

THE MOSSES OF LORD HOWE ISLAND.

BY DR. V. F. BROTHERUS AND THE REV. W. WALTER WATTS.

Introductory Notes by Rev. W. W. Watts.

At the beginning of July, 1911, I started on a health-trip to Lord Howe Island, and it was not until towards the end of August that I again saw Sydney. Seven weeks was I privileged to spend on the far-famed island, experiencing much kindness from the hospitable residents, and collecting Ferns, Mosses, and Hepatics from almost every accessible part of this beauty-spot of the near Pacific.

The Ferns of the Island have been dealt with in these Proceedings (1912, xxxvii., p.395, and 1914, xxxix, p.257); and the Hepatics in a paper on "*Hepaticæ Australes*," in the Journ. Proc. Roy. Soc. N. S. Wales, xlviii. (1914), p.94.

The present paper deals with the Mosses of the Island, which I collected somewhat exhaustively, though there are some localities which I was unable to visit.

From the bryologist's point of view, the most interesting part of Lord Howe is the southern end, where the Island attains its greatest width (nearly two miles), and where the twin mountains, Lidgbird and Gower, lift their impressive heads, the former to 2,504 feet, and the latter to 2,840 feet. These mountains, frequently "cloud-capped," are separated by the deep cleft of Erskine Valley, where many cryptogamic treasures probably yet remain for discovery. The top of Mt. Gower is a veritable paradise of plant-life—one of Nature's Botanic Gardens, consisting of some 120 acres of rich scrub-land, intersected by gullies that run always towards the north, and, on its southern edge, dropping almost sheer into the ocean.

Here, on this rich plateau, may be found fern after fern, and moss after moss, that occur nowhere else in the world. I was fortunate enough to add to the number of the indigenous mosses

of Mt. Gower, and I have no doubt that others will yet be discovered. Very interesting, also, is the eastern side of Mt. Lidgbird, where the land slopes up from the ocean to enormous cliffs that bar access, on that side at any rate, to the top of the mountain. The centre and north of the island, while less interesting bryologically than the southern end, are by no means negligible; and the neighbourhood of the northern "Look-Out," the Northern Hills, and the North Head, supplied me with many treasures.

Specimens of nearly all my packets of mosses were submitted to Dr. V. F. Brotherus, and he kindly found time to examine them and report upon them. The results of our joint work appear in the following pages. Twenty-two new species are described, and a few new varieties.

Some supplementary notes, dealing mainly with previous records, will be found at the end.

I take this opportunity of sincerely thanking Dr. Brotherus for his invaluable assistance, without which the publication of this paper would have been scarcely possible.

i. Group **Acrocarpi.**

DICRANACEÆ.

TREMATODON Michx.

TREMATODON sp. (sporogon destroyed).

Second open gully, south of King's, at western base of Mt. Lidgbird.

The specimens were indeterminable, on account of the capsules being too old; plants should be collected in April or May, or in October or November.

CERATODON Brid.

C. PURPUREUS (L.) Brid.

Open gully, south of King's.

HOLOMITRIUM Brid.

H. PERICHÆTIALE (Hook.) Brid.

Saddle-Back and Mt. Gower.

Var. ROBUSTUM Broth. et Watts, var. nov.

Robustior, folia sicca minus crispata, haud circinato-incurva.

Saddle Back (No. 449).

DICRANOLOMA Ren.

D. BARTRAMIOIDES (Broth.) Par.

Mt. Gower, on trees.

D. DICARPUM (Hsch.) Par.

Mt. Gower; Saddle Back; Erskine Valley; track to "Dinner Run"; etc.

D. MENZIESII (Tayl.) Par.

Mt. Gower, mixed with *D. bartramioides* and *D. dicarpum* (No. 426).

LEUCOLOMA Brid.

L. SIEBERIANUM (Hsch.) Par.

Saddle Back; Mt. Gower; etc.

f. LONGIPILA.

On slopes of Mt. Gower, above the Saddle Back, mixed with the typical *L. Sieberianum*.

CAMPYLOPUS Brid.

C. CLAVATUS (R.Br.) H.f.W.

Mt. Gower.

C. INTROFLEXUS (Hedw.) Mitt.

At several places, mostly at northern end of the Island,—the typical plant and other forms.

C. PUDICUS (Hsch.) Jæg.

Northern Look-Out.

C. WOOLLSIANUS (C.M.) Par.

Face of Mt. Lidgbird (eastern side), mixed with *Bryum leptothecium*.

LEUCOBRYACEÆ.

LEUCOBRYUM Hampe.

L. CANDIDUM Brid.

Top of Mt. Gower.

L. PSEUDOCANDIDUM Broth.

Seacliff near Flagstaff; gully, south of King's; hillside above Johnson's; on decayed log, track to Dinner Run; Mt. Gower; etc.

L. SPEIROSTICHUM C.M.

Dinner Run, mixed with *Dicranoloma dicarpum*.

FISSIDENTACEÆ.

FISSIDENS Hedw.

Bryoidium C.M.

FISSIDENS (*Bryoidium*) AMBLYOTHALLIOIDES Broth. et Watts,
sp.nov.

Dioicus; gracilis, cæspitosus, cæspitibus densiusculis, pallide viridibus, opacis; *caulis* usque ad 7 mm. longus, cum foliis c. 1.5 mm. latus, laxiuscule foliosus, simplex vel parce ramosus; *folia* sicca homomalla, apice circinato-incurva, humida strictiuscula, erecto-patentia, infima minuta remota, superiora multo majora, ovato-lanceolata, acuta, marginibus apice minutissime serrulatis, limbata, limbo angustissimo, in parte basilari laminæ dorsalis deficiente, lamina vera ad medium folii evanida, lamina dorsali ad basin nervi enata, ibidemque angustata, nervo sat tenui, infra summum apicem folii evanido, cellulis minutissimis, rotundato-hexagonis, sublævibus. Cætera ignota.

