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LICHENS.

BY

O. V. DARBISHIRE

(The University, Bristol).

WITH TEN FIGURES IN THE TEXT AND TWO PLATES.

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BOTANY.—PART III.

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CONTENTS.

I.—Introductory remarks .......................... 29
II.—List of the Species brought back by the present Expedition 32
III.—Descriptions of the New Species ............. 33
IV.—Complete List of Lichens found in the Antarctic Regions 45
V.—Key to the Genera known to have Representatives in the Antarctic 68
VI.—Key to the Species of any Genus known to have more than one Antarctic Species 69
VII.—Literature cited .................................. 73
VIII.—Index to Genera and Species enumerated in Complete List of Antarctic Lichen Species on pages 45-67 74

I.—INTRODUCTION.

The plant material collected by the British Antarctic ("Terra Nova") Expedition, 1910, did not yield many lichens, but I was glad of the opportunity of working through them. Actually seventeen species were brought back, and among these there were eight new species.

Since the last general summary on antarctic lichens in 1812 (Darbishire, 6, p. 61), the number of known antarctic lichens has risen from 107 to 208. This increase is mainly due to the material brought back by the Second French Antarctic Expedition of 1908-10, and reported upon by the late Abbé Huc.
The following is a complete record of the lichens brought back by the various Expeditions to the Antarctic region:

<table>
<thead>
<tr>
<th>Expedition</th>
<th>Author of Report</th>
<th>Total Species</th>
<th>New to Antarctic</th>
<th>New to Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ross's Antarctic Voyage, &quot;Erebus&quot; and &quot;Terror,&quot; 1839-1843</td>
<td>Hooker, 1843-1847</td>
<td>9</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Borchgrevink's Expedition, &quot;Southern Cross,&quot; 1898-1900</td>
<td>Th. Fries, 1902</td>
<td>4</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Gerlache de Gomery's Expedition, &quot;Belgica,&quot; 1897-1899</td>
<td>Blackman, 1902</td>
<td>4</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Bruce's Expedition, &quot;Scotia,&quot; 1902-1904</td>
<td>Wainio, 1903</td>
<td>55</td>
<td>51</td>
<td>29</td>
</tr>
<tr>
<td>Drygalski's Expedition, &quot;Gauss,&quot; 1901-1903</td>
<td>Darbishire, 1905</td>
<td>11</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td>Charcot's Expedition, &quot;Française,&quot; 1903-1905</td>
<td>Zahlbruckner, 1906</td>
<td>3</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Scott's Expedition, &quot;Discovery,&quot; 1901-1904</td>
<td>Hue, 1906</td>
<td>16</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Charcot's Expedition, &quot;Pourquoi pas?&quot; 1908-1910</td>
<td>Darbishire, 1912</td>
<td>47</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>Scott's Expedition, &quot;Terra Nova,&quot; 1910</td>
<td>Hue, 1915</td>
<td>112</td>
<td>93</td>
<td>89</td>
</tr>
<tr>
<td>Total ofantarctic lichen species</td>
<td>Darbishire, 1923</td>
<td>17</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Total: 208

In 1912, the Author (Darbishire, 6, p. 63) showed that nearly half, actually forty-six species, or 43 per cent., of theantarctic lichens were known from the arctic regions. As is pointed out by Miss A. L. Smith (20, p. 347), however, our views concerning the "antarctic" character of theantarctic lichen flora have been completely changed or at least much modified by the, already quoted, account of the lichens brought back by the Second French Expedition, under Charcot. In reporting on these M. Hue published a list of 112 species, of which eighty-nine represented new species, four in addition were not previously known from theantarctic, and the rest, nineteen, had already been recorded from theantarctic continent.

Making use of the totalantarctic lichens now known the following table has been drawn up, in order to show the number ofantarctic lichen species found also in the arctic regions:

<table>
<thead>
<tr>
<th>Fruticulose</th>
<th>Foliaceous</th>
<th>Crustaceous</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 or 44 per cent.</td>
<td>9 or 32 per cent.</td>
<td>28 or 18 per cent.</td>
<td>49 or 23 per cent.</td>
</tr>
</tbody>
</table>

Even thus these figures are remarkable. They are proof of the greater antiquity of the more highly developedfruticulose lichens.

It is, I think, of interest to show here the very similar composition of arctic and
antarctic lichen flora in regard to the proportion among the known species of the three chief lichen forms:—

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Arctic</td>
<td>61 = 12.3%</td>
<td>91 = 18.4%</td>
<td>343 = 69.3%</td>
<td>495</td>
</tr>
<tr>
<td>Antarctic</td>
<td>27 = 13%</td>
<td>28 = 13.4%</td>
<td>153 = 73.6%</td>
<td>208</td>
</tr>
</tbody>
</table>

That the Weddell Sea half of the antarctic continent shows so far a total of 189 lichen species, the Ross Sea half only thirty-five, these numbers including sixteen species common to both areas, only means that the latter has so far been inadequately searched for lichen material.

I would like here again to refer to the lichens collected by the Second French Antarctic Expedition of 1908–1910 under Charcot, the privilege of working through which fell to the late M. Hue. The discovery of so many new species was due mainly to the rocky substratum on which the lichens grew being collected, not in small fragments, but in bigger blocks. Thus more material was secured and better and more complete specimens. It is really essential that this plan should be followed by subsequent expeditions. In order to obtain some insight into the real character of the antarctic lichen there must be plenty of material for a thorough microscopic examination. With scanty material at hand this may mean spoiling a specimen for future reference.

M. Hue has, in the Report just referred to described on 202 pages of quarto size, altogether 126 species. Of these 14 came from South America, and of the remaining 112, as already mentioned, 89 are species new to science, discovered in the antarctic. The new species have been most carefully described, but the descriptions are not illustrated by figures, or photographs of the habits of the new species. A few drawings of spores are given. Despite the long and careful descriptions, it is therefore not easy properly to realise the various new species. Hue himself says concerning two new species that are very much alike, "... il suffit de voir leurs thalles pour les distinguer" (15, p. 165). Yet no illustration of the lichens in question accompanies the diagnoses. I have endeavoured by means of keys to facilitate the naming of any further material that may be brought over from the antarctic.

I may express a hope that future Expeditions will bring back good material in rather larger quantities than hitherto, and with a more careful preservation of the substratum. The material need only be dried first and then packed in paper and kept dry.

I would also suggest that as far as possible new species should be illustrated by photographs or drawings, and the latter coloured.

It is impossible as yet to give an accurate picture of the lichen vegetation of the antarctic owing to the incompleteness of the accounts brought back by the collectors. It is possible to gather, however, that lichens are found extensively over rocks and stones, as long as these are not permanently covered by ice or snow.

I wish to express my thanks to Professor S. H. Reynolds and Mr. H. W. Turner for kindly giving me their opinion as to the nature of the rocky substratum in the case of the lichens of this paper.
II.—LIST OF THE SPECIES BROUGHT BACK BY THE PRESENT EXPEDITION.

The species enumerated below are all from South Victoria Land. The two localities named are Cape Adare and Evans Cove. The latter is often additionally defined by the use of the name Cape Sustruzi:—

1. *Lecidea physciella* sp. nov.
   Cape Adare. On rocks (shale, grit).
2. *Gyrophora anthracina* (Wulf.) Koerb.
   Cape Adare; Evans Cove (Cape Sustruzi). On rocks (gneiss, shale, granite).
   Evans Cove. On rocks.
4. *Placodium murorum* (Hoffm.) D.C.
   Cape Adare. On rocks (acid and calcareous grit).
5. *Lecanora polytropa* (Ehrh.) Th. Fr.
   Cape Adare; Evans Cove (Cape Sustruzi). On rocks (granite, gneiss).
   Cape Adare; Evans Cove (Cape Sustruzi). On rocks (granite, gneiss).
   Cape Adare (?). On rocks.
   Cape Adare; Evans Cove (Cape Sustruzi). On rocks (gneiss, granite, schist, grit).
9. *Buellia adarensis* sp. nov.
   Cape Adare. On rocks.
10. *Buellia evanescens* sp. nov.
    Cape Adare; Evans Cove (Cape Sustruzi). On rocks (grit, granite, shale).
11. *Buellia flavoplana* sp. nov.
    Cape Adare; Evans Cove (Cape Sustruzi). On rocks (gneiss).
    Cape Adare; Evans Cove. On rocks (acid and calcareous grit).
13. *Buellia pycnogonoides* sp. nov.
    Cape Adare; Evans Cove (Cape Sustruzi). On rocks (granite).
14. *Buellia superba* sp. nov.
    Evans Cove (Cape Sustruzi). On rocks (granite).
15. *Buellia tristis* sp. nov.
    Evans Cove (Cape Sustruzi). On rocks (granite).
16. *Buellia variabilis* sp. nov.
    Evans Cove (Cape Sustruzi). On rocks (mica, schist).
   Cape Adare; Evans Cove (Cape Sustruzi).
III.—DESCRIPTIONS OF THE NEW SPECIES.

**Lecidea physciella sp. nov.** (Pl. I. fig. 1.)

Thallus crustaceus sed bene evolutus. Protothallus nigerius, ad 0·4 mm. latus et ad 0·1 et 0·13 mm. crassus, rarissimus teommissimis praecurrentibus instructus. gonidiis destitutus. Metathallus primo areola assimilantis constitutus 0·5 × 0·3 = 0·14 mm. magnis, quasi marginem effiguratum efficiens, et 0·12 mm. crassus, alliophilavescentibus vel alliophacastanis, dein plus minusque rimosus diffraetis; vix 0·5 ad 0·8 mm. latos, difformibus, sed ad 2 mm. crassos, cortex instructis indistincte. Apotheia areolis assimilantibus adnatus nigra, plana vel paucis convexa, rotundata, 0·5 mm. lata; epithecium et parathecium nigrum; hypothecium decolor; sporis octonae. unicellulares, hyalinae, 0·01 × 0·003 = 0·001 mm. magnae. Spermogonia non bene visa.

Habitat ad saxis antarctica. Cape Adare.

The protothallus or growing edge of this lichen is black in colour, and it may have a breadth of as much as 0·4 mm. It is generally fairly thick, being as much as 0·1 to 0·12 mm. in thickness. The black colour is due to the darkened tips of the hyphae of the cortex of the protothallus, which rise up obliquely in a direction towards the actual edge (fig. 1). The actual black layer is about 0·008 to 0·010 mm. deep. As a rule, the protothallus ends abruptly at its edge, but occasionally very thin pre-current hyphae grow out from the actual edge. These always form very thin layers. There are no gonidia under the dark cortex of the protothallus. The lichen-fungus exerts a very effective control over the expansion of the gonidial layer by means of this dark cortical covering. The lower cortex is soon well marked. It consists of ordinary and not coloured hyphae growing down towards the substratum and gradually forming a very firm and continuous layer. Even the protothallus may show shallow chinks here and there before it passes into the metathallus. At that point abruptly losing its dark cortex, it may be 0·2 mm. thick.

The metathallus at first consists of areoles of fairly large size, and of a whitish colour, with a very faint touch of yellowish brown. The areoles are continuous except for the chinks, though very occasionally there may be some black non-assimilating and, therefore, undeveloped and thin portions of the metathallus visible between the
coloured and taller assimilating areoles. The first areoles of the metathallus are on the average 0·5 mm. broad, and they may extend for a distance of 3-4 mm. in a direction away from the protothallus. They produce an effigurate appearance. They may appear also to be more or less convolute. The upper surface is flat, but the actual edges of the areoles are rounded off. By means of secondary chinks these primary areoles gradually break up into much smaller and yet quite distinct secondary assimilating areoles measuring about 0·5 to 0·8 mm. across. They are mostly placed very close together. They increase very much in thickness, and may be as much as 2 mm. high.

The structure of an assimilating areole is very simple. Old white primary cortex lies on the top of the new cortex. Its constituent hyphae become indistinguishable, and it therefore appears quite structureless. The hyphae of the still living cortex are also very difficult to make out. The course taken by them, indistinctly at right angles to the surface of the old cortex, can be determined only by numerous small yellow granules which limit the walls of these hyphae. The active cortex is very thin. Beneath it lie the very closely massed gonidia, which measure about 0·01 to 0·015 mm. in diameter. The medulla consists of loose hyphae, which at a distance of 0·08 to 0·1 mm. from the substratum begin to grow in a direction towards the substratum. Just above the latter they are closely applied to one another, but they are not really interwoven. They form a continuous layer. As a rule colourless, in one or two places I found them to be black at their tips. The hyphae are about 0·004 to 0·005 mm. in diameter; about the same size as the medullary hyphae.

The apothecia are borne on the ordinary assimilating areoles. They grow up clear of the gonidial layers which on several occasions, however, I have seen to extend below the colourless hypothecium. The apothecia are round in outline, and generally flat, though when moistened they will become slightly convex. They measure about 0·5 mm. across. No margin is visible. Epithecium and parathecium are black. The
hypothecium is hyaline. The spores are eight in number in each ascus, and are hyaline and one-celled. They measure 0·01 by 0·003 to 0·004 mm.

The spermogonia were found on the same areoles, and they appear to consist of a simple cavity. I have not, however, come across properly developed spermogonia.

The most striking feature of this species of Lecideae, is the more or less effigurate marginal portion of the thallus. It is of no great thickness, but it passes gradually into the metathallus, now mature, which is of much greater thickness.

**Buella adarensis sp. nov.** (Pl. I, fig. 2.)

Thallus crustaceus, bene evolutus, areolatus. Protothallus nigerrimus, margine instructus paulo distincto, quasi confervoideus. Metathallus areolis instructus albido-flavescentibus assimilantibus, et nigerrimis vix distinctis sterilibus aut nonum fertilibus, et fertilibus. Areolae assimilantes, ad 1 mm. latae et 0·24 mm. altae, convexae, granulose et rugosae, albido-flavescentes, rarius margine atro instructae ut in *Buella flavoplaena*, solitariae. Areolare nigerrimae; gonidiis destitutae, steriles, vel depuratae aut quasi rimosae; diffractae, vix 0·1-0·15 mm. latae, tenus assimilantes. Apothecia nigra, rotundata, ad 1 mm. lata; epitezium carbonaceum, convexum; paraperizium carbonaceum, minime elevatum et margine proprium efficiens; hypothecium fuscascens; spore octonae, nigrosfoescae, bimedullares et 0·01-0·014 x 0·006-0·006 mm. magnae, vel rarius unicellulares et 0·008 x 0·008 mm. magnae. Spermogonia nondum visi.

Habitat ad saxa antarctica. Cape Adare.

The protothallus of this lichen is black in colour, and it is at the actual margin broken up into numerous rather ill-defined strands, which make their way along the channels and crevices of the substratum. It is very thin.

The metathallus consists of yellowish assimilating areoles, black areoles bearing apothecia, and between both these the very thin black portion of the metathallus, which is in this species more extensive than usual.

The yellow assimilating areoles are each isolated and they are therefore fairly regularly roundish, and clearly convex even when dry. They reach a diameter of about 1 mm. and a height of about 0·25 mm. Their surface is coarsely granular. Their colour is yellow, but very faintly so. This is due partly to the coloured hyphae forming a very shallow cortical layer. But in any case, the yellow is diluted with whitish hyphae. The yellow areoles arise from the black protothallus, and in growing up the yellowish hyphae of the future yellow areole push aside and gradually replace the original black hyphae. In an early stage the young areoles may therefore have a black edge, just as in the mature yellow areoles of *Buella flavoplaena*. Older areoles very rarely show this black edge. The actual edge of the areole is slightly overhanging.

The black sterile portion between the assimilating and the fertile areoles is very thin, and it is made up of very minute areoles, barely 0·1 to 0·15 mm. in diameter. They hardly deserve the name of areoles, as they really only represent a slight puckering of the surface. The surface is, however, increased and shallow channels are formed which no doubt assist in the absorption of water. Chinking is noticeable here and there, especially near the margin of the protothallus. Here and there also the dead remains of old cortical cells are seen forming white flakes: but this is not general.
The apothecia are round and quite black, and about 1 mm. across. Their disk is slightly convex and raised to the height of the assimilating areoles. The fertile areole is narrowed at the base.

Epithecium and parathecium are carbonaceous, and the latter is raised sufficiently to show up as a proper margin. The hypothecium is brownish in colour. The spores are eight in number, and of a deep brown colour. They are normally two-celled and 0·01 to 0·014 by 0·006 to 0·008; one-celled spores which occur occasionally measure about 0·008 by 0·006 mm.

Spermogonia were not observed.

*Buellia adarensis* is well separated from other species by the solitary nature of the assimilating areoles, standing between the minute black sterile areoles.

**Buella evanescens** sp. nov.

Thallus crustaceus, areolatus. Prothallus minus evolutus, persistens, nigerrimus, coniferoideus, hyphis constans conglobatissimis assimilantisibus, gonidiis destitutus, vix visibilis. Metathallus areolis instruct us assimilantibus albocastaneis, et fertilibus nigris. Areolae assimilantes, albocastaneae, planae et 0·35 mm. latae, aut plius minusve convolutae et ad 1 mm. latae, et quasi papillosae et maxime ad 0·35 latae, seipius cortice vetustiori primo albisae. Apothecia nigra, valde convexa aut quasi sphaericae, ad 0·5-0·7 mm. lata aut rarius 1 mm. lata; epithecium carbonaceum; parathecium carbonaceum, primo margine proprium efficiens disco concavorum; hypothecium decolor v. rarius paulo fuscescens; sporae octonae, fuscae, biccillares, 0·013-0·015×0·008-0·009 mm. Spermogonia areolis assimilantibus immersa, simplicia, ostiolo instructa margine aterrimo circundato, toto 0·1 mm. alta, 0·06 mm. lata; spermata 0·002×0·00025 mm. magna.

Habitat ad saxa antarctica. Cape Adare; Cape Sustruzi.

The prothallus consists of very narrow and thin coniferoide strands, branching and anastomosing, black in colour and about 0·04 mm. across. They grow along the narrow channels and into the crevices of the rocky substratum, and they are uniformly narrow. It is not possible to cut sections of the prothallus, but after teasing out some material it was clear that it is devoid of gonidia, and that the medulla is of a lighter colour than the black cells of the cortex. The hyphae of the cortex consist of short stout cells, about 0·008 to 0·01 by about 0·006 mm. The other lighter cells are slightly longer, but otherwise of about the same thickness. The prothallus persists in this simple form among the mature areoles of the metathallus.

The metathallus consists of the light brown assimilating areoles, and the black apothecia, and, in between, the persistent prothallus.

The assimilating areoles are whitish in colour, or slightly and faintly brownish. They measure about 0·35 mm. across, though occasionally as much as 1 mm. Ordinarily the areoles are flat on the top and more or less polygonal in outline. In height they measure then about 0·35 mm. Occasionally they become convolute and even to a slight extent almost papillose. In that case they are taller than the ordinary flat areoles. As regards the structure of the areole, the cortex consists of light brown hyphae, and this is covered by the complete and generally continuous old primary cortex of the areole. This cortex is white and often flaky.
The apothecia are black and when mature, even when dry, are so convex, as to appear almost as small black spheres, about 0.5 to 0.7 mm. in diameter, though in some cases up to 1 mm. At first their disk is flatter, and the parathecium forms a faintly discernible proper margin. The apothecia arise in the assimilating areoles, but in the end they show nothing of the latter which they outgrow. Apparently they are free of these, but a section will show that they are still attached to them. They may rise to a height of about 1 mm. Epitheciun and paratheciun are quite black. The hypothecium is lighter in colour and sometimes more or less brown. The two-celled spores are brown, and measure 0.013 to 0.015 by 0.008 to 0.009 mm.

Spermogonia were fairly plentiful on the larger assimilating areoles and are embedded in the tissue of the latter. They appear as black spots on the areoles, about 0.08 mm. across. The spermogonia may occur three or four on one areole. The main cavity of the spermogonium is embedded in the tissue of the areole, and opens by a very narrow ostiole. This is surrounded by a carbonaceous lip projecting all round beyond the cortex of the areole, thus producing the black spot on the outside of the areole as just mentioned. The cavity is simple, but it is separated from the light tissue of the medulla by a very thin slightly darker layer of closely knit hyphae. Each
spermatium is straight and measures about 0·002 mm. in length and 0·00025 mm. in diameter.

The distinguishing characters of this species are the very thin and simple black protothallus, and the often solitary flat assimilating areoles, between which and the apothecia the black protothallus persists to such an extent as to give the whole lichen a greyish-black appearance on the stone, though the assimilating areoles are faintly brown in colour. The apothecia are almost like small black spheres when mature.

Buella flavoplana sp. nov. (Pl. I, fig. 3.)

Thallus crustaceus, sed bene evolutus et rimose diffusus. Protothallus nigerrimus, ad 1·5 mm. latus, margine distincto, superficiem rugosus. Metathallus arcolis instructus flavocitrinìs, assimilantibus, et nigerrimus sterilibus aut nondum fertilibus, et jam fertilibus. Areolae assimilantes 0·05 ad 0·5 mm. altae, flavocitrinae, et saepius margine atro instructae 1·5 ad 2 mm. latae, uniusim rugosae, irregulariter difformes. Areolae nigrae, steriles et non assimilantes, valde indistinctae, et vix rimosae, goniidis non instructae. Apothecia nigra, rotundata, saepius margine albidus instructa; epithecium carbonaceum, convexus; parietecium carbonaceum; hypothecium nigrofuscens; sporae octonae, bicellulares aut rariusine unim cellulares, fusescentes, 0·015-0·015 x 0·003-0·01 mm. Spermogonia non visa.

Habitat ad saxa antarctica. Cape Adare; Cape Sustruzi.

The thallus has a black protothallus which may measure up to 1·5 mm. in breadth. It is very distinct and ends in a fairly even margin, but has a slightly streaky and stranded upper surface.

The metathallus takes three forms—the bright yellow assimilating areoles, the black

Fig. 6.—Buella flavoplana sp. nov.—Vertical section of metathallus, showing on the right three small sterile and non-assimilating black areoles, followed by a black-edged assimilating areole, and an apothecium.—Magn. 75.

fertile areoles, and between these an undifferentiated or only slightly areolate sterile and non-assimilating thallus.

The bright yellow assimilating areoles are polygonal in outline, and rather angular. When dry they are quite flat on the top though they may be slightly rounded at the edges. When moist they are slightly convex. The actual surface is slightly rough. The areoles are pillars which may be up to 0·5 mm. in height and about 1·5 to 2 mm. across. Each yellow areole has its top edged by black. From a section (fig. 6) it is then seen that the pillar has grown up from the protothallus and has become more and
more yellow as it pushed aside the original hyphae of the black primary cortex. Occasionally the black edge of a pillar is further edged by some white hyphae, which represent the oldest cortical hyphae which are now replaced by the black ones. They show in several though not in the case of all yellow areoles.

Although fairly regular at first the yellow areoles soon become irregular owing to the formation of fissures or secondary chinks. These have no black edge to their flat tops; their sides are also not black. The gonidia are round, and measure about 0·008–0·01 mm. in diameter.

In between the yellow areoles are small black areoles which are almost indistinguishable as such. They may give rise to apothecia, and probably also spermogonia, though I did not see any of the latter. Their black cortex consists of hyphae forming a secondary cortex. The primary cortex is no longer present. They contain no gonidia.

The black edge to the flat assimilating areoles is the most characteristic vegetative feature of this species.

The apothecia occupy separate pillars and are in surface view quite black. When young they generally show a white edge of rather irregular appearance, produced by the apothecium not occupying the whole of the pillar or areole. The remaining portion of the areole is generally black, and then not noticeable, but occasionally it has some white hyphae showing. These are outside the black hyphae and represent a very early cortex and are dead. The apothecia are more or less roundish in outline and slightly convex, when dry. They become more convex when moistened. In diameter the apothecia do not exceed 1 mm. Epithecium and parathecium are black. The hypothecium is darkish brown in colour. No amphithecium is present. When a portion of an otherwise fertile pillar is not occupied by an apothecium, the sterile portion will gradually become separate from the fertile part, though the dividing chink may be very shallow. The thecium is about 0·080 mm. deep. The club-shaped asci are 0·05 to 0·06 mm. high, and about 0·024 mm. thick, and eight-spored. The spores are two-celled, dark brown and about 0·013–0·015 by 0·005–0·011 mm. Occasionally one-celled spores of about the same size are seen.

_Buellia frigida_ Darbish. (Pl. I, figs. 5, 6.)

A large amount of material of this species was collected, and I wish to add some further remarks to those made when first describing it (5, p. 7, pl. 1, fig. 4).

I use the term protothallus exclusively for the marginal portion of the thallus. This is often called the hypothallus. Hue uses the last word in that sense. In _Buellia frigida_ it is quite black. In all specimens I examined it was thick and almost overhanging at the actual margin. The word margin I use only for the actual edge. The protothallus soon becomes very thick and then shows very clearly a primary cortex, gonidial layer, medulla and hypothallus. By hypothallus I mean that portion of the protothallus which remains in contact with the substratum even at some distance from the actual margin. Soon the outer primary cortex, black in colour, is got rid of and
it then forms a white scaly and flaky layer on the outside. Below it the black secondary cortex is forming or has already formed. The protothallus has now gradually passed into the metathallus or more mature portion of the thallus: just as we speak of protoxylem and metaxylem.

In the metathallus we can distinguish primary cortex, secondary cortex, gonidial layer, medulla and hypothallus. The primary cortex consists of the now dead and discoloured old remains of the cortical cells of the protothallus. These old cells have become much flattened. The living cortical hyphae run at right angles to the surface of the thallus, both at the actual margin of the protothallus and in the metathallus. So the dead cells of the primary cortex are merely the dead apical cells of these hyphae. As can be seen from fig. 8, new hyphae grow up between the older hyphae so as to increase the outer surface of the cortex when the thallus grows up into the assimilating areoles. It is the scaling off of the white primary cortex when dead which gives the thallus its characteristic white flaky appearance as the protothallus passes into the metathallus.

I do not wish the words protothallus and metathallus absolutely to distinguish two parts of the crustaceous lichen thallus. The actual margin is definitely a portion of the protothallus. The mature areoles of the crustaceous lichen, whether fertile or assimilatory, form the metathallus. There are regions in between which are not easy to assign to either of these. The hypothallus is only the lower permanent part of the protothallus. Sometimes the protothallus is quite homoioemerous, and in that case a hypothallus can hardly be distinguished.
The epithecium of the apothecium is free of any white old cortical cells, though the latter often form a white spurious margin to the apothecium.

The black ostiole of the spermogonium is surrounded by black secondary cortical hyphae. The spermogonia are about 0.15 mm. high, and at the base about 0.3 mm. across. The ostiole is about 0.01 to 0.015 mm. in diameter. Gonidia occur in the tissues immediately surrounding the spermogonia.

It is important to mention that in this species the metathallus consists of one kind of areole only. All the areoles have gonidia. The apothecium is distinctly a buellian one, but occasionally a few gonidia help to make a kind of pseudo-amphithecium.

**Buella** pycnogonoides sp. nov (Pl. I, fig. 4.)

Thallus crustaceus, tenissimus, minime evolutus. Protothallus nigerrimus, lattissimus, valde confervoidus, hyphis constans praecurrentibus, anastomosantibus, goniidiis destitutus. Metathallus arcoli constans paucis, atracastaneis, 0.25 mm. latis, irregulariter disformibus. Apothecia nigra, ad 0.25 mm. lata; epithecium carbonaceum, convexum; paratheicum carbonaceum; hypothecium decolor; sporae octonae, bicellulares, fuscescentes, 0.012-0.014 X 0.008-0.01 mm. Spermogonia non visa.

Habitat ad saxa antarctica. Cape Adare; Cape Sustruzi.

This species has a very remarkable protothallus which consists almost entirely of black, much branched, thin confervoid outgrowths very closely attached to the substratum. The actual extent of the protothallus may be as much as 3 mm. Sections of the protothallus cannot be cut, but teasing out material after treatment with potash shows that gonidia are absent in the portions examined. The strands of the protothallus are made up of dark loosely connected hyphae consisting of short and broad cells. These are about 0.008-0.01 mm. long and about
0·004-0·0045 mm. broad, the cell-walls being about 0·001 mm. thick. The end-cells are rounded at the tips. The flat strands of the protothallus branch frequently and may anastomose. They grow out from a central point where there may be a sterile or fertile areole, and become narrower as they get further away from this point.

The metathallus appears to consist of small areoles about 0·25 mm. across, and very thin. They are dark olive brown in colour, and contain gonidia of the usual size, namely, about 0·01 mm. in diameter. These assimilating areoles are very few in number and can hardly be said to form a connected thallus.

The small black apothecia are convex and about 0·25 mm. across. They are frequently surrounded irregularly by some white cells of the old primary cortex. Epithecium and parathecium are carbonaceous, the hypothecium being light in colour. The spores, eight in each ascus, are brown, two-celled and 0·012 to 0·014 by 0·008 to 0·01 mm.

Spermogonia have not been observed.

This species is not unlike Buellia melanotrichia Darbish., but the spores of the latter measure 0·028 to 0·032 by 0·008 to 0·012 mm, and its hypothecium is also blackish.

**Buellia superba sp. nov.** (Pl. II, figs. 7, 8.)

Thallus crustaceus, sat bene evolutus, rimosae areolatus. Protothallus nigerrimus, ad 1 mm. latus, margine distinctn, saepius hyphis conglomeratis instructus praeurrentibus, superficiem rugosam. Metathallus areolis instructus valde citrinis assimilantibus, et nigerrimus vix distinctis sterilibus, aut nonundum fertilibus, et fertilibus. Areolae assimilantes, 0·5 mm. ad 1 mm. altae, valde citrinae, ad 1·5 mm. latae, convexeae, rugosae, irregulariter difformes. Areolae steriles, non assimilantes, nigrae vix distinguendae et vix rimosae diffusae, gonidias non instructae, partim cortex vetusiori albidae. Apothecia nigra, rotundata, saepius primo margine instructa albido, ad 0·4 mm. alta; epithecium carbonaceum et convexus; parathecium et hypothecium carbonaceum; spora octona, fuscescentes, bicellularae, rarius uniscellulares, 0·013-0·017 × 0·005-0·006 mm. Spermogonia non visa.

Habitat ad saxa antarctica. Cape Sustruzi.

There is a black protothallus about 1 mm. in breadth. The surface is slightly uneven but occasionally slightly convolute. The actual margin is irregular, but quite distinct, crenate, and long, narrow black strands are often pushed forward along the channels and depressions of the substratum. It is thin, not exceeding 0·05 mm. in thickness.

The metathallus is made up of bright yellow assimilating areoles, a very indistinct portion of the thallus which is sterile, and the fertile areoles which bear apothecia.

The bright yellow assimilating areoles are irregular in shape and well rounded off, and distinctly convex even when dry. They reach a height of about 0·5 mm. up to almost 1 mm., and are about 1·5 mm. across. Their surface is very rough and granular. Secondary chinks are very common. The round gonidia are about 0·006 to 0·008 mm. in diameter. The thallus between the yellow areoles is black and there is a faint indication of chinking. The black secondary cortex is very generally covered here and there with the torn white remains of the primary cortex, which gives this black portion of the metathallus an interruptedly white appearance. Numerous apothecia are formed
from this part and the apothecia are therefore, at first at any rate, edged by white
flakes of dead primary cortex. The disk is distinctly convex. Epithecium, parathecium
and hypothecium are all carbonaceous. The dark brown spores measure 0.013 to 0.017
by 0.005 to 0.008 mm. They are generally bicellular. Occasionally we meet with one-
celled spores which are slightly smaller, though judging by their colour they are already
mature.

Spermogonia have not been seen.

The absence of any distinct areolation of the sterile and non-assimilating portion
of the metathallus is an important character of this species, and also the occurrence
frequently of the white flakes of dead old primary cortex in connection with the
non-assimilating portion of the metathallus.

Buellia tristis sp. nov. (Pl. II, figs. 9–10).

Thallus crustaceus, bene evoluto, rimose areolatus. Protothallus nigerrimus, ad 2 mm. latus,
margine distincto instructus, saepius quasi conervoideus, superficiem rugosam. Metathallus areolis
instructus flavescentibus assimilantibus, et nigra fertilibus. Areolae assimilantes, ad 0.25 mm. altae,
flavescentes, ad 2 et 3 mm. latae, contigue, minime convexae, rugosae, valde irregulariter difformes,
rimose diffraetae. Apothecia nigra, rotundata, saepius marginie albido instructa, ad 1 mm. lata; disco
convexus; epithecium, parathecium et hypothecium nigrum. Sporae octonae, fuscescentes, bicellulares
0.010–0.014 × 0.005–0.007 mm. Spermogonia non visa.

Habitat ad saxa antarctica. Cape Sustruzi.

This species has a very distinct black protothallus extending to a depth of about
2 mm., with a clearly defined margin. The latter may be slightly crenate, with occasional
convervoid outgrowths into the uneven crevices of the substratum. The surface of the
protothallus is uneven with furrows extending in a direction at right angles to the edge.

In the metathallus we can distinguish the yellow assimilating areoles, the black
apothecia and occasionally very small black portions which have given rise to neither
assimilating nor fertile areoles. Practically the metathallus consists only of yellow
assimilating and black fertile areoles.

The bright yellow assimilating areoles grow up very close together and form a very
nearly continuous metathallus. They are of very varying shapes, which become still
more irregular on account of the numerous secondary fissures. All these latter close
up almost completely on the application of water. The longest continuous surface in
these areoles would lie between 2 and 3 mm. They are rather thin, not much more than
about 0.25 mm. in thickness, flat or slightly convex on the top, with a slightly uneven
surface; the edges are rounded. At the point where the protothallus gradually passes
into the metathallus we frequently find white flakes formed by the dead hyphae of
the primary cortex.

The black apothecia are up to 1 mm. in diameter and are frequently surrounded
by a white margin, representing the dead remains of the primary cortex of that portion
of the protothallus from which the particular fertile areole arose. The disk is slightly
convex. Epithecium, parathecium, and hypothecium are black. The spores are
brown, two-celled and about 0.01 to 0.014 by 0.003 to 0.007 mm. Spermogonia were not observed.

This lichen, at first sight appears not unlike *Rhizocarpon geographicum*. The continuity of the yellow areoles of the metathallus are a characteristic feature of this species.

**Buellia variabilis** sp. nov. (Pl. II, figs. 11–12).

Thallus crustacea, bene evolutus, rimose diffusus et areolatus. Protothallus primo nigerrimus, dein sordide albidus, ad 1 mm. lat. margine distincto instructus, superficie rugosis. Metathallus areolis instructus flavoцитринис, assimilantibus, at nigerrimus, sterilibus aut nondum fertilibus, et jam fertilibus. Areolae assimilantes ad 1–5 mm. altae, flavoцитринae, ad 3 mm. latae, rugose irregulariter diffomes, et convolutae. Areolae nigrae, steriles, et non assimilantes, valde distinctae, margine instructae albidae, valde rimose diffusae, vix 0.5 mm. altae et 0.5 mm. latae. Apothecia nigra, rotundata, sepium margine albidus instructae, ad 1–5 mm. latae; epithecium carbonaceum, valde convexum; paratheicum et hypothecium carbonaceum; spora octomae, fuscescentes, biecclullares, aut rarius unicellulares, 0.012–0.015 x 0.008–0.01 mm. magnae. Spermogonia non visa.

Habitat ad saxa Antarcticae. Cape Sustruzi.

This plant has a black protothallus extending to a distance of about 1 mm. The actual margin is black and thin but very distinct, though it occasionally shows long confluent praecurrent strands. This black margin soon passes into the white portion of the protothallus, when the primary cortex, now white and dead, is replaced by the secondary cortex made up of black hyphae. The surface of the protothallus is furrowed when dry, though it becomes more smooth when moistened.

The metathallus here, as in *Buellia flavoplana*, takes three forms: the bright yellow assimilating, then the very distinctly black, but white-edged sterile areoles, and finally the areoles which bear apothecia.

The yellow assimilating areoles are very irregular in outline, and gradually become more or less convolute, owing to secondary chinking. They are distinctly convex and their surface is roughly granular. They may measure up to 2 or even 3 mm. across, rising to a height of about 1 or even 1.5 mm. They are not really continuous, but groups here and there are very close together, and actually touch when moistened though there may be gaps up to 0.1 mm. when dry. These gaps disappear almost entirely when the thallus is moistened. Between the large yellow areoles are very much smaller black sterile areoles, about 0.5 mm. across and about 0.5 mm. in height. Each such areole has a distinct white edge representing the now dead primary cortex before it was replaced by the black hyphae of the secondary cortex of the young areole growing up. These black sterile areoles do not contain gonidia. When moistened they fit very closely together, the white margin assuming a darker and slightly brown colour. The small black areoles may give rise to apothecia, or even possibly to spermogonia, though the latter have not actually been observed. Most apparently, however, remain sterile. Gonidia are generally absent, but in one case they were discovered in small numbers. These areoles undoubtedly absorb water very rapidly and may thus fulfil an important function.
The apothecia are black with a markedly convex disk. They have generally a white margin formed by the hyphae, now dead, of the primary cortex. The apothecia reach to about the same height as the yellow areoles. They are round and measure about 1.5 mm. across. Epithecium, parathecium and hypothecium are black and carbonaceous. The spores are brown and 0.012–0.015 by 0.008–0.01 mm. in size. They are generally two-celled, but one-celled spores are found occasionally.

The sterile black, and very distinctly white-edged areoles form a very characteristic feature of this species.

IV.—COMPLETE LIST OF LICHENS FOUND IN THE ANTARCTIC REGIONS.

This is a complete list of all lichens hitherto recorded in published papers from localities to the south of the 60° S. parallel. This represents the true antarctic region in the sense of Skottsberg (19, p. 407). Rudmose Brown (2, p. 477), myself (6, p. 56), and others.

As regards the localities of the Weddell area, taking this word in the broadest sense, I can say that I have here followed the general nomenclature used by Nordenskjöld (16, Vide map at end of vol. 1).

In the following list the species brought back by the present Expedition are marked with an asterisk. New localities are similarly marked. The first reference after each name indicates where a good description can be found of the particular genus or species. Other references are mainly of antarctic interest.

CONIOCARPI.


Graham Land (Cape Tuxen). On rocks between moss.
Distribution.—Practically cosmopolitan.

DISCOCARPI.

LECIDEALES.


Danco Land (Wiencke Island). On rocks.
Distribution.—Europe, Asia and South America.

South Victoria Land (Granite Harbour); South Shetland Islands (Nelson Island). On rocks (felspar porphyry).

Distribution.—Arctic regions; northern and Alpine Europe.


Danco Land (Brabant Island). On rocks.

5. **Lecidea cinericia** Hue.  Charc. II, no. 77.

Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).

6. **Lecidea cremoricolor** Hue.  Charc. II, no. 79.

Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).

7. **Lecidea eburnea** Hue.  Charc. II, no. 78.

Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).


South Orkney Islands. On rocks.

Distribution.—Arctic regions.

9. **Lecidea physciella** sp. nov.—See p. 33, fig. 1, 2, pl. I, fig. 1.

*South Victoria Land (Cape Adare). On rocks (shale, grit).

10. **Lecidea rufonigerrima** Hue.  Charc. II, no. 80.

Graham Land (Petermann Island). On rocks.


Danco Land (Brabant Island). On rocks.

12. **Lecidea sciatrapha** Hue.  Charc. II, no. 76.

Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).


Danco Land (Brabant Island). On rocks.

**Biatora** Fr.—A. Zahlbr. Lich. p. 132.

14. **Biatora acervuligera** (Hue, Charc. II, no. 73, sub Lecidea).

Graham Land (Petermann Island). On rocks (diorite).
  Louis Philippe Land (Paulet Island). On rocks.

16. Blataora monocarpa (Hue, Charc. II, no. 74, sub Lecidea).
  Graham Land (Wandel Island). On rocks (diorite).

17. Blataora pociloderma (Hue, Charc. II, no. 72, sub Lecidea).
  Graham Land (Petermann Island). On rocks (diorite).

18. Blataora theiochroa (Hue, Charc. II, no. 71, sub Lecidea).
  Graham Land (Petermann Island). On rocks.


  Louis Philippe Land (Hope Harbour). On rocks.

20. Bacidia rhodochoira (Hue, Charc. II, no. 75, sub Lecidea).
  Graham Land (Cap des Trois-Perez). On rocks (granite).


  South Shetland Islands (Nelson Island); Louis Philippe Land (Hope Harbour).
  On rocks.
  Distribution.—Northern Africa and America; New Zealand; Europe.


  Lecidea (Rhizocarpon) radioatrum Floerk. var. Gerlachei Wain. Belg. p. 32.
  Danco Land (Cape van Beneden). On rocks.
  Distribution.—Europe; Asia; North America.

  Lecidea (Rhizocarpon) atroalbicans (for atroalbicans) Nyl., Wain. Belg. p. 32.
  Danco Land (Brabant Island). On rocks.
  Distribution.—Northern and Eastern Asia; Europe.


24. Rhizocarpon argyreum (Hue, Charc. II, no. 114, sub Lecidea).
  Fallières Land (small island in Marguerite Bay). On rocks (diorite).


Danco Land (Cape van Beneden); Louis Philippe Land (James Ross Island, northern coast). On rocks.

Distribution.—Arctic America and Asia; Eastern Africa; Europe; New Zealand.


*Lecidea (Rhizocarpon) geographica* Fr., and *f. gerontica* Wain. Belg. p. 31; Hue, Chare. I. no. 16; Hue, Chare. II. no. 111; Blackman, "Southern Cross." p. 320.

South Orkneys; Graham Land (Petermann and Wandel Islands); Danco Land (Wienecke, Goudier and Brabant Islands); South Victoria Land (Granite Harbour).

On rocks (diortite, granite).

Distribution.—Cosmopolitan arctic and alpine.


*Lecidea (Rhizocarpon) grandis* (Floerk.) Wain. Belg. p. 32 (and *f. atrocaesia* Wain.).

Danco Land (Brabant Island). On rocks.

Distribution.—Cosmopolitan.

28. Rhizocarpon griseolum (Hue, Chare. II, no. 115, sub Lecidea).

Graham Land (Wandel Island). On rocks (diortite).

29. Rhizocarpon melanostictum (Hue, Chare. II, no. 112, sub Lecidea).

Fallièreses Land (small island in Marguerite Bay). On rocks (diortite).

30. Rhizocarpon nidificum (Hue, Chare. II, no. 113, sub Lecidea).

Graham Land (Wandel Island). On rocks (diortite).

31. Rhizocarpon parapetraeum (Nyl.) (Hue, Chare. I. no. 15, sub Lecidea).

*Lecidea (Rhizocarpon) granitis* (Floerk.) Wain. var. parapetraea (Nyl.) Wain. Belg. p. 32.

Danco Land (Wienecke and Brabant Islands). On rocks.

Distribution.—Cosmopolitan.


32. Psorora placodiformis (Hue, Chare. II. no. 68, sub Lecidea).

Danco Land (Goudier Island near Wienecke Island); Fallières Land (small island in Marguerite Bay). On rocks.
LICHENS—DARLISHIRE.

**GYROPHORA** Ach.—A. Zahlbr. Lich. p. 147.


_Umbilicaria leucosperma_ D.C., Wain. Belg. p. 9 (also var. _umbra_ Wain.).

Danco Land (Brabant Island): Louis Philippe Land (Paulet, Cockburn and Snow Hill Islands, off James Ross Island); South Victoria Land (Mt. Erebus and Terror; *Capes Adare and *Sustruzi (Evans Cove)). On rocks (basic scoriaceous lava, gneiss, granite, shale).

Distribution.—Arctic and alpine Europe and America.


Danco Land (Brabant Island): South Victoria Land (Granite Harbour). On rocks.

Distribution.—Arctic and alpine Europe and North America; mountains in Africa and Australia.


_Cchargotia rufidula_ Hue, Chare. II. no. 12 (sec. Hue, Chare. II. no. 39 (est _chargotia rufidula_ Hue, quod vide infra).

Danco Land (Brabant Island, Cape Flora, Islands of Moreno and of Cavalier de Cuverville); Louis Philippe Land (Paulet Island): South Victoria Land (Granite Harbour). On rocks.


South Orkneys; *South Victoria Land (Evans Cove). On rocks.

**UMBILICARIA** Hoffm.—A. Zahlbr. Lich. p. 149.

37. **UMBILICARIA EXIMIA** Hue. Chare. II. no. 40.

Failières Land (Jenny Island in Marguerite Bay); Graham Land (Wandel Island). On rocks (diorite).

38. **UMBILICARIA PARVULA** Hue. Chare. II. no. 41.

Failières Land (small island in Marguerite Bay). On rocks (diorite).

**CHARCOTIA** Hue.—Hue, Trib. Umbilic. p. 17.


_Umbilicaria rufidula_ Hue, Chare. II. no. 39.


Graham Land (Petermann and Wandel Islands). On rocks (diorite).

40. STEREOCAULON ANтарCTICUM Wain. Belg. p. 16, Tab. 2, fig. 7; Hue, Chare. I, no. 4; Hue, Chare. II, no. 15.

Graham Land (Cape Tuxen); Danco Land (Brabant Island). On rocks and over earth.


STEREOCAULON tomentosum Fr. subsp. magellanicum Th. Fr. Stereoc. p. 55.

Danco Land (Moss Island in Gerlache Channel). On rocks.

Distribution.—South America.

42. STEREOCAULON Pygmaeum Wain. Belg. p. 15 (Tab. 2, fig. 9); Hue, Chare. II, no. 16; Darbish. Swed. Aut. p. 24.

South Shetland Islands (Nelson Island); Louis Philippe Land (Astrolabe Island, Paulet Island); Graham Land (Wandel Island); Danco Land (Cape Anna Osterrieth). On rocks.


Graham Land (Hovgaard and Wandel Islands, Cape Tuxen, Cape Renard); Danco Land (Moss Island in Gerlache Channel). Over rocks among moss.

Distribution.—South Orkneys (Scotia Bay); Graham Land (Cape Rasmussen). On rocks.

Distribution.—North Europe; North and alpine Asia; Africa; Arctic and Southern America; Australia; New Zealand.


South Orkneys (Scotia Bay); Graham Land (Wandel and Petermann Islands). Over earth and rocks, and among moss.

Distribution.—Cosmopolitan.


Graham Land (Cape Tuxen). On rocks.

Distribution.—Cosmopolitan.

Danco Land (Brabant and Moss Islands in Gerlache Channel, Cape Renard). Over earth and moss.

Distribution.—Cosmopolitan.


Danco Land (Moss Island, Capes Renard and Flora); Louis Philippe Land (Paulet Island). Over earth and moss.

Distribution.—Cosmopolitan.


Danco Land (Moss Island). Over earth and moss.

Distribution.—Cosmopolitan.


Graham Land (Cape Tuxen). Over earth and moss.

Distribution.—Cosmopolitan.


Graham Land (Cape Tuxen). Over earth and moss.

Distribution.—Europe; America; Australia.


Danco Land (Moss Island). Over earth and moss.

Distribution.—Cosmopolitan.

PARMELIALES.


South Shetland Islands (Deception Island). On rocks.


Graham Land (Petermann Island); Danco Land (Moss Island). Over moss and earth and on rocks.

Distribution.—Asia; America; Europe.

Louis Philippe Land (Cockburn Island). On rocks.
Distribution.—Cosmopolitan.

Note: From the descriptions of this and the following species by Wainio, I believe that these two sterile species really belong to the genus Variolaria Ach. Darbish. Pertus. p. 619.
Danco Island (Brabant Island). On rocks.

See note under previous species.
Danco Land (Wiencke Island). On rocks.


Physcia parietina var. lychnea, f. antarctica Hue, Charc. II, no. 28.
South Victoria Land (Granite Harbour); South Orkneys (Scotia Bay); Graham Land (Wandel Island); Danco Land (Capes van Beneden and Flora; Moss Island; Goudier Island); Louis Philippe Land (Hope Harbour; Paulet Island). On rocks (basic volcanic tuff, diorite).
Distribution.—Asia; Europe; North and South America.


59. Placodium cirrochroides Wain. Belg. p. 24, Tab. 1, fig. 3.
Danco Land (Cape Anna Osterrieth). On rocks.

Lecanora elegans Ach. var. Gainii Hue, Charc. II, no. 49.
Caloplaca elegans (Link) Th. Fr. f. furcata (Bab.). Th. Fr. Ant. p. 208.
South Orkneys (Scotia Bay); Fallieres Land (small island in Marguerite Bay); Graham Land (Petersmann Island, Cape Tuxen); Danco Land (Goudier and Wandel Islands); Louis Philippe Land (Hope Harbour, Paulet, James Ross and Snow Hill Islands); Kaiser Wilhelm II Land (Mount Gauss); Geikie Land; South Victoria Land (Granite Harbour). On rocks (felspar porphyry).
61. **Placodium inordinatum** (Hue, Chare. II, no. 52, sub *Lecanora*).
   South Shetland Islands (Deception Island). On rocks (tuff).

62. **Placodium johnnae** (Hue, Chare. II, no. 50, sub *Lecanora*).
   Graham Land (Wandel Island). On rocks (diorite).

   Danco Land (Augustus Island and Cape Osterrieth); Kaiser Wilhelm II Land (Mount Gauss). On rocks.
   Distribution.—Kerguelen and Cape Horn.

   Louis Philippe Land (Paulet and Cockburn Islands, Cape Lagrelius on James Ross Island). On rocks.
   Distribution.—America, Europe, New Zealand.

   South Victoria Land (Granite Harbour, Observation Hill and Cape Royds on Ross Island, Cape Adare); Louis Philippe Land (Cockburn Island); Danco Land (Cape Anna Osterrieth); South Shetland Islands (Nelson Island). On rocks (acid and calcareous grit, felspar porphyry, lava).
   Distribution.—Cosmopolitan.

66. **Placodium sublobulatum** Nyl.
   *Lecanora (Placodium) sublobulata* Nyl. Hue, Chare. II, no. 51.
   South Shetland Islands (Deception Island). On rocks (tuff, basalt).
   Distribution.—Southern America.

**Polycauliona** Hue.—Chare. I, p. 8.

   Graham Land (Wandel Island). On rocks.

   Graham Land (Wandel Island). On rocks.

69. **Polycauliona lectuosa** Hue. Chare. II, no. 22.
   Danco Land (Port Lockroy on Goudier Island near Wiencke Island). On rocks (diorite).
70. **Polycaulonia regalis** (Wain.) Hue. Chare. I, no. 7; II, no. 21, & n. 55, Notula; Darbish. Nat. Ant. I, p. 4.


*Placodium fruticulosum* Darbish. S. Ork. p. 3, pl. III.

South Orkneys (Scotia Bay); South Shetland Islands (Nelson and Deception Islands); Graham Land (Wandel Island); Danco Land (Augustus Island; Cape van Beneden); South Victoria Land (Cape Royds on Ross Island). On rocks (lava, tuff, basalt).


71. **Blastenia cerussata** (Hue, Chare. II, no. 69, sub Leccidea).

Danco Land (Goudier Island near Wiencke Island). On rocks.

72. **Blastenia coralligera** (Hue, Chare. II, no. 70, sub Leccidea).

Graham Land (Wandel Island). On rocks (diorite).


Louis Philippe Land (Paulet Island). Over earth and moss.

**Distribution.**—Arctic America; Northern and alpine Europe.


Louis Philippe Land (Paulet Island). On old moss.


Louis Philippe Land (Paulet and Snow Hill Islands). On rocks.

**Distribution.**—Practically cosmopolitan.

76. **Caloplaca cinericola** (Hue, Chare. II, no. 53, sub Lecanora).

South Shetland Islands (Deception Island). On rocks (ash).


South Victoria Land (Cape Royds on Ross Island). On rocks (lava).

**Distribution.**—Almost cosmopolitan.

**Note.**—The reference in Darbish. Swed. Ant. p. 58, to the presence of this species in Graham Land seems to be based on an error as I have not been able to verify it.

  Lecanora (Placodium) chrysoleuca (Sm.) Ach. var. melanophthalma (D.C.) Th. Fr. Ant. p. 208.

South Victoria Land (Granite Harbour); Geikie Land; Louis Philippe Land (Cape Lagrelius on James Ross Island; Cockburn Island). On rocks (dark basic tuff).

Distribution.—Arctic and alpine in America, Europe, Asia and Africa.


  Graham Land (Petermann Island). On rocks.

80. ASPICILIA ERYTHRODA Hue. Chare. II, no. 117.
  Fallières Land (small island in Marguerite Bay); Graham Land (Wandel and Petermann Islands); Danco Land (Port Lockroy on Goudier Island near Wiencke Island). On rocks (diorite).


81. LECANORA ALUTACEA Hue. Chare. II, no. 60.
  Graham Land (Petermann Island). On rocks (diorite).

  Fallières Land (Jenny Island and other small island in Marguerite Bay); Graham Land (Petermann and Wandel Islands); Danco Land (Port Lockroy on Goudier Island, and Wiencke Island). On rocks (diorite).

  Danco Land (Brabant Island). On rocks.
  Distribution.—Cosmopolitan.

  Louis Philippe Land (Cockburn Island). On rocks probably.
  Note.—This species has not been properly identified.

  South Shetland Islands (Nelson Island). On rocks.
  Distribution.—Northern and tropical America; Northern Asia; Europe.
86. Lecanora Charcotiana Hue. Chare. II. no. 61.
   Graham Land (Petersmann Island). On rocks.

87. Lecanora Dancoënsis Wain. Belg. p. 20 (with f. normalis Wain. and f. prolifera Wain.).
   Danco Land (Cape Anna Osterrieth in Wilhelmina Bay). On rocks.

   South Victoria Land (Winter Quarters Harbour, near Cape Armitage, Ross Island).
   Over earth and moss.
   Distribution.—Arctic America; Asia; Europe.

   South Victoria Land (Winter Harbour, near Cape Armitage, Ross Island). Over moss on earth.

   Graham Land (Wandel Island). On rocks (diorite).

   Graham Land (Wandel Island). On rocks.

   South Victoria Land (Winterquarters near Cape Armitage, Ross Island). On rocks (basic tuff).

   Graham Land (Wandel Island). On rocks (diorite).

   Fallières Land (Jenny Island in Marguerite Bay). On rocks (diorite).

95. Lecanora miranda Hue. Chare. II, no. 54.
   Fallières Land (small island in Marguerite Bay); Graham Land (Wandel Island).
   On rocks (diorite).

   Louis Philippe Land (Seymour and Snow Hill Islands). On rocks.

   Danco Land (Augustus Island). On rocks.

Danco Land (Wienecke Island). On rocks.


South Victoria Land (Granite Harbour; Observation Hill on Cape Armitage, Ross Island; *Cape Adare, Cape Sustruzi*); Danco Land (Capes van Beneden and Flora); Louis Philippe Land (Hope Harbour and Paulet Island). On rocks (granite, gneiss, tuff, volcanic ash).

Distribution.—Cosmopolitan.


Distribution.—Cosmopolitan.


South Shetland Islands (Deception Island). On rocks.

**LECANIA** Mass.—A. Zahlbr. Lich. p. 204.

102. *Lecania Brialmontii* (Wain. Belg. p. 17, pl. II, fig. 11-12, sub *Lecanora*).

Danco Land (Bob Island). On rocks.

103. *Lecania cariosa* (Hue) Darbish.

*Lecanora cariosa*, Hue, Chare. II, no. 55.

South Shetland Islands (Deception Island). On rocks (tuff, basalt).

104. *Lecania Gerlachei* (Wain. Belg. p. 17, pl. II, fig. 13-14, sub *Lecanora*).

Danco Land (Augustus Island). On rocks.


Danco Land (Augustus Island). On rocks.

**PARMELIA** Ach.—A. Zahlbr. Lich. p. 211.


Graham Land (Cape Tuxen). On rocks.


Note.—This is not *Parmelia antarctica* Bitter.

Danco Land (Cape van Beneden). On rocks.


Corniculata lanata var. minuscula Hue. Chare. II, no. 25.

Kaiser Wilhelm II Land (Mount Gauss); Fallières Land (Jenny Island in Marguerite Bay); *South Victoria Land (*Cape Adare; *Cape Sustruzi, *Evans Cove). On rocks (granite gneiss).

Distribution—Northern Asia; Northern America; Europe.

Parhelia quarta Darbish. Nat. Ant. I, p. 6, pl. I, fig. 5.

South Victoria Land (Granite Harbour, Cape Adare (?)). On rocks (basic volcanic ash).


Danco Land (Cape Flora); Louis Philippe Land (Cockburn Island). On rocks.

Distribution.—Colder and alpine portions of America, Asia, Australia, New Zealand and Europe.


Graham Land (Wandel Island). On rocks.


Usnea melaxantha Ach. Darbish. S. Ork. p. 2; Hue, Chare. I, no. 5 (including var. sorediifera Hue), Chare. II, no. 17 (including var. granulifera (Wain.) Hue, and var. sorediifera (Wain.) Hue).

Usnea sulphurea (Koenig) Th. Fr. Ant. p. 208 (including f. sphacelata (R. Br.)); Wain. Belg. p. 11 (including var. normalis Wain. var. granulifera Wain. and var. sorediifera (Cromb.) Wain.).


South Victoria Land (Mount Terror and Cape Royds on Ross Island; Cape Adare; Cape Sustruzi, Evans Cove); Geikie Land; Fallières Land (small island in Marguerite Bay); Graham Land (Cape Tuxen; Islands of Hovgaard, Wandel and Petermann); Danco Land (Islands of Moss, Augustus, Brabant, Goudier near Wieneke Island; Capes Flora and Anna Osterrieth); Louis Philippe Land (Hope Harbour; Islands of Paulet, James Ross and Snow Hill); South Shetland Islands (Deception Island); South Orkneys. On rocks (basic scoriaceous lava, tuff, diorite, grit, gneiss, granite, schist), rarely over earth.

Distribution.—Arctic, alpine and Southern America; Australia and New Zealand.
113. **Alectoria corymbosa** Hue. Char. I, no. 10.

Graham Land (Wandel Island). On rocks.

114. **Alectoria intricata** Hue. Char. II, no. 21.

Fallières Land (small island in Marguerite Bay). On rocks (diorite).

115. **Alectoria nigerrima** Hue. Char. II, no. 23.

Graham Land (Cape Tuxen). On rocks.

**Bryopogon** Link.—A. Zahlbr. Lich. p. 219.


South Orkneys. On rocks.

Distribution.—Asia; Africa; America; Europe.


117. **Ramalina lugubris** Hue. Char. II, no. 20.

Graham Land (Petermann Island). On rocks.


Danco Land (Augustus Island); Louis Philippe Land (Paulet Island); South Shetland Islands (King George Island). On rocks.

Distribution.—Southern America.

**Siphula** E. Fr.—A. Zahlbr. Lich. p. 225.

119. **Siphula orphnina** Hue. Char. II, no. 11.

Shetland Island South (King George Island). Over earth.

**Physcia** Schreb.—A. Zahlbr. Lich. p. 234.


South Victoria Land (Granite Harbour, Winter Harbour near Cape Armitage, Ross Island); Kaiser Wilhelm II Land (Mount Gauss); Graham Land (Wandel Island); Danco Land (Augustus Island; Cape van Beneden); Louis Philippe Land (Hope Harbour; Paulet and James Ross Island). Generally on rocks (basic scoriaceous lava), or over moss; in one case on a feather.

Distribution.—Cosmopolitan.
Graham Land (Petermann Island). On rocks (diorite).

Graham Land (Petermann Island). On rocks.

Danco Land (Goudier Island near Wiencke Island). On rocks.

Fallières Land (Leonie Island in Marguerite Bay). Over moss on rocks.

Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).

Danco Land (Cape Flora). On rocks.
Distribution.—Asia; Africa; America; Europe; New Zealand.

127. *Physcia puncticulata* Hue. Char. II, no. 34.
Graham Land (Petermann Island). On rocks (diorite).

Geikie Land; Danco Land (Moss and Challenger Islands); Louis Philippe Land (Cockburn Island). Over earth and moss.
Distribution.—North and South America; Africa; New Zealand; Eastern Asia; Europe.

Fallières Land (Jenny Island in Marguerite Bay). On rocks (diorite).

Danco Land (Capes Anna Osterrieth and van Beneden). On rocks.
Distribution.—Europe, Asia and North America.

Graham Land (Petermann Island). On rocks.
LICHENS.—DARBISHIRE.


Louis Philippe Land (Hope Harbour). On rocks.

133. RINODINA EGENISSIMA (Hue, Chare. II, no. 67, sub Lecanora).

Graham Land (Petermann Island). Over earth on rocks (diorite).

134. RINODINA HYPOPOCHILA Wain. Belg. p. 25.

Danco Land (Wienecke Island). On rocks.

135. RINODINA PETERMANNII (Hue, Chare. II, no. 96, sub Lecanora).

Graham Land (Petermann Island); Danco Land (Goudier Island near Wiencke Island). On rocks (diorite).


South Victoria (Winter Quarters, near Cape Armitage, Ross Island); Danco Land (Moss and Challenger Islands); South Orkneys. Over earth and moss, and rocks. Distribution.—Northern and arctic America; Europe.


137. BUCELLA ACAROSPOROIDES (Hue, Chare. II, no. 92, sub Lecidea).

Danco Land (Goudier Island near Wiencke Island). On rocks (diorite).

138. BUCELLA ACTINOLABA (Hue, Chare. II, no. 82, sub Lecidea).

Graham Land (Petermann Island). On rocks (diorite).

*139. BUCELLA ADARENSIS sp. nov. See diagnosis on p. 35; Plate I, fig. 2.

*South Victoria Land (Cape Adare). On rocks.

140. BUCELLA ANISOMERA Wain. Belg. p. 26, pl. 4, fig. 35.

Lecidea (Buellia) anisomera (Wain.) Hue, Chare. II, no. 83.

Graham Land (Petermann and Wandel Islands; Cap des Trois-Perez); Danco Land (Wienecke and Goudier Islands). On rocks (diorite, granite).


Danco Land (Augustus and Wiencke Islands). On rocks.


Danco Land (Brabant Island). On rocks.
143. **Buellia caesiocinerescens** (Hue, Charc. II, no. 102, sub Lecidea).
    Fallières Land (Jenny Island in Marguerite Bay); Danco Land (f. *rufescens* Hue, at Cap des Trois-Perez). On rocks (diorite, granite).

144. **Buellia Charcotii** (Hue, Charc. II, no. 98, sub Lecidea).
    Graham Land (Petermann and Wandel Islands). On rocks (diorite).

145. **Buellia cirella** (Hue, Chare. II, no. 87, sub Lecidea).
    Danco Land (Goudier Island near Wiencke Island). On rocks (diorite).

146. **Buellia conspicua** (Hue, Charc. II, no. 97, sub Lecidea).
    Danco Land (Goudier Island near Wiencke Island). On rocks (diorite).

147. **Buellia creamea** (Hue, Charc. II, no. 88, sub Lecidea).

148. **Buellia dichromatina** (Hue, Charc. II, no. 86, sub Lecidea).
    Danco Land (Goudier Island near Wiencke Island). On rocks (diorite).

149. **Buellia dimorphota** (Hue, Charc. II, no. 99, sub Lecidea).
    Graham Land (Petermann Island). On rocks.

150. **Buellia endomelaena** (Hue, Charc. II, no. 101, sub Lecidea).
    Graham Land (Petermann Island). On rocks (diorite).

*151. **Buellia evanescens** sp. nov. See diagnosis, p. 36, fig. 3–5.
    *South Victoria Land (Cape Adare, Cape Sustruzi). On rocks (grit, granite, shale).

152. **Buellia festivissima** (Hue, Charc. II, no. 85, sub Lecidea).
    Graham Land (Petermann Island). On rocks.

*153. **Buellia flavoplana** sp. nov. See diagnosis on p. 38, fig. 6; Plate I, fig. 3.
    *South Victoria Land (Cape Adare; Cape Sustruzi; Evans Cove). On rocks (gneiss).

*154. **Buellia frigida** Darbish. See also pp. 39, 40, fig. 7–9; plate I, fig. 5, 6.
    *Louis Philippe Land (Hope Island, small island off coast); *South Victoria Land (*Cape Adare, *Evans Cove). On rocks (acid and calcareous grit, dark basic tuff, felspar porphyry).
155. **Buellia GAINII** (Hue, Charc. II, no. 94, sub *Lecidea*).  
Danco Land (Goudier Island near Wiencke Island); Graham Land (Petermann Island). On rocks (diorite).

156. **Buellia GOUDIERI** (Hue, Charc. II, no. 89, sub *Lecidea*).  
Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).

157. **Buellia IMPERFECTA** (Hue, Charc. II, no. 91, sub *Lecidea*).  
Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).

158. **Buellia INORDINATA** (Hue, Charc. II, no. 84, sub *Lecidea*).  
Graham Land (Petermann and Wandel Islands). On rocks (diorite).

159. **Buellia ISABELLINA** (Hue, Charc. II, no. 105, sub *Lecidea*).  
Graham Land (Petermann Island); Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).

160. **Buellia JOANNAE** (Hue, Charc. II, no. 107, sub *Lecidea*).  
Graham Land (Petermann and Wandel Islands). On rocks.

Louis Philippe Land (Paulet Island). On rocks.

162. **Buellia LIOUVILLEI** (Hue, Charc. II, no. 108, sub *Lecidea*).  
Graham Land (Petermann Island). On rocks (diorite).

163. **Buellia MARGARITAE** (Hue, Charc. II, no. 109, sub *Lecidea*).  
Fallières Land (Jenny Island in Marguerite Bay). On rocks (diorite).

164. **Buellia MELAMPOA** (Hue, Charc. II, no. 96, sub *Lecidea*).  
Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).

165. **Buellia MELANOSTOLA** (Hue, Charc. II, no. 110, sub *Lecidea*).  
Graham Land (Wandel Island). On rocks (diorite).

166. **Buellia MODESTA** (Hue, Charc. II, no. 90, sub *Lecidea*).  
Graham Land (Petermann Island). On rocks (diorite).

South Shetland Islands (Nelson Island). On rocks.

South Victoria Land (Winter Harbour, near Cape Armitage, Ross Island). Over moss and earth.

**Distribution.**—Arctic America and Europe.

169. **Buellia perlata** (Hue, Chare. II, no. 103, sub Lecidea).

Graham Land (Petermann Island). On rocks (diorite).

Whilst working through the lichens brought back by the late Sir Ernest Shackleton, during the Expedition in the *Endurance,* to the Antarctic Continent, one new species was found, *Buellia pernigra* Darbish. It was found on Mount Erebus. An account of this new species will be published in the "Journal of Botany." It has, however, been included in the key to the species in Section vi. of this paper, but has not been included in any of the statistics of the Antarctic Lichens which are herewith brought up to a total of 209 species.

170. **Buellia ptermannii** (Hue, Chare. II, no. 106, sub Lecidea).

Graham Land (Petermann Island; Cape des Trois-Perez). On rocks (diorite, granite).

171. **Buellia polychora** (Hue, Chare. II, no. 100, sub Lecidea).

Graham Land (Petermann Island). On rocks (diorite).


Louis Philippe Land (Paulet Island); Danco Land (Augustus and Wiencke Islands). On rocks.

173. **Buellia pycnoconoides** sp. nov. See diagnosis, p. 41, fig. 10; plate I, fig. 4.

*South Victoria Land (*Cape Adare; *Cape Sustruzi, Evans Cove). On rocks (grit, granite).

174. **Buellia quercina** Darbish. Nat. Ant. I, p. 8, pl. 1, fig. 3.

South Victoria Land (Granite Harbour). On rocks (dark basic slag).

175. **Buellia radians** (Hue, Chare. II, no. 81, sub Lecidea).

Graham Land (Wandel Island). On rocks (diorite).

176. **Buellia russa** (Hue, Chare. II, no. 93, sub Lecidea).

Graham Land (Wandel Island); Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).

177. **Buellia surpedicellata** (Hue, Chare. II, no. 95, sub Lecidea).

Graham Land (Petermann Island); Danco Land (Goudier Island, near Wiencke Island). On rocks (diorite).
*178. **Buellia superba** sp. nov. See diagnosis, p. 42; plate II, fig. 7-8.

*179. **Buellia tristis** sp. nov. See diagnosis, p. 43; plate II, fig. 9-10.

180 **Buellia tuxenii** (Hue, Charc. II, no. 191, sub Leiden).
Graham Land (Cape Tuxen). On rocks.

*181. **Buellia variabilis** sp. nov. See diagnosis, p. 44; plate II, fig. 11-12.


South Victoria Land (*Cape Adare; *Cape Sustruzi, *Evans Cove; Granite Harbour); Louis Philippe Land (Cockburn Island). On rocks (mica-schist, gneiss, granite, vesicular lava, felspar porphyry, basic scoriaceous lava).
Distribution.—Asia; Arctic and Central America; Europe.

183. **Acarospora convoluta** Darbish. Swed. Ant. p. 16 & p. 36, pl. 3, fig. 32.
Louis Philippe Land (Astrolabe Island). On rocks.

184. **Acarospora macrocyclos** Wain. Belg. p. 31, pl. 4, fig. 29; Darbish. Swed. Ant. p. 36; Hue, Charc. II, no. 118.
Fallières Land (Jenny Island and another small island in Marguerite Bay); Danco Land (Goudier and Wiencke Islands; Cape van Beneden). On rocks (diorite).

Louis Philippe Land (Hope Harbour and small island off the coast). On rocks.

**CYANOPHILIALES.**

**STICTA** Ach.—A. Zahlbr. Lich. p. 188.

186. **Sticta endochrysea** Del. Stizb. Stict. n. 63.
_Pseudocyphellaria endochrysea_ (Del.) Wain. Belg. p. 28.
Danco Land (Cape van Beneden). On rocks.
Distribution.—South America; South Georgia.

**COLLEMA** Hoffm.—A. Zahlbr. Lich. p. 171.

Louis Philippe Land (Cockburn Island). Over moss and earth.
Distribution.—Europe and America.

188. LEPTOGIUM PUBERULUM Hue. Chare. II, no. 10.
South Shetland Islands (King George Island). On stones.

PYRENOCARPI.

VERRUCARIA (Web.) Th. Fr.—A. Zahlbr. Lich. p. 54.

  Danco Land (Moreno Island). On rocks.

190. VERRUCARIA DISPARTITA Wain. Belg. p. 38.
  Danco Land (Cape Anna Osterrieth). On rocks.

191. VERRUCARIA ELAEOPLACA Wain. Belg. p. 37, pl. 1, fig. 6.
  Danco Land (Bob Island). On rocks in water.

192. VERRUCARIA FAMELICA Darbish. Swed. Ant. p. 18 & 40, pl. 3, fig. 33.
  South Shetland Islands (Nelson Island). On rocks.

193. VERRUCARIA GLAUCOPLACA Wain. Belg. p. 37, pl. 1, fig. 5: Hue, Chare. II, no. 119.
  Danco Land (Goudier Island, near Wiencke Island; Moreno Island). On rocks.

  Danco Land (Moreno Island). On rocks.
  Distribution.—Cosmopolitan.

  Danco Land (Moreno Island). On rocks.

  Louis Philippe Land (Cockburn Island). On rocks.
  Distribution.—Asia; North America; New Zealand; Europe.


  South Victoria Land (Granite Harbour). On rocks (felspar porphyry).

198. MASTODIA TESSELLATA Hook. fil. & Harvey. Wain. Belg. p. 36, pl. 1, fig. 33-34; Darbish. Swed. Ant. p. 41, pl. 3, fig. 36; Hue, Charc. II. no. 9.

Graham Land (Hovgaard Islands); Danco Land (Bob Island, and Goudier Island, near Wiencke Island; Cape van Beneden); South Shetland Islands (Nelson Island); Louis Philippe Land (Astrolabe, Paulet and James Ross Islands, and small island off coast). On rocks (diorite).

Distribution.—Eastern Asia; South America; South Georgia; Kerguelen.

LEPRARIA Ach.—A. Zahlbr. Lich. p. 239.


Danco Land (Augustus Island). Over old moss.


Danco Land (Capes van Beneden and Cavalier de Cuverville). On rocks.


201. CROCYNIA ANTARCTICA Hue. Charc. II, no. 2.

South Shetland Islands (King George Island). On Siphula orphmna Hue.


Graham Land (Petermann and Wandel Islands; Cape Tuxen). Over moss and lichens on rocks.


Graham Land (Cap des Trois-Perez). Over moss on rocks (granite).

204. CROCYNIA JOANNAE Hue. Charc. II, no. 3.

Graham Land (Wandel Island). On rocks (diorite).

205. CROCYNIA MINIMA Hue. Charc. II, no. 5.

Graham Land (Petermann Island). On rocks.

206. CROCYNIA NIVEA Hue. Charc. II, no. 4.

Graham Land (Petermann Island). On rocks.

207. CROCYNIA PLUMOSA Hue. Charc. II, no. 8.

Danco Land (Goudier Island, near Wiencke Island). On rocks.

208. CROCYNIA TERMINALIS Hue. Charc. II, no. 6.

Graham Land (Wandel and Petermann Islands). Over moss and lichens, on rocks.
V.—KEY TO THE GENERA KNOWN TO HAVE REPRESENTATIVES IN THE ANTARCTIC

1. Thallus blood-red with potash, 2.
   ... not so, 6.
2. Thallus distinctly crustaceous, 3.
   ... not so, 5.
3. Apothecium lecanorine, Blastenia.
   lecanorine, 4.
4. Thallus ecoricate, simple, Caloplaca.
   lecanorine, 4.
5. Thallus foliaceous, Xanthoria.
   fruticulose, Polycauliona.
6. Thallus fruticulose, 7.
   ... not so, 15.
7. Thallus with attachment disk, 8.
   ... without attachment disk, 12.
8. Solid axis, hard outer cortex, Neurophyton.
   ... not so, 9.
9. Thallus quite terete, 10.
   ... not so, 11.
10. Spores, 1; hyaline, Buellia.
    ... 4; brown, Alveroria.
11. Spores, 2-celled, Rumalina.
    ... 1-celled, Letharia.
12. Thallus diploblastic, Cladonia.
    ... not so, 13.
    ... not so, 14.
    lecanorine, Stereocaulon.
15. Thallus squamulose or efigurate, with hyaline
    spores, 16.
    ... not so, or efigurate, with brown spores, 17.
    lecanorine, Poora.
17. Thallus foliaceous, 18.
    ... not so, 27.
    ... not so, 20.
19. Thallus ecoricate, Collema.
    ... ecoricate, Leptogium.
20. Fruit a perithecium, 21.
    ... an apothecium, 22.
    ... not so, Endocarpon.
22. Spores simple, 23.
    ... not so, 24.
23. Apothecium lecanorine, Parmelia.
    ... lecanorine, Gyrophora.
    ... not so, 26.
25. Spores 2-celled; apothecium lecanorine,
    Cladonia.
    ... many-celled; apothecium lecanorine,
    Umbilicaria.
26. Spores 2-celled, brownish, Physcia.
    ... hyaline, many-celled, Sticta.
27. Thallus always sterile, Lepraria.
    ... may be fertile, 28.
28. Thallus hyssinic, Croenia.
    ... not so, 29.
    ... not so, 30.
    ... not so, 37.
31. Fruit a perithecium, Verescaria.
    ... not so, 32.
32. Apothecium lecanorine, 33.
    ... lecanorine, 36.
33. Gonidia found under hypothecium, Ochrolechia.
    ... not found under hypothecium, 34.
34. Spores large, Pertusaria.
    ... small, 35.
35. Apothecium sessile, Lecanora.
    ... immersed in thallus, Aspicilia.
36. Apothecium biatorine, Biatora.
    ... not so, Lecidea.
37. Spores colourless, 38.
    ... brown, 39.
38. Apothecium lecanorine, Lecania.
    ... lecanorine, Bacidia.
    ... not so, 41.
40. Thallus crustaceous, efigurate, Diplostephan.
    ... but not efigurate, Rhizocarpum.
41. Spores with halo, Catocarpon.
    ... without halo, 42.
42. Apothecium lecanorine, Buellia.
    ... lecanorine, Rinodina.
VI.—KEY TO THE SPECIES OF ANY GENUS KNOWN TO HAVE MORE THAN ONE ANTARCTIC SPECIES.

**LECIDEA** Ach.

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1. Thallus white, 2.</td>
<td>not so. 7.</td>
</tr>
<tr>
<td>2. Apothecia well under 1 mm. broad. 3.</td>
<td>about 1 mm. broad. 4.</td>
</tr>
<tr>
<td>3. Thallus 0·45 mm. thick, <em>eburnea.</em></td>
<td>thinner, <em>repicida.</em></td>
</tr>
<tr>
<td>4. Apothecia over 2 mm. broad. <em>auriculata.</em></td>
<td>well under 2 mm. broad. 5.</td>
</tr>
<tr>
<td>5. Apothecia dark brown, <em>sciadapha.</em></td>
<td></td>
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<tr>
<td></td>
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</tr>
<tr>
<td>7. Spores under 0·010 mm. long, <em>brunnecento.</em></td>
<td>over 0·010 mm. long. 8.</td>
</tr>
<tr>
<td>8. Apothecia 1 mm. or more across, 9.</td>
<td>less across, 10.</td>
</tr>
<tr>
<td></td>
<td>not so. 11.</td>
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**BIATORA** Fr.

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<tbody>
<tr>
<td>2. Thallus white, <em>oveostrum.</em></td>
<td>not so. 3.</td>
</tr>
<tr>
<td></td>
<td>not so. 4.</td>
</tr>
</tbody>
</table>

**BACIDIA** de Not.

| Spores, 0·056–0·07 mm. rhodochroa. 0·02–0·03 mm. granulosa. |

**CATOCARPON** Koerb.

| Apothecia minute, *polycarpum.* | large, *bidentatum.* |

**RHIZOCARPON** Ram.

| 1. Thallus, quite white, *argyrea.* | not so. 2. |
| 2. Thallus, yellowish, 3. | not so. 5. |

**STEREOCAULON** Schreb.

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1. Podetia, up to 3 cm. high, <em>magellanicum.</em></td>
<td>much shorter. 2.</td>
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<tr>
<td>6. Axis, perforate. 7.</td>
<td>closed. 8.</td>
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</tbody>
</table>

**UMBILICARIA** Hoffm.


**GYROPHORA** Ach.

| 1. No rhizines below, *anthracina.* | not so. 2. |
| 2. Thallus, not black below, *cylindraca.* | black below, 3. |
| 3. Spores, 0·008 to 0·013 mm. long, *ilicella.* | 0·017 to 0·025 mm. long, *Dilleni.* |

**CLADONIA** Hoffm.

| Podetia, without cups. 2. | with cups, 4. |
| 2. Primary thallus foliaceous, *fuscata.* | crustaceous, 3. |
|   | straw-coloured, K —, *sylvatica.* |
| 6. Axis, perforate. 7. | closed, 8. |
OCHROLECHIA Mass.
Apothecia, well under 1 mm. across, deceptionis.

PERTUSARIA D.C.
1. Plant, bearing apothecia, communis.
   not so, 2.
2. Thallus, thin, grisea.
   thick, corallophora.

PLACODIUM D.C.
1. Margin more or less indeterminate, 2.
   thick, 4.
2. Apothecia, up to 1-5 mm. across, joanae.
   about 0-6 mm. across, 3.
3. Thallus, areolate laciniate, subabundatam.
4. Thallus applied to rock, 5.
   very closely applied, 6.
5. Spores, 0-011 to 0-016 by 0-009 mm. large, elegans.
   0-011 by 0-005 mm. large, lucens.
6. Margin effigurate, thinish, cirrochroides.
   lobate, thicker, 7.
7. Thallus pruinose, murorum.
   epruinose, miniatum.

POLYCAULIONA Hue.
1. Thallus, yellow, 2.
   not so, 3.
2. Thallus, up to 50 mm. high, upright, regalis.
3. Thallus, brown, Charcotiana.
   greenish, bustosa.

BLASTENIA Mass.
1. Growing over earth and moss, leucoraea.
   rocks, 2.
2. Thallus, white, cervusata.
   greyish, corallophora.

CALOPLACA Th. Fr.
1. Growing over moss, athallina.
   not so, 2.
2. Thallus, minutely granulose, citrina.
   not so, 3.
3. Thallus, thicker, aurantiaca.
   thinner, cucicica.

ASPICILIA Mass.
Thallus, grey; apothecia slightly convex, dilixina.
brownish; apothecia very convex, crythrida.

LECANORA Ach.
1. Thallus, black and white, or quite black, leuca-melaceae.
   not so, 2.
2. Thallus, brownish, alataceae.
   not so, 3.
3. Thallus greyish, 4.
   not so, 7.
4. Thallus powdery, or absent, lavae.
   granular and warty, 6.
6. Apothecia up to 1-2-5 mm. across, atra.
   0-5 mm. across, polioschoides.
7. Thallus, yellow, 8.
   not so, 13.
   not so, 11.
9. Thallus, intensely yellow, crossochoides.
   straw coloured, 10.
10. Thallus, granular to warty, aspidophora.
   granular to subsquamosus, polytropa.
11. Apothecia well over 1 mm across, Charcotiana.
   up to 1 mm. across, 12.
12. Thallus, thin, granulose, humiliana.
   more a continuous crust, Gainiana.
   not so, 14.
   not so, 12.
   black, 17.
15. Apothecium, under 1 mm. across, tephracera.
   over 1 mm. across, 16.
16. Thallus, granulose, erythogen.
   more continuous areolate crust, subsquamosus.
17. Thallus, thin, granulose, 18.
   thick, 19.
18. Growing over moss, expectans.
   stone, mons-nivis.
19. Thallus subsquamosula Babingtonii.
   not so, 20.
20. Thallus, more crustaceous, miranda.
   more granulose, danecopsis.

LECANIA Mass.
1. Thallus, faint yellow, curica.
   not so, 2.
2. Thallus crustaceous, verrucose, Racovitzae.
   fruticulose, 3.
3. Thallus 6-13 mm. high, Biedmontii.
   ascending only, Gerlachi.

PARMelia Ach.
1. Thallus, yellow, antarctica.
   not so, 2.
2. Thallus, filiform, *bunata*.
   not so, 3.
3. Thallus, naked below, *quarta*.
   fibrillosa below, 4.
   small, *accrata*.

ALECTORIA Ach.
1. Thallus, pale brown, *corymbosa*.
2. Thallus, a densely packed cushion, *intricata*.
   looser, *nierissima*.

RAMALINA Ach.
Base brown, apices yellow, *tecebrata*.
black, apices straw-coloured, *lygopbris*.

PHYSICIA Schreb.
1. Rhizines, black, 2.
2. Thallus, grey, not yellow, *palcradena*.
3. Lobes, 1-2 mm. broad, *puncticulata*.
   0-4-0.6 mm. broad, *tebalcina*.
4. Growing over earth and moss, 5.
   rocks, 6.
5. Thallus, black, when exposed, *louiac*.
   whitish when exposed, *stellaris*.
6. Rhizines, white, 7.
   not so, 8.
8. Lobes to 0-7 mm. broad, *inordinata*.
   2 mm. broad, *tebicia*.
   not so, 10.
10. Lobes to 0-3 mm. broad, *fuscella*.
   1 mm. or more broad, 11.
11. Thallus, without soralia, *dissiminita*.
   with soralia, *coeris*.

RINODINA Mass.
1. Apothecia, over 1 mm. across, 2.
   under 1 mm. across, 3.
2. Spores up to 0-030 mm. long, *furacea*.
   well under 0-030 mm. long, *petermannii*.
3. Thallus, yellowish, *tessar*.
   not so, 4.
4. Thallus, areolate, *hypopsischita*.
   squamulose, *egetissima*.

BUELLIA De Not.
1. Thallus, yellow of some shade, 2.
   not so, 11.
2. Thallus, indistinctly yellow, 3.
   bright yellow, 6.
3. Thallus, brownish yellow, 1.
   whitish yellow, 5.
4. Spores, 0-017-0-025 mm. long, *iselllina*.
   0-011-0-016 mm. long, *cubina*.
5. Spores, 0-014-0-020 mm. long, *modesta*.
   0-010-0-014 mm. long, *adacervia*.
6. Spores, up to and over 0-020 mm. long, 7.
   up to 0-015 mm. long, 11.
7. Spores, 0-02 mm. and less long, *nelsounii*.
   0-02 mm. and over long, 8.
8. Apothecia up to 2 mm. across, *astriocera*.
   1 or less, 9.
9. Apothecia, not more than 0-6 mm. across, *cetella*.
   up to 1 mm. across, 10.
10. Thallus, more areolate, *cremen*.
    granulose to squamulose, *inordinata*.
11. Yellow areoles, flat on top, with black edging, *fuscella*.
    ... not so, 12.
12. Apothecia up to 0-4 mm. across, assimilating areoles up to 1 mm, *stebera*.
    ... and areoles bigger, 13.
13. Thallus, with small black sterile areoles, *varibility*.
    never so, *tristis*.
    ... rocks, 15.
15. Spores, 0-03 mm. or more long, 16.
    ... less, 17.
16. Thallus, brownish white, warts 3-4 mm. high, *subpuncticellata*.
    ... pure white, warts much smaller, *goudieri*.
17. Hypothecium, colourless, 18.
    ... not so, 23.
18. Spores, 0-020 mm. or more long, 19.
    ... less, 20.
19. Margin of protothallus not distinct, thallus 1 mm. thick, *conspicua*.
    ... black, thallus 0-5 mm. thick, *webnostola*.
20. Thallus, mainly conchoidal, *pygynomones*.
    ... not so, 21.
    more continuous, 22.
22. Thallus, light grey to brown, areolate, *dimorpho*.
    quite black, convolute, *pervigia*.
23. Margin of protothallus white, *tenuimarginata*.
    ... not white, 24.
    ... not brownish, 26.
25. Thallus thick, brown, *augusta*.
    ... thin, whitish, *prototallina*.
    .. .. very distinct, 33.
27. Spores not above 16 mm. long, 28.
    .. larger, 29.
28. Thallus, thick, maculate, frigida.
    .. thin, continuous, quercina.
29. Spores up to 0.028 mm. long, dichromatina.
    .. not so, 30.
30. Thallus, white, imperfecta.
    .. not so, 31.
31. Thallus, brownish, russe.
    .. not so 32.
32. Apothecia up to 0.4 mm. across, polychora.
    .. up to 1 mm. across, melampora.
33. Margin, dentritic, 34.
    .. not so, 40.
34. Thallus, whitish, 35.
    .. greyish, 37.
35. Spores, brown, Gainii.
    .. finally black, 36.
36. Protothallus, 2-5 mm. broad, nargariace.
    .. 5-6 mm. broad, liouvillei.
37. Spores, ultimately black, taizenii.
    .. brownish, 38.
38. Hypothecium, black, caespicinerescens.
    brownish, 39.
39. Thallus, up to 0.8 mm. thick, perlata.
    .. up to 1 mm. thick, elmomelaesa.
40. Spores, over 0.020 mm. long, 41.
    .. under 0.020 mm. long, 15.
41. Spores, black, petrevanni.
    .. not so, 42.
42. Protothallus, very narrow, acarosporoides.
    .. up to 1 mm. broad, festivissima.
43. Thallus, up to 0.5 mm. thick, 44.
    .. much less thick, 45.
44. Apothecia, up to 1 mm. across, actinoloba.
    .. up to 0.5 mm. across, brobantica.
45. Thallus, dark grey, Charostii.
    .. brownish, joannae.

ACAROSPORA Mass.
1. Thallus, bright yellow, chlorophana.
    .. not so, 2.
2. Apothecia up to 0.5 mm. across, ovolobulina.
    .. over 1 mm. across, 3.
3. Thallus, chinked and areolate, macrocyctos.
    .. convolute to almost fruticulosae, con-
    voluta.

VERRUCARIA Mass.
1. Spores, 2mm. over 0.04 long, umbrina.
    .. 5mm. well under 0.04 long, 2.
2. Spores, up to about 0.010 long, 3.
    .. well over 0.010 long, but under 0.030, 4.
3. Thallus, maculate, dispersel, disperselita.
    .. crustaceous, continuous, cylindrophora.
4. Thallus, black, 5.
    .. not so, 6.
5. Thallus, continuous, manca.
    .. interrupted, or abscut, fenelica.
6. Peritheium, wholly dark brown, Racovitzae.
    .. not wholly dark brown, 7.
7. Thallus, greyish in colour, glaucoplaca.
    .. olive in colour, etaroplast.

LEPRARIA Ach.
Thallus granular throughout, straminea.
.. areolate near margin, pattidostraminea.

CROCYNIA Mass.
1. Growing directly on rocks, 2.
    .. not so, 5.
2. Gonidia, over 0.020 mm. in diameter, joannae.
    .. under 0.020 mm. in diameter, 3.
3. Thallus, greyish white, plumosa.
    .. purc white, 4.
    .. not so, minima.
5. Gonidia, 0.020 mm. in diameter, antarctica.
    .. less, 6.
6. Thallus very white, candidissima.
    .. not so, 7.
7. Thallus, bluish white, carulexens.
    .. piukish white, terminatis.
VII.—LITERATURE CITED.

The following papers have been referred to in the course of this Report. Papers are quoted either by their number or in the abbreviated form given at the end of each paper enumerated below:


7. Fries, Th. M.—Monographia Stereocaulorum et Pilophororum.—Upsaliae, 1858.—Th. Fr. Stereoc.


VIII.—INDEX TO GENERA AND SPECIES ENUMERATED IN COMPLETE LIST OF ANTARCTIC LICHEN SPECIES.

ACAROSPORA Mass., 65
cacosporoides (Hue) (Buclia), 61
acervata Hue (Parmeina), 57
acervuligera (Hue) (Biatora), 46
actinoloba (Hue) (Buclia), 61
adareusis Darbish. (Buclia), 61
albostrum (Hoffm.) Th. Fr. (Diplotomma), 47
ALECTORIA Ach., 59
alatacea Hue (Lecanora), 55
amination Wain. (Buclia), 61
antarctica (Hue) (Crocynia), 67
antarcticum Wain. (Stereocaulon), 50
authracina (Wulf.) Koerb. (Gyrophora), 49
argyrum (Hue) (Rhizocarpon), 47
ASPICILIA Mass., 55
aspidotheca Wain. (Lecanora), 55
athalina Darbish. (Caloplaca), 54
atra Ach. (Lecanora), 55
atrolulicans Nyl. (Lecidea), 54
atrobrunea (Ram.) Schuer. (Lecidea), 45
augusta Wain. (Buclia), 61
aurantiaca (Lightft.) Th. Fr. (Caloplaca), 54
auriculata Th. Fr. (Lecidea), 46
Babingtonii Hook. fil. & Tayl. (Lecanora), 55
BACIDIA de Not., 47
badia (Pers.) Ach. (Lecanora), 55
badiostrum (Plk.) Th. Fr. (Catacarpon), 47
BIATORA Fr., 46
BLASTENIA Mass., 51
brabantica Wain. (Buclia), 61
Briandontii (Wain.) (Lecania), 46
brunneocatra Wain. (Lecidea), 46
BRYOPOGON Link, 50
BUELLA de Not., 61
caerulescens Hue (Crocynia), 67
caesia (Hoffm.) Nyl. (Physcia), 59
cassioicerescens (Hue) (Buclia), 62
CALOPLACA Th. Fr., 54
caudolissina Hue (Crocynia), 67
cariosa (Hue) (Lecania), 57
CATOCARPON Koerb., 47
cerussata (Hue) (Blastenia), 51
CHARCOTIA Hue, 52
Charcotana Hue (Lecanora), 56
Charcoti (Hue) (Buclia), 62
... " (Polycaulium), 53
chlorophana (Wdbg.) Mass. (Acarospora), 65
chrysocaulis (Sm.) Th. Fr. (Sphenaria), 55
cinerica Hue (Lecidea), 46
cinericola (Hue) (Caloplaca), 54
cirrochoroides Wain. (Placodium), 52
citrella (Hue) (Buclia), 62
citrina (Hffm.) Th. Fr. (Caloplaca), 51
CLADONIA Hoffm., 50
cocifera (L.) Wild. (Cladonia), 50
COLLEMA Hoffm., 65
communis D.C. (Pertusaria), 52
concreta (Ach.) Wain. (Lecidea), 48
consanguinea (Hue) (Buclia), 62
convoluta Darbish. (Acarospora), 65
coraligera (Hue) (Blastenia), 51
... " (Polycaulium), 53
coralloides Pers. (Sphaerophora), 54
corallophora Wain. (Pertusaria), 52
corymbosa Hue (Alectoria), 59
crasa Darbish. (Rinodina), 61
cruma (Hue) (Buclia), 62
cremoricolor Hue (Lecidea), 46
crispum Ach. (Collema), 65
CROCYNIA Hue, 67
cylindrica (L.) Ach. (Gyrophora), 49
cylinderphora Wain. (Verrucaria), 66
danceoasis Wain. (Lecanora), 56
deceptionis (Hue) (Ochrolechia), 51
deformis Hoffm. (Cladonia), 50
dichromatina (Hue) (Buclia), 62
dilbenni Tuck. (Gyrophora), 49
dimorphota (Hue) (Buclia), 62
DIPLOTOMMA Flot., 47
dispartita Wain. (Verrucaria), 66
dissomnata Hue (Physcia), 69
dittisiana Hue (Aspicilia), 55
eburnea Hue (Lecidea), 46
egentissima (Hue) (Rinodina), 61
eclacopla Wain. (Verrucaria), 66
elegans (Link) Nyl. (Placodium), 52
ENDOCARPON Hedw., 66
eudochrysea Del. (Sticta), 65
eundomelaena Hue (Buclia), 62
eubryous Tuck. Slaer. (Lecanora), 56
eythroma Hue (Aspicilia), 55
evanescentis Darbish. (Buclia), 62
eximia Hue (Unbiliaria), 49
expectans Darbish. (Lecanora), 56
familia Darbish. (Verrucaria), 66
festivissima (Hue) (Buclia), 62
flavipila Wain. (Buclia), 62
frigida Darbish. (Buclia), 62
fruticulosum Darbish. (Placodium, Syn.), 54
fucata (Huds.) Schrad. (Cladonia), 50
fuscella (Physcia), 99
fuscosea (L.) Th. Fr. (Baeocetraria), 16
Gaminia Hue (Lecanora), 57
Ganii (Hue) (Baeocetraria), 63
geminatum (Alb.) Th. Fr. (Rhizocarpon), 48
geographicum (L.) D.C. (Rhizocarpon), 48
Gerlachii (Wain.) (Lecanora), 57
glaucoplaea (Wain.) (Verrucaria), 66
Goudieri (Hue) (Baeocetraria), 63
gracilis (Hue) (Lecanora), 57
grisea Wain. (Pertusaria), 52
griseolum (Hue) (Rhizocarpon), 48
GYROPHORA Ach., 49
humilissima Hue (Lecanora), 56
hypopolichila Wain. (Rhizocarpon), 61
imperfecta (Hue) (Baeocetraria), 63
inordinata (Hue) (Baeocetraria), 63
inordinatum (Hue) (Placodium), 53
intrescata Hue (Alectoria), 59
isabelina (Hue) (Baeocetraria), 63
joannae (Hue) (Baeocetraria), 67
.. 
(Crocynia), 67
.. 
(Placodium), 53
jubatum (L.) Ach. (Bryopogon), 59
lauita (L.) Wallr. (Parmelia), 58
lateanarginita Darbish. (Baeocetraria), 63
lavae Darbish. (Baeocetraria), 47
.. 
(Lecanora), 56
LECANIA Mass., 57
LECANORA Ach., 55
LECIIDEA Ach., 45
leioarpa D.C. (Unbiliarcia), 49
leioae Hue (Physcia), 60
LEPRARIA Ach., 67
LEPTOGIUM Körb., 66
LETHARIA (Th. Fr.) A. Zahlbr., 58
leucomelasina Hue (Lecanora), 56
leucoracea (Ach.) Th. Fr. (Blastenia), 51
Liovilli (Hue) (Baeocetraria), 63
lucens Nyl. (Placodium), 53
luctuosa Hue (Polycodium), 53
lugubris Hue (Ramalina), 59
lychna (Ach.) Th. Fr. (Xantoria), 52
macrocyclos Wain. (Acarospora), 65
magellanicum Th. Fr. (Stercocaulon), 50
margaritae (Hue) (Baeocetraria), 63
.. 
(Lecanora), 56
MASTODIA Hook. fil. & Tayl., 67
maura Wahlenb. (Verrucaria), 66
melamps (Hue) (Baeocetraria), 63
melanophthluma Ram. (Lecanora), 55
melanstictum (Hue) (Rhizocarpon), 48
melanostola (Hue) (Baeocetraria), 63
melanostoma (Ach.) Nyl. (Neuropogon), 58
miniatum Hoffm. (Placodium), 53
minima Hue (Crocynia), 67
miranda Hue (Lecanora), 56
modesta (Hue) (Baeocetraria), 63
molybrina Ach. (Acarospora), 65
monocarpa (Hue) (Baeocetraria), 47
mons-nivis Darbish. (Baeocetraria), 56
murorum (HfEm.) D.C. (Placodium), 53
nelsonii Darbish. (Baeocetraria), 63
NEUROPOGON Nyl., 58
nidulicium (Hue) (Rhizocarpon), 48
nigerrima Hue (Alectoria), 59
nivescens Hue (Physcia), 60
niveae Hue (Crocynia), 67
OCHROLECHIA Mass., 51
ostreocalloides Wain. (Lecanora), 56
orithina Hue (Siphula), 59
pallidiostraminena Wain. (Leparia), 67
parapetraeae (Nyl) (Rhizocarpon), 48
parasema (Ach.) Th. Fr. (Baeocetraria), 61
parietina (L.) de Not. (Physcia), 52
PARMELIA Ach., 57
parvula Hue (Umbilicaria), 39
perlaya (Hue) (Baeocetraria), 64
pernigra Darbish. (Baeocetraria), 64
PERTUSARIA D.C., 52
petermannii (Hue) (Baeocetraria), 61
.. 
(Rhomnina), 61
PHYSICA Schreb., 39
physicida Darbish. (Lecanora), 46
placodiflorinis (Hue) (Psora), 48
PLACIDIUM D.C., 52
plamosa Hue (Crocynia), 67
poeciloclerdera (Hue) (Baeocetraria), 47
poliophileoides Wain. (Lecanora), 57
polykarpon (Hepp.) Th. Fr. (Catacorpon), 47
POLYCAULIONA Hue, 53
polychora (Hue) (Baeocetraria), 64
polytropa (Ehrh.) Th. Fr. (Lecanora), 57
protocallina (Kremphl.) Wain. (Baeocetraria), 61
PSORA (Hall.) Mass., 48
puberulum Hue (Leptogium), 66
pubescens (L.) Wain. (Parmelia, Syn.), 58
pulverulenta (Schreb.) Nyl. (Physcia), 60
puncticulata Hue (Physcia), 60
pycnonogonides Darbish. (Baeocetraria), 64
pygmacum Wain. (Stercocalon), 50
pyxidata (L.) Fr. (Cladonia), 51
quarta Darbish. (Parmelia), 58
quercina Darbish. (Buellia), 64
Racovitzae (Wain.) (Lecania), 57
.. (Verrucaria), 66
radians (Hue) (Buellia), 64
RAMALINA Ach., 59
rangiferina L. (Cladonia), 51
regalis (Wain.) Hue (Polycaulonia), 54
RHIZOCARPON Ram., 47
rhodochroa (Hue) (Bacidia), 47
RINODINA Mass., 61
rufulula Hue (Charcotia), 49
rufuligerinula Hue (Lecidea), 46
rupecida Wain. (Lecidea), 46
russa (Hue) (Buellia), 64
saxatilis (L.) Ach. (Parmelia), 58
sciaphrapha Hue (Lecidea), 46
SIPHULA Hue, 59
SPHAEROPHURUS Pers., 45
SQUAMARIA D.C., 55
squamosa (Scop.) Wain. (Cladonia), 51
stellaris Ach. (Physcia), 60
STEREOCAULON Schreb., 50
STICTA Ach., 65
straminea Wain. (Lepraria), 67
subcongrua Nyl. (Lecidea), 46
submusca (L.) Ach. (Lecanoria), 57
sublobulatum Nyl. (Placodium), 53

subpedicellata (Hue) (Buellia), 64
subsquamosa (Nyl.) Wain. (Cladonia), 51
sulphurea (Koenig) Th. Fr. (Usnea), 58
superba Darbish. (Buellia), 65
sylvatica (L.) Hoffm. (Cladonia), 51
tabacina Hue (Physcia), 60
tartarea (L.) Mass. (Ochrolechia), 51
Taylori Nyl. (Neurophorion, Syn.), 58
tephiroreta Hue (Lecanoria), 57
terebrata Tayl. & Hook. f. (Ramalina), 59
terminalis Hue (Crocynia), 67
tessellata Hook. fil. & Harv. (Mastodia), 67
theiochroa (Hue) (Biatora), 47
tomentosum Fr. (Stereoaulon), 50
tribacia (Aech. Nyl. (Physcia), 60
tristis Darbish. (Buellia), 65
turfacea (Wahlenb.) Fr. (Rinodina), 61
taxonii (Hue) (Buellia), 65
UMBILICARIA Hoffm., 49
umbrina Ach. (Verrucaria), 66
variabilis Darbish. (Buellia), 66
velus (L.) Ach. (Gyrophora), 49
VERRUCARIA (Web.) Th. Fr., 66
wandelensis Hue (Letharia), 58
xanthopila Hue (Physcia), 60
XANTHORIA Fr., 52

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Lichens, Plate I.
PLATE I.

Fig. 1. — *Leucidiella physciella* sp. nov.—In the foreground on the right a portion of the frond of a *Gyrophora anthracina* is seen. At this point too the new species is at its thinnest. It is thickest in the left further corner of the photograph.—Magn. 5.

Fig. 2.—*Buellia adacensis* sp. nov.—A typical specimen showing the much scattered assimilating areoles. Apothecia here and there.—Magn. 5.

Fig. 3. *Buellia flavoplana* sp. nov.—Notice the yellow assimilating areoles with the black edging.—Magn. 5.

Fig. 4.—*Buellia pycnogonoides* sp. nov.—The well developed black protothallus is shown with the few assimilating areoles in the centre.—Magn. 5.

Fig. 5.—*Buellia frigida* Darbish.—The black protothallus is shown on the right gradually passing into the lighter metathallus.—Nat. size.

Fig. 6.—*Buellia frigida* Darbish.—A portion of the protothallus and apothecia in a specimen which has been soaked in water.—Magn. 5.


Fig. 1.—Leucidea physciella sp. nov. × 5. (Dry)

Fig. 2.—Buellia advenensis sp. nov. × 5. (Dry)

Fig. 3.—Buellia floraphana sp. nov. × 5. (Dry)

Fig. 4.—Buellia pyriformes sp. nov. × 5. (Dry)

Fig. 5.—Buellia frigida Darbish. Nat. size. (Dry)

Fig. 6.—Buellia frigida Darbish. × 5. (Moistened)

Lichens.
PLATE II.

Fig. 7.—Buellia superba sp. nov.—The black protothallus is shown in the upper part of the figure, also the big assimilating areoles and between these the black sterile small areoles often capped with white remains of the old primary cortex.—Magn. 5.

Fig. 8.—Buellia superba sp. nov.—Small portion of protothallus showing the dendritic outgrowths of the latter, also several convex assimilating areoles.—Magn. 5.

Fig. 9.—Buellia tristis sp. nov.—Habit of plant showing that the metathallus is made up entirely of assimilating and fertile areoles.—Magn. 5.

Fig. 10.—Buellia tristis sp. nov.—More complete specimen of same species.—Magn. 2.

Fig. 11.—Buellia variabilis sp. nov.—The highly convolute nature of the assimilating areoles is shown in this specimen photographed in a dry condition. Notice the big black apothecium on the left in the figure.—Magn. 5.

Fig. 12.—Buellia variabilis sp. nov.—The same portion of the thallus taken in a soaked condition. Again notice the state of the convolute assimilating areoles surrounding the large black apothecium on the left.—Magn. 5.

Botany.

Lichens, Plate II.

Fig. 7.—*Buellia superba* sp. nov. × 5. (Dry)

Fig. 8.—*Buellia superba* sp. nov. × 8. (Dry)

Fig. 9.—*Buellia tristis* sp. nov. × 5. (Dry)

Fig. 10.—*Buellia tristis* sp. nov. × 2. (Dry)

Fig. 11.—*Buellia variabilis* sp. nov. × 5. (Dry)

Fig. 12.—*Buellia variabilis* sp. nov. × 5. (Moistened)

Lichens.