

LICHENOLOGICAL NOTES ON THE FLORA OF THE ANTARCTIC CONTINENT AND THE SUBANTARCTIC ISLANDS. I-IV

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In 1947-1948, the Australian National Antarctic Research Expedition established weather stations at Heard Island and Macquarie Island and somewhat later at Mawson in MacRobertson Land, on the Antarctic Continent. Through the kindness of Dr. H. W. Jessep of the National Herbarium, Melbourne Botanic Garden, and Dr. A. M. Gwynn, Medical Officer and Biologist of the Australian National Antarctic Research Expedition (A.N.A.R.E.), we have had the privilege of studying the lichen collections.

I. ADDITIONS TO THE LICHEN FLORA OF HEARD ISLAND

Previous collections were reported by Dodge (1948) based on the British Australian New Zealand Antarctic Research Expedition (B.A.N.Z.A.R.E.), November 27-December 2, 1929, all between Atlas Cove and Corinthian Bay. The weather station was established at Atlas Cove in December 1947 (Scholes, 1951) and closed in 1955. The earlier collections received in 1949 were by D. Alan Gilchrist, Medical Officer; the collector of the later specimens was not recorded on the herbarium labels and are cited: A.N.A.R.E. The island was more accurately mapped in 1948 (A.N.A.R.E. 1949). Most of the southern part of the island is covered by glaciers and ice fields, so that the lichen collections have come from the northwestern part, especially the Cape Laurens peninsula on the northwest corner. Thirty-two species are represented, of which three are new and fifteen have not been previously reported although known from Kerguelen Island to the northwest, making a total of 52 species known from Heard Island.

THELIDIUM HEARDENSE Dodge, B.A.N.Z.A.R.E. Rept. B. 7:44. 1948.

The thallus is lighter (vinaceous buff) than the type, but it agrees microscopically.

North of Cape Laurens on volcanic rock, A.N.A.R.E. 75.

THELIDIUM PRAEVALESCENS (Nyl.) Zahlbr., Deutsche Südpolar Exp. 8:51. 1906.

Verrucaria praevalescens Nyl., in Crombie, Jour. Linn. Soc. Bot. 15:192. 1876.

As in most previous collections, all of our material is sterile although the thallus has a characteristic appearance.

West Bay, A.N.A.R.E. 743; north of Cape Laurens, on broken lava, in cave, A.N.A.R.E. 67, 72.

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MICROGLAENA KERQUELENA (Nyl.) Zahlbr., Deutsche Südpolar Exp. 8:51. 1906.

Verrucaria kerquelela Nyl., in Crombie, Jour. Bot. Brit. For. 14:22. 1876.

D. Alan Gilchrist 5, growing with *Steinera Werthii* Zahlbr. New to Heard Island.

XANTHOPYRENIA heardensis Dodge & Rudolph, n. sp.

Type: Heard Island, north of Cape Laurens at base of black cliffs, A.N.A.R.E. 76.

Thallus areolatus, areolis 0.3–0.5 mm. diametro subconvexis substipitatisque, marginibus liberis crenulatis, humectatis obscure flavo-viridibus, siccatis flavo-citrinis, homoeomericus; algae *Xanthocapsa*, coloniis sphaericis aut oblongis, vaginis flavo-brunneis, cellulis 7–8 μ diametro; hyphae 2–3 μ diametro inter colonias algarum.

Perithecia immersa, 1–3 in quaque areola, subsphaerica, 200–250 μ diametro, ostiolo minuto; parathecium obscure brunneum, 15–20 μ crassitudine, cellulis polyhedricis; asci 12–15 $\times$ 115 μ , leptodermei; ascosporae octonae, imbricatim monostichae, late fusiformes, 19–24 $\times$ 8–9 μ , tenui cum halone dum in asco, dein liberae 24 $\times$ 10–11 μ , biloculares, cellula superiori majori, hyalinae, septo constrictae.

Thallus areolate, areoles 0.3–0.5 mm. in diameter, slightly convex above, substipitate below, margins free, crenulate, dark yellow-green when moist, old gold to buffy citrine when dry, homoeomericous; algae *Xanthocapsa*, colonies rounded to oblong, of 4–16 cells with a thick yellow-brown sheath at first, becoming densely packed in a homogeneous gel with abundant hyphae and cells more rounded, 7–8 μ in diameter, each with its own sheath about 2 μ thick; hyphae 2–3 μ in diameter, filling most of the interstices between the algal cells and colonies.

Perithecia immersed or nearly so, 1–3 per areole, showing as minute dark brown to black points; subspherical, about 200–250 μ in diameter, ostiole small; wall dark brown, 15–20 μ thick, of polyhedral cells; asci 115 $\times$ 12–15 μ , thin-walled, 8-spored; ascospores imbricately monostichous, broad fusiform, 19–24 $\times$ 8–9 μ , with a thin halo while still in the ascus, 24 $\times$ 10–12 μ when free, bilocular, the upper cell larger, hyaline, slightly constricted at the septum.

STEINERA GLAUCELLA (Tuck.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:66. 1948.

Pannaria glaucella Tuck., Bull. Torrey Bot. Club 6:57. 1875.

Growing with *Placopsis bicolor* (Tuck.) B. de Lesd., on broken lava, north of Cape Laurens, A.N.A.R.E. 80. New to Heard Island.

STEINERA WERTHII Zahlbr., Deutsche Südpolar Exp. 8:43. 1906.

D. Alan Gilchrist 5 and unnumbered specimen.

LICHINA ANTARCTICA Crombie, Jour. Bot. Brit. For. 14:21. 1876.

On crystalline rock (sandstone?), A.N.A.R.E. New to Heard Island.

? SIPHULASTRUM CLADINOIDES Dodge, B.A.N.Z.A.R.E. Rept. B. 7:69. 1948.

We have doubtfully referred our material to this species. It forms compact hemispheric cushions up to 2.5 cm. in diameter. The habit resembles young dense tufts of *Sphaerophorus fragilis* Pers. from the Arctic and Subarctic but it is completely different in structure. The thalli are stiffer than in the type. Although the tips of the ultimate branches become very dark brown, we have been unable to find any reproductive structures. It may represent a new species.

North of Cape Laurens on broken lava, A.N.A.R.E. 78. New to Heard Island.

