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# The Mosses of Juan Fernandez Islands

HAROLD ROBINSON



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Juan Fernandez Islands

*Harold Robinson*

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## ABSTRACT

Robinson, Harold. The Mosses of Juan Fernandez Islands. *Smithsonian Contributions to Botany*, number 27, 88 pages, 1975.—Keys and descriptions are presented for the mosses of Juan Fernandez Islands. A total of 129 species are recognized in 73 genera and 32 families. Thirty-three of the species (about 25 percent) are endemic. Four new combinations are provided: *Amphidium tortuosum*, *Calypstrochaeta grandiretis*, *C. leptoloma*, and *Diplostichum jamesonii*.

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# The Mosses of Juan Fernandez Islands

*Harold Robinson*

## Introduction

The Juan Fernandez Islands comprise one of the remote island groups of the Southeastern Pacific that are under the administration of Chile. The islands are located near 34° S latitude and 80° W longitude, about 400–500 miles off the west coast of South America. Juan Fernandez consists of three islands: Mas a Tierra, to the east, with about 36 square miles and elevations to 3000 feet; the small island of Santa Clara, off the southwest tip of Mas a Tierra; and Mas Afuera, about 100 miles to the west, with 33 square miles and elevations to 5415 feet. Mas a Tierra is the island on which Alexander Selkirk was stranded for many years. The islands have a moist, temperate climate and rough terrain with some areas rather inaccessible. The flora is known to contain many interesting and endemic plants, including one endemic family of higher plants.

The present study is the third major effort on the moss flora of Juan Fernandez. The two previous studies, by Brotherus (1924) and Bartram (1957), were based primarily on the collections of Carl and Inga Skottsberg (Sk), first from the 1916–1917 expedition and later from the 1954–1955 expedition. Information from other collections, including those of Dr. C. Bertero (B), Mr. E. C. Reed, and Prof. Skottsberg in 1908 are summarized by Brotherus. Later collections by Baron Benkt Sparre (Sp) and Mr. Günther Kunkel (K) are included in the study by Bartram. From his study Bartram

concluded that 150 species occurred on the island, with 46 of the species (about 30 percent) endemic.

A number of factors have contributed to the present revision of the moss flora of Juan Fernandez. Foremost are the collections obtained during the 1965 expedition sponsored by the National Science Foundation, with participants Raymond Hatcher (H), John Engel (E), Henry Imshaug (I), and Frederick Meyer (M). Further collections by Mr. Kunkel have also been obtained for identification through the kindness of Dr. Schultz-Motel and the Botanisches Museum at Berlin-Dahlem (B). At the conclusion of the study a very large loan of the original Skottsberg collections was obtained through the kindness of Dr. Elsa Nyholm and others at the Naturhistoriska Riksmuseum of Stockholm (S), and a few types were available from the Laboratoire de Cryptogamie, Museum National d'Histoire Naturelle (PC), through the kindness of Mme. Allorge and Mme. Jovet-Ast. Some duplicates of the Skottsberg collections distributed by Brotherus have been available in the U. S. National Herbarium. Many changes brought to light in the production of the *Index Muscorum* (Wijk et al., 1959–1969) are included here along with some findings of subsequent work, such as the studies of Zander (1972), Smith (1971), and Vitt and Crosby (1972). Three new species discovered in the present study, *Fissidens ornaticostatus*, *Dicranoloma kunkelii*, and *Sematophyllum kunkelii*, along with new combinations in *Thamnobryum* and *Achrophyllum* have been published separately (Robinson, 1974). General use has been made of moss treatments for two floristically related areas: Sainsbury (1955a) for New Zealand and Vitt (1974) for Campbell Island.

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The present treatment recognizes 129 species from Juan Fernandez, of which 33 are endemic. The moss flora of the islands has most species in common with the mainland of Chile, but there are a few anomalous elements. Combined on the islands are some species from far south in Chile, such as *Rigodium hylacomiooides*, with some from much farther north in South America, such as *Leptodontium pungens*. The genus *Cyrtodon* represents the most unusual type of distribution, being an element in common with the New Zealand area but not found on the much closer mainland of South

America.

The sequence of families in the following treatment is according to the revised classification by Robinson (1971). The citation of specimens is modified to include the code given above for the many collectors and herbaria. Herbaria are indicated in parentheses; and the specimens are in the U. S. National Herbarium unless otherwise indicated. Portions of the Berlin specimens are retained in the U. S. National Herbarium. Of the types listed in synonymy, only those indicated by the symbol "(!)" have been seen.

### Key to Genera

1. Leaves ornamented with or thickened by lamellae or crowded ridges on adaxial surface ..... 2
  2. Plants dendroid, profusely branched; marginal lamina bistratose ..... *Dendroligotrichum*
  2. Plants not dendroid, stems not branched; marginal lamina unistratose ..... 3
    3. Leaves with sharply demarcated, broader sheathing base; capsule with 2 sharp angles; peristome with 64 teeth ..... *Polytrichadelphus*
    3. Leaves without sharply demarcated sheathing base; capsule without angles; peristome with 32 teeth ..... 4
      4. Upper leaf margins not incurved; lamellae mostly restricted to costa, lamellae without differentiated marginal cells; capsule erect, cylindrical ..... *Oligotrichum*
      4. Upper leaf margins incurved; lamellae on costa and adjacent lamina, marginal cells of lamellae papillose; capsule oblique with narrowed mouth ..... *Notoligotrichum*
1. Leaves without lamellae or crowded ridges on adaxial surface ..... 5
  5. Leaves strictly and regularly in 2 rows on most stems ..... 6
    6. Leaves with clasping basal laminae distinct from vertical apical lamina ..... *Fissidens*
    6. Leaves simple, without distinct or partially discontinuous apical lamina ..... *Diplostichum*
  5. Leaves inserted in more than 2 rows, bases at least partially offset toward dorsal or ventral surfaces of stem ..... 7
    7. Plants without creeping or frondose habit; stems mostly erect with most branching from just beneath apical perichaetia ..... 8
      8. Leaves without midrib ..... 9
        9. Leaves without differentiated alar cells; capsule opening by lateral slits ..... *Andreaea*
        9. Leaves with highly differentiated alar cells; capsules with operculum ..... *Eucauptodon*
    8. Leaves with distinct midrib ..... 10
      10. Leaf with lax, smooth, thin-walled cells throughout upper part and most of lower part, sometimes with distinct narrow cells along margin ..... 11
        11. Leaves lanceolate to narrowly lanceolate, widest in basal fourth; capsules erect ..... 12
          12. Leaf bordered, entire ..... *Daltonia*
          12. Leaf not bordered, subentire to serrulate ..... 13
            13. Perichaetium apical; peristome double; leaves in dense, short-stemmed tufts ..... *Orthodontium*
            13. Perichaetium lateral; peristome single; leaves mostly imbricated on longer stems ..... *Mielichhoferia*
  11. Leaves ovate to obovate, usually widest above basal third; capsules strongly inclined to pendant ..... 14
    14. Leaves obovate, without distinct border ..... *Funaria*
    14. Leaves ovate or with distinct border ..... 15
      15. Coarse, pale plants with elongate stems; capsule inclined, short and broad ..... *Philonotis*



15. Small or dark plants with usually short stems; capsule pendant, narrow ..... *Bryum*
10. Leaf with short, dense, papillose or thick-walled cells in upper part; without distinct border of narrow cells on upper margin ..... 16
16. Leaf with costa broad, nearly filling upper part, not mamillose or papillose ..... 17
17. Leaves without differentiated alar cells; seta straight ..... *Ditrichum*
17. Leaves often with differentiated alar cells; seta usually sinuous ..... *Campylopus*
16. Leaf with costa narrow and not filling most of upper lamina, or mamillose or papillose ..... 18
18. Alar cells highly differentiated, forming prominent auricles ..... 19
19. Costa mamillose on back ..... *Chorisodontium*
19. Costa smooth on back ..... *Dicranoloma*
18. Alar cells not highly differentiated or sharply demarcated ..... 20
20. Vegetative leaves small, scalelike, appressed; capsules sessile, without differentiated operculum ..... *Pleuroidium*
20. Vegetative leaves small to large, with spreading or contorted tips; capsules with short to long setae, with distinct operculum ..... 21
21. Leaves broadly oblong or oblong-ovate, with costa in abrupt apical mucro or hair-point ..... 22
22. Leaf cells papillose ..... *Tortula*
22. Leaf cells smooth ..... 23
23. Costa in short mucro; capsules ribbed ..... *Leptotheca*
23. Leaf with long hair-point; capsules not ribbed ..... 24
24. Hair-point hyaline; leaves not contorted when dry; seta cygneous ..... *Grimmia*
24. Hair-point not hyaline; leaves slightly contorted when dry; seta straight ..... *Leptostomum*
21. Leaves ovate to narrowly oblong or lanceolate, without costa in abrupt apical mucro or hair-point ..... 25
25. At least lower cells of leaf narrow with closely sinuous walls ..... *Rhacomitrium*
25. Lower cells of leaf without distinctly sinuous walls ..... 26
26. Upper leaf cells elongate, usually with papillae at upper or lower ends or both ends ..... 27
27. Upper leaf abruptly narrowed from sheathing hyaline base ..... *Bartramia*
27. Upper leaf not abruptly narrowed from sheathing hyaline base ..... 28
28. Costa partially merging with bi-tristratose lamina in upper part of leaf; plants with single subfloral innovations; capsules erect and smooth ..... *Anacolia*
28. Costa discrete in upper part of leaf; plants with whorls of subfloral innovations; capsules inclined to pendant, ribbed ..... 29
29. Leaves rather lustrous, partially plicate; all but marginal leaf cells linear ..... *Breutelia*
29. Leaves not lustrous, not plicate; at least basal leaf cells not linear ..... *Philonotis*
26. Upper leaf cells mostly rounded to subquadrate, smooth or with papillae over lumens ..... 30
30. Inner basal cells narrow with very thick walls, outer basal cells short and thinner-walled ..... *Ulota*
30. Inner basal cells not thicker-walled than outer basal cells ..... 31
31. Leafy stems with prominent red tomentum ..... *Zygodon*
31. Leafy stems without prominent red tomentum except at base ..... 32

32. Leaves without papillae .....33
33. Leaves regularly and sharply serrate above middle; perichaetia lateral; peristome double .....  
..... *Rhizogonium*
33. Leaves irregularly serrate or serrulate to entire; perichaetia apical; peristome single .....34
34. Leaves mostly lingulate, strongly crisped when dry; peristome teeth simple, undivided .....  
..... *Rhabdoweisia*
34. Leaves distinctly lanceolate to ovate; mostly erect to flexuous when dry; peristome teeth cleft .....35
35. Leaves spreading from a distinct erect sheathing base .....*Oncophorus*
35. Leaves without prominent distinct erect sheathing base .....36
36. Leaves entire with incurved margins; calyptra mitrate; capsule not ribbed .....  
..... *Ptychomitrium*
36. Leaves usually serrulate, margins slightly to strongly reflexed; calyptra cucullate; capsule ribbed or sulcate when dry .....37
37. Basal leaf cells subquadrate to short-oblong; seta mostly reddish to purple; peristome teeth cleft to base into long, narrow segments, without striations .....*Ceratodon*
37. Basal leaf cells 3-4 times as long as wide; seta yellow; peristome teeth cleft to middle, with striations .....  
..... *Dicranella*
32. Leaves papillose .....38
38. Leaf cells with single simple papillae; capsules subglobose, becoming more oblong when dry; peristome double .....*Philonotis scabrifolia*
38. Leaf cells with many papillae or with complex papillae; capsules cylindrical or arcuate; peristome single or lacking .....39
39. Leaf margins slightly to distinctly incurved ..  
.....40
40. Plants yellowish green; leaves narrowly lanceolate; peristome teeth short-lanceolate or lacking .....*Weisia*
40. Plants dark green; leaves oblong-lanceolate; peristome teeth erect, narrow, bifid ..  
..... *Trichostomum*
39. Leaf margins plain or recurved .....41
41. Leaves entire, blunt or obtuse .....  
..... *Gymnostomum*
41. Leaves distinctly few- to many-toothed, sharply acute .....42
42. Leaves with papillae strictly cuticular, mostly elongate, appearing as short lines on surface; capsules ribbed when dry; peristome lacking .....*Amphidium*
42. Leaves with normal papillae, rounded or appearing C-shaped; capsules not ribbed; peristome present .....43



43. Plants reddish green; stems with central strand *Bryoerythrophyllum*
43. Plants yellowish green with only rhizoids reddish; stems lacking central strand ..... *Leptodontium*
7. Plants with mostly creeping or frondose habit, often profusely branched in vegetative parts; creeping stems sometimes hidden under crowded, erect branches ..... 44
44. Costae short, double, or lacking ..... 45
45. Leaves transversely undulate ..... *Neckera*
45. Leaves not transversely undulate ..... 46
46. Alar cells not differentiated ..... 47
47. Leaves with border of narrow cells ..... *Calyptrochaeta*
47. Leaves without distinct border ..... 48
48. Plants not complanate-foliolate ..... 49
49. Leaves usually longitudinally plicate or rugose; capsules ribbed ..... *Ptychomnion*
49. Leaves smooth; capsules smooth ..... *Lepyrodon*
48. Plants mostly complanate-foliolate; leaves not distinctly plicate or rugose ..... 50
50. Leaves pseudodistichous, margins entire ..... *Catagonium*
50. Leaves obviously in more than two rows, margins serrulate to serrate ..... 51
51. Robust plants; leaves broadly elliptical, short-acute ..... *Schimperobryum*
51. Slender plants; leaves lanceolate, very narrowly acute ..... *Isopterygium*
46. Alar cells differentiated ..... 52
52. Leaf tip mostly rounded, usually concave, sometimes slightly produced ..... 53
53. Alar cells inflated, thin-walled, hyaline; leaves only slightly concave ..... *Acrocladium*
53. Alar cells not inflated, rather thick-walled, yellowish; leaves very strongly concave ..... *Weymouthia*
52. Leaf tip short- to long-acute or piliferous, not concave ..... 54
54. Plants brittle when dry; cuticle on backs of leaves forming a thick ceramic covering; leaf tips rather abruptly piliferous ..... *Rhacocarpus*
54. Plants not noticeably brittle when dry; cuticle not forming a ceramic covering; leaf tips not abruptly piliferous ..... 55
55. Leaves somewhat keeled to faintly costate in upper part; perichaetia apical; capsules erect; peristome single, spores multicellular ..... *Eucamptodon*
55. Leaves not keeled or costate in upper part; perichaetia lateral; capsules inclined to arcuate; peristome double; spores unicellular ..... 56
56. Basal row of alar cell group forming a distinct series of 3 or 4 cells; leaves erect-spreading to slightly falcate-secund; operculum long-rostrate ..... *Sematophyllum*
56. Basal row of alar cells not distinct; leaves strongly falcate-secund; operculum conical ..... *Hypnum*
44. Costae single and reaching midleaf or beyond ..... 57
57. Stems with dorsal leaves distinctly smaller than lateral leaves ..... 58
58. Leafy stems prostrate; leaves without border of narrow cells ..... *Rhacopilum*
58. Leafy stems rather dendroid, frondose on distinct, erect stipes; leaves with distinct border of narrow cells ..... 59
59. Fronds subpinnately branched, erect; seta papillose; capsule suberect ..... *Lopidium*
59. Fronds rather palmately branched, reflexed on stipe; seta smooth; capsule inclined to pendant ..... *Hypopterygium*
57. Stems with dorsal leaves not distinctly smaller than lateral leaves ..... 60
60. Lower leaf cells and sometimes all leaf cells narrow with thickened, closely sinuous walls ..... *Rhacomitrium*

60. Lower leaf cells without thickened, closely sinuous walls ..... 61
61. Upper leaf cells rounded with thick walls, often bulging; perichaetia terminal on leafy branches; leafy stems and branches never complanate ..... 62
62. Leafy stems slender; leaves appressed when dry, not contorted; leaf cells rounded or oval throughout most of lamina ..... *Macrocoma*
62. Leafy stems not slender; leaves slightly to strongly contorted when dry; leaves with distinct linear basal cells ..... *Macromitrium*
61. Upper leaf cells angular to elongate, smooth or papillose; perichaetia in lateral buds; leafy stems and branches sometimes complanate ..... 63
63. Leaf cells papillose ..... 64
64. Leaf cells elongate, papillae in series on cell surface; leaves tightly appressed when dry ..... *Papillaria*
64. Leaf cells mostly isodiametric, papillae not in series; leaves not tightly appressed when dry ..... 65
65. Stems without paraphyllia; leafy stems and branches complanate-foliate ..... *Pinnatella*
65. Stems with distinct paraphyllia; leafy stems and branches not complanate-foliate ..... *Thuidium*
63. Leaf cells not papillose ..... 66
66. Plants forming distinct, pinnately branched fronds ..... 67
67. Leaf tips rounded; fronds curling when dry ..... *Leptodon*
67. Leaf tips acute to sharply acuminate; fronds not curling when dry ..... 68
68. Costa of leaf with series of teeth abaxially toward tip; capsule ribbed ..... *Hypnodendron*
68. Costa of leaf not toothed on back; capsule not ribbed ..... 69
69. Leafy stems and branches never complanate-foliate; alar region with many short subquadrate cells ..... *Rigodium*
69. Leafy stems and branches sometimes complanate-foliate; alar cells indistinct ..... 70
70. Leaf cells mostly elongate; costa up to 3/4 of leaf length ..... *Porothamnium*
70. Leaf cells mostly rounded or oval; costa reaching near or to leaf apex ..... *Thamnobryum*
66. Plants not forming distinct, pinnately branched fronds ..... 71
71. Leaves at least partially bordered with elongate cells ..... 72
72. Leaf border multistratose; coarse, often aquatic plants ..... *Sciaronium*
72. Leaf border with cells unistratose in 1-3 rows; rather delicate, often epiphytic plants ..... 73
73. Leaves lanceolate; peristome teeth without median furrow on outer surface; erect, tufted plants ..... *Daltonia*
73. Leaves broadly elliptical to obovate; peristome teeth with median furrow on outer surface; plants mostly complanate-foliate ..... *Distichophyllum*
71. Leaves without distinct border of elongate cells ..... 74
74. Leaf cells mostly isodiametric, mostly 25-80  $\mu\text{m}$  in diameter ..... *Achrophyllum*
74. Leaf cells mostly distinctly longer than wide ..... 75
75. Alar region with numerous subquadrate to transversely elongate cells in many radiating series ..... *Cyrtodon*
75. Alar region without great numbers of subquadrate cells in many radiating series ..... 76
76. Leaves completely entire ..... *Catagoniopsis*
76. Leaves slightly to sharply serrulate ..... 77
77. Mature leaves distinctly longitudinally plicate; leaf cells distinctly thickened and porose ..... *Lepyrodon*
77. Leaves not plicate; leaf cells without thick porose walls ..... 78



78. Leafy stems and branches not complanate; leaf cells about 3 times as long as wide; operculum conical ..... *Amblystegium*  
 78. Leafy stems and branches complanate; leaf cells 5–10 or more times as long as wide; operculum long-rostrate ..... *Rhynchostegium*

## ANDREAEACEAE

### Genus *Andreaea*

Blackish mosses in cushions 1–3 cm high. Leaves usually densely imbricate, often fragile. Sporophyte on pseudopodium, capsule opening by 4–6 vertical slits. Calyptra mitrate, thin, lacerate at the base.

The specific limits followed are those given by Roivainen and Bartram (1937) and Green (1968). A single species is recognized from the islands.

### *Andreaea alpina*

*Andreaea alpina* Hedw., Sp. Musc. 49, 1801. [Original material: Wales, coll. Dillen.]

*Andreaea naumannii* C. Müll., Bot. Jahrb. 5:76, 1883. [Original material: Kerguelen, coll. Naumann.]

*Andreaea squamata* C. Müll., Bot. Jahrb. 5:77, 1883. [Original material: Kerguelen, coll. Naumann.]

Plants blackish, about 1 cm high. Stems sparsely branching. Leaves 0.8 mm long, 0.4–0.5 mm wide, strongly panduriform with lower half sheathing, upper half slightly spreading with incurved tips, apices distinctly and rather abruptly long-attenuate; lower margin with distinct crenulations from projecting cell tips; ecostate; cells of lower lamina narrow and elongate with thick, reddish lateral walls, mostly 10  $\mu$ m wide, up to 25  $\mu$ m long, marginal cells sometimes paler; upper cells oval, mostly 10  $\mu$ m wide and 15  $\mu$ m long, aligned longitudinally and obliquely. Perichaetium long-sheathing, inner leaves 2.0 mm long. Capsule with 4 valves split to the base.

MAS AFUERA: Correspondencia Camp, 3800 ft, *H. & E.* 52; trail to Los Inocentes, ca. 3000 ft, *H. & E.* 567.

The collections cited represent the first collections of the genus *Andreaea* from Juan Fernandez. The species is widely distributed in northern Europe, South Africa, southern South America, and the subantarctic islands.

## POLYTRICHACEAE

### Genus *Oligotrichum*

Medium-sized, erect, mostly unbranched, yellowish to dark green plants in loose tufts, rhizoids on basal part. Lower leaves small, upper leaves large, lingulate to oblong-lanceolate, margins singly or doubly serrate; costa rather narrow; abaxial surface often with rudimentary lamellae, adaxial surface with few high, longitudinal lamellae mostly restricted to costa; lamina unistratose, most cells subquadrate to rounded, rather smooth, lower cells more elongate, alar not distinct. Dioicous. Perichaetia and perigonia apical. Setae elongate, smooth. Capsules erect, not angled, with stomates, without well-developed annulus; peristome teeth ca. 32, formed as slender, close, high undulations of basal membrane many cells thick, teeth interlocking with margin of epiphragm at top of columella. Operculum rostrate. Calyptra cucullate with a few hairs near tip.

### *Oligotrichum canaliculatum*

*Oligotrichum canaliculatum* (Hook. & Arn.) Mitt., J. Linn. Soc., Bot. 12:606, 1869.

*Polytrichum canaliculatum* Hook. & Arn., Bot. Capt. Beechey's Voyage 54, 1832. [Original material: Concepción (Chile), coll. Lay, October 1825.]

*Polytrichum molinae* Mont., Ann. Sc. Nat. Bot. ser. 3, 4:102, 1845. [Original material: Southern Chile, coll. Gay.]

*Pogonatum liliputanum* Thér., Rev. Chil. Hist. Nat. 21:16, 1917. [Original material: Los Perales, Marga-Marga (Chile), coll. Costes.]

Small, often scattered plants with stems 2–5 mm high. Leaves rather crisped when dry, erect-spreading when moist, ca. 4 mm long, 1.5 mm wide, oblong-elliptical with acute apex, margin entire, distal margin erect to slightly incurved; abaxial surface smooth; costa 50–100  $\mu$ m wide above, bearing in distal half adaxially ca. 14–25 lamellae 4–7 cells high, those with more lamellae bearing some on adjacent lamina; lamella margin entire but often

undulate, cells ca. 12  $\mu\text{m}$  in diameter, marginal row not distinct; median and upper cells of lamina mostly 12–20  $\mu\text{m}$  wide, 10–20  $\mu\text{m}$  long, irregularly rounded-hexagonal, smooth, walls thickened at corners; cells near margin more than 10–12  $\mu\text{m}$  wide and 8–12  $\mu\text{m}$  long, with slightly thicker walls and traces of cuticular papillae; leaf base often narrower than blade, lower cells progressively larger, mostly 15–20  $\mu\text{m}$  wide, 25–50  $\mu\text{m}$  long, near base 75–100  $\mu\text{m}$  long, near margin smaller and thicker-walled, mostly 12  $\mu\text{m}$  wide, 25  $\mu\text{m}$  long. Setae 10–25 mm long, yellowish to reddish; capsule 2–3 mm long, up to 1 mm wide, cylindrical; operculum ca. 2 mm long. Spores 15–20  $\mu\text{m}$ , minutely papillose.

MAS AFUERA: Correspondencia Camp, 3300 ft, *M. 3403*; Q. Mono, *H. & E. 537*.

MAS A TIERRA: Near summit of Portezuelo de Villagra, 1725 ft, *M. 9656d*.

The species occurs in Juan Fernandez and southern South America.

### Genus *Notoligotrichum*

Rather small to medium-sized, erect, unbranched, yellowish to dark green or brownish plants in loose tufts, rhizoids on basal part. A few lower leaves very small, mature leaves oblong-ovate to broadly elliptical, tip broadly lanceolate-acute to broadly rounded, margins serrulate to entire, upper margin incurved; costa broad to rather narrow; lamellae numerous, low, and crowded or few and high, restricted to adaxial surface of costa and adjacent bistratose part of lamina; upper lamina narrow or broad, unistratose in nonlamellose parts, cells smooth, rounded to subquadrate, cells of the scarcely broader leaf base narrowly rhomboidal to rectangular, alar not distinct. Dioicous. Perichaetia and perigonia apical. Setae elongate, smooth. Capsule very broad with a small mouth, usually inclined to horizontal, asymmetric, often bilaterally compressed, smooth or slightly angled, with stomates, without well-developed annulus; peristome teeth lacking or as 32 slender, irregular, undivided projections. Operculum rostrate. Calyptra cucullate, bare or with sparse hairs.

### *Notoligotrichum minimum*

*Notoligotrichum minimum* (Card.) G. L. Smith, Mem. New York Bot. Gard. 21 (3):51, 1971.

*Polytrichadelphus minimus* Card., Bull. Herb. Boiss. ser. 2, 5:1008, 1905. [Original material: Tierra del Fuego; Bahía Tekenika, coll. Skottsberg n. 135.]

*Psilopilum minimum* (Card.) G. L. Smith, Bull. Torrey Bot. Club 96:67, 1969.

Stems to 1 cm tall. Leaves somewhat incurved, contorted when dry, erect-spreading when moist; lower leaves ovate to broadly lanceolate, acuminate, 1.5–2.0 mm long, to 0.8 mm broad; mature leaves to 3 mm long, base 1 mm broad, subula to 2.0 mm long and 0.8 mm broad, base oblong to oblong-elliptical, subula broadly lanceolate, apex short-acute, margin entire; costa subpercurrent, ca. 150  $\mu\text{m}$  wide below, becoming broader above, 30–40 lamellae 3–4 cells high, borne adaxially on costa and adjacent bistratose lamina; lamella margins entire, cells quadrate 12–17  $\mu\text{m}$  in diameter, marginal row papillose but the same shape; outer lamina unistratose with cells rounded to subquadrate mostly 12  $\mu\text{m}$  wide and 12–20  $\mu\text{m}$  long, thick-walled; cells of upper leaf base similar but slightly larger; most cells of base short-rectangular, 12–17  $\mu\text{m}$  wide, 25–60  $\mu\text{m}$  long, rather thin-walled, 1–2 rows of somewhat more hyaline cells along lower margin ca. 10  $\mu\text{m}$  wide, 50–75  $\mu\text{m}$  long. Perichaetial leaves only slightly differentiated, to 3.5 mm long with basal half sheathing, shoulders of sheath sometimes indistinctly serrulate. Setae 1.5–2.5 cm long, reddish brown. Capsule inclined to horizontal, urn broadly ovate, to 5 mm long by 3 mm wide, not angled, mouth narrowed to ca. 1 mm wide, exothecial cells irregularly hexagonal, smooth; stomata superficial, confined to basal series; peristome teeth 32, of varying length, very narrow, acute, basal membrane as high as teeth, to 50  $\mu\text{m}$ . Operculum rostrate to near half as long as urn. Calyptra pilose with short hairs at apex. Spores ca. 20  $\mu\text{m}$  in diameter, minutely, densely papillose.

MAS AFUERA: Los Torres, *Sk. 469* (not seen).

Smith (1968) has established the identity of the specimen on the basis of the portion deposited at the New York Botanical Garden. The specimen was originally determined by Brotherus as *P. trichodon* (Hook. f. & Wils.) Mitt. (= *P. antarcticum* (C. Müll.) Par.), a species supposedly differing by the crenulate nonpapillose margins of its lamellae. *Notoligotrichum minimum* is known only from Fuegia and Juan Fernandez.



## Genus *Polytrichadelphus*

Medium-sized to large, erect, mostly unbranched, dark green to brownish plants in loose tufts, rhizoids on basal part. Lower leaves small, mature leaves with broad sheathing bases abruptly narrowed to a linear-lanceolate subula; margin of subula slightly serrate to ciliate; costa broad, nearly filling subula, upper surface covered with low, crowded longitudinal lamellae; abaxial surface smooth or with spines distally; upper lamina narrow, unistratose, cells mostly subquadrate or rounded, smooth; cells of leaf shoulders short; basal cells narrowly rhomboidal to linear, alar cells not distinct. Dioicous. Perichaetia and perigonia apical. Setae elongate, smooth. Capsules erect to inclined, usually 2-angled, sulcate on one side, with stomates, without well-developed annulus; 64 peristome teeth. Operculum rostrate. Calyptra cucullate, with a few hairs near tip.

### *Polytrichadelphus magellanicus*

*Polytrichadelphus magellanicus* (Hedw.) Mitt., J. Linn. Soc., Bot. 4:97, 1859.

*Polytrichum magellanicum* Hedw., Sp. Musc. 101, 1801. [Original material: Straits of Magellan, coll. *Commerson*, 1767.]

*Catherinea innovans* C. Müll., Bot. Zeit. 9:548, 1851. [Original material: Tasmania, coll. *Mossman*, 1850.]

*Polytrichadelphus horridus* Mitt., J. Linn. Soc., Bot. 4:98, 1859. [Original material: Hermite Island, Cape Horn, coll.

*J. D. Hooker*; Sandy Point, Magellan, coll. *Lechler n. 1163*;

Falkland Isl., *J. D. Hooker*, 1839-1843, and *Lechler n. 97*.]

*Catherinea australasiaca* Hampe, Linnaea 40:315, 1876. [Original material: Eastern Australia, coll. *Eaves*.]

*Polytrichum ruahinicum* Col., Trans. New Zealand Inst. 18: 282, 1886. [Original material: New Zealand, east slope Ruahine Mt. Range, Waipawa Co., coll. *H. Hill*, Nov. 1885.]

*Polytrichum polycarpum* Col., Trans. New Zealand Inst. 19: 276, 1887. [Original material: New Zealand, east base of Ruahine Mt. Range, Hawke's Bay Co., coll. *A. Hamilton*, 1885.]

*Catherinea lagenacea* C. Müll., Hedwigia 36:338, 1897. [Original material: Marydale, Tasmania, coll. *Weymouth*, Dec. 1891.]

*Catherinea prolificans* C. Müll., Hedwigia 36:339, 1897. [Original material: Mt. Wellington, Tasmania, coll. *J. & B. Gullwer*, 1876.]

Medium-sized to rather large, erect, pale to brownish green plants with stems 2-15 cm high, simple or with few branches. Leaves slightly in-

curved, contorted when dry, erect-spreading from

sheathing base when moist, to 14 mm long, base to 4 mm long and 2.5 mm broad, oblong to broadly elliptical, entire margined; blade linear-lanceolate, ca. 1 mm wide at base, sharply serrate; costa percurrent or shortly excurrent in a red serrate arista, abaxial surface with a few sharp teeth distally; adaxial surface covered by 40-50 lamellae; lamellae 5-8 cells high with crenulate margin, cells 10-12  $\mu\text{m}$  in diameter, marginal cells higher, to 25  $\mu\text{m}$  high, 8-10  $\mu\text{m}$  wide, with thicker outer wall; upper lamina 2-3 cells wide, cells ca. 15  $\mu\text{m}$  wide, 8-20  $\mu\text{m}$  long, subquadrate with rather thick walls, teeth usually with long, sharp, thick-walled apical cell to 75  $\mu\text{m}$  long; base of blade and upper sheath with large area of transversely elongate cells 20-25  $\mu\text{m}$  wide, mostly 8-10  $\mu\text{m}$  long with very thick transverse walls; most cells of sheath elongate, progressively longer and thinner-walled toward base, upper mostly 12-15  $\mu\text{m}$  wide, 40-75  $\mu\text{m}$  long, median to 125  $\mu\text{m}$  long, basal fusiform, mostly 10  $\mu\text{m}$  wide, to 150  $\mu\text{m}$  long. Setae 4-7 cm long, pale brownish. Capsule 3-4 mm long, to 3 mm broad, oval. Peristome membrane not as high as teeth. Operculum ca. 2 mm long. Calyptra with tuft of hairs at apex. Spores 12-17  $\mu\text{m}$  in diameter, very minutely papillose, appearing nearly smooth.

MAS AFUERA: *Carlos Munoz 797*; Camp Correspondencia, 11-1300 m, *Sk. 471*; near Camp Correspondencia, ca. 3800 ft, *H. & E. 439A, 641*; *Q. Mata Maqui* by trail to Camp Correspondencia, 1500 ft, *M. 9400*; Los Innocentes, below summit, ca. 4000 ft, *H. & E. 341, 578, 638*.

The species is known from southern South America, Tasmania, New Zealand, and the Campbell Islands. The New Zealand material that I have seen is generally shorter, more branched, with smaller serrations on the leaves, larger cells in the lamellae, and with marginal cells of the lamellae less distinct.

### Genus *Dendroligotrichum*

Large, erect, branching dendroid, dark green to brownish plants growing singly or in loose clumps, rhizoids on base. Long, unbranched stipes with mostly appressed, scalelike leaves. Upper stem and branch leaves with broad sheathing bases abruptly contracted into linear-lanceolate subulae; margin of subula serrate; costa broad, nearly filling subula, upper surface covered with low, crowded longi-

tudinal lamellae, rudimentary lamellae on abaxial surface; upper lamina narrow, bistratose, cells smooth, subquadrate to rounded, cells of shoulders short, basal cells very narrowly rhomboidal, alar cells not distinct. Dioicous. Perichaetia and perigonia apical on branches, former becoming lateral by innovation. Setae elongate, smooth. Capsules erect, not angled, smooth, with stomates, without well-developed annulus, 64 peristome teeth. Operculum short-rostrate. Calyptra cucullate, bare.

The genus contains two species, with one in Juan Fernandez.

### *Dendroligotrichum dendroides*

*Dendroligotrichum dendroides* (Hedw.) Broth., Nat. Pfl., 1 (3):681, 1905.

*Polytrichum dendroides* Hedw., Sp. Musc. 102, 1801. [Original material: Straits of Magellan, coll. Commerson, 1767.]

*Polytrichum tongariroense* Col., Trans. New Zealand Inst. 20:239, 1888. [Original material: New Zealand, base of Mt. Ruapehu, Tongariro Mt. Range, East Taupo Co., 5400 ft, coll. H. Hill, 1887.]

Very large dendroid plants to 40 cm high, erect and rigid. Stipe to 25 cm long, branches 3–8 cm long, some with 2–3 branches. Stipe leaves ca. 9 mm long, sheathing, yellowish brown, oblong-ovate base, 5 mm long, ca. 2.5 mm wide, margins entire, tapering rather abruptly into very slender, serrate tip ca. 4 mm long, basal cells linear-flexuose with thick lateral walls and very thin transverse and oblique end walls, inner cells 17–18  $\mu\text{m}$  wide, 70–150  $\mu\text{m}$  long, gradually narrower and shorter toward margin, at margin ca. 6  $\mu\text{m}$  wide, 50  $\mu\text{m}$  long, upper margin to 25  $\mu\text{m}$  long; narrow subula with lamellae vestigial to totally lacking, lamina cells rectangular, 6–8  $\mu\text{m}$  wide, 25–50  $\mu\text{m}$  long, only marginal cells with thick outer wall, teeth very sharp and slender. Branch leaves to 11 mm long, sheathing bases oblong, ca. 1.5 mm wide, 2 mm long, margins entire, base of linear-lanceolate subula ca. 0.9 mm wide, margins serrate, cells of base elongate, thin-walled, inner cells 7–10  $\mu\text{m}$  wide,

30–100  $\mu\text{m}$  long, becoming narrower to 5  $\mu\text{m}$  wide at margin; blade slightly curved and contorted when dry, spreading when moist; costa with 2–3 separate layers of guide cells, with up to ca. 50 lamellae 2–4 cells high on adaxial surface, lamella cells nonpapillose, ca. 10  $\mu\text{m}$  in diameter, basal row sometimes 15–71  $\mu\text{m}$  in diameter, marginal row not very distinct; cells of narrow lamina rounded-subquadrate, ca. 10  $\mu\text{m}$  wide, mostly 7–10  $\mu\text{m}$  long, walls slightly thickened; each tooth with 2–3 larger or thicker-walled cells, rather blunt. Setae 3–5 cm long. Capsule 5–6 mm long, sub-cylindrical, exothecial cells not mamillate; peristome teeth on a rather high basal membrane. Spores 10–12  $\mu\text{m}$  in diameter, smooth to very minutely papillose.

MAS AFUERA: *Carlos Munoz 790*; 3000 ft, *Harold Moore 791*; Los Innocentes, below summit, ca. 4000 ft, *H. & E. 442*; Camp Correspondencia, 3800 ft, *H. & E. 121, 118, 429, 736b, 794*.

The species occurs in Chile, Fuegia, Juan Fernandez, and New Zealand. This large and showy plant is often noticed and collected by non-bryologists.

## FISSIDENTACEAE

### Genus *Fissidens*

Plants forming mats with projecting or procumbent leafy branches. Branch leaves distichous; basal half of leaf of paired laminae clasping the stem, apical half single and oriented vertically, being variously decurrent on back of costa; costa usually percurrent or subpercurrent; median leaf cells usually rounded or polygonal. Perichaetia usually terminal. Setae slender. Capsule short-cylindrical, peristome teeth reddish, lanceolate, usually cleft to middle, tips often prominently spirally ridged. Operculum short- to long-rostrate. Calyptra cucullate, bare.

The seven species found in Juan Fernandez are separated by the following key.

### Key to Species of *Fissidens*

1. Leaves with distinct border of elongate cells reaching near or to the tip .....2
2. Cells of leaf border of 1–3 rows in a single stratum ..... *F. fernandezianus*
2. Cells of leaf border very thick, multistratose .....3
3. Small plants with about 2 pairs of leaves; costa projecting in short arista; median cells irregularly polygonal, 8–12  $\mu\text{m}$ , unistratose ..... *F. crassicuspes*



3. Plants with long stems and many pairs of rigid leaves; costa percurrent; median cells subquadrate to short-rectangular, 6-7  $\mu\text{m}$ , bistratose ..... *F. rigidulus*
1. Leaves without distinct border of elongate cells except near base ..... 4
4. Plants 1-5 mm high; leaves 1.0-1.5 mm long; internal cells of costa biseriate, often very obvious from surface view ..... 5
5. Leaf cells with a single large papilla on each side; costa extending into short-acuminate tip; internal cells of costa not prominent from surface view ..... *F. leptochaete*
5. Leaf cells essentially smooth, walls often slightly thickened in centers; costa ending below nonacuminate tip; internal cells of costa very prominent from surface view ..... *F. ornaticostatus*
4. Plants 2-3 cm long; leaves 2-3 mm long; internal cells of costa in 3 or more rows, not obvious from surface view ..... 6
6. Costa reaching 1-3 cells from tip of leaf; end of vaginant lamina usually acute; dorsal lamina reaching base of leaf ..... *F. maschalanthus*
6. Costa ending 4 or more cells from tip of leaf; end of vaginant lamina usually rounded; dorsal lamina usually ending distinctly short of leaf base ..... *F. asplenioides*

### *Fissidens fernandezianus*

*Fissidens fernandezianus* Broth. in Skottsb., Nat. Hist. Juan Fernandez 2:416, 1924. [Original material: V. Anson, Mas a Tierra, c. 250 m, n. 86; Q. Loberia, Mas Afuera, c. 280 m, n. 85; both coll. C. & I. Skottsborg.]

Plants to 1 cm high, leafy branches to 2 mm across. Leaves in 7-10 pairs, secund when dry, largest to 1.5 mm long, 0.4 mm wide, lanceolate-lingulate, apiculate, entire, bordered nearly to tip by narrow, elongate hyaline cells; vaginant lamina reaching  $\frac{3}{5}$  of leaf length, acute, ending near or at margin; dorsal lamina reaching leaf base, rounded at lower end; cells of lamina 5-7  $\mu\text{m}$  in diameter, rounded, smooth on vaginant laminae, mamilliose on upper and dorsal laminae. Sporophyte unknown.

MAS A TIERRA: Q. Plazoleta, 200 m, K. 320/1c, 320/6; near Cumberland Bay, K. 336/1 in part (all B).

The species is endemic to Juan Fernandez. The small plants sometimes grow in sizable mats.

### *Fissidens crassicuspes*

*Fissidens crassicuspes* Broth. in Skottsb., Nat. Hist. Juan Fernandez 2:417, 1924. [Original material: V. Colonial, Mas a Tierra, 435 m, coll. C. & I. Skottsborg n. 26 (St).]

Plants to 3 mm high, leafy branches ca. 2 mm broad. Leaves in ca. 7 pairs, scarcely altered when dry, strict, upper leaves linear-lanceolate, all leaves ending in a short arista; vaginant lamina ca.  $\frac{1}{2}$  leaf length, acute, ending near or at margin, with

distinct incurved margin near tip; dorsal lamina tapering to base of leaf; margins with thick border of multistratose, elongate cells confluent with excurrent costa; cells of lamina 8-10  $\mu\text{m}$  to 12  $\mu\text{m}$  near costa, irregularly polygonal, inner basal cells oblong,  $8 \times 12-15 \mu\text{m}$ , all smooth, unistratose. Sporophyte unknown.

MAS A TIERRA: V. Colonial, Q. Seca, ad terram, 435 m, Sk. 26 in part (type, S).

The species is endemic to Juan Fernandez. The type material seen consisted of a slide bearing three small plants. No sections were possible but careful focusing indicated the lamina is unistratose. The closest relative seems to be *F. rigidulus*.

### *Fissidens rigidulus*

*Fissidens rigidulus* Hook. f. & Wils., Fl. Nov. Zel. 2:61, 1854. [Original material: New Zealand, East Cape, coll. Sinclair; Wellington, coll. Lyall; Auckland, coll. Knight.]

Large, usually somewhat aquatic plants forming coarse mats. Stems to 5 cm high, rigid, dark green. Leaves to 4 mm long, to 0.8 mm wide, acute, strict, slightly twisted when dry; vaginant lamina  $\frac{1}{2}$ - $\frac{2}{3}$  of leaf length; dorsal lamina tapering to leaf base; margin from base with border of multistratose, elongate cells which are confluent apically with percurrent costa; cells of lamina subquadrate to short-rectangular, 6-7  $\mu\text{m}$  in diameter, mostly bistratose. Seta 4-8 mm long. Spores ca. 20  $\mu\text{m}$  in diameter.

MAS AFUERA: Q. Casas, innermost accessible part, H. & E. 356.

MAS A TIERRA: Q. Damajuana, *Sk.* 63; Pangal Falls, *H. & E.* 182; V. Colonial, trail to Portezuelo de Villagra, 240 m, *I.* 37685.

The species is widely distributed in the southern hemisphere, occurring in Australia, Tasmania, New Zealand, the Andes, and southern South America.

### *Fissidens leptochaete*

*Fissidens leptochaete* Dus., *Ark. Bot.* 6 (8):5, 1906. [Original material: Southern Chile, Quiriquina Is. nr. Talcahuanos, coll. *Dusén*, Sept. 20 1896 (S!).]

Plants small with stems ca. 2 mm long. Leafy stems ca. 1.5 mm wide. Leaves in 3–6 pairs, oblong-lanceolate, to 1.4 mm long, 0.27 mm wide, slightly acuminate; vaginant lamina 1/2 length of leaf, acute, ending well in from margin; dorsal lamina tapering to near leaf base; margin sharply crenulate or serrulate, not distinctly bordered, often with elongate, marginal or submarginal cells and large teeth on vaginant lamina; costa percurrent, 27  $\mu$ m broad at base; cells of lamina irregularly polygonal, 8–10  $\mu$ m in diameter, unipapillose; basal cells quadrate to oblong, 10–12  $\mu$ m wide, 12–18  $\mu$ m long, smooth. Perichaetia apical, leaves not noticeably distinct. Setae ca. 6–7 mm long, yellow. Capsule erect, symmetrical, mouth of urn with 4–5 rows of rounded, strongly collenchymatous cells 12  $\mu$ m in diameter, middle cells more mamilllose, urn 0.5 mm long, 0.2 mm wide with wider mouth.

MAS A TIERRA: V. Colonial, Q. Seca, 455 m, *Sk.* 26 in part (S).

The species is known only from southern Chile and Juan Fernandez. The Juan Fernandez specimen was growing mixed with *F. crassicuspes* and the following species.

### *Fissidens ornatocostatus*

*Fissidens ornatocostatus* H. Robinson, *Phytologia* 29 (2):116, 1974. [Original material: V. Colonial, Mas a Tierra, 435 m, coll. *C. & I Skottsberg n. 26* (S!).]

Plants small with stems ca. 1 mm long. Leaves oblong-elliptical, 1.2 mm long, ca. 0.25 mm wide, acute without acumination; vaginant lamina ca. 0.6 mm long, acute, sometimes very short-acute, ending in from margin; dorsal lamina becoming decurrent at base; margin minutely serrulate, near base minutely dentate, not bordered; costa ending 5–6

cells before apex, 25–30  $\mu$ m broad at base; with guide cells prominent and biseriate, 12–25  $\mu$ m wide and 30–70  $\mu$ m long, subbasal guide cells 75–130  $\mu$ m long, cells on both surfaces of costa transparent and narrowly fusiform, 4–5  $\mu$ m wide and 20–40  $\mu$ m long; cells of lamina irregularly polygonal, 8–10  $\mu$ m in diameter, smooth, cells near margin sometimes 6  $\mu$ m in diameter, near costa 12  $\mu$ m in diameter, near base of costa 18–40  $\mu$ m long and 12  $\mu$ m wide, submarginal cells of vaginant lamina mostly elongate to 35  $\mu$ m long. Sporophyte unknown.

MAS A TIERRA: V. Colonial, Q. Seca, 455 m, *Sk.* 26 in part (holotype, S; isotype slide, US).

The species is represented by two stems from a mixture of *F. leptochaete* and *F. crassicuspes*. This one collection is the only one known for the two endemic species and the only known record for *F. leptochaete* from the islands. The single collection with two holotypes is ample evidence of the need for more collecting of the smaller species in Juan Fernandez.

The new species is most closely related to *F. leptochaete* but differs by the very prominent inner cells of the costa, the nonacuminate leaf tip, and the essentially nonpapillose leaf cells. Walls over the cell lumens are often a little thickened in the centers.

### *Fissidens maschalanthus*

*Fissidens maschalanthus* Mont., *Ann. Sc. Nat. Bot. ser. 3*, 4:115, 1845. [Original material: Southern Chile, coll. *Gay* (PC).]

Plants in dense mats with stems to 2 cm long. Leaves in 8 or more pairs, to 3 mm long and 0.4 mm wide, oblong-lingulate, acute, tips somewhat curved when dry; vaginant lamina 1/2–2/3 length of leaf, acute at tip and attachment ending 1/2–2/3 length of leaf, acute at tip and attachment ending 1/3–1/2 way from costa to margin; dorsal lamina tapering or rounded at lower end, ending near leaf base; costa extending within 1–3 cells of apex, mostly straight; margin crenulate to serrulate, margin of vaginant lamina with series of short, rather irregular or oblique, projecting, slightly mamilllose cells, lamina cells smooth, rounded to irregularly polygonal, 8–12  $\mu$ m in diameter, smaller in marginal row, inner basal cells larger, to 25  $\mu$ m long.



MAS A TIERRA: Near Cumberland Bay, Grotten der Verbannten, *K. 336/14a, 336/15a, 336/18b* (all B).

The species is known from central Chile and Juan Fernandez. Review of a number of specimens indicates that there is considerable confusion between this and the closely related *Fissidens asplenioides*. Actually, *F. maschalanthus* can be distinguished by a number of characters including the costa reaching nearer the apex, the vaginant lamina acute apically and not rounded, the dorsal lamina reaching the leaf base, the leaves being less curled when dry, and the cells being smoother and more irregularly polygonal.

### *Fissidens asplenioides*

*Fissidens asplenioides* Hedw., Sp. Musc. 156, 1801. [Original material: Jamaica, coll. Swartz, 1783-1787.]

*Fissidens pycnotylus* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:418, 1924. [Original material: Villagra, Mas a Tierra, ca. 600 m, coll. C. & I. Skottsberg n. 30 (S!).]

Plants in dense mats with stems to 3 cm long. Leaves in 10 or more pairs, 2-3 mm long, to 0.5 mm wide, oblong-lingulate, obtuse or bluntly acute, tips strongly curled when dry; vaginant lamina to 2/3 length of leaf, rounded at tip and ending near the costa; dorsal lamina tapering or rounded at base, ending distinctly above base of leaf; costa ending 4 or more cells below apex, rather sinuous distally; margin crenulate or serrulate, margin of vaginant lamina with many short, oblique, projecting cells; lamina cells 8-10  $\mu$ m in diameter, rounded, mamilllose, inner basal cells larger, to 15 or 20  $\mu$ m, more subquadrate or polygonal, cells of vaginant lamina smooth. Seta 4-5 mm long. Peristome teeth papillose above. Spores 14-16  $\mu$ m in diameter.

MAS AFUERA: Q. Casas, *H. & E. 571*; Q. Mono, *H. & E. 659* in part; Q. Mono, near mouth, ca. 440 m, *H. & E. 740b*.

MAS A TIERRA: Villagra, ca. 600 m, *Sk. 30* (type of *F. pycnotylus*, S).

The species is widely distributed, known from southeastern United States, West Indies, Mexico, Central and South America, Africa, Indonesia, Tasmania, and New Zealand. The species has been reviewed by Crum and Anderson (1965), but two additional features of the vaginant laminae have been noted: the rounded, almost auriculate tips of

the lesser lamina, and the tendency of the lesser laminae to be on different sides of the plant in the different rows of leaves. The type specimen of *F. pycnotylus* seems in no way distinct. Brotherus (1924) compared his species with *F. maschalanthus*, remarking that the costa was much thicker.

## DITRICHACEAE

### Genus *Pleuridium*

Small, erect, pale green plants. Leaves ovate to lanceolate; costa broad, usually subpercurrent. Perichaetia apical. Capsule immersed, inoperculate, without peristome. Calyptra cucullate, bare.

A single species is known from Juan Fernandez.

### *Pleuridium robinsonii*

*Pleuridium robinsonii* (Mont.) Mitt., J. Linn. Soc., Bot. 12: 26, 1869.

*Phascum nervosum* var. *robinsonii* Mont., Ann. Sc. Nat. Bot. ser. 2, 4:96, 1835. [Original material: Mas a Tierra, coll. Bertero, 1830 (PC).]

Small, loose tufts of scattered, erect stems to 5 mm high, pale yellowish. Stems unbranched, julaceous with appressed, small leaves, leaves larger near the fertile tips. Vegetative leaves ca. 0.5 mm long, 0.3-0.4 mm wide, broadly oval, strictly short-acute; distal margins minutely, closely serrulate by projecting ends of narrow, outward pointed cells; costa broad, percurrent, lamina cells 25-40  $\mu$ m long, 7-10  $\mu$ m wide. Perichaetial leaves up to 2 mm long, obovate with long, acuminate tip, costa subpercurrent, median cells to 60  $\mu$ m long, basal cells very enlarged and oblong. Capsule immersed on very short seta, often emerging to one side at maturity, ca. 1 mm long.

MAS A TIERRA: Without precise locality, *O. Jenz n. 36*.

The species is found also in central Chile and in Uruguay. This is the only moss of the inoperculate "pygmy" type known from Juan Fernandez.

### Genus *Ditrichum*

Yellow to dark green tufts or cushions of erect stems 0.5-10.0 cm high. Leaves costate. Perichaetia apical. Setae very long and slender. Capsule cylindrical, smooth or partially sulcate, peristome teeth

of linear halves separate to base. Calyptra cucullate, bare.

The two species known from Juan Fernandez can be distinguished by the following key.

### Key to Species of *Ditrichum*

- Mature setae yellow; leaf tips straight or arching, leaf cells all elongate ..... *D. difficile*  
 Mature setae reddish; leaf tips spirally twisted, upper leaf cells mostly short, rounded or oval ....  
 ..... *D. longisetum*

#### *Ditrichum difficile*

*Ditrichum difficile* (Dub.) Fleisch., Musci Fl. Buitenzorg 1: 300, 1904.

*Trichostomum difficile* Dub. in Moritzi, Syst. Verz. Zoll. Pfl. 134, 1846. [Original material: Java, coll. Zollinger n. 411z, 1842-1848 (PC).]

*Dicranum flexifolium* Hook., Musci Exot. 2:144, 1819, *hom. illeg.* [Original material: Cape of Good Hope, coll. Menzies, 1791 (K).]

*Leptotrichum boryanum* C. Müll., Syn. 1:452, 1848. [Original material: Bourbon Isl., coll. Bory St. Vincent, 1798-1802.]

*Trichostomum laxifolium* Hook. f. & Wils., Fl. Nov. Zel. 2: 72, 1854. [Original material: Bay of Islands, North Island, New Zealand, coll. Colenso.]

Loose, tufted, yellowish green plants 0.5-2.0 cm high, stems usually unbranched. Leaves 3-4 mm long, usually widely spreading and flexuous from a short, oval base, base up to 0.7 mm long; costa flattened, filling upper subula, excurrent and sometimes denticulate at tip; lamina cells narrowly linear, lower cells to 65  $\mu$ m long, 7  $\mu$ m wide, upper cells to 40  $\mu$ m long, 5  $\mu$ m wide. Autoicous, male bud gemmiform, female leaves little differentiated. Setae usually 2-3 cm long, yellow or slightly reddish yellow. Capsule 2-3 mm long, inclined, usually slightly curved with somewhat narrower mouth. Operculum with suberect beak.

MAS AFUERA: Los Innocentes, near summit, ca. 4000-5000 ft, *H. & E.* 353.

MAS A TIERRA: Portezuelo de Villagra, near summit, 1725 ft, *M.* 9656a.

The species is a southern member of the group containing the well known *Ditrichum pallidum* (Hedw.) Hampe. The leaves, with narrow, rather distinct bases, are most like *D. rufescens* (Hampe) Hampe. Distribution extends from southern South America to South Africa, the East Indies, Australia, and New Zealand.

#### *Ditrichum longisetum*

*Ditrichum longisetum* (Lor.) Hampe, Flora 50:182, 1867.

*Leptotrichum longisetum* Lor., Bot. Zeit. 24:186, 1866. [Original material: Coastal Cordillera near Valdivia, Chile, coll. Krause.]

Rigid plants with short stems to 1 cm high, yellowish green above. Leaves ca. 3 mm long, ca. 0.4 mm wide, linear-lanceolate, with tenuous, spirally twisted apices, margins with large teeth near tip; costa filling the linear tip; upper leaf cells rounded-oval, ca. 8  $\mu$ m wide, 10-12  $\mu$ m long, thick-walled; lower cells 6  $\mu$ m wide, 25-50  $\mu$ m long. Autoicous. Setae ca. 2 cm long, red. Capsule erect, esulcate; peristome teeth short and rather pale. Operculum erect.

MAS AFUERA: Los Innocentes, near summit, ca. 4500 ft, *H. & E.* 610.

The species is one of the group distinguished by the spirally twisted leaf tips. The species is known only from south-central Chile and Juan Fernandez.

#### Genus *Ceratodon*

Plants dark green in dense cushions. Leaves oblong to broadly lanceolate, costate; lamina cells mostly subquadrate. Perichaetia apical. Setae long and slender. Capsule inclined to horizontal, ribbed; peristome teeth narrowly triangular, cleft to base with halves joined at nodes. Operculum conical. Calyptra cucullate, bare.

The genus is small, being represented in most of the world by one or two closely related species. A series of more distinctive species has been described from Antarctica, and these are reviewed by Horikawa and Ando (1963). A single species occurs in Juan Fernandez.



### *Ceratodon purpureus*

*Ceratodon purpureus* (Hedw.) Brid., Bryol. Univ. 1:480, 1826.  
*Dicranum purpureum* Hedw., Sp. Musc. 136, 1801. [Original material: Europe.]

Plants with erect stems 0.5–2.0 cm high. Leaves sharply curved when dry, erect-spreading when moist, ovate-lanceolate, 0.8–1.5 mm long, 0.4–0.5 mm wide; margins narrowly but distinctly recurved, distally usually slightly serrate; costa stout, percurrent or slightly excurrent; lamina cells quadrate, smooth, 6–9  $\mu\text{m}$  in diameter. Dioicous. Sporophyte usually reddish to purple. Setae 1.0–2.5 cm long. Capsule nearly horizontal, curved at maturity, slightly strumose, 2.0–2.5 mm long. Spores 10–15  $\mu\text{m}$ .

MAS A TIERRA: Plazoleta del Yunque, 200 m, K. 333/7a (B).

The species is one of the most common in the world, occurring on every continent. Sterile material is often confused with members of the Pottiaceae, but smooth leaf cells and slight serrations near the apex of the leaf are helpful distinctions.

## GRIMMIACEAE

### Genus *Grimmia*

Plants in dense cushions, usually blackish green. Stems erect, sparsely branching. Leaves imbricate, with or without hyaline tips, usually not crisped when dry; costae percurrent; leaf cells with slightly nodulose or sinuous walls, basal cells subquadrate to narrowly rectangular. Perichaetia apical. Setae often short. Capsule ovoid to urceolate; peristome teeth reddish, short-triangular, 2–3 cleft above the middle or cribose, sometimes teeth lacking; operculum mamillate to rostrate. Calyptra usually mitrate, lobate at base, bare.

A single species is known from Juan Fernandez.

### *Grimmia phyllorhizans*

*Grimmia phyllorhizans* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:419, 1924. [Original material: Mas a Tierra, Villagra, coll. C. & I. Skottsberg n. 129.]

Plants in small, dark green cushions, slightly grayish with hyaline leaf tips. Stems to 3 mm high,

sparsely brownish tomentose below. Leaf blades to 1 mm long, oblong to oblong-lanceolate, abruptly constricted at base of hair point; margins erect, entire; hair hyaline, 1.0 mm long, serrulate at tip; costa narrow, disappearing into hair tip; lamina cells unistratose, upper cells 8–10  $\mu\text{m}$  in diameter, subquadrate, smooth, with straight walls; basal cells larger, 10–12  $\mu\text{m}$  wide, 10–17  $\mu\text{m}$  long, with sinuous walls, inner basal cells short-rectangular, 12  $\mu\text{m}$  wide, 20–30  $\mu\text{m}$  long, marginal in 1–4 rows, pellucid, 10  $\mu\text{m}$  wide, 10–17  $\mu\text{m}$  long, with thicker transverse walls. Setae cygneous, 2.5 mm long. Operculum highly convex.

MAS AFUERA: Q. Mono, H. & E. 470.

As presently recognized the species is endemic to Juan Fernandez, but distinctions from other, more widely distributed species are not clear. The species name was inspired by the presence of brownish branching filaments among the leaves. The type specimen has not been seen and no such filaments are produced by the Hatcher and Engel specimen. Filaments of such appearance that occurred in the new collection were the blue-green algal genus *Stigonema*.

### Genus *Rhacomitrium*

Plants in dense, spreading mats with erect branches, dark green or sometimes yellowish. Leaves imbricate, with or without hyaline tips, not crisped when dry; costa usually percurrent; lamina cells with nodulose or sinuous walls, basal cells linear with very sinuous walls. Dioicous. Perichaetia apical. Setae usually elongate. Capsule erect, ovoid to cylindrical; peristome teeth very long, reddish, cleft nearly to base into 2 or 3 long, filiform segments; operculum rostrate. Calyptra mitrate, lobate at base, bare.

The genus *Rhacomitrium* has had many interpretations, including the broad species concept of Clifford (1955) and the very narrow species concepts of Roivainen (1955). The concepts accepted here are closer to those of Sainsbury (1955a), with the realization that the genus is more complex in southern South America.

At present I recognize five species of *Rhacomitrium* in Juan Fernandez. These can be distinguished by the following key.

Key to Species of *Rhacomitrium*

1. Leaves with very dentate and papillose hyaline leaf tips and upper margins ..... *R. lanuginosum*
1. Leaves without hyaline tips or with nonpapillose, denticulate tips ..... 2
  2. Costa stout, 150–200  $\mu\text{m}$  wide at base, 100  $\mu\text{m}$  wide above; upper lamina cells bi-tri-stratose ..... *R. nigratum*
  2. Costa 50–100  $\mu\text{m}$  wide below; cells of lamina unistratose ..... 3
    3. Leaf base distinctly plicate; cells of lamina coarsely papillose ..... *R. laevigatum*
    3. Leaf base not or only weakly plicate; cells of lamina striate or smooth ..... 4
      4. Leaves with distinct, long, hyaline tips; lateral branches numerous; setae 6–10 mm long ..... *R. crispipilum*
      4. Leaves with little or no hyaline tip; few lateral branches; setae 2–5 mm long ..... *R. crispulum*

*Rhacomitrium crispipilum*

*Rhacomitrium crispipilum* (Tayl.) Jaeg., Ber. S. Gall. Naturw. Ges. 1872–1873:96, 1874 (Ad. 1:374).

*Trichostomum crispipilum* Tayl., Lond. J. Bot. 5:47, 1846. [Original material: Summit of the Quitinian Andes, Ecuador, coll. Jameson, 1845.]

*Rhacomitrium striatipilum* Card., Bull. Herb. Boiss. ser. 2, 5:1004, 1905. [Original material: Tierra del Fuego, Tekenika Bay, coll. Skottsberg n. 74; Ushuaia, coll. Skottsberg n. 83 in part.]

*Rhacomitrium integripilum* Dus., Ark. Bot. 6(10):20, 1907. [Original material: Desolation I., Puerto Angosto, Magellan Straits; Río Aysen, western Patagonia, both coll. Dusén, 1895–1897.]

*Rhacomitrium geminatum* Roiv., Arch. Soc. Zool. Bot. Fenn. Vanamo 9:88, 1955. [Original material: Fjordo de Finlandia, western Tierra del Fuego, Coll. Roivainen, 1928–1929.]

*Rhacomitrium substriatipilum* Roiv., Arch. Soc. Zool. Bot. Fenn. Vanamo 9:95, 1955. [Original material: Cerro Nylandia, Fjordo Finlandia, western Tierra del Fuego, coll. Roivainen n. 1800.]

Plants in dense, spreading mats with stems to 6 cm long, numerous lateral branches. Leaves lanceolate, 3–4 mm long, ca. 1 mm wide, usually laxly imbricate, rapidly recurved and spreading when moist; hyaline hair 0.5–1.5 mm long, non-papillose, usually denticulate; leaf margins entire or minutely crenulate, narrowly recurved at base; base weakly plicate; costa disappearing into base of hyaline tip, ca. 75  $\mu\text{m}$  wide at base, ca. 50  $\mu\text{m}$  wide distally; lamina cells unistratose throughout, smooth to transversely striate; upper cells variable, sometimes many short, about twice as long as wide; lower cells up to 80  $\mu\text{m}$  long, wall thickenings confluent in thickened band, lumens usually very narrow; alar cells short-rounded, in 1–2 rows in short decurrency, a row of thin-walled cells extend-

ing up the margin. Setae 6–10 mm long, often in pairs. Spores 11–15  $\mu\text{m}$  in diameter.

MAS AFUERA: Ridge above Q. Pasto, c. 1250 m, Sk. 142.

The species is widely distributed in the southern hemisphere, occurring in southern South America, New Zealand, and Kerguelen, and extending northward to the northern Andes, Central America, Hawaii, New Guinea, and the Himalayas. Related species include *R. heterostichum* (Hedw.) Brid., of the north, which was distinguished by Dixon (1913–1929) by its consistent lack of the row of hyaline cells along the basal margin, and *R. crispulum*, of Antarctica and the subantarctic islands, which has little or no hyaline leaf tip, shorter setae, and no fasciculate branching.

The need for further subdivision remains in question. In the present concept I include many plants with variously weak basal plications, striated upper cells, and entire-margined hair tips on the leaves. Such characters are the basis for some Roivainen species, but variations are seen in individual plants. A more reasonable subdivision has been made between the coarse, more erect specimens of the subantarctic and Juan Fernandez that are *R. striatipilum*, and the more lax material with frequent twin setae that would be typical of the widely distributed *R. crispipilum* (= *R. geminatum* Roiv.)

*Rhacomitrium crispulum*

*Rhacomitrium crispulum* (Hook. f. & Wils.) Hook. f. & Wils., Fl. Nov. Zel. 2:75, 1854.

*Dryptodon crispulus* Hook. f. & Wils., London J. Bot. 3:544, 1844. [Original material: Campbell Isl., coll. J. D. Hooker, 1839–1843.]



- Rhacomitrium convolutum* Mont., Ann. Sc. Nat. Bot. ser. 3, 4:122, 1845. [Original material: Chile, coll. Gay (PC).]  
*Grimmia austro-patens* C. Müll., in Neum., Deutschl. Exp. Int. Polarforsch. 2:316, 1890. [Not *Rhacomitrium austro-patens* Rehm. ex Broth. Original material: South Georgia, coll. Will.]  
*Rhacomitrium austro-georgicum* Par., Ind. Bryol. 519, 1896, nom. nov.  
*Rhacomitrium substenocladum* Card., Rev. Bryol. 38:127, 1911. [Original material: Cape Tuxen, Graham Land, Antarctica, coll. Gain n. 200, 1909.]  
*Rhacomitrium skottsbergii* Card. & Broth., Vet. Ak. Handl. 63(10):29, 1923. [Original material: Cumberland Bay, South Georgia, coll. Skottsberg, 1907-1909.]

Stems to 3 cm long, mostly without short lateral branches. Leaves lanceolate, to 3 mm long, usually appressed-imbricate, leaf base simply plicate with recurved margins; leaf tip usually very short with little hyaline tissue, rarely longer or totally rudimentary; costa ca. 75  $\mu$ m wide at base, 50  $\mu$ m wide distally; lamina cells unistratose, marginal row sometimes bistratose, all smooth to slightly papillose; upper cells of variable length, 9-22  $\mu$ m long; lower cells up to 100  $\mu$ m long, wall thickenings confluent, lumens usually very narrow, 1-3 rows of shorter, less thickened cells basally at margin, a row of thin-walled cells extending up margin. Setae 2-4 mm long, yellowish. Spores 11-18  $\mu$ m in diameter.

MAS AFUERA: Trail to Los Inocentes, ca. 3000 ft, *H. & E.* 403, 583; near Camp Correspondencia, ca. 3800 ft, *H. & E.* 728; Correspondencia, c. 1200 m, *Sk.* 146.

The species is widely distributed in the subantarctic, occurring in Tierra del Fuego, Kerguelen, Tasmania, and New Zealand among other places. The species has been interpreted much more broadly by Clifford (1955). There has even been suggestion of identity with *R. heterostichum* of the north (see previous species discussion). The concept here is more like that of Sainsbury (1955a), restricted to shorter plants with few lateral branches, short setae, and with very short, hyaline leaf tips. For the present I exclude also plants with bistratose or distinctly papillose lamina cells. The concept might be extended to include *R. rupestre* (Hook. f. & Wils.) Wils. in Hook. f., but I have seen nothing quite like the transverse markings on the leaf cells by which Cardot (1908) keeps the species separate. There are transverse markings on some specimens of the related *R. crispipilum*, but such

markings do not match some of the critical features of Cardot's (1908) illustrations.

### *Rhacomitrium laevigatum*

- Rhacomitrium laevigatum* Jaeg., Ber. S. Gall. Naturw. Ges. 1872-1873:95, 1874 (Ad. I:373).  
*Grimmia laevigata* Mitt., J. Linn. Soc., Bot. 12:104, 1869, hom. illeg. [Original material: Hermite Isl., Magellan Straits, coll. J. D. Hooker 1839-1843.]  
*Grimmia willii* C. Müll. in Neum., Deutsch. Exp. Int. Polarforsch. 2:316, 1890. [Original material: Near Southwest Glacier, South Georgia, coll. Will, 1883.]  
*Rhacomitrium loriforme* Dus., Ark. Bot. 6[10]:26, 1907. [Original material: Western Patagonia, Río Aysen, coll. P. Dusen n. 479, Jan. 1897 (S!).]  
*Rhacomitrium scabrifolium* Bartr., Farlowia 2:311, 1946. [Original material: Fjordo de Agostini, Tierra del Fuego, coll. Roivainen n. 2068, 1928-1929.]

Robust plants in spreading, pale yellowish mats, stems to 20 cm long with numerous lateral branchlets. Leaves ovate-lanceolate, ca. 3.5 mm long, ca. 1 mm wide, erect-appressed with flexuose tips when dry, erect-spreading when moist, with short, hyaline, denticulate points; leaf margins narrowly recurved nearly to tip, crenulate with minute papillae; leaf bases distinctly multiplicate; costa weak, ending near midleaf; lamina cells linear with low, coarse papillae, lateral walls thick nodulose; alar cells enlarged, not sinuous, brownish or hyaline in small group. Sporophytes unknown.

MAS AFUERA: Correspondencia, 11-1200 m, *Sk.* 147 (174?) (S); Paseo de las Cabras, 11-1200 m, *Sk.* 148 (S).

Roivainen has characterized the plant well and indicated synonymy under the name *R. willii*. The name *R. laevigata*, though inappropriate, is the oldest valid name.

### *Rhacomitrium lanuginosum*

- Rhacomitrium lanuginosum* (Hedw.) Brid., Mant. Musc. 79, 1819.  
*Trichostomum lanuginosum* Hedw., Sp. Musc. 109, 1801. [Original material: Sudeten, Central Europe, coll. Hedwig.]  
*Rhacomitrium lanuginosum* var. *pruinatum* Hook. f. & Wils., Fl. Nov. Zel. 2:76, 1854. [Original material: North Isl., New Zealand, coll. Colenso.]  
*Rhacomitrium geronticum* C. Müll., Verh. Zool. Bot. Ges. Wien 19:224, 1869. [Original material: Volcán de Osorno, Valdivia, Chile, coll. Poeppig; Cordillera litoralis, 1200 ft, Corral, Chile, coll. Krause.]

- Rhacomitrium senile* Schimp. in Jaeg., Berg. S. Gall. Naturw. Ges. 1872-1873:93, 1874 (Ad. 1:371). [Original material: Capo Negro, Magellan Straits, coll. *Lechler*.]  
*Grimmia hypnoides* Lindb., Musci Scand. 29, 1879.  
*Bryum hypnoides* L., sp. pl. 1119, 1753, *nom. illeg.* [Original material: Europe.]  
*Grimmia chrysoblasta* C. Müll., Bot. Jahrb. 5:81, 1883. [Original material: Kerguelen, coll. *Naumann*, 1874.]  
*Grimmia glacialis* C. Müll. in Neum. Deutsch. Exp. Int. Polarforsch. 2:317, 1890, *hom. illeg.* [Original material: South Georgia, coll. *Will*, 1882-1883.]  
*Rhacomitrium glaciale* Kindb., Enum. Bryin. Exot. 108, 1891.

Plants often in very extensive colonies, hoary from hyaline leaf tips. Stems 10-20 cm long with numerous branches. Leaves lanceolate to 5 mm long, slightly curved when dry, fast recurving when moist; upper margins hyaline, papillose, crosely dentate; costa stout, extending into hyaline tip; lamina cells often to 100  $\mu$ m long, 12  $\mu$ m wide, lumens 5  $\mu$ m wide, unistratose, smooth to slightly papillose, a row of shorter cells along margin; basal cells with less thickened walls. Setae 3-7 mm long, rough; capsule ovoid, ca. 1.5 mm long. Spores 7-12  $\mu$ m in diameter.

MAS AFUERA: Camp Correspondencia, 3800 ft. *H. & E.* 51, 127.

The species is noted for its bipolar distribution, being very common in the arctic and boreal and also in the subantarctic. Less often emphasized is the occurrence at high elevations in such places as the northern Andes, Hawaii, and New Guinea.

### *Rhacomitrium nigratum*

- Rhacomitrium nigratum* Jaeg., Ber. S. Gall. Naturw. Ges. 1872-1873:90, 1874 (Ad. 1:368).  
*Grimmia nigrita* C. Müll., Syn. 1:801, 1849, *hom. illeg.* [Original material: Hermite Isl., Tierra del Fuego, coll. *J. D. Hooker*, 1839-1843.]

Plants blackish green, stems unbranched to sparsely dichotomously branched, to 5 cm high. Leaves broadly lanceolate, 2.5-3.0 mm long, 1 mm wide, usually appressed-imbricate with occasionally recurved tips when dry, stiffly spreading when wet; margins entire; base only slightly plicate with broadly and laxly recurved margins; apex concolorous with few or no elongate cells; costa percurrent, very stout, 125-200  $\mu$ m wide at base, ca. 100  $\mu$ m wide near tip; lamina cells smooth; upper cells 5-12  $\mu$ m long, mostly 1-2 times as long as wide, bistratose, sometimes tristratose at margin; inner

and lower cells unistratose; lower cells to 75  $\mu$ m long, lumens as wide as nodulose or sinuous walls; alar cells short, smooth, to 20  $\mu$ m broad, in short-decurrent cluster of 3-5 rows; only 1-2 less thickened cells extending up the margin. Setae 5-7 mm long, yellowish brown when mature, blackish when old. Spores 15-22  $\mu$ m in diameter.

MAS AFUERA: Correspondencia, 1100 m, *Sk.* 132; Los Innocentes, near summit, 4500-5000 ft. *H. & E.* 94.

The distribution of the species has been given as Tierra del Fuego, South Georgia, and Kerguelen; however, material must be rechecked. Earlier descriptions and treatments did not make any mention of either costa width or cross section of leaves, characters of primary importance. Dixon (1913-1929) and others who follow him place the name with *R. rupestre* under the broad concept of *R. crispulum*. What Dixon saw and whether it included material of the above description is unknown. In any case, neither Dixon nor Clifford (1955) seems to have made any allowances for any distinct species of this type in the subantarctic region, and such a view must be corrected.

The concept followed here is based on the key and description by Roivainen (1955). The Roivainen treatment is sufficiently detailed to allow one to disagree intelligently. Unfortunately, the treatment does not indicate whether types or other authentic material of *R. nigratum* or *R. subnigratum* (C. Müll.) Par. were seen. The original descriptions of the two species are useless. Brotherus (1924) cited and distributed the Skottsberg material from Juan Fernandez as *R. subnigratum*. Roivainen reserves that name for specimens with thicker borders (4-stratose) and includes *R. limbatum* Bartr. as a synonym. If the setae mean anything, those of the Juan Fernandez specimens are longer and darker as described for *R. subnigratum* rather than very short and yellow as originally described for *R. nigratum*.

### Genus *Ptychomitrium*

Plants in dense cushions, usually dark green; stems erect, sparsely branching. Leaves incurved or crispate when dry, without hyaline tips; costa strong; leaf cells with straight, evenly thickened walls, mostly quadrate, nonpapillose; basal cells more hyaline, longer; alar cells sometimes distinct.



Autoicous. Perichaetia apical. Setae usually elongate. Capsule cylindrical to urceolate, erect; peristome teeth usually narrowly lanceolate, cleft into filiform segments; operculum long-rostrate. Calyptra mitrate, base deeply and narrowly lobed.

A genus of near 60 species with one occurring in Juan Fernandez.

### *Ptychomitrium fernandezianum*

*Ptychomitrium fernandezianum* (Mitt.) Jaeg., Ber. S. Gall. Naturw. Ges. 1872-1873:104, 1874 (Ad. 1:382).

*Glyphomitrium fernandezianum* Mitt., J. Linn. Soc., Bot. 4: 74, 1859. [Original material: Juan Fernandez, coll. *Bertero n. 1591*.]

Plants in dense crusts of crowded stems, to 3 mm high, stems not tomentose. Leaves 2.0-2.5 mm long, ca. 0.6 mm wide, lanceolate from an oblong base; margins entire, incurved from the slightly cucullate apex to near base of blade; costa ca. 100  $\mu$ m wide, subpercurrent; lamina cells smooth, upper cells at margins and in various median rows bistratose, rounded-subquadrate, ca. 10  $\mu$ m wide, 5-10  $\mu$ m long, with rather thick walls; lower cells rectangular, up to 20  $\mu$ m long; cells across base lax, thin-walled, up to 40  $\mu$ m long, 15  $\mu$ m wide. Sporophyte pale reddish. Setae 3-4 mm long. Capsule urn ovoid, 1.0 mm long.

MAS AFUERA: Q. Casas, innermost accessible part, *H. & E. 221*; Q. Vacas, *M. 9379*.

The species is presently known only from Juan Fernandez and the Valdivia area of southern Chile. Meyer records on his specimen 9379 that the species is common on volcanic boulders near the mouth of the creek in Quebrada Vacas.

## DICRANACEAE

### Genus *Dicranella*

Small, yellowish to dark green plants in loose or dense cushions. Stems erect, sparingly branched. Leaves erect-spreading when wet or dry, ovate to lanceolate; costa usually subpercurrent; upper lamina cells subquadrate to rhomboidal or linear, smooth; basal cells more elongate or sometimes more lax, alar cells not distinct. Perichaetia apical. Setae elongate, straight. Capsule ovate to cylindrical, erect to horizontal; peristome teeth lanceolate,

bifid to middle with vertical striations on lower plates. Operculum long-rostrate. Calyptra cucullate, bare.

A large genus represented by a single species in Juan Fernandez.

### *Dicranella costata*

*Dicranella costata* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:412, 1924. [Original material: Mas a Tierra, Portezuelo de Villagra, ca. 450 m, coll. *C & I. Skottsberg n. 1* (lectotype, present designation; S!)]

Stems erect to 2 mm high, brownish radiculose below. Upper leaves 2.5 mm long, linear-lanceolate, flexuose when dry, semivaginate at base, canaliculate-concave above, tips narrowly acute, sometimes extreme tips obtuse; margins slightly and narrowly reflexed from above base, more erect and densely serrulate near tip; costa 40-50  $\mu$ m wide; upper lamina cells small, ca. 8  $\mu$ m wide, 8-12  $\mu$ m long, subquadrate or short-rectangular with firm walls; basal cells larger, 50-75  $\mu$ m long, 12-20  $\mu$ m wide. Dioicous. Setae 5-7 mm long, tenuous, yellow. Capsule erect, oval, 1 mm by 0.5 mm, brown, 8-ribbed when dry; exothecial cells large, 15-25  $\mu$ m wide, 40-60  $\mu$ m long. Spores 20-25  $\mu$ m in diameter, densely papillose.

MAS A TIERRA: Portezuelo de Villagra, ca. 450 m, *Sk. 1* (lectotype, S).

MAS AFUERA: Near Correspondencia, ca. 1140 m, *Sk. 2* (S).

The species is apparently endemic to Juan Fernandez. The costae on the dry capsule are quite obvious and rather distinctive.

### Genus *Oncophorus*

Plants with stems erect in loose cushions. Leaves spreading or slightly secund, incurved to crisped when dry, lanceolate, sometimes with sheathing bases; costa subpercurrent to percurrent, with two stereid bands; upper lamina cells subquadrate, marginal rows usually partially bistratose, alar cells not distinct. Autoicous. Perichaetia apical. Setae elongate. Capsules curved, sometimes strumose; opercula long-rostrate; peristome teeth bifid to middle, striate below. Calyptra cucullate, bare.

A rather small genus of mostly boreal and north temperate distribution. A single species is known from Juan Fernandez and adjacent regions.

*Oncophorus fuegianus*

*Oncophorus fuegianus* Card., Rev. Bryol. 27:39, 1900. [Original material: Lapataia River, Tierra del Fuego, coll. C. Skottsberg n. 16, 1902 (S!).]

Plants rather robust, to 3 cm high, yellowish green, brownish below, radiculose only at base. Leaves spreading from an erect sheathing base, only slightly crisped when dry, 3.0–3.5 mm long; base ca. 1.0 mm long, 1.0 mm wide, with flaring margins; blade lanceolate, narrowed apically to a blunt, toothed tip; margin erect, irregularly and coarsely serrate above the middle; costa percurrent, ca. 100  $\mu\text{m}$  wide at base of blade, on both surfaces covered with small subquadrate cells 8–10  $\mu\text{m}$  in diameter; cells of lamina and margin unistratose; cells of blade and shoulders subquadrate, 10–12  $\mu\text{m}$  in diameter; upper cells more rounded, mostly 8–10  $\mu\text{m}$  in diameter; inner and lower marginal cells of base narrow, elongate, mostly 50–130  $\mu\text{m}$  long, mostly 12–15  $\mu\text{m}$  wide, 10 or more rows nearer margin 8–10  $\mu\text{m}$  wide, cell walls rather thin but firm. Sporophyte unknown.

MAS AFUERA: Q. Casa, *Sk.* 477 (S).

The three specimens in the herbarium at Stockholm seem to represent the known distribution of the species: the specimen above from Juan Fernandez, the type from Tierra del Fuego, and a third specimen from Río Aysen, Western Patagonia, *Dusén* n. 467, 1897, that was noted as equal to *Dichodontium brotheri* Dus. ex Par. *nom. nud.*

Genus *Amphidium*

Densely caespitose plants, pale above and brownish below. Stems sparingly radiculose with age. Leaves spreading when wet, rather crisped when dry, with erect, loosely imbricate bases, linear-lanceolate; margins rather remotely serrulate; costae subpercurrent; upper lamina cells rounded-quadrate, usually in distinct longitudinal rows, streaked with many minute, elongate cuticular papillae; alar cells not very distinct. Perichaetia apical. Setae rather short. Capsule short, strongly 8-ribbed, urceolate when dry, gymnostomous; operculum rostellate. Calyptra cucullate, bare.

A genus of about ten species. Four species seem rather widely distributed and one occurs in Juan Fernandez.

*Amphidium tortuosum*

*Amphidium tortuosum* (Hornsch.) H. Robinson, new comb. *Syrhophodon tortuosus* Hornsch., *Linnaea* 15:117, 1841. [Original material: Teufelberges, 3rd Peak, Cape of Good Hope, South Africa, coll. Ecklon, 1827.]

*Zygodon cyathicarpus* Mont., *Ann. Sc. Nat. Bot. ser. 3*, 4:106, 1845. [Original material: San Antonio, Chile, coll. Gay, Aug. 1829.]

*Gymnostomum linearifolium* Tayl., *London J. Bot.* 5:42, 1846. [Original material: Pichincha, Ecuador, coll. Jameson, Oct. 9, 1827.]

*Zygodon kilimandscharicus* C. Müll., *Flora* 73:482, 1890. [Original material: Kilima-Ndscharo, coll. H. Meyer, 1889.]

*Zygodon integrifolium* C. Müll. ex Beck., *Trans. New Zealand Inst.* 25:297, 1893. [Original material: Ben More, North Canterbury, South Island, New Zealand, coll. Beckett, 1892.]

*Zygodon anoectangioides* C. Müll., *Flora* 82:449, 1896. [Original material: Hawaii, coll. Hillebrand, 1872.]

*Zygodon compactus* C. Müll., *Hedwigia* 37:134, 1898, *hom. illeg.* [Original material: Kowai, North Canterbury, South Island, New Zealand, coll. Beckett, 1892.]

*Amphoridium compactum* Par., *Ind. Bryol. Suppl.* 7, 1900.

Stems to 1 cm high, sparingly branched. Leaves crisped when dry, linear-lanceolate, distinctly keeled, sharp-acuminate at apex; margins narrowly recurved below middle, plane above, remote teeth distally; costa subpercurrent; lamina cells with firm walls, 6–8  $\mu\text{m}$  long, 10–12  $\mu\text{m}$  wide; basal cells thin-walled, short-oblong, 6–12  $\mu\text{m}$  wide, 25–50  $\mu\text{m}$  long, hyaline, usually with very minute papillae. Autoicous. Setae rather thick, urn short and rather thick with flaring mouth when mature.

MAS AFUERA: Q. Casas & Papal, c. 200 m, *Sk.* 57 (S).

MAS A TIERRA: Forests of Villagra, 400–550 m, *Sk.* M236 (S); Cerro Alto, *Sp.* M258 (S); Cerro Piramide, NE slope, *Sk.* M289 (S).

The species is widely known under the name *Amphidium cyathicarpum* (Mont.) Brid. The distribution of the species includes mainland Chile, northern Andes, Central America, Hawaii, New Zealand, Australia, New Guinea, and Central and South Africa.

Genus *Rhabdoweisia*

Small plants in dense tufts with erect, sparsely branching stems, stems lacking central strands. Leaves crisped when dry, erect-spreading when moist, lingulate to linear-lanceolate, keeled, usually



acute; margins plane or slightly recurved below, entire or serrulate distally; costa subpercurrent, with distinct abaxial stereid, adaxial stereid weak or lacking; upper lamina cells mostly subquadrate, nonpapillose; basal cells elongate and nearly hyaline, alar cells not distinct. Autoicous. Setae slender, elongate. Capsule urn ovoid, erect, usually 8-ribbed; annulus none; peristome single, teeth narrow; operculum rostrate. Calyptra cucullate, bare.

A world monograph of the genus has been provided by Lawton (1961) and a further note has been added by Zander (1966). Three species are presently recognized, with one occurring in Juan Fernandez.

### *Rhabdoweisia crispata*

*Rhabdoweisia crispata* (With.) Lindb., Act. Soc. Sc. Fenn. 10:22, 1871.

*Bryum crispatum* Dicks. ex With., Syst. Arr. Brit. Pl. ed. 4. 3:816, 1801. [Original material: Scotland, coll. Griffith.]

*Weisia denticulata* Brid., Sp. Musc. 1:108, 1806, *nom. illeg. incl. sp. prior.* [Original material: Germany, coll. Ludwig.]

*Rhabdoweisia denticulata* B.S.G., Bryol. Eur. 1:99, 1846.

*Rhabdoweisia kusenevae* Broth., Trav. Mus. Bot. Ac. Sc. Petrograd 16:19, 1916. [Original material: Amur, Siberia, coll. Kusenevar, July 1915 (H).]

*Rhabdoweisia gymnostomioides* Dix. & Thér. in Dix., Rev. Bryol. et Lichén. 13:10, 1942. [Original material: Mt. Sirane, Prov. Simozuke, Japan, coll. Sasaoka n. 4450, July 1927 (BM).]

*Rhabdoweisia sinensis* Chen, Feddes Rep. 58:23-24, 1955. [Original material: Ching-ding, Omei-schan, Szetschwan, China, coll. Chen, n. 5616, Aug. 1942.]

Stems usually less than 1 cm high. Leaves linguulate to linear-lanceolate, 2.0-3.5 mm long, apex

acute; margins serrulate to entire; upper lamina cells 9-15  $\mu\text{m}$  in diameter, walls somewhat thickened; basal cells thin-walled, 10  $\mu\text{m}$  wide, to 60  $\mu\text{m}$  long. Setae 2-5 mm long, very slender. Capsule urn narrowly cylindrical, ca. 0.7 mm long; peristome teeth linear-lanceolate, obliquely striate to smooth on surface. Spores ca. 15  $\mu\text{m}$  in diameter.

MAS AFUERA: Q. Blindado, 440 m, *Sk. 478* (S).

MAS A TIERRA: Salsipuedes, 464 m, *Sk. 58* (S); Q. Damajuana, 345 m, *Sk. 77* (S); Wand Damajuana, 500-550 m, *K. 315/2b* (B), *K. 317/17b* (S).

The species occurs in Europe, eastern North America, Alaska, Mexico, Hawaii, Japan, Korea, Amur, China, Java, and Bolivia in addition to Juan Fernandez. The early collections from Juan Fernandez were determined as *Amphidium*, but Lawton (1961) does report *R. fugax* (Hedw.) B.S.G. from the island on the basis of a Mosely collection from the 1875 *Challenger* Expedition. Material that I have seen from the islands shows mixed characters. The leaves are like those described for *R. fugax* and must be the basis for the Lawton determination. Still, I have given greater emphasis to the broader, striated peristome teeth that are characteristic of *R. crispata* (= *R. denticulata*).

### Genus *Dicranoloma*

Medium-sized to robust brownish to bright yellowish green plants with stems usually erect in very loose tufts or cushions, often stems elongate with occasional branches. Leaves slightly to strongly secund, scarcely altered when dry, lanceolate with slender tips, subconvolute; margins with border of

### Key to Species of *Dicranoloma*

1. Leaf very narrow, prolonged into fragile, filamentous tip filled with short-rectangular or subquadrate cells which are 5-7  $\mu\text{m}$  wide; costa 100-125  $\mu\text{m}$  at base ..... *D. menziesii*
1. Leaf base broadly oblong; upper lamina cells partly or completely elongate, 10-12  $\mu\text{m}$  wide; costa usually less than 80  $\mu\text{m}$  wide at base ..... 2
2. Leaves strongly circinnate; leaf base under handlens appearing to have very lax areolation; leaf tip smooth or nearly smooth on back ..... *D. nigricaulis*
2. Leaves erect to strongly secund; leaf base of firm-walled linear cells; leaf tip with prominent costa which bears numerous teeth abaxially ..... 3
3. Most cells of upper leaf lamina short-oblong to subquadrate, 1:1 or 2:1 ..... *D. kunkelii*
3. Most cells of lamina 3 or more times as long as wide ..... 4
4. Leaves tapering to a short, slender, sharply and irregularly toothed arista; many cells of upper lamina 5:1 or shorter ..... *D. billardieri*
4. Leaves with long, slender, fragile tips bearing many uniformly small, sharp teeth; lamina cells nearly all 8:1 or longer ..... *D. capillifolioides*

very narrow cells sometimes extending to midleaf; costa subpercurrent, narrow, usually ca. 1/5 or less width of leaf base, 2 stereids; at least lower leaf cells elongate, smooth; alar cells enlarged, quadrate to rectangular, in a group that does not reach the costa. Pseudoautoicous. Perichaetial leaves convolute sheathing. Setae elongate. Capsule curved, usually strumose; peristome teeth bifid to middle, striolate below; operculum rostrate. Calyptra cucullate, bare.

The genus is mostly restricted to the southern hemisphere. The five species known from Juan Fernandez may be distinguished by the accompanying key.

### *Dicranoloma menziesii*

*Dicranoloma menziesii* (Tayl.), Par., Ind. Bryol. ed. 2, 2:28, 1904.

*Dicranum menziesii* Tayl., Phytologist 2:412, 1094, 1843. [Original material: Lord Auckland's Isl., New Zealand, coll. Menzies, 1791.]

*Dicranum brachypelma* C. Müll., Bot. Zeit. 9:550, 1851. [Original material: New Zealand, coll. Mossman, 1850.]

*Dicranum suberectum* Hampe, Linnæa 30:629, 1860. [Original material: Tarwin River valley, Australia, coll. F. Müller, 1854–1855.]

*Dicranum trichophyllum* Hampe, Linnæa 37:515, 1872. [Original material: Chatham Isl., coll. F. Müller.]

*Dicranum kroneanum* C. Müll. in Hampe & Geh., Rev. Bryol. 8:26, 1881. [Original material: Near Fernshaw, Victoria, Australia, coll. Krone, 1875.]

*Dicranum oedithecium* C. Müll., Hedwigia 36:357, 1897. [Original material: Fitzroy Falls, New South Wales, Australia, coll. Whitelegge, Nov. 1884.]

*Dicranum kauparense* Par., Ind. Bryol. 357, 1895, *nom. illeg. incl. sp. prior.* (*D. brachypelma* C. Müll.)

*Dicranum calymperoideum* C. Müll., Hedwigia 36:359, 1897. [Original material: Titirangi Range near Auckland, New Zealand, coll. Beccari, March 1878.]

*Dicranum fulvum* R. Brown ter., Trans. New Zealand Inst. 29:462, 1897, *hom. illeg.* [Original material: New Zealand, West Oxford, coll. R. Brown ter., 1885.]

*Dicranum brownii* Par., Ind. Bryol., Suppl. 121, 1900, *nom. nov.*

*Dicranoloma kauparense* Par., Ind. Bryol. ed. 2, 2:27, 1904.

*Leucoloma capillifolium* Broth. in Dus., Ark. Bot. 4(1):35, 1905, *hom. illeg.* [Original material: In valley of Río Aysen and on Guaitecas Isl. in western Patagonia; near Puerto Varas and in Coastal Cordillera between Río Tirua and Bajo Imperial in southern Chile, coll. Dusén, 1895–1897.]

*Dicranum capillifolium* Card., Wiss. Ergebn. Schwed. Südpol. Exp. Nordenskjöld 4(8):70, 1908.

*Dicranodontium australe* Dix., New Zealand Inst. Bull. 3(3): 92, 1923. [Original material: Great Barrier Isl., New Zealand, coll. Hutton & Kirk n. 63 (NY).]

*Campylopus fernandezianus* Bartr., Ark. Bot. ser. 2, 4:31, 1957. [Original material: Forest above Plazoleta del Yunque, 400–450 m, coll. C. & I. Skottsberg n. 247 (S!).]

Stems with central strand, to 6 cm long. Leaves to 8 mm long, erect to secund, linear-lanceolate from a clasping base, very long, setaceous; tip usually serrate on margin, often very slender and fragile in short area near apex; costa 1/5 or less of leaf width at base, ca. 100–125  $\mu\text{m}$  wide; upper lamina and costa slightly scabrous abaxially; upper leaf cells and sometimes many lower leaf cells short-rectangular to subquadrate, 5–7  $\mu\text{m}$  wide, 7–14  $\mu\text{m}$  long; lower cells with rather thickened, only slightly porose walls, in section lumens of cells rounded or transversely elongate with upper and lower walls evenly thickened. Setae single from perichaetia, 1 cm long or less. Capsule ca. 2 mm long, mouth turned to one side.

MAS A TIERRA: El Yunque, below east face, ca. 1600–1800 m, *H. & E. 514, 656*; forest above Plazoleta de Yunque, 400–450 m, *Sk. M247* (S); Q. Frances, slope of Cordón Chifladores, *K. M91* (S); ridge between Rabanal and Q. Piedra, 720 m, *Sp. M230* in part (S).

The species occurs in southern South America, Australia, Tasmania, Norfolk Island, Chatham Islands, Auckland Islands, and New Zealand. I have not seen authentic material of *D. capillifolium*, but all described features agree with the above concept of *D. menziesii*. A difference noted in some descriptions—erect leaves in *D. menziesii* and secund leaves in *D. capillifolium*—does not hold. Also the border of the leaf is variable, sometimes indistinct, sometimes distinct to midleaf.

### *Dicranoloma billardieri*

*Dicranoloma billardieri* (Brid.) Par., Ind. Bryol. ed. 2, 2:24, 1904.

*Dicranum billardieri* Brid., Bot. Zeit. Regensburg 1:214, 1802. [Original material: Australia, coll. La Billardière, 1791–1794.]

*Cecalophum dichotomum* P. Beauv., Prodr. 51, 1805. [Original material: Reunion Isl., coll. Bory St. Vincent, 1798–1802.]

*Dicranum confine* C. Müll. & Hampe, Linnæa 28:206, 1856. [Original material: Sealer's Cove, Australia, coll. F. Müll.]

*Dicranum angustenerve* Mitt., J. Linn. Soc. Bot. 4:68, 1859. [Original material: Tasmania, coll. Archer, 1846–1857.]

*Dicranum scopareolum* C. Müll., Linnæa 40:238, 1876. [Original material: Johanna, Comoro Isl., coll. Hildebrandt, 1875.]



*Dicranum drepanocladium* C. Müll., Flora 73:473, 1890. [Original material: Mt. Kilima-Ndscharo, Marengo, 1800–3000 m, coll. *H. Meyer*, 1889.]

*Dicranum integerrimum* Broth. & Geh., Oefv. Finsk. Vet. Soc. Foerh. 37:152, 1895. [Original material: Tasmania.]

*Dicranum subconfine* C. Müll., Hedwigia 36:353, 1897. [Original material: Near Greymouth, South Island, New Zealand, coll. *R. Helms*, 1885.]

*Dicranum weymouthii* C. Müll., Hedwigia 36:354, 1897. [Original material: Southdale, Tasmania, coll. *Weymouth*, Oct. 1889.]

*Dicranum pungentella* C. Müll., Hedwigia 36:355, 1897. [Original material: Mt. Wellington, Tasmania.]

*Dicranum austro-congestum* C. Müll., Hedwigia 36:356, 1897. [Original material: Fitzroy Falls, Massvale, Victoria, Australia, coll. *Whitelegge*, Nov. 1884.]

*Dicranum baileyianum* C. Müll., Hedwigia 36:356, 1897. [Original material: Queensland, Australia, coll. *F. M. Bailey*, 1880–1883.]

*Dicranum scopelloides* Par., Ind. Bryol., Suppl. 25, 1900, *nom. nov.* for *D. subconfine* C. Müll.

*Dicranoloma patentifolium* Ren. & Par., Rev. Bryol. 29:76, 1902. [Original material: Region of Mandritsara, terr. Sakalave, Madagascar, 1901.]

*Dicranoloma fernandezianum* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:412, 1924. [Original material: Salsipuedes, Mas a Tierra, coll. *C. & I. Skottsberg*, n. 37, 1917 (lectotype, present designation; S!).]

Rather pale yellowish green plants. Stems with central strand, up to 10 cm high. Leaves 5–8 mm long, regularly falcate-secund, lanceolate with long, slender, rather straight tip; margins sharply serrulate to nearly entire, abaxial surface of tip with distinct teeth; costa 50  $\mu$ m wide at base; cells of lamina 7–9  $\mu$ m wide, lower cells up to 100  $\mu$ m long, upper cells mostly 35–40  $\mu$ m long, in section lumens of lamina cells as wide as high or wider with outside walls evenly thickened. Setae single from perichaetium. Mature capsule smooth.

MAS AFUERA: Trail to Los Inocentes, ca. 3000 ft, *H. & E.* 247, 601.

MAS A TIERRA: Salsipuedes, 660 m, *Sk.* 37 (type *D. fernandezianum*; S); 625 m, *Sk.* 40 (S, US); between Laura and Piedra Agujereada, 650 m, *Sk.* 3 (S); without definite locality, *G. Lundberg* L20 (S); Q. Frances, slope of Cordon Chiffadores, *K.* M79 (S); ridge between Rabanal and Q. Piedra Agujereada, 720 m, *Sp.* M230 in part (S); near Portezuelo de Villagra, ca. 1800 ft, *H. & E.* 482.

The species occurs in the areas of southern South America, New Zealand, Australia, Madagascar, and central and South Africa. The plants have the general size and form of the common *Dicranum sco-*

*parium* Hedw. of the north. The leaf margin seems rather variable and in a few specimens the leaves are nearly straight.

### *Dicranoloma nigricaula*

*Dicranoloma nigricaula* (Aongstr.) Par., Ind. Bryol. ed. 2, 2:28, 1904.

*Dicranum nigricaula* Aongstr., Oefv. K. Vet. Ak. Forh. 29 (4): 6, 1872. [Original material: Magellan Straits, coll. *N. J. Andersson*, 1851–1853.]

*Leucoloma peruncinatum* Dus., Ark. Bot. 4 (1):31, 1905. [Original material: Near Punta Arenas, southern Patagonia, coll. *Dusen*, 1895–1897.]

Plants lustrous yellowish green. Stem with central strand, to 8 cm long. Leaves to 9 mm long, strongly and regularly circinnate, not closely imbricate, allowing dark stem to show prominently, linear-lanceolate, prolonged into a long, setaceous, often contorted tip; apex sharply toothed on margins, nearly or completely glabrous abaxially; costa 80–100  $\mu$ m wide at base; cells of lamina linear, 9  $\mu$ m wide, up to 125  $\mu$ m long, appearing lax and pellucid under handlens, a few short cells near the apex; cells in section with lumens higher than wide, outer walls thin over lumens and with thickenings over crosswalls. Sporophyte not seen.

The species was reported from Mas Afuera, Cerro Correspondencia, 1150 m, *Sk.* 43, by Brotherrus (1924). No specimen from the islands has been seen.

The only known distribution of the species is southern Chile and Juan Fernandez. The synonymy and some of the possible relatives have been discussed by Roivainen and Bartram (1937). The areolation of the leaves gives a rather distinct appearance at low magnification, but detailed structural differences are apparent only by taking cross sections.

### *Dicranoloma capillifolioides*

*Dicranoloma capillifolioides* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:413, 1924. [Original material: Los Inocentes, Mas Afuera, 950–1000 m, coll. *C. & I. Skottsberg*, n. 46, 1917.]

Slender, yellowish green plants. Stem with central strand, up to 3 cm high. Leaves falcate, to 12 mm long, lanceolate or oblong base, tapering into a long, slender, fragile capillary tip which is up to

1.5 mm long with numerous uniformly small, sharp teeth on back and margin; costa ca. 60  $\mu\text{m}$  wide at base, long-excurrent; cells of lamina 10–12  $\mu\text{m}$  wide; lower cells strongly porose, up to 120  $\mu\text{m}$  long; upper cells 40–70  $\mu\text{m}$  long, lamina cells in section with lumens as wide as high or wider and outer walls distinctly and evenly thickened. Sporophyte unknown.

MAS AFUERA: Los Innocentes, 950–1000 m, *Sk. 46* (type, S).

MAS A TIERRA: El Yunque, *K. M337* (S); Cordon rechts v. Yunque, 600 m, *K. 313/9c* (B).

The species is known only from Juan Fernandez. The slender leaf tips are reminiscent of *Dicranoloma menziesii* but the elongate cells are entirely different.

### *Dicranoloma kunkelii*

*Dicranoloma kunkelii* H. Robinson, *Phytologia* 29 (2):117, 1974. [Original material: Cordon rechts v. Yunque, Mas a Tierra, 500 m, coll. G. Kunkel 312/4 (B!).]

Plants rather robust, yellowish green. Stem with central strand, erect to 5 cm high. Leaves 8–10 mm long, regularly falcate-secund, narrowly lanceolate with very long, flexuous, prolonged tips; apex with short-excurrent costa, distinctly denticulate marginally and abaxially; costa ca. 50  $\mu\text{m}$  wide at base; cells of lamina 10–12  $\mu\text{m}$  wide; lower cells strongly porose, to 100  $\mu\text{m}$  long; upper cells mostly short-oblong or subquadrate, 10–20  $\mu\text{m}$  long; lamina cells in section with lumens as wide as high or wider, outside walls evenly thickened. Dioicous. Sporophyte unknown.

MAS A TIERRA: Cordon rechts v. Yunque, 500 m, *K. 312/4* (holotype, B; isotype, US); Q. Damajuana 400–450 m, *Sk. M216* (S).

The species is easily distinguished by the very short but large upper leaf cells. The habit is similar to that of *D. billardieri* but the leaf tips are more flexuous. The differences in areolation and leaf tips indicate that *D. kunkelii* is not particularly closely related to either *D. billardieri* or any other species in the area.

### Genus *Chorisodontium*

Erect plants in compact tufts, stems sparsely branching, radiculose below. Leaves erect, lanceo-

late with slender tips, sometimes subconvolute; margins serrulate to entire, without borders; costa broad, 1/4–1/3 of basal leaf width, to 400  $\mu\text{m}$  wide, in section with 2 stereids of small, irregular cells, guide and epidermal cells distinct, cells on back of costa small and usually slightly mamillate, giving dull appearance to abaxial surface; cells of lamina rhomboidal to linear, alar cells greatly enlarged in group reaching costa. Setae long, straight. Capsule erect, cylindrical, slightly asymmetric; peristome teeth divided to near middle, striolate below; operculum long-rostrate. Calyptra cucullate, bare. Spores often very large and multicellular.

The genus is mostly South American, with isolated species from Costa Rica, the Antarctic Peninsula, and St. Paul Island. A single species occurs in Juan Fernandez.

### *Chorisodontium aciphyllum*

*Chorisodontium aciphyllum* (Hook. f. & Wils.) Broth., *Nat. Pfl.* ed. 2, 10:205, 1924.

*Dicranum aciphyllum* Hook. f. & Wils., *London J. Bot.* 3: 541, 1844. [Original material: Hermite Isl., Cape Horn, and Falkland Isl., coll. J. D. Hooker, 1839–1843.]

*Campylopus muricatus* Dix., *K. Norsk. Vid. Selsk. Forh.* 4:180, 1932. [Original material: Near sea level, Maiviken, South Georgia, coll. Trøim, 1929.]

Slender, yellowish green plants in tufts with stems to 5 cm high. Leaves to 10 mm long, 1.1 mm wide, narrowly lanceolate; margin entire or sometimes with few apical teeth; cells of lamina ca. 10  $\mu\text{m}$  wide, narrower near margin, lower leaf cells elongate to 100  $\mu\text{m}$ , a few upper cells short-rectangular to rhomboidal, walls distinctly thick-walled and rather porose. Dioicous. Setae ca. 2.5 cm long. Capsule urn 2.5 mm long; peristome ca. 250  $\mu\text{m}$  long, red; operculum 2.0 mm long.

MAS A TIERRA: Cordón Damajuana, above 650 m, *K. M331* (S); 600 m, *K. 328/17a* in part (B).

The species is known from the southern tip of South America, the Falkland Islands, South Georgia, and the South Orkney Islands in addition to Juan Fernandez.

### Genus *Campylopus*

Erect plants in loose or compact tufts. Stems sparsely branching. Leaves erect, spreading, more



appressed when dry, lanceolate with slender tips; margins usually serrulate; costa 1/3 or more of width of leaf base, sometimes ridged on back, cross section with 0, 1, or 2 stereids; lower leaf cells mostly elongate, upper lamina cells rhomboidal to subquadrate, alar cells either distinct or vestigial. Dioicous. Perichaetial leaves scarcely distinct. Setae slender, cygneus when moist, usually flexuous when

dry. Capsule ovoid, ribbed in most species, erect to inclined; peristome teeth bifid to middle, striolate below; operculum rostrate. Calyptra cucullate, with or without basal fringe.

The genus is widely distributed, with species particularly numerous in the tropical highlands. The five species known from Juan Fernandez can be distinguished by the following key.

### Key to Species of *Campylopus*

1. Costa usually 1/2-2/3 width of leaf base, smooth abaxially, in section having thin-walled adaxial cells forming at least 1/2 of thickness; calyptra not fringed ..... *C. kunkelii*
1. Costa usually less than 1/2 of width of leaf base, with slight to strong ridges of small, quadrate cells abaxially, in section the enlarged adaxial cells forming less than 1/2 of thickness; where known, calyptra fringed ..... 2
  2. Stems not or only sparsely tomentose below; basal leaf arcolation very lax, many cells over 100  $\mu\text{m}$  long; upper cells very irregular ..... *C. blindioides*
  2. Stems tomentose below; basal leaf cells mostly 50-100  $\mu\text{m}$  long; upper cells usually obliquely rhomboidal with thick walls ..... 3
    3. Alar cells usually forming large, reddish brown auricles (often remaining attached to stem in dissections); capsule erect and smooth, sometimes sulcate when dry; peristome teeth divided to base into 2 filiform, densely papillose parts ..... *C. clavatus*
    3. Alar cells poorly developed, rarely forming colored auricles; capsule distinctly plicate; peristome teeth cleft to middle and striolate below ..... 4
      4. Upper leaves with long, reflexed, hyaline hair tips; costa filling most of subula; costa section without stereids adaxially; capsule curved ..... *C. introflexus*
      4. Leaves with tips straight or concolorous; costa about 1/3 width of subula; costa section usually showing stereids adaxially; capsule erect ..... *C. aberrans*

### *Campylopus aberrans*

*Campylopus aberrans* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:414, 1924. [Original material: Mas a Tierra, way to Portezuelo, coll. C. & I. Skottsberg n. 11, 1916 (lectotype, present designation; S!).]

Stems erect to 3 cm high, reddish tomentose. Leaves 3-5 mm long, to 0.7 mm wide, oblong-lanceolate with rather slender, nearly entire, sometimes slightly hyaline tips; costa 1/3 width of leaf base, slightly ridged abaxially, 1/3 width of leaf near tip, distinct stereids both adaxially and abaxially; upper lamina cells obliquely rhomboidal, mostly 13-20  $\mu\text{m}$  long; supraalar cells enlarged, hyaline, thin-walled, to 75  $\times$  22  $\mu\text{m}$ ; alar cells very indistinct, a few reddish cells bordering the costa; many rows of prominent, very narrow cells along all of the lower margin. Setae ca. 3 mm long. Capsule scabrous basally, plicate. Calyptra fringed basally.

MAS AFUERA: Q. Casas, *Sk.* 16 (S); Lobería, 0 m, *Sk.* 47 (S); in campo above Chozas, ca. 850 m. *Sk.*

49 (S); Los Inocentes, 800-950 m, *Sk.* 48 (S); Q. Ovalo, *Sk.* M116 (S); coast between Q. Vacas and Varadero, *Sk.* M170 (S); Q. Mono, *Sk.* 287 (S); Q. Casas, near mouth, *H.* & *E.* 91; innermost accessible part, *H.* & *E.* 280; Los Inocentes, below summit, ca. 4000 ft, *H.* & *E.* 342, 496.

MAS A TIERRA: Trail to Portezuelo, *Sk.* 11 (lectotype; S; isotype, US); Salsipuedes, 625 m, *Sk.* 13 (S), 600 m, *Sk.* 50 (S), 500 m, *Sk.* 53 (S); Cordón Centinela, 530 m, *Sk.* 14 (S); Tres Puntas, *Sk.* 15 (S); Cordón Chifladores, ca. 350 m, *Sk.* 17 (type of *C. a.* var. *viridis* Broth.; S); Cordón escarpado El Pico, 360 m, *Sk.* 51 (S); Villagra, ca. 200 m (S); Puerto Frances, *Sk.* M78 (S); slope of Cerro Alto, *Sp.* M259 (S); Valle Ingles, *Sk.* M261 (S); Cordón Pangal/Molina, ca. 600 m, *K.* 323/19 (B).

As presently recognized the species is endemic to Juan Fernandez. Perhaps the closest relative is *C. arbuticola* Card. & Dix. of New Zealand but that species differs by usually having long hair tips on the leaves.

### *Campylopus blindioides*

- Campylopus blindioides* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:416, 1924. [Original material: Q. Vacas, Mas Afuera, coll. C. & I. Skottsberg n. 60, 1917 (S!).]
- Campylopus subareodictyon* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:415, 1924. [Original material: Forest between Sanchez and Toltén, Mas Afuera, coll. C. & I. Skottsberg n. 19, 1917 (S!).]
- Campylopus laxiretis* Bartr., Ark. Bot. ser. 2, 4:30, 1957, *hom. illeg.* [Original material: Q. Doña Maria, Mas Afuera, coll. C. & I. Skottsberg n. M173, 1955 (S!).]

Stems erect, to 5 cm high, without evident tomentum. Leaves 5–7 mm long, ca. 0.7 mm wide, oblong below, becoming lanceolate, margins serrulate, tips concolorous; costa 2/5–1/2 leaf width at base, nearly filling subula, slightly ridged and scabrous abaxially; single stereid band abaxial, not full width of costa; guide cells distinct, medium-sized, in 1 row; 1 row of smaller adaxial cells; upper lamina cells irregularly subquadrate to rectangular, 10–20  $\mu\text{m}$  long, mostly 7–10  $\mu\text{m}$  wide; alar cells continuous with large area of lax supraalar cells, cells up to 75–120  $\mu\text{m}$  long, 25–30  $\mu\text{m}$  wide, thin-walled; leaves lacking distinct border of narrow cells. Sporophyte unknown.

MAS AFUERA: Q. Vacas, on rock of waterfall, *Sk. 60* (type, S); in forest between Sanchez and Toltén, 515 m, *Sk. 19* (type of *C. subareodictyon*, S); cascade in Q. Doña Maria (also called Floripa), *Sk. M173* (type of *C. laxiretis* Bartr., S); Los Inno-centes, below summit, ca. 4000 ft, *H. & E. 500*.

The species seems to be endemic to Mas Afuera. The types of *C. blindioides* and *C. laxiretis* Bartr., and the Hatcher and Engel specimen are totally alike, although nothing in the original Brotherus description could have led either Bartram or myself to this conclusion. The type of *C. subareodictyon* seems slightly different and has a little tomentum.

### *Campylopus clavatus*

- Campylopus clavatus* (R. Brown) Wils. in Hook. f., Fl. Nov. Zel. 2:69, 1854.
- Dicranum clavatum* R. Brown in Schwaegr., Sp. Musc., Suppl. 3(2):255a, 1829. [Original material: Tasmania, coll. R. Brown & G. Sieber, 1801–1803.]
- Campylopus leptodus* Mont., Ann. Sc. Nat. Bot. ser. 3, 4:111, 1845. [Original material: Southern Chile, coll. C. Gay.]
- Campylopus insititius* Hook. f. & Wils., Fl. Tasman. 2:172, 1859. [Original material: Tasmania, Southport, Brown's River, coll. Stuart.]

- Campylopus appressifolius* Mitt. in Hook. f., Handb. New Zealand Fl. 414, 1867. [Original material: Mt. Eden near Auckland, North Island, New Zealand, coll. Jupp (NY).]
- Campylopus cylindrothecium* R. Brown ter., Trans. New Zealand Inst. 29:473, 1892. [Original material: Bealey, New Zealand, coll. R. Brown ter., Feb. 1889.]
- Dicranum sulphureo-flavum* C. Müll., Hedwigia 36:352, 1897. [Original material: Near Greymouth, South Island, New Zealand, coll. R. Helms, 1886.]
- Campylopus traillii* R. Brown ter., Trans. New Zealand Inst. 29:468, 1897. [Original material: Stewart Isl., New Zealand, coll. R. Brown ter., Mar. 1892.]
- Campylopus walkeri* R. Brown ter., Trans. New Zealand Inst. 29:469, 1897, *hom. illeg.* [Original material: New Zealand, coll. R. Brown ter., Mar. 1892.]
- Campylopus rarus* R. Brown ter., Trans. New Zealand Inst. 29:470, 1897. [Original material: New Zealand, near Lake Te Anau, coll. R. Brown ter., Jan. 1890.]
- Campylopus ellipticothecum* R. Brown ter., Trans. New Zealand Inst. 29:473, 1897. [Original material: New Zealand, coll. R. Brown ter., Mar. 1892.]
- Campylopus otaramaii* R. Brown ter., Trans. New Zealand Inst. 29:474, 1897. [Original material: New Zealand, Mt. Torlesse, near Otarama, coll. R. Brown ter., Mar. 1896.]
- Campylopus arcuatus* R. Brown ter., Trans. New Zealand Inst. 29:474, 1897, *hom. illeg.* [Original material: Stewart Isl., New Zealand, coll. R. Brown ter., Mar. 1892.]
- Campylopus arenarius* R. Brown ter., Trans. New Zealand Inst. 29:475, 1897, in part. [Original material: Stewart Isl., New Zealand, coll. R. Brown ter., Mar. 1892.]
- Campylopus persimplex* C. Müll., Abh. Naturw. Ver. Bremen 16(3):496, 1900. [Original material: Frenchpass, Cook Strait, New Zealand, coll. H. Schauinsland, 1896–1897.]

Stems elongate in dense tufts to 5 cm high, usually tomentose below. Leaves 4–7 mm long, narrowly oblong-lanceolate with slender, sometimes hyaline, and often secund scabrous tips; costa 1/3–1/2 basal leaf width, nearly filling tip, slightly ridged on back, well-developed stereid band abaxially, small, often very thick-walled cells in 1–2 series adaxially; upper lamina cells short, obliquely rhomboidal with porose walls, mostly 13–20  $\mu\text{m}$  long; alar cells forming prominent auricles; supra-alar cells in triangular area reaching upward along margin, narrow, thin-walled, usually hyaline, 50–100  $\mu\text{m}$  long, 10–15  $\mu\text{m}$  wide, ca. 5 rows of narrower cells along margin. Setae usually aggregated, up to 7 mm long. Capsule scabrous basally, smooth to sulcate when dry. Calyptra fringed at base.

MAS AFUERA: Q. Casas, innermost accessible part, *H. & E. 200*; Q. Mono, *H. & E. 434, 713*; trail to Los Innocentes, ca. 3000 ft, *H. & E. 582*; Q. Sanchez, *H. & E. 684*; Campo Correspondencia, 1000 m, *I. 36992*.



MAS A TIERRA: Portezuelo (Mirador), 500 m, *K. 308/25* (B), *308/29* (B); Cordon rechts v. Yunque, 600 m, *K. 313/9b* (B); Wand Damajuana, 400–500 m, *K. 317/14b* (B).

The species is known from Chile, Australia, Tasmania, Auckland and Campbell Islands, New Zealand, and apparently South Africa. Sainsbury (1955a) established the identity of *C. leptodus* of South America with *C. clavatus* of Tasmania and New Zealand and he also mentioned the variation in the adaxial cells of the costa. Sections of some leaves are difficult to distinguish from those of *C. introflexus*. *Campylopus clavatus* is closely related to *C. richardii* Brid. of tropical America, and the latter name has been used for some Juan Fernandez material. In South America the distinction seems sharp, with the supraalar cells of *C. richardii* being shorter, thicker-walled, and porose. The question of whether this character is variable in New Zealand and Australian material as indicated by Sainsbury or whether the range of *C. richardii* extends to Hawaii and Asia as indicated by Dixon (1922) remains unresolved at this time.

### *Campylopus introflexus*

*Campylopus introflexus* (Hedw.) Brid., Mant. Musc. 72, 1819. *Dicranum introflexum* Hedw., Sp. Musc. 147, 1801. [Original material: New Zealand.]

*Campylopus lamellatus* Mont., Ann. Sc. Nat. Bot. ser. 2, 9:52, 1838. [Original material: Near Chupe, Prov. Yungas, Bolivia, coll. Orbigny (PC).]

*Campylopus truncatus* C. Müll., Linnaea 18:685, 1845. [Original material: Chile, coll. Philippi (B).]

*Dicranum leptcephalum* C. Müll., Bot. Zeit. 9:551, 1851. [Original material: New Zealand, coll. Mossman, 1850.]

*Dicranum liebmanni* C. Müll., Syn. 2:601, 1851. [Original material: Chinantle, Mexico, coll. Liebmann.]

*Dicranum lamellicosta* C. Müll., Syn. 2:601, 1851. [Original material: La Foga, Mexico, coll. Liebmann.]

*Dicranum lutescens* C. Müll., Syn. 2:602, 1851. [Original material: Mt. Orizaba, Mexico, coll. Liebmann.]

*Dicranum proliferum* C. Müll., Syn. 2:602, 1851. [Original material: Colonia Tovar, Venezuela, 5600 ft, coll. Wagner.]

*Campylopus vitzliputzli* Lor., Moosstud. 158, 1864. [Original material: Mexico City, coll. Schmitz.]

*Campylopus leucotrichus* Sull. & Lesq., Icones Musc. 28, 1864. [Original material: Raccoon Mts., Alabama, coll. Lesquereux.]

*Campylopus strictus* Schimp. in Besch., Mém. Soc. Nat. Sci. Natur. Cherbourg 16:167, 1872, *hom. illeg.* [Original material: Río Orizaba, Mexico, coll. F. Müller.]

*Campylopus luridus* Schimp. in Besch., Mém. Soc. Nat. Sci.

Natur. Cherbourg 16:168, 1872. [Original material: Orizaba, Mexico, coll. F. Müller.]

*Campylopus pilosissimus* Schimp. in Besch., Mém. Soc. Nat. Sci. Natur. Cherbourg 16:168, 1872. [Original material: Mirador, Mexico, coll. Sartorius.]

*Campylopus bertereanus* Dub., Mém. Soc. Phys. Hist. Nat. Genève 24:372, 1875. [Original material: Chile, Coll. Bertero, 1827–1830.]

*Thysanomitrium jamaicense* C. Müll., Bull. Herb. Boiss. 5: 552, 1897. [Original material: near Cinchona plantations, Jamaica, 4900 ft, coll. W. Harris, 1896.]

*Dicranum tasmanicum* C. Müll., Hedwigia 36:351, 1897, *hom. illeg.* [Original material: Tasmania, coll. Schimper.]

Stems in dense tufts to 4 cm or more high, more or less tomentose below. Leaves 5–7 mm long, oblong-lanceolate, subulate-pointed, subtubulose above; tip scabrous, hyaline, often reflexed; costa 1/3–1/2 of basal leaf width, abaxially with many serrated ridges 2–6 cells high, a single stereid which is abaxial, one series of large, thin-walled cells adaxially; upper lamina cells obliquely rhomboidal, 13–20 µm long, porose; alar cells indistinct; supraalar cells in area extending out obliquely from base of costa and becoming extensive along margin, narrow, hyaline, thin-walled, to 15 µm wide, to 80 µm long, 5 rows somewhat narrower near margin. Setae 1–3 in perichaetium, 6–9 mm long. Capsule curved, sometimes scabrous basally, ribbed. Calyptra fringed.

MAS AFUERA: Los Inocentes, below summit, ca. 4000 ft, *H. & E. 441*.

MAS A TIERRA: Trail to Portezuelo, *Sk. 8*; Cerro Salsipuedes, 1500 ft, *M. 9506*; Cordon rechts v. Yunque, *K. 313/11a* (B); Wand Damajuana, *K. 317/15a* (B); Cordon Pangal/Molina, to 700 m, *K. 323/16b* (B), *323/17* (B).

The species occurs widely in South, Central, and southern North America, Australia, Tasmania, New Zealand, Kerguelen, and the Falklands and is adventive in Europe. Included here are plants that have been reported as *Campylopus polytrichoides* DeNot. As indicated by Richards (1963), the latter species is distinct but primarily European and African in distribution.

### *Campylopus kunkelii*

*Campylopus kunkelii* Bartr., Ark. Bot. ser. 2, 4:31, 1957. [Original material: Near summit of El Yunque, Mas a Tierra, coll. G. Kunkel n. 345, 1954–1955.]

Stems erect, to 3 cm high, reddish tomentose. Leaves 7–9 mm long, 0.6 mm wide, oblong below, becoming narrowly lanceolate, margin entire, tips slightly toothed and concolorous; costa 1/2–2/3 leaf width in basal part, smooth abaxially, well-developed stereid band of simple cells abaxially, adaxial 1/2–3/5 of costa thickness composed of one layer of large, thin-walled cells, no distinct guide cells; upper lamina cells rectangular to obliquely rhomboidal, 10–20  $\mu\text{m}$  long; alar cells not differentiated, supraalar cells to 50  $\mu\text{m}$  long, 20  $\mu\text{m}$  wide; lower margins bordered with up to 10 rows of very long, narrow cells. Setae mostly solitary, 5–7 mm long. Capsules erect, distinctly ribbed. Calyptra not fringed.

MAS AFUERA: Near Camp Correspondencia, ca. 1100 m, *Sk. 18* (S, US), ca. 3800 ft., *H. & E. 456*; trail to Los Inocentes, ca. 3000 ft., *H. & E. 244, 602*; Los Inocentes, near and below summit, ca. 4000 and 4500 ft., *H. & E. 263, 681*.

As presently recognized the species is endemic to Juan Fernandez. Close relatives include *C. chris-marii* (C. Müll.) Mitt. of Central America and *C. leucognodes* of the Andes. The former species has less developed stereids in the costa and the latter has longer upper lamina cells. The name *C. arce-dictyon* (C. Müll.) Mitt. was applied to this species by Brotherus. This last, however, is most likely a species endemic to the Venezuelan Andes with two stereid bands and a papillose capsule base.

## DICNEMONACEAE

### Genus *Eucamptodon*

Stems in dense cushions or laxly branching, usually brownish green. Leaves erect to slightly spreading when moist or dry; costa narrow to lacking; upper lamina cells elongate; alar cells sometimes very distinct. Perichaetial leaves long-sheathing, about as long as setae. Capsules erect; peristome teeth undivided; spores enlarged, multicellular; operculum long-rostrate. Calyptra cucullate, bare.

The genus is represented on the islands by one species.

### *Eucamptodon perichaetialis*

*Eucamptodon perichaetialis* (Mont.) Mont., Ann. Sc. Nat. Bot. ser. 3, 5:14 f.3, 1845.

*Weisia perichaetialis* Mont., Ann. Sc. Nat. Bot. ser. 3, 4:119, 1845. [Original material: Southern Chile, coll. C. Gay.]

Plants yellowish green, brownish below, to 7 mm high. Leaves erect-spreading, 3.0–3.3 mm long, 0.8 mm wide, oblong-lanceolate, sometimes rather short-acute, leaf slightly keeled above; margins erect, entire; costa narrow, lacking in lower 1/3; cells of upper lamina narrow, elongate, 40–100  $\mu\text{m}$  long, 12–15  $\mu\text{m}$  wide, with thick walls; apical cells mostly 30–50  $\mu\text{m}$  long; alar cells 35–40  $\mu\text{m}$ , quadrate, numerous, brownish. Autoicous. Perichaetial leaves to 5 mm long, narrowly attenuate. Setae 3–4 mm long, yellowish. Capsules oblong, 1.2 mm long, 0.5 mm wide, erect to inclined; peristome teeth pale when old, minutely papillose. Spores irregular in shape, 75–100  $\mu\text{m}$  long.

MAS AFUERA: Cordon Barril, *Sk. 31* (S).

The species is known only from southern Chile and Juan Fernandez. All other species of the genus and other genera of the family are restricted to the area of Australia, New Zealand, and New Caledonia.

## POTTIACEAE

### Genus *Weisia*

Small, caespitose, yellowish green plants, often on rocks or soil, often calciphilous. Stems short. Leaves spreading when wet, incurved to crisped when dry; costae percurrent, with 2 stereids; upper leaf cells quadrate, papillose; basal leaf cells rectangular, hyaline. Setae longer than leaves. Capsules erect, smooth, oval; peristome rudimentary or lacking; operculum long-rostrate. Calyptra cucullate, bare.

Two species of the genus are claimed for the island.

### Key to Species of *Weisia*

- Capsule with distinct, short peristome teeth ..... *W. controversa*  
 Capsule without distinct peristome teeth ..... *W. kunzeana*



### *Weisia controversa*

*Weisia controversa* Hedw., Sp. Musc. 67, 1801. [Original material: Leipzig, Germany, coll. *Hedwig*.]

Plants in dense cushions, bright to yellowish green, stems erect, often branching. Leaves lanceolate, up to 3 mm long; middle and upper margins strongly involute, entire; costa percurrent to short-excurrent in short, pale mucro, 35–45  $\mu\text{m}$  wide at base; cells of upper lamina 6–7  $\mu\text{m}$  in diameter, rounded-quadrate or hexagonal, obscured with numerous simple papillae; basal cells longer, larger, nonpapillose. Autoicous. Setae erect, 3–10 mm long, yellowish. Capsules erect, oval, brownish; peristome teeth of 1–10 usually papillose sections, sometimes perforate. Spores 15–20  $\mu\text{m}$  in diameter.

MAS AFUERA: Q. Mono, *Sk. M119* (S).

The species is very widely distributed in the temperate and tropical parts of the world.

### *Weisia kunzeana*

*Weisia kunzeana* C. Müll., Syn. 1:656, 1849. [Original material: Chile, coll. *Pöppig*.]

*Gymnostomum marginatum* Kunz. ex. Mont. in Gay, Hist. Fis. Polit. Chile Bot. 7:193, 1850, *nom. illeg. incl. spec. prior*. [Original material: Chile, coll. *Pöppig*.]

Stems and leaves essentially like *W. controversa* Hedw. Capsules lacking peristome teeth. Spores 15–20  $\mu\text{m}$  in diameter.

MAS A TIERRA: Portezuelo, ca. 475 m, *Sk. 102* (S).

The species is known only from Chile. The material cited was determined by Brotherus and is the only known record for the islands. The two capsules in the specimen are without peristomes, but more material is needed for confirmation of the record.

### Genus *Gymnostomum*

Small green to yellowish green plants in dense, sometimes deep tufa-forming masses on limestone or other calcareous material, stems erect, sparsely branching. Leaves erect-spreading when moist, contorted when dry, rather densely imbricate with somewhat erect bases; margins plain to slightly recurved; costa subpercurrent, with 1 stereid band; cells of lamina subquadrate to short-rectangular,

with simple papillae; basal cells not noticeably differentiated. Dioicous. Perichaetia apical, perichaetial leaves not distinct. Setae longer than leaves. Capsule erect, smooth, wall of urn very thin; peristome teeth lacking; operculum rostrate, sometimes persistent on columella. Calyptra cucullate, bare.

A single species is reported from Juan Fernandez.

### *Gymnostomum calcareum*

*Gymnostomum calcareum* Nees & Hornsch., Bryol. Germ. 1: 153, 1823. [Original material: Near München, coll. *Hornschuch*.]

Plants in dense, yellowish green cushions, to 10 mm high. Leaves to 1.0 mm long, to 0.08 mm wide, narrowly oblong, apex obtuse to rounded; costa ca. 30  $\mu\text{m}$  at base; cells of lamina 6–12  $\mu\text{m}$  in diameter, subquadrate to wider than long, a few basal cells to 15  $\mu\text{m}$  long. Setae 3–4 mm long, pale. Capsule urn to 1 mm long, 0.5 mm wide. Spores 8–10  $\mu\text{m}$  in diameter.

Brotherus reported the species from both Mas Afuera and Mas a Tierra but no specimens have been seen in this study. The world distribution is claimed to include Europe, Azores, North Africa, Caucasus, Himalaya, Siberia, North America, Mexico, Guatemala, Ecuador, Chile, Tristan da Cunha, East Australia, Tasmania, and New Zealand. A more restricted interpretation of the species was given by Crum and Anderson (1956) according to whom much of the material outside of the Mediterranean region and California would actually be *G. aeruginosum* Sm. At best, distinctions are not clear and little is gained by changing names at this time.

### Genus *Trichostomum*

Caespitose, yellowish to dark green plants, stems erect and branching. Leaves spreading when wet, crisped when dry; margins usually plain, becoming incurved when dry; costa percurrent or excurrent in a mucro, with 2 stereid bands; cells of upper lamina small, rounded or subquadrate, papillose; lower cells rectangular, pellucid. Nearly all species dioicous. Perichaetia apical. Setae elongate, erect. Capsules erect, cylindrical; peristome of 16 bifid,

narrow, papillose, erect teeth; operculum conic-rostrate. Calyptra cucullate, bare.

One species is reported from Juan Fernandez.

### *Trichostomum brachydontium*

*Trichostomum brachydontium* Bruch in F. A. Müll., Flora 12:393, 1829. [Original material: Spezia and Cagliari, Sardinia, coll. F. A. Müller.]

*Hymenostomum muelleri* Bruch in F. A. Müll., Flora 12:386, 1829. [Original material: Near Cagliari, Sardinia, coll. F. A. Müller.]

*Trichostomum mutabile* Bruch in DeNot., Syll. 192, 1838. [Original material: Sardinia, coll. De Notaris.]

*Hymenostomum unguiculatum* Philib., in Schimp., Syn. 2:37, 1876. [Original material: Near Aix, Provence, France, coll. Philibert, 1871–1872.]

Plants in dark green cushions or crusts with stems to 2 cm high. Leaves to 3 mm long, to 0.5 mm wide, oblong-lanceolate, very short-acute; margins involute above; costa percurrent into short mucro, 70  $\mu\text{m}$  wide at base; cells of upper lamina 6–8  $\mu\text{m}$  in diameter, with dense linear or finely C-shaped papillae; basal cells to 70  $\mu\text{m}$  long, to 20  $\mu\text{m}$  wide, hyaline. Dioicous. Setae 1.0–1.5 cm long. Peristome short.

The species is reported from the islands by both Brotherus and Bartram, but no specimens have been seen in this study. The complete range of the species includes Europe, Asia, Africa, Mexico, Central America, West Indies, northern South America, and Chile.

### Genus *Bryoerythrophyllum*

Small to robust, usually reddish green caespitose plants with erect, sparsely branching stems, usually with central strand. Leaves spreading when moist, contorted when dry; margins usually recurved below, variously toothed above; apex with small, projecting, slender, smooth cell; costa subpercurrent, in section showing 2 stereid bands and distinct epidermal layer; cells of upper lamina rounded to quadrate, papillose; inner basal cells distinctly enlarged and differentiated, smooth. Perichaetial leaves scarcely distinct. Setae long, erect. Capsule erect or curved; peristome teeth erect, linear to irregularly cleft; operculum short conic-rostrate. Calyptra cucullate, bare.

One species occurs in Juan Fernandez.

### *Bryoerythrophyllum campylocarpum*

*Bryoerythrophyllum campylocarpum* (C. Müll.) Crum, Svensk. Bot. Tidskr. 51:200, 1957.

*Syrhophodon jamesonii* Tayl., London J. Bot. 6:331, 1847. [Not *Bryoerythrophyllum jamesonii* (Tayl.) Crum. Original material: Pichincha, Ecuador, coll. Jameson, Nov. 1846.]

*Trichostomum campylocarpum* C. Müll., Syp. 2:628, 1851. [Original material: Mountain region, between 500–8000 ft, Costa Rica, coll. Oersted, Feb. 1847.]

*Syrhophodon crispatus* Hampe, Ann. Sc. Nat. ser. 5, 5:335, 1866. [Original material: San Juan, 1400 m, Colombia, coll. Lindig.]

*Trichostomum amblystegium* C. Müll., Nuov. Giorn. Bot. Ital. n. ser. 4:118, 1897. [Original material: Colombia, coll. Lindig n. 2146.]

*Trichostomum campylopyxis* C. Müll., Nuov. Giorn. Bot. Ital. n. ser. 4:118, 1897. [Original material: Near Choquecamata, Prov. Cochabamba, Bolivia, coll. Germain, 1889.]

*Didymodon calymperidictyon* Broth. in Skotts., Nat. Hist. Juan Fernandez 2:419, 1924. [Original material: Quebrada Damajuana, 345 m, Mas a Tierra, coll. C. & I. Skottsberg n. 107 (S!).]

*Didymodon linearis* Broth. in Skotts., Nat. Hist. Juan Fernandez 2:419, 1924, *hom. illeg.* [Original material: Near Correspondencia, 1100 m, Mas Afuera, coll. C. & I. Skottsberg n. 380 (S!).]

Stems small or slender in loose, green to reddish green tufts or cushions, up to 1.5 cm high. Leaves strongly contorted when dry, up to 2 mm long, linear with obtuse or acute tip; lower margins erect or variously recurved, usually distinctly toothed near tip; costa percurrent, densely papillose on back; cells of upper lamina subquadrate with many small papillae, 8–10  $\mu\text{m}$  in diameter; inner basal cells sharply demarcated, up to 35  $\mu\text{m}$  long, 20  $\mu\text{m}$  wide, laxly rectangular, clear and smooth, pale or slightly reddish; lower margins usually with smaller, more colored cells, those nearest base elongate, narrow. Dioicous. Setae (7–)13–15 (–17) mm long. Capsules narrow, usually strongly curved, with flaring mouth when old.

MAS AFUERA: Near Correspondencia, 1100 m, *Sk. 380* (type, *Didymodon linearis*, S).

MAS A TIERRA: Q. Damajuana, 345 m, *Sk. 107* (type, *Didymodon calymperidictyon*, S); Cordon Salsipuedes, ca. 1700 ft, *H. & E. 186*.

The species is known from Mexico, Guatemala, Costa Rica, Jamaica, Colombia, Ecuador, Bolivia, and now Juan Fernandez. For a discussion of the species see Crum (1957). In spite of some variations in color and apex, the new collection, which is very depauperate, and the two Brotherus species all seem



to belong under this broad concept of *B. campylocarpum*.

The broad concept given above should probably also include Colombian specimens that I have erroneously associated with the name *Didymodon angustulus* Herz. (Robinson, 1967). According to Hilpert (1933) the latter name refers to what must now be called *Trichostomopsis*, being close to or the same as *T. australasiae* (Hook. & Grev.) H. Robinson.

### Genus *Leptodontium*

Small to robust, loosely caespitose plants with erect, sparsely branching stems, lacking central strand. Leaves spreading when moist, crisped and

contorted when dry; margins recurved in lower 1/3-3/4, usually strongly dentate distally; costa subpercurrent to short-excurrent, in section showing 2 stereids without distinct epidermal layer; cells of upper lamina rounded to quadrate, variously papillose; inner basal cells larger, smooth. Dioicous or pseudoautoicous. Perichaetia apical, leaves mostly high-sheathing. Setae long, erect. Capsule erect, cylindrical; peristome teeth erect, mostly cleft to base into linear divisions; opercum conical to conic-rotate. Calyptra cucullate, bare.

The concepts followed here are those in the monograph by Zander (1972). As indicated in that work, there are two species known from Juan Fernandez.

### Key to Species of *Leptodontium*

- Papillae grouped or centered over lumens of leaf cells, lower marginal and submarginal cells usually strongly papillose; leaf tips with mostly subquadrate cells; costa in section elliptical, with 1-2 ventral layers of stereids ..... *L. microruncinatum*  
 Papillae scattered over surfaces of cells, lower marginal and submarginal cells not unusually papillose; apex narrowly acute with many rhomboidal cells; costa in section semicircular, with 2-3 ventral layers of stereids ..... *L. pungens*

### *Leptodontium microruncinatum*

*Leptodontium microruncinatum* Dus., Ark. Bot. 6 (8):10, 1906.  
 [Original material: Guaitecas, Chiloe, Chile, coll. *Dusén n. 620*, 1895-1897 (FH).]

*Leptodontium rufescens* Broth. in Herz. Biblioth. Bot. 87:35, 1916. [Original material: Cerros de Malaga, Cochabamba, Bolivia, coll. *Herzog n. 4362*, 1911 (H).]

*Leptodontium undulatum* Herz., Biblioth. Bot. 87:36, 1916.  
 [Original material: Camarapa, Cochabamba, Bolivia, coll. *Herzog n. 4277*, 1911 (JE).]

*Leptodontium fernandezianum* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:418, 1924. [Original material: Correspondencia, ca. 1400 m, Mas Afuera, coll. *C. & I. Skottsberg n. 105* (FH).]

Stems in loose mats, 4-10 cm long, without tomentum, in section showing enlarged, usually collapsed epidermal cells. Leaves narrowly lanceolate, 4-6 mm long, with sheathing base; margins recurved below, dentate in upper 1/3-1/2; costa subpercurrent, narrow in section with 4 guide cells, 2 rows of stereid cells dorsally; upper leaf cells subquadrate, 11-13  $\mu$ m in diameter, walls thickened, cells with single, central, scarcely branching papilla; cells of lower margin often bearing dense covering of larger bi-trifid papillae; inner basal

cells 9-11  $\mu$ m wide, 30-85  $\mu$ m long, with few or no papillae, with thickened porose walls. Setae ca. 12 mm long, yellow; peristome teeth 0.2-0.4 mm long. Spores 18-22  $\mu$ m in diameter.

MAS AFUERA: Los Innocentes, below summit, ca. 4000 ft, *H. & E. 236, 637*.

The species is presently known from Chile, Tristan da Cunha, Reunion, and along the Andes into northern South America.

### *Leptodontium pungens*

*Leptodontium pungens* (Mitt.) Kindb., Enum. Bryin. Exot. 63, 1888.

*Didymodon pungens* Mitt., J. Linn. Soc., Bot. 7:150, 1863.  
 [Original material: Cameroons Mt., Cameroon, coll. *Mann*, 1862 (NY).]

*Leptodontium acutifolium* Mitt., J. Linn. Soc., Bot. 12:51, 1869. [Original material: Volcán de Fuego, Guatemala, coll. *Godman & Salvin, s.n.* (NY).]

*Leptodontium braunioides* C. Müll., Linnaea 42:325, 1879.  
 [Original material: Mts. between Siambon & Tafi, Tucumán, Argentina, coll. *Lorentz*, 1873.]

*Leptodontium matucanense* Besch., Bull. Soc. Bot. France 32:58, 1885. [Original material: Matucana, Peru, coll. *Savatier n. 1210*.]

*Leptodontium grimmioides* C. Müll. ex. Britt., Bull. Torr. Bot. Club 23:474, 1896. [Original material: Sorata, La Paz, Bolivia, coll. Rusby n. 3192 (NY).]

*Leptodontium subgrimmioides* Broth. & Thér., Bull. Acad. Int. Geogr. Bot. 16(196):40, 1906. [Original material: Bogotá, Colombia, coll. Apollinaire-Maria n. 1 (H).]

*Leptodontium acutissimum* Bartr., Bull. Brit. Mus. Nat. Hist., Bot. 2:54, 1955. [Original material: Pichincha, Ecuador, coll. Bell. n. 413.]

*Leptodontium skottsbergii* Bartr., Ark. Bot., ser. 2, 4:33, 1959. [Original material: Las Torres, Mas Afuera, coll. C. & I. Skottsberg n. M159 (FH!).]

Stems in rather dense mats, 2–5 cm long, without tomentum, in section showing enlarged, usually collapsed, epidermal cells. Leaves only slightly twisted when dry, spreading-recurved from rather sheathing bases when wet, 3–4 mm long, 1.0–1.3 mm wide, lanceolate, carinate distally with narrowly acute apex; lower margins recurved, dentate in upper 1/3–1/2; costa percurrent to subpercurrent, semicircular in section with 4 guide cells, 2–3 rows of stereid cells abaxially; upper leaf cells subquadrate, 11–15  $\mu\text{m}$  in diameter, with crowded, multifid papillae scattered over surface; apical cells mostly rhomboidal, scarcely papillose; inner basal cells 9–11  $\mu\text{m}$  wide, 45–65  $\mu\text{m}$  long, scarcely papillose; alar cells often yellowish brown with short, thick-walled cells. Setae 10–11 mm long, brown. Peristome 0.3–0.4 mm long. Spores 17–20  $\mu\text{m}$  in diameter.

MAS AFUERA: Las Torres, ca. 1350 m, *Sk. M159* (type, FH).

The species is also known from Mexico, Central America, Andes south to Argentina, southern Brazil, and the mountains of Africa. Juan Fernandez is the southernmost known locality for the species.

### Genus *Tortula*

Medium-sized to large plants in coarse tufts, with stems erect, sparingly branched. Leaves broad, ovate to spatulate, contorted when dry; margins with or without teeth or elongate cells or paler cells; costa percurrent to long-excurrent, in section with stereids abaxially and only a region of enlarged cells adaxially; upper leaf cells usually papillose, some with larger cells and no papillae; inner basal cells enlarged, smooth, usually forming a distinct area. Perichaetia apical. Setae elongate. Peristome teeth filiform, spirally twisted, often fused into high membrane basally; operculum very long-conical. Calyptra cucullate, smooth.

The genus shows great diversity in the Andes and especially Chile, but only two apparently closely related species are reported from Juan Fernandez.

### Key to Species of *Tortula*

- Leaf tip obtuse, usually with smooth or serrulate apical arista ..... *T. flagellaris*  
 Leaf tip rather acute, with distinct apiculus ..... *T. scabrinervis*

#### *Tortula flagellaris*

*Tortula flagellaris* (Schimp.) Mont. in Gay, Hist. Fis. Polit. Chil. Bot. 7:147, 1850.

*Barbula flagellaris* Schimp., Ann. Sc. Nat. Bot. ser. 2, 6:146, 1836. [Original material: Chile, coll. Bertero.]

*Tortula perflaccida* Broth. ex Dus., Ark. Bot. 6(8):27, 1906. [Original material: Near Valparaiso, Chile, coll. Dusén, 1895–1897.]

Plants in pale to dark green mats, stems slender, laxly caespitose, to 2 cm high. Leaves 3–4 mm long, spreading when moist, incurved-contorted when dry, oblong with obtuse apex; margin reflexed, entire; costa usually excurrent in smooth or serrulate, rather short arista, rarely percurrent

or subpercurrent, papillose abaxially; upper lamina cells rounded-hexagonal, ca. 15  $\mu\text{m}$  in diameter, thin-walled, densely papillose; inner basal cells hyaline, smooth. Dioicous. Peristome syntrichous.

The species is listed by Brotherus (1924), but no specimens have been seen in the present study. The distribution of the species includes central Chile.

#### *Tortula scabrinervis*

*Tortula scabrinervis* (C. Müll.) Mont. in Gay, Hist. Fis. Polit. Chil. Bot. 7:150, 1850.

*Barbula scabrinervis* C. Müll., Syn. 1:634, 1849. [Original



material: Los Chorillos, Prov. Quillota, Chile, coll. Pöppig, Sept. 1827.]

Small, brownish to reddish green. Leaves erect-spreading when moist, appressed with scarcely contorted tips when dry, ca. 3 mm long, oblong-lanceolate; margins recurved in middle, rather incurved above, entire, without differentiated cells; apex acute with distinct apiculus; costa usually scabrous abaxially; cells of upper lamina rounded-hexagonal, 8–12  $\mu\text{m}$  in diameter, cells toward margins 6–8  $\mu\text{m}$  in diameter, cells multipapillose; basal cells hyaline, 12–15  $\mu\text{m}$  broad, 30–80  $\mu\text{m}$  long. Dioicous. Setae rather short. Peristome syntrichous.

MAS A TIERRA: Portezuelo de Villagra, 590 m, *Sk. 121* (S); Valle Colonial, *Sk. M38* (S).

The species is known from Juan Fernandez and central Chile. None of the differences cited between this and the preceding species seem convincing. The presence of an arista is supposedly variable in both species.

## FUNARIACEAE

### Genus *Funaria*

Pale green terrestrial plants with short, erect stems in loose clusters. Leaves in comal tuft, somewhat shrivelled when dry; costa slender, subpercurrent to short-excurrent; cells of lamina large, thin-walled, smooth; no distinct alar cells. Perichaetia apical. Setae long, slender. Capsule erect and cylindrical or strongly asymmetric; peristome with outer teeth often obliquely arranged and forming spiral, inner teeth directly behind outer ones or lacking; operculum flat or convex. Calyptra smooth, cucullate when mature.

Only the most widely distributed species of the genus has been found in Juan Fernandez.

### *Funaria hygrometrica*

*Funaria hygrometrica* Hedw., *Sp. Musc.* 172, 1801. [Original material: Germany, coll. *Hedwig*.]

Leafy plants budlike when young, with leaves more spreading when mature. Upper leaves to 4 mm long, to 2 mm broad, ovate to obovate, short-acuminate; margin slightly serrulate distally; costa subpercurrent; cells of upper lamina rhomboidal, to 45  $\mu\text{m}$  long, to 20  $\mu\text{m}$  wide; lower cells larger,

rectangular, 70–100  $\mu\text{m}$  long, 30–40  $\mu\text{m}$  wide; larger in alar region but not otherwise distinct. Autoicous. Setae solitary, 2–5 cm long, reddish yellow when mature. Capsule becoming inclined to pendant, to 3 mm long, asymmetrical with mouth turned strongly to one side, the one side flattened, the other side often weakly ribbed; operculum large, 0.8 mm in diameter, convex; annulus present; peristome teeth attached apically to small disk; segments  $3/4$  length of teeth. Spores 14–17  $\mu\text{m}$  in diameter. Calyptra greatly expanded and campanulate in lower part when young.

MAS AFUERA: Q. Casas, near mouth, *H. & E. 140*; above beach between Q. Casas and Q. Vacas, *M. 9340*.

The species occurs in all major land areas of the world except Antarctica, and it is often very common on calcareous substrates or in burned-over areas. Brotherus reported the species from both Mas Afuera and Mas a Tierra.

## BRYACEAE

### Genus *Orthodontium*

Small, slender, pale to golden green plants with erect stems. Leaves little altered when dry, long and very narrow; margins mostly entire; costa subpercurrent; cells very narrowly rhomboidal, without distinct alar cells. Perichaetia apical. Setae elongate. Capsule erect to inclined, cylindrical; peristome double, teeth and segments each 16, slender. Calyptra cucullate, bare.

The genus has been monographed by Meijer (1952). One species is known from Juan Fernandez.

### *Orthodontium gracile*

*Orthodontium gracile* Schwaegr. ex B.S.G., *Bryol. Eur.* 4:70, 1844 (fasc. 23–24 Mon. 4). [Original material: Near Helsby, Cheshire, England, coll. *Wilson*, 1833 (BM).]

*Orthodontium aethiopicum* C. Müll., *Bot. Zeit.* 13:753, 1855. [Original material: Cossi berri, Abyssinia, coll. *Schimper* (lectotype; S).]

*Orthodontium osculationum* DeNot., *Mem. R. Acc. Sc. Torino* ser. 2, 18:443, 1859. [Original material: Mt. Napo, Colombia, coll. *Osculati* (RO).]

*Orthodontium tenellum* Mitt., *J. Linn. Soc., Bot.* 12:275, 1869. [Original material: Picillum, Andes Quitenses, coll. *Jameson* (NY).]

Stems usually 2–4 mm high. Leaves pellucid, lin-

ear, to 7 mm long; margins subentire; costa without stereids; median cells linear, 8–12  $\mu\text{m}$  broad, 40–80  $\mu\text{m}$  long; basal cells rectangular, 75–125  $\mu\text{m}$  long, to 25  $\mu\text{m}$  wide. Paroicous. Setae 2.5–10.0 mm long. Capsule 1.5–2.0 mm long, narrowly ovate to narrowly pyriform, not plicate; peristome teeth narrowly lanceolate. Spores 10–18  $\mu\text{m}$  in diameter.

MAS A TIERRA: El Yunque, near and below east face, ca. 1600–1800 ft, *H. & E.* 361, 374, 504A; trail to base of El Yunque up to 1800 ft, *H. & E.* 796.

The species is known also from Europe, Central Africa, western United States, Mexico, Guatemala, and the Andes from Colombia to Chile. Bartram was the first to report the species from Juan Fernandez.

### Genus *Mielichhoferia*

Pale to yellowish green plants in dense mats of crowded, erect stems. Leaves little altered when dry; margins slightly serrate distally; costa subpercurrent or rarely excurrent; cells of lamina very narrowly rhomboidal, alar cells not distinct. Perichaetia usually forming short, lateral branch, sometimes apical. Setae elongate. Capsule usually pyriform, erect or inclined to horizontal; peristome usually simple, outer row vestigial or lacking, inner row of 16 linear to narrowly lanceolate segments. Calyptra cucullate, bare.

A single species is reported from Juan Fernandez.

### *Mielichhoferia longiseta*

*Mielichhoferia longiseta* C. Müll., *Syn.* 1:236, 1848. [Original material: Andes, coll. *Humboldt & Bonpland.*]

Stems to 7 mm high. Leaves ca. 1.5 mm long, ca. 0.3 mm wide, lanceolate from oblong base, apex slenderly acuminate; margins plane; costa subpercurrent; upper leaf cells linear, to 100  $\mu\text{m}$  long, 10–12  $\mu\text{m}$  wide; basal cells rectangular, 25–40  $\mu\text{m}$

long, 12  $\mu\text{m}$  wide. Synoicous or paroicous, antheridia usually in axils of lower bracts of perichaetia. Perichaetia on short, lateral branch. Setae 9–10 mm long, reddish when mature, curved near top. Capsule inclined to horizontal when moist, usually erect when dry, narrowly pyriform, 3 mm long; peristome segments ca. 20  $\mu\text{m}$  broad with distinct, slightly keeled median line and small appendiculations, basal membrane visible. Spores ca. 15  $\mu\text{m}$  in diameter, finely papillose. Operculum convex to long-conical, mamillate in center.

MAS AFUERA: Q. Blindado, *H. & E.* 241.

The species is known primarily from Ecuador, with a few reports from other localities. The value of various reports might be questioned, as species concepts in the genus need careful review. The material cited from Juan Fernandez has no capsules, and the identification is based on the previous report of the species from the *Challenger* Expedition.

### Genus *Bryum*

Small to very large plants with tufts of erect stems, often radiculose below with papillose rhizoids. Leaves scarcely to distinctly shrivelled when dry, ovate to ovate-lanceolate; margins entire or serrate, sometimes bordered with narrow cells; costa subpercurrent to short-excurrent, cross section with single large stereid; upper leaf cells rhomboidal. Perichaetia apical. Setae elongate. Capsule cylindrical with swollen or tapering base, usually pendant; peristome double, inner peristome usually complete with keeled segments and cilia. Operculum convex, apiculate. Calyptra cucullate, bare.

As many as 800 species have been listed for this cosmopolitan genus. The four species known from Juan Fernandez can be distinguished by the following key.

### Key to Species of *Bryum*

1. Leaves up to 4.5 mm long, sharply serrate distally, bordered by many rows of narrow cells ..... *B. lechleri*
1. Leaves not over 1.5 mm long, entire, with border indistinct or lacking ..... 2
  2. Stems and leaves green or yellowish green; all basal cells of leaves and most surface cells of stems small and quadrate ..... *B. chryseum*
  2. Stems and parts of leaf costae reddish; most cells of leaf bases and stem surfaces elongate... 3
    3. Leaves whitish in apical half with hyaline cells; costa weak or lacking in apical part ..... *B. argenteum*
    3. Leaf laminae green throughout; costae reddish, excurrent in short arista ..... *B. fernandezianum*



*Bryum argenteum*

*Bryum argenteum* Hedw., Sp. Musc. 181, 1801. [Original material: Europe, coll. *Hedwig*.]

Small, whitish green plants usually 5–10 mm high, sparingly reddish radiculose, with stems reddish and covered with elongate epidermal cells. Leaves mostly ca. 1 mm long, 0.6 mm wide, broadly ovate, rather concave, often with abrupt, slender acumination; margins entire, erect to slightly recurved below; costa percurrent or rarely slightly excurrent, distal part usually weak or ending near upper 1/4 of leaf; cells of upper lamina rhomboidal, 12–20  $\mu\text{m}$  wide, ca. 75  $\mu\text{m}$  long, those in upper 1/3 hyaline; lower cells with firmer walls; basal cells more rectangular, 12  $\mu\text{m}$  wide, 25–30  $\mu\text{m}$  long, often reddish. Dioicous. Setae usually ca. 10 mm long, yellowish and becoming red when older. Capsule distinctly pendulous, short-cylindrical with a short tapering or slightly swollen base, often reddish; peristome complete. Spores 14–18  $\mu\text{m}$  in diameter.

MAS A TIERRA: Cordon Salsipuedes, ca. 1500 ft. *H. & E.* 354.

*Bryum argenteum* is undoubtedly the most weedy species of moss in the world, being known from almost all terrestrial regions including Greenland and Antarctica. It is difficult to understand why there are no previous reports of the species from Juan Fernandez.

*Bryum chryseum*

*Bryum chryseum* Mitt., J. Linn. Soc., Bot. 12:304, 1869. [Original material: Volcán de Fuego, Guatemala, coll. *Godman & Salvin.*]

Small, yellowish green plants to 1 cm high; stems green, very brittle, making stripping of leaves impossible, surface covered with quadrate or short-rectangular cells 15–30  $\mu\text{m}$  long and 20  $\mu\text{m}$  wide; very densely foliate with crowded, spreading leaf tips. Leaves ca. 1 mm long, 0.6 mm wide, with broadly ovate base and long, slender acumination; margins entire, narrowly recurved; costa percurrent to slightly excurrent; basal 1/3 of leaf filled with numerous green, quadrate cells, cells ca. 15  $\mu\text{m}$  wide, 12–15  $\mu\text{m}$  long; upper cells narrowly rhomboidal to linear, 10–12  $\mu\text{m}$  wide, 75–100  $\mu\text{m}$  long. Dioicous. Setae to 20 mm long. Capsule pendulous,

cylindrical with a tapering neck; peristome complete.

The species was reported from Juan Fernandez by Bartram (1957) and had previously been known only from Guatemala and Mexico. I have seen many collections from the coastal range of Peru and from western Venezuela. In South America the species may have been confused with *Haplodontium*, which it superficially resembles.

The green, brittle stems with quadrate epidermal cells are the most distinctive feature of the species.

*Bryum fernandezianum*

*Bryum fernandezianum* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:424, 1924. [Original material: Puerto Ingles, Mas a Tierra, coll. *C. & I. Skottsberg*, n. 189 (lectotype, present designation; S!).]

Light green plants to 1 cm high, brownish radiculose below; stems reddish, covered with elongate cells 12  $\mu\text{m}$  wide and 40–50  $\mu\text{m}$  long. Leaves imbricate when dry, erect-spreading when moist, upper leaves larger, to 1.3 mm long and 0.5 mm wide, oblong, short-acuminate; margins entire, erect; costa thick, excurrent into a short, nearly smooth arista, reddish; cells of upper lamina oblong-hexagonal, 10–18  $\mu\text{m}$  wide, 40–50  $\mu\text{m}$  long, usually thin-walled; basal cells more rectangular, 15–20  $\mu\text{m}$  wide, 25–50  $\mu\text{m}$  long, those at margins narrower, forming indistinct border. Dioicous. Sporophyte unknown.

MAS AFUERA: V. Casas, *Sk.* 183 (S); Q. Vacas, *Sk.* 187 (S); Q. Ovalo, *Sk.* M113.

MAS A TIERRA: Puerto Ingles, *Sk.* 189 (lectotype, S); Punta San Carlos, *Sk.* M18 (S).

Brotherus compares the species to *B. cruegeri* Hampe, which has narrower leaf cells and seems better placed in *Pohlia*. As presently recognized, *B. fernandezianum* is endemic to Juan Fernandez, but capsules are unknown and the leaves do not seem particularly distinctive.

*Bryum lechleri*

*Bryum lechleri* C. Müll., Bot. Zeit. 14:416, 1856. [Original material: Near col. Arique, Valdivia, Chile, coll. *Lechler* Pl. Chilens. I n. 626b.]

Plants forming coarse tufts to 3 cm high, densely reddish radiculose; stems red, covered with elongate, narrow cells. Leaves up to 4.5 mm long and

1.5 mm wide, often forming comal tufts that are repeated on longer stems; obovate to oblanceolate, narrowed in basal 1/3 with narrowly recurved margins, slenderly acuminate above with sharply serrate margins; costa long-excurrent; cells of upper lamina mostly rhomboidal, ca. 50  $\mu\text{m}$  long, 15  $\mu\text{m}$  wide; basal cells rectangular, thin-walled, ca. 75–100  $\mu\text{m}$  long, 25  $\mu\text{m}$  wide, 6 or more marginal rows of narrow, elongate cells ca. 10  $\mu\text{m}$  wide and to 200  $\mu\text{m}$  long. Dioicous. Setae 15–25 mm long, reddish brown. Capsule urn to 5 mm long, inclined to horizontal, curved with slender base; peristome complete. Spores 10–15  $\mu\text{m}$  in diameter.

MAS AFUERA: Q. Casas, near mouth, *H. & E.* 224; Los Innocentes, base of cliff, ca. 4000 ft. *H. & E.* 670.

This species, the only member of the distinctive subgenus *rosulata* in Juan Fernandez, is related to the widely distributed *B. billardieri* Schwaegr. (Ochi, 1970) and to *B. truncorum* of Reunion Island and Madagascar (Ochi, 1972).

## LEPTOSTOMATACEAE

### Genus *Leptostomum*

Coarse, yellowish green plants with tufts of erect stems, dense reddish radiculose below. Leaves laxly appressed or spirally twisted around stem when dry, erect-spreading when moist, oblong with piliferous tip; margins erect or reflexed; costa subpercurrent to excurrent, in section showing large stereid abaxially, 2-layered stereid adaxially; lamina cells smooth, mostly rounded-hexagonal; basal cells scarcely distinct. Dioicous. Perichaetia apical. Setae elongate, smooth. Capsule erect or inclined; annulus lacking; peristome rudimentary. Operculum short, convex. Calyptra cucullate, bare.

The genus is mostly Austral and Indonesian, with one species known from Juan Fernandez.

### *Leptostomum menziesii*

*Leptostomum menziesii* R. Brown., Trans. Linn. Soc. London 10:321, 1811. [Original material: Staaten Isl., Cape Horn, coll. *Menzies*.]

Stems to 2 cm high with erect, laxly appressed, slightly contorted leaves when dry. Leaf laminae oblong, to 3 mm long, 1.2 mm wide, abrupt or

somewhat tapering at base of arista; margins erect or broadly and laxly reflexed, obscurely serrate near tip; costa stout, ca. 150  $\mu\text{m}$  wide at base, more slender apically to 20  $\mu\text{m}$  wide, long-excurrent in slightly sinuous or bent arista; most lamina cells rather rounded, with somewhat thickened walls, ca. 12–15  $\mu\text{m}$  in diameter, some basal cells more elongate, to 30  $\mu\text{m}$ ; scattered, narrow, elongate cells along upper margin to 40  $\mu\text{m}$  long. Setae to 2 cm long, reddish brown. Capsule horizontal to pendant, urn to 7 mm long, 1 mm wide, cylindrical, with tapering base 1.5 mm long; outer peristome lacking, inner peristome a partly dissected membrane.

MAS AFUERA: Cordón Barril, *Sk.* 196; trail to Los Innocentes, ca. 3000 ft. *H. & E.* 248B; below summit of Los Innocentes, ca. 4000 ft. *H. & E.* 485, 529.

MAS A TIERRA: Below east face of El Yunque, ca. 1600 ft. *H. & E.* 321.

The species is known only from Chile and the Fuegian part of Argentina.

## DIPLOSTICHACEAE

### Genus *Diplostichum*

Plants with slender, yellowish green branching stems in loose tufts, slightly radiculose at base, bare above. Leaves at bases of stems and branches small and spirally arranged; mature leaves larger, distichous with occasional one dorsal or ventral, strongly carinate with halves complicate, outline of folded leaf cymbiform; margins slightly to strongly crenulate; costa stout, excurrent in rather short mucro or arista, in section showing single central stereid; cells of lamina small, subquadrate, minutely papillose. Dioicous. Perichaetia lateral, with elongate, nonpapillose, partly ecostate leaves. Setae slender. Capsule urn erect or slightly curved, ribbed; annulus lacking; peristome single (outer lacking), teeth lanceolate and sometimes perforate in middle line, vertically striolate; operculum with conical base and long-rostrate tip. Calyptra cucullate, bare.

The relationships of the family are worthy of further study. Inasmuch as the median line of the tooth is a guide, one can confirm that the single peristome is endostome as in the Haplolepidaceae. Still, the elongate branching habit of the plant, the



lateral perichaetium, and the simpler section of the costa all tend to confirm the placement of the family in the Diplolepideae near the Rhizogoniaceae.

On the basis of limited review of the genus I refer the Juan Fernandez specimens to the following species.

### *Diplostichum longirostre*

*Diplostichum longirostre* (Brid.) Mont., Ann. Sc. Nat. Bot. ser. 3, 4:117, 1845.

*Pterigynandrum longirostre* Brid., Mant. Musc. 131, 1819.  
[Original material: Tristan da Cunha, coll. Aubert du Petit Thouars.]

*Eustichia longirostris* (Brid.) Brid., Bryol. Univ. 2:789, 1827.

*Didymodon distichus* Schwaegr., Spec. Musc. Suppl. 2(2): 110, 1827, *hom. illeg.* [Original material: Madagascar, coll. Aubert du Petit Thouars.]

*Diplostichum spruceanum* C. Müll., Hedwigia 36:85, 1897.  
[Original material: Mt. Pichincha, Ecuador, coll. Spruce n. 1.]

*Eustichia spruceana* (C. Müll.) Par., Ind. Bryol. Suppl. 153, 1900.

*Diplostichum distichum* Card., Rev. Bryol. 40:19, 1913. [Based on *Didymodon distichus* Schwaegr., *hom. illeg.*]

Stems 1–3 cm high. Leaves to 1.2 mm long, 0.4 mm wide, usually equally wide on both sides at base; margin with small projections which sometimes are double at each cell juncture, projections weaker to nearly lacking toward tip; cells of lamina rounded to subquadrate, ca. 10 µm in diameter, with rather thick walls, a few scattered, narrower cells along margin; basal cells up to 20 µm long. Perichaetia 2 mm long. Setae ca. 2 cm long, yellowish. Capsule urn to 1.2 mm long. Operculum ca. 1.2 mm long.

MAS AFUERA: Q. Casas, bluff beside stream, *H. & E. 145*, near mouth, *H. & E. 146* part, 222.

As delimited here the species occurs on islands of the South Atlantic and Indian oceans, Juan Fernandez, and northward in the Andes at least to Ecuador. While using the oldest species name in the genus, I nevertheless recognize some limitations.

Without seeing more material or types I can only suggest the following possible alignment. Juan Fernandez material has weak papillae on the lamina and the margins are only slightly serrulate distally. This most closely approaches the entire-margined condition described by Bridel-Brideri (1827) and is essentially like the fruiting part of isotype material of *D. spruceanum* C. Müll. Other South American material, including the nonfruiting pieces of the isotype of *D. spruceanum*, have stronger papillae and more strongly papillose margins. The proper name for such material seems to be *Diplostichum jamesonii* (Tayl.) H. Robinson, new comb. (basionym: *Cymbaria jamesonii* Tayl., J. Bot. 7:190, 1848). Specimens from Costa Rica (*Valerio 310*) and the Dominican Republic (*Ekman 12006*) show a slightly more robust plant with large, nonoverlapping leaves that are usually narrower on one side at the base. The only name that might represent this northern element is *D. miradoricum* C. Müll. The name previously used for Juan Fernandez material, *D. poeppigii* C. Müll., cannot be definitely placed without seeing type material.

## RHIZOGONIACEAE

### Genus *Rhizogonium*

Slender to coarse plants with erect or arching stems in loose mats, densely radiculose at base. Leaves spirally arranged to complanate in two rows, broadly ovate to lanceolate; margins toothed; costa subpercurrent to excurrent, in section showing 2 stereid bands and row of guide cells; cells of lamina small, rounded-hexagonal, smooth. Perichaetia lateral from near base, sometimes clustered, budlike. Setae elongate, solitary, smooth. Capsule urn elongate or ovoid, sometimes curved, smooth; annulus present; peristome usually complete. Operculum short or long-rostrate. Calyptra cucullate, bare.

Two species are known from Juan Fernandez.

### Key to Species of *Rhizogonium*

- Plants radially foliate; leaves spirally inserted in 2/5 sequence, narrowly lanceolate, costa toothed on back; border bistratose with double series of teeth ..... *R. mmioides*  
Plants complanate; leaves mostly in two rows, oblong-ovate or elliptical; costa smooth on back; border unistratose ..... *R. novae-hollandiae*

*Rhizogonium mnioides*

*Rhizogonium mnioides* (Hook.) Wils. in Hook. f., Fl. Nov. Zel. 2:116, 1854.

*Hypnum mnioides* Hook., Musci. Exot. 1:77, 1818. [Original material: Staaten Isl., near Cape Horn, coll. Menzies, 1787.]

Coarse, yellowish green plants usually on soil, with stems to 6 cm high, densely radiculose below. Leaves evenly and rather laxly distributed around stem, somewhat crisped when dry, narrowly lanceolate, to 6 mm long, 1.0 mm wide, slightly decurrent; margins thickened with double row of sharp teeth; costa subpercurrent; cells of upper lamina 8–13  $\mu\text{m}$  in diameter, rounded to subquadrate, walls slightly thickened especially at angles; small area of inner basal cells larger, to 40  $\mu\text{m}$  long, to 15  $\mu\text{m}$  wide. Dioicous. Perichaetia with long, setaceous bracts. Setae to 4 cm long, reddish. Capsule urn ca. 2.0 mm long, ovoid, rather curved, horizontal; peristome complete. Spores 16–20  $\mu\text{m}$  in diameter. Operculum conic-rostrate.

MAS AFUERA: Q. Casas, *H. & E.* 40b, 125, 571, 788; trail to Los Innocentes, ca. 3000 ft, *H. & E.* 451B.

The species is known also from southern South America northward in the mountains to Colombia and Costa Rica, and from Australia, Tasmania, and New Zealand.

*Rhizogonium novae-hollandiae*

*Rhizogonium novae-hollandiae* (Brid.) Brid., Bryol. Univ. 2:664, 1827.

*Fissidens novae-hollandiae* Brid., Bot. Zeit. Regensburg 1:212, 234, 1802. [Original material: Nova Hollandia, coll. La Billardière, 1791–1794.]

Plants usually on humus or bark, with stems to 2 cm high. Leaves of mature stems usually distichous, becoming incurved or secund when dry, oblong-ovate to elliptical, ca. 1 mm long, 0.5 mm wide; margin plane, unistratose, strongly serrate in distal half; costa percurrent or subpercurrent into a short, sharp acumination, smooth abaxially; cells of lamina rounded-hexagonal, ca. 15–20  $\mu\text{m}$  in diameter, walls somewhat thickened; a few basal cells narrow and elongate, to 40  $\mu\text{m}$  long. Dioicous. Perichaetia basal, long with long-tipped, narrow-celled leaves. Setae 1–2 cm long, reddish. Capsule to 2 mm long, oblong with tapering neck, inclined

to horizontal. Spores 12–16  $\mu\text{m}$  in diameter. Operculum with short beak.

MAS A TIERRA: Salsipuedes, 660 m, *Sk.* 190 (S).

The species is known from Australia, Tasmania, New Zealand, the East Indies, Juan Fernandez, and Patagonia. The material from Patagonia and Juan Fernandez has been placed in a variety *patagonicum* Card. & Broth. which was noted for "folia superne argute serrata, nervo superne tenuiore."

## AULACOMNIACEAE

Genus *Leptotheca*

Plants yellowish green with slender, erect stems, sometimes reddish radiculose at base. Leaves laxly erect-spreading when moist, becoming slightly incurved when dry, laxly imbricate, oblong, rather strongly keeled; margins slightly recurved; costa short-excurrent, in section showing 2 stereids, with distinct epidermal cells; cells of lamina smooth, mostly rounded-hexagonal; basal cells more quadrate. Axillary propagula common. Dioicous. Perichaetia apical. Setae elongate, smooth. Capsule erect, ribbed; annulus broad; peristome double, teeth papillose, cilia short. Operculum prominently convex. Calyptra cucullate, bare.

The following species is provisionally reported from the islands.

*Leptotheca gaudichaudii*

*Leptotheca gaudichaudii* Schwaegr., Sp. Musc. Suppl. 2(1): 135, 1824. [Original material: Near Port Jackson, New South Wales, coll. Gaudichaud, 1817–1820.]

*Leptotheca spegazzini* C. Müll., Flora 68:398, 1895. [Original material: Ushuaia, Fuegia, coll. Spegazzini, May 1882.]

Stems in lax tufts, to 2 cm high. Leaves 2–4 mm long, 0.5 mm wide, scarcely imbricate, oblong-lanceolate; distal margin with very small or sometimes very large, sharp teeth; costa ca. 75  $\mu\text{m}$  wide at base, smooth abaxially, excurrent, ca. 150  $\mu\text{m}$  in short, stout arista; cells of lamina irregularly isodiametric, mostly 10–14  $\mu\text{m}$  in diameter, walls unevenly thickened; very few elongate cells at base by costa; most of leaf base with many rows of smaller subquadrate cells ca. 8–10  $\mu\text{m}$  in diameter. Setae 2–3 cm long. Capsule urn 3–4 mm long, very slender. Spores 10–16  $\mu\text{m}$  in diameter.



MAS A TIERRA: Ridge between Q. Piedra and Q. Laura, 650 m, *Sk.* 398 part.

The species is known from southern South America, Australia, Tasmania, and New Zealand. It is reported from Juan Fernandez on the basis of a few loose stems mixed in a collection of *Hypnum lechleri* C. Müll. The stems might represent a contaminant and the record thus based might be spurious; nevertheless, the species is to be expected on Juan Fernandez. An attempt to examine a duplicate collection from Stockholm failed since, apparently, only a label without a specimen of this collection was retained there.

## BARTRAMIACEAE

### Genus *Anacolia*

Rather coarse plants with erect stems in loose or dense tufts, often densely reddish radiculose below, primary stems sometimes creeping. Leaves imbricated, closely appressed when dry, erect or recurved when moist, narrowly lanceolate, strongly serrate in distal half, margins revolute in basal half; costa strong, percurrent, in section showing 2 stereids with upper one usually small; upper leaf lamina sometimes bistratose; upper cells small, linear to quadrate, usually papillose on one or both ends or over the lumens; outer basal cells usually quadrate. Dioicous. Perichaetia terminal, leaves not very distinct, with 1–3 innovations. Setae solitary, 2–15 mm long. Capsule globose, sometimes becoming shortly and broadly cylindrical, erect; mouth small, peristome rudimentary or lacking. Operculum low-convex. Calyptra cucullate, bare.

The genus has been monographed by Flowers (1952). Only one species is reported from Juan Fernandez.

### *Anacolia laevisphaera*

*Anacolia laevisphaera* (Tayl.) Flow. in Grout, Moss Fl. N. Am. 2:155, 1935.

*Glyphocarpa laevisphaera* Tayl., London J. Bot. 5:56, 1846. [Original material: Mt. Pichincha, Ecuador, coll. W. Jameson, Sept. 1826.]

*Bartramia subsessilis* Tayl., London J. Bot. 6:334, 1847. [Original material: Mt. Pichincha, Ecuador, coll. W. Jameson, Nov. 1846.]

*Glyphocarpa taylorii* Hampe, Flora 45:453, 1862, *nom. illeg.*

*incl. sp. prior.* [Original material: Los Laches, Bogotá, Colombia, 2800 m, coll. Lindig, 1859–1861.]

*Anacolia abyssinica* Schimp., Syn. ed. 2, 514, 1876. [Original material: Semen, Abyssinia, coll. W. Schimper.]

Plants yellowish green, brown below, with stems 1–5 cm high. Leaves erect when dry, slightly erect-spreading when moist, mostly ca. 4 mm long, up to 0.5 mm wide at base, narrowly lanceolate; margins narrowly recurved below, sharply serrate above; costa percurrent to short-excurrent, ending in sharp point, bearing some teeth laterally and abaxially near tip, in section partially merging into bi- or tri-stratose lamina in distal half; cells of upper lamina short-rectangular, small, ca. 5  $\mu$ m wide, 7–15  $\mu$ m long, papillose at lower or both ends; inner basal cells longer, to 75  $\mu$ m long with papilla at base adaxially; many rows of subquadrate cells along basal margin that are ca. 10  $\mu$ m wide and 15  $\mu$ m long. Setae to 1 cm long, reddish brown. Capsule 2–3 mm in diameter, rugulose when dry. Spores 23–28  $\mu$ m in diameter, coarsely papillose.

MAS AFUERA: Q. Casas, *H.* & *E.* 116, 726; Q. Blindado, *H.* & *E.* 239; Q. Mono, ca. 600 ft, *H.* & *E.* 621.

MAS A TIERRA: Cordon Salsipuedes, ca. 1800 ft. *H.* & *E.* 388; Portezuelo (Mirador), 500 m, *K.* 308/27 (B); Cordon rechts v. Yunque, 600 m. *K.* 313/6c (B); Camote, 500–550 m, *K.* 326/13.

The species is known from southwestern United States, Mexico, and Central America, in the Andes from Venezuela to Chile, and from Abyssinia and India. Chilean material under the name *Bartramia ambigua* Mont. is strikingly similar but seems to differ in setae being 1–2 cm long and capsules being clearly striated.

### Genus *Bartramia*

Small to large plants with erect stems in loose or dense tufts, sometimes reddish radiculose below. Leaves appressed or crisped when dry, erect or recurved when moist; blade lanceolate from an ovate base or abruptly narrowed from a rectangular, hyaline sheathing base; upper margin slightly to strongly serrate; costa subpercurrent to excurrent, usually filling half or more of subula, in section showing 2 stereids with upper stereid sometimes weak; cells of upper lamina short- to long-rectangular, papillose at each end, papillae of adja-

cent cells forming distinct pairs; cells of leaf base elongate, more or less hyaline; alar cells not differentiated. Perichaetia terminal with single innovations, leaves usually not differentiated, rarely perichaetial or perigonal leaves with very attenuate and less papillose subulae. Setae solitary, 3–20 mm long. Capsules globose to oval, slightly asymmetri-

cal, usually drying narrower and more strongly ribbed with mouth more to one side and constricted; peristome double, single, or lacking. Operculum low-convex. Calyptra cucullate, bare.

The following two species are known from Juan Fernandez. Both are easily distinguished from *Anacolia* by their sheathing, hyaline leaf bases.

### Key to Species of *Bartramia*

- Dioicous; costa rather prominent on back of most leaves, costa in section with well-developed abaxial stereid band (50 or more cells in mature leaves) ..... *B. aristata*  
 Synoicous; back of leaf rounded with costa not usually evident, costa in section with weakly developed abaxial stereid band (20 cells or less) ..... *B. patens*

#### *Bartramia aristata*

*Bartramia aristata* Schimp. ex C. Müll., Bot. Zeit. 20:338, 1862. [Original material: Cordillera de Rauco, near Arique, coll. Lechler, Mar. 1854.]

*Bartramia fernandeziana* Card. in Ther., Recueil Publ. Soc. Havraise, Etud. Div. 88:33, 1921. [Original material: Mas a Tierra, coll. Bertero, May 1830 (PC!).]

Plants yellowish green, brownish below, in tufts to 3 cm high. Leaves mostly 6–7 mm long, sometimes broken at top of sheathing base; erect base obovate, to 1.5 mm long, 0.7 mm wide; inner cells hyaline or slightly yellowish, linear, 7–10  $\mu\text{m}$  wide, 75–150  $\mu\text{m}$  long, inner cells of shoulder mostly rectangular, 10  $\times$  25  $\mu\text{m}$ , with firm walls, marginal cells of shoulder and below usually very narrow, 5–7  $\mu\text{m}$  wide, to 60  $\mu\text{m}$  long, thin-walled, hyaline; leaf blade usually strongly squarrose, linear-lanceolate; margins erect, sharply serrate; tip rather aristate with sharp teeth on edges and back; costa usually prominent abaxially, in section showing well-developed abaxial stereid with 50 cells or more in most leaves; cells of lamina narrowly rectangular, 5–7  $\mu\text{m}$  wide, 20–30  $\mu\text{m}$  long, papillose; cells near apex longer and more pointed, abaxial cells near tip very sharply projecting at distal ends. Dioicous. Perigonal and perichaetial leaves not particularly elongate. Setae 5–12 mm long. Capsule urn ca. 1.5 mm long, ovoid, inclined, ribbed when dry; lower exothelial cells 40–50  $\mu\text{m}$  in diameter, some to 75  $\mu\text{m}$  long, many upper exothelial cells 30–40  $\mu\text{m}$  in diameter; peristome double. Spores ellipsoidal, ca. 20  $\mu\text{m}$  in diameter, rough, with large, round papillae.

MAS AFUERA: Q. Blindado, *H. & E.* 88; trail to Los Innocentes, ca. 3900 ft, *H. & E.* 568; Camp Correspondencia, 3300–3800 ft, *H. & E.* 422b; *M.* 9403.

MAS A TIERRA: Without precise locality, *Bertero*, May 1830 (type of *Bartramia fernandeziana*, PC).

The species is known only from Chile and the Fuegian part of Argentina. It is most easily distinguished from *B. patens* by having a more prominent costa and stronger serrations.

Through the kindness of the staff of the Laboratoire de Cryptogamie in Paris I have been able to borrow a portion of the type of *B. fernandeziana*. The plants seem very stunted, with narrow bases on the leaves. Costae are rather prominent but have only about 30 cells in the abaxial stereids. Similar-looking leaves are seen on poorly developed parts of specimens of *B. aristata*. There is no indication of particularly fragile leaf tips, though Thériot (1921) places the species close to *B. fragilifolia* (= *B. potosica* Mont.).

#### *Bartramia patens*

*Bartramia patens* Brid., Musc. Rec. 2(3):134, 1803. [Original material: Magellan Straits, coll. Commerson.]

*Bartramia diminutiva* C. Müll., Bot. Jahrb. 5:79, 1883. [Original material: Kerguelen, coll. Neumann, 1874–1875.]

*Bartramia pycnocolea* C. Müll. in Neum., Deutsch. Exp. Int. Polarforsch. 2:304, 1890. [Original material: Hochthal über dem oberen Whalerthal, South Georgia, coll. Will, 1882–1883.]

*Bartramia subpatens* C. Müll. in Neum., Deutsch. Exp. Int. Polarforsch. 2:304, 1890, *hom. illeg.* [Original material: Whaler Bay, South Georgia, coll. Will, 1882–1883.]

*Bartramia oreadella* C. Müll. in Neum., Deutsch. Exp. Int.



Polarforsch. 2:305, 1890. [Original material: Whalerthal, South Georgia, coll. Will, 1882-1883.]

Plants yellowish green, brownish below, in tufts to 2 cm high. Leaves mostly 4-5 mm long, often becoming detached whole from stem; erect base obovate, ca. 1 mm long, 0.7 mm wide; inner cells usually yellowish, linear, 7-10  $\mu\text{m}$  wide, 75-175  $\mu\text{m}$  long; inner cells of shoulder mostly rectangular, 10  $\times$  25  $\mu\text{m}$  with firm walls; marginal cells to above shoulders very narrow, ca. 5  $\mu\text{m}$  wide, to 75  $\mu\text{m}$  long, thin-walled, hyaline; blade erect to slightly squarrose, lanceolate; margin erect, weakly serrulate to subentire; costa rather obscure, not prominent abaxially, in section with very poorly developed stereid of 20 cells or less; cells of lamina narrowly rectangular, ca. 7  $\mu\text{m}$  wide, 25-40  $\mu\text{m}$  long, papillose; cells near apex less rectangular, generally longer. Synoicous. Perichaetial leaves not particularly elongate. Setae 5-15 mm long. Capsule urn ca. 1.5 mm long, ovoid, inclined, ribbed when dry; exothecial cells mostly 50-60  $\mu\text{m}$  in diameter, some to 75  $\mu\text{m}$  long; peristome double. Spores ellipsoidal, ca. 30  $\mu\text{m}$  long, very minutely papillose or ridged.

The species has been reported from Juan Fernandez by Brotherus (1924) but no material has been seen. The species is known from the Straits of Magellan, Fuegia, South Georgia, the Antarctic Peninsula, and Kerguelen. Both this species and the preceding one are notable for enlarged exothe-

cial cells, but in this species such cells are larger near the mouth of the capsule.

### Genus *Philonotis*

Small to large, light yellowish green plants with erect stems in loose or dense tufts, usually reddish radiculose below. Leaves usually imbricated, appressed when dry, sometimes laxly contorted, spreading when moist, lanceolate to oblong; margins serrate; apices obtuse to slenderly acuminate; costa rather slender, ending below apex to excurrent, in section showing 2 rather weak stereids; cells of upper lamina linear to laxly rectangular, lower cells usually larger; cells on basal margins often small and quadrate; cells usually papillose at ends, sometimes papillose at centers. Perichaetia terminal, usually with numerous innovations in a whorl; perichaetial bracts often longer and more attenuate than leaves. Setae solitary, slender, 10-30 mm long. Capsules globose to oval, usually more slender, strongly ribbed and constricted below mouth when dry, usually asymmetrical with mouth distinctly turned to one side when dry; peristome double, complete. Operculum low-convex to conical. Calyptra cucullate, bare.

The following four species have been reported from Juan Fernandez. Three of these species with others of Argentina are covered in the recent treatment by Matteri (1968).

### Key to Species of *Philonotis*

1. Leaves bordered with 3-5 rows of narrow cells; robust plants with leaves mostly 2.5 mm long ..... *P. vagans*
1. Leaves without distinct border of narrow cells; smaller plants with leaves 1.0-1.5 mm long . 2
  2. Cells of lamina mostly subquadrate with a large central papilla on both surfaces ..... *P. scabrifolia*
  2. Cells of lamina mostly elongate with papillae at ends ..... 3
    3. Cells of lamina scarcely papillose, those at base smooth ..... *P. glabrata*
    3. Cells of lamina strongly papillose ..... *P. krausei*

### *Philonotis glabrata*

*Philonotis glabrata* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:426, 1924. [Original material: Pangal, Mas a Tierra, coll. C. & I. Skottsberg n. 363 [S!].]

Slender, densely tufted, light green plants with sparsely branching stems to 3 cm high, reddish radiculose below. Leaves erect-spreading, more

erect when dry, 1.2-1.5 mm long, 0.3-0.4 mm wide, ovate-lanceolate to narrowly lanceolate; margins erect or very slightly recurved in middle, singly serrulate distally; costa thick, excurrent in short, serrulate arista, serrulate abaxially toward tip; cells of upper lamina narrowly rectangular, 10  $\mu\text{m}$  wide, mostly ca. 40  $\mu\text{m}$  long, most with only small papillae which are at distal ends on adaxial surface and

at basal ends on abaxial surface; basal cells 12–18  $\mu\text{m}$  wide, 25–40  $\mu\text{m}$  long, rather lax, mostly smooth; 3–4 rows of laxly quadrate to short-oblong alar cells, 12–15  $\mu\text{m}$  wide, 12–20  $\mu\text{m}$  long, marginal cells rather crenulate. Dioicous. Sporophytes unknown.

MAS A TIERRA: Near Pangal, 45 m, *Sk.* 363 (type, S).

As presently recognized the species is endemic to Juan Fernandez. Additional specimens are needed for proper evaluation.

### *Philonotis krausei*

*Philonotis krausei* (C. Müll.) Broth., Nat. Pfl. 1 (3):648, 1904.

*Bartramia krausei* C. Müll., Linnaea 38:595, 1874. [Original material: Valdivia, Chile, coll. Krause, 1874.]

*Philonotis krauseana* Broth. in Skottsbl., Nat. Hist. Juan Fernandez 2:426, 1924, *nom. illeg.*

Slender, often densely tufted, yellowish green plants with sparsely branching stems to 3 cm high, reddish radiculose below. Leaves erect-spreading to slightly secund, scarcely changed when dry, mostly 1.3 mm long, 0.4 mm wide, lanceolate from a broadly ovate base, slenderly acuminate; margins narrowly recurved with 2–3 rows of serrations; costa stout, 40  $\mu\text{m}$  wide at base, excurrent into serrate arista, serrate abaxially toward tip; cells of upper lamina narrowly rectangular, ca. 7  $\mu\text{m}$  wide, 25–30  $\mu\text{m}$  long; inner basal cells larger, to 12  $\mu\text{m}$  wide, some above base to 60  $\mu\text{m}$  long, toward lower margin narrower, a few subquadrate cells ca. 15  $\times$  20  $\mu\text{m}$  in basal angle; cells of lamina with papilla at distal end on adaxial surface and at lower end abaxially. Dioicous. Perigonia gemmiform. Setae 30 mm long, reddish. Capsule oblique, rather ovoid; urn 2.5–3.0 mm long, more ribbed when dry. Spores elliptical, ca. 22  $\mu\text{m}$  long, with large papillae.

MAS AFUERA: Below summit of Los Innocentes, ca. 4000 ft, *H. & E.* 498B, 499B.

The species is rather common in southern Chile and Argentina and has been reported from both Mas Afuera and Mas a Tierra.

### *Philonotis scabrifolia*

*Philonotis scabrifolia* (Hook. f. & Wils.) Braithw., Brit. Moss Fl. 2:215, 1893.

*Hypnum scabrifolium* Hook. f. & Wils., London J. Bot. 3:552, 1844. [Original material: Lord Auckland Isl., coll. J. D. Hooker, 1839–1843.]

*Bartramia appressa* Hook. f. & Wils., Fl. Nov. Zel. 2:89, 1854. [Original material: Falls of Waitangi, Bay of Islands, North Island, New Zealand, coll. J. D. Hooker, 1839–1843.]

*Bartramia pusilla* Sull., Kew J. Bot. 2:316, 1850, *hom. illeg.* [Original material: Vic. Orange Harbor, Tierra del Fuego, coll. Wilkes Exp., 1838–1842.]

*Bartramia hymenodon* C. Müll., Bot. Zeit. 17:220, 1859. [Original material: Olifantshoek, Cape of Good Hope, South Africa, coll. Ecklon.]

*Bartramia exigua* Sull. in Wilkes, U.S. Expl. Exp. 11, 8C, 1859, *nom. nov.*

*Bartramia remotifolia* Hook. f. & Wils., Fl. Tasman. 2:193, 1859. [Original material: Gullies Road, Brown's River, Tasmania, coll. Oldfield.]

*Bartramia catenulata* Hampe, Linnaea 30:631, 1860. [Original material: Mt. Cobboras, 6000 ft, Australia, coll. F. Müller.]

*Bartramia willii* C. Müll. in Neum., Deutsch. Exp. Int. Polarforsch. 2:306, 1890. [Original material: High plateau, South Georgia, coll. Will, 1882–1883.]

*Bartramia ventanae* C. Müll., Hedwigia 36:98, 1897. [Original material: Sierra Ventana, Patagonia, Argentina, coll. G. Lorentz, Feb. 1881.]

*Bartramia pinnulata* C. Müll., Nuov. Giorn. Bot. Ital. n. ser., 4:44, 1897. [Original material: Near Choquecamata, Cochabamba, Bolivia, coll. P. Germain, 1889.]

Slender, whitish to pale green plants 1.0–2.0 cm high, almost always dendroid with subforal innovations on both male and female plants, reddish radiculose below. Leaves erect-spreading, more appressed when dry; stem leaves mostly 1 mm long, 0.5 mm wide, lanceolate from a broadly ovate base, slenderly acuminate; branch leaves ca. 0.4 mm long, 1.5 mm wide, lanceolate; margins of stem leaves in lower part prominently crenulate with pairs of projecting cell ends, in upper part narrowly recurved; margins of branch leaves erect; costae 40  $\mu\text{m}$  wide at base, percurrent or excurrent into serrulate arista, serrulate abaxially toward tip; lamina cells mostly subquadrate to short-rectangular, 8–10  $\mu\text{m}$  wide, 8–20  $\mu\text{m}$  long, with large central papillae on both surfaces; inner basal cells to 30  $\mu\text{m}$  long. Dioicous. Perigonia disciform. Setae 1.0–2.5 cm long, reddish. Capsule urn 2–3 mm long, oval-oblong, rather oblique, more ribbed and sometimes curved when dry. Spores elliptical, ca. 25  $\mu\text{m}$  long, with large papillae.

MAS AFUERA: Q. Casas, *H. & E.* 155, 571; near Camp Correspondencia, ca. 3800 ft, *H. & E.* 422A, 738b; Los Innocentes, below summit, ca. 4000 ft, *H. & E.* 499B, 577.

The species is known from South Africa, Marion and Kerguelen Islands, East Australia, Tasmania,



New Zealand, Tristan da Cunha, and in the area of southern South America north to Colombia and Mexico. The species has been reported from both Mas Afuera and Mas a Tierra.

### *Philonotis vagans*

*Philonotis vagans* (Hook. f. & Wils.) Mitt., J. Linn. Soc. Bot. 4:80, 1859.

*Bryum vagans* Hook. f. & Wils., London J. Bot. 3:546, 1844. [Original material: Hermite Isl., Cape Horn, coll. J. D. Hooker.]

Pale, yellowish green plants becoming brown below, with stems sparsely branching in loose tufts to 8 cm high. Leaves erect-spreading, unchanged when dry, ca. 2.5 mm long, 1 mm broad, ovate, slenderly acuminate; margins erect, sharply, singly serrate in distal half; costa slender, ca. 50  $\mu$ m wide, usually percurrent into acumination, sometimes shorter; cells of lamina laxly rhomboidal; upper cells 20–25  $\mu$ m broad, 50–75  $\mu$ m long, lower cells to 150  $\mu$ m long; cells nearly all smooth but reflecting light as though slightly bulging at ends, a few uppermost cells projecting at upper ends; 2–4 rows of marginal cells elongate, 5–7  $\mu$ m wide, forming a border; a single row of short, marginal, inflated cells at base, lowermost to 40  $\mu$ m wide. Dioicous. Perigonia disciform. Setae to 60 mm long, reddish. Capsule horizontal, globose, to 6 mm long, becoming ovoid, ribbed and curved when dry. Spores ca. 25  $\mu$ m in diameter, with very large papillae.

MAS A FUERA: Q. Loberia, C. & I. Skottsberg n. 291 part (S).

The species is known from southern South America, South Georgia, and Tristan da Cunha. Even sterile, the species is very distinct from all others of the genus, but plants might easily be mistaken for a very robust *Mniobryum*.

### Genus *Breutelia*

Rather coarse plants with erect stems usually in loose tufts. Leaves usually rather erect or recurved, spreading when moist or dry; blade narrowly to broadly lanceolate; base broadly ovate to rectangular, sometimes strongly clasping the stem, more or less longitudinally plicate; costa rather narrow, subpercurrent to shortly excurrent, with 2 usually rather weak stereids; cells of upper lamina usually linear with papillae at distal ends on adaxial surface and on lower ends abaxially; cells of leaf base often longer and somewhat porose; few to many rows of enlarged, thin-walled cells at basal angle or along lower margins. Dioicous. Perichaetia terminal, bracts not greatly differentiated, usually with numerous innovations in a whorl. Setae solitary, 4–20 mm long. Capsule globose to cylindrical, narrower and more ribbed when dry, erect to pendant, symmetrical except in some with long necks; peristome double, cilia rudimentary. Operculum nearly flat with small apiculus.

The following two species are known from Juan Fernandez.

### Key to Species of *Breutelia*

- Upper leaf cells 25–60  $\mu$ m long, lumens narrow with lateral walls very thick and porose ..... *B. masafuerae*  
 Upper leaf cells 15–30  $\mu$ m long, distinctly narrowly rectangular with equally slightly thickened walls ..... *B. subplicata*

### *Breutelia masafuerae*

*Breutelia masafuerae* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:427, 1924. [Original material: Camp Correspondencia, 1350 m, coll. C. & I. Skottsberg n. 366.]

*Breutelia subplicata* var. *masafuerae* (Broth.) Matteri, Rev. Mus. Argent. Cienc. Nat. Bern. Rivadav. 4(4):345, 1973.

Yellowish green plants, with sparsely branching stems to 8 cm high, not tomentose below. Leaves 4–5 mm long; base obtrapezoidal, closely sheathing

the stem, ca. 0.9 mm long and 1.0 mm wide, with distinct large plications; blade narrowly lanceolate with slender, flexuous tip, plicate, sharply spreading from base; margins slightly recurved at least near shoulders, slightly serrulate above; costa percurrent to distinctly excurrent, nearly smooth abaxially; cells of lamina 7  $\mu$ m wide, 25–60  $\mu$ m long, lumens narrow with lateral walls very thickened and porose, not papillose; inner basal cells slightly narrower and less porose, 50–100  $\mu$ m long;

4–6 rows of cells along basal margin more hyaline, thinner-walled, rectangular, mostly 10–12  $\mu\text{m}$  wide, 25–30  $\mu\text{m}$  long. Sporophyte unknown.

MAS AFUERA: Los Inocentes, below summit, ca. 4000 ft, *H. & E.* 394.

As presently recognized the species is endemic to Mas Afuera. Relationship is very close to *B. subplicata* but reduction to varietal status in the recent treatment of the southern South American species by Matteri (1973a) seems unnecessary. The longer, smooth, porose leaf cells described by Brotherus seem quite distinctive. Also, the leaves seem generally longer and the stems less tomentose.

### *Breutelia subplicata*

*Breutelia subplicata* Broth. in Thér., Rev. Chil. Hist. Nat. 15:38, 1911. [Original material: Valdivia, Chile, coll.?] ]

Yellowish green plants, with sparsely branching stems to 10 cm high, reddish radiculose below. Leaves ca. 3.5 mm long; base obtrapezoidal, closely sheathing, ca. 0.7 mm long, to 1.0 mm wide, with distinct, large plications; blade narrowly lanceolate with slender, flexuous tip, sharply squarrose-spreading from base; margins recurved at shoulders, serrulate above and more serrate on the slender tip; costa percurrent to distinctly excurrent, with prominent papillae at upper ends of abaxial cells, smooth in lower 1/4; cells of lamina narrowly rectangular, 5  $\mu\text{m}$  wide, 15–30  $\mu\text{m}$  long, papillae sometimes at lower ends on adaxial surface; inner

basal cells to 75  $\mu\text{m}$  long and 5  $\mu\text{m}$  wide, smooth on adaxial surface; 4–5 rows of thin-walled, hyaline, rectangular cells along basal margins, ca. 30  $\mu\text{m}$  long, 8–10  $\mu\text{m}$  wide. Setae 1.5–2.0 mm long. Capsule subspherical, ca. 2.5 mm long, inclined.

MAS AFUERA: Q. Casas, *H. & E.* 117, 339; Camp Correspondencia, 3800 ft, *H. & E.* 421, 793.

The species is known only from southern Chile and Mas Afuera. Although not previously reported for Juan Fernandez, *B. subplicata* proves to be the commoner of the two species of *Breutelia* on the islands.

## ORTHOTRICHACEAE

### Genus *Zygodon*

Erect, often epiphytic plants in dense cushions, with prominent reddish tomentum in older parts. Leaves usually erect-appressed or contorted when dry, erect or squarrose-spreading when moist, oblong or lanceolate, sharply keeled; costa usually subpercurrent; upper cells of lamina small, rounded, with somewhat thickened walls. Axillary propogula common. Perichaetia terminal. Setae elongate, usually yellow. Capsules erect, distinctly ribbed; peristome usually double with broad, pale, and densely papillose outer teeth. Calyptra cucullate, bare.

The genus has been monographed on a world-wide basis by Malta (1926). The following three species are known from Juan Fernandez.

### Key to Species of *Zygodon*

1. Leaves in 5 distinct ranks; leaf blades lanceolate with slender tips, sharply spreading from a distinct sheathing base; costa percurrent ..... *Z. pentastichus*
1. Leaves not distinctly ranked; leaf blades oblong with broadly acute tips, leaf bases not distinctly sheathing; costa ending below apex ..... 2
  2. Leaf cells papillose, basal cells scarcely differentiated ..... *Z. intermedius*
  2. Leaf cells smooth, basal cells somewhat elongate ..... *Z. menziesii*

A fourth species, *Z. obovalis* Mitt., described from Mas a Tierra, remains unidentifiable (Malta, 1926:139).

### *Zygodon intermedius*

*Zygodon intermedius* B.S.G., Bryol. Eur. 3:41, 1838. [Original material: New Zealand, coll. J. D. Hooker, 1839–1843.]

*Zygodon brownii* Schwaegr., Sp. Musc. Suppl. 4:317b, 1842. [Original material: Tasmania, coll. R. Brown, 1801–1803.]  
*Zygodon brachyodus* C. Müll. & Hampe, Linnaea 28:210, 1856. [Original material: Sealers Cove, Victoria, Australia, coll. F. Müller, 1855.]

*Zygodon affinis* Doz. & Molk. ex Bosch & Lac., Bryol. Jav. 1:107, 1859. [Original material: Java.]

*Zygodon kraussei* Lor., Moosstud. 162, 1864. [Original material: Near Valdivia, Chile, coll. Krause.]



*Zygodon nanus* C. Müll., Hedwigia 37:135, 1898. [Original material: Greymouth, South Isl., New Zealand, coll. Helms, 1888.]

*Zygodon hymenodontioides* C. Müll., Hedwigia 37:135, 1898, *hom. illeg.* [Original material: Moe River, Gippsland, Victoria, Australia, coll. Luehmann, 1881.]

*Zygodon gracilicaulis* C. Müll., Hedwigia 37:135, 1898. [Original material: Greymouth, South Isl., New Zealand, coll. Helms, 1885.]

*Zygodon curvicaulis* Dus., Rep. Princeton Univ. Exp. Patag. 8:84, 1903. [Original material: Río Chico, Patagonia, coll. J. B. Hatcher, 1896-1897.]

*Zygodon pangerangensis* Fleisch., Musci Fl. Buitenzorg 2:395, 1904. [Original material: Pangerango, 2700 m, West Java, coll. Fleischer.]

*Zygodon stresemannii* Herz., Hedwigia 57:233, 1916. [Original material: Gunung Pinaia, Central Ceram, Indonesia, coll. Stresemann.]

*Zygodon coraniensis* Herz., Biblioth. Bot. 87:63, 1916. [Original material: Above Coranital, ca. 2600 m, Bolivia, coll. Herzog n. 3413, 1911 (JE).]

*Zygodon transvaaliensis* Rehm. ex Sim, Trans. R. Soc. S. Afr. 15:271, 1926. [Original material: Lechlaba, Houtbosch, Transvaal, coll. Rehm, Musci austro-afric. n. 500.]

Yellowish green plants with clustered, slender, erect stems usually ca. 5 mm high, sparingly branched. Leaves not ranked, erect-spreading from the base when moist, somewhat contorted when dry, to 1 mm long, 0.3 mm wide, narrowly oblong with short-acute apex, usually apiculate with a sharp apical cell; costa ending 10 or more cells below apex; cells of lamina 7-10  $\mu\text{m}$  in diameter, mostly rounded with rather thickened walls, finely and distinctly pluripapillose; inner basal cells somewhat larger, to 15  $\mu\text{m}$  long, to 12  $\mu\text{m}$  wide, smooth. Propagula mostly 3-celled. Dioicous. Setae yellow, 5-7 mm long. Capsule urn ca. 1.5 mm long. Spores 13-18  $\mu\text{m}$  in diameter, papillose.

MAS A TIERRA: NE slope Cerro Pirámide, 350-450 m. *Sk. M33* part (S); Cumberland Bay, El Pangal, *Sk. M53* (S); Cordon rechts v. Yunque, 600 m, *K. 313/11b*; Wand Damajuana, *K. 317/11c*.

The species is known from Cameroon and Abyssinia south in Africa, from India, Ceylon, Indonesia, Australia, Tasmania, New Zealand, and South America north to Bolivia.

### *Zygodon menziesii*

*Zygodon menziesii* (Schwaegr.) Arnott, Mem. Soc. Linn. Paris 5:233, 1827.

*Codonoblepharon menziesii* Schwaegr., Sp. Musc. Suppl. 2 (1): 142, 1824. [Original material: New Zealand, coll. Menzies.]

*Zygodon drummondii* Tayl., London J. Bot. 5:46, 1846. [Original material: Swan River, West Australia, coll. J. Drummond, 1829-1845.]

*Bryum oamaruense* R. Brown *ter.*, Trans. New Zealand Inst. 31:447, 1899. [Original material: New Zealand, near Oamaru, coll. R. Brown *ter.*, Nov. 1897.]

Pale to dark green plants, with clustered, slender, erect, sparingly branched stems usually ca. 5 mm high. Leaves not ranked, erect-spreading from the base when moist, somewhat contorted when dry, to nearly 1.5 mm long, 0.4 mm wide, oblong with short-acute apex, usually short-apiculate; costa ending 3-5 cells below leaf tip; cells of upper lamina mostly 10-12  $\mu\text{m}$  in diameter, in longitudinal and oblique rows, usually obliquely elongated, rather thin-walled, smooth; inner basal cells enlarged, hyaline, 25-50  $\mu\text{m}$  long, 20  $\mu\text{m}$  wide, narrower, more elongate cells toward basal margin. Propagula mostly 4-6-celled. Dioicous. Setae reddish brown when mature, 5-10 mm long. Capsule urn ca. 1.5 mm long. Spores 13-17  $\mu\text{m}$  in diameter, nearly smooth.

MAS A TIERRA: Valle Anson, near Plazoleta, 260 m, *Sk. 371* (S).

The species is known from Australia, Tasmania, New Zealand, and Chile.

### *Zygodon pentastichus*

*Zygodon pentastichus* (Mont.) C. Müll., Syn. 1:675, 1849.

*Aulacomnium pentastichum* Mont., Ann. Sc. Nat. Bot. ser. 3, 4:103, 1845. [Original material: Southern Chile, coll. C. Gay.]

*Zygodon uncinatus* Mitt., J. Linn. Soc., Bot. 12:234, 1869. [Original material: Chiloe Isl., Chile, coll. Lobb.]

Brownish green plants, with creeping stems giving rise to erect branches 1-2 cm long, branches with terminal perichaetia and frequent innovations. Leaves in 5 distinct ranks, spreading when dry or sharply squarrose-recurved from sheathing base when moist, 3.0-3.5 mm long, 1 mm wide, blade lanceolate with a slenderly acute tip; costa percurrent or subpercurrent; cells of upper lamina ca. 10  $\mu\text{m}$  wide, 10-25  $\mu\text{m}$  long, very thick-walled with lumens rounded to elliptical, surface finely pluripapillose; cells of sheathing base smooth, elongate to 65  $\mu\text{m}$  long, forming streaks consisting of lines of thin-walled, hyaline cells and intervening lines of thick-walled, reddish cells. Dioicous. Setae yellowish, to 10 mm long. Capsule urn ca. 2 mm long. Spores 26  $\mu\text{m}$  in diameter, rough.

MAS AFUERA: Near Camp Correspondencia, 3800 ft, *H. & E.* 114; Los Inocentes, trail to ca. 3000 ft, *H. & E.* 248, 581; below summit, ca. 4000 ft, *H. & E.* 529; 4000–5000 ft, *H. & E.* 792; south summit, 1300 m, *I.* 37391, 37416.

The species is known from Juan Fernandez, mainland Chile, Patagonia, and northward to southern Peru. The species is very distinctive and is often placed in a separate genus, *Stenomitrium*.

### Genus *Ulota*

Plants usually epiphytic with stems erect in dense tufts to 5 mm high, with indistinct tomentum in

older parts. Leaves crisped or rarely appressed when dry, erect-spreading when moist, lanceolate from an obovate base; margins entire; costa subpercurrent; cells of upper lamina small, rounded, with rather thickened walls; inner basal cells usually linear with thick walls; lower borders with many rows of quadrate cells. Perichaetia terminal. Setae short, slender. Capsules erect, distinctly ribbed; stomata phaneropore, near base of urn; peristome double with broad, pale, densely papillose outer teeth. Calyptra mitrate, often hairy.

The South American species have been treated by Malta (1929). The following two species have been reported from Juan Fernandez.

### Key to Species of *Ulota*

- Perichaetial leaves very long, reaching to base of capsule; spores 19–26  $\mu\text{m}$  in diameter .....  
 ..... *U. rufula*  
 Perichaetial leaves short, reaching only to middle of seta; spores 36  $\mu\text{m}$  in diameter .....  
 ..... *U. fernandeziana*

### *Ulota fernandeziana*

*Ulota fernandeziana* Malta, Act. Hort. Bot. Univ. Latv. 2:202, 1927. [Original material: Cordon de Borril, Mas Afuera, coll. C. & I. Skottsberg n. 165, 1917 (S!).]

Plants brownish below, yellowish green above, to 5 mm high. Leaves linear-lanceolate from an obtrapezoidal base; margins entire; costa subpercurrent; lower margins with 10 or more rows of quadrate, hyaline cells having thicker transverse walls; cells of upper lamina thick-walled, ca. 11  $\mu\text{m}$  in diameter, weakly papillose. Autoicous. Perichaetial leaves a little larger than stem leaves. Setae yellow, to 4.5 mm high. Capsule yellowish, constricted under mouth when dry; endostome segments 8, slender, weakly papillose. Spores ca. 36  $\mu\text{m}$  in diameter, finely papillose. Calyptra slightly cleft below, densely hairy.

MAS AFUERA: Cordon de Borril, *Sk.* 165 (type, S); between Las Torres and Q. Huaton, ca. 1350 m, *Sk.* M138 (S); Camp Correspondencia, 1150 m, *Sk.* M124 part (S).

As presently recognized the species is endemic to Mas Afuera. This and the following species can grow mixed and specimens should be checked carefully.

### *Ulota rufula*

*Ulota rufula* (Mitt.) Jaeg., Ber. S. Gall. Naturw. Ges. 1872–1873:164, 1874 (Ad. 1:442).

*Orthotrichum rufulum* Mitt., J. Linn. Soc., Bot. 12:191, 1869. [Original material: Near Valdivia, Chile, coll. Lechler n. 527 part.]

*Orthotrichum brevicolle* Mitt., J. Linn. Soc., Bot. 12:192, 1869. [Original material: Near Valdivia, Chile, coll. Lechler n. 527 part.]

*Orthotrichum chilense* Mitt., J. Linn. Soc., Bot. 12:193, 1869. [Original material: Near Valdivia, Chile, coll. Lechler n. 527 part.]

Plants light green, with stems in tufts to 5 mm high. Leaves ca. 2 mm long, 0.5 mm wide, linear-lanceolate from an obtrapezoidal base; margins entire; costa subpercurrent; lower margins with 5–10 rows of cells that are 12  $\mu\text{m}$  wide and 12–15  $\mu\text{m}$  long, with transverse walls more thickened; cells of upper lamina rounded to elliptical with very thick walls, 8  $\mu\text{m}$  wide, usually 7–12  $\mu\text{m}$  long, lumens 5  $\mu\text{m}$  wide, in distinct longitudinal rows, slightly papillose; inner basal cells 7  $\mu\text{m}$  wide, 25–40  $\mu\text{m}$  long, smooth. Autoicous. Perichaetial leaves to 3 mm long. Setae ca. 3 mm long, yellow. Capsule urn ca. 1.2 mm long, usually contracted under mouth when dry; endostome segments 8, slender,



weakly papillose. Spores 19–26  $\mu\text{m}$  in diameter. Calyptra hairy.

MAS AFUERA: Camp Correspondencia, 1150 m, *Sk. M124* part (S).

The species occurs in New Zealand, Juan Fernandez, central Chile, and adjacent Argentina. Malta (1929) described a variety *patagonica* with spores 26–37  $\mu\text{m}$  in diameter, but otherwise the species seems totally distinct from the preceding.

**Genus *Macrocoma***

Plants usually epiphytic, forming tangled mats; stems slender, filiform, irregularly branching. Leaves appressed when dry, not contorted, erect-spreading when moist; costa subpercurrent, sometimes bearing rhizoids abaxially near tip; leaf cells rounded or oval throughout most of lamina. Setae smooth, elongate. Capsules slender, usually plicate. Calyptra mitrate.

The genus has been revised by Vitt (1973). Only one species occurs in Juan Fernandez.

***Macrocoma sullivantii***

*Macrocoma sullivantii* (C. Müll.) Grout, *Bryol.* 47:5, 1944.  
*Macromitrium sullivantii* C. Müll., *Bot. Zeit.* 20:361, 1862.  
[Original material: Bear Mt., Georgia, U.S.A., coll. *Lesquereux*, 1850–1856.]

*Macromitrium paraphysatum* Mitt., *J. Linn. Soc., Bot.* 12: 198, 1869. [Original material: Andes Quitenses, Ecuador, coll. *Spruce n. 107.*]

*Macromitrium mexicanum* Mitt., *J. Linn. Soc., Bot.* 12:198, 1869. [Original material: Oaxaca, Mexico, coll.?, Herb. Van den Bosch.]

*Macromitrium leiboldii* Hampe, *Bot. Zeit.* 28:50, 1870. [Original material: Veracruz, Mexico, coll. *Strebel.*]

*Macromitrium ghiesbreghtii* Besch., *Mem. Soc. Sc. Nat. Cherbourg* 16:188, 1872. [Original material: Mexico, coll. *Ghiesbreght*, 1845 (PC).]

*Macromitrium bolivianum* C. Müll., *Nuov. Giorn. Bot. Ital.* n. ser., 4:126, 1897. [Original material: Near Choquecamata, Cochabamba, Bolivia, coll. *P. Germain*, 1889.]

*Macromitrium consanguineum* Card., *Beih. Bot. Centralb.*

17:11, 1904. [Original material: Quen-san, Korea, *Faurie 142.*]

*Macromitrium okamuræ* Broth., *Oefv. Finsk. Vet. Soc. Foerh.* 62A (9):13, 1921. [Original material: Sendai-shi, Honsho, Japan, *Ihsiba.*]

Dark green to reddish brown mats with creeping stems 5–7 cm long, slender and widely spaced spreading branches 1–2 cm long. Leaves ca. 0.8 mm long, lanceolate, acute to narrowly obtuse at apex; margins slightly recurved below, essentially entire, upper lamina cells thick-walled, ca. 7  $\mu\text{m}$  in diameter, slightly bulging or mamilllose, marginal cells slightly smaller, walls rather thick but slightly angular, cells in longitudinal and oblique rows; inner basal cells somewhat larger, to 20  $\mu\text{m}$  long. Autoicous. Perichaetial leaves ca. 1.0–1.2 mm long. Setae ca. 5 mm long, pale reddish when mature. Capsule urn ca. 1.5 mm long, fusiform when dry; peristome a pale, rather indistinct membrane. Calyptra hairy.

The species was reported from Mas a Tierra by Brotherus (1924). No material has been seen. The species is known from the southeastern United States, Mexico, Central America, South America, and Japan.

**Genus *Macromitrium***

Epiphytic or saxicolous plants in mats with creeping stems and numerous, erect, crowded branches. Branch leaves contorted or appressed-imbricate when dry, erect-spreading when moist, oblong to lanceolate, acute to attenuate; costa subpercurrent to excurrent; basal lamina cells rather elongate; upper cells of lamina rounded to narrowly elliptical. Perichaetia terminal on main branches. Setae slender. Capsule erect, smooth or sulcate; operculum short- to long-rostrate. Calyptra mitrate, pleated, usually with deeply lobed basal margin.

Three species are known from Juan Fernandez.

**Key to Species of *Macromitrium***

- 1. All basal leaf cells elongate, narrow, smooth ..... *M. microstomum*
- 1. At least inner basal cells oval, often papillose ..... 2
  - 2. Leaves 2.0–2.5 mm long, ca. 100  $\mu\text{m}$  wide near the tip; uppermost leaf cells mostly 10–12  $\mu\text{m}$  in diameter ..... *M. fernandezianum*
  - 2. Leaves 1.0–1.5 mm long, ca. 150–200  $\mu\text{m}$  wide near the tip; uppermost leaf cells mostly 5–10  $\mu\text{m}$  in diameter ..... *M. masafueræ*

*Macromitrium fernandezianum*

*Macromitrium fernandezianum* Broth. in Skottsbl., Nat. Hist. Juan Fernandez 2:422, 1924. [Original material: Mas a Tierra, Puerto Ingles, ca. 550 m, coll. C. & I. Skottsberg n. 168 (lectotype, present designation; S!)]

Bright green to brownish plants with erect branches to 5 mm high. Leaves irregularly contorted or twisted spirally around stem when dry, erect-spreading when moist, 2.0–2.5 mm long, to 0.4 mm wide, narrowly lanceolate from an oval base, narrowed to 0.1 mm wide near tip; margins plane to slightly recurving, crenulate to serrulate; tip usually narrowly rounded with small teeth and a long, projecting, papillose apical cell; costa subpercurrent, covered with many rounded cells abaxially in distal 1/5; cells of upper lamina rounded, 10–12  $\mu\text{m}$  in diameter, with somewhat thickened walls, mamillate and weakly papillose; inner basal cells oval, to 20  $\mu\text{m}$  long; those toward margin linear, to 40  $\mu\text{m}$  long, many bearing a high, cylindrical papilla. Pseudoautoicous? Setae 3–5 mm long, reddish, smooth. Capsule urn oval, ca. 1.0 mm long, smooth; mouth somewhat puckered when dry, more reddish brown; peristome lacking? Spores 20–25  $\mu\text{m}$  in diameter, finely papillose. Calyptra bare.

MAS A TIERRA: El Yunque, 400–500 m, *Sk. 166* (S); Puerto Ingles, ca. 500 m, *Sk. 168* (lectotype, S); Salsipuedes, *Sk. 169* (S); Portezuelo de Villagra, ca. 600 m, *Sk. 170* (S); Puerto Frances, Loma Incienso, *Sk. 172* (S); Valle Colonial, near trail to Portezuelo de Villagra, ca. 220 m, *Sk. M6* (S); Falda Larga (Q. Minerio), *Sk. M60* (S); La Vaguería, *Sk. M62* (S); Cerro Pascua, eastern end, *Sk. M76* (S); forest above Plazoleta del Yunque, 400–450 m, *Sk. M245*, *M246*, *M253* (S); Vaquería, slope of Cerro Alto, *Sk. M257* (S), *Sk. M260* (S); Portezuelo (Mirador), 500 m, *K. 308/31*, *308/32a* (B); Q. östl. Plazoleta, 300 m, *K. 322/13* (B); trail to Camote, 500 m, *K. 330/13a*, *330/15* (B); Plazoleta del Yunque, 220 m, *K. 332/1a*, *332/2* (B); Gorden Salsipuedes, ca. 1700 ft, *H. & E. 345*.

The species is endemic to Mas a Tierra. Being epiphytic, it probably is less common now than formerly. *Macromitrium masafuerae*, which follows, is a closely related species, and the group may well have evolved on the islands.

*Macromitrium masafuerae*

*Macromitrium masafuerae* Broth. in Skottsbl., Nat. Hist. Juan Fernandez 2:423, 1924. [Original material: Q. Mono, Mas Afuera, 475 m, coll. C. & I. Skottsberg n. 173 (S!)]

Brownish to reddish green plants with erect branches to 5 mm high. Leaves usually twisted spirally around stem when dry, erect-spreading when moist, ca. 1.5 mm long, to 0.4 mm wide, narrowly oblong-lanceolate, 0.2–0.25 mm wide near tip; margins plane to slightly recurved, crenulate to serrulate; tip usually broadly acute or rounded with slightly mucronate apex; costa subpercurrent or projecting into mucro, abaxial surface with elongate cells nearly or completely to tip; cells of upper lamina rounded, with somewhat thickened walls, uppermost usually 5–7  $\mu\text{m}$  in diameter, progressively larger below, mostly 10–12  $\mu\text{m}$  in diameter, mamillate and weakly papillose; inner basal cells oval, to 20  $\mu\text{m}$  long; those toward margin linear, to 40  $\mu\text{m}$  long, many bearing a slight but distinct papilla. Pseudoautoicous. Setae 3–4 mm long, reddish, smooth. Capsule urn oval, ca. 1.0 mm long, smooth; mouth somewhat puckered when dry; peristome simple. Spores 15–18  $\mu\text{m}$  in diameter. Calyptra bare.

MAS AFUERA: Q. Mono, *Sk. 173* (type, S), *H. & E. 589*.

The species is known only from the two specimens cited, both from Quebrada Mono. Characters of this and the preceding species seem at some variance with the original descriptions and figures. This might be partially explained by assuming the original drawings of leaf shapes were reversed. In addition, however, the papillae of the upper leaf cells were overlooked and the basal leaf cells were completely misrepresented. The difference in leaf lengths was the only really usable character cited by Brotherus.

*Macromitrium microstomum*

*Macromitrium microstomum* (Hook. & Grev.) Schwaegr., Sp. Musc. Suppl. 2(2):130, 1827.

*Orthotrichum microstomum* Hook. & Grev., Edinburg J. Sc. 1:114, 1824. [Original material: Tasmania, coll. D. Spence.]

*Macromitrium saxatile* Mitt., J. Linn. Soc., Bot. 12:200, 1869. [Original material: Mas a Tierra, coll. Bertero, 1830]

*Macromitrium tasmanicum* Broth., Oefv. Finsk. Vet. Soc. Foerh. 37:162, 1895. [Original material: South Road Forest,



Circular Head, Tasmania, coll. *Weymouth nos. 846, 1040, 1041.*]

*Macromitrium pseudo-hemitrichodes* C. Müll., *Hedwigia* 37: 150, 1898. [Original material: North Isl., New Zealand, coll. F. M. Reader, 1882.]

Yellowish green plants with erect branches to 5 mm high. Leaves in rather evident spiral series and erect with incurved, circinate points when dry, giving branch ropelike appearance, leaves widely spreading when moist, to 1.5 mm long, 0.4 mm wide, lanceolate from a narrowly ovate base; margins plane to slightly recurved, essentially entire; apex sharply acute or more blunt with a short mucro; costa percurrent to shortly excurrent; cells of upper lamina rounded, 5–7  $\mu\text{m}$  in diameter, very thick-walled, becoming longer below and toward costa; basal cells linear, ca. 50  $\mu\text{m}$  long, smooth with thick walls. Autoicous. Perichaetial leaves longer and broader, slenderly long-acuminate. Setae ca. 7 mm long. Capsule urn ca. 1.5 mm long, ovate, puckered around mouth when dry. Spores 45–50  $\mu\text{m}$  in diameter. Calyptra bare.

MAS A TIERRA: Cordon rechts v. Yunque, ca. 550 m, *K. 309/12* (B); West Cordon Damajuana, 600 m, *K. 328/17c* (B); near Portezuelo de Villagra, ca. 1800 ft, *H. & E. 416*; trail to base of El Yunque, up to 1800 ft, *H. & E. 795*.

As recognized here the species occurs in Juan Fernandez, New Zealand, Tasmania, and Australia. This represents a merging of a series of species having setae mostly between 5–10 mm in length. An additional series of very closely related species with setae 1.0–2.0 cm long includes *M. nitidum* Hook. & Wils. of Brazil, *M. owahiense* C. Müll. of Hawaii, *M. reinwardtii* Schwaegr. of the East Indies and Pacific Islands, *M. stratosum* Mitt. of Central America and the West Indies, and *M. weymouthii* Broth. of Tasmania. Sainsbury (1955b) has discussed part of this problem, and it is possible most or all of the series will be combined ultimately under the name *M. reinwardtii*.

## HEDWIGIACEAE

### Genus *Rhacocarpus*

Plants in yellowish brown, tangled mats with stems often prostrate, pinnately branching, very brittle when dry. Leaves rather appressed when

dry, subjulaceous or with spreading tips, erect-spreading when moist, oblong to panduriform, acute to piliferous, ecostate; lamina cells narrowly rhomboidal to linear, alar cells in cluster of 6 rows or more, quadrate to short-rectangular; abaxial surface of leaf except margins and alar regions covered with thick cuticle giving very ceramic appearance. Dioicous. Perichaetia terminal on stems or longer branches. Setae slender, elongate, solitary. Capsules short-cylindrical, strongly ribbed when dry; peristome lacking; operculum narrowly rostrate. Calyptra cucullate, bare.

A single species occurs in Juan Fernandez.

### *Rhacocarpus purpurascens*

*Rhacocarpus purpurascens* (Brid.) Par., *Ind. Bryol. Suppl.* 292, 1900.

*Hypnum purpurascens* Brid., *Sp. Musc.* 2:121, 1812. [Original material: Plaine des Chicots, Reunion Isl., coll. Bory St. Vincent, 1798–1802.]

*Anictangium humboldtii* Hook., *Pl. Crypt. Plag. Orb. Nov. Aequin.* Humboldt et Bonpland 1a, 1816. [Original material: Quindiu, ca. 9480 ft, Novo-Granada, coll. *Humboldt & Bonpland*, 1799–1804.]

*Anoetangium humboldtii* var. *australis* Hook. f. & Wils., *Fl. Antarct.* 1:135, 1844. [Original material: Auckland Isl., 1400 ft, and Campbell Isl., 600 ft., coll. J. D. Hooker, 1839–1843.]

*Harrisonia mandonii* C. Müll., *Nuov. Giorn. Bot. Ital. n. ser.*, 4:140, 1897. [Original material: Luncha de Cochipato, Sorata, Prov. Larecaja, Bolivia, 3200 m, coll. *Mandon n. 1639*, Mar. 1858.]

*Harrisonia uleana* C. Müll., *Oesterr. Bot. Zeitschr.* 47:389, 1897. [Original material: Insula Santa Catharina, Brasil, coll. *E. Ule n. 151*, Feb. 1887.]

*Harrisonia pallidipila* C. Müll., *Oesterr. Bot. Zeitschr.* 47:393, 1897. [Original material: Serra de Caraca, coll. *E. Ule n. 1463*, Mar. 1892.]

*Harrisonia rubiginosa* C. Müll., *Oesterr. Bot. Zeitschr.* 47:393, 1897. [Original material: Serra Itatiaia, 2300 m, Brasil, coll. *E. Ule n. 436–1855*, Feb. 1894 (US!).]

*Harrisonia flavipila* C. Müll., *Oesterr. Bot. Zeitschr.* 47:394, 1897. [Original material: Lesuer, Guadeloupe, W. Ind., coll. *Forsström*.]

*Harrisonia crasso-limbata* C. Müll., *Oesterr. Bot. Zeitschr.* 47:394, 1897. [Original material: Hermite Isl., Cape Horn, coll. *J. D. Hooker*, 1843.]

*Harrisonia appendiculata* C. Müll., *Oesterr. Bot. Zeitschr.* 47:396, 1897. [Original material: Agulhas Negras, Serra Itatiaia, 2300 m, Brasil, coll. *E. Ule n. 1859*, Mar. 1894 (lectotype, present designation; US!).]

*Harrisonia rubro-cincta* C. Müll., *Oesterr. Bot. Zeitschr.* 47:396, 1897. [Original material: Southern Brasil, coll. *Glaziou n. 4528* (BM).]

Stems to 10 cm long, branches ca. 1 cm long. Leaf lamina to 1.5 mm long, 0.7 mm wide, acute to rounded above, with piliferous tip to 0.5 mm long; margins narrowly shining, often reddish, entire except a few teeth at base of arista, upper margins often broadly incurved; upper cells 8–10  $\mu$ m wide, 30–50  $\mu$ m long, obscured by thick whitish or brownish cuticle; median basal cells less obscured, more reddish, with somewhat thicker, porose walls; large area of short, broad, rectangular alar cells, which are 15–17  $\mu$ m wide and 15–22  $\mu$ m long, having much-thickened lateral walls, very reddish when mature. Setae 1.25–2.0 cm long, slender, reddish. Capsule urn 1.5–2.0 mm long. Spores 20–22  $\mu$ m in diameter, finely papillose.

MAS AFUERA: Camp Correspondencia, ca. 3800 ft, *H. & E.* 264, 464.

The species is known from East Africa, Reunion Island, Madagascar, Indonesia, Australia, Tasmania, New Zealand, Mexico, Central America, the West Indies, and South America.

## CRYPHAEACEAE

### Genus *Cyrtodon*

Plants mostly dark green, often rather aquatic with trailing secondary stems and many lateral branches, no central strands. Leaves erect-spreading, slightly contorted when dry, broad with acute, slightly serrulate tips; costa subpercurrent, without stereids, costae of inner series of perichaetial leaves becoming excurrent into smooth, blunt tip; cells of lamina oval, smooth; inner basal cells more linear; alar region with many small subquadrate or transversely elongate cells in radiating series. Autoicous. Perichaetia terminal on secondary stems or longer side branches. Capsule immersed, wrinkled when dry; peristome double, outer yellowish, inner whitish. Operculum very low with central apiculus. Calyptra mitrate, reaching to near base of operculum.

A single species occurs in Juan Fernandez.

### *Cyrtodon crassinervis*

*Cyrtodon crassinervis* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:428, 1924. [Original material: Valle Casas, Mas Afuera, coll. C. & I. Skottsberg n. 341.]

Secondary stems to 8 cm long. Stem leaves 1.0–1.2

mm long, 0.45 mm wide, ovate with short, obtusely acute tips; margins plane, subentire, slightly serrulate at tip; costa 40  $\mu$ m wide at base, ending 3–4 cells before tip, mostly smooth abaxially; upper lamina cells oval-rhomboidal, 6  $\mu$ m wide, 10  $\mu$ m long, in longitudinal and oblique rows; lower cells near costa longer, in diverging rows, to 25  $\mu$ m long; alar cells 8  $\mu$ m wide, 5–10  $\mu$ m long. Inner perichaetial leaves to 2.5 mm long; cells of lamina all more elongate, to 60  $\mu$ m long; costa occupying most of narrow subula. Setae 0.3 mm long. Capsule 1 mm long, narrowly cylindrical, urn longitudinally folded when old.

MAS AFUERA: *Q. Casas, H. & E.* 157, 251.

The species is endemic to Juan Fernandez. It is almost certain that Cardot's report of *Dendrocryphaea cuspidata* (Sull.) Broth. from Quebrada de las Casas really represents this species. *Cyrtodon crassinervis* is distinguished from *Dendrocryphaea cuspidata* of the Chilean mainland by the acute leaf apex, the lack of the minute papillae at the ends of the leaf cells, the smoother abaxial surface of the costa, the lack of the small area of slightly larger cells below the larger area of transversely elongate alar cells, and the flatter rather than conical operculum. Except for the one species on Juan Fernandez, *Cyrtodon* is restricted to Australia, New Zealand, New Caledonia, and the Fiji, Samoan, and Tonga Islands.

## LEPYRODONTACEAE

The family is retained here in its customary position among what might be called the neckeroid families. The Ptychomniaceae, another primarily austral family that is often placed in this series, is here transferred to a position near the Hookeriaceae and Sematophyllaceae. For an explanation see the Ptychomniaceae.

### Genus *Lepyrodon*

Lustrous, yellowish green plants, usually with erect secondary stems, densely reddish radiculose below. Leaves appressed to erect-imbricate, scarcely altered when dry, sometimes plicate, often hair-tipped; costa weak, ending near midleaf or below, without stereids; cells of lamina elongate, with more or less porose walls. Dioicous. Perichaetia in a lateral bud. Setae erect, slender. Capsule urn



erect, cylindrical, smooth; annulus present; outer peristome lacking or reduced to low preperistome, inner peristome rather irregular; operculum long-

conical to long-rostrate. Calyptra cucullate, bare.

The three species known from Juan Fernandez can be distinguished by the following key.

### Key to Species of *Lepyrodon*

1. Leaves of mature plants completely without plications; costa very short, ending near basal 1/4 ..... *L. parvulus*
1. Leaves of mature plants strongly plicate; some costae reaching to midleaf or beyond ..... 2
  2. Vegetative leaves linear-lanceolate, all with long hairtips; leaf base scarcely auriculate, with small alar cells usually reaching widest part ..... *L. tomentosus*
  2. Vegetative leaves rather oblong-lanceolate, often with only short, slender tips; leaf base usually distinctly auriculate ..... *L. hexastichus*

### *Lepyrodon hexastichus*

*Lepyrodon hexastichus* (Mont.) Wijk & Marg., Taxon 9:190, 1960.

*Leucodon hexastichus* Mont., Ann. Sc. Nat. Bot. ser. 3, 4:101, 1845 (VIII). [Original material: Chile, coll. C. Gay (PC).]

*Leucodon kunzeanus* C. Müll., Linnaea 18:684, 1845. [Original material: Chile, coll. Pöppig n. 51, Philippi.]

*Neckera implexa* C. Müll., Syn. 2:93, 1850, nom. illeg. incl. spec. prior. [Original material: Southern Chile, coll. Pöppig, C. Gay, Philippi.]

*Neckera glauca* C. Müll., Bot. Zeit. 17:230, 1859. [Original material: Chile, coll. Pöppig n. 51; near Arique, Valdivia, coll. Lechler, 1851.]

Stems prostrate and branching, or erect to ca. 2 cm. Leaves usually appressed, sometimes rather fragile at tips, blade ca. 2.0 mm long, 0.6 mm wide, acumination of various lengths from 0.2–0.6 mm, auricles at base usually distinct; margin mostly erect, serrulate above; costa usually to middle of leaf; cells of lamina narrow, usually with rather thickened, porose walls; median cells ca. 7  $\mu$ m wide, to 60  $\mu$ m long; cells near tip mostly 25–30  $\mu$ m long; basal cells more porose, to 12  $\mu$ m wide, mostly 25  $\mu$ m long; up to 25 small subquadrate cells ca. 10  $\mu$ m in diameter at basal angle below auricle. Setae 0.8–1.0 cm long. Capsule short-cylindrical; peristome minutely papillose; spores 12–15  $\mu$ m in diameter, finely papillose; operculum rostrate.

MAS A TIERRA: Without precise locality, O. Jenz n. 35, 1922.

The species is known from Chile and southern Argentina south to Tierra del Fuego. Collections have been reported from Mas a Tierra by both Brotherus (1924) and Bartram (1957). The New Zealand *L. australis* Hampe ex Broth. is very sim-

ilar, but material I have seen has less auriculate leaves and setae 1–2 cm long.

### *Lepyrodon parvulus*

*Lepyrodon parvulus* Mitt., J. Linn. Soc., Bot. 12:422, 1869. [Original material: Mas Afuera, coll. Cuning, 1826–1831.]

Stems to 0.8 cm high, usually julaceous with appressed, nonplicate leaves, leaves sometimes more lax and erect-spreading. Stem leaves ca. 1 mm long, 0.5 mm wide, oblong-lanceolate, constricted above into a short, or rarely a long, slender acumination, base slightly rounded to auriculate; margins mostly plane, serrulate above; costa short, to 1/4 leaf length, sometimes double; cells narrow with pointed ends, walls rather thin and scarcely porose, 5  $\mu$ m wide, ca. 50  $\mu$ m long; cells near leaf tip ca. 25  $\mu$ m long; basal cells more porose, to 12  $\mu$ m wide, 20–40  $\mu$ m long, 4–5 small, subquadrate cells ca. 10  $\mu$ m in diameter at basal angle. Setae ca. 0.8 cm long. Capsule oval; operculum rostrate.

MAS A TIERRA: Q. Damajuana, Sk. 233; NE slope of Cerro Piramide, 250–450 m, Sk. M33 part (S); trail to Camote, 350–340 m, K. 327/5 (B); Cordon Salsipuedes, ca. 1700 ft, H. & E. 346A, 346B.

The species was first described from Juan Fernandez and has since been collected on the Chilean mainland.

### *Lepyrodon tomentosus*

*Lepyrodon tomentosus* (Hook.) Mitt., J. Linn. Soc., Bot. 12: 421, 1869.

*Leucodon tomentosus* Hook., Musci Exot. 1:37, 1818. [Original material: Near Loja, Ecuador, 1080 hexap., coll. Humboldt & Bonpland, 1799–1804.]

*Neckera suborthosticha* C. Müll., Syn. 2:112, 1850. [Original material: Merida, Venezuela, coll. Moritz n. 185.]

*Isopterygium semicostatum* Ren. & Card., Bull. Soc. R. Bot. Belg. 41 (1):143, 1905. [Original material: Forêts de General, Costa Rica, coll. Pittier & Tonduz n. 5817, Feb. 1891 (US!).]

Plants with secondary stems usually erect, to 3 cm high. Leaves erect-imbricate, only slightly spreading, those of mature vegetative branches strongly, longitudinally plicate, narrowly lanceolate with little constriction at base of slender acumination; blade 3.0–3.5 mm long, 0.7 mm wide, scarcely auriculate at base, hair tip 1.0–1.5 mm long; margins often slightly reflexed above, serrulate distally; costa often reaching middle of leaf; cells of lamina narrow, usually with rather thickened, porose walls; median and upper cells 6  $\mu$ m wide, 45–75  $\mu$ m long; basal cells more porose, to 15  $\mu$ m wide, mostly 50  $\mu$ m long; alar region with up to 15 small subquadrate cells 10  $\mu$ m in diameter in cluster extending near or to widest part of leaf base. Setae 10–15 mm long. Capsule short-cylindrical, urn ca. 2.0 mm long; peristome not papillose; spores 12–15  $\mu$ m in diameter, finely papillose; operculum rostrate.

The species is known from Costa Rica, the West Indies, and South America south to Peru and Argentina. Collections were cited from both Mas Afuera and Mas a Tierra by Brotherus (1924) and Bartram (1957) but no material has been seen.

## METEORIACEAE

### Genus *Weymouthia*

Plants pale green, matted or pendant epiphytes with long secondary stems irregularly, sparsely, and pinnately branched. Leafy stems and branches round and turgid with laxly imbricate cochleariform leaves. Leaves only slightly heterophyllous, rounded-obtuse with broad, incurved margins; costae lacking; leaf cells mostly elongate, smooth; alar region with cluster of short, thicker-walled cells. Dioicous. Perichaetia in a lateral bud. Setae short. Capsules erect to inclined, smooth; annulus broad; peristome double, teeth with transverse striations; operculum conical to rostrate. Calyptra cucullate, bare.

The genus is entirely austral and with only two species. Only one species is known from Juan Fernandez.

### *Weymouthia mollis*

*Weymouthia mollis* (Hedw.) Broth., Nat. Pfl. 1 (3):812, 1906.

*Leskea mollis* Hedw., Sp. Musc. 234, 1801. [Original material: New Zealand, coll. Banks, 1768–1771.]

*Neckera cumingi* C. Müll., Syn. 2:132, 1850. [Original material: Chile, coll. Cuming, 1826–1831.]

Plants with slender stems to 12 cm long. Leaves mostly 1.3 mm long, when spread flat the upper part to 0.8 mm broad, broadly oblong with upper margins incurved until often overlapping, basal angle rounded-auriculate; apex completely blunt, plane, sometimes slightly projecting, with a few minute serrulations; cells of lamina mostly 5  $\mu$ m wide, 40–60  $\mu$ m long, with slightly thickened, porose walls, a few small, short to rounded cells ca. 10  $\mu$ m long at apex; alar region yellowish, with thick-walled cells ca. 10  $\mu$ m wide and 10–20  $\mu$ m long in dense cluster. Setae ca. 3.0 mm long. Capsule erect, urn ca. 1 mm long; cilia of peristome lacking; spores 20–30  $\mu$ m in diameter, papillose; operculum shortly conic-rostrate.

MAS A TIERRA: Trail to Portezuelo de Villagra, 1400–1800 ft, *H. & E.* 84.

The species is known from Chile, East Australia, Tasmania, and New Zealand. Collections were reported from both Mas Afuera and Mas a Tierra by Brotherus (1924) and Bartram (1957).

### Genus *Papillaria*

Plants yellowish green, matted or pendant epiphytes, often becoming black with age. Leafy branches cylindrical with laxly to tightly appressed imbricate leaves when dry, rapidly spreading when moist. Leaves only slightly heterophyllous, ovate to broadly lanceolate, rounded or auriculate at base, tip narrowly attenuate; costae single, reaching to distal 1/3 or 1/4; cells of lamina arranged in radiating lines from base; inner basal cells elongate, smooth; upper and lateral cells shorter, elliptical, each cell pluripapillose with papillae in 1–2 rows. Dioicous. Perichaetia in lateral bud. Setae short. Capsule erect, symmetrical, smooth; peristome double, teeth papillose, cilia rudimentary or lacking; operculum shortly conic-rostrate. Calyptra cucullate, densely hairy.

One species is known from Juan Fernandez.



*Papillaria flexicaulis*

*Papillaria flexicaulis* (Wils.) Jaeg., Ber. St. Gall. Naturw. Ges. 1875-1876:271, 1877 (Ad. 2:175).

*Meteorium flexicaule* Wils. in Hook. f., Fl. Nov. Zel. 2:101, 1854. [Original material: North Isl., New Zealand, coll. Dr. Stanger.]

*Meteorium filipendulum* Hook. f. & Wils., Fl. Tasm. 2:203, 1859. [Original material: Tasmania, coll. Gunn nos. 26, 1606, Lawrence s.n.]

Plants with secondary stems to 20 cm long, rather sparsely branched. Leaves not plicate, tightly appressed when dry; stem leaves ca. 1.5 mm long, 0.8 mm wide, lanceolate from broadly ovate base; branch leaves ca. 1.0 mm long, 0.45 mm wide, lanceolate; all leaves short-decurrent with smooth cells at extreme base, very broadly rounded to cordate above base; apex narrowly attenuate with a few short cells forming uniseriate tip; margin plane, minutely crenulate below, entire distally; median, upper, and lateral cells mostly 5-6  $\mu\text{m}$  wide, 10-15  $\mu\text{m}$  long, papillae in 2 rows; inner basal cells to 45  $\mu\text{m}$  long. Setae 2-3 mm long. Capsule urn ca. 1.5 mm long; spores 16-20  $\mu\text{m}$  in diameter, slightly papillose.

The species is known from Indonesia, Australia, Tasmania, New Zealand, and southern Chile. The species was reported from Mas Afuera by Bartram (1957) but no material has been seen.

## NECKERACEAE

Genus *Leptodon*

Plants yellowish to brownish green in mats with primary stem tips and secondary stems erect, pinnately to bipinnately branching and curling greatly when dry; paraphyllia present. Leafy branches rather compressed. Leaves small, heterophyllous; all rather oblong with short-acute or rounded tips; margins essentially entire; costae strong, reaching distal 1/4; most cells of lamina short-rhomboidal or quadrate, smooth; cells of lower margins small. Dioicous. Perichaetia in lateral bud. Setae short, about as long as perichaetium. Capsule erect, oval, smooth; peristome teeth entire, finely papillose; inner peristome rudimentary; operculum short-rostrate. Calyptra cucullate, with numerous hairs.

One species occurs in Juan Fernandez.

*Leptodon smithii*

*Leptodon smithii* (Hedw.) Web. & Mohr, Ind. Mus. Pl. Crypt. 2, 1803.

*Hypnum smithii* Hedw., Sp. Musc. 264, 1801. [Original material: Near Barham Downs, Kent, England, coll. J. E. Smith.]

*Leptodon beccarii* C. Müll., Nuov. Giorn. Bot. Ital. 4:19, 1872. [Original material: Abyssinia, coll. O. Beccari, 1870.]

*Leptodon novae-seelandiae* C. Müll., Hedwigia 41:131, 1902. [Original material: Waimakariri Gorge, North Canterbury, and at Birling's Flat, Bank's Peninsula, New Zealand, coll. T. W. N. Beckett, Oct. 1890.]

*Leptodon australis* C. Müll., Hedwigia 41:132, 1902. [Original material: Mossvale, New South Wales, coll. Whitelegge, Nov. 1884.]

Usually epiphytic plants with frondose stems mostly ca. 1.5 cm long. Stem leaves 1.0 mm long, 0.5 mm wide, oblong from broadly ovate base; branch leaves ca. 0.5 mm long, 0.3 mm wide, oblong; all leaves with tips obtusely acute to rounded, sometimes slightly apiculate; margins narrowly recurved below; costa 20-30  $\mu\text{m}$  wide at midleaf; cells of upper lamina short-rhomboidal, mostly 8-10  $\mu\text{m}$  wide, 10-12  $\mu\text{m}$  long, arranged in oblique rows; many rows of cells along lower margins very small, 7-8  $\mu\text{m}$  in diameter, rounded to subquadrate; inner basal cells more elongate, to 40  $\mu\text{m}$  long in stem leaves. Setae ca. 2.0 mm long. Capsule urn ca. 1.5 mm long; spores elliptical, 17-25  $\mu\text{m}$  long, minutely papillose.

The species is known from Europe, the Canary Islands, Central, East, and South Africa, Australia, New Zealand, and southern South America. Collections have been reported from Juan Fernandez by both Brotherus (1924) and Bartram (1957) but no material has been seen in this study.

Genus *Neckera*

Plants slender to robust with erect or ascending, usually pinnately branched secondary stems. Leafy stems and branches flattened; paraphyllia sometimes present. Leaves in 8 rows, oblong-ovate to lingulate, often undulate; apex short-acute to truncate; margins serrulate to entire; costae weak, usually very short or lacking; some or most of upper lamina cells short-rhomboidal, smooth; cells of lower margin often small, subquadrate. Perichaetia in lateral bud, leaves often large-sheathing, sometimes very slender-tipped. Setae smooth, usually short. Capsules often immersed, sometimes exerted

or rarely long-exserted; urn erect, smooth; peristome double, teeth papillose, seldom transversely striated below, cilia lacking; operculum short-rostrate. Calyptra short, cucullate, with or without hairs.

One species is known from Juan Fernandez.

### *Neckera rotundata*

*Neckera rotundata* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:430, 1924. [Original material: Quebrada del Mono, 440 m, coll. C. & I. Skottsberg n. 275 (S!).]

Plants lustrous yellowish green, slender, with secondary stems to 3 cm long, pinnately branched; leafy stems and branches densely foliate, flattened, without paraphyllia; branches spreading, to 1 cm long. Leaves undulate, ca. 3 mm long, 0.95 mm wide, oblong-lanceolate or lingulate; apex rounded-obtuse; margins very minutely serrulate to subentire; costae very short and double; median cells ca. 6  $\mu$ m wide, 40–60  $\mu$ m long, slightly porose; upper cells becoming rhomboidal, those in distal 1/6 ca. 10  $\mu$ m wide, 20–25  $\mu$ m long; lower cells longer to 80  $\mu$ m and more porose; alar cells 12  $\mu$ m wide, 12–20  $\mu$ m long, oval, yellowish with thickened porose walls. Sporophyte unknown.

MAS AFUERA: Q. Mono (changed on label to Q. Blindado), 440 m, Sk. 275 (type, S).

MAS A TIERRA: Valle Frances, slope of Cordón Chifladores, K. M83 (S).

As presently recognized the species is endemic to Juan Fernandez. The tips of the leaves are more rounded than in most species of *Neckera*.

### Genus *Pinnatella*

Small to medium-sized frondose plants with erect or ascending, usually pinnately branched secondary stems. Basal leaves of stem reduced, sometimes squarrose. Leafy stems and branches complanate with leaves laxly imbricated. Leaves ovate to oblong with short-acute to obtusely rounded tips; costa very strong, ending near leaf apex; cells of lamina rounded to irregularly hexagonal, with or without large central papilla; some basal cells elongate, a row inside basal margin often elongate and sometimes prominent. Dioicous. Perichaetia in lateral buds. Setae short, scabrous. Capsules exerted, erect, smooth; peristome double, cilia lacking; operculum rostrate.

Only one species is known from Juan Fernandez.

### *Pinnatella macrosticta*

*Pinnatella macrosticta* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:433, 1924. [Original material: Quebrada de las Casas, Mas Afuera, coll. C. & I. Skottsberg nos. 271, 273.]

Slender, yellowish to brownish green plants in loose mats, secondary stems to 5 mm high, usually distinctly pinnately branched. Leafy branches very compressed with leaves nonundulate and often spreading at near right-angles when mature. Leaves to 0.7 mm long, 0.3 mm wide, oblong-ovate with short-acute tip; margins slightly recurved at base, serrulate, some larger teeth near apex; costa strong to distal 1/8, ca. 25  $\mu$ m wide near middle; most cells of lamina short-polygonal or rounded, 7–10  $\mu$ m wide, 10–15  $\mu$ m long; inner basal cells to 25  $\mu$ m long; ca. 5 rows of subquadrate cells along basal margin that are 7  $\mu$ m wide, 7–10  $\mu$ m long; cells except marginal row and some at extreme base with 1–2 large papillae on each surface. Sporophyte unknown.

MAS AFUERA: Q. Casa, H. & E. 146.

As presently known the species is endemic to Mas Afuera. The three known collections are all from Quebrada de las Casas.

### Genus *Porothamnium*

Plants medium-sized to robust, frondose, lustrous green, with rather pinnately to bipinnately branching secondary stems. Stipe leaves appressed, with or without squarrose-recurved tips. Leafy main stems and branches slightly to greatly flattened, branches sometimes attenuate or flagellate. Leaves larger on main stems, smaller on branches, scalelike on flagellae or stolons; leaf apices short-acute to nearly truncate, dentate to subentire; costae single, slender, usually to near 3/4 leaf length, rarely longer; upper leaf cells narrowly oval to elongate with thin, rather nodular walls, some very short cells at apex; basal cells long and narrow; alar cells indistinct. Perichaetia in lateral bud. Setae long, smooth. Capsule erect to inclined; urn usually short-cylindrical, smooth; peristome double, teeth with transverse striations below, cilia well developed; operculum rostrate. Calyptra cucullate, bare.

The following two species are known from Juan Fernandez.



### Key to Species of *Porothamnium*

- Leafy stems and branches only laxly compressed, leaves mostly spreading at about 45° angle; costa of branch leaves only rarely ending in small spine ..... *P. arbusculans*  
 Leafy stems and branches very complanate, leaves mostly spreading at about 70° angle; costa of branch leaves usually ending in small spine ..... *P. valdiviae*

#### *Porothamnium arbusculans*

*Porothamnium arbusculans* (C. Müll.) Fleisch. in Broth. & Card., K. Svensk. Vet. Ak. Handl. 63(10):59, 1923.  
*Hypnum arbusculans* C. Müll., Linnaea 38:618, 1874. [Original material: Valdivia (?), Chile, coll. Krause.]

Plants when fully developed with fronds to 12 cm long. Stipe leaves with squarrose-recurved tips. Leafy main stem and branches laxly compressed, most leaves spreading at 60° angle or less. Main stem leaves to 3.5 mm long, 1.5 mm wide; branch leaves ca. 1.5 mm long, 0.6 mm wide; all leaves oblong-ovate, with only slightly more obtusely acute apices on stem leaves; basal margin slightly recurved, small sharp teeth on apical margin, lateral margin subentire; costa ca. 90 µm wide at base, slender above, ending near apical 1/4–1/5 with little or no spine abaxially; cells of lamina mostly 6–8 µm wide, short-rhomboidal cells near apex 10–12 µm wide and 17–25 µm long, cells near tip of costa 30–50 µm long, cells of leaf middle mostly 40–60 µm long, basal cells to 100 µm long. Dioicous. Capsule horizontal, short-oval; cilia shorter than segments.

MAS AFUERA: Q. Casas, *H. & E.* 49a, 338a.

The species is known only from central Chile and Juan Fernandez. Brotherus (1924) reported the species from the same locality. This and the following species grow intermixed but can be consistently separated by the characters in the key.

#### *Porothamnium valdiviae*

*Porothamnium valdiviae* (C. Müll.) Fleisch. in Broth., Nat. Pfl. ed. 2, 11:200, 1925.  
*Hypnum valdiviae* C. Müll., Bot. Zeit. 13:783, 1855. [Original material: Arique, Chile, coll. Lechler n. 631.]

Plants when fully developed with fronds to 15 cm long. Stipe leaves with squarrose-recurved tips. Leafy main stem and branches very complanate, most leaves spreading at 60° angle or more. Main stem leaves 2.5 mm long, ca. 1 mm wide; branch leaves ca. 1.5 mm long, 0.6 mm wide; all leaves

oblong-ovate, with distinctly broader, more obtusely acute apices on stem leaves; basal margin slightly reflexed, small sharp teeth in apical part, lateral margins subentire; costa ca. 100 µm wide at base, slender above, ending near apical 1/6, usually ending in sharp spine abaxially; cells of lamina mostly 5–7 µm wide, a few short-rhomboidal cells in apex 10–12 µm wide and 17–20 µm long, cells near tip of costa mostly 25–40 µm long, cells of leaf middle mostly 50–60 µm long, basal cells to 100 µm long. Dioicous. Capsule inclined, oval.

MAS AFUERA: Q. Casa, *H. & E.* 49b; near Camp Correspondencia, ca. 3500 ft. *H. & E.* 70c; Q. Mono, *H. & E.* 272, 659 part.

The species is known from central Chile south to Tierra del Fuego as well as Juan Fernandez. The plants included here seem to represent what has been called *P. fasciculatum* (Hedw.) Fleisch. by Brotherus (1924) and Bartram (1957). The latter species occurs in the West Indies and adjacent regions and southward to southern Brazil, and it is characterized by a stout costa usually reaching 9/10 the leaf length.

#### Genus *Thamnobryum*

Plants medium-sized to robust, frondose, with rather pinnately to bipinnately branching secondary stems, with a dull sheen. Stipe leaves appressed with or without squarrose-recurved tips, usually abraded beyond recognition. Leafy main stems and branches usually only slightly flattened, branches sometimes attenuate. Leaves mostly smooth, larger on main stems, scalelike on stolons; apices short-acute or with projecting costa, dentate to subentire; costae single, stout, reaching to or near tip; upper leaf cells all oval to rounded with rather thick, slightly porose walls, basal cells more elongate, alar cells indistinct. Perichaetia in lateral buds. Setae long, usually smooth throughout. Capsule mostly horizontal to pendant, slightly curved, rarely more erect and symmetric, smooth; peristome double, teeth usually with transverse striations

below, cilia usually well developed; operculum rostrate. Calyptra cucullate, bare.

It has been necessary to provide new combinations for the Juan Fernandez species previously placed in the genus *Thamniium* B.S.G. (nec *Thamniium* Klotzsch, 1838, Ericaceae). Unfortunately, the change does not represent any improved understanding of the vile group of genera in the Thamnioideae. Some of the present concepts require sporophytes, but these are rarely present and sometimes prove an embarrassment when they are found

(see *Thamniium siamense*, Robinson, 1968). For the present I adopt the concept that places the more lustrous plants with longer leaf cells and weaker costae in *Porothamniium*, and the duller plants with shorter leaf cells and stronger costae in *Thamnobryum*. Such a concept works well for the Juan Fernandez species and may even prove ultimately correct.

The following key to the five species in Juan Fernandez is adapted from Bartram (1957), who reviewed the species with particular care.

### Key to Species of *Thamnobryum*

1. Costa very strong, 80–100  $\mu\text{m}$  wide below, percurrent to excurrent ..... 2
  2. Costa excurrent in a stout, rough point, lamina excised at apex ..... *T. proboscideum*
  2. Costa ending in or just below apex, lamina not excised ..... *T. rigidum*
1. Costa usually 45–80  $\mu\text{m}$  wide below, ending 5–15 cells below leaf apex ..... 3
  3. Leaves strongly complanate; upper leaf cells short, oval, 12  $\mu\text{m}$  long ..... *T. ingae*
  3. Leaves complanate or not complanate; upper leaf cells elongate, to 25  $\mu\text{m}$  long ..... 4
    4. Leaves slightly complanate; acuminate, subentire; cell walls rather incrassate ..... *T. carolii*
    4. Leaves densely imbricated, erect; branch leaves toothed at apex; cell walls only slightly incrassate ..... *T. confertum*

### *Thamnobryum carolii*

*Thamnobryum carolii* (Broth.) H. Robinson, *Phytologia* 29 (2):117, 1974.

*Thamniium carolii* Broth. in Skottsberg, *Nat. Hist. Juan Fernandez* 2:431, 1924. [Original material: Portezuelo de Villagra, ca. 600 m, coll. C. & I. Skottsberg n. 344 (lectotype, present designation.)]

Robust plants with secondary stems to 13 cm long, with stipes 3–5 cm long. Stipe leaves with squarrose-recurved tips. Main stems and branches rather densely foliate, slightly complanate. Branching laxly erect with branches to 9 cm long. Main stem and branch leaves 3.0–4.0 mm long, ca. 1.3 mm wide, oblong-lanceolate, branch leaves 1.0–1.5 mm long, to 0.3–0.5 mm wide; margins of all leaves usually subentire, apex slightly acuminate; costae stout throughout, ca. 80  $\mu\text{m}$  wide at base, ending about 10–15 cells before apex, smooth abaxially; most cells of lamina 7–10  $\mu\text{m}$  wide, upper cells 12–25  $\mu\text{m}$  long, median cells 20–40  $\mu\text{m}$  long, basal cells up to 75  $\mu\text{m}$  long. Dioicous. Sporophyte unknown.

MAS A TIERRA: Cordon rechts v. Yunque, 450 m, K. 310/4b (B); Q. östl. Plazoleta, 200 m, K. 320/7 part (B); ridge south of Portezuelo de Villagra, ca. 1800 ft, H. & E. 458.

The species is endemic to Juan Fernandez. Bartram (1957) reported a collection from Mas Afuera.

### *Thamnobryum confertum*

*Thamnobryum confertum* (Mitt.) H. Robinson, *Phytologia* 29 (2):117, 1974.

*Porotrichum confertum* Mitt., *Rep. Sc. Res. Voyage Challenger Bot.* 1 (4):81, 1885. [Original material: Mas a Tierra, coll. Moseley, 1875.]

Rather robust plants with secondary stems to 8 cm long, stipes to 3.5 cm long. Stipe leaves with squarrose-recurved tips. Main stems and branches densely foliate, scarcely compressed, densely branching with branches to 2 cm long. Main stem and branch leaves ca. 2.5 mm long, 1.0 mm wide, leaves of smaller branches 1.2 mm long, 0.4 mm wide, all leaves broadly ovate becoming narrowly oblong above, smaller leaves elliptical; lateral margins subentire, recurved below; apex acute, in branch leaves sharply dentate; costae stout throughout, ca. 50–60  $\mu\text{m}$  wide at base, ending about 5–10 cells below apex, smooth abaxially; most cells of lamina 7–10  $\mu\text{m}$  wide, slightly incrassate, upper cells 15–25  $\mu\text{m}$  long, median cells mostly 20–35  $\mu\text{m}$  long, a few basal cells to 50  $\mu\text{m}$  long. Dioicous.



MAS AFUERA: Q. Casas, *H. & E.* 338b.

The species is endemic to Juan Fernandez. Bartram (1957) was doubtful of the validity of the species. On the basis of the new collection cited above, which shows Bartram's key characters, I would think the species distinct. A difference from *T. carolii* not mentioned by Bartram is the thinner cell walls.

### *Thamnobryum ingae*

*Thamnobryum ingae* (Broth.) H. Robinson, *Phytologia* 29(2):117, 1974.

*Thamniium ingae* Broth. in Skottsbl., *Nat. Hist. Juan Fernandez* 2:432, 1924. [Original material: Puerto Frances, ca. 500 m, Mas a Tierra, coll. C. & I. Skottsberg n. 345 (lectotype, present designation).]

Rather robust plants with secondary stems 6–10 cm long, with stipes 1–3 cm long, becoming rather pinnately to subbipinnately branched above. Lower stipe leaves with squarrose-recurved tips. Main stems and branches densely foliate, strongly complanate. Branches to 3 cm long. Main stem and branch leaves ca. 2.0 mm long, 0.8 mm wide, broadly elliptical, slightly concave; leaves of smaller branches ca. 1.0 mm long, 0.3 mm wide, less broadly elliptical; lateral margins subentire, slightly recