with the medulla, even including an occasional algal cell; periphyses not seen as the upper portion is badly gelified in the specimens seen and invaded by *Sclerococcus* (?); paraphyses slender, vertical, little branched, forming a dense, somewhat gelified palisade between the long, cylindric, 8-spored asci; ascospores hyaline, muriform with about 3 prominent transverse septa and 5–6 longitudinal ones in the middle cells, 16–25 × 7–10μ.

Growing on rocks with *Verrucaria obfuscata, Lecidea sublygomma, Rhizocarpon kerguelense, Aspicilia disjunguenda, A. endochlora, Lecanora atrocaesia* and *Rinodina aspicilina.*

As the ascospore matures, apparently the walls finally gelify between the individual spore cells, as many groups of small oblong cells are seen in the gel of the ostiole, the groups having the general shape of the spores that produced them. As one traces these cell groups lower in the perithecium along the row of the now gelified ascus, the arrangement is more regular, the number of cells composing the group fewer, until at the base of the perithecium, typical muriform spores are seen. Such separation of cells of muriform spores with subsequent division of the spore cells has been observed in other groups of fungi but is not commonly reported in the lichens.

The collection from Kerguelen which we have provisionally referred here is much more gelified and parasitized, but such structures as are still discernible, agree with corresponding structures in the material from Heard Island upon which the above description was based. The Kerguelen material is from the type locality of this species.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–4.

Heard Island: Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–6.

Microglaena Mawsoni Dodge, sp. nov.

Type: Kerguelen, near Port Jeanne d'Arc, 1,600 ft., B.A.N.Z.A.R.E. B201.

Thallus tenuissimus, indeterminatus, continuus, gelifactus madefactus, obscure oblivaceus; ecorticatus; algae palmelloideae, cellulis 4–5μ diametro; perithecia dimidiata, involucrello carbonacea, 40–75μ crassitudine ad ostiolum circa 20μ crassitudine tenuescente, circa 250μ ab ostiolo radiante; ostiolo papillato 20μ altitudine, 90μ diametro basi; murus perithecialis 20μ crassitudine hyphis periclinalibus, tenuibus, hyalinis; periphyses desunt; hypothecium a muro peritheciali non distinctum; thecium basale, non in lateribus dispositum; paraphyses tenues, ramosae, persistentes ad ostiolum attingentes; asci cylindrici, centro recti, ad latera curvati, circiter 130 × 20μ evanescentes; ascosporae octonae, submonostichae, hyalinae, muriformes, circiter, transversim 7-septatae et longitudinaliter 4–5-septatae (.36–40 × 12–14μ.

Thallus very thin, indeterminate, continuous, gelatinous when moist, dark olive; ecorticate; algae palmelloid, 4–5μ in diameter near the perithecia (scrapings of the thallus show algal cells more variable in size with occasional filaments of *Rivularia*); perithecia dimidiate, covered by a carbonaceous involucrellum about 40–75μ thick, thinning rapidly to about 20μ thick around the ostiole and extending about 250μ from it; ostiole piercing a papilla about 20μ tall and about 90μ in diameter at the base; perithecial wall 20μ thick of slender periclinal hyaline hyphae; periphyses absent; hypothecium not differentiated from the perithecial wall; thecium not differentiated as a distinct layer and not extending up the sides of the perithecium; paraphyses slender, branched, persistent, extending to the ostiole; asci cylindrical, straight in the centre, curved next the side walls, about 130 × 20μ, evanescent, 8-spored ascospores subuniseriate, hyaline, muriform with about 7 transverse septa and 4–5 longitudinal septa while still in the ascus, but continuing to divide repeatedly after the ascus wall disappears, 36–40 × 12–14μ.

On rock with *Steinera Werthii.*

This species differs from *Microglaena kerguelena* (Nyl.) Zahlbr. in much larger spores.

Kerguelen: above Port Jeanne d'Arc, 1,600 ft., B.A.N.Z.A.R.E. B201.

PYRENULACEAE.

Thallus crustose, uniform, epi- or endophloedal, rarely epilithic, ecorticate, algae *Trentepohlia*. Perithecia single or crowded, erect, with vertical ostiole. Spermatia usually exobasidial.

This family is predominantly tropical and in need of revision, especially in its relations with the Trypetheliaceae (see Johnston, G. T. 1940. Contributions to the study of the Trypetheliaceae. Ann. Missouri. Bot. Gard., 27, 1–50; pl. 1–4.). All the genera so far found in our region belong to the group of genera with cylindric cells in the spores, rather than to the group with lentiform cells, unless *Porina insueta* be transferred to *Pyrenula* on account of its thick-walled spores with round protoplasts.

Key to Genera.

Paraphyses branched and reticulately anastomosing, soon gelifying and evanescent
- Spores 2-celled, hyaline with a thick septum, uniseriate .. .. *Acrocordia*
- Ascospores 2–6-celled, brown, cells variable in shape, not clearly uniseriate *Microthelia*

Paraphyses unbranched and free
- Ascospores unicellular, wall rather thick .. .. *Coccotrema*
- Ascospores 4-celled, protoplasts cylindric .. .. *Porina*
  - Perithecia nearly covered by the thallus .. .. .. sect. *Segestria*
  - Perithecia not covered by the thallus .. .. sect. *Sagedia*

Acrocordia Mass.

Acrocordia Mass., Geneac. Lich., 18; 1854.

Arthopyrenia sect. *Acrocordia* Müll.-Arg., Mém. Soc. Phys. Hist. Nat. Genève, 16, 428; 1862.

Sagedia sect. *Acrocordia* Stzbgr., Ber. Thätigk. St. Gallisch. Naturw. Ges., 148; 1862.

Verrucaria subg. *Acrocordia* Harm. & Claud., Guide Elément. Lichénol., 77; 1904.

Type: This genus was based on *A. gemmata* and *A. Garovagli*.

Thallus crustose, uniform, thin, ecorticate, mostly homoeomerous, endophloedal, rarely epilithic, algae *Trentepohlia*. Perithecia single, semi-emersed or immersed, conic or hemispheric, wall carbonaceous, with a central ostiole; paraphyses persistent, branched, anastomosing; asci cylindric, usually 8-spored; ascospores ellipsoidal to oblong, uniseriate in the ascus, with two cells of equal size separated by a broad septum, hyaline. Spermogonia small, spherical, dark coloured; spermatiophores simple, spermatia bacilliform to cylindric.

Acrocordia platyseptata (Zahlbr.) Dodge, n. comb.

Arthopyrenia platyseptata Zahlbr., Deutsche Südpolar Exp., 8, 31; 1906.

Type: Kerguelen, Observatory Bay, Werth (Deutsche Südpolar Exp.).

Thallus epilithic, very thin, small, irregular, more or less confluent, continuous, smooth, olivaceous, blackening, somewhat shining; K-, Ca-; ecorticate, homoeomerous with slender, rather indistinct medullary hyphae, I-; algae *Trentepohlia*, cells 8–16μ in diameter, pale green with a thin membrane. Perithecia minute, 150–200μ in diameter, sessile, scattered, black, shining, not covered by the thallus; perithecial wall depressed hemispheric, black on the top and sides, hyaline below, ostiole small; paraphyses soon evanescent; thecium I vinose reddening; asci ovoid to oblong, tips not thickened, 26–35 $\times$ 10–13μ, 8-spored; ascospores obliquely biseriate, hyaline, oblong to ellipsoid oblong, ends rounded, straight or slightly curved, 2-celled, the very thick sep-

tum occupying about one-fourth the length of the spore, slightly constricted at the septum, wall otherwise thin.

The collections referred here are not in good condition for study. Such characters as are observable, agree with those given by Zahlbruckner.

On rock with *Huea diphyella*.

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B126–3, B126–4; Observatory Bay, B.A.N.Z.A.R.E. B192–10.

MICROTHELIA Koerb.

Microthelia Koerb., Syst. Lich. Germ., 372; 1855.

Pyrenula sect. *Microthelia* Branth & Rostr., Bot. Tidskr., 3, 259; 1869.

Verrucaria sect. *Microthelia* Claud. & Harm., Guide Elément. Lichénol., 77; 1904.

Anzia Garovagl., Rendic. Ist. Lombardo II., 1, 558; 1868 non Stzbgr.; 1861.

Polythelis Clements, Gen. Fung., 41; 1909.

Type: In his original description of the genus, Koerber included *M. micula* (Fw), *M. atomaria* (Ach.), *M. propinqua* Koerb., and *M. pygmaea* Koerb. Clements & Shear, Gen. Fung., 3; 1931, selected *M. micula* (Fw.) Koerb. *Polythelis* was based on *P. sexlocularis* (Müll.-Arg.) Clements.

Thallus crustose, uniform, epi- or endophloedal, rarely epilithic, ecorticate; algae *Trentepohlia*; perithecia sessile or semi-immersed, usually hemispheric, rarely spherical, wall carbonaceous, ostiole central; paraphyses branched and anastomosing, often gelifying and evanescent; asci cylindric clavate to pyriform, 4–8-spored; ascospores ovoid to long fusiform, normally 2-, seldom 4–6-celled, brown, cells variable in shape but protoplasts not lentiform. Spermogonia spherical, very small, dark coloured; spermatia short bacilliform, straight or slightly curved.

MICROTHELIA MACQUARIENSIS Dodge, sp. nov.

Type: Macquarie Island, Highlands, B.A.N.Z.A.R.E. B534–1.

Thallus orbicularis, 0·2 mm. diametro, albidus, tenuissime marginatus, confluens, tenuissimus, deinde nigricans; ecorticatus; algae *Trentepohlia*, cellulis cylindricis, 5–6μ diametro, ca. 8–10μ longitudine. Perithecia juventute thallo immersa, emergentia, subsessiliaque, ad 0·1 mm. diametro, nigra; peridium carbonaceum, integrum, 20μ crassitudine pseudoparenchymaticum, cellulis pachydermeis, fuscis, 4μ diametro; paraphyses evanescentes; ascosporae fuscae, ovoideae, 2-loculares, 15 $\times$ 4μ vel majores.

Thallus circular, about 0·2 mm. in diameter, whitish with a very narrow black line at the margin, sometimes confluent, very thin, finally the whole darkening and almost disappearing except close to the perithecium; ecorticate; algae *Trentepohlia*, cells cylindric, 5–6μ in diameter and about 8–10μ long, or somewhat rounded; medulla with many minute crystals of rock.

Perithecia immersed in the thallus except for the tip when young, then emerging until almost sessile when old and the upper portion of the thallus has eroded, up to 0·1 mm. in diameter, black; peridium carbonaceous, completely surrounding the nucleus, about 20μ thick, of thick-walled, dark brown pseudoparenchyma, the cells about 4μ in diameter; hypothecium scarcely differentiated; paraphyses evanescent; asci not clearly seen; ascospores brown, ovoid, larger than 15 $\times$ 4μ, 2-celled.

Owing to the very small size of these plants, I have relied mostly on crushed preparations. As most of the spores have been shed, evidently the perithecia were quite old when collected. The abundant rock crystals in the thallus make it very difficult to crush and separate the parts

for accurate observation. The only ascospore I was able to free in a position to measure, is evidently old and shrunken. The length may be approximately correct, but the diameter is certainly too small. Some spores apparently still in the ascus seem to have one cell almost a hemisphere, the other almost a cone, and very slightly constricted at the septum. Some of the perithecia have been attacked by a mould. B.A.N.Z.A.R.E. B531–1 probably belongs here but is in much poorer condition than the type.

Macquarie Island: Highlands, Sta. 81c, B.A.N.Z.A.R.E. B534–1, type; Featherbed Flat, B.A.N.Z.A.R.E. 531–1.

Coccotrema Müll-Arg.

Coccotrema Müll.-Arg., Miss. Sci. Cap Horn, 5, 171; 1889.

Type: *C. cucurbitula* (Mont.) Müll.-Arg.

Thallus crustose, uniform, ecorticate, algae *Trentepohlia*. Perithecia single, or 2–3 sunk in spherical thalline warts with a thin, hyaline wall and vertical ostiole; periphyses simple eseptate, early gelified; paraphyses very slender and little branched; asci short, 6–8-spored; ascospores relatively large, hyaline, unicellular, ellipsoidal.

This genus seems intermediate between the Pyrenulaceae and the Pertusariaceae; the blackened outer wall of the perithecium, the periphyses and symbiont suggest the Pyrenulaceae; the penetration of the algae between the outer and inner walls of the perithecium, the presence of several perithecia in a thalline wart and the relatively large, thick-walled ascospores suggest *Perforaria* of the Pertusariaceae. Further morphological and cytological studies are needed to clarify the situation, as we have been unable to study all the species concerned.

Coccotrema kerguelensis Dodge, sp. nov.

Type: Kerguelen, Observatory Bay, B.A.N. Z.A.R.E. B192–1.

Thallus tenuissimus, uniformis, laevis vel subrimulosus, dilute brunneo-olivaceus, nigricansque; ecorticatus; algae *Trentepohlia*, cellulis 4–5μ diametro metientibus, longitudine variabilibus, cylindricis. Perithecia 375μ diametro, sparsa; murus 60–65μ crassitudine, strato extero 15μ crassitudine nigricante, aliter hyalinus, hyphis periclinalibus, gelifactis; strato gonidiorum circiter 18μ crassitudine in dimidia parte inferiore inter stratum nigrum exterum et stratum interum; ostiolum ad 150μ diametro; periphysibus gelifactis evanescentibusque; paraphyses tenues, gelifactae pauci-ramosae; asci cylindrici 110 $\times$ 11μ; ascosporae octonae, unicellulares, ellipsoideae, 22 $\times$ 18μ, episporio crasso.

Thallus very thin, uniform, smooth or somewhat rimulose, light brownish olive and blackening; ecorticate; algae *Trentepohlia*, cells 4–5μ in diameter, cylindric, of variable length. Perithecia 375μ in diameter, scattered, wall 60–65μ thick, the outer 18μ darkened, the rest hyaline, of periclinal, gelified hyphae; algal layer about 18μ thick tapering gradually above and reaching about half way up the perithecium between the darkened outer layer and the inner hyaline layer of the perithecial wall; ostiole relatively wide, about 150μ in diameter; periphyses gelified and evanescent; paraphyses slender, gelified, little branched; asci cylindric, 8-spored, 110 $\times$ 11μ (immature); ascospores unicellular, short ellipsoidal, 22 $\times$ 18μ with a thick wall.

On rock with *Verrucaria obfuscata, Coccocarpia kerguelensis, Lecidea phaeostoma, Aspiciliopsis macrophthalma* and *Buellia tristiuscula*.

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–1.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–1 type; Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp.).

PORINA Ach.

Porina Ach. emend. Müll.-Arg., Flora, 66, 320; 1883.

Porina Ach., Syn. Lich. 109; 1814 (pro parte minore, non Ach., K. Vetensk. Akad. Nya Handl., 158; 1809. Lichenogr. Univ., 60, 308; 1810. Luyken, Tentamen Hist. Lich., 88; 1809).

Porophora Zenk. in Goebel and Kunze, Pharmazeut. Waarenkunde, 1, 180; 1827–9, non *Porophora* Meyer, Nebenstudien, 326; 1825. Sprengel, Syst. Veg., 4, 1, 237; 1827.

Spermatodium Trevis., Conspect. Verruc., 10; 1860. Fée, Suppl. Essai Crypt. Ecorc. Officin., 49; 1837, nom. nud.

Dichoporis Clements, Gen. Fung., 40; 1909.

Diporina Clements, Gen. Fung., 40; 1909.

See also synonymy of sections.

Type: *Porina nucula* Ach. This genus should be added to the list of *nomina generica conservanda,* since the case is very similar to that of *Verrucaria.* Acharius based his name on *Lichen pertusus* L. and added *P. leioplaca* and *P. chionea.* DeCandolle had already made *L. pertusus* L. the type of his genus *Pertusaria* in 1805. *P. leioplaca* belongs in *Pertusaria* and *P. chionea* is now referred to *Lecanora cinerea.* Hence the first use of the name clearly falls into synonymy with *Pertusaria.* Other species were added in 1810 but it was not until Acharius added *P. nucula* in 1814 that it contained a single pyrenocarp. During first half of the nineteenth century the genus was poorly defined, but gradually the older species were transferred to *Pertusaria* and the newer species show a closer relationship to *Porina* in the modern usage. Strictly speaking, *Porina* Ach. is invalid according to Art. 61 of the International Rules of Nomenclature. However it has had such wide usage since Müller-Argau's emendation in 1883 that it is a proper candidate for a *nomen genericum conservandum.* While the sectional names *Segestria* and *Sagedia* are also available as early generic names, the same problem arises in the case of *Sagedia* (see p. 51).

Spermatodium Trev. was based on 83 species and varieties belonging to quite discordant elements and no type designated. Thirty are now placed in *Porina.*

Dichoporis Clements was based on *Porina schizospora* Vainio, usually placed in the section *Sagedia. Diporina* Clements was based on *Porina subsimplicans* Nyl., also in the section *Sagedia.*

Thallus crustose, uniform, epi- or endophloedal, rarely epilithic, ecorticate, with *Trentepohlia* algae. Apothecia simple, sessile, scattered, with light or dark hemispheric or spherical walls and central ostiole; paraphyses simple, rarely forked near the tip, free; asci 6-8-spored; ascospores fusiform to acicular, 2 or more celled with cylindrical cells, hyaline. Spermogonia small, spherical; spermatiophores simple or somewhat branched; spermatia straight, long, fusiform to filiform. Stylospores 2-4-celled.

Sect. SEGESTRIA.

Segestria Fr., Syst. Orb. Veg., 1, 263; 1825.

Sphaeromphale Reichenb., Conspect. Regn. Veg., 1, 20; 1828.

Segestrella Fr., Lichenogr. Eur., Ref. 460; 1831.

Porina sect. *Segestrella* Müll.-Arg., Flora, 66, 322; 1883.

Porina sect. *Segestria* Vainio, Étude Lich., Brésil, 2, 220; 1890.

Sagedia sect. *Segestria* Jatta, Fl. Ital. Cryptog., 3, 890; 1911.

Type: *Segestria* Fr. was based on *S. lectissima* Fr. *Segestrella* Fr. was substituted for *Segestria* by Fries without comment. *Sphaeromphale* Reichenb. was based on *Segestria* Fr. *non zoologorum,*

an invalid reason for changing the name. *Segestria* is available for *Porina* in case an International Congress rejects the latter as a *nomen genericum conservandum* since it contain *Porina nucula*, Ach., the type of the latter in Müller-Argau's emended sense.

Apothecia mostly immersed in the thallus, wall either light below and dark above or wholly dark.

PORINA INSUETA (Nyl.) Müller-Argau

Porina insueta (Nyl.) Müll.-Arg., Rev. Myc., 6, 20; 1884. Zahlbr., Deutsche Südpolar Exp., 8, 51; 1906.

Verrucaria insueta Nyl. in Crombie, Jour. Linn. Soc. Bot., 15, 192; 1877. Phil. Trans. Roy. Soc. [London], 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 241; 1885.

Type: Kerguelen, Swain's Bay, A. E. Eaton (Venus Transit Exp.), also reported from Volage Bay, A. E. Eaton.

Thallus 110–120μ thick, white or stained ochraceous, rimulose areolate, areoles slightly convex, K–; ecorticate, homoeomerous, of vertical filaments of *Trentepohlia*, 6–7μ in diameter, closely septate, cells more or less separated. Perithecia black, about 0·2 mm. in diameter, semi-emersed, wall carbonaceous, 80μ thick on top and sides, thinning to about 15μ below the thecium, covered by a thin layer of thallus about half-way up the sides; ostiole very small; periphyses slender once or twice dichotomously branched at wide angles, cutting off bacilliform cells about 4 $\times$ 1μ; hypothecium scarcely differentiated; thecium about 55–60μ tall; paraphyses slender, branched, persistent and extending above the line of ascal tips into the perithecial gel; asci clavate, 50–55 $\times$ 8–10μ, thin-walled, 8-spored; ascospores 18–21 $\times$ 3–4μ, slightly curved, 4-celled, walls thickened and protoplasts rounded at maturity.

Growing with *Steinera glaucella, Pertusaria cineraria* and *Xanthoporina kerguelensis.*

The material from Heard Island seems to have either very young or very old perithecia, but such characters as are observable seem to indicate this species.

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–4.

Heard Island: between Corinthian Bay and Atlas Cove, B.A.N.Z.A.R.E. B140–7.

Sect. SAGEDIA.

Sagedia Mass., Ricerch. Autonom. Lich., 159; 1852, non auct. prior.

Porina sect. *Sagedia* Müll-Arg.. Flora, 66, 337; 1883.

Sagedia sect. *Eusagedia* Müll.-Arg., Mém. Soc. Phys. Hist. Nat. Genève, 16, 417; 1862.

Segestrella sect. *Sagedia* Branth and Rostr., Bot. Tidskr., 3, 258; 1869.

Verrucaria sect. *Sagedia* Harm. and Claud., Guide Elément. Lichénol., 76; 1904.

Type: *S. crassa* (D.C.) Mass., *S. chlorotica* (Ach.) Mass., *S. glabra* Mass., and *S. erumpens* Mass. were included by Massalongo in 1852. The history of the application of this name is similar to that of *Verrucaria* and *Porina*. *Sagedia* was first proposed by Acharius (Lichenogr. Univ., 71, 327–330; 1810) for five species now placed in *Lecanora*, one in *Acarospora* and one in *Lecidea*. *S. protuberans* Ach. later became the type of *Sagiolechia*. No further species were added in his *Synopsis* in 1814. Fries (Syst. Orb. Veg., 1824) lists three species all now placed in *Lecanora*. In 1831 Fries (Lichenogr. Eur. Reform. 448) first began to include pyrenocarps, his *S. cinerea* now placed in *Dermatocarpon*, his *S. fuscella* and *S. viridula* now placed in *Verrucaria* and *S. clopima* now in *Staurothele*. He still included two species now placed in *Lecanora* and one now found in *Chiodecton*. Rabenhorst (Deutschl. Kryptog. Fl., 2, 16; 1845) further emended the

genus by excluding all but the pyrenocarp species of Fries' 1831 treatment. Massalongo redefined the genus in its present sense (as genus or subgenus) in 1852 and his definition has been generally accepted since, although Flotow (Bot. Zeitung, 13 129; 1855) based his emendations on *S. viridula* and *S. verrucarioides*, the former usually referred to *Verrucaria*, the latter to *Lecanora cinerea*. In case this section is raised to generic rank, *Sagedia* Mass. non Ach. should be added to the list of *nomina generica conservanda*.

Perithecia not covered by thallus, spores elongate to fusiform, 2-many-celled.

Porina Werthii Zahlbr.

Porina Werthii Zahlbr., Cat. Lich. Univ., 1, 410; 1922.

Porina chlorotica (Ach.) Vainio subsp. *Werthii* Zahlbr., Deutsche Südpolar Exp., 8, 32; 1906.

Sagedia chlorotica Tuck., Bull. Torrey Bot. Club, 6, 59; 1875. Bull. U.S. Nat. Mus., 3, 30; 1876 non (Ach.) Mass.

Verrucaria chlorotica Crombie, Jour. Bot., 15, 106; 1877. Phil. Trans. Roy. Soc. [London], 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 240; 1885 non Ach.

Type: Kerguelen, outlet of Green Lake between Observatory Bay and West Fjord, Werth (Deutsche Südpolar Exp.).

Thallus epilithic, continuous, very thin, smooth, ochraceous greenish, K–, C–, ecorticate; medullary hyphae I–; algae *Trentepohlia*, cells round or oblong in chains, 9–13μ. Perithecia sessile, hemispheric, minute, 200–250μ in diameter, black and shining, not covered by the thallus; upper half of perithecial wall carbonaceous, fuliginous, K reddish black, with central ostiole 20–22μ in diameter; thecium gelified with oil droplets, I yellow; paraphyses simple, eseptate, filiform; asci oblong-fusiform or almost fusiform, shorter than the paraphyses, 65–70 $\times$ 15–18μ; ascospores 2–3–seriate, nearly vertical, hyaline, fusiform with rounded tips, 3–septate with cylindric cells and thin walls, 27–29 $\times$ 3–4μ. Spermogonia small, black, semi-emersed, spherical; spermatiophores short, subinflated; spermatia oblong-ellipsoid, straight, 1·8–2 $\times$ 1μ.

This species is said to differ from *P. chlorotica* by the larger spores and the small spermogonia. So far I have been unable to find Kidder's collection in the Tuckerman herbarium, nor have I seen other material referable here with certainty. B177–12 may belong here but the perithecia are too old for certain determination. B20–2 also seems to belong here but the perithecia are very old, the thecium disintegrated and in one case replaced by a spermogonium.

On rock with *Aspicilia endochlora*, *Blastenia keroplasta* v. *athallina* and *Buellia tristiuscula*

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–2.

Kerguelen: upper part of Greenland Harbour, B.A.N.Z.A.R.E. B177–12.

PHYLLOPYRENIACEAE.

Thallus foliose, corticate on both surfaces, with *Trentepohlia* algae; perithecia simple, erect, immersed in the thallus; ascospores hyaline.

Perithecial wall dark, cortex thick and carbonaceous below, not clearly differentiated above *Phyllopyrenia*

Perithecial wall hyaline, cortex of thick-walled irregular hyphae .. .. *Lepolichen*

Phyllopyrenia Dodge, gen. nov.

Thallus orbicularis, laevis, rimosusve, adpressus, marginibus subliberis; cortex superior male evolutus; algae *Trentepohlia*; cortex inferior bene evolutus, carbonaceus. Perithecia immersa, murus perithecialis cellulis brunneis pachydermeis irregulariter carbonaceis insuper; thecium

solum ad basim perithecii sine gonidiis; paraphyses evanescentes; ascosporae octonae, hyalinae, ellipsoideae unicellulares.

Thallus circular, smooth or cracked into areolae in the centre, closely appressed to the substrate except at the margins; upper cortex not clearly differentiated; algae *Trentepohlia*, occupying all the space between the cortices, the filaments separated by medullary hyphae; lower cortex highly developed and carbonaceous. Perithecia immersed or nearly so; wall of thick-walled brownish cells irregularly carbonized above; thecium confined to the base of the perithecium, without algae; asci 8-spored; ascospores hyaline, ellipsoidal, unicellular.

The relationships of this genus are puzzling. The algae are *Trentepohlia* rather than *Palmella*, and hence it is excluded from the Dermatocarpaceae. Otherwise its homoeomerous character is suggestive of *Normandina*, as well as its carbonaceous perithecial wall, which is even closer to that of *Anapyrenium*. It differs from both in its ascospores. Its habit and ascospores suggest *Dermatocarpon*, sect. *Catopyrenium*, but the latter is heteromerous. The pseudoparenchymatous appearance suggests *Agonimia*, but its ascospores are altogether different.

The family Phyllopyreniaceae was based on *Lepolichen* Trev. as its type and only genus, but our present genus is much closer to the family description, hence we have formed our generic name from the family name.

PHYLLOPYRENIA TESSELLATA Dodge, sp. nov.

Type: Heard Island, Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–1.

Thallus orbicularis vel irregularis ad 7·5 cm. diametro, 0·5 mm. crassitudine, dilute olivaceus, aetate obscure griseo-olivaceus, marginibus laevibus crassis superficie rimis radiantibus dein concentrice rimosa, areolis plus minusve polygoniis, cortice inferiori carbonaceo, prolificante et rimos pro parte implente, ad saxa adpressa marginibus subliberis cortex superior male distinctus; algae *Trentepohlia*, filamentis verticalibus paene ad superficiem attingens, inter hyphas dense septatis 3–4μ diametro, cellulis exteris subgelifactis; cortex inferior carbonaceus pseudoparenchymaticus cellulis pachydermeis brunneis 4–4·5μ diametro irregulariter dispositis. Perithecia immersa, murus perithecialis 50–75μ crassitudine, cellulis pachydermeis periclinaliter dispositis, lateribus perithecii irregulariter nigrescentibus, infra dilutioribus; ostiolum 85–90μ diametro, periphyses tenuissimae dichotome ramosae; hypothecium 20–25μ crassitudine, hyphis tenuissimis dense contextum; thecium 50μ altitudine; paraphyses evanescentes; asci cylindrico-clavati circiter 50 $\times$ 15μ leptodermei; ascosporae octonae ellipsoideae, hyalinae 13·5 $\times$ 7·5μ leptodermeae.

Thallus circular to irregular, up to 7·5 cm. in diameter, about 0·5 mm. thick, pale olive buff becoming dark greyish olive in age, margins smooth, thick, surface soon cracked radially then concentrically into more or less polygonal areoles, the lower carbonaceous cortex proliferating to partially fill the cracks; closely adnate to the rock except at the margins; upper cortex not clearly differentiated; algae vertical filaments of *Trentepohlia* extending nearly to the surface between closely septate, vertical hyphae 3–4μ in diameter, giving a minutely pseudoparenchymatous appearance, the outer cells slightly gelified; the lower cortex carbonaceous, pseudoparenchymatous of thick-walled brown cells 4–4·5μ in diameter irregularly arranged, proliferating upward in the cracks and into the middle of the thallus without reaching the upper surface.

Perithecia completely immersed, the perithecial wall 50–75μ thick, of isodiametric thick-walled brownish cells, periclinally arranged, irregularly blackened on the sides, lighter below the hypothecium; ostiole 85–90μ in diameter, filled with a palisade of periphyses, very slender and dichotomously branched; hypothecium 20–25μ thick, of very slender, densely tangled hyphae; thecium about 50μ tall, covering the base of the perithecium; paraphyses early disappearing; asci cylindric clavate, 8-spored, about 50 $\times$ 15μ, thin-walled; ascospores ellipsoidal, hyaline, 13·5 $\times$ 7·5μ, contents appearing granular, wall hyaline, rather thin.

Spermogonia flask-shaped, immersed in the areoles, about 130μ tall, venter about 70μ in liameter, tapering gradually to the mouth; spermatiophores about 15μ long in a dense palisade, ›earing straight, bacilliform spermatia about 4 × 1μ.

Growing with *Verrucaria aethioboliza, V. Mawsoni, V. tessellatula, V. Werthii, Mastodia essellata, Thelidium heardense, Blastenia kerguelensis, B. keroplasta* v. *athallina, Buellia subplicata* and *B. subplicata* v. *Joannae.*

Heard Island: Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–1, B140–2, B140–5.

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B204–1, B204–3; Royal Sound, B.A.N.Z.A.R.E. B126-5.

On rock B140–8 from Heard Island are two thalli with the structure of this species. The nly reproductive structures I have found are very old, resembling apothecia (or perithecia ith the tops broken away). The thecium has largely gelified, but the paraphyses were evidently uch longer persistent than in *P. tessellata.* The ascospores are mostly old and shrivelled, but ıc is definitely 2-celled, brown, about 18–20 × 5–6μ. These thalli evidently represent an ıdescribed species or a new genus, but the material is in too poor condition to warrant a formal scription. There is no suggestion of parasitism so we can exclude a parasitic *Buellia* on a *hyllopyrenia* thallus. It may be a species of *Melaspilea* sect. *Melaspileopsis* although the thallus more highly developed. The *Trentepohlia* algae would exclude *Encephalographa* as would the bly developed thallus.

Lepolichen Trev.

polichen Trev., Spighe e Paglie, 1; 1853.

Type: *Parmelia coccophora* Mont.

Although this genus has been described for nearly a century and specimens supposed to ong to it have been studied by well-known lichenologists, there is much confusion. Nylander ced the type species successively in *Lecanora, Thelocarpon* and *Pertusaria.* Müller-Argau died the type of *Porina granulatus* Tayl. from the Auckland Islands and transferred the cies to *Lepolichen.* After a study of the type of *Porina granulata* Tayl. in his herbarium at Farlow Herbarium, it is clearly *Pertusaria* DC. or a segregate of that genus as Tuckerman ıted out years ago. At the time Taylor wrote, *Porina* Ach. was in common use for *Pertusaria* , both names having been based on the same type species. While Müller-Argau saw the type in 7, and annotated it as *Lepolichen granulatus,* in his discussion he mentions only Chilean material, region from which *Parmelia coccophora* Mont. came. Hue (Description de deux espèces de ns et de cephalodies nouvelles, Assoc. Nat. Levallois Perret, 10, 31-37; 1904) discussed the lem from still other specimens. Zahlbruckner reduces all the names proposed in the group to nymy with *Porina granulata* under *Lepolichen granulatus,* but omits the Auckland Islands, e locality in his geographical distribution. Only careful description by the same person of ıe specimens referred to *Lepolichen* upon which previous names or combinations were based, ompletely clear up the present confusion.

XANTHOPYRENIACEAE.

Thallus crustose to squamulose; algae *Xanthocapsa,* homoeomerous; perithecia simple, ostiole tip.

Xanthoporina Dodge, gen. nov.

Type: *Xanthoporina kerguelensis* Dodge.

Thallus crustosus vel squamulosus, centro affixus, homoeomerus; algae *Xanthocapsa*; peri- immersa, murus carbonaceus; paraphyses parcae, dichotome ramosae; ascosporae ellipsoi- vel subfusiformes, septatae, protoplastis cylindricis; spermatiophorae elongatae, parcesep- ramosae, spermatia bacilliformia, brevia et parva.

Thallus crustose to squamulose, attached to the substrate at the centre, homoeomerous: algae *Xanthocapsa*; perithecia immersed in the thallus, wall complete, carbonaceous; paraphyses few, dichotomously branched; ascospores long ellipsoid to subfusiform, septate, protoplasts cylindric; spermatiophores long, sparingly septate and branched, spermatia short and small.

The systematic position of this genus is doubtful. The perithecial characters are close to *Porina*, the habit of the thallus is that of *Omphalaria* Dun. & Gir. in Mont., Fl. Alger., 1, 201; 1846–8, (ap. Garov., Notizie Nat. e Civ. sulla Lombardia, 1, 336; 1844 nom. nud. *Thyrea* Mass., Flora, 39, 210; 1856) where sterile thalli were first referred by me until perithecia were found. If one admits the validity of families based on the algal symbiont, it clearly belongs in the Xanthopyreniaceae, bearing the same relation to *Porina* which *Xanthopyrenia* bears to *Arthopyrenia* and *Gloeopyrenia* to *Microglaena*.

XANTHOPORINA KERGUELENSIS Dodge, sp. nov.

Type: Kerguelen, Greenland Harbour, B.A.N.Z.A.R.E. B177–4.

Thallus crustosus vel squamulosus, centro affixus, ad 6 mm. diametro, superficie verrucosa vel cerebriformi, marginibus crenato-incisis, liberis, obscure flavido-viridis madefactus, nigricans siccitate, ad 200μ crassitudine; ecorticatus; algae *Xanthocapsa*, coloniis cum 2–4 cellulis vaginatis, cellulis sphaericis, circiter 4μ diametro vel majoribus intus ellipsoideis 20 $\times$ 10μ; hyphae dichotome ramosae, tenues, leptodermeae.

Perithecia immersa, sphaerica vel subellipsoidea, 180–200μ diametro, ostiolo minuto, circiter 15μ diametro; murus perithecialis integer, carbonaceo, 15μ crassitudine; hypothecium 10μ crassitudine hyphis tenuibus dense contextum; asci clavati vel cylindrici, apice crasso juventute, ad 40 $\times$ 10μ; ascosporae octonae, elongato-ellipsoideae vel subfusiformes [immaturae], quadricellulares, protoplastis cylindricis, hyalinis, 10–12 $\times$ 3–4μ.

Spermogonia sphaerica circiter 180μ diametro; murus 35μ crassitudine hyphis tenuibus, leptodermaticis, dense implexum; spermatiophorae 65μ longitudine, pauciseptatae, ramosae; spermatia bacilliformia, cylindrica 2 $\times$ 0·75μ.

Thallus crustose to squamulose, attached to the substrate at the centre, margins free, up to 6 mm. in diameter, surface verrucose to cerebriform, margin crenate incised, dark yellow green when moist becoming black when dry, about 200μ thick; ecorticate, but outer layer of gel dark brown, opaque; algae *Xanthocapsa*, colonies of 2–4 cells, in a brownish sheath, cells spherical, about 4μ in diameter, deeply staining the outer portion, the cells larger and less deeply staining within, ellipsoidal up to 20 $\times$ 10μ; hyphal system dichotomous, of slender, thin-walled hyphae.

Perithecia immersed in the thallus, spherical or slightly ellipsoidal, 180–200μ in diameter, ostiole very small, 15μ in diameter, perithecial wall carbonaceous, 15μ thick, completely surrounding the thecium except for the ostiole; hypothecium about 10μ thick, of deeply staining, tangled hyphae; asci clavate cylindric, tip thickened when young, about 40 $\times$ 10μ, 8-spored; ascospores immature but apparently long ellipsoidal to subfusiform, about 4-celled, cells cylindric, 10–12 $\times$ 3–4μ, hyaline.

Spermogonia spherical, about 180μ in diameter, wall about 35μ thick, of slender, densely tangled, thin-walled hyphae; spermatiophores about 65μ long, sparingly septate and branched; spermatia bacilliform, cylindric, 2 $\times$ 0·75μ.

The spermogonia are described from sterile material from the Crozet Archipelago.

On rocks with *Verrucaria obfuscata, Porina insueta, Steinera glaucella, S. Werthii, Pannaria dichroa, Lecidea subdisjunguenda, L. superjecta, Pertusaria cineraria* and *P. crozetica*.

Kerguelen: upper part of Greenland Harbour, B.A.N.Z.A.R.E. B177–4, type, B177-13, B204–4; Port Jeanne d'Arc, 1,600 ft., B.A.N.Z.A.R.E. B217–1.

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–3.

MASTODIACEAE.

Thallus foliose, homoeomerous; algae *Prasiola;* perithecia simple, immersed to sessile with a central ostiole.

MASTODIA Hook.

Mastodia Hook. f. & Harvey, Crypt. Antarct., 193; 1845. Fl. Antarct., 2, 499; 1847.

Leptogiopsis Nyl., Flora, 67, 212; 1884. Bull. Soc. Linn. Normand. IV., 1, 221; 1887. non Trev., 1880 neque Müll.-Arg., 1882.

Dermatomeris Reinsch, Internat. Polarforsch. 14, 445; 1890. [Deutsche Exp., 2, 424–427; 1890].

Type: *Mastodia tessellata* Hook. f. & Harvey. The type of *Leptogiopsis* Nyl. is *L. complicatula* Nyl. and of *Dermatomeris, D. georgica* Reinsch.

Thallus foliose, umbilicate or stalked, homoeomerous to subheteromerous toward the umbilicus from the abundance of hyphae separating the algal cells; algae *Prasiola*; perithecia spherical, varying from immersed to subsessile, wall hyaline or somewhat brownish, not carbonaceous; ostiole central; paraphyses diffluent; asci 8-spored; ascospores hyaline, elongate to fusiform, unicellular; spermogonia immersed, relatively large, wall hyaline, more or less infolded; spermatiophores filiform; spermatia ellipsoidal.

The systematic position of this group has long been in doubt. First described as an alga, then as a lichen and as *Prasiola sp.* parasitized by *Laestadia* (Winter, 1887) or *Guignardia* (Reed, 1902), it has been largely neglected by algologists, lichenologists and mycologists, except by Vainio and Hue. In the type species from Kerguelen, the fungal hyphae penetrate all parts of the algal gel surrounding the algal cells, separating them and apparently stimulating the multiplication of the layers of algal cells. The same genus of fungi, represented by different species in different regions, seems to be constantly associated with the various species of *Prasiola.* Some algologists have noted in passing that certain species of *Prasiola* are uniformly parasitized by a fungus. In order to bring together the scattered literature and probable synonymy, I have prepared the following key to species, based on the literature, with citation of the original descriptions and notes on such species as I have seen, although *Mastodia tessellata* Hook. f. & Harvey is the only species found in Kerguelen.

Spores small, under 8μ long

Spores 6–6·5 × 4–5·5μ; asci 12–16 × 4–5·5μ	*M. tessellata*
Spores 5·5 × 2·5–2·8μ; asci 33–47 × 5·5–7μ	*M. georgica*

Spores larger, over 8μ long

Spores 12–15 × 3·5–5·5μ; asci 30–57 × 9–10μ	*M. antarctica*
Spores 10–16 × 3–4μ; asci 39–50 × 10–12μ	*M. complicatula*
Spores 8–13·5 × 3–4μ; asci 25–33 × 7–14μ	*M. borealis*

Spore size unknown

Thallus very large, up to 6 cm.; algal cells 5·5–10 × 4·5–6μ	*M. mexicana*
Thallus much smaller, marginal cells 11–12 × 3–4μ, central cells 3·5–4·5μ	*M. Mawsoni*

MASTODIA TESSELLATA Hook. f. & Harvey

Mastodia tessellata Hook. f. & Harvey, Crypt. Antarct., 193; 1845. Fl. Antarctica, 2, 499; 1847.

Ulva tessellata Hook. f. & Harvey, London Jour. Bot., 4, 297; 1844.

Prasiola tessellata Kütz., Spec. Alg., 473; 1849.

Type: Kerguelen, [Christmas Harbour], J. D. Hooker (Voy. "Erebus & Terror").

Thallus varying from umbilicate to stipitate; stipe about 0·2 mm. in diameter, of variable height, composed of fungus filaments exclusively in old plants, expanding into a head about 450μ in diameter from which radiate flat folioles about 90μ thick, thinning to 25μ at the margin; ecorticate but the outer layer of hyphae and algal gel darker; algae *Prasiola*, a single layer of cells in tetrads with the long axis of the cell perpendicular to the surface of the gel at the margin, inside which the elongate cells form two pairs of tetrads, the cells disappearing and becoming increasingly irregularly arranged toward the head, where tetrads are rarely seen; lower surface with rhizinae near the head, smooth over the thinner portions of the folioles; small spherical propagula or soredia formed on the upper surface containing one or two tetrads surrounded by hyphae and algal gel.

Perithecia immersed in the head, about 200μ in diameter, spherical, wall not clearly differentiated from the vegetative hyphae, outer 8μ staining nearly black with haematoxylin, within which is a layer about 50μ thick of slender densely woven somewhat periclinal hyphae imbedded in a gel; thecium of asci and very slender branched and anastomosing paraphyses which apparently soon disappear in the thecial gel; asci 12–16 × 4–5·5μ, relatively thick-walled without thickened tip, 8-spored; ascospores broadly ellipsoidal, 6·2–8 × 4–5·5μ, unicellular, uninucleate.

Spermogonia in pulvinate swellings of the frond, 375μ in diameter and 15μ thick, thalline wall 20–25μ thick of periclinal hyphae with occasional pairs or tetrads of algal cells; cavities ellipsoidal or gyrose about 35μ broad, dissepiments continuous with the outer wall and of the same texture, but without algal cells; spermatiophores in a dense palisade lining the cavities 14–16μ tall; spermatia bacilliform 2–3 × 1μ.

On rocks with *Kuttlingeria crozetica*.

Kerguelen: Royal Sound, Sta. 62, B.A.N.Z.A.R.E. B126–6; [Observatory Bay, B.A.N.Z.A.R.E., specimen without data in Jar 540C most of which was from this locality].

MASTODIA MAWSONI Dodge, sp. nov.

Type: MacRobertson Land, Cape Bruce, B.A.N.Z.A.R.E. B108–1.

Thallus foliosus, plus minusve orbicularis, lobis rotundis, crispatis, cellulis marginalibus elongatis, 11–12 × 3–4μ, cellulis centricis quaternis 3·5–4·5μ; medulla hyphis tenuissimis hyalinis; soredia cellulis quaternis subsphaerica, 8–12μ diametro, hyphis paucis in vagina crassa. Akinetes algarum 10 × 25μ, ellipsoidei cellulis 4–8nis, cylindricis, 8μ diametro, 4μ longitudine. Perithecia subsphaerica, muro subbrunneo, tenui. Spermogonia applanata, muro tenuissimo; spermatiophori 18–20μ altitudine; spermatia ellipsoidea 2–3 × 1μ.

Thallus foliose, probably umbilicate but attachment not seen, growing over mosses, more or less circular in outline, lobes rounded and crisped, in some individuals, the upper surface microphylline probably from the germination of akinetes *in situ*; marginal cells elongate, 11–12 × 3–4μ, arranged in a palisade, other cells in tetrads arranged in rows near the margin, more irregular within, 3·5–4·5μ in diameter, with spaces between the tetrads somewhat variable, the whole imbedded in a gel; medulla between the upper and lower layers of tetrads, of very slender hyaline hyphae. Soredia of subspherical tetrads 8–12μ in diameter, with a thick sheath and a few hyphal filaments; akinetes of the alga long ellipsoid or subfusiform, about 25 × 10μ of 4–8 cylindric cells, 4μ long and 8μ in diameter, without hyphae in the sheath.

Perithecia subspherical, immersed, with a light brown wall, too old and disintegrated to see contents clearly, but apparently with clavate asci and elipsoidal unicellular spores.

Spermogonia flattened, irregular, wall very thin, palisade of spermatiophores 18–20μ tall; spermatia ellipsoidal, 2–3 × 1μ.

Unfortunately, our material consists of a few fragments floated out from a tuft of moss over which *Parmelia Johnstoni* was growing. The perithecia are very old and gelified. Such

structures as are vaguely visible, suggest that it is closer to *M. tessellata* from Kerguelen than to other described species. In a crushed preparation, a few free spores are about the same size and shape, and the spermogonia are similar, although the spermatiophores are a little longer. The habit seems different, and soredia are abundant besides the akinetes of the alga.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. B108–1.

MASTODIA sp.

A single fragment growing among mosses with large colonies of *Nostoc* and germinating soredia was found. It is too poorly developed for description or identification.

Macquarie Island: north end, B.A.N.Z.A.R.E. B540–1.

MASTODIA GEORGICA (Reinsch) Dodge, n. comb.

Dermatomeris georgica Reinsch, Internat. Polarforsch., 14, 358; 425–427; pl. 4, fig. 12–14; pl. 19, fig. 1–6; 1890. [Deutsche Exp., 2, 358, 425–427, 445; pl. 4, fig. 12–14; pl. 19, fig. 1–6; 1890.]

Type: South Georgia.

MASTODIA ANTARCTICA (Kütz.) Dodge, n. comb.

Prasiola antarctica Kütz., Spec. Algar., 473; 1849. [For fuller description based on type specimen, see Imhäuser, Flora, 72, 281–282; 1889.]

Physospora Prasiolae Wint. in Hariot. Journ. de Bot. [Morot], 1, 233; 1887.

Laestadia Prasiolae Wint., Hedwigia, 26, 16; 1887.

Mastodia tessellata Wainio, Exp. Antarct. Belge, Résultats Voy. S.Y. "Belgica" Bot. Lichens, 36; 1903. Hue, Bull. Soc. Bot. France, 56, 315–321; 1909. Hue, Deuxième Exp. Antarct. Franç. Lichens, 13–14; 1915 excl. syn.

Type: Cockburn Island, 64° 13′ S., 57° W., J. D. Hooker (Voy. "Erebus & Terror").

Imhäuser (*loc. cit.*) does not describe the reproductive organs of the fungus; the other authors agree in measurements so far as given.

MASTODIA COMPLICATULA (Nyl.) Dodge, n. comb.

Leptogiopsis complicatula Nyl., Flora, 67, 211; 1884. Bull. Soc. Linn. Normand. IV, 1, 221, 1887.

Mastodia tessellata Vainio, Ark. f. Bot., 8, 4, 156; 1909 non Hook f. & Harvey.

Type: Behring Strait, Konyam Bay, Almquist (Voy. "Vega"). Vainio (Exp. Antarct. Belge Résultats Voy. S.Y. "Belgica" Bot. Lichens, 36; 1903) gives additional data on the type specimen.

MASTODIA BOREALIS (Reed) Dodge, n. comb.

Prasiola borealis Reed, Univ. Calif. Publ. Bot., 1, 160; 1902.

Guignardia alaskana Reed, Univ. Calif. Publ. Bot., 1, 161; 1902.

Type: Alaska, Uniak and Kadiak Islands, W. A. Setchell (Harriman Alaska Exp.).

Perhaps this should be treated as a variety of *M. complicatula* as the only differences in the published descriptions seem to lie in the smaller dimensions of asci and ascospores, or did Miss Reed have material of each species and confuse the matter by giving composite measurements? In the Farlow Herbarium is a specimen of the Harriman Alaska Expedition without further data, com. C. E. Cummings and determined by W. G. Farlow as *Prasiola borealis* with *Guignardia alaskana*, which is certainly *M. complicatula*. This specimen may be described as follows:

Thallus very fragmentary, apparently not stipitate, but attached by a margin as if dwarf foliose, tea green; variable in thickness about 85μ, cells in tetrads but more or less disarranged with a thick medulla 15–20μ thick in the centre, hyphae slender closely woven, more or less periclinal in the gel.

Perithecium (or apothecium) lecanorine, immersed, then erumpent and finally dropping out leaving a hole; amphithecium 35μ thick, of thick-walled hyphae more or less periclinal and algal cells 8–9 $\times$ 5–6μ; parathecium 20–25μ thick of highly gelified strictly periclinal slender hyphae; hypothecium seemingly a deeper staining palisade extending up the sides nearly to the top, giving rise to a compact, persistent thecium until the perithecium is mature then completely disappearing and leaving an empty brownish cup which finally breaks through to form a hole; asci 70 $\times$ 14–17μ, cylindric; ascospores ellipsoid to almost cigar shaped, 14–16 $\times$ 3–4μ, unicellular.

This specimen evidently gave Miss Cummings considerable difficulty, as she wrote Dr. Farlow on May 23: "You may be surprised to learn that my paper on the Alaskan lichens is not published yet. Having an opportunity to revise it I would like to ask your opinion in regard to the enclosed specimen. Would you call it an *Endocarpon* or constitute a new genus for it; the grouping of the gonidia and the way they are scattered throughout the thallus is different from the *Endocarpons*; the fact that the apothecium is so much thicker than the thallus, is noticeable. I have named it *Endocarpon perforatus*, but it may be that a new genus should be constituted; and I should value your opinion on the subject".

Mastodia mexicana (J. G. Agardh) Dodge, n. comb.

Prasiola mexicana J. G. Agardh, Oefvers. K. Vetensk. Akad. Forhandl., 4, 6; 1847. Lunds Univ. Årsskr., 19, 85; 1882 [Til Algernes Syst. 3].

Type: Mexico, Orizaba, Liebmann.

Kuetzing, Spec. Algar., 473; 1849, and Imhäuser, Flora, 72, 279–281; 1889, also describe material from the same locality and collector under this name. The fungal component is not satisfactorily described but it is evidently a much larger species, thallus up to 6 cm., algal cells 5·5–10 $\times$ 4·5–6μ.

GRAPHIDACEAE.

Thallus crustose, uniform, homoeomerous or heteromerous, ecorticate with *Palmella* or *Trentepholia* algae. Lirellae usually elongate, sometimes shorter and broader, single or grouped, simple or branched, immersed or semi-emersed; parathecium well developed (except in *Gymnographa*) usually carbonaceous, often with an amphithecium; disc usually long and slender; paraphyses simple or branched and anastomosing, usually persistent; asci usually 8-spored; spermatia exobasidial.

Only a single genus, *Encephalographa* with *Palmella* algae has yet been found in our region. The family is predominantly tropical and subtropical.

Encephalographa Mass.

Encephalographa Mass., Geneac. Lich., 13; 1854.

Melanospora Mudd, Man. Brit. Lich., 226; 1861. non Corda, Icones Fung., 1, 24; 1837.

Type: based on *E. Elisae* Mass. and *E. rubiformis* Mass., *nomina nuda* first described in 1855. *Melanospora* Mudd based on *Opegrapha cerebrina* DC.

Thallus epi- or endolithic, crustose, uniform, ecorticate, with *Palmella* algae. Lirellae almost punctiform, at first immersed in the thallus, becoming sessile and more elongate, usually crowded

in groups, simple or somewhat forked, disc slender, irregular in width; parathecium thick, carbonaceous, more or less flexuous; hypothecium thick, usually carbonaceous, rarely only dark brown; paraphyses branched, anastomosing, without septa; asci with 5–8-spores; ascospores brown, 2-celled, constricted at the septum, cells of somewhat unequal size. Spermogonia spherical, simple to somewhat coalesced, more or less superficial; spermatia long, slender, straight.

This small Old World genus contains a few, widely-scattered species.

ENCEPHALOGRAPHA CEREBRINELLA (Nyl.) Zahlbr.

Encephalographa cerebrinella (Nyl.) Zahlbr. in Engler and Prantl, Die Natürlich. Pflanzenfam. I, 1*, 94; 1903. Deutsche Südpolar Exp., 8, 51; 1906.

Lecidea cerebrinella Nyl. in Crombie, Jour. Bot. Brit. For., 14, 22; 1875. Jour. Linn. Soc. Bot., 15, 191; 1876. Phil. Trans. Roy. Soc. [London], 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 239; 1885.

? *Lecidea stellulata* Tayl. in Hook. f. & Tayl., London Jour. Bot., 3, 636; 1844. Crypt. Antarct., 233; 1845. Fl. Antarct., 2, 539; 1847. Crombie, Jour. Bot. Brit. For., 15, 105; 1877. Phil. Trans. Roy. Soc. [London], 168, 52; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 240; 1885. non Tayl. in Mackay, Fl. Hibern., 2, 118; 1836.

Buellia stellulata Tuck., Bull. Torrey Bot. Club, 6, 59; 1875. Bull. U.S. Nat. Mus., 3, 30; 1876 non alio loco.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus very thin, greyish ashy and darkening to almost black, continuous, with very fine wrinkles, K yellowing [*fide* Nyl.]; algae *Palmella*, cells about 4μ in diameter. Lirellae crowded in cerebriform groups, somewhat elongate. immersed in the thallus (i.e. sections show thalline tissue between contiguous lirellae nearly to the top of the parathecium); parathecium carbonaceous, upper surface minutely ridged (but not split as in some sections of *Graphis*), about 60–75μ thick and extending about 200μ below the hypothecium; hypothecium not clearly differentiated; thecium about 75μ tall and wide; paraphyses dichotomously branched, very slender, imbedded in the thecial gel and apparently disappearing; asci 8-spored, cylindric, early disappearing; ascospores monostichous, brown, 2-celled, 9–11 $\times$ 6–7·5μ, thin-walled, often one cell larger than the other, septum thin.

This species might easily be mistaken for a *Buellia* with crowded apothecia, since occasional solitary apothecia are not conspicuously elongate. The spores are more like those of *Rinodina* sect. *Placothallia* (Trev.) Vainio. The species is closely related to *E. otagensis* (Linds.) Müll.-Arg. from New Zealand, from which it differs in the smaller spores and thinner thallus.

Hooker's specimen from Christmas Harbour was not found by Crombie (*loc. cit.* 1877) and Kidder's specimen in the Tuckerman herbarium at the Farlow herbarium is not labelled as *B. stellulata*. As Tuckerman did not recognize *E. cerebrinella*, which might easily be taken for *Buellia* by the techniques common in Tuckerman's time, it seems likely that reports of *Buellia stellulata* listed above, belong here. I failed to find Hooker's specimen in Taylor's herbarium although specimens labelled *L. stellulata* from other localities collected on the same expedition are present.

Growing on rocks with *Lecidea asbolodes, L. intersita, L. Werthii, Rhizocarpon kerguelense, Pertusaria subperrimosa, Aspicilia disjunguenda, A. endochlora, Lecanora atrocaesia, Aspiciliopsis macrophthalma, Kuttlingeria crozetica, Pyrenodesmia vitellinella, Buellia subplicata,* and *B. tristiuscula.*

Crozet Archipelago: Possession Island, American Bay, 6 m., B.A.N.Z.A.R.E. B20–4.

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B90–1, B90–2, B90–3, B90–4, B126–7, B126–8,

B126–9; Greenland Harbour, B.A.N.Z.A.R.E. B177–14, B177–15; Murray Island, B.A.N.Z.A.R.E. B211–1, B530–2, B530–3; Mt. Wyville Thompson, B.A.N.Z.A.R.E. B246–2; Observatory Bay, B.A.N.Z.A.R.E. B192–11, B192–67; Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp. in Tuck. Herb. 3273).

Heard Island: Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–9.

LECANACTIDACEAE.

Thallus crustose, uniform, ecorticate, usually homoeomerous, algae *Trentepohlia*. Apothecia circular, sessile or immersed, parathecium poorly developed, or well developed and carbonaceous, sometimes with an amphithecium; paraphyses branched and anastomosing; ascospores fusiform to acicular, septate, hyaline, cells approximately cylindric, thin-walled; spermatia exobasidial.

LECANACTIS Eschw.

Lecanactis Eschw., Syst. Lich., 14; 1824.

Scolecactis Clements, Gen. Fung., 76; 1909.

Type: None designated. *L. lobata* Eschw. was figured, *Lichen lyncea* Sm. and Sow., Engl. Bot., 12, pl. 809; 1801: and *Opegrapha astroidea* Sm. and Sow., Engl. Bot., 26, pl. 1847; 1808 are mentioned. *L. lobata* was referred to *Phaeographis* sect. *Leiogramma* by Müller-Argau and *Lichen lyncea* to *Opegrapha*. The type of *Scolecactis* is *Lecidea myriadea* Fée.

Thallus crustose, uniform, mostly homoeomerous, ecorticate, without rhizinae, algae *Trentepohlia*. Apothecia immersed, appressed or sessile, single or crowded, circular, lecideine with a carbonaceous parathecium continuous below the hypothecium; no amphithecium; paraphyses branched and anastomosing, slender; asci 4–8-spored; ascospores hyaline, fusiform to acicular, 4–16-celled, cells cylindric. Spermogonia spherical with a hemispheric carbonaceous wall; spermatia exobasidial, ovoid elongate to cylindrical.

LECANACTIS KERGUELENSIS Dodge, sp. nov.

? *Lecidea amylacea* Crombie, Jour. Linn. Soc. Bot., 15, 188; 1876. Jour. Bot. Brit. For., 15, 104; 1877. Phil. Trans. Roy. Soc. [London], 168, 50; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 237; 1885.

Type: Kerguelen, Greenland Harbour, B.A.N.Z.A.R.E. B177–16.

Thallus indeterminatus, minute areolatus, vel etiam subgranulosus, niger, ad 200μ crassitudine; ecorticatus; homoeomerus, algae *Trentepohlia*, cellulis angularibus, filamentis brevibus, 7–8μ diametro, cellulis ad 10μ longitudine. Apothecia 0·13 mm. diametro; parathecium nigrum, 35–40μ crassitudine, carbonaceum; hypothecium 35–40μ crassitudine brunneum, hyphis dense contextum; thecium 35–40μ altitudine; paraphyses pertenues, anastomosantes, apicibus submoniliformibus ad 4μ diametro, obscure brunneis; asci cylindrici, 30 $\times$ 7–8μ, apicibus incrassatis, protoplasto truncato, 22 $\times$ 4μ; ascosporae octonae, aciculares, quadriloculares, hyalinae, 10–12 $\times$ 2–3μ.

Thallus indeterminate, minutely areolate, at times appearing almost granulose, black, dull, about 200μ thick, ecorticate, homoeomerous; algae *Trentepohlia*, cells angular, filaments short, 7–8μ in diameter, cells up to 10μ long. Apothecia 0·13 mm. in diameter; parathecium black, 35–40μ thick, carbonaceous; hypothecium 35–40μ thick, brownish, of densely woven hyphae; thecium 35–40μ tall; paraphyses very slender, anastomosing, imbedded in the thecial gel, ending above in short, moniliform chains of swollen cells about 4μ in diameter; dark brown, forming the epithecium; asci cylindric, 30 $\times$ 7–8μ, tip rounded, thickened, protoplast truncate, 8-spored, 22 $\times$ 4μ; ascospores acicular 4-celled, hyaline, 10–12 $\times$ 2–3μ.

The above spore measurements may be rather low as I have been unable to find spores free from the ascus in my scanty material. Without seeing the specimens upon which Crombie based his determination the citation of *Lecidea amylacea* from Kerguelen is doubtful, as that name has been applied to various species by different authors. Nylander, upon whom Crombie relied for most of his determinations of exotic lichens, is said to have used it for species now placed in *Lecanactis*.

On rock with *Lecidea phaeostoma*, *Rhizocarpon kerguelense* and *Pertusaria cineraria*.

Kerguelen: upper end of Greenland Harbour, B.A.N.Z.A.R.E. B177–16.

LECANACTIS MAWSONI Dodge, sp. nov.

Type: Kerguelen, Observatory Bay, B.A.N.Z.A.R.E. B192–12.

Thallus tenuis, rimuloso-areolatus, determinatus, margine tenui, non lobatus, probabiliter obscure olivaceo-luteus, sed fere totus ochraceo-fulvo in typo tinctus, ecorticatus; algae *Trentepohlia*, filamentis verticalibus 7–8μ diametro. Apothecia solitaria, sessilia, nigra, disco convexo, margine crenulato; parathecium carbonaceum, 180μ crassitudine non sub hypothecio; hypothecium hyalinum, 150μ crassitudine, hyphis subverticalibus, tenuibus; thecium 110–120μ altitudine; paraphyses tenues, ramosae anastomosantesque, epithecium carbonaceum 50–75μ crassitudine formantes; asci cylindrici vel subclavati, leptodermatici, 70–75μ longitudine; ascosporae octonae, hyalinae, fusiformes, 4-loculares, 18–20 $\times$ 5–6μ.

Thallus thin, rimulose-areolate, determinate, margin thin, not lobed, probably deep olive buff, but type uniformly stained ochraceous tawny over most of the surface; ecorticate but upper 10μ of the thallus nearly opaque from a dense mass of yellowish brown crystals; algae *Trentepohlia*, of vertical filaments 7–8μ in diameter, breaking up into single cells below, among the rock crystals.

Apothecia solitary, sessile, carbonaceous, disc convex, margin crenulate, finally appearing as a ring of hemispheric black warts surrounding the hemispheric black disc; parathecium carbonaceous, 180μ thick, not extending below the thecium; hypothecium hyaline, 150μ thick, of subvertical, densely woven, very slender hyphae, deeply staining and resting directly on the algal layer; thecium 110–120μ tall; paraphyses slender, branched and anastomosing to form a carbonaceous epithecium 50–75μ thick with dense masses of ochraceous crystals; asci cylindric to slightly clavate, thin-walled, 8-spored, 70–75μ long; ascospores hyaline, fusiform, 4-celled, 18–20 $\times$ 5–6μ.

This species differs from others so far referred to *Lecanactis* in the absence of parathecium below the hypothecium, much as the group of species centering around *Lecidea Auberti* differs from the rest of the species of *Lecidea* in Kerguelen.

On rock with *Lecidea Mawsoni*.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–12.

GYALECTACEAE.

Thallus crustose, homoeomerous or heteromerous, uniform or rarely with lobate margins; ecorticate with *Trentepohlia* or *Phyllactidium* algae. Apothecia circular, immersed to sessile; amphithecium either present or absent; parathecium thin and light coloured or carbonaceous; paraphyses slender, little branched; asci 6-many-spored; ascospores hyaline, thin-walled.

Only *Ionaspis* has yet been found in our area.

IONAPSIS Th. Fries.

Ionaspis Th. Fries, Lich. Scand., 1, 273; 1871.

Type: *Aspicilia chrysophana* Körb., *A. rhodopis*.Smrflt., *A. odora* Ach., *A. suaveolens* Ach., *A. haematina* Körb., *A. cyanocarpa* Anzi, *A. epulotica* Arn., *A. cinereorufescens* v. *heteromorpha* Kremplh. were originally included. *A. chrysophana* Körb. is a confusion of *A. odora* and *A.*

suaveolens; A. rhodopis has been reduced to a variety of *A. epulotica.* The rest are still recognized as species in Magnusson's monograph (Medd. Göteborgs Bot. Trädg., 8, 1–47; 1933), and any one of them would conserve the name in its usual sense.

Thallus crustose, uniform or determinate, endo- or epilithic, with or without hypothallus; homoeomerous with *Trentepohlia* algae. Apothecia immersed with a more or less well developed parathecium, disc plane or concave, dark to blackish, small; paraphyses simple or occasionally branched, usually in the upper part, imbedded in the thecial gel, more or less distinctly septate; asci clavate, with 8 unicellular, hyaline, ellipsoid, thin-walled ascospores.

Apparently the first record of this genus from the southern hemisphere, previously recorded species having an Arctic-alpine distribution in Eurasia. The algal cells are smaller than in previously recorded species and the parathecium is much thicker and more carbonaceous below.

IONASPIS KERGUELENSIS Dodge, sp. nov.

Type: Kerguelen, Observatory Bay, B.A.N.Z.A.R.E. B192.

Thallus ad 2 cm. diametro, nigromarginatus, aulici-griseus vel gnaphali-viridis, rimoso-areolatus, K–; homoeomerus, circiter 200μ crassitudine, strato extero 40μ crassitudine nigro (sed probabiliter ecorticatus); algae *Trentepohlia,* filamentis 6–10μ diametro, cellulis triplo vel quadruplo diametro longioribus, saepe singulis, laxe dispositis inter hyphas tenues medullares. Apothecia immersa, urceolata, thallo circum marginem nigrato; parathecium 55μ crassitudine sub margine ad 25μ infra hypothecium paulo evolutum tenuescens, carbonaceum; thecium 75–80μ altitudine; paraphyses tenues, paene eseptatae, semel ramosae, cellulis apicalibus moniliformibus paulo incrassatis; asci clavati, 55 $\times$ 9μ, leptodermatici; ascosporae octonae, uniserialiter dispositae, ellipsoideae, 9–10 $\times$ 7–8μ, unicellulares.

Thallus about 2 cm. in diameter with a conspicuous black margin about 1 mm. broad, formed by the dendroid strands of the hypothallus; otherwise court-grey to Gnaphalium green, rimose areolate, K–; homoeomerous, about 200μ thick, upper 40μ blackened, obscuring the structure but probably ecorticate; algae *Trentepohlia,* filaments 7–10μ in diameter, mostly disintegrated into cylindrical cells of varying size, 3–4 times as long as broad, loosely arranged between slender medullary hyphae. Apothecia immersed, urceolate, with the thallus blackening about the apothecial margins; parathecium 55μ thick at the margin, thinning to about 25μ thick below the scarcely developed hypothecium, wholly carbonaceous; thecium 75–80μ tall; paraphyses slender scarcely septate below, once forked below the epithecium, the ultimate cells moniliform, darkened and slightly thicker than the rest of the paraphysis; asci 8-spored, clavate 55 $\times$ 9μ, thin-walled; ascospores uniseriate, ellipsoidal, hyaline, unicellular, 9–10 $\times$ 7–8μ.

B192–16 and B192–17 are stained ferruginous from the substrate. Except for the symbiont, this species seems close to the description of *Lecidea endocyanella* Zahlbr. of which I have seen no material.

On rocks with *Lecidea phaeostoma, Aspiciliopsis macrophthalma, Gasparrinia depauperata, Buellia subplicata* and *B. tristiuscula.*

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–13, B192–14, B192–15, B192–16, B192–17; upper part of Greenland Harbour, B.A.N.Z.A.R.E. B177–17.

Heard Island: Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–10.

IONASPIS MAWSONI Dodge, sp. nov.

Type: Kerguelen, Observatory Bay, B.A.N.Z.A.R.E. B192–18.

Thallus tenuis, circiter 300μ crassitudine, continuus vel rariter irregulariter subrimulosus, dilute rubro-alutaceus vel dilute griseus, margine tenui, nigro; strato extero nigrescente, 15μ crassitudine, evidenter sudete cellulorum gelifactorum; algae *Trentepohlia,* filamentis 7–8μ

diametro, cellulis circiter 18μ longitudine; medulla paulo evoluta. Apothecia innata, urceolata, disco margineque nigrescentibus, 0·2–0·3 mm. diametro; parathecium superne 18–20μ, inferne ad 50μ crassitudine, carbonaceum, ab involucrello carbonaceo thallino, 65μ crassitudine, 150μ latitudine circumvallatum; hypothecium paulo evolutum; thecium 80–90μ altitudine; paraphyses tenues, subflexuosae, semel vel bis ramosae super ascos, apicibus non incrassatis, epithecio hyalino, gelifacto; asci clavati, leptodermei, apicibus non incrassatis, 55 × 10μ; ascosporae octonae, ellipsoideae, hyalinae, leptodermeae, 7–8 × 3·5–4μ.

Thallus thin, about 300μ thick, continuous or occasionally somewhat irregularly rimulose, pale pinkish buff to pale drab grey, margin thin, partially surrounded by a narrow black line, especially where two thalli meet; cortex 15μ thick, blackened but apparently a palisade of gelified cells; algae *Trentepohlia*, filaments 7–8μ in diameter, cells about 18μ long [most of the cells have lost their protoplasts, but one colony of young cylindrical cells, deeply staining and nearly isodiametric, was seen]; medulla not sharply differentiated from the algal layer but including many rock crystals. Apothecia innate, urceolate, disc and margin blackened, 0·2–0·3 mm. in diameter, solitary or grouped; parathecium 18–20μ thick above, becoming lenticular below, 50μ thick in the centre, completely surrounding the thecium and hypothecium and in turn surrounded by an involucrellum of carbonaceous thalline tissue, 65μ thick and extending about 150μ beyond the parathecium; hypothecium scarcely differentiated; thecium 80–90μ tall; paraphyses slender, somewhat flexuous, forking once or twice above the asci, tips not thickened, epithecial gel hyaline; asci 8-spored, clavate, thin-walled, tip not conspicuously thickened, 55 × 10μ; ascospores ellipsoidal, hyaline, thin-walled, 7–8 × 3·5–4μ, unicellular.

The ascospores often have a layer of granules extending across the cells, near the centre, giving the appearance of a septum, but no true septum has been seen. In B200–3, the thallus is K– at first, then slowly dirty yellow as the solution dries.

On rocks with *Lecidea rhizocarpiza* and *Placopsis bicolor*.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–18; near Port Jeanne d'Arc, 1,400 ft., B.A.N.Z.A.R.E. B200–3, B200–10.

COENOGONIACEAE.

Thallus byssoid, loose, homoeomerous with *Trentepohlia* or *Cladophora*, filaments covered by a scant network of fungus hyphae. Apothecia biatorine; asci 8-spored; ascospores hyaline, 1–2-celled. Spermatia exobasidial.

Coenogonium Ehrenberg.

Coenogonium Ehrenberg, Horae Phys. Berol. [Nees ab Esenbeck], 1, 120; 1820.

Type species: *C. Linkii* Ehrenberg.

Thallus loose, byssoid, either dimidiate or forming cottony, sessile tufts; homoeomerous, the *Trentepohlia* filaments little branched, radiating, with a network of mostly longitudinal hyphae. Apothecia terminal or lateral, short stipitate, biatorine; parathecium pseudoparenchymatous; paraphyses simple, septa scarcely visible; asci 8-spored; ascospores hyaline, fusiform or long ellipsoid, 1-2-celled. Spermogonia spherical; spermatiophores fasciculate with anaphyses; spermatia fusiform, straight.

Coenogonium subtorulosum Müll.-Arg.

Coenogonium subtorulosum Müll.-Arg., Jour. Linn. Soc. Bot., 32, 207; 1896.

Type: New Zealand, Napier, Colenso 1656.

Thallus forming hemispherical tufts 1 cm. in diameter or less, more or less confluent, filaments short, intricate, ecorticate younger filaments 10–12μ in diameter, corticate older filaments

22–25μ in diameter, constricted at the septa, cells barrel-shaped, mostly less than twice as long as broad, sparingly corticate with slender, hyaline hyphae; apothecia not seen.

On earth among mosses and Parmeliae, Macquarie Island.

The above description is based on B.A.N.Z.A.R.E. material and agrees well with Müller-Argau's description.

Macquarie Island, north end, B.A.N.Z.A.R.E. B540–2.

Another species is present on a rock in our collections, old and weathered, cells mostly collapsed and devoid of protoplasts, about 30–35 $\times$ 10–12μ.

Macquarie Island: highlands, B.A.N.Z.A.R.E. B534–1, B534–2.

Coenogonium confervoides Nyl.

Coenogonium confervoides Nyl. in Crombie, Jour. Linn. Soc. Bot., 16, 222; 1877. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 203; 1885.

Type: Mexico, Orizaba, Fr. Müller in Schimper Herb.

Reported from Marion Island, Moseley (Voy. "Challenger"). Since this species has been differently interpreted by different authors, the specimen upon which this report was based should be restudied. While *Trentepohlia* is present as a symbiont in other families and is perhaps free-living in our area, *Coenogonium* ordinarily has a much more tropical distribution.

LICHINACEAE.

Thallus crustose, uniform or with radiate lobes at the margin, squamose or dwarf fruticose, without hypothallus; homoeomerous or heteromerous with *Rivularia* algae. Apothecia terminal or superficial, varying from immersed perithecioid through urceolate to convex, immarginate and sessile; parathecium present or absent; paraphyses simple; asci 8-spored; ascospores hyaline, spherical to ellipsoid, thin-walled, unicellular to 4-celled.

Thallus squamose to subfoliose, determinate; apothecia sessile on the thallus, without parathecium; algal filaments vertical in the upper portion of the thallus .. .. .. *Steinera*

Thallus dwarf fruticose, algal chains confined to the outer portion of the branches leaving the axis free of algae, parallel to the long axis of the branches; apothecia immersed, perithecioid with thin, hyaline parathecium .. .. *Lichina*

Steinera Zahlbr.

Steinera Zahlbr., in Engler and Prantl, Die Nat. Pflanzenfam. I, 1*, 166; 1906. Deutsche Südpolar Exp., 8, 41; 1906.

Type: *Amphidium molybdoplaca* Nyl.

Thallus placodiomorph, resembling *Coccocarpia*, not gelatinous, without rhizinae or hypothallus, homoeomerous, hyphae and algal filaments parallel to the substrate, curving upward to form a palisade above, pseudoparenchymatous; algae *Calothrix*. Apothecia wholly adnate to the base; parathecium not developed; paraphyses simple, well developed; asci 8-spored; ascospores hyaline, ellipsoidal, very thin-walled, 2-4-celled. Spermatiophores septate; spermatia cylindric, straight.

Except for the algal symbiont, this genus seems nearer to the Peltigeraceae, somewhat similar to *Solorina* in appearance.

Spermogonia about 250μ tall; apothecia present, thallus olive buff to olive brown.

Disc red-brown, paraphyses filiform above, spores oblong ellipsoid, mostly 4-celled, 16–21 $\times$ 7–9μ .. .. *S. glaucella*

Disc black, paraphyses moniliform above, spores ellipsoid, usually 2-celled, 8–10 $\times$ 5–7μ *S. Werthii*

Spermogonia about 35μ tall; apothecia unknown; thallus black .. .. *S. nigra*

STEINERA GLAUCELLA (Tuck.) Dodge, comb. nov.

Pannaria glaucella Tuck., Bull. Torrey Bot. Club, 6, 57; Oct., 1875. Bull. U.S. Nat. Mus., 3, 28; 1876.

Lecanora melanaspis Hook. f. & Tayl., Cryptog. Antarct., 230; 1845. Fl. Antarct., 2, 536; 1847. non Ach. [fide Crombie, Jour. Bot. Brit. For., 15, 103; 1877 excl. Babington's syn. of *Lecanora dichroa* Tayl.].

Amphidium molybdophaeum Nyl. in Crombie, Jour. Bot. Brit. For., 13, 333; Nov., 1875.

Amphidium molybdoplacum Nyl. in Crombie., Jour. Linn. Soc. Bot., 15, 181; 1876 [spelling corrected]. Jour. Bot. Brit. For., 15, 103; 1877. Phil. Trans. Roy Soc. [London], 168, 47; 1879.

Amphidium molybdophlacum Nyl. in Crombie, Rept. Sci. Results, Voy. "Challanger" Bot., 1, 2, 232; 1885.

Leptogium molybdoplacum Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges., 1889–90, 237; 1891.

Steinera molybdoplaca Zahlbr., in Engler and Prantl, Die Nat. Pflanzenfam. I, 1*, 166; 1906. Deutsche Südpolar Exp., 8, 43; pl. 4, fig. 13–14; 1906.

Type: Kerguelen, Molloy Point, J. H. Kidder (U.S. Venus Transit Exp.) in Tuckerman Herb. The type of *Amphidium molybdoplacum* was based on Kerguelen, Swain's Harbour, A. E. Eaton (Venus Transit Exp.).

Thallus adnate to the substrate, areolate squamose in the centre, margin lobate (habit of *Coccocarpia pellita*) up to 4 cm. in diameter, but several thalli sometimes confluent, forming much larger patches and nearly covering the surface of the pebble, between vinaceous buff and olive buff in lighter specimens to olive brown in most of the older specimens; marginal lobes mostly 4–5 mm. long, somewhat cuneate ultimate lobes about 1 mm. wide (one specimen with lobes up to 1 cm. long and 2 mm. wide, nearly linear); about 400μ thick, pseudoparenchymatous, basal hyphae periclinal, curving upward and carrying the filaments of *Calothrix* with them until they are vertical in the greater portion of the thallus; outer layer about 50μ thick without algae, giving the appearance of a pseudoparenchymatous cortex, outer cells somewhat brownish. Apothecia urceolate in warts on the areoles, disc reddish brown, lecanorine; amphithecium 150μ thick, of the same texture as the thallus; no parathecium; hypothecium obconic, 75μ tall, about 170μ in diameter, similar to the thallus but looser in texture and without algae; thecium 110–120μ tall; paraphyses filiform, sparingly dichotomous below, closely so above, tips clavate; asci clavate, 8-spored, 70 $\times$ 10–12μ; ascospores ellipsoid, 4-celled, thin-walled, not constricted at the septa, 18–20 $\times$ 7–8μ. Spermogonia ovoid, 250 $\times$ 180–200μ, wall very thin and scarcely differentiated, but deeply staining; spermatiophores closely septate, densely branched; spermatia bacilliform, 3·5–4 $\times$ 1μ.

On rocks with *Verrucaria kerguelensis, V. obfuscata, Microglaena Mawsoni, Xanthoporina kerguelensis, Porina insueta, Physma kerguelense, Lecidea subdisjunguenda, Mykoblastus stephanodes, Pertusaria cineraria, P. Werthii, Aspiciliopsis macrophthalma* and mosses.

B177–19 and B217–2 are evidently immature, spores still unicellular and the tips of the paraphyses not clavate.

Kerguelen, Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp.), type; Royal Sound, B.A.N.Z.A.R.E. B126–10; Greenland Harbour, upper part, B.A.N.Z.A.R.E. B177–1, B177–4, B177–13, B177–18, B177–19; near Port Jeanne d'Arc, 1,400 ft., B.A.N.Z.A.R.E. B200–2; Mt. Jeanne d'Arc 1,600 ft., B.A.N.Z.A.R.E. B217–2.

STEINERA WERTHII Zahlbr.

Steinera Werthii Zahlbr., Deutsche Südpolar Exp. 8, 43; 1906.

Type: Kerguelen, Station Lake, E. Werth (Deutsche Südpolar Exp.).

Thallus up to 3 cm. in diameter, placodiomorph, centre squamose-areolate and imbricate, margins radiately lobed, lobes cuneate, very convex, 2–3 mm. long and about 2 mm. wide, deep olive buff to citrine drab; about 500μ thick, structure typical for the genus but fewer algal cells in the lower portion; pseudocortex about 40μ thick. Apothecia slightly urceolate when very young, soon plane with a very narrow exciple, then convex and immarginate, disc dark brown to black; amphithecium and parathecium lacking at maturity; hypothecium slightly brownish, 10–12μ thick, of intricate hyphae; thecium 100–110μ tall; paraphyses slender, dichotomously branched once or twice below and densely so above, the cells moniliform to obovoid, 3–4μ in diameter; asci 8-spored, clavate 55 $\times$ 7–8μ; ascospores short ellipsoidal, 2-celled 8–10 $\times$ 5–7μ. Spermogonia ellipsoidal, 250 $\times$ 125μ, wall hyaline, scarcely differentiated; spermatiophores closely septate, densely branched, 35–55μ tall; spermatia bacilliform or cylindric, 3·5–5 $\times$ 1μ.

On rocks with *Microglaena Mawsoni, Xanthoporina kerguelensis, Pannaria dichroa, Lecidea superjecta, Pertusaria crozetica, Aspiciliopsis macrophthalma* and *Buellia tristiuscula.*

B246–3 is moribund, but seems to belong here in all observable characters except the spores which are 4-celled and about the size of those of *S. glaucella.*

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E B20–3.

Kerguelen: Greenland Harbour, B.A.N.Z.AR.E. B177–20, B177–21; near Port Jeanne d' Arc, 1,600 ft., B.A.N.Z.A.R.E. B201; ? Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–3.

STEINERA NIGRA Dodge, sp. nov.

Type: Kerguelen, Long Island, B.A.N.Z.A.R.E. B953–1.

Thallus niger, areolatus, areolis plus minusve rotundatis, ca. 0·5 mm. diametro; ecorticatus; algae filamentis verticalibus ca. 4μ diametro; hyphis tenuibus. Spermogonia ampulliformia, ca. 35μ altitudine, 15μ diametro; murus tenuissimus; spermatiophorae dichotomae, ca. 4–6 $\times$ 1μ; spermatia ca. 2–3 $\times$ 1–1·5μ ellipsoidea.

Thallus black, areolate, areoles more or less rounded, about 0·5 mm. in diameter; ecorticate; algae vertical, filaments about 4μ in diameter, separated by slender medullary hyphae in a very firm gel. Apothecia not seen. Spermogonia flask-shaped, about 35μ tall and 15μ in diameter; wall very thin; spermatiophores dichotomous, about 4–6 $\times$ 1μ; spermatia ellipsoidal, about 2–3 $\times$ 1–1·5μ.

Only a little material has been seen, growing on dead *Acaena* between *Parmelia kerguelensis?* thalli. In the absence of apothecia the systematic position is somewhat uncertain, but the anatomy of the thallus and spermogonia are similar to that of other species of *Steinera,* although the spermogonia are very much smaller and the spermatia are more like those of *Lichina.*

Kerguelen: Royal Sound, Long Island, B.A.N.Z.A.R.E. B953–1.

LICHINA Agardh.

Lichina Agardh, Syn. Algar. Scand., xii, 9; 1817.

Pygmaea Stackh., Mém. Soc. Nat. Moscou, 2, 60; 1809.

Thamnidium Tuck. ap. Naegli, Algentyp., 19; 1860 non Link 1809.

Type: *Lichina* was based on *Fucus pygmaeus* Lightf. and *Lichen confinis* Müll. *Pygmaea* was based on *Lichen lichenoides,* a renaming of *Fucus pygmaeus* Lightf. So far as I can learn

from the literature available, *Pygmaea* has priority over *Lichina* which has been in use in recent years. The lichen *Pygmaea* certainly has priority over *Pygmaea* Hook. f. (*Pygmea* J. Buch.) in the Scrophulariaceae. *Thamnidium* Tuck. was based on *Lichina confinis* v. *Willeyi* Tuck.

Thallus dwarf fruticose, repeatedly branched, branches round or flattened; cortex appearing somewhat pseudoparenchymatous; algae *Calothrix*, filaments zig-zag, twisted or straight parallel to the long axis of the thallus; medulla of longitudinal, thin-walled, septate hyphae. Apothecia often terminal in a branch or grouped, immersed in the thallus and nearly circular in cross section with a narrow, round or irregularly torn ostiole; lecanorine with a thin hyaline parathecium; thecium gelified; paraphyses filiform, eseptate, sparingly branched; asci almost cylindric, thin-walled, 8-spored; ascospores hyaline, ellipsoidal, thin-walled, uni- or bi-seriate, unicellular. Spermogonia immersed, single or grouped near the apothecia, almost spherical with hyaline wall, venter labyrinthiform; spermatiophores slender, spermatia long.

LICHINA ANTARCTICA Crombie.

Lichina antarctica Crombie, Jour. Bot. Brit. For., 14, 21; 1876. Jour. Linn. Soc. Bot., 15, 181; 1876. Phil. Trans. Roy. Soc. [London], 168, 47; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 232; 1885.

Pygmaea antarctica Zahlbr., Hedwigia, 31, 37; 1892.

Type: Kerguelen, Observatory Bay, on dry rocks near the sea; Swain's Bay, A. E. Eaton (Venus Transit Exp.).

"At first sight not unlike some small state of *L. confinis* [2 mm. high or less]. Apothecia and spermogones enclosed in subglobose, crowded, fastigiate clavuli; spores ellipsoid [14–16 × 7–9μ]; spermatia oblong [3 × 1μ]."

Thallus prostrate or erect, filaments 18–22μ in diameter, straight or curved with irregular, slight constrictions, corticate with a single layer of coarse, septate dark greenish black, thick-walled hyphae, 4μ in diameter, which often grow out as single branched filaments to serve as organs of attachment. Apothecia subspherical on tips of short, lateral branches about 75μ in diameter, corticate with more or less isodiametric cells; paraphyses slender, more or less discrete, few; asci 33 × 8μ, tip not thickened, 8-spored, cylindric-clavate; ascospores submonostichous (immature in our material).

At first sight, the appearance is suggestive of a minute Antarctic member of the *Alectoria pubescens* (L.) Howe group, but the algae are Myxophyceae and the apothecia quite distinct. The thallus is much more fragile when dry, breaking cleanly at the slight constrictions, and the apothecia easily breaking loose and floating free.

Growing with *Psoroma lanuginosa, Stigonema* and other Myxophyceae over small, dead mosses.

Kerguelen: Royal Sound, Robert Hall (Nat. Herb. Melbourne Bot. Gard.)

SIPHULASTRUM Müll-Arg.

Siphulastrum Müll.-Arg., Flora, 72, 143; 1889.

Type species: *S. triste* Müll.-Arg.

Thallus erect, dendroid, branches more or less compressed, corticate on all sides; central cells loose with air spaces, peripheral cells dense, irregular, not longitudinal; algae blue-green then olivaceous, in short chains, variously curved, here and there transversely not longitudinally divided. Apothecia unknown.

Since no material has been available for comparison, I have hesitated to refer our material to this genus, but it seems related. The above description is translated from Müller-Argau.

SIPHULASTRUM CLADINOIDES Dodge, sp. nov.

Type: Macquarie Island, Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. B531–2.

Thallus flaccidus, gelifactus semipellucidus ad 1·5 cm. altitudine, basi emoriens, apice proliferens, 0·4–0·5 mm. diametro, teres, plus minusve dichotome ramosus, superne ramis densioribus subapplanatisque, apicibus eis *Cladinae* similibus (unde nomen), alutaceus; hyphae corticantes tenuissimae, 1·5–2μ diametro, longitudinales ramis anastomosantibus, superioribus curvatis perpendicularibus, cellulas ellipsoideas 6–7 $\times$ 2–3μ in sterigmatibus brevibus abjungentes; cellulae algarum in coloniis sparsis inter hyphas corticantes et medullam, sphaericae 8–9μ diametro, tenui-vaginatae vel angulares, dein in catenis brevibus; medulla hyphis longitudinalibus 3μ diametro rare ramosis anastomosantibusque.

Thallus flaccid, gelatinous, up to 1·5 cm. tall, dying at the base, and proliferating at the apex, 0·4–0·5 mm. in diameter below, terete or nearly so, more or less dichotomously branched; above branching denser, more irregular and branches somewhat flattened, tips suggestive of those of *Cladina* (whence the name), cream-buff to cartridge-buff, semipellucid; whole thallus gelified; cortical hyphae very slender, 1·5–2μ in diameter, longitudinal branching at nearly right angles and anastomosing, sending perpendicular branches up through the gel, upper portion curved and cutting off small long-ellipsoidal cells 6–7 $\times$ 2–3μ on slender, short sterigmata; algal cells in scattered colonies between the corticating hyphae and the medulla, cells mostly spherical 8–9μ in diameter with relatively thin sheaths, each penetrated by a haustorium, protoplast ecru olive to olive-ochre, sometimes angular and then in short chains, probably *Scytonema*; medulla of thick-walled longitudinal hyphae 3μ in diameter spaced 6–8μ apart, rarely branched and anastomosing.

A thorough search of all the available material with a high-power dissecting microscope has failed to locate reproductive organs beyond the conidium-like cells borne on the cortical hyphae. Occasionally I have seen spherical spermogonioid structures 18μ in diameter, with a wall one cell thick, a palisade of sporophores about 6 $\times$ 2μ, cutting off short, bacilliform cells about 2 $\times$ 1μ which may be spermatia or may be a parasite. Compare the spermogonia and spermatia of *Lichina pygmaea* described and figured by Tulasne (Ann. Sci. Nat. Bot. III., 17, 211–212; pl. 9, fig. 2, 3, 6; 1852: and *L. confinis,* loc. cit. pl. 10, figs. 12–15) but our structures are apparently much smaller. Brownish spots on the thallus are frequently due to a species of *Torula.*

Growing in tufts of *Polytrichum.*?

Macquarie Island, Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. B531–2.

SIPHULASTRUM USNEOIDES Dodge, sp. nov.

Type: Macquarie Island, Featherbed Flat, B.A.N.Z.A.R.E. B531–3.

Thallus flaccidus, gelifactus, pauci-ramosus, usque ad 5 cm. altitudine, inferne 1 mm. diametro, teres, subdichotome ramosus, ramis articulatis, basi subinflatis, ramulis 3 mm. longitudine, circiter 0·1 mm. diametro, raris, pellucidus, albidus cum annulis olivaceis ubi adsunt algae; cortex circiter 18μ crassitudine, laxe fastigiatus, algae in pulvinulis annularibus, filamentis axi chondroideo perpendicularibus, 45μ longitudine, cellulis 8–10μ diametro; medulla non bene evoluta; axis chondroidea circiter 75μ diametro hyphis tenuibus, pachydermaticis, conglutinatis.

Thallus flaccid, gelified, sparingly branched, up to 5 cm. tall, 1 mm. in diameter below, terete, branching subdichotomous, the branches articulate by an annular crack as far as the chondroid axis, slightly inflated above the joint, ramuli 3 mm. long about 0·1 mm. in diameter, rare, mostly in the upper portion, pellucid, white with ecru olive bands where algae are present; cortex about 18μ thick, a loose palisade formed from perpendicular branches of the corticating hyphae, cutting off conidium-like cells 4 $\times$ 1μ at the surface of the gel, somewhat less compact over the portions lacking algae where it rests on the chondroid axis; algae in annular cushions along the thallus, the

zone filled with air in the intercellular spaces, hence appearing black in a fresh mount, as well as in the tissue about the articulations, of filaments perpendicular to the chondroid axis, about 45μ long, cells 8–10μ in diameter; medulla not differentiated; chondroid axis about 75μ in diameter, of slender, thick-walled conglutinate hyphae, tough and elastic, often partly decorticate in the older portions.

Reproductive structures immature. A single young spermogonium similar to that of *Lichina* is immersed in the axil of a very short lateral branch near the apex of the thallus, but no spermatia seen. A structure which may be a coiled ascogonium with a cellular trichogyne protruding from the thalline gel and reaching nearly to the ostiole of the spermogonium is located in the base of the young branch.

Rarely a medulla is evident as loosely tangled hyphae about 3μ in diameter in the zone where the algae have disappeared, but where the chondroid axis is not yet decorticate. It is unfortunate that our material is so scanty and immature. It mimics *Usnea* in several respects but apparently is unrelated. Our material was segregated from a collection of *Cladia aggregata* with which it was tangled, along with a decaying, sterile, Jungermanniaceous hepatic. The arrangement of the algal filaments suggests *Lichinella*. Its very highly developed chondroid axis clearly differentiates it from any species previously described in the Lichinaceae.

Growing with *Cladia aggregata* and Hepaticae.

Macquarie Island, Featherbed Flat, B.A.N.Z.A.R.E. B531–3; north end, B.A.N.Z.A.R.E. B540–3.

COLLEMACEAE.

Thallus gelified, from almost crustose to squamose, foliose or dwarf fruticose, with or without rhizinae, rarely umbilicate, homoeomerous, ecorticate, or with pseudoparenchymatous cortex or completely pseudoparenchymatous, with *Nostoc*. Apothecia varying from apparent perithecia to typical apothecia, partly immersed or sessile, usually lecanorine, rarely biatorine. parathecium present or absent; paraphyses simple; asci 8-spored; ascospores hyaline, spherical to acicular, straight or curved, unicellular to muriform, thin-walled (except in *Physma*).

PHYSMA Mass.

Physma Mass., Neag. Lich., 6; 1854.

Dichodium Nyl., Bull. Soc. Linn. Normand. II., 2, 43; 1868.

Type: *Collema Boryanum* Pers. in Gaudich. *Dichodium* was based on *Collema reflectens* Nyl.

Thallus foliose, usually radiately lobed, attached by rhizinae; cortex pseudoparenchymatous, usually of several layers of cells; algae *Nostoc* in chains of moniliform cells in a gel filling the space between the upper and lower cortex. Apothecia lecanorine with broad disc; amphithecium thick; hypothecium hyaline, paraphyses simple, filiform; ascospores hyaline, ellipsoid to fusiform, unicellular, thick-walled, often minutely verrucose (as in Pannariaceae). Spermogonia immersed, often visible as blackish warts, wall hyaline, pseudoparenchymatous; spermatiophores closely septate, simple or forked; spermatia short, straight.

PHYSMA KERGUELENSE Dodge, sp. nov.

Type: Kerguelen, near Port Jeanne d'Arc, 1400 ft., B.A.N.Z.A.R.E. B200–2.

Thallus parvus, umbilicatus, obscure olivaceus, opacus, centro 75μ crassitudine, ad 50μ margine tenuescens; cortex superior inferiorque 8–10μ crassitudine, stratis duobus cellularum isodiametricarum subangularium; rhizinae in centro thalli, marginibus nudis, hyphis 110–120 × 4μ pachydermeis, septatis; apothecia non visa.

Thallus small, umbilicate, dark olive, surface dull, 75μ thick over the central portion thinning to about 50μ at the margin; upper and lower cortex 8–10μ thick, of about two layers of isodiametric somewhat angular cells; rest of the thallus a gel filled by filaments of *Nostoc* and hyphae confined to strands between the colonies of *Nostoc* (reminding one of conditions in the Pyrenopsidaceae); rhizinae over the central portion of the thallus, margins nude, composed of very long, thick-walled septate hyphae 110–120 × 4μ. Apothecia not seen.

I have hesitated to describe this sterile, somewhat fragmented group of thalli. At first I thought they might belong in the section *Mallotium* of *Leptogium*, but in all but one of the species of that section which I have seen, the cortex consists of a single layer of isodiametric cells as is general in that genus except in section *Pseudoleptogium* (where lower cortex is filamentous) and *Homodium* (where whole thallus is pseudoparenchymatous). *Physma* is much more common in Australasia. Krempelhuber (Reise Novara 128, 1870) lists *Leptogium* (*Mallotium*) *Burgessii* (Lightf.) Mont., a Scottish species, from St. Paul without description.

Growing over mosses and old thallus of *Steinera glaucella* along with *Mykoblastus stephanodes*.

Kerguelen: near Port Jeanne d'Arc, 1,400 ft., B.A.N.Z.A.R.E. B200–2.

HEPPIACEAE.

Thallus squamose, microphylline to almost fruticose, with a well developed hypothallus, with rhizinae or with a central holdfast; homoeomerous, or more or less heteromerous, mostly of large-celled pseudoparenchyma; algae Myxophyceae. Apothecia immersed in the thallus, parathecium little developed; paraphyses simple; ascospores hyaline, unicellular to muriform, ellipsoidal to spherical; spermatiophores not septate, spermatia short, straight.

Heppia Naeg.

Heppia Naeg. in Hepp, Flecht. Eur., 49; 1853. nom. nud.: in Mass., Geneac. Lich., 7; 1854.

Type: *Heppia urceolata* Naeg. in Hepp.

Thallus subfoliose, closely adherent to the substrate, somewhat imbricate, homoeomerous, pseudoparenchymatous, with colonies of algae in the interstices; apothecia immersed, urceolate; parathecium absent or evanescent; paraphyses unbranched, septate; asci clavate normally 8-spored (many spored in sect. *Heterina* Vainio); ascospores unicellular, hyaline, ellipsoidal to spherical with thin walls; spermogonia immersed, spermatia ellipsoidal, straight.

A widely distributed genus, mostly in the warmer, dryer areas, not previously reported from the Antarctic. Our single species belongs in the section *Peltula* Vainio. In some ways it also suggests *Fernaldia* Lynge, Medd. om Groenland, 118, 8, 23–25; 1937, but the parathecium is not so highly developed, nor is the symbiont *Nostoc*.

Heppia antarctica Dodge, sp. nov.

Type: MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. B103–3.

Thallus ad 2 cm. diametro, hypothallo alutaceo in locis umbrosis, vel brunneo-olivaceo in locis insolatis, marginibus laevibus, determinatis, fibrosis, areolis assimilativis 0·1–0·2 mm. diametro, subsphaericis, ad margines hypothalli subsparsis vel ad 0·5 mm. diametro, subapplanatis, cerebriformibusve in centro confertis, albido-alutaceis in locis umbrosis, vel brunneo-olivaceis in locis insolatis; hypothallo ca. 100μ crassitudine, hyphis conglutinatis, fuscis, pachydermeis, ca. 4μ diametro, exteris dilutioribus; areolae assimilantes juventute corticatae, cellulis isodiametricis (ut in *Leptogio*), maturitate cortice evanescente; algae *Stigonema*, filamentis ca. 15μ diametro, brevibus, in coloniis parvis, a trabeculis ex hyphis tenuibus medullaribus separ-

atis. Apothecia in areolis assimilantibus immersis, disco thallo concolore; amphithecium paratheciumque desunt; hypothecium vix distinctum, hyphis subverticalibus; thecium ad 35μ altitudine; paraphyses tenues, septatae, bis dichotomae super ascos, ramis submoniliformibus; asci clavati, apice incrassato, ca. 30 × 8μ; ascosporae octonae, hyalinae, longe ellipsoideae, circiter 8 × 3μ.

Thallus covering areas up to 2 cm. in diameter, hypothallus cartridge buff in shaded areas, shading to brownish olive in exposed portions, margin smooth, determinate, fibrous, assimilative areoles 0·1–0·2 mm., subspherical and somewhat scattered near the margin, to 0·5 mm., somewhat flattened and cerebriform, densely crowded in the centre, cream buff to chamois in shaded portions, brown olive in exposed portions; hypothallus about 100μ thick, of conglutinate dark brown, thick-walled hyphae, about 4μ in diameter in interwoven strands, agglutinate to the substrate below, the outer hyphae somewhat lighter; assimilative areoles corticate with a single layer of isodiametric cells when young (as in *Leptogium*), disappearing at maturity; algae filling the areole when young the colonies separated by narrow plates of slender, hyaline, medullary hyphae, forming a layer about 15μ thick at the surface, of hyaline, thin-walled, more or less isodiametric cells; colonies variable in size and shape, evidently *Stigonema*, but filaments short in the larger colonies, with only a few cells in the smaller colonies; filaments about 15μ in diameter, cells of varying length in the older portions, much smaller in the rapidly growing younger portions.

Apothecia immersed in the assimilative areoles, disc concolorous [the single fertile areole looks like a convex biatorine apothecium] amphithecium and parathecium not differentiated; hypothecium scarcely differentiated, of hyaline, subvertical hyphae, continuous with the medullary hyphae, resting on algal colonies; thecium about 35μ tall; paraphyses slender, closely septate, about twice dichotomous above the asci, branches submoniliform, imbedded in the thecial gel; asci clavate, tips slightly thickened and protoplasts mammillate when young, about 30 × 8μ, 8-spored; ascospores hyaline, long ellipsoidal, about 8 × 3μ.

On granite, with *Toninia Johnstoni*, *Umbilicaria Hunteri*, *Charcotia cerebriformis*, *Lecanora exsulans* and its v. *minor*, *Thamnolecania Mawsoni* and *Parmelia Johnstoni*.

King George V Land: Cape Denison, A.A.E. 121, 122, 123, 124; B.A.N.Z.A.R.E. B536–1, 536–2, 536–3, 536–4, 536–5.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. B108–2, B108–3, type.

Another sterile thallus with *Stigonema* from MacRobertson Land, growing over dead mosses, without reproductive organs may be another *Heppia* sp.

PANNARIACEAE.

Thallus squamose or foliose, not gelified; hypothallus and rhizinae usually highly developed, heteromerous; cortex of erect, irregular, or periclinal hyphae (absent in *Leprocollema*), usually more or less pseudoparenchymatous; medulla usually well developed; with *Nostoc*, *Scytonema*, or *Dactylococcus* algae; lower cortex of thick-walled, periclinal hyphae, often thin or wholly absent. Apothecia marginal or scattered over the upper surface, biatorine or lecanorine; paraphyses unbranched; asci 8-spored; ascospores hyaline, unicellular, rarely 2–4-celled; spermatia short, straight.

Ecorticate, homoeomerous or nearly so .. .. *Leprocollema*

Upper cortex pseudoparenchymatous from more or less vertical hyphae; medulla of loosely woven hyphae .. .. *Pannaria*

Upper cortex of septate periclinal hyphae which may simulate pseudoparenchyma; medulla of periclinal, conglutinate hyphae, appearing pseudoparenchymatous .. *Coccocarpia*

LEPROCOLLEMA Vainio

Leprocollema Vainio, Etude Lich. Brésil, 1, 232; 1890.

Type: *L. americanum* Vainio.