COLLEMOPSIDIUM pyrenuloides Dodge & Rudolph, n. sp.

Pl. 15, fig. 3.

Type: Heard Island, north of Cape Laurens, on humus in cave, A.N.A.R.E. 65.

Thallus gelifactus, flavidus, siccitate fragillimus, membrano-foliosus, semipellucidus, lobis irregularibus sinibus rotundatis, erectis, subrugosis; homoeomericus; algae Xanthocapsoideae, cellulis 5–6 μ diametro; hyphae sparsae, tenues.

Apothecia lecanorina immersa, 0.4–0.5 mm. diametro; amphithecium non bene evolutum; hypothecium ca. 25 μ crassitudine, hyphis periclinalibus intertextis; thecium 100 μ altitudine; paraphyses 3–4 μ diametro, pachydermeae; asci clavati, juventute apice incrassati; ascospores octonae, brunneae, late fusiformes, biloculares, septo constrictae, pachydermeae, 25–30 $\times$ 10–14 μ .

Thallus a yellowish gel, very fragile when dry, yellow, foliose-membranous, semipellucid, lobes very irregular with somewhat rounded sinuses, erect, subrugose; homoeomericous; algae Xanthocapsoid, cells mostly singly dispersed in the gel without evident sheath, 5–6 μ in diameter, occasionally in small subspherical colonies up to 40 μ in diameter with thin sheaths about each cell and a somewhat thicker sheath surrounding the colonies, best seen in the amphithecium; hyphae very slender, not abundant; some bacterial colonies imbedded in the gel as well as a few moss (?) fragments.

Apothecia lecanorine, immersed or nearly so, about 0.4–0.5 mm. in diameter; amphithecium not clearly differentiated, a zone of Xanthocapsoid colonies with more abundant subvertical hyphae; hypothecium about 25 μ thick, of interwoven periclinal hyphae; paraphyses 3–4 μ in diameter with thick walls, occasionally branched; thecium 100 μ tall; asci clavate, thickened at the tip when young, diffluent, 8-spored; ascospores brown, broad, fusiform, sometimes flattened on one side, bilocular, constricted at the septum, wall thick, protoplasts rounded, rarely 2 distinct protoplasts in each cell, resembling the spores of *Pyrenula*, 25–30 $\times$ 12–14 μ .

The thallus suggests the Pyrenopsidaceae, but the algal cells mostly occur singly without an evident sheath and the gel is much softer when moist so that we have been unable to secure good sections. It is possible that the fungus is a parasitic *Tichothecium*, but the mycelium below the hypothecium is continuous with that of the thallus and it lacks a parathecium. Although *C. pyrenuloides* is foliose, it seems more closely related to *Collemopsidium* than to any other genus of the Pyrenopsidaceae.

North of Cape Laurens, on humus in cave, *A.N.A.R.E.* 64, type, 67 sterile.

PANNARIA DICHROA (Hook. f. & Tayl.) Crombie, Jour. Linn. Soc. Bot. 16:220. 1876.

Lecanora dichroa Hook. f. & Tayl., London Jour. Bot. 3:643. 1844.

Probably owing to the very rough surface of the lava, the lobes are somewhat ascendant and imbricate. The thallus is darker, light brownish olive and not stained with iron. On another very dense rock without locality, nearly covered by *Blastenia keroplasta* Zahlbr., the thallus is quite typical.

D. Alan Gilchrist 3; north of Cape Laurens on broken lava, *A.N.A.R.E.* 74.

LECIDEA AUBERTI B. de Lesd., Ann. Crypt. Exot. 4:99. 1931.

D. Alan Gilchrist 8.

LECIDEA ASSENTIENS Nyl., in Crombie, Jour. Bot. Brit. For. 13:334. 1875.

North of Cape Laurens, on volcanic rock, *A.N.A.R.E.* 75. New to Heard Island.

LECIDEA SUBASSENTIENS Nyl., in Crombie, Jour. Bot. Brit. For. 14:21. 1876.

D. Alan Gilchrist 4.

RHIZOCARPON KERGUELENSE Dodge, B.A.N.Z.A.R.E. Rept. B. 7:116. 1948. Jacka Valley, on cliffs, *A.N.A.R.E.* 33.

RHIZOCARPON MAWSONI Dodge, B.A.N. Z.A.R.E. Rept. B. 7:115. 1948.

D. Alan Gilchrist 7. New to Heard Island.

RHIZOCARPON JOHNSTONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:118. 1948.

On moraine of Schmidt Glacier, *A.N.A.R.E.* 242. New to Heard Island.

CLADONIA PHYLLOPHORA (Tayl.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:132. 1948.

Cenomyce phyllophora Tayl. in Hook. f. & Tayl., London Jour. Bot. 3:652. 1844.

North of Cape Laurens, *A.N.A.R.E.* 70.

CLADONIA JOHNSTONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:135. 1948.

Some podetia are nearly clothed with coarse granules, rarely almost isidioid, thus somewhat resembling *C. pyxidata* (L.) Fr.

Among mosses on broken lava, north of Cape Laurens, *A.N.A.R.E.* 69. New to Heard Island.

ARGOPSIS CYMOSA (Crombie) Stzbgr., Ber. Thätigk. St. Gall. Naturw. Ges. 1889-90:231. 1891.

Stereocaulon cymosum Crombie, Jour. Linn. Soc. Bot. 15:182. 1876.

On broken lava, north of Cape Laurens, *A.N.A.R.E.* 71. New to Heard Island.

URECEOLINA KERGUELIENSIS Tuck., Bull. Torrey Bot. Club 6:58. 1875.

Jacka Valley, 600 ft., on cliff, *A.N.A.R.E.* 34. New to Heard Island.

ASPICILIA LYGOMMA (Nyl.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:164. 1948.

Lecidea lygomma Nyl. in Crombie, Jour. Bot. Brit. For. 13:334. 1875.

On boulders, 20 ft., West Bay, A.N.A.R.E. 743, growing with *Thelidium praevalescens* (Nyl.) Zahlbr. and *Kuttlingeria crozetica* (Zahlbr.) Dodge. New to Heard Island.

ASPICILIA DISJUNGUENDA (Nyl.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:167. 1948.

Lecanora disjuguenda Nyl. in Crombie, Jour. Bot. Brit. For. 15:105. 1877.