Gully, south of King's (n.153, 157, 178, 145, 163); North Head (n.494 ex p.); edge of sideling on way to King's (n.102); paddock at north end of Island (n.78); Dinner "Run" (n.327).

Species habitu speciebus minoribus Sect. *Amblyothallia* similis, foliis dense areolatis, limbo in parte basilari laminæ dorsalis deficiente notabilis.

F. DIETRICHIE C.M.

Gully at back, and south, of "The Pines," and in open gully south of King's.

Aloma C.M.

FISSIDENS (*Aloma*) SUBTENELLUS Broth. et Watts, sp.nov.

Autoicus; tenellus, cæspitosus, cæspitibus laxiusculis, viridibus, opacis; *caulis* brevissimus, infima basi fusco-radiculosus, dense foliosus, simplex; *folia* pauci-juga, erecto-patentia, stricta, linearia,

breviter acuminata, acuta, usque ad 1.5 mm. longa et medio 0.2 mm. lata, marginibus minutissime crenulatis, elimbata, lamina vera ad medium folii producta, lamina dorsali ad basin nervi enata ibidemque angustata, nervo crassiusculo, infra summum apicem folii evanido, cellulis rotundato-hexagonis, 0.010-0.012 mm., pellucidis, papilla media humili instructis; *seta* c. 3 mm. alta, tenuissima, rubella; *theca* minuta, erecta, ovalis, pallida; *operculum* recte rostratum; *calyptra* mitræformis, operculum obtegens, scabra.

Track above sugarcane back of Paton's (n.56); back of Gower Wilson's (n.60 ex p.).

Species *F. tenello* Hook. fil. et Wils. valde affinis, sed foliis minutissime crenulatis, cellulis minutius papillosis dignoscenda.

FISSIDENS (Aloma) TENELLIFORMIS Broth. et Watts, sp.nov.

Species præcedenti affinis, sed foliis usque ad 2.5 mm. longis, nervo crassiore, plus minusve longe excedente, cellulis minoribus, papilla media altiore instructis diversa.

On earth, Northern Hills (n.209, 221, 223).

F. TENELLUS, H.f.W.

Gully at back of Henderson's.

Amblyothallia C.M.

F. ARBOREUS Broth.

Erskine Valley; Black Face, etc., Mt. Lidgbird; "Run," Scaly Bark; and Northern Hills.

F. (Amblyothallia) LONGILIGULATUS Broth. et Watts, sp.

Robustiusculus, gregarie crescens, saturate viridis, opacus; *caulis* fertilis c. 5 mm., sterilis usque ad 1.5 cm. longus, cum foliis c. 2 mm. latus, infima basi fusco-radiculosus, dense foliosus, simplex vel furcatus; *folia* multijuga, subæqualia, sicca plerumque apice circinato-incurva, humida erecto-patentia, stricta, e basi oblonga elongate et anguste ligulata, obtusiuscula vel obtusa, marginibus apice minutissime crenulatis, elimbata, lamina vera ad medium folii producta, lamina dorsali ad basin nervi enata ibidemque rotundata, nervo crasso, lutescente, infra summum apicem folii evanido, cellulis minutissimis, rotundato-hexagonis, valde chlorophyllosis; *seta* terminalis, c. 3 mm. alta, tenuis,

pallide rubra; *theca* inclinata, asymmetrica, ovalis, sicca deoperculata sub ore paulum constricta, pallida; *operculum* ignotum; *calyptra* ignota.

On trees, Mt. Gower (n.382, 525).

Species *F. arboreo* Broth., affinis, sed foliorum forma, nervo crasso cellulisque minoribus optime diversa.

F. (Amblyothallia) WATTSII Broth., sp.nov.

Tenellus, gregarie crescens, glaucoviridis, opacus; *caulis* vix ultra 3 mm. longus, cum foliis c. 1·7 mm. latus, strictus, infima basi fusco-radiculosus, dense foliosus, simplex; *folia* infima remota, minuta, superiora raptim multo majora, 5-7 juga, sicca et humida erecto-patentia, stricta, linearia, lanceolato-acuminata, acutissima, marginibus crenulatis, elimbata, lamina vera ad medium folii producta, lamina dorsali ad basin nervi enata ibidemque angustata, nervo crassiusculo, continuo vel subcontinuo, cellulis rotundato-hexagonis, 0·007-0·010 mm., pellucidis. Cætera ignota.

Northern Hill (n.224); Dinner Run (n.337); "Run," Scaly Bark (n.515, 518); Stone, Intermediate Hill (n.136).

Species pulchella, tenella, foliis strictis, linearibus, lanceolato-acuminatis faciliter dignoscenda.

F. (Amblyothallia) ARCUATULUS Broth. et Watts, sp.nov.

Tenellus, cæspitosus, cæspitibus laxis, sordide viridibus, opacis; *caulis* usque ad 5 mm. longus, cum foliis c. 1·2 mm. latus, infima basi fusco-radiculosus, dense foliosus, simplex; *folia* omnia æqualia, usque ad 15 juga, sicca homomalla, humida stricta, erecto-patentia, arcuatula, anguste linearia, breviter acuminata, acuta, marginibus minutissime crenulatis, elimbata, lamina vera ad medium folii producta, lamina dorsali ad basin nervi enata ibidemque angustata, nervo tenuisculo, albido, infra apicem folii evanido, cellulis rotundato-hexagonis, minutissimis; papillois, subobscuris. Cætera ignota.

On ground beyond Robins' farm (n.118).

Species præcedenti affinis, sed statura minore, caule æqualiter folioso, foliis arcuatulis, breviter acuminatis, nervo tenuiore, cellulis subobscuris optime diversa.

CALYMPERACEÆ.

SYRRHOPODON Schwgr.

S. PLATYCERII Mitt.

Found at only one spot (up the slope at the back of Johnson's), and a mere scrap (n.114).

POTTIACEÆ.

HYMENOSTOMUM R.Br.

HYMENOSTOMUM sp.ster.

Second open gully, south of King's (n.183).

WEISIA Hedw.

W. FLAVIPES H.f.W.

Northern Look-Out; and second open gully, south of King's.

TORTELLA (C.M.) Limpr.

T. SUBFLAVOVIRENS Broth. et Watts, sp.nov.

Dioica; gracilis, cæspitosa, cæspitibus densis, læte viridibus, inferne fuscescentibus, nitidiusculis; *caulis* erectus, vix ultra 1 cm. longus, fusco-radiculosus, dense foliosus, dichotome ramosus vel simplex; *folia* sicca circinato-crispata, humida patentia, carinato-concava, e basi albicante, adpressa breviter lanceolato-lineararia, obtusa, mucronata, usque ad 3 mm. longa, marginibus erectis, integerrimis, nervo crasso breviter excedente, dorso albido, nitido, cellulis minutissimis, dense verrucosis, opacis, basilaribus oblongis, teneris, hyalinis, utrinque ad marginem laminae brevi spatio adscendentes; *seta* 1-1.5 cm. alta, tenuissima, rubra, apice lutescens; *theca* erecta, minuta, cylindrica; *annulus* 0; *peristomium* rubrum, papillosum, cruribus oblique positus, haud contortis; *operculum* cellulis in seriebus subobliquis positus.

Sandy Cliff by Flagstaff (n.300, 174); rocks near Wilson's (n.84, 83); Blenkenthorp's Beach (n.524); rocks by sea, Johnson's (n.108); stone-border, Wilson's Garden (n.502 ex p.); on rocks, Middle Beach (n.106), etc.

Species *T. flavovirens* (Bruch.) Broth., valde affinis.

Very plentiful on rocks and sandy soil near the sea, on all sides of the Island. The only good fruiting specimen was found

on sandy ground, near the Flagstaff. This plant was, earlier, confused with Hampe's *Trichostomum cirrhatum*, from Western Australia.

BARBULA Hedw.

B. CALYCINA Schwgr.

Northern Hills.

TORTULA Hedw.

T. BAILEYI Broth.

Northern Hills, on rocks and in rock-crevices; also on rocks below Wilson's, close to the water.

GRIMMIACEÆ.

GLYPHOMITRIUM Brid.

G. COMMUTATUM (C.M.) Broth.

On rocks, Northern Look-out; Northern Hills and North Head; very plentiful. I did not find it in the south of the Island (W.W.W.).

G. HOWEANUM (Hpe.) Broth.

Top of Northern Hills; also on Mt. Gower.

GRIMMIA Ehrh.

G. CAMPESTRIS Burch.; *G. leucophæa* Grev.; *G. leiocarpa* Tayl.

Northern Hills; Northern Look-out; and North Head.

G. PULVINATA (L.) Sm., var. *OBTUSA* (Brid.) Br. Eur.; *G. cygnicollis* Tayl.

Second gully south of King's; and on top of Northern Hills.

ORTHOTRICHACEÆ.

MACROMITRIUM Brid.

M. BREVISETACEUM Hampe.

Plentiful on trees on the coastal flats; also found on the Northern Hills, and on Transit and Intermediate Hills, but I have no specimens from Mounts Lidgbird and Gower.

M. PERARISTATUM Broth.

Mt. Gower. A remarkably fine species.

M. SUBBREVICAULE Broth. et Watts, sp.nov.

Species *M. brevicauli* Besch., foliorum structura valde affinis, sed statura robustiore oculo nudo jam dignoscenda. Sporogonia ignota.

Growing mostly on cliffs at North Head and on the Northern Hills (n.236, 239, 478, 504, 507).

MACROMITRIUM sp., ster.

Northern Look-out.

FUNARIACEÆ.

FUNARIA Schreb.

F. HYGROMETRICA (L.) Sibth.

Scarce; found at North Head, and on the ground near Dignam's.

BRYACEÆ.

BYRUM Dill., emend. Schimp.

Areodictyon C.M.

BYRUM (*Areodictyon*) **DIVERSINERVE** Broth. et Watts, sp.nov.

Dioicum; gracilescens, cæspitosum, cæspitibus densis, mollibus, pallide viridibus, opacis; *caulis* erectus, usque ad 1.5 cm. longus, basi fusco-radiculosus laxiuscule foliosus, simplex; *folia* sicca adpressa, humida patentia, carinato-concava, oblonga, breviter acuminata, acuta, marginibus erectis vel suberectis, integris, nervo crassiusculo, infra summum apicem folii evanido, cellulis teneris, laxis, rhomboideis vel oblongo-hexagonis, marginalibus elongatis, angustis, limbum angustissimum efformantibus, basilaribus rectangularibus. Cætera ignota.

Sea-cliff, Middle Beach (n.105); Northern Hills (n.283); gully, south of King's (n.190).

Species *Br. Wildii* Broth., affinis, sed foliis breviter acuminatis, nervo crassiore dignoscenda.

Argyrobryum C.M.

B. ARGENTEUM L.

Mt. Gower and Dignam's garden.

Var. **NIVEUM** H.f.W.

Top of Northern Hills.

Var. **LANATUM** Br.Eur.