Thallus crustose, homoeomerous, ecorticate, of colonies of *Nostoc*, separated by a few thin-walled hyphae. Apothecia sessile, biatorine or sublecideine; parathecium pseudoparenchymatous; ascospores ellipsoidal, unicellular, hyaline.

This genus has previously been known only from Brazil and New Caledonia, but it is so very inconspicuous that it may have been overlooked in other localities. The systematic relationship is problematical. It was placed in the Collemaceae by its author and by Zahlbruckner, while Reinke, Jahrb. Wiss. Bot., 28, 236–238; 1895 and A. L. Smith who added a new species (Jour. Linn. Soc. Bot., 46, 78; 1926) have placed it in the Pannariaceae. Our species certainly has the peculiar spores of the Pannariaceae, although it must be admitted that the thallus is a very primitive structure, consisting of almost discrete colonies of *Nostoc* with a thick, brownish sheath, with so few cells that the colonies might almost be mistaken for *Xanthocapsa*.

A. H. Magnusson, Hedwigia 78, 219–221; 1938, describes *L. europaeum*, adding notes on the type of *L. americanum* Vaino and calls attention to a group of species in *Parmeliella* centring about *P. deficiens* (Nyl.) Zahlbr. which have a similarly reduced thallus. He remains non-committal as to the systematic position of the genus.

LEPROCOLLEMA OBSCURIUS (Nyl.) Dodge, comb. nov.

Pannaria obscurior Nyl. in Crombie, Jour. Bot. Brit. For., 13, 334; 1875. Jour. Linn. Soc. Bot., 15, 183; 1876. Phil. Trans. Roy. Soc. [London], 168, 48; 1879. Rept. Sci. Results Voy. "Challenger" Bot. 1, 2, 234; 1885.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.) on ground among decayed mosses associated with *Psoroma hirsutulum*, not seen.

Thallus crustose, very dark green to black, covering small areas of the sides of a pebble coated with a film of mud, subareolate, areoles about 0·1 mm. in diameter; ecorticate, homoeomerous; algae of discrete or somewhat concrescent colonies of *Nostoc*, sheath relatively thin and not very distinct in the interior of the thallus, forming more or less spherical colonies about 30μ in diameter, with a thick yellow brown sheath at the surface, where they have not yet been invaded by the hyphae. [These free-living colonies are intermingled with short filaments of *Scytonema* and perhaps other genera of Myxophyceae]. Hypothallus not seen.

Apothecia black, sessile, 0·1–0·4 mm. in diameter, disc urceolate at first, becoming plane; parathecium about 120μ thick at the side of the thecium, carbonaceous above, extending under the hypothecium as a layer of small-celled pseudoparenchyma, about 75μ thick, enclosing small rock crystals and making sections difficult to cut; hypothecium about 50μ thick in the centre, thinning toward the margin, of slender, conglutinate, deeply staining, septate hyphae, more or less subvertical in the centre, becoming increasingly periclinal toward the margin; thecium 130–140μ tall; paraphyses slender, sparingly septate; tips not thickened, relatively few in the thecial gel; asci about 85 $\times$ 15μ, tips conspicuously thickened when young, 8-spored; ascospores monostichous below, distichous above, long ellipsoidal, ends rather acute in the ascus, becoming relatively shorter and broader with more rounded ends when free, 15–26 $\times$ 9·8–7μ, wall about 2μ thick, roughened, both without and within.

As is often the case when spores show considerable variation in linear dimensions, the spore volume is nearly a constant, as the shorter lengths are correlated with the broader diameters.

While Nylander's description is extremely brief and in terms of *Pannaria brunnea* (Sw.) Mass., our material agrees well with such statements as he gives in conjunction with his description of *P. brunnea* (Lich. Scand., 123; 1861).

On rock with *Aspiciliopsis macrophthalma*.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–50.

PANNARIA Del.

Pannaria Del. in Bory, Dict. Class. Hist. Nat., 13, 30; 1828.

Type: *P. rubiginosa* (Thunb. in Ach.) Del. in Bory.

Thallus granular, squamulose to foliose with a well developed bluish black or black hypothallus, rarely with dark, more or less tangled rhizinae below, heteromerous; upper cortex of large-celled pseudoparenchyma formed from a palisade of hyphae; algae *Nostoc*; medulla uniform and arachnoid, or with the upper portion of periclinal thin-walled, loosely woven hyphae, and the lower portion of densely tangled hyphae; without lower cortex. Apothecia at first sunk in the thallus, finally sessile or peltate, superficial; amphithecium pseudoparenchymatous, with a few algae in the centre; hypothecium hyaline; asci clavate, 8-spored; ascospores hyaline, elongate, ellipsoid, to almost fusiform with a somewhat thickened and finely verrucose wall. Spermogonia in hemispherical warts, spermatiophores septate with short, broad cells; spermatia straight or very slightly curved, elongate, cylindrical.

PANNARIA DICHROA (Hook. f. & Taylor), Crombie.

Pannaria dichroa (Hook. f. & Tayl.) Crombie, Jour. Linn. Soc. Bot., 16, 220; 1876. Jour. Bot. Brit. For., 15, 106; 1877. Phil. Trans. Roy. Soc. [London], 168, 48; 1879 Rept. Sci. Res. Voy. "Challenger" Bot., 1, 2, 234; 1885.

Lecanora dichroa Hook. f. & Tayl., London Jour. Bot., 3, 643; 1844.

Lecanora melanaspis Bab. in Hook. f., Crypt. Antarct., 230; 1845. Fl. Antarct., 2, 536; 1847 non Ach.

Pannaria Taylori Tuck., Bull. Torrey Bot. Club, 6, 57; Oct., 1875. Bull. U.S. Nat. Mus., 3, 28; 1876.

Pannaria placodiopsis Nyl. in Crombie, Jour. Bot. Brit. For., 13, 334; Nov., 1875. Jour. Linn. Soc. Bot., 15, 183; 1876.

Type: Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. Type of *P. Taylori*, same locality and collector, on rock with *Placodium elegans* in Tuckerman Herb., scanty so not sectioned; type of *P. placodiopsis*, Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus up to 5 cm. in diameter, adnate to the substrate, centre somewhat areolate, verrucose; margin lobed, lobes contiguous, convex, cuneate, di- or tri-chotomously branched, about 5 mm. long, incised crenate, ultimate lobules about 1 mm. broad, isabella colour to ochraceous, surface dull, occasionally tops of verrucae broken off from handling, but no true isidia nor soredia; upper cortex 75–80μ thick, of large, thin-walled, polyhedral cells, up to 15μ in diameter, irregularly arranged; algal cells probably *Nostoc*, mostly in perpendicular rows with some discrete, more or less fusiform colonies, cells mostly 6–7μ in diameter; medullary hyphae thin-walled, up to 6–7μ in diameter, mostly parallel between rows of algal cells; without distinct lower cortex or rhizinae. Apothecia up to 3 mm. in diameter, crowded in the central portion of the thallus, somewhat elevated, constricted at the base; urceolate at first, with thick, involute

margin, disc soon plane, cinnamon rufous at first, then chestnut brown; amphithecium 250μ thick, extending over the disc; cortex 35–40μ thick; algal layer as in the thallus; parathecium 35–55μ thick, of slender periclinal hyphae extending part way under the hypothecium and merging with the medullary and algal tissues; hypothecium about 75μ thick, thinning to about 35μ near the margin, of slender, densely woven hyphae; thecium 150–170μ tall; paraphyses simple, 3–4·5μ in diameter, septate, tips moniliform, epithecium brownish, gelified; asci cylindric, 8-spored, tip rounded, about 110 × 10μ; ascospores monostichous, ellipsoidal, wall thick, smooth without, roughened within, 12–18 × 9–11μ.

On rocks with *Xanthoporina kerguelensis, Steinera Werthii, Lecidea phaeostoma, L. superjecta, Catillaria basaltica, Pertusaria crozetica* and *Buellia subplicata.*

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–3, B20–5.

Kerguelen: Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") type, in Taylor Herbarium, type of *P. Taylori* in Tuck. Herb. both at Farlow Herb., Harvard Univ.

Heard Island: Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–11, B140–12.

Pannaria sp.

A very small, young thallus among mosses may belong here. It has the general anatomy of *Pannaria,* but the cortex is less developed and is covered by the gelified remains of a tomentum. The algae fill nearly the whole thickness of the thallus.

Macquarie Island: north end, B.A.N.Z.A.R.E. B540–4.

Coccocarpia Pers.

Coccocarpia Pers. ap. Gaudichaud, in Freycinet, Voy. "Uranie" Bot., 206; 1826.

Type: *Coccocarpia molybdaea* Pers. ap. Gaudich.

Thallus squamose to foliose with dark or light coloured rhizinae, corticate on both surfaces; upper cortex pseudoparenchymatous from thin-walled, large periclinal hyphae, without tomentum; algal layer of coiled chains of *Scytonema* in thin sheaths; medulla of thin-walled, somewhat conglutinate hyphae not sharply differentiated from the lower cortex of more or less septate, periclinal hyphae. Apothecia superficial, sessile or somewhat constricted below; amphithecium absent; parathecium corticate of large-celled pseudoparenchyma, with large septate periclinal hyphae within; medulla lacking; hypothecium light or dark; asci 8-spored; ascospores hyaline, unicellular, spherical to ellipsoidal-fusiform, thin-walled. Spermogonia in warts on the thallus, spermatiophores frequently septate; spermatia straight, elongate-cylindric.

Coccocarpia kerguelensis Dodge, sp. nov.

Type: Kerguelen, Observatory Bay, B.A.N.Z.A.R.E. B192–1.

Thallus foliosus, ad 2 cm. diametro, centro plus minusve areolatus, rimis radiantibus, lobis cuneatis incisis, griseo-olivaceus, non nitidus, sine isidiis sorediisque; hypothallus non bene evolutus; thallus 175μ crassitudine; cortex 7–10μ crassitudine, hyphis periclinalibus; stratum gonimicum 100–160μ crassitudine, filamentibus scytonematum et hyphis verticalibus septatis 4μ diametro, cellulis 8–10μ longitudine; medulla compacta, funiculis hypharum dense intertexta; cortex inferior 7–10μ crassitudine hyphis periclinalibus septatis.

Thallus foliose, up to 2 cm. in diameter, centre more or less areolate, cracks principally radial, marginal lobes cuneate incised, grayish olive, surface dull, without soredia or isidia; hypothallus not highly developed; thallus 175μ thick; cortex 7–10μ thick, of periclinal hyphae; algal layer

100–160μ thick, a palisade of algal filaments separated by fungus pseudoparenchyma, formed of vertical septate hyphae, about 4μ in diameter, cells about 8–10μ long; medulla a network of strands of somewhat smaller hyphae; lower cortex black, appearing pseudoparenchymatous from periclinal hyphae, 7–10μ thick, giving rise to rhizinae below. Apothecia not seen.

The systematic position of this species is somewhat doubtful as no reproductive structures have been seen; the thalline structure of *Coccocarpia,* however, is characteristic enough to warrant description at this time.

On rock with *Verrucaria obfuscata* and *Coccotrema kerguelensis.*

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–1; Murray Island, small cave about 10 ft. above shore, possibly lashed by higher sprays, B.A.N.Z.A.R.E.; Macquarie Island, B.A.N.Z.A.R.E., B530–4.

PSOROMA Ach.

Psoroma Ach. emend. Nyl., Mém. Soc. Imp. Sci. Nat. Cherbourg, 3, 175; 1855.

Lichen sect. *Psoroma* Ach., Lichenogr. Suec. Prodr., 91; 1798.

Psoroma Ach. in Michx., Fl. Bor-Amer., 2, 321; 1803; quoad descr. generica; Gray, Nat. Arr. Brit., Pl. 1, 444; 1821.

Parmelia sect. *Psoroma* Ach., Meth. Lich., 181; 1803.

Lecanora sect. *Psoroma* Ach., Lichenogr. Univ., 406; 1810.

Zeora sect. *Psoroma* Fw., Jahresber. Schles. Ges. Vaterl. Kultur, 27, 120; 1849.

Pannaria sect. *Psoroma* Stzbgr., Ber. Thätigk. St. Gall. Naturw., Ges., 172; 1862.

Placodium sect. *Psoroma* Müll.-Arg., Mém. Soc. Phys. Hist. Nat. Genève, 16, 377; 1862.

Type: Michaux, the first to use *Psoroma* unequivocally as a generic name, attributing it to Acharius, repeated verbatim Acharius' description of *Lichen* (*tribus 10*) *Psoroma* and evidently considered *Psoroma microphylla* (Sw.) now placed in *Parmeliella,* as typical of the genus. He also described *P. palmulata* as new but "propter quandam habitus affinitatem cum *P. microphylla,* ad hoc genus refero; forsan potius inter PLACODIA recensenda", hence *P. palmulata* should not be taken as the type, although it is the only one described in detail in Michaux' work. If *P. microphylla* is taken as the type, *Psoroma* would replace *Parmeliella* Müll.-Arg., producing much confusion of nomenclature.

In 1798, Acharius treated 11 Swedish species and lists 14 others not Swedish, which he may have known only from the literature. In 1803, he transferred to *Parmelia* sect. *Psoroma* four Swedish species and five others, one doubtfully, adding five new ones, abbreviating the sectional description and transferring the rest of the Swedish species to *Lecidea* sect. *Lepidoma.* In 1810, when Acharius transferred the section to *Lecanora,* he retained all these species of the 1803 treatment, transferring three of the 1798 treatment back from *Lecidea* sect. *Lepidoma* besides adding new ones. In 1814, he retained the 1803 treatment of the original species, although making some changes in other species of the 1810 treatment. Hence we have to consider: *Lichen Hypnorum, L. candelarius, L. squamulosus, L. cartilagineus, L. crassus, L. chrysoleucos,* and *L. rubinus,* in choosing a type.

In 1821, Gray again raised *Psoroma* to generic rank, treating *P. crassum, P. candelarium* and *P. Hypnorum* of the original Acharian concept and *L. squamulosus* Schrad. as a synonym of his *P. cervinus* (Pers.) instead of *Lichen badius* Ach. non Pers. where Acharius had placed it. In 1855, Nylander restricted the genus to the present concept, treating *P. Hypnorum, P. sphinctrinum* (Mont.) and *P. palaceum* (Fr.). Since *Lichen Hypnorum* Vahl is common to all treatments

of *Psoroma* as a section by Acharius and later authors and to *Psoroma* Gray and Nylander and implied by Michaux although not expressed, it may be chosen to conserve *Psoroma* in its present usage, without conflict to historical principles of nomenclature. Since Michaux added nothing to Acharius' treatment as a section nor intended to give a complete treatment of the group, to select *P. microphylla* (Sw.) Michx. would replace *Parmeliella* by *Psoroma*, or to select *P. palmulata* Michx. would replace *Anaptychia* Mass. by *Psoroma*, either course resulting in much confusion of nomenclature.

Thallus squamose to somewhat foliose, rhizinae slightly developed or absent; heteromerous, without tomentum, upper cortex of vertical septate hyphae forming a pseudoparenchyma, rarely of irregularly arranged hyphae; algae *Dactylococcus ?*; medulla loose; lower cortex of periclinal hyphae. Apothecia sessile, lecanorine, constricted at the base; hypothecium hyaline; paraphyses usually simple; ascospores unicellular, spherical to ellipsoidal, thin-walled; spermatiophores septate; spermatia short, straight.

Psoroma hirsutulum Nyl.

Psoroma hirsutulum Nyl. in Crombie, Jour. Bot. Brit. For., 13, 333; 1875. Jour. Linn. Soc. Bot., 15, 184; 1876. Phil. Trans. Roy. Soc. [London], 168, 48; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 234; 1885. Bouly de Lesdain, Ann. Crypt. Exot., 4, 100; 1931.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.) on mosses and decayed stems of *Acaena*.

Thallus little developed between the apothecia; apothecia crowded, reddish brown, concave, 1–2 mm. in diameter, amphithecium densely whitish hirsute or woolly; ascospores 16–21 × 9–14μ.

We have seen no material referable here. There seems little to distinguish this species from *Lecanora broccha* Nyl. except the larger spores, since the latter may belong in *Psoroma*.

Psoroma versicolor Müll.-Arg.

Psoroma versicolor Müll.-Arg., Flora, 71, 538; 1888.

Lecanora versicolor Hook. f. & Tayl., London Jour. Bot., 3, 642; 1844 non Ach.

Type: Lord Auckland's group, J. D. Hooker (Voy. "Erebus & Terror") [on old wood *fide* Müller-Argau].

Thallus of concrescent squamules, growing over tops of mosses, surface smooth or minutely granular, margin subeffigurate, of short rounded lobes about 1 mm. broad, yellowish glaucous; cortex 35–50μ thick, of fastigiate hyphae, 8μ, lumen 1μ in diameter, branched and anastomosing (the deeply staining lumina forming a reticulum which might be mistaken for boundaries of pseudoparenchymatous cells), partially conglutinate; algal layer about 70μ thick, of subspherical colonies and single cells 8μ in diameter, separated by strands of closely woven medullary hyphae; medulla about 50μ thick, of more loosely woven, subvertical hyphae 6–7μ in diameter, very thick-walled, somewhat more periclinal below between the rhizinal hyphae, but not forming a cortex.

Apothecia very numerous, about 1·5 mm. in diameter, constricted below, margins inrolled, smooth concolorous with the thallus, disc very concave, buffy olive or darker; amphithecium 200μ thick below, thinning to 100μ thick above, cortex 50μ thick, of the same structure as that of the thallus, but the hyphae slightly more slender and less anastomosed, thinning rapidly at the top; algal layer filling the rest of the amphithecium, in less compact colonies above, more scattered, solitary cells below and disappearing under the hypothecium; hypothecium 40μ thick below thinning to 20μ at the edges, of conglutinate, hyaline, periclinal hyphae, not otherwise differentiated from the medulla; thecium 130μ tall; paraphyses about 1μ in diameter, unbranched or

once dichotomous above the asci, tips not enlarged; asci cylindric, about $90 \times 15\mu$, tip not thickened; ascospores unicellular, long ellipsoidal, about $15 \times 6\mu$ while still in the ascus, with a broad sheath about 2μ thick, thinning when free and becoming $18 \times 7\mu$ (sheath included in both measurements).

Spermogonia oblately sphaeroidal, about 250μ in diameter, 150μ tall, brown; wall formed by the outgrowth of cortical hyphae which become slender and periclinal and increasingly brown toward the top, 20μ thick; spermatiophores 1μ or less in diameter, about 25μ long, branched at the base; spermatia curved, somewhat crescent shaped, $6–8 \times 1\mu$.

The structure of the thallus is clearly that of *Psoroma* as is also the structure of the apothecium with the tendency of the algae to disappear from the older parts of the amphithecium. Externally the spermogonia are suggestive of *Cetraria* and *Aspidelia*, being marginal in elevated structures, while the spermatiophores and spermatia resemble those of *Lecanora*, rather than the type usual in *Psoroma*. The habit of the apothecia resembles that of the Parmeliaceae.

Macquarie Island: Featherbed Flat, B.A.N.Z.A.R.E. B531–4, B531–5.

THELIDEA Hue.

Thelidea Hue, Bull. Soc. Bot. France 48: lxi. 1901.

Type: *T. corrugata* Hue.

Thallus erect, foliose, upper surface corticate, of more or less erect, septate hyphae; algae Palmellaceae ?; ecorticate below. Apothecia biatorine; ascospores hyaline, 2-celled.

The systematic position of this genus is uncertain. Hue made a separate tribe, the Thelideae; Zahlbruckner treats it with the Pannariaceae, but of uncertain position. Our material adds nothing to clear up the uncertainty. The type is known only from Campbell Island.

THELIDEA sp.

Thallus more or less erect, about 8 mm. tall and 10 mm. broad, somewhat flabellate, margin variously lacerate and subdigitate, olive yellow, surface minutely granulate and slightly corrugate; upper cortex about 25μ thick, fastigiate, of coarse, occasionally branched, highly gelified hyphae, lumen less than 1μ in diameter; algal layer about 35μ thick, of hemispheric colonies, separated by strands 10μ thick of medullary hyphae, cells spherical, $7–8\mu$ in diameter, palmelloid; medulla $110–120\mu$ thick, loosely woven, of hyaline, very thick-walled hyphae, 6μ in diameter, lumen 1μ or less, slightly more closely woven below but not developing a lower cortex; provided with a rooting base. Reproductive structures not seen.

The anatomy of the thallus is somewhat intermediate between that of *Psoroma versicolor* (Hook. f. & Tayl.) Müll.-Arg. and *Thelidea corrugata* Hue. In the cortex, the hyphae are less branched and anastomosed than in the former, but are not moniliform as in the latter. The identification of the algae is uncertain. Hue referred the yellowish green algae of *Thelidea corrugata* to *Palmella*, but Bornet was uncertain, while those of *Psoroma* are protococcoid. In our material, the algae are quite yellowish, but occur as single cells with a relatively thick wall. The chloroplast is quite unfamiliar to me, but resembles those figured for the Palmellaceae more than those of the Protococcaceae. In habit our plant might be taken for a small, yellowish *Cetraria* until it is sectioned.

Growing among mosses.

Macquarie Island: north end, B.A.N.Z.A.R.E. B540–5.

STICTACEAE.

Thallus foliose, appressed, or with ascending margins, tending to be attached at a single point, then somewhat erect and subfruticose with a more or less well developed system of rhizoids below; cortex on both surfaces, usually pseudoparenchymatous, often with a tomentogenous layer more or less developed on both surfaces; algae protococcoid or Nostocaceous, medulla arachnoid; the lower cortex, rarely the upper instead, abundantly pierced by a more or less highly developed system of pores or cracks to facilitate respiration.

Apothecia hemiangiocarpous, scattered over the upper surface or marginal, sessile or somewhat stalked, with a cortex of large-celled pseudoparenchyma and a medulla, either with or without algae; paraphyses well developed, unbranched, septate, tips often slightly clavate, ending in a coloured epithecial gel; ascospores fusiform to acicular, 2– to several-celled.

Spermogonia marginal, spermatia short, straight; stylospores rare.

Only a single genus, *Pseudocyphellaria* has been found in our area.

PSEUDOCYPHELLARIA Vainio.

Pseudocyphellaria Vainio, Etude Lich. Brésil, 1, 182; 1890.

? *Crocodia* Link, Grundriss der Kräuterkunde, 3, 177; 1833.

Sticta Clements & Shear, Gen. Fungi, 322; 1931 *non aliorum.*

Type: none mentioned by Vainio who includes *P. aurata* and *P. aurora.* Since *P. aurata* (Ach.) Vainio is the more widespread, older and better known species, it may be taken as the type. Clements & Shear selected this species as the type of *Sticta* Schreb., although it does not fit Schreber's description which calls for white cyphellae, while *S. aurata* has yellow pseudocyphellae. It was not described until 1803, so that it cannot have entered into the concept of the genus by any of the earlier authors. They also imply that the species has brown 2-celled spores, if it is to be typical of their genus *Sticta,* although in the large numbers of specimens of this species which I have seen, I have never found it fertile. It seems likely that they obtained their information from Tuckerman's *Synopsis* where he mentions that Cuban and Brazilian specimens (which he doubtfully referred to this species and which all belong to *S. clathrata*) have such spores. Judging from Zahlbruckner's Catalogue, this genus should probably be called *Crocodia* which was apparently based on *Sticta aurata* Ach., but I hesitate to change existing nomenclature without a study of Link's original description, which has not been available.

Thallus foliose, ascending or rarely appressed, both upper and lower cortex of pseudoparenchyma, with pseudocyphellae and rhizinae below.

This genus is predominantly found in the southern hemisphere with comparatively few species in the American tropics.

PSEUDOCYPHELLARIA GLABRA Dodge, comb. nov.

Sticta glabra Hook. f. & Tayl., London Jour. Bot., 3, 647; 1844.

Sticta Freycinetii Hook. f. & Tayl., Crypt. Antarct., 86; 1845. *non al.*

Sticta Freycinetii v. *glabrescens* Müll.-Arg., Flora 66, 23; 1883.

Type: none designated, specimens mentioned from Lord Auckland's group, Campbell Island, Falkland Islands, Cape Horn and Tasmania. J. D. Hooker later noted that this species was a mixture of *S. Freycinetii* and *S. Delisea.* If I interpret the handwriting correctly, Tuckerman did not annotate the specimens in Taylor's herbarium, although the handwriting is intermediate between that of Taylor and of Tuckerman in several particulars. The material is very variable in external appearance. One specimen from Lord Auckland's group has very narrow

linear lobes 3 mm. wide and large, black, marginal apothecia about 3 mm. in diameter. This is so aberrant from the other members that we can disregard it in selecting the type. Perhaps it is *S. homoeophylla* Nyl. Hooker & Taylor note that the specimens from the Falkland Islands have very wide lobes, and since they consider these specimens aberrant, we can eliminate them, although they happen to be the only ones studied by Müller-Argau in 1887 who referred them to *S. Freycinetii*. No. 1307 [or 1317] from Van Diemen's Land (= Tasmania) is aberrant from all the others in having a scrobiculate thallus and much shallower lobing (cf. *S. psilophylla* Müll.-Arg.). The specimen collected by J. D. Hooker Aug. 24, 1840 in Van Diemen's Land is very close to *S. Delisea* as figured by Delise from the type in King Island. The specimens collected by Gunn from Tasmania are rather poor and ambiguous but apparently are *S. Delisea*, referred by Müller-Argau to *S. Freycinetii* var. *prolifera* Müll.-Arg. Müller-Argau refers the Cape Horn material to *S. Freycinetii* var. *fulvo-cinerea* (Mont.) Nyl. This leaves a residue of specimens from Lord Auckland's group and Campbell Island which are fairly uniform in appearance. Of these, that "from Lord Auckland's group, J. D. Hooker [Nov. 20–Dec. 12, 1840, sent Taylor in] 1844" may be considered the type as it is the best developed and most fertile. The following description is based on the broader specimen with notes on two specimens from Campbell Island. Our material from Macquarie Island has the measurements of the material from Campbell Island. *S. Freycinetii* var. *glabrescens* was based on duplicate collections from Auckland and Campbell Islands, J. D. Hooker (not the specimens in Taylor's herbarium) and a specimen from New Zealand, Lyall.

Thallus large, lobes very irregular, rounded, margins crisped, smooth or crenulate, sometimes minutely so and appearing lacerate, (much less so than in *S. Delisea*) surface glabrous, smooth or slightly rugose, drying chamois, tinged orange cinnamon to warm sepia, very fragile, proliferating from broken edges and occasionally the margins, as flat isidioid lobules or as continuous bands of small soredia (while in *S. Delisea* the isidia are more terete and coralloid); below black in the centre, shading to cinnamon at the margins and tips; pseudocyphellae prominent, white, of medium size; upper cortex 25μ thick, of irregular thin-walled pseudoparenchyma, cells about 7–8μ in diameter; outer cells forming a tomentum at least under the apothecia; algal layer 35–40μ thick, protococcoid, cells 8–10μ in diameter; medulla about 100μ thick, of loosely woven, more or less periclinal, thin-walled hyphae about 3–4μ in diameter; lower cortex about 40–50μ thick, of brown, thick-walled, more or less periclinal pseudoparenchyma, cells 7–8μ in diameter, the outer layer very dark brown, giving rise to tufts and scattered septate rhizinae, 5–6μ in diameter, cells 8–11μ long.

Apothecia 3·5–4 mm. in diameter, disc concave, chestnut, exciple minutely tomentose, hairs short; amphithecial cortex about 65μ thick, of irregular pseudoparenchyma, protoplasts 7–8μ in diameter, outermost growing out as a fine short tomentum; algal layer 15–20μ thick, not well developed; medulla continuous with that of the thallus and of the same texture; parathecium brownish, 35–40μ thick, of densely woven periclinal hyphae; hypothecium not differentiated; thecium 80–90μ tall; paraphyses slender, septate, tips slightly clavate, epithecial gel not well developed nor coloured; asci cylindric, 55 $\times$ 15μ; ascospores hyaline, two-celled, ellipsoid, 20–22 $\times$ 7–8μ, apices obtuse.

Spermogonia 85μ tall, 120μ in diameter, wall not well developed; spermatiophores typical, spermatia ellipsoid, 1·5 $\times$ 2μ [in material from Campbell Island in Clinton Herb.].

The material from Campbell Island agrees well with the above, but the thallus is somewhat thicker and all dimensions larger, e.g. upper cortex 35–40μ thick; algal layer 35–40μ; medulla 140–150μ, lower cortex 35–40μ.

Lord Auckland Group: J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb., type.

Campbell Island, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. and Clinton Herb. at Buffalo Museum of Natural History.

Macquarie Island: B.A.N.Z.A.R.E. 1658–1, Featherbed Flat, B.A.N.Z.A.R.E. 531–6, 531–7; Highlands, B.A.N.Z.A.R.E. 534–3; north end, B.A.N.Z.A.R.E. 540–6, 540–7; top of hill, Wind Desert, H. Hamilton, A.A.E. 109.

PELTIGERACEAE.

Thallus foliose, heteromerous, corticate above and usually ecorticate below (except in *Nephroma*); cortex of large-celled pseudoparenchyma, several layers of cells thick; algae either *Palmella* or *Nostoc;* medulla of loosely woven, slender hyphae, veined below, with rhizinae. Apothecia innate, superficial or on the upper or lower surface of the margins of the lobes; parathecium little developed, hypothecium hyaline; paraphyses unbranched; asci (2–) 8-spored (many spored in *Solorinella*); ascospores hyaline (or brown in *Solorina*), ellipsoid, fusiform or acicular, 2 or more celled, thin-walled.

PELTIGERA Willd.

Peltigera Willd., Fl. Berol. Prodr., 347; 1787. Nyl., Naturaliste, 2, 387; 1884 [année 6].

Peltidia Ach. [as subgenus], K. Vetensk. Akad. Nya Handl., 15, 254; 1794.

Peltidea Ach., Meth. Lich., 282; 1803: [as sect. Duby, Bot. Gall., 2, 597; 1830. Vainio, Etude Lich. Brésil 1, 179; 1890].

Dermatodea St.-Hil., Expos. Fam. Nat., 20; 1805, p. p.

Peltophora Clements, Gen. Fung., 75; 1909.

Chloropeltis Clements, Gen. Fung., 75; 1909.

Type: *Peltigera* was based on *Lichen caninus* L., and its var. *rufescens* Weis and *L. aphthosus* L. Since the latter species may be segregated as *Peltidea* or *Chloropeltis*, we may consider *L. caninus* L. as the type, conserving the name for the most species, according to the usage of the last century, e.g. Nylander (1884). *Peltidea* both as subgenus and genus was based on *Lichen aphthosus* L., *L. venosus* L., *L. caninus* L., and *L. horizontalis* Huds., as well as two species later segregated as *Solorina*, and three later segregated as *Nephroma*. Vainio restricted *Peltidea*, as a subgenus, to species with *Dactylococcus* algae which would include *Lichen aphthosus* L., and *L. venosus* L. of the original usage. As Wallroth (Fl. Cryptog. Germ., 3, 556; 1831) used *Lichen venosus* L. as the type of his section *Phlebia* which might conceivably be raised to generic rank, we may consider *Lichen aphthosus* L. as the type of *Peltidea*. *Dermatodia* was based on *Lichen pulmonarius* [Dill.] L. and *L. caninus* [Dill.] L. Since the former is the type of *Lobaria* Hoffm. and the latter is the type of *Peltigera* Willd., both earlier names, *Dermatodea* can be permanently dropped. *Peltophora* Clements was a re-naming of species of *Peltigera* with *Nostoc* in violation of the International Rules of Nomenclature. *Chloropeltis* was based on *Lichen aphthosus* L.

Thallus foliose, margins (especially the fertile lobes) often ascending, attached to the substrate by fascicles of rhizinae, heteromerous, upper surface smooth or slightly cottony tomentose; upper cortex a palisade of large-celled, thin-walled pseudoparenchyma; algae *Nostoc* or *Dactylococcus;* medulla loosely woven, of thick-walled, sparingly septate, hyphae; ecorticate below with more or less well developed anastomosing veins, bearing tufts of rhizinae. Apothecia marginal on the upper surface of narrowed marginal lobes, innate, appearing sessile as the disc becomes convex; parathecium lacking, but margined by the torn remains of the upper cortex; hypothecium hyaline or brownish, pseudoparenchymatous; paraphyses unbranched, septate with thickened tips; asci 8-spored; ascospores hyaline or brownish, long ellipsoid to acicular, 4–8-celled, thin-walled.

PELTIGERA sp.

Thallus small and probably immature, 3 × 1·5 cm., surface very faintly scrobiculate and minutely short tomentose, smoke gray to isabella colour or darker, margins strongly ascending, shallowly sinuate, lobate and somewhat microphylline; below white, veins strongly elevated, bearing short, conical tufts of rhizinae, arachnoid between the veins; cortex 75μ thick, pseudoparenchymatous from a palisade, cells nearly isodiametric above, up to 12μ in diameter, more elongate below, 15–17 × 7–8μ, thin-walled; some of the cells growing out to form the thin-walled septate hyphae of the tomentum; algal layer 100–110μ thick, filaments predominantly periclinal, closely packed above, more scattered below, cells 5–6μ, somewhat ellipsoidal; medulla about 75μ thick, thinning toward the margins, of somewhat periclinal hyphae, 6μ in diameter with moderately thick walls, loosely woven, hyphae of the veins 7–8μ, parallel and conglutinate, growing out in fascicles of rhizinae which finally blacken. Apothecia not seen.

Only two small thalli growing over mosses have been seen in the material from Macquarie Island. Taylor in Hook. f. & Taylor, London Jour. Bot., 3, 650; 1844; Hook. f. & Taylor, Crypt. Antarct., 85; 1845, reports *P. polydactyla* Ach. from Lord Auckland's group, Campbell Island and Kerguelen.

Macquarie Island: B.A.N.Z.A.R.E. 1658–2; Featherbed Flat, B.A.N.Z.A.R.E. 532–1.

PELTIGERA sp.

Peltigera rufescens Wilson, Mém. Herb. Boissier, 18, 87; 1900 non (Weis) Humboldt.

Plants more or less erect among mosses in sandy soils, very fragile when dry, about 1·5 cm. tall, lobes about 5 mm. broad, margins inrolled, surface smooth and shining, drying Verona brown, underside tomentose without veins (as in *P. malacea*), light ochraceous salmon to light ochraceous buff; cortex 35μ thick, of thick-walled pseudoparenchyma, cells 10–15μ in diameter, apparently from periclinal hyphae; algal layer 100–200μ thick, of more or less confluent colonies of *Nostoc*; medullary layer of thick-walled, densely tangled hyphae, 8–9μ in diameter; lower cortex and veins absent. Apothecia not seen.

Kerguelen: Royal Sound, Robert Hall (3 collections in Nat. Herb. Melbourne Bot. Gard.)

OTHER SPECIES OF PELTIGERA REPORTED FOR KERGUELEN.

The following species have been reported from Kerguelen but no material of *Peltigera* was collected by the B.A.N.Z.A.R. Expedition in this region. As species concepts were rather broad and vague at the time these reports were made, and no characters of the Kerguelen plants were recorded, the specimens need restudy before we can be certain of identities.

Peltigera (Peltidea) venosa (L.) Baumg. doubtfully reported by Hook. f. & Taylor, London Jour. Bot., 3, 650; 1844. Hook. f., Crypt. Antarct., 219; 1845 from Christmas Harbour, was referred to *P. spuria* (Ach.) DC. [*P. rufescens* var. *spuria* (Ach.) Koerb.] by Crombie, Jour. Bot. Brit. For., 15, 103; 1877. Rept. Sci. Results Voy. "Challenger" Bot. 1, 2, 233; 1885.

Peltigera canina (L.) Willd., reported by Hook. f. & Taylor, London Jour. Bot., 3, 650; 1844 from Christmas Harbour was omitted by Hook. f., Crypt. Antarct. 1845.

Peltigera horizontalis (Huds.) Baumg., reported by Hook. f. & Taylor, London Jour. Bot., 3, 650; 1844: Crypt. Antarct., 219; 1845 from Christmas Harbour was referred to *P. polydactyla* var. *hymenina* (Ach.) Fw. by Crombie, Jour. Bot. Brit. For., 15, 104; 1877.

Peltigera polydactyla (Neck.) Hoffm., reported by Hook. f., Crypt. Antarct., 218; 1845 perhaps a redetermination of the *P. canina* cited above was referred to var. *hymenina* (Ach.) Fw. by Crombie, Jour. Bot. Brit. For., 15, 104; 1877. Rept. Sci. Results Voy. "Challenger" Bot. 1, 2, 234; 1885.

Var. *hymenina* (Ach.) Fw. Besides the two preceding, Crombie reports it from Observatory Bay, A. E. Eaton (Jour. Linn. Soc. Bot., 15, 183; 1876. Phil. Trans. Roy. Soc. [London], 168, 48; 1879) and from Marion Island, Moseley (Voy. "Challenger") in Jour. Linn. Soc. Bot., 16, 222; 1878. Rept. Sci. Results Voy. "Challenger" Bot. 1, 2, 203; 1885.

Peltigera rufescens (Weis) Humb. was reported by Bouly de Lesdain, Ann. Crypt. Exot., 4,100; 1931 from bay north of the isthmus at Port Jeanne d'Arc, Aubert de la Rue 6.

Peltigera scutata (Dicks.) Duby was reported by Müller-Argau, Bot. Jahrb. [Engler] 3,54; 1883 from Port Palliser, Betsy's Cove, Naumann (Voy. "Gazelle").

Peltigera spuria (Ach.) DC. Besides the J. D. Hooker material mentioned above under *P. venosa*, Crombie, Jour. Linn. Soc. Bot., 15, 183; 1876. Phil. Trans. Roy. Soc. [London], 168, 48; 1879, reports it from Swain's Bay, A. E. Eaton and Müller-Argau, Bot. Jahrb. [Engler] 3, 54; 1883 reports it from Betsy's Cove, Naumann (Voy. "Gazelle").

LECIDEACEAE.

Thallus crustose, simple or with effigurate margins, continuous, areolate to squamulose and dwarf fruticose (in *Sphaerophoropsis*), attached to the substrate by the hyphae of the hypothallus or of the medulla without differentiated rhizinae (except in *Psora*), often decorticate, ecorticate or with an incomplete cortex of fasciculate thick-walled hyphae, never pseudoparenchymatous; algal layer of *Protococcus*, rarely producing many cells in a colony before the colonial wall disappears; medulla loosely woven with the basal layer not differentiated or suggesting the structure of the upper cortex. Apothecia circular, sessile or rarely immersed, or with a very short stalk, parathecium hyaline or carbonaceous, not surrounded by an amphithecium nor including medullar tissue; paraphyses somewhat branched but not conspicuously so nor anastomosing; asci usually 8-spored (less than 8 in *Mykoblastus* and *Megalospora*) or with 16–32 in a few species of *Lecidea* and *Bacidia;* ascospores usually hyaline (becoming brown in *Rhizocarpon*) of a variable number of cells, with or without a gelified sheath. Spermogonia immersed; spermatia elongate-ellipsoidal to cylindrical, straight or slightly curved.

Spores unicellular
- Spores thin-walled, under 25μ long .. .. *Lecidea*
- Spores thick-walled, over 25μ long .. .. *Mykoblastus*

Spores 2-celled
- Thallus ecorticate, uniform
  - Parathecium and hypothecium hyaline .. .. *Biatorina*
  - Parathecium and often hypothecium carbonaceous .. .. *Catillaria*
- Thallus corticate, verrucose to squamulose .. .. *Thalloidima*

Spores 4– or more celled, fusiform to acicular
- Thallus ecorticate, uniform .. .. *Bacidia*
- Thallus corticate, verrucose to squamulose .. .. *Toninia*

Spores muriform, usually brown at maturity with a conspicuous sheath .. *Rhizocarpon*

LECIDEA Ach.

Lecidea Ach., Meth. Lich., 32; 1803.

Type: Acharius, in proposing the genus, treated 99 species in 4 subgenera, including species now in the Lecanoraceae as well as the Lecideaceae. The choice of a type may well be left to a monographer. Clements & Shear, Gen. Fung., 319; 1931, chose *L. enteroleuca* Ach., which was first described seven years after the genus was described!

Thallus crustose, simple, continuous, areolate, verrucose or squamulose (in sect. *Psora*), attached to the substrate by the hyphae of the hypothallus or of the medulla, without true rhizinae, ecorticate or with a thin cortex, sometimes sorediose, very rarely with true soralia or cephalodia; algae *Protococcus*. Apothecia round or angled by mutual pressure, exceptionally slightly elongate, immersed, sessile or with a very short stalk, with hyaline, coloured or black parathecium of closely woven hyphae which may or may not be continuous below the hypothecium, epithecium bright coloured or black; hypothecium hyaline; paraphyses inconspicuously branched but not anastomosing, with more or less thickened tips; asci usually 8-, rarely 16-spored; ascospores hyaline, unicellular, small, spherical, ovoid, ellipsoid or allantoid, straight or somewhat curved, usually with a thin wall. Spermogonia immersed, with a dark ostiole, spherical; spermatia short cylindric to filiform, straight or curved.

Key to species of Lecidea in Kerguelia.

Parathecium not continuous under the hypothecium
- Parathecium hyaline or bright coloured
  - Apothecia immersed (see *Aspicilia*).
  - Apothecia sessile
    - Ascospores 12–13 × 3–4μ; parathecium deep green; apothecia convex, almost immarginate .. .. *L. Sancti-Pauli*
    - Ascospores 11–15 × 6–7μ; parathecium hyaline; apothecia plane or somewhat concave .. .. *L. variatula*
    - Ascospores 14–15 × 10–11μ; parathecium slightly brownish; apothecia concave *L. Mawsoni*
- Parathecium carbonaceous, well developed
  - Apothecia innate, thallus whitish, K yellow then blood red; ascospores 10–12 × 7–8μ *L. subdisjunguenda*
  - Apothecia sessile
    - Thallus fuliginous, thecium yellowish; ascospores 8–10 × 7μ .. *L. asbolodes*
    - Thallus white or ashy
      - Thallus K–
        - Apothecia convex, margin depressed, epithecium bluish-black, hypothecium of subvertical hyphae; thecium 55μ tall; ascospores 9–13 × 4–6μ *L. subplana*
        - Apothecia plane, margin prominent, epithecium brownish-black, hypothecium of densely woven hyphae; thecium 170–180μ tall; ascospores 18–25 × 8–10μ .. .. *L. Urbanskyana*
      - Thallus K yellow; apothecia plane or slightly concave
        - Thecium 50–60μ bluish, hypothecium of periclinal hyphae; ascospores 10–12 × 6–7μ .. .. *L. subassentiens*
        - Thecium 75μ yellowish, disc with yellowish pruina, hypothecium of vertical hyphae with some colonies of algae; ascospores 12–13 × 7–9μ *L. Auberti*
      - Thallus K yellow then red; apothecia plane, parathecium extending farther beneath the hypothecium of periclinal hyphae; thecium 100–130μ; ascospores 10–12 × 5–7μ .. .. *L. Werthii*

Parathecium continuous under the hypothecium, carbonaceous below
- Apothecia innate
  - Parathecium not well developed above (at least not carbonaceous), epithecium bluish black, thallus K yellow
    - Thallus 200μ thick; ascospores 9–11 × 4–5μ; spermatia 5–7 × 1μ .. *L. Eatoni*
    - Thallus 600μ thick; ascospores 12–14 × 5·5–6μ; spermatia 13–15 × 0·8μ *L. kerguelensis*
  - Parathecium well developed, carbonaceous throughout
    - Ascospores 7–8 × 3·5–4μ, epithecium bluish-black, thallus, K– .. *L. endocyanella*
    - Ascospores 10–16 × 6–8μ
      - Thallus K–; epithecium fuliginous; spermatia unknown .. *L. sincerula*
      - Thallus K yellow; epithecium greenish-black; spermatia 7–9 × 1μ *L. sublygomma*
      - Thallus K yellow then red; epithecium yellowish fuscous; spermatia 15–20 × 0·5–0·6μ .. .. *L. subcontinua*
    - Ascospores 17–23 × 7–9μ; thallus K yellow; epithecium umber fuscous; spermatia 4–6 × 1μ .. .. *L. rhizocarpiza*
- Apothecia sessile
  - Apothecia sublecanorine, i.e. innate in blackened thalline wart, thallus K yellow then red, ascospores 11–15 × 5–7μ (see *Aspicilia lygomma*).
  - Apothecia with well developed carbonaceous parathecium
    - Growing over other lichens, thallus reduced or absent; parathecium 55–65μ; ascospores 8–11 × 5–7μ .. .. *L. superjecta*
    - Thallus well developed, K yellow
      - Disc pale brownish pruinose, parathecium 160–170μ; ascospores 11–13 × 5–6μ *L. phaeostoma*
      - Disc black, not pruinose
        - Parathecium 110–120μ; ascospores 12–15 × 6–8μ - *L. intersita*
        - Parathecium 35–40μ; ascospores 9–12 × 5–6μ - - *L. assentiens*

Lecidea Sancti-Pauli Bouly de Lesdain.

Lecidea Sancti-Pauli Bouly de Lesdain, Ann. Cryptog. Exot. 4: 98. 1931.

Type: Saint Paul, rochers du Grand Mornex, Aubert de la Rue 5.

Thallus thin, areolate, olive-buff, areoles more or less discrete [intense green, very slightly granulose, forming minute plaques 5–8 mm. in diameter]. Apothecia convex, almost immarginate, disc brownish-black, 0·2–0·3 mm. in diameter, [always plane, black], adnate; parathecium hyaline, deep green (fading rapidly in lactophenol), a palisade of thick-walled hyphae; hypothecium hyaline, epithecium an intense green; thecium about 40μ tall; asci clavate, tips thickened; paraphyses slender, simple, tips clavate; ascospores immature in my specimen [12–13 × 3–4(–5)μ. Spermatia nearly straight, 6–9 × 0·8μ].

Our material is rather immature and may not belong here. The portion of the above description in brackets [] was taken from the original description. Most of the characters observable agree with the original description except colour of the thallus is somewhat lighter and the disc is convex instead of plane.

Kerguelen: Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp. in Tuckerman Herb. sheet 1,452 on rock with *Steinera glaucella* (Tuck).

LECIDEA VARIATULA Nyl.

Lecidea variatula Nyl. ap. Crombie, Jour. Linn. Soc. Bot. 15, 186; 1876. Phil. Trans. Roy. Soc. [London], 168, 50; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 236; 1885.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus whitish, finely subgranular, dispersed. Apothecia 0·3–0·5 mm., pale at first becoming fuscous and finally blackening, disc plane or somewhat concave, margined; parathecium white, hypothecium hyaline; paraphyses slender, discrete, tips not thickened; asci 8-spored; ascospores hyaline ellipsoid, unicellular 11–15 × 6–7μ. Asci alone becoming blue with iodine and then violet fuscous, thecial gel not coloured.

On decaying stems of *Acaena*. No material of this species has been seen. Nylander referred it to the group of *Lecidea mutabilis*.

LECIDEA MAWSONI Dodge, sp. nov.

Type: Kerguelen, Observatory Bay, B.A.N.Z.A.R.E. B192–12.

Thallus minute verruculoso-granulosus, dilute griseus; ecorticatus; algae protococcoideae, cellulis 5–6μ diametro, subverticaliter dispositis. Apothecia sessilia, nigra, circiter 0.25 mm. diametro, disco nigro concaviusculo vel plano; parathecium 35μ crassitudine, hyphis tenuibus periclinalibus, intus dilute brunneis, extus obscure brunneis, non sub hypothecio percurrens; hypothecium 75μ crassitudine hyphis tenuibus dense contextum in strato gonidiali impositum; thecium 150–180μ altitudine; paraphyses tenues dichotome ramosae anastomosantesque, apicibus non incrassatis, liberis; asci cylindrici dein clavati, 60–65 × 20–22μ apicibus non incrassatis; ascospores 8nae late ellipsoideae maturae subbrunneae 14–15 × 10–11μ.

Thallus minutely verrucose granular, indeterminate, but separated by a black line when in contact with the margin of *Lecanactis Mawsoni*, light mineral grey; ecorticate; algae protococcoid, cells 5–6μ in diameter, arranged in more or less vertical rows. Apothecia sessile, black, about 0.25 mm. in diameter, disc black, concave to plane; parathecium 35μ thick of slender, periclinal hyphae, slightly brownish within, darker brown next the surface, not extending below the thecium; hypothecium 75μ thick, of densely woven, slender hyphae, seated on the algal layer; thecium 150–180μ tall; paraphyses slender, dichotomously branched and anastomosing, tips not enlarged, free, epithecial gel more or less covered with spores and foreign Myxophyceae; asci cylindric at first, becoming clavate, 60–65 × 20–22μ, wall 2μ thick, tip not thickened, 8-spored; ascospores monostichous at first becoming distichous in the upper portion only, thin-walled, unicellular, slightly brownish when mature, broadly ellipsoidal, 14–15 × 10–11μ.

This species seems distinct from *L. variatula* Nyl. of which we have seen no material. It may also be related to *Placopsis*, since the paraphyses, young asci and ascospores are much closer to *P. vitellina* than to most species of *Lecidea*, but it lacks the well developed amphithecium and external cephalodia.

Growing with *Lecanactis Mawsoni*.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–12.

LECIDEA SUBDISJUNGUENDA Zahlbr.

Lecidea subdisjunguenda Zahlbr., Deutsche Südpolar Exp., 8, 39; 1906.)

Type: Kerguelen, Station lake, Werth (Deutsche Südpolar Exp.).

Thallus very thin, continuous or minutely rimulose, whitish, sometimes coloured ferruginous, K yellowing then slowly reddening, Ca–, more or less cut by black lines of protothallus; ecorticate; algae protococcoid, spherical, 9–12μ; medulla of vertical hyphae. Apothecia innate to slightly elevated, up to 0·5 mm. in diameter, disc plane to slightly convex, margin slightly

prominent; parathecium 100–110μ thick, carbonaceous, not extending below the thecium; hypothecium not clearly differentiated from the medulla and thecium except more deeply staining: thecium about 75–90μ tall; paraphyses slender, not conspicuously branched, eseptate, not thickened at the tip, ending in the bluish epithecial gel; asci [oblong cuneate, nearly as long as the thecium, thin-walled, 8-spored]; ascospores distichous, hyaline, ellipsoidal 10–14 $\times$ 7–9μ.

[Spermogonia immersed, spherical, tip black; wall fuligineous, dimidiate; spermatiophores fasciculate, subulate cylindric, shorter than the spermatia which are moderately curved or hamate, 18–24 $\times$ 1μ]. Data in brackets [] supplied from the original description as our material is too old.

On rocks with *Xanthoporina kerguelensis, Lecidea asbolodes, L. Eatoni, L. rhizocarpiza, Rhizocarpon kerguelense, R. Mawsoni, Aspicilia disjunguenda, A. endochlora, Lecanora atrocaesia* and *Buellia subplicata.*

Kerguelen: Port Jeanne d'Arc, 1,600 ft. B.A.N.Z.A.R.E. B217–1; Greenland Harbour, B.A.N.Z.A.R.E. B177–26, B177–27; Royal Sound, B.A.N.Z.A.R.E. B90–7, B126–11; Royal Sound, Robert Hall sub. *L. sincerula* Nyl. (Nat. Herb. Melbourne Bot. Gard.).

LECIDEA ASBOLODES Nyl.

Lecidea asbolodes Nyl. in Crombie, Jour. Bot. Brit. For., 14, 21; 1876. Jour. Linn. Soc. Bot., 15, 188; 1876. Phil. Trans. Roy. Soc. London, 168, 51; 1879. Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 238; 1885.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus fuliginous to black, sometimes stained ochraceous, rimose areolate, more or less determinate with a very narrow black margin; ecorticate; algae protococcoid, occupying most of the thallus, cells up to 7μ in diameter. Apothecia semi-immersed, 0·4–0·5 mm. in diameter; parathecium carbonaceous, extending about one fourth the distance under the hypothecium, about 110μ thick, continued across under the hypothecium by a line of fuliginous cells, 55μ thick at the centre and thinning to 20μ thick at the margin, extending about halfway up the hypothecium; hypothecium about 110μ thick at the centre, thinning to the margin, of essentially vertical hyphae, branched and anastomosed; thecium 75μ tall; paraphyses about 1·5μ in diameter, fasciculately branched, and brown above the asci, cutting off spherical cells at the tips, about 3μ in diameter; asci 8-spored, clavate, 40 $\times$ 11μ; ascospores monostichous or nearly so, hyaline, short ellipsoidal (often appearing spherical in the ascus), 7–8 $\times$ 4–6μ while still in the ascus (8–10 $\times$ 7μ *fide* Nylander).

B93, B177–15, and B177–26 appear to belong here from the microscopic characters of the apothecia, but the thallus is variegated bluish-black and white, the latter staining yellow with KOH, resembling a thin state of *L. subassentiens* without the marginal lobules.

On rocks with *Encephalographa cerebrinella, Lecidea intersita, L. subdisjunguenda, Rhizocarpon kerguelense, Pertusaria subperrimosa, Aspicilia disjunguenda, A. endochlora, Lecanora atrocaesia* and *Aspiciliopsis macrophthalma.*

Kerguelen: Murray Island, 50 ft., B.A.N.Z.A.R.E. B530–3, B530–5; upper end of Greenland Harbour, B.A.N.Z.A.R.E. B177–15, B177–26; Royal Sound, 1,500 ft., B.A.N.Z.A.R.E. B90; Long Island, B.A.N.Z.A.R.E. B93.

LECIDEA SUBPLANA Nyl.

Lecidea subplana Nyl., Flora, 68, 448; 1875. Crombie, Jour. Bot. Brit. For., 13, 334; 1875. Jour. Linn. Soc. Bot., 15, 189; 1876. Phil. Trans. Roy. Soc. [London], 168, 51; 1879. Rept. Sci. Results Voy. "Challenger" Bot. 1, 2, 239; 1885.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus ashy, rimose areolate, thin, K-; ecorticate; algae protococcoid, hyphae very slender, densely woven, including crystals of rocks. Apothecia about 0·1 mm. in diameter, crowded, angular, coalescent; parathecium carbonaceous, 30–35μ thick, extending about 75μ under the hypothecium, then narrowing to about 20μ and extending inward and downward as fuliginous periclinal hyphae about 2μ in diameter and disappearing in the medulla; hypothecium of slightly brownish subvertical loosely woven hyphae, becoming hyaline and periclinal in a compact layer about 8μ thick below the thecium; thecium about 55μ tall; paraphyses flexuous, slender, not numerous, branching twice or thrice in the upper portion, ultimate branches terminating in a clavate, bluish-black cell which cuts off a spherical black cell; asci broadly clavate, 35–40 $\times$ 9–12μ, tip thickened, protoplast truncate, umbonate at first, 8-spored; ascospores distichous, ellipsoidal, 10–15 $\times$ 4–6μ, nucleus central with dense strands of protoplasm, giving the spore a 2-celled appearance, so that this species might be mistaken for a *Catillaria* without careful examination.

On rocks with *Rhizocarpon kerguelense R. Mawsoni, Aspicilia disjunguenda, A. endochlora, Lecanora atrocaesia, Blastenia Auberti* and *Buellia subplicata;* also on old timber of Transit Venus Expedition hut, where the thallus is mostly inside the weathered wool cells, showing only as whitish patches.

Kerguelen: Observatory Bay, Sta. 56 B.A.N.Z.A.R.E. B192–26, B195–1; Murray Island, B.A.N.Z.A.R.E. B210–4; Royal Sound, B90–8.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–24.

Lecidea Urbanskyana Zahlbr.

Lecidea Urbanskyana Zahlbr., Deutsche Südpolar Exp., 8, 38; 1906.

Type: Kerguelen, plateau of Stationberg, strand of Penguin Bay and valley between Station and Mittelberg, Werth (Deutsche Südpolar Exp.).

Thallus up to 100μ thick, subareolate rimulose, leaden ashy (often stained by iron), K–, Ca–, with a narrow dark line on margin; ecorticate; algae protococcoid, spherical cells 6–14μ in diameter. Apothecia sessile, up to 1 mm. in diameter, dispersed and round, or congested and more or less angular or even subgyrose, black, disc concave at first then nearly plane, slightly fusco-pruinose then nude and black, sometimes papillate in the centre; margin thick, black, obtuse, prominent and slightly inflexed; parathecium 120–130μ thick, carbonaceous in the upper 70μ, fading to brown and finally hyaline below; hypothecium 75μ thick, hyaline, of slender, densely woven hyphae; thecium 170–180μ tall; paraphyses sparingly dichotomously branched, tips clavate, forming a brown epithecium about 35μ thick, imbedded in a firm gel: asci broadly ellipsoidal, 35–55 $\times$ 18–20μ tips greatly thickened when young; ascospores biseriate or oblique, hyaline, variable in shape and size in the same ascus, the larger ones 18–25 $\times$ 8–11μ with a prominent halo in the ascus, later becoming thin-walled. Spermogonia immersed, subspherical, tips blackened; wall dimidiate, fuscous, blackening; spermatiophores densely fasciculate, slightly shorter than the spermatia which are bacilliform, straight or nearly so, tips truncate, rounded, 7–9 $\times$ 1μ.

Growing with *Toninia kerguelensis* and *Pertusaria cineraria.*

Kerguelen: upper end of Greenland Harbour, B.A.N.Z.A.R.E. B177–36.

Lecidea subassentiens Nyl.

Lecidea subassentiens Nyl. ap. Crombie, Jour. Bot. Brit. For., 14, 21; 1876. Jour. Linn. Soc. Bot., 15, 188; 1877. Phil. Trans. Roy. Soc. [London], 168, 51; 1879. Rept. Sci. Results Voy. "Challenger" Bot. 1, 2, 238; 1885. Müll.-Arg., Bot. Jahrb. [Engler], 4, 137; 1884.

Type: Kerguelen, Royal Sound, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus thin, 160–190μ thick, white, limited by a black hypothallus, determinate, margins slightly lobate, surface smooth or nearly so, minutely rimose; cortex about 10μ thick of periclinal, gelified hyphae; algal layer 75–100μ thick of protococcoid cells about 6–10μ in diameter with thick gelified walls; medulla of slender, densely woven hyphae. Apothecia semi-immersed to sessile, black, 0·6–0·7μ mm. in diameter, margin prominent, disc plane to slightly concave, black; parathecium carbonaceous, 100–120μ thick extending about one third the distance under the hypothecium, the central third under the hypothecium thinner, pale brown to almost hyaline and merging with the medulla below and the hypothecium above; hypothecium hyaline, 35–50μ thick, of periclinal, loosely woven hyphae, passing into subvertical hyphae above and not sharply differentiated from the thecium; thecium 50–60μ tall; epithecium bluish; paraphyses slender, hyaline, once or twice branched in the upper third, tips not enlarged, imbedded in the thecial gel; asci clavate, 50 $\times$ 10–12μ, tip thickened, protoplast umbonate; ascospores ellipsoid, hyaline, wall rather thick, nucleus and protoplasmic strands staining deeply and simulating a septum, 10–12 $\times$ 6–7μ.

On rock with *Verrucaria obfuscata.*

The above description is based on B.A.N.Z.A.R.E. B204–9. The thallus of B177–2 appears somewhat thicker but the surface is badly eroded and the marginal lobules appear somewhat more prominent. Zahlrbuckner, Deutsche Südpolar Exp., 8, 27; 1906, describes spermogonia from Station lake, Urbansky, as immersed, spherical with black apex, wall fuliginous, dimidiate; spermatiophores densely fasciculate, subfiliform 17–18μ long; spermatia nearly straight to moderately or strongly curved and hamate, 17–23 $\times$ 1μ.

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–2, B204–9.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–22.

Lecidea subassentiens var. brachybasidia Zahlbr.

L. subassentiens var. *brachybasidia* Zahlbr., Deutsche Südpolar Exp., 8, 37; 1906.

Type: Kerguelen, cliff wall on the Südmire, Werth (Deutsche Südpolar Exp.).

Apothecia larger up to 1 mm. broad, epithecium olive, blackening. Spermogonia as in the typical species, spermatiophores short, 8–9 $\times$ 2–3μ, ampullaceo-cylindric; spermatia variously curved or hamate.

As we have not seen either type of spermogonia in this species we have not been able to identify this variety in our material. The description of the epithecium and the illustration suggest *L. Auberti* Bouly de Lesdain (see below).

Lecidea Auberti Bouly de Lesdain.

Lecidea Auberti Bouly de Lesdain, Ann. Cryptog. Exot. 4: 99. 1931.

Type: Kerguelen, Port Jeanne d'Arc, Aubert de la Rüe 18.

Thallus white, uniform, indeterminate, very thin and continuous near the margin, centre areolate diffract and thicker, K yellow; cortex 65μ thick of subspherical cells and many crystals; algae protococcoid, cells up to 8μ in diameter in rounded groups just under the cortex, more scattered and ellipsoidal below; medullary hyphae slender, closely woven, mostly vertical. Apothecia 0·5–0·6 mm. in diameter, scattered or sometimes crowded, then somewhat angular, margin slightly crenate, disc plane, covered with an ochraceous pruina (somewhat lighter than that of *L. phaeostoma*) when young, becoming black when old, occasionally with sterile papillae or almost gyrose; parathecium carbonaceous, marbled with lighter veins, 180μ thick, not extending much below the hypothecium and only to the cortex of the thallus; lower portion of the hypothecium about 200μ thick of closely woven subvertical medullary tissue with scattered algal

cells; true hypothecium 35μ thick at the centre, thinning to about 20μ thick at the margin, more deeply staining with hyphae somewhat more periclinal to the thecium; thecium 75μ tall; paraphyses about 2μ in diameter forming a dense palisade, tips not thickened, epithecial granules dissolved by KOH, decolourized by lacto-phenol; asci clavate, tip somewhat thickened, protoplast acuminate when young, 8-spored, 54–60 × 11–12μ; ascospores distichous, hyaline, ellipsoidal, 12–15 × 7–9μ.

Growing with *Lecidea intersita, L. phaeostoma, L. superjecta, L. Werthii, Rhizocarpon Johnstoni, R. kerguelense, Pertusaria cineraria, P. subperrimosa, Aspicilia endochlora, Lecanora atrocaesia, Aspiciliopsis macrophthalma, Buellia subplicata, B. tristiuscula* and sterile thalli of *Thelidium praevalescens.*

Kerguelen: upper end of Greenland Harbour, B.A.N.Z.A.R.E. B177–22, B177–23, B204–5; Observatory Bay, B.A.N.Z.A.R.E. B192–19; Murray Island, Sta. 60. B.A.N.Z.A.R.E. B210–2, B212 (old).

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–13, B140–14, B140–15, B140–16.

Lecidea Werthii Zahlbr.

Lecidea Werthii Zahlbr., Deutsche Südpolar Exp., 8, 41; 1906.

Type: Kerguelen, Station Lake, Werth (Deutsche Südpolar Exp.).

Thallus epilithic, thin, effused, irregularly and minutely rimulose, smooth, pale olive buff to white, K yellow, then slowly reddening, margin thin, bounded by deep plumbeous to black hypothallus, cortex about 75μ thick, a palisade of slender, septate hyphae with very minute crystals; algal layer about 75μ thick, protococcoid, cells up to 7μ in diameter, somewhat angular between the subvertical medullary hyphae, medulla more loosely woven, enclosing rock crystals. Apothecia sessile, up to 1 mm. in diameter, solitary or in small groups, black, disc plane, nude, black, margin thin, acute, inrolled, prominent, becoming less so in age, smooth to somewhat sinuate; parathecium carbonaceous, 90μ thick at the margin becoming thicker, up to 125μ below and extending one-third the distance under the hypothecium; hypothecium 25μ thick, of periclinal, slender hyphae, slightly brownish and bending downward in the open space of the parathecium to join the medulla; thecium 100–130μ tall; paraphyses slender, septate, branching twice or thrice dichotomously in the upper portion, becoming submoniliform, tips not thickened; asci 58–62 × 8–10μ, tip thickened, protoplast long papillate; ascospores biseriate, hyaline, ellipsoid, unicellular, 10–12 × 5–8μ, with moderately thick walls.

Spermogonia minute, immersed, tip black, prominent; wall black, dimidiate; spermatiophores few, branched, subcylindric, much shorter than the filiform spermatia which are variously curved and hamate, up to 35μ long and scarcely 1μ in diameter *fide* Zahlbruckner.

Growing with *Thelidium praevalescens, Encephalographa cerebrinella, Lecidea Auberti, L. superjecta,* and *Buellia subplicata.*

Kerguelen: upper end of Greenland Harbour, B.A.N.Z.A.R.E. B177–14.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–4.

Lecidea Eatoni Crombie.

Lecidea Eatoni Crombie, Jour. Bot. Brit. For., 13, 334; 1875: Jour. Linn. Soc. Bot., 15, 189; 1876: Phil. Trans. Roy. Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 238; 1885: Wilson, Mém. Herb. Boissier, 18, 88; 1900; Zahlbr. Deutsche Südpolar Exp., 8, 39; 1903.

Type: Kerguelen, Observatory Bay, Volage Bay and Swain's Bay, A. E. Eaton (Venus Transit Exp.).

Thallus very thin, growing over the thallus of *L. kerguelensis* forming small dark grey patches about 1 cm. in diameter, rimose areolate, K-, about 200μ thick, upper 40μ of closely woven, subvertical hyphae, below more loosely woven and with somewhat larger hyphae; algae protococcoid, cells 4–5μ in diameter; medulla filled with rock crystals. Apothecia immersed in the areoles, up to 0·3 mm. in diameter, disc plane, tawny-olive when moistened, drying nearly black and very slightly concave, somewhat irregular in shape, completely immarginate; amphithecium and parathecium lacking; hypothecium carbonaceous, lentiform, 140μ thick in the centre; thecium 75μ tall; paraphyses slender, flexuous and branched but not anastomosing, upper 4–5 cells moniliform, not thickened at the tip, fuliginous in the upper 15μ; asci clavate, 8-spored, 40–45 $\times$ 15μ, greatly thickened at the tip when young; ascospores distichous, appearing 1-septate, 10–12 $\times$ 4–5μ.

It is with some hesitation that I have referred this material here as Crombie states that the thallus is continuous, K yellow and that the tips of the paraphyses are bluish-black; however it agrees in other characters so far as given. It may be the unnamed form described by Zahlbruckner, l.c.

Growing over *Lecidea kerguelensis* and with *Verrucaria Werthii, Lecidea subdisjunguenda, Rhizocarpon kerguelense, Pertusaria cineraria, P. kerguelana, Aspicilia endochlora, Lecanora atrocaesia, Buellia subplicata,* and *B. tristiuscula.*

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–6, B192–23; Mt. Wyville Thompson 300–500 m. Sta. 62, B.A.N.Z.A.R.E. B246–4; Royal Sound, B.A.N.Z.A.R.E. B90–5; upper end of Greenland Harbour, B.A.N.Z.A.R.E. B177–25, B177–27, B177–28, B177–29.

LECIDEA KERGUELENSIS Bouly de Lesdain.

Lecidea kerguelensis Bouly de Lesdain, Ann. Cryptog. Exot., 4, 96; 1931.

Type: Kerguelen, Mt. P. Termier, 600 m., Aubert de la Rue 10.

Thallus pale vinaceous fawn, K yellow, Ca-, KCa-, surface dull, smooth, rimose areolate, especially about the apothecia, about 600μ thick; cortex decomposed with crystalline matter, of more or less perpendicular hyphae; algae protococcoid, cells 4–5μ in diameter. Apothecia innate, 0·4–0·6 mm. in diameter, scattered or crowded but not confluent, being separated by a margin of thallus and a crack, but more or less angular, disc plane, black; parathecium 18–20μ thick at the margin, hyaline, of vertical closely septate, somewhat moniliform hyphae, shading through fuscous to carbonaceous below the hypothecium, where it is pateriform, about 150μ thick, prolonged downward at the centre into a stipitiform projection, and sending out fuscous rhizinal masses between the crystals of the rock; hypothecium not differentiated from the parathecium; thecium 75μ tall; paraphyses very slender, flexuous, once or twice dichotomously branched, sparingly septate below, ending in a chain of about 5 spherical cells 2μ in diameter, forming the epithecium; asci clavate, 55 $\times$ 8μ, protoplast truncate with a slight papilla when young, 8-spored; ascospores subdistichous, subfusiform but slightly constricted in the middle and appearing septate, 12–15 $\times$ 4–6μ.

My material may belong in *Catillaria.* I have been unable to satisfy myself whether it is a case of deeply staining protoplasm occupying the centre of the spore or whether there is a true septum. Young spores in the ascus are slightly smaller and unicellular but with a deeply staining equatorial mass. This species differs from material referred to *Lecidea Eatoni* in somewhat larger, less ellipsoid spores and thinner parathecium below the hypothecium. Both may belong in *Catillaria.*

Growing with *Lecidea Eatoni, Rhizocarpon Johnstoni, Aspicilia endochlora, Aspiciliopsis macrophthalma* and *Buellia tristiuscula.*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–30, B204–8; Observatory Bay, B.A.N.Z.A.R.E. B192–20, B192–23; Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–6.

LECIDEA ENDOCYANELLA Zahlbr.

Lecidea endocyanella Zahlbr., Deutsche Südpolar Exp., 8, 40; 1906.

Type: Kerguelen, plateau of Stationberg, Werth, (Deutsche Südpolar Exp.).

Thallus epilithic, very thin, tartareous, ashy-plumbeous or mouse coloured, here and there stained with iron, K–, Ca–, areoles small, 0·1–0·2 mm. in diameter, plane, hypothallus ashy black, visible at the margin of the thallus; algae protococcoid, cells 8–12μ in diameter; medulla I–. Apothecia 0·3–0.6 mm. in diameter, innate or at least not prominent, black, disc slightly concave, margin slightly prominent at first becoming indistinct; parathecium carbonaceous, well developed at the sides as well as below, of subvertical hyphae not sharply differentiated from the hypothecium; thecium aeruginose bluish, 70–80μ tall, I dirty blue; paraphyses slender, conglutinate, simple, eseptate, tip not thickened, epithecial gel bluish-black, HNO_3 lilac violascent; asci oblong or ovoid cuneate 70–80μ long, tip and sides thickened, 8-spored; ascospores biseriate, hyaline, ellipsoid, thin-walled, 7–8 $\times$ 3·5–4μ. Spermogonia not seen.

Close to *L. Eatoni* from which it differs in dark grey thallus K– and the laterally well developed parathecium. I have seen no material referable here.

LECIDEA SINCERULA Nyl.

Lecidea sincerula Nyl. ap. Crombie, Jour. Bot. Brit. For., 14, 22; 1876.

Lecidea Dicksonii Crombie ap. Hook., Phil. Trans. Roy. Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot, 1, 2, 239; 1885.

Lecidea Dicksonii f. *sincerula* Zahlbr., Deutsche Südpolar Exp., 8, 40; 1906.

Type: Kerguelen, Royal Sound, Observatory, Volage and Swain's Bays, (Venus Transit Exp.).

This is typical *L. Dicksonii* Ach. with a normal greyish thallus; ascospores 9–12 $\times$ 6–7μ; thecial gel I bluish then vinous reddening. Zahlbruckner compared spermogonia of this form from Kerguelen with typical European *L. Dicksonii* and was unable to find differences. I have seen no material referable here although it has been reported as relatively common by both Crombie and Zahlbruckner.

LECIDEA SUBLYGOMMA Zahlbr.

Lecidea sublygomma Zahlbr., Deutsche Südpolar Exp., 8, 35; 1906.

Type: Kerguelen, Südmire, Werth (Deutsche Südpolar Exp.).

Thallus thin, tartareous, continuous becoming slightly and irregularly rimulose, deep gull grey, KOH yellowing then slowly fulvescent, margin determinate with a narrow black line on a thin black hypothallus; ecorticate; algal layer 175–180μ thick, protococcoid, cells 8–10μ in diameter in irregular subvertical rows between medullar hyphae; medulla at least 150μ thick, of thick-walled subvertical hyphae about 4μ in diameter, closely septate. Apothecia 0·2–0·4 mm. in diameter, innate, urceolate at first with a concave disc becoming plane and margin less prominent; parathecium 15–25μ thick above, of periclinal hyphae, the outer 7–10μ of dark brown, thick-walled, septate hyphae almost carbonaceous, the inner hyphae more slender, thin-walled and hya-

line, below the thecium becoming about 110μ thick, carbonaceous; hypothecium scarcely differentiated of vertical, somewhat more deeply staining hyphae; thecium 175–180μ tall; paraphyses slender, flexuous, dichotomously branched, especially above the asci, more closely septate, tips not thickened, ending in the thin brownish epithecial gel; asci long cylindric at first, the upper portion becoming clavate, 8-spored, 35 × 15–18μ, tip thickened, protoplast rounded; ascospores subdistichous, ellipsoidal, hyaline, appearing 2-celled at maturity, 11–14 × 5–6μ.

The identity and systematic position of this species are somewhat uncertain as there are some differences from Zahlbruckner's measurements. The thallus cracks around the apothecia, and if this is taken as an amphithecium, it might be referred to *Aspicilia*. As in so many species of *Lecidea* from this region, the septation of the spores is doubtful. While still in the ascus, there is a band of deeply staining protoplasm crossing the centre of the spore. In a few free spores, a definite septum was seen in the middle of this deeply staining area. The mature spores may be two-celled or it may be that the septum is that which is often laid down on the beginning of germination of a unicellular spore. This is the only material so far observed, referable to this species.

Growing with *Microglaena kerguelana, Rhizocarpon kerguelense, Aspicilia disjunguenda, Lecanora atrocaesia* and *Rinodina aspicilina*.

Heard Island. Between Atlas Cove and Corinthian Bay. B.A.N.Z.A.R.E. B140–6.

Lecidea subcontinua Nyl.

Lecidea subcontinua Nyl. ap. Crombie, Jour. Linn. Soc. Bot., 15, 189; 1877: Jour. Bot. Brit. For., 15, 104, 106; 1877: Phil. Trans. Roy. Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 238; 1885.

Type: Kerguelen, Swain's Bay, Royal Sound, A. E. Eaton (Venus Transit Exp.).

Thallus deep glaucous grey, areolate diffract, growing over a black hypothallus which shows as a relatively broad, thin, black margin, K yellowish, then reddening and finally becoming deep brown; algae protococcoid, cells 5–6μ in diameter. Apothecia innate, black, urceolate at first then plain, margin elevated, up to 1 mm. in diameter; parathecium carbonaceous, 60μ thick at the margin, thinning to 45μ just below the edges of the hypothecium, then thickening to 90–100μ in the centre; hypothecium about 20μ thick, of deeply staining vertical hyphae, not clearly distinct from the thecium; thecium 75μ tall; paraphyses slender, septate, unbranched, tips not thickened, ending in the yellowish fuscous epithecial gel; asci clavate, 8-spored, 55 × 12μ; ascospores ellipsoid to subfusiform, hyaline, 11–14 × 6–8μ.

The determination of my material is somewhat uncertain, as I have been unable to satisfy myself as to the septation of the spores. As in several other species, there is a deeply staining mass of protoplasm in the centre which looks very like a septum. My material agrees in other respects with Nylander's description, except I have seen no spermatia, which he states to be straight or slightly curved, 15–20 × 0·5–0·6μ. He does not give reaction with KOH. Our material is quite close to *Lecidea sublygomma*, which, however, does not turn red with KOH.

Growing with *Pertusaria cineraria* and *Placopsis bicolor*.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–25.

Lecidea rhizocarpiza Zahlbr.

Lecidea rhizocarpiza Zahlbruckner, Deutsche Südpolar Exp., 8, 36; 1906.

Type: Kerguelen, between Station and Mittelberg, Werth (Deutsche Südpolar Exp.).

Thallus epilithic, very thin, forming plaques up to 3 mm. broad, irregular, discrete or somewhat confluent, lead to mouse coloured, somewhat wrinkled and rimulose, K yellowing then red-

dening, Ca–, surrounded by a thin, black hypothallus; algae [protococcoid, spherical 9–12μ in diameter; medullary hyphae bluish with iodine]. Apothecia innate, minute, 0·2–0·8 mm. in diameter, scattered or crowded, black, round or somewhat angular, disc slightly concave then plane, black; margin thin, slightly prominent, black; parathecium fuliginous to carbonaceous, dense becoming fuliginous and looser below; epithecium umbrine-fuscous; hypothecium not differentiated; thecium 90–110μ tall; paraphyses coarse, up to 2μ in diameter, branched and anastomosing, not clearly septate, flexuous, tips not thickened, highly gelified; asci obovoid to subspherical, wall greatly thickened, protoplast clavate becoming obovoid, tip truncate, 8-spored 45 $\times$ 25μ [53–57 $\times$ 28–40μ *fide* Zahlbruckner] ; ascospores sub-triseriate, oblique, thin-walled, broadly ellipsoid, hyaline [17–23 $\times$ 7–9μ].

[Spermogonia minute, immersed, subspherical, tip black; wall dimidiate, black; spermatiophores densely fasciculate, flask-shaped, tips acuminate, about 4–6μ long; spermatia short bacilliform, straight, 4–6 $\times$ 1μ].

Our material is immature but agrees with the description and figures of Zahlbruckner. Data not observable in our specimen are enclosed in brackets [] in the above description and are translated from Zahlbruckner. I have been unable to reach a definite conclusion as to the algal symbiont. The thallus contains too many rock crystals to secure a good section. Crushed bits of thallus mounted in lactophenol show some evolution of gas bubbles suggesting calcareous deposits, a few cells which might be protococcoid, but smaller than the dimensions given by Zahlbruckner, yellowish cells which seem to be *Trentepohlia* and fuliginous torulose filaments which might be a dematiaceous mycelium.

Lecidea confluens Hook. f. & Tayl., London Jour. Bot., 3, 636; 1844 and *L. albocaerulescens* Hook. f. & Tayl., Crypt. Antarct., 232; 1845: Fl. Antarct., 2, 538; 1847 may belong here in part as this species is the Kerguelen representative of the *L. confluens* group, or they may belong in *Lecanora atrocaesia* (see Crombie, Jour. Bot. Brit. For., 15, 104; 1877).

On rocks with *Ionaspis Mawsoni, Lecidea assentiens, L. subdisjunguenda, Rhizocarpon kerguelense, R. Mawsoni, Aspicilia disjunguenda, A. endochlora, A. lygomma, Lecanora atrocaesia* and *Placopsis bicolor.*

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–24, B192–38; Royal Sound, B.A.N.Z.A.R.E. B90–7; Greenland Harbour, B.A.N.Z.A.R.E. B177–24; Port Jeanne d'Arc, B.A.N.Z.A.R.E. B200–3.

LECIDEA SUPERJECTA Nyl.

Lecidea superjecta Nyl. in Crombie, Jour. Linn. Soc. Bot., 16, 221; 1878: Phil. Trans. Roy. Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 239; 1885: Wilson, Mém. Herb. Boissier, 18, 88; 1900: Zahlbr., Deutsche Südpolar Exp., 8, 37; 1906.

Type: Kerguelen, Moseley ("Challenger" Exp.).

Semiparasitic (usually on the thallus of *Aspicilia endochlora* or *Pertusaria subperrimosa*); beside the normal protococcoid algae of the thallus is an abundance of an extremely small chroococcoid alga and some cells of *Trentepohlia* among the rock crystals. Apothecia sessile, solitary, 0·3–1·0 mm. in diameter, black, round to angular and irregular, disc small, black, plane, margin thick, black, inrolled; parathecium carbonaceous, about 55μ thick at the margin, of variable thickness (50–65μ) below, outer surface appearing quite undulate below in sections; hypothecium about 25μ thick, of loose, subvertical hyphae not sharply differentiated from the thecium, slightly brownish; thecium about 70–80μ tall; paraphyses very slender, unbranched or forking once just below the tips, eseptate below, ultimate cells submoniliform, about twice as long as

broad, not enlarged, ending in the stiff epithecial gel, which is stained brownish; asci clavate, tip thickened, protoplast acute with a minute papilla; ascospores subdistichous, hyaline, ellipsoidal, 8–11 × 5–7μ.

This species seems intermediate between *Lecidea assentiens* and *L. intersita.*

Growing on *Pertusaria cineraria, P. crozetica, P. subperrimosa, Aspicilia endochlora* and *Lecanora atrocaesia,* on rocks with *Xanthoporina kerguelensis, Thelidium praevalescens, Steinera Werthii, Pannaria dichroa, Lecidea Auberti, L. intersita, L. phaeostoma and L. Werthii.*

Crozet Archipelago, Possession Island, American Bay, B.A.N.Z.A.R.E. B20–5.

Kerguelen: Murray Island district, B.A.N.Z.A.R.E. B530–7; Greenland Harbour, B.A.N.Z.A.R.E. B204–5; Poincaré Peninsula, B126–13.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–4.

Lecidea phaeostoma Nyl.

Lecidea phaeostoma Nyl. in Crombie, Jour. Bot. Brit. For., 13, 334; 1875: Jour. Linn. Soc. Bot., 15, 187; 1876: Phil. Trans. Roy. Soc. [London], 168, 50; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 237; 1885: Wilson, Mém. Herb. Boissier, 18, 88; 1900: Zahlbr., Deutsche Südpolar Exp., 8, 34; 1906.

Type: Kerguelen, Royal Sound, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus epilithic, thin, smooth, continuous or rimulose, plumbeous, whitish or ochraceous ashy, K yellowish, margin smooth, determinate, slightly blackened. Apothecia sessile, up to 1 mm. in diameter, round or somewhat angular by mutual pressure, margin black, shining, rather thick, inflexed, smooth at first then flexuous to crenulate, disc concave to nearly plane, ochraceous orange, pruinose, finally somewhat blackening; parathecium carbonaceous, 160–170μ thick, continuous under the hypothecium; hypothecium of vertical hyphae about 50μ thick, not sharply differentiated from the thecium above; thecium 100–130μ tall; paraphyses very slender, flexuous, twice or thrice dichotomously branched just above the asci, nearly eseptate below, ultimate branches submoniliform, imbedded in the epithecial gel; asci cylindric clavate, tips not thickened, 8-spored, 55 × 8–9μ; ascospores ellipsoidal, hyaline, unicellular, 11–13 × 5–6μ. Spermogonia minute, black, wall dimidiate, fuliginous, thin, spermatiophores fasciculate, subulate, shorter than the spermatia; spermatia variously curved, filiform, 14–18 × 0·5μ.

Growing with *Coccotrema kerguelensis, Lecanactis kerguelensis, Ionaspis kerguelensis, Pannaria dichroa, Lecidea Auberti, L. intersita, L. superjecta, Rhizocarpon kerguelense, Pertusaria cineraria, P. subperrimosa, Aspicilia disjunguenda, Lecanora atrocaesia, Aspiciliopsis macrophthalma, Placopsis bicolor, Buellia subplicata* and *B. tristiuscula.*

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B90–6; Greenland Harbour, B.A.N.Z.A.R.E. B177–16, B177–17, B177–33, B177–34, B177–35; Observatory Bay, B.A.N.Z.A.R.E. B192–21, B192–22; Murray Island, B.A.N.Z.A.R.E. B530–6, B530–7.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–11, B140–18, B140–19, B140–20, B140–21.

Crozet Archipelago, Possession Island, American Bay, B.A.N.Z.A.R.E. B20–1.

Lecidea intersita Nyl.

Lecidea intersita Nyl. in Crombie, Jour. Linn. Soc. Bot., 15, 187; 1876: Phil. Trans. Roy. Soc. [London], 168, 50; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 237; 1885: Zahlbr., Deutsche Südpolar Exp., 8, 37; 1906.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus very thin, greenish ashy from a minute chroococcoid alga, appearing minutely rough from the fractured surface of the rock, K yellow, drying somewhat tawny; algae protococcoid, cells 7–8μ in diameter, spherical, replaced in part by the very minute chroococcoid alga. Apothecia sessile, black, up to 1 mm. in diameter, disc plane to slightly convex, margin inrolled, thin, prominent, smooth to slightly undulate; parathecium carbonaceous, 110–120μ thick at the margin, of variable thickness under the hypothecium, up to 150μ; hypothecium not differentiated; thecium 110–120μ tall: paraphyses slender, moniliform, once or twice dichotomously branched just above the asci, ending in a tuft of short, moniliform, brownish branches in the epithecial gel; asci 55–60 × 10–11μ, cylindric, tip thickened, protoplast with a very small papilla; ascospores monostichous, hyaline, unicellular, ellipsoid, 12–15 × 6–8μ, with moderately thick walls. [Spermogonia minute, up to 0·2 mm. broad, not prominent, black; wall fuliginous, dimidiate; spermatiophores little branched, oblong, cylindric, shorter than the spermatia which are curved to hamate, 14–20 × 1μ].

Growing with *Encephalographa cerebrinella, Lecidea asbolodes, L. Auberti, Catillaria kerguelensis, Rhizocarpon kerguelense, Pertusaria subperrimosa, Aspicilia disjunguenda, A. endochlora, Lecanora atrocaesia, Aspiciliopsis macrophthalma* and *Buellia tristiuscula*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–15, B177–31, B177–32, B204–6, B204–7; Observatory Bay, B.A.N.Z.A.R.E. B192–19; Murray Island, B.A.N.Z.A.R.E. B210–3; Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–5.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–17.

LECIDEA ASSENTIENS Nyl.

Lecidea assentiens Nyl. in Crombie, Jour. Bot. Brit. For., 13, 334; 1875; 15, 105; 1877: Jour. Linn. Soc. Bot., 15, 187; 1876: Phil. Trans. Roy. Soc. [London], 168, 50; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 237; 1885: Zahlbr., Deutsche Südpolar Exp., 8, 36; 1906.

Lecidea confluens Hook. f. & Tayl., London Jour. Bot., 3, 636; 1844 non Ach.

Lecidea contigua v. *hydrophila* Bab. in Hook. f., Crypt. Antarct., 232; 1845: Fl. Antarct., 2, 538; 1847 *fide* Crombie, Jour. Bot. Brit. For., 15, 105; 1877.

Type: Kerguelen, Royal Sound and Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus epilithic, effused, thin, ashy to deep olive, minutely rimose areolate, surrounded by a narrow dark line, K yellowing; cortex 35μ thick, of coarse thin-walled, periclinal hyphae; algal layer 75μ thick, of discrete colonies of protococcoid cells, somewhat angular, mostly 7–10μ in diameter; medulla 150μ thick, loosely woven and enclosing rock crystals. Apothecia black, sessile, solitary or confluent in dense clusters, round or angular by mutual pressure, 0·5–0·7 mm. in diameter, disc plane or nearly so, margin elevated; parathecium 35–40μ thick, carbonaceous, of thick-walled, periclinal hyphae extending under the hypothecium and just above the algal layer of the thallus; hypothecium and just above the algal layer of the thallus; hypothecium lenticular, about 55μ thick in the centre, composed of loosely woven, light brown hyphae; thecium about 75–90μ tall; paraphyses slender, imbedded in the thecial gel, scarcely septate below, dichotomously branched in the upper third, more frequently septate, terminal cell dark brown, spherical, about 4μ in diameter; asci 35 × 10μ tip thickened when young with broadly papillate protoplast, becoming thin-walled at maturity, cylindric; ascospores sub-distichous, hyaline, broadly ellipsoidal, 9–12 × 6–8μ. [Spermogonia black, immersed; wall fuliginous, dimidiate; spermatiophores fasciculate, short; sterigmata arcuate to hamate, 9–14 × 1μ].

On rocks with *Thelidium praevalescens, Steinera Werthii, Lecidea rhizocarpiza, Rhizocarpon kerguelense* and *Aspicilia disjunguenda.*

Kerguelen: Mt. Wyville Thompson, 1,000–1,500 ft. B.A.N.Z.A.R.E. B246–29; Greenland Harbour, B.A.N.Z.A.R.E. B177–9, B177–24; Royal Sound, B.A.N.Z.A.R.E. B90–9.

Antarctic species of Lecidea (Eulecidea)

While two species of the subgenus *Psora* and five of the subgenus *Biatora* have been reported from the Antarctic Archipelago and neighbouring Graham Land, only members of *Eulecidea* have been found in Marie Byrd Land, South Victoria Land and in our area. In the following key only *Eulecidea* species are given.

Thallus deep greyish, brown or fuscous
- Spores less than 10μ; hypothecium hyaline; thallus fusco-rufous . . *L. brunneoatra*
- Spores more than 10μ long
  - Apothecia 1 mm. or more in diameter
    - Thallus thick, hypothecium black .. .. *L. atrobrunnea*
    - Thallus thin, poorly developed .. .. *L. fuscoatra*
  - Apothecia less than 1 mm.; thallus 0·4–0–5 mm.
    - Thallus deep greyish .. .. *L. cinericia*
    - Thallus brownish .. .. *L. rufonigerrima*

Thallus dark olive buff or darker; hypothecium 20μ thick; thecium 25–30μ tall *L. Laseroni*

Thallus citrine drab to pale olive buff; hypothecium 60–70μ thick; thecium 50–90μ tall *L. Blackburni*

Thallus white to pale yellowish, sometimes stained ferruginous when growing over ferriferous rocks
- Apothecia over 2 mm. in diameter .. .. *L. auriculata*
- Apothecium up to 1·5 mm. in diameter; parathecium very thick below, usually with strands penetrating into the medulla .. .. *L. cancriformis*
- Apothecia 1 mm. or less in diameter
  - Hypothecium dark fuscous to brown
    - Spores 10–16 × 5–8μ; hypothecium 100–150μ thick
      - Cortex not differentiated; apothecia about 0·3 mm. in diameter; thecium 60μ tall; paraphyses 0·5–1·5μ in diameter, tips 2μ .. *L. ecorticata*
      - Cortex 30–60μ thick; apothecia 0·6–1·0 mm.
        - Thecium 100–120μ tall; paraphyses 5–6μ, tips not thickened *L. cremoricolor*
        - Thecium 140–160μ tall; paraphyses 3μ, tips furcate *L. sciatrapha*
    - Spores 7·5–10μ long; epithecium K green
      - Spores 2–3μ in diameter; thecium 30–40μ tall; asci short clavate, base not attenuate, 24–28 (—32) × 12·5–14μ .. .. .. *L. Coreyi*
      - Spores 4μ in diameter; thecium 50μ tall; asci clavate to subcylindric, becoming broadly ellipsoid with a long base, 25 × 8–9μ .. *L. MacLeani*
      - Spores 5–6μ in diameter; thecium 60μ tall; asci clavate .. *L. rupicida*
    - Spores 6–8·5μ long; epithecium K green
      - Spores 1·7–2·5μ in diameter
        - Asci 25–42μ tall, inflated above, attenuate below; hypothecium 100μ thick with long strands penetrating the medulla .. *L. cancriformis*
        - Asci (37–) 52–60μ tall, not inflated; hypothecium 60–70μ thick, not penetrating the medulla .. .. *L. Blackburni*

Spores 3·5–5μ in diameter; asci 23–31 × 6–9μ
Cortex 12μ thick; apothecia 0·25–0·3 mm. in diameter; hypothecium 20μ thick; ascospores 6–6·5 × 3·5–5μ .. .. *L. Painei*
Cortex 20μ thick; apothecia 0·4–0·7 mm. in diameter; hypothecium 150–180μ thick; ascospores about 8 × 4μ .. .. *L. MacLeani*
Hypothecium hyaline
Spores 10–12μ long
Spores 3–5μ in diameter; asci (20–) 32–40 × 12·5–16μ; thecium 60–70μ tall; epithecium K green.. .. .. *L. Wadei*
Spores 5–8·5μ in diameter
Paraphyses 1·0–1·5μ in diameter, not capitate; epithecium K–; asci 30–44 × 14–16 (–20)μ .. .. *L. Byrdii*
Paraphyses 0·75–1·0μ, capitate; epithecium K green; asci (41–) 48–62 (–70) × 15–18μ .. .. *L. Siplei*
Paraphyses 3–4μ, not capitate .. .. .. *L. eburnea*
Spores 7–11μ long
Spores 5–6μ in diameter; epithecium K–; thecium 55–60μ tall
Apothecia 0·3–0·5 mm. in diameter; spores 8–10μ long *L. rupicida*
Apothecia 0·675 mm. in diameter; spores 10–11μ long *L. Byrdii*
Spores 3–5μ in diameter; epithecium K green
Thecium 35μ tall; apothecia 0·2 mm. in diameter; paraphyses with clavate tips; hypothecium 20μ thick; parathecium not clearly differentiated *L. Harrissoni*
Thecium 50–60 (–70)μ tall; apothecia 0·2–0·25 mm. in diameter; paraphyses not capitate; hypothecium 30μ thick; parathecium 40μ *L. capsulata*
Thecium 70μ; apothecia 0·6 mm. in diameter; paraphyses capitate, heads 4–5μ; hypothecium 30μ thick; parathecium not differentiated *L. Stancliffi*

LECIDEA LASERONI Dodge, sp. nov.

Type: King George V Land, Madigan Nunatak, 30 miles east of Winter Quarters, C. F. Laseron, A.A.E. 41–1.

Areolae parvae, elevatae, 1 mm. altitudine, obscure olivaceo-alutaceae; strato amorpho circiter 18μ crassitudine; cortex circiter 20μ crassitudine, pseudoparenchymate fusco; stratum algarum 45–50μ crassitudine, protococcoideum, coloniis discretis compactum, cellulis 7–8μ diametro; medulla hyphis tenuibus laxe contexta, 2μ diametro. Apothecia conferta in apicibus areolarum, basi constricta, nigra, nitida, 0·5 mm. diametro, excipulo prominente, disco plano; parathecium carbonaceum, 150μ crassitudine, cellulis isodiametricis, pachydermeis, fuscis, 4μ diametro; hypothecium inconspicuum, circiter 20μ crassitudine, hyphis tenuibus, verticalibus; thecium 25–30μ altitudine; paraphyses tenues, apicibus clavatis, nigris, 2·5μ diametro; asci late clavati, 26 × 10–12μ; ascosporae unicellulares, hyalinae, longe ellipsoideae, vaginatae, 7–8 × 2·5–3μ (vagina inclusa).

Thallus mostly between and below quartz crystals, on the surface of the rock, largely confined to small, elevated areoles about 1 mm. tall, bearing several crowded apothecia at their tips, dark olive buff or darker; outer amorphous layer about 18μ thick, cortex about 20μ thick, of dark brown pseudoparenchyma; algal layer 45–50μ thick, of compact, discrete colonies of *Protococcus*, cells 7–8μ in diameter; medulla of slender, loosely woven hyphae about 2μ in diameter.

Apothecia crowded on the tops of the areoles, constricted beneath, black, shining, mostly about 0·5 mm. in diameter (proliferating ones up to 1 mm.), exciple prominent, disc remaining flat (or concentrically gyrose from proliferation of new small apothecia from the disc of the old one); parathecium carbonaceous, 150μ thick, of isodiametric, thick-walled, dark brown cells, about 4μ in diameter; hypothecium inconspicuous, about 20μ thick, of very slender subvertical hyphae, epithecium greenish-blue when first sectioned, fading on standing; thecium 25–30μ tall; paraphyses, slender, wall gelified, once branched above the asci, tips clavate, black, about 2·5μ in diameter; asci broadly clavate, 26 × 10–12μ, wall about 4μ thick, protoplast papillate at first, becoming clavate; ascospores unicellular, hyaline, long ellipsoidal with a broad sheath, 7–8 × 2·5–3μ (including sheath).

This species is intermediate between *L. Coreyi* which it resembles in several microscopic characters, and *L. Blackburni* and *L. rupicida* which it resembles in habit.

King George V Land, Madigan Nunatak, 2,400 ft., 30 miles east of Winter Quarters, C. F. Laseron, A.A.E. 41–1.

Lecidea Blackburni Dodge & Baker

Lecidea Blackburni Dodge & Baker, Ann. Mo. Bot. Gard., 25, 540; 1938.

Type: South Victoria Land, Queen Maud Mts., Mt. Scudder, 86° 03′ S., 150° 40′ W., Q. A. Blackburn, R. S. Russell, Jnr. & S. D. L. Paine QM–6 (2).

Non-assimilative portion a few black strands composed of dark, irregular hyphae, dendritic, extending over areas 4–5 mm. in diameter; assimilative portion up to 0·75 mm., irregularly areolate, soft to gelified when moist, pale olive buff to citrine drab; cortex 10–18μ thick, of several layers of small, fastigiate cells, light to dark-brown in the outer layers, the whole covered by a layer of dead cells, up to 20μ thick; algal layer 80–100μ thick, cells up to 15μ in diameter, closely packed; medulla up to 850μ thick, of slender hyphae 1–1·5μ in diameter, reticulately arranged, more compactly so about the algae; lower cortex absent.

Apothecia up to 0·5 mm. in diameter, irregularly elliptical to circular in outline, more or less flattened with a distinct margin, sessile, closely crowded or scattered, black, somewhat shining; parathecium consisting of a few cells merging with the marginal cortex which is well developed, up to 25μ thick, of large, isodiametric cells, carbonaceous, fusing with the epithecium above and the thalline cortex below; hypothecium 60–70μ thick, fuscous brown slightly thinning toward the margin, of thick-walled pseudoparenchyma; thecium 50–90μ tall; paraphyses 1μ in diameter, heads up to 3μ, darkened, without incrustations, unbranched or branched near the tips, epithecium 8–12μ, thick, carbonaceous, rough, turning green with K; asci (37–) 52–60 × 9–11μ, 8-spored, long, slender clavate, expanding gradually from the attenuate base (not abruptly as in *L. cancriformis*); ascospores 6·5–8·5 × 2–2·5μ, ellipsoidal, unicellular.

A few weathered thalli seem to belong here although the spores are somewhat larger. The above description was based on the type.

King George V Land: Madigan Nuntak, 2,400 ft., C. F. Laseron A.A.E. 25–1.

Lecidea cancriformis Dodge & Baker

Lecidea cancriformis Dodge & Baker, Ann. Mo. Bot. Gard., 25, 539; 1938.

Type: South Victoria Land, Queen Maud Mts., Mt. Scudder 86° 03′ S., 150° 40′ W., Q. A. Blackburn, R. S. Russell, Jnr. & S. D. L. Paine QM–6 (2).

Thallus areolate, up to 0·5 mm. wide, usually in long strands bearing several apothecia, greyish white, gelified when moist, irregular in shape, more or less verrucose, small and inconspicuous in comparison with the apothecia; upper cortex 2–8μ thick, brownish, of small fastigiate

cells up to 2μ in diameter, which terminate the medullary hyphae, with a thick layer of dead cells on the surface up to 40μ thick; algal layer up to 100μ thick, of protococcoid cells up to 10μ in diameter; medulla up to 1,200μ thick, of reticulately arranged hyphae up to 2μ in diameter, more or less vertical toward the base of the areolae; lower cortex not differentiated.

Apothecia up to 1·5 mm. in diameter, round or angular from mutual pressure, convex to pulvinate, immarginate, gregarious, black, constricted at the base, subsessile to substipitate on the areolae; parathecium of a few cells which merge laterally with the marginal cortex; hypothecium up to 100μ thick, extending irregularly into the medulla, occasionally as much as 450μ, of dark fuscous brown cells, about 2μ in diameter, more or less parallel and vertical; thecium up to 70μ tall; paraphyses 1–1·5μ, expanding to heads 3–4μ in diameter which are hyaline but incrusted with carbonaceous fragments, unbranched or branched, thick-walled, septate, epithecium about 10μ thick, carbonaceous, surface irregular, K greenish; asci 25–42 × 8–12μ, attenuate below, inflated abruptly above, 8-spored; ascospores subfasciculately arranged, unicellular, hyaline, 6·5–7·5 × 1·7–2·5μ, ellipsoidal, one end sometimes pointed.

This species seems to be quite abundant in our region, but unfortunately I have been unable to find mature asci and ascospores, so that it is with much hesitation I have referred it to *L. cancriformis*. In our material the thallus is slightly better developed with some verrucae as large as the smaller apothecia, and slightly brownish. The algal layer is much thinner, only 20μ thick or completely missing over large areas, as if the plants were moribund. In the more completely moribund apothecia, the whole spongy medulla becomes deep brown.

On rocks with *Umbilicaria Hunteri, Lecanora exsulans, L. Johnstoni, Candelariella cerebriformis, Alectoria congesta* and *Usnea* sp.

King George V Land: Aurora Peak 1,860 ft., A.A.E. 14–1; near Cape Denison, A.A.E. 104–1, 125, 126, 127, 128, 129, 130, 131, 1,055.

MacRobertson Land: Cape Bruce B.A.N.Z.A.R.E. 108–4, 108–5.

LECIDEA MCLEANI Dodge, sp. nov.

Type: King George V Land: Aurora Peak, 1,860 ft., A. L. McLean, A.A.E. 91.

Thallus 750μ crassitudine, subsquamulosa, squamulis circiter 1 mm. diametro, cinnamomeo-alutaceis, marginibus laevibus vel subcrenatis; cortex fastigiatus, 20μ crassitudine, hyphis pachydermeis, conglutinatis, septatis, parte extera gelifacta; stratum algarum ad 220μ crassitudine, cellulis 6–8μ diametro cystococcoideis, in coloniis parvis, subverticaliter dispositis; medulla hyphis tenuibus pachydermeis, substrato algarum dense contexta, subtus laxius.