D. Alan Gilchrist 6, 7, 9.

ASPICILIOPSIS MACROPHTHALMA (Hook. f. & Tayl.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:175. 1948.

Urceolaria macrophthalma Hook. f. & Tayl., London Jour. Bot. 3:640. 1844.

D. Alan Gilchrist 10.

PLACOPSIS BICOLOR (Tuck.) B. de Lesd. Ann. Crypt. Exot. 4:100. 1931.

Placodium bicolor Tuck., Bull. Torrey Bot. Club 6:57. 1875.

The specimens are much paler than usual, probably from less iron in the rocks, and cephalodia are very rare.

North of Cape Laurens, on broken lava, A.N.A.R.E. 80, growing with *Steinera glaucella* (Tuck.) Dodge; on cliff, Jacka Valley, 600 ft., A.N.A.R.E. 31.

USNEA TAYLORI Hook. f., London Jour. Bot. 3:657. 1844.

Moraine of Baudessen Glacier, 800 ft., A.N.A.R.E. 250. New to Heard Island.

USNEA INSULARIS (Lamb) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:211. 1948.

Neuropogon insularis Lamb, Jour. Linn. Soc. Bot. 52:215. pl. 8, fig. 17. 1939.

Only a few plants, beginning to form cupulate apothecia.

Mt. Aubert de la Rüe, 300 ft., A.N.A.R.E. 4.

USNEA TRACHYCARPA (Stirton) Müll. Arg. Nuovo Giorn. Bot. Ital. 21:37. 1889.

Neuropogon trachycarpus Stirton, Scottish Nat. 6:105. 1881.

D. Alan Gilchrist 2. New to Heard Island.

BLASTENIA KEROPLASTA Zahlbr., Deutsche Südpolar Exp. 8:28. 1906.

Two specimens without locality, A.N.A.R.E. New to Heard Island.

KUTTLINGERIA CROZETICA (Zahlbr.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:226. 1948.

Caloplaca crozetica Zahlbr., Deutsche Südpolar Exp. 8:29. 1906.

Atlas Cove, on rocks above high water, A.N.A.R.E. 225; West Bay, 20 ft., A.N.A.R.E. 743; on cliff in Jacka Valley, 600 ft., A.N.A.R.E. 32; D. Alan Gilchrist 1. New to Heard Island.

BUELLIA SUBPLICATA (Nyl.) Müll. Arg., Bot. Jahrb. [Engler] 5:138. 1884.

Lecidea subplicata Nyl. in Crombie, Jour. Bot. Brit. For. 13:334. 1875.

On cliff, Jacka Valley, A.N.A.R.E. 33.

RINODINA ASPICILINA Zahlbr., Deutsche Südpolar Exp. 8:50. 1906.

Two small specimens without locality, A.N.A.R.E.

DEUTEROLICHENES (LICHENES IMPERFECTI)

Occasionally lichenologists have encountered conidial fructifications on lichen thalli, sometimes associated with apothecia, sometimes not. Müller-Argau (1881) described an otiform conidial structure which he named a campylidium. Vainio (1890) found the same structure on a thallus of *Lopadium perpallida* (Nyl.) Zahlbr. (*Lecidea perpallida* Nyl.) and referred it to *Cyphella aeruginascens* Karst. Spegazzini (1909) named it as a genus of lichenes imperfecti, *Chlorocyphella*, based on *C. subtropica* Speg. Keissler (1927) transferred *Cyphella aeruginascens* Karst. and described several new varieties. Mameli Calvino (1930) proposed the name Deuterolichenes to include *Chlorocyphella*, and Cengia Sambo (1937, 1941) and Rizzini (1952) have reported species of *Chlorocyphella* not associated with apothecia. Malme (1935) considered *C. aeruginascens* (Karst.) Keissl. to be a conidial stage of *Lopadium perpallidum* (Nyl.) Zahlbr., and Dodge (1953) described a campylidium as a conidial state of *L. Deightoni* Dodge. Campylidia have also been observed on *Sporopodium* sp.

Müller-Argau (1890) described another type of fructification, the orthidium, which resembles an apothecium except that the thecium is replaced by conidiophores, and the senior author has seen a similar fructification on a foliicolous thallus from Jamaica. Our material contains an orthidium-bearing lichen from Heard Island, resembling *Ephelis* Fr. of the Excipulaceae, which has unicellular spores, while those of our lichen become septate as do those of *Ephelis trinitensis* Cooke & Massee, the imperfect state of *Balansia trinitensis* Cooke & Massee on *Panicum palmifolium* in Trinidad, B.W.I.

EPHELIDIUM Dodge & Rudolph, n. gen.

Type: *Ephelidium heardense* Dodge & Rudolph.

Thallus crustosus, indeterminatus, sorediosus, ecorticatus, heteromericus; algae protococcoideae. Orthidium sessile, concavum, margine persistente; conidiophorae simplices; conidia singulatim disposita, terminalia, acicularia, septata.

Thallus crustose, indeterminate, sorediose, ecorticate, heteromericous; algae protococcoid. Orthidium sessile, concave with a persistent margin, resembling a lecanorine (or biatorine as the algae die above) apothecium; conidiophores unbranched; conidia single, terminal, acicular, long remaining unicellular but finally multiseptate.

EPHELIDIUM *heardense* Dodge & Rudolph, n. sp.

Pl. 15, fig. 1.

Type: Heard Island, Atlas cove at foot of *Poa* mound, A.N.A.R.E. 147.

Thallus crustosus, indeterminatus, 0.7–1.2 mm. crassitudine, citrinus, sorediosus; ecorticatus; stratum algarum ca. 280 μ crassitudine, cellulis protococcoideis, 8.7–12.2 μ diametro; medulla crassa, hyphis 1 μ diametro dense intertextis, nubilatis.

Orthidium sessile, basi constrictum, orbiculare, 0.6–1.5 mm. diametro, subochraceum, margine 250–280 μ crassitudine; conidiophorae tenues, unicellulares, 13–17 μ longitudine; conidia singulatim disposita, acicularia, hyalina, $30-44 \times 2 \mu$, primum unicellulares, dende ad 7-septata, recta aut subcurvata.