Wilson's garden (border of footpath); and North Head.

Doliolidium C.M.

BRYUM (*Doliolidium*) *ÆQUICOLLUM* Broth. et Watts, sp.nov.

Dioicum; gracile, cæspitosum, cæspitibus compactis, pallide viridibus, ætate lutescenti-viridibus sericeo-nitidis; *caulis* erectus, cum innovationibus usque ad 1 cm. vel paulum ultra longus, fusco-tomentosus, densiuscule foliosus, in axillis foliorum propagulis gemmiformibus instructus, innovationibus binis, breviusculis, erectis, æqualiter foliosis; *folia* erecto-patentia, carinato-concava, breviter ovato-lanceolata, aristata, marginibus erectis vel angustissime revolutis, apice minutissime denticulatis, nervo crasso, in aristam rigidam, lævem excedente, cellulis haud incrassatis, rhomboideis vel oblongo-hexagonis, basilaribus brevioribus, subrectangularibus, marginalibus angustis, limbum uniseriatum, indistinctum efformantibus; *seta* 1-1.5 cm.; tenuissima, flexuosa lutescenti-rubra; *theca* subnutans, cum collo subventricosus, sicco ruguloso, sporangii longitudinis oblongo-ovatis, fusco-rubra; operculum convexum, mammillatum.

Among rocks one mile south of King's (n.207); open gully south of King's (n.147d, 213a); Mt. Gower (n.360, 408); also Northern Hills, and sea-cliff, Middle Beach.

Species *Br. pachythecæ* C. Müll., affinis, sed collo nec sporangio crassiore nec basi impresso jam dignoscenda.

B. CORONATUM Schwgr., f. ROBUSTA.

Mt. Gower.

B. (*Doliolidium*) *PHILONOTIDEUM* Broth. et Watts, sp.nov.

Dioicum; gracile, cæspitosum, cæspitibus compactis, lutescenti-viridibus, nitidiusculis; *caulis* erectus, cum innovationibus usque ad 1.5 cm. longus, fusco-tomentosus, dense foliosus, propagulis gemmiformibus axillaribus instructus, innovationibus binis, brevibus, æqualiter foliosis; *folia* erecto-patentia, carinato-concava, ovato-lanceolata, aristata, marginibus anguste revolutis, apice serrulatis, nervo crassiusculo, in aristam elongatam, serrulatam excedente, cellulis anguste rhomboideis vel oblongo-hexagonis, basilaribus laxioribus, breviter rectangularibus. Cætera ignota.

Rocks, Blenkenthorp's Beach (n.526).

Species *Br. æquicollo* affinis, sed foliis angustioribus, nervo

longius aristato, cellulis superioribus angustioribus dignoscenda, habitu *Philonotidis*, unde nomen.

B. SUBATROPURPUREUM C.M.

On sandy ground in front of "The Pines," in large quantities.

Alpiniformia Kindb.

B. (Alpiniformia) LIMBIFOLIUM Broth. et Watts, sp. nov.

Dioicum; gracilescens, cæspitosum, cæspitibus densis, viridibus, opacis; *caulis* procumbens vel adscendens, fusco-radiculosus, dense foliosus, parce et vage ramosus; *folia* sicca suberecta, humida patentia, elongate oblonga, breviter acuminata, mucronata, c. 2 mm. longa et c. 0.57 mm. lata, marginibus erectis, integris, nervo crasso, breviter excedente; cellulis oblongo-hexagonis vel rhomboideis, haud incrassatis, marginalibus linearibus, limbum pluriseriatum efformantibus, basilaribus rectangularibus. Cætera ignota.

Growing in the drip of a waterfall at the head of the "Dinner Run" on the eastern side of Mt. Lidgbird.

Species distinctissima, foliis angustis, late limbatis, nervo breviter excedente facillime dignoscenda.

Rosulata C.M.

B. (Rosulata) HOWEANUM Broth. et Watts, sp. nov.

Dioicum; gracilescens, cæspitosum, cæspitibus densis, viridibus, inferne fuscescentibus, nitidiusculis; *caulis* erectus, cum innovationibus c. 2 cm. longus, fusco-tomentosus, dense foliosus, innovando ramosus; *folia* sicca spiraliter contorta, humida erecto-patentia, carinato-concava, inferiora remotiuscula, minora, sæpe destructa, apicalia in rosulam dense congesta, e basi breviter et late spathulata ovalia, acutiuscula, aristata, marginibus fere ad apicem revolutis, apice minutissime serrulatis, haud limbata, nervo crassiusculo, superne sensim tenuiore, in aristam elongatam, strictam, integram excedente, cellulis ovali-hexagonis, basilaribus rectangularibus. Cætera ignota.

North Head (n. 500, 501, 503, 510).

Species *Br. Billardierii* Schwægr., affinis, sed foliis siccis spiraliter contortis, nervo in aristam longam excedente optime diversa.

B. LEPTOTHECIUM Tayl.

Many parts of the Island, sometimes typical, but mostly in various forms, including "forma foliis acuminatis argute serratis." (at back of Gower Wilson's, plentiful).

B. (Rosulata) LEPTOTHECIOIDES Broth. et Watts, sp. nov.

Dioicum; gracilescens, cæspitosum, cæspitibus densis, viridibus, nitidiusculis; *caulis* erectus, cum innovationibus 5-7 mm. longus, fusco-tomentosus, dense comoso-foliosus, innovando-ramosus; *folia* sicca plus minusve distincte spiraliter contorta, humida erecto-patentia, carinato-concava, comalia e basi breviter et late spathulata ovalia, acutiuscula, aristata, marginibus fere ad apicem anguste revolutis, apice minute serrulatis, limbata, nervo crassiusculo, superne sensim tenuiore, in aristam elongatam, strictam, integram excedente, cellulis laxis, oblongo-hexagonis, in medio folii 0.05-0.06 mm. longis et c. 0.015 mm. latis, basilaribus subrectangularibus, marginalibus elongatis, angustis, limbum lutescentem, 2-3 seriatum efformantibus; *seta* usque ad 3 cm. alta, rubra; *theca* subnutans e collo sporangio æquante oblonga, macrostoma, fusca.