Apothecia primum immersa dein elevata, basi constrictaque, disco nigro, plano vel convexo, margine concolore, non elevato; parathecium circiter 50μ crassitudine, cortice fastigiato 30μ crassitudine, hyphis tenuibus nigris, conglutinatis, medulla subhyalina, 20μ crasstitudine, hyphis 3μ diametro laxe contextis; hypothecium 150–180μ crassitudine ad margines tenuescens, fuscum, pseudoparenchymaticum, cellulis leptodermeis subsphaericis circiter 4–5μ diametro; thecium 50μ altitudine; paraphyses tenues, repetito-dichotomi super ascos, cellulis apicalibus sphaericis, 4μ diametro, nigris; asci 25 × 8–9μ, clavati vel subcylindrici, dein late ellipsoidei, stipite longo; ascosporae 8nae, amerosporae, pachydermeae, hyalinae, ellipsoideae, circiter 8 × 4μ.

Thallus more than 750μ thick, subsquamulose, squamules about 1 mm. in diameter, cinnamon-buff, margin smooth or slightly crenate, closely applied to the rock; cortex fastigiate, about 20μ thick, of thick-walled, conglutinate, septate hyphae, the outer half gelified and structureless where exposed to the weather; algal layer up to 220μ thick, cells 6–8μ, cystococcoid, in small colonies in more or less vertical rows, with occasional colonies surviving below the hypothecium of young apothecia; medulla of slender, thick-walled hyphae, compactly woven below the algal layer, becoming very loose below, with occasional surviving algal cells deep in the medulla.

Apothecia 0·4–0·7 mm. in diameter, immersed in the thallus when young, becoming elevated and constricted at the base when mature; disc black, plane to convex, margin concolorous, not elevated; parathecium about 50μ thick, consisting of a fastigiate cortex 30μ thick, of very slender, conglutinate black hyphae at right angles to the surface and a loosely woven subhyaline medulla 20μ thick, somewhat thicker in old apothecia, hyphae 3μ in diameter; hypothecium 150–180μ thick, thinning toward the margin, dark-brown, pseudoparenchymatous, cells thin-walled, nearly spherical, about 4–5μ in diameter; thecium 50μ tall; paraphyses slender, repeatedly dichotomous above the asci, cutting off spherical, thick-walled black cells about 4μ in diameter, imbedded in the epithecial gel; asci 25 × 8–9μ, clavate to subcylindric with thick wall and tip when young, becoming broadly ellipsoidal with a long stipe, 8-spored; ascospores unicellular, hyaline, ellipsoidal, about 8 × 4μ.

King George V Land: Aurora Peak, 1,860 ft., A. L. McLean, A.A.E. 91.

LECIDEA HARRISSONI Dodge, sp. nov.

Type: Queen Mary Land: Possession Nunatak, 66° 45′ S., 98° 30′ E., C. T. Harrisson, A.A.E. 53.

Areolae parvae, sparsae, 0·3 mm. diametro, albae, laeves, marginibus laevibus; cortex fastigiatus, pseudoparenchymaticus. Apothecia nigra, immarginata, 0·2 mm. diametro; parathecium indistinctum; hypothecium 20μ crassitudine, hyphis conglutinatis dense contextum, cellulis isodiametricis, 3μ diametro; thecium 35μ altitudine; paraphyses 1–2-dichotomae, apicibus tenuibus clavatis, una cum cellulis sphaericis pachydermeis, fuligineis, circiter 4μ diametro; asci clavati, ad 20 × 10–11μ, stipite circ. 10μ longitudine, apice incrassata; ascosporae octonae, hyalinae, longe ellipsoideae, apicibus subacutis, pachydermeae, 7–8 × 3–4μ.

Thallus of small, scattered areoles, 0·3 mm. in diameter, white, smooth, margin smooth; cortex fastigiate, pseudoparenchymatous. Apothecia black, immarginate, 0·2 mm. in diameter, parathecium not differentiated (perhaps represented by a narrow, blackened structure similar to the thalline cortex at the base of the apothecium), medulla of very loosely woven, more or less vertical hyphae; hypothecium 20μ thick, of densely woven conglutinate hyphae with nearly isodiametric cells, about 3μ in diameter; thecium 35μ tall; paraphyses once or twice dichotomous above the asci, slender, tips clavate, cutting off spherical thick-walled dark fuliginous cells, about 4μ in diameter; asci clavate, becoming broadly so, about 22 × 10–11μ with a stipe about 10μ long, tip thickened, protoplast rounded; ascospores hyaline, long ellipsoid with somewhat pointed ends, wall rather thick, 7–8 × 3–4μ.

Our material is very scanty. Apparently the asci mature near the sides first, with new asci forming toward the centre, leaving the exhausted thecium to darken so much it might be taken for the parathecium as the disc becomes increasingly elevated and convex. The small interstices between the medullary hyphae entrap much air, so that if care is not taken to remove it, it may be mistaken for a carbonaceous layer below the hypothecium, but when the hyphae are finally thoroughly wetted in the mounting medium, the smaller branches of the medullary hyphae are seen to pass directly into the hypothecium.

Queen Mary Land: Possession Nunatak, 66° 45′ S., 98° 30′ E., C. T. Harrisson, A.A.E. 53.

MYKOBLASTUS Norm.

Mykoblastus Norm., Nyt Mag. Naturvidensk., 7, 24; 1853.

Lecidea sect. *Mycoblastus* Th. Fr., Lich. Scand., 1, 479; 1874.

Megalospora Mass., Ricerch. Autonom. Lich. Crost. 105; 1852 non Mey. & Fw., 1843.

Oedemocarpus Trev., Linnaea, 28, 289; 1856.

Type: *Lichen sanguinarius* L. for all names.

Thallus crustose, uniform, ecorticate, with protococcoid algae. Apothecia sessile; parathecium very thick, highly gelified, often darkened but not truly carbonaceous; hypothecium hyaline or reddish, paraphyses slender, branched, suggesting *Pertusaria* but more compact, gelified; asci 1–8-spored; ascospores ellipsoid, large, hyaline, with a thick, gelified wall resembling those of *Pertusaria* much more than those of the Lecideaceae.

The 8-spored members of the genus are subantarctic, reaching New Zealand, but have not yet been detected in the western hemisphere; the 2-spored members extend from New Zealand northward to the Philippines, Siberia and Central Europe, while the 1-spored species are subarctic and alpine in both hemispheres. The characters of the thecium are suggestive of Pertusariaceae, especially *Pertusaria* sect. *Lecanorastrum*, and perhaps should be included in that family rather than in the Lecideaceae, where they have been universally placed.

KEY TO SUBANTARCTIC SPECIES OF MYKOBLASTUS.

Asci 8-spored; Kerguelen
- Ascospores 24–36 × 11–18μ .. .. *M. perustus*
- Ascospores 38–51 × 21–34μ .. .. *M. stephanodes*

Asci 1–2-spored; ascospores 40–50 × 24–28μ; thallus sorediate; Campbell and Macquarie Islands *M. campbellianus*

MYKOBLASTUS PERUSTUS (Nyl. in Crombie) Dodge, comb. nov.

Lecidea fuscoatra Hook. f. & Tayl. Cryptog. Antarct., 233; 1845: Fl. Antarct., 2, 539; 1847 non Ach.

Lecidea perusta Nyl. in Crombie, Jour. Bot. Brit. For., 13, 334; 1875: 15, 106; 1877; Jour. Linn. Soc. Bot., 15, 188; 1876: Phil. Trans. Roy. Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot. 1, 2, 238; 1885.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus relatively thick, somewhat determinate on a black hypothallus which extends a short distance beyond the thallus, giving an inconspicuous black margin, olive buff, rimose to rimulose-areolate, the centres of the areoles slightly convex; ecorticate, highly gelified; algae protococcoid, cells about 4–5μ in diameter, with short filaments of a brownish *Scytonema* penetrating the thallus for some distance.

Apothecia, black, solitary, crowded or coalesced (then giving the appearance of *Glyphis*) up to 2·5 mm. in diameter, angular and irregular by mutual pressure, margins thick, prominent, disc concave to plane, black; semi-immersed in the thallus; parathecium gelified, of thick-walled brownish moniliform branching hyphae more or less perpendicular to the surface (thick sections may appear carbonaceous but not truly so) about 90μ thick at the margin, becoming 110μ thick below the hypothecium where the hyphae are lighter and densely interwoven; hypothecium thin, 35μ thick, of slender densely woven deeply staining hyphae; thecium 140–150μ tall; paraphyses slender, apparently eseptate, dichotomously branched, flexuous, ultimate branches submoniliform terminal cell clavate and slightly larger, often with a very small chroococcoid alga growing over the brownish epithecial gel; asci cylindric, becoming clavate with a thick wall, 70–75 × 18–21μ, 8-spored; ascospores ellipsoidal, hyaline, with thick gelified wall and deeply staining protoplast 24–36 × 11–18μ.

It seems probable that the original description was based on an old weathered specimen whose areoles were stained by iron in the rock, analogous to the var. *ferruginea* of many Antarctic and subantarctic species. The collection from Molloy Point, J. H. Kidder, has smaller apothecia, subspherical, only 0·3 mm. in diameter and is glaucous-grey, variegated with black; the parathecium is somewhat thicker, but it seems only a young specimen of this species.

Growing with *Steinera glaucella, Aspicilia endochlora, Aspiciliopsis macrophthalma,* and *Buellia tristiuscula.*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–37; Observatory Bay, B.A.N.Z.A.R.E. B192–27, B192–28, B192–29, B192–30; Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp. in Tuckerman Herb., sheet 1,452, on rock with *Steinera glaucella*).

MYKOBLASTUS STEPHANODES (Stirton) Dodge, comb. nov.

Lecidea stephanodes Stirton in Crombie, Jour. Linn. Soc. Bot., 16, 221; 1878: Phil. Trans. Roy. Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot. 1, 2, 239; 1885.

Type: Kerguelen, Moseley ("Challenger" Exp.).

Thallus very thin, continuous, whitish to dark olive-buff, indeterminate; apothecia black, superficial, about 1 mm. in diameter, margin thick, elevated, cracking in old specimens, disc plane, black; parathecium 220μ thick above, thinning to about 150μ thick below, fuliginous, the space under the hypothecium of coarse thick-walled loosely woven hyphae, dense and almost carbonaceous in a layer just under the hypothecium; hypothecium of slender, densely woven, deeply staining hyphae about 55μ thick; thecium 170–180μ tall; paraphyses slender, flexuous, dichotomously branched; asci very thick-walled when young, 110 $\times$ 35μ, 8-spored; ascospores hyaline, unicellular, with a thick gelified wall, 38–56 $\times$ 21–34μ.

Growing with *Verrucaria Werthii, Thrombium kerguelanum, Steinera glaucella, Physma kerguelense, Aspiciliopsis macrophthalma* and *Placopsis bicolor.*

Kerguelen: Mainland opposite Murray Island, 1,000–1,500 ft. Sta. 62, B.A.N.Z.A.R.E. B246–1; near Port Jeanne d'Arc, 1,400 ft., B.A.N.Z.A.R.E. B200–1, B200–2.

MYKOBLASTUS CAMPBELLIANUS (Nyl.) Zahlbr.

Mykoblastus campbellianus (Nyl.) Zahlbr., Cat. Lich. Univ., 4, 3; 1926.

Lecidea campbelliana Nyl., C. R. Acad. Sci., 83, 90; 1876.

Type: Campbell Island, Filhol.

Thallus subdeterminate, forming a white circle about 5 cm. in diameter over the surface of mosses; individual verrucae small, subisidioid, tips broken and appearing sorediate; algae protococcoid, cells 6–7μ in diameter. Apothecia 0·5–0·6 mm. in diameter, solitary or crowded, appearing black; disc very convex, warm sepia or darker under a hand-lens, immarginate; parathecium about 35μ thick of slender hyphae scarcely differentiated from the paraphyses, imbedded in bluish gel; hypothecium hyaline; thecium about 150μ tall; asci cylindric, thick-walled, 2-spored, 70–75 $\times$ 22–25μ; ascospores 44–48 $\times$ 22–26μ, ellipsoidal, thick-walled, hyaline.

Apparently several spores start to form, but soon abort until two seems the normal number in our material, although one single-spored ascus was seen and another immature ascus in which one spore was beginning to abort. Nylander reports the spores 40–50 $\times$ 24–28μ, slightly larger than ours, which would probably be the case if all but one of the spores aborted. Our material is much closer to this species than to any 2-spored species so far described from New Zealand.

Growing over mosses.

Macquarie Island: Highlands, Sta. 81c, B.A.N.Z.A.R.E. 534 B.

BIATORINA Mass.

Biatorina Mass., Ricerch. Autonom. Lich. Crost., 134; 1852.

Patellaria sect. *Biatorina* Müll.-Arg., Mém. Soc. Phys. Hist. Nat. Genève, 16, 396; 1862.

Catillaria sect. *Biatorina* Th. Fr., Lichenogr. Scand., 1, 564; 1874.

Biatora sect. *Biatorina* Tuck., Syn. N. Amer. Lich., 2, 29; 1888.

Sporoblastia Trevis., Linnaea, 28, 290; 1856.

Cliostomum Fries, Syst. Orb. Veg., 116; 1825 [based on spermogonia only].

Type: Massalongo listed ten species, all of which are still considered as belonging in this group, whether as genus or subgenus. *Sporoblastia* was based on *Biatorina* Mass. and *Gyalolechia* Mass., both older names.

Thallus crustose, indeterminate or determinate, ecorticate, algae protococcoid. Apothecia immersed to sessile, amphithecium absent; parathecium waxy, hyaline or light coloured, never carbonaceous; disc light coloured; hypothecium hyaline; paraphyses unbranched; asci 8-spored; ascospores small, relatively long ellipsoid, 2-celled with thin wall and very thin septum.

BIATORINA SUBLUTESCENS (Nyl. in Crombie) Dodge, comb. nov.

Lecanora sublutescens Nyl. in Crombie, Jour. Bot. Brit. For., 14, 21; 1876: Jour. Linn. Soc. Bot., 15, 186; 1876: Phil. Trans. Roy. Soc. [London], 168, 49; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 236; 1885: Müll.-Arg., Bot. Jahrb. [Engler], 4, 137; 1884.

Type: Kerguelen, Swains Bay*, A. E. Eaton (Venus Transit Exp.).

Thallus about 200μ thick, rimose areolate to almost granulose, Chartreuse yellow, margin thin and indeterminate, but with a narrow black and somewhat thicker margin where it comes in contact with an unidentified sterile, greyish thallus; ecorticate, homoeomerous; algae protococcoid, cells 6–7μ in diameter, separated by medullar hyphae, not united into colonies. Apothecia biatorine, variable in size and shape, mostly about 1 mm. in diameter, sessile, appearing like an areolate thallus where crowded, margin very thin, not elevated, Chartreuse yellow, disc convex, cinnamon buff; amphithecium absent; parathecium hyaline, gelified, 75μ thick just below the thecium and extending inward and downward to the rock, becoming only about 35μ thick just inside the thallus, of thick-walled, septate, periclinal hyphae which spread fan-wise in the thicker portion; hypothecium of vertical hyphae with rock crystals included just above the surface of the rock and slightly more deeply staining just below the thecium which is about 75μ tall; paraphyses slender, closely septate, becoming moniliform above, tips not thickened and ending in the brownish epithecial gel; asci cylindric-clavate, thin-walled tips not thickened, 50–55 $\times$ 7–8μ, 8-spored; ascospores ellipsoid, hyaline, 2-celled with moderately thickened wall, 7–9 $\times$ 3–4μ. Spermogonia not seen.

Apparently Nylander and Müller-Argau had only fragments with immature apothecia and described them as: "Entirely similar in appearance to *Lecanora lutescens* DC. but saxicole . . . . Thallus sulphur-coloured, subleprose (Ca saffron-coloured)". Various authors have used *Lecanora lutescens* for species now placed in various genera. Our material agrees well with the thalline characters of *Lecanora expallens* v. *lutescens* (DC.) Nyl. as described by Crombie, Monog. Lich. Brit., 432; 1894, and probably represents the Nylanderian tradition. A study of the mature apothecium shows that the apothecium is wholly biatorine rather than lecanorine and the spores appear 2-celled, but as in several species of *Lecidea*, it has been very difficult to decide whether the thin septum develops late, so that the spores appear mostly unicellular or whether the nucleus and protoplasmic strands are giving the appearance of a septum.

Growing with a greyish, inconspicuous sterile thallus.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–31.

*In the original description, Crombie (1879) changes the citation to "shaded seacliff near Observatory Bay, colouring the rock". I have seen neither specimen.

CATILLARIA Mass.

Catillaria Mass., Ricerch. Autonom. Lich. Crost., 78; 1852.

Type: *C. chalybeia* (Borr.) Mass. [*C. lutosa* (Mont.) Mass.].

Thallus crustose, endo- or epilithic, indeterminate or with effigurate margins; ecorticate: algae protococcoid. Apothecia round, immersed to sessile, with dark coloured or carbonaceous parathecium, without amphithecium, epithecium concave or convex, dark coloured; hypothecium hyaline to black; paraphyses not or sometimes branched, tips capitate, free or immersed in a gel; asci 8-spored; ascospores usually small, under 30μ, hyaline, ellipsoid or elongate and bacilliform, straight or curved, finally 2-celled with a thin wall and septum, without a sheath. Spermogonia ellipsoidal to flask-shaped, spermatia straight or slightly curved.

CATILLARIA BASALTICA (Müll.-Arg.)

Catillaria basaltica (Müll.-Arg.) Zahlbr., Deutsche Südpolar Exp., 8, 51; 1906.

Patellaria (*Catillaria*) *basaltica* Müll.-Arg., Bot. Jahrb. [Engler], 4, 137; 1884.

Type: Kerguelen, Betsy Cove, Naumann (Voy. "Gazelle").

Thallus very thin, continuous or somewhat rimose, dark olive to subfuscous; algae protococcoid, cells 10–15μ in diameter. Apothecia solitary, 0·2–0·6 mm. in diameter, sessile, black, margin rather thick, disc plane; parathecium carbonaceous, 110μ thick at the margin to 210μ below the hypothecium which is not clearly differentiated; thecium 120–130μ tall; paraphyses slender, flexuous, eseptate, branching several times just above the asci and terminated by a large, dark brown, thick-walled, spherical cell about 4μ in diameter, thecial gel poorly developed; asci clavate 35 × 10–11μ on long stalks 35–40μ long, 8-spored; ascospores hyaline, clearly 2-celled with deeply staining protoplasts and clear septum, slightly constricted in the centre, long ellipsoid to subfusiform, 15–18 × 8–10μ.

Growing with *Pannaria dichroa*.

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–5.

CATILLARIA KERGUELENSIS Dodge, sp. nov.

Type: Kerguelen, Greenland Harbour, B.A.N.Z.A.R.E. B177–38.

Thallus tenuis, albidus vel subgriseus, continuus, rare minute rimulosus, margine subnigricante et subdeterminatus sed non effiguratus; ecorticatus; algae protococcoideae, cellulis 7–8μ diametro. Apothecia sessilia, ad 1 mm. diametro, angularia irregulariaque, marginibus elevatis, discis concavis vel planis, nigris; parathecium carbonaceum, 75μ crassitudine sub margine ad 110–120μ crassitudine sub hypothecio; hypothecium hyalinum, 35μ crassitudine hyphis tenuibus, dense contextum; thecium 110–120μ altitudine; paraphyses tenues, eseptatae dichotome ramosae apicibus 2-cellularibus clavatis; asci 50–55 × 9–10μ, clavati, leptodermatici; ascosporae octonae, hyalinae, uniseptatae, ellipsoideae, 12–15 × 5–6μ.

Thallus thin, whitish to somewhat greyish, continuous, occasionally minutely rimulose, margin somewhat darkened and determinate but not clearly effigurate; ecorticate; algae protococcoid, cells 7–8μ in diameter, with occasional included groups of chroococcoid cells and other foreign algae. Apothecia sessile, up to 1 mm. in diameter, angular and irregular, margin elevated, disc concave to plane, black; parathecium carbonaceous, 75μ thick at the margin, of somewhat irregular thickness below the hypothecium, up to 110–120μ; hypothecium hyaline, 35μ thick, of slender densely woven hyphae; thecium 110–120μ tall; paraphyses slender, eseptate, dichotomously branched just above the asci and twice or thrice branched just below the clavate, 2-celled tips

about 4 × 1μ in a clavate mass of gel about 7 × 11μ; asci 50–55 × 9–10μ, cylindric clavate, thin-walled, 8-spored; ascospores hyaline, 2-celled, somewhat constricted at the relatively thick septum, ellipsoidal, 12–15 × 5–6μ.

On rocks with *Lecidea intersita, Rhizocarpon kerguelense, Lecanora atrocaesia, Buellia subplicata* and *B. tristiuscula.*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–38; Murray Island, B.A.N.Z.A.R.E. B210–3.

Antarctic species of Catillaria

Our material is very fragmentary and in poor condition for identification, but such characters as are observable suggest the following species, whose descriptions are based on the types.

Catillaria cremea Dodge & Baker.

Catillaria cremea Dodge & Baker, Ann. Mo. Bot. Gard. 25, 544; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, P. Siple & S. Corey, 72W–8.

Assimilative thallus thinly diffused over 1 cm., slightly arachnoid to areolate and deeply cracked, gelified when moist, white to cream colour, often rusty and discoloured from the substratum; cortex poorly developed, sometimes with a few darker fastigiate cells appearing in the cracks and on the sides of the areoles, amorphous over the tops of the areoles; algal layer 65μ thick, cells protococcoid, up to 7μ in diameter, in more or less spherical colonies; medulla of loosely reticulate strands, basal cortex 50–75μ thick, of more compact cells, darker brown, irregularly arranged (not fastigiate):

Apothecia up to 0·35 mm. in diameter, irregular in outline, flattened, scattered, immarginate, sometimes slightly concave, sessile on the areoles, black; parathecium up to 50μ thick, carbonaceous, merging with the hypothecium which is up to 75μ thick, light to dark brown and carbonaceous; thecium about 50μ tall; paraphyses 0·75–1·0μ, expanding to 1·5–2·5μ at the heads, mostly unbranched, somewhat flexuous, slender, epithecium about 10μ thick, dark; asci 31–37 × 12–15μ, short and broadly clavate, especially when mature, 8-spored; ascospores fasciculatly arranged, 11–14 × 3–4μ, uniseptate, slender-ellipsoidal with truncate ends.

MacRobertson Land, Cape Bruce, 67° 26′ S., 60° 49′ E., B.A.N.Z.A.R.E. B108–6.

Catillaria floccosa Dodge & Baker

Catillaria floccosa Dodge & Baker, Ann. Mo. Bot. Gard., 25, 545; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, P. Siple & S. Corey 72W–2.

Assimilative portions well developed covering areas of several square centimetres, floccose to calcareous when dry, gelified and pustular when moist, white to greenish from the abundance of included algae; cortex evanescent, represented by groups of dark, fastigiate cells, variable in size, scattered over individual pustules; algal layer about 150μ thick, of scattered colonies, cells 6–7μ in diameter; medulla up to 300μ thick, of very slender hyphae, very loosely woven, more compact about the algal colonies; basal layer identical with the scattered dark cortical cells but continuous, about 15μ thick. Cephalodia with *Nostoc* abundant under the basal layer.

Apothecia up to 0·35 mm. in diameter, usually about 0·20 mm., sessile covering the pillars of the assimilative portions, irregular, convex, scattered, black, shining; parathecium 10–12μ thick, black; hypothecium up to 20μ thick, of dark, compact cells, more or less reticulately arranged; thecium 50–70μ tall; paraphyses 1·5–2μ in diameter, of short, brownish cells, tips scarcely enlarged, epithecium 4–5μ thick, dark; asci 29–48 × 12–16μ, 8-spored, tip thickened; ascospores 11·5–15 × 3·5–6·5μ, uniseptate, not constricted, one cell usually obtuse, the other more acute.

King George V Land: Cape Denison, D. Mawson 1051, A.A.E.

CATILLARIA INCONSPICUA Dodge & Baker

Catillaria inconspicua Dodge & Baker, Ann. Mo. Bot. Gard., 25, 548; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Chester Mts., P. Siple & S. Corey 97A–1.

Non-assimilative portions of the thallus finely reticulate, black, very inconspicuous, of coarse dark hyphae forming the cortex, medulla of more slender hyaline hyphae, loosely to compactly woven. Assimilative portions scant over areas of 1 sq. cm., greyish; cortex prominent, of small fastigiate cells, little darkened; algal layer 55–60μ thick, cells single or in small colonies, more or less vertically arranged; medulla of slender loose hyphae, branching in the sub-cortical region; basal layer not sharply differentiated, often confluent with the non-assimilative portions.

Apothecia up to 1·35 mm. in diameter, sessile on the assimilative areoles, pulvinate, irregular, black, scattered; parathecium scarcely distinct; hypothecium 20–25μ thick, hyaline, of slender periclinal hyphae, very compact; thecium 80–90μ tall; paraphyses about 1μ in diameter, heads 4·5μ, slightly darkened, sheath rather conspicuous, branched or unbranched, slightly flexuous, epithecium about 10μ thick, K purple; asci 56–67 $\times$ 15–19μ clavate, 8-spored; ascospores 15–19 $\times$ 4·5–7μ, uniseptate, long ellipsoid, rarely reniform or navicular, not constricted at the septum.

On granite.

Queen Mary Land: Mt. Barr Smith, about 4,000 ft., C. T. Harrisson, A.A.E. 6–1.

THALLOIDIMA Mass.

Thalloidima Mass., Ricerch. Autonom. Lich. Crost., 95; 1852.

Scolecites sect. *Thalloidima* Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges., 163; 1862.

Toninia sect. *Thalloedema* Th. Fr., Lichenogr. Scand., 1, 336; 1874.

Lecidea subg. *Thalloedema* Vainio, Etude Lich. Brés., 2, 18; 1890.

Biatorina sect. *Thalloidima* Jatta, Syll. Lich. Ital., 369; 1900.

Type: Based on *L. vesicularis* Ach., *L. candida* Ach., *L. mammillaris* Duf. and *L. conglomerata* Ach., all but the last still treated as belonging here by Zahlbruckner, the last placed in *Toninia* sect. *Eutoninia*.

Thallus cartilaginous squamulose in a bullate or wrinkled crust, effigurate, with amorphous cortex or a palisade of thick-walled septate vertical hyphae; algae protococcoid. Apothecia sessile, with coloured or dark parathecium formed of radiating hyphae imbedded in a gel; paraphyses simple or imbedded in a gel, often capitate; hypothecium hyaline; asci small, subventricose, tips obtuse, 8-spored; ascospores long ellipsoid to fusiform, 2-locular, hyaline, septum often not very clear.

Our species is closest to the segregate *Fritzea* Stein ap. Cohn, Kryptog. fl. Schlesiens, 2, 2, 114; 1879, based on *Psora lamprophora* Körb. (*Thalloidima lamprophorum* Müll.-Arg.) in the apothecia being innate in the thallus when young, then emerging and becoming almost immarginate at maturity. I have not seen sufficient to form an opinion on the validity of *Fritzea*. Zahlbruckner, while citing the generic name as a synonym of *Toninia* sect. *Thalloidima*, leaves the single species so far referred to *Fritzea* in *Lecidea* sect. *Psora*.

THALLOIDIMA KERGUELENSIS Dodge, sp. nov.

Type: Kerguelen, Greenland Harbour, B.A.N.Z.A.R.E. B177–39.

Thallus crustosus, effiguratus, marginibus crassis lobatis, albidus glauco-griseus, centro rimoso-areolatus; cortex 55μ crassitudine, hyphis pachydermaticis, subverticalibus, dense contextus dein gelifactus et subamorphus; algae protococcoideae, coloniis rotundatis, cellulis 7–8μ diametro,

stratum discontinuum circiter 75μ efficientes. Apothecia immersa dein elevata, nigra, subimmarginata; parathecium hyalinum 55μ crassitudine, hyphis radiantibus tenuibus, brunneis, dichotome ramosis; hypothecium tenue, 10–15μ crassitudine hyphis subverticalibus; thecium 30μ altitudine; paraphyses tenues, apicibus non incrassatis, epithecio viridi; asci ellipsoidei, apicibus incrassatis, 25–26 × 12–13μ; ascosporae octonae, hyalinae longe-ellipsoideae, obscure uniseptatae, 10–11 × 3–4μ.

Thallus crustose, effigurate, with thick, lobed darkened margins, whitish becoming glaucous-grey, centre rimose areolate; cortex 55μ thick, of hyaline, thick-walled, subvertical hyphae densely woven, becoming gelified and somewhat amorphous; algae protococcoid, in rounded colonies, cells 7–8μ in diameter, forming a discontinuous layer about 75μ thick. Apothecia immersed at first, showing as a small black disc, becoming elevated, black and almost immarginate; parathecium hyaline, 55μ thick, of slender brownish radiating, dichotomous hyphae imbedded in a gel, the outer portion being deep green; hypothecium thin, 10–15μ thick, more deeply staining but not clearly differentiated, of subvertical hyphae; thecium about 30μ tall; paraphyses slender, forking once or twice above the asci, tips not thickened, epithecial gel not well developed, greenish; asci ellipsoidal, tip thickened, protoplast slightly papillate, 8-spored, 25–26 × 12–13μ; ascospores hyaline, long ellipsoid, hyaline, rather thick-walled, obscurely uniseptate, 10–11 × 3–4μ.

Growing over old *Pertusaria subperrimosa*, *Aspicilia endochlora* and *Lecanora atrocaesia* and on rock with *Rhizocarpon Johnstoni* and *Buellia subplicata*.

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–39.

Bacidia DNtrs.

Bacidia DNtrs., Giorn. Bot. Ital., 1, 189; 1846.

Type: Originally based on *Lecidea rosella* Ach. and *L. carnea* Ach. Since *L. carnea* Ach. has been transferred from the genus, we may accept *L. rosella* Ach. as the type, as this would conserve the genus in the sense commonly used.

The synonymy of this very large and variable genus is very confused, hence I have not tried to cite the numerous synonyms. Of the five species in our collections four belong in *Eubacidia* Zahlbr. and one in sect. *Weitenwebera* Zahlbr. (*Bilimbia* DNtrs. non Reichb., *Weitenwebera* Opiz non Schrank).

Thallus crustose, homoeomerous or heteromerous, ecorticate; algae protococcoid. Apothecia sessile, rarely somewhat immersed or almost stipitate, with flat to very convex disc; parathecium light coloured; hypothecium hyaline or darkening; asci usually 8-spored; ascospores hyaline, ong fusiform to acicular, 3-many-septate, walls and septa thin, cells cylindric, straight, curved or helical. Spermatia acicular, straight or curved.

Bacidia (Bilimbia) Laseroni Dodge, sp. nov.

Type: King George V Land, Madigan Nunatak, 2,400 ft., 30 miles east of Winter Quarters, C. F. Laseron, A.A.E. 2.

Thallus glebosus, obscure viridis vel subniger; cortex 20μ crassitudine, gelifactus, hyphis periclinalibus; algae protococcoideae, coloniis 35–55μ diametro, raro confluentibus, cellulis 8μ diametro, compactis; medulla hyphis tenuibus dense compactis. Apothecia circiter 0·15 mm. diametro, stipitata, convexa, immarginata, disco rufo nigricante; parathecium deest; hypothecium circiter 90μ crassitudine, ab hyphis medullaribus non bene distinctum; thecium 75μ altitudine; paraphyses 2–3μ diametro, ter dichotome ramosae, apicibus non incrassatis; asci clavati dein dimidia parte superiori latiores, circiter 35 × 8–10μ; ascosporae octonae, subfusiformes, hyalinae, 4-loculares, apicibus rotundatae, fasciculatim dispositae, circiter 15 × 3μ.

Thallus glebose, dark green to almost black, growing over tips of weathered *Stereocaulon*

Laseroni, cortex about 20μ thick, highly gelified, apparently of periclinal hyphae; algae in spherical colonies, about 35–55μ in diameter, occasionally confluent, of densely packed cells, about 8μ in diameter, protococcoid; medulla of strands of densely woven, slender hyphae; no lower cortex seen.

Apothecia about 0·15 mm. in diameter, stipitate, stipe about 75μ in diameter and about the same height, with scattered algal colonies which do not penetrate the apothecium proper, disc very convex, immarginate, dark rufous, blackening; parathecium absent or at least not differentiated from the paraphyses; hypothecium about 90μ thick, not differentiated from the medullary hyphae of the stipe; thecium 75μ tall; paraphyses 2–3μ in diameter, about thrice dichotomous in the upper portion, tips not inflated, ending in the epithecial gel which is about 10μ thick; asci clavate at first, then expanding above as the spores develop in the upper half, about 35 × 8–10μ; ascospores subfusiform, hyaline, 4-celled, ends rounded, fasciculately disposed in the ascus, about 15 × 3μ.

Only three small groups of apothecia seen.

King George V. Land, Madigan Nunatak, 2,400 ft., 30 miles east of Winter Quarters, C. F. Laseron, A.A.E. 2.

BACIDIA (EUBACIDIA) HARRISSONI Dodge, sp. nov.

Type: Queen Mary Land, Mt. Barr-Smith, ca. 4,000 ft., C. T. Harrisson, A.A.E. 75–1.

Thallus 1–2 mm. diametro, continuus, superficie minute granulosa, albus; cortex non bene distinctus; stratum algarum 200μ crassitudine, coloniis subsphaericis, cellulis protococcoideis, 5–6μ diametro; medulla hyphis ramosis laxe contexta. Apothecia convexa, nigra, 0·1–0·5 mm. basi constricta, sessilia, aut breviter stipitata; parathecium 125μ crassitudine, cortice 50μ, fastigiato hyphis bis dichotomis, medulla 75μ medullae thalli similis sed compactius contexta; hypothecium circiter 20μ crassitudine, hyphis subverticalibus non bene distinctum; thecium 50μ altitudine; paraphyses tenues, septatae, repetito-dichotomae super ascos, ramis ultimis moniliformibus, non incrassatis; asci cylindrici vel subclavati, apicibus incrassatis, 25 × 10μ; ascosporae aciculares, hyaline, multiseptatae, 22–25 × 2–2·5μ, subcurvatae in ascis sed non contortae.

Thallus 1-2 mm. in diameter, continuous, surface minutely granular, white; cortex scarcely differentiated from the medulla; algal layer about 200μ thick of subspherical colonies, with smaller ones deep in the medulla, cells protococcoid, 5–6μ in diameter, not closely packed, extending under the apothecium; medulla of loosely woven, branched hyphae in a gel.

Apothecia convex, black, 0·1–0·5 mm., constricted at the base, sessile, or short stipitate; parathecium consisting of a cortex about 50μ thick, fastigiate, of widely spaced, twice dichotomous hyphae in a gel and a medulla 75μ thick, similar in structure to that of the thalline medulla but more closely woven; hypothecium about 20μ thick, of vertical hyphae not well differentiated from the thecium but more deeply staining; thecium 50μ tall; paraphyses slender, septate, repeatedly dichotomous in the upper portion, ultimate branches moniliform, not enlarged, imbedded in the brownish epithecial gel; asci cylindric to slightly clavate, tip thickened, end of protoplast round, 25 × 10μ; ascospores acicular, hyaline, multiseptate, 22–25 × 2–2·5μ somewhat curved, especially in the ascus, but not contorted.

Queen Mary Land: Mt. Barr Smith, ca. 4,000 ft., A.A.E. 75–1.

BACIDIA JOHNSTONI Dodge, sp. nov.

Type: King George V Land, Cape Denison, B.A.N.Z.A.R.E. B536–6.

Thallus albus, granulosus, vel subsquamulosus; cortex circiter 15μ crassitudine, densius contextus, partim decompositus, ab hyphis medullaribus non aliter distinctus; stratum algarum ad 100μ crassitudine, cellulis protococcoideis, singulis, sphaericis vel subangulosis, ca. 10μ diametro;

medulla hyphis ramosis, 2μ diametro, laxe contexta, cum coloniis bacteriorum. Apothecia ad 0·7 mm. diametro, nigra, convexa, immarginata, basi constricta; parathecium 100–120μ crassitudine, e cortice 35μ crassitudine, hyphis verticalibus semel vel bis dichotomis, medullaque hyphis periclinalibus laxe contexta; hypothecium 35μ crassitudine, hyphis verticalibus non bene distinctum; thecium ca. 35μ altitudine; paraphyses simplices vel semel dichotomae, apicibus septatis; asci cylindrici, 25–27 × 6–8μ, apice incrassato; ascosporae fastigiatim dispositae, aciculares, multiseptatae, 15–18 × 2μ, altero apice acutiore.

Thallus white, granular to subsquamulose, covering several sq. cm., partly overgrown by a young, sterile Blasteniaceous thallus; cortex about 15μ thick, more densely woven and partly decomposed, otherwise not differentiated from the medullary hyphae; algal layer at least 100μ thick, cells protococcoid, single, spherical to somewhat angled, about 10μ in diameter; medulla of branched, loosely woven hyphae, about 2μ in diameter, with bacterial colonies.

Apothecia up to 0·7 mm. in diameter, soon black, convex, immarginate, constricted at the base; parathecium 100–120μ thick, hyaline, consisting of a cortex 35μ thick, of vertical hyphae in a gel, once or twice dichotomous, and a medulla of loosely woven, periclinal hyphae in a gel, with the algal layer underneath; hypothecium scarcely differentiated from the thecium except more deeply staining, about 35μ thick, of vertical hyphae; thecium about 35μ tall; paraphyses simple or once dichotomous, tips very slightly septate, ending in the brownish epithecial gel; asci cylindric, 25–27 × 6–8μ, tip thickened with mammillate protoplast when young; ascospores fastigiate in the ascus, acicular, multiseptate, one end slightly more acute than the other, 15–18 × 2μ.

On old skin of sea elephant (*Macrorhinus leoninus*) with *Lecanora exsulans* and sterile Blasteniaceous thallus.

King George V Land: Cape Denison, B.A.N.Z.A.R.E. 1936–6.

Bacidia proliferans Dodge, sp. nov.

Type: Queen Mary Land: Mt. Barr Smith, ca. 4,000 ft., C. T. Harrisson, A.A.E. 10–1.

Thallus ex granulis subsphaericis, circiter 0·1 mm. diametro, in crustam aggregatis, roseobubalinus; cortex gelifactus, circiter 20μ crassitudine, hyphis tenuissimis contextus; algae protococcoideae, in coloniis magnis, discretis, cellulis usque ad 12μ diametro; hyphis medullaribus laxe contextis circumdatis. Apothecia aggregata, ad 0·8 mm. diametro, cinnamomea; parathecium hyalinum, ca. 70μ crassitudine, hyphis gelifactis, luminibus 2μ diametro; hypothecium obconicum, ca. 200μ altitudine, hyphis subverticalibus, thecium ca. 50μ altitudine; paraphyses conglutinatae, simplices, apicibus non incrassatis; asci clavati, 35–40 × 6–8μ juventute apicibus incrassatis, protoplasmate truncato-mamillato, dein leptodermei; ascosporae fasciculatim in asco dispositae, aciculares, 4–6-loculares, 15–18 × 2–2·5μ.

Thallus of subspherical granules about 0·1 mm. in diameter, aggregated into a crust, pinkish buff; cortex highly gelified, about 20μ thick, apparently of very slender, densely woven hyphae; algae protococcoid, in discrete, large colonies, cells up to 12μ in diameter, spherical or angular from mutual pressure, surrounded by loosely woven medullary hyphae about 2μ in diameter.

Apothecia aggregated in subspherical masses about 0·8 mm. in diameter, cinnamon buff to tawny olive, repeatedly proliferating from old thecia; amphithecium absent; parathecium hyaline, about 70μ thick, a palisade of gelified hyphae, lumina about 2μ in diameter; hypothecium hyaline, obconic, about 200μ tall, prolonged below as a deep yellow stalk of vertical conglutinate hyphae, above the hyphae spreading flabellately and not clearly distinct from the thecium, except as the latter stains more deeply; thecium about 50μ tall; paraphyses conglutinate, simple, tips not enlarged, ending in the epithecial gel; asci clavate, 35–40 × 6–8μ, tip thickened when young,

protoplast truncate with central mammilla, thin-walled at maturity; ascospores fasciculate, acicular, 15–18 × 2–2·5μ, 4–6-locular, straight or very slightly curved.

On granite. Some of the apothecial masses are elevated above the general surface on short stalks, almost suggesting *Bæomyces*.

Queen Mary Land, Mt. Barr Smith, ca. 4,000 ft., C. T. Harrisson, A.A.E. 10–1.

BACIDIA KERGUELENSIS Dodge, sp. nov.

Biatora rubella (Ehrh.) Rabh. v. *inundata* (Fr.) Nyl. in Tuck., Bull. Torrey Bot. Club, 6, 59; 1875: Bull. U.S. Nat. Mus., 3, 29; 1876 non in alio loco.

Lecidea inundata Fr. in Crombie, Jour. Bot. Brit. For., 15, 106; 1877: Phil. Trans. Roy. Soc. [London], 168, 50; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 236; 1885. non in alio loco.

Type: Kerguelen, Molloy Point, J. H. Kidder (U.S. Transit Venus Exp. on rock with "*Placodium bicolor* sp. nov." [abundantly fertile specimen] in Tuckerman Herb. sheet 1777a at Farlow Herb).

Thallus tenuissimus, continuus vel subrimuloso-areolatus obscure olivaceo-alutaceus; cortex 17–18μ crassitudine, gelifactus, hyphis dense contextus; algae protococcoideae strato 35μ crassitudine, cellulis 4–5μ diametro; medulla hyphis tenuibus laxius contexta. Apothecia 0·1–0·15 mm. diametro, nigra immarginata, subsphaerica; parathecium 45–50μ crassitudine ad marginem tenuescens hyalinum, hyphis dichotomis radiantibus in gelatina flavo-viridi; hypothecium aeruginosum hyphis tenuibus periclinalibus gelifactis; thecium 60–65μ altitudine; paraphyses tenues, eseptatae, simplices, epithecio aeruginoso; asci cylindrici, 43–45 × 7–8μ, pachydermei; ascosporae aciculares, multiseptatae, fasciculatae, subcontortae, 30–46 × 1·5–2·5μ.

Thallus very thin, continuous or slightly rimulose areolate, dark olive-buff, verging toward wood-brown (type evidently mouldy at one time); cortex 17–18μ thick, highly gelified, apparently of densely woven hyphae; algae protococcoid in layer about 35μ thick, somewhat thicker immediately under the parathecium, cells 4–5μ in diameter; medulla more loosely woven, of slender hyphae. Apothecia 0·1–0·15 mm. in diameter, black, subspherical, immarginate; parathecium 45–50μ thick, thinning to the margin, of radiating dichotomously branched, slender hyphae, imbedded in a thick, yellowish green gel, ending abruptly about 75μ from the margin of the hypothecium; hypothecium deep green (aeruginous) of slender gelified, periclinal hyphae, resting on the parathecium at the margin and on a densely tangled mass of gelified hyphae, similar to the cortex in texture in the central portion; thecium 60–65μ tall; paraphyses slender, eseptate, unbranched, imbedded in a stiff thecial gel, epithecium aeruginous; asci cylindrical, 43–45 × 7–8μ, thick-walled, the spores occupying a fusiform mass in the centre; ascospores acicular, many celled thin-walled, fasciculate, somewhat twisted in the ascus, 30–46 × 1·5–2·5μ.

A thorough search of Tuckerman's herbarium failed to disclose any specimen labelled *Biatora rubella* from Kerguelen. It seems likely that he studied this specimen but failed to label it. It is the only representative of this genus so far encountered from Kerguelen.

Growing with *Placopsis bicolor*.

Kerguelen: Molloy Point, J. H. Kidder (U.S. Transit Venus Exp.).

TONINIA Mass.

Toninia Mass., Ricerch. Autonom. Lich. Crost., 107; 1852.

Thalloidima sect. *Toninia* Müll.-Arg., Mém. Soc. Phys. Hist. Nat. Genève, 16, 381; 1862.

Scolecites sect. *Toninia* Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges., 162; 1862.

Toninia sect. *Eutoninia* Th. Fr., Lichenogr. Scand., 1, 330; 1874.

Lecidea sect. *Toninia* Tuck., Syn. N. Amer. Lich., 2, 61; 1888.

Lecidea subg. *Toninia* Vainio, Etude Lich. Brésil, 2, 9; 1890.

Type: *Lecidea cinereo-virens* Schaer., *L. squalida* Ach. and *Toninia fallasca* Mass. were included in the original description. All three are still retained in the subgenus *Eutoninia*.

Thallus crustose, squamulose, effigurate or with lobate margins, without rhizinae; cortex amorphous or a palisade of thick-walled septate vertical hyphae; algae protococcoid. Apothecia sessile, parathecium coloured or dark of radiating gelified hyphae which may become carbonaceous; paraphyses clavate to capitate at the tips; asci thin-walled, 8-spored; ascospores long ellipsoidal to linear, 4-many-celled, thin-walled. Spermogonia spherical to pyriform, spermatia acicular, curved.

TONINIA KERGUELENSIS Dodge, sp. nov.

? *Lecidea assimilata* Nyl. in Crombie, Jour. Linn. Soc. Bot., 15, 187; 1876: Jour. Bot. Brit. For., 15, 104; 1877: Phil. Trans. Roy. Soc. [London], 168, 50; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 237; 1885 non aliis locis.

? *Patellaria flavovirescens* Müll.-Arg., Bot. Jahrb. [Engler], 3, 56; 1883.

Type: Kerguelen, Greenland Harbour, B.A.N.Z.A.R.E. B177.

Thallus verrucose-areolatus vel subsquamulosus, marginibus effiguratis sed non lobatis; albidus vel olivaceus, ferro tinctus; cortex amorphus; algae protococcoideae 4–5μ diametro. Apothecia circiter 0·4 mm. diametro, solitaria vel caespitosa confluentiaque, nigra, marginibus tenuibus subelevatis, disco plano dein convexo, nigro; parathecium carbonaceum, 55μ crassitudine ad marginem aut 75μ crassitudine sub hypothecio; hypothecium circiter 15μ crassitudine, hyphis brunneis subverticalibus non bene distinctum; thecium 50–55μ altitudine; paraphyses tenues, simplices, apicibus clavatis terminali cum cellula obscure brunnea sphaerica 4μ diametro; asci clavati, leptodermei, 50 $\times$ 7μ; ascosporae aciculares, apicibus rotundatis, 1–3-septatae, hyalinae, 8–12 $\times$ 3–4μ.

Thallus verrucose areolate to subsquamulose, margin effigurate but not clearly lobed; whitish to olivaceous, becoming stained with iron; cortex amorphous; algae protococcoid, cells 4–5μ in diameter. Apothecia about 0·4 mm. in diameter, solitary or crowded and confluent, black, margin slightly elevated, thin, disc plane becoming convex, black; parathecium becoming carbonaceous, 55μ thick at the margin, about 75μ thick below the hypothecium, sometimes prolonged downward in the centre, covered by a thin layer of thalline cortex and an occasional algal cell in a layer about 15μ thick, but not a clearly developed ampithecium; hypothecium about 15μ thick, of more or less vertical, brownish hyphae, not clearly differentiated; thecium 50–55μ tall; paraphyses slender, unbranched, tips with a clavate cell, cutting off a thick-walled dark brown spherical cell about 4μ in diameter; asci clavate, thin-walled, 50 $\times$ 7μ; ascospores acicular, ends rounded, 2–4-celled, hyaline, 8–12 $\times$ 3–4μ.

This species has proved very difficult to study. Rock crystals have prevented cutting good sections of the thallus; the ascospores are mostly 2-celled while still in the ascus, but a few floating free seem to be 4-celled. The presence of a poorly developed amphithecium might warrant its reference to *Lecania*. We have cited *Lecidea assimilata* as a possible synonym as Nylander's original description based on Scandinavian plants agrees with our plants fairly well except for spores being unicellular. Crombie's reference to Kerguelen material was based on *Lecidea aromatica* Hook. f. & Tayl., London Jour. Bot., 3, 636; 1844, from Christmas Harbour. No material under this name was found in the Taylor herbarium, but a specimen in Tuckerman's

herbarium ex herb. Taylor sub *L. aromatica* was described in manuscript as *Lecidea* (*Toninia*) *antarctica* and is here described as *Thamnolecania*. Churchill Babington ap. Hook. f., Crypt. Antarct., 232; 1845 remarks, "Specimens greener and darker than in Schaer.'s [*L. conglomerata*], but still I think referable to that species."

Perhaps the sterile thallus listed by Müller-Argau from Betsy's Cove, Naumann ("Gazelle" Exp.) under *Patellaria flavovirescens* (*Lecidea citrinella* Nyl.) and now commonly known as *Bacidia flavovirescens* (Dicks.) Anzi v. *citrinella* (Nyl.) Vainio may also belong here.

Growing with *Lecidea Urbanskyana, Pertusaria cineraria, Aspicilia disjunguenda, A. endochlora, Lecanora* sp. and *Aspiciliopsis macrophthalma.*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–36, B177–40, B177–41; Observatory Bay, B.A.N.Z.A.R.E. B192–32, B192–33.

TONINIA JOHNSTONI Dodge, sp. nov.

Type: MacRobertson Land, Cape Bruce, 67° 26′ S., 60° 49′ E., T. H. Johnston, B.A.N.Z.A.R.E. 108–7.

Thallus effiguratus, areolatus, lobis marginalibus furcatis, albus, crassiusculus; cortex fastigiatus, gelifactus, ca. 55μ crassitudine; stratum algarum 50–70μ crassitudine, protococcoideum, cellulis ad 10μ diametro, plus minusve verticaliter dispositis; medulla hyphis pachydermeis, anastomosantibus, laxe contexta. Apothecia 0·5–0·6 (–0·9) mm. diametro, nigra, disco plano, margine nigro, subelevato, dein convexo vel hemisphaerico; amphithecium deest; parathecium ca. 50μ crassitudine, hyphis periclinalibus, tenuissimis, pachydermeis, hyalinis, margine flabellatim dispositis; hypothecium obconicum cum segmento sphaerico insuper, hyphis subverticalibus, crassis, brunneis, laxe contextis, non gelifactis, circiter 4μ diametro, densius insuper contextis; thecium ca. 75μ altitudine; paraphyses tenues, hyalinae, bis dichotomae super ascos, epithecio azureo-nigro, ca. 10μ crassitudine, apicibus clavatis; asci cylindrici vel clavati, apicibus non conspicue incrassatis, 35–40 × 7–8μ; ascosporae octonae, hyalinae, aciculares, fastigiatim in ascis dispositae, 3-cellulares, 10–14 × 2·5μ.

Thallus areolate, margin effigurate, marginal lobes forked, white, rather thick, often mostly developed below surface crystals (quartz) of the rock, with only the small areole and relatively large apothecium showing at the surface between the crystals; cortex about 55μ thick, apparently fastigiate, soon largely gelified, especially the outer 30μ; algal layer 50–70μ thick, protococcoid, cells up to 10μ in diameter, arranged in more or less vertical rows and angular from mutual pressure; medulla spongy, of very loosely woven, slender, thick-walled, anastomosing hyphae with large air spaces.

Apothecia 0·5–0·6 (–0·9) mm. in diameter, black, disc plane at first with slightly elevated black margin, then very convex to hemispheric or subsphaerical; amphithecium absent; parathecium about 50μ thick, of periclinal, very slender, thick-walled, hyaline hyphae next the thecium and hypothecium, spreading flabellately, so that the outer 35μ are nearly perpendicular to the surface and very dark brown; hypothecium obconic, capped by a spherical segment becoming a hemisphere or greater, of subvertical, coarse brown hyphae, more loosely woven and not gelified, about 4μ in diameter, becoming a close palisade above and merging into the thecium; thecium about 75μ tall; paraphyses slender, hyaline, about twice dichotomous above the asci, forming a blue-black epithecium about 10μ thick, terminal cells clavate; asci linear to clavate, tips not conspicuously thickened, 8-spored, 35–40 × 7–8μ; ascospores hyaline, acicular, fastigiate, more or less helically coiled in the ascus, 10–14 × 2·5μ, at least three-celled.

In both apothecia sectioned, the asci are mostly quite immature. Two asci were seen with still immature binucleate spores (furnishing the ascus measurements above) and a slightly older but smaller ascus with one spore at least 3–, possibly 4–celled. In the latter ascus, the ascospores were nearly straight and furnished the above measurements, which may still be too small for the mature spores. Much of the material from other localities is too immature, or too old and weathered for certain identification, but has been referred here on thalline and such apothecial characters as are observable.

On crystalline quartz beset with small amethystine or pinkish crystals, growing with *Lecanora exsulans* f. *minor*, *Thamnolecania Mawsoni*, *Polycauliona citrina*, *Buellia frigida* and *B. podocarpa*.

King George V Land: Madigan Nunatak, 2,400 ft., C. F. Laseron, A.A.E. 25–2; Cape Denison A.A.E. 93, 96, 97, 102–1, 103–2, 123, 132, 133, 134, 135, 136, 137, 138, 139; B.A.N.Z.A.R.E. 536–7, 536–8, 536–9, 536–10, 536–11.

Queen Mary Land: Possession Nunatak, C. T. Harrisson, A.A.E. 76.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. 108–7, type, 108–8.

RHIZOCARPON Ram.

Rhizocarpon Ram. in Lamarck & D.C., Fl. Franc. ed., 3, 2, 365; 1805.

Abacina Norm., Nyt Mag. Naturvidensk., 7, 236; 1853.

Siegertia Koerb., Parerga Lich., 180; 1861.

Phalodictyum Clements, Gen. Fung., 77; 1909.

Type: *Rhizocarpon geographicum* (Dill. ex L.) Ram. The type of *Abacina* was not designated, but *A. amphibia* (Fr.) Norm. may be so considered. The type of *Siegertia* is *Lecidea calcarea* (Weis) Hepp. The type of *Phalodictyum* is *P. obscuratum* (Ach.) Clements.

Thallus crustose, uniform, with well developed hypothallus; ecorticate; algae protococcoid. Apothecia sessile or immersed in the thallus; parathecium carbonaceous, rarely brown; hypothecium dark; thecium gelified, paraphyses branched; asci 1–8-spored; ascospores hyaline or finally brown, 2-several-celled becoming muriform by vertical septa, with a well developed, gelified sheath. Spermatia cylindric to acicular, straight or nearly so.

Thallus white, cracking radially, centre soraliate; ascospores 47–51 × 17–18μ *R. candidum*

Thallus dark grey, dark olive to black, esorediate, areolate; ascospores smaller

- Thallus dark olive buff to black, ascospores long 4-celled finally becoming few-celled muriform, sheath thick but finally disappearing, 25–28 × 10–11μ .. *R. Mawsoni*
- Thallus dark grey, ascospores early many-celled muriform, sheath thin and early disappearing, 35 × 15μ .. .. *R. urceolina*

Thallus some shade of yellow or green variegated with black, sometimes light mineral grey in weathered specimens, not sorediate, areolate

- Ascospores 30 × 18μ, early muriform; thallus usually bright chalcedony yellow *R. kerguelense*
- Ascospores 21–25 × 10–11μ, long 4-celled, finally few-celled muriform; thallus pale chalcedony yellow to tea green and mineral grey .. .. *R. Johnstoni*

RHIZOCARPON CANDIDUM Dodge, sp. nov.

Type: Kerguelen, Observatory Bay, B.A.N.Z.A.R.E. B192–35.

Thallus crassus, albus, rimoso-areolatus, margine zonata, radianter fissus, lobis cuneatis, hypothallo tenuissimo, nigro; areolis centricis soraliatis, soredia coloniis protococcoideis circiter 20μ diametro hyphis subgelifactis circumdatis. Apothecia innata, 0·1–0·2 mm. diametro, disco nigro;

parathecium carbonaceum 200μ crassitudine, 160μ altitudine, non sub hypothecio penetrans; hypothecium 80–90μ crassitudine, lentiforme, brunneum hyphis laxe contextum; thecium 160μ altitudine; paraphyses tenues flexuosae, ramosae anastomosantesque, apicibus moniliformibus, obscure brunneis; asci cylindrici, 120–130 × 35μ; ascosporae octonae, monostichae, late ellipsoideae vagina angusta, 25 × 15μ juventute, subfusiformes, 47–51 × 17–18μ, diu hyalinae dein brunneae, cellulis irregulariter dispositis.

Thallus thick, white, rimose areolate, margin zonate, determinate, cracking radially and assuming almost the appearance of the cuneate lobes of *Coccocarpia cronia*, lying on a narrow very thin hypothallus; some of the central areoles soraliate, up to 0·5 mm. in diameter, leaving white, apotheciiform cups when the soredia have disappeared; soredia dense colonies of *Protococcus*, about 20μ in diameter, surrounded by a tightly woven, somewhat gelified mass of hyphae about 5μ thick. Apothecia innate, disc black, about 0·1–0·2 mm. in diameter; parathecium carbonaceous, 200μ thick at the margin, about 160μ tall, not penetrating beneath the thecium; hypothecium 80–90μ thick at the centre, lentiform, brown, of loosely woven hyphae, becoming more periclinal next the thecium; thecium 160μ tall; paraphyses slender, flexuous, branched and anastomosing, repeatedly branched just above the asci, tips moniliform, dark, brown, ending in the epithecial gel; asci cylindric, 125–130 × 35μ, 8-spored; ascospores monostichous, broad ellipsoidal with a narrow sheath, 25 × 15μ when young, becoming nearly fusiform, 47–51 × 17–18μ, remaining hyaline a long time, finally brownish, cells wholly irregular in arrangement.

Growing with *Rhizocarpon urceolinum* and *Buellia tristiuscula*.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–34, B192–35.

Rhizocarpon Mawsoni Dodge, sp. nov.

Type: Kerguelen, Greenland Harbour, B.A.N.Z.A.R.E. B177–43.

Thallus tenuis, obscure olivaceo-alutaceus nigricans, rimoso-areolatus, hypothallo nigro, determinatus sed non lobatus; algae protococcoideae, cellulis circiter 4μ diametro; medulla I—. Apothecia sessilia, marginibus nigris, elevatis tenuibus, disco concavo vel plano, nigro, solitaria vel caespitosa, plus minusve angularia irregulariaque, 0·3–0·4 mm. diametro; parathecium carbonaceum, tenue, 35–40μ crassitudine ad marginem et circiter 75μ crassitudine sub thecio in strato gonidiali impositum; hypothecium non bene evolutum; thecium 140–145μ altitudine; paraphyses tenues, septatae, dichotome ramosae epithecio obscure brunneo, subcarbonaceo 18–20μ crassitudine; asci cylindrici dein clavati, 110–115 × 15–18μ, leptodermatici; ascosporae octonae, monostichae, juventute 3-septatae, vagina 4–5μ crassitudine, circiter 33 × 10μ rectae vel curvatae, dein brunneae sine vagina cellulis centralibus uniseptatae, 25-28 × 10–11μ.

Thallus thin, dark olive-buff to dark olive or almost black, rimose areolate, on a black hypothallus, determinate but not conspicuously lobed at the margin; algae protococcoid, cells about 4μ in diameter; medulla I—. Apothecia sessile on the areoles, margin black, thin, elevated, disc concave to plane, black, solitary or crowded, more or less angular and irregular, 0·3–0·4 mm. in diameter; parathecium carbonaceous, thin, 35–50μ thick at the margin and about 75μ thick below, resting on the algal layer of the thallus; hypothecium not differentiated; thecium 140–145μ tall; paraphyses slender, septate, repeatedly dichotomously branched just above the asci, ending in a dense, dark brown, almost carbonaceous epithecium 18–20μ thick; asci cylindric, becoming clavate, 110–115 × 15–18μ, 8-spored, wall not thickened; ascospores monostichous, hyaline, 4-celled at first with a gelified sheath 4–5μ thick, straight or slightly curved, about 33 × 10μ, finally brown, without sheath and central cells divided once longitudinally, 25–28 × 10–11μ.

B90–8 has a less well developed parathecium.

Partly overgrown by *Rhizocarpon kerguelense* and *Aspicilia endochlora* on smooth, water-worn pebble in the type. On other rocks with *Lecidea rhizocarpiza, L. subdisjunguenda, L. sub-*

plana, Rhizocarpon kerguelense, Aspicilia disjunguenda, A. endochlora, Lecanora atrocaesia and *Buellia subplicata.*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–43; Royal Sound, B.A.N.Z.A.R.E. B90–7, B90–8; Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp. in Tuckerman Herb., on rock with "*Buellia geographica*" sheet 3273).

Rhizocarpon urceolinum Dodge, sp. nov.

Lecidea geographica v. *urceolata* Hook. f. & Tayl., Crypt. Antarct., 233; 1845; Fl. Antarct., 2, 539; 1847 non Schaer.

Type: Kerguelen, Observatory Bay, B.A.N.Z.A.R.E. B192–34.

Thallus obscure griseus, tenuissimus, rimuloso-areolatus margine angusta, nigra, non lobatus; algae protococcoideae, cellulis 4–5μ diametro; medulla I—. Apothecia minuta, urceolata, in areolis immersa, marginibus obscurius griseis, ostiolis circiter 0·1 mm. diametro, disco concavo, nigro; parathecium circiter 30μ ad ostiolum crassitudine, involucrellum carbonaceum 200μ latitudine, 75μ crassitudine formans, dein subhypothecio 20–25μ crassitudine, brunneum, hyphis magnis septatis laxe contextum, pseudoparenchymaticum; hypothecium non bene evolutum; thecium 125–130μ altitudine; paraphyses tenues, flexuosae, dichotome ramosae, rami submoniliformes; asci cylindrici, juventute 75 $\times$ 15μ dein 110 $\times$ 32μ; ascosporae 30 $\times$ 15μ juventute, late ellipsoideae, muriformes, dein 35 $\times$ 15μ, vagina tenui evanescenti.

Thallus dark grey, very thin, rimulose areolate with a narrow dark margin, not lobed; algae protococcoid, cells 4–5μ in diameter; medulla I—. Apothecia minute, urceolate. immersed in the areole, margin darker grey, opening over the disc about 0·1 mm. in diameter, disc very concave, black; parathecium about 30μ thick at the ostiole, spreading outward and downward, similar to the involucrellum of *Verrucaria* for about 200μ, ending abruptly, where it is 75μ thick, inner portion thin, 20–25μ thick, curving downward around the hypothecium, carbonaceous above, becoming brown below, of large, septate, loosely woven hyphae, almost pseudoparenchymatous, nearly hyaline between the two layers below, with algal cells penetrating as far as the base of the thecium; hypothecium not well differentiated; thecium 125–130μ tall; paraphyses slender, flexuous, sparingly dichotomously branched above the asci, branches somewhat moniliform, ending in the epithecial gel; asci cylindric, 75 $\times$ 15μ before the spores begin to differentiate, then elongating to 110 $\times$ 32μ; ascospores 30 $\times$ 15μ when young with a rather thin sheath, broadly ellipsoidal and early forming both transverse and longitudinal septa to form a many-celled muriform, brown spore, 35 $\times$ 15μ without a sheath.

Lecidea geographica v. *urceolata* Hook. f. & Tayl. probably belongs here rather than in *R. kerguelense* as I have seen no specimens with concave discs in the latter.

On rocks with *Rhizocarpon candidum, Pertusaria cineraria, P. subperrimosa, Placopsis bicolor* and *Buellia tristiuscula.*

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–34, B192–40; Grave Island, B.A.N.Z.A.R.E. B91 (old and determination uncertain).

Rhizocarpon kerguelense Dodge, sp. nov.

Lecidea geographica Hook. f. & Tayl., Crypt. Antarct., 233; 1845: Fl. Antarct., 2, 539; 1847: Crombie, Jour. Linn. Soc. Bot., 15, 191; 1877: Jour. Bot. Brit. For., 15, 105; 1877: Phil. Trans. Roy. Soc. [London], 168, 52; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 240; 1885 non (Dill. ex L.) Rebent.

Buellia geographica Tuck., Bull. Torrey Bot. Club., 6, 59; 1875: Bull. U.S. Nat. Herb., 3, 30; 1876 non (Dill. ex L.) Tuck., Lich. Calif,, 26; 1866.

Rhizocarpon geographicum Wilson, Mém. Herb. Boissier, 18, 88; 1900: Zahlbr., Deutsche Südpolar Exp., 8, 41; 1906 non (Dill. ex L.) Ram. in Lam. & DC.

Type: Kerguelen, Observatory Bay, B.A.N.Z.A.R.E. B192–4.

Thallus uniformis, areolatus, areolis planis vel subconvexis, laevis, viridi-flavus, esorediatus, hypothallo nigro, tenui, lineam nigram angustam marginalem formans; ecorticatus, stratum exterum, 35μ crassitudine, hyphis medullaribus verticalibus, septatis decompositis; stratum algarum protococcoideum (vel cystococcoideum) crassitudine variabili, cellulis sphaericis, 8–12μ, vel subcylindricis, verticaliter dispositis; medulla alba, K—, I caerulescens, hyphis 3–4μ diametro, septatis, verticalibus. Apothecia innato, centralia excentrica vel in areolis marginalia; disco plano, nigro ad 0·5 mm. diametro; parathecium crassitudine colore variabile; hypothecium vix evolutum; thecium 160–180μ altitudine; paraphyses 2–2·5μ diametro, septatae, pachydermeae, flexuosae, dichotome ramosae anastomosantesque apicibus submoniliformibus incrassatisque, brunneis, liberis; asci clavati, 110 × 22μ, leptodermei, 8-spori; ascosporae monostichae dein subdistichae, vagina tenui, ellipsoideae, brunneae, muriformes, 29–33 × 15–18μ.

Thallus crustose, uniform, areolate, areoles plane or slightly convex, smooth, thin, bright chalcedony yellow, esorediate, hypothallus black, thin, extending beyond the areoles as a narrow black line; ecorticate, the outer 35μ of decomposing, subvertical, septate medullary hyphae; algal layer variable in thickness, protococcoid (or cystococcoid) cells spherical, 8–12μ in diameter or ellipsoid to almost cylindrical between the vertical medullary hyphae; medulla white, K–, I bluish, hyphae 3–4μ in diameter, closely septate, vertical.

Apothecia innate, variously arranged in the areole from central to excentric or even marginal, rarely occupying the whole areole, disc plane, black, up to 0·5 mm. in diameter; parathecium of variable thickness and colour, sometimes 75–80μ thick at the margin, thinning to 35μ thick below, the outer 15μ black and carbonaceous, shading through fuliginous to hyaline next the thecium, sometimes thin, 15–20μ thick, of thickwalled, slender somewhat dichotomously branched hyphae in a stiff gel, from very dark fuscous to rarely hyaline, not extending under the hypothecium; hypothecium not clearly differentiated, but the hyphae are somewhat densely tangled and more deeply staining in a layer about 20μ thick just above the blackening vertical medullary hyphae; thecium 160–180μ tall; paraphyses 2–2·5μ in diameter, not closely septate, with gelified walls, flexuous, dichotomously branched and anastomosing, tips slightly moniliform and thickened, brownish, free; asci clavate, 110 × 22μ, thinwalled, 8-spored (sometimes less by the abortion of part of the spore nuclei); ascospores monostichous, finally subdistichous, with a thin sheath; ellipsoid, early browning, muriform, 29–33 × 15–18μ.

Apparently the species is abundant throughout the islands, the thalli often a centimetre or less in diameter when competing with other lichens, and reaching 5 cm. in diameter when not competing. The development of the perithecium is very variable. It apparently consists of vertical or somewhat curved hyphae similar to the medullary hyphae with somewhat thicker walls, appressed or conglutinate, finally dark brown and more or less carbonaceous. In B177–44 the parathecium seems wholly undifferentiated on one side, the hyaline medullary hyphae lying next the paraphyses, with a few algae extending about one-third under the thecium on that side, while the other side has a dark brown parathecium about 18μ thick; B90–9 also has a parathecium only on one side and the thecium is remarkably tall about 250μ and narrow, about 250μ; the blackening of the medullary hyphae is also very variable, sometimes only a thin layer under the hypothecium, sometimes extending to the base of the thallus, while in B177–43 there is no blackening of medullary hyphae, no

differentiation of parathecium, and the algae in vertical rows extend under the whole thecium, actively dividing in cystococcoid colonies; in B140–26 two apothecia are contiguous, the parathecial hyphae are not blackened where they come together, the thecium is only 150μ tall, the spores either very young or old and shrivelled. B140–24 clearly shows a proliferation of the paraphyses of an old apothecium to form a new one, with still shrivelled ascospores between the old paraphyses. Probably the algae are cystococcoid in all cases, but when not dividing it is difficult to distinguish them from *Protococcus*. When the algal cells become more or less cylindrical from the pressure of the medullary hyphae and are closely packed, they might easily be mistaken for *Trentepohlia* except for colour.

It is with some hesitation I have separated this species from *Rhizocarpon geographicum* (Dill. ex L.) Ram. in Lam. & DC. The thallus is much thinner and smaller, the apothecia are smaller, the disc is less convex, the paraphyses more slender and less closely septate, the asci are less ventricose, and the ascospores are shorter and broader, making a considerably greater spore volume, although the measurements fall within the range of *R. geographicum* as given by Vainio, Acta Soc. Fauna Fl. Fenn., 53, 1, 280–283; 1922. We have been unable to recognize the forms reported from our region by other investigators, since more abundant material shows so many intergrading forms. Material perhaps similar to that referred to *R. geographicum* f. *cyanodes* (Nyl.) Boist., Nouv. Fl. Lich., 2, 242; 1903 (*Lecidea geographica* f. *cyanodes* Nyl. in Gasilien, Act. Soc. Linn. Bordeaux, 53, 90; 1898) seems to be only moribund thalli. There is some variation in the closeness of the assimilative areoles, so that extreme forms might possibly have been referred to *R. geographicum* f. *protothallinum* (Koerb). Th. Fr., Lichenogr. Scand., 622; 1874 (*R. geographicum* v. *atrovirens* f. *protothallinum* Koerb., Syst. Lich. Germ., 263; 1854) by Zahlbruckner, Deutsche Südpolar Exp., 8, 41; 1906. Most of our material would have been referred to *R. geographicum* f. *contiguum* (Schaer.) Mass., Richerch. Autonom. Lich. Crost. 100. 1852 (*Lecidea geographica* v. *contigua* Schaer, Lich, Helv. Spicil., 3, 124; 1828, the forma typica of Dillenius' plate. *R. geographicum* f. *atrovirens* (L.) Mass., Nuov. Ann. Sci. Nat. Bologna, 7, 220; 1853 (*Lichen atrovirens* L., Sp. Pl. 1141; 1753 etc.) reported by Bouly de Lesdain, Ann. Crypt. Exot., 4, 99; 1931 may belong here but more probably to *R. Johnstoni* (see below).

On rocks with *Verrucaria obfuscata, Thelidium praevalescens, Microglaena kerguelana, Encephalographa cerebrinella, Lecanactis kerguelensis, Lecidea assentiens, L. Auberti, L. Eatoni, L. intersita, L. phaeostoma, L. rhizocarpiza, L. subdisjunguenda, L. subplana, Catillaria kerguelensis, Rhizocarpon Mawsoni, Pertusaria cineraria, P. subperrimosa, Aspicilia disjunguenda, A. endochlora, A. lygomma, Lecanora atrocaesia, Pyrenodesmia vitellinella, Buellia subplicata, B. tristiuscula* and *Rinodina aspicilina.*

Kerguelen: Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp., in Tuckerman Herb., sheet 3273 sub *Buellia geographica*); Royal Sound, B.A.N.Z.A.R.E. B90–4, B90–5, B90–7, B90–8, B90–9, B90–10, B90–11, B126–11; Greenland Harbour, B.A.N.Z.A.R.E. B177–16, B177–31, B177–42, B177–43, B177–44; Observatory Bay, B.A.N.Z.A.R.E. B192–4, B192–11, B192–36, B192–37, B192–38, B192–67; Port Jeanne d'Arc, B.A.N.Z.A.R.E. B200–4; Murray Island, B.A.N.Z.A.R.E. B210–1, B210–3; Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–7.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E., B140–6, B140–9, B140–13, B140–14, B140–23, B140–24, B140–25, B140–26.

RHIZOCARPON JOHNSTONI Dodge, sp. nov.

? *Rhizocarpon geographicum* f. *atrovirens* Bouly de Lesd., Ann. Crypt. Exot., 4, 99; 1931 non (L.) Mass.

Type: Kerguelen, Greenland Harbour, B.A.N.Z.A.R.E. B177–39.

Thallus areolatus, areolis 0·2–0·4 mm. diametro, contiguis, planis aut subconvexis, viridi-flavus aut viridi-griseus, K–, hypothallo bene evoluto nigro; medulla viridi-flava, K–; cortex non evoluto, stratum exterum 20μ crassitudine gelifactum, hyphis verticalibus medullaribus; stratum algarum 100–110μ crassitudine, protococcoideum, cellulis 7–8μ diametro, subangulares verticaliter dispositis; hyphae medullares laxae, verticales, 3–4μ diametro, septatae. Apothecia innata, disco margineque nigris; parathecium 25–30μ crassitudine, obscure brunneum, hyphis pachydermeis, ramosis, radiantibusque, etiam sub thecio 35μ crassitudine, plus minusve periclinalibus; hypothecium non bene evolutum; thecium 90–120μ altitudine; paraphyses 3μ diametro, septatae, dichotome ramosae super ascos, anastomosantes, apicibus non incrassatis, epithecio fusco; asci ventricosi-clavati, 75 × 25μ, leptodermei, 8-spori; ascosporae ellipsoideae, vagina crassa juventute, dein 4-cellulares, brunneae, 21–25 × 10–11μ cum 1–2 septis longitudinalibus.

Thallus crustose, areolate, areoles 0·2–0·4 mm. in diameter, contiguous except at the margin, mostly plane or very slightly convex, bright chalcedony yellow to pale chalcedony yellow and finally tea green and mineral grey; K–; hypothallus well developed showing as a black margin with scattered, thin assimilative areoles; medulla bright chalcedony yellow, K–; cortex not differentiated, the outer 20μ gelified with remains of decomposing ends of the vertical, medullary hyphae; algal layer 100–110μ thick, protococcoid, cells 7–8μ in diameter, somewhat angular in vertical rows between the loose, vertical medullary hyphae, which are closely septate, 3–4μ in diameter.

Apothecia wholly innate, often filling the whole areole, disc and margin black; parathecium 25–30μ thick, dark brown but not truly carbonaceous, of thick-walled, branching and radiating hyphae, imbedded in a stiff gel, appearing at times almost pseudoparenchymatous, continued under the thecium, about 35μ thick, of densely tangled, more or less periclinal hyphae; hypothecium scarcely differentiated; thecium 90–120μ tall; paraphyses about 3μ in diameter, closely septate, frequently dichotomously branched, especially above the asci and occasionally anastomosing, tips not or very slightly thickened but crowded to form a fuscous epithecium; asci ventricose clavate, 75 × 25μ, thin-walled, 8-spored; ascospores ellipsoidal, with thick sheath when young, soon becoming 4-celled and browning, 21–25 × 10–11μ, finally with one or two longitudinal septa.

It is with some hesitation that I have separated this species from *Rhizocarpon viridiatrum* (Wulf.) Koerb., Syst. Lich. Germ., 262; 1854 (*Lichen viridiater* Wulfen, Collect. Bot. [Jacquin] 2, 186; 1788). *R. Johnstoni* has much thinner and smaller areoles, much smaller algal cells with better developed hypothallus, the tips of the paraphyses are not thickened and the ascospores are smaller. It is somewhat intermediate between *R. viridiatrum* and *R. flavum* from Marie Byrd Land.

On rocks with *Thelidium praevalescens, Lecidea Auberti, L. kerguelensis, Thalloidima kerguelensis, Pertusaria subperrimosa, Aspicilia endochlora, Lecanora atrocaesia* and *Buellia subplicata.*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–39, type; Observatory Bay, B.A.N.Z.A.R.E. B192–20; Royal Sound, B.A.N.Z.A.R.E. B212.

CLADONIACEAE.

Primary thallus crustose, squamose or small foliose, ecorticate or corticate above, usually ecorticate below; with *Trebouxia* (*Cystococcus* Chodat non Naeg.) algae, rarely with Myxophyceae; cephalodia often present and characteristic in some genera, lacking in others. Podetia usually from the centre of the thallus, marginal in a few species, simple, branched or scyphiferous, decorticate or corticate, often clothed with squamules or phyllocladia, hollow or solid. Apothecia terminal or lateral; amphithecium usually absent (except in a few species of *Stereocaulon*);

parathecium well-developed or reduced to a few hyphae not differentiated from paraphyses; hypothecium usually light coloured, rarely dark; paraphyses unbranched or sparingly branched above the asci, asci 8-spored; ascospores hyaline or brown, unicellular, septate or muriform, relatively thin-walled. Spermatia long cylindrical, slender, on tips of long spermatiophores.

SUBANTARCTIC GENERA.

Podetia usually hollow; spores unicellular, long ellipsoidal; cephalodia absent
- Chondroid axis lacking, podetia corticate, of longitudinal conglutinate hyphae, primary thallus crustose and evanescent or unknown .. .. *Cladia*
- Chondroid axis present, podetia corticate or decorticate, of vertical hyphae, primary thallus squamulose to small foliose .. .. *Cladonia*

Podetia solid, ascospores multicellular; cephalodia usually present
- Ascospores with transverse septa only, fusiform to acicular .. .. *Stereocaulon*
- Ascospores muriform .. .. *Argopsis*

CLADIA Nyl.

Cladia Nyl., Bull. Soc. Linn. Normandie II. 4, 167; 1870.

Clathrina Müll.-Arg., Flora 66, 80; 1883.

Type: Nylander based his genus on *Cladonia aggregata, C. schizopora* and *C. retipora.* Since Vainio considered the inclusion of *C. schizopora* as doubtful, the type should be chosen from *C. aggregata or C. retipora.* Müller-Argau renamed the genus on account of *Cladium* P. Br., a genus of Cyperaceae, and added *C. Sullivani* and *C. Ferdinandi*, closely related to, if not subspecies of, *C. retipora.*

Primary thallus unknown; podetia erect, branching, variously perforate, dying at the base and proliferating above, without squamules, fragile; cortex of conglutinate longitudinal hyphae; algae *Trebouxia;* medulla scarcely developed, arachnoid; chondroid axis absent, its function taken by the cortex. Apothecia minute, on tips of short branches aggregated in small cymes, peltate, disc plane, margin disappearing; ascospores unicellular, long ellipsoid to subfusiform.

CLADIA AGGREGATA (Sw.).

Cladia aggregata (Sw.) Nyl., Bull. Soc. Linn. Normandie II, 4, 167; 1870.

Lichen aggregatus Sw., Nova Gen. Sp. Pl. Ind. Occ., 147; 1788.

Cladonia aggregata Ach., K. Vetensk. Acad. Nya Handl., 16, 68; 1795.

Baeomyces aggregatus Ach., Meth. Lich., 355, 1803.

Cenomyce aggregata Ach., Lichenogr. Univ., 563, 1810: Hook. f. & Tayl., Crypt. Antarct., 85; 1845: Fl. Antarct. 1, 197; 1845.

Cladina aggregata Nyl., Flora, 49, 179; 1866.

Clathrina aggregata Müll.-Arg., Flora, 66, 80; 1883.

Baeomyces terebratus Willd. ap. Floerke, Ges Naturf. Freunde, Berlin Mag., 3, 125; 1809.

Cenomyce terebrata Laur., Linnaea, 2, 43; 1827.

Cladonia terebrata Floerke, De Cladoniis, 179; 1828.

Cladonia cornicularia v. *terebrata* Hampe, Linnaea, 25, 712; 1852.

Cenomyce pertusa Pers. in Gaudich., Voy. "Uranie" Bot., 213; 1826

Cladonia pertusa Mass., Mem. R. Ist. Veneto, 10, 45; 1861.

Cenomyce australis Pers. in Gaudich., Voy. "Uranie" Bot., 213; 1826.

Dufourea collodes Hook. f. & Tayl., London Jour. Bot., 3, 650; 1844.

Cenomyce diatrypa Tayl., London Jour. Bot., 6, 186; 1847.

Types: *C. aggregata* from Jamaica, Swartz; *B. terebratus* from Réunion, Bory de St. Vincent; *C. pertusa* from Brazil, Rio de Janeiro, Gaudichaud; *C. australis* from Australia, Blue Mountains, Port Jackson, Gaudichaud; *D. collodes* from Campbell Island, J. D. Hooker (Voy. "Erebus and Terror"); and *C. diatrypa* from Australia, Macquarie River, Robert Hall's herb.

Podetia forming dense tufts, 3–5 cm. tall, dying at the base and proliferating at the apices, very fragile and breaking apart, starting new colonies; 1–2 mm. in diameter, cylindric, branching dichotomous, divaricate, axils somewhat dilated, usually closed, very rarely perforate, ultimate branches and internodes short, sometimes appearing almost tri- or tetrachotomous, often tipped with spermogonia or apothecia, perforations round to elliptic, variable in size and position, not abundant; cortex 30μ thick, outer 10μ yellowish brown, disintegrating into a gel, rest hyaline, composed of very slender, longitudinal, conglutinate hyphae, closely interwoven; algal colonies of *Trebouxia,* about 20–25μ in diameter, discrete and scattered on the under surface of the cortex, whose hyphae grow inward to surround the colony and form a loosely woven medulla between the colonies; chondroid axis absent.

Spermogonia ellipsoid, cylindric, constricted at the base, black; spermatiophores 10–15μ long, branched at the base, tapering toward the apex; spermatia cylindric, slightly curved, 5–6 $\times$ 1μ.

The apothecia are very immature in our material. From the limited material of this species available to me, it seems probable that a study along the lines of des Abbayes (Révision monographique des Cladonia du sous-genre Cladina (Lichens), Bull, Soc. Sci. Bretagne, 16, 2, 1–156; 2 pl., 1939) would reveal several different species now referred to *C. aggregata,* but in the absence of types, such a revision is impossible at this time. I have included all of the synonyms from the Eastern Hemisphere. Our material has the branching and habit of *Dufourea collodes* Hook. f. and Tayl. There is also a very small, immature plant (B.A.N.Z.A.R.E. B540–8) which I have referred here for want of more adequate material, with a somewhat different branching.

Macquarie Island: H. Hamilton, A.A.E. 1658–3; Featherbed Flat (Sta. 81a), B.A.N.Z.A.R.E. B531–8, B531–9; north end of Island, Sta. 81, B.A.N.Z.A.R.E. B540–8.

CLADONIA [Hill] Weber.

Cladonia [Hill] Weber in Wiggers, Prim. Fl. Holsat., 90, 1780.

Cladonia Hill, Gen. Nat. Hist., 2, 91; 1751 [Hist. Pl.] polynomial nomenclature.

Pyxidium [Hill] Pers., Neue Ann. d. Bot., 1, 19; 1794. Ach., K. Vetensk. Akad. Nya Handl., 15, 256; 1794.

Pyxidium Hill, Gen. Nat. Hist., 2, 94; 1751 [Hist. Pl.] polynomial nomenclature.

Scyphophorum Necker, Element. Bot., 3, 350; 1790. uninomial nomenclature.

Scyphophorus Ach. [as subgenus], Lich. Suec. Prodr., 3, 183; 1798. Michaux [as genus], Fl. Bor. Am. 2, 328; 1803.

Scyphophora Gray, Nat. Arr. Brit. Pl., 1, 417; 1821.

Helopodium Ach. [as subgenus], Lich. Suec. Prodr., 3, 198; 1798; Michaux [as genus], Fl. Bor. Am., 2, 329; 1803.

Capitularia Floerke, Ges. Naturf. Freunde, Berlin, Mag., 1, 294; 1807 without formal description or combinations; *Ibid.*, 2, 132; 1808 with formal combinations.

Cenomyce Ach., Lichenogr. Univ., 105, 526; 1810.

Schasmaria Ach. [as subgenus of *Cenomyce*], Syn. Lich. 271; 1814. Gray [as genus], Nat. Arr. Brit. Pl., 1, 416; 1821. *Capitularia* sect. *Chasmaria* Mart., Fl. Cryptog. Erlang., 271; 1817.

Cladonia sect. *Chasmaria* Floerke, Clad. Comm., 125; 1828.

Type: Hill first segregated *Cladonia* from *Coralloides* Dillenius for those species which were branched but not scyphiferous, dividing the species into two groups, those with hollow, and those with solid podetia. In the first group, which corresponds to *Cladonia* of later writers, he treated *C. furcata* and *C. ramosissima cava* (*C. rangiferina* group) in detail and listed the *great, soft, open Cladonia* (*C. uncialis*), the *curled Cladonia* (*C. crispata* ?) and the *prickly, distorted Cladonia* (*C. furcata var. racemosa*). The solid group was composed of rather heterogeneous elements such as species of *Roccella, Cetraria, Parmelia (lanata* and *tristis*), *Stereocaulon, Sphaerophorus* and *Ramalina.* Weber treated *C. polymorpha* (corresponding to *Pyxidium* Hill), *C. rangiferina, C. uncialis, C. subulatus* (*C. furcata*), *C. paschalis* (*Stereocaulon paschale*) and *C. fragilis* (*Sphaerophorus fragilis*). Since *C. rangiferina* has been segregated in a small separate genus or subgenus and *C. uncialis* belongs in another small subgenus which may be raised to generic rank, it seems best to consider *C. furcata* (Hill ex Huds.) Schrad. (*C. subulata* Weber) as the type of *Cladonia* [Hill] Weber.

Hill's segregate *Pyxidium* from *Coralloides* Dillenius for the scyphiferous species, included *C. fimbriata* (including *C. verticillata*), *C. pyxidata* and *C. tubaeformis,* treated in detail and listed seven others including species with red and brown apothecia. Persoon lists *Lichen cornucopioides, L. pyxidatus* and *L. deformis.* Since *L. pyxidatus* is common to both treatments and is described in detail in the former, it may be considered as the type of *Pyxidium* (Hill) Pers.

Scyphophorus Ach. as a subgenus, included 22 species with both red and brown apothecia. Michaux repeated Acharius' description when he used the name for a genus but treats only *S. sulphurinus* and *S. verticillaris.* In his *Scyphophora,* Gray treated 17 species with both red and brown apothecia. Since, if the scyphiferous species are ever segregated as a genus, *Scyphophorus* and *Scyphophora* would fall into synonymy with *Pyxidium* [Hill] Pers., selection of a type is unimportant.

Helopodium Ach. was based on four species. Michaux repeats Acharius' description, but treats only *H. capitatum* Michaux, hence the latter should be considered the type of *Helopodium* as a genus.

Capitularia Floerke was proposed primarily for the scyphiferous species, of which *C. pyxidata* may be taken as the type, hence it falls into exact synonymy with *Pyxidium* [Hill] Pers. Later it was extended by Martius, Fl. Cryptog. Erlangensis, 260; 1817, to include all groups now included in *Cladonia.*

Cenomyce Ach. included 41 species falling into all groups of *Cladonia* as understood at present.

Schasmaria Ach. as a section, was based on *C. cenotea, C. parecha, C. crispata* and *C. sparassa* (now regarded as a synonym of *C. squamosa* (Scop.) Hoffm. var. *denticollis* (Hoffm.) Floerke). When Gray used *Schasmaria* as a genus, he treated only *S. sparassa,* which should be considered as the type.

Primary thallus persistent or evanescent, squamulose to small foliose; upper cortex fastigiate, of vertical, conglutinate hyphae, highly gelified and distintegrating above; algal layer continuous

or in discrete colonies of *Trebouxia;* medulla of thick-walled hyphae, often somewhat gelified and conglutinate. Podetia usually arising from the surface of the primary thallus, rarely from its margin, base persistent or dying below and proliferating above, simple or variously branched, tips acute, obtuse or scyphiferous, solid at first, soon hollow; cortex usually present in young stages, similar to that of the primary thallus, often lacking in mature plants; algal layer as in the primary thallus, often transformed into soredia where the cortex is poorly developed, or tearing away as verrucae, isidia or squamules, leaving portions of the podetia denuded; medulla usually loosely woven, sometimes distinct, sometimes little developed or merging into the chondroid axis which is well developed, of conglutinate, thick-walled, longitudinal hyphae.

Apothecia immersed in the tips of the podetia or sessile, disc plane to convex; parathecium only slightly differentiated from the paraphyses, or absent; hypothecium hyaline, reddish or slightly brownish, of more or less subvertical hyphae, merging into the chondroid axis below and into the thecium above; paraphyses slender, tips not thickened or clavate and capitate, simple or somewhat branched above the asci; asci clavate to cylindric, slender, tip thickened when young, becoming thin-walled at maturity, 8-spored; ascospores irregularly distichous, fusiform to long ellipsoid, unicellular.

Spermogonia usually on the tips of branches, or margins of cups, sometimes in axils, sides of podetia or on the primary thallus; cylindric, conic or ovoid, sessile or short stipitate, sometimes constricted at the base, usually brownish to black, sometimes ashy or reddish; spermatiophores variously branched, subcylindric or ventricose; spermatia filiform, cylindric, straight or somewhat curved.

In the course of this study, it became necessary to examine the types of species described by Thomas Taylor, since the microscopic characters have never been adequately described. As most of them originally came from the Auckland Island group which has a flora very similar to that of Macquarie Island, they have been included in the following key.

Apothecia typically scarlet, sometimes very pale yellow (albino forms) or blackened; paraphyses not thickened at the tip; spermogonia cylindrical .. .. .. COCCIFERAE
- Scyphiferous
  - Podetia with powdery granular soredia above, K yellow; chondroid axis 90μ thick; Auckland and Macquarie .. .. *C. subdigitata*
  - Podetia with corticate verrucae above, not truly sorediose, K yellow fusescent, P bright yellow to orange; chondroid axis 150μ thick; Auckland Island .. *C. rigida*
- Not scyphiferous; podetia with corticate isidioid verrucae above (resembling the phyllocladia of *Stereocaulon*), K–, P slowly orange then ferruginous; chondroid axis 75μ; "Islands of the Pacific" .. .. *C. acuta*

Apothecia brown, sometimes quite dark but not black; paraphyses thickened at the tip, cutting off characteristic cells; spermogonia usually ovoid; podetia with relatively thin walls; axils and cups imperforate or very rarely perforate .. .. OCHROPHAEAE
- Primary thallus early evanescent, podetia yellowish green; apothecia small, peltate, constricted at base, light brown .. .. *C. capitellata*
- Primary thallus usually persistent; podetia greyish; apothecia not peltate or constricted at the base.
  - Apothecia conglomerate; podetial axis sublacerate, K yellow fuscescent, P– or only very faint yellow; Falkland Islands .. .. *C. ustulata*

Apothecia solitary or concrescent in lines; podetial axis not lacerate.

Proliferating from the centre of the cup; corticate areolate, then verrucose and squamulose, finally decorticate; cortex of primary thallus composed of conglutinate, gelified vertical hyphae; chondroid axis 30–100μ; hypothecium 70–75μ; Macquarie Island .. .. *C. Mawsoni*

Proliferating only from the margin of the cup or not proliferating.

Podetia very slender, corticate below, then areolate and sorediate between the areoles and finally decorticate above; very rarely scyphiferous and then cups small, poorly developed; axis 35μ thick; Auckland and Macquarie Islands *C. sarmentosa*

Podetia stouter, usaually scyphiferous; cortex usually absent from podetia in all stages, usually farinose sorediose very rarely somewhat areolate corticate at the base.

Primary thallus corticate on all sides, surface verrucose to almost cerebriform; Kerguelen .. .. *C. kerguelensis*

Primary thallus not corticate below.

Cortex of whitish primary thallus a mixture of periclinal and vertical hyphae conglutinate but not gelified, suggesting a pseudoparenchyma; cups abruptly dilated above; chondroid axis 75–110μ; hypothecium 85–110μ; Kerguelen .. .. .. *C. phyllophora*

Cortex of greenish primary thallus of vertical hyphae conglutinate and often highly gelified above.

Cups gradually dilated upward, impellucid, splitting into lobes, not corticate below when young; axis 100–110μ; Macquarie Island. *C. floriformis*

Cups gradually dilated upward at first, then abruptly so, pellucid, margin not splitting into lobes, areolate corticate below when young; axis 110–150μ thick; hypothecium 120μ tall; Kerguelen *C. Johnstoni*

Cladonia subdigitata Nyl.

Cladonia subdigitata Nyl., C. R. Acad Sci., 83, 88; 1876.

Type: Campbell Island, Filhol.

All of our material of this species belongs in the following variety.

Cladonia subdigitata var. albinea Dodge, var. nov.

Type: Macquarie Island, north end, Sta. 81, B.A.N.Z.A.R.E. B540–11.

Thallus primarius orbicularis, 4–5 mm. diametro, verrucosus subisidiosusve, marginibus verrucosis sublaceratis, imbricatus, concrescens circiter 300μ crassitudine, superne pallide brunneo-olivaceus vel glaucus, inferne sorediosus glaucescens vel albidus; cortex fastigiatus mox gelifactus 25–35μ crassitudine brunneo-olivaceus; stratum algarum circiter 90–110μ crassitudine, cellulis protococcoideis circiter 10μ diametro coloniis parvis et cellulis singulis in medulla sparsis, soredia superficiei inferae formantibus; medulla laxe contexta hyphis pachydermaticis circiter 4μ diametro.

Podetia circiter 3 cm. altitudine, 1–2 mm. diametro ad 5–6 mm. sensim dilatata, scyphifera, scyphis non dilatatis, marginibus integris sublaceratisve sed non proliferantibus inferne dense

isidioideo-verrucosa subsquamulosave dein superne areolato-corticata et granuloso-sorediosa postea denudata glaucescentia vel substraminea, lateribus marginum scyphorum 150μ crassitudine; cortex deest; axis chondroideus ad 90μ crassitudine, hyphis longitudinaliter laxe contextis, gelifactis.

Apothecia pellucida, pallide flavida, circum marginem scyphorum confluentia, ad 0·25 mm. diametro immarginata, disco plano, amphithecio mox evanescente; parathecium non evolutum, hypothecium cuneatum circiter 100μ altitudine, hyphis leptodermaticis, subverticalibus, subbrunneis; paraphyses tenues circiter 2μ diametro, non ramosae, apicibus non incrassatis; asci clavati circiter 30 × 6–7μ leptodermatici; ascosporae hyalinae, longe ellipsoideae vel subfusiformes, 6–7 × 3μ.

Primary thallus orbicular, 4–5 mm. in diameter, surface verrucose, or somewhat isidiose, margin verrucose and somewhat lacerate, closely imbricate and concrescent, about 300μ thick, light brownish olive to glaucous above, sorediose, glaucous to whitish below; cortex fastigiate, soon wholly gelified, 25–35μ thick, brownish olive; algal layer about 90–110μ thick, compact protococcoid, cells about 10μ in diameter with some cells or small colonies in the medulla, forming the soredia on the margin and the lower surface; medulla loosely woven, of thick-walled hyphae about 4μ in diameter.

Podetia about 3 cm. tall, 1–2 mm. in diameter, gradually dilated upward to 5–6 mm. wholly scyphiferous, cups not dilated, sometimes a little smaller than the greatest diameter of the podetium, margin entire or somewhat lacerate, but not proliferous in our material, densely isidioid-verrucose and subsquamulose below, then areolate corticate, passing into powdery, granular soredia above, and finally nearly denuded of soredia, glaucescent to substramineous; walls about 130μ thick at the margin of the cup, cortex wholly lacking above, probably the same as that of the primary thallus below; algal layer reduced to small spherical soredia attached by the loosely woven medullary hyphae, about 4μ in diameter, chondroid axis about 90μ thick, of loosely woven, anastomosing longtiudinal hyphae imbedded in a hyaline gel.

Apothecia pellucid, pale yellowish, confluent around the margin of the cup, about 0·25 mm. in diameter, immarginate, disc flat, edges convex; amphithecium early evanascent; parathecium not developed; hypothecium cuneate, about 100μ tall, of slender, thin-walled, vertical hyphae, slightly brownish, not clearly differentiated from the base of the thecium; thecium about 35μ tall; paraphyses slender, about 2μ in diameter, apparently unbranched, tips not thickened; asci clavate, about 30 ×6–7μ, thin-walled; ascospores hyaline, long ellipsoid to subfusiform, 6–8 × 3μ.

Macquarie Island, north end, Sta. 81, B.A.N.Z.A.R.E. B540–11.

Cladonia rigida (Tayl.) Hampe.

Cladonia rigida, Hampe, Linnaea, 28, 216; 1856 Nyl., C. R. Acad. Sci., 83, 88; 1876.

Cenomyce rigida Taylor in Hook. f. & Taylor, London Jour. Bot., 3, 652; 1844.

Cenomyce pyxidata v. *rigida* Taylor in Hook f., Crypt. Antarct., 85; 1845.

Type: Lord Auckland's group, J. D. Hooker, 1575 (Voy. "Erebus & Terror") in Taylor Herb. at Farlow Herbarium, Harvard University.

[Primary thallus foliose, ascendent, ashy-glaucous, margin undulate, subincurved, thick, broad.]

Podetia up to 1·5 cm. tall, and 1·5 mm. in diameter, growing in dense tufts, slightly inflated in the middle, tips very minutely scyphiferous (scarcely more than truncate), cups about 0·4 mm. in diameter with two or three proliferations from the margin, appearing dichotomously or trichotomously branched in the older portions of the podetia, not perforate, below with dense, verrucose, subisidioid squamules about 0·15 × 0·5 mm. passing into corticate verrucae above which break away,

leaving the chondroid axis bare, but not truly sorediose, pale olive buff to white; promptly yellow then slowly fuscescent with KOH; verrucae and medulla P bright yellow to orange, tips of a few verrucae miniate red; cortex 20μ thick, fastigiate, highly gelified; algal layer about 75μ thick, nearly continuous at first, then rounding up into groups of small colonies as the verrucae form by unequal growth, protococcoid, cells 8–10μ in diameter, somewhat angular from mutual pressure; medulla 20–25μ thick of longitudinal, thick-walled hyphae, similar to those of the chondroid axis but less conglutinate and more deeply staining; chondroid axis 150μ thick, of thick-walled, conglutinate, longitudinal hyphae, about 4μ in diameter.

Apothecia maroon or darker, 0·1 mm. in diameter or confluent in lines about the margin of the shallow cup, very convex, amphithecium and parathecium not developed; hypothecium about 100μ tall, of slender, vertical hyphae, passing into paraphyses, asci not yet developed; paraphyses unbranched, tips not inflated nor cutting off cells.

Spermogonia ovoid to subcylindric on tips of acuminate podetia, not constricted at the base, spermatiophores dichotomous at the base, slightly ventricose, about 15μ long and 1·5μ in greatest diameter; spermatia 5–6 × 0·5μ, cylindrical, slightly curved.

The above description of the primary thallus is taken from the original description and Vainio's notes, evidently from the duplicate at Kew, as I have been unable to find the primary thallus in the specimen in Taylor's herbarium, unless a larger basal squamule or a crushed podetium has been mistaken for the primary thallus.

Nylander, Syn. Meth. Lich., 224; 1860 and C. R. Acad. Sci., 83, 88; 1876, was probably right in referring this species to the Cocciferae, as the paraphyses and spermogonia suggest that group rather than *Cladonia pyxidata,* where it was later referred by Taylor, or *C. squamosa,* where it was referred by Müller-Argau, Flora, 71, 18; 1888. Vainio, Monog. Clad., 1, 509; 1887, first recognized it as a species related to *C. pleurophylla* or perhaps *C. pityrophylla* Nyl. Later, Monog. Clad., 2, 461; 1894, he referred it to *C. subsquamosa.* In habit and microscopic structure it is close to *C. acuta* (Taylor) Hue, in which I have been unable to find apothecia. Both resemble some species of *Stereocaulon* in habit, but are clearly not that genus on closer examination. *C. acuta* is more easily denuded of verrucae and fails to react with KOH. Certainly *C. rigida,* and perhaps *C. acuta* are related to *C. subdigitata.*

Cladonia acuta (Taylor) Hue.

Cladonia acuta (Taylor) Hue, Lich. Exot., 43; 1892.

Cenomyce acuta Taylor, London Jour. Bot., 6, 1847; Nylander, Syn. Meth. Lich., 196; 1858.

Cladonia squamosa var. *acuta* Müll.-Arg., Flora, 71, 19; 1888.

Type: Islands of the Pacific, Hooker Herb. in Taylor Herb. at Farlow Herbarium, Harvard University.

Primary thallus not seen. Podetia in dense tufts, at least 4 cm. in diameter, proliferating above and dying at the base, 2 cm. tall and 1 mm. in diameter; branching occasionally dichotomous below, polychotomous above, or irregular, branches mostly inflated above the axil, then tapering gradually to a blunt point (acute if tipped by a spermogonium), axils imperforate (occasional circular holes occur on the sides of the podetia which seem to result from a broken branch which has been partly concealed by the growth of the nearby verrucae), cartilaginous and pellucid where decorticate, especially below, above covered with pulvinate verrucae and isidiose squamules (resembling the phyllocladia of *Stereocaulon*), tips densely covered with spinulose isidia, then completely denuded; tawny olive to cinnamon buff, KOH–; axis P–, verrucae P slowly orange becoming ferruginous;

cortex over the verrucae fastigiate, highly gelified, 22–25μ thick; algae protococcoid, scattered in the spongy medulla of the pulvinus, cells 6–7μ in diameter; medulla of loosely woven, contorted, thick-walled hyphae about 4μ in diameter; chondroid axis about 75μ thick, inner surface somewhat wrinkled and lacerate. Apothecia not seen.