Thallus crustose, indeterminate, 0.7–1.2 mm. thick, buffy citrine, sorediose, K orange brown, C—; ecorticate; algal layer about 280 μ thick, cells protococcoid, spherical to somewhat polyhedral from mutual pressure, 8.7–12.2 μ in diameter; medulla thick, of closely woven hyphae about 1 μ in diameter, somewhat nubilated with granules and including pieces of roots etc. from the substrate.

Orthidium sessile, constricted at the base, circular, 0.6–1.5 mm. in diameter, ochraceous buff, disc very concave; margin 250–280 μ thick, finally undulate; algae in a discontinuous layer on the outside of the layer of conidiophores, tending to die out above and forming a continuous layer below; the medulla around and between the algal colonies is formed of compactly woven hyphae about 1 μ in diameter; conidiophores arising from the medullary hyphae, forming a continuous layer 13–17 μ thick; conidia borne singly, acicular, $30-44 \times 2 \mu$, hyaline, non-septate until late, finally up to 7-septate, straight or slightly curved, slightly tapering at the ends.

II. ADDITIONS TO THE LICHEN FLORA OF MACQUARIE ISLAND

Previous collections were reported by Dodge (1948). Most of the present collections are from the northern half of the island, collected mostly by Norman R. Laird and by N. M. Haysom of the A.N.A.R.E. Taylor (1954) has discussed the problem of distribution of the flowering plants which apparently have much wider ranges than the lichens. Twenty-seven species are reported from the present collection, three of which are new and three not previously reported bringing the total species of lichens to forty-four. Several other possible new species will be reported in a later number of these Lichenological Notes. In the following list *MI/49/* has been omitted from N. M. Haysom's numbers of collections.

MICROTHELIA MACQUARIENSIS Dodge, B.A.N.Z.A.R.E. Rept. B. 7:48. 1948. Plateau, 800 ft., between Mt. Elder and Sandy Bay, N. M. Haysom Z8.

COENOGONIUM SUBTORULOSUM Müll. Arg., Jour. Linn. Soc. Bot. 32:207. 1896.

Orange red when fresh, drying olive buff. The *Trentepohlia* filaments have very few corticating hyphae. From glacial moraine above Sandy Bay, 500 ft., N. M. Haysom Z2.

PSOROMA VERSICOLOR (Hook. f. & Tayl.) Müll. Arg., Flora 71:538. 1888.

Lecanora versicolor Hook. f. & Tayl., London Jour. Bot. 3:642. 1844, non Ach.

The squamules are less well developed than in previous collections but the apothecia agree microscopically.

Norman R. Laird 2, 2a, 2c; Featherbed Terrace, growing over decaying hepatics and other vegetable debris, A.N.A.R.E.

PSEUDOCYPHELLARIA GLABRA (Hook. f. & Tayl.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:79. 1948.

Stricta glabra Hook. f. & Tayl., London Jour. Bot. 3:647. 1844.

South end of Plateau, on moss, *N. M. Haysom Z114*; north end of Plateau, on soil and over decaying mosses, *Norman R. Laird*; Featherbed Terrace, *A.N.A.R.E.*; Wireless Hill, *N. M. Haysom Z1*; north of Lusitania Bay, *N. M. Haysom Z134*.

PELTIGERA Lairdi Dodge & Rudolph, n. sp.

Type: Macquarie Island, growing on soil over decaying grasses, mosses and hepatics, *Norman R. Laird 4*, *A.N.A.R.E.*

Thallus foliosus, in herbario isabellinus, ad 10 cm. diametro, 400 μ crassitudine, lobis sterilibus ca. 1.5 cm. latitudine, 2 cm. longitudine; tomentum crassum, verrucosum in partibus junioribus; superficies inferior arachnoideus inter venas; venae sparsae, elevatae, arachnoideo-tomentosae, rhizinis simplicibus vel semel dichotome ramosis, ca. 5 mm. longitudine, concoloribus; cortex ca. 90 μ crassitudine, pseudoparenchymaticus, cellulis 12–15 μ diametro leptodermeis; stratum algarum 50–55 μ crassitudine, cellulis nostocaceis, 5 μ diametro; medulla 270 μ crassitudine, hyphis periclinalibus pachydermeis, 4 μ diametro, parte superiore compacta, inferiore laxiore, hyphis ad 8 μ diametro, lumine 5 μ .

Apothecia in lobis erectis non revolutis, 15 mm. altitudine, 5–6 mm. latitudine, sita; discus nigro-brunneus, 4 mm. diametro; sine amphithecio nec parathecio, stratum algarum sub hypothecio crassiore, ad 120 μ crassitudine; hypothecium 30 μ crassitudine, brunneum, superne obscurius, pseudoparenchymaticum, hyphis periclinalibus; thecium 120–130 μ altitudine; paraphyses simplices, ca. 2 μ diametro; asci 100–105 $\times$ 11–12 μ , juventute apice incrassati; ascosporae octonae, hyalinae, aciculares, multiseptatae, ca. 56 $\times$ 3 μ .

Thallus foliose, becoming isabella color in the herbarium, up to 10 cm. in diameter, 400 μ thick, margin lobed, sterile lobes about 1.5 cm. wide and 2 cm. long, somewhat lacerate on drying, ends of lobes with thick, verrucose tomentum above, becoming smooth but surface dull in the older portions as the tomentum weathers away; underside pinkish buff, arachnoid between the sparse veins; veins elevated, arachnoid-tomentose; rhizinae not abundant, simple or once-dichotomous near the tips, about 5 mm. long, concolorous; cortex about 90 μ thick, pseudoparenchymatous, cells rather thin-walled, 12–15 μ in diameter; algal layer 50–55 μ thick, of *Nostoc* colonies, cells about 5 μ in diameter in an inconspicuous gel; medulla 270 μ thick, of closely packed periclinal hyphae, thick-walled, about 4 μ in diameter, less compact and more irregularly arranged below, forming the arachnoid underside with hyphae up to 8 μ in diameter, lumen 5 μ .