Rocks by sliprails south of Robins' farm (n.100); gully south of King's, base of Mt. Lidgbird (n.151, 152, 162, 176, 180); Blenkenthorp's Beach (n.489, 526); Northern Hills (n.235a, 284a); rock and soil back of Gower Wilson's (n.66); North Head (n.491, 494, 506a).

Species habitu formis minoribus *Br. leptothecio* similis, sed foliis nervo longe excedente cellulisque laxis optime diversa.

RHODOBRYUM.

R. LEUCACANTHUM Hampe.

North Head; gully south of King's; Mt. Gower.

LEPTOSTOMACEÆ.

LEPTOSTOMUM R.Br.

L. MACROCARPUM (Hedw.) R.Br.

Eastern face of Mt. Lidgbird; Saddle Back; Mt. Gower.

RHIZOGONIACEÆ.

MESOCHÆTE Lindb.

M. UNDULATA Lindb.

Dinner Run (n.336).

BARTRAMIACEÆ.

PHILONOTIS Brid.

PH. JARDINI (Besch.) Broth.

In "Run," Erskine Valley (n.453, 455, 463). Previous record: Tahiti.

PH. PSEUDOMOLLIS (C.M.) Jæg.

Gully, south of King's; Dinner Run; Soldier's Creek, etc.

In addition to the typical plant (several nos.), one or more "forms" were collected in the places named.

PH. TENUIS (Tayl.) Jæg.

Black Face, Mt. Lidgbird; Erskine Valley; face, eastern side of Mt. Lidgbird; Mt. Gower.

POLYTRICHACEÆ.

CATHARINEA Ehrh.

C. MUELLERI Hpe. et C.M.

Top of Mt. Gower.

ii. Group **Pleurocarpi.**

SPIRIDENTACEÆ.

SPIRIDENS Nees.

S. MUELLERI Hampe.

Growing mostly on the stems of tree-ferns on the top of Mt. Gower, in large quantities. It is one of the most striking and handsome mosses in the world, especially when seen in its native state.

ECHINODIACEÆ.

ECHINODIUM Jur.

E. HISPIDUM (H.f.W.) Jæg.

Dinner Run; Mt. Gower; etc. Plentiful on the top of the mountain.

E. PARVULUM Broth. et Watts, sp.nov.

Dioicum; tenellum, cæspitosum, cæspitibus laxis, rigidis, saturate viridibus, opacis; *caules secundarii* conferti, usque ad 2 cm. longi, inferne simplices, dein pinnatim ramosi, ramis patentibus, usque ad 1.5 cm. longis, densiuscule foliosis, simplicibus vel parce ramulosis; *folia* sicca crispulo-falcatula, humida falcatula, e basi late ovata subraptim ligulata, breviter lanceolato-acuminata, acuta, c. 2 mm. longa et basi c. 0.57 mm. lata, marginibus inferne late subrecurvis, apice minutissime serrulatis vel subintegris, nervo crasso, infra summum apicem folii evanido, cellulis minutis, incrassatis, subrotundis, pellucidis. Cætera ignota.

In "Run" above "Scaly Bark," Mt. Lidgbird (n.517).

Species *E. umbroso* (Mitt.), valde affinis, sed ramificatione foliisque basi latioribus, brevius acuminatis, cellulis pellucidis dignoscenda.

PTYCHOMNIACEÆ.

P T Y C H O M N I O N H.f.W.

P. ACICULARE (Brid.) Mitt.

Top of Mt. Gower.

NECKERACEÆ.

P T E R O B R Y E L L A (C.M.) C.M.

P. PRÆNITENS (Hpe.) C.M.

Saddle Back and slopes below, especially on eastern side.

T R A C H Y L O M A Brid.

T. WATTSII Broth., sp.nov.

Dioicum; robustum, cæspitosum, cæspitibus densis, læte viridibus, sericeo-nitidis; *caulis primarius* rhizomaticus, fusco-tomentosus; *caules secundarii* congesti, usque ad 7 cm. longi, corpuscula filiformia, articulata, fusca gerentes, dense et complanate foliosi, basi simplices, dein irregulariter pinnatim ramosi, ramis patentibus, vix ultra 2 cm. longis, complanatis, dense foliosis, simplicibus, obtusis; *folia* infima adpressa, squamæformia, sæpe destructa, cætera erecto-patentia, sicca erectiora, concava, elongate oblonga, sensim breviter lanceolato-acuminata, breviter subulato-acutata, subula semitorta, marginibus erectis, superne minute

serrulatis, nervo simplici, basi crassiusculo, superne multo tenuiore, ultra medium folii evanido, cellulis anguste linearibus, basilariibus laxioribus, abbreviatis, inter se porosis, alaribus haud diversis; *bractea perichætii* erectæ, e basi vaginante, plicata, sensim lanceolato-subulatæ, superne minute serrulatæ; *seta* c. 2 cm. alta, rubra; *theca* erecta, oblongo-cylindrica, fusca; *peristomium* destructum.

Mt. Gower (n.357).

Species pulcherrima, cum nulla alia commutanda.

E U P T Y C H I U M Schimp.

E. MUCRONATUM Hpe.

Slopes of Mts. Lidgbird and Gower.