Spermogonia black, cylindric, terminal on branches; spermatiophores curved, ventricose, branched, 15–18 $\times$ 2μ, tips acuminate; spermatia cylindric, slightly curved, 7–10 $\times$ 1μ.

Cladonia capitellata (Taylor) Bab.

Cladonia capitellata (Taylor) Babington in Hook. f., Fl. Nov. Zel., 2, 296; 1855.

Cenomyce capillata Taylor in Hook f., and Taylor, London Jour. Bot., 3, 652; 1884 [typographical error for *C. capitellata* as it is so written by Taylor on the sheet in his herbarium].

Cladonia amaurocraea var. *capitellata* Nyl., Mém. Soc. Nat. Cherbourg, 5, 95; 1857.

Types: New Zealand, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. at Farlow Herbarium, Harvard University.

There is little to add to Vainio's description in the Monog. Clad., 1, 274; 1887, except the microscopic structure of the apothecia; parathecium scarcely more than browner paraphyses at the margin of the thecium; hypothecium 35–40μ thick, of slender vertical hyphae, somewhat interwoven; thecium 35–40μ tall; paraphyses slender, dichotomous above, tips very slightly thickened, cutting off spherical, brownish cells about 2μ in diameter at the surface of the brownish epithecial gel; asci clavate, 25–30 $\times$ 7–8μ thin-walled; ascospores 6–8 $\times$ 2·5–3μ, long ellipsoidal, hyaline, unicellular. All parts of the thallus P–.

Cladonia ustulata (Hook. & Taylor).

Cladonia ustulata (Hook. f. & Tayl.) Leight., Ann. Mag. Nat. Hist. III, 18, 108; 1866.

Cenomyce ustulata Hook. f. & Tayl., London Jour. Bot., 3, 652; 1844.

Cenomyce fimbriata var. *ustulata* Tayl. in Hook. f., Crypt. Antarct., 225; 1845.

Cladonia fimbriata f. *ustulata* Nyl., Syn. Lich., 196; 1858.

Type: Falkland Islands, Uranie Bay, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. at Farlow Herbarium, Harvard University.

Primary thallus circular, about 3 mm. in diameter, margins minutely crenate and ascending, surface slightly verrucose, tawny olive to clay colour; cortex 35–55μ thick, fastigiate, completely gelified above, hyphae more distinct below, 4–5μ in diameter; algal layer continuous, 75μ thick, very compact in the upper half, less so below, with occasional algal cells scattered in the upper part of the medulla, cells about 10μ in diameter; medulla of loosely woven, thick-walled hyphae, 2–3μ in diameter.

Podetia up to 1·5 cm. tall, 0·7–1·2 mm. in diameter, cylindrical or slightly inflated below, tapering upward, obtuse when terminated by spermogonia, or truncate when minutely scyphiferous, tips blackened, corticate at first, then areolate verrucose below, powdery sorediose above, and finally decorticate, pale to dark olive buff, impellucid, KOH promptly yellow then fuscescent; P– or very faintly yellow, axis P–; cortex not seen in portion of podetium sectioned; algal layer about 35μ thick, continuous, then breaking up into verrucae and soredia and finally absent; medulla not differentiated as a distinct layer; chondroid axis about 75μ thick, of very slender, closely woven, conglutinate hyphae, sublacerate and divided into fibres, but very rarely fistulose.

Apothecia conglomerate, convex but constricted at the margin, now black; amphithecium and parathecium absent, very immature.

Spermogonia, ovoid, not constricted at the base, on tips of sterile podetia, spermatiophores about 15 × 1·5μ, trichotomously branched at the base, subventricose; spermatia cylindric, straight or slightly curved, 6–8 × 0·5μ.

The type material is very scanty and I have hesitated to section the only podetium with apparently mature apothecia. While it seems to belong in the *C. fimbriata* group where it antedates *C. fimbriata* var. *Balfourii* (Crombie) Vainio, to which it was referred by Vainio, Monog. Clad., 2, 341; 1894, the agglomerate apothecia and the sublacerate chondroid axis suggest that it may be a valid species intermediate between *C. elegantula* Müll.-Arg. and *C. testaceopallens* Vianio, with which it agrees in its reaction with KOH. It is hoped that it will be found again in greater abundance and in better condition for study.

Cladonia Mawsoni Dodge, sp. nov.

Type: Macquarie Island, north end, Sta. 81, B.A.N.Z.A.R.E. B534–4.

Thallus primarius orbicularis, 4–5 mm. diametro, albidus, laceratus, lobis adscendentibus, subramosis; cortex 50–55μ crassitudine, gelifactus, hyphis magnis verticalibus; stratum algarum circiter 50μ crassitudine, continuum sed cellulis non caespitosis, 7–8μ diametro, paucis in medulla sparsis; medulla 100–110μ crassitudine, hyphis pachydermaticis, periclinalibus, 6–8μ diametro.

Podetia centralia, rare submarginalia, basi emoriente nigricante, apicibus proliferantia, scyphis dilatatis, circiter 4 mm. diametro clausis madida pellucida, sicca impellucida albidaque, areolato-corticata dein verrucosa squamulosave decorticataque; squamulae albidae, subramosae isidiiformesque totum podetium (etiam interiorem scyphi) tegentes; e centro scyphorum proliferantia (rare etiam bravissimis cum proliferationibus scyphiferis ex marginibus); margines scyphorum laceratae squamulosaeque; cortex circiter 20μ crassitudine super verrucas squamulasque fastigiatus, gelifactus; stratum algarum 20–25μ crassitudine continuum, cellulis non caespitosis, paucis in medulla sparsis, ad 7–8μ diametro; medulla 35–50μ crassitudine, hyphis pachydermaticis, 6–7μ diametro, laxe contextis; axis chondroideus 30–100μ crassitudine, hyphis tenuibus longitudinalibus, conglutinatis, gelifactus.

Apothecia immatura in lineis super margines scyphorum confluentes, 0·1–0·13 mm. latitudine; amphithecium paratheciumque non evoluta; hypothecium cuneatum 70–75μ altitudine, a thecio non bene distinctum; thecium circiter 35μ altitudine; paraphyses tenues, apicibus subclavatis cellulas sphaericas abjungentibus; asci, ascosporae spermogoniaque non visa.

Primary thallus 4–5μ in diameter, white, lacerate, lobes ascending and somewhat branched; cortex 50–55μ thick, highly gelified, of large, vertical hyphae; algal layer about 50μ thick, continuous, but cells not crowded, 7–8μ in diameter, with occasional cells scattered in the medulla; medulla 100–110μ thick, of thick-walled, periclinal hyphae, 6–8μ in diameter.

Podetia arising from the centre, rarely from near the margin of the primary thallus, about 3 cm. tall, 1–1·5 mm. in diameter, cups dilated, about 4 mm. in diameter, shallow, closed, pellucid when moist, impellucid and white when dry, areolate corticate, becoming verrucose decorticate and squamulose, squamules white, somewhat branched and isidiiform, covering the whole podetium, including the interior of the cup, proliferating from the centre of the cup, with an occasional very short, minutely scyphiferous proliferation from the margin of the cup, which is lacerate and squamulose, finally blackening and dying at the base, proliferating above, cortex about 20μ thick over the verrucae and squamules, fastigiate, highly gelified; algal layer 20–25μ thick, continuous but cells not crowded, with scattered cells in the medulla, cells up to 7–8μ in diameter; medulla 35–50μ thick, of loosely woven, thick-walled hyphae 6–7μ in diameter; chondroid axis 30–100μ thick, rather variable in the same podetium, of slender, conglutinate, longtitudinal, hyphae, highly gelified.

Apothecia not fully developed, confluent in lines along the margin of the cup, 0·1–0·13 mm. in diameter; amphithecium and parathecium not developed; hypothecium cuneate, about 70–75μ tall, not clearly differentiated from the thecium which is about 35μ tall; paraphyses slender, tips slightly clavate, cutting off spherical cells about 3–4μ in diameter; asci and ascospores not seen.

Spermogonia not seen in the type. Structures which resemble them in appearance have proved to be the perithecia of a parasite, *Didymella Cladoniae*.

No. 531 seems to be a much older state, up to 5 mm. tall, main axis up to 2 mm. in diameter, below blackened and decaying, nearly denuded of squamules, the lower cups almost obliterated by proliferation from the margin as well, so that the branching appears almost polytomous with some of the squamules from the margin of the cup and sides of the podetia growing out, 2 × 1 mm., palmately divided and bearing the early stages of new podetia from their upper surface. Some of the smaller proliferations appear subulate, but a careful examination shows them to be very minutely scyphiferous before the cup has begun to expand. Spermogonia on short stipes, about 75μ tall, from the upper surface of the squamules which are beginning to function as new primary thalli, broadly conic, about 300μ in diameter and 200μ tall, with a small, depressed ostiole, dark brown to black; spermatiophores 15–20μ long, branched, bases ventricose, tips acuminate; spermatia curved, ends pointed, 7–8 × 0·5μ.

No. 540a seems to be very young and very old material; 531a consists of very old podetia which seem to belong here, but no proliferation from cups has been seen, or it may be referable to some state of *C. fimbriata* var. *Balfourii* group, as a few branches seem to be truly subulate.

Macquarie Island: Highland, Sta. 81c, B.A.N.Z.A.R.E. B534–4, type; Featherbed Flat, B.A.N.Z.A.R.E. B531–12, B531–13, B531–14, B531–15, B531–16.

CLADONIA SARMENTOSA (Taylor) Dodge, comb. nov.

Cenomyce sarmentosa Taylor in Hook. f. & Taylor, London Jour. Bot., 3, 651; 1844.

Cenomyce ecmocyna v. *gracilis* Hook. f. & Taylor, Cryptog. Antarct., 85; 1845.

Cladonia scabriuscula Nyl., C. R. Acad. Sci., 83, 88; 1876 non Del. in Duby, Bot. Gall., 2, 623; 1830.

? *Cladonia cornuta* f. *gracilentior* Nyl., C. R. Acad. Sci., 83, 88; 1876.

? *Cladonia chordalis* f. *soredians* Nyl., Lich. Nov. Zeland., 18; 1888.

Cladonia gracilis var. *Campbelliana* Vainio, Acta Soc. Fauna Fl. Fenn., 10, 113; 1894. [Monog. Cladoniarum Univ. 2.]

Type: Lord Auckland's group, among mosses on dry ground on the hills, J. D. Hooker 1576 [fertile], 1569 [sterile] (Voy. "Erebus & Terror") in Taylor Herb. at Harvard Univ. *C. gracilis* var. *Campbelliana* (*C. scabriuscula* Nyl. non Del.) and *C. cornuta* var. *gracilentior* were based on collections from Campbell Island, Filhol. *C. chordalis* var. *soredians* was based on collections from New Zealand, Helms 157.

Primary thallus 2–3 mm. in diameter, margins crenate to lacerate sorediose, often parasitized and soon evanescent*; cortex 35μ thick, fastigiate, soon gelified; algal layer 35μ thick, protococcoid cells mostly single, 7–8μ in diameter; medulla about 150μ thick, of loosely woven, thick-walled, hyaline hyphae 4–5μ in diameter, some of those on the lower side becoming brownish

*The "thallo foliaceo palmato-adscendente" of the orginal description applies to podetial squamules at the base of the living portion of the podetia at the top of the mosses, while the dead portion may be traced for some distance (about 2 cm.) below these rather large squamules.

and growing out as rhizinae. Podetia 0·3–0·7 mm. in diameter at the base (up to 1 mm. in the dead portion among the mosses), tapering gradually upward, up to 5 cm. tall, dying at the base, with occasional short branches, perpendicular to the main axis, mostly subulate, terminated by a spermogonium, or narrowly scyphiferous; cups only slightly dilated or oblique, closed or open by a small pore, rare, corticate at first, then verrucose areolate and sorediate between the areoles, especially above, and finally more or less decorticate in the upper portion; verrucae K soon reddish, medulla pale yellow, both gradually fuscescent; P faint yellow, medulla P–; cortex 20–30μ thick, gelified; algae in colonies which by proliferation form the verrucae, medulla not clearly differentiated from the chondroid axis which is about 35μ thick, of very slender, thick-walled, conglutinate hyphae.

Apothecia sessile on the margins of the cup, up to 0·3 mm. in diameter, disc flat to somewhat convex, formed by confluence of several very minute apothecia, dark brown to black; parathecium not developed; hypothecium conical, of subvertical, slender, slightly brownish hyphae; thecium not clearly differentiated, about 30–40μ tall; paraphyses slender, brownish, dichotomously branched, tips clavate, deeper brown, imbedded in the hyaline epithecial gel which is about 5μ thick above the ends of the paraphyses; asci clavate, tip thickened, protoplast truncate in the young stage, about 25 $\times$ 6–7μ; ascospores unicellular, ellipsoidal, 7–8 $\times$ 2·5–3μ. [I am not quite certain that the spores measured are ascospores, although some were floating free just above the epithecium and some were imbedded in the apothecial gel in a crushed, rather thick section.]

Spermogonia terminal on the subulate podetia, black, slightly constricted at the base, ovoid, ostiole quite small; spermatiophores di- or tri-chotomous, base somewhat ventricose, tips subulate, slightly curved, 7–10μ long; spermatia curved, tips acute, 5–7 $\times$ 0·5μ.

This species is somewhat variable in podetia from the same tuft. Some are completely corticate, approaching *C. gracilis* var. *chordalis* in appearance, while the other extreme with the upper portion sorediate and partially decorticate suggests sterile *C. cornuta*. The verrucose areolate cortex seems to be the most characteristic state, and when the tip of the podetium is injured, some of the verrucae grow out into squamules similar to those of the primary thallus, and in one case, a minute podetium was seen growing from the centre. B.A.N.Z.A.R.E. 540 seems to be younger, with podetia much shorter, badly parasitized and blackened in spots, while B.A.N.Z.A.R.E. 531 consists of a few long podetia without primary squamules which were found tangled in a collection of *Clathrina aggregata*. The types of *C. chordalis* f. *soredians* and *C. cornuta* f. *gracilentior* Nyl. have not been available for study, but there is nothing in their descriptions to differentiate them from this species. The description of *C. gracilis* var. *Campbelliana* agrees very closely with the type of *C. sarmentosa* as well as with our material from Macquarie Island.

As Taylor originally stated, this species seems more closely related to *C. gracilis* and *C. cornuta* of the northern hemisphere and may prove to be the southern representative of that group. The form of both the apothecia and spermogonia is that of *C. gracilis* and *C. cornuta* rather than of the *C. squamosa* group where Müller-Argau placed it when he studied the type in 1887 (cf. Flora, 71, 18; 1888). As there are so few spermogonia in the type, the microscopic characters in the above description are taken from our Macquarie Island material. It must be admitted that the small perforations in some of the cups suggest that *C. squamosa* group, although Vainio states that *C. gracilis* sometimes has rimose and perforate podetia. If the perforate cups are taken as the most distinctive character, the reaction with potassium hydroxide suggests *C. subsquamosa* Nyl. as emended by Vainio, where var. *pulverulenta* (R. Br.) Vainio from Tasmania, Table Mt., R. Brown, would seem closely related.

Auckland Islands: J. D. Hooker 1576, 1569 (Voy. "Erebus & Terror") Type, in Taylor Herb. at Harvard University.

Macquarie Island: North end, Sta. 81, B.A.N.Z.A.R.E. 540–10; Featherbed Flat, B.A.N.Z.A.R.E. 531–11.

CLADONIA GRACILIS var. TURBINATA Schaer.

Cladonia gracilis var. *turbinata* Schaer. has been reported by Müller-Argau, Bot. Jahrb. [Engler], 3, 53; 1883, from Kerguelen, collected by Naumann, but no material referable here was collected by the B.A.N.Z.A.R. Expedition.

CLADONIA CORNUTA (L.).

Cladonia cornuta (L.) Schaer. has been reported by Crombie, Jour. Linn. Soc. Bot., 16, 220; 1878: Phil. Trans. Roy. Soc. [London], 168, 1879; Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 233; 1885 from Kerguelen, collected by Moseley, on the "Challenger" Expedition, but no material referable here was collected by the B.A.N.Z.A.R. Expedition.

CLADONIA KERGUELENSIS Dodge, sp. nov.

Type: Kerguelen, Long Island, B.A.N.Z.A.R.E. 953–2.

Thallus primarius parvus, orbicularis, superficie verrucosa aut subcerebriformis, aut subteres excavatusque; ambabus lateribus corticatus, hyphis leptodermaticis, verticalibus, conglutinatis, superne gelifactis, crassitudine variabili; stratum algarum crassissimum, cellulis etiam in medulla sparsis, sphaericis, 11–12μ diametro aut in seriebus verticalibus compactis, dein cylindricis, flavido-viridibus; medulla hyphis tenuibus, leptodermaticis laxissime contextis.

Podetia immatura, 0·6 mm. altitudine, ad 0·2 mm. diametro, apicibus scyphiferis; cortex non evolutus; soredia ad 30μ diametro coloniis minutis; medulla non bene distincta; axis chondroideus hyphis conglutinatis, tenuibus, subbrunneis.

Apotheia immatura, amphithecium paratheciumque non evolutum; paraphyses tenues, apicibus clavatis, arthrosporas uniseptatis abjungentibus.

Primary thallus small, round, surface verrucose, at times appearing almost cerebriform, sometimes almost terete, becoming hollow in the centre; corticate on all sides, of hyaline, thin-walled, vertical, conglutinate hyphae, decomposing above, of variable thickness; algal layer very thick with some cells scattered through most of the medulla, cells spherical, 11–12μ in diameter, or closely packed in vertical rows, then appearing cylindrical, yellowish green, walls thin, dividing repeatedly to form a spherical mass of aplanospores which are released in a group by rupture of the wall of the mother cell; medulla very loosely woven, of slender, thin-walled hyphae.

Podetia very immature, 0·6 mm. high, 0·2 mm. or less in diameter, tip very minutely scyphiferous, margin apparently a ring of apothecial initials; cortex not developed, sorediate throughout the length, soredia 30μ or less in diameter consisting of minute colonies formed by the aplanospores of a single algal cell, surrounded by about two layers of thalline hyphae; medulla not clearly differentiated from the chondroid axis, both consisting of parallel, conglutinate, slender, slightly brownish hyphae.

Apothecial initials as in *C. phyllophora;* tips of the paraphyses more dilated and cutting off mostly two-celled arthrospores; asci and ascospores not seen. Spermogonia not seen.

The structure of the primary thallus clearly distinguishes this species from any species of *Cladonia* with which I am familiar, otherwise it might be taken for an extremely young member of the *C. fimbriata* group.

Kerguelen: Long Island, B.A.N.Z.A.R.E. 953–2.

CLADONIA PHYLLOPHORA (Taylor) Dodge, comb. nov.

Cenomyce phyllophora Taylor in Hook. f. & Taylor, London Jour. Bot., 3, 652; 1844.

Cladonia acuminata Crombie, Jour. Linn. Soc. Bot., 15, 187; 1876; Jour. Bot. Brit. For., 15, 103; 1877: Phil. Trans. Roy. Soc. [London], 168, 47; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 233; 1855, non Ach.

Cladonia squamosa v. *nana* Müll.-Arg. 71, 19; 1888.

Cladonia pyxidata Tuck., Bull. Torrey Bot. Club, 6, 58; 1875: Bull. U.S. Nat. Mus., 3, 29; 1876: Wilson. Mém. Herb. Boissier, 18, 87; 1900, non al.

? *Cladonia pyxidata* v. *chlorophaea* Müll.-Arg., Bot. Jahrb. [Engler], 4, 53; 1883; Bouly de Lesdain, Ann. Crypt. Exot., 4, 99; 1931, non al.

? *Cladonia pyxidata* v. *negelecta* Bouly de Lesdain, Ann. Crypt. Exot., 4, 99; 1931, non al.

? *Cladonia pyxidata* v. *costata* Müll.-Arg., Bot. Jahrb. [Engler], 4, 53; 1883.

? *Cladonia fimbriata* f. *costata* Crombie, Jour. Linn. Soc. Bot., 15, 182; 1876: 16, 222; 1877: Phil. Trans. Roy. Soc. [London], 168, 47; 1879.

? *Cladonia fimbriata* Crombie, Jour. Linn. Soc. Bot., 15, 182; 1876: Phil. Trans. Roy. Soc. [London], 168, 47; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 233; 1885.

? *Cladonia fimbriata* f. *scyphosa minor* Krmplhbr., Reise Novara Bot., 127; 1870: *C. fimbriata* f. *minor* Nyl., Flora, 69, 319; 1886, non (Retz.) Hag.

? *Cladonia fimbriata* f. *simplex* Zahlbr., Deutsche Südpolar Exp., 8, 41; 1906.

Cladonia fimbriata v. *gracilenta* Müll.-Arg., Bot. Jahrb. [Engler], 3, 53; 1884, non Nyl.

Cladonia squamosa v. *gracilenta* Müll.-Arg., Bot. Jahrb. [Engler], 4, 134; 1884.

Type: Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror"), also the type of *C. squamosa* v. *nana*, in Taylor Herb. at Farlow Herbarium, Harvard University. *C. fimbriata* v. *minor* was based on collection from St. Paul Island (Voy. "Novara"), not seen.

Primary thallus of small, imbricate squamules, 2–3 mm. in diameter, about 250μ thick, lobes narrow and short, mostly appressed, forming a compact crust in young colonies, finally almost disappearing as the old podetia proliferate, tilleul buff, or somewhat darker, whitish when dry; cortex about 15–18μ thick, a mixture of thick-walled, periclinal and vertical hyphae, conglutinate but not fully gelified, suggesting a pseudoparenchyma, walls in the central portion slightly brownish; algal layer about 55μ thick, cells spherical to slightly elongate, arranged in subvertical rows, up to 8μ in diameter, protococcoid; medulla of thick-walled, loosely woven, more or less periclinal hyphae, 4–5μ in diameter, occasionally with an algal cell or small colony below the compact algal layer, and deposits of crystals.

Podetia up to 1·2 cm. tall, arising from below the algal layer, cylindrical with a shallow cup, at first farinose sorediate, soredia developing *in situ* to minute isidiose verrucae and occasional minute squamules; the stalk about 2 mm. in diameter; the cup becomes abruptly dilated, up to 12 mm. in diameter, mostly smaller, margin smooth, slightly brownish with groups of spermogonia and sessile apothecial initials, finally becoming proliferous at the margin in a

number of conical rays tipped with apothecial initials or minute cups, finally producing several cups nearly as large as the original cup, and dying at the base; cortex not clearly developed at any stage; algal colonies small, discrete, forming soredia about 30–45μ in diameter above, confluent into much larger masses below; medulla 18–25μ thick, of very loosely tangled, sub-vertical hyphae; chondroid axis 75–110μ thick, of thick-walled, hyaline, periclinal, conglutinate hyphae, the cavity, at least in the cup, crossed by trabeculae of the same texture as the chondroid axis.

Apothecia immature, about 0·25 mm. in diameter, sessile on the margin of the cup, soon convex, parathecium not developed; hyopthecium 85–110μ tall, of vertical brownish hyphae, radiating from what appears to be the remains of an old spermogonium, continued above as paraphyses with broad clavate and variously branched tips, cutting off spherical, thick-walled brown cells about 5μ in diameter, or two-celled arthrospores about 5 $\times$ 9μ, forming the dark brown epithecium; asci not developed.

Spermogonia sessile, nearly spherical, about 180μ in diameter, dark brown, appearing black, wall very thin, hymenium of spermatiophores completely lining the cavity, about 18–20μ tall, cutting off straight, cylindrical spermatia, 4–5 $\times$ 0·5μ.

Some of the collections referred here contain several hundred podetia in various stages of development. If certain ones be selected, one could separate the collections into several named varieties and forms, but there are so many intergradations that it seems obvious that they represent only stages of development. The type represents a very old stage. It consists of four masses of debris more or less covered by young squamules, apparently developing from soredia or broken podetial squamules. One moribund podetial cup with the diaphragm nearly covered by squamules developing from soredia *in situ*, bears a single decorticate proliferation nearly denuded of squamules, bearing a partly broken cup apparently oblique and still sterile. Another very much decayed cup bears a badly broken expanded cup completely denuded of squamules and a proliferation of a less expanded cup split on one side, otherwise well covered with pulvinate squamules and beginning to proliferate from two points on its margin. There are also two much smaller proliferations from the decaying cup densely covered with squamules and not yet expanded. Medulla K yellow at first, becoming fuscescent; P–, growing points of primary thallus P miniate red. There are broken remains of younger podetial cups on the other masses of debris. Since both Taylor and Müller-Argau mention apothecia, it is possible that Müller-Argau removed a fertile podetium from one of the latter masses of debris, as two fragments of podetia look as if they were cut with a knife rather than broken. In its present condition, the type specimen is practically undeterminable, but such characters as survive, including the microscopic characters of the primary thallus, indicate that our material from Kerguelen belongs here and that the species belongs in the *C. fimbriata* group rather than to the *C. squamosa-C. subsquamosa* group. It is very fortunate that our material contains so many stages of development. Our material is also closely related to *C. fimbriata* v. *chondroidea* Vainio, Acta Soc. pro Fauna Fl. Fenn., 10, 334–342; 1894 [Monog. Cladoniarum Univ. 2] and its synonyms, but since all of the names in this group are more recent and the types are not available for study, they need not concern us here.

The very young, slender podetia with minute cups represent *C. fimbriata* f. *minor* (Krmplhbr.) Nyl. originally described from St. Paul Island, also reported by Zahlbruckner as f. *simplex* from Schwarzer See, Werth, noting that it is still smaller than f. *minor* (Retz.) Hag., and if seen while the outer layers are verrucose before the soredia are shed may account for Bouly de Lesdain's report of *C. pyxidata* v. *neglecta*. A little later stage, when the cup is beginning to expand and the basal verrucae are beginning to elongate, represents *C. pyxidata* of Tuckerman's report and *C. pyxidata* v. *chorophaea* of Müller-Argau and Bouly de Lesdain. Then the primary cup is well expanded and the soredia and partly shed, when we have Crombie's report of

C. fimbriata and as growth becomes somewhat unequal, before proliferation sets in, we have *C. pyxidata* v. *costata* of Müller-Argau and *C. fimbriata* f. *costata* of Crombie. When fully developed with young proliferations, we have forms similar to *C. squamosa* v. *gracilenta* of Müller-Argau and when very old, forms similar to the type. None of our specimens has the thick primary thallus nor the impellucid podetia of *C. pyxidata*.

The last two collections cited below are very young colonies growing over mosses with the podetia just beginning to emerge from the primary squamule, but seem to belong here, although in the last cited, the cortex of the primary squamule is less well differentiated and the hyphae of the medulla have thinner walls and are less characteristically differentiated. The lobes are a little narrower and sometimes almost terete.

Kerguelen: Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. at Farlow Herb., Harvard University; Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp.) in Tuckerman Herb. at Farlow Herb., Harvard University; Observatory Bay, on dry rocks, B.A.N.Z.A.R.E. B188–1; Royal Sound, R. Hall, Nat. Herb. Melb. Melbourne; Long Island, Royal Sound, B.A.N.Z.A.R.E. B168–2 (538), B169–2 (535), B169–3; Murray Island, 50 ft., Sta. 60, B.A.N.Z.A.R.E. B530–8; Mt. Wyville Thompson, 1,000–1,500 ft., Sta. 62, B.A.N.Z.A.R.E. B246–8 (529).

CLADONIA FLORIFORMIS Dodge. sp. nov.

Type: Macquarie Island, north end, Sta. 81, B.A.N.Z.A.R.E. 540–9.

Thallus primarius orbicularis, 8–9 mm. diametro, margine integro sublaceratove, viridis; cortex superior 35–40μ crassitudine, fastigiatus, hyphis non bene conglutinatis contextus, 5–6μ diametro, apicibus gelifactis; stratum algarum 35–40μ crassitudine, coloniis plus minusve confluentibus, cellulis 7–8μ diametro, paucis in basi medullae sparsis; medulla circiter 90μ crassitudine, hyphis subleptodermaticis, circiter 3μ diametro, in parte inferior (15–20μ crassitudine) densius perielinalibus contextis.

Podetia ad 1·5 cm. altitudine stipite 2 mm. diametro, 5 mm. altitudine, scyphis sensim dilatatis, marginibus lacero-lobatis, lobis 5 mm. longitudine, 3–6 mm. latitudine, madida impellucida, verrucosa dein decorticata basi subsquamulosa; cortex non evolutus; stratum algarum 55–65μ crassitudine, coloniis discretis, verrucas sorediaque formantibus, cellulis 7–8μ diametro; medulla non bene evoluta; axis chondroideus 100–110μ crassitudine, hyphis pachydermaticis.

Apothecia sessilia in marginibus scyphorum in lineis confluentibus, immatura, circiter 0·2 mm. latitudine, disco convexissimo; amphithecium paratheciumque non evoluta; hypothecium cuneatum, 65μ altitudine, hyphis subverticalibus, subbrunneis, leptodermaticis laxe contextis; thecium non bene evolutum, circiter 25μ altitudine; paraphyses tenues, superne dichotome ramosae, apicibus clavatis, cellulas sphaericas 3μ diametro abjungentibus; asci non bene evoluti; sporae anguste ellipsoideae, 7–8 $\times$ 3μ. Spermogonia non visa.

Primary thallus circular, 8–9 mm. in diameter, margin smooth, only slightly lacerate, deep grape green; upper cortex 35–40μ thick, fastigiate but hyphae little conglutinate and somewhat interwoven, walls gelified, 5–6μ in diameter, tips gelified and disintegrating; algal layer 35–40μ thick of more or less confluent colonies, cells 7–8μ in diameter, more or less angular, a few scattered at the base of the medulla which is about 90μ thick, loosely woven, of relatively thin-walled hyphae about 3μ in diameter, in the lower 15–20μ, hyphae mostly periclinal, compactly woven, the outer disintegrating as a pseudocortex with scattered algal cells just above.

Podetia about 1·5 cm. tall, stipe about 2 mm. in diameter, somewhat larger above, about 5 mm. tall, cup gradually dilated upward, margin splitting into lobes about 5 mm. long, 3–6 mm.

wide, suggesting the petals of a flower (whence the name) impellucid when moist, verrucose decorticate, subsquamulose near the base; cortex not developed algal layer 55–65μ thick, in discrete colonies, forming the verrucae which disintegrate into minute soredia, cells 7–8μ in diameter; medulla scarcely differentiated except as loosely woven slender hyphae between the algal cells; chondroid axis 100–110μ thick, of moderately closely woven thick-walled hyphae.

Apothecia sessile in the margin of the cups, confluent in lines, immature, about 0·2 mm. broad, disc very convex, parathecium not developed; hypothecium cuneate, 65μ tall, of loosely woven, subvertical, slightly brownish, thin-walled hyphae; thecium not sharply differentiated, about 25μ tall; paraphyses slender, dichotomous above, tips clavate, 2–3-celled, cutting off spherical cells about 3μ in diameter; asci not yet developed. [In a crushed preparation of a slightly more mature apothecium, there are a few thick-walled, cylindrical asci and a few free ascospores, narrowly ellipsoidal, 7–8 $\times$ 3μ. Spermogonia not seen.]

The systematic position of this species is not clear. The dilation of the cup with its short, thick stipe and the verrucae of the podetia are suggestive of *C. pyxidata* but its microscopic characters are closer to *C. fimbriata*. It may be related to *C. fuscopyxidata* Hampe, Linnaea, 25, 712; 1852 (*nom. nud.*) collected in Tasmania by Stuart, but I have not seen material of this species.

Macquarie Island: Featherbed Flat, B.A.N.Z.A.R.E. B531–10; north end. B.A.N.Z.A.R.E. B540–9.

Cladonia Johnstoni Dodge, sp. nov.

Type: Kerguelen, Long Island, Royal Sound, B.A.N.Z.A.R.E. B168–1.

Thallus primarius convexus, subadpressus, dein sinuatus, plus minusve laceratus, lobulis subadscendentibus, 2–10 mm. diametro, circiter 180μ crassitudine, ad margines tenuescens, dein evanescens, madidus pallide glaucus, siccus albidus; cortex circiter 45μ crassitudine, fastigiatus, hyphis pachydermaticis, gelifactis; stratum algarum circiter 35μ crassitudine, protococcoideum, continuum, cellulis caespitosis, pressione mutua polyhedricis, circiter 7–8μ diametro; medulla hyphis pachydermaticis, plus minusve periclinalibus, circiter 5μ diametro, dense contextis.

Podetia primo cylindrica, scyphifera, scyphis non dilatatis, clausis, concavis, margine laevi, subbrunnea, dein superene sensim dilatata sorediosaque, pellucida, inferne areolato-corticata, circiter 20 mm. altitudine, scyphis ad 12 mm. diametro, rare e marginibus aut lateribus prolifera; cortex deest; stratum algarum coloniis sphaericis, ab uno duobusve stratis hypharum tectis, soredia efformantibus; axis chondroideus, 110–150μ crassitudine, hyphis pachydermaticis, conglutinatis, dense contextis.

Apothecia immatura, circiter 2 mm. diametro, in marginibus scyphorum sessilia, convexissima; parathecium non evolutum; hypothecium obconicum, circiter 120μ altitudine, hyphis subverticalibus radiantibusque, leptodermaticis, subbrunneis; paraphyses apicibus late clavatae, cellulas pachydermaticas, subsphaericas, circiter 4μ diametro abjungentibus; asci non evoluti.

Primary thallus of imbricate squamules, convex and somewhat appressed at first, then sinuate and more or less lacerate, lobules somewhat ascendant, 2–10 mm. in diameter, about 180μ thick, thinning somewhat towards the margins, finally disappearing as the podetia proliferate, pale glaucous green when moist, becoming white when dry; cortex about 45μ thick, fastigiate, of thick-walled hyphae which gelify almost completely; algal layer about 35μ thick, protococcoid, continuous, with cells densely packed so that they appear angular from mutual pressure, about 7–8μ in diameter; medulla of densely woven more or less periclinal, thick-walled, hyaline hyphae, about 5μ in diameter.

Podetia cylindrical at first, wholly scyphiferous, cup not dilated, bottom moderately concave, margin smooth and slightly brownish; then dilating gradually upward, pellucid, areolate corticate, rapidly passing into farinose sorediose above; then the cup dilates rapidly above, becoming about 20 mm. tall, cups up to 12 mm. broad, occasionally proliferating from the margins of the cup, or more commonly from the side of the old podetium, and wholly farinose sorediose; cortex absent, algal layer breaking up into spherical colonies, 20–35μ in diameter, corticated by one or two layers of fungal hyphae and breaking away as soredia, leaving a few loosely woven, medullary hyphae; chondroid axis 110–150μ thick, of densely woven, thick-walled, conglutinate hyphae.

Apothecia immature, about 0·2 mm. in diameter, sessile in the margin of the cup, very convex; parathecium not developed; hypothecium obconic, about 120μ tall, of vertical hyphae radiating from what appears to be the remains of an old spermogonium, of slender, thin-walled, slightly brownish hyphae which are continued above as paraphyses with broad clavate tips, cutting off thick-walled, subspherical cells about 4μ in diameter; forming a dark brown epithecium about 15μ thick; asci not developed.

In the case of the apparent proliferation from the sides of the podetia, it is not clear whether the podetia arise from a soredium developing *in situ,* or by true proliferation, as the base consists of a contorted squamule with several other, subascendant, almost isidioid squamules nearly contiguous with that bearing the podetium.

Our plants seem to belong in the species, or group of species from the southern hemisphere, related to *Cladonia fimbriata* and *C. pityrea.* Fortunately the collection is abundant, with many different stages of development. If one had only the young podetia, it might be referred to *C. pyxidata* v. *pocillum,* in spite of the thinner cortex and pellucid wall of the podetium where it is visible between the areolae. If one has an old, somewhat lacerate podetium, proliferating, with squamules about the base of the proliferation, it might be referred to *C. squamosa* as understood by Müller-Argau. If one has a long, slender podetium before the cup begins to expand, it might be considered *C. acuminata* in the sense of Crombie. Certain broadly expanded podetia before they have proliferated might be taken for *C. fimbriata* var. *chondroidea* Vainio. It may be related to *C. adspersa* Mont. & v. d. Bosch, of which I have seen no authentic material.

Kerguelen: Long Island, Royal Sound, B.A.N.Z.A.R.E. B168–1, B169–1 (535).

STEREOCAULON (Schreber) Hoffmann.

Stereocaulon (Schreber) Hoffmann, Deutschl. Fl., 128; 1796 non Schrader, Spicil. Flor. Germ., 1, 113; 1794.

Lichen sect. *Stereocaulon* Schreber in Linné, Gen, Pl. ed., 8, 2, 768; 1791; Acharius, K. Vetensk Akad. Nya Handl., 1794, 258; 1794.

Type species: *S. paschale* (L.) Hoffm. The early nomenclature of this genus is confused. Proposed by Schreber as a subgenus without citing any species belonging to it, it was first used by Schrader for *S. corallinum* (Gmel.) Schrader, a species now considered as belonging in *Pertusaria.* Since this use antedates *Pertusaria,* to adopt it would invalidate that name which has been in general use for more than a century and one would have to use *Coralloides* [Dillenius] Hoffmann, Descr. Adumbr. Pl. Lich., 1, 23; 1789, for the group now known as *Stereocaulon.* Acharius (1794) included a species (and its variety) of *Sphaerophorus,* "*Lichen paschalis, L. ramulosus* Swartz, etc." in his *Stereocaulon* but nowhere makes formal combinations. In his Lichenographia Suecicae Prodomus, 208–209; 1798, he treats the group as a subgenus of *Lichen* but excludes *Sphaerophorus* and treats three species and three doubtful ones. One of his three species is now

treated in *Lichina*. Meanwhile Hoffmann (1796) recognized nine species of *Stereocaulon*, his section *Globifera* now *Sphaerophorus* and his *Tuberculoza* including two species of *Pertusaria*, one *Lichina* and one *Parmeliella* with three species now recognized as belonging to *Stereocaulon*, *S. quisquilare*, *S. condensatum* and *S. paschale*. As *S. quisquilare* is sterile and sometimes reduced to synonymy, it should be rejected in selecting a type. Either *S. condensatum* or *S. paschale* would conserve the genus in the sense it has been used since Acharius, 1803. Since Acharius treats *S. paschale* and includes *S. condensatum* in his doubtful species, I have chosen to regard *S. paschale* as the type.

Primary thallus almost crustose, granular, verrucose or squamose, usually evanescent; podetia erect, usually branched, corticate or often more or less completely decorticate, covered with verrucae or with phyllocladia, simple or branched, usually terete and corticate; medulla loosely woven, containing colonies of protococcoid algae; chondroid axis of thick-walled longitudinal hyphae; usually with characteristic cephalodia formed by *Stigonema*, *Scytonema* or *Chroococcus*. Apothecia brown to black, lecideine, very rarely truly lecanorine, hypothecium usually hyaline, paraphyses simple; asci clavate to cylindric, 8-spored; ascospores hyaline, long fusiform, to acicular, 4-several-celled, cells thin-walled, cylindric. Spermogonia terminal or lateral, immersed, ovoid to spherical, darkened about the ostiole; spermatia filiform to cylindric, straight or curved.

Stereocaulon leptaleum Nyl.

Stereocaulon leptaleum Nylander, Syn. Meth. Lich., 1, 251; 1860.

Type: Tasmania, ex Hb. Hooker, in Mus. Fenn., 39, 978.

Primary thallus granular, evanescent, podetia up to 1·0 cm. tall, base 0·25 mm. in diameter, dying below, sparingly branched in the upper half, terete or somewhat flattened, tips of branches granulate sorediate; decorticate with algae confined to the sorediate areas, cells up to 11μ in diameter; chondroid axis of densely woven hyphae about 4μ in diameter; cephalodia brownish pruinose, stipitate, cerebriform to botryose, 1–1·5 mm. in diameter with filaments of *Stigonema*.

[Spermogonia terminal, black, spermatia straight or nearly so, 6–8 $\times$ 0·5μ, *fide* Nylander.]

This species seems closely related to *S. corticatulum* Nyl. and *S. detergens* (Müll.-Arg.) Nyl. but it is more slender, less branched and with large, conspicuous cephalodia. Collections from New Zealand, Otago and Dunedin occur on micaceous rocks, while *S. corticatulum* grows among mosses. In these specimens the lower portion of the thallus is imbedded in soil. A specimen from Rangitoto, Auckland, on lava blocks, H. H. Allan, is still smaller with the lower portion of the podetia creeping in the interstices, almost like rhizomorphs. Our Macquarie Island material is growing on a fragment of a greenish rock and is in rather poor condition, but seems to belong here rather than in *S. corticatulum*.

Macquarie Island, Highlands, 3rd December, 1930, B.A.N.Z.A.R.E. 534–7.

Stereocaulon corticatulum Nyl.

Stereocaulon corticatulum Nyl., Flora, 61, 117; 1858.

Type: New Zealand, Colenso 5,144 in Mus. Fenn., co-type in Kew.

Primary thallus granular, evanescent; podetia 0·7–1·0 cm. tall, base up to 2 mm. in diameter, 3 mm. tall then repeatedly dichotomously branched and more or less compressed, forming a tuft of branches, the fertile ones slender, about 0·5 mm. in diameter, the sterile somewhat thicker; cortex more or less rimulose and verrucose, soon flaking off carrying most of the algal layer with it, the few algal cells remaining proliferating to form the granular soredia, apparently fastigiate but not clearly seen; algal layer thin, composed of scattered small colonies of Protococcus entangled in

the loosely woven medullary hyphae; chondroid axis of flexuous hyphae about 4μ in diameter with highly gelified walls, generally longitudinal, spreading above to form the base of the apothecium; cephalodia minute, hemispheric, formed of a palisade of *Stigonema*, covered by a thin, brown cortex.

Apothecia up to 1 mm. in diameter, terminal, disc black; amphithecial cortex a palisade of hyphae formed from the chondroid axis without algal cells, about 50μ thick; no true parathecium differentiated; hypothecium about 50μ thick, of very slender, densely woven, deeply staining hyphae; thecium about 60μ tall; paraphyses slender, dichotomously branched above the asci, ultimate branches moniliform, dark brown, cutting off spherical cells about 3μ in diameter, forming a deep brown epithecium about 18μ thick; asci cylindric clavate, 50 × 8–9μ protoplast truncate above; ascospores fastigiate, acicular, 30–35 × 3μ (still in ascus and perhaps somewhat immature), about 3-septate.

The above description is based on two collections from Dunedin and two from Otago, New Zealand. Our material from Macquarie Island is somewhat fragmentary but agrees well.

Macquarie Island: Wind Desert, H. Hamilton, A.A.E. 107; highland, B.A.N.Z.A.R.E. B534–5.

Stereocaulon sp.

Primary thallus not seen. Podetia 3 cm. tall, polychotomous near the base, decorticate with occasional verruciform phyllocladia below, then very densely ramulose with phyllocladia and cephalodia in the central portion, above corticate with scattered phyllocladia much reduced above; phyllocladia terete, simple, dichotomous or more often polychotomous, 1–3 mm. long, verruculose often with annular fractures, tips white pruinose; cephalodia stalked, spherical to cerebriform, crowded; cortex about 55μ thick, fastigiate, gelified, yellowish in section, outer 7–10μ decomposed and hyaline; algae protococcoid in colonies of variable size and shape, scattered quite irregularly through the medulla and extending up the cracks in the cortex, cells 3–5μ in diameter; medulla 35–55μ thick, very loosely woven, of slender hyaline hyphae about 3μ in diameter; chondroid axis of slender, densely woven longitudinal hyphae.

Apothecia lateral near the tips of branches; pseudolecanorine, about 1 mm. in diameter; amphithecial cortex 75μ thick, fastigiate, continuous with the thalline cortex, medulla thinning upward with occasional algal colonies to the level of the hypothecium; chondroid axis less densely woven and spreading under the hypothecium; parathecium not differentiated; hypothecium of densely woven, very slender, deeply staining hyphae about 90μ thick in the centre, thinning to 50μ or less at the margin; thecium 65μ tall; paraphyses slender, once or twice dichotomous above the asci; tips clavate, brownish, cutting off spherical cells 3–4μ in diameter; asci about 55 × 11–12μ, tip thickened, protoplast truncate when young, thin-walled and protoplast practically filling the mature ascus; ascospores fascicled, somewhat twisted, acicular 20 × 2·0–2·5μ, one end rounded and obtuse, the other end acute, 4-celled, hyaline.

Two fragments of the middle portions of podetia from Macquarie Island agree very closely with a small member of the *S. ramulosum* group from Tasmania, Gunn growing with *Sticta "glabra"* in the Taylor herbarium. Only a study of all the types of this group can settle the nomenclature as several entities are rather imperfectly described. The nature of the cephalodial algae which has been used to separate species has been shown by Johnson, G.T., Ann. Mo. Bot. Gard., 25, 729–768; pl. 66–68; 1938 to be useless for separating species as very frequently two cephalodia from the same podetium contain different genera of Myxophyceae, and occasionally two genera occur in the same cephalodium. Our material is quite probably a new species, but I hesitate to describe it from four somewhat fragmentary plants, one of which bears a single apothecium.

Tasmania: Gunn (fertile).

Macquarie Island: Wind Desert, top of hills, H. Hamilton A.A.E. 108.

STEREOCAULON SUBMOLLESCENS Nyl.

Stereocaulon submollescens Nyl., C. R. Acad. Sci. 83, 88; 1876.

Type: Campbell Island, Filhol.

Primary thallus not seen, podetia dying at the base, about 6 cm. tall, about 1 mm. in diameter below, branching occasional, di- or tri-chotomous, axis somewhat flattened and sulcate, decorticate, mostly denuded of phyllocladia below, phyllocladia abundant above, not clearly differentiated from small branches, terete, corticate verrucose and slightly tomentose, densely and repeatedly branched, tips pruinose but not sorediose, branches with abundant cephalodia, stalked to nearly sessile, clavate becoming cerebriform or deeply foveolate; true cortex not seen except just below the pseudoamphithecium, the outermost hyphae of the chondroid axis grow out perpendicular to the axis as a palisade about 35μ thick forming a compact medulla of hyphae about 7μ in diameter, then branch dichotomously to form a loosely woven zone of hyphae 4–5μ in diameter in which the algal colonies are irregularly imbedded, then a very compact zone about 35μ thick in which the hyphae appear encrusted with minute brownish crystals and finally fraying out as a loose tomentum of dichotomously branched hyphae 7–8μ in diameter; algae protococcoid in dense colonies of variable size, cells 7–8μ in diameter; chondroid axis of slender hyphae 2–3μ in diameter, conglutinate, becoming somewhat larger and more loosely woven just under the hypothecium.

Apothecia mostly lateral, sometimes terminal, about 1 mm. in diameter, biatorine, marginate at first with flat disc, becoming hemispheric and emarginate, pseudoamphithecial cortex 70–80μ thick, a palisade of hyphae 11–18μ in diameter, of isodiametric cells which disintegrate into a gel as the apothecium matures; medulla under the cortex but no algal colonies seen for some distance below the hypothecium even in young apothecia; parathecium not clearly differentiated, hypothecium 90μ thick, deep brown, fading to yellowish in lactophenol, of very densely woven, slender hyphae below, becoming increasingly vertical and merging into the thecium above; thecium 65μ tall, paraphyses slender once dichotomous above the asci, tips clavate, very thick-walled, cutting off spherical thick-walled, dark brown cells 7μ in diameter which form the dark brown epithecium 9–10μ thick; asci clavate, about 45 $\times$ 10μ, tip thickened when young 8-spored; ascospores fasciculate, contorted in the ascus, acicular with one end obtuse, the other acute about 35 $\times$ 3μ.

Spermogonia abundant, oblate spheroidal; wall dark brown about 10μ thick, of very slender, densely woven hyphae; spermatiophores in a dense palisade 25μ thick cutting off straight or slightly curved spermatia, 10–11 $\times$ 0·5μ.

The reference of our material to *S. submollescens* Nyl. is somewhat doubtful as we have not had an opportunity to study the type. It agrees with Nylander's brief description and Riddle's manuscript notes. The type is said to be sterile. The above description is based on a specimen from New Zealand, Otago, on tussock grassland, J. S. Thomson 10. Our Macquarie Island material is very abundant, but I have found only very immature apothecia, although the spermogonia are very abundant. The apothecium seems to arise from a group of ascogonia which apparently develop the usual mass of paraphyses which fuse into a continuous thecium in the mature apothecium, but no cytological studies have been attempted. The measurements of the ascospores may be too small as we have been unable to find free ascospores in our preparation nor have been able to count the septa.

Macquarie Island: Featherbed Flat (Sta. 81a), B.A.N.Z.A.R.E. 531–17, 531–18.

STEREOCAULON PULVINARE Dodge, sp. nov.

Type: New Zealand, Dunedin, Mac's Valley, J. S. Thomson 9.

Thallus primarius non visus. Podetia pulvinos magnos ad 6 cm. altitudine formantia, basi radicante cum radicibus dichotome ramosis, super saxa sympodialiter repetito-ramosa, ramis plus

minusve applanatis; dein super basem ad 1·5 cm. dichotome ramosa, decorticata, sine phyllocladiis cephalodiisque, apicibus dense ramosis, verrucose corticatis cum cephalodiis cerebriformibus stipitatis et phyllocladiis brevibus teretibus; cortex fastigiatus, hyphis magnis leptodermaticis, 7–8μ diametro, cellulis isodiametricis dein gelifactus; medulla 35–40μ crassitudine, hyphis circiter 3μ diametro laxe contextis cum multis algis protococcoideis in strato subcontinuo, cellulis 5–6μ diametro; axis chondroideus hyphis conglutinatis, parallelis, pachydermeis, 4μ diametro.

Apothecia maxima parte lateralia (aut terminalia super ramos brevissimos) aut rare terminalia, circiter 1 mm. diametro, aut in apothecia composita confluentia 2·5 mm. diametro, ab initio convexa, disco obscure brunneo nigricante, biatorina sed immarginata; cortex amphithecialis cum cortice thallino continuus, coloniae algarum sub apotheciis desunt; parathecium subbrunneum, inferne circiter 100μ crassitudine, ad marginem tenuescens, margine 20μ crasstitudine, hyphis brunneis 3–4μ diametro, dense contextum; hypothecium 15–20μ crassitudine hyphis subverticalibus tenuissimis, minus tinctum quam thecium, superne non bene distinctum; thecium 75μ altitudine; paraphyses tenuissimi, super ascos semel dichotome ramosi, apicibus clavatis cellulis ultimis sphaericis, obscure brunneis, 5μ diametro, epithecium brunneum 7–8μ crassitudine formantibus; asci clavati, 62–65 $\times$ 11–12μ pachydermaticis; ascosporae 8-nae, aciculares, uno apice obtuso, altero acuto, 6–8-cellulares, hyaline, 37–40 $\times$ 3–3·5μ.

Spermogonia sub apotheciis in verrucis immersis ostiolis nigris, 180–200μ diametro, 125μ altitudine, murus obscure brunneus, 10μ crassitudine, spermatiophorae 15–18μ longitudine, tenuissimae; spermatia bacilliformia, 5–6 $\times$ 0·5μ.

Primary thallus not seen. Podetia forming a large pulvinate cushion about 6 cm. tall, sending a branched rooting system into the crevices of the rock, 2 mm. in diameter, repeatedly dichotomously branched, the branches progressively smaller; at the base where it leaves the rock, repeatedly sympodially branched, branches more or less flattened, trunks, branching again about 1·5 cm. above the base, usually closely once to thrice dichotomous, the upper internodes progressively shorter, decorticate without cephalodia or phyllocladia below; upper centimetre or less densely branched, verrucose corticate with stalked, cerebriform cephalodia and phyllocladia varying from verrucae to short, branched and terete; cortex fastigiate of large thin-walled hyphae, 7–8μ in diameter, breaking up into rounded, isodiametric cells and appearing pseudoparenchymatous, then highly gelified; medulla 35–40μ thick, of loosely woven hyphae about 3μ in diameter, containing many protococcoid algae in a nearly continuous layer, cells up to 5–6μ in diameter; chondroid axis of conglutinate, thick-walled parallel hyphae, 4μ in diameter.

Apothecia mostly lateral (or terminal on very short branches) or rarely terminal, about 1 mm. in diameter or confluent into compound apothecia 2·5 mm., convex from the beginning, disc dark brown, blackening biatorine, immarginate; thalline cortex contiguous with parathecium, algal colonies absent for some distance below the parathecium; parathecium slightly brownish, about 100μ thick below, extending between the thalline cortex and the thecium as a thin brownish layer about 20μ thick, of densely woven, brownish hyphae 3–4μ in diameter in contrast to the hyaline, more loosely woven chondroid axis with hyphae incrusted with crystals immediately below; hypothecium 15–20μ thick, of subvertical very slender hyphae, less deeply staining than the thecium but not clearly differentiated above; thecium 75μ tall; paraphyses very slender, once dichotomous above the asci, tips clavate, cutting off spherical, dark brown thick-walled cells 5μ in diameter, forming a brownish epithecium 7–8μ thick; asci clavate, 62–65 $\times$ 11–12μ, thick-walled with clavate protoplast, becoming cylindric, thin-walled with spores filling it at maturity; ascospores acicular, with one end rounded, the other acute, 6–8-celled , hyaline, 37–40 $\times$ 3–3·5μ.

Spermogonia immersed in verrucae just below the apothecia, conical ostiole black, 180–200μ

in diameter, 125μ tall, wall dark brown, 10μ thick, inner portion folded to form a labyrinthine cavity at maturity; spermatiophores 15–18μ long, very slender, cutting off bacilliform spermatia 5–6 × 0·5μ.

Our Macquarie Island material agrees well with this species but the apothecia are very immature.

Macquarie Island: Highlands, B.A.N.Z.A.R.E. 534–6.

STEREOCAULON LASERONI Dodge, sp. nov.

Type: George V Land, Madigan Nunatak, ca. 2,400 ft., 30 miles east of Winter Quarters, C. F. Laseron, A.A.E. 25–3.

Podetia cribrosa, subtomentosa, 4–5 mm. altitudine subapplanata, ramis teretibus, 0·2–0·5 mm. diametro, corymbis apotheciorum 0·3 mm. diametro terminatis; phyllocladia verrucis parvis in ramis fertilibus reducta, olivacea; cortex verus non evolutus; algae protococcoideae, 7–8μ diametro, pachydermeae; hyphae medullares ca. 3μ diametro, pachydermeae; hyphae chondroideae, 4–5μ diametro pachydermeae, conglutinatae, centro parallelae, sub medulla hypothecioque laxius contextae. Apothecia convexa, hemisphericave, ca. 0·3 mm. diametro, concrescentia, vinaceo-cinnamomea, mox nigricantia; amphithecium deest; parathecium 18–20μ crassitudine, hyphis periclinalibus subbrunneis, 2–3μ diametro, ex hyphis medullaribus oriundis et sub hypothecio parathecium deest; hypothecium 40–50μ crassitudine, hyphis subverticalibus, hyalinis, ex hyphis chondroideis oriundis; thecium 36–40μ altitudine; paraphyses tenues, apicibus ramosi, epithecio hyalino dein obscure brunneo ut apothecium nigrescit; asci clavati, primum protoplasto subtruncato 36–40 × 7–8μ; ascosporae hyalinae, 8-loculares, rectae vel leviter curvatae, fasciculatim dispositae, 16–18 × 2μ.

Thallus compact masses, 4–5 mm. tall, of flattened, ascending, cribrose, subtomentose, warm buff podetia, with marginal round branches, 0·2–0·5 mm. in diameter, ending in short corymbs of apothecia about 0·3 mm. in diameter; phyllocladia reduced to small verrucae on the fertile branches, dark olive buff or darker; cortex reduced to the medullary hyphae which surround the algal cells in the verrucae; algae protococcoid, 7–8μ in diameter, with conspicuously thickened walls; medullary hyphae about 3μ in diameter, with moderately thickened walls; chondroid hyphae, 4–5μ in diameter, thick-walled, conglutinate, parallel in the centre, more loosely woven next the medulla and under the hypothecium.

Apothecia convex to hempisheric, about 0·3 mm. in diameter, sometimes concrescent, vinaceous, cinnamon, soon darkening to black; amphithecium absent; parathecium 18–20μ thick, of periclinal, slightly brownish hyphae 2–3μ in diameter, springing from the medullary hyphae and not continued under the hypothecium; hypothecium 40–50μ thick, of compact, subvertical hyphae arising from the chondroid hyphae, hyaline; thecium 36–40μ tall; paraphyses slender, branched near the tips, epithecium hyaline becoming dark brown as the apothecium blackens; asci clavate, wall moderately thickened, protoplast somewhat truncate above at first, 36–40 × 7–8μ; ascospores hyaline, about 8-celled, straight or slightly curved, fasciculately arranged, 16–18 × 2μ.

In habit and microscopic characters of the thallus, this species is suggestive of the sterile *Alectoria corymbosa* Hue. Apparently growing on a disintegrating, reddish granite or quartz, but mostly scraped from the surface of the rock. In habit it is also suggestive of *Neophyllis* Wilson from Australia and *Gymnoderma* Nyl. from the Himalayas, from both of which it differs in the spores.

George V Land, Madigan Nunatak, ca. 2,400 ft., 30 miles east of Winter Quarters, C. F. Laseron A.A.E. 2, 25–3; Cape Denison, B.A.N.Z.A.R.E. 536–12.

ARGOPSIS Fries.

Argopsis Th. Fr., Nova Acta R. Soc. Sci. Upsal. III, 2, 325; 1858.

Type: *A. megalospora* Th. Fr.

Primary thallus unknown. Podetia fruticose, branched, erect, more or less terete, the cortex peeling and carrying the scattered algal colonies with it; algae protococcoid, medulla loose, remaining as an arachnoid tomentum, finally disappearing; chondroid axis dense, of thick-walled, parallel hyphae; phyllocladia terete, branched; cephalodia cerebriform. Apothecia terminal, disc concave then nearly plane, black, margin prominent; pseudoamphithecium of cortex and medulla without algae; parathecium thin, reaching the margin, hyaline or brownish; asci cylindric, 1–8-spored; ascospores hyaline or slightly brownish, muriform, thin-walled.

This rare genus, apparently confined to the sub-Antarctic islands of the Australian quadrant, has been controversial over a long period although comparatively few specimens exist in herbaria. First included by Taylor in *Stereocaulon Argus* without microscopic examination of all the plants, it was segregated as *Argopsis megalospora*, a new genus of Usneaceae by Th. Fries when he prepared his monograph of *Stereocaulon* in 1858 and pointed out that its microscopic characters are those figured by Hooker f. for *Stereocaulon Argus*. In 1883, Müller-Argau, in studying material brought back by Naumann from Betsy's Cove, Kerguelen, misidentified his material as the same species previously described from Campbell Island, and thinking Th. Fries' description in error, renamed what he supposed to be a single species *Argopsis Friesiana*. The next year he called attention to the similarity of his sterile material to the sterile *Stereocaulon cymosum* Crombie. In 1887 he studied the type of *Stereocaulon Argus* in Taylor's herbarium and recognized that the Kerguelen material was distinct from *A. megalospora* Th. Fr. (Flora, 71, 19; 1888).

Meanwhile, Nylander, C. R. Acad. Sci., 83, 88; 1876, had described *Stereocaulon argodes* from Campbell Island, collected by Filhol. In 1888 (Lich. Nov. Zeland 16) he reduced the portion of *S. Argus* Hook. f. & Tayl. which was not *A. megalospora*, to synonymy with *S. argodes*.

Reinke (Jahrb. f. wiss. Bot. 28, 119–121; 1895) described the anatomy of *A. Friesiana* Müll.-Arg., probably based on material collected by the "Gazelle" Expedition in Kerguelen (as he does not mention its occurrence elsewhere, and figures botryose cephalodia in the habit sketch, while his figure of the cross section of the cephalodium suggests the cerebriform type. Zahlbruckner tried to reconcile the literature without a critical study of the material of either species resulting in misstatements as citing *A. megalospora* as occurring only in Kerguelen (Engler & Prantl, Die nat. Pflanzenfam. I., 1*, 147; 1907) and reduces *S. Argus*, *S. cymosum* and *A. Friesiana* to synonymy with *A. megalospora* (Cat. Lich. Univ., 4, 674–675; 1927).

Fortunately the type of *Stereocaulon Argus* Tayl. and a duplicate of the type collection of *S. cymosum* Crombie (originally identified by Taylor as *S. paschale*) are present in the Taylor herbarium, formerly at the Boston Society of Natural History and recently transferred to the Farlow Herbarium of Harvard University. Some of the plants of the former specimen agree with Th. Fries' description of *Argopsis megalospora* the latter specimen with the description of *A. Friesiana* Müll.-Arg. Both are similar in podetial characters and cephalodia to *Stereocaulon ramulosum* (Sw.) Ach. (*sensu latiore*) and it is possible that specimens may exist in other herbaria, placed under this name without microscopic examination.

A. megalospora has a hyaline parathecium and hypothecium, asci apparently not more than 2-spored, of which one degenerates early, leaving a single large muriform spore very similar to those of *Lopadium* and *Oropogon*, remaining hyaline until late, then becoming slightly yellowish brown, not the deep brown muriform spore of *Rhizocarpon*. *S. cymosum* has a brownish, almost

carbonaceous parathecium, asci 8-spored; ascospores with three transverse septa and one or two longitudinal or oblique septa, producing a few-celled muriform spore similar to those of *Collema* sect. *Blenothallia* which finally becomes slightly yellowish brown. Were it not for the extreme form of *S. megalospora* only the darker parathecium and the muriform spore distinguish *A. cymosa* from *Stereocaulon* where the sterile material was referred. Until more information is available, it is largely a matter of individual opinion whether the generic limits should be circumscribed to include only *S. megalospora* or enlarged to include *S. cymosum*. Although Th. Fries described this genus in the Usneaceae, neither species seems related to *Oropogon* Th. Fries, the only genus of Usneaceae with muriform spores.

Argopsis megalospora Th. Fr.

Argopsis megalospora Th. Fr., Nova Acta R. Soc. Upsal. III, 2, 325; 1858.

Stereocaulon Argus Hook. f. & Tayl., London Jour. Bot., 3, 653; 1844: Cryptog. Antarct., 84; 1845: Fl. Antarct., 1, 196; 1845 *pro parte.*

Type: Campbell Island, on rocks on mountains, J. D. Hooker (Voy. "Erebus & Terror") in Upsala, a duplicate in Taylor Herb. at Farlow Herb. at Harvard Univ. The sheet marked *Stereocaulon Argus* Tayl. contains four plants glued to the sheet. When they were studied by Müller-Argau in 1887, he lettered the plants "a" and "b" and annotated the sheet: "a. *Argopsis megalospora* Th. Fr.; b. *Stereocaulon ramulosum* v. *macrocarpum* Bab. Nyl." Duplicates of the latter plants were taken as the type of *S. Argus* when Fries segregated *A. megalospora* in 1858. The following formal description is based on the two individuals marked "a" by Müller-Argau. The confusion is not surprising as the specimens resemble each other closely in microscopic characters, having the same type of branching and phyllocladia. The primary branches of *Argopsis megalospora* are somewhat flattened, the cephalodia are much less conspicuous and darker in colour, the exciple is verrucose and the disc tends to remain flatter—all characters which would have been considered in Taylor's time.

Three courses of nomenclature are open. One may follow Fries and Müller-Argau, retaining *S. Argus* for the plants not *Argopsis* in spite of the fact that the characters of the description and most of the figures on the plate are clearly those of *Argopsis;* or one may accept the specific epithet *Argus* in *Argopsis*, reducing *A. megalospora* to synonymy with it and call the *Stereocaulon* plants *S. Argodes* Nyl. or refer them elsewhere in *Stereocaulon*. Finally one may reject *S. Argus* as a *nomen confusum* (International Rules, Art. 64). In the following treatment I have preferred to follow Th. Fries.

Thallus 4–5 cm. tall, branching near the base, closely dichotomous appearing sympodial, base 2·5 mm. in diameter, somewhat flattened and obscurely striate sulcate longitudinally; decorticate, smooth, secondary branches more terete, verrucose, the verrucae passing into short terete obtuse phyllocladia, cortex dull and peeling off, leaving a slightly tomentose surface; cephalodia not abundant, small, cerebriform, of the *S. ramulosum* type. Podetial cortex 110–130μ thick, formed of a palisade of large thick-walled hyphae about 15μ in diameter, protoplasts about 7·5μ, the outer 15μ more or less decomposed, often peeling off; algal layer about 55μ thick, more or less interrupted, extending to the base of the parathecium, composed of more or less spherical colonies about 15–20μ in diameter loosely imbedded in loosely woven, slender medullary hyphae, algal cells spherical 4μ in diameter, protococcoid; chondroid axis of densely woven rather thick-walled hyphae 4μ in diameter extending in a thin layer under the parathecium and merging with it.

Apothecia terminal, up to 4 mm. in diameter, disc black, concave, margin thin, prominent, exciple with pyramidal verrucae, yellowish becoming cinnamon to Sayal brown in the herbarium; pseudoamphithecial cortex continuous with that of the podetium up to 325μ thick below, thinning above to 140μ; true parathecium not clearly differentiated; hypothecium about 75μ thick of very slender densely woven hyphae, faintly tinged brownish; thecium 185μ tall, paraphyses slender, about 2μ in diameter, about thrice dichotomous above the asci, ultimate branches 4μ thick-walled, closely septate cutting off subspherical cells 5–6μ in diameter in a deep brown epithecial gel; asci cylindric clavate 110 $\times$ 33μ, tip thickened; ascospores muriform, 55–65 $\times$ 30–33μ, cells very small, usually a single mature spore per ascus although the asci are sometimes seen with two or more young spores, hyaline to slightly brownish.

Apparently the cells of the spore separate before germination, as I have seen partially disintegrated spores similar to those figured by Hooker f. & Taylor, Crypt. Antarct. pl. 79, fig. II, 8, 9.

Campbell Island, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. at Farlow Herb., Harvard University, type.

ARGOPSIS CYMOSA (Crombie) Stzbgr.

Argopsis cymosa (Crombie) Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges., 1889–90, 231; 1891.

Stereocaulon cymosum Crombie, Jour. Linn. Soc. Bot., 15, 182; 1876: Jour. Bot. Brit. For., 15, 103; 1877: Phil. Trans. Roy. Soc. [London], 168, 47; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 232; 1885.

Stereocaulon paschale Hook. f. & Tayl., London Jour. Bot., 3, 653; 1844 non Hoffm.

Stereocaulon corallinum Hook. f. & Tayl., Crypt. Antarct., 222; 1845: Fl. Antarct., 2, 528; 1847 non Fr.

Argopsis Friesiana Müll.-Arg., Bot. Jahrb. [Engler], 3, 54; 1833: *Ibid.*, 5, 133; 1884: Flora, 71, 19; 1888.

Argopsis megalospora Reinke, Jahrb. f. wiss. Bot. [Pringsheim], 28, 119–121; 1895 non Th. Fr.

Type: Kerguelen, Christmas Harbour, 600–1,200 ft., J. D. Hooker (Voy. "Erebus & Terror"); specimen same locality, Moseley (Voy. "Challenger") and top of a hill on east side of Carpenter's cove barren, Smith Dorrien (Venus Transit Exp.) also cited. The following description is based on one fertile and four sterile specimens, part of type collection in Taylor Herb. but not seen by Crombie. They were annotated "*S. ramulosum pumilum, antarcticum?* Cf. *S. cymosum* Crombie, Lich. Kerg." by Tuckerman. They agree with Crombie's description in all particulars. *A. Friesiana* was based on Kerguelen, Betsy Cove, Naumann 255, 258, not seen, but from the somewhat fragmentary description apparently belongs here.

Thallus fruticose, 13–16 mm. tall, 10–25 mm. in diameter, branching near the base into several trunks about 2 mm. in diameter and 4–5 mm. long, these repeatedly branched to form a dense hemispherical mass, branches varying from terete to somewhat flattened and obscurely longitudinally sulcate, decorticate; ultimate branches (or phyllocladia) coralloid, terete and passing into granular soredia, K yellow; cephalodia fuscous, hemispheric and confluent into low cerebriform patches on the larger branches, composed of disintegrating filaments of *Stigonema*, cells 4–5μ in diameter, surrounded by a few loosely woven medullary hyphae; cortex and algal layer not seen; chondroid axis of slender hyphae, densely interwoven but not so conspicuously longitudinal as in *A. megalospora*.

Apothecia terminal, about 1 mm. in diameter, black, lecideine; cortex fastigiate, somewhat brownish, outer 35μ decomposing and hyaline, the subparathecial tissue a continuation of the chondroid axis with hyphae more loosely woven through which are irregularly branching hyphae covered with brownish crystals, growing out from the parathecium; parathecium 95–100μ thick, dark brown to nearly carbonaceous below the hypothecium, merging with the amphithecial cortex above, with a greenish pigment diffusing into the tissues below (when mounted in lacto-phenol); hypothecium scarcely differentiated, brownish; thecium 60–65μ tall; paraphyses very slender, unbranched, tips clavate, dark brown, about 5μ in diameter forming a dark brown epithecium about 10μ thick; asci cylindric, 36 × 18μ thick-walled with truncate protoplast when young, becoming thin-walled with protoplast filling the ascus at maturity; ascospores narrowly ellipsoid and 2-celled when young, becoming 4-celled and finally with one or two longitudinal septa in the central cells at maturity, 20–25 × 4–5μ, slightly brownish.

Kerguelen: Christmas Harbour, 6–1,200 ft., J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. at Farlow Herb., Harvard University.

Crozet Archipelago, Possession Island, American Cove, side of main valley, a half mile from beach, B.A.N.Z.A.R.E. B27–1.

UMBILICARIACEAE.

Thallus foliose, monophyllous or polyphyllous, attached to the substrate by a central hapteron, heteromerous, corticate on both surfaces, underside smooth or rhizinose; medulla of coarse, hyaline hyphae, often loosely woven; algae protococcoid (*Trentepohlia* in *Dermatiscum*); apothecia appressed, sessile or almost stalked; amphithecium present or absent; parathecium carbonaceous, well developed (except where an amphithecium is present), disc smooth, stellate or gyrose plicate; asci 1–8-spored; ascospores hyaline or brown, unicellular, 2-celled or muriform, with a thin wall.

The division of this family into genera and smaller subdivisions presents serious problems. Since most of the Antarctic material is sterile, we have referred it to *Umbilicaria*, the oldest name in the group, without attempting to reach a decision on the various current proposals for segregation. The structure of the spermogonia suggest a much closer relation to the Parmeliacae and Physciaceae than to the lecideine series (Lecideaceae-Cladoniaceae) where it has been placed by Zahlbruckner.

Apothecia lecideine or absent; algae protococcoid .. .. *Umbilicaria*

Apothecia lecanorine, at least when young
- Ascospores unicellular, hyaline .. .. *Omphalodium*
- Ascospores 2-celled
  - Acospores hyaline; algae *Protococcus* .. .. *Charcotia*
  - Ascospores brown; algae *Trentepohlia* .. .. *Dermatiscum*

UMBILICARIA Hoffm.

Umbilicaria Hoffm., Descr. Adumbr. Pl. Lich., 1, 9; 1789.

Type: None designated, *U. exasperata* and *U. cirrosa* were described.

Thallus foliose, mono- or polyphyllous, attached to the substrate by a central hapteron, heteromerous, underside smooth or rhizinose; upper cortex pseudoparenchymatous, commonly covered by a much thinner amorphous layer of dead cells; algae protococcoid; medulla arachnoid, lower cortex pseudoparenchymatous, sometimes from a palisade of hyphae with isodiametric cells.

Apothecia lecideine, disc smooth or papillate, or gyrose plicate; asci 1, 2 or 8-celled; ascospores 1, 2-celled or muriform, hyaline or brown. Spermogonia papillate, immersed, with black tips, spermatiophores branched; spermatia short, cylindric.

Key to Species Reported from the Antarctic.

With rhizinae below; monophyllous
- With marginal rhizinae; ashy pruinose above
  - Pale below, rhizinae of under side flattened .. .. .. *U. cylindrica*
  - Fuscous below; rhizinae of under side cylindric .. .. .. *U. cristata*
- Without marginal rhizinae; black below
  - Rhizinae flattened and concrescent into trabeculae; medulla very dense throughout *U. Dillenii* v. *solida*
  - Rhizinae cylindric (at least not flattened and concrescent); medulla very loose above, more dense and hyphae more periclinal below; lower cortex of irregularly arranged spherical dark brown cells, 10–20μ thick
    - Upper surface rimose areolate
      - Upper surface bay, upper cortex 20–35μ, cells 4–7μ; S. Orkneys *U. antarctica*
      - Upper surface mouse grey, upper cortex 25–50μ, cells 2–5μ; S. Victoria Land *U. spongiosa* v. *subvirginis*
    - Upper surface slightly rimulose in the centre, rest smooth, mummy brown to light buff; upper cortex 20–25μ, cells 2–3μ; Marie Byrd Land .. *U. spongiosa*
- Without rhizinae below
  - Areolate-verrucose below; monophyllous .. .. .. *U. rigida*
  - Glabrous or rarely white granulate below
    - Upper cortex rimulose areolate, ashy pruinose; below black with pale margins; Ile Brabant .. .. *U. leiocarpa* v. *nana*
    - Upper surface reticulate rugose
      - Upper cortex 150μ, with fine rimose areolae, dark grey or brown; below black with pale margins .. .. *U. decussata*
      - Upper cortex 50–100μ
        - Upper cortex 80μ, decomposed, medulla of loose periclinal hyphae, algal layer 50–80μ, lower cortex 60–70μ; Booth-Wandel Island *U. eximia*
        - Upper cortex fasigiate to pseudoparenchymatous; upper medulla loose, lower 35μ of conglutinate hyphae more or less perpendicular to the upper medullary hyphae, algal layer 35μ, lower cortex 12–20μ; George V Land *U. Hunteri*
      - Upper cortex usually less than 40μ thick
        - Lower part of upper cortex periclinal to irregular, upper half brown, fastigiate; lower portion of medulla compact subfastigiate; lower cortex 10μ, pseudoparenchymatous dark brown; King George V Land *Charcotia cerebriformis*
      - Upper cortex wholly fastigiate.
        - Medulla dense, of periclinal hyphae, lower 40–50μ intricate; Jenny Island *U. parvula*
        - Medulla loose throughout, upper cortex 10–15μ, lower cortex up to 40μ both pseudoparenchymatous; Marie Byrd Land to Queen Mary Land *U. rugosa*

Medulla loose above with compact lower layer

Upper cortex 30μ, upper 10–12μ brown, surface very rugose, medullary hyphae 6–7μ; King George V and Queen Mary Lands .. .. *U. subcerebriformis*

Upper cortex 20μ fastigiate, resting on a layer of subfastigiate hyphae 20–40μ, surface smooth, medullary hyphae about 1μ; Marie Byrd Land and King Edward VII Land .. .. *U. pateriformis*

UMBILICARIA CRISTATA Dodge & Baker.

Umbilicaria cristata Dodge & Baker, Ann. Mo. Bot. Gard., 25, 565; 1938.

Type: King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, P. Siple, F. A. Wade, S. Corey and O. D. Stancliff HW-la.

Thallus monophyllous, 2–3 cm. in diameter, surface smooth or verrucose and rugose near the centre, margin somewhat lacerate with dense tufts of rhizinae, very brittle when dry, ashy pruinose, minutely rimulose areolate, especially toward the centre; below fuscous, margins lighter with occasional cylindrical, branched rhizinae, tips and branches ashy; upper cortex 5–10μ thick, of loose pseudoparenchyma, the cells 3–5μ in diameter, outer ones dark, the whole covered by an irregular layer of dead cells, 3–6μ thick; algae up to 10μ in diameter, protococcoid, scattered near the cortex, medulla 140–150μ thick, of branched and anastomosing hyphae 2–3μ in diameter, loosely woven above, more or less periclinal near the lower cortex which is 30–40μ thick, dark on the outside, hyaline within, pseudoparenchymatous; rhizinae dark with a pseudoparenchymatous cortex continuous with that of the thallus and with periclinal hyphae within; stipe very irregular in cross section, 1·5–2·5 mm. in diameter with a central opening 1 mm. in diameter; cortex dark, medulla hyaline, of compact, vertical cells. Sterile.

Our material, also sterile, agrees closely with the type. It had been removed from the rock and determined as *Gyrophora cylindrica* v. *denuda* by Cheel.

Queen Mary Land: Hippo Nunatak, C. F. Harrisson, A.A.E. 65–1; Possession Nunatak, C. F. Harrisson, A.A.E. 60–2.

UMBILICARIA SPONGIOSA Dodge & Baker.

Umbilicaria spongiosa Dodge & Baker, Ann. Mo. Bot. Gard., 25, 566; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, P. Siple and S. Corey, 73–9.

Thallus monophyllous up to 15 cm. in diameter, surface deeply reticulate rugose and verrucose in centre, smoother and only impressed at the margin which is smooth, not torn and very crisped, leathery when dry, mummy brown to light buff, pruinose very slightly areolate in the centre, otherwise not cracked; below sepia, smooth, very densely rhizinose; rhizinae sepia next the thallus, becoming pale pinkish buff toward the tips, sparingly branched, cylindric, not anastomosing into trabeculae; upper cortex 20–25μ thick, surface very uneven, cells thick-walled, 2–3μ in diameter, isodiametric, not darkened, the whole covered by a layer of dead cells 2–4μ thick, or lacking entirely; algal layer up to 75μ thick, cells up to 12μ in diameter, protococcoid; medulla 250–400μ thick, of hyphae 2·5–3μ in diameter, irregularly arranged, often somewhat periclinal next the lower cortex which is 10–20μ thick, the outer cells isodiametric, thick-walled, dark brown; rhizinae of slender branched, rarely anastomosed hyphae, covered with a pseudoparenchymatous cortex about 10μ thick; stipe central, 1·5–2 mm. in diameter, in section irregular in outline with small openings, either central or lateral, of compact hyphal tissue, covered externally and internally by a dark, pseudoparenchymatous cortex, without algae.

Spermogonia 400μ tall, 325μ in diameter at the base, tapering to a narrow neck, about 150μ

in diameter; the wall of compact dark cells 5–7μ in diameter; spermatiophores branched, about 1μ in diameter, tapering at the ends; spermatia $1 \times 0 \cdot 5\mu$, straight.

Although our material is much smaller, it is evidently at the same stage of development as spermogonia are also present, and it agrees well microscopically. In some plants the layer of dead cells is almost absent, in others up to 55μ thick. Perhaps the small size is due to severer climatic conditions.

There seems little except size, colour of upper surface and amount of cracking in the upper surface to separate var. *subvirginis* (Frey & Lamb) Dodge, n. comb. (*U. antarctica* v. *subvirginis* Frey and Lamb, Trans Brit. Myc. Soc., 22, 272; 1939).

Queen Mary Land: David Island, C. F. Harrisson, A.A.E. 55, 66, 68, 69; Possession Nunatak. C. F. Harrisson, A.A.E. 62–2.

UMBILICARIA HUNTERI Dodge, sp. nov.

Type: King George V Land, Cape Denison, J. G. Hunter 21, A.A.E. 21.

Thallus monophyllus, 2–3 cm. diametro, superficie superiore reticulatim scrobiculatus, ad marginem subcerebriformis, rimoso-aerolatus, statu humido ochraceus vel fulvus, sicco centro bubalinus, ad marginem griseo-sepiaceus vel obscurior; superficie inferiore nigro, opaco, nigro-ruinoso, laevi, sine rhizinis; cortex superior 50–100μ crassitudine, strato extero 18–20μ crassitudine obscure brunneo, parte reliqua hyalino, fastigiatus, strato amorpho ad 35μ frequenter tectus; stratum algarum ca. 35μ crassitudine, cellulis 7–8μ diametro, protococcoideis, in coloniis parvis dispositis; medulla ca. 185μ crassitudine inter reticulationes, hyphis plus minusve periclinalibus, pachydermeis, 4–6μ diametro, laxe contextis, strato infero compactius contexto, etiam periclinalibus sed hyphis superis perpendiculariter dispositis; cortex inferior 18–20μ crassitudine, fastigiatus, cellulis isodiametricis circiter 7μ diametro, obscure brunneis vel nigris. Apothecia spermogoniaque non visa.

Thallus monophyllous, 2–3 cm. in diameter, upper surface shallowly and finely reticulate-scrobiculate to somewhat cerebriform near the margin, rimose areolate, between yellow ochre and buckthorn brown when moist, drying pale pinkishbuff at the centre, shading to hair brown or darker at the crenulate margin; below black, dull, black-pruinose, smooth, without rhizinae; upper cortex 50–100μ thick, the outer 18–20μ deep brown, the rest hyaline, fastigiate, covered by a layer of dead cells of variable thickness, often 35μ thick; algal layer about 35μ thick, cells 7–8μ, protococcoid, often in small colonies; medulla about 185μ thick except at the reticulations, of more or less periclinal hyphae, thick-walled, about 4–6μ in diameter, loosely woven, the lower 35μ very compact, also periclinal but running at approximately right angles to the hyphae of the upper portion (hence showing as cut ends in sections); lower cortex 18–20μ thick, a palisade of isodiametric cells, cutting off spherical cells 7μ in diameter, dark brown to black. Apothecia and spermogonia not seen.

Hunter 11–2 seems to be a young thallus of this species, the cortices being much thinner than the measurements given above, the thallus is smooth, tawny olive when moist and the medulla has the same structure as the other specimens cited.

On gneiss with *Heppia antarctica, Toninia Johnstoni, Lecanora exsulans, L. Johnstoni, Thamnolecania Mawsoni* and *Buellia frigida.*

King George V Land: Madigan Nunatak, ca. 2,400 ft., 30 miles east of winter quarters, C. F. Laseron, A.A.E. 2–2; Cape Denison, J. G. Hunter, A.A.E. 11–2, 21, 22, 123, 128, B.A.N.Z.A.R.E. B536–18, 536–20, 536–21, 536–22.

UMBILICARIA RUGOSA Dodge & Baker.

Umbilicaria rugosa Dodge & Baker, Ann. Mo. Bot. Gard., 25, 561; 1938.

Type: King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, P. Siple, F. A. Wade, S. Corey and O. D. Stancliff HW12.

Thallus monophyllous, 8–9 cm. in diameter, upper surface deeply and coarsely reticulate-scrobiculate, folds closer and pits shallower near the margin, centre deep olive buff, margins dark olive grey, crenulate, very thin and fragile, not laciniate; below black, dull, minutely pruinose, smooth, without rhizinae, not folded at the umbilicus; upper cortex 10–15μ thick, of large isodiametric cells, very dark on the outside, hyaline within, covered by a layer of dark cells up to 25μ thick; algal layer 20–65μ thick, cells up to 10μ in diameter, protococcoid; medulla 200–300μ thick, of thick-walled hyphae 2–4μ in diameter, with rather short cells, loosely interwoven, branched and anastomosed; lower cortex up to 40μ thick, pseudoparenchymatous, almost black.

Apothecia up to 2 mm. in diameter, irregular, gyrose, fuscous to black, dull; parathecium up to 25μ thick, fuscous, cells isodiametric, thick-walled, continuous laterally with the thalline cortex; medulla of loosely woven hyhpae; hypothecium up to 150μ thick, dark, irregular; thecium 50–80μ tall; paraphyses 1μ in diameter, expanding to heads 1·5–2μ, straight or branched, septate, epithecium 10–13μ thick, gelified, brown; asci 37–46 $\times$ 11–13·5μ, clavate above and very slender below, with a thin sheath, 8-spored; ascospores 7·5–9 $\times$ 3–4μ, ellipsoidal, mostly with blunt ends, hyaline.

Our material is sterile and smaller (most specimens have been broken, so that it is difficult to decide how large the original specimens were). Microscopically they agree well in thalline characters, the upper cortex being a little thicker and the lower a little thinner than in the type. The lower cortex is always thicker than the upper cortex of the same thallus and there is no compact layer of medulla next the lower cortex. Hunter 11–1 shows old spermogonia about 130μ tall and about 150μ in diameter, wall pseudoparenchymatous, 10–15μ thick, brown, darker above.

On rocks with *Dermatiscum Mawsoni, Lecanora exsulans* and its f. *minor, Alectoria congesta, Buellia frigida* and *B. pernigra.*

South Victoria Land: McMurdo Sound, Ross Island, D. Mawson 1,056 (First Shackleton Exp.); Cape Royds, D. Mawson 1,058 (First Shackleton Exp.).

King George V Land: Cape Denison, J. G. Hunter 8, 11–1, 22, A.A.E. 145, 146, B.A.N.Z.A.R.E. 536-23, 536-24.

Queen Mary Land: David Island C. T. Harrisson, A.A.E. 57; Hippo Nunatak, C. T. Harrisson, A.A.E. 64.

UMBILICARIA SUBCEREBRIFORMIS Dodge, sp. nov.

Type: George V Land, Cape Denison, J. G. Hunter, A.A.E. 70.

Thallus monophyllus, 2 cm. diametro vel major, superficie superiori rugosa vel cerebriformi, margine laevi vel subcrenato, subpruinosus, centro avellaneo vel oliveaceo dein nigricante, superficie inferiori nigra, opaca, subrugosa et minute verrucosa ad marginem, sine rhizinis; stratum amorphum tenue, ad 15μ vel deest; cortex superior ca. 30μ crassitudine, fastigiatis, hyphis 5–6μ diametro, lumine 1μ, insuper cellulis isodiametricis in strato 10–15μ crassitudine; stratum algarum ca. 30μ crassitudine, cellulis protococcoideis ad 8μ diametro, sparsis aut in parvis coloniis dispositis; medulla crassitudine variabilii, laxissime contexta, hyphis hyalinis 6–7μ diametro, lumine 1–2μ, strato infero 15–25μ crassitudine, hyphis periclinalibus 3–5μ diametro, densissime contextis; cortex inferior fastigiatus, brunneus, ca. 18μ crassitudine, cellulis 5–6μ diametro, isodiametricis vel subellipsoideis. Apothecia spermogoniaque non visa.

Thallus monophyllous, 2 cm. in diameter (perhaps larger as the specimens are broken), surface rugose to cerebriform, deeply folded, appearing almost polyphyllous but not so, margin smooth or somewhat crenate (edges mostly broken), subpruinose, centre wood brown shading to olive brown, finally blackening; lower surface black, dull, slightly rugose and minutely verrucose toward the margin, without rhizinae; layer of dead cells thin, 15μ thick or even absent; upper cortex about

30μ thick, fastigiate, hyphae 5–6μ in diameter, lumen about 1μ, cutting off brown, isodiametric cells above (brown layer 10–15μ thick); algal layer about 30μ thick, of scattered, protococcoid cells up to 8μ in diameter or in small colonies; medulla very variable in thickness, very loosely woven, of hyaline hyphae, 6–7μ, lumen 1μ in diameter, the lower 15–25μ of periclinal hyphae 3–5μ in diameter, very compact; lower cortex fastigiate, brown, about 18μ thick, of hyphae 5–6μ in diameter, cutting off isodiametric to slightly ellipsoidal cells. Apothecia and spermogonia not seen.

On rocks with *Lecanora Johnstoni, Alectoria, congesta, Buellia dendritica* and *Rinodina frigida.*

King George V Land: Cape Denison, J. G. Hunter A.A.E. 70, also A.A.E. 90–1, 104–2, 147, 148, 1,054; B.A.N.Z.A.R.E. 536–25, 536–26, 536–27, 536–28; Madigan Nunatak ca. 2,400 ft., 30 miles east of Winter Quarters C. F. Laseron A. A. E. 25–4, 41–2.

Queen Mary Land: Possession Nunatak, C. T. Harrisson, A.A.E. 60; Hippo Nunatak, A.A.E. 65–2.

CHARCOTIA Hue.

Charcotia Hue, Bull. Soc. Bot. France, 62, 16; 1915: 2me Exp. Antarct. Franç. Lich, 185; 1915.

Type: *Umbilicaria rufidula* Hue.

Thallus foliose, mono- or polyphyllous, attached by a central hapteron, heteromerous, underside smooth or rhizinose; upper cortex fastigiate, often appearing pseudoparenchymatous, covered by an amorphous layer of dead cells; algae protococcoid; medulla of coarse, thick-walled hyphae; lower cortex similar to the upper cortex. Apothecia lecanorine, disc smooth or slightly rough, not gyrose plicate; asci 8-spored; ascospores 2-celled, hyaline. Spermogonia immersed, with dark brown wall; spermatiophores septate, moniliform; spermatia short, cylindric.

The interpretation of the morphology of the apothecium is difficult. The amphithecial cortex and medulla are continuous with those of the thallus. A few algal cells are found under the apothecial cortex but apparently soon die out. The parathecium is thick and dark brown below, thinning toward the margin, where it merges with the amphithecial cortex. This may be interpreted as a lecanorine apothecium. On the other hand, one may consider it to be a lecideine apothecium immersed in a thalline wart, as sometimes two or more such apothecia coalesce, separated only by the very thin parathecia, and are immersed in the same thalline wart. In other cases, the several apothecia seem to be proliferations from the disintegrating thecium of an original single apothecium. We face the same problem in some of the Kerguelen species of *Aspicilia* and in *Rinodina.*

Lamb in litt. interprets the type species, *C. rufidula,* as having a lecideine apothecium and suggests that it is a parasitic *Scutula* on *Umbilicaria antarctica* Frey & Lamb. Such an explanation does not account for the peculiar spermogonia with septate, moniliform spermatiophores present on the thallus of *C. rufidula,* which are certainly not those of an *Umbilicaria.* In our material, the apothecia are always submarginal, not erratically distributed as one would expect in a parasite, nor is there any suggestion of parasitism. Apothecia have been found on nearly all the large thalli.

CHARCOTIA CEREBRIFORMIS (Dodge & Baker) Dodge, comb. nov.

Umbilicaria cerebriformis Dodge & Baker, Ann. Mo. Bot. Gard., 25, 562; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, P. Siple & S. Corey 72W–15.

Thallus monophyllous, 3–4 cm. in diameter, surface rugose-reticulate to cerebriform, minutely areolate elevated, with rounded, shallow lobes, very fragile, hence margins appearing somewhat

lacerate and irregular, or even microphylline from regeneration of broken lobes, minutely rimose areolate (giving almost exactly the appearance of the surface of *Elaphyomyces muricatus*); drab, shading to hair brown or darker; lower surface smooth to subverrucose, mostly black, sometimes wood brown at the margin without rhizinae; outer gel of dead cells nearly amorphous, quite variable in thickness, up to 25μ; cortex variable in thickness, 25–55μ, the outer 15–18μ deep brown, fastigiate, less clearly so below, hyphae 5–6μ in diameter, cells nearly isodiametric with very thick walls; algal layer about 35μ thick, compact, protococcoid, cells 8–10μ in diameter, spherical or angular from mutual pressure; medulla about 165μ thick, hyphae predominantly periclinal, about 4μ in diameter, from moderately compact to relatively lax and arachnoid; lower cortex about 35μ thick, the inner 25μ very compact and subfastigiate, the outer 10μ black or very dark brown, cells subspherical, 7–8μ in diameter.

Apothecia lecanorine, about 0·2 mm. in diameter, disc concave, black, slightly rough, margin slightly elevated (especially in younger apothecia); amphithecial cortex 20–35μ thick, of the same structure as the thalline cortex but darker, medulla 20–45μ thick, similar to that of the thallus but rather looser, including single algal cells, many apparently dying or dead (not staining well with eosin or phloxine); parathecium 15–20μ thick, carbonaceous, of dark brown hyphae about 4μ in diameter, becoming 35–40μ thick below the hypothecium and somewhat more loosely woven; hypothecium hyaline, about 25μ thick, of slender, subvertical hyphae; thecium about 35μ tall; paraphyses slender, terminal cell clavate, blackened, cutting off a spherical cell about 4μ in diameter; asci thick-walled, 25–30 × 10–12μ, broadly clavate, 8-spored; ascospores hyaline, 2-celled, one cell somewhat larger than the other, slender with somewhat pointed end, rounding to ellipsoid as it matures, 8–10 × 4–5μ.

Spermogonia immersed, flask-shaped to subconic (starting as an oblate sphaeroid in the algal layer, and expanding through the cortex until the ostiole is finally exposed); wall 10–12μ thick, of dark brown, isodiametric cells; spermatiophores 10–12 × 2μ, septate, moniliform, occasionally branched; spermatia cylindric, ends truncate, about 4 × 0·6μ. After it has ceased to function, it fills with thick-walled brownish, little branched, moniliform hyphae with isodiametric cells about 4μ in diameter. In the thallus in which new apothecia were proliferating from the old thecium a new spermogonium developed just below the ostiole of the old one.

As some of our material is more mature than the type, we have based the above description on B.A.N.Z.A.R.E. 536–15. A re-examination of the type for the young stages of apothecial formation, shows a dense tangle of slender hyphae in the lower part of the algal layer which expands upward between the algae which are stimulated to rapid division. The young parathecium is very thin and hyaline and is surrounded by a thick algal layer forming the amphithecium. The expanding apothecium ruptures the cortex and pushes it back, forming a stalk about as tall as the disc is wide. Then the parathecium blackens, ruptures above and fuses with the thalline cortex. The algal layer continues to surround the sides of the parathecium in all the material from Marie Byrd Land. As the asci mature, the algae gradually die out in the amphithecium. No suggestion of parasitism was seen at any stage.

On rocks with *Lecanora exsulans, L. Johnstoni* and *Buellia frigida.*

King George V Land: Cape Denison, J. G. Hunter, A.A.E. 3, 4, 42–1, 48, 49, 67, 102–2, 103–1, 124, 140, 141, 142, 144, 1,049–1; B.A.N.Z.A.R.E. 536–13, 536–14, 536–15.

Queen Mary Land: Alligator Nunatak, C. T. Harrisson, A.A.E. 28–1, 58; Possession Nunatak. C. T. Harrisson, A.A.E. 62–1; Hippo Nunatak, C. T. Harrison, A.A.E. 64.

DERMATISCUM Nyl.

Dermatiscum Nyl., Bot. Zeitg., 25, 133; 1867.

Type: *Lichen Thunbergii* Ach. (*L. viridis* L. f.).

Thallus monophyllous, attached to substrate by central hapteron, without rhizinae; heteromerous; upper cortex fastigiate, pseudoparenchymatous; algae *Trentepohlia;* medulla loosely woven; lower cortex fastigiate, dark. Apothecia immersed at first then sessile, disc finally somewhat convex, not gyrose; amphithecium present; parathecium present but not highly developed; hypothecium hyaline or slightly brownish; paraphyses slender with thickened tips, not branched; asci clavate, 8-spored; ascospores 2-locular, brown. Spermogonia immersed in small warts, wall very thin, hyaline, spermatiophores little branched, not septate; spermatia fusiform cylindric, straight.

This rare genus is known only from one species in South Carolina, one (or perhaps two) from the Cape of Good Hope and Madagascar, and the two here described from King George V Land and Queen Mary Land. The nature of the algae were not mentioned in the early descriptions, but Hue, Bull. Soc. Bot. France, 62, 13; 1915 reports *Trentepohlia* in material from Madagascar and I have found the same in a portion of the type of *D. catawbense* Nyl. from South Carolina and in our two new ones.

DERMATISCUM MAWSONI Dodge, sp. nov.

Type: King George V Land, Cape Denison, B.A.N.Z.A.R.E. 536.

Thallus 7–8 mm. diametro, obscure grisea, rugosa, margine minute lobato; cortex superior ca. 75μ crassitudine, parte dimidia superiori gelifacta, inferiori fastigiata, pseudoparenchymatica, cellulis leptodermeis; stratum algarum ad 75μ crassitudine, cellulis compactis vel coloniis parvis vel filamentis singulis brevibus Trentepohlioideis, ad 7–8μ diametro, cellulis breviter cylindricis; medulla ca. 100μ crassitudine, hyphis plus minusve periclinalibus, leptodermeis, dense contextis; cortex inferior 35μ crasstitudine, brunneus, fastigiatus. Apothecia 0·2–0·3 mm. diametro, nigra, erumpentia, maturitate circiter 100μ elevatis, disco convexo, nigro; parathecium 20μ crassitudine, hyphis tenuibus, conglutinatis, periclinalibus, exteris obscuris (ubi super corticem projectae), reliquis hyalinis; hypothecium centro 90μ crassitudine, ad marginem tenuescens, hyphis verticalibus, inferis subbrunneis; thecium ca. 90μ altitudine; paraphyses tenues, 1·5–2μ diametro, septatae, apicibus clavatis, 2-locularibus, 4μ diametro; asci late clavati, apicibus incrassatis, protoplasto mamillato, 40 $\times$ 12μ stipite ca. 35μ longitudine; ascosporae subdistichae, 2-loculares, obscure brunneae, 11–15 $\times$ 7–8μ, septo subconstrictae.

Thallus 7–8 mm. in diameter, dark gray, rugose, margin of minute, rounded lobes, appressed to the surface of the rock but attached by a hapteron, without rhizinae; upper cortex about 75μ thick, the upper half slightly gelified; corresponding to the amorphous layer of *Umbilicaria*, the lower half fastigiate, of thin-walled pseudoparenchyma, the outer cells of the inner half darkened in the vicinity of apothecia; algal layer very variable from 75μ thick in a compact mass of cells, to small colonies and single cells, apparently Trentepohlioid, of short filaments, up to 7–8μ in diameter, cells short cylindric; medulla about 100μ thick, very compact, of more or less periclinal, slender, thin-walled hyphae; lower cortex brownish, about 35μ thick, fastigiate, of coarser, brown hyphae.

Apothecia 0·2–0·3 mm. in diameter, black, erumpent and only slightly elevated at maturity (about 100μ), disc convex, black; parathecium 20μ thick, of slender, conglutinate, periclinal hyphae, the outer ones darkened where they project above the amphithecial cortex, otherwise hyaline; hypothecium 90μ thick in the centre thinning toward the margin, of vertical, deeply staining hyphae,

somewhat brownish below; thecium about 90μ tall; paraphyses slender, 1·5–2μ in diameter, septate, ending in a two-celled brown club, about 4μ in diameter; asci broadly clavate, tip thickened, protoplast mamillate, 40 × 12μ, tapering below into a stalk about 35μ long; ascospores subdistichous, 2-celled, dark brown, 11–15 × 7–8μ, slightly constricted at the septum.

On rocks with *Umbilicaria rugosa* and *Lecanora exsulans*.

King George V Land, Cape Denison, B.A.N.Z.A.R.E. 536–16, 536–17, 536–19.

DERMATISCUM HARRISSONI Dodge, sp. nov.

Type: Queen Mary Land, Possession Nunatak, C. T. Harrisson, A.A.E. 56–1.

Thallus super muscos crescens, ca. 1 cm. diametro, crassus, margine crenato, crasso, superficie superior laevis aut subverrucosa; strato amorpho tenuis, ad 18μ crassitudine, cortex ca. 70μ crassitudine, fastigiatus, hyphis tenuibus leptodermeis, conglutinatis, cellulis exteris sphaericis et obscure brunneis; stratum algarum non bene evolutum, filamentis Trentepohlioideis ca. 8μ diametro, inter hyphas verticales medullares, infra emorientibus et inter hyphas corticalibus penetrantibus; medulla 100–120μ crassitudine, compacta hyphis pachydermeis tenuibus brunneis; cortex inferior ca. 20μ crassitudine, fastigiatus, obscure brunneus.

Apothecia innata, ca. 0·5 mm. diametro, vel in apotheciis compositis ad 1·3 mm. concrescentia, disco convexo immarginata; parathecium carbonaceum, ca. 50μ crassitudine, sub hypothecio ad 150μ; hypothecium 180–200μ crassitudine, parte infera obconica, supra hemisphaerica, flavidum, hyphis tenuibus, pachydermeis, conglutinatis; thecium ca. 100μ altitudine; paraphyses tenues, super ascos dichotomi, apicibus clavatis, nigerrimis, conglutinatis, epithecium 8μ crassitudine formantibus; asci clavati vel cylindrici, apicibus incrassatis, protoplasto truncato, una cum mamilla magna juventute ca. 55 × 15μ; ascosporae octonae, monostichae vel distichae, brunneae, 2-loculares, 11–18 × 8–10μ, septo subconstrictae.

Thallus growing over mosses, about 1 cm. in diameter, thick, margin crenate, thick, upper surface smooth or somewhat verrucose; amorphous layer thin, up to 18μ thick; cortex about 70μ thick, fastigiate, of slender, thin-walled, conglutinate hyphae, the outer cells spherical and dark brown; algal layer not sharply differentiated, trentepohlioid, filaments about 8μ in diameter, between the vertical medullary hyphae, dying out below and pushing up between the cortical hyphae, sometimes to within 20μ of the surface; medulla 100–120μ thick, compact of slender, thick-walled, brownish, conglutinate hyphae, more vertical below and passing into the fastigiate, dark brown lower cortex about 20μ thick, from which single, dark brown, thick-walled, septate hyphae, 6μ in diameter, serve to anchor the plant to the top of a tuft of decayed mosses.

Apothecia innate at first, about 0·5 mm. in diameter or concrescent in masses 1·3 mm. in diameter, disc very convex, black, immarginate; parathecium carbonaceous, about 50μ thick at the top of the thecium to 150μ or more below the hypothecium; hypothecium 180–200μ thick, obconic below and hemispheric above, deep yellow, of very slender, thick-walled, conglutinate hyphae, becoming increasingly vertical under the thecium; thecium about 100μ tall; paraphyses slender, dichotomous above the asci, tips clavate, very black, conglutinate, forming an epithecium 8μ thick; asci clavate-cylindric, tips thickened, protoplast truncate with a large mammilla when young, 8-spored, about 55 × 15μ; ascospores mono- or distichous, brown, 2-celled, 11–18 × 8–10μ, slightly constricted at the septum.

Unfortunately this species is represented by a single fragmentary collection, separated from other lichens, on dead mosses. It is evidently old and weathered, which may account for the browning of medullary tissue. The species is somewhat aberrant in the genus in being attached to the substrate by abundant single brown hyphae, rather than by a central hapteron and by much

slenderer hyphae throughout the thallus, but its algae are clearly Trentepohlioid, and it does not seem to be related to *Rinodina* nor the Physciaceae.

Queen Mary Land: Possession Nunatak, C. T. Harrisson, A.A.E. 56–1.

ACAROSPORACEAE.

Thallus little developed, crustose, squamulose or dwarf foliose, homoeomerous or heteromerous, attached to the substrate by the hyphae of the medulla or the prothallus, or by a central strand in *Glypholechia,* without rhizinae; ecorticate or more or less corticate; with protococcoid algae. Apothecia immersed in thalline warts, sometimes nearly perithecioid, sessile or short stipitate, single or crowded, with a circular or somewhat irregular disc, biatorine, lecideine or lecanorine; asci polysporous; ascospores very small, usually unicellular, 2-celled in *Maronea,* with thin walls and without sheaths.

Only *Acarospora,* the largest and most widely distributed genus, has yet been found in our area.

Acarospora Mass.

Acarospora Mass., Ricerche Autonom. Lich. Crost., 27; 1852.

Myriospora Naeg. in Hepp, Flecht. Europ., no. 57; 1853.

Type: Massalongo originally listed *Urceolaria Schleicheri* Ach., *Lecanora chlorophana* Ach., *L. oxytona* Ach., *Lichen cervinus* Pers., *Endocarpon smaragdulum* Wahl. in Ach. and *A. veronensis* Mass. Since the yellow species are sometimes segregated, the type should be chosen from the brown species. *Myriospora* was based on *M. Heppii* Naeg.

Thallus crustose, uniform or effigurate, areolate, cortex appearing pseudoparenchymatous, outer portion usually decomposed; alga *Cystococcus;* medulla well developed, lower cortex thin. Apothecia immersed, solitary or several in the same areole with a small, round or irregular disc, surrounded by the thallus; parathecium usually present; hypothecium hyaline, resting on the algal layer; thecium gelified; paraphyses usually sparingly branched, tips often swollen to capitate; asci polysporous; ascospores small, hyaline, unicellular, thin-walled; spermogonia immersed, ovoid, with hyaline wall, often folded; spermatiophores eseptate; spermatia ellipsoid, small.

Acarospora Kidderi Dodge, sp. nov.

Lecidea fuscoatra Tuck., Bull. Torrey Bot. Club, 6, 59; 1875: Bull. U.S. Nat. Mus., 3, 30; 1876 non Ach.

? *Lecanora molybdina* Hook f., Cryptog. Antarct., 230; 1845: Fl. Antaract., 2, 536; 1847 non Ach.

Type: Kerguelen, Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp. on rock with "*Buellia geographica*" in Tuckerman Herb. sheet 3,273 at Farlow Herb.).

Hypothallus continuus, tenuis, niger, margine sublobato sed non fimbriato; areolae assimilativae avellaneae vel castaneae, innatae inter crustam non-assimilativam, minus quam 0·5 mm. diametro; cortex amorphus 20–50μ crassitudine; stratum gonidiale 90μ crassitudine, cellulis protococcoideis 4–5μ diametro; medulla circiter 35μ crassitudine hyphis verticalibus laxe contextis; cortex inferior tenuis aeruginosus. Apothecia innata, marginibus subelevatis, disco plano vel convexiusculo, nigro 0·7–0·8 mm.; parathecium non evolutum; hypothecium 30μ crasstitudine, hyphis tenuissimis dense contextum; thecium 150–160μ altitudine; paraphyses tenues, flexuosae, anastomosantes, cellulis 2–3 superioribus ellipsoideis 4–5μ diametro, aeruginosis vel fuliginosis, pachydermeis, gelatina epitheciali 7–8μ crassitudine; asci late ovoidei, pachydermei 55 $\times$ 30μ; ascosporae immaturae, hyalinae 4 $\times$ 1μ.

Hypothallus continuous, thin, black, margin slightly lobed but not fimbriate; assimilative areoles hazel to chestnut brown, innate in the non-assimilative crust, appearing lecideine to almost chiodectonoid, mostly less than 0·5 mm. in diameter, darker when dry or old; cortex represented by an amorphous gelified layer varying from 20–50μ thick, below which is a fuliginous layer about 12–18μ thick of indistinct, dark spherical cells 4–5μ; algal layer 90μ thick, protococcoid, cells 4–5μ thick, the upper 20μ apparently of dying algae which stain very faintly; medulla about 35μ thick, of loose vertical hyphae; lower cortex very thin, staining aeruginous. Apothecia immersed, margin slightly elevated, disc plane or very slightly convex, black, 0·7–0·8 mm. in diameter; parathecium not differentiated; hypothecium about 30μ thick, the lower 10μ hyaline, not staining, the upper 20μ staining with phloxine, of very slender, densely woven hyphae; thecium 150–160μ tall; paraphyses slender, flexuous, anastomosing and contorted, upper 2–3 cells broad ellipsoid, 4–5μ, aeruginous to fuliginous, very thick-walled, covered by a layer of hyaline epithecial gel 7–8μ thick; asci broadly ovoid, very thick-walled, 55 $\times$ 30μ; ascospores immature, hyaline 4 $\times$ 1μ.

Magnusson (K. Vetensk. Akad. Handl. III, 7, 4, 353; 1929) referred *L. molybdina* Hook. f. to *A. macrocyclos* Vainio, apparently without seeing the specimen. I failed to find a specimen in Herb. Taylor, hence I am uncertain whether it is a synonym of *A. Kidderi*, especially as Hooker's specimen from Christmas Harbour was growing on earth, while Kidder's was growing on rock with *Rhizocarpon Kerguelense* and a sterile thallus "*Lecidea fuscoatra.*"

Kerguelen: Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp. on rock with "*Buellia geographica*" in Tuckerman Herb. sheet 3,273 at Farlow Herb.).

PERTUSARIACEAE.

Thallus crustose, uniform or dwarf fruticose, corticate or ecorticate, medulla loosely woven; algae protococcoid. Apothecia single or several immersed in the thallus or in thalline warts, usually with a small disc, rarely broader, resulting in a lecanorine apothecium, sometimes almost pyrenocarp in appearance; parathecium absent or poorly developed; paraphyses commonly flexuous, branched and anastomosing, occasionally unbranched; asci 1–8-spored; ascospores hyaline or somewhat brownish, very large, thick-walled, multinucleate, 1–2-celled.

The family is badly in need of revision, especially as to the genera to be included. *Coccotrema* (Pyrenulaceae) has been confused with *Perforaria*. *Lepolichen* has been confused with the dwarf fruticose species so far included in *Pertusaria*. *Urceolina* seems more closely related to *Pertusaria* than to *Lecanora*, while *Lecanidium* is difficult to separate from *Ochrolechia* (Lecanoraceae).

Disc small, often punctiform

Apothecia solitary in convex, cerebriform, almost stipitate areoles; asci 8-spored, spores with thin sheath .. .. *Urceolina*

Apothecia 1-several in thalline areoles or warts; asci 1–8-spored; spores with very thick sheath *Pertusaria*

Disc broad, apothecia lecanorine with a single thecium, asci mostly 1-spored *Lecanidium*

URCEOLINA Tuck.

Urceolina Tuck., Bull. Torrey Bot. Club, 6, 57; 1875.

Placodium sect. *Urceolina* Müll.-Arg., Bot. Jahrb. [Engler], 5, 136; 1885: Forschungsreise S. M. S. "Gazelle," 4, 11; 1889.

Lecanora sect. *Urceolina* Zahlbr. in Engler & Prantl, Die Nat. Pflanzenfam. I, 1*, 202; 1907.

Type: *U. kergueliensis* Tuck.

Thallus crustose, effigurate, the central areoles very convex, almost stipitate, crowded, appearing cerebriform; marginal areoles short lobate; cortex decomposed; algae protococcoid; in a thin layer on the top and sides of the areoles, often disappearing; medulla of slender, loose hyphae in a dense gel. Apothecia immersed in the aeroles, solitary; parathecium scarcely developed; hypothecium hyaline; thecium not extending up the sides of the very urceolate apothecium; paraphyses slender, flexuous, dichotomously branched, tips acuminate in the thecial gel; asci cylindric, 8-spored; ascospores hyaline, ellipsoidal with a thin sheath.

This endemic genus seems much more closely related to *Pertusaria* in the structure of the apothecial warts, the slender branched and anastomosing paraphyses and the spores with a thin, gelified sheath. While the spores are smaller than those of most Pertusariaceae, the protoplast appears similar and is probably multinucleate.

Urceolina kergueliensis Tuck.

Urceolina kergueliensis Tuck., Bull. Torrey Bot. Club, 6, 58; 1887: Bull. U.S. Nat. Mus., 3, 29; 1876: Proc. Amer. Acad. Arts Sci., 12, 184; 1877: Syn. N. Amer. Lich., 2, 150; 1888; Bouly de Lesdain, Ann. Cryptog. Exot., 4, 100; 1931.

Lecanora kerguelensis Crombie, Jour. Bot. Brit. For., 15, 106; 1877: Phil. Trans. Roy. Soc. [London], 168, 49; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 326; 1885: Zahlbr., Deutsche Südpolar Exp., 8, 49; 1906.

Placodium kerguelense Müll.-Arg., Bot. Jahrb. [Engler], 5, 136; 1884: Forschungsreise S. M. S. "Gazelle," 4, 11; 1889.

Type: Kerguelen, Molloy Point, J. H. Kidder (U.S. Transit Venus Exp.).

Thallus crustose, effigurate, up to 6 cm. in diameter, thick, verrucose areolate, the central areoles heaped, more or less stalked, giving a cerebriform appearance, margin thick, lobes once or twice dichotomously branched, about 1 mm. broad and about 3 mm. long, very convex, smooth and shining, mars yellow to ochraceous orange; cortex 35μ thick, decomposed from septate periclinal hyphae; algal layer 25μ thick, protococcoid, of closely packed cells about 4–5μ in diameter, covering the tops and sides of the areoles, but discontinuous when the cortex merges imperceptibly into the medulla; medulla of slender, very loosely tangled hyphae about 2μ in diameter, imbedded in a gel. Apothecia solitary in the thalline warts, wholly immersed, disc punctiform, black, greatly depressed (more like a depressed ostiole than an epithecium); amphithecium not differentiated; parathecium about 15μ thick, not differentiated from the medulla except more deeply staining and hyphae more compactly woven, completely surrounding the thecium and hypothecium; hypothecium 125μ thick in the centre, thinning to the edge of the thecium, of densely woven, deeply staining, slender hyphae; thecium 600μ in diameter and 375μ tall; paraphyses slender, flexuous, dichotomously branched and anastomosing, about 1μ in diameter in the thecial gel; asci cylindric, 8-spored, 250 $\times$ 18–20μ, wall gelified, about 4μ thick, tip not thickened more than the rest; ascospores monostichous, ellipsoidal, hyaline 21–30 $\times$ 15–20μ, sheath thin, sometimes with a small papilla at one or both ends. Spermogonia immersed in the thalline warts; wall about 10μ thick, of slender, periclinal hyphae, scarcely differentiated from the medulla, but more deeply staining; spermatiophores in a dense palisade lining the variously folded cavity, about 15–18 $\times$ 1μ; spermatia acicular, curved, 18–20 $\times$ 1μ.

Wilson, Mém. Herb. Boissier, 18, 88: 1900 lists *Lecanora kergueliensis* var. *lateritia, nom. nud.* from Kerguelen, Royal Sound, collected by Robert Hall.

Growing with *Aspiciliopsis macrophthalma*.

Kerguelen: Molloy Point, J. H. Kidder (U.S. Transit Venus Exp. in Tuckerman Herb. sheet 1,914 at Farlow Herbarium); Royal Sound, B.A.N.Z.A.R.E. B126–12.

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20-12, B31–1, B31–2, B31–3.

PERTUSARIA DC.

Pertusaria DC. ap. Lam. & DC., Fl. Franc. ed. 3, 2, 319; 1805.

Variolaria Pers., Neue Ann. d. Bot., 1, 23; 1794.

Thelotrema Rebent., Prodr. Fl. Neomarchica 298; 1804 non Ach. 1803.

Porina Ach., K. Vetensk. Acad. Nya Handl. 158; 1809 non Ach. 1814 neque Ach, emend. Müll.-Arg. 1883.

Porophora Meyer, Nebenstudien, 326; 1825.

Type: *Lichen pertusus* L. is the type of *Pertusaria, Thelotrema, Porina* and *Porophora*. *Variolaria* was based on *Lichen fagineus L. lacteus* L. and *L. discoidea* (*L. faginea Hoffm.* var. *c* and *d*). *Pertusaria* should be conserved as it has almost universal use for this group of plants during the last century. *Thelotrema, Porina* and *Porophora* have all been applied to other groups of lichens.

Thallus crustose, uniform to dwarf fruticose; ecorticate or corticate with a palisade of septate, thick-walled hyphae; algae protococcoid, medulla loosely woven, of thin-walled hyphae. Apothecia single or several in more or less elevated thalline warts, or sunk in thalline areoles; disc small, punctiform, or broader when the apothecium appears lecanorine (in sect. *Lecanorastrum*); parathecium little developed; thecium often subspherical; hypothecium hyaline; paraphyses flexuous, dichotomously branched and anastomosing, slender, thin-walled; asci 1–8 spored; ascospores unicellular (but multinucleate) large, hyaline or somewhat brownish, with a thick hyaline sheath often in concentric layers, surface of protoplast smooth or variously roughened, with deeply staining reticula in the protoplasm; spermatia cylindric, filiform to acicular.

Apothecia immersed in slightly convex thalline areoles with many small thecia; discs punctiform, black, asci 4–8-spored; ascospores 55–105 $\times$30–70μ .. .. .. *P. subperrimosa*

Apothecia in urceolate to chiodectonoid thalline warts, 1–4 thecia; discs irregular, black, margins elevated; asci 8-spored; ascospores 30–52 $\times$16–24μ .. .. .. *P. cineraria*

Apothecia in hemispheric thalline warts, not constricted at the base

Asci 4-spored, ascospores 140–150 $\times$ 69–90μ .. .. .. *P. Auberti*

Asci 6-8-spored; ascospores 90–125 $\times$ 25–53μ; usually 2 thecia with single dark brown disc and crenate margin .. .. *P. kerguelana*

Asci 4, rarely 6-8-spored; ascospores 44–65 $\times$ 23–30μ; usually monocarpic *P. Werthii*

Apothecia in lecanorine wart, constricted at the base with 3–4 thecia, discs punctiform, black; asci 4-, rarely 2-spored; ascospores 54–88 $\times$ 35–45μ .. .. *P. ochrolechioides*

PERTUSARIA SUBPERRIMOSA Nyl.

Pertsuaria subperrimosa Nyl., Lich. Nov. Zeland, 68; 1888.

Pertusaria perrimosa Nyl. ap. Crombie, Jour. Linn. Soc. Bot., 15, 186; 1876: Jour. Bot. Brit. For., 14, 104; 1877: Phil. Trans. Roy. Soc. [London], 168, 50; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 236; 1885 non Nyl.

Pertusaria communis Hook. f., Cryptog., Antarct., 234; 1845: Fl. Antarct., 2, 540; 1847 non DC.

Type: Kerguelen: Swain's Bay, A. E. Eaton (Venus Transit Exp.).

Thallus thin, buffy brown, rimose areolate, areoles polygonal, very regular, 0·5–0·7 mm. in diameter, separated by relatively wide cracks, K yellow then cinnabar red and ferruginascent; cortical layer about 35μ thick, decomposed and gelified; algae protococcoid in small discrete colonies, cells 6–7μ in diameter; medulla loosely woven, including many rock crystals. Apothecial warts slightly convex areoles 1–2 mm. in diameter, containing many small thecia, disc punctiform, black, slightly depressed; ampithecium not differentiated from the thallus; parathecium 35μ thick, hyaline, gelified, of periclinal hyphae, completely surrounding the thecium except at the narrow disc; thecium subspherical, about 400μ in diameter; paraphyses slender, branched and anastomosing, relatively few, scattered throughout the thecial gel; asci cylindric, 370–400 × 65–70μ, walls gelified about 20μ thick, 4–8-spored; ascospores variable in size and shape from ovoid to ellipsoid, 55–105 × 30–70μ, sheath 8–12μ thick. Spermogonia immersed, 150–180μ in diameter, wall not clearly differentiated; spermatiophores lageniform cylindric, fasciculate; spermatia straight or slightly curved, 16–23 × 0·5–0·6μ.

Growing on rocks with *Thelidium praevalescens, Encephalographa cerebrinella, Lecidea asbolodes, L. Auberti, L. intersita, L. Eatoni, L. phaeostoma, Thalloidima kerguelensis, Rhizocarpon Johnstoni, R. kerguelense, R. urceolinum, Aspicilia disjunguenda, A. endochlora, Lecanora atrocaesia, Buellia subplicata* and *B. tristiuscula;* parasitized by *Lecidea superjecta.*

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–9.

Kerguelen: Murray Island: B.A.N.Z.A.R.E. B210–2, B211–2, B530–1, B530–6, B530–7, B530–10; Observatory Bay, B.A.N.Z.A.R.E. B192–19, B192–65; Royal Sound, B.A.N.Z.A.R.E. B90–12; Grave Island, B.A.N.Z.A.R.E. B91; Greenland Harbour, B.A.N.Z.A.R.E. B177–31, B177–32, B177–39, B177–45, B177–46, B177–47; Poincaré Peninsula, BA.N.Z.A.R.E. B126–13.

F. SUBFERRUGINOSA Zahlbr., Deutsche Südpolar Exp., 8, 45; 1906.

Pertusaria perrimosa f. *subferruginosa* Crombie, Jour. Linn. Soc. Bot., 15, 186; 1876.

Pertusaria subferruginosa Crombie, Phil. Trans. Roy. Soc. [London], 168, 50; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 326; 1885.

Type: Kerguelen, Royal Sound and Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus more or less ferruginous.

This form does not seem worthy of recognition. As in so many other instances, whitish thalli, growing upon rocks containing an abundance of iron are easily stained ferruginous. In our specimens, one can find all gradations of colour.

F. ZONATA Zahlbr., Deutsche Südpolar Exp., 8, 45; 1906.

Type: Kerguelen, on rocks in valley between Mittleberg and Station, also Penguin Bay, Werth (Deutsche Südpolar Exp.).

Thallus with broadly zonate margins.

We have seen no material referable here.

PERTUSARIA CINERARIA Nyl.

Pertusaria cineraria Nyl. ap. Crombie, Jour. Linn. Soc. Bot., 15, 186; 1876: Phil. Trans. Roy. Soc. [London], 168, 50; 1879: Zahlbr., Deutsche Südpolar Exp., 8, 45; 1906.

Pertusaria cinerea Crombie, Rept. Sci. Results Voy. "Challenger." Bot., 1, 2, 236; 1885 *lapsus calami.*

Type: Kerguelen, Swain's Bay and Volage Bay, A. E. Eaton (Venus Transit Exp.).

Thallus thin, wrinkled areolate rimulose, with very narrow black margin of hypothallus, deep olive grey to olive grey, K–; cortex 40–45μ thick, decomposed and highly gelified with occasional rock crystals and small colonies of a chroococcoid alga; algal layer 35–40μ thick of rounded colonies of *Protococcus*, cells 4–6μ in diameter; medulla about 150μ thick, of loosely woven, thin-walled hyphae. Apothecia in low urceolate to chiodectonoid thalline warts, rounded to somewhat irregular, up to 0·5 mm. in diameter enclosing 1–4 thecia, separated by thin, slightly elevated margins; discs somewhat irregular, black; parathecium hyaline, 75–80μ thick of vertical slender gelified hyphae enclosing rock crystals, sometimes more loosely woven and then enclosing small air bubbles very difficult to remove from sections, not sharply differentiated from the medulla below the thecium; hypothecium scarcely differentiated beyond a more deeply staining area at the base of fascicles of asci; thecium about 230μ tall; paraphyses flexuous, slender, dichotomous, tips not thickened ending in the thecial gel; asci ventricose-clavate, fasciculate, 120–130 $\times$ 30–35μ, 8-spored; ascospores hyaline 30–35 $\times$ 18–20μ [35–52 $\times$ 16–24μ *fide* Nylander], unicellular with hyaline sheath about 4μ thick.

In the ascus the spores are shorter and broader with deeply staining protoplast, becoming longer and narrower with non-staining protoplast while still in the thecium after the ascus wall has disintegrated.

Growing on rocks with *Verrucaria obfuscata, Porina insueta, Xanthoporina kerguelensis, Lecanactis kerguelensis, Steinera glaucella, Lecidea Auberti, L. Eatoni, L. phaeostoma, L. subcontinua, L. Urbanskyana, Toninia kerguelensis, Rhizocarpon kerguelense, R. urceolinum, Pertusaria ochrolechioides, Aspicilia endochlora, Lecanora atrocaesia, Aspiciliopsis macrophthalma, Placopsis bicolor, Huea diphyella, Buellia subplicata* and *B. tristiuscula.*

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–25, B192–33, B192–39, B192–40; Greenland Harbour, B.A.N.Z.A.R.E. B177–4, B177–16, B177–36, B177–41, B204–5; Royal Sound, B.A.N.Z.A.R.E. B90–5.

Pertusaria Auberti Bouly de Lesdain.

Pertusaria Auberti Bouly de Lesdain, Ann. Cryptog. Exot., 4, 100; 1931.

Type: Kerguelen, basalt plateau west of Port Jeanne d'Arc, Aubert de la Rüe 19.

Thallus white, K slowly yellowish, passing to ferruginous, thin, opaque, closely adnate, finely rimulose, margins olive zonate. Apothecial warts sessile, convex, up to 1 mm. broad, variously confluent, discs black, scattered, immersed, punctiform, finally surrounded by a slightly elevated thalline margin; paraphyses branched and anastomosing; asci cylindric-oblong, I intensely blue, 4-spored; ascospores hyaline becoming smoke coloured, ovoid, oblong or ovoid-ellipsoid, sheath 15μ thick, 140–150 $\times$ 69–90μ, thecial gel I–. Spermogonia numerous, black, minute, semi-immersed; spermatia slightly curved, 12–13 $\times$ 0·9μ.

This species should be easily recognizable by the larger spores, but we have seen no material referable here.

Pertusaria kerguelana Zahlbr.

Pertusaria kerguelana Zahlbr., Deutsche Südpolar Exp., 8, 47; 1906.

Type: Kerguelen, Südmire, Werth (Deutsche Südpolar Exp.).

Thallus thin, rimulose areolate, between light greyish olive and light drab, K yellowing and slowly reddening, bounded by a narrow black line of hypothallus; cortex 35μ thick, gelified and decomposed of more or less periclinal hyphae, enclosing small rock crystals; algal layer 150μ thick,

protococcoid, of large, ellipsoidal colonies, cells 7–9μ in diameter; medulla 250–300μ thick, of densely woven, slender, more or less vertical hyphae imbedded in a gel. Apothecia immersed in low thalline warts, mostly 2 per wart but having a single dark brown disc, surrounded by a thick, slightly elevated, more or less crenate margin; parathecium 20–30μ thick, hyaline, of very slender, periclinal hyphae, not extending below the hypothecium; hypothecium a deeply staining mass of medullary tissue common to both thecia, of densely woven slender hyphae; thecium 200–350μ tall; paraphyses slender, sparingly septate, dichotomously branched, tips acuminate, ending in the thecial gel; asci ablong to clavate, walls 7–8μ thick, 6–8 spored, about 330 $\times$ 110μ; ascospores hyaline to pale olive, unicellular, ellipsoidal, 90–115 $\times$ 50–53μ, sheath 9–12μ thick. [Spermogonia immersed in the thallus or apothecial warts, tip black, semi-emersed; wall hyaline; spermatiophores lageniform cylindric, shorter than the spermatia; spermatia bacilliform, ends obtuse, nearly straight to moderately curved, 12–18 $\times$ 1μ. Zahlbr.]

The specimen from Murray Island agrees in thalline characters, but the ascospores are 110–125 $\times$ 25–35μ with a thin sheath only 4μ thick, although the protoplast is already beginning to stain less deeply.

Growing with *Verrucaria Werthii, Lecidea Eatoni, Aspicilia lygomma, Lecanora atrocaesia* and *Buellia subplicata.*

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–5; Murray Island, 0–100 ft. Sta. 60, B.A.N.Z.A.R.E. B530–9; Greenland Harbour, BA.N.Z.A.R.E. B177–29.

Pertusaria Werthii Zahlbr.

Pertusaria Werthii Zahlbr., Deutsche Südpolar Exp., 8, 46; 1906.

? *Lecanora tartarea* Hook. f. & Tayl., London Jour. Bot., 3, 644; 1884: Cryptog. Antarct., 230; 1845.

Type: Kerguelen, Südmire, E. Werth (Deutsche Südpolar Exp.)

Thallus tartareous, thin, unequally rugose and rimulose, white or whitish, opaque, K– above, slightly yellow within, C–. Apothecial warts sessile, hemispheric or depressed hemispheric, not constricted at the base, somewhat constricted and irregular at the margin, solitary or 2–4 growing together, monocarpic, up to 2 mm. broad, white, disc white, farinose, ostioles slightly depressed at first, punctiform then broader, irregular and blackening; thecium subspherical, hyaline; hypothecium rather thick, of densely woven hyphae, flesh-coloured, fuscescent; paraphyses slender, 1·5μ in diameter, flaccid, branched and anastomosing, longer than the asci, I–; asci cylindric clavate, tip rounded, wall moderately thickened, straight, 200–210 $\times$ 35–40μ, normally 4-, rarely 6-8-spored; ascospores uniseriate, hyaline, simple, variable in the same ascus, oblong, oblong-ovoid or broad navicular, ends rounded or shortly and obtusely apiculate, sheath thick, 44–65 $\times$ 23–30μ, K violet when mature. Spermogonia immersed in the thallus or in apothecial warts, minute, ostiole punctiform, blackened; spermatiophores fasciculate, lageniform-subulate, shorter than the spermatia which are acicular-fusiform, slightly curved, 12–15 $\times$ 1μ.

We have seen no material referable here.

Pertusaria ochrolechioides Zahlbr.

Pertusaria ochrolechioides Zahlbr., Deutsche Südpolar Exp., 8, 46; 1906.

Type: Kerguelen, Penguin Bay and plateau of Stationsberg, Werth, (Deutsche Südpolar Exp.).

Thallus thin, about 100μ thick, somewhat wrinkled and areolate rimulose, cartridge buff, sometimes stained ferrugineous, K yellowing not bounded by a dark margin; ecorticate; algae

protococcoid in spherical colonies about 35μ in diameter. Apothecial warts sublecanorine somewhat constricted at the base 2–3 mm. broad, 1 mm. high, rounded or rarely crowded and then somewhat angular; amphithecium thick, entire, ostiolar discs depressed, black with 3–4 thecia per wart; thecia ellipsoidal, 500μ tall and 250–350μ in diameter; paraphyses slender, flexuous, branched and anastomosing; hypothecium about75μ thick, of tangled, deeply staining hyphae; asci about 350 × 35μ, cylindric, thick-walled; ascospores mostly 4, rarely 2 per ascus, hyaline, sheath 7–8μ thick, one or both apices of the protoplast truncate, 54–88 × 35–45μ.

Zahlbruckner gives the spores as "88–25μ longis et 42–44μ longis", probably misprint for 88–125μ longis et 42–44μ latis.

On rocks with *Pertusaria cineraria, Aspiciliopsis macrophthalma* and *Buellia tristiuscula.*

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–8.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–39.

Pertusaria tyloplaca Nyl.

Pertusaria tyloplaca Nyl., C. R. Acad. Sci. [Paris], 83, 90; 1876.

Type: Campbell Island, Filhol.

Thallus investing mosses or hepatics, circular, about 4 cm. in diameter, white, thick, almost foliose, surface subcerebriform; cortex 50–60μ thick, subfastigiate, somewhat gelified; algal layer 60–80μ thick, of closely packed, protococcoid cells, more or less in vertical rows, up to 18μ in diameter, a few extending deeper into the medulla; medulla variable in thickness, of very slender, densely woven hyphae. Apothecial warts, hemispheric, mostly about 1 mm. in diameter, more or less confluent and irregular, disc flat, isabella colour, 0·5–0·7 mm. in diameter; parathecium about 35μ thick, hyaline, of very slender, conglutinate, periclinal hyphae, opening by a very narrow, slightly depressed ostiole; hypothecium about 35–50μ thick, of very slender, densely woven hyphae, covering the base of the cavity only; thecium more or less spherical, about 120μ in diameter; paraphyses branched and anastomosed, not abundant, about 1μ in diameter in the thecial gel; asci cylindric [8-spored *fide* Nyl.]; ascospores monostichous, unicellular, ellipsoidal, somewhat yellowish, 100–120 × 36–44μ, sheath thin, about 3μ thick.

In the apothecia sectioned, the asci have disappeared and the spores are somewhat shrunken, but from the spores still in the thecium they are probably monostichous. Spermogonia not seen. Some of the collections are old and sterile, but have been referred here on such characters as are observable.

Macquarie Island: Featherbed Flat, B.A.N.Z.A.R.E. B531–19, B531–20; highlands, B.A.N.Z.A.R.E. B534–8.

Lecanidium Mass.

Lecanidium Mass., Miscell. Lich., 36; 1856.

Clausaria Nyl., Ann. Sci. Nat. Bot. IV, 15, 45; 1861.

Lecanora sect. *Pionospora* Th. Fr., Lich. Arctoi, 216; 1861.

Pionospora Th. Fr., Lichenogr. Scand. 1, 304; 1874.

Pertusaria sect. *Lecanorastrum* Müll.-Arg., Flora, 67, 268; 1884.

Lecanora sect. *Lecanidium* Jatta, Fl. Ital. Cryptog., 3, 317; 1910.

Type: *Lichen oculatus* Dicks. *Clausaria* was based on *C. pallens* Nyl. *Pionospora* and *Lecanorastum* were based on *L. bryontha* Ach.

Thallus crustose, uniform; ecorticate; algae protococcoid, medulla loosely woven, of thin-walled hyphae. Apothecia sessile, more or less constricted at the base; amphithecium essentially a continuation of the thallus with the algal layer disappearing early; paraphyses dichotomously branched at acute angles forming a denser palisade with a densely woven epithecium; asci 2-4-spored; ascospores large, hyaline multinucleate, sheath thin.

LECANIDIUM CROZETICUM Dodge, sp. nov.

Type: Crozet Archipelago, Possession Island, Amercan Bay, B.A.N.Z.A.R.E. B20.

Thallus crassus, albidus, KOH–, areolato-rimosus, margine crasso sed non lobato; cortex circiter 80μ crassitudine, hyphis tenuibus anastomosantibus laxe contextus, plus minusve periclinalibus, cum crystallis parvis; stratum algarum protococcoideum, circiter 30μ crasstitudine, discontinuum, coloniis cellularum 6–7μ diametro; medulla similis cortici, laxius contexta cum paucis aut sine crystallis. Apothecia sessilia aut basi subconstricta, circiter 1 mm. diametro, solitaria, disco plano, cretaceo; amphithecium 180–200μ crassitudine simile cortici thallino, gonidiis mox evanescentibus; hypothecium circiter 90μ crassitudine, hyphis dense contextum; thecium 425-450μ altitudine; paraphyses tenues, dichotome ramosi, epithecio 160–170μ crassitudine cum crystallis parvis; asci circiter 250 × 50μ muro 18–20μ crassitudine, 2-4-spori; ascosporae hyalinae, 120 × 55μ, muro tenui, obovoideae.

Thallus thick, white, KOH–, areolate rimose, margin thick but not lobed; cortex about 80μ thick of loosely woven, slender, anastomosing hyphae, more or less periclinal with very small crystals; algal layer protococcoid, about 30μ thick, discontinuous with colonies of small cells, 6–7μ in diameter; medulla of the same texture as the cortex or somewhat more loosely woven and few or no crystals. Apothecia sessile or somewhat constricted at the base, about 1 mm. in diameter, solitary, disc plane, chalky; amphithecium 180–200μ thick, of the same texture as the cortex, algal cells soon disappearing so that scarcely a living algal cell can be found in a mature apothecium; hypothecium about 90μ thick, of densely woven, deeply staining hyphae; thecium 425–450μ tall; paraphyses slender, dichotomously branched at very acute angles, forming a dense palisade between the asci and ending in a densely woven epithecium, 16–17μ thick, not staining and with abundant small crystals; asci about 250 × 50μ, wall about 18–20μ thick, protoplast clavate, 2-4-spored; ascospores hyaline, about 120 × 55μ, wall rather thin, apparently obovoid.

From my material, I have been unable to find mature spores in a position to measure them accurately. Most of the asci are just beginning to differentiate spores. The one mature spore found was still within the thecium and in such a position that its measurements and the thickness of its sheath are uncertain. The species differs from *Pertusaria Werthii* in the surface of the thallus not staining with KOH, although the medulla stains light yellow in sections, the thecium and spores remain hyaline in KOH, nearly complete absence of algae from the amphithecium (Zahlbruckner figures a well-developed, continuous algal layer) also in the apparently much larger spores.

Growing over very porous lava, alone or with *Xanthoporina kerguelensis, Steinera Werthii, Panneria dichroa, Lecidea superjecta* and *Rinodina aspicilina.*

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–3, B20–6, B20–7.

LECANIDIUM SUBFOLIOSUM Dodge, sp. nov.

Type: Kerguelen, Observatory Bay, B.A.N.Z.A.R.E. B188–2.

Thallus crassus, subfoliosus, muscos investiens, orbicularis, ad 2 cm. diametro, albus, margine lobato, lobis rotundatis, circiter 1 mm. latitudine, 2–3 mm. longitudine. Apothecia circiter 1 mm.

diametro, lecanorina, basi constricta, excipulo laevi, albo, disco concaviusculo, albo pruinoso, multis theciis continente; cortex amphithecialis circiter 35μ crassitudine plus minusve fastigiatus, hyphis pachydermaticis ramosis, cellulis isodiametricis; stratum algarum circiter 40μ crassitudine, cellulis protococcoideis, 7–8μ diametro, dense compactis; parathecium 50–60μ crassitudine, hyphis tenuibus, periclinalibus, pachydermaticis; hypothecium non bene evolutum; thecium 550–600μ altitudine; paraphyses tenuissimae, ramosae; asci ellipsoidei, leptodermatici, monospori; ascosporae uniloculares, subluteae, 185–225 $\times$ 110–135μ, hyalina cum vagina 15μ crassitudine. Spermogonia subsphaerica, vel subirregularia, murus 20μ crassitudine; spermatiophorae tenues, semel vel bis dichotomae, pauci-septatae, circiter 20 $\times$ 1μ; spermatia elongata, fusiformia, recta vel subincurva, 7–8 $\times$ 1μ.

Thallus thick, subfoliose, investing mosses, forming a plaque at least 2 cm. in diameter, white, surface badly eroded, margin lobate, lobes rounded, about 1 mm. broad and 2–3 mm. long. Apothecia about 1 mm. in diameter, lecanorine, constricted at the base, exciple smooth, white, disc concave, white pruinose, containing many thecia (as in *Chiodecton*); amphithecial cortex 35μ thick, more or less fastigiate, of thick-walled, branched hyphae with isodiametric cells; algal layer about 40μ thick, of densely packed, protococcoid cells, 7–8μ in diameter, disappearing above as the apothecium matures; parathecium 50–60μ thick, of periclinal, slender, thick-walled hyphae; hypothecium not clearly differentiated from the parathecium; thecium 550–600μ tall; paraphyses very slender, branched, enclosing each ascus in a dense tissue; asci ellipsoidal, thin-walled, monosporous; ascospores unilocular, slightly yellowish, 185–225 $\times$ 110–135μ, with a hyaline sheath about 15μ thick.

Spermogonia forming in regenerating thecia after the discharge of ascospores, subspherical to somewhat irregular, wall 20μ thick, very deeply staining; spermatiophores slender once or twice dichotomous, very sparingly septate, about 20 $\times$ 1μ; spermatia long-fusiform, straight or slightly curved, 7–8 $\times$ 1μ.

Growing over the tops of a coarse moss on dry rocks. Unfortunately our material is very old and eroded, but is much nearer foliose than any other species of this family with which I am familiar. Our species seems closest to *Pertusaria creberrima* Stirt. and *P. circumcincta* Stirt. from New Zealand. It differs from these in the much larger spores and thicker, lobate thallus.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B188–2, type; Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–9, B246–10, B246–11; near Port Jeanne d'Arc, 1,400 ft., B.A.N.Z.A.R.E. B200–5, B217–3; Long Island, Royal Sound, B.A.N.Z.A.R.E. B953–3.

LECANORACEAE.

Thallus crustose, uniform or with effigurate margins, rarely dwarf fruticose, branched, attached to the substrate by hyphae of the medulla without rhizinae, heteromerous (except in *Harpidium*); ecorticate or corticate; algae protococcoid. Apothecia immersed, sessile or short stalked, round; amphithecium usually well developed (apparently absent in *Candelariella cerebriformis*); parathecium usually poorly developed or absent; hypothecium hyaline, usually with algae below; paraphyses unbranched and free or branched and intricate; asci usually 8-spored, rarely polysporous; ascospores, hyaline, rarely brown, 1-, 2-, or more-celled, or many-celled muriform, thin-walled.

Ascospores unicellular
- Thallus indeterminate
  - Apothecia immersed
    - Asci 8-spored, thallus grey or brown .. .. *Aspicilia*
    - Asci polysporous, thallus yellow .. .. *Candelariella*
  - Apothecia sessile, at least the margin elevated above the thallus .. *Lecanora*
- Thallus determinate, margin usually lobed
  - Without cephalodia; apothecia more or less stalked .. *Lecanora* sect. *Placodium*
  - Cephalodia usually large and conspicuous, apotheciiform
    - Apothecia immersed .. .. *Aspiciliopsis*
    - Apothecia sessile .. .. *Placopsis*

Ascospores 2-celled (rarely pluri-septate)
- Thallus grey or brown
  - Thallus crustose .. .. *Lecania*
  - Thallus dwarf fruticose .. .. *Thamnolecania*
- Thallus yellow .. .. *Candelariella*

Aspicilia Mass.

Aspicilia Massal., Ricerche Autonom. Lich. Crost., 36; 1852.

Lecanora sect. *Aspicilia* Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges., 169; 1862.

Type: Of the eight species originally included by Massalongo, four (*Lichen polygonius* Vill., *Urceolaria cinereo-rufescens* Ach., *A. ochracea* (Schaer.) Mass. and *A. scutellaris* (Schaer.) Mass.) are still included in *Aspicilia* by modern authors.

Thallus crustose, uniform, indeterminate or determinate, more or less areolate, attached to the substrate by hyphae of the hypothallus or of the medulla, without rhizinae; heteromerous, ecorticate or corticate; algae protococcoid. Apothecia immersed in the thallus; parathecium present, sometimes fuscescent but not carbonaceous; hypothecium hyaline; asci normally 8-spored; ascospores hyaline, unicellular, ellipsoidal, relatively thin-walled, without a sheath. Spermatia exobasidial, bacilliform, cylindric or filiform, straight or curved.

In our species the thallus is determinate as in the section *Orbiculares* of Magnusson, K. Svenska. Vetensk. Akad. Handl. III, 17, 5, 7; 1939.

Parathecium about 35μ thick on the sides, thinning to 10μ below the hypothecium, hyaline; thecium 35μ tall .. .. *A. lygomma*

Parathecium thin on the sides, 75μ or more, thick below, somewhat brownish
- Thecium 35 (–55) μ tall; cortex 45–40μ thick; spermatia 6–8 × 1μ .. *A. endochlora*
- Thecium 75–90μ tall; cortex 60–75μ thick
  - Parathecium obconic, usually reaching the base of the thallus; apothecial margin not elevated; spermatia 16–20 × 1μ .. .. *A. disjunguenda*
  - Parathecium lenticular, resting on the algal layer; margin of apothecia slightly elevated; spermatia 9–11 × 1μ .. .. *Lecanora atrocaesia*

Aspicilia lygomma (Nyl.) Dodge, comb. nov.

Lecidea lygomma Nyl. ap. Crombie, Jour. Bot. Brit. For., 13, 334; 1875: Jour. Linn. Soc. Bot., 15, 189; 1877: Phil. Trans. Roy Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 238; 1885: Wilson, Mém. Herb. Boissier 18, 88; 1900; Zahlbr., Deutsche Südpolar Exp., 8, 35; 1906.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.).

Thallus ashy or bluish ashy and blackening, thin, smooth, rimulose; algae protococcoid, cells up to 10μ in diameter, more or less angular arranged vertically in rows between medullar hyphae. Apothecia black, flat, innate or nearly so, margin not prominent, often more or less angled and completely covering an areole, up to 1 mm. in diameter; algal layer below the parathecium about 35μ thick, of protococcoid cells 7–8μ in diameter, somewhat angular, extending part way up the sides of the parathecium, becoming blackened and forming a carbonaceous mass about 20–25μ thick. (This carbonaceous blackening of the edge of the areole extends to the bottom of the thallus); true parathecium hyaline of slender gelified, periclinal hyphae, 35μ thick at the blackened margin, thinning to about 10μ between the algal layer and the hypothecium; hypothecium, lenticular, about 50μ thick in the centre, of closely tangled larger hyphae, passing into the thecium above; thecium about 35μ tall; paraphyses slender, gelified, closely septate, repeatedly branched, ending in thick-walled, dark brown, ellipsoidal cells, 3 × 4μ; asci broadly clavate, 30–35 × 10–12μ, tip not conspicuously thickened; ascospores 11–15 × 6–7μ, hyaline, ellipsoidal.

The systematic position of this well marked species is not altogether clear. The presence of a well-developed hyaline parathecium, blackened only at the margin, suggests distant affinities with *Lecidea,* while the immersed apothecia with highly developed algal layer below the hypothecium suggest *Aspicilia,* which however, usually lacks such a well developed parathecium.

On rocks with *Lecidea rhizocarpiza, Rhizocarpon kerguelense, Pertusaria kerguelana, Lecanora atrocaesia* and *Buellia subplicata.*

Kerguelen: Murray Island, Sta. 60, B.A.N.Z.A.R.E. 530–9; Observatory Bay, Sta. 56, B.A.N.Z.A.R.E. B192–38.

ASPICILIA ENDOCHLORA (Hook. f. & Tayl.) Dodge, comb. nov.

Urceolaria endochlora Hook. f. & Tayl., London Jour. Bot., 3, 640; 1844: Crypt. Antarct., 231; 1845: Fl. Antarct., 2, 537; 1847.

Lecidea endochlora Tuck., Bull. Torrey Bot. Club, 6, 59; 1875: Bull. U.S. Nat. Mus., 3, 30; 1876 non Taylor, 1847.

Lecidea homalotera Nyl. in Crombie. Jour. Bot. Brit. For., 15, 105; 1877: Phil. Trans. Roy. Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 238; 1885.

Type: Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. Type of *L. homalotera* segregated from material from same locality and collector determined as *Urceolaria endochlora* at Kew. The following description is based on the type in the Taylor Herb., previously studied and annotated by Tuckerman: "*Lecidea ! endochlora* (Taylor sub *Urceolaria* 1844). Sp. 0,008–14 mm. long., 0,004–7 mm. crass. Paraph. agglut[inat]ae. N.B. *L. endochlora* Tayl. 1847 species distinctissima = *L. ictericum,* Mont. E.T. 1875." Specimen also annotated by Müller-Argau in 1887: "*Lecidea disjunguenda* Cromb. in Jour. of Bot. 1877, (p. iv) Apr."

Thallus relatively thick, 370μ, white or cream colour, light ochraceous buff, flecked with cinnamon brown [or even neutral grey in recent specimens], determinate, rimulose, margin thinner than in *Lecanora atrocaesia,* K yellow fuscescent, I–, surrounded by a greyish or black line up to 1 mm. broad; cortex 35–40μ thick, of agglutinated hyphae 2–3μ in diameter, heavily incrusted with very small crystals, giving an opaque olivaceous appearance in section; algal layer 90μ thick of discrete colonies of *Protococcus ?,* cells ellipsoidal, 7 × 4μ separated by strands of vertical hyphae similar to those of the cortex, or stained brownish; medulla of closely woven, slender, encrusted hyphae, enclosing rock crystals. Apothecia up to 0·9 mm. in diameter

[only 0·3–0·4 mm. in most recent collection], immersed, disc plane or only slightly convex; parathecium scarcely more than a strand of hyphae such as separate the algal colonies, but appearing almost black in thick sections, pale fuscescent in thin sections, 90μ thick below the hypothecium thinning to 50μ at the margin, of agglutinated, periclinal hyphae; hypothecium hyaline, 55μ thick, of vertical, densely woven hyphae; thecium 35 (–55)μ tall; paraphyses slender, 2μ in diameter, wall gelified, sparingly dichotomously branched, tips only slightly clavate, bluish, imbedded in a stiff gel; asci cylindric when young, becoming broadly clavate with thick walls, protoplast mamillate above 20–35 × 9–14μ; ascospores sub-biserate, hyaline, thin-walled, 8–14 × 4–7μ, ellipsoidal.

[Spermogonia spherical, immersed, tip black; wall dimidiate, fuliginous; spermatiophores subfiliform, 12–16μ long; spermatia cylindric or slightly smaller in the middle, tips rounded, 6–8 × 1μ—Zahlbr.]

This species has been very confused. Nylander separated the material so determined at Kew into two species which he named *Lecidea homalotera* Nyl. and *L. disjunguenda* Nyl. Crombie later referred part of the material to *L. subcontinua* Nyl., citing *Urceolaria endochlora* Tayl. as a synonym, considering it a *nomen ineptum et informe,* basing his citation on the obconic black hypothecium which is conspicuous in that species. In the specimen in Taylor's herbarium, thick sections of the apothecium under relatively low magnifications which were the highest available to Taylor, show his description to be remarkably accurate and characteristic of the species. Under these conditions, the bluish black epithecium shows the "disk consists of a black pruina", the rest of the very low thecium as "an exceedingly shallow lamina of a glaucous green colour, resting on an inverted cone of black matter, extending to the bottom of the thallus" (the brownish parathecium and included rock crystals of a thick section). Considering the optical equipment in use, Taylor's description is more accurate than those of Nylander and of Crombie. Since a careful reading of the joint work of Hooker and Taylor shows that Taylor studied the specimens and wrote the descriptions [the descriptions in Taylor's hand on the sheets in his herbarium are usually verbatim descriptions of those published] while Hooker merely saw the manuscript through press. After Taylor's death before the collections were fully studied, Churchill Babington was called upon to study the undetermined material left at Kew and usually incorrectly identified it with previously described species. Hooker tried in vain to correlate the work of the two lichenologists without a careful study of the specimens, until it is very difficult to decide whether an opinion in the "Cryptogamia Antarctica" and the "Flora Antarctica" is that of Babington, Hooker or even Taylor. In view of this situation, the specimen studied by Taylor and retained in his herbarium (especially as it is uniform) should be taken as the type rather than the miscellaneous duplicates (!) at Kew, which have been segregated by subsequent workers into three species.

A careful comparison of Nylander's description of *L. homalotera* and of *L. disjunguenda* shows the only essential differences lie in the smaller apothecia and narrower spores. The type of *U. endochlora* has some apothecia as large as the measurements given for *L. disjunguenda,* while the spores as measured by both Tuckerman and myself agree with the measurements given for *L. homalotera.* Zahlbruckner distinguishes Nylander's species on the length of the spermatia and spermatiophores (spermatia 16–20μ, spermatiophores 6–8μ in *L. disjunguenda;* spermatia 6–8μ spermatiophores 12–16μ in *L. homalotera*). A crushed preparation of the type of *U. endochlora* shows short spermatia only.

On rocks with *Verrucaria obfuscata, Microglaena kerguelana, Porina Werthii. Encephalographa cerebrinella, Lecidea intersita, Mykoblastus perustus, Thalloidima kerguelensis, Rhizocarpon Johnstoni, R. kerguelense, R. Mawsoni, Pertusaria subperrimosa, Lecanora atrocaesia, Blastenia*

keroplasta v. *athallina*, *Buellia subplicata* and *B. tristiuscula*. Overgrown or partly parasitized by *Lecidea superjecta*.

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–2, B20–4.

Kerguelen: Christmas Harbour, J. D. Hooker, type (Voy. "Erebus & Terror") in Taylor Herb.; Royal Sound, B.A.N.Z.A.R.E. B90–15, B90–16; Greenland Harbour, B.A.N.Z.A.R.E. B177–37, B177–43, B177–54, B204; Observatory Bay, B.A.N.Z.A.R.E. B192–2, B192–4, B192–29, B192–36.

Heard Island: Between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–9.

ASPICILIA DISJUNGUENDA (Nyl.) Dodge, comb. nov.

Lecidea disjunguenda Nyl. in Crombie, Jour. Bot. Brit. For., 15, 105; 1877; Phil. Trans. Roy. Soc. [London], 168, 51; 1879; Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 238; 1885: Zahlbr., Deutsche Südpolar Exp., 8, 39; 1906.

Type: Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") at Kew, detemined originally as *Urceolaria endochlora* Hook. f. & Tayl., but not type of that species.

Thallus thin, rimulose, determinate, margin thin, smooth, blackened; surface smooth, glaucous-grey, at least 375μ thick; cortex 75μ thick, a palisade of vertical hyphae 2–3μ in diameter, the upper 15μ gelified and structureless; algal layer about 300μ thick, protococcoid of clavate colonies between vertical strands of medullar hyphae, cells 8–12μ in diameter. Apothecia innate, 0·6–0·7 mm. in diameter, disc black, concave to plane; amphithecium not differentiated from the thallus; parathecium 350μ thick below, thinning to the margin, of closely septate large, thick-walled, yellowish brown hyphae, not carbonaceous, appearing almost pseudoparenchymatous, extending vertically to the bottom of the thallus; hypothecium conical, the lower portion of densely woven, deeply staining hyphae, becoming vertical above and merging into the thecium; thecium about 90μ tall; paraphyses free, 3–4μ in diameter, with thick gelified walls, closely septate, tips capitate, dark brown, forming a thin, dark brown epithecium; asci cylindric clavate with thickened tip, protoplast truncate or mamillate, 8-spored; ascospores subdistichous, ellipsoidal, hyaline 8–12 $\times$ 5–6μ [11–13 $\times$ 7–9μ *fide* Nylander]. [Spermogonia spherical, immersed, tip black, slightly prominent; wall dimidiate, black; spermatiophores, narrowly ampullaceous, 7–8μ; spermatia filiform more or less arcuate or hamate, 16–20 $\times$ 1μ—Zahlbruckner.]

This species seems intermediate between *Lecanora atrocaesia* and *Aspicilia endochlora*, and it is with hesitation we have referred material as we have failed to find spermatia in this group. The spermatial characters seem best for separation of these species. After an examination of over 60 slides from different collections, I have attempted to separate them as given in the key. The extremes are easily separable with the naked eye, but there are many intergrading forms. The character of the tips of paraphyses seems fairly constant.

Growing on rocks with *Microglaena kerguelana*, *Encephalographa cerebrinella*, *Lecidea assentiens*, *L. intersita*, *L. phaeostoma*, *L. rhizocarpiza*, *L. subdisjunguenda*, *L. subplana*, *Toninia kerguelensis*, *Rhizocarpon kerguelense*, *R. Mawsoni*, *Pertusaria subperrimosa*, *Lecanora atrocaesia*, *Buellia subplicata*, *B. tristiuscula* and *Rinodina aspicilina*.

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B90–7, B90–8, B90–9, B90–17, B126–9, B126–14; Murray Island, B.A.N.Z.A.R.E. B246–7, B530–2; Observatory Bay, B.A.N.Z.A.R.E. B192–11, B192–21, B192–32, B192–37; Greenland Harbour, B.A.N.Z.A.R.E. B177–31, B177–33.

Heard Island: Between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–6, B140–17, B140–19, B140–25, B140–28.

LECANORA Ach.

Lecanora Ach., Lichenogr. Univ., 77; 1810.

Type: Acharius treated 132 species in 1810 and 139 in 1814. During the nineteenth century, the name was applied to species with lecanorine apothecia now placed in various families besides the Lecanoraceae. Thirty-six of Acharius' original species are still placed in *Lecanora* sect. *Eulecanora* as understood by modern authors.

Thallus crustose, uniform, attached to the substrate by the hyphae of the hypothallus or of the medulla, without rhizinae, heteromerous; ecorticate or corticate; algae protococcoid. Apothecia sessile, circular; ampithecium well developed; parathecium usually absent or inconspicuous; hypothecium hyaline; asci normally 8-spored (rarely 16-32-spored); ascospores hyaline, ellipsoidal, elongate to spherical, rarely reniform, relatively thin-walled without a sheath. Spermatia exobasidial, bacilliform, cylindric or filiform, straight or curved.

This very large genus of nearly world wide distribution is rather poorly represented in our area. While I am inclined to restrict it to the section *Eulecanora*, and recognize the placodioid forms as a separate genus, as many have done previously, there are so many problems of nomenclature and part of the pertinent literature is not available to me, I have left them in *Lecanora* for the present.

LECANORA ATROCAESIA Nyl.

Lecanora atrocaesia Nyl. ap. Crombie, Jour. Bot. Brit. For., 13, 334; 1875: 15, 104; 1877: Jour. Linn. Soc. Bot., 15, 185; 1876: Phil. Trans. Roy. Soc. [London], 168, 49; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 235; 1885: Zahlbr., Deutsche Südpolar Exp., 8, 47; 1906: Bouly de Lesdain, Ann. Cryptog. Exot., 4, 100; 1931.

Lecanora albocaerulescens Bab. ap. Hook., Cryptog. Antarct., 232; 1845: Fl. Antarct., 2, 538; 1847 non Ach.

Type: Kerguelen, Observatory Bay and Volage Bay, A. E. Eaton (Venus Transit Exp.). *L. albocaerulescens* Bab. based on material from Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror").

Thallus 400μ or more thick, rimose areolate, determinate, marginal areoles somewhat lobate, thick, on a black hypothallus; cortex about 60μ thick, a palisade of vertical hyphae about 3μ in diameter, the upper 20μ disintegrating into a more or less structureless gel; algal layer about 200μ thick, protococcoid, cells 7–8μ in diameter, occurring singly or in more or less vertical rows separated by strands of vertical hyphae, loosely interwoven; medulla of more or less vertical hyphae similar to those of the cortex but more loosely woven. Apothecia innate in thalline areoles which become elevated above the others; discs plane, black, becoming convex; amphithecium not differentiated except as the thallus cracks around the apothecium, leaving a layer of thallus about 150–180μ thick around and under the apothecium; parathecium about 75μ thick, thinning at the top of the thecium, of densely tangled, large, brownish hyphae, but not carbonaceous; hypothecium lenticular, 180μ or less thick in the centre, of hyaline, slender, deeply staining hyphae, becoming subvertical above and not sharply differentiated from the thecium which is about 75–90μ tall; paraphyses coarse, septate, 4–5μ in diameter, unbranched, thin-walled and densely staining at first, becoming brownish with highly gelified walls, cutting off a large, spherical, thick-walled brown cell at the tip; asci cylindric, becoming narrowly clavate, tip thickened, protoplast truncate or with a small umbo, 8-spored; ascospores hyaline, unicellular, with moderately thick wall, 8–13 $\times$ 5–6μ.

[Spermogonia black, semi-immersed, spherical; wall dimidiate, black; spermatiophores fasciculate, subcylindric; spermatia nearly straight or curved, 9–11 × 1μ—Zahlbruckner.]

On rocks with *Verrucaria obfuscata, Thelidium praevalescens, Microglaena kerguelana, Encephalographa cerebrinella, Lecidea asbolodes, L. Auberti, L. Eatoni, L. intersita, L. kerguelensis, L. phaeostoma, L. rhizocarpiza, L. subdisjunguenda, L. sublygomma, L. subplana, L. superjecta, Catillaria kerguelensis, Thalloidima kerguelensis, Rhizocarpon Johnstoni, R. kerguelense, R. Mawsoni, Pertusaria cineraria, P. kerguelana, P. subperrimosa, Aspicilia disjunguenda, A. endochlora, A. lygomma, Lecania Heardensis, Pyrenodesmia vitellinella, Blastenia keroplasta* v. *athallina, Kuttlingeria crozetica, Buellia subplicata, B. tristiuscula* and *Rinodina aspicilina.*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–39, B177–42, B177–44, B177–48, B177–49, B177–50, B177–51, B177–52, B177–53, B204–7; Murray Island, B.A.N.Z.A.R.E. B210–4, B210–5, B212, B530–1, B530–3, B530–6, B530–10; Royal Sound, B.A.N.Z.A.R.E. B90–2, B90–4, B90–10, B90–11, B90–12, B90–13, B90–14, B126–9, B126–11, B126–13; R. Hall, Nat. Herb. Melbourne; Observatory Bay, B.A.N.Z.A.R.E. B192–20, B192–67.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–6, B140–9, B140–14, B140–18, B140–27.

Lecanora broccha Nyl.

Lecanora broccha Nyl. in Crombie, Jour. Bot. Brit. For., 14, 21; 1876: 15, 104; 1877: Jour. Linn. Soc. Bot., 15, 185; 1876. *L. brocella* [typographical error?] Phil. Trans. Roy Soc. [Loudon], 168, 49; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 235; 1885.

Lecanora subfusca Hook. f. & Tayl., London Jour. Bot., 3, 641; 1844 non Ach. sec. specimen in herb. Taylor.

Lecanora subfusca v. *epibryon* Hook. f. & Tayl., Crypt. Antarct., 230; 1845: Fl. Antarct., 2, 536; 1847 *fide* Crombie, Jour. Bot. Brit. For., 15, 104; 1877.

Lecanora Hageni Tuck., Bull. Torrey Bot. Club, 6, 58; 1875: in Kidder, Bull. U.S. Nat. Mus., 3, 29; 1876 *non al.* [at least for Hooker specimen].

Lecanora subfusca v. *Hypnorum* Müll.-Arg., Bot. Jahrb. [Engler], 3, 56; 1883 [specimen not seen].

Lecanora subfusca v. *bryontha* Wilson, Mém. Herb. Boissier, 18, 88; 1900.

Type: Kerguelen, Observatory Bay, Royal Sound, A. E. Eaton (Venus Transit Exp.). The following description based on material available, as I have not seen the type.

Thallus thin, whitish, granular, encrusting dead stems of *Azorella,* K+ yellowing. Apothecia sessile, constricted below, margin smooth, white, rather thick, elevated when young, subcrenate, inrolled, disc chamois to cinnamon rufous, white pruinose, plane or slightly concave; amphithecial cortex a palisade of thick-walled, occasionally branched hyphae with very slender lumina, 100μ thick, highly gelified; algal layer 50μ thick, below the thecium, thinning somewhat toward the margins, cells spherical, up to 10μ in diameter; medulla up to 150μ thick, of thick-walled, contorted hyphae about 5μ in diameter; parathecium inconspicuous, 6–7μ thick, of periclinal hyphae; hypothecium 20μ thick, of very densely woven, slender hyphae; thecium 50–75μ tall; paraphyses very slender, imbedded in the thecial gel, about twice dichotomous above the asci; asci cylindric, 8-spored, 45–65 × 8–12μ; ascospores unicellular, monostichous, ellipsoidal, 11–12 × 4–5μ [15–17 × 6–7μ *fide* Nylander], thick-walled.

The thick-walled spores are very suggestive of *Pannaria,* hence this species may belong in *Psoroma,* but in the absence of spermogonia, one cannot be certain.

Kerguelen: Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror", in Taylor Herb.); Observatory Bay, B.A.N.Z.A.R.E. B192–68; Long Island, Royal Sound, B.A.N.Z.A.R.E. B166–1, B167–1, B167–2, B169–4 (535); Royal Sound, R. Hall, Nat. Herb. Melbourne.

LECANORA MAWSONI Dodge, sp. nov.

Type: King George V Land, Cape Denison, A.A.E. 1049c.

Thallus ad 1 cm. diametro, margine byssoideo, areolae assimilantes pulvinatae, ca. 0·2 mm. diametro, olivaceo-bubalinae. Apothecia 0·2–0·3 mm. diametro, disco convexiusculo, roseo-bubalino; cortex ca. 75μ crassitudine, gelifactus, hyphis fastigiatis; stratum algarum ca. 60μ crassitudine, protococcoideum, cellulis ad 8μ diametro; parathecium ca. 20μ crassitudine, hyphis periclinalibus, 2μ diametro laxe contextis; hypothecium ca. 20μ crassitudine hyphae subverticalibus, septatis; thecium ca. 50μ altitudine; paraphyses tenues, ter dichotomae super ascos, apicibus non incrassatis; asci 22 $\times$ 8μ, stipite 7μ, apicibus incrassatis; ascosporae unicellulares, 7–8 $\times$ 3·5–4μ hyalinae, episporio crasso.

Thallus up to 1 cm. in diameter, margin cottony, assimilative areoles pulvinate, about 0·2 mm. in diameter, olive buff to deep olive buff. Apothecia 0·2–0·3 mm. in diameter, disc slightly convex, Verona brown to warm sepia, margin thin, concolorous with the thallus, each covering an assimilative areole; amphithecial cortex about 75μ thick, now gelified with included rock crystals with suggestions of loosely woven, fastigiate, branched hyphae, more clearly so next the parathecium; algal layer about 60μ thick, protococcoid, cells closely packed above, looser below, angular from mutual pressure, up to 8μ in diameter, mostly smaller; parathecium about 20μ thick, of loose periclinal hyphae about 2μ in diameter; hypothecium, about 20μ thick, of subvertical hyphae, similar to those of the parathecium, but more closely septate and more deeply staining; thecium about 50μ tall; paraphyses slender, about thrice dichotomous above the asci, tips not thickened; asci 22 $\times$ 8μ with a stalk about 7μ long, tips thickened (4–5μ thick), narrowly clavate at first becoming ellipsoidal, tips of protoplasts quite acute and often eccentric; ascospores unicellular with thick epispore, hyaline, 7–8 $\times$ 3·5–4μ, straight or slightly curved while in the ascus.

The species is suggestive of *Lecanora subolivacea* Dodge & Baker, but the assimilative areoles form a more compact crust, surrounded by a broad, cottony margin, the amphithecial cortex seems loosely fastigiate instead of pseudoparenchymatous, the thecium, asci, and ascospores are much smaller. Our material is scanty, growing on a fine-grained, dark rock about the base of very young *Usnea (Neuropogon)* sp. A few apothecia on another rock (149) with *Alectoria congesta* seem to be this species.

King George V Land: Cape Denison, A.A.E. 149, 1,049c type.

Section PLACODIUM Ach.

Lecanora sect. *Placodium* Ach., Lichenogr. Univ., 422; 1810.

Placodium Hill, Gen. Nat. Hist., 2, 96; 1751 [Hist. Pl.]

Lichen sect. *Placodium* Ach., K. Vetensk. Akad. Nya Handl., 248; 1794.

Parmelia sect. *Placodium* Ach., Meth. Lich., 188;1803.

Patellaria subg. *Placodium* Trev., Riv. Period. Lav. I. R. Accad. Padova, 255; 1851–2.

Squammaria DC. in Lam. & DC., Fl. Franç. ed. 3, 2, 374; 1805 non *Squamaria* Scop., Fl. Carniol. ed. 2, 1, 438; 1772 (Orobanchaceae).

Parmelia sect. *Squamaria* Schaer., Flora, 32, 291, 296; 1849.

Lecanora sect. *Squamaria* Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges., 170; 1862.

Squamaria subg. *Squamaria* Boist., Nouv. Fl. Lich., 2, 89; 1903.

Zeora sect. *Placodes* Fw., Jahresber. Schles. Ges. Vaterl. Kultur, 27, 121; 1849.

Psorodium Trev., Riv. Period. Lav. I. R. Accad. Padova, 256; 1851–2.

Placodium subg. *Semiplacodium* Boist., Nouv. Fl. Lich., 2, 97; 1903.

Parmularia B. Nils in Humb., Naturw. Unters. Sarekgebirg. Schwed. Lappl., 3, 34; 1907: non Lév., Ann. Sci. Nat. Bot. III, 3, 5, 236; 1846.

Lecanora sect. *Parmularia* Hue, Ann. Myc., 12, 520; 1914.

Placolecanora Räs., Jour. Jap. Bot., 16, 90; 1940.

Type: as some of the above cited literature is unavailable to me, we may defer the consideration of a type until a later paper.

Thallus crustose in the centre, margin determinate, lobed to squamose, without rhizinae; corticate above, ecorticate below; apothecia sessile or stalked, amphithecium present, parathecium variable in development.

LECANORA EXSULANS (Th. Fries) Dodge & Baker.

Lecanora exsulans (Th. Fries) Dodge & Baker, Ann. Mo. Bot. Gard., 25, 570; 1938.

Lecanora chrysoleuca (Smith) Ach., var. *melanophthalma* (Ram.) Th. Fries, f. *exsulans* Th. Fries, Nyt. Mag. Naturvidensk., 40, 208; 1902.

Lecanora rubina (Vill.) Ach., var. *melanophthalma* (Ram.) Zahlbr. f. *exsulans* (Th. Fries) Zahlbr., Cat. Lich. Univ., 5, 660; 1928.

Type: South Victoria Land, Geikie Land, 71° 40′ S., 170° E., 100 m., C. E. Borchgrevink (in Oslo and Upsala).

Thallus pulvinate, cerebriform masses 1·5–2 cm. in diameter, 3–5 mm. tall, rather fragile, apothecial stalks somewhat branching near the base, mostly smooth, sometimes slightly verrucose (from incipient spermogonia and apothecia?), margin crenate, soon concealed by developing apothecia, light ochraceous salmon to light ochraceous buff; cortex subfastigiate, of slender, hyaline hyphae, about 3μ in diameter, branched and anastomosing in a gel, tips decomposed and covered with minute crystals, about 60μ thick, less regular and decomposed below, where the algal layer is absent; algal layer about 35μ thick, of discrete colonies, cells 7–8μ in diameter, protococcoid; medulla compact, of slender, branched, interwoven hyphae, enclosing many rock crystals.

Apothecia 2–3 mm. in diamter, disc slightly concave at first, light ochraceous buff, soon plane then convex to hemispheric, covering the whole of the apothecial stalk nickel green and finally dusky green, almost black, margin smooth becoming crenulate and irregular, finally disappearing, sometimes concrescent in cerebriform masses; amphithecium not differentiated from the tissues of the apothecial stalk; parathecium 75μ thick below, thinning to about 30μ at the margin, of slender, densely woven, hyaline hyphae, continuous with the medulla in the centre and between the algal colonies which are better developed, often reaching 75μ in diameter and form a nearly continuous layer below the parathecium; hypothecium about 35μ thick, of subvertical, closely septate, slender, deeply staining hyphae; thecium 50μ tall; paraphyses slender, little branched, the last 6–8 cells spherical, about 1μ in diameter, epithecial gel not coloured in thin sections; asci clavate, tips thickened, protoplasts truncate, long mamillate 35–40 $\times$ 7–8μ ascospores long ellipsoid, unicellular, hyaline, 12–15 $\times$ 4μ when still in the ascus 8–10 $\times$ 3μ with thick epispore when discharged.

Spermogonia ellipsoidal, imbedded in the cortex, about 50μ in diameter and 90μ tall; wall very dark brown, 18–20μ thick; spermatiophores slender, 10–12μ long; spermatia 6–7 × 0·5μ, straight.

The above description is largely based on specimens from King George V Land. When I studied the types in Oslo and Upsala, the material was so scanty that I did not section an apothecium. The present material is somewhat smaller, perhaps because it was growing on windswept granite instead of a more protected habitat among mosses.

On rocks with *Heppia antarctica, Lecidea cancriformis, Bacidia Johnstoni, Umbilicaria Hunteri, U. rugosa, Charcotia cerebriformis, Dermatiscum Mawsoni, Lecanora Johnstoni, Alectoria congesta, Polycauliona citrina* and *Rinodina frigida,* and on old skin of sea elephant (*Macrorhinus leoninus*).

King George V Land: Horn (Dreadnought) Bluff, A. L. McLean, A.A.E. 13; Cape Denison, A.A.E. 23, 95–1, 99, 131, 142, 150, 151, 152, 153, 154, 155, 156, 157, B.A.N.Z.A.R.E. 536–1, 536–6, 536–11, 536–16, 536–18, 536–29, 536–33, 536–42.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. 108–9, 108–10, 108–11, 108–12, 108–13, 108–14; 1847.

LECANORA EXSULANS forma MINOR Dodge, forma nova.

Type: King George V Land, Cape Denison, A.A.E.

Apothecia minora, non ad 1 mm. diametro adtingentia; thecium ca. 35μ altitudine; ascosporae minores, 6–7 × 4μ.

Apothecia fewer and smaller, less than 1 mm. in diameter, thecium about 35μ tall; ascospores smaller, 6–7 × 4μ.

Only more field observations and more abundant collections can furnish data as to whether this smaller form is really distinct or only an ecological variant. The collections from MacRobertson Land cited above are somewhat intermediate in size.

On rocks with *Heppia antarctica, Toninia Johnstoni, Umbilicaria rugosa, Lecanora Johnstoni, Rinodina frigida* and *B. Johnstoni.*

King George V Land: Cape Denison, A.A.E. 158, 159, 160, B.A.N.Z.A.R.E. 536–2, 536–8, 536–9, 536–10, 536–24, 536–30, 536–31, 536–32.

LECANORA JOHNSTONI Dodge, sp. nov.

Type: King George V Land, Cape Denison, B.A.N.Z.A.R.E. 536–34.

Thallus cerebriformis, ad 5 mm. diametro, 4 mm. altitudine, subrugosis, lobis marginalibus applanatis, laevibus, minute crenulatis, pallidis, umbrinus; cortex 35–40μ crasstitudine subdecompositus, pseudoparenchymaticus, ex hyphis periclinalibus, 4–5μ diametro, crystallis flavidis inspersis; algae protococcoideae in strato denso sub hypothecio, aliter inter hyphis medullaribus sparsis, cellulis 7–8μ diametro; medulla compacta, hyphis hyalinis, pachydermeis, ca. 4μ diametro. Apothecia 5–6 mm. diametro, disco plano vel subconvexo, isabellino vel brunneo-olivaceo, margine tenui, pallidiori, mox evanescente, non elevato, sessilia, basi constricta; cortex amphithecii magis decompositus, thallino similis; stratum algarum, ca. 55μ crassitudine; parathecium ca. 35μ crassitudine sub hypothecio, hyphis plus minusve periclinalibus 4–5μ diametro, hyalinis, dense contextis; hypothecium ca. 20μ crassitudine, hyphis subverticalibus, tenuibus, septatis; thecium 50–55μ altitudine; paraphyses tenues, ter dichotomae super ascos, ramosae, ramis moniliformibus, apice ellipsoideo, ca. 4–6μ, pachydermeo; asci clavati, 22–25 × 7–8μ, stipite 25μ longitudine, apicibus incrassatis, protoplasto mamillato dein maturitate magis ellipsoidei, ca. 25 × 12μ; ascosporae uniloculares, hyaline, episporio crasso, 8–10 × 4–5μ.

Thallus in small cerebriform cushions up to 5 mm. in diameter and 4 mm. tall; surface somewhat rugose, marginal lobes flattened, smooth, margin minutely crenulate, paler, Dresden brown, nearly covered by apothecia; cortex 35–40μ thick, somewhat decomposed, apparently a pseudoparenchyma from periclinal hyphae 4–5μ in diameter, heavily incrusted with small yellowish brown, minute crystals and including small rock crystals; algae forming a dense layer below the hypothecium, scattered cells in the medulla, cells 7–8μ in diameter, spherical or angular, protococcoid; medulla compactly woven, of thick-walled, hyaline hyphae about 4μ in diameter.

Apothecia 5–6 mm. in diameter, disc flat to somewhat convex, isabelline to brownish olive, margin thin, lighter, soon disappearing, not elevated; sessile, constricted at the base; amphithecial cortex similar to that of the thallus but more decomposed; algal layer about 55μ thick, of densely packed cells filling the space between the cortex and thecium; parathecium about 35μ thick below the hypothecium, of densely woven, more or less periclinal hyphae, almost devoid of protoplasts in the mature apothecium, 4–5μ in diameter; hypothecium about 20μ thick, of subvertical, slender, closely septate, deeply staining hyphae; thecium 50–55μ tall; paraphyses slender, about thrice dichotomously branched above the asci, branches moniliform above, terminal cell ellipsoidal about 6 $\times$ 4μ, thick-walled, encrusted with dark crystals; asci clavate, 22–25 $\times$ 7–8μ on stalk about 25μ long when maturing spores, tips thickened, protoplast mamillate, becoming more ellipsoid about 20 $\times$ 12μ as spores mature; ascospores unicellular, hyaline with thick epispore, 8–10 $\times$ 4–5μ.

What seems to be a young state of *L. Johnstoni* occurs on a worn rock of fine grained granite from Cape Denison and a small thallus from Madigan Nunatak. The thallus is only slightly developed, with a single stalked apothecium. In the apothecium sectioned, the structure is similar to this species, but the dimensions are slightly smaller, the spores being only 7–8 $\times$ 4μ. As these apothecia have developed in the shade of *Umbilicaria subcerebriformis,* perhaps the development has been suppressed, or it may be only a juvenile state. Some of the material is associated with *Buellia* sp.

On rocks with *Lecidea cancriformis, Charcotia cerebriformis, Lecanora exsulans* f. *minor* and *Rinodina frigida.*

King George V Land: Madigan Nunatak, ca. 2,400 ft., 30 miles east of winter quarters, C. F. Laseron, A. A. E. 25–5; Cape Denison, A.A.E. 45, 50–1, 130, 161, 162, 163, 164, 165, 166, 177, B.A.N.Z.A.R.E. 536–14, 536–32, 536–34 type, 536–35, 536–36, 536–37.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A. A. E. 65–2.

LECANORA MCLEANI Dodge, sp. nov.

Type: King George V Land: Horn (Dreadnought) Bluff, A. L. McLean, A.A.E. 47.

Thallus umbilicatus, polyphyllus (sed foliolis plus minusve concrescentibus) in pulvinulos applanatos, plicatos, cerebriformes, fere apotheciis tectos, partes inter apothecia melleae, partes umbrosae et superficies inferior fulva, subrugosa; cortex superior ca. 20μ, laxe fastigiatus, hyphis viridibus, ca. 4μ diametro, cellulis isodiametricis, strato hyalino gelifacto 10–12μ tecta, ex hyphis tenuissimis periclinalibus; stratum algarum 35–40μ crassitudine, altera parte continuum, altera parte coloniis discretis, sphaericis, cellulis cystococcoideis, 8–10μ diametro; medulla laxe contexta, hyphis 2μ diametro, in partibus laxioribus ad 5–6μ, ramosis, anastomosantibusque; cortex inferior fastigiata, hyphis verticalibus ramosis, anastomosantibus in stratum gelifactum, 40–60μ crasstitudine, sine rhizinis.

Apothecia substipitata, disco plano, cinnamomeo-rufo, mox nigricans, dein irregulariter expanso, convexo, frequenter in acervulis cerebriformibus et superficiem superiorem thalli tegentia; amphithecium ab structura thalli non distinctum; stratum algarum sub parathecio continuum;

parathecium 10–15μ crassitudine, hyphis hyalinis, periclinalibus, tenuibus; hypothecium ca. 15μ crassitudine, hyphis crassioribus, leptodermeis; thecium ca. 40μ altitudine; paraphyses pachydermeae, 2μ diametro, semel bisve dichotome super ascos ramosae apicibus clavatis, subincrassatis, in strato gelifacto viridi-nigricanti; asci clavati, primum ca. 21 × 10μ, apicibus incrassatis, protoplastis truncatis cum mamillis longis, truncatis, dein subsphaerici, 18 × 14μ, leptodermei; ascosporae breviter ellipsoideae, 6–7 × 3·5–4μ, uniloculares, hyalinae, episporio modice incrassato.

Thallus umbilicate, polyphyllous, but folioles more or less concrescent in flattened cushions, deeply folded and cerebriform, nearly covered with apothecia, circular, up to 1·5 cm. in diameter, parts exposed to light between the apothecia cream buff to chamois, shaded parts and lower surface ochraceous tawny, somewhat rugose but much smoother than the upper surface; upper cortex about 20μ thick, loosely fastigiate, of dark greenish hyphae about 4μ in diameter, forming isodiametric periclinal hyphae; algal layer 35–40μ thick, in some places continuous, in others of discrete cells above, overlain by a hyaline, gelified layer 10–12μ thick, seemingly formed of very slender spherical colonies, cells cystococcoid, mostly 8–10μ in diameter; medulla loosely woven, of slender, thick-walled hyphae about 2μ in diameter, in looser portions 5–6μ, branched and anastomosed; lower cortex fastigiate, of vertical, branched and anastomosing hyphae, imbedded in a gel, 40–60μ thick; without rhizinae.

Apothecia slightly stalked at first, disc flat, level with the exciple, expanding irregularly, cinnamon rufous, soon blackening, convex, often coalescent in cerebriform masses, practically covering the upper surface of the thallus; apothecium not differentiated from the thallus (i.e. the apothecium is essentially immersed in the cortex of a thalline wart); algal layer continuous under the parathecium; parathecium 10–15μ thick, of slender hyaline, periclinal hyphae; hypothecium about 15μ thick, of coarse, thin-walled deeply staining hyphae; thecium about 40μ tall; paraphyses thick-walled, 2μ in diameter, once or twice dichotomous above the asci, tips slightly clavate, imbedded in the epithecial gel which is nearly hyaline in thin sections, dark greenish black in thick sections; asci clavate, 20 × 10μ at first with thick hyaline tip, protoplast truncate, with a long, truncate mammilla, becoming subsphaerical, 18 × 14μ; ascospores short ellipsoidal, 6–7 × 3·5–4μ with moderately thick epispore.

This species is closely related to *Omphalodium quartum* (Darb.) Dodge & Baker, but the systematic position of both is not clear. Both resemble *Lecanora* sect. *Placodium* in general appearance and microscopic structure except for the well-developed lower cortex. On the other hand it must be admitted that, in several details, the microscopic anatomy is quite suggestive of *Omphalodium*. Unfortunately spermogonia have not yet been found in either species.

King George V Land: Mt. Murchison, 1,860 ft., A. L. McLean, A.A.E. 14–2; Horn (Dreadnought) Bluff, A. L. McLean, A.A.E. 31–1, 34, 47 type, 54.

Aspiciliopsis Müll.-Arg.

Placodium sect. *Aspiciliopsis* Müll.-Arg., Bot Jahrb. [Engler], 5, 135; 1885: Forschungsreise S. M. S. "Gazelle," 4, 10; 1889.

Lecanora sect. *Aspiciliopsis* Zahlbr. ap. Engler & Prantl, Die Nat. Pflanzenfam. I, 1*, 203; 1907.

Type: *Urceolaria macrophthalma* Tayl.

Thallus very thick, areolate in the centre with a radiate margin which often becomes free from the substrate; ecorticate on both surfaces; algae protococcoid, but often replaced in part by the cephalodial algae; medulla thick; cephalodia large, floriform, with *Stigonema*. Apothecia innate with a thin parathecium of periclinal hyphae which becomes brownish to almost black,

especially below the hypothecium; paraphyses slender; asci clavate to cylindric, thin-walled. 8-spored; ascospores unicellular, hyaline, thin-walled.

This endemic genus with its large, conspicuous innate apotheca and large floriform cephalodia is easily recognized.

ASPICILIOPSIS MACROPHTHALMA (Hook. f. & Tayl.) Dodge, comb, nov.

Urceolaria macrophthalma Hook. f. & Tayl., London Jour. Bot. 3, 640; 1844.

Lecanora gelida Bab. ap. Hook. f., Cryptog. Antarct., 229, 1845: Fl. Antarct., 2, 535; 1847 p.p. non (L.) Ach.

Lecanora macrophthalma Nyl., Mém, Soc. I. Sci. Nat. Cherbourg, 5, 336; 1857: Flora 41, 489; 1858: Tuck., Bull. Torrey Bot. Club, 6, 58; 1875: Bull. U.S. Nat. Mus., 3, 29; 1876: Crombie, Jour. Linn. Soc. Bot., 15, 185; 1876: Jour. Bot. Brit. For., 15, 104; 1877: Phil. Trans. Roy. Soc. [London], 168, 48; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 234; 1885: Zahlbr., Deutsche Südpolar Exp., 8, 48; 1906.

Placopsis macrophthalma Nyl. ap. Crombie, Jour. Bot. Brit. For., 15, 106; 1877.

Placodium macrophthalmum Müll.-Arg., Bot. Jahrb. [Engler], 5, 135; 1884: Forschungsreise S. M. S. "Gazelle," 4, 10; 1889: Wilson, Mém. Herb. Boissier, 18, 87; 1900.

Type: Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror").

Thallus thick, up to 1 mm., smooth, centre irregularly cracked through the algal layer, and attached to the substrate by rhizinoid hyphae, especially in older thalli, margin determinate ,more or less lobed and free from the substrate, olive buff to pale olive buff; upper cortex pseudoparenchymatous, 10–15μ thick, protoplasts spherical, about 2μ in diameter; lower cortex completely gelified, 10–15μ thick, except where the rhizinoid hyphae pass through to attach the thallus to the rock; algal layer 220μ thick, protococcoid, cells 8–14μ in diameter, but often replaced by *Stigonema*; medulla 300μ thick but quite variable in thickness, of very slender, thick-walled, conglutinate hyphae, mostly vertical; cephalodia scattered over the central portion, circular to floriform, up to 8 mm. in diameter, slightly elevated, radially cracked, vinaceous fawn to the colour of the thallus, algae *Stigonema*. Apothecia immersed, aspicilioid, 1–1·7 mm. in diameter, disc slightly concave to plane, pruinose, becoming black; amphithecium not differentiated; parathecium 35μ thick, of hyaline, thin-walled hyphae, 3μ in diameter, becoming brownish under the hypothecium, where it is sometimes 35μ thick and blackened, almost carbonaceous; hypothecium up to 150μ thick, of thick-walled dichotomous hyphae, densely woven, subvertical and more deeply staining; thecium 150–180μ tall; paraphyses slender, occasionally branched and anastomosing, several times dichotomously branched and somewhat thicker above the tops of the asci and more closely septate, becoming moniliform, cutting off at the tips short ellipsoidal cells 3–4 $\times$ 2–3μ; asci cylindric, 120–125μ long, wall uniformly 3–4μ thick, not conspicuously thickened at the tips, 8-spored; ascospores monostichous, thin-walled, ellipsoidal hyaline, unicellular, 16–27 $\times$ 9–15μ. Spermogonia immersed, ellipsoidal, 275μ tall, 150μ in diameter, ostiole minute, wall hyaline, about 20μ thick, scarcely differentiated from the medulla except more deeply staining; spermatiophores slender, lageniform, subulate, 10–12 $\times$ 1–1·5μ; spermatia very long, slender, 40–60 $\times$ 1μ.

On rocks with *Verrucaria obfuscata, V. tessellatula, V. Werthii, Coccotrema kerguelensis, Encephalographa cerebrinella, Ionaspis kerguelensis, Steinera glaucella, S. Werthii, Leprocollema obscurius, Lecidea asbolodes, L. Auberti, L. intersita, L. kerguelensis, L. phaeostoma, Mykoblastus perustus, M. stephanodes, Toninia kerguelensis, Urceolina kerguelensis, Pertusaria cineraria, P. ochrolechioides, Huea diphyella, Buellia subplicata* and *B. tristiuscula.*

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–1, B20–10, B20–11, B31, B32.

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B126–10, B126–15, B126–16, B126–17, B126–18; Greenland Harbour, B.A.N.Z.A.R.E. B177–3, B177–15, B177–30, B177–40, B177–41, B177–55, B177–56, B177–57, B177–58, B177–59, B204–6; Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E B246–1, B246–3, B246–12, B246–13, B246–14; Observatory Bay, B.A.N.Z.A.R.E. B192–7, B192–16, B192–28, B192–33, B192–41, B192–42, B192–43, B192–44, B192–45, B192–46, B192–47, B192–48, B192–49, B192–50

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–16, B140–29, B140–30, B140–31, B140–32.

Aspiciliopsis antarctica (Müll.-Arg.) Dodge, comb. nov.

Placodium antarcticum Müll.-Arg., Bot. Jahrb. [Engler], 5, 136; 1884: Forschungsreise S.M.S. "Gazelle," 4, 10; 1889.

Lecanora antarctica Zahlbr. Deutsche Südpolar Exp., 8, 51; 1906 non Müll.-Arg. 1887.

Lecanora (*Aspiciliopsis*) *sublateritia* Zahlbr., Cat. Lich. Univ., 5, 670; 1928.

Type: Kerguelen, Betsy Cove, circ. 500 ft., Naumann, 191, 241 ("Gazelle" Exp.).

Thallus placodioid, closely adnate, from the first monophyllous, radiately lobed, lobes continguous, and flattened, ultimate lobules broad and obtuse, not black marginate, lateritious to orange, from smooth becoming minutely wrinkled. Apothecia minute, first showing as a pore, then growing into a hemispheric protuberance with a wrinkled tip, then thelotremoid, rarely the disc more open up to 0·5 mm., rufofuscescent, epithecium orange rufous, thecium hyaline; paraphyses slender; asci linear, 8-spored; ascospores uniseriate, unicellular, hyaline, ellipsoid, about 20 × 13μ.

The colour of the thallus is probably spurious, due to iron. It differs from *P. macrophthalmum* in being thinner, lacking the blackened margin and in the thalline protuberances.—Müller-Argau.

Since we have been unable to see the type of this species, we are uncertain of its identity. A specimen from Heard Island agrees with Müller-Argau's description in all particulars, but from a study of a large series of apothecia of *Placopsis bicolor* in all stages of development, our specimen is clearly that species. It seems probable that Müller-Argau, who had only a small amount of material, mistook this juvenile condition which has begun to produce spores but in which the thecium has not reached its maximum development and pushed back the greatly expanded amphithecium which nearly covers the younger thecium, for a distinct species from the completely developed state in which the amphithecium is scarcely elevated above the thecium and the disc is several times as large. I made this mistake until I had found so many of the intermediate stages.

Placopsis Nyl.

Placopsis Nyl., Ann. Sci. Nat. Bot. IV, 15, 376; 1861.

Placodium subg. *Placopsis* Müll.-Arg., Bot. Jahrb. [Engler], 5, 135; 1884.

Lecanora subg. *Placopsis* Nyl. in Hue, Nouv. Arch. Mus. [Paris] III, 3, 58; 1891.

The type species is *P. gelida* (L.) Nyl.

Thallus crustose, effigurate, cortex of thick-walled pseudoparenchyma; heteromerous; algae protococcoid with abundant internal cephalodia of *Stigonema* which often almost wholly replace the normal symbiont; external cephalodia apotheciiform, cracked (similar to those of *Aspiciliopsis*).

Apothecia sessile, amphithecium well developed, with *Stigonema* colonies as well as *Protococcus*; parathecium poorly developed and inconspicuous; hypothecium well developed, hyaline; paraphyses slender, branched and moniliform above; asci 8-spored; ascospores ellipsoidal, unicellular, hyaline, thin-walled. Spermogonia ovoid, wall thin, hyaline, hymenium invaginating; spermatiophores long; spermatia relatively short, bacilliform.

In this genus the internal cephalodia reach such a high development that it is difficult to find any *Protococcus* in many sections. The habit of our Kerguelen species is quite similar to *Pannaria dichroa,* although the colour is much deeper orange and the spore is thin-walled. Sterile material may easily be mistaken for *Pannaria.*

PLACOPSIS BICOLOR (Tuck) B. de Lesd.

Placopsis bicolor (Tuck.) Bouly de Lesdain, Ann. Crypt. Exot., 4, 100; 1931.

Placodium bicolor Tuck., Bull. Torrey Bot. Club, 6, 57; 1875: Bull. U.S. Nat. Mus., 3, 28; 1876.

Lecanora bicolor Zahlbr., Deutsche Südpolar Exp., 8, 48; 1906.

Lecanora gelida Hook. f. & Tayl., London Jour. Bot., 3, 641; 1844: Hook. f., Crypt. Antarct., 229; 1845: Fl. Antarct., 2, 535; 1847: Crombie Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 234; non Ach.

Placopsis gelida Crombie, Jour. Linn. Soc. Bot., 14, 184; 1876: Jour. Bot. Brit. For., 15, 104, 106; 1877: Phil. Trans. Roy. Soc. [London], 168, 48; 1879.

Lecanora (*Placopsis*) *gelida* f. *lateritia* Nyl. ap. Crombie, Jour. Linn. Soc. Bot., 15, 184; 1876: Phil. Trans. Roy. Soc. London, 168, 48; 1879.

Placodium gelidum v. *lateritium* Wilson, Mém. Herb. Boissier, 18, 87; 1900.

Type: Kerguelen, Molloy Point, J. H. Kidder (U.S. Transit Venus Exp.), type of *L. gelida* f. *lateritia* from Kerguelen, Swain's Bay, A. E. Eaton (Venus Transit Exp., not seen). Following description based on type, with description of spermogonia from sterile specimen from Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror"), originally determined as *Lecanora gelida* Ach. and annotated by Tuckerman as *L. gelida* var. *lateritia* Nyl.

Thallus orbicular, determinate, margin shortly crenate lobed, lobes about 2 mm. long and broad, rest of the thallus cracked into polygonal areoles about 1 mm. in diameter; now (1940) burnt sienna, about 500μ thick; cortex 35μ thick, a palisade of thick-walled pseudoparenchyma; algal layer about 140μ thick, of scattered cells and small colonies of *Protococcus* with spherical cells about 4–5μ in diameter, largely replaced by a palisade of *Stigonema* filaments 7–8μ in diameter, closely septate as internal cephalodia; medulla of subvertical looser hyphae 3–4μ in diameter; external cephalodia flattened conic, 2–3 mm. in diameter, striate rimose nearly to the centre and crackling along the striate suggesting apothecia of *Coccocarpia*) to almost depressed cerebriform; cortex similar to that of the thallus, consisting of more or less ellipsoidal colonies of *Stigonema*, sometimes clearly filamentous, about 7μ in diameter, sometimes separated into single more rounded cells 7–8μ in diameter and separated by partitions of periclinal, congultinate hyphae 20–35μ broad.

Apothecia up to 3 mm. in diameter, sessile, constricted below, margin elevated, smooth, cortex often eroding so that the margin appears whitish, disc black, plane; amphithecium 110–120μ thick, extending in a layer 35μ thick over the thecium in the juvenile state and gradually retreating as the thecium continues to grow; cortex continuous with that of the thallus and of the same texture; algal layer filling the rest of the amphithecium; parathecium not differentiated; hypothecium 150μ thick, thinning to 35μ thick at the edge, of densely woven, slender, deeply staining hyphae;

thecium about 150μ tall when spores begin to mature, becoming 220μ tall when fully mature; paraphyses slender, repeatedly dichotomously branched, especially above the asci where the branches become more closely septate and finally moniliform; asci cylindric, 8-spored, thin-walled, tips not thickened, 150 × 10–12μ; ascospores monostichous, unicellular, hyaline, short ellipsoidal, thin-walled, 18–20 × 10–12μ.

Spermogonia ovoid, 400μ tall, 250μ in diameter; wall 30μ thick, hyaline, of periclinal hyphae similar to those of the medulla but more compact, invaginating to increase the fertile surface; spermatiophores 35μ long; spermatia exobasidial, short bacilliform, 5–6 × 1μ.

A greyish brown thallus with a few traces of pale orange remaining, on rock with *Steinera glaucella* from Kerguelen, Molloy Point, J. H. Kidder (U.S. Transit Venus Exp.) in Tuckerman Herb, sheet 1,452, determined as *Lecanora gelida* (L.) Ach., is very weathered and "insect" eaten and is thought to belong here but was not sectioned.

Usually solitary, but also on rocks with *Verrucaria obfuscata, V. Mawsoni, Thrombium kerguelanum, Ionaspis Mawsoni, Steinera glaucella, Lecidea phaeostoma, L. rhizocarpiza, L. subcontinua, Mykoblastus stephanodes, Rhizocarpon urceolinum, Pertusaria cineraria* and *Buellia tristiuscula.*

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–13, B20–14.

Kerguelen: Molloy Point, J. H. Kidder (U.S. Transit Venus Exp.) in Tuckerman Herb. sheet 1,777a, type; Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror" in Taylor Herb. sub *Lecanora gelida* (L.) Ach. annotated *Placodium bicolor* Tuck., sterile with spermogonia); Greenland Harbour, B.A.N.Z.A.R.E. B177–60, B177–61; near Port Jeanne d'Arc, 1,400 ft., B.A.N.Z.A.R.E. B200–1, B200–6, B200–7, B200–9; Royal Sound, B.A.N.Z.A.R.E. B126–19, B126–20, B126–21; Mt. Wyville Thompson. B.AN.Z.A.R.E. B246–15, B246–16, B248; Observatory Bay, B.A.N.Z.A.R.E. B192–3, B192–25, B192–40, B192–51, B192–52, B192–53.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–3, B140–20, B140–33, B140–34.

PLACOPSIS VITELLINA (Bab.) Dodge, comb. nov.

Lecanora (*Placopsis*) *gelida* v. *vitellina* Bab. in Hook f. Cryptog. Antarct., 229; 1845: Fl. Antarct., 2, 535; 1847: Bouly de Lesdain, Ann, Cryptog. Exot., 4, 101; 1934.

Type: Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror"), not seen.

Thallus thinner, rimose, areolate, areoles not convex but variously wrinkled and verrucose, margin thin, lobed, lighter in colour and free from the substrate, ochraceous buff to light ochraceous buff, cortex 35μ thick, almost pseudoparenchymatous from a palisade of septate hyphae, 4μ in diameter, decomposing above but not conspicuously gelified; algal layer 300μ thick, probably originally protococcoid but largely replaced by broken filaments of *Stigonema*, about 3–4μ in diameter in long narrow vertical colonies, separated by strands of vertical medullary hyphae; medulla thin, of conglutinate, densely woven hyphae; external cephalodia similar to those of *P. bicolor* but thinner and flatter, less regularly cracked, concolorous with the thallus becoming blackened in age. Apothecia sessile, disc flesh colour, becoming carnelian red or darker at maturity, slightly concave with prominent warm buff margins, solitary or crowded in groups of 3–4 with connate margins, but discs not angular; amphithecium 250μ thick; cortex 25μ thick of gelified pseudoparenchyma, the outer third hyaline, the rest packed with coloured crystals, giving a deep brown colour, nearly opaque; algae and medullary hyphae filling the rest; parathecium 35–50μ thick, apparently of conglutinate, periclinal hyphae but dark brown, almost opaque, extending under the hypothecium; hypothecium obconical, 325μ tall, of vertical hyphae, becoming

more interwoven and deeply staining just below the thecium, with scattered algal cells in the lower portion; thecium 160μ tall; paraphyses flexuous, dichotomously branched and anastomosing, tips free, extending to unequal heights above the thecium, septate but not conspicuously moniliform; asci thin-walled, 8-spored, cylindric, 140–145 $\times$ 15μ; ascospores monostichous, ellipsoidal, thin-walled, 15 $\times$ 10μ.

As I have been unable to see the type of *Lecanora gelida* v. *vitellina* nor Bouly de Lesdain's interpretation of this name, I am uncertain of its identity with the present species. Babington described his variety as "thallo vitellino." I have seen no spores free from the ascus, so the measurements given above may be too small for mature spores. While macroscopically this paler species with lighter disc, even in moribund apothecia, might be referred to *P. bicolor*, its internal structure is clearly distinct.

Kerguelen: near Port Jeanne d'Arc, 1,400 ft., B.A.N.Z.A.R.E. B200–8; Royal Sound, R. Hall, Nat. Herb. Melbourne Bot. Gard., sub. *Lecidea sincerula*.

Lecania Mass.

Lecania Massalongo, Alcun. Gen. Lich., 12; 1855.

The type species is *Lecania fuscella* Mass.

Thallus crustose, uniform, effigurate or somewhat squamose, attached to the substrate by hyphae of the prothallus or of the medulla, without rhizinae, heteromerous; ecorticate or corticate; algae protococcoid; medulla loosely woven of thin-walled hyphae. Apothecia sessile, round, lecanorine; parathecium not well developed; hypothecium hyaline with algae below; paraphyses slender; asci cylindric normally 8-, exceptionally 16-32-spored; ascospores hyaline, ellipsoid to elongate, straight or curved, 2- or more celled, thin-walled with cylindric cells.

Lecania heardensis Dodge, sp. nov.

Type: Heard Island, between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–27.

Thallus 250μ crassitudine, rimuloso-areolatus, cinereus, indeterminatus; ecorticatus, homoeomerus; algae protococcoideae, cellulis 7–10μ diametro, subpolyhedricis, hyphis medullaribus parvis cum crystallis. Apothecia solitaria, 0·3–0·4 mm. diametro, immersa dein subelevata, disco convexo, flavo, pruinoso; amphithecium non bene evolutum; parathecium hyalinum, 35μ crassitudine hyphis pachydermeis gelifactis, non sub hypothecio; hypothecium 100μ altitudine, obconicum, hyphis verticalibus leptodermeis; thecium circiter 90μ altitudine; paraphyses tenues, super ascos dichotome ramosae, apicibus non incrassatis; asci cylindrici apicibus incrassatis, papillatis, 55 $\times$ 6–7μ dein late clavati aut subspherici, leptodermei, 15–18μ diametro; ascosporae hyalinae, uniseptatae, ellipsoideae, leptodermae, 10–12 $\times$ 4–5μ.

Thallus 250μ thick, rimulose areolate, ashy, indeterminate; ecorticate, homoeomerous; algae protococcoid, cells 7–10μ n diameter, somewhat polyhedral, separated by medullar hyphae with very small crystals in the upper portion and rock crystals below. Apothecia solitary, 0·3–0·4 mm. in diameter, immersed at first, then slightly elevated, disc convex, bright chalcedony yellow, pruinose, amphithecium not differentiated from the thallus; parathecium hyaline, 35μ thick, covered by a layer of yellowish brown crystals about 20μ thick, composed of thick-walled, periclinal, gelified hyphae with nearly spherical protoplasts, not extending below the thecium; hypothecium about 100μ tall, obconic, of vertical thin-walled hyphae not sharply differentiated from the thecium above and resting on the algal layer; thecium about 90μ tall; paraphyses slender, dichotomously branched above the asci, tips not enlarged, ending in the epithecial gel, which is

filled with very minute crystals; asci cylindric at first with a narrow papilla in the gelified tip, 55 × 6–7μ then becoming broadly clavate and finally subspherical and thin-walled, 15–18μ in diameter, as the maturing spores form at the top of the ascus; ascospores hyaline, 2-celled, ellipsoid, thin-walled, 10–12 × 4–5μ.

Growing with *Lecanora atrocaesia*, *Usnea* sect. *Neuropogon* sp. and *Buellia subplicata*.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–27, type.

LECANIA KERGUELENSIS Dodge, sp. nov.

? *Lecanora umbrina* Crombie, Jour. Linn. Soc. Bot., 15, 185; 1877: Phil. Trans. Roy Soc. [London], 168, 49; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 235; 1885: Müll.-Arg., Bot. Jahrb. [Engler], 4, 137; 1884 non (Ach.) Mass.

Type: Kerguelen, Royal Sound, Long Island, B.A.N.Z.A.R.E. B167–1.

Thallus areolis 0·5 mm. diametro, vel minoribus, olivaceus, ecorticatus; algae protococcoideae, cellulis 7–8μ diametro, coloniis parvis inter hyphis medullaribus verticalibus, ca. 3μ diametro, leptodermeis. Apothecia 0·1–0·2 mm. diametro, immersa dein sessilia vel subelevata, disco convexiusculo, umbrino, margine tenui, laevi; amphithecium evolutum, parathecium deest; hypothecium 20μ crassitudine, hyphis tenuissimis, dense contextis; thecium 55–60μ altitudine; paraphyses tenues, pachydermae, septatae, simplices vel bifurcatae, ad apices non incrassatae; asci cylindrici, juventute pachydermei, apicibus incrassatis, 40–44 × 10–12μ; ascosporae octonae, aciculares, distichae, 6-loculares, 14 × 2·5–3μ.

Thallus reduced to small, round areoles, about 0·5 mm. in diameter, or less, ecru olive; ecorticate; algae protococcoid, cells 7–8μ in diameter in small colonies between vertical medullary hyphae, with other very small, more or less cylindrical or irregular colonies of *Nostoc?*, cells 3–4μ in diameter at the surface, and also penetrating between the medullary hyphae to considerable depth; medullary hyphae vertical, about 3μ in diameter, thin-walled.