Apothecia on erect lobes, not revolute, 15 mm. tall, 5–6 mm. wide, disc very dark brown, 4 mm. in diameter; no amphithecium nor parathecium differentiated; algal layer thicker below the hypothecium, up to 120 μ thick; hypothecium 30 μ thick, lower half pale brown, upper half very dark brown, pseudoparenchymatous from periclinal hyphae; thecium 120–130 μ tall; paraphyses about 2 μ in diameter, unbranched, tips ending in the dark brown epithelial gel; asci 100–105 $\times$ 11–12 μ ,

tips slightly thickened when young, 8-spored; ascospores hyaline, acicular, $56 \times 3 \mu$, thin-walled, many septate.

This species somewhat resembles *Peltigera dilacerata* Gyelnik from Auckland, New Zealand, which has longer and narrower lobes with dilacerate margins and is about half as thick.

LECIDEA SUBGLOBULATA Knight, Trans. Proc. N. Zeal. Inst. 8:314. 1875 [1876].

South slopes of Wireless Hill, A.N.A.R.E. New to Macquarie Island.

CATILLARIA (EUCATILLARIA) Rudolphi Dodge, n. sp.

Type: Macquarie Island, without locality, but the rock types closely resemble those from the south slopes of Wireless Hill, A.N.A.R.E.

Thallus crustosus, albidus, continuus aut ad centrum areolatus crassior, margine irregulariter lobatus; cortex fastigiatus subdecompositus, erosus, ad 30μ crassitudine; stratum algarum 65μ crassitudine, cellulis protococcoideis $6-8 \mu$ diametro; medulla $250-300 \mu$ crassitudine, hyphis tenuibus, granulis brunneis nubilatis, dense contexta.

Apothecia subimmersa aut sessilia, ad 2.5 mm. diametro, orbicularia, aut mutua pressione angularia, margine elevato, disco plano aut subconvexo nigro; parathecium carbonaceum, in margine 50μ crassitudine ad $125-160 \mu$ sub thecio; hypothecium non bene evolutum; thecium $90-120 \mu$ altitudine; paraphyses tenues, septatae, super ascos ramosae, apicibus clavatis brunneis, ca. 1.5μ diametro; asci $50-60 \times 7-8.5 \mu$, cylindrico-clavati, leptodermei; ascosporae octonae, hyalinae, biloculares, uniseriales, ellipsoideae, $13-15 \times 6-7 \mu$.

Thallus whitish, sometimes stained ferruginous from iron in the underlying rock, thin, continuous at the margin, thicker toward the areolate center, K yellow then orange, margin irregularly lobate, distinct; cortex fastigiate, somewhat decomposed and eroded, up to about 30μ thick; algal layer 65μ thick, cells protococcoid, $6-8 \mu$ in diameter in a continuous dense layer; medulla $250-300 \mu$ thick, of densely woven slender hyphae, heavily nubilated with dark brown granules.

Apothecia slightly immersed to sessile, up to 2.5 mm. in diameter, abundant, circular or angular from mutual pressure, margins elevated, disc plane to slightly convex, black; parathecium carbonaceous, 50μ thick at the margin, $125-160 \mu$ thick below the thecium; hypothecium not clearly differentiated; thecium $90-120 \mu$ tall; paraphyses slender, septate, branched at the level of the tips of the asci, tips slender, clavate, brownish, about 1.5μ in diameter, asci $50-60 \times 7-8.5 \mu$, cylindric-clavate, thin-walled, 8-spored; ascospores hyaline, bilocular, mostly uniseriate, ellipsoidal, $13-15 \times 6-7 \mu$.

The germinating ascospore produces an extensive black hypothallus. As contact is made with algal cells, thin assimilative areoles develop and finally fuse, covering the hypothallus as a continuous thallus which gradually thickens with age.

Without locality but probably from south slopes of Wireless Hill, A.N.A.R.E., type; west side of Wireless Hill, N. M. Haysom Z152; south end of Plateau, N. M.

Haysom Z137; Plateau, 900 ft., young, A.N.A.R.E.; north end of Plateau, N. M. *Haysom* Z86; without locality, *Norman R. Laird* 8.

CLADIA AGGREGATA (Sw.) Nyl., Bull. Soc. Linn. Normand. II, 4:167. 1870.

Lichen aggregatus Sw., Nova Gen. Sp. Pl. Ind. Occ. 147. 1788.

West coast, fluviatile swamp, 50 ft., A.N.A.R.E.

CLADONIA FLORIFORMIS Dodge, B.A.N.Z.A.R.E. Rept. B. 7:134. 1948.

Wireless Hill, 300 ft., *Norman R. Laird* 1d; Nuggets Creek, *Norman R. Laird* 1a, 1b, young; without locality, *Norman R. Laird* 1; only a few young plants among mosses, A.N.A.R.E. 5c.

CLADONIA MAWSONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:128. 1948.

Nuggets Valley, 100 ft., A.N.A.R.E.; ? primary thallus only, mouth of cave, south end of isthmus, A.N.A.R.E.

CLADONIA SARMENTOSA (Tayl.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:129. 1948.

Cenomyce sarmentosa Tayl. in Hook. f. & Tayl., London Jour. Bot. 3:651. 1844.

Interior of cave, 35 ft., A.N.A.R.E.; near Brothert Point, 250 ft., A.N.A.R.E.; near Nuggets Creek, *Norman R. Laird* 1c, 1d, 2c; Lusitania Valley, east coast, 150 ft., A.N.A.R.E.

STEREOCAULON ARGODES Nyl., Compt. Rend. Acad. Sci. [Paris] 83:88. 1876.

Stereocaulon Argus Th. Fr., Nova Acta R. Soc. Sci. Upsal. III, 2¹:333. 1858; Hook. f. & Tayl., London Jour. Bot. 3:653. 1844, pro parte min.

For discussion of nomenclature, see Dodge (1948, pp. 142–144) sub *Argopsis megalospora*. In the present collection the dimensions of the ascospores are somewhat greater, 45–53 $\times$ 5.5–7 μ , than those given by Th. M. Fries and Nylander.

On coastal vegetation north of Lusitania Bay, N. M. *Haysom* Z128; Plateau, N. M. *Haysom* Z1.

STEREOCAULON PULVINARE Dodge, B.A.N.Z.A.R.E. Rept. B. 7:139. 1948.

Near Nuggets Creek, *Norman R. Laird*.

STEREOCAULON SUBMOLLESCENS Nyl., Compt. Rend. Acad. Sci. [Paris] 83:88. 1876.

Featherbed Terrace, A.N.A.R.E.; north end of Plateau, N. M. *Haysom* Z85.

PERTUSARIA TYLOPLACA Nyl. Compt. Rend. Acad. Sci. [Paris] 83:90. 1876.

South end of Plateau, N. M. *Haysom* Z122; Plateau, 900 ft., A.N.A.R.E.; north end of Plateau, N. M. *Haysom* Z59, Z62; growing over *Menegazzia circumsoarediata* Santesson on radio mast erected by A.A.E. in 1911 on Wireless Hill, A.N.A.R.E.

PLACOPSIS PERRUGOSA (Nyl.) Nyl., Lich. Nov. Zelandiae, 57. 1888.

Lecanora perrugosa Nyl., Flora 48:338. 1865.

For complete description, see I. M. Lamb, Lilloa 13:268–272. 1947.

On rocky banks of Lusitania Creek, N. M. *Haysom* 2123. New to Macquarie Island.

THAMNOLECANIA macquariensis Dodge & Rudolph, n. sp.

Type: Macquarie Island, Wireless Hill, on cliff subject to water seepage, A.N.A.R.E.

Thallus fruticosus erectus aut subdecumbens, pulvinos hemisphaericos ad 3 cm. diametro formans, di- aut tri-chotome ramosus, torulosus, cinnamomeo-alutaceus, inferne ad 0.8 mm. diametro, superne tenuior, ad 1 cm. altitudine; ecorticatus; algae flavo-virides, cellulis sphaericis vel mutua pressione polyhedricis, 8–11 μ diametro; hyphae medullares ca. 3 μ diametro, conglutinatae, inter cellulas algarum.

Apothecia ad 1 mm. diametro in lateribus ramorum sessilia, plana dein convexa emarginataque, ca. 250 μ altitudine, disco nigro; amphithecium 250 μ crassitudine; parathecium non bene distinctum, margine ad 40 μ crassitudine; hypothecium obconicum, ca. 190 μ altitudine, hyphis verticalibus nigro-brunneis; thecium 135 μ altitudine; paraphyses 2.5–3 μ diametro, septatae, cellula terminali clavata 4×5.5 μ , pachydermea nigro-brunnea; asci ca. 65×12 μ , clavati, juventute apice incrassati; ascospores octonae, subdistichae in ascis 16×8 μ , biloculares, brunneae, septo tenui constrictae, liberatae, 12×6 μ , nigro-brunneae.

Thallus fruticose, erect or subdecumbent, forming dense, depressed hemispheric cushions up to 3 cm. in diameter, branching di- or trichotomous, torulose, pinkish buff to cinnamon buff, up to 0.8 mm. in diameter below, more slender above, circular in cross-section, about 1 cm. tall; ecorticate; algae yellow-green, spherical or somewhat polyhedric from mutual pressure in the outer portion, 8–11 μ in diameter with a thick sheath of periclinal medullary hyphae, more scattered throughout the medulla; hyphae about 3 μ in diameter, compact and conglutinate between the algal cells.

Apothecia up to 1 mm. in diameter, sessile on the sides of the branches, not on the ultimate branches, flat at first becoming convex and emarginate, about 250 μ tall, disc black; amphithecium about 250 μ thick, similar in structure to that of the thallus but the medullary hyphae more vertical; parathecium not well differentiated, about 40 μ thick at the margin, scarcely differentiated from the paraphyses, continuous below with the dark brown obconic hypothecium about 190 μ tall at the center, of vertical dark brown hyphae, not sharply differentiated from the thecium above; thecium 135 μ tall; paraphyses 2.5–3 μ in diameter, septate, terminal cell broadly clavate, about 4×5.5 μ , thick-walled, dark brown above; asci about 65×12 μ , clavate, tips very thick when young, 8-spored; ascospores subdistichous, 16×8 μ , bilocular, brown, ellipsoid, slightly constricted at the thin septum, shrinking to 12×6 μ when free from the ascus and very dark brown.

The specimens have been cut from the underlying rock, but the cut ends suggest that the base may expand into a circular holdfast. The systematic position of this species is not clear. The bilocular brown spores with a thin septum, the paraphyses and lecanorine apothecium suggest *Rinodina* sect. *Beltraminia*; the very dark hypothecium suggests *Melanaspicilia* Vainio. From both of these it differs in

its fruticose thallus. The structures of the thallus and of the apothecia are wholly different from those of the fruticose species of *Anaptychia*, but do resemble those of *Thamnolecania* from which it differs in a very dark brown hypothecium and broader brown bilocular spores. Its yellowish green algae suggest a relationship to *Thelidea* Hue, which is foliose with biatorine apothecia and hyaline ascospores. It is not a parasite as the medullary hyphae are continuous with those at the base of the hypothecium and the amphithecium is well developed; hence it cannot be considered a *Karschia* sp. on a *Siphula*.

PARMELIA TURGIDULA Bitter, Hedwigia 40:246. 1901.

Featherbed Terrace, over mosses. A single sterile plant. New to Macquarie Island but previously known from New Zealand.

PARMELIA SUBLUGUBRIS Dodge, B.A.N.Z.A.R.E. Rept. B. 7:188. 1948.

Featherbed Terrace, A.N.A.R.E.; Norman R. Laird 3; north end of Plateau, N. M. Haysom Z61.

PARMELIA TENUIRIMA Hook. f. & Tayl., London Jour. Bot. 3:645. 1844.

Featherbed fluvial terrace on northwest slopes, growing over mosses, Norman R. Laird; from rock face, Half Moon Bay, west coast, A.N.A.R.E.

MENEGAZZIA CIRCUMSOREDIATA Santesson, Ark. f. Bot. 30:11:14. 1942.

Thallus 9 cm. in diameter. Wireless Hill, on radio mast erected by the A.A.E. in 1911, A.N.A.R.E.; coastal rocks north of Lusitania Bay, N. M. Haysom Z127.

USNEA ARIDA v. MUSCICOLA Dodge, B.A.N.Z.A.R.E. Rept. B. 7:207. 1948.

Wireless Hill, on planks of A.A.E. radio hut, N. M. Haysom Z53.

USNEA CONTEXTA Motyka, Lich. Gen. Usnea Stud. Monog. 2:436. 1937.

Featherbed Terrace, A.N.A.R.E.; north end of Plateau, N. M. Haysom Z83.

USNEA TORULOSA (Müll. Arg.) Zahlbr., Cat. Lich. Univ. 6:594. 1930.

Usnea dasypogoides f. *torulosa* Müll. Arg., Flora 66:19. 1883.

Our plants are only 3 cm. tall with shorter lower internodes. North of Lusitania Bay, N. M. Haysom Z130.

USNEA XANTHOPOGA Nyl., Compt. Rend. Acad. Sci. [Paris] 83:89. 1876.

Among mosses, Norman R. Laird 5a, 5b, 5c, 5d, 5e; Featherbed Terrace, very young, A.N.A.R.E.

RAMALINA GENICULATA Hook. f. & Tayl., London Jour. Bot. 3:665. 1844.

Turf from rock surface, west coast, 50 ft., A.N.A.R.E.; Featherbed Terrace, A.N.A.R.E.

GASPARRINIA MACQUARIENSIS Dodge, B.A.N.Z.A.R.E. Rept. B. 7:234. 1948.

One plant has much larger apothecia, up to 4 mm. in diameter, with flat discs and nearly excluded margins but agrees microscopically.

Hasselborough Bay, isthmus beach, Norman R. Laird 8a; beach of Garden Cove, N. M. Haysom Z11, Z223; Green Gorge, N. M. Haysom Z102.

BUELLIA MAWSONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:243. 1948.
South end of Plateau, N. M. Haysom Z137.

III. FLORA OF ADÉLIE LAND

A small collection was received from Cape Margerie, 66° 50' S., 141° 20' E., collected on November 4, 1950, the first specimens taken from Adélie Land. Since the collection is small and Adélie Land lies between King George V Land and Queen Mary Land, it is not surprising that all these species have been reported before.

UMBILICARIA HUNTERI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:148. 1948.

A.N.A.R.E. 4. Previously known from King George Land.

ALECTORIA CONGESTA (Zahlbr.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:195. 1948.

Parmelia pubescens v. *congesta* Zahlbr., Deutsche Südpolar Exp. 8:52. 1906.

A.N.A.R.E. 3. Previously known from King George V Land to MacRobertson Land.

USNEA ANTARCTICA DuRietz, Svensk Bot. Tidskr. 20:90, 93. 1926.

A.N.A.R.E. 6. Previously known from Marie Byrd Land to King George V Land.

USNEA PUSTULATA Dodge, B.A.N.Z.A.R.E. Rept. B. 7:203. 1948.

A.N.A.R.E. 5a. Previously known from King George V Land and Queen Mary Land.

USNEA SCABRIDULA (Lamb) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:204. 1948.

Neuropogon acromelanus v. *inactivus* f. *scabridulus* Lamb, Jour. Linn. Soc. Bot. 52:220. 1939.

A.N.A.R.E. 5. Previously known from South Victoria Land to King George V Land.

XANTHORIA MAWSONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:236. 1948.

A.N.A.R.E. 1. Previously known from King George V Land to MacRobertson Land.

RINODINA FRIGIDA (Darb.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:259. 1948.

Buellia frigida Darb., Brit. Nat. Antarct. "Discovery" Exp. Nat. Hist. 5:Lich.:7. 1910.

A.N.A.R.E. 3. Previously known from Marie Byrd Land to MacRobertson Land.

IV. ADDITIONS TO THE FLORA OF MACROBERTSON LAND

Previous collections from Cape Bruce were reported by Dodge (1948). The present collections are from the A.N.A.R.E. weather station at Mawson, about 67° S. and 50° E., collected by the Medical Officer, Dr. A. M. Gwynn. Fourteen species are represented, one new species, six others new to MacRobertson Land,

making twenty-four species so far known. The Verrucariaceae are still absent from collections.

HEPPIA ANTARCTICA Dodge, B.A.N.Z.A.R.E. Rept. B. 7:71. 1948.

Small sterile thalli along with several genera of Myxophyceae on a weathered crystalline rock with *Parmelia Johnstoni* Dodge, A. M. Gwynn Li23.

LECIDEA HARRISSONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:101. 1948.

On rock with *Alectoria congesta* (Zahlbr.) Dodge, A. M. Gwynn Li29.

UMBILICARIA SPONGIOSA v. SUBVIRGINIS (Frey & Lamb) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:148. 1948.

Umbilicaria antarctica v. *subvirginis* Frey & Lamb, Trans. Brit. Myc. Soc. 22:272. 1939.

Thallus about 7 cm. in diameter, upper surface pale smoke-gray or lighter, very minutely rimulose.

A. M. Gwynn Li30. New to MacRobertson Land.

UMBILICARIA SUBCEREBRIFORMIS Dodge, B.A.N.Z.A.R.E. Rept. B. 7:149. 1948.

A. M. Gwynn Li30. New to MacRobertson Land.

ACAROSPORA (PACHNOLEPIA) **Gwynni** Dodge & Rudolph, n. sp.

Pl. 15, fig. 2.

Type: MacRobertson Land, Mawson, on weathered reddish granite? A. M. Gwynn Li21.

Thallus cerebriformis subfruticulosus, juventute citrinus dein magis olivaceo-viridis, ad 3 mm. diametro, substipitatus, marginibus liberis, ca. 500 μ crassitudine, inferne alutaceus; cortex superne 20–25 μ inferne ad 30 μ crassitudine, fastigiatus, pseudoparenchymaticus, cellulis pachydermeis, luminibus 2.5 μ diametro, strato amorpho gelifacto 15 μ crassitudine tectus; algae protococcoideae, cellulis 13–14 μ diametro; medulla non distincte evoluta, hyphis 2 μ diametro.

Apothecia ca. 0.5 mm. diametro, orbicularia vel mutua pressione elliptica, immersa, disco obscuro; parathecium hyalinum, 15 μ crassitudine in lateribus thecii, subtus 25–30 μ crassitudine, hyphis periclinalibus; hypothecium 15 μ crassitudine, hyphis tenuibus grumosis dense contextum; thecium 230 μ altitudine; paraphyses cohaerentes, distinctae, pachydermeae, 2 μ diametro; asci 100 $\times$ 20 μ , juventute apice incrassati; ascosporae multae, ellipsoideae, ca. 3.5 $\times$ 1.8 μ (liberae non visae).

Spermogonia immersa, 200 μ diametro; perifulcrum hyalinum, 15 μ crassitudine, hyphis pachydermeis, periclinalibus conglutinatis; fulcrum in cavitate invaginans; spermatophorae 12–15 μ longitudine, subramosae (modo *Cladoniae*); spermatia hyalina, anguste ellipsoideae, 3 $\times$ 1 μ .

Thallus cerebriform, subfruticulose, lemon-yellow in younger portions to warbler green when the apothecia are well developed, covering areas up to 2 cm. in diameter, individual thalli up to 3 mm. in diameter, attached at the center, margins free, about 500 μ thick, upper surface smooth to deeply furrowed and cerebriform, under surface warm-buff, K—; cortex 20–25 μ above to 30 μ thick below, completely surrounding the thallus, fastigate, of thick-walled pseudo-

parenchyma, cell lumina $2.5\ \mu$ in diameter, densely nubilated with minute yellowish crystals, especially above, covered by an amorphous layer of gel about $15\ \mu$ thick, with scattered granules; algal layer filling the thallus between the cortices, cells protococcoid, $13\text{--}14\ \mu$ in diameter, often polyhedral from mutual pressure; medulla not differentiated, hyphae about $2\ \mu$ in diameter between the algal cells.

Apothecia very numerous in the central thalli, about 0.5 mm. in diameter, circular to somewhat elliptic from mutual pressure, immersed, disc greenish black; amphithecium not differentiated from the thallus, but often with a circular furrow about 0.2 mm. from the parathecium; parathecium hyaline, of periclinal hyphae about $15\ \mu$ thick at the sides of the thecium to $25\text{--}30\ \mu$ thick below; hypothecium about $15\ \mu$ thick, of grumose, densely woven, slender hyphae; thecium $230\ \mu$ tall, the upper $25\ \mu$ brownish and covered by a hyaline amorphous gel about $13\ \mu$ thick; paraphyses coherent, distinct, thick-walled, about $2\ \mu$ in diameter; asci about $100 \times 20\ \mu$, tips thickened when young; ascospores numerous, ellipsoid, about $3.5 \times 1.8\ \mu$ (not seen free from ascus).

Spermogonia immersed, about $200\ \mu$ in diameter, wall hyaline, $15\ \mu$ thick, of thick-walled, conglutinate, periclinal hyphae; layer of spermatophores invaginated, forming cerebriform cavities, spermatophores $12\text{--}15\ \mu$ long, somewhat branched (*Cladonia* type); spermatia hyaline, narrow ellipsoid, about $3 \times 1\ \mu$.

On weathered reddish granite, A. M. Gwynn Li21, Li27.

LECANORA GRISEOMARGINATA Dodge & Baker, Ann. Mo. Bot. Gard. 25:572. 1938.

Growing on moss cushion, A. M. Gwynn Li20. New to MacRobertson Land.

LECANORA EXSULANS (Th. Fr.) Dodge & Baker, Ann. Mo. Bot. Gard. 25:570. 1938.

Lecanora chrysouleuca v. *melanophthalma* f. *exsulans* Th. Fr., Nyt Mag. Naturvidensk. 40:208. 1902.

A. M. Gwynn Li21, Li24, Li38, Li31 (a single young plant not sectioned).

PARMELIA JOHNSTONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:191. 1948.

Growing over weathered rocks and mosses, A. M. Gwynn Li21, Li22, Li23, Li25, Li28, Li31.

ALECTORIA CONGESTA (Zahlbr.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:195. 1948.

Parmelia pubescens v. *congesta* Zahlbr., Deutsche Südpolar Exp. 8:52. 1906.

On rock, A. M. Gwynn Li29.

PROTOPLASTENIA CITRINA Dodge, B.A.N.Z.A.R.E. Rept. B. 7:222. 1948.

The color is more orange than in the type and all the material is sterile, although the thallus agrees microscopically.

Growing over moss cushions, A. M. Gwynn Li20, Li21, Li25.

GASPARRINIA HARRISSONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:235. 1948.

Thallus about 5 cm. long and 2 cm. wide, apparently starting near the edge of the rock fragment, so probably capable of forming a circular thallus about 5 cm. in diameter when the substrate permits. A. M. Gwynn Li26, Li31, a smaller thallus.

XANTHORIA MAWSONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:236. 1948.

A. M. Gwynn Li20, Li28, Li32.

BUELLIA JOHNSTONI Dodge, B.A.N.Z.A.R.E. Rept. B. 7:249. 1948.

A. M. Gwynn Li28, associated with *Lecanora exsulans* (Th. Fr.) Dodge & Baker, as in the type. New to MacRobertson Land.

RINODINA FRIGIDA (Darb.) Dodge, B.A.N.Z.A.R.E. Rept. B. 7:259. 1948.

Buellia frigida Darb., Brit. Nat. Antarct. "Discovery" Exp., Nat. Hist. 5:Lich.:7. 1910.

A. M. Gwynn Li21, with lecanorine apothecia nearly immersed; Li27, Li33, larger older thallus up to 6 cm. in diameter.

NOSTOC sp.

Several thalli growing on a moss cushion, akinetes abundant. A few young perithecia or cleistothecia were seen which may be parasites, or perhaps the thalli are those of a Pyrenidiaceous lichen. Very few fungus hyphae were seen in the gel between the algal filaments but in one or two places there is a faint suggestion of a cortex. Some thalli contained a few bacterial colonies. We hope it will be found again in a more mature condition, if it be a lichen.

A. M. Gwynn Li20, along with *Lecanora griseomarginata* Dodge & Baker and sterile *Protoblastenia citrina* Dodge.

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EXPLANATION OF PLATE

PLATE 15

- Fig. 1. *Ephelidium beardensis* Dodge & Rudolph.
A. Cross-section of thallus.
B. Cross-section of orthidium.
C. Conidiophores.
D. Conidiospores.
- Fig. 2. *Acrospora Gwynni* Dodge & Rudolph.
A. Cross-section of apothecium.
B. Cross-section of thallus showing spermogonium.
C. Ascus.
D. Spermatophores.
- Fig. 3. *Collemopsidium pyrenuloides* Dodge & Rudolph.
A. Ascospores.
B. Algal colonies.



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