E. ROBUSTUM Hpe.

Slopes and top of Mt. Gower.

W E Y M O U T H I A Broth.

W. MOLLIS (Hedw. as *Leskea*) Broth.

Mt Gower.

B A R B E L L A (C.M.) Fleisch.

B. ENERVIS (Thwait. et Mitt.) Fl.; *Neckera trichophoroides* Hpe.,
fid. Fleisch.

Upper slopes and top of Mt. Gower.

O R T H O R R H Y N C H I U M Reichdt.

O. ELEGANS (H.f.W.) Reichdt.

Mt. Gower (n.369, 395, 416).

T H A M N I U M Bryol. eur.

TH. GRACILLIMUM (Hpe. as *Rhizogonium*).

Erskine Valley; Mt. Gower; gully at back of "The Pines," etc.

C A M P T O C H Æ T E Reichdt.

C. DEFLEXA (Wils.) Jæg.

Eastern side of Mt. Lidgbird; Mt. Gower.

C. GRACILIS (H.f.W.).

On rocks above Robins' farm; Mt. Gower.

C. VAGA (Hsch.) Broth.

Top of Mt. Gower.

ENTODONTACEÆ.

ENTODON C.M.

E. PANCHERIANUS Besch.

Very plentiful on the slopes of the Northern Hills (on wet rocks); and near the Northern Look-out; also on Mt. Gower.

Previous record : New Caledonia.

HOOKERIACEÆ.

DISTICHOPHYLLUM D. et M.

D. LONGICUSPES Broth.

Erskine Valley; Dinner Run; Mt. Gower.

PTERYGOPHYLLUM Brid.

PT. HEPATICÆFOLIUM (Hpe. et C.M.) Jæg.

Dinner Run; Erskine Valley; Mt. Gower.

PT. NIGELLUM (H.f.W.) Jæg.

Mt. Gower.

HYPOPTERYGIACEÆ.

CYATHOPHORUM Palis.

C. BULBOSUM (Hedw.) C.M.

Top of Mt. Gower.

HYPOPTERYGIUM Brid.

H. MUELLERI Hpe. et C.M.

Dinner Run; gully south of King's, etc.

RHACOPILACEÆ.

RHACOPILUM Palis.

RH. CONVOLUTACEUM Hpe.

Several localities, including the top of Mt. Gower.

f. ROBUSTA.

Robins' Swamp (n.138 and 306).

RH. PACIFICUM Besch.

On rocks by Wilson's boat-shed, mixed with a *Tortula* (n.82).

Previous record : New Caledonia, Samoa, Tahiti.

LESKEACEÆ.

THUIDIUM Br. eur.

TH. CYMBIFOLIUM (D. et M.) Br. jav.

Top of Mt. Gower (n.362, 377, 388, 425).

TH. FURFUROSUM (H.f.W.) Jæg., var.

Open gully south of King's.

THUIDIUM (Thuidiella) TRACHYPODIOIDES Broth. et Watts, sp.nov.

Autoicum; gracillimum, cæspitosum, cæspitibus densis, viridissimis, opacis; *caulis* elongatus, repens, per totam longitudinem hic illic fusco-radiculosus, laxè foliosus, bipinnatim ramosus; *folia caulina* erecto-patentia, e basi hastato-ovata lanceolato-subulata, marginibus erectis, integris, nervo crassiusculo, in apice evanido, cellulis minutis, angulato-rotundatis, pellucidis, levibus; *folia ramulina* sicca subincurva, humida, erecto-patentia, ovato-ovalia, obtusa, marginibus late recurvis, crenulatis, nervo pallido, longe infra apicem folii evanido, cellulis minutis, rotundatis, valde chlorophyllosis, papillosis, obscuris; *bractee perichætii* internæ erectæ, ovato-lanceolatæ, in subulam elongatam, filiformem sensim attenuatæ, longe et dense fimbriatæ, apice minute denticulatæ; *seta* brevis, tenuis, rubra, scaberrima. Cætera ignota.

On coral rocks, gully behind "The Pines" (n.287, 289, 293, 537); south of King's, open gully (n.164) and creek (n.171); top of Mt. Gower (n.389).

Species *Th. trachypodo* (Mitt.) habitu simillima, sed bracteis perichætii longe fimbriatis dignoscenda.

HYPNACEÆ.

Hylocomieæ.

CTENIDIUM (Schimp.) Mitt.

C. PUBESCENS (H.f.W.) Broth.

Face of Mt. Lidgbird; Mt. Gower.

Stereodontææ.

ECTROPOTHECIUM Mitt.

E. HOWEANUM Broth. et Watts, sp.nov.

Autoicum; gracilescens, cæspitosum, cæspitibus densiusculis, depressis, viridissimis, nitidis; *caulis* elongatus, repens, per

totam longitudinem fusco-radiculosus, dense pinnatim ramosus, ramis patulis, densiuscule foliosis, vix ultra 5 mm. longis, valde complanatis, cum foliis c. 1.5 mm. latis, obtusis; *folia* concaviuscula, *caulina* patentia, lanceolata, breviter acuminata, marginibus erectis, superne minute serrulatis, nervis binis, brevissimis, cellulis elongatis, angustissimis, levissimis, basilaribus infimis brevioribus et laxioribus, alaribus haud diversis, *ramea* patentia, superiora indistincte falcata, brevius acuminata, argutius serrata; *bractea perichaetii* internæ e basi vaginante subsensim longe lanceolato-subulatæ, superne serrulatæ; *seta* c. 2 cm. alta, tenuissima, lutescenti-rubra; *theca* nutans, ovalis, sicca deoperculata sub ore vix constricta, pallide fusca; *operculum* ignotum.

On rocks in deep gully at back of "The Pines," July, 1911, (n.530, 533).

Species *E. leucochloro* affinis, sed ramis valde complanatis, foliis breviter acuminatis, patentibus nec falcatis oculo nudo jam dignoscenda.

E. LEUCOCHLORON (Hpe.).

Very plentiful throughout the Island, on the lower levels.

STEREODON (Brid.) Mitt.

S. CHRYSOGASTER (C.M.) Mitt.

Top of Mt. Gower; and in Erskine Valley.

ACANTHOCLADIUM Mitt.

A. EXTENUATUM (Brid.) Mitt.

Top of Mt. Gower.

Plagiothecieæ.

ISOPTERYGIUM Mitt.

I. CANDIDUM (C.M.) Jæg.

Frequent on the lower levels.

I. HOWEANUM Broth. et Watts, sp. nov.

Autoicum; robustiusculum, cæspitosum, cæspitibus densiusculis, depressis, lutescenti-viridibus, nitidis; *caulis* elongatus, repens, per totam longitudinem fusco-radiculosus, dense foliosus, dense pinnatim ramosus, ramis complanatis, vix ultra 5 mm. longis, obtusis; *folia* homomallula, concaviuscula, ovato-lanceo-

lata, subulato-acuminata, marginibus erectis, superne minutissime denticulatis, enervia, cellulis anguste linearibus, basilaribus infimis multo brevioribus et laxioribus, alaribus haud diversis; *bracteæ perichaetii* internæ e basi vaginante, raptim longe subulatae, subula denticulata; *seta* 1·5-2 cm. alta, tenuissima, lutescenti-rubra; *theca* nutans, oblongo-ovalis, sicca deoperculata sub ore paulum constricta, pallide fusca; *operculum* breviter et obtuse rostratum.

On rotten log, back of Johnson's (n.112).

Species distinctissima, ab *I. candido* statura multo robustiore, seta elongata thecaque nutante raptim dignoscenda.

CATAGONIUM (C.M.) C.M.

C. POLITUM (H.f.W. as *Hypnum*) Broth.

Top of Mt. Gower.

VESICULARIA (C.M.) C.M.

V. MONTAGNEI (C.M.).

On wet rocks, Dinner Run (n.320); and Run, Scaly Bark (n.520).

SEMATOPHYLLACEÆ.

RHAPHIDOSTEGIUM (Br. eur.) De Not.

RH. CONTIGUUM (H.f.W.) Par.

Throughout the Island; plentiful.

RH. (Cupressinopsis) SUBFALCATULUM Broth. et Watts, sp.nov.

Autoicum; gracilescens, cæspitosum, cæspitibus densiusculis, depressis, mollibus, lutescentibus, nitidis; *caulis* elongatus, repens, per totam longitudinem fusco-radiculosus, dense foliosus, pinnatim ramosus, ramis vix ultra 3 mm. longis, patentibus, complanatis, obtusis; *folia* indistincte falcata, concava, e basi oblongo-lanceolata sensim in acumen elongatum piliforme attenuata, marginibus erectis vel angustissime recurvis, apice serrulatis, enervia, cellulis angustissime linearibus, levissimis, alaribus magnis, oblongis, vesiculosus, fusco-aureis; *bracteæ perichaetii* internæ e basi vaginante in subulam elongatam, argute serratam sensim attenuatae; *seta* c. 1·5 cm. alta, tenuissima, rubra, levissima; *theca* horizontalis, minuta, ovalis, sicca deoperculata sub ore vix contracta, pallide fusca; *operculum* longe rostratum.

On rotten log, Intermediate Hill (n.134, 135); Creek above Johnson's (n.122); gully at back of Henderson's (n.131); Mt. Gower (n.370, 400); top of Mt. Gower (n.364a).

Species *Rh. callidioidi* (C. Müll.), affinis, sed statura robustiore foliisque indistincte falcatulis oculo nudo jam dignoscenda.

TRICHOSTELEUM (Mitt.) Jæg.

T. MUSCICOLUM Broth.

Several places on the slopes of Mts. Lidgbird and Gower; also on the top of Mt. Gower, and in Erskine Valley.

BRACHYTHECIACEÆ.

OXYRRHYNCHIUM (Br. eur.) Warnst.

O. HOWEANUM Broth. et Watts, sp. nov.

Synoicum; robustiusculum, cæspitosum, cæspitibus densiusculis, rigidis, læte viridibus, dein fuscescenti-viridibus, nitidis; *caulis* elongatus, repens, flexuosus, plus minusve fusco-radiculosus, laxè foliosus, pinnatim ramosus, ramis patulis, laxiuscule et complanate foliosis, vix ultra 1 cm. longis, simplicibus, singulis longioribus, attenuatulis, parce ramulosis; *folia caulina* erecto-patentia, e basi ovata sensim in acumen lanceolato-subulatum attenuata, marginibus erectis, ubique serrulatis, nervo crassiusculo, superne multo tenuiore, ad $\frac{3}{4}$ folii longitudinis vel ultra producto, cellulis angustissime linearibus, basilaribus infimis brevioribus et laxioribus, alaribus, haud diversis; *folia ramea* oblongo-ovata, breviter acuminata, argute serrata, nervo longiore, apice dentiformiter exstante; *bractee perichaetii* internæ albidæ, e basi vaginante sensim lanceolato-subulatæ, subintegre; *seta* c. 2 cm. alta, fuscescenti-rubra, scabriuscula; *theca* subnutans, ovalis, sicca deoperculata sub ore constricta, fusca; *operculum* breviter et crasse rostratum.

Mt. Gower, 2,800 p. (n.376, 392).