Apothecia 0·1–0·2 mm. in diameter, often 3–4 per areole, immersed at first, then sessile or somewhat elevated, disc slightly convex, burnt umber, or darker, margin thin, smooth, finally almost disappearing as the apothecia are concrescent into masses up to about 0·5 mm. in diameter, when they practically cover the whole areole; amphithecium present, parathecium not differentiated; hypothecium about 20μ thick, of very slender, closely woven hyphae; thecium 55–60μ tall; paraphyses slender, thick-walled, septate, simple or once forked near the apex, tip not enlarged, in the thecial gel; asci cylindric, 8-spored, thick-walled and tip considerably thickened until the spores mature, 40–44 × 11–12μ; ascospores, acicular, distichous, 6-celled, 14–15 × 2·5–3μ.

This very inconspicuous species on decayed grass along with *Lecanora broccha* has been very sparingly collected. The penetration of the thallus by colonies of *Nostoc?* is apparently similar to that observed in *Aspiciliopsis* and *Placopsis*, although not stimulating the formation of cephalodia.

Kerguelen: Royal Sound, Long Island, B.A.N.Z.A.R.E. B167–1.

LECANIA JOHNSTONI Dodge, sp. nov.

Type: Macquarie Island, Featherbed Flat, B.A.N.Z.A.R.E. B533–1.

Thallus crustaceus, uniformis, rimoso-areolatus, superficie minute verrucosa vel glebulosa, grisea; ecorticatus; stratum algarum ca. 100μ crassitudine, protococcoideum, cellulis sphaericis, 11–14μ diametro; medulla hyphis 2μ diametro, ramosis, laxe contextis. Apothecia ad 1 mm. diametro, basi subconstricta, disco olivaceo nigricanti, plano vel concavo statu sicco, margine subelevato, laevi, subcrenulato, colore thalli vel dilutiore; cortex 35–45μ crassitudine, subfastigiatus

hyphis tenuibus, ramosis, strato extero 15μ crassitudine gelifacto; stratum algarum sub thecio et ad latera thecii; medulla ca. 90μ crassitudine, hyphis tenuibus ramosis anastomosantibusque, 1μ diametro; parathecium verum hypotheciumque non evoluta; thecium 45–60μ altitudine; paraphyses 2μ diametro, furcatae, cellulis terminalibus clavatis vel ellipsoideis 7 × 4μ, vaginatis; asci subcyclindrici, 35–40 × 7–8μ; ascosporae hyalinae, leptodermeae, 2-loculares, in asco 7–8 × 3·5-4μ, liberae 10–11 × 4–5μ, septis subconstrictae.

Thallus crustose, uniform, somewhat rimose areolate, surface minutely verrucose to glebulose, grey; ecorticate; algal layer about 100μ thick, protococcoid, cells spherical 11–14μ in diameter; medulla enclosing rock crystals, of slender, branched, loosely woven hyphae, about 2μ in diameter, imbedded in a gel.

Apothecia urceolate, up to 1 mm. in diameter, slightly constricted at the base, disc buffy olive to olive, blackening, flat, drying concave, margin slightly elevated, smooth to slightly crenulate, concolourous with the thallus or lighter; amphithecial cortex 35–40μ thick, subfastigiate, of branched, slender hyphae in a gel, the outer 15μ almost completely gelified; algal layer extending under and to the top of the thecium; medulla about 90μ thick, extending to the top of the thecium, a very loose network of slender, branched and anastomosing hyphae, about 1μ in diameter in a gel; true parathecium and hypothecium not differentiated; thecium 45–60μ tall; paraphyses 2μ in diameter, a continuation of medullary hyphae, less branched and not anastomosing once dichotomous near the apex, ending in a brownish, clavate to ellipsoidal cell with a sheath, 7 × 4μ; asci subcylindric, 35–40 × 7–8μ; ascospores hyaline, thin-walled, 2-celled 7–8 × 3·5–4μ while still in the ascus, 10–11 × 4–5μ when free, slightly constricted at the septum.

The systematic position of this species is not altogether clear. While the characters usually used to separate genera, place it in *Lecania*, the structure of the thallus and apothecia are strongly reminiscent of *Lecanidium* of the Pertusariaceae.

On rocks with *Pyrenodesmia inclinans* and *Rinodina peloleuca*.

Macquarie Island: Featherbed Flat, B.A.N.Z.A.R.E. B533–1, B533–2, B533–3, B533–4.

THAMNOLECANIA Vainio.

Lecanora subg. *Thamnolecania* Vainio, Résult. Voy. S.Y. "Belgica," Bot., 16; 1903.

Lecania sect. *Thamnolecania* Zahlbr. ap. Engler & Prantl, Die Natürl. Pflanzenfam. I, 1*, 205; 1907.

Type: *Lecanora Brailmontii* Vainio.

Thallus dwarf fruticose, terete; cortex decomposed and gelified; algae protococcoid. Apothecia lecanorine on the tips of branches, often aggregate and confluent; asci 8-spored; ascospores 4–6-celled. Spermogonia immersed in lateral branches; spermatiophores few septate, branched; spermatio filiform, curved.

THAMNOLECANIA ANTARCTICA (Tuckerman, M.S.) Dodge, sp. nov.

Lecidea (*Toninia*) *antarctica* Tuck., in herb.

Lecidea aromatica Hook. f. & Taylor, London Jour. Bot., 3, 636; 1844: Cryptog. Antarct., 232; 1845 *non aliorum.*

? *Lecidea assimilata* Crombie, Jour. Linn. Soc. Bot., 15, 187; 1876: Jour. Bot. Brit. For., 15, 104; 1877: Phil. Trans. Roy. Soc. [London], 168, 50; 1879: Rept. Sci. Res. Voy. "Challenger" Bot., 1, 2, 237; 1885: non Nylander, Lich. Scand., 221; 1861.

Type: Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb., fragment in Tuck. Herb. sheet 3,163 in Farlow Herbarium at Harvard University. Tuckerman annotated sheet 3,163 as follows: "Thallus radiculosus, durus. Sporae crassiores! incolores, oblongo-ovoideae, 4-loculares, 20–25 × 7–9μ. Paraphyses aggregatae. Hypothecium nigrofuscescens."

Thallus subfruticosus, aggregatus ad 2·5 cm. diametro, et ad 5 mm. altitudine, apicibus ramorum crustam verrucosam efformantibus, verrucae applanatae vel subsquamosae, stipites argillacei; cortex circiter 25μ crassitudine, hyphis periclinalibus gelifactis; stratum algarum circiter 150μ crassitudine, protococcoideum, cellulis in dimidio superiore densissimis, inferiore sparsis; medulla circiter 200μ crassitudine, hyphis dimidio exteriore laxissime, interiore densius contextis, circiter 2μ diametro.

Apothecia aggregata confluentia, terminalia in apicibus ramorum brunnea vel nigra convexa, immarginata ad 2 mm. diametro ex parathecio apotheciorum senescentium proliferantia; amphithecium texturae thalli simile; parathecium hyphis gelifactis, dichotomis non bene a paraphysibus differentiatis; hypothecium obconicum 180μ altitudine brunneum, hyphis verticalibus, tenuibus; thecium circiter 165μ altitudine hyalinum superne viridi-nigricans; paraphyses tenues, dichotome ramosae, septatae, apicibus non inflatis; asci clavati, 130 × 30μ; ascosporae octonae, uniseriales, fusiformes elongatae, 3–5-septatae, 20–30 × 5–7μ.

Thallus dwarf fruticose, forming dense tufts about 2·5 cm. diameter and about 5 mm. tall, tips of branches forming a verrucose crust, some of the verrucae applanate to almost squamose, stems clay colour with some of the subfoliose verrucae tea-green; cortex about 25μ thick, of gelified disintegrating periclinal hyphae; algal layer about 150μ thick, protococcoid, cells densely packed in the upper half, more scattered below; medulla about 200μ thick, the outer half of very loosely woven slender hyphae about 2μ in diameter, much denser within.

Apothecia terminal on the ends of thalline branches (appearing as a lobed, very thick and convex brownish apothecium), aggregate and confluent often appearing as a single large convex, immarginate, black apothecium up to 2 mm. in diameter, but in sections the individual apothecia are separated by thin algal layers, apparently proliferating from the parathecium of the old apothecium; amphithecium similar in structure to that of the thallus; parathecium of slender, paraphysiform hyphae imbedded in a gel arising from the outer margin of the hypothecium and spreading flabellately above, dichotomously branched, not sharply differentiated from the paraphyses; hypothecium obconic, 180μ tall, brownish, of slender vertical hyphae which pass into the paraphyses and asci above; thecium about 165μ tall, hyaline becoming greenish black above; paraphyses slender, dichotomously branched and more closely septate above, tips not inflated ending in the dark green epithecial gel; asci 8-spored, clavate, 130 × 20μ; ascospores uniseriate long fusiform, 4–6-celled, 20–30 × 5–7μ. [Our spores may be immature as they are still in the ascus.]

The systematic position of this species is somewhat doubtful. It might be considered as a very reduced *Stereocaulon*, but the spores of this genus are much smaller, and reduced *Stereocaula* are seldom fertile. The presence of algae between the apothecia and the dwarf fruticose thallus with its disintegrating, almost amorphous, gelified cortex and its large 4–6-celled spores all point to *Thamnolecania*, previously known only from the Graham Land Archipelago. Except for the algae between the apothecia, visible only by microscopic sections, it might be considered a species of *Toninia* as did Tuckerman, although I know of no species with such a thick verrucose thallus and this type of cortex.

Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. and Tuckerman Herb.

THAMNOLECANIA MAWSONI Dodge, sp. nov.

Type: King George V Land, Cape Denison, A.A.E. 15.

Thallus ad 2 mm. altitudine, K–, marginibus lobatis rotundatis, lobis 0·3 mm. longitudine, ca. 0·5 mm. latitudine, superficie subcerebriformi, olivaceo-ochracea; cortex 20μ crassitudine, fastigiato-pseudoparenchymaticus, cellulis parvis leptodermeis, crystallis flavo-brunneis inspersis, aut plus minusve decompositus; stratum algarum ad 35μ crassitudine sub parathecio, inferne tenuescens et in stipite apothecii evanescens, cellulis 6–7μ diametro, compactis; medulla hyphis tenuibus irregularibus, ca. 4μ diametro, dense contexta. Apothecia solitaria vel gregaria in apicibus stipitum, 0·5–0·9 mm. diametro, disco convexissimo, immarginato, luteo-olivaceo vel obscuriori; amphithecium non bene evolutum; parathecium ca. 35μ crassitudine, hyphis tenuibus, pachydermeis, hyalinis, periclinalibus, flavidum, plus minusve crystallis margine inspersum; hypothecium ca. 20μ crassitudine, hyphis subverticalibus, non bene distinctum; thecium 130μ altitudine; paraphyses tenues; asci cyclindrici; ascosporae distichae, 2-loculares, leptodermeae, septo subeccentrico, longe ellipsoideae, 7–8 × 3μ. Spermatia curvata 10–12 × 0·5μ.

Thallus very fragmentary, 2 mm. tall, K–, margin lobed, lobes rounded 0·3 mm. long, about 0·5 mm. broad, surface subcerebriform, olive ochre; cortex 20μ thick, a palisade of small-celled, relatively thin-walled pseudoparenchyma, thickly incrusted with yellowish brown, minute crystals, more or less decomposed; algal layer up to 35μ thick, under the parathecium thinning rapidly and disappearing along the sides of the apothecial stalk, cells 6–7μ in diameter, closely packed; medulla of slender, closely woven, irregular hyphae about 4μ in diameter.

Apothecia occurring singly or crowded in groups of 2–3 on tips of stalks, 0·5–0·9 mm. in diameter, disc very convex, immarginate, yellowish olive or darker; amphithecium not well developed; parathecium about 35μ thick, of slender, thick-walled, hyaline, periclinal hyphae, yellowish, more or less incrusted with minute crystals at the margin; hypothecium about 20μ thick, of subvertical hyphae, more deeply staining, merging with the parathecium below and the thecium above; thecium 130μ tall; paraphyses slender; asci cylindric; spores distichous, 2-celled, hyaline, thin-walled, septum somewhat eccentric, long ellipsoid, 7–8 × 3μ. Spermatia long, curved, 10–12 × 0·5μ.

Most of the apothecia sectioned are old and gelified, the asci collapsed and only a few spores seen, several germinating *in situ*. Spermogonia were not clearly seen, but in one old thallus, old ones still contained a few long, curved spermatia 10–12 × 0·5μ.

On red and grey granite with *Heppia antarctica, Toninia Johnstoni* and *Umbilicaria Hunteri*.

King George V Land, Cape Denison, A.A.E. 15, 103–2, 123, 167.

CANDELARIELLA Müll.-Arg.

Candelariella Müll.-Arg., Bull. Herb. Boissier, 2, app., 1, 11; 1894.

The type species is *Candelariella vitellina* (Ach.) Müll.-Arg.

Thallus crustose, uniform, horny, verrucose or effigurate (sect. *Caloplacopsis*), bright yellow not coloured red by KOH, attached to the substrate by hyphae of the prothallus or of the medulla, without rhizinae, heteromerous; with *Protococcus*. Apothecia sessile, circular, yellow, not coloured red by KOH, lecanorine; hypothecium hyaline with algae below; paraphyses unbranched, non-septate or septate near the tip; asci 8- to many-spored; ascospores hyaline, elongate to ellipsoidal, 1-2-celled with thin septum and walls. Spermogonia very small, punctiform, yellow; spermatiophores scantily septate, forked or branched, short; spermatia short, straight.

CANDELARIELLA PARASITICA Dodge, sp. nov.

Type: Crozet Archipelago, Possession Island, American Bay, B.A.N.Z.A.R.E. B20–15.

Thallus obscure viridis, parasiticus in *Buellia tristiuscula*. Apothecia sessilia vel semi-immersa, flava, K–, 0·3–0·4 mm. diametro, marginibus tenuissimis, non elevatis, disco plano vel subconvexo; amphithecium non bene evolutum; parathecium 18–22μ crassitudine, pseudoparenchymaticum, cellulis pachydermaticis, sphericis vel ellipsoideis, 4–6μ diametro, sub hypothecio obconicum, 120–140μ altitudine, pseudoparenchymaticum, cellulis leptodermaticis; hypothecium 75μ crassitudine, hyphis subverticalibus; thecium 35μ altitudine; paraphyses gelifactae, tenuissimae, septatae, dichotome ramosae super ascos; asci clavati, apicibus incrassatis, mamillatis, 40–45 $\times$ 7–8μ; ascosporae octonae, hyalinae, oblongae, subcurvatae, unicellulares dein 2-cellulares, septo tenuissimo, 14–15 $\times$ 4–5μ.

Thallus forming dark greenish patches on the surface of *Buellia tristiuscula*, impossible to differentiate in sections from that of *Buellia* which has algae of approximately the same size and shape. Apothecia sessile to semi-immersed, primuline yellow to mustard yellow, K–, 0·3–0·4 mm. in diameter, margin very thin, not elevated, disc plane to slightly convex; amphithecium not clearly differentiated; parathecium 18–22μ thick, pseudoparenchymatous, of thick-walled cells, protoplasts spherical to ellipsoidal, 4–6μ in diameter, extending below the hypothecium as a cone of thinner-walled pseudoparenchyma, 120–140μ tall; hypothecium 75μ thick, of subvertical hyphae, not clearly differentiated from the parathecium except by its deep staining; thecium 35μ tall; paraphyses highly gelified but apparently very slender, septate, dichotomously branched above the asci and ending in the thecial gel; asci clavate, 40–45 $\times$ 7–8μ, tip thickened, protoplast mamillate, apparently 8-spored; ascospores hyaline with moderately thick walls, oblong with rounded ends, sometimes slightly curved, remaining unicellular for a long time but finally 2-celled with a very thin septum, 14–15 $\times$ 4–5μ

The systematic position of this species is not altogether clear. *Candelariella* includes species with quite varied morphology and possible relationships and is badly in need of revision. The thin but well developed parathecium suggests *Blastenia*, but its spores and lack of chrysophanic acid suggest *Candelariella* as at present understood.

Parasitic on *Buellia tristiuscula*.

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–15, type.

CANDELARIELLA CEREBRIFORMIS Dodge, sp nov.

Type: King George V Land, Cape Denison, A.A.E. 1,052.

Thalli determinati concrescentes vel subsparsi in areis 2–3 cm. diametro; thallus singulus subcerebriformis, 2–3 mm. diametro, ca. 1 mm. altitudine, flavus, K–; cortex superior ca. 25μ crassitudine insuper gelifactus, cum crystallis flavo-brunneis, hyphis tenuibus plus minusve periclinalibus; stratum algarum 55–60μ crassitudine, sub apothecio crassius, cellulis 5–6μ diametro; medulla laxe contexta, hyphis tenuibus, pachydermeis, 3·5μ diametro; cortex inferior 18–22μ crassitudine, gelifactus, fastigiatus, cellulis plus minusve isodiametricis. Apothecia in verrucis thallinis immersis, disco primum concavo dein cerebriformiter expanso, flavo, ad 3–4 mm. diametro, basi constricta, immarginata; amphithecium non bene evolutum; parathecium 110μ crassitudine centro, ad marginem tenuescens, hyphis periclinalibus, leptodermeis, strato extero 35μ crassitudine, hyphis superficiei extero perpendicularibus, gelifacto, crystallis minutis flavobrunneis insperso; hypothecium ca. 75μ crassitudine, hyphis verticalibus, non aliter distinctum; thecium ca. 90μ altitudine; paraphyses tenues, leptodermeae, simplices vel semel bisve dichotome ramosae, septatae,

submoniliformes, crystallis minutis brunneis inspersae; asci clavati, apicibus incrassatis, protoplastis longe mamillatis, 60–65 × 10–12μ, polyspori; ascosporae ellipsoideae, hyalinae, uniloculares, 4 × 2μ. Spermogonia sphaerica in cortice superiori immersa, ca. 45μ diametro; murus hyalinus, 2–3 stratis hypharum periclinalium; spermatiophorae ca. 15 × 1·5–2μ, simplices vel ramosae. 3-septatae; spermatia terminalia, cylindrica vel subellipsoidea, 2 × 0·4μ.

Thallus determinate, concrescent or somewhat scattered, covering areas 2–3 cm. in diameter; individual thalli somewhat cerebriform, 2–3 mm. in diameter, about 1 mm. tall. primuline yellow, corticate on both surfaces, K–; upper cortex about 25μ thick, gelified upper portion with dense masses of minute, yellow-brown crystals, rest of slender, more or less periclinal hyphae; algal layer 55–60μ, thicker under the apothecium, cells 5–6μ in diameter, closely packed; medulla loosely woven, of slender, thick-walled hyphae, 3·5μ in diameter; lower cortex 18–22μ gelified, fastigiate cells more or less isodiametric, heavily incrusted with minute, yellow-brown crystals.

Apothecia immersed in thalline warts, at first disc concave, expanding to cerebriform masses, 3–4 mm. in diameter, immarginate, constricted at the base, disc variously contorted, aniline yellow; amphithecium absent; parathecium of periclinal thin-walled conglutinate hyphae, 110μ thick below, thinning toward the margin, the hyphae of the outer 35μ bending outward, more or less perpendicular to the surface, forming a gelified, fastigiate cortex, heavily incrusted with minute yellow-brown crystals; hypothecium about 75μ thick, deeply staining vertical hyphae, not otherwise differentiated from those of the parathecium; thecium about 90μ tall; paraphyses slender, thin-walled, simple or once or twice dichotomous above the asci, more closely septate in the epithecial gel, submoniliform and heavily incrusted with minute brownish crystals; asci long clavate, tips thickened and protoplast long mamillate, 60–65 × 10–12μ, polysporous; ascospores ellipsoidal, hyaline, unicellular, 4 × 2μ.

Spermogonia spherical, immersed in the upper cortex, about 45μ in diameter; wall hyaline, of 2–3 layers of periclinal hyphae; spermatiophores about 15 × 1·5–2μ, 3-septate, simple or branched; spermatia terminal, single or in pairs, cylindric to slightly ellipsoidal, with a large nucleus, 2 × 0·4μ.

While apparently this species belongs in sect. *Caloplacopsis* from its sparingly septate spermatiophores, its systematic position is somewhat uncertain. Since the mature apothecium lacks an amphithecium, it might be referred to *Biatorella* sect. *Eubiatorella*, none of whose species has such a highly developed thallus nor algae under the parathecium. The thallus with a well-developed lower cortex suggests *Candelaria* of the Parmeliaceae.

On rocks with *Heppia antarctica, Lecidea cancriformis* and *Rinodina frigida*.

King George V Land: Cape Denison, A.A.E. 100, 121, 125, 127, 168, 169, 170, 171, 172, 1,052.

PARMELIACEAE.

Thallus foliose, resupinate to erect and almost fruticose, often attached to the substrate by rhizinae, dorsiventral; usually corticate on both surfaces, rarely ecorticate below (*Anzia*); algae protococcoid, lower surface nearly nude or more usually covered with rhizinae which rarely anastomose to form a spongy hypothallus (*Anzia* and *Pannoparmelia*). Apothecia circular, sessile to short stipitate, amphithecium well developed; paraphyses branched or unbranched, often imbedded in a gel; asci 6–8-spored (16–32-spored in *Anzia and Candelaria*); ascospores hyaline, unicellular, ellipsoidal to almost spherical.

Of the dozen commonly recognized genera of this family, only *Menegazzia* and *Parmelia* have been found in our area.

Medulla with coarse, loosely woven, dark-brown hyphae below; ascospores very large, thick-walled often fewer than 8 per ascus; rhizinae absent .. .. *Menegazzia* Mass.

Medulla uniform, white or pale yellow; ascospores smalled thin-walled .. *Parmelia* Ach.

Rhizinae absent, more or less fruticose, often hollow or inflated .. .. *Hypogymnia* Nyl.

Rhizinae present, foliose, not hollow or inflated .. .. *Euparmelia* Ach.

Upper cortex appearing pseudoparenchymatous and often extending to the under-side of the tips of the lobes for a short distance; lower cortex of conglutinate slender periclinal hyphae, or decomposed.. .. .. *Physcioideae.*

Upper cortex of branched hyphae perpendicular to the surface of the thallus, cells more or less isodiametric, often giving the appearance of pseudoparenchyma in both upper and lower cortex

Rhizinae small and evenly distributed, thallus dark, some shade of olive, brown or black .. .. *Melanoparmelia*

Rhizinae large, evenly distributed, thallus greyish .. .. *Hypotrachyna*

Menegazzia Mass.

Menegazzia Massal., Neag. Lich., 3; 1854.

Parmelia subg. *Menegazzia* Vainio, Etude Lich. Brésil, 1, 27; 1890.

Type: *M. terebrata* (Hoffm.) Mass. [*Parmelia pertusa* (Schrank) Schaer.]

Thallus radiately lobed, underside black, without rhizinae; upper cortex often perforate; medulla with coarse, loosely woven, dark brown hyphae in the lower portion, smaller, closely woven and hyaline in the upper portion, often splitting leaving a central cavity; apothecia parmelioid; ascospores large, unicellular, hyaline, with thick wall, often fewer than 8 per ascus.

This genus with its large thick-walled ascospores seems to have been derived from *Pertusaria* and *Urceolina* rather than from *Lecanora* as has *Parmelia.* There is a single species widespread in the colder portions of the north temperate zone, the rest distributed in southern South America, southern Australia, Tasmania and New Zealand, south to Macquarie Island. The distribution closely parallels that of *Usnea,* subg. *Neuropogon,* but not extending quite as far either north or south.

Menegazzia circumsorediata Santesson.

Menegazzia circumsorediata Santesson, Ark. Bot., 30, 11, 14; 1942.

Parmelia diatrypa Hook. f. & Tayl., Crpt. Antarct., 227, 239; 1845: Fl. Antarct., 2, 533, 547; 1847 non Ach.

Parmelia pertusa Nyl., C. R. Acad. Sci. [Paris], 83, 89; 1876 non (Schrank) Schaer.

Type: New Zealand, South Island, Fiord Bot. Dist., Doubtful Sound, Deep Cove, E. Du Rietz in Bot. Mus. Stockholm, not seen.

Thallus circular, light mineral grey, at least 3 cm. in diameter and probably larger as it tends to die in the centre and proliferate at the margin; central portion appearing somewhat cerebriform from the fusion of more or less imbricated lobes, marginal lobes about 8 mm. long, subcuneate, once or twice dichotomous, margin smooth, 2–3 mm. broad, with small circular perforations 0·3–0·5 mm. in diameter near the margins, older perforations on the tops of the bullae, larger and more irregular, up to 1·5 mm. in diameter, and appearing similar to an apothecium with inrolled margin, slightly crenate at the edge; lobes inflated, hollow, the rupture being in the middle

of the dark brown, coarse medullary hyphae (not at the junction with the finer, white medullary hyphae as in *M. pertusa*); soredia in the centre of the thallus, from circular, subcerebriform soralia which break up into coarsely granular soredia and are more or less confluent (not at the tips as in *M. pertusa*); lower surface antique brown at the margin, darker towards the centre, variously wrinkled and verrucose, smooth, without rhizinae; upper cortex 25–35μ thick, fastigiate, of very thick-walled hyphae about 4μ in diameter, with spherical protoplasts about 2μ in diameter, decomposed above; algal layer about 35μ thick, of loosely arranged, solitary protococcoid cells, 11–15μ in diameter, more or less continuous, with occasional small colonies about 20μ in diameter, composed of closely packed young cells 5–6μ in diameter, separated by strands of medullary hyphae (the future soredia?); upper medulla 50–60μ thick, compact, hyaline, of thick-walled, longitudinal hyphae, 5–6μ in diameter, appearing almost pseudoparenchymatous above, somewhat looser below; lower medulla of dark brown hyphae, very loosely woven, 7–8μ in diameter, splitting into two layers, each 75–100μ thick, thus lining the central cavity (often with outgrowths at the septa suggesting the clamp connections of the Basidiomycetes); lower cortex a palisade of the lower medullary hyphae, cells rounded, about 8μ in diameter, giving a loose pseudoparenchyma, dark brown to black in thicker sections. Apothecia and spermogonia not seen.

At first sight this might be taken for *M. pertusa* (Schrank) Schaer, but the soredia are borne on the older portions, not the growing tips, the rupture to form the cavities of the inflated lobes is in the centre of the lower medulla, not at its junction with the upper medulla, all dimensions are much larger, and the upper cortex is hyaline and decomposing.

Growing over mosses, Macquarie Island. Probably the reports of *Parmelia pertusa* from Campbell Island by Nylander and of *P. diatrypa* from the Auckland Islands by J. D. Hooker and Taylor belong here.

Macquarie Island, Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. 531–21, 531–22; north end of Island, Sta. 81, B.A.N.Z.A.R.E. 540–12, 540–13.

Parmelia Ach.

Parmelia Ach., Meth. Lich., 153; 1803.

Imbricaria Ach., K. Vetensk. Akad. Nya Handl., 15, 250; 1794: Michaux, Fl. Bor.-Am., 2, 322; 1803.

Physcia S. F. Gray, Nat. Arr. Brit. Pl., 1, 455; 1821 non Schreber, 1791.

Type: *P. saxatilis* (L.) Ach.

Thallus foliose, appressed or ascending, laciniate, with rounded or linear lobes, often imbricate; upper surface often sorediose or isidiose, lower surface either lighter or darker than the upper, usually covered with rhizinae except at the margins (rhizinae absent in subgenus *Hypogymnia*); upper cortex of vertical hyphae, lower cortex usually similar (but of longitudinal hyphae in the Physcioideae); medulla of loosely woven periclinal hyphae; algae protococcoid; apothecium on the upper surface, never marginal, sessile or short stipitate, disc concave or flat, chestnut brown, amphithecium prominent, hypothecium hyaline with algae below; paraphyses imbedded in a gel, usually branched and septate, clavate or pointed at the tips; asci clavate, usually 8-spored, ascospores hyaline and unicellular; spermogonia immersed in the surface of the thallus or amphithecium, spherical or pyriform, opening by black ostioles, wall black or dark brown above, light brown or hyaline below, spermatiophores simple or branched; spermatia cylindric or fusiform, often slightly constricted in the middle.

HYPOGYMNIA Nyl. (subgenus).

Parmelia subgenus *Hypogymnia* Nyl., Flora, 64, 537; 1881.

Hypogymnia Nyl., Lich. Env. Paris, 39; 1896 [without formal generic description].

Type: *Parmelia physodes* (L.) Ach. As a genus Nylander included *P. pertusa* (Schrank) Schaer., the type of *Menegazzia,* here treated as a distinct genus.

Thallus grey, yellowish-brown to black, placodioid to subfruticose, under surface usually black, without rhizinae; often with a central cavity.

Sub-Arctic, sub-Antarctic and alpine. A single species in our collections.

PARMELIA SUBLUGUBRIS Dodge, sp. nov.

? *Parmelia physodes* v. *sublugubris* Müll.-Arg., Flora, 66, 75; 1883.

? *Parmelia lugubris* f. *tenuis* Bitter, Hedwigia, 40, 244; 1901.

Type: Macquarie Island, Wind Desert, top of hills, H. Hamilton A.A.E. 106, det. *P. lugubris* by Edwin Cheel. The descriptions of the above-cited varieties are suggestive of our plant, but are too brief for certain reference. The former was described from Tasmania, Gunn and Australia, Mt. Cobbaros, 6,000 ft., in Herb. Hampe; the latter from New Zealand, South Island, Ben Lomond, Schauinsland in Herb. Bremen. It is quite probable that the material from Lord Auckland's group and Campbell Island, reported as *P. enteromorpha* Ach. by Hook. f. & Tayl., Crypt. Antarct., 227, 239; 1845, belongs here.

Thallus erectus, rigidus basi emoriens superne proliferans, 4 cm. altitudine, repetito-divaricate et subdichotome ramosus, cavus, inflatus, axillis constrictis, 2 mm. diametro, apicibus rotundis vel obtusis, superficie inferiori (morphologica) nigra, rugosa, foveolata, rare perforata; superficie superiori grisea, nigris cum maculis irregularibus, verrucosa, rugosave; cortex 18–20μ crassitudine, fastigiatus, cum strato gelifacto superne 7–8μ crassitudine; stratum inter corticem et stratum algarum ca. 35μ crassitudine, hyphis medullaribus contexta; stratum algarum discontinuum, ca. 75μ crassitudine, cellulis protococcoideis, 5–6μ diametro; medullae stratum superius ca. 75μ crassitudine, hyphis laxissime contextis, 4μ diametro, stratum inferius ca. 50μ crassitudinis, hyphis compactius intus laxius contextis. Spermogonia in apicibus loborum, nigra; spermatia bacilliformia medio subconstricta, ca. $5 \times 0 \cdot 5\mu$.

Thallus erect, very rigid, dying at the base and proliferating above, 4 cm. tall, repeatedly divaricately branched, hollow, inflated, branching more or less dichotomous, constricted (at least not inflated) at the axils, about 2 mm. in diameter, tips rounded or obtuse, not connate, morphological lower surface black, rugose and foveolate with occasional perforations, upper surface (1943) light ochraceous buff to warm buff (grey when preserved in formalin), with irregular black patches, especially in the lower portions, verrucose and rugose; upper cortex 18–20μ thick, fastigiate, with a clear zone above, 7–8μ thick; then a layer of loosely woven medullary hyphae of variable thickness, often 35μ, between the cortex and the algal layer; algal layer discontinuous, about 75μ thick, of closely packed cells, protococcoid 5–6μ in diameter, with occasional small colonies in the medulla; upper medulla about 75μ thick, often quite variable, of loosely woven hyphae 4μ in diameter; lower medulla about 50μ thick, of compactly woven typhae, fraying out inside next the cavity, with occasional solitary algal cells; lower cortex 18–20μ thick, similar to the upper cortex.

Apothecial initials scattered over the morphological upper surface, margin crenate; only ascogonia seen. Spermogonia on tips of somewhat inflated lobes, as small black warts; spermatia

bacilliform, slightly constricted in the middle, about $5 \times 0 \cdot 5\mu$ [seen floating in crushed preparations; fully developed spermogonia not seen in sections].

This species approaches *Alectoria* in its fruticose habit, circular cross section with algal layer surrounding the upper part of the lobes. As the algae die, the thallus blackens irregularly and more rapidly on the morphological underside. The structure of the cortex clearly shows its relationship to *Parmelia,* subgenus *Hypogymnia,* rather than to *Alectoria.* The lack of chondroid tissue distinguishes it from other members of the Usneaceae, while the presence of the amphithecium separates it from the Unciales series of *Cladonia.* The wholly fruticose habit with much longer internodes and clearly developed perforations on the morphological under surface, although not abundant served to separate it from *P. lugubris* Pers. with which it is close in its morphological details, although most measurements are smaller.

Apparently growing on earth or rocks, perhaps among mosses.

Macquarie Island, Wind Desert, top of Hills, H. Hamilton, A.A.E. 106, type: Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. 531–23 (immature).

EUPARMELIA Nyl.

Parmelia subgenus *Euparmelia* Nyl. in Hue, Revue de Bot., 4, 375; 1885–6.

Type: *P. caperata* (L.) Ach.

Thallus foliose, rhizinae always present, either uniformly distributed, or absent from the margins; medulla of loosely woven hyphae, uniform.

Section MELANOPARMELIA Hue.

Parmelia subgenus *Euparmelia* sect. *Melanoparmelia* (Hue) Zahlbr. in Engler & Prantl, Nat. Pflanzenfam. I, 1*, 212; 1907.

Parmelia sect. *Melanoparmelia* Hue, Nouv. Arch. Mus. [Paris] IV, 1, 138; 1899.

Type: *P. stygia* (L.) Ach.

Thallus greenish brown, chestnut brown to black, under surface sparingly covered with rhizinae; apothecia sessile.

PARMELIA STYGIOIDES Nyl.

Parmelia stygioides Nyl. in Crombie, Jour. Bot. Brit. For., 13, 333; 1875: Jour. Linn. Soc. Bot., 15, 183; 1876: Jour. Bot. Brit. For., 15, 103; 1877: Phil. Trans. Roy. Soc. [London], 168, 48; 1879: Hue, Nouv. Arch. Mus. II, 2, 291; 1890: Zahlbr., Deutsche Südpolar Exp., 8, 48; 1906.

Type: Kerguelen, Swain's Bay, A. E. Eaton (Venus Transit Exp.).

Resembling a small *P. stygia,* but more constricted, with thallus chestnut brownish, subopaque, medulla K– yellow; apothecia with entire thalline margin; ascospores ellipsoid, $7–8 \times 4 \cdot 5\mu$; spermatia subfusiform, acicular, scarcely constricted in the middle, $5–6 \times 0 \cdot 8\mu$.

We have seen no material referable here.

Section HYPOTRACHYNA Vainio.

Parmelia subgenus *Euparmelia* sect. *Hypotrachyna* Zahlbr. in Engler & Prantl, Nat. Pflanzenfam. I, 1*, 212; 1907.

Parmelia sect. *Hypotrachyna* Vainio, Etude Lich. Brésil, 1, 38; 1890.

Type: *P. acanthifolia* Pers.

Thallus grey, under surface usually black; rhizinae uniformly distributed over the whole under surface; apothecia usually substipitate.

Isidia minute, ashy, in centre of thallus; lobes narrow, small .. .. *P. kerguelensis*

Isidia absent, soredia present

Soredia in fine white lines along cracks in the cortex, tips of the lobes truncate, 1–1·5 mm. broad .. .. *P. tenuirima*

Soredia coarsely granular, darkening in age on older portions of the thallus; tips of lobes rounded, 2–3 mm. .. .. *P. Johnstoni*

PARMELIA KERGUELENSIS Wilson.

Parmelia kerguelensis Wilson, Mém. Herb. Boissier 18, 87; 1900.

Type: Kerguelen, Royal Sound, Robert Hall, in Nat. Herb., Melbourne Bot. Gard.

Thallus thin, about 125μ thick, membranous, loosely attached, glaucous white to milk white, drying cream buff, greyish where the cortex is eroded, K– yellow slowly fulvescent, C–, KC–, somewhat shining, smooth, cortex not cracked, with minute isidia in the centre of the lobes, either occurring singly or in small, compact groups, tips blackened; lobes very narrow, 0·5–1 mm. wide, sinuously multifid, tips truncate, intricate, plane, rarely and irregularly subcanaliculate and imbricate; below black rhizinose, margins not nude below; upper cortex about 30μ thick, a palisade of hyaline, thick-walled hyphae of isodiametric cells, the uppermost somewhat rounded, imbedded in a gel; algal layer about 30μ thick of densely packed protococcoid cells 5–7μ in diameter; medulla up to 75μ thick, of loosely woven, mostly periclinal hyphae, about 4μ in diameter; lower cortex about 20μ thick of subspherical cells 4–5μ in diameter, imbedded in a black gel; rhizinae about 300μ long and 50–75μ in diameter, very black, of thick-walled, conglutinate hyphae. Apothecia and spermogonia not seen.

Near *P. mutabilis* Taylor, but isidiose above; also near *P. saxatilis* (L.) Ach. which it resembles in habit but has smaller dimensions, medulla K– and differs in the nature and distribution of the isidia.

The type grew over mosses without associated lichens, but a small bit of thallus, too fragmentary for certain identification, from Long Island was found on a rock with *Steinera nigra*.

Kerguelen: Royal Sound, Robert Hall, type (Nat. Herb., Melbourne Bot. Gard.); Long Island, B.A.N.Z.A.R.E. B953–1.

PARMELIA TENUIRIMA Hook. f. & Taylor.

Parmelia tenuirima Hook. f. & Tayl., London Jour. Bot. 3,645; 1844.

Type: Tasmania, J. D. Hooker (Voy. "Erebus & Terror").

Thallus spreading over mosses and other lichens, lobes slender, branching irregular, subpinnate, sinuses rounded, ultimate lobes 1–1·5 mm. broad, tips truncate or somewhat rounded, puritan grey or lighter, margins somewhat ascendant, surface smooth or variously reticulate with minute white lines from the rupture of the cortex with production of minute soredia; dark brown below, with scattered tufts of rhizinae covering the whole under surface; upper cortex 15–18μ thick, a palisade of slender, thin-walled hyphae about 3μ in diameter, cutting off spherical brownish cells about 4–5μ in diameter, finally decomposing; algal layer about 50μ thick of loosely arranged cells of *Protococcus* about 7–8μ in diameter with occasional cells deeper in the medulla; medulla about 50μ thick, of very loosely woven, slender hyphae; lower cortex dark brown, about 20μ thick, highly gelified but apparently from coarser, periclinal hyphae. Apothecia not seen.

The above description is based on our Macquarie Island material. I have had some hesitation in referring our material here as it is sterile, but it agrees well with Taylor's original description. *P. tenuirima* and its varieties seem to be common in south-eastern Australia, Tasmania and New Zealand.

Macquarie Island: north end, Sta. 81, B.A.N.Z.A.R.E. B540; Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. 531–24; highland, B.A.N.Z.A.R.E. B534–9, B534–10, B534–11.

PARMELIA JOHNSTONI Dodge, sp. nov.

Type: MacRobertson Land, Cape Bruce, Sta. 108, B.A.N.Z.A.R.E. B108–16.

Thallus fragilis, lobis tenuibus, radiatis, imbricatis, subdichotome ramosis, apicibus rotundatis, 2–3 mm. latitudine, superficie convexa, laevi, deinde subverrucosa, opaca, viridi madefacta, olivaceo-alutacea siccitate, K rufescens; soredia in partibus vetustioribus, granulosa, aetate nigricantia, inferne albidus vel pallide alutacea cum rhizinis brunneis sparsis; cortex superior crassitudine variabili 25–45μ, hyphis pachydermeis 4–5μ diametro, cellulis isodiametricis fastigiatus; stratum algarum ad 75μ crassitudine, cellulis protococcoideis, 7–8μ diametro; medulla 130–140μ crassitudine, hyphis pachydermei, 4–5μ diametro, dense contexta; cortex inferior 35–40μ, hyphis plus minusve verticalibus, pachydermeis, conglutinatis, cellulis elongatis; rhizinae ad 75μ diametro. Apothecia ca. 1·5 mm. diametro, margine inflexo, disco concavo dein plano, fulvo; basi constricta; cortex amphithecii ca. 75μ crassitudine, cortici inferiori similis; stratum algarum ca. 75μ crassitudine, sub hypothecio; thecium destructum.

Thallus fragile, lobes narrow, radiate, imbricate, branching more or less dichotomous, tips rounded, 2–3 mm. broad, surface convex, smooth becoming verrucose, dull, tea-green when moist, drying olive buff, K rufescent; soredia scattered on the older portions, coarsely granular, darkening in age; under side white or light buff, with scattered tufts of brownish rhizinae; cortex variable in thickness, 25–45μ thick, a palisade of thick-walled hyphae 4–5μ in diameter with isodiametric cells, forming a pseudoparenchyma; algal layer about 75μ thick, with a few scattered cells deep in the medulla, cells protococcoid, 7–8μ in diameter, moderately packed, not in conspicuous colonies; medulla 130–140μ thick, of compactly woven, thick-walled hyphae, 4–5μ in diameter; lower cortex 35–50μ thick, of more or less vertical, thick-walled, conglutinate hyphae, cells more elongate, hence not appearing as a pseudoparenchyma; rhizinae about 75μ in diameter from the outgrowth of the lower cortical hyphae.

Apothecia about 1·5 mm. in diameter, margin inrolled, disc concave at first, becoming plane, tawny, constricted beneath; amphithecial cortex about 75μ thick, similar to the lower cortex of the thallus; algal layer about 75μ thick, extending under the hypothecium.

All of our material is badly fragmented, whether in formalin or dried, so it has been very difficult to interpret. The apothecia are all old or very young, with only traces of the thecium left. Apparently after the thecium disappears, the algae proliferate rapidly to form soredia. In B108–20, growing over *Xanthoria Mawsoni*, the amphithecial cortex is only 35μ thick; parathecium hyaline, about 35μ thick, compactly woven of thick-walled hyphae similar to those of the medulla below the algal layer, thinning to 10μ at the margin, then expanding flabellately and merging with the amphithecial cortex and paraphyses; hypothecium 25μ thick, of more or less vertical, branched and closely septate hyphae, deeply staining; thecium 55μ tall; paraphyses very slender, mostly unbranched, tips clavate, about 3·5μ in diameter, forming a dark greenish epithecium about 10μ thick; asci broadly clavate to subcylindric, tips greatly thickened, protoplasts acute, becoming rounded above, about 35 $\times$ 8μ, 8-spored; ascospores distichous, unicellular, hyaline 8–10 $\times$ 3·5–4μ.

Our species evidently belongs in the group with *P. Gerlachei* from the structure of its lower cortex, but differs in its reaction with KOH.

Growing over sand and mosses between rocks, with *Heppia antarctica* and *Xanthoria Mawsoni*.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 59.

MacRobertson Land: Cape Bruce, 67° 26′ S., 60° 49′ E., B.A.N.Z.A.R.E. B108–3, B108–16 type, B108–17, B108–18, B108–19, B108–20, B108–21, B108–22.

Section Physcioideae Dodge & Baker.

Parmelia subgenus *Euparmelia* sect. *Physcioideae* Dodge & Baker, Ann. Mo. Bot. Gard., 25, 590; 1938.

Type: *P. variolosa* Dodge & Baker.

Cortex appearing pseudoparenchymatous above and often extending a short distance over the underside; lower cortex of compact, slender, periclinal hyphae, or decomposed; apothecia sessile.

Our material of this section is fragmentary and the determinations are somewhat doubtful.

Parmelia leucoblephara Dodge & Baker.

Parmelia leucoblephara Dodge & Baker, Ann. Mo. Bot. Gard., 25, 592; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Lichen Peak, P. Siple & S. Corey 73–7.

Thallus up to 8 mm. in diameter, laciniae irregularly branched, divaricate, flat or somewhat convex, white, smooth, margins smooth, with long branched cilia, white then fuscous; soredia granulose and subisidiose with somewhat elevated margins; K yellow; rhizinae long, fuscous and unbranched; upper cortex 15μ thick, fastigiate, cells ellipsoid, brown, 7–14 $\times$ 5·5–7μ, covered by a gelified layer 7–8μ thick; algal layer 20–30μ thick, cells protococcoid, 5–7μ in diameter, single or in small colonies; medulla 55–60μ thick, of slender hyphae, 1·5–2μ in diameter, very loosely woven; lower cortex 30μ thick, of brownish hyphae 1·5–2μ, loosely woven with an outer layer of subspherical brown cells 5·5–6μ in diameter; rhizinae 40–60μ in diameter, of longitudinal hyphae with an outer brown layer.

Spermogonia immersed, subspherical, 55 $\times$ 70μ, wall 7–9μ thick, of isodiametric thick-walled cells; spermatiophores long, slender; spermatia bacilliform, straight.

A few young plants were seen growing on rocks with *P. Johnstoni* which seem to belong here, but are still too young to produce soredia; also some very old plants on bits of rock, tangled with *Polycauliona* show the same structure. Specimens from Queen Mary Land were growing over dead moss, associated with *Buellia muscicola* and *Xanthoria Mawsoni*.

Queen Mary Land: Possession Nunatak, C. T. Harrisson, A.A.E. 61–1, 61–2.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. B108–23, B108–27.

Parmelia variolosa Dodge & Baker.

Parmelia variolosa Dodge & Baker, Ann. Mo. Bot. Gard., 25, 593; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Mt. Rea-Cooper, P. Siple, F. A. Wade, S. Corey and O. D. Stancliff R–1.

Thallus up to 2 cm. in diameter, laciniae convex, 0·6–0·8 mm. broad, dichotomously branched, tips truncate, smooth, pruinose, primuline yellow, rarely greying; soralia large, granular, K yellow; upper cortex 5–20μ thick, rather loosely pseudoparenchymatous, covered by a gelified layer 5–15μ thick, thicker where the cortex is thin and vice versa; algae 7–9μ in diameter, protococcoid, scattered in the upper portion of the medulla which is 500–600μ thick, of loosely woven

hyphae, 2–4μ in diameter; lower cortex 40–60μ thick, of very dark, sometimes black, hyphae, more or less periclinal, with here and there groups of cut ends of hyphae running at right angles to the others; rhizinae common up to 1,100μ in diameter, of dark hyphae with an outer layer 10μ thick, identical and continuous with that of the thallus.

Apothecia up to 0·5 mm. in diameter, more or less circular, with a prominent margin, reddish brown to grey, sessile, very rare; amphithecium 50–80μ thick, cortex about 20μ, mostly decomposed, occasionally somewhat fastigiate; parathecium not developed; hypothecium 10–20μ thick, hyaline, of slender densely woven hyphae; thecium 50–60μ tall; paraphyses about 1μ in diameter, with slightly enlarged apical cells surrounded by a gelified sheath 3·5μ in diameter, mostly straight, rarely branched; epithecium 5–10μ thick, light brownish; asci 50–60 × 10–15μ, clavate with thick wall, protoplast umbonate, 8 spored; ascospores broadly ellipsoidal to subreniform, 9–11 × 4·5–6μ, hyaline.

Spermogonia 70 × 90μ, flask-shaped, with a dark brown wall of thick-walled, isodiametric cells; spermatia 1–1·5μ long, very slender, straight.

Our sterile, somewhat fragmentary material agrees well microscopically. The material from King George V Land is very fragmentary with the whole upper surface eroded, leaving only the lower part of the medulla and the large, short rhizinae.

Growing over mosses and other lichens.

King George V Land: Cape Denison, A.A.E. 16.

Queen Mary Land: David Island, C. T. Harrisson. A.A.E. 8; Possession Nunatak, C. T. Harrisson, A.A.E. 61μ1.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. B108–36, B108–37, B108–38.

Parmelia Coreyi Dodge & Baker.

Parmelia Coreyi Dodge & Baker, Ann. Mo. Bot. Gard., 25, 595; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, P. Siple & S. Corey 72W–3.

Thallus fragile, laciniae convex, 0·4–0·5 mm. broad, tips flabellate, 0·8–1·0 mm. broad, sinuses excised, tips of lacinulae rounded, smooth, pruinose, rarely eroded, granulose, grey and darkening, K yellow; upper cortex 10–20μ thick, fastigiate, of ellipsoidal cells 5·5–7 × 4–5μ, loosely packed (but more closely than in *P. variolosa*), upper cells darkened, covered by a gelified layer 7–10μ thick; algal layer 30–35μ thick, cells up to 10μ in diameter, protococcoid; medulla 700–1,000μ thick, of loosely woven hyphae somewhat brownish throughout; lower cortex 20–30μ thick, less compact than in *P. variolosa*, only the outer cells darkened, hyphae periclinal; rhizinae numerous, 700–1,000μ in diameter, branched, dark brown, cortex up to 10μ thick, of dark, short, thick-walled cells, the rest of conglutinate longitudinal hyphae.

Apothecia up to 0·5 mm. in diameter, rarely with a prominent margin, brown, sessile; hypothecium hyaline; thecium 45–55μ tall; paraphyses 1–1·5μ in diameter, rarely branched, septate, the terminal cells enlarged, surrounded by a gelified sheath, up to 3·5μ in diameter, brown at maturity, epithecium 5–10μ thick, brownish, gelified; asci 42–50 × 10·5–13μ, broadly clavate, protoplast with small umbo, wall moderately thick, 8-spored; ascospores elongate-ellipsoid to subreniform, hyaline, 10·5–14·5 × 3·5–4·5μ.

Spermogonia about 55 × 70μ, subspherical, the walls not darkened, immersed; spermatiophores thick, closely septate.

Only a few sterile fragments seen, identification uncertain.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 9; David Island, C. T. Harrisson, A.A.E. 37.

PARMELIA GRISEOLA Dodge & Baker.

Parmelia griseola Dodge & Baker, Ann. Mo. Bot. Gard., 25, 596; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, P. Siple & S. Corey 72W–3.

Thallus up to 1 cm. in diameter, laciniae linear, convex, dichotomously branched, 0·2–0·3 mm. broad, pruinose and eroded, pale olive buff, then greying and darkening, K rufescent; upper cortex 20–40μ thick, pseudoparenchymatous, outer cells irregularly darkened, of thin-walled cells about 4μ in diameter, covered by a gelified layer 5–10μ thick over the darkened areas, less developed over the light areas; algal layer up to 30–50μ thick, cells up to 10μ in diameter, protococcoid, some imbedded in the cortex; medulla 50–80μ thick, of slender hyphae about 2μ in diameter, loosely woven, becoming more periclinal at the junction with the lower cortex which is 20–30μ thick, of periclinal hyphae 1–3μ in diameter, only the outer ones darkened; rhizinae frequent, branched, 500–800μ in diameter, of dark cells 20 $\times$ 1·5–2μ, longitudinally arranged, covered by a cortex about 5μ thick, of short, thick-walled, dark cells, 4·5–9 $\times$ 2–4μ, progressively longer and thinner within.

Only a few fragments referred here.

Queen Mary Land: David Island, C. T. Harrisson, A.A.E. 56–2; Hippo Nunatak, C. T. Harrisson, A.A.E. 37.

USNEACEAE.

Thallus fruticose, erect, prostrate or pendent, attached to the substrate by a hapteron, radiate, corticate with longitudinal hyphae in *Alectoria* and a few species of *Ramalina*, otherwise cortex fastigiate somewhat pseudoparenchymatous; algae protococcoid (Trentepohlioid in *Usnea* sect. *Roccellinae*); medulla compact to arachnoid, often with a chondroid axis or strands of thick-walled, parallel hyphae, variously disposed. Apothecia circular, sessile or stipitate; amphithecium well developed; asci 1–8-spored; ascospores hyaline or brown, unicellular to muriform, thick-walled.

Inner portion of cortex strengthened by strands of mechanical tissue; medulla arachnoid; spores 2-celled .. .. *Ramalina*

Cortex not strengthened by mechanical tissue; medulla uniform or horny cartilaginous.

Cortex of conglutinate longitudinal hyphae; thallus hollow, or very loosely stuffed *Alectoria*

Cortex a palisade of pseudoparenchyma; chondroid axis well developed and central *Usnea*

Thallus yellow to orange, variously blackened, especially the ultimate branches; apothecial disc usually black .. .. *Neuropogon*

Thallus rarely yellow, ultimate branches not characteristically blackened; apothecial disc never black .. .. *Eunusnea*

Thallus commonly distinctly articulate or moniliform, without pseudocyphellae, stramineous, unchanged in herbarium or becoming fuscous in very old specimens *Stramineae*

Thallus pale stramineous not changing in herbarium, with almost no ramuli, smooth and shining .. .. *Amoenae*

Thallus not conspicuously articulate, divergently branched, smooth *Glabratae*

Thallus pale green when fresh, becoming deep brown in the herbarium.

Sparingly ramulose and subarticulate .. .. *Pycnocladae*

Neither ramulose nor subarticulate .. .. *Osseoleucae*

Thallus yellow stramineous, only the larger branches becoming brown in the hebarium, neither ramulose nor subarticulate .. .. *Xanthopogae*

Thallus not articulate, surface smooth, usually pruinose and very pale green (drying yellow to orange, black maculate in species from Kerguelia) *Laevigatae*

Thallus long, pendulous; not in our area .. .. *Amabiles*

Thallus short, erect; algae *Trentepohlia* .. .. *Roccellinae*

ALECTORIA Ach.

Alectoria Ach., Lichenogr. Univ., 120; 1810.

Type: *A. sarmentosa* Ach.

Thallus pendulous, prostrate or somewhat erect, attached by a hapteron, round or somewhat flattened, seldom angular, radiate; cortex horny, of longitudinal conglutinate hyphae; algae protococcoid; medulla of longitudinal hyphae; centre hollow or arachnoid; pseudocyphellae or soredia frequent. Apothecia lateral on short branches; amphithecium usually well developed, margin naked or ciliate, sessile or substipitate; disc brown to black; hypothecium hyaline, resting on the algal layer; paraphyses branched and anastomosing; asci 4–8-spored; ascospores unicellular, ellipsoid, hyaline or brown, thin-walled. Spermogonia immersed in small warts, spermatiophores little branched, septate; spermatia short, straight, somewhat thickened at the ends.

A single species in the section *Byropogon* is present in our material.

ALECTORIA CONGESTA (Zahlbr.) Dodge, comb. nov.

Parmelia pubescens v. *congesta* Zahlbr., Deutsche Südpolar Exp., 8, 52; 1906.

Type: Kaiser Wilhelm II Land, Gaussberg, Vanhöffen, on basalt, (Deutsche Südpolar Exp.).

Thallus forming dense, flat tufts up to 3 cm. in diameter and 5 mm. high; more or less recumbent below, the larger filaments up to 0·3 mm. in diameter, slightly flattened [excessive pressure in drying?], buffy citrine to Saccardo's olive, repeatedly dichotomous, lower internodes up to 0·7 mm. long, successively shorter and darker, becoming trichotomous and thus pinnate, ultimate branches obtuse, up to 250μ long and 50μ in diameter, coal black, dull, deep olive under the high power of the microscope; cortex about 20μ thick, of longitudinal hyphae with moderately thickened walls, the outermost hyphae with dark brown walls; algal layer filling the rest of the filament, cells protococcoid, ellipsoidal, about 15μ in diameter, crowded next the cortex, more loosely spaced with air-spaces and more medullary hyphae toward the centre.

In the growing tips, the algae are closely packed in rows and appeal almost filamentous, with a very thin cortex. Colonies of bacteria appear in many of the axils, perhaps representing an *Azotobacter* symbiosis such as Cengia Sambo (Atti Soc. Ital. Sci. Nat. Mus. Civico Stor. Nat. Milano, 62, 226–238; 1923: 64, 191–195; 1926) reported in the Italian Alps and we have suggested in Antarctica (Dodge & Baker, Ann. Mo. Bot. Gard., 25, 522; 1938). Except for a very small, depauperate specimen on granite, our material has been detached from the rocks, hence the substratum is uncertain.

On rocks with *Umbilicaria rugosa, Lecanora exsulans, L. Johnstoni, L. Mawsoni, Buellia dendritica* and *B. muscicola*.

King George V Land: Cape Denison, A.A.E. 50–2, 51, 92, 102–3, 103–3, 104–3, 131, 146, 149, 157, 177, 178; Madigan Nunatak, 2,400 ft., 30 miles east of winter quarters, C. F. Laseron, A.A.E. 25–6.

Queen Mary Land: Possession Nunatak, C. T. Harrisson, A.A.E. 36; Hippo Nunatak, C. T. Harrisson, A.A.E. 65–2.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. B108–9.

USNEA [Hill] Wiggers.

Usnea [Hill] Wiggers, Primit. Fl. Holsat., 90; 1780.

Usnea Hill, Gen. Nat. Hist., 2, 85; 1751 [Hist. Pl.].

Parmelia sect. *Usnea* Wallr., Fl. Crypt. Germ., 3, 541; 1831.

Type: *U. florida* (L.) Wigg.

Thallus fruticose or filamentous, very rarely of a single branch, usually of several compound branches, dichotomous or subdichotomous, more rarely sympodially branched, from 1 cm. to 7 m. or more long, erect, pendulous or prostrate, attached to the substrate by a hapteron; branches thicker at the base, thinning very much toward the apex, 0·2–7 mm. thick, terete, angled or longitudinally sulcate, or foveolate, smooth or tuberculate, verrucose or spinuliferous, continuous, areolate or annulate; cortex coriaceous or somewhat spongy, of densely woven thick-walled, conglutinate, vertical hyphae, in a few species almost evanescent on the primary branches; algae usually protococcoid (apparently Trentepohlioid in the section *Roccellinae*); medulla usually well developed, quite variable in thickness; chondroid axis, single, percurrent, of longitudinal, thick-walled hyphae, usually very solid, rarely lacerate on the surface or hollow. Apothecia lecanorine, constricted at the base, lateral, rarely subterminal or terminal, margin usually thin, nude or ciliate; asci subcylindric or slightly inflated; ascospores unicellular, hyaline, ellipsoidal, epispore distinct; paraphyses conglutinate, septate, branched, epithecium with distinct granules. Spermogonia immersed in the cortex, pale or slightly darkened, spermatiophores sparingly septate; spermatia straight, with one slightly thicker.

The genus is divided into six subgenera of which only *Neuropogon* and *Euusnea* reach our area.

Subgenus NEUROPOGON (Nees & Fw.), Motyka.

Usnea subgenus *Neuropogon* Motyka, Lich. Gen. Usnea Stud. Monogr. Syst., 1, 18; 1936.

Neuropogon Nees & Flotow, Linnaea, 9, 496; 1835.

Usnea sect. *Neuropogon* Mont. in Gay, Hist. Fís. Polít. Chile, Bot., 8, 67; 1852.

Type: Montagne treated *N. melaxanthus* (Ach.) Nyl. as the type of his section *Neuropogon* of *Usnea* and was followed by Motyka when the section was raised to subgeneric rank. As a genus, *Neuropogon* was based on *N. Poeppigii* and *N. antennarius*. Nylander, Syn. Meth. Lich., 1, 275; 1860, transferred *N. Poeppigii* to *Chlorea*, leaving *N. antennarius* as the type of the genus. The latter is now considered by Motyka and Lamb as a synonym of *N. aurantiaco-ater* (Bory) Lamb.

Thallus short, not reaching 10 cm., fruticose, erect, branched, almost wholly saxicolous, sulphur yellow, orange or orange red, tips of branches and cilia of apothecia when present, commonly black, or whole thallus black or black variegated. Apothecia lateral on smaller branches (often appearing terminal as the tip of the branch is small and inconspicuous in most cases), disc usually black (disc zinc orange to tawny, irregularly blackening in *U. trachycarpa*).

While the habit and colour of this subgenus are usually easy to recognize, the various structures of the individual species show such close relationships to those of other subgenera, I cannot follow Lamb, Jour. Linn. Soc. Bot., 52, 199–237; pl. 5–11; 1939 in regarding it as a separate genus. Except for a single commonly recognized species in the Arctic and Andes, all of the species are antarctic and subantarctic.

Medulla very loosely woven throughout
- Cortex very thin, 20–30μ
  - Plants erect, rigid, medulla about 2·5 times as thick as cortex .. *U. frigida*
  - Plants decumbent, very soft, medulla about six times as thick as the cortex *U. laxissima*
- Cortex about 100μ thick
  - Fertile, disc zinc orange to tawny, medulla about four times as thick as the cortex *U. trachycarpa*
  - Sorediose, soredia tuberculate, medulla about twice as thick as the cortex; Arctic *U. sulphurea*

Medulla somewhat loosely woven, cortex papillate
- Rugose plicate, 7–8 cm. tall .. .. *U. strigulosa*
- Papillae hemispheric, 3 cm. tall .. .. *U. aurantiaca*

Medulla dense in the outer half, loose next the the axis, with large air-spaces; sorediose; cortex 60–70μ; axis 400–450μ
- Surface smooth or nearly so, soredia plane to deeply eroded; medulla 80–100μ *U. antarctica*
- Surface foveolate, soredia tuberculate; medulla 190μ .. .. *U. subfoveolata*

Medulla uniformly densely woven
- Medulla very thin, much thinner than the cortex
  - Medulla about one-tenth as thick as the cortex .. .. .. *U. aurantiaco-atra*
  - Medulla about one-half as thick as the cortex; sorediate .. .. *U. pustulata*
- Medulla equal to the cortex or slightly thicker, not twice as thick
  - Fertile .. .. *U. fasciata*
  - Sorediose
    - Not papillate, cortex cracked annularly, cracks blackening, with some longitudinal cracks .. .. *U. acromelana*
    - Surface papillate
      - Secondary branches closely papillate with large soralia, only a few small soralia on the ultimate branches .. .. *U. scabridulus*
      - Secondary branches slightly rugose and subfoveolate with scattered papillae above, soralia small, convex, confined to the ultimate branches *U. subpapillata*
- Medulla much thicker than the cortex (more than twice as thick)
  - Axis very thick, about 1,000μ
    - Sorediose; branches dense and spreading, surface yellow maculate *U. insularis*
    - Fertile
      - Apothecia large, surface of branches yellow maculate but not sorediose (young sterile plants sparingly branched at acute angles, branches erect) *U. Taylori*
      - Apothecia small, surface of branches with black annular cracks .. *U. ciliata*
  - Axis 430–960μ; apothecia very large, axis not lacerate .. .. *U. substrigulosa*
  - Axis slender, 300–500μ
    - Sorediose
      - Surface smooth, soredia germinating *in situ* to form dense tufts of propagula, suggesting witches' brooms .. .. *U. propagulifera*

Surface slightly rugose and subfoveolate

Not verrucose, with some black annular cracks; soralia eroded, flat *U. picatus*

Verrucose, without annular cracks; soredia minute, on tips of the warts *U. Crombii*

Densely papillate .. .. *U. granulifera*

Fertile

Coarsely verrucose and rugose, often somewhat angulate; not sorediose *U. melaxantha*

Minutely tuberculate, not rugose or angled, soredia abundant *U. floriformis*

USNEA LAXISSIMA Dodge, sp. nov.

Type: Queen Mary Land, Possession Nunatak, C. T. Harrisson, A.A.E. 84.

Thallus 4 cm. altitudine vel major, siccitate fragillimus, dichotome ramosus, internodis longis, ramis divergentibus, basi subconstrictis, mollis, nitidus, nigroannulatus sed non annulatim fractus, isabellinus, ramis majoribus subarticulatis articulationibus constrictis, fractis, irregulariter foveatis, raro subscrobiculatis; ramis ultimis longis, tenuissimis; eramulosus, teres; soredia rara, punctiformia, pseudocyphellis minutis simulantia, alia subconvexa tuberculiformiave, ad 0·3 mm. diametro, farinosa, viridia; cortex 25–30μ crassitudine, gelifactus, hyphis in 7μ exteris hyalinis, pseudoparenchymaticus, cellulis isodiametricis, crystallis luteis minutis nubilatis; algae in coloniis parvis sub cortice, cellulis 5–7μ diametro; medulla ca. 185μ crassitudine, K–, hyphis 5μ diametro, pachydermeis, crystallis hyalinis nubilatis, ex axi radiantibus, dichotomis in rete laxissimo dispositis; axis chondroideus ca. 160μ diametro, sectione transversali orbicularis, hyphis longitudinalibus, pachydermeis, conglutinatis.

Thallus at least 4 cm. tall, very fragile when dry, dichotomous, internodes long, branches divergent, often somewhat constricted at the base, very soft, shining, black annulate but not cracked at the annulations, isabella colour, larger branches somewhat articulate, constricted at the joints, cracked and separating showing the axis, irregularly foveate, rarely almost scrobiculate, ultimate branches long, very slender; eramulose, terete; soredia rare, punctiform, less than 0·1 mm. in diameter, suggesting minute pseudocyphellae, occasionally slightly convex, tuberculiform up to 0·3 mm. in diameter, farinose, glass green; cortex 25–30μ thick, gelified, the outer 7μ hyaline, pseudoparenchymatous of isodiametric cells 3–4 rows thick, heavily incrusted with minute yellowish crystals; algae in small colonies just below the cortex, cells 5–7μ in diameter; medulla a very loose net of hyphae 5μ in diameter, very thick-walled, nubilated with larger hyaline crystals, radiating from the chondroid axis, divergently dichotomously branched, leaving very large air spaces; chondroid axis about 160μ in diameter, circular in cross section, of conglutinate longitudinal thick-walled hyphae.

Although this species seems to have been growing on greatly weathered red granite from the small grains tangled in the thallus, I have been unable to find it attached, and the lower ends of many plants are blackened and decomposing, as if it were dying at the base and proliferating at the tip, a condition unknown to me in any other species of *Usnea*, although not uncommon in other groups of lichens. On the other hand, it may have been torn loose from its base by high winds and continued to develop in some more protected situation between the rocks. It is so soft that it cannot have been erect, probably decumbent or perhaps pendulous, if attached to a vertical surface of rock.

The relationships of this species are not clear. In microscopic structure it seems closest to *U. frigida* Dodge & Baker, an erect plant from Marie Byrd Land, with much more conspicuous

soredia. In some respects, it suggests a small *U.* (*Protousnea*) *lethariiformis* Mot. from southern Chile, Patagonia and the Falkland Islands, and in others, *U.* (*Euusnea, Articulatae*) *praelonga* Stirton from South and East Africa. Species like the present strengthen Motyka's view that *Protousnea* and *Neuropogon* are the primitive groups in the genus and make the recognition of *Neuropogon* as a separate genus very difficult.

Known only from the abundant collection from the type locality.

USNEA TRACHYCARPA (Stirton) Müll.-Arg.

Usnea trachycarpa (Stirton) Müll.-Arg., Nuov. Giorn. Bot. Ital., 21, 37; 1889.

Neuropogon trachycarpus Stirton, Scottish Nat., 6, 105; 1881.

Usnea sulphurea Tuck., Bull. Torrey Bot. Club, 6, 57; 1875: Bull. [U.S.] Nat. Mus., 3, 27; 1876 *non alio loco nec aliorum.*

Usnea Naumanni Müll.-Arg., Bot. Jahrb. [Engler], 4, 54; 1883.

? *Neuropogon melaxanthus* v. *ciliatus* Crombie, Phil. Trans. Roy. Soc. [London], 168, 47; 1879 non Nyl. 1865.

Usnea melaxantha v. *ciliata* Wilson, Mém. Herb. Boissier, 18, 87; 1900 non Müll.-Arg. 1892.

Type: Kerguelen, Moseley ("Challenger" Exp.). The type of *U. Naumanni* from Kerguelen, Betsy Cove, Naumann ("Gazelle" Exp.).

Thallus about 5 cm. tall when well developed, usually growing in dense tufts from a common base, erect, dichotomously branched, branches ascending; often closely ramulose, especially above; usually clay colour to cinnamon buff just above the blackened foot to primrose yellow or colonial buff above, tips, especially of the ramuli and cilia, blackened, often annularly so, but not annularly cracked, very smooth and something shining, branches somewhat constricted at the base and slightly inflated, primary branches often up to 2 mm., successive branches more slender, often about 0·6 mm. just below the apothecia; cortex continuous, not characteristically cracked, approximately terete, but often foveate or papillate; ramuli usually abundant above, erect, relatively long, cylindric, slender, smooth and shining; cortex 75μ thick, a palisade of conglutinate, gelified hyphae with included very minute crystals, outer 10μ structureless; algal layer about 100μ thick, of very irregular discrete colonies, separated by broad bands of medulla, cells not closely packed in colonies, mostly 6–7μ, occasionally up to 11μ in diameter; medulla variable in thickness, sometimes outer half, sometimes the whole rather compact, sometimes the inner half arachnoid; chondroid axis 450–750μ in diameter, circular in cross section, of longitudinal, thick-walled, conglutinate hyphae about 4μ in diameter.

Apothecia probably strictly lateral, athough usually appearing terminal, deeply cupulate at first, shallower later, very rarely nearly flat, commonly up to 6 mm. in diameter, exciple papillate, sometimes rugose reticulate and slightly foveolate in fully mature ones, cilia irregularly scattered over the surface, the marginal cilia dense, short, conical, quite variable in size, usually wholly black; disc zinc orange to tawny, epruinose, with a slender margin; amphithecial cortex 30μ thick, a palisade of relatively large hyphae covered with minute crystals and imbedded in a slightly yellowish gel, the outer 7–8μ wholly gelified; algal layer somewhat variable in thickness, of loosely arranged cells 8–11μ in diameter, separated by strands of loosely woven medullary hyphae; medulla otherwise not differentiated; parathecium a palisade of subvertical hyphae 3–4μ in diameter, imbedded in a gel; hypothecium 90μ thick, of loosely woven subvertical hyphae, the lower zone (about 20μ) more deeply staining, not clearly differentiated from the thecium; thecium about 70μ tall; paraphyses dichotomously branched, septate, 2μ in diameter, tips not thickened,

ending in a brownish epithecial gel; asci cylindric-clavate, 8-spored; ascospores monostichous below, distichous above, hyaline, short ellipsoidal, about $8 \times 5\mu$ in the ascus [11×8 *fide* Motyka], immature spores showing a curious bipolar staining with haematoxylin, so that they might be mistaken for polar-bilocular spores, mature spores clearly unicellular with a clear central nucleus.

Spermogonia oblately sphaeroidal, 250μ in diameter, 110μ tall, immersed in the cortex, wall thin, spermatiophores 25μ tall, dichotomous; spermatia $7–10 \times 1\mu$, straight or slightly curved, fusiform.

In spite of the abundance of the material, this has proved to be a very puzzling species or group of species, although the separation from the other species of *Usnea* is not difficult. If we include the four additional names based on specimens from Patagonia southward to 55° 24′ S., which clearly belong in this group (if they be not identical with forms found in Kerguelen), we have a total of six names, only *U. Naumanni* sufficiently well described to refer plants to them with any certainty, and even here many possible characters for separation are wanting. At the time I studied the types in Stirton's herbarium at the Art Galleries of Glasgow, this species could not be found, nor did I find it at the British Museum, where a large number of Stirton's specimens had been "borrowed" by the late A. L. Smith. At least a portion has since been found, and a photograph of an evidently sterile portion has been figured by Lamb (Jour. Linn. Soc. Bot., 52, pl. 6, 11; 1939). In his description, Stirton states "similis *N. melaxanthae*" which he elsewhere characterizes "The central axis in *N. melaxanthus* is thick, and the medullary fibres rather compact. I find the reactions of *Neuropogon melaxanthus* (Ach.) from N.Z.—viz., fibrillae medullares K fl[avescentes] dein rubentes; I–" In his herbarium, I found two specimens: New Zealand, near Wellington, J. Buchanan, and Tasmania, Mt. Wellington, W. Scott-Campbell. Therefore it seems probable that his concept of *N. melaxanthus* was based on material of *N. ciliatus* (Nyl.) Krmplhbr., and his description should be interpreted accordingly.

When we consider the usual characters for separating groups of species of *Usnea,* we encounter difficulties. In general, the relative thickness and compactness of the medulla is a useful character. In one plant sectioned, the medulla is loose and arachnoid in the inner half, the whole four-thirds the thickness of the axis; in another plant in sections taken in a comparable site on the main axis, the medulla is very compact, with a tendency for a fracture plane in the middle, and less than half the diameter of the axis, although the medulla appears to be somewhat looser on some of the secondary branches. On the slender branches and ramuli, the medulla is completely lacking, the algal layer extendng to the chondroid axis. Foveation characterizes the whole section *Foveatae* of *Euusnea* and is quite characteristic of certain other species of *Neuropogon.* In this species, the very slender, young plants are smooth; as they become older, some become deeply foveate on the larger branches, while other branches of equal size remain terete and smooth. Similarly papillation seems a quite specific character in several of the other subdivisions of *Usnea,* but here, one branch may be conspicuously papillate and another branch of the same plant be without a trace of papillae. Similarly, there is considerable variation in the number and arrangement of the ramuli or cilia on the stems. Most of the apothecia are conspicuously papillate, and more or less ciliate, both below and on the margins.

Similarly, reactions with potash and paraphenylene diamine have been extensively used by Stirton, Vainio, Motyka, and Lamb. In general, our plants from Kerguelen are K–, but one is clearly K yellow then red, and one is K yellow then ferruginous, yet these reactions are not correlated with other characters. The crystals are not characteristic, corresponding to Lamb, Jour. Linn. Soc. Bot., 52, 202, fig. 3; 1939.

Superficially the apothecia appear terminal, but in sections of apothecia, the chondroid axis

is seen to curve through the apothecium and occasionally to emerge and continue for some distance, forming another apothecium on its tips, so that the first appears sessile on the side of the branch.

While some of these variations appear discontinuous and one may sort the plants into groups with reference to a single character, none of the characters appears to be associated constantly with any other.

The relationships of the species are equally puzzling. In spite of the colour and characteristic blackening of the thallus, which are typically confined to this subgenus, this species seems more closely related to *U. scabrida* of the *Glabratae* in many respects. All of the species of *Neuropogon* where spermogonia have been reported have spermatia of the endobasidial type. Here the spermatia are much longer and more slender, and the spermatiophores are closer to the exobasidial type common in the Lecanoraceae than to those figured by Crombie, Monog. Lich. Brit., 1, 201; 1894 for *Usnea florida*. I have not seen spermogonia of the *U. scabrida* group. Since spermogonia are abundant and apparently functional, it is possible that at least some of the variation encountered is the result of hybridization with other apotheciiferous species in each region, e.g. *U. Taylori* in Kerguelen and *U. aurantiaco-atra*, etc., in the South American area.

All authors who have considered the question, have stated that this species is distributed both in Kerguelen and South America from Patagonia to 55° 24′ S. I have seen two specimens from the latter region, Mt. Aymond, Straits of Magellan, T. Hill (Hassler Exp.), and Patagonia, R. Fosiles, 1,000 m., P. Dusén 1206. Both differ somewhat in habit, but I have found no clear differences and hesitate to express an opinion based on so little material from these regions.

Kerguelen: Port Jeanne d'Arc, about 1,500 ft., B.A.N.Z.A.R.E. B176–2 and upper levels on rocks, B.A.N.Z.A.R.E. B109–1, B109–2, B109–3, B109–4, B109–5, B109–6; Molloy Point, J. H. Kidder (U.S. Transit of Venus Exp. in Tuckerman Herb. sub *U. sulphurea*), Observatory Bay, B.A.N.Z.A.R.E. B192–54, B192–55, B192–56, B192–57, B192–58, B192–59, B192–60; Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–17, B246–18, B246–19, B246–20, B246–21; Royal Sound, B.A.N.Z.A.R.E. B203; R. Hall (three collections, Nat. Herb. Melbourne Bot. Gard.); Greenland Harbour, B.A.N.Z.A.R.E. B204–10, B204–11, B204–12, B204–13, B204–14, B204–15, B204–16, B204–17, B204–18, B204–19, B204–20, B204–21, B204–22, B204–23.

USNEA ANTARCTICA DuRietz.

Usnea antarctica DuRietz, Svensk. Bot. Tidskr., 20, 90, 93; 1926.

Neuropogon Taylori Blackman, Rept. Coll. Nat. Hist. Antarct. Voy. "Southern Cross," 1898–1900, 320; 1902, non Hook. f. & Tayl., 1844.

Usnea sulphurea f. *sphacelata* Th. Fr., Nyt. Mag. Naturvidensk., 40, 208; 1902 non *U. sphacelata* R. Brown, 1824.

Neuropogon melaxanthum Darb., Nat. Antarct. ["Discovery"] Exp. Nat. Hist., 5, 7; 1910: Brit. Antarct. ["Terra Nova"] Exp. Nat. Hist. Rept. Bot., 58; 1923 excl. syn.

Type: South Victoria Land, Geikie Land, 71° 40′ S., 170° E., Admiralty Range, 700 m., C. E. Borchgrevink, Bot. Mus. Upsala.

Thallus erect or prostrate, fruticose, 3–4 cm. tall, sparingly branched, eramulose, rigid, sorediose, strawcolour, yellowing, tips black or with black bands, or completely blackened, smooth, somewhat shining; base thick, up to 1·5 mm. rigid, sparsely sympodially or diochotomously branched above, branches slightly attenuate at the base and subulate attenuate at the tips, usually almost simple or branched below the tips, terete, glabrous, shining, smooth, lateral branches rare, somewhat constricted at the base, ascending, appressed; cortex about 60μ thick, almost

horny, yellow without, of fastigiate pseudoparenchyma, cells thin-walled, up to 7μ in diameter; algae protococcoid, cells up to 8μ in diameter, scattered in the medulla which is thin, 80–100μ, dense, white, K-, of smooth hyphae 1·5–3·5μ in diameter, branched and anastomosed, irregularly woven in a close network, denser next the cortex, looser next the axis; chondroid axis about 450μ thick, horny, slightly fuscous, of conglutinate, longitudinal hyphae 1μ in diameter, cells 25–30μ long. Sterile. Soredia frequent in the upper portions, granulose farinose, white or finally blackened, soralia deeply eroded, or at least not in tubercles.

The material here reported is smaller, only 1·5 cm. tall and less branched; soredia less abundant; cortex 40–50μ thick; medulla 75–130μ thick, similar in structure but somewhat more loosely woven; axis about 180μ in diameter, growing on granite.

South Victoria Land: Cape Irizar [75° 30′ S., ca. 163° E.], D. Mawson, 1,057, British Antarctic Exp., 1907–9.

King George V Land: Penguin Point [ca. 67° 35′ S., 146° E.], A. L. McLean, A.A.E. 86, 87.

USNEA SUBFOVEOLATA Dodge, sp. nov.

Type: Queen Mary Land, C. T. Harrisson, Hippo Nunatak.

Thallus ad 3 cm. altitudine, repetito-dichotome ramosus, internodis brevibus, rami basi non constricti, rigidi, nitidi, superne nigri vel nigroannulati sed non fracti, inferne ochraceolutei vel ochraceo-aurantiaci, ad 0·7 mm. diametro; ramis ultimis longis, tenuibus, teretibus, rugosis et profunde foveolatis; soredia tuberculata, in ramulis ultimis, granulosa, deinde partim erosa, in soraliis orbicularibus subconvexis, apothecia minuta simulantibus, juventute nigris deinde flavidis aut sordide griseis; cortex 70μ crassitudine strato extero 5μ crassitudine gelifacto, strato infero 10–12μ crassitudine hyphis periclinalibus, reliqua parte hyphis verticalibus, 5μ diametro, septatis, cellulis isodiametricis cum crystallis minutis, flavidis nubilatis; algae protococcoideae, ad 10μ diametro, infra cortice in medulam sparsae; medulla K-, ca. 190μ crassitudine, hyphis pachydermaticis laxe intertextis, ca. 4μ diametro cum crystallis hyalinis nubilatis, hyphis intimis ex axi chondroideo radiantibus; axis chondroideus sectione transversali ellipticus vel subquadratus, ca. 400μ diametro hyphis conglutinatis longitudinalibus. Apothecia spermongoniaque non visa.

Thallus up to 3 cm. tall, repeatedly dichotomous just above the base with very short internodes, branches not constricted at the base, rigid, shining, black or black annulate above, not cracked, yellow ochre to ochraceous orange below, up to 0·7 mm. in diameter below; ultimate branches long, slender, terete, rugose and deeply foveolate; soredia tuberculate on the ultimate branches, granular, finally partly eroded, leaving slightly convex, circular soralia resembling minute apothecia, black when young, becoming yellowish and finally dirty grey; cortex 70μ thick, highly gelified, the outer 5μ clear, lower 10–12μ of periclinal hyphae whose branches form the palisade, the rest a palisade of hyphae 5μ in diameter, cells nearly isodiametric, walls with very minute yellowish crystals; algae protococcoid, up to 10μ in diameter, mostly smaller, scattered in the medulla below the cortex; medulla K- about 190μ thick, of loosely woven thick-walled hyphae about 4μ in diameter, nubilated with hyaline crystals, the inner hyphae radiating from the axis, leaving large air spaces; chondroid axis short elliptic to somewhat squarish, about 400μ in diameter, of densely packed conglutinate, thick-walled, longitudinal hyphae. Apothecia and spermogonia not seen.

Macroscopically this species suggests *U. frigida,* although the foveolation is more conspicuous and the thallus is rather less blackened, but the microscopic structure resembles that of *U. antartica,* from which it differs in the conspicuous foveolation and the soredia.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 82–2 type, 71–3.

USNEA PUSTULATA Dodge, sp. nov.

Type: Queen Mary Land, Possession Nunatak, C. T. Harrisson, A.A.E. 85–1.

Thallus ad 4–5 cm. altitudine, subdichotomeramosus, ramis flexuosis, adscendentibus, rigidis, ramis ultimis longis capillaribus, frequenter nigris, raro nigro-maculatis, rarissime nigroannulatis sed non fractis, inferne ochraceo-aurantiacus ad ochraceo-alutaceus superne; ramis majoribus laevibus rare subfoveolatis aut rugosis, ramis secundariis laevibus cum tuberculis humilibus sparsis, raro in parvis sorediis punctiformibus, 0·1 mm. diametro vel minoribus ruptis; ramis penultimis cum sorediis pallide olivaceis granulo-isidioideis in soraliis orbicularibus, primum subconvexis ad 0·5 mm. diametro mox erosis, apotheciis minutis cum disco plano vel subconcavo, similibus; soralia in ramis ultimis immarginatis in maculis irregularibus erosis confluentia; cortex 55–110μ crassitudine, gelifactus, strato extero 10–20μ crassitudine, flavido, reliqua parte hyphis ramosis, contortisque pachydermeis; medulla 35–55μ crassitudine, hyphis conglutinatis pachydermeis, periclinalibus cum cellulis algarum singulis vel in coloniis parvis sparsis; axis chondroideus 680–750μ diamtro, hyphis conglutinatis, longitudinalibus, pachydermeis.

Thallus 4–5μ cm. tall, branching essentially dichotomous, but often one branch larger than the other, branches flexuous, ascending, rigid, ultimate branches long, capilliform, usually wholly black, rarely black maculate and very rarely black annulate, not cracked, ochraceous-orange below, shading to ochraceous buff above; larger branches smooth, rarely slightly foveolate or rugose, secondary branches smooth with scattered, low tubercles which occasionally rupture as small, punctiform soredia, 0·1 mm. in diameter or smaller, perhaps only breathing pores; the penultimate branches producing many pale olive buff granulo-isidioid soredia in circular soralia, slightly convex at first, up to 0·5 mm. in diameter, soon eroded, and appearing as small apothecia with plane or slightly concave discs; on the ultimate branches, soralia similar but not margined, confluent in irregular eroded patches; cortex 55–110μ thick, gelified, the outer 10–20μ yellowish, nearly structureless, the rest hyaline, composed of branched and contorted, thick-walled periclinal hyphae not arranged in a palisade; medulla 35–55μ thick, of conglutinate, thick-walled, periclinal hyphae with scattered algal cells, 5–7μ in diameter or small colonies, scattered throughout; chondroid axis 680–750μ in diameter, of conglutinate, thick-walled, longitudinal hyphae.

This species is evidently related more closely to *U. aurantiacoatra* than to other members of the group. The medulla is extremely thin and compact, and the structure of the cortex is quite different from the usual type in *Usnea*. The thickness of the cortex varies considerably in the same section, but in general is much thicker than the medulla. This is the commonest form in our region. A shorter, somewhat stouter and less branched form with a rather thicker cortex occurs but there as so many intermediate conditions that I have been unable to separate it. In general, this form is more sorediose.

King George V Land: Horn ["Dreadnought"] Bluff, [ca. 68° 25′ S., 149° 45′ E.], A. L. McLean, A.A.E. 46; Penguin Point [ca. 67° 35′ S., 146° E.], A. L. McLean, A.A.E. 86; vicinity of Cape Denison, Commonwealth Bay, 67° S. [ca. 142° 40′ E.], J. G. Hunter, A.A.E. 1, 5, 18, 19, 20, 45 on gneissic rocks, Sta. 88, B.A.N.Z.A.R.E. 536–38, 536–39; [McKellar Islets], Commonwealth Bay [ca. 67° S., 142° 45′ E.], A. L. McLean, A.A.E. 90–3.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 82–1; David Island, C. T. Harrisson, A.A.E. 83; Possession Nunatak, C. T. Harrisson, A.A.E. 85–1, 85–2, type; Alligator Nunatak, C. T. Harrisson, A.A.E. 72.

USNEA SCABRIDULA (Lamb), Dodge, comb. nov.

Neuropogon acromelanus v. *inactivus* f. *scabridulus* Lamb, Jour. Linn. Soc. Bot., 52, 220; 1939.

Type: Antarctic, probably Ross Sea region, in Brit. Mus., not seen. The following description based on George V Land, Cape Denison, Commonwealth Bay, D. Mawson, A.A.E., 1,049.

Thallus 3 cm. tall, branching essentially dichotomous, but often one branch larger than the other, and internodes variable, giving the appearance of irregular branching; branches not divergent, curved, ascending, rigid, ultimate branches relatively short and coarse, fragile; chamois to cream buff, only the ultimate branches black maculate or wholly blackened, primary branches rarely slightly rugose with annular cracks, not blackened, slightly constricted at the base, secondary branches not constricted, mostly closely papillate with large, round, eroded soralia; 0·7–0·8 mm. in diameter, containing pale yellow, granular soredia; the ultimate branches less sorediose and there the soredia are much smaller, cortex about 75–80μ thick, highly gelified, a palisade of very thick-walled, conglutinate hyphae, the outer 20μ nubilated with very small crystals, giving a brownish appearance in section, the rest hyaline; medulla K–, dense, 90–110μ thick, the outer 35μ filled with algae in a nearly continuous layer, with a few scattered cells below, algal cells protococcoid, 10–12μ in diameter, the rest of the medulla of interwoven hyphae about 4μ in diameter, not leaving conspicuous air spaces, slightly looser next the axis, here producing a fracture plane when roughly handled; chondroid axis 200 $\times$ 370μ elliptic in cross section, of slender, conglutinate, longitudinal hyphae.

The papillae seem to function as breathing pores, being provided with a slender tube through the cortex, more or less filled with crystals. No spermogonia nor apothecia seen.

When first seen this species appeared to be related to *U. granulifera* (Vain.) Motyka, but microscopically it seems closer to *U. fasciata* Torrey, agreeing in general proportions and in the elliptic cross section of the axis. Our plant may prove to be a sorediose variety of that species. *U. acromelana* is much more remote in habit, nature of the soredia and black-edged cracks and lacks the characteristic papillae of our plants although the proportions of cortex, medulla and axis are similar.

South Victoria Land: Cape Irizar [75° 30′ S., ca. 163° E.] D. Mawson, 1,057–2, British Antarctic Exp., 1907–9, growing with *U. antarctica.*

George V Land: Horn [Dreadnought] Bluff [ca. 68° 25′ S., 149° 45′ E.] A. L. McLean, A.A.E. 46; Cape Denison, on gneiss, Commonwealth Bay [67° S., 142° 36′ E.] J. G. Hunter, A.A.E. 19, 45; D. Mawson, 1,049; Sta. 88, B.A.N.Z.A.R.E. 536–38.

USNEA SUBPAPILLATA Dodge, sp. nov.

Type: Queen Mary Land, Hippo Nunatak, C. T. Harrisson, A.A.E. 82–3.

Thallus 2–3 cm. altitudine, subdichotome ramosus, rami non late divergentes, adscendentes, rigidi, lutei, ramis ultimis brevibus, nigris; ramis primariis infra laevibus, non fractis, basi non constrictis, subrugosis vel subfoveolatis, superne cum papillis minutis sparsis; soralia minutissima, subconvexa, in ramis ultimis, raro in axi confluentia, soredia granulosa subflavida, non conspicue erosa; cortex 60–65μ crassitudine, strato, extero 20μ gelifacto, hyaline hyphis verticalibus cum cellulis isodiametricis, crystallis minutis acicularibus flavidis nubilatis; medulla K–, 100μ crassitudine, hyphis dense contextis; algae cellulis ca. 10μ diametro, singulis vel in coloniis parvis in parte tertia medullae irregulariter dispositae; axis chondroideus 250μ diametro, teres vel subhexogonus in sectione transversali, hyphis tenuibus conglutinatis, longitudinalibus, pachydermaticis. Apothecia spermogoniaque non visa.

Thallus mostly 2 cm. (one plant 3 cm.) tall, branching essentially dichotomous, but one branch often larger than the other, not widely divergent, ascending, rigid, buff yellow to maize yellow, ultimate branches relatively short, wholly blackened; primary branches smooth, not cracked below, slightly rugose and subfoveolate with small, scattered papillae above, not constricted at the base; soralia slightly convex, very small, confined to the ultimate branches, occasionally several confluent along the axis, soredia granular, not conspicuously eroded, slightly yellowish; cortex 60–65μ thick, outer 20μ a hyaline gel, rest of palisade of hyphae with isodiametric cells, heavily nubilated with small, acicular, yellowish crystals in a yellowish gel; medulla K–, 100μ thick, compact with small air spaces quite uniformly distributed; algae in small colonies or singly, irregularly distributed in the outer third of medulla, cells mostly 10μ or smaller, a few up to 15μ; chondroid axis about 250μ in diameter, round or slightly hexagonal in cross section, of slender, conglutinate, longitudinal, thick-walled hyphae. Apothecia and spermogonia not seen.

Macroscopically this species appears intermediate between *U. scabridula* and *U. pustulata*. Microscopically it is closer to the former, from which it differs in its soredia, more sparse papillation, more slender, blacker ultimate branches and axis circular in cross section. So far known only from Queen Mary Land.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 82–3, type; 71–2.

USNEA PICATA (Lamb) Dodge, comb. nov.

Neuropogon acromelana (Stirton) Lamb, var. *inactivus* f. *picatus* Lamb, Jour. Linn. Soc. Bot., 52, 220; 1939.

Type: S. Victoria Land, Cape Adare on Sastrugi, Brit. Antarct. (Terra Nova) Exp., not seen. The following description based on material from Queen Mary Land.

Thallus about 3 cm. tall, base 1 mm. in diameter, repeatedly dichotomously branched near the base, forming a dense, erect tuft, ultimate branches 1 cm. or more long, very slender, often wholly blackened, more rarely annulate blackened, intermediate portion between antimony yellow and ochraceous buff, sometimes slightly rugose and subfoveolate, with occasional annular cracks, which may be blackened as in *U. acromelana* but without the characteristic longitudinal cracks of that species; soredia minutely tubercular, becoming granular and finally partly eroded, leaving circular, almost flat soralia, resembling minute apothecia on the ultimate branches; cortex 40–45μ thick, highly gelified, the outer 7–8μ hyaline, the rest a palisade of vertical branched, loosely ascending hyphae about 1μ in diameter, with very minute yellowish crystals; algal cells 6–7μ in diameter, scattered or in small, loose groups in the outer portion of the medulla; medulla dense, K–, about 150μ thick, of densely woven hyphae about 4μ in diameter with moderately thickened walls; chondroid axis nearly square in cross section, about 340μ on a side, of very densely conglutinate, slender, thick-walled hyphae. Apothecia and spermogonia not seen.

I have been unable to satisfy myself whether the blackening in the cracks of this species is due to chemical or to morphological changes in the lichen itself. It seems rather due to the invasion of a parasite, perhaps mycelium of a *Phacopsis*. I have seen no reproductive structures of the supposed parasite, although in some sections, a palisade, suggestive of the base of the apothecium of *Phacopsis*, has been noted.

The systematic relationship of this species is not clear. It is erect, not subdecumbent and in its microscopic characters and chemical reactions, it is closer to *U. antarctica* than to *U. acromelana*.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 71.

The following species, *U. Crombii* Dodge, *U. floriformis* Dodge, *U. insularis* (Lamb) Dodge and *U. Taylori* Hook f., are intermediate in several respects between *Usnea* subgenus *Neuropogon* and *Usnea* subgenus *Euusnea* sect. *Laevigatae* subsect. *Roccellinae*. On account of the peculiar algal symbiont which they share with some species of the subsection *Roccellinae*, I have placed them in the latter, although I have included them in the keys of both groups.

Subgenus Euusnea.

Usnea subgenus *Euusnea* Motyka, Lich. Gen. Usnea Stud. Monog., 68; 1936.

Usnea section *Euusnea* Jatta, Syll. Lich. Ital., 52; 1900.

Type: *U. florida* (L.) Wigg.

Thallus variable in habit, either short and fruticulose or very long, sometimes sparingly or more frequently densely branched, colour usually some shade of grey or green when fresh, not distinctly blackening or only the tops of the branches blackening, apothecial margin almost always with cilia, disc commonly pale and pruinose, darkening in only a few species; cortex commonly coriaceous; axis usually solid rarely somewhat lacerate within but not distinctly hollow.

This large subgenus of over 400 species is widely distributed in the temperate zone and the higher elevations in the tropics. Of the nine sections, only the *Stramineae* and the *Glabratae* of the temperate regions reach Macquarie Island. The *Laevigatae* subsection *Roccellinae* of colder regions are found in Kerguelen and Heard Island.

Section Stramineae.

Usnea subg. *Euusnea* sect. *Stramineae* Motyka, Lich. Gen. Usnea Stud. Monog., 2, 432; 1937.

Thallus long, rarely medium or short, almost always pendulous, soft, commonly distinctly articulate, pale green occasionally unchanged or pale stramineous, more commonly distinctly fuscescent in the herbarium; cortex almost always thin, papery, but firm.

Section Amoenae.

Usnea subg. *Euusnea* sect. *Stramineae* subsect. *Amoenae* Motyka, Lich. Gen. Usnea Stud. Monog., 433; 1937.

Thallus pendulous, prostrate or even fruticulose and suberect, terete or quite distinctly foveolate, more or less articulate, epapillose and eciliate or with slender ramuli and very indistinct papillae, without pseudocyphellae; colour comparatively variable, pale stramineous or almost white, slightly fuscous; cortex thin and very soft; medulla thick, lax; chondroid axis slender.

Usnea contexta Motyka.

Usnea contexta Motyka, Lich. Gen. Usnea Stud. Monog., 2, 436; 1937.

Type: New Zealand, Mt. Maungatua, 900 m. near Dunedin, Scott–Thomson in herb. Motyka, not seen.

Thallus 10–15 cm. long, very soft and flaccid in preserved material, rather rigid when dry, straw-green drying pale light orange yellow to raw sienna [bleaching completely white in preservative] smooth and somewhat shining, base short and slender with several branches from a common base, repeatedly dichotomously branched, divergent and irregularly curved, about 1 mm. in diameter tapering rapidly towards the ends, somewhat irregularly articulate, joints of irregular length, slightly constricted at the joints, terete, sometimes foveolate, glabrous; ramuli rare and scattered, very slender, 2–5 mm. long, perpendicular, often once branched; ultimate branches very

slender, 5–15 mm. long; cortex 40–50μ thick, a palisade of highly gelified hyphae, the gel yellowish in section, surrounded by a layer of clear gel about 7·5–10μ thick; algal cells occurring singly or in small colonies in the outer portion of the medulla, mostly 5–6μ in diameter, occasional cells larger; medulla about 180μ thick, rather compact in the outer half, especially in the vicinity of the algae, the inner portion very loose, mostly of unbranched hyphae radiating from the axis, about 4μ in diameter; chondroid axis slightly elliptic in cross section, 180 $\times$ 165μ, of densely woven, conglutinate, more or less longitudinal hyphae.

Most of our material was preserved in formalin which apparently dissolved part of the gel, leaving the thalli very soft and flaccid. The above description is largely based on the dry specimen.

Macquarie Island: B.A.N.Z.A.R.E. 532–2 (preserved material); B.A.N.Z.A.R.E. 1,658 (dry material).

Section Glabratae.

Usnea subgen. *Euusnea* sect. *Glabratae* Motyka, Lich. Gen. Usnea Stud. Monog., 2, 483; 1937.

Thallus small, rarely medium, very rarely long, fruticulose and cespitose, quite widely divergently branched, nude, rarely or frequently ramulose, smooth or indistinctly papillose, never distinctly tuberculate, glabrous, in the herbarium intensely fuscescent or persistent stramineous; cortex commonly thin and papery; medulla lax or dense.

Subsection Pycnocladae.

Usnea subgen. *Euusnea* sect. *Glabratae* subsect. *Pycnocladae* Motyka, Lich. Gen. Usnea Stud. Monog., 2, 484; 1937.

Thallus small and cespitose fruticulose, rarely subpendulous and irregularly ramulose, sterile, smooth or indistinctly papillate, ramuli few, quite soft and irregularly scattered.

Usnea arida Motyka.

Usnea arida Motyka, Lich. Gen. Usnea Stud. Monog., 2, 492; 1937.

Type: Australia, Gippsland, Tarvin, Mrs. Manton in Naturhist. Hofmus. Wien, not seen, but specimens from King Island, Bass Strait, Spong, and New Zealand, Mt. Tararua, John Buchanan, both ex herb. Stirton in British Museum, so determined by Motyka.

Usnea arida var. muscicola Dodge, var. nov.

Type: Macquarie Island, Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. 531–31.

Thallus mollis, erectus, basi 1 mm. diametro, ramis primariis non divergentibus, internodis brevibus, secundariis basi constrictis, superne repetito-dichotomis, divergentibus, inferne laevibus, superne spinulosis, articulis subinflatis, ramis ultimis tenuibus apicibus acutis, subnigricantibus, spinulossisimis; soredia isidiosa; cortex ca. 35μ crassitudine, hyphis pachydermeis, verticalibus, cellulis isodiametricis; stratum algarum interruptum, cellulis, 7–10μ diametro, laxe dispositis; medulla laxa, 35–60μ, crassitudine, hyphis pachydermeis, laxissime contextis; axis chondroideus 190μ diametro, hyphis conglutinatis, longitudinalibus. Apothecia spermogoniaque non visa.

Thallus spreading, rather flaccid, erect, base about 1 mm. in diameter, lower branches at acute angles, upper branches at nearly right angles, internodes short; secondary branches slightly constricted at the base, repeatedly dichotomously branched above; surface smooth below, spinulose above, joints relatively long, very slightly inflated and slightly tapering above; outer portions of

the branches with dense masses of isidiose soredia which often completely obscure the cortex; the ultimate branches slender, tips acute and slightly blackened, densely beset with spinules; cortex about 35μ thick, a palisade of thick-walled hyphae with nearly isodiametric cells; algal layer interrupted, cells 7–10μ in diameter, loosely arranged, not in compact colonies; medulla lax, 35–60μ thick, of very loosely woven, thick-walled hyphae; chondroid axis 190μ in diameter, of longitudinal, conglutinate hyphae, appearing almost structureless in sections.

Growing on mosses (*Polytrichum* ?).

While this variety seems to belong to *U. arida*, it suggests members of the subsection *Scabridae*. The medulla is very loosely woven and is much thinner, aboth absolutely and proportionally than in either group.

Macquarie Island: Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. 531–31.

Subsection Xanthopogae.

Usnea subgen. *Euusnea* sect. *Glabratae* subsect. *Xanthopogae* Motyka, Lich. Gen. Usnea Stud. Monog., 2, 548; 1937.

Thallus of medium size, fruticulose or cespitose, yellowish or stramineous, rarely slightly fuscous-green, smooth or distinctly ramulose, not ciliate, mostly sterile, sorediose, medulla quite thin, lax or subdense.

Usnea xanthopoga Nyl.

Usnea xanthopoga Nyl., C. R. Acad. Sci. [Paris], 83, 89; 1876: Hue, Nouv. Arch. Mus. [Paris] IV, 1, 41; 1899.

Usnea barbata v. *sulphurea* Hook. f. & Tayl., Crypt. Antarct. 82, 1845; Fl. Antarct., 1, 194; 1845 non alior.

Type: Campbell Island, Filhol, on branches of trees. The type of *U. barbata* v. *sulphurea* from Campbell Island and Lord Auckland's group, J. D. Hooker (Voy. "Erebus & Terror").

There seem to be several entities from the mountains of New Zealand and the islands to the southward, which have been referred to *U. xanthopoga* by various authors. From Macquarie Island, we have only a small fragment about 1 cm. tall, evidently not the whole plant, referable to this group. It is clearly not *U. xanthopoga* of Nylander and of Hue based on the type from Campbell Island, although it is K–. Nor is it *U. xanthophana* Stirton, Scot. Nat., 7, 77; 1883 (type from New Zealand, Mt. Tararua, John Buchanan in the Art Galleries at Glasgow) also with the thallus and medulla K–. Except for its reaction with K, our Macquarie Island plant agrees in its soredia with the description of *U. xanthopoga* (Motyka, Lich. Gen. Usnea Stud. Monog., 2, 549; 1937) and with a specimen from New Zealand, Akawa Heads, on old rails, T. W. N. Beckett, Dec., 1893, determined as *U. xanthophana* by Stirton a decade after his original publication. From Hooker & Taylor's description, it seems likely that their *U. barbata* v. *sulphurea* refers to this entity, but I have not seen their type, nor is it cited by Motyka. Until more material is available to me from this region, I prefer not to propose new names for these entities.

Macquarie Island: B.A.N.Z.A.RE. 1,658; Dec., 1930.

Subsection Osseoleucae.

Usnea sugben. *Euusnea* sect. *Glabratae* subsect. *Osseoleucae* Motyka, Lich. Gen. Usnea Stud. Monog., 2, 555; 1937.

Thallus medium or even quite large, always rigid, persistently yellowish or greenish and in the herbarium profoundly fuscescent, less distinctly fruticulose, often cespitose or irregularly

branched, smooth, or less distinctly grossly papillate or rather verruculose, bone white, shining or dull and quasi pruinose, fertile or sterile sorediose; cortex comparatively thick and cartilaginous; medulla dense, very rarely sublax; axis rather thick.

USNEA TORULOSA (Müll.-Arg.).

Usnea torulosa (Müll.-Arg.) Zahlbr., Cat. Lich. Univ., 6, 594; 1930.

Usnea dasypogoides f. *torulosa* Müll.-Arg., Flora, 66, 19; 1883.

Type: New South Wales, Mt. Kosciusko, Findley in Herb. Univ. Genève, not seen, but specimen from type locality, Merritt's Camp, J. H. Maiden, Jan., 1899; ex Nat. Herb. New South Wales, seen.

Thallus about 7 cm. tall, erect, fruticulose (said to be pale green when living), drying wood brown, and buffy brown when preserved in formalin and alcohol, surface dull, base short, primary branches about 1·5 mm. in diameter (drying to 1 mm.), slightly attenuated at the base, lower internodes long between dichotomous secondary branches, cortex with annular cracks, slightly constricted, nearly terete, but somewhat foveolate below, otherwise smooth, eramulose; branches of upper centimetre, closely dichotomous, ultimate branches rapidly tapering to a blunt tip; other secondary branches scarcely tapering but covered with hemispherical soralia, nearly a millimetre in diameter, producing dense, echinulate isidia, about 8–10μ in diameter and about 30–40μ long; cortex 90–100μ thick, of slender, subvertical densely branched hyphae with isodiametric cells imbedded in a gel; algal layer 35–50μ thick, of discrete subspherical colonies of cells about 7–8μ in diameter, rarely up to 11μ, protococcoid; medulla lax, about 100μ thick, of very loosely woven, thick-walled hypae about 4μ in diameter; chondroid axis compressed, almost rectangular in cross section, about 225 $\times$ 140μ, solid, of very slender, thick-walled, conglutinate, longitudinal hyphae.

Previously known from Mt. Kosciusko, New South Wales (the type locality); Greymouth, New Zealand; and Tasmania, a single collection each.

Macquarie Island, North End, Sta. 81, B.A.N.Z.A.R.E. 540–15; Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. 531–32.

SECTION LAEVIGATAE.

Usnea subgen. *Euusnea* sect. *Laevigatae* Motyka, Lich. Gen. Usnea Stud. Monog., 3, 620; 1938.

Thallus variable in size, pendulous or fruticose, mostly white or pale greenish, unchanged in the herbarium, either very smooth or dull and tartareous, very rarely grossly papillate, nude or irregularly ramulose, cortex chondroid but soft and fragile, mostly fertile, rarely sorediose.

SUBSECTION ROCCELLINAE.

Usnea subgen. *Euusnea* sect. *Laevigatae* subsect. *Roccellinae* Motyka, Lich. Gen. Usnea Stud. Monog., 3, 632; 1938.

Thallus small, rarely beyond 5–8 cm. tall, fruticose, smooth, tartareous or coarsely papillate, white, yellowish or even quite dark.

The algae of our species of this group and such others as have been available to me for examination, are very puzzling. In colour, shape and tendency to form filaments, they are suggestive of *Trentepohlia*. On the other hand, in the same section, one sees groups of cells suggestive of a recently ruptured *Trebouxia* (*Cystococcus*), although there are fewer cells in the group and the individual cells appear as truncate pyramids (or possibly cones). Other cells of about the same size, but more rounded, are found in the gelified cortex or in the old thecium (after most

of the ascospores are ejected). In such sections, colonies of a small-celled *Trentepohlia* are found at the outer surface. Hence it seems probable that these small cells are aplanospores (transformed zoospores on account of the high viscosity of the gel in which they are liberated) which make their way to the surface of the thallus and start small colonies which serve to disseminate the alga apart from the fungus. In the sterile *U. hereroensis* and *U. mossamedana*, Vainio reported the algae as *Trentepholia* and assigned them to *Roccella*. Darbishire, Ann. Crypt. Exot., 5, 160–166. pl. 4; 1932, after a study of the types, concluded that the algae were probably *Protococcus*, although his figures of "autospores" (pl. 4, figs. 9, 10) are strikingly similar to the aplanospores of *Trentepohlia* figured by Meyer (Bot. Zeitung, 67, pl. 2, figs. 44–47; 1909). The protoplast seems to be cup-shaped or perhaps a single wide parietal band, thus differing from that usual in *Trentepohlia*, so that our alga may represent a new genus of the Trentepohliaceae. The yellow-orange pigment and branching, filamentous structure are very characteristic of the Trentepohliaceae.

Surface of chondroid axis lacerate, the algae penetrating the lacunae, colour yellow to orange, tips blackened as in subgenus *Neuropogon*.
- Fertile, branches relatively few and erect .. .. *U. Taylori*
- Sorediose, densely branched and spreading
  - Soralia round, slightly elevated, large, plane to somewhat eroded .. *U. insularis*
  - Soralia minute on tips of abundant elevated warts .. .. *U. Crombii*

Surface of chondroid axis not lacerate; sorediose
- Surface tuberculate; cortex 90μ thick, fertile with large apothecia .. *U. floriformis*
- Surface smooth; cortex 20μ; soredia germinating *in situ* as propagula .. *U. propagulifera*

Usnea Taylori Hook. f.

Usnea Taylori Hook f., London Jour. Bot., 3, 657; 1884: Cryptog. Antarct., 215, 1845: Fl. Antarct., 2, 521; pl. 195, 1847: Müll.-Arg., Bot. Jahrb. [Engler], 3, 54; 1883: Reinke, Jahrb. Wiss. Bot. [Pringsheim], 28, 396; fig. 116, 117 iii, 1895: Wilson, Mém. Herb. Boissier, 18, 87; 1900: Zahlbr. in Schenck, Wiss. Ergebn. Deutsche Tiefsee Exp., 2, 1, 37; 1905: Du Rietz, Svensk. Bot. Tidskr., 20, 91; 1926: Bouly de Lesdain, Ann. Crypt. Exot., 4, 101; 1931: Motyka, Lich. Gen. Usnea Stud. Monog., 1, 26; 1936.

Neuropogon Taylori Nyl., Syn. Meth. Lich., 1, 273; 1860: Crombie, Jour. Linn. Soc. Bot., 15, 183; 1876: Jour. Bot. Brit. For., 15, 103; 1877: Phil. Trans. Roy. Soc. [London], 168, 48; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1 2, 233; 1885: Zukal, Sitzungsber. Math. Naturw. Cl., K. Akad. Wiss. Wien, Abt. I, 104, 45; pl. 1, fig. 3; 1895: Lamb, Jour. Linn. Soc. Bot., 52, 214; 1939.

Type: Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb., cotypes widely distributed.

Several plants arising from a common base, 8–10 cm. tall, erect, sparingly dichotomously branched below, more frequently above, primary branches 1·4–3·5 mm. in diameter, slightly attenuate below, expanding into a common hapteron; surface dull, cinnamon buff to pinkish buff, darkening to tawny olive in old plants and finally black, maculate with ivory yellow to colonial buff (suggesting soredia but not so, even in blackened, moribund plants); upper branches shining, black maculate but not annulate, with primrose yellow, slender tips, short and obtuse; eramulose; cortex sometimes subannularly cracked but never annulate [a single plant shows verruculose pseudocyphelloid cortex with some verrucae elongate on the upper part of the apothecial branches, and the apothecia have similar verrucae on the lower side], not black punctuate [as Motyka states for

the Paris specimen]; cortex 40μ thick, outer layer a gel 8–15μ thick, below which is a palisade of dichotomously branched, brownish hyphae, 3μ in diameter, very dense above, looser below and passing directly into the medulla without algae; medulla up to 200μ thick, arachnoid, hyphae 3μ in diameter, heavily incrusted with crystals, passing indistinctly below into the chondroid axis which is 1,250μ in diameter, lacerate about the margin with cortex nearly lacking over the lacerations, the whole lacuna filled with algae with a narrow medullar strand in the centre, connected with the ecorticate area to provide aeration; algal cells arranged in rows, forming a palisade next the cortex, with more spherical colonies scattered in the medullary tissue, cells 4 × 7μ, angular; hyphae of axis with lumen about 1μ in diameter; central cavity brownish, nearly devoid of algae, asteroid, stuffed with loosely woven hyphae 3–7μ in diameter, with lumina less than 1μ; no reaction with paraphenylene diamine nor K.

Apothecia abundant on the larger stalks, lateral near the tip of a branch, the end of the branch then bent back and often inconspicuous, up to 20 mm. mostly about 10 mm. in diameter, irregularly lobed, disc black, shining, slightly rugose; exciple smooth [except one plant minutely verrucose as in the stem immediately below], concolorous with the thallus but not maculate even in old moribund apothecia; cortex 85μ thick, fastigiate as in the thallus, without the outer layer of gel; algal layer continuous, 60–70μ thick, cells subspherical 6–7μ in diameter with sheaths 3μ thick; medulla 140μ thick, of loosely periclinal hyphae, 4–6μ in diameter with very narrow lumina; hypothecium 85μ thick, of very slender, densely woven hyphae, more or less periclinal; thecium about 80μ tall; paraphyses slender, fastigiately dichotomously branched above, forming a greenish black epithecium about 15μ thick; asci clavate, thick-walled, 8-spored, 56 × 15μ; ascospores short ellipsoidal, hyaline, relatively thick-walled, 10 × 5–6μ.

Spermogonia immersed in black, irregular swellings, oblately sphaeroidal, 185μ tall, 250μ in diameter, wall thin, hyaline, 20μ thick, of slender, periclinal hyphae about 1·5μ in diameter, easily separable from the surrounding tissues; spermatiophores closely septate and branched; spermatia 3 × 1μ, ellipsoidal, straight.

The above description is based on the type. The B.A.N.Z.A.R.E. material is mustard yellow and more blackened with much smaller apothecia.

Kerguelen: Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") type in Taylor Herb. and duplicate ex Herb. Taylor in Tuckerman Herb.; Mountain, 1,500 ft. above Port Jeanne d'Arc, B.A.N.Z.A.R.E. B176; locality not given, Moseley ("Challenger" Exp.) in Stirton Herb. at the Art Galleries, Glasgow.

USNEA INSULARIS (Lamb) Dodge, n. comb.

Neuropogon insularis Lamb, Jour. Linn. Soc. Bot., 52, 215; pl. 8, fig. 17; 1939.

Type: Prince Edward Group, Marion Island, 46° 49′ S., 37° 49′ E., Moseley ("Challenger" Exp.), not seen.

Thallus erect, spreading, 5 cm. tall, forming hemispheric tufts, rigid, base 4 mm. in diameter, repeatedly branched just above the base, primary branches about 2 mm. in diameter, dichotomous above, divergent, ascending, ultimate branches short, tips obtuse, without true ramuli, terete, smooth, subnitid, some of the larger branches rugose to subfoveolate, ultimate branches black maculate or black annulate but not cracked, tips black, rest hazel to cinnamon rufous, with lighter, somewhat irregular patches over the young soralia which are slightly elevated, more or less circular and confluent, plane to slightly eroded, naphthalene yellow; cortex 55–90μ thick, K fuscescent, thinning over the future soralia, a palisade of thick-walled hyaline hyphae, without crystals; algal layer and medulla often lacking over a portion of the older branches, where present about 90μ thick,

densely packed with algal cells arranged in radial rows which also fill the lacunae in the outer surface of the axis, medullary hyphae few, radiating from the axis and producing the cortex; chondroid axis about 950μ in diameter, similar in structure to that of *U. Taylori*.

The above description is based on the Heard Island material, which differs slightly from Lamb's description in being somewhat smaller with a thinner cortex and relatively thicker axis. The cortical hyphae form a more regular palisade. The algae are similar to those of *U. Taylori* and *U. floriformis*. In several respects, these species are transitional between the subgenous *Neuropogon* and the subsection *Roccellinae*, having the colour of the former, but microscopic structure of the latter.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–50.

USNEA CROMBII Dodge, sp. nov.

? *Neuropogon melaxanthus* v. *sorediifer* Crombie, Jour. Linn. Soc. Bot., 15, 182; 1876: Phil. Trans. Roy. Soc. [London], 168, 47; 1879.

? *Usnea melaxantha* v. *sorediifera* Wilson. Mém. Herb. Bossier, 18, 87; 1900, probably non Müll.-Arg.

? *Usnea sulphurea* v. *sorediifera* Zahlbr., Deutsche Südpolar Exp., 8, 52; 1906, probably non Vain.

? *Neuropogon antarcticus* v. *sorediifer* Lamb, Jour. Cinn. Soc. Bot., 52, 213; 1939.

Type: Heard Island, between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–36.

Thallus growing in dense tufts about 5 cm. tall and broad, branching dichotomous, internodes relatively short and about equal throughout the length, branches somewhat flexuous, the ultimate branches often curved, younger ones slender with acute tips, older much less attenuate and tips obtuse; base blackened, about 1 mm. in diameter, isabella colour to honey yellow, upper portion more or less black, maculate sometimes black annulate but not cracked; surface variously rugose and somewhat foveolate, with abundant irregularly distributed verrucae or short papillae, often forming minute soredia at their tips, verrucae fewer but somewhat larger near the tips, with soralia more eroded; cortex 36–55μ, rather variable in thickness in the same section, a palisade of thick-walled, gelified hyphae about once dichotomous above, completely structureless in the upper 10μ; medulla K brown, soon fading to colourless, about 100μ thick up to 200μ under the verrucae, of densely woven, thick-walled hyphae with aggregations of relatively large crystals in the lower half; algae in dense colonies, occupying the whole thickness of the medulla, or confined to the upper half with some single cells scattered throughout the medulla, filamentous, branched, bright orange in section, cells relatively short cylindric, becoming subspherical when occurring singly; chondroid axis about 625μ in diameter, of thick-walled, branched, conglutinate hyphae, leaving irregular lacunae near the centre, but not conspicuously hollow.

The interpretation of *Neuropogon melaxanthus* v. *sorediifer* Crombie is very difficult, as the type has never been adequately described. Motyka states that some forms from Kerguelen (i.e. Crombie's specimens of *N. melaxanthus* v. *sorediifer*) seem to approach *U. acromelana*. Our plants have a cortex somewhat cracked into areoles near the base, but without blackening in the cracks as in *U. acromelana*, and none of the characteristic annular cracks. The surface of the branches is also somewhat reminiscent of *U. strigulosa*. Lamb, on the other hand, emphasizes the reactions with potassium hydroxide and paraphenylene diamine. Our plants apparently have less of the colour-producing compounds than Crombie's type, but more than other plants which Lamb refers here.

Four plants from Kerguelen are rather more robust, the larger branches up to 1·7 mm. in diameter and often more foveate with correspondingly fewer verrucae and larger eroded soredia. In one section, an algal filament has pushed through a thin place in the cortex and is terminated by a subspherical sporangium, at the surface of the thallus. The sporangium had liberated all but two of the zoospores (or akinetes).

As the epithet *sorediifer,* if raised to specific rank in *Usnea* would be preoccupied by *U. sorediifera* Arn. in Lynge and by *U. sorediifera* (Hue) Mot., this entity would have to be renamed. It has seemed best to describe *U. Crombii* as new, based on our Heard Island plants as I have seen so few plants from Kerguelen.

Growing with *Usnea Taylori.*

Kerguelen: Royal Sound, Robert Hall (Nat. Herb. Melbourne Bot. Gard.).

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–35, B140–36, type, B140–37.

USNEA CROMBII, var. SUBLAEVIS Dodge, var. nov.

? *Neuropogon melaxanthus* Crombie, Jour. Linn. Soc. Bot. 15, 182; 1876. Jour. Bot. Brit. For. 15, 103, 106; 1877; Phil. Trans. Roy. Soc. [London] 168: 48. 1879; Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 233; 1885; Schenck Wiss, Ergebn. Deutsche Tiefsee Exp. "Valdivia", 2, 1, 37; 1905: Wilson, Mém. Herb. Boissier, 18, 87; 1900 non Ach.

Type: Heard Island, between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–40.

Thallus smoother, rather sparsely verrucose, scarcely sorediose, rather stouter and more branched below, upper branches more slender and tips acute, with occasional ramuli; cortex and medulla similar to that of the species, but the medulla disappears over large areas of the branches; outer surface of the chondroid axis lacerate, with the algal filaments tending to penetrate the lacerations as in *U. Taylori*; chondroid axis about 825μ in diameter, not lacunose in the centre.

While the structure of the stems remind one of that found in *U. Taylori,* the algal layer is better developed and the habit is altogether different from that of the sterile specimens of *U. Taylori* from Kerguelen.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–38, B140–39, B140–40, type.

USNEA PROPAGULIFERA Dodge, sp. nov.

Type: Heard Island, Atlas Cove to Corinthian Bay, B.A.N.Z.A.R.E. B140–52.

Thallus erectus, ad 7 cm. altitudine, basi 1·5 mm. diametro, nigricanti, dichotome ramosus, internodis basalibus brevibus, ramis ca. 1 mm. diametro, flexuosis, internodis mediis longis, superis brevioribus, ramulis singulis, apicibus acutis, frequenter nigricantibus, opacus, subpruinosus, olivaceo-ochraceus vel dilutior, laevis, raro subrugosus vel subverrucosus; soralia orbicularia, marginibus subelevatis, suberosa, in ramis mediis confluentia, in ramis ultimis magis elevata convexaque ubi soredia in ramillis (propagulis) ad 0·2 mm. longitudine, nigris evolvunt; cortex ca. 20μ crassitudine, gelifactus, strato tenui crystallorum minutorum flavorum tectus, hyphis verticalibus pachydermeis ramosis; stratum algarum ca. 35μ crassitudine, cellulis in filamentis dispositis, breviter cylindicis ad 8μ diametro, cellulis solitariis subsphaericis, hyphis medullaribus circumdatis; medulla 35–45μ crassitudine, K- vel subbrunnescens, hyphis pachydermeis 4–5μ diametro, dense contextis; axis chondroideus ad 500μ, teres, hyphis tenuibus, pachydermeis, ramosis, conglutinatis. Apothecia spermogoniaque non visa.

Thallus erect, up to 7 cm. tall, base 1·5 mm. in diameter, blackened, dichotomous, internodes

very short just above the base, branches about 1 mm. in diameter, flexuous, intermediate internodes much longer, upper internodes shorter, with occasional ramuli (branches with arrested development), tips acute, often blackened, opaque (shining where the pruina has been rubbed off in handling), olive ochre or lighter, surface smooth, rarely slightly rugose or verrucose from unopened soralia which are circular with slightly elevated margins, slightly eroded, sometimes confluent on the intermediate branches; soredia of a few algal cells in a dense, spherical colony surrounded by brown hyphae, hence appearing as minute black points on the surface of the soralia where some of the soredia germinate *in situ*, forming tufts of short, black ramilli (propagula) about 0·2 mm. long; cortex about 20μ thick, gelified, covered with a thin layer of minute yellow crystals, a palisade of branched, thick-walled hyphae with very small lumina; algal layer about 35μ thick, cells in filaments or scattered, short cylindric, up to 8μ in diameter, usually shorter than the diameter, isolated cells somewhat less angular, surrounded by medullary hyphae; medulla 35–45μ thick, K– or somewhat brownish, hyphae thick-walled, 4–5μ in diameter, very dense, with very large hyaline crystals filling the spaces below, slightly looser in the upper branches with fewer crystals; Chondroid axis up to 500μ below, circular in cross section, of slender, thick-walled, conglutinate, branched hyphae, 150–175μ in diameter above, less regular in cross section. Apothecia and spermogonia not seen.

The germination of the soredia of the upper soralia *in situ*, gives the appearance of a minute witches' broom. These evidently serve as propagula, since they are attached to the parent plant only by medullary hyphae, their slender, chondroid axis not being attached to the chondroid axis of the parent plant. The algal layer consists of a few flattened colonies, not in a continuous layer. The tip consists of free ends of the hyphae of the chondroid axis, not covered by cortex nor algae, as described by Darbishire, Ann. Crypt. Exot., 5, 164; 1932, for *U. hereroensis* (Vain.) Darb., another species of the subsection *Roccellinae*.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–51, B140–52, type, B140–53, B140–54, B140–55, B140–56, B140–61.

USNEA FLORIFORMIS Dodge, sp. nov.

Type: Heard Island, Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–1.

Thallus adscendens, rigidus, ca. 6 cm. altitudine, teres, 2 mm. diametro basi, ramis dichotomis, perpendicularibus, curvatis, ramis ultimis ad 1 mm. diametro, basi decorticatus, superne fulvus, opacus, sed non pruinosus, dense minuteque tuberculatus, tubercula in sorediis minutis erumpentia, ramis ultimis grosse tuberculatis, tubercula in soredia flava, erosa, erumpentia, dein plus minusve nigricantia; cortex ad 90μ, variabili crassitudine, fastigiatus, hyphis tenuibus ad 2μ diametro, plus minusve superne ramosis, sine crystallis, gelifactus; stratum algarum 150–180μ crassitudine, aurantiacum luce reflexo, viridiflavum luce transmisso, cellulis cylindricis vel subangulosis, filamentis ex axi chondroideo plus minusve radiantibus, dein cellulis plus minusve ab hyphis ca. 4μ diametro medullaribus separatis, circa axem crystallis abundanter nubilatis; axis chondroideus sectione transversali subellipticus 250 $\times$ 350μ (in ramo secto) diametro, hyphis conglutinatus longitudinalibus ab funiculis ex hyphis plus minusve horizontalibus separatis.

Apothecia sessilia super ramos majores, ad 1 cm. diametro, contorta, margine plus minusve inflexa, floriformiter scissa, excipulo eciliato, laevi, subnitido, poris respiratoriis numerosis quae in apotheciis vetustioribus in soralia orbicularia erosa expandunt, disco concavo, vel irregulari, obscure brunneo nigricantique; cortex amphithecii 40μ crassitudine, fastigiatus, hyphis tenuibus pachydermeis, dimidia parte superiori cum crystallis subbrunneis, parte inferiori hyalina, paucis cum crystallis; stratum algarum ca. 100μ crassitudine, cellulis dense dispositis; medulla ca. 150μ

crassitudine, hyphis pachydermeis, 6–7μ diametro dense sub strato algarum contextis, laxe sub parathecio, acicularibus cum crystallis aggregatis inter hyphas; parathecium ca. 55μ crassitudine, hyalinum, subgelifactumque, hyphis tenuibus dense contextis; hypothecium circa 55μ crassitudine, hyphis leptodermeis periclinalibus sublaxe contextis; thecium 90μ altitudine; paraphyses tenues, pachydermateae, septatae, bis vel ter dichotome super ascos ramosae, apicibus non incrassatis; asci cylindrico-clavati, 40–45 $\times$ 15–18μ; ascosporae 6–8nae (raro 4nae), hyalinae, ellipsoideae, uniloculares, 8–10 $\times$ 6–8μ. Spermogonia non visa.

Thallus erect, rigid, about 6 cm. tall, spreading about 10 cm., terete, 2 mm. in diameter at the base, branching more or less dichotomous, at right angles, branches curved, the ultimate branches very strongly so, about 1 mm. in diameter; decorticate, showing the blackened axis at the base, above tawny to russet in sheltered positions, surface dull but not pruinose, densely beset with minute tubercles which rupture as soredia, the ultimate branches with conspicuous tubercles which rupture and erode as yellow soredia, the whole finally more or less blackened and weathered; cortex very variable in thickness in the same cross section, up to 90μ thick, a palisade of slender hyphae, not more than 2μ in diameter, branching and more closely septate above, imbedded in a gel without crystals, sometimes reduced to a clear gel 12μ thick or overlain with small colonies of algae similar to those within the thallus, but with smaller cells; algal layer 150–180μ thick, bright orange in reflected light, yellowish green by transmitted light, algal cells cylindric or somewhat angular from mutual pressure, in filaments radiating from the chondroid axis, or cells more or less separated by dense, slender, very thick-walled medullary hyphae about 4μ in diameter, heavily incrusted with relatively large crystals near the axis; chondroid axis slightly elliptic in cross section, 250 $\times$ 350μ in diameter (in branch sectioned) of conglutinate, thick-walled longitudinal hyphae, separated by strands of more or less horizontal hyphae.

Apothecia sessile on the larger branches, up to 1 cm. in diameter, contorted, margin more or less inflexed and splitting into petaliform lobes, exciple ciliate, smooth, shining with numerous breathing pores which expand in the old apothecia into eroded, circular soralia, disc concave to irregular, deep brown to almost black; amphithecial cortex 40μ thick, fastigiate, of slender, thick walled septate hyphae, the tips bending at nearly right angles and running periclinally a short distance in the hyaline outer gel (about 7–10μ thick), the upper half heavily coated with brownish crystals, appearing as a brownish zone in section, the inner half with few crystals; algal layer about 100μ thick, of densely packed cells; medulla about 150μ thick, of thick-walled hyphae, 6–7μ in diameter, rather densely woven next the algal layer and loose with large air spaces next the parathecium, with dense aggregations of hyaline, acicular crystals between the hyphae below the algal layer; parathecium about 55μ thick, hyaline, somewhat gelified, of slender, densely woven hyphae, the upper 15μ staining deeply, thinning abruptly where it meets the amphithecial cortex and not reaching the top of the thecium; hypothecium about 35μ thick, of slender thin-walled, periclinal hyphae rather loosely woven and staining deeply; thecium 90μ tall; paraphyses slender, thick-walled, closely septate, especially above where they are twice or thrice dichtomous above the asci, tips not thickened, cutting off minute spherical cells in the epithecial gel which is hyaline, about 7μ thick; asci cylindric-clavate, 40–45 $\times$ 15–18μ, walls thick when young, protoplast with a long apiculus, thin-walled when mature, 6–8-spored, rarely 4-spored; ascospores hyaline, unicellular, ellipsoidal 8–10 $\times$ 6–8μ. Spermogonia not seen.

There is also a group of sterile specimens, somewhat smaller and more densely branched, agreeing with this species in microscopic structure. They are parasitized (?) by a brown mycelium which completely replaces the algal and medullary layers, giving rise to apotheciiform, convex black structures about 2 mm. in diameter. Over these the cortical hyphae have thinner walls with

much larger lumina and the upper 20μ is so blackened that it is difficult to see microscopic details. In this cortex, spermogonia are rather common, obpyriform, about 75μ in diameter with a thin wall of brownish hyphae; spermatiophores about 18 × 1μ, rarely once dichotomous, about 3-septate, bearing spermatia at the septa; spermatia 7 × 1μ, inflated at one end, acute at the other, straight or very slightly curved. As these spermogonia are the usual type in the genus *Usnea*, they are thought to belong to the lichen and not to the parasite. So far I have observed no reproductive structures in parasite, which consists of contorted, much branched, septate mycelium about 5–6μ in diameter with dark brown walls.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–41, type, B140–42, B140–43, B140–44, B140–45, B140–46, B140–47, B140–48, B140–49.

USNEA sp.

Ramalina scopulorum var. ε Hook. f. & Tayl., Crypt. Antarct., 216, 1845: Fl. Antarct., 2, 522; 1847.

Neuropogon melaxanthus Crombie, Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 233; 1885 p.p.

Type: Kerguelen's Land, Anderson, on dry granite rocks.

"Omnia varietatis δ sed rigida, apotheciis apices versus laciniarum confertis corrugatis plerisque monstruosis."

Var. δ was described: "thallo flavo, dense fastigiato lineari-ligultato, 1–5 unciali, laciniis flaccidis, nunc pertusis pluries divisis acuminatis, glabratis punctisve pruinosis sparsis, apotheciis nullis.... Falkland Islands, and Cape Horn, on rocks near the sea."

From the above description, it is probable that this unnamed variety belongs in *Usnea* sect. *Neuropogon*. Perhaps it is *U. trachycarpa*, since Crombie did not include this species in his list, although "apotheciis.... plerisque monstruosis" is suggestive of our *U. floriformis* where, however, the apothecia are on the larger branches not toward the tips of the smaller branches. *Neuropogon melaxanthus* as understood by Crombie included entities now recognized as several species. Only a study of the original specimens can settle the identity of the unnamed variety ε of Hook. f. & Tayl.

RAMALINA Ach.

Ramalina Ach., Lichenog. Univ., 122; 1810.

Type: Acharius treated ten species, all of which are usually retained in this genus. The selection of the type may well await further monographic studies.

Thallus fruticose, erect or pendulous, attached by a hapteron, branches usually flattened, rarely terete; completely corticate, cortex variable in structure; mechanical tissue usually below the cortex, either in a continuous ring or variously broken up into strands, of longitudinal thick-walled hyphae; algae protococcoid; medulla loosely woven, usually filling the interior, sometimes confined to a zone below the algae, leaving a central cavity; apothecia terminal or lateral, peltate or cup-shaped, lecanorine, disc light coloured; paraphyses conglutinate; asci 8-spored; ascospores hyaline, long ellipsoid to fusiform, straight or curved, thin-walled, usually two-celled. Spermogonia with black or hyaline walls, more or less immersed in the thallus; spermatiophores exobasidial, little branched; spermatia cylindric, short.

This very large genus is badly in need of revision. It is very widely distributed in temperate climates, usually in somewhat warmer climates than *Usnea*, so far found only on Macquarie Island in our area.

RAMALINA INFLATA Hook. f. & Taylor.

Ramalina inflata Hook. f. & Tayl. in Hook. f., Fl. Antarctica, 1, 194; 1845. Cryptogamia Antarct., 82; 1845.

Cetraria inflata Hook. f. & Tayl., London Jour. Bot., 3, 646; 1844.

Ramalina calicaris v. *inflata* Hook. f., Handb. N. Zeal. Fl., 564; 1867.

Type: Lord Auckland's group, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. at Harvard University.

Thallus about 5 cm. tall in dense clusters, dichotomously branched, branches 3 mm. in in diameter, ultimate branches short, 1 mm. in diameter, tips obtuse, sparingly fistulose, perforations relatively small, surface shining, drying wrinkled and lightly foveate, very pale yellow when fresh, drying ochraceous buff, spotted with dark blood-red, hollow; cortex a palisade of gelified, conglutinate hyphae 5–6μ in diameter, with abundant very small crystals, gel yellowish green in thin sections, golden brown in thick ones; mechanical tissue not developed; algae in colonies about 30μ in diameter, cells protococcoid, 8–10μ in diameter, scattered in a very loose medulla of very thick-walled hyphae about 6μ in diameter, lumen about 1μ, forming a layer about 100μ thick, K fuscous.

Apothecia terminal on the branches, about 6 mm. in diameter, disc concave to nearly plane, yellowish glaucous, margin not elevated, exciple smooth; amphithecial cortex, algal layer and medulla of the same structure as that of the thallus, with smaller and fewer colonies of algae beneath the hypothecium which is much more densely woven of slightly more slender hyphae in a layer about 35μ thick; thecium 55μ tall; paraphyses slender, dichotomous above the asci, ending in slightly enlarged, gelified tips covered with crystals or minute granules; asci cylindric clavate, tips thickened, 40–45 $\times$ 10–12μ; ascospores hyaline, 2-celled, ends subacute, not constricted at the septa, straight or slightly curved, 10–11 $\times$ 5–6μ. Spermogonia not seen.

From the structure of the cortex and the absence of mechanical tissue, this species seems to belong in sect. *Desmaziera* Stzbgr. or perhaps segregated in *Cenozosia* Mass. rather than in sect. *Euramalina* Stzbgr. subsect. *Fistularia* Vainio where it has usually been placed.

Besides the type specimen described above, a small specimen from Macquarie Island may belong here. It is sterile and probably young. The lumina in the cortical cells are somewhat larger and coarse, brownish hyphae, very loosely inter-woven with very large air spaces fill the central portion, at least in the small branch sectioned.

Macquarie Island: Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. 531.

RAMALINA BANZARENSIS Dodge, sp. nov.

Type: Macquarie Island, Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. 531.

Thallus ad 3 cm. altitudine vel major, applanatus, plus minusve dichotome ramosus, ramis 2–3 mm. latitudine, subinflatis, fistulosis, fistulis elongatis irregulariter dispositis, frequenter ad margines sitis, albidis, brunneo-maculatis; cortex verus deest; stratum chondroideum ca. 40μ crassitudine, gelifactum, hyphis ramosis, longitudinalibus cum luminibus tenuissimis; stratum algarum in ramo secto deest; pars centralis hyphis pachydermaticis, brunneis, 3–4μ diametro, laxissime contextis impleta; soralia elliptica, albida, suberosa, sorediis ex paucis cellulis algarum, 5–6μ diametro, plus minusve ab pressione mutua angulosis, ab paucis stratis hypharum leptodermaticarum tenuissimarum hyalinarum circumdatis. Apothecia spermogoniaque non visa.

Thallus at least 3 cm. tall [perhaps more as the material is very broken, although preserved in formalin], flattened, more or less dichotomously branched, branches 2–3 mm. wide except at the

axils which are wider, somewhat inflated, fistulose (perhaps from degeneration of old soredia rather than as in *R. inflata*), holes long elliptic, irregularly placed, often along the edges of the branches, colour when fresh unknown (preserved specimens nearly white, variously spotted with brown), true cortex lacking, replaced by mechanical tissue about 40μ thick, highly gelified, of longitudinal branched hyphae with very narrow lumina; algal layer 20μ thick, continuous, of closely packed cells 5–6μ in diameter (absent in one branch sectioned except in soralia); central portion stuffed with thick-walled, brownish hyphae, 3–4μ in diameter, very loosely woven; soralia elliptic, white, somewhat eroded, soredia of a few closely packed algal cells, 5–6μ in diameter, more or less angular from mutual pressure, surrounded by a few layers of very slender, thin-walled, hyaline hyphae, resting on a thin layer of the same type of hyphae. Apothecia and spermogonia not seen.

Growing tangled with Cladoniaceae. This species belongs in the sect. *Ecorticatae* Stnr. and is closely related to *R. inflata* and *R. geniculata*, perhaps a sorediose condition derived from one of them. Only more and better material can solve the problem raised. As these species have often been confused and may later be found in our area, I have provided descriptions below, based on material in the herbarium of Thomas Taylor at Harvard University.

Macquarie Island, Featherbed Flat, Sta. 81a, B.A.N.Z.A.R.E. 531–25, 531–26, 531–27, 531–28, 531–29, 531–30; north end of island, Sta. 81, B.A.N.Z.A.R.E. 540–14.

Ramalina linearis (Sw.) Ach.

Ramalina linearis (Sw.) Ach., Lichenogr. Univ., 598; 1810.

Lichen linearis (Sw.), Meth. Musc., 36, pl. 2, fig. 3; 1781.

Type: New Zealand, no collector cited. The following description is based on New Zealand, J. D. Hooker (Voy. "Erebus & Terror" in Taylor Herb. at Harvard Univ. sub *R. geniculata* Hook. f. & Tayl., plants marked "c" by Müller-Argau and determined by him as *R. linearis*. (cf. Flora, 71, 132; 1888).

Thallus 5 cm. tall, basal portion reticulate foraminous (as in *R. reticulata* [Noehd.] Krmplhbr.), repeatedly dichotomous, the branches flattened, somewhat nervose costate becoming canaliculate with the margins slightly inrolled, ultimate branches very narrow but still flat, apothecia borne along the margins on short stipes, not producing a bend of the frond at the point of attachment; probably whitish ashy when fresh, now light pinkish cinnamon; cortex lacking, being replaced by mechanical tissue which is 35–40μ thick (with thickenings up to 75μ), highly gelified, of predominantly longitudinal, conglutinate, thick-walled hyphae about 7–8μ in diameter, lumen about 1μ; algal layer 40–75μ thick, sometimes completely filling the central portion, tending to occur in subspherical colonies with spaces between the colonies filled with loosely woven medullary hyphae about 5μ in diameter, lumen about 1μ; central portion with large air spaces but not truly hollow; K–.

Apothecia up to 2 mm. in diameter, disc slightly concave at first with slightly elevated margin, becoming very convex and immarginate, exciple smooth, pale ochraceous buff from whitish pruina; amphithecial cortex highly gelified, 90μ thick, thinning toward the margin, outer 35μ a palisade, rest of irregularly periclinal hyphae, similar to the mechanical tissue of the thallus; algae abundant under the central portion of the thecium, thinning and disappearing under the outer two thirds, medullary hyphae not differentiated apart from the algal portion; hypothecium about 35μ thick, of very slender, densely woven hyphae, thinning to about 20μ at the margin, hyphae increasingly periclinal and expanding upward to the margin of the thecium as a parathecium; thecium about 75μ tall; paraphyses very slender, dichotomously branched above the asci, tips not conspicuously thickened, epithecium gelified with minute crystals; asci cylindric clavate, 8-spored,

45–48 × 10–12μ, tips thickened when young; ascospores distichous, hyaline, 2-celled, slightly constricted at the septum, straight, 10–12 × 6–7μ, ends rounded, occasionally acute.

While the growth habit seems to separate this clearly from *R. geniculata,* its anatomy shows it to be clearly related to that species and there seems to be no clear microscopic characters to separate it except the slightly broader spores. *Lichen linearis* Sw. from New Zealand was early confused with a similar plant from America and all subsequent descriptions were based on American material. R. H. Howe, Bryologist, 17; pl. 6, fig. 4; 1914 reproduces a photograph of Swartz' type but gives no microscopic details in the text. This seems to be a smaller, narrower, more closely branched plant, perhaps lacking its base. Only a microscopic examination of the type and a study of more New Zealand material can settle the identities. The material described above belongs in the section *Ecorticatae* Stnr.

RAMALINA GENICULATA Hook. f. & Taylor.

Ramalina geniculata Hook. f. & Tayl., London Jour. Bot., 3, 655; 1844: Crypt. Antarct., 83, 1845; Fl. Antarct., 1, 195; 1845.

Ramalina gracilis Müll.-Arg., Flora, 71, 132; 1888 non (Pers.) Nyl.

Type: New Zealand, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. at Harvard University, plants marked "b" by Müller-Argau and determined by him as *R. gracilis.* The type of *R. gracilis* (Pers.) Nyl. is from Brasil, Gaudichaud.

Thallus 2 cm. or more tall, lower portion somewhat flattened, 1 mm. in diameter, branching dichotomous, middle branches terete, nervose costate, upper branches terete, smooth, not sorediose, ashy white (now 1944 light pinkish cinnamon to pinkish cinnamon); apothecia occasional on the middle branches, producing a slight bend, often several along the ultimate branches, there producing a bend almost at right angles below, with less bending by the smaller apothecia above; cortex lacking, replaced by a layer of mechanical tissue, about 75μ thick, thinning in places to 35μ or thickening to 90μ, of gelified, conglutinate, thick-walled hyphae, 7·5μ in diameter, lumen 1μ, longitudinal except just below the apothecium where they are less regular but not forming a palisade, the outer 10–15μ brownish yellow from the minute crystals and pigmentation of the cell walls, the inner portion yellowish with few crystals; algal layer about 35μ thick, continuous, of cells up to 7–8μ in diameter, protococcoid, separated by medullary hyphae; medulla K–, of loosely woven, moderately thick-walled hyphae, 4–5μ in diameter, with large air spaces but without a well developed central cavity (at least in the smaller branches).

Apothecia early convex concealing the margin, pale ochraceous buff from the whitish pruina, mostly about 1·5 mm. in diameter, some up to 2 mm., exciple smooth; amphithecium 90μ thick below, thinning to 50μ near the margin, highly gelified, apparently a palisade of thick-walled hyphae about 9μ in diameter, lumen 1μ; algal layer extending about a third of the way toward the margin below the hypothecium, about 35μ thick, continuous, cells more densely packed than in the thallus, without conspicuous medullary hyphae; hypothecium 35μ thick, highly gelified, of slender, periclinal hyphae; thecium 75–80μ tall; paraphyses very slender, once or twice dichotomous above the level of the asci, tips not conspicuously thickened, covered with dense masses of dark brownish crystals; asci cylindric clavate, tips thickened when young, 8-spored, 44–47 × 10–12μ; ascospores hyaline, 2-celled, straight or slightly curved, more or less biseriate in the ascus, 10–12 × 4–5μ.

As stated by Müller-Argau, Flora, 71, 132; 1888, the type collection of *R. geniculata* in Thomas Taylor's herbarium (now at Harvard University, formerly at the Boston Society of Natural History) consists of three types of plants, intimately tangled, evidently collected growing intermingled and associated with *Parmelia* (*Hypogymnia*) sp. We can disregard those marked "a" by

Müller-Argau as they do not fit Taylor's description as well as the others, although there is no question they entered into Taylor's concept, giving rise to the phrase "sometimes pierced with a series of minute holes" as the other two entities do not show such well defined perforations, although plants marked "b" occasionally show very small holes (essentially tears in the cortex between the costations). The plants marked "a" are the type of *R. inflata* v. *gracilis* Müll.–Arg. excl. syn. (see below). Plants marked "c" referred by Müller-Argau and myself to *R. linearis* (Sw.) Ach. are reticulate foraminous at the base, flattened and canaliculate in the middle portion, ultimate branches also flattened, not terete and not producing the characteristic bends at the base of the apothecia (the character upon which the specific epithet was based). Although these plants marked "c" undoubtedly entered into Taylor's concept, giving rise to the phrases "lobis .... hinc concaviusculis" and "The apothecia are merely marginal" which are not descriptive of the other entities, I think we may eliminate these plants as not conforming to many of the descriptive phrases which are only applicable to plants marked "b" by Müller-Argau. In none of the plants do I find structures described by Taylor "gemmis dispersis granulatis statim linearibus." Taylor regularly used *gemma* as the equivalent of *soredia* of other authors. The white cottony medulla showing through the perforations of plants marked "a" might have been mistaken for soredia with low magnifications but even these are not linear. Occasionally there are small slits between the ridges in the plants marked "b" which also show the white medullary hyphae but these could hardly be mistaken for soredia. Hence in determining the applicability of *R. geniculata* Hook. f. & Tayl. it would seem appropriate to take the plants marked "b" and similar plants in the two unmarked tangles as the type, since the description fits these plants better than it does the other entities and since the pronounced geniculation of the apotheciiferous branches gave the specific epithet to the species, a character which neither of the other entities show.

This species seems to belong in the section *Ecorticatae* Stnr. rather than in *Euramalina* Stzbgr. subsect. *Fistularia* Vain., where the plants from Japan described by Hue, Nouv. Arch. Mus. IV., 1, 79; 1899, evidently belong. Small black dots on the ultimate branches, suggestive of the ostioles of black-walled spermogonia, are visible near the very very young apothecia, but were not sectioned on account of the small amount of material present. In my sections of an older portion near a larger apothecium, a darkened area, also suggestive of a spermogonium, was seen. While it had disintegrated too far to show structure, no mycelium suggestive of a parasite was seen.

RAMALINA INFLATA var. GRACILIS Müll.-Arg.

Ramalina inflata v. *gracilis* Müll.-Arg., Flora, 71,132, 1888.

Type: New Zealand, J. D. Hooker (Voy. "Erebus & Terror") in Taylor Herb. at Harvard Univ. sub *R. geniculata* Hook. f. & Tayl., plants marked "a".

Thallus erect, about 3 cm. tall, rarely branched in the lower half, twice or thrice dichotomous above, hollow, terete, not compressed, about 1 mm. in diameter, surface smooth and shining, perforate below, perforations circular or elliptic, relatively large, foveate above, probably whitish ashy when fresh, now clay colour, apothecia terminating short branches; cortex about 30μ thick, a palisade of branched and anastomosing hyphae, lumina about 1μ in diameter, highly gelified, woven in with occasional longitudinal hyphae; mechanical tissue 35-55μ thick, of longitudinal conglutinate hyphae similar to those of the cortex, the gel slightly less refractive and more hyaline; algal layer about 35μ thick, of loose colonies of *Protococcus*, cells 8–10μ in diameter, separated by loosely woven strands of medullary hyphae about 4μ in diameter, with very small lumina, not extending beyond the algae; K yellowish fuscous.

Apothecia flat at first, margin slightly elevated, expanding to 2 mm. in diameter, immarginate

and finally very convex, with yellowish glaucous pruina; amphithecial cortex 55μ thick, of the same structure as that of the thallus, mechanical tissue increasing in thickness upward, of the same texture as that of the thallus but the component hyphae more contorted and interwoven: algae lining the cavity at the end of the branch but not penetrating into the mechanical tissue below the hypothecium; mechanical tissue continued under the hypothecium as a layer about 75μ thick; hypothecium not clearly differentiated except as a deeply staining zone below the thecium, about 20μ thick; thecium 35–40μ tall; paraphyses slender, about thrice dichotomous above the asci, ending in slightly swollen gelified tips; asci cylindric, 30–33 × 10–12μ, tips thickened; ascospores 2-celled, hyaline, ends subacute, not constricted at the slightly thickened septum, 8–10 × 5–6μ.

This entity belongs in the sect. *Euramalina* Stzbgr. subsect. *Fistularia* Vainio. If the presence or absence of true cortex has the validity usually assigned to it, our plants cannot be referred to *R. inflata,* but until I have seen more New Zealand material I hesitate to elevate the entity to specific rank under a new name or to refer it to another species as a variety. *Ramalina subgeniculata* Nyl. (type from Madeira) is probably not a synonym as stated by Müller-Argau.

BLASTENIACEAE.

Thallus crustose, indeterminate or effigurate, small foliose or dwarf fruticose, attached to the substrate by hyphae of the pro-thallus, or of the medulla (or by rhizinae in *Xanthoria*), heteromerous; ecorticate or fastigiate corticate (except in *Mawsonia*); algae protococcoid. Apothecia round, sessile or immersed, biatorine, lecideine or lecanorine, usually with an algal layer beneath the hypothecium; epithecium granular or powdery, usually containing chrysophanic acid (producing a purple or violet colour with KOH); paraphyses simple, septate, tips usually thickened; asci normally 8-spored; ascospores hyaline, thick-walled, usually polari-bilocular.

Key to Genera.

Apothecia biatorine, but algae may occur beneath the hypothecium.
- Spores unicellular .. .. *Protoblastenia*
- Spores polari-bilocular .. ..
  - Thallus crustose, indeterminate, ecorticate .. .. *Blastenia*
  - Thallus effigurate, corticate .. .. *Kuttlingeria*
- Spores 4-celled .. .. *Xanthocarpia*

Apothecia lecideine, thallus crustose, indeterminate, spores polaribilocular .. *Huea*

Apothecia lecanorine
- Spores unilocular
  - Thallus effigurate .. .. *Fulgensia*
  - Thallus dwarf fruticose .. .. *Polycauliona Charcoti*
- Spores polari-bilocular
  - Thallus indeterminate, usually ecorticate .. .. .. *Pyrenodesmia*
  - Thallus effigurate, usually corticate .. .. *Gasparrinia*
  - Thallus small foliose, corticate, with rhizinae .. .. *Xanthoria*
  - Thallus dwarf fruticose to fruticose
    - Apothecia immersed in tubercles without algae; true parathecium not developed; cortex of longitudinal hyphae .. .. *Mawsonia*

Apothecia lecanorine
Cortex fastigiate, pseudoparenchymatous
Medulla loosely woven without chondroid strands *Polycauliona*
Medulla compact with central chondroid strand of conglutinate, longitudinal hyphae .. .. *Lethariopsis*
Cortex of longitudinal hyphae; medulla very loosely woven, often hollow in the centre .. .. *Teloschistes*
Spores 3–4-celled, protoplasts nearly spherical, connected by isthmi; thallus crustose *Triophthalmidium*

PROTOBLASTENIA Steiner.

Protoblastenia Steiner, Verh. Zool. Bot. Ges. Wien, 61, 47; 1911.

Blastenia subg. *Protoblastenia* Zahlbr. in Engler & Prantl, Die Nat. Pflanzenfam. I., 1, 226; 1907.

Type: *P. rupestris* (Scop.) Steiner.

Thallus crustose, uniform, ecorticate; algae protococcoid. Apothecia sessile or immersed with well developed parathecium; hypothecium light or dark; paraphyses simple, asci 8-spored; ascospores hyaline, unicellular. Spermatiophores closely septate; spermatia short, straight.

PROTOBLASTENIA CITRINA Dodge, sp. nov.

Type: Queen Mary Land, Alligator Nunatak, C. T. Harrisson, A.A.E. 38.

Thallus granulosus, indeterminatus, granulis sphaericis, 10–100μ diametro, plus minusve erosis, flavis, ecorticatis; algae protococcoideae, cellulis 8–10μ diametro, granula implentibus, coloniis hyphis medullaribus tectis. Apothecia ad 0·3 mm. diametro, disco convexo, citrino vel obscuriori, margine tenui, laevi, non elevato; parathecium 20μ crassitudine, hyphis tenuibus conglutinatis; hypothecium centro 30μ crassitudine, hyphis tenuibus dense contextum; thecium 35μ altitudine; paraphyses tenues, pachydermeae, super ascos ramosae, ramis moniliformibus, apicibus non incrassatis, crystallis flavidis inspersis; asci clavati, maturitate subinflati, apicibus non conspicue incrassatis; ascosporae uniloculares, hyalinae, ellipsoideae, 6–7 $\times$ 3μ.

Thallus granular, indeterminate, composed of spherical granules 10–100μ in diameter, surface often eroded and appearing sorediose under low magnifications but not truly so, lemon chrome; cortex absent, represented by conglutinate medullary hyphae surrounding the algal colonies; algae protococcoid, cells 8–10μ in diameter, loosely packed, filling the granules.

Apothecia up to 0·3 mm. in diameter, disc convex, citrine to dark citrine; margin thin, smooth, not elevated; parathecium 20μ thick, of conglutinate, slender hyphae; hypothecium 30μ thick in the centre, thinning toward the margin, of densely woven, deeply staining, slender hyphae; thecium 35μ tall; paraphyses slender, relatively thick-walled, branching above the asci, branches somewhat moniliform, tips not thickened but densely incrusted with yellowish crystals; asci clavate, somewhat inflated at maturity, tips not conspicuously thickened; ascospores unicellular, hyaline, ellipsoidal, 6–7 $\times$ 3μ.

The systematic position of this species is somewhat uncertain as no spermagonia have been found. Only the type is sparingly fertile, and in the one apothecium sectioned, very few asci have matured spores. The other specimens have been referred here from thalline characters.

King George Land: Cape Denison, A.A.E. 42, 179, 180, 181, 182, B.A.N.Z.A.R.E. 536–40, 536–41, 536–43.

Queen Mary Land: Alligator Nunatak, C. T. Harrisson, A.A.E. 28–2, type; Possession Nunatak, C. T. Harrisson, A.A.E. 42; David Island, C. T. Harrisson, A.A.E. 40, 73; Hippo Nunatak, C. T. Harrisson, A.A.E. 78–1, 79.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. 108–24, 108–25.

Blastenia Mass.

Blastenia Mass., Atti I. R. Ist. Veneto II., 3, append., 101; 1852: Flora, 35, 575; 1852.

Type: *B. sinapisperma* (Lam.) Mass. For discussion, see Dodge & Baker, Ann. Mo. Bot. Gard., 25, 611; 1938.

Thallus crustose, uniform, continuous, powdery, granulose or rimose, attached to the substrate by the hyphae of the prothallus, or of the medulla, homoeomerous or heteromerous; ecorticate: algae protococcoid. Apothecia round, immersed or sessile; parathecium well developed, very rarely including a few algal cells; epithecium granular or powdery, K violet or purple; hypothecium hyaline; paraphyses simple, septate, capitate; asci 4–16-spored; ascospores hyaline, ellipsoid, polaribilocular. Spermogonia immersed, spherical; spermatiophores septate; spermatia short cylindric, straight.

Blastenia Auberti (Bouly de Lesdain) Dodge, comb. nov.

Placodium Auberti Bouly de Lesdain, Ann. Crypt. Exot., 4, 102; 1931.

Caloplaca (*Gasparrinia*) *Auberti* Zahlbr. Cat. Lich. Univ. 8, 585; 1932.

Type: Kerguelen, Port Jean d'Arc, Aubert de la Rue 9.

Thallus whitish, smooth, shining, very thin, 2–2·5 mm. in diameter to almost absent when growing over *Lecidea subplana*; algal layer 15–20μ thick, partially discontinuous, cells protococcoid 7–8μ in diameter; medulla of loosely woven, gelified hyphae, 4μ in diameter, enclosing abundant rock crystals.

Apothecia 0·3–0·4 mm. in diameter, gregarious to crowded, margin elevated, disc concave cadmium orange or slightly darker; parathecium 50–75μ thick, becoming only 10μ thick above the algal layer, highly gelified, of radiating hyphae 4μ in diameter, appearing almost pseudoparenchymatous, ending in a fastigiate cortex 10μ thick, heavily incrusted with yellowish crystals; hypothecium 18–20μ thick, of very slender, densely woven, deeply staining, more or less vertical hyphae; thecium about 70μ tall; paraphyses branched dichotomously once or twice above the asci, branches slightly moniliform, ending in ellipsoidal cells not much thicker than the rest of the paraphysis in the yellowish, epithecial gel with minute crystals; asci clavate, thin-walled, 40–47 $\times$ 8μ, 8-spored; ascospores subdistichous, ellipsoid, hyaline, polari-bilocular, 12 $\times$ 6μ.

I have referred our material to this species, with much hesitation, as I have been unable to see the type, destroyed during the battle of Dunkerque. Our thallus is nearly white instead of orange perhaps from being shaded. The spores are slightly smaller, perhaps not mature as they are still in the ascus. It agrees well in other characters and is the only species with such small asci seen from this region.

Growing with or over *Lecidea subplana*.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–26.

Blastenia Johnstoni Dodge, sp. nov.

? *Lecanora subunicolor* Nyl. in Crombie, Jour. Linn. Soc. Bot., 15, 184; 1876: Phil. Trans. Roy. Soc. [London], 168, 49; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 235; 1885 non Nyl. in Crombie, Jour. Bot. Brit. For., 14, 19; 1876: Jour. Linn. Soc. Bot., 15, 172; 1876.

? *Callopisma subunicolor* Müll.-Arg., Bot. Jahrb. [Engler], 5, 137; 1885.

Type: Crozet Archipelago, Possession Island, American Bay, B.A.N.Z.A.R.E. B20.

Thallus tenuis, subverrucosus rugosusve, minute rimoso-areolatus, olivaceus, ca. 5 mm. diametro, plus minusve concrescens; cortex ca. 25μ crassitudine, gelifactus, cellulis exter

fastigiatis, crystallis flavo-brunneis inspersis; algae protococcoideae, cellulis 9–11μ diametro. Apothecia 0·2–0·5 mm. diametro, margine tenuissimo, elevato, disco primum concavo dein plano vel convexiusculo, miniato vel badio; parathecium 75–100μ crassitudine, gelifactum, ad 50μ sub hypothecio tenuescens, stratum algarum sub parathecio ca. 60μ crassitudine; hypothecium 75μ crassitudine, hyphis tenuibus dense contextum; thecium ca. 150μ altitudine; paraphyses tenues, septatae, bis dichotomae super ascos, ramosae; asci cylindrici, 120 $\times$ 7–8μ, apicibus non incrassatis dein clavati; ascosporae sub-biseriales, polari-biloculares, hyalinae, late ellipsoideae, 10–13 $\times$ 6–7μ.

Thallus thin, very slightly verrucose and rugose, minutely rimose areolate, between olive ochre and olive yellow, forming patches about 5 mm. in diameter, sometimes confluent; cortex about 25μ thick, highly gelified, outer cells fastigiate and densely incrusted with yellow-brown crystals; algae protococcoid, cells 9–11μ in diameter, loosely packed, with few medullary hyphae.

Apothecia 0·2–0·5 mm. in diameter, margin elevated and disc concave at first, becoming plane or somewhat convex, mars orange to burnt sienna with a very thin margin; parathecium 75–100μ thick, highly gelified, outer 10μ incrusted with yellowish brown crystals, thinning to about 50μ thick below the hypothecium (in some places as thin as 20μ); algal layer beneath the parathecium about 60μ thick with another layer beneath similar in texture to the parathecium; hypothecium 75μ thick, of densely woven slender, deeply staining hyphae; thecium about 150μ tall; paraphyses slender, septate, about twice dichotomously branched above the asci, ending in the epithecial gel which is only moderately stained yellowish from imbedded crystals; asci cylindric, 120 $\times$ 7–8μ, tips not thickened; ascospores uniseriate at first then sub-biseriate as the asci become clavate; ascospores polari-bilocular, hyaline, broadly ellipsoidal, 10–13 $\times$ 6–7μ.

Without access to the type specimens, the relationship of this species to *Lecanora subunicolor* Nyl. from the Cape of Good Hope, is uncertain. It was described as having a better developed, smooth, rimulose thallus and slightly broader spores. Even Nylander was uncertain that his Kerguelen material, collected by A. E. Eaton from Royal Sound, was the same species as his South African one. Some characters suggest *B. crozetica,* but it is clearly not that species in thalline characters or in several apothecial characters. The thallus suggests *B. Auberti,* but its apothecia are different.

Growing over *Buellia subplicata* on rocks with *Phyllopyrenia,* and parasitized by *Didymosphaeria Kuttlingeriae.*

Crozet Archipelago, Possession Island, American Bay, B.A.N.Z.A.R.E. B20–16, B20–17, B20–18, B20–19.

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B204–3, B204–4.

Blastenia keroplasta Zahlbr.

Blastenia keroplasta Zahlbr., Deutsche Südpolar Exp. 8: 28, 1906.

Type: Crozet Archipelago, Possession Island, Werth (Deutsche Südpolar Exp.) on volcanic rock.

Thallus thin, areolate, marginal lobes rare, when present thin, flat, margins crenulate, primuline yellow to old gold, growing over thalli of other lichens, and then the thallus reduced and passing into v. *athallina.*

Apothecia sessile, congested, round or somewhat angular by mutual pressure, up to 1·3 mm. in diameter, margin thick, elevated and somewhat inflexed at first, becoming very thin, primuline yellow, disc slightly concave at first, soon plane and finally slightly convex, level with the margin, ochraceous orange to ochraceous tawny; algae in cavities as in *Kuttlingeria crozetica,* but only a

single cavity below the hypothecium, cells 6–9μ, protococcoid; parathecium 20μ thick below, of slender, thick-walled conglutinate, periclinal hyphae, spreading at the edge to about 75μ thick, tips of hyphae incrusted with minute yellow crystals; hypothecium 35μ thick in the centre, thinning to the margin, of thin-walled, densely woven and closely septate hyphae, becoming vertical above and not sharply differentiated from the thecium; thecium 110–120μ tall, paraphyses slender, simple, tips not thickened, submoniliform, ending in the epithecial gel, or somewhat free; asci nearly cylindric at first then clavate in the upper portion as the spores develop, and pushed to the surface of the epithecial gel by the elongation of the lower, sterile portion of the ascus as a long stipe, 110–120 $\times$ 12–14μ at maturity; ascospores monostichous at first becoming sub-distichous, ellipsoidal, polari-bilocular, protoplasts small, isthmus very slender, 10–13 $\times$ 7–8μ.

As Zahlbruckner has already pointed out, this species is closely related to *Kuttlingeria crozetica*. The development of the thallus is variable on a single rock, ranging from a well developed thallus as described above to apothecia growing directly from thalli of other lichens as in the following v. *athallina*.

Growing with *Phyllopyrenia tessellata* and *Buellia subplicata* v. *Joannae*.

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B126–5, B126–22; Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–22.

Blastenia keroplasta var. athallina Zahlbr.

B. keroplasta var. *athallina* Zahlbr., Deutsche Südpolar Exp. 8, 50; 1906.

Amphiloma murorum v. *obliteratum* Wilson, Mém. Herb. Boissier 18, 88; 1900 non (Pers.) Körb.

Type: Kerguelen, south of outlet of Green Lake between Observatory Bay and West Fjord, Werth (Deutsche Südpolar Exp.).

Thallus reduced to granular, subleprose spots, apricot yellow to buff yellow; granules about 0·5 mm. in diameter, hemispheric, about 0·3 mm. tall; cortex about 35μ thick, capitate fastigiate, terminal cells subspherical, about 5μ in diameter, covered by a gelified amorphous layer 10μ thick; algal layer about 110μ thick, of closely packed cells 10–12μ in diameter; medulla of loosely woven, thick-walled hyphae, lumen about 1μ in diameter.

Apothecia about 0·5 mm. in diameter, constricted at the base, margin elevated, disc concave becoming plane, orange; algae in irregular colonies, forming a more or less continuous layer across the base of the apothecium; cortex not differentiated but the outer tips of the hyphae heavily incrusted with yellowish crystals in the outer 10μ; parathecium highly gelified, of relatively coarse, tangled hyphae below the hypothecium which become more or less periclinal toward the edges and spread outward and upward, fanwise, to form a parathecium 75μ thick; hypothecium 35μ thick, of thin-walled, closely septate, interwoven, deeply staining hyphae; thecium 90–100μ tall; paraphyses slender, closely septate, branching dichotomously above the asci end ending in the yellowish epithecial gel; asci cylindric at first, tips thickened, protoplast acute, becoming clavate at maturity, 70–75 $\times$ 10–12μ, tip remaining thick until late; ascospores distichous, polari-bilocular, hyaline, 10–12 $\times$ 5–6μ.

Growing with *Porina Werthii, Aspicilia endochlora, Lecanora atrocaesia, Buellia subplicata* and *B. tristiuscula*; parasitized by *Thelidium*.

Crozet Archipelago: Possession Island, American Bay, on lava, B.A.N.Z.A.R.E. B20–2.

Kerguelen: Royal Sound, Robert Hall (Nat. Herb. Melbourne Bot. Gard.) Murray Island, cliff on north side, 20–100 ft., B.A.N.Z.A.R.E. B210–5; rocks near shore, foot of Mt. Wyville Thompson, B.A.N.Z.A.R.E. B246–22.

Blastenia Wilsoni Dodge, nom. nov.

Amphiloma elegans v. *athallina* Wilson, Mém. Herb. Boissier, 18, 88; 1900.

Type: Kerguelen, Royal Sound, Robert Hall (Herb. Nat. Melbourne Bot. Gard.).

Thallus wholly obsolete except for stipe of the apothecium.

Apothecia gregarious to crowded, up to 1 mm. in diameter, margin thick, elevated ochraceous orange, disc very concave, rufous, both becoming greenish black in old apothecia; stipe 0·4–0·5 mm. tall and about 0·3 mm. in diameter; cortex about 20μ thick, apparently fastigiate but so heavily incrusted with yellowish brown crystals that its structure is not clear; algal layer 55–75μ thick, cells 10–12μ in diameter, loosely packed, with a few hyphae; medulla of slender, interwoven, gelified hyphae with narrow lumina, growing upward as periclinal hyphae to form a parathecium, 110–120μ thick, joining the cortex a short distance above the abrupt expansion of the stipe and spreading fanwise to 185μ thick; hypothecium about 35μ thick, of subvertical, thin-walled, deeply staining hyphae; thecium 85–90μ tall; paraphyses slender, several times dichotomously branched just above the asci, branches closely septate, not conspicuously moniliform and ending in the epithecial gel filled with yellowish crystals; asci 65 × 10μ, tips and upper portions thickened, protoplast fusiform truncate when young, becoming thin-walled at maturity, 8-spored; ascospores distichous, hyaline, polari-bilocular, 15–16 × 5–6μ.

We have used a new specific epithet since *Blastenia keroplasta* v. *athallina* occurs in the same genus and might lead to confusion. The highly developed stipe of the apothecium serves to distinguish this species from other athalline conditions in the group.

Kerguelen: Mt. Wyville Thompson, 1,000–1,500 ft. B.A.N.Z.A.R.E. B246–23, B246–24, B246–25, B246–26; Royal Sound, Robert Hall, type (Nat. Herb., Melbourne Bot. Gard.).

Kuttlingeria Trev.

Kuttlingeria Trev., Riv. Period. Lav. Accad. Padova, 5, 72; 1857.

Type: *K. Visianii* Trev. (*Blastenia Visianica* Mass.).

Thallus crustose, central portion granulose areolate, margin effigurate, lobate to subfoliose, corticate; algae protococcoid; medulla filamentous; corticate below. Apothecia biatorine, adnate; parathecium well developed; hypothecium hyaline; paraphyses branched or simple, capitate; asci clavate, 8-spored; ascospores polari-bilocular at first, becoming uniseptate.

Kuttlingeria crozetica (Zahlbr.) Dodge, comb. nov.

Caloplaca (*Eucaloplaca*) *crozetica* Zahlbr., Deutsche Südpolar Exp., 8, 29; 1906.

? *Lecanora murorum* v. *farcta* Hook. f. & [Bab.], Crypt. Antarct., 229; 1845: Fl. Antarct., 2, 535; 1847.

? *Caloplaca elegans* f. *farcta* Th. Fr., Nyt Mag. Naturvidensk., 40, 208; 1902.

Amphiloma elegans Wilson, Mém. Herb. Boissier, 18, 88; 1900, non aliorum.

Type: Crozet Archipelago, Possession Island, Werth (Deutsche Südpolar Exp.) on volcanic stones; *L. murorum* v. *farcta* from Kerguelen, Christmas Harbour, J. D. Hooker (Voy. "Erebus & Terror") on rocks near the sea.

Thallus effigurate, up to 8 cm. in diameter, but often much smaller, only 1–2 cm. in diameter, light cadmium to aniline yellow, centre verrucose areolate and subfruticose, marginal lobes up to 5 mm. long, often shorter, about 2 mm., simple or dichotomous, tips rounded or forked, about 0·5 mm. in diameter, very convex, surface deeply rugose or punctate impressed, very smooth and somewhat shining, closely applied to the surface of the rock where the basal layer is dark brown

to black, about 20μ thick, a pseudoparenchyma from thick-walled, periclinal hyphae; cortex absent over the algal layer; algal layer very variable, of discrete colonies perpendicular to the surface, often reaching the surface of the thallus or apothecium, at other times as much as 35μ below the surface, consisting of cavities filled with a very loose network of medullary hyphae filled with rapidly proliferating algal cells 5–6μ in diameter, with occasional resting cells up to 14–15μ in diameter, more densely packed at the periphery of the cavity which is quite variable in shape and size; medulla of closely woven, conglutinate hyphae 2–3μ in diameter, the outer 10μ yellow from abundant, minute crystals in the gel.

Apothecia constricted below, 1–2 mm. in diameter, disc slightly concave at first, then plane, cadmium orange, often centrally papillate and finally gyrose plicate, as the parathecial tissue pushes up through the old thecium; amphithecium absent; parathecium elevated, somewhat inrolled, similar in structure to the medulla, lighter below on the outside, with 3–4 concentric dark lines where the algal cavities reach the surface (the thalline margin of Zahlbruckner); hypothecium about 55μ thick, pseudoparenchymatous from periclinal hyphae, deeply staining, thin-walled; the upper hyphae more slender and vertical; thecium 110–120μ tall; paraphyses semifree, about 2μ in diameter, unbranched, moniliform in the upper 18μ and cells 4–5μ in diameter; asci oblong to clavate, 75–90 × 10–14μ, tips not thickened, 8-spored; ascospores subdistichous, ellipsoidal, polaribilocular, rarely 1-septate, 9–14 × 7–8μ, protoplasts small, becoming larger as the spore matures until finally they appear 2-locular with only a slightly thickened septum.

This species is one of the most abundant in our collections, but very uniform in habit. Zahlbruckner evidently had a rather depauperate thallus for his description although the microscopic anatomy agrees closely with our material. The thecia in our material is somewhat shorter than Zahlbruckner's measurements. Some of our material is orange to Mars yellow but not different in habit nor in internal characters. One very small, sterile preserved specimen growing over mosses, agrees microscopically in thalline characters. Perhaps it is the same as *Lecanora elegans* v. *lucens* Nyl. in Crombie, Jour. Linn. Soc. Bot. 15:184, 1876; Phil. Trans. Roy. Soc. [London], 168, 49; 1879. This was described from specimen from Kerguelen, A. E. Eaton (Venus Transit Exp.) growing on dead stems of *Acaena* and *Pringlea*. It is not *Placodium lucens* Nyl., Lich. N. Zeal., 145; 1888: Vainio, Lich. Voy. S.Y. "Belgica" 23; 1903: *Caloplaca lucens* Zahlbr., Deutsche Südpolar Exp. 8, 29; 1906: from the Magellan region. Our specimen is lime green in formalin.

Growing on rocks with *Verrucaria hebena*, *Mastodia tessellata*, *Encephalographa cerebrinella*, *Lecanora atrocaesia*, *Pyrenodesmia kerguelensis*, *P. vitellinella*, *Buellia subplicata* and *Rinodina aspicilina*.

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–20, B20–21, B20–22, B20–23.

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B90–1, B90–3, B90–18, B90–19, B90–20, B126–6, B126–7, B126–23, B126–24, B126–26; Greenland Harbour B.A.N.Z.A.R.E. B177–5, B177–62; Observatory Bay, B.A.N.Z.A.R.E. B190, B192–61, B192–62; Murray Island, B.A.N.Z.A.R.E. B211–1, B211–3, B211–4, B211–5; Mt. Wyville Thompson, 1,000–1,500 ft. B.A.N.Z.A.R.E. B246–27.

HUEA Dodge & Baker.

Huea Dodge & Baker, Ann. Mo. Bot. Gard., 25, 617; 1938.

Type: *Huea flava* Dodge & Baker.

Thallus crustose, uniform, rugose, or granulose, attached to the substrate by the medullary hyphae, heteromerous, ecorticate or corticate, algae protococcoid, ecorticate below. Apothecia lecideine, sessile, circular, black; parathecium carbonaceous, pseudoparenchymatous, continued

below the hypothecium; epithecium black; asci 8-spored; ascospores ellipsoidal, hyaline, polari-bilocular. Spermogonia immersed, with a black ostiole; spermatiophores branched and closely septate; spermatia cylindric, short, straight.

HUEA DIPHYELLA (Nyl.) Dodge, comb. nov.

Lecanora diphyella Nyl. in Crombie, Jour. Bot. Brit. For., 14, 21; 1876: Jour. Linn. Soc. Bot., 15, 184; 1876: Phil. Trans. Roy. Soc. [London], 168, 49; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 235; 1885.

Lecidea diphyella Hue, Nouv. Arch. Mus. V., 4, 12; 1912 [1914].

Blastenia diphyella Zahlbr., Cat. Lich. Univ., 7, 28; 1930.

Type: Kerguelen, Observatory Bay, Royal Sound, A. E. Eaton (Venus Transit Exp.).

Thallus very thin, pale ashy, stained ochraceous tawny in our material, determinate, usually with a narrow black margin, especially where it comes in contact with other thalli; cortex about 20μ thick, decomposed; algae protococcoid, cells 7–8μ in diameter; the whole thallus enclosing so many minute rock crystals that it has been impossible to secure good sections.

Apothecia immersed at first, becoming elevated, urceolate with concave, black disc and elevated, somewhat inrolled margins, 0·2–0·3 mm. in diameter; parathecium 75μ thick below, thinning to about 20μ thick at the margin, carbonaceous; hypothecium not well differentiated; thecium about 80μ tall; paraphyses slender, little branched, sparingly septate below, more closely septate above, the outer 3–4 cells somewhat rounded but tips not or only very slightly enlarged, ending in the brownish epithecial gel; asci narrowly clavate, becoming subcylindric, tips not conspicuously thickened, 35–40 × 10–12μ; ascospores hyaline, subdistichous, polari-bilocular, 10–12 × 5–6μ in our material, 12–17 × 8–10μ in type *fide* Nylander.

On rock with *Acrocordia platyseptata*.

Kerguelen: Observatory Bay, B.A.N.Z.A.R.E. B192–10.

HUEA SMARAGDULA Dodge, sp. nov.

Type: Queen Mary Land, Mt. Barr-Smith, ca. 4,000 ft., C. T. Harrisson A.A.E. 10–2.

Thallus spongiosus, subsphaericus, usque ad 8 mm. diametro, albidus; algae protococcoideae, cellulis 8–10μ diametro, hyphis medullaribus pachydermeis, ca. 4μ diametro laxe contextis. Apothecia 0·1–0·4 mm. diametro, sparsa vel aggregata, nigra, margine prominulo, incurvo, dein non super thecium prominente, recto, disco plano, nigro; parathecium inferne ca. 110μ crassitudine, ad latera tenuescens ubi ca. 55μ, superne attenuatum, carbonaceum, opacum, obscure fuscum, hyphis pachydermeis conglutinatis dense contextum; hypothecium non bene evolutum; thecium 110–120μ altitudine, smaragdulum; paraphyses tenues, flexuosae, apicibus non incrassatis; asci anguste clavati, 50–55 × 7–8μ; ascosporae 8nae, polari-biloculares, hyalinae, 7–8 × 2–3μ.

Thallus a spongy mass, subspherical, up to 8 mm. in diameter, white, including many large crystals of the very rotten granite; algae mostly dead or dying, apparently protococcoid, cells 8–10μ in diameter; medullary hyphae thick-walled, about 4μ in diameter, loosely woven, including some colonies of bacteria.

Apothecia 0·1–0·4 mm. in diameter, scattered or aggregated, black, margin prominent inrolled at first, finally straight and not extending above the thecium, disc flat, black; parathecium about 110μ thick below thinning to about 55μ on the sides and much thinner at the top of the thecium, carbonaceous, opaque in thick sections, deep fuscous in thin ones, of thick-walled conglutinate hyphae, densely interwoven, divided into isodiametric cells, hence appearing almost pseudoparenchymatous, becoming parallel and forming a palisade on the sides; hypothecium scarcely

differentiated; thecium 110–120μ tall, bluish green; paraphyses slender, flexuous, not densely packed, tips not enlarged, ending in the greenish black epithecial gel; asci narrow clavate, 50–55 $\times$ 7–8μ, 8-spored; ascospores polari-bilocular, ellipsoidal, hyaline, 7–8 $\times$ 2–3μ.

The abundant rock crystals have prevented cutting good sections of the thallus; the material is meagre and fragmented, and the apothecia are old, with almost no young asci, very few mature asci and ascospores. It may even be parasitic on an old weathered *Polycauliona* sp., but it is certainly not a *Scutula* and is close in apothecial structure and spores to *Huea*. The spores are slightly smaller than in *Huea flava* Dodge & Baker, the thecium is much taller and more deeply coloured. The colour gradually fades in lacto-phenol.

A.A.E. 6–2 from the type locality seems to be a younger stage, agreeing well in measurements Very few of the asci have differentiated spores. The algae are better developed, cells 10–12μ in diameter, with suggestion of a fastigiate cortex 50μ thick, of branched hyphae about 4μ in diameter, highly gelified. The more compact white thallus has included so many crystals of sand, that it is very difficult to secure satisfactory sections.

Queen Mary Land: Mt. Barr-Smith, ca. 4,000 ft., C. T. Harrisson, A.A.E. 6–2, 10–2, 80.

Pyrenodesmia Mass.

Pyrenodesmia Mass., Atti I. R. Ist. Veneto II, 3, 119; 1858.

Callopisma DNtrs., Giorn. Bot. Ital. II, 2, 198; 1847. non Martius, 1827 (Gentianaceae).

Caloplaca Th. Fr., Lich. Arctoi, 218; 1860.

Type: For discussion see Dodge & Baker, Ann. Mo. Bot. Gard., 25, 619; 1938.

Thallus crustose, attached to the substrate by the hyphae of the prothallus or of the medulla, without rhizinae, uniform, mostly yellow and K purple; heteromerous, ecorticate or nearly so; algae protococcoid; medulla arachnoid, of thin-walled hyphae. Apothecia round, appressed or sessile, seldom immersed, lecanorine with a well developed amphithecium containing cortex, algal layer and medulla; epithecium granulose to powdery, usually K purple or violet; hypothecium hyaline, lying above the algal layer; paraphyses simple, septate, capitate; asci 8-spored; ascospores hyaline, ellipsoidal to fusiform, usually polari-bilocular, cells often connected by an isthmus. Spermogonia immersed, with a hyaline wall; spermatiophores closely septate; spermatia short straight, cylindrical.

Pyrenodesmia kerguelensis (Bouly de Lesdain) Dodge, comb. nov.

Caloplaca kerguelensis Bouly de Lesdain, Ann. Crypt. Exot., 4, 101; 1931.

Type: Kerguelen, Port Jeanne d'Arc, Aubert de la Rüe 10.

Thallus very thin, somewhat rimose, smooth, shining, aniline yellow, indeterminate, margin thin and irregular, growing over other lichen thalli; cortex about 30μ thick, more or less fastigiate, with abundant brownish crystals in the outer 10μ; algae protococcoid, cells spherical up to 15μ in diameter.

Apothecia sessile, constricted at the base, about 0·2 mm. in diameter, margin thick, slightly elevated, disc concave; amphithecium about 150μ thick, cortex 75μ, similar to that of the thallus but thicker; algal layer 75μ thick, of closely packed cells and very few hyphae; parathecium 60–120μ thick, of gelified subvertical hyphae, forming a cone below the hypothecium which is about 35μ thick, of slender, densely woven, deeply staining hyphae; thecium about 75μ tall; paraphyses slender, eseptate, forked and moniliform above the asci heavily incrusted with yellow brown crystals, forming an epithecium 15–20μ thick; asci clavate, thin-walled at maturity, 55–60 $\times$ 10–12μ, 8-spored; ascospores hyaline, polari-bilocular, ellipsoidal, 12–16 $\times$ 6–7μ.

On rocks with *Phylloporina tessellata, Kuttlingeria crozetica, Buellia subplicata* and *Rinodina aspicilina.*

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E. B177–62, B204.

PYRENODESMIA VITELLINELLA (Nyl.) Dodge, comb. nov.

Lecanora vitellinella Nyl. in Crombie, Jour. Bot. Brit. For., 13, 334; 1875; Jour. Linn. Soc. Bot., 15, 184; 1876: Phil. Trans. Roy. Soc. [London], 168, 49; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 235; 1885.

Caloplaca vitellinella Zahlbr., Cat. Lich. Univ., 7, 200; 1930.

Lecanora candelaria Hook. f. & Tayl., Crypt. Antarct., 231; 1845; Fl. Antarct., 2, 537; 1847 non Ach. 1810, *fide* Crombie, Jour. Bot. Brit. For., 15, 104; 1877.

Type: Kerguelen, Observatory Bay and Swain's Bay, A. E. Eaton (Venus Transit Exp.).

Thallus indeterminate, thin, granular, deep chrome, cadmium yellow and darkening to raw sienna; algae protococcoid, cells spherical, up to 10μ in diameter.

Apothecia covering a granule, up to 0·2 mm. in diameter, margin broad, slightly elevated above the concave disc when young, becoming thin, with a plane or slightly convex disc at maturity, lecanorine; hypothecium 18–20μ thick, of densely woven, slender, deeply staining, subvertical hyphae; thecium about 75μ tall; paraphyses slender, dichotomously branched above the asci, branches of clavate cells, the ultimate branches more or less moniliform, heavily incrusted with yellow crystals, forming an epithecium about 20μ thick; asci cylindric, thick-walled with a very thick tip and a protoplast with a long, slender mamilla when young, becoming clavate and thin-walled at maturity, 40–45 $\times$ 10–12μ, ascospores polari-bilocular, hyaline, ellipsoid, 9–11 $\times$ 4–5μ.

Owing to the small size and abundant rock crystals in the thallus, it has been impossible to secure good sections; the above description is based on crushed apothecia. Its reference to this species is somewhat uncertain, as Nylander's description is very brief and in terms of *Lecanora vitellinula* Nyl., which is also inadequately described. Nylander reports the spores somewhat smaller than we have found in our material, our spores approaching the size given for *L. vitellinula* in the original description. None of the pertinent types or authentic specimens have been available. The whole family is sadly in need of monographic treatment.

Growing over sterile lichen thalli and with *Verrucaria obfuscata, Thelidium praevalescens, Encephalographa cerebrinella, Rhizocarpon kerguelense, Lecanora atrocaesia, Kuttlingeria crozetica* and *Buellia subplicata.*

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B126–8, B126–25; Murray Island, B.A.N.Z.A.R.E. B210–1; Mt. Wyville Thompson, B.A.N.Z.A.R.E. B246–2; Observatory Bay, B.A.N.Z.A.R.E. B192–63.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–58.

PYRENODESMIA INCLINANS (Stirton) Dodge, comb. nov.

Lecanora inclinans Stirton, Jour. Linn. Soc. Bot., 14, 463; 1875.

Callopisma inclinans Müll.-Arg., Bull. Herb. Boissier, 2: app., 1, 51; 1894.

Caloplaca inclinans Hellb., Bihang K. Svensk. Vetensk. Akad. Handl., 21, 3, 68; 1896.

Type: New Zealand, Wellington, John Buchanan.

Thallus thin, whitish to citron green or lime green, rimulose areolate, margin very thin and whiter where spreading over rock, rather thicker, sublobate and darker where spreading over *Rinodina* thalli, 180–200μ thick; cortex not differentiated from medullary hyphae, the tips of which are

incrusted with minute yellowish crystals in the upper 10–12μ; algae protococcoid, cells 7–10μ in diameter, occurring in more or less vertical rows between the vertical medullary hyphae which unite into a palisade above the algae and inclose rock crystals below them.

Apothecia immersed in the thallus at first, becoming slightly elevated and constricted at the base at maturity, about 0·2 mm. in diameter, margin greenish yellow to oil yellow, smooth, not elevated, disc plane, old gold to buffy citrine; amphithecium 75μ thick, cortex subfastigiate, of thick-walled, conglutinate hyphae about 6μ in diameter; parathecium about 20μ thick, of thin-walled, periclinal, hyaline hyphae, 3μ in diameter; hypothecium about 20μ thick, somewhat pseudoparenchymatous, deeply staining; thecium 75μ tall; paraphyses slender, tips not enlarged, somewhat moniliform, imbedded in the epithecial gel, with minute crystals; asci about 60 $\times$ 15μ, subcylindric at first, tip somewhat thickened, protoplast acute, becoming greatly inflated above to broadly clavate, 8-spored; ascospores 14–15 $\times$ 8–9μ, broadly ellipsoidal, protoplasts more or less hemispherical, joined by an isthmus when young, separate at maturity.

As I have not seen the type, the above description is based on our material which agrees well with the original description except fully mature spores are somewhat larger.

Three other collections from the same locality have smaller and narrower spores with somewhat larger apothecia. They may belong here or in *P. subpyracea* or they may be new. Since so many of the species from Australia and New Zealand are so briefly described and the types scattered in European herbaria at present inaccessible, I prefer to await a monographic treatment of the Blasteniaceae from this region rather than adding to the confusion by describing additional species.

Growing over rock and *Rinodina* spp. with *Lecania Johnstoni, Gasparrinia macquariensis, Rinodina peloleuca* and *R. subbadioatra.*

Macquarie Island, Featherbed Flat, B.A.N.Z.A.R.E. B533–2, B533–3, B533–4, B533–6, B533–7.

PYRENODESMIA SUBPYRACEA (Nyl.) Dodge, comb. nov.

Lecanora subpyracea Nyl., Lich. Nov. Zeland., 59; 1888.

Caloplaca subpyracea Zahlbr., Cat. Lich. Univ., 7, 185; 1931.

Type: New Zealand, Knight, Helms, corticole.

Thallus thin, rimose areolate, primuline yellow, margin very thin and lighter coloured over the rock, thicker with a narrow, bluish-black line above the thallus of *Buellia Mawsoni,* surface somewhat rugose; ecorticate; algae protococcoid, in discrete colonies between strands of more or less vertical, slender, medullary hyphae which become more irregular below and inclose many rock crystals.

Apothecia sessile, constricted at the base, margin old gold, darkening to Saccardo's olive, thick and elevated at first, becoming thin and level with the disc, which is buckthorn brown darkening to mummy brown and almost black; amphithecium with fastigiate cortex 35–40μ thick, the outer portion somewhat gelified with minute crystals; algal layer up to 100μ thick at the margin, cells loosely arranged below, more compact under the parathecium and separated into discrete colonies separated by strands of medullary hyphae toward the centre; parathecium 150μ thick at the centre, thinning to 50μ at the margin of the thecium, hyphae thin-walled, hyaline, periclinal below, spreading fan-wise at the margin as they curve upward in a wall about the thecium; hypothecium about 50μ thick, deeply staining, of more or less vertical hyphae, not sharply differentiated from the thecium above; thecium about 75μ tall; paraphyses several times dichotomous above, branches moniliform but not conspicuously thickened, covered by a layer 7–8μ thick of clear

epithecial gel with a few inclosed minute crystals; asci a rhombus in optical section with slightly rounded tip, 8-spored, about 55 × 4μ, thin-walled; ascospores polari-bilocular, 14–15 × 6–7μ, broadly ellipsoid, protoplasts hemispheric, joined by a narrow isthmus.

The relationship of this species is somewhat puzzling. Since the algae do not penetrate the apothecium above the lower surface of the parathecium, it is suggestive of *Blastenia*, but the greatly constricted base of the apothecium with well defined cortex outside the algal layer point to its inclusion with *Pyrenodesmia*. Nylander's description of this species is very brief and I have hesitated to refer our material here, although it agrees well with such characters as Nylander gives. It is also somewhat suggestive of *Blastenia ferruginea* f. *leucophloia* (Krmplhbr.) Müll.-Arg. from Chatham Island, but has a thicker, more coloured thallus and slightly larger ascospores.

On rock with *Buellia Mawsoni*.

Macquarie Island, Featherbed Flat, B.A.N.Z.A.R.E. B533–8.

Pyrenodesmia Mawsoni Dodge, sp. nov.

Type: MacRobertson Land, Cape Bruce, B.A.N.Z.A.R.E. 108–27.

Thallus squamulis pulvinatis 0·2–0·5 mm. diametro super muscos crescens, marginibus laevibus; cortex ca. 35μ crassitudine, fastigiatus, hyphis pachydermeis septatis basim versus male evolutus; algae protococcoideae, cellulis sphaericis, 8–10μ diametro; medulla hyphis dense contextis cum lacunis subsphaericis ad centrum. Apothecia frequenter totam squamalam tegentia, disco plano flavo-brunneo; amphithecium ad 200μ crassitudine, cortex cum eo thalli continuus et ei similis; parathecium non evolutum; hypothecium ca. 20μ crassitudine a thecio male distincto; thecium ca. 75μ altitudine; paraphyses tenuissimae, sub apicibus furcatae, cellulis terminalibus clavatis vel ellipsoideis, 6 × 3μ hyalinis, leptodermeis; asci cylindrici, apicibus incrassatis, 50–55 × 8–10μ; ascosporae monostichae, hyalinae, late ellipsoideae, polari-biloculares, 10–11 × 7–8μ, protoplastis hemisphaericis, isthmo junctis.

Thallus of small, pulvinate squamules, 0·2–0·5 mm. in diameter, growing over the tops of mosses, margin smooth; cortex about 35μ thick, fastigiate, of thick-walled, septate hyphae, less clearly differentiated toward the base; algae protococcoid, nearly filling the interior of the thallus, cells spherical, 8–10μ in diameter, densely packed above and on the sides, cells fewer toward the centre and base; medulla compactly woven hyphae with subsperical lacunae in the central portion.

Apothecia often covering the whole squamule, disc plane, yellowish brown; amphithecium about 200μ thick, cortex continuous with that of the thallus and of the same structure, algae filling the rest of the amphithecium; parathecium not differentiated; hypothecium about 20μ thick, of very slender, vertical hyphae, resting on the algal layer and not sharply differentiated from the thecium above; thecium about 75μ tall; paraphyses very slender, furcate just below the tips, terminal cells clavate to ellipsoidal, about 6 × 3μ, thin-walled and hyaline; asci cylindric or nearly so, 50–55 × 8–10μ, tips thickened; ascospores monostichous, hyaline, broadly ellipsoidal, polari-bilocular, 10–11 × 7–8μ, protoplasts hemispheric, joined by an isthmus.

Growing over tops of mosses.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. B108–26, B108–27.

Gasparrinia Tornab.

Gasparrinia Tornabene, Lichenogr. Sicula, 27; 1849.

Amphiloma Koerb., Syst. Lich. Germ., 110; 1854: non *Parmelia* sect. *Amphiloma* Fr., Lichenogr. Eur. Reform., 87; 1831.

Aglaopisma DNtrs. in Bagl., Mem. Accad. Sci. Torino II., 17, 396; 1856.

Type: *G. murorum* (Hoffm.) Tornabene. (For discussion, see Dodge & Baker, Ann. Mo. Bot. Gard., 25, 622; 1938).

Thallus crustose, effigurate or lobed and subfoliose at the margin, mostly yellow, K purple, heteromerous; corticate on both surfaces; cortex pseudoparenchymatous, cells thin-walled; algae protococcoid; medulla arachnoid, of thin-walled hyphae. Apothecia round, appressed or sessile, lecanorine; amphithecium containing cortex, algae and medulla; epithecium granulose or powdery usually K purple or violet; hypothecium hyaline, lying above the algal layer; paraphyses simple, septate, capitate; asci 8-spored; ascospores hyaline, ellipsoidal, polari-bilocular, cells often connected by an isthmus. Spermogonia immersed, with a hyaline wall; spermatiophores closely septate; spermatia short, straight, cylindric.

GASPARRINIA DEPAUPERATA (Müll.-Arg.) Dodge, comb. nov.

Amphiloma depauperatum Müll.-Arg., Bot. Jahrb. [Engler], 4, 135; 1884.

Caloplaca depauperata Zahlbr., Deutsche Südpolar Exp., 8, 51; 1906.

Type: Kerguelen, Betsy Cove, Naumann 103 (Voy. "Gazelle").

Thallus determinate, closely adnate, margin of thin, parallel lobes, central portion diffract areolate, areoles turgid and convex, with crenulate margins, smooth, shining, yellow ochre with antimony yellow margins; cortex fastigiate, 15μ thick, highly gelified, outer portion darkened and containing minute rock crystals; algae protococcoid, cells 10–12μ in diameter.

Apothecia immersed in the areole at first, becoming sessile and constricted at the base, margins slightly elevated, disc concave, flame scarlet; amphithecium 150–190μ thick, cortex 90μ thick, outer portion fastigiate, highly gelified with very slender protoplasts, inner portion less gelified, of interwoven, periclinal hyphae with very thick walls and narrow lumina; algal layer 75–100μ thick, cells loose, with few hyphae between, intercellular air spaces communicating with the outside through a break in the cortex; parathecium about 100μ thick, of highly gelified slender hyphae, periclinal beneath the hypothecium, spreading fan-wise at the level of the thecium, outer 10–12μ heavily incrusted with minute crystals, appearing almost black in sections; hypothecium 35μ thick, of somewhat larger, thin-walled, closely septate, more or less subvertical hyphae, very deeply staining; thecium 90–110μ tall; paraphyses very slender, gelified, repeatedly dichotomously branched just above the asci, branches closely septate, cells of ultimate branches becoming moniliform and slightly larger, heavily incrusted with yellow crystals, imbedded in the yellowish epithecial gel which is about 20μ thick; asci somewhat fusiform at first becoming clavate, wall thin, 70–75 $\times$ 9–11μ, 8-spored; ascospores distichous, polari-bilocular, hyaline, ellipsoidal, 9–13 $\times$ 5–7μ.

The systematic position of this species is somewhat doubtful; the highly developed parathecium surrounding the thecium and hypothecium suggests *Kuttlingeria*, especially if the horizontal structure, here described as an amphithecium, is considered part of the thalline areole, but in several sections, the structure here described as amphithecial cortex rests on another algal layer, separated by a thin, hyaline layer, here considered as the thalline cortex. There are very few apothecia, mostly very young, in our material and I have hesitated to sacrifice more of them in an attempt to decide this point. While we have not seen the type of this species, our material agrees well with Müller-Argau's description.

One specimen with a less well-developed parathecium, leaving the apothecium wholly immersed in the thalline wart, which it nearly fills, has been referred here.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–11, B140–59, B140–60.

GASPARRINIA MACQUARIENSIS Dodge, sp. nov.

Type: Macquarie Island, north end, B.A.N.Z.A.R.E. 540–116.

Thallus 1–1·5 cm. diametro, 1 mm. crassitudine, lobis marginalibus, ca. 1 mm. diametro, 2–3 mm. longitudine, ramosis, laevibus, olivaceoflavus vel dilute flavido-olivaceus humectatus; cortex non bene distinctum, ca. 8–10μ crassitudine, fastigiatus; stratum algarum 470–500μ crassitudine, protococcoideum, cellulis 8–10μ diametro; medulla 50–75μ crassitudine, hyphis conglutinatis, pachydermeis, ca. 5μ diametro, intricate contexta. Apothecia ad 1 mm. diametro, margine crasso, prominente, dilute flavido-olivaceo, disco concavo, obscuriori; amphithecium eadem structura ut thallus; parathecium obconicum, ca. 400μ altitudine, 25μ crassitudine ad marginem thecii, hyphis flabellatim ad 150μ crassitudine ad apicem thecii dispositis, hyphis periclinalibus conglutinatis; hypothecium 35–50μ crassitudine, hyphis leptodermeis, verticalibus; thecium ca. 100μ altitudine; paraphyses tenues, cellulis terminalibus clavatis, 3μ diametro; asci subcylindrici, apicibus incrassatis, protoplastis truncatis, 90 × 8μ; ascosporae submonostichae, late ellipsoideae, polari-biloculares, loculis hemisphaericis tubulo junctis, 11–14 × 7–8μ. Spermogonia sphaerica, ca. 100μ diametro, in centro strati algarum immersa, murus ca. 10μ crassitudine, hyphis laxis, periclinalibus, 2μ diametro; spermatiophorae 15–20 × 2μ, septatis, moniliformibus; spermatia bacilliformia, 3–4 × 0·5μ.

Thallus 1–1·5μ cm. in diameter, 1 mm. thick, marginal lobes about 1 mm. in diameter, 2–3 mm. long, branched, surface smooth, olive yellow to light yellowish olive when moist; cortex not clearly differentiated, but the outer 8–10μ of the medullary hyphae are incrusted with minute brownish crystals and appear to form a fastigiate cortex; algal layer 475–500μ thick, of loosely packed, protococcoid cells, 8–10μ in diameter, separated by strands of medullary tissue, about 35μ thick below (perhaps the fundaments of apothecia); medulla 50–75μ thick, of conglutinate, intricately woven, thick-walled hyphae about 5μ in diameter.

Apothecia up to 1 mm. in diameter, margin very thick, prominent, light yellowish olive, disc concave, darker; amphithecium a continuation of the thallus; parathecium obconic, about 400μ tall, a continuation of the medulla, 25μ thick at the edge of the thecium and spreading flabellately upward to 150μ thick at the top of the thecium, of conglutinate, periclinal hyphae; hypothecium 35–50μ thick, of thin-walled, deeply staining, slender, vertical hyphae; thecium about 100μ tall; paraphyses slender, cutting off a succession of clavate cells above, the upper about 3μ in diameter; asci sub-cylindric, tip thickened and protoplast truncate when young, about 90 × 8μ; ascospores submonostichous, 11–14 × 7–8μ, broadly ellipsoid, protoplasts hemispheric, united by an isthmus.

Spermogonia spherical, about 100μ in diameter, immersed in the centre of the algal layer, wall scarcely differentiated, about 10μ thick, of loose, periclinal hyphae about 2μ in diameter, invaginating to partially separate the central cavity; spermatiophores 15–20 × 2μ, closely septate, submoniliform; spermatia bacilliform, 3–4 × 0·5μ.

Parasitized by *Phaeospora Gasparriniae*.

Macquarie Island, north end, B.A.N.ZA.R.E. B540–16, type: Featherbed Flat, B.A.N.Z.A.R.E. B533–6.

GASPARRINIA HARRISSONI Dodge, sp. nov.

Type: Queen Mary Land; Possession Nunatak, C. T. Harrisson, A.A.E. 77.

Thallus subfoliosus, margine lobato, lobis dichotomis, ca. 1 mm. longitudine, 0·3–0·4 mm. latitudine, apicibus dichotomis, miniatus; cortex superior 45–50μ crassitudine, pseudoparenchymaticus, cellulis sphaericis, 6–7μ diametro; stratum algarum ca. 100μ crassitudine, ad 200μ sub

apotheciis, cellulis sphaericis protococcoideis, 18–22μ diametro; medulla laxe contexta, hyphis hyalinis, leptodermeis, ramosis, 5μ diametro; cortex inferior 35–40μ hyphis subverticalibus, laxe contextis, cellulis plus minusve isodiametricis.

Apothecia ad 1 mm. diametro, ad marginem thalli sessilia basi constricta, ad centrum magis elevata, stipitibus ad 2 mm. altitudine, margine laevi, elevato, incurvo, disco concavo dein plano, badio; cortex amphithecialis ca. 75μ crassitudine ei thallo similis; parathecium ca. 35μ crassitudine, hyphis tenuibus, pachydermeis, dense contexta, verticalibus ad latera thecii, ca. 3μ diametro; hypothecium ca. 10μ crassitudine hyphis leptodermeis; thecium ca. 75μ altitudine; paraphyses tenues dichotomae, apicibus cellulis sphaericis 4μ diametro, epithecium flavum 20μ crassitudine; asci ca. 50 × 12μ, clavati dein magis ellipsoidei, apicibus incrassatis; ascosporae hyalinae, ellipsoideae, polari-biloculares, 10 × 4·5μ.

Thallus fragmented in removal from rotten granite, subfoliose, centre apparently continuous, margin lobed, lobes dichotomous, about 1 mm. long, 0·3–0·4 mm. wide, tips furcate, very convex, flame scarlet to Mars orange; upper cortex 45–50μ thick, pseudoparenchymatous, cells spherical or nearly so, 6–7μ in diameter, arranged in more or less vertical rows; algal layer about 100μ thick, up to 200μ thick under the apothecia, cells spherical, protococcoid, 18–22μ in diameter; medulla of loosely woven, hyaline, thin-walled, branched hyphae, 5μ in diameter; lower cortex 35–40μ thick, of subvertical, loosely woven hyphae with more or less isodiametric cells, somewhat gelified, especially the outer 10μ, yellowish in section.

Apothecia up to 1 mm. in diameter, sessile and constricted at the base near the margin, more elevated with stipes 2 mm. tall near the centre, margins smooth, elevated and slightly inrolled when young with concave disc, becoming even with the plane, burnt sienna disc at maturity, densely crowded, covering practically the whole thallus except the marginal zone, somewhat angular from mutual pressure; amphithecial cortex about 75μ thick, similar in structure to that of the thallus, medulla reaching the level of the hypothecium at the margin, algal layer under the parathecium; parathecium about 35μ thick, of slender, thick-walled, densely woven hyphae about 3μ in diameter, becoming vertical beside the thecium; hypothecium about 10μ thick, of deeply staining thin-walled hyphae forming a transition zone between parathecium and thecium; thecium about 75μ tall; paraphyses very slender, upper half repeatedly dichotomous, tips of about three spherical cells 4μ in diameter, heavily incrusted with yellow crystals, forming a yellow epithecium about 20μ thick; asci about 50 × 12μ, clavate becoming more ellipsoidal, tips somewhat thickened when young becoming thin at maturity; ascospores hyaline, ellipsoidal, 10 × 4–5μ, protoplasts subspherical, 4μ in diameter, connected by a narrow isthmus.

The material from King George V Land is more fragmentary and smaller in most dimensions, but seems to be this species.

King George V Land: Horn (Dreadnought) Bluff, A. L. McLean A. A. E. 31–2, 33; Cape Denison, A.A.E. 1,053.

Queen Mary Land: Possession Nunatak, C. T. Harrisson, A.A.E. 77, type.

Xanthoria Th. Fr.

Xanthoria Th. Fr., Nova Acta R. Soc. Sci. Upsal. III, 3, 166; 1861 [Lich. Arctoi].

Parmelia sect. *Xanthoria* Fr., Syst. Orb. Veg., 243; 1825.

Physcia Körb., Syst. Lich. Germ., 90; 1854 non alior.

Physcia sect. *Xanthoria* Jatta, Syll. Lich. Ital., 148; 1900.

Anaptychia sect. *Hyalopolarididymae* Hue, Ann. Myc., 12, 517; 1914.

Type: *X. parietina* (L.) Th. Fr.

Thallus foliose, dorsiventral, corticate on both surfaces, with rhizinae; cortex pseudoparenchymatous from vertical hyphae, cells thin-walled; algae protococcoid; medulla of loosely woven branched, thin-walled hyphae. Apothecia sessile or short stipitate; amphithecium present; hypothecium hyaline, paraphyses septate; asci 8-spored; ascospores polari-bilocular, hyaline. Spermogonia in small warts, spherical; spermatiophores septate; spermatia long ellipsoidal.

XANTHORIA MAWSONI Dodge, sp. nov.

Type: George V Land, Cape Denison, A.A.E. 38.

Thallus pulvinatus, ad 2 cm. diametro, 6 mm. altitudine, lobis cuneatis, superficie punctato-impressa, rugosa vel subscrobiculata, margine fimbriato-lacero, lobulis ca. 0·5 × 0·1 mm., teretis applanatisve, vel microphyllinis, ochraceus in locis umbrosis aurantiacorufus vel umbrinus in locis insolatis; rhizinae parvae, male evolutae; cortex superior 18–20μ crassitudine, pseudoparenchymaticus, cellulis irregularibus, ad 5μ diametro, exteris crystallis minutis, brunneis inspersis; stratum algarum ad 30μ crassitudine, cellulis sparsis 18–20μ diametro, vel in coloniis parvis; medulla ca. 50μ crassitudine, laxissime contexta, hyphis leptodermeis, irregularibus, ramosis anastomosantibusque; cortex inferior superiori similis.

Thallus in pulvinate tufts up to 2 cm. in diameter, 6 mm. tall, lobes cuneate, surface punctate impressed, rugose and subscrobiculate, margin fimbriate lacerate, ultimate lobules about 0·1 mm. in diameter and 0·5 mm. long flat or nearly terete, sometimes submoniliform or microphylline, shaded portions ochraceous buff, portions exposed to sun orange rufous to Sanford's brown, attached by minute holdfasts; rhizinae occasional, small, poorly developed; upper cortex 18–20μ thick, pseudoparenchymatous, cells irregular in size, up to 5μ in diameter, outer 5μ heavily incrusted with minute brownish crystals; algal layer up to 30μ thick, more or less discontinuous, of scattered cells 18–20μ in diameter or in small colonies; medulla about 50μ thick, very lax, of thin-walled, irregular, branched and anastomosing hyphae, with occasional algal cells next lower cortex, which is similar to the upper cortex in structure and thickness.

Most of our material is growing over soil and mosses. The specimen from Hippo Nunatak, A.A.E. 27 is much smaller, lobes flatter, growing on rock but seems to belong here. In this the rhizinae are about 75μ in diameter with a cortex of dark brown, thick-walled hyphae, about 5μ in diameter, cells 8–12μ long; medulla of longitudinal, conglutinate, nearly hyaline hyphae about 4μ in diameter.

King George V Land: Cape Denison, A.A.E. 17, 38 type, 113, B.A.N.Z.A.R.E. 536–44, 536–45, 536–46.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 26, 27; David Island, C. T. Harrisson, A.A.E. 29, 30; Alligator Nunatak, C. T. Harrisson, A.A.E. 28–3.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. 108–37.

MAWSONIA Dodge, gen. nov.

Type: *M. Harrissoni* Dodge.

Thallus fruticulosus, prostratus, cortex hyphis longitudinalibus, conglutinatis; algae protococcoideae; medulla laxe contexta. Apothecia in capitulis, theciis immersis sine paratheciis; paraphyses tenues; asci pachydermei; ascosporae ellipsoideae, polari-biloculares.

Thallus fruticulose, prostrate; cortex of longitudinal, conglutinate hyphae; algae protococcoid; medulla of loosely woven hyphae. Apothecia in heads without algae, thecia immersed, numerous, without parathecia; paraphyses slender; asci relatively thick-walled, only the tip thinning at maturity; ascospores ellipsoidal, hyaline, polari-bilocular.

MAWSONIA HARRISSONI Dodge, sp. nov.

Type: Queen Mary Land, Possession Nunatak, C. T. Harrisson, A.A.E. 53.

Thallus prostratus, niger, dichotome ramosus, ramis ad 75μ diametro, radiantibus; cortex hyphis longitudinalibus, conglutinatis, obscure fuligineis, 5μ diametro; algae protococcoideae, 7–8μ diametro, coloniis parvis; medulla hyphis laxe contextis, 6–7μ diametro, crystallis inspersis. Capitula apotheciorum ad 200μ diametro, discis convexiusculis, nigris; parathecium deest; theciis immersis, 75μ diametro, 50μ altitudine; paraphyses tenues, semel bisve super ascos dichotome ramosae, apicibus clavatis, nigris, pachydermeis, ca. 4μ diametro; asci clavati, apicibus incrassatis, protoplastis conicis, dein magis ellipsoidei, 25 × 15μ, pachydermei, sed apicibus tenuescentibus; ascosporae octonae, distichae, late ellipsoideae vel ovoideae, polari-biloculares, 8–9 × 5·5–6μ, protoplastis late conicis 3μ altitudine, isthmis tenuibus junctis.

Thallus prostrate, black, branching dichotomous, larger branches up to 75μ in diameter, radiating; cortex of longitudinal, conglutinate branched, dark fuliginous hyphae about 5μ in diameter; algal cells scattered, protococcoid, 7-8μ in diameter; producing apotheciiform assimilative aeroles (perhaps soralia) up to 200μ in diameter, upper surface (corresponding to the disc of an apothecium) white or slightly greenish, cortex eroded, except for a few somewhat moniliform fragments of hyphae, algal cells grouped in small colonies, mostly rather deep in the medulla; medulla of loosely woven hyphae 6–7μ in diameter, with abundant hyaline crystals and larger hyaline rock crystals near the surface, also small colonies of bacteria.

Apothecial heads spherical, up to 200μ in diameter, black, similar in structure to the assimilative areoles but without algae; with many minute thecia immersed in the heads, disc concolourous and of the same curvature as the adjacent sterile tissue (hence invisible except in sections); no parathecium; thecium about 75μ in diameter and 50μ tall; paraphyses slender, once or twice branched above the asci, tips clavate, black, thick-walled, about 4μ in diameter; asci clavate at first with a very thick wall and tip, protoplast conical above, becoming almost ellipsoid, 25 × 15μ, wall remaining relatively thick, but tip thinning, 8-spored; ascospores distichous, broadly ellipsoidal to ovoid, polari-bilocular, 8–9 × 5·5–6μ, protoplasts somewhat broadly conic, about 3μ tall, connected by a very slender isthmus.

This species is easily mistaken for a young state of *Buellia flavoplana* Darb. or a small *Alectoria,* except for the peculiar structure of the apothecial heads and ascospores. The anatomy of the thallus corresponds closely with that of *Alectoria* and in a general way with that of *Teloschistes,* but the apothecia are very distinct from either.

Queen Mary Land, Possession Nunatak, C. T. Harrisson, A.A.E. 53.

POLYCAULIONA Hue.

Polycauliona Hue, Exp. Antarct. Franç. Sci. Nat. Lich., 8; 1908.

Placodium sect. *Thamnoma* Tuck. Gen. Lich., 107; 1872.

Type: *P. regalis* (Vainio) Hue. The type of *Placodium* sect. *Thamnoma* is *P. coralloides* Tuck.

Thallus fruticulose, yellow to chestnut, erect or decumbent at the periphery, dichotomous or irregularly branched, branches often short and nodulose; cortex completely surrounding the thallus, duplex the outer zone, amorphous from hyphae perpendicular to the axis, the inner more branched and much more slender; algae protococcoid; medulla of hyphae parallel to the axis, closely conglutinate. Apothecia terminal on the main axis or branches, constricted at the base, concave then flattened, disc orange; amphithecium and parathecium well developed; hypothecium

hyaline; paraphyses hyaline, yellow or rufous above; asci cylindric or somewhat ventricose in the middle base caudate, 8-spored; ascospores hyaline, polari-bilocular (rarely unicellular). Spermogonia terminal on the axis and branches, round; spermatia cylindric, straight.

POLYCAULIONA CITRINA Dodge, sp. nov.

Type: Queen Mary Land, Possession Nunatak, C. T. Harrisson, A.A.E. 42.

Thallus erectus, longitudine variabilis, insuper phyllocladiis subsphaericis tectus, citrinus; cortex strato extero 12μ crassitudine, fastigiatus, hyphis 4μ diametro, cellulis brunneis, isodiametricis crystallis flavo-brunneis inspersis; intus pseudoparenchymaticus cellulis ad 12μ diametro hyalinis; stratum algarum ca. 180μ crassitudine, cellulis cystococcoideis, 7–8μ diametro; medulla laxe contexta, hyphis 3–4μ diametro. Apothecia basi constricta, margine non elevato, disco aurantiaco, convexiusculo; cortex 25μ crassitudine, fastigiatus, hyphis leptodermeis, ca. 4μ diametro, cellulis isodiametricis, crystallis brunneis inspersis; stratum algarum ca. 180μ crassitudine, cellulis ad 12μ diametro; parathecium deest; hypothecium centro 100μ crassitudine, ad marginem tenuescens; thecium ca. 60μ altitudine; paraphyses 2μ diametro, septatae, dichotomae super ascos, apicibus non incrassatis; asci clavati, ca. 30μ longitudine, apicibus incrassatis; ascosporae uniloculares, pachydermeae, hyalinae, 8–11 $\times$ 4–5μ.

Spermogonia composita in verrucis thallinis immersa, murus, 20μ crassitudine, hyphis tenuibus, hyalinis, periclinalibus; spermatiophorae, ramosae, moniliformae, septatae, 20μ longitudine; spermatia ellipsoidea ca. 2 $\times$ 0·7μ.

Thallus erect, variable in height, covered above with closely packed subspherical phyllocladia, giving a more or less cerebriform appearance; attached by branching rhizomorphs which penetrate between the crystals of the rock; lemon chrome to lemon yellow, lighter in the shaded portions; cortex variable in thickness, outer 12μ a palisade of brownish hyphae, 4μ in diameter, with isodiametric cells, encrusted with yellowish brown crystals, completely osbscuring structure in thick sections, inner portion pseudoparenchymatous, cells variable in size, up to 12μ in diameter; algal layer somewhat variable, about 180μ thick of colonies of *Cystococcus*, cells 7–8μ in diameter, rather compact, with scattered cells deep in the medulla of loosely woven hyphae 3–4μ in diameter.

Apothecia strongly constricted at the base, margin not elevated, disc orange chrome, slightly convex; amphithecial cortex 25μ thick, fastigiate, of thin-walled hyphae about 4μ in diameter, with isodiametric cells in a gel, the outer cells decomposing with abundant brownish minute crystals; algal layer about 180μ thick, cells up to 12μ in diameter, closely packed; parathecium not differentiated; hypothecium 100μ thick, or more in the centre, thinning toward the margin, texture similar to that of the medulla below, the upper 25μ more deeply staining, of more slender, subvertical hyphae; thecium about 60μ tall; paraphyses about 2μ in diameter, closely septate, sparingly dichotomous above the asci, tips not thickened, ending in a thin epithecial gel (easily free in crushed preparations); asci clavate, about 30μ long, tip moderately thickened, tip of protoplast rounded to subacute; ascospores unicellular, relatively thick-walled, 8–11 $\times$ 4–5μ.

Spermogonia (in A.A.E. 75) developing in thalline warts, compound; wall about 20μ thick, of slender, hyaline, periclinal hyphae, loosely woven on the outside, conglutinate within; spermatiophores septate, branched, moniliform, about 20μ long, lining the cavities; spermatia ellipsoidal, about 2 $\times$0·7μ.

Unfortunately I have been unable to find apothecia and spermogonia in the same thallus. The thallus is very uniform in appearance in all of the specimens, most of which are sterile and fragmented from attempts to remove them from the rocks.

King George V Land: Madigan Nunatak, 2,400 ft., 30 miles east of Cape Denison, C. F.

Laseron, A.A.E. 25–7; Cape Denison, A.A.E. 1, 24, 42, 95–2, 102–4, 104–4, 183, 184, 185; B.A.N.Z.A.R.E. 536–7, 536–29, 536–42; Mt. Murchison, 1,860 ft., A. L. McLean, A.A.E. 39.

Queen Mary Land: Possession Nunatak, C. T. Harrisson, A.A.E. 42 type, 44; Hippo Nunatak, C. T. Harrisson, A.A.E. 74; Mt. Barr-Smith, ca. 4,000 ft., C. T. Harrisson, A.A.E. 75–1.

POLYCAULIONA JOHNSTONI Dodge, sp. nov.

Type: MacRobertson Land, Cape Bruce, B.A.N.Z.A.R.E. B108–28.

Thallus, fruticulosus, 2 mm. altitudine, teres vel subapplanatus, miniatus; cortex 35μ crassitudine, fastigiatim pseudoparenchymaticus, cellulis 4μ diametro, pachydermeis, exteris crystallis flavo-brunneis inspersis; stratum algarum 75–100μ crassitudine, coloniis discretis, cellulis sphaericis subangulosisve, 15–18μ diametro; medulla laxissime contexta, hyphis ramosis anastomosantibusque, leptodermeis, ca. 4μ diametro. Apothecia terminalia, ad 1·5 mm. diametro, disco plano, convexiusculo, miniato vel obscuriori, margine laevi; parathecium inferne 20μ crassitudine, ad 75μ superne, hyphis periclinalibus, conglutinatis; hypothecium ca. 15μ crassitudine, non bene distinctum; thecium 40–45μ altitudine; paraphyses 3μ diametro, pachydermeae, septatae, apicibus clavatis, crystallis brunneis inspersae; asci late clavati, apicibus incrassatis, protoplastis mamillatis; ascosporae hyalinae, polari-bilocularibus, ca. 10 × 5μ.

Thallus dwarf fruticose, 2 mm. tall, very fragmentary, but apparently in low pulvinate tufts, very variable in form, from round to flattened and subcerebriform, flame scarlet in exposed portions to lemon chrome in shaded portions; cortex 35μ thick, subfastigiately pseudoparenchymatous, cells thick-walled, variable in size (many about 4μ in diameter), outer 6–7μ heavily incrusted with minute yellowish brown crystals; algal layer 75–100μ thick, of discrete colonies, protococcoid, cells spherical to somewhat angular, 15–18μ in diameter; medulla very loosely woven to arachnoid, of curved, branched and anastomosing hyphae, about 4μ in diameter, relatively thin-walled.

Apothecia terminal on upright members of the thallus, up to 1·5 mm. in diameter, disc flat, or somewhat convex, Mars orange or somewhat darker, margin smooth, concolourous with the thallus, level with the disc but often showing a distinct groove on the outside where it joins the thallus (apothecia essentially replacing the thalline cortex at the top of the stalk); parathecium not differentiated from the medulla below the hypothecium except somewhat more compactly woven, toward the sides the medullary hyphae become increasingly periclinal and conglutinate, forming a hyaline parathecium about 20μ thick at the base of the thecium, spreading fanwise upward to 75μ, the outer 30μ heavily incrusted with brownish crystals; hypothecium about 15μ thick, deeply staining, closely woven, not sharply differentiated from the parathecium below and the thecium above; thecium 40–45μ tall; paraphyses 3μ in diameter, thick-walled, septate, lumen about 1μ in diameter, tips clavate, cutting off a spherical cell 4μ in diameter, heavily incrusted with brownish crystals in the upper 10μ; asci broad clavate, tip thickened, protoplast long-mamillate, 30 × 8μ; ascospores hyaline, polari-bilocular, about 10 × 5μ.

King George V Land: Cape Denison, A.A.E. 186.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. 108–28, type.

BUELLIACEAE.

Thallus crustose to squamose, simple or effigurate, without rhizinae, attached to the substrate by the hyphae of the prothallus or of the medulla; cortex variable, evanescent in some species; algae protococcoid; medulla loosely woven, of thin-walled hyphae. Apothecia round, immersed or sessile, lecideine or lecanorine; paraphyses simple or branched; asci normally 8-spored; asco-

spores smoke grey to brown, 2–4-celled or few-celled muriform by division of one or more middle cells, usually with a thick wall, without a gelified sheath (halo) as in *Rhizocarpon,* especially sect. *Catocarpon,* with which they may be confused. Spermatia short, straight.

Key to Genera and Sections.

Apothecia lecideine .. .. *Buellia*
- Spores 2-celled, occasionally 1- or 3-celled
  - Thallus indeterminate .. .. *Eubuellia*
  - Thallus determinate, effigurate .. .. *Diploicia*
- Spores 4-celled or few-celled muriform, indeterminate .. .. *Diplotomma*

Apothecia lecanorine .. .. *Rinodina*
- Hypothecium dark coloured, spores polari-bilocular .. .. .. *Orcularia*
- Hypothecium hyaline
  - Spore wall relatively thin, no isthmus; spores small, 2-celled
    - Thallus indeterminate; apothecia immersed .. .. *Melanaspicilia*
    - Thallus effigurate .. .. *Beltraminia*
  - Spore wall thick, often irregularly so
    - Lumen of spore cordiform or blunt corniform, spore hyaline until late *Mischoblastia*
    - Lumen of spore round or with rounded angles .. .. *Eurinodina*
      - Ascospores, 2-celled .. .. *Pachysporaria*
      - Ascospores, 4-celled .. .. *Conradia*

Buellia DNtrs.

Buellia DNtrs., Giorn. Bot. Ital. II, 1, 1, 195; 1846.

Lecidea subg. *Buellia* Harm., Bull. Soc. Sci. Nancy II, 32, 106; 1898.

Type: *Buellia parasema* DNtrs.

Thallus crustose, simple, margins sometimes effigurate, seldom squamulose, attached to the substrate by the hyphae of the medulla or of the prothallus, without true rhizinae; with a fastigiate cortex rarely ecorticate or with a pseudoparenchymatous cortex; algae protococcoid; medulla of reticulately woven, thin-walled hyphae; occasionally sorediate. Apothecia immersed or sessile, lecideine, black, without algae; parathecium highly developed, carbonaceous and often extending under the hypothecium; paraphyses often capitate, epithecium dark; asci usually 8-spored; ascospores brown to black, ellipsoid to elongate, 2–4-celled, or few-celled muriform (from division of middle cells in sect. *Diplotomma*) with a thick-wall and without a gelified sheath (halo).

Buellia subplicata (Nyl.) Müll.-Arg.

Buellia subplicata (Nyl.) Müll.-Arg., Bot. Jahrb. [Engler], 5, 138; 1884: Wilson, Mém. Herb. Boissier, 18, 88; 1900: Zahlbr., Deutsche Südpolar Exp., 8, 50; 1906: Bouly de Lesdain, Ann. Crypt. Exot., 4, 102; 1931.

Lecidea subplicata Nyl. in Crombie, Jour. Bot. Brit. For., 13, 334; 1875: Jour. Linn. Soc. Bot., 15, 190; 1876: Phil. Trans. Roy. Soc. [London], 168; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 239; 1885.

? *Buellia parasema* Tuck., Bull. Torrey Bot. Club, 6, 59; 1875: Kidder, Bull. U.S. Nat. Mus., 3, 30; 1876, non (Ach.) DNtrs.

? *Lecidea myriocarpa* Crombie, Jour. Linn. Soc. Bot., 15, 190; 1876: Jour. Bot. Brit. For., 15, 106, 1877; Phil. Trans. Roy Soc. [London], 168, 51; 1879: Rept. Sci. Res. Voy. "Challenger" Bot., 1, 2, 239; 1885.

Type: Kerguelen, Royal Sound, Observatory Bay and Swain's Bay, A. E. Eaton (Venus Transit Exp.).

Thallus variable from very thin, almost obsolete, conforming to the surfaces of the rock crystals, to moderately thick, rimulose areolate, mostly greyish olive to olivaceous black, margin indeterminate, very thin; cortex 12–15μ thick, of thick-walled isodiametric cells, the outer somewhat brownish, finally decomposed and hyaline; algal layer about 75μ thick, cells protococcoid, arranged in more or less vertical rows between the medullary hyphae; medulla of loosely woven, very thick-walled hyphae, inclosing many rock crystals.

Apothecia from semi-emersed to sessile at maturity, black, disc concave, margin elevated, smooth, becoming sublobate-crenate, then angular, and from proliferation of new apothecia from the old disc, irregularly gyrose or chiodectonoid; amphithecium absent; parathecium quite variable in thickness below (depending on the amount of proliferation) (60–) 90–110 (–180 or more) μ, somewhat thinner laterally, carbonaceous; hypothecium not differentiated from the thecium; thecium about 70–90μ tall, in well developed apothecia; paraphyses slender, dichotomous above the asci, tips clavate, covered by a spherical cap of dark crystalline material; asci clavate to subcylindric, walls only slightly thickened when young, 55–60 $\times$ 10–12μ, 8-spored; ascospores brown, bilocular, broadly ellipsoidal, thick-walled, not or only slightly constricted at the septum, 14–18 (–22) $\times$ 7–8 (–10)μ.

This widespread and somewhat variable species of the Kerguelen Region is readily recognized by its proliferations, irregular apothecia with horizontal rather than vertical ridges on the exciple. Some sections of proliferating apothecia are suggestive of *Encephalographa cerebrinella* which has smaller spores and usually a few algae between the parathecia.

I did not find the specimens on which Tuckerman based his report of *B. parasema*, but from his interpretation of that species in other publications, it seems probable that his report should be referred here. It seems likely that specimens with a very thin or evanescent thallus from Swains Bay, A. E. Eaton (Venus Transit Exp.) referred by Crombie to *Buellia myriocarpa* also belong here. The latter name has been used by various authors to cover different entities, but if A. L. Smith followed Crombie's tradition, the spore size would be somewhat intermediate between *B. subplicata* and *Encephalographa cerebrinella*.

On rocks with *Verrucaria Werthii, Thelidium heardense, T. praevalescens, Phyllopyrenia tessellata, Encephalographa cerebrinella, Ionaspis kerguelensis, Pannaria dichroa, Lecidea Auberti, L. Eatoni, L. phaeostoma, L. subdisjunguenda, L. subplana, L. superjecta, L. Werthii, Catillaria kerguelensis, Rhizocarpon Johnstoni, R. kerguelense, R. Mawsoni, Thalloidima kerguelensis, Pertusaria cineraria, P. kerguelensis, P. ochrolechioides, P. subperrimosa, Aspicilia disjunguenda, A. endochlora, A. lygomma, Lecanora atrocaesia, Aspiciliopsis macrophthalma, Lecania heardensis, Blastenia Johnstoni, B. kerguelensis, Kuttlingeria crozetica, Pyrenodesmia vitellinella, Buellia tristiuscula* and *Rinodina aspicilina*.

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–8, B20–16, B20–18, B20–19, B20–23, B20–24.

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B90–4, B90–5, B90–8, B90–10, B90–12, B90–15, B90–16, B90–21; Greenland Harbour, B.A.N.Z.A.R.E. B177–14, B177–27, B177–34, B177–35, B177–38, B177–39, B177–44, B177–47, B177–48, B177–49, B177–53, B177–62, B177–63, B177–64,

B204–3, B204–5, B204–24; Observatory Bay, B.A.N.Z.A.R.E. B192–6, B192–16, B192–37, B192–64; Murray Island, B.A.N.Z.A.R.E. B210–2, B211–5, B212, B530–9, B530–10.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–5, B140–12, B140–23, B140–26, B140–27, B140–58.

BUELLIA SUBPLICATA (Nyl.) var. JOANNAE Bouly de Lesdain.

B. subplicata var. *Joannae* Bouly de Lesdain, Ann. Crypt. Exot. 4, 102; 1931.

Type: Kerguelen, Port Jeanne d'Arc, Aubert de la Rüe 9.

This variety was described with spermatia curved, 9–11 × 0·7μ and shorter asci, 45μ long. As I have seen no spermogonia in my sections, I have been unable to refer any material here unless the two collections cited below, belong here. They have apothecia nearly immersed in the thallus, with thecia about 55μ tall, asci about 55μ tall, asci about 40μ and somewhat thinner parathecia.

On rocks with *Phyllopryrenia tessellata* and *Blastenia keroplasta.*

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B126–5; near Port Jeanne d'Arc, B.A.N.Z.A.R.E. B109–7.

BUELLIA PUNCTATA f. ERUMPENS Zahlbr.

Buellia punctata f. *erumpens* Zahlbr., Cat. Lich. Univ., 7, 396; 1931.

Lecidea myriocarpa f. *erumpens* Crombie, Jour. Linn. Soc. Bot., 15, 190; 1876: Phil. Trans. Roy. Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 239; 1885.

Type: Kerguelen, Observatory Bay, A. E. Eaton (Venus Transit Exp.) on dead stems of *Acaena,* associated with *Lecanora elegans* f. *lucens* and *L. umbrina.*

"Thallus very thin. Apothecia erumpent."

I have seen no material referable here.

BUELLIA TRISTIUSCULA (Nyl.) Zahlbr.

Buellia tristiuscula Zahlbr., Deutsche Südpolar Exp., 8, 51; 1906.

Lecidea tristiuscula Nyl. in Crombie, Jour. Linn. Soc. Bot., 15, 190; 1876: Phil. Trans. Roy. Soc. [London], 168, 51; 1879: Rept. Sci. Results Voy. "Challenger" Bot., 1, 2, 239; 1885.

Type: Kerguelen, Swain's Bay, A. E. Eaton (Venus Transit Exp.).

Thallus thin, about 180μ, determinate, minutely rimulose, areolate, surface smooth to rugulose, hair-brown, margin with a narrow black line; cortex scarcely differentiated; algae filling most of the thallus, cells protococcoid, small, angular, 4–6μ in diameter, often in more or less vertical rows, less abundant near the basal portion where many rock crystals are inclosed.

Apothecia superficial, sessile, dull black, margin elevated, inrolled, crenulate and vertically rugose; parathecium carbonaceous, 150μ thick on the sides, thinning to 75μ above the thecium, absent below the hypothecium at maturity (extending part way under it when young, but not completely so); hypothecium obconic about 150μ thick in the centre, thinning to the edge of the thecium, of slender, densely woven, subvertical hyphae, not sharply differentiated from the thecium above; thecium 75μ tall; paraphyses very slender, branching dichotomously above the asci, upper two cells clavate, 8 × 3μ, brownish; asci clavate, tip thickened at first, becoming ellipsoid, thin-walled, 43–45 × 18–20μ, 8-spored; ascospores 2-celled, thin-walled and hyaline at first, then the septum thickens, leaving a pore until the light brown spore closely resembles that of *Rinodina* sect. *Orcularia,* finally becoming dark brown, thick-walled, constricted at the septum, 18–24 × 8–11μ.

[Spermogonia immersed in the thallus; spermatiophores few septate; spermatia short and slender.—Nylander.] Such spermogonia as I have seen have been rather old, so that I have been unable to make out details of structure.

One specimen from the Crozet Archipelago has a thicker, lighter thallus with somewhat smaller spores, but it is otherwise similar.

On rocks with *Coccotrema kerguelensis, Porina Werthii, Encephalographa cerebrinella, Ionaspis kerguelensis, Steinera Werthii, Lecidea Auberti, L. Eatoni, L. intersita, L. kerguelensis, L. phaeostoma, Catillaria kerguelensis, Mykoblastus perustus, Rhizocarpon candidum, R. kerguelense, R. urceolinum, Pertusaria cineraria, P. ochrolechioides, P. subperrimosa, Aspicilia disjunguenda, A. endochlora, Lecanora atrocaesia, Aspiciliopsis macrophthalma, Placopsis bicolor, Candelaria parasitica, Blastenia keroplasta* v. *athallina* and *Buellia subplicata*.

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–1, B20–15.

Kerguelen: Royal Sound, B.A.N.Z.A.R.E. B126–9, B126–21; Greenland Harbour, B.A.N.Z.A.R.E. B177–12, B177–21 B177–25, B177–30, B177–37, B177–42, B177–52, B177–58, B177–63, B177–64; Observatory Bay, B.A.N.Z.A.R.E. B192–11, B192–13, B192–14, B192–19, B192–23, B192–29, B192–34, B192–36, B192–39, B192–43, B192–46, B192–65; Murray Island, B.A.N.Z.A.R.E. B210–3, B210–5, B211–2, B530–6; Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–28.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–25.

Buellia Mawsoni Dodge, sp. nov.

Type: Macquarie Island, Featherbed Flat, B.A.N.Z.A.R.E. B533–8.

Thallus albidus vel cinereus, rimoso-areolatus, indeterminatus; cortex ca. 35μ crassitudine, fastigiatus, hyphis verticalibus pachydermeis, cellulis 4 $\times$ 2μ; stratum algarum ca. 75μ crassitudine, filamentis verticalibus, Trentepohlioideis ?, 5μ diametro, cellulis cylindricis, ca. 10 $\times$ 5μ, vel solitariis magis ellispoideis majoribusque; medulla ca. 75μ crassitudine, hyphis tenuibus compacte contextis, subverticalibus. Apothecia semi-emersis, margine nigro, non elevato, disco plano dein convexo, immarginataque; parathecium ca. 20μ crassitudine ad latera thecii et 180μ crassitudine sub hypothecio, nigrum, carbonaceum; hypothecium ca. 75μ crassitudine, hyphis verticalibus, crassis, brunneis; thecium ca. 75μ altitudine; paraphyses tenuissimae, super ascos ramosae, apicibus brunneis, clavatis, 10–11 $\times$5–6μ, cellula terminali sphaerica pachydermea; asci cylindrici vel clavati, ca. 60 $\times$ 12μ, apicibus juventute incrassatis, protoplastis insuper conicis; ascosporae monostichae vel subdistichae, brunneae, 2-loculares, 14–16 $\times$ 7–8μ. Spermogonia non visa.

Thallus white or ashy, rimose-areolate, indeterminate; cortex about 35μ thick, a palisade of thick-walled hyphae, cells about 4 $\times$ 2μ, decomposing above; algal layer about 75μ thick, of vertical filaments of *Trentepohlia* ? about 5μ in diameter, cells about twice as long as the diameter, dissociated cells ellipsoidal, somewhat larger; medulla about 75μ thick, of closely woven, slender, subvertical hyphae.

Apothecia semi-emersed, black, margin not elevated, disc plane becoming convex and immarginate; parathecium about 20μ thick on the sides of the thecium and 180μ thick below the hypothecium, black, carbonaceous; hypothecium about 75μ thick, of coarse, brown, vertical hyphae; thecium about 75μ tall; paraphyses very slender, branching abundantly just above the asci, tips brown, clavate, 10–11 $\times$ 5–6μ, two celled, the terminal cell spherical, thick-walled; asci cylindric to clavate, about 60 $\times$ 12μ, tip thickened when young, protoplast conic above; ascospores monostichous to sub-distichous, brown, 2-locular, walls of uniform thickness, 14–16 $\times$ 7–8μ. Spermogonia not seen.

The algae are quite abnormal for *Buellia* but the apothecial characters are closer to *Buellia* than to any genus known to me in the *Trentepohlia* series of families.

On rock with *Pyrenodesmia subpyracea*.

Macquarie Island, Featherbed Flat, B.A.N.Z.A.R.E. B533–8.

Key to Antarctic Species.

Ascospores 4-celled to few-celled muriform .. .. Sect. Diplotomma
- Cortex of intricate hyphae; ascospores 16-22 (–26) × 8–9 (–12)μ .. *B. anisomera*
- Cortex fastigiate but not capitate-fastigiate
  - Ascospores 20–30 × 8–15μ; thallus white, verrucose to granulose
    - K reddening, thallus 1 mm. thick .. .. *B. granulosa*
    - K–, thallus 200–250μ thick .. .. *B. Goudieri*
  - Ascospores 15–26 × 4–5μ; thallus white to brownish, crustose to granulose .. *B. Siplei*
  - Ascospores 16–26 × 7–10μ; thallus usually somewhat yellowish
    - Marginal hypothallus broad; thallus yellow, K–; apothecia 0·4–0·7 mm. in diameter .. .. *B. Nelsoni*
    - Hypothallus absent, at least not extending beyond the margin of the assimilative areoles
      - Apothecia 0·5–0·6 mm. in diameter, thecium 100–110μ tall; thallus rather citrine, 300–1,000μ thick .. .. *B. citrella*
      - Apothecia 0·7–1·0 mm. in diameter, thecium 120–140μ tall
        - Thallus cream colour, 500μ thick .. .. *B. cremea*
        - Thallus paler, 2 mm. thick .. .. v. *incrassata*

Ascospores 2-celled
- Thallus effigurate .. .. Sect. Diploicia
  - Thallus yellow rufescent; spores 11–16 × 6–9μ .. .. *B. Huei* (*L. radians* Hue)
  - Thallus white to pale ashy; ascospores 13–16 × 7–7·5μ .. .. *B. actinobola*
  - Thallus white glaucescent, subsquamulose; apothecia with evanescent thalline margin may belong in *Rinodina*) .. .. .. *B. Babingtonii* (*australissima*)
- Thallus not effigurate .. .. Sect. Eubuellia
  - Ascospores polari-bilocular, very clearly so when young, less distinctly so when old
    - Thecium 50–55μ tall, ascospores 16–20 × 5·5–7μ; cortex nearly absent *B. Russellii*
    - Thecium 140μ tall, ascospores 14–20 × 7–12μ; cortex capitate-fastigiate *B. perlata*
  - Ascospores not polari-bilocular.
    - Hypothallus absent, at least not extending beyond the assimilative areoles
      - Cortex intricate or lacking over the top of the areole
        - Ascospores 9–13 × 5–6·5μ, thecium 50–60μ tall
          - Parathecium not well differentiated .. .. .. *B. pallida*
          - Parathecium 30μ on sides, 40–50μ thick below .. *B. Johnstoni*
        - Ascospores 15 × 7μ, thecium 75μ tall; parathecium 35μ thick *B. pinnicola*
        - Ascospores over 16μ long
          - Thecium 180–190μ tall, parathecium 90–60μ on sides, 120–200μ thick below .. .. *B. inordinata*
          - Thecium 130–140μ tall, 40–80μ on sides, 70–100μ thick below *B. anisomera* Vainio

Thecium 100–120μ tall; parathecium 120μ on sides, 180μ thick below .. .. *B. dichromatina*

Thecium 50–55μ tall; parathecium not well differentiated *B. Russellii*

Cortex fastigiate but not capitate-fastigiate

Ascospores 10–12 × 6–8μ; thallus wholly black, 1–2 mm. thick; apothecia 0·5 mm. in diameter .. .. *B. pernigra*

Ascospores 13–20 (–22)μ long, paraphyses capitate

Thallus dirty reddish, areoles 1–1·5 mm. in diameter, up to 1 mm. thick, apothecia 0·2–0·5 mm., thecium 140–160μ tall, tips of paraphyses 8–9μ in diameter .. .. .. *B. conspicua*

Thallus rufous, areoles, 0·7–1·5 mm. in diameter, 400–600μ thick; apothecia 0·4–1 mm., thecium 130–140μ tall, tips of paraphyses 5–6μ .. .. *B. russa*

Thallus white, ashy or pale rufous

Cortex 5–10 (–20)μ thick; apothecia 0·5–1 mm., areoles 0·5–1·5 mm. in diameter, tips of paraphyses 6μ .. *B. imperfecta*

Cortex 15–30μ thick

Apothecia 0·5–1 mm.; areoles 0·2–0·5 (–1) mm., tips of paraphyses 7–8μ .. .. *B. melampoa*

Apothecia 0·4–0·5 mm.; areoles 0·4–1 mm.; tips of paraphyses 4–6μ .. .. *B. Gainii*

Cortex capitate-fastigiate

Thallus white to cream colour; thecium 40μ tall, ascospores 8–9·5 × 4·5–6μ .. .. *B. floccosa*

Thallus ashy to rufescent; thecium 120μ tall, ascospores 15–19 × 7–9μ *B. polychora*

Hypothallus white, extending beyond the assimilative areoles; ascospores 12–20 × 6–10μ

Apothecia 0·5–1·5μ mm. in diameter; thallus dirty ashy fuscous *B. latemarginata*

Apothecia 0·3–0·7 mm. in diameter; thallus white, rufescent toward the margin .. .. *B. Liouvillei*

Hypothallus black, extending beyond the assimilative areoles

Margin of hypothallus even, very rarely with a few confervoid strands extending beyond

Ascospores (16–) 22–24 × 7–10μ; thallus greenish white *B. festivissima*

Ascospores 15–22 × 5·5–9μ; thallus rufous .. *B. acarosporoides*

Ascospores under 20μ long

Thallus black; ascospores 10–12 × 6–8μ .. .. .. *B. pernigra*

Thallus ashy fuscescent, K–; ascospores 11–17 × 7–9μ *B. brabantica*

Thallus brown, white punctate, K yellow, reddening; ascospores 12–16 × 5–6μ .. .. *B. augusta*

Thallus whitish ashy; ascospores 12–15 × 6–8μ .. *B. protothallina*

Apothecia elevated, plane to somewhat convex, margined v. *Gerlachei*

Apothecia immersed in the thallus, finally only slightly elevated .. .. v. *indissimilis*

Thallus white to grey; ascospores 10–13 × 5·5–7μ .. .. *B. grisea*
Thallus some shade of yellow
Tops of areoles flat with black margins; apothecia up to 1 mm. in diameter; assimilative areoles 1·5–2 mm. in diameter, 500μ thick .. .. *B. flavoplana*
Tops of areoles convex, margins not black
Apothecia usually white margined from dead cortical cells; hypothallus with occasional confervoid strands extending beyond the otherwise even margin
Apothecia 0·4 mm.; assimilative areoles 1·5 mm. in diameter, 500–1,000μ tall .. .. .. *B. superba*
Apothecia up to 1 mm.; areoles 2–3 mm., 250μ tall *B. tristis*
Apothecia up to 1·5 mm.; areoles 3 mm., 1,500μ tall *B. variabilis*
Apothecia not white margined; hypothallus without confervoid strands
Apothecia 0·2–0·5 mm.; areoles 0·3–0·6 mm., 250–450μ tall; ascospores 14–18 (–20) × 7–10μ *B. modestula*
Apothecia 0·8 mm.; areoles 0·75 mm. broad; ascospores 10–12 × 5·5–7μ .. .. *B. chrysea*
Margin of hypothallus confervoid, or at least fimbriate
Assimilative areoles subpedicellate, 3–4 mm. tall, pale rufous; ascospores 22–30 × 9–12μ .. .. *B. subpedicellata*
Assimilative areoles not pedicellate, much shorter
Ascospores 17–20 (–25) × 6·5–8 (–9)μ; assimilative aeroles pale to dark isabelline, 600–1,000μ thick .. .. .. *B. isabellina*
Ascospores 16–23 × 10–14μ; assimilative areoles dark rufous, 400–500μ thick .. .. *B. melanostola*
Ascospores under 18μ (rarely up to 20μ) long
Apothecia wholly immersed, parathecium not developed; thallus olive brown; ascospores 9–9·5 × 5·5–6·5μ .. *B. brunnescens*
Apothecia not immersed at maturity; parathecium well developed (except in *B. dendritica*)
Hypothecium hyaline or very pale brownish
Thallus some shade of brown
Apothecia 0·25 mm. in diameter, white margined from old cortex; ascospores 12–14 × 8–10μ *B. pycnogonoides*
Apothecia 0·3–0·33 mm., sometimes faintly white margined; ascospores 8–10 (–13) × 4–6 (–7·5)μ
Thecium 110μ thick, asci 30–8μ; basal layer of areoles dark, 200μ thick, parathecium 40μ .. .. *B. McLeani*
Thecium 50–60μ, asci 35–53 × 13–18μ; basal layer 10–15μ thick, parathecium 15μ on sides .. .. *B. dendritica*

Apothecia 0·5–0·7 mm., not white margined; ascospores 13–15 × 8–9μ .. .. *B. evanescens*

Thallus white to ashy; apothecia 0·3–0·7 mm.

Ascospores 8–10 × 4–6 (–8)μ; areoles flat, 0·33 mm. in diameter; thecium 45–50μ tall, paraphyses 1–3μ in diameter, tips up to 5μ .. *B. alboradians*

Ascospores 9–12 × 5–7μ; areoles hemispheric to flattened, 0·33 mm.; thecium 50–70μ tall, paraphyses 1–1·5μ in diameter, tips 1·5–2·5μ *B. stellata*

Ascospores 11–16 × 8–11μ; areoles more or less granular; thecium 100–120μ tall; paraphyses 2–3μ in diameter

Tips of parphyses 6–7μ in diameter *B. dimorphota*

Tips of paraphyses 3–4μ in diameter *B. Margaritae*

Hypothecium very dark brown to black

Thallus red within, ashy blackening, margin reddish; ascospores 13–17 (–19) × 6·5–8 (–9)μ *B. Tuxenii*

Thallus white within

Thallus olive brown to red brown

Asci 31–50 (–57) × 14–17μ, ascospores 11–15 (–17) × 4·5–7μ, thecium 80μ tall; thallus pale to red brown .. .. *B. muscicola*

Asci (50–) 70–96 × (14–) 18–28μ, ascospores 13–17·5 × 6–11μ; thecium 90–110μ tall; thallus dark olive brown *B. olivaceobrunnea*

Asci 60 × 20μ, ascospores (14–) 16–18 × 7–10μ, thecium 100–140μ tall; thallus rufous to reddish .. .. .. *B. Petermanni*

Asci 60–70 × 20–24μ, ascospores 12–17 × (7–) 8–9μ, thecium 80–110μ, thallus ashy rufescent .. .. *B. Joannae*

Thallus white or ashy with pale yellow or rufous tints

Apothecia 0·1–0·15 mm. in diameter, thallus pale yellow, areoles about 1 mm. in diameter; ascospores 10–14 × 8–10μ .. *B. adarensis*

Apothecia 0·35 mm., thallus white, areoles 0·67 mm.; ascospores 11–14 × 5·5–7μ *B. albida*

Apothecia 0·4–0·8 mm. in diameter; thallus ashy with rufous tints.

Thecium 120–130μ, ascospores 12–18 × 6·5–9μ *B. caesiocinerescens*

Thallus chalky-ashy, areoles 0·4–0·6 mm., 200–400μ thick, hypothecium I– v. *typica*

Thallus chalky-ashy with rufescent margins, areoles 0·5–1 mm., 300–450μ thick, hypothecium I blue v. *rufescens*

Thecium 80–110μ thick

Cortex 12–15 (–20)μ thick, areoles 500–700 (–1,000)μ thick, the upper 100–120μ hyaline; the rest of vertical dark hyphae; ascospores 14–20 × 8–10·5 (–12)μ .. .. *B. endomelaena*

Cortex 15μ thick, areoles thin; ascospores 9–11 × 6–7μ .. *B. podocarpa*

Cortex 25–30μ thick, areoles 300–350μ thick with only narrow dark zone below; ascospores 14–18 × 8·5–10·5μ *B. Charcoti*

Cortex 30–40μ thick, areoles 180–260μ thick with broad dark zone below; ascospores, 12–17 × 7–9μ .. *B. Joannae*

BUELLIA HUEI Dodge, nom. nov.

Lecidea radians Hue, Lich, 2me Exp. Antarct. Franç., 117; 1915 non Harm., 1898.

Buellia radians Darb., Brit. Antarct. Exp. 1910, Nat. Hist. Rept. Bot., 3, 64; 1923 non Lettau, 1912.

Type: Booth-Wandel Island, Jeanne Hill 30–100 m., on diorite, Gain 116.

BUELLIA BABINGTONII (Hook. f. Tayl.) Lamb in litt., comb. nov.

Lecidea atroalba Hook f. & Tayl., London Jour. Bot., 3, 636; 1844.

Lecanora Babingtonii Hook. f. & Tayl., Crypt. Antarct., 229; 1845: Fl. Antarct., 2, 535; 1847.

Lecidea australissima Nyl., Mém. Soc. Imp. Sci. Nat. Cherbourg, 5, 123; 1857 (nom. nud.); Nyl. in Hue, Nouv. Arch. Mus. III, 3, 139; 1891 [Lich. Exot. 221; 1892].

Buellia australissima Zahlbr., Cat. Lich. Univ., 7, 458; 1931.

Type: Graham Land, Cockburn Island, J. D. Hooker (Voy. "Erebus & Terror"). *L. australissima* based on duplicate of same collection in Paris.

Unfortunately I have been unable to see the type. Hooker f. & Taylor mention a very thin, evanescent thalline margin, hence it may belong in *Rinodina*. Its 2-celled brown spores remove it from both *Lecidea* and *Lecanora* of present usage.

BUELLIA JOHNSTONI Dodge, sp. nov.

Type: King George V Land, Cape Denison, B.A.N.Z.A.R.E. 536–31, on *Lecanora exsulans*.

Thallus ambiguus, cortex non bene evolutus, cellulis algarum exteris, paucis, hyphis medullaribus tectis; algae cystococcoideae, ad 10μ diametro, solitariis, paucis; medulla hyphis hyalinis pachydermeis, 4μ diametro, dense contextis. Apothecia nigra, 0·3–0·4 mm. diametro, sessilia, disco plano vel convexiusculo, margine non prominulo; parathecium inferne 40μ crassitudine, in lateribus ad 30μ tenuescens, obscure brunneum, hyphis leptodermeis periclinalibus; hypothecium

non bene evolutum; thecium 55–60μ altitudine; paraphyses tenues, super ascos dichotome ramosae, cellulis terminalibus nigro-brunneis, ad 4μ diametro; asci clavati, incrassati, protoplastis truncatis, late mamillatis, ca. 35 $\times$ 8μ; ascosporae octonae, oblique monostichae vel distichae, obscure brunneae, biloculares, ellipsoideae, septo non constrictae, 10–12 $\times$ 5–6μ.

Thallus ambiguous, cortex not differentiated, the outermost algal cells protected by one to a few layers of medullary hyphae; algae cystococcoid, up to 12μ in diameter, mostly solitary and relatively few; medulla of closely woven, hyaline, thick-walled hyphae about 4μ in diameter, forming a cushion under the apothecium. Below what seems to be the thallus proper of the *Buellia*, apparently the thallus of the host has been stimulated to elongation of the medullary hyphae, forming a thick reticulate layer, about 60μ thick, without algal cells, covered by a thin cortex, 10μ thick, of disintegrating fastigiate hyphae, and a lower medullary layer of anastomosing subvertical hyphae, thin-walled, about 6μ in diameter. Dark brown hyphae from the base of the parathecium, about 5μ in diameter, singly or in loose strands, penetrate the medulla of the host thallus.

Apothecia black, 0·3–0·4 mm. in diameter, sessile, flat or slightly convex, margin black, not prominent; parathecium 40μ thick below, thinning to 30μ at the sides, dark brown, of thin-walled periclinal hyphae, closely septate below and appearing almost pseudoparenchymatous, slightly inrolled above, but not extending above the thecium; hypothecium scarcely differentiated; thecium 55–60μ thick; paraphyses slender, dichotomously branched above the asci; terminal cells spherical, dark brown, about 4μ in diameter, forming a dark brown epithecium about 8μ thick; asci clavate, wall and tip thickened, protoplast truncate, broadly mamillate, becoming thin-walled, about 35 $\times$ 8μ, 8-spored; ascospores obliquely monostichous to distichous, dark brown, bilocular, ellipsoid or flattened on one side, moderately thick-walled, not constricted at the septum, 10–12 $\times$ 5–6μ.

The interpretation of this species is not clear. Very little material is available. On the rock, a few pulvinate, very thin areoles, 0·1–0·2 mm. in diameter, nearly covered with a single apothecium each, are visible. On the thallus of *Lecanora exsulans* close to them, the thallus seems still further reduced to about 0·1 mm. in diameter and is mostly covered by the much larger apothecium. The surface of the *Lecanora exsulans* in the vicinity of the *Buellia* apothecia, is abnormally coarsely verrucose, verrucae about 0·15 mm. in diameter. Apparently we are dealing with a species with a very reduced thallus which can survive alone, but which is a facultative parasite. In the free living phase, the apothecia are mostly 0·1 mm., very rarely up to 0·2 mm., while in the parasitic phase, the apothecia are mostly 0·2 mm. with some reaching 0·4 mm. in diameter. The almost complete disappearance of the algae in the vicinity of the brownish parasitic hyphae, and that the dying algal cells are about 12μ in diameter, suggests a facultative parasite rather than an obligate one. Hence we have preferred to describe this species in *Buellia* rather than in *Karschia*, a segregate from *Buellia* for the obligate parasites.

On the thallus of *Lecanora Johnstoni* is the same or perhaps another species of *Buellia* which shows a similar transition. The algae under the *Buellia* apothecia appear cystococcoid, usually in tetrads or larger colonies, cells mostly 4–5μ in diameter; parathecium and hypothecium black and carbonaceous; thecium only 25–30μ tall; paraphyses dichotomously branched above the asci; epithecial gel fuliginous or darker; asci broadly clavate to almost ellipsoidal, 25 $\times$ 15μ; ascospores immature in the asci A few ascospores 8–10 $\times$ 6–7μ, bilocular, brown, constricted at the septum were seen floating in the preparation. I have been unable to decide whether this Buellia is epiphytic with algae of its own, or whether it is parasitic, stimulating the host alga to divide more fre-

quently, so the resulting cells are smaller. The host algal cells are mostly 7–8μ in diameter and clearly protococcoid.

King George V Land, Cape Dension, B.A.N.Z.A.R.E. 536–31 on *Lecanora exsulans;* ? B.A.N.Z.A.R.E. 536–34 on *L. Johnstoni.*

BUELLIA PINNICOLA Dodge, sp. nov.

Type: King George V Land, Cape Denison, near hut, B.A.N.Z.A.R.E. 536–59, on decaying feathers.

Thallus albus, planus vel irregulariter minuteque tubercularis, indeterminatus, margine tenui; cortex ca. 30μ crassitudine, hyphis septatis laxe contextus; algae cystococcoideae, in strato 70μ crassitudine, cellulis 10–15μ diametro; medulla laxe contexta. Apothecia ca. 0·4 mm. diametro, hemisphaerica, brunnea vel nigra, semi-immersa, disco brunneo vel nigro, convexo, margine tenuissimo, concolore; parathecium 35μ crassitudine, dimidia parte extera fastigiata, cellulis elongatis, turgidis, intus hyphis, tenuibus, periclinalibus, conglutinatis hyalinis; hypothecium hemisphaericum, ad 120μ altitudine, obscure brunneum; thecium ca. 75μ altitudine; paraphyses tenues, dichotome ramosae super ascos, cellulis terminalibus late clavatis, obscure brunneis, pachydermeis, 5–6μ diametro; asci clavati, 35 $\times$ 12μ, apicibus incrassatis; ascosporae octonae, oblique monostichae vel subdistichae, brunneae, biloculares, rectae vel curvatae, 15 $\times$ 7μ.

Non-assimilative thallus not evident, assimilative thallus white or slightly buff, flat or irregularly and minutely tubercular, indeterminate, margin thin; cortex thin, about 30μ thick, of slender, loosely woven septate hyphae about 3μ in diameter (perhaps the true cortex has been eroded, leaving only the medullary hyphae surrounding the algal colonies); algae cystococcoid, in colonies of variable size, scattered or forming compact layers up to 70μ thick, cells up to 10–15μ in diameter; medulla loosely woven below, becoming vertical and compact in the centre of the fertile pillars, curving outward around the hypothecium and merging with the parathecium; basal layer not differentiated.

Apothecia about 0·4 mm. in diameter, hemispheric, brown to black, semi-immersed on tops of fertile pillars (tall verrucae), disc brown to black, convex, margin very thin and concolourous; parathecium 35μ thick, the outer half a palisade of swollen, elongate, dark brown cells, the inner half of slender, periclinal, conglutinate, hyaline hyphae, continuous with those of the medulla; hypothecium hemispheric, about 120μ tall, deep brown, somewhat pseudoparenchymatous below, cells longer and radially arranged above, passing into the thecium; thecium about 75μ tall; paraphyses slender, dichotomously branched several times just above the asci, terminal cells broadly clavate, dark brown, thick-walled, 5–6μ in diameter; asci clavate, 35 $\times$ 12μ, tips somewhat thickened when young, 8-spored; ascospores obliquely monostichous to somewhat distichous, brown, 2-celled, straight or curved, 15 $\times$ 7μ.

An A.A.E. collection also on decaying feathers from the same locality probably belongs here. It is sterile, old and blackened, with colonies of various Myxophyceae.

King George V Land: Cape Denison, near hut, B.A.N.Z.A.R.E. 536–59; A.A.E. 43.

BUELLIA GRISEA Dodge & Baker.

Buellia grisea Dodge & Baker, Ann. Mo. Bot. Gard., 25, 639; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Haines Mts., P. Siple & F. A. Wade, H–1.

Non-assimilative thallus up to 1·5 cm. in diameter, radiate saxicolous, lobed, grey to white, margins black; cortex fastigiate, of dark cells thinning out over the tops of the lobes; medulla

of loose, irregular hyphae, basal layer of scattered, dark, isodiametric cells; assimilative thallus of distinct lobes up to 1·75 mm., irregular, often dichotomously branched, radiately cracked, becoming diffused and scattered toward the centre, white to yellowish or grey, margins usually lighter in colour; cortex fastigiate, breaking away over the tops of the areoles; algal layer 60μ thick, cells 14–16μ, scattered, protococcoid; medulla 35–40μ thick, of loosely woven hyphae; basal layer not well developed, occasionally represented by a few dark cells.

Apothecia up to 0·6 mm. in diameter, irregularly hemispheric, sessile on the areole, black, parathecium of thick-walled pseudoparenchyma; hypothecium up to 50μ thick; thecium 60–70μ tall; paraphyses 1–1·5μ, expanding to 2μ at the tips with heavy black incrustations, branched or unbranched, epithecium about 10μ, dark; asci 36–46 $\times$ 14–16μ, long clavate, thick-walled, 8-spored; ascospores 10–13·5 $\times$ 5·5–7μ, bilocular, with or without constriction of the septum, blunt or slightly tapering.

Our material is scant, but agrees with the type in microscopic characters, although somewhat less radiate. It seems to have a strong affinity for the mica of the granite, and spreads only slightly over the other constituents. The thallus is rather old and weathered.

King George V Land: Cape Denison, near hut, B.A.N.Z.A.R.E. 536–58.

Buellia pernigra Darb.

Buellia pernigra Darb., Jour. Bot. Brit. For., 61, 106; fig. 1, 2; 1923.

Type: South Victoria Land, Mt. Erebus (British Antarctic (Shackleton) Exp.)

Thallus crustose, subeffigurate, about 1 cm. in diameter, areolate, thinner and flatter toward the margin, areoles tall and rounded toward the centre, black and somewhat shining, about 225μ thick; outer amorphous layer variable in thickness (about 25μ); cortex 25–35μ thick, fastigiate, of coarse, thick-walled hyphae, the upper cells subspherical, very thick-walled and blackened, giving the colour to the thallus; algal layer of cystococcoid colonies, about 35μ in diameter, sometimes closely packed and nearly filling the thallus, sometimes more scattered and confined to the upper half; medulla of closely woven hyphae, 3–4μ in diameter, thin-walled, becoming vertical and passing into the carbonaceous lower cortex or hypothallus, which is 35–40μ thick.

Apothecia semi-immersed to subsessile, margins somewhat prominent, smooth, black, disc plane to slightly convex, black; parathecium 50–90μ thick, carbonaceous, pseudoparenchymatous, not extending below the hypothecium; hypothecium hyaline to slightly brownish, not sharply differentiated from the medullary hyphae but more compact and pseudoparenchymatous; thecium about 100μ tall, not sharply differentiated from the hypothecium below; paraphyses relatively coarse, repeatedly dichotomous, terminal cells broadly clavate, 4–6μ in diameter, united into a carbonaceous epithecium 20μ thick; asci ellipsoidal, tips slightly thickened when young, disappearing early, relatively numerous in proportion to the paraphyses, 8-spored; ascospores ellipsoid, 2-celled, dark brown, soon very black, up to 14–15 $\times$ 7–8μ, mostly somewhat smaller, constricted at the septum, relatively thin-walled.

Spermogonia immersed in the thallus, flask-shaped, wall black, about 18μ thick, with fastigiate slender hyphae (like a miniature cortex); spermatiophores 10–12 $\times$ 1μ, septate, once dichotomous above; spermatia ellipsoidal, about 3 $\times$ 0·5μ.

On rock with *Umbilicaria rugosa*.

King George V Land: Cape Denison, B.A.N.Z.A.R.E. 536–23, 536–60.

BUELLIA DENDRITICA Dodge & Baker.

Buellia dendritica Dodge & Baker, Ann. Mo. Bot. Gard., 25, 651; 1938.

Type: King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, P. Siple, F. A. Wade, S. Corey & O. D. Stancliff HW–18.

Thallus covering areas 5–8 mm. in diameter, closely attached to the rock; non-assimilative areas 50μ thick, more or less continuous, but sometimes open-reticulate, margins fimbriate or dendritic, or sometimes of only a few rugose strands, black; cortex of large, dark cells; medulla not differentiated morphologically but composed of hyaline cells more loosely arranged, basal layer not distinct from the upper cortex; assimilative areoles up to 0·6 mm. in diameter, circular to elongate, dark olive brown to black at maturity, much lighter when young, few, scattered; cortex up to 12μ thick, of large, fastigiate cells continuous over the top, covered with a layer of dead cells up to 15μ thick; algae abundant, scattered throughout the areole; medulla 50μ or more thick, of coarse, interwoven hyphae; basal layer 10–15μ thick, of compact brownish pseudoparenchyma.

Apothecia up to 0·33 mm. in diameter, subspherical to flattened, sometimes with a faint margin of whitish cells, usually single, covering a whole areole, black; parathecium scarcely differentiated, the sides of the thecium covered by a layer of dark pseudoparenchyma, 15μ thick, continuous with the cortex of the areole; hypothecium about 20μ thick, hyaline or faintly brownish, of thin-walled pseudoparenchyma; thecium up to 110μ tall; paraphyses about 1μ in diameter, much branched above, tips thickened to 3μ, slightly darkened on outer surfaces, epithecium about 10μ thick, rugose, dark, K faint greenish; asci 35–53 × 13–18μ, long clavate, becoming shorter and stouter at maturity, usually 8-spored (occasionally 6-, 4-, or 2-spored with a corresponding increase in the size of spores); ascospores bilocular, somewhat constricted at the septum, sometimes unilocular, slightly pointed or blunt, dark brown, 8–10 (–13) × 5–6 (–7·5)μ.

Our material is very young, no mature spores have been found. The assimilative areoles are lighter coloured than in the type (naphthalene yellow, some being dead white, as if the tops had been eroded by snow crystals). The habit is the same and such characters as are observable agree with this species.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 65–2.

BUELLIA MCLEANI Dodge, sp. nov.

Type: King George V Land: Mt. Murchison, 1,860 ft., A. L. McLean, A.A.E. 52.

Thallus crustaceus subeffiguratus, griseo-niger, hypothallo nigro, centro areolato, margine tenuescente, confervoideo; areolae assimilantes 0·2 (–0·3) mm. diametro, 75μ crassitudine, pulvinatae, rotundatae vel angulares, olivaceae obscurioresve, aut cortice eroso dein albidae; cortex ca. 20μ crassitudine, laxe capitato-fastigiatus, strato amorpho 8–10μ tectus; algae cystococcoideae, ad 10μ diametro per medullam laxe contextam sparsae, super basim 200μ crassitudine, dimidia parte superiori brunnea, pseudoparenchymatica, dimidia parte inferiori carbonacea. Apothecia 0·3 mm. diametro, applanata dein convexa, margine laevi nigro, thallo immersa cum margine albido cellularum corticalium emortuarum dein magis elevata; parathecium ca. 40μ in lateribus crassitudine, infra ab basi non bene evolutum; hypothecium ca. 35μ crassitudine, hyalinum dein viridi-nigrum, hyphis tenuibus verticalibus; thecium ca. 55–60μ altitudine, subviride; paraphyses tenues, repetito-dichotome ramosae super ascos, ramis ultimis tricellularibus, submoniliformibus, cellulis exteris nigricantibus, ellipsoideis, ca. 6 × 4μ, epithecio nigro 8–15μ crassitudine; asci clavati 30 × 8μ juventute apicibus incrassatis, protoplastis truncatis, mamillis

parvis, dein ellipsoideis, evanescentibus; ascosporae octonae, obscure brunneae vel nigrae, late ellipsoideae, bilocularibus, septo non constrictae, 8–10 × 4–5μ, vel unicellulares, sphaericae, ca. 6μ diametro.

Thallus crustaceous, subeffigurate, greyish black; non-assimilating thallus black, areolate in the centre, margin thinning out with branched, black strands extending about 0·5 mm. beyond the areoles; assimilative areoles mostly about 0·2 mm. in diameter, sometimes up to 0·3 mm., 75μ thick, pulvinate, circular to somewhat angled or irregular, light olive brown or darker, mostly with cortex eroded and then dull white; cortex about 20μ thick, loosely capitate-fastigiate, the terminal cells larger, thick-walled and blackened, overlaid by a hyaline amorphous layer 8–10μ thick; algae cystococcoid, up to 10μ in diameter, scattered through the loosely woven medulla, resting on a non-assimilative areole or base, about 200μ thick, upper half of brownish pseudoparenchyma, lower half carbonaceous, attached to rock by rhizinal strands about 10μ in diameter.

Apothecia 0·3 mm. in diameter, round, flat at first, becoming convex, margin smooth, not prominent, wholly black; immersed in the thallus at first, when it appears bordered by a thin, white margin, then more elevated; parathecium about 40μ thick, the sides developing late after the thecium is mature, scarcely differentiated from the non-assimilative areole below; hypothecium about 35μ thick, of compact, slender, vertical hyphae, hyaline or somewhat greenish black, not sharply differentiated from the paraphyses above; thecium about 55–60μ tall, greenish in thick sections; paraphyses slender, repeatedly dichotomous above the asci, ultimate branches about 3-celled, somewhat moniliform, outer cells thick-walled, black, ellipsoid, about 6 × 4μ, forming a black epithecium 8–15μ thick; asci clavate, 30 × 8μ when young, tips thickened, protoplast truncate with a very small mamilla, becoming ellipsoid and disappearing when the spores begin to turn brown, 8-spored; ascospores dark brown to black broadly ellipsoidal 2-celled, not constricted at the septum, 8–10 × 4–5μ, some remaining unicellular, nearly spherical, about 6μ in diameter.

Our material evidently grew in extreme climatic conditions as the cortex has been eroded from the tops of the assimilative areoles by snow crystals, and a large proportion of the ascospores appear collapsed and shrunken, as if conditions had been unfavourable for dispersal when they matured.

On granite, stained ochraceous below.

King George V Land: Mt. Murchison, 1,860 ft., A. L. McLean, A.A.E. 2.

Buellia muscicola Dodge & Baker.

Buellia muscicola Dodge & Baker, Ann. Mo. Bot. Gard., 25, 643; 1938.

Type: King Edward VII Land, Rockefeller Mts., Mt. Helen Washington, P. Siple, F. A. Wade, S. Corey & O. D. Stancliff, HW–2, HW–10.

Non-assimilative portion 1·75 × 0·7 cm., on rocks or soil among mosses, conspicuous but very slender, branched, spreading, dark reddish brown to black, edges of the main strands roughened by short side branches, of dark, irregular cells; cortex and medulla not differentiated, but the inner cells sometimes hyaline; the assimilative areoles up to 0·33 mm. in diameter, pale to red brown, gelified, especially abundant and prominent at the confluence of the non-assimilative branches, gregarious or scattered; cortex soon evanescent; algal layer protococcoid, about 60μ thick in the middle of the areole, cells about 4μ in diameter; medulla of loosely woven hyphae, somewhat more compact under the apothecia; lower cortex not differentiated; asexual reproduction on the non-assimilative portions of the thallus by bulbils up to 75μ in diameter, spherical, dark, scattered or in groups, pseudoparenchymatous.

Apothecia up to 0·6 mm. in diameter, flattened to almost spherical, sometimes marginate, sessile to substipitate, scattered to gregarious, black; parathecium pseudoparenchymatous about 20μ thick on the sides of the thecium becoming about 50μ thick below; hypothecium not well differentiated; thecium up to 80μ tall; paraphyses 1·5–2μ in diameter, branched, heads in a group of 7–8, suggesting a candelabrum, individual heads about 5μ in diameter, walls darkened, with a brown cap, epithecium up to 10μ thick, dark brown, rough; asci 31–50 (–57) × 11–15 (–17)μ, 8-spored, clavate, wall thick; ascospores 2-locular, not constricted at the septum, ends acute, nearly distichous when young, irregularly arranged when mature, 11–15 (–17) × 4–5·7μ.

Our material differs from that from King Edward VII Land and Marie Byrd Land in having somewhat larger apothecia and thicker assimilative areoles, up to 180μ thick with a single dark brown rhizinal hypha attaching the areole to the dead moss below. Numerous minute colonies of *Nostoc* are found in the moss, but without apparent connection to the lichen thallus. A.A.E. 36 with very old proliferating apothecia and bulbils is intimately associated with *Alectoria congesta*. A.A.E. 61 is intimately associated with the thallus of *Parmelia leucoblephara*, also growing over dead moss but I have been unable to decide whether it is epiphytic or parasitic. A.A.E. 12 is parasitized by *Orbicula Buelliae*.

Queen Mary Land: David Island, C. T. Harrisson, A.A.E. 56–3; Possession Nunatak, C. T. Harrisson, A.A.E. 12, 36, 61.

BUELLIA PODOCARPA Dodge, sp. nov.

Type: Queen Mary Land, Possession Nunatak, C. T. Harrisson, A.A.E. 76.

Thallus hyphis obscure brunneis in funiculos reticulatos aut radiantes; areolae assimilantes ad 0·7 mm. diametro, irregulares, planae, albidae, sparsae vel aggregatae; cortex ca. 15μ crassitudine, hyphis pachydermeis, irregularibus, laxe contextis, cellulis exteris obscuris, sub strato amorpho gelifacto, 20–30μ crassitudine (ex hyphis periclinalibus ?); algae protococcoideae, cellulis ad 12μ diametro, in strato compacto, etiam sub hypothecio; medulla hyphis irregularibus, subverticalibus, pachydermeis, laxissime contexta. Apothecia conglomerata in capitulis ad 0·5 mm. diametro, disco nigro, convexo; parathecium ca. 40μ crassitudine ad latera thecii non sub hypothecio, carbonaceum; hypothecium 40–45μ crassitudine, dilute brunneum, pseudoparencymaticum ex hyphis plus minusve periclinalibus conglutinatis obscurascens; thecium ca. 90μ altitudine; paraphyses tenues, dichotomae, apicibus inflatis, cellulis terminalibus sphaericis, nigris; epithecium 8–10μ crassitudine, obscure fuligineum; asci cylindrici, apicibus incrassatis, evanescentes; ascosporae obscure brunneae, nigricantes, biloculares, late ellipsoideae, non vel rare septo constrictae, 9–11 × 6–7μ.

Non-assimilative thallus of delicate strands of dark brownish hyphae, reticulate or irregularly radiating, covering areas of a few mm. over quartz crystals; assimilative areoles up to 0·7 mm. in diameter, irregular in outline, flat, whitish scattered or closely aggregated, or reduced to a small stalk bearing conglomerate apothecia; cortex about 15μ thick, of thick-walled, very irregular hyphae, loosely woven, outer cells blackened overlaid by a gelified layer 20–30μ thick, of apparently periclinal hyphae; algae protococcoid, cells up to 12μ, mostly much smaller, forming a compact layer under the hypothecium as well as the cortex, becoming scattered and disappearing in the older thalli; medulla of irregular, thick-walled hyphae, very loosely woven, more or less vertical.

Apothecia conglomerate in heads up to 0·5mm. in diameter, disc black, convex; parathecium about 40μ thick at the sides of the thecium, carbonaceous, not extending below the hypothecium; hypothecium 40–45μ thick, light brown, darkening, pseudoparenchymatous from conglutinate,

more or less periclinal hyphae; thecium about 90μ tall; paraphyses slender, dichotomous, tips swollen, cutting off black, spherical cells, epithecium dark fuliginous, 8–10μ thick; asci cylindric, tip greatly thickened, protoplast rounded, disappearing early leaving groups of maturing spores in the thecial gel; ascospores dark brown to black, remaining unicellular until the wall is very dark, finally 2-celled, very broadly ellipsoidal, not or rarely constricted at the septum, 9–11 × 6–7μ.

The groups of apothecia are evidently formed by proliferation of the edge of the hypothecium, the original parathecium disappearing.

On rock with *Toninia Johnstoni*.

Queen Mary Land: Possession Nunatak, C. T. Harrisson, A.A.E. 76.

Rinodina Gray.

Rinodina S. F. Gray, Nat. Arr. Brit. Pl. 1, 448; 1821, emend. Mass., Ricerch. Autonom. Lich Crost., 14; 1852.

Lecanora subg. *Rinodina* Ach., Syn. Lich., 146; 1814.

Dimelaena Norm., Nyt Mag. Naturvidensk., 7, 231; 1853 (p.p.min.).

Berengeria Trev., Riv. Period. Lav. Accad. Padova, 265; 1851–2.

Pleorinis Clements, Gen. Fung., 84; 1909.

Merorinis Clements, Gen. Fung., 84; 1909.

Dictyorinis Clements, Gen. Fung., 84; 1909.

Type: *Rinodina sophodes* (Ach.) S. F. Gray. For discussion, see Dodge & Baker, Ann. Mo. Bot. Gard., 25, 655; 1938.

Thallus crustose, rarely squamulose, uniform or with effigurate margin (in sect. *Beltraminia*), attached to the substrate by the hyphae of the prothallus or of the medulla, without rhizinae; ecorticate or with fastigate cortex, or in the higher forms with a palisade of pseudoparenchyma; algae protococcoid; medulla of loosely woven, thin-walled hyphae. Apothecia circular, immersed or sessile, lecanorine, but in some species the algae finally disappear from the amphithecium; parathecium thin or absent; epithecium dark or black, horny or pulverulent, usually K purple or violet; hypothecium hyaline, rarely dark; paraphyses filiform, seldom forked, more or less gelified, usually capitate; asci normally 8-spored, rarely up to 24-spored; ascospores smoke grey, brown or black, 2–4-celled, wall very thick, protoplasts commonly united by an isthmus. Spermogonia immersed or in warts, irregularly flask-shaped; spermatia small, elongate, straight.

Rinodina aspicilina Zahlbr.

Rinodina aspicilina Zahlbr., Deutsche Südpolar Exp., 8, 50; 1906.

Type: Kerguelen, Pinguinbucht, Werth (Deutsche Südpolar Exp.).

Thallus thin, areolate, rimose, pale ochraceous to dark olive buff and dark olive, determinate, but not bounded by a dark line; cortex 25-30μ thick, more or less decomposed, but apparently fastigiate, cells more or less isodiometric; algal layer about 75μ thick, of closely packed, protococcoid cells, about 7μ in diameter; medulla about 75μ thick, of more or less vertical, compact hyphae.

Apothecia immersed in the areoles, often nearly covering them, 0·3–0·4 mm. in diameter, disc black, dull, slightly concave at first, then plane; amphithecium and parathecium not differentiated from the thallus; hypothecium 75–90μ thick in the centre, thinning toward the margin, scarcely differentiated from the medulla, the upper 35μ more deeply staining, of slender, subvertical hyphae; thecium 75–85μ tall; paraphyses very slender, scarcely septate, dichotomously branched above the asci, tips brown, clavate 7–8 × 3μ, or finally moniliform, cutting off spherical cells in

the brownish epithecial gel; asci 45–55 × 15–18μ, oblong clavate, tips slightly thickened; ascospores distichous, polari-bilocular when young, ovoid to broadly ellipsoid, becoming dark brown, 14–18 × 7–9μ, clearly septate and constricted at the septum.

[Spermogonia marginal, semi-emersed, punctiform, black; wall darkened above; spermatiophores septate, little branched; spermatia ovoid or ovoid-oblong, 3 × 1μ—Zahlbruckner].

As the thallus becomes moribund, the medullary hyphae under and around the thecium become stained brownish to black, the spores remaining in the ascus shrivel until it might be taken for another species, but transitional stages present in our material, indicate that they are moribund.

On rocks with *Verrucaria hebena, Thelidium praevalescens, Microglaena kerguelana, Lecidea sublygomma, Rhizocarpon kerguelense, Pertusaria crozetica, Aspicilia disjunguenda, Lecanora atrocaesia, Pyrenodesmia kerguelensis, Kuttlingeria crozetica* and *Buellia subplicata.*

Crozet Archipelago: Possession Island, American Bay, B.A.N.Z.A.R.E. B20–7.

Kerguelen: Greenland Harbour, B.A.N.Z.A.R.E B177–5, B177–62; Royal Sound, B.A.N.Z.A.R.E. B90–10, B126–2, B126–23, B126–27.

Heard Island: between Atlas Cove and Corinthian Bay, B.A.N.Z.A.R.E. B140–6.

Rinodina peloleuca (Nyl.) Müll.-Arg.

Rinodina peloleuca Müll.-Arg., Nuov. Giorn. Bot. Ital., 23, 125; 1891.

Lecanora peloleuca Nyl., Jour. Linn. Soc. Bot., 9, 251; 1865.

Type: New Zealand, Dunedin, on basalt, Lauder Lindsay.

Thallus white, subdeterminate, thin, areolate rimose; cortex about 35μ thick, of fastigiate hyphae with more or less isodiametric cells, decomposing above; algal layer 35–50μ thick, protococcoid, cells spherical, 12–15μ in diameter; medulla of vertical, thick-walled hyphae, enclosing many rock crystals below.

Apothecia 0·4–0·5 mm. in diameter, constricted below, disc black, margin white; amphithecial cortex 60μ thick below, thinning to 35μ at the margin, fastigiate, similar to that of the thallus; algal layer well developed, 40μ thick, of closely packed cells to much thinner or finally absent; parathecium 15–20μ thick, hyaline, of very slender periclinal hyphae; hypothecium about 100μ thick, of vertical hyphae, not clearly differentiated from the thecium above; thecium 150μ tall: paraphyses conglutinate, about 1μ in diameter, branching above the asci, tips clavate, 5μ in diameter, brown; asci about 75 × 30μ, tip thickened, with broadly mamillate protoplast when young, 8-spored; ascospores brown, 2-celled; polaribilocular as they begin to brown, finally slightly constricted in the middle with moderately thickened walls, 20–27 × 9–11μ.

The development of the spores suggests a relationship with *R. aspicilina.*

On rock with *Lecania Johnstoni, Pyrenodesmia inclinans* and *Gasparrinia macquariensis.*

Macquarie Island: Featherbed Flat, B.A.N.Z.A.R.E. 533–3, 533–6.

Rinodina subbadioatra (Knight) Dodge, comb. nov.

Lecidea subbadioatra Knight, Trans. Proc. N. Zealand Inst., 8, 317; 1875 [1876]; Trans. Linn. Soc. Bot. II., 1, 276; 1877.

Buellia subbadioatra Müll.-Arg., Bull. Herb. Boissier 2: append., 1, 70; 1894.

Type: New Zealand, Charles Knight, on rocks.

Thallus about 400μ thick, smooth, gelatinous when moist, becoming chalky white and slightly rimulose areolate when dry; cortex a palisade of pseudoparenchyma, 20–35μ thick, decomposing;

formantibus. Apothecia 0·1–0·2, rare 0·3 mm. diametro, disco plano, nigro, margine laevi, albido dein obscure griseo nigricantive; amphithecium ca. 80μ crassitudine, cortici thallino similis cum seriebus algarum inter hyphas; parathecium non evolutum; hypothecium non bene distinctum; thecium 110–150μ altitudine; paraphyses tenuissimae, super ascos dichotomae, apicibus non incrassatis; asci clavati, apicibus incrassatis, 55 × 15μ, evanescentes; ascosporae subdistichae, brunneae nigricantes, ellipsoideae, pachydermeis, 22–29 × 8–11μ.

Thallus obscured by apothecia, reduced to a small squamule, about 0·7 mm. in diameter and 0·2 mm. thick, prolonged below into a short stipe about 200μ long and 125μ in diameter, where brown hyphae 4–5μ in diameter, either singly or in small rhizinoid fascicles attach the thallus to the moss; cortex fastigiate, pseudoparenchymatous, 30μ thick, more or less decomposed and brownish in the stipe, up to 55μ thick, hyaline with very thick walls and septa in the squamule; algae cystococcoid, cells 8–15μ in diameter, dying out in the stipe, sometimes nearly filling the medulla, but tending to disappear below and penetrate the cortex at the margin of the squamule and between the apothecia (preparatory to forming new apothecia?), tending to disappear under the centre of the apothecium; medulla of thick-walled, closely woven hyphae with small air spaces, sometimes more periclinal under the hypothecium but not differentiated as a parathecium.

Apothecia 0·1–0·2 mm., rarely 0·3 mm. in diameter, disc plane, black, margin smooth, white becoming dirty grey and blackening, closely packed over the squamule but not deformed or angular; amphithecium about 80μ thick, similar in structure to the thalline cortex with rows of algae between the hyphae, outermost algal cell of each row surrounded by a single layer of cortical hyphae; parathecium not differentiated; hypothecium indistinct, slender branches of medullary hyphae apparently passing upward directly into the more deeply staining paraphyses, the asci arising from short branches of deeply staining hyphae periclinal to the base of the thecium; thecium 110–150μ tall; paraphyses very slender, dichotomously branched above the asci, tips not thickened, ending in the dark brown epithecial gel when young, finally cutting off spherical cells about 3μ in diameter; asci clavate with a thickened tip and rounded protoplast when young, about 50 × 15μ as the ascospores begin to assume a brownish colour, then apparently disappearing while the spores still develop in the thecial gel; ascospores subdistichous, brown becoming black, ellipsoidal, with very thick walls and septum, protoplasts hemispheric, connected by a very slender isthmus, the wall thinning and the isthmus disappearing, the protoplast ceasing to stain as the wall darkens, until finally the spore is slightly constricted at the septum, the ends somewhat pointed, straight or slightly curved, 22–29 × 8–11μ. As is often the case with large, dark ellipsoidal spores, the greater lengths are associated with the smaller transverse diameters, making the spore volume more nearly constant than the linear dimensions seem to indicate.

This species seems closely related to *R. egentissima* Hue from Petermann Island (Graham Land Archipelago). It has the same habit and habitat, but with a much thicker thalline cortex, smaller apothecia, margin not crenulate, without parathecium, taller thecium and smaller asco spores. As in *R. egentissima*, the proportion of asci to paraphyses is unusually large. As our material is very scant, I have not sacrificed any of it to learn if the apothecia arise directly from the moss plant without forming a basal squamule. While the basal portion of the moss is dead, the tips seem to have been alive when collected, and project between the squamules as if the fungus portion of the lichen was parasitic or saprophytic on the moss and derived part of its nutrition from the moss, accounting for the great reduction of the thallus.

Growing over mosses with *Nostoc*, etc.

King George V Land: Cape Denison, McKellar Islets, A. L. McLean, A.A.E. 90–2.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 78–2, type.

RINODINA SORDIDA Dodge & Baker.

Rinodina sordida Dodge & Baker, Ann. Mo. Bot. Gard., 25, 657; 1938.

Type: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, P. Siple & S. Corey 72W–6.

Thallus up to 3 cm. in diameter; non assimilative portion scant, black, dull; cortex capitate fastigiate, cells brown and thick walled; medulla hyaline to pale brown; assimilative areoles up to 1 mm. in diameter, angular, white to grey, the margins often blackened; cortex fastigiate, well developed laterally and in places on the upper surface, often with a conspicuous zone of dead cells; algae protococcoid, cells up to 18μ in diameter, scattered in the upper half of the thallus; medulla of loosely woven hyphae; basal layer of small, dark cells merging laterally with the fastigiate cortex.

Apothecia up to 1·35 mm. in diameter, angular, sinuous or hemispheric, convex, flattened with a faint margin or umbilicate, surface cracked, scattered or gregarious, sessile on the areoles; amphicium 100μ thick, cortex 20μ thick, of spherical, subhyaline cells, algal layer of scattered cells 4–5μ in diameter, no medulla nor parathecium; hypothecium up to 230μ thick, thinning toward the margin, hyaline, of compact, small cells; thecium up to 70μ thick; paraphyses 1μ in diameter, branched or unbranched, conspicuously septate, thick-walled, tips 4–5μ in diameter with dark spherical caps; asci 8-spored, 47–54–63 $\times$ 16–19μ, slender clavate, thick-walled when young, the mature asci shorter and stouter as the spores fill them; ascospores bilocular, slightly constricted at the septum, acute or obtuse, dark brown, 11–13·5 $\times$ 6–8μ.

Our material is very old with the thecia largely disintegrated. Such characters as are still visible agree with this species, although the habit and colour approach that of *R. olivaceobrunnea* Dodge & Baker.

King George V Land: Cape Denison, A.A.E. 194.

RINODINA FRIGIDA (Darbishire) Dodge, comb. nov.

Buellia frigida Darbishire, Brit. Nat. Antarct. "Discovery" Exp., Nat. Hist., 5, Lich.; 7, 1910.

Type: South Victoria Land, Granite Harbour, McMurdo Bay, British National Antarctic "Discovery" Expedition.

Thallus crustose, effigurate, up to 7 cm. in diameter, mostly much smaller; hypothallus black, carbonaceous, extending 5–7·5 mm. beyond the assimilative thallus, margin somewhat fimbriate, sometimes much narrower and scarcely visible; assimilative portion deeply rimose radially, giving the appearance of radiating marginal lobes, with shallower cracks cutting up the whole surface into angular areoles, surface more or less verrucose, so that the individual areoles are subcerebriform, colour variable, buffy brown to grey, marginal areoles often nearly black; amorphous layer highly developed, often 35–40μ thick, upper cortex 6–7μ thick, capitate-fastigiate, but appearing as a single layer of dark, thick-walled, isodiametric cells, the hyphae bearing them thicker-walled but not otherwise differentiated from those of the medulla; algal layer variable in thickness, protococcoid, cells small, 4–7μ in diameter; medulla variable in thickness, of loosely woven thin-walled hyphae, somewhat vertically arranged; basal layer brownish, about 15μ thick, of compact, dark brown, more or less isodiametric cells elongating upward and merging with the medullary hyphae.

Apothecia carbonaceous, somewhat shining, sessile or subsessile on the assimilative areoles, flat to convex and almost spherical, up to 0·75 mm. in diameter, lecanorine (clearly so when young); amphithecial cortex 15–17μ thick, a palisade of isodiametric cells; algae between the medullary hyphae, early disappearing; medulla of vertical brown hyphae, loosely woven and continuous with those of the thalline medulla; parathecium not differentiated; hypothecium brown, 30–80μ thick in

the centre thinning to 2–8μ at the edges of the thecium where it merges with the cortical cells, pseudo-parenchymatous with a tendency to periclinal arrangement; thecium 90–110μ tall; paraphyses 2μ in diameter, branched or unbranched, septate, thick-walled, apical cell 4μ in diameter, darkened at the surface; asci short clavate, 8-spored, 36–46 $\times$ 14·5–17μ; ascospores dark brown, 2-celled, obtuse, rarely or only slightly constricted at the septum, sometimes undivided, 9–13 $\times$ 5–8μ.

Spermogonia immersed in the thallus, from flask-shaped to quite irregular; wall thin, hyaline of very small-celled pseudoparenchyma; spermatiophores about 10 $\times$ 1μ, few septate, branched; spermatia ellipsoid, about 4 $\times$ 1μ.

There is considerable variation of colour from ashy-fuscescent, through ashy to almost white, although the marginal areoles are always dark, but none of the colour variations is correlated with microscopic characters, the thickness of the thallus nor with the ease with which the assimilative areoles separate from the hypothallus, leaving bare patches. As colour and interrupted thallus and its thickness are the only characters used by Darbishire to separate *B. quercina* Darb., Brit. Nat. Antarct. "Discovery" Exp. Nat. Hist., 5, Lich., 8; 1910, from this species, I am inclined to think he had two extremes of a continuous series, although I have not seen his material. Many of our specimens agree microscopically in all characters except darkening of the outer cells of the cortex below the amorphous layer (secondary cortex of Darbishire). As in specimens with these cells darkening, one finds areas where they are just forming and have not darkened, I have assumed that the specimens without darkening of the cortical cells are only younger states of the same species, although the apothecia have already developed.

The systematic position of this species has always been a puzzle. The structure of the apothecium is clearly that of a lecanorine apothecium. The algae are present in the young stages as Darbishire reported in the original description and as I have observed repeatedly. As the algae die and disappear, the medullary hyphae become brown, giving the appearance of a lecideine apothecium, if little attention is paid to details of the tissues surrounding the thecium. Until we have more accurate definitions of lecanorine and lecideine, and these terms are more accurately applied, such species as this will be troublesome. As Dr. Baker and I saw only two old specimens from Marie Byrd Land, we left the species in *Buellia*, but the abundance of material from these three expeditions shows clearly that it belongs in *Rinodina* sect. *Beltraminia*.

On rocks with *Toninia Johnstoni*, *Umbilicaria Hunteri*, *U. rugosa*, *U. subcerebriformis*, *Charcotia cerebriformis*, *Lecanora exsulans* and its forma *minor*, *L. Johnstoni*, *Candelariella cerebriformis*, *Usnea* sp., *Protoblastenia citrina*, *Polycauliona citrina* and *Xanthoria Mawsoni*.

South Victoria Land: Cape Royds, D. Mawson 1058 (Brit. Antarct. [Shackleton] Exp.).

King George V Land: Horn "Dreadnought" Bluff, A. L. McLean, A.A.E. 32; Cape Denison, A.A.E. 141, 166, 172, 185, 188, 189, 190, 191, 192, 193, 1049–2; B.A.N.Z.A.R.E. 536–7, 536–8, 536–9, 536–10, 536–11, 536–14, 536–18, 536–24, 536–27, 536–28, 536–32, 536–36, 536–37, 536–40, 536–41, 536–43, 536–44, 536–45, 536–47, 536–48, 536–49, 536–50, 536–51, 536–52, 536–53, 536–54, 536–55, 536–56, 536–57.

Queen Mary Land: Hippo Nunatak, C. T. Harrisson, A.A.E. 35.

MacRobertson Land: Cape Bruce, B.A.N.Z.A.R.E. 108–13, 108–14, 108–29, 108–30, 108–31, 108–32, 108–33, 108–34, 108–35, 108–40, 108–41, 108–42; 1847.

Undeterminable Sterile Thalli.

Psoroma lanuginosum Wilson, Mém. Herb. Boissier 1887; 1900 non aliorum.

Four specimens under this name in the National Herbarium at Melbourne Botanic Garden are not this species as represented in Europe and understood by Acharius or Müller-Argau. They seem to be young thalli growing over mosses and may be a juvenile condition of the primary thallus of *Cladonia phyllophora* (Tayl.) Dodge. Cortex not developed, masses of very slender, closely woven hyphae, enclosing colonies of cystococcoid algae, cells 4–6μ in diameter. The thalli are granular in confluent patches up to 1·2 cm. in diameter, chalky white. Another thallus more cottony in appearance is a hyphomycete (perhaps *Sporotrichum*) completely lacking algae.

Kerguelen: Royal Sound, Robert Hall (Nat. Herb. Melbourne Bot. Gard.)

LICHEN PARASITES.

Besides the species described below, mycelium and sometimes immature or very old perithecia suggestive of *Endococcus* have been seen in various collections, all in too poor condition for description.

PERISPORIACEAE.

Orbicula Cooke.

Orbicula Cooke, Handbook Brit. Fungi, 2, 926; 1871.

Type: Originally based on *O. cyclospora* Cooke and *O. tartaricola* (Nyl.) Cooke. Saccardo, Syll. Fung., 1, 36; 38. 1882 transferred *O. cyclospora* to *Anixia*, leaving *O. tartaricola* as the type.

Perithecia between membranaceous and carbonaceous, reticulated, seated on a distinct superficial mycelium; ostiole absent; asci cylindric; ascopores subspherical, hyaline at first, finally brown; paraphyses simple or branched.

Orbicula Buelliae Dodge, sp. nov.

Type: Queen Mary Land, Possession Nunatak, C. T. Harrisson, A.A.E. 12.

Hyphae ramosae pachydermeae brunneae septatae, 4–5μ diametro, superficiales vel in parte superiore thalli hospitis penetrantes. Perithecia sphaerica, ca. 50μ diametro, nigra; murus 8–10μ crassitudine, stratis duobus cellularum polygonalium 8–10μ diametro, 4–5μ crassitudine; paraphyses tenues, ca. 1·5μ diametro, hyalinae, evanescentes; asci cylindrico-clavati, mox evanescentes; ascoporae subsphaericae, hyaline, dein brunneae, ca. 6 $\times$ 4μ.

Mycelium of thick-walled, brown, septate, branched hyphae 4–5μ in diameter, mostly superficial but penetrating the upper portion of the thallus of the host. Perithecia spherical, up to 50μ in diameter, black; wall of two layers of thick-walled, dark brown, polygonal cells (giving a reticulate appearance to the surface of the perithecium), 8–10μ in diameter and 4–5μ thick; paraphyses slender, about 1·5μ in diameter, hyaline, soon evanescent; asci cylindric-clavate, soon evanescent; ascospores subspherical or short ellipsoidal, hyaline becoming brownish, about 6 $\times$ 4μ.

On *Buellia muscicola* Dodge & Baker.

The richly branched, brown mycelium appears to cut off 2-celled, thick-walled, brown conidia, about 11 $\times$ 6μ from short, erect, simple conidiophores. Each perithecium appears to arise from a single hypha.

Queen Mary Land: Possession Nunatak, C. T. Harrisson, A.A.E. 12.

MYCOSPHAERELLACEAE.

PHAEOSPORA Hepp.

Phaeospora Hepp, Flecht. Eur., 947; 1867.

Type: *Microthelia rimosicola* Mudd, Man. Brit. Lich., 308; 1861.

Perithecia developing under the cortex of the host, rupturing it and partly emersed at maturity; wall thick, carbonaceous; periphyses abundant above the thecium; asci fusiform, 8-spored; ascospores usually 4-celled, only slightly constricted at the septa, brown.

PHAEOSPORA GASPARRINIAE Dodge, sp. nov.

Type: Macquarie Island, north end, B.A.N.Z.A.R.E. B540–16 on *Gasparrinia macquariensis* Dodge.

Perithecia sphaerica, ca. 180μ diametro, nigra, juventute immersa, maturitate semi-emersa; murus ca. 35μ crassitudine, carbonaceus; ostiolum 15–18μ diametro; periphyses super thecium abundantes; thecium 75μ altitudine; paraphyses tenues, non ramosae, apicibus non incrassatae; asci cylindrici dein anguste fusiformes; ascosporae octonae, brunneae, 4-loculares, pachydermeae, ad septa subconstrictae, ca. 22 $\times$ 5μ.

Mycelium not clearly distinguishable from that of the host. Perithecia spherical, about 180μ in diameter, black, immersed when young, becoming semi-emersed at maturity; wall about 35μ thick, carbonaceous; ostiole 15–18μ in diameter; periphyses abundant above the thecium; thecium 75μ tall; paraphyses discrete, slender, unbranched, tips not thickened; asci cylindric, becoming narrowly fusiform as the spores mature, 8-spored; about 65 $\times$ 9μ; ascospores brown, 4-celled, thick-walled, slightly constricted at the septa, about 22 $\times$ 5μ.

On thallus of *Gasparrinia macquariensis* Dodge.

Macquarie Island, north end, B.A.N.Z.A.R.E. B540–16.

PLEOSPORACEAE.

DIDYMELLA Sacc.

Didymella Sacc., Michelia, 1, 377; 1878.

Perithecia immersed, erumpent, nearly spherical, wall thin, black, smooth; asci cylindric to clavate, usually 8-spored; ascospores ellipsoidal to fusiform, 2-celled, hyaline.

DIDYMELLA CLADONIAE Dodge, sp. nov.

Type: Macquarie Island, north end, B.A.N.Z.A.R.E. B540–4, on *Cladonia Mawsoni* Dodge.

Perithecia semi-emersa vel subsessilia, nigra, 175μ diametro, murus obscure brunneus, 15μ crassitudine, hyphis periclinalibus, ca. 2μ diametro; hypothecium 10μ crassitudine, hyphis tenuibus dense contextus; paraphyses persistentes, liberae, ramosae, ca. 2μ diametro, indistincte septatae; asci cylindrici, 70–75 $\times$ 7–8μ cum stipite ca. 10μ longitudine, pachydermei, apicibus incrassati juventute; ascosporae octonae, uniseriales, ellipsoideae, hyalinae, pachydermeae, uniseptatae, 10–11 $\times$ 4–5μ.

Perithecia semi-emersed to almost sessile, black, 175μ in diameter, wall dark brown, 15μ thick, of periclinal hyphae about 2μ in diameter; hypothecium 10μ thick, of closely woven, slender hyphae; paraphyses persistent, free, branched, about 2μ in diameter, indistinctly septate; asci cylindrical, 70–75 $\times$ 7–8μ, with a stipe about 10μ long, wall and tip thickened when young,

8-spored; ascospores uniseriate, ellipsoidal, hyaline, walls thick, with spherical protoplasts, 2-celled, 10–11 × 4–5μ.

On Cladonia Mawsoni Dodge.

Macquarie Island, north end, Sta. 81, B.A.N.Z.A.R.E. B540–4.

DIDYMOSPHAERIA Fuckel.

Didymosphaeria Fuckel, Jahrb. Nassau. Ver. Naturk., 23/24, 140; 1869 [Symb. Myc.].

Perithecia immersed in the substrate, wall dark, at least above, sometimes almost hyaline below; ostiole present; paraphyses present; asci clavate, 4–8-spored; ascospores elongate, 2-celled, brown.

DIDYMOSPHAERIA KUTTLINGERIAE Dodge, sp. nov.

Type: Crozet Archipelago, Possession Island, American Bay, B.A.N.Z.A.R.E. B20–22, on *Kuttlingeria crozetica* (Zahlbr.) Dodge.

Perithecia in thecio hospitis immersa, ellipsoidea, 85μ altitudine, 55μ diametro, nigra; murus ca. 10μ crassitudine, hyphis tenuibus, septatis, periclinalibus, subtus hyalinis, insuper brunneis nigricantibusque; ostiolum angustum; paraphyses ca. 1μ diametro, septatae, hyalinae; asci clavati, ca. 35 × 10μ, evanescentes; ascosporae brunneae, 2-loculares, pachydermeae, ca. 15 × 4μ, elongato-ellipsoideae vel oblongae, cellula superiore paulo longiore crassioreque.

Mycelium of slender hyaline hyphae, scarcely distinguishable from that of the host. Perithecia immersed in the thecium of the host, ellipsoidal, 85μ tall and 55μ in diameter, black above; wall about 10μ thick, of slender, septate, periclinal hyphae, hyaline below, becoming darker through brown to black above, where it is thicker, penetrated by a narrow ostiole; paraphyses about 1μ in diameter, septate, hyaline; asci clavate, about 35 × 10μ, evanescent; ascospores dark brown, 2-celled, long ellipsoid to oblong, upper cell slightly longer and wider, about 15 × 4μ.

On *Kuttlingeria crozetica* (Zahlbr.) Dodge.

The systematic position is not wholly clear. In one section, there is a suggestion that the tips of the paraphyses are not free and might be considered as paraphysoids. Very immature perithecia, which may be this species, have been seen immersed in the parathecium. In another section of the same apothecium is a structure which may be the spermogonium of this species, or it may be a different fungus, at it is impossible to trace the mycelium of either very far from the reproductive structures. It is ellipsoidal, 62μ tall, 37μ in diameter; wall about 8μ thick, of septate periclinal hyphae, brown, somewhat paler below; ostiole broad, about 15μ in diameter, filled with a hyaline gel; spermatiophores hyaline, about 7 × 1μ in a dense palisade lining the cavity; spermatia ellipsoidal, about 3 × 1μ. The other specimens referred here are either immature or very old, but such characters as are observable suggest that they belong here.

Crozet Archipelago, Possession Island, American Bay, on *Kuttlingeria crozetica* (Zahlbr.) Dodge, B.A.N.Z.A.R.E. B20-22, type; on *Blastenia Johnstoni* Dodge, B.A.N.Z.A.R.E. B20–19.

Kerguelen: Mt. Wyville Thompson, on *Blastenia keroplasta* v. *athallina* Zahlbr., B.A.N.Z.A.R.E. B246–22.

DIDYMOSPHAERIA MACQUARIENSIS Dodge, sp. nov.

Type: Macquarie Island, Featherbed Flat, B.A.N.Z.A.R.E. B533–7, on *Pyrenodesmia inclinans* (Strtn.) Dodge.

Perithecia in thecio hospitis immersa; murus ca. 20μ crassitudine, subtus hyalinus, insuper brunneus nigricansque, crassior; paraphyses tenues, non-ramosae, apicibus liberis acutisque; asci late clavati, ca. 35 × 15μ; ascosporae octonae, brunneae, 2-loculares, subpachydermeae, ad septum subconstrictae, cellula superiore grandiuscula, anguste ellipsoideae vel oblongae, 15–16 × 4–5μ.

Perithecia immersed in the thecium of the host; wall about 20μ thick, hyaline below, shading to dark brown and much thicker above; paraphyses slender, unbranched, tips free, acute; asci broadly clavate, 8-spored, about 35 × 15μ; ascospores brown, 2-celled, narrowly ellipsoidal to oblong, 15–16 × 4–5μ, upper cell slightly larger, walls moderately thickened, slightly constricted at the septum.

On *Pyrenodesmia inclinans* (Strtn.) Dodge.

This species differs from the related *D. Kuttlingeriae* from Kerguelia in larger, thicker-walled perithecia, more numerous and broader asci and slightly larger ascospores. Unfortunately, the only material seen was in a crushed preparation, where the delicate lower portion of the perithecium was so disorganized in crushing that exact measurements of the perithecia are impossible, but judging from the much larger number of asci and the greater dimensions of the blackened upper portion of the perithecium, the perithecia are much larger than those of *D. Kuttlingeriae.*

Macquarie Island: Featherbed Flat, B.A.N.Z.A.R.E. B533–7.

Didymosphaeria ?

Perithecia immersed in the thecium of the host, oblong, about 95μ tall and 35μ in diameter; wall about 8μ thick, of periclinal thick-walled, closely septate, brown hyphae, much thickened and blacker above about the very small ostiole; paraphyses present; asci cylindric; ascospores not seen.

On thecium of *Lecidea Werthii* Zahlbr.

Heard Island: vicinity of Corinthian Bay and Atlas Cove, B.A.N.Z.A.R.E. B140–4.

CELIDIACEAE.

Phacopsis Tul.

Phacopsis Tul., Ann. Sci. Nat. Bot. III., 17, 124; 1852.

Type: Originally based on *P. Clemens, P. varia* and *P. vulpina.* Massalongo transferred *P. Clemens* and *P. varia* to other genera leaving *P. vulpina* as the type.

Apothecia cespitose, immersed at first, erumpent and finally sessile, disc flat then convex, parathecium undeveloped; asci ovoid, thick-walled, 8-spored; ascospores long-ellipsoid, unicellular, hyaline; hypothecium brown; paraphyses branched, tips enlarged and black.

Phacopsis Usneae Dodge, sp. nov.

Type: Kerguelen, Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–21 on *Usnea trachycarpa* (Stirton) Müll.-Arg.

Stromata nigra, ca. 1 mm. diametro; hyphis brunneis ca. 7μ diametro, contortis et laxe contextis, stratum algarum hospitium penetrantibus; stroma ca. 225μ crassitudine, hyphis verticalibus, conglutinatis; parathecium deest; thecium 55μ altitudine; paraphyses pachydermeae, 4μ diametro, apicibus non incrassatis, conglutinatae, brunneae, septatae; asci 40–45 × 15–18μ, ellipsoidei, hyalini; ascosporae octonae, hyalinae, uniloculares, fusiformes, 10–12 × 4μ pachydermeae.

Stromata appearing as black circular spots about 1 mm. in diameter on the surface of the larger branches of the host, hypae dark brown, about 7μ in diameter, contorted and loosely woven, penetrating to the algal layer of the host, more dense above and forming a stroma about 225μ thick; consisting of vertical conglutinate hyphae, parathecium absent; thecium 55μ tall, paraphyses thick-walled, 4μ in diameter, tips not thickened, conglutinate, brownish, septate; asci 40–45 ×15–18μ, ellipsoidal, 8-spored, hyaline; ascospores hyaline unicellular, fusiform, 10–12 × 3·5–4μ, thick-walled.

Kerguelen, Mt. Wyville Thompson, 1,000–1,500 ft., B.A.N.Z.A.R.E. B246–21.

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* The authorship and dates of issue of this and the next work are very puzzling. Evidently the lichens from the voyage were forwarded to Thomas Taylor and a preliminary manuscript returned for publication late in 1844. The first part of the completed manuscript, also by Thomas Taylor, was clearly published in May, 1845 (see S. T. Dunn, Jour. Bot. Brit. For., 51; 357; 1913). In the meantime some of the duplicates were sent to Churchill Babington, who studied them very superficially and whose comments occur in the second part. The date of issue of the latter part is uncertain. In the bound copy in the library of the Missouri Botanical Garden, the title page for the whole work is dated 1845 and the cryptogams are paged continuously as if the whole was issued at once and the text of Part II reissued with changed pagination (without evident change of text) when these groups were reached in the course of publication in 1847. On the other hand, the signatures of Part I are numbered A-Y, of Part II [A]-Z, 2A-2Q, index unnumbered. The signature [A] of Part II consists of a single leaf (p. 89, 90); perhaps it originally was a whole sheet, the other half being a title page which was discarded by the binder when the work was bound as a single volume.

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For convenience of reference, names of forms and varieties are treated in this index as if they were specific. Scientific names included in the body of generic and specific descriptions have not been included unless they are quoted in the synonymy under genera and species. [T. H. Johnston, Editor.]

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Printed at THE HASSELL PRESS, Adelaide