Species *O. remotifolio* (Grev., Hook. fl. et Wils.) affinis, sed seta scabriuscula jam dignoscenda.

RHYNCHOSTEGIELLA (Br. eur.) Limpr.

R. MURICULATA (H.f.W.) Broth., forma.

Mt. Gower, mixed with *Ctenidium pubescens*.

R. (Eurhynchostegiella) CAMPYLIODES Broth. et Watts, sp.nov.

Autoica; gracilis, cæspitosa, cæspitibus densis, læte viridibus, nitidiusculis; *caulis* elongatus, repens, parce fusco-radiculosus, divisus, divisionibus irregulariter pinnatim ramosis, dense foliosis; *folia* squarroso-patula, concaviuscula, e basi subhastato-ovata lanceolato-subulata, marginibus erectis, subintegris, nervo tenui ad medium folii evanido, cellulis linearibus, apice palillose exstante, alaribus sat numerosis, laxis, oblongis, hyalinis. Cætera ignota.

Swampy ground, open gully, south of King's (n.201).

Species *Rh. muriculatæ* (Hook. fil. et Wils.) affinis, sed foliis squarroso-patulis, e basi subhastato-ovata lanceolato-subulatis, subintegris, optime diversa.

RHYNCHOSTEGIUM Br. eur.

RH. TENUIFOLIUM (Hedw.) Jæg.

* Mt. Gower; western base of Mt. Lidgbird; North Head, etc.

Var. HOWEANUM Broth. et Watts, var.nov.

Foliis latioribus, densius areolatis, seta plerumque longiore.

Very plentiful at the back of Gower Wilson's; also found in Robins' Swamp.

Supplementary Notes by Rev. W. W. Watts.

The preceding pages record exclusively the species collected by myself in 1911. I have made no attempt to determine how many of these species are new records, but the following notes may be of service.

1. Collectors from the Melbourne Herbarium were apparently first in the field; and Mitten's "Catalogue of Australian Mosses" (1882) mentions 16 species, collected by Milne, McGillivray, Fullagar, and Lind. The new species recorded in the Catalogue are based on Hampe's "Species muscorum novæ ex herbario Melbourneo Australiæ," published in *Linnæa*, Vol. xxxviii. (1874), viz., *Brachystelium Howeanum* (*Glyphomitrium*), *Macromitrium brevisetaceum*, *Rhodo-Bryum leucacanthum*, *Spiridens Muelleri*, *Euptychium mucronatum*, *E. robustum*, *Neckera trichophoroides*

(*Barbella enervis*), *Drepano-Hypnum leucochlorum* (*Ectropethecium*), and *Dendro-Hypnum prænitens* (*Pterobryella*).

All these are included in my collection.

In addition, Mitten's "Catalogue" records *Syrrhopodon Platycerii* Mitt., *Macromitrium Tongense* Sull., *Bryum Billardieri* Schwgr., and *B. Commersonii* Brid., *Rhaphidostegium contiguum* H.f.W., *Plagiothecium Howeanum* C.M. (*Hypnum*), and *Isopterygium molliculum* Sull., (*H. Norfolkianum*; *H. nitidulum* Hpe. et C.M.).

Of these, *Macromitrium Tongense*, the two *Brya*, *Plagiothecium Howeanum*, and *I. molliculum*, are not represented in my collection.

I question the occurrence of *M. Tongense*, *Bryum Billardieri* and *Commersonii*, and *I. molliculum*.

2. In 1887, Mr. Thomas Whitelegge collected a few specimens on the Island, and the resulting list (determined by Dr. Brotherus) was published in these Proceedings (1892, Vol. vii., p.277).

Mr. Whitelegge's list includes the following, as new species: *Macromitrium peraristatum*, *Bryum Whiteleggei*, *Distichophyllum leucoloma* (apparently an error for *D. longicuspes*), *Trichosteleum muscicolum*, *Campylopus bartramioides* (*Dicranoloma*), *Leucobryum pseudo-candidum*, and *Fissidens howeanus*. Of these new species, *M. peraristatum*, *D. longicuspes*, *D. bartramioides*, *L. pseudo-candidum*, and *T. muscicolum* were published by Dr. Brotherus in "Some new Species of Australian Mosses," Part ii., 1893.

Mr. Whitelegge's list records two species which I did not find, viz., *Rhizogonium parramattense* C.M., and *Thuidium protensulum* C.M. Nor did I find the two undescribed species, *Bryum Whiteleggei* and *Fissidens howeanus*.

3. A few species were also brought to Sydney by Mr. J. H. Maiden, and Messrs. Hedley and Dun, but without any addition being made to previous lists.

4. *Tortella cirrhata* (Hpe.) is recorded for Lord Howe Island in the Melbourne Herbarium, but *T. cirrhata* belongs to Western Australia. The Lord Howe Island moss is a new species, *T. subflavovirens*.

5. *Catharinea semilamellosa* C.M., "Symbolæ" (1897), must be merged in *C. Muelleri*.

6. In the Sydney Herbarium, there is an interesting *Papillaria* (!*P. intricata* Mitt.) marked "Lord Howe Island, 26." I regard this as due to some error. I did not find any trace of *Papillaria* on the Island. Similarly, there is a specimen of *Macromitrium Dæmelii* C.M., marked "Lord Howe Island, 25," which must also be regarded with grave doubt. *Rhaphidostegium aciculum* C.M., is also recorded for Lord Howe Island, but this is, almost certainly, *Rh. contiguum*.

7. *Entodon pallidus* Mitt., has been recorded for the Island, but I did not find it.



Brotherus, V. F. and Watts, William Walter. 1915. "The mosses of Lord Howe Island." *Proceedings of the Linnean Society of New South Wales* 40, 363–385.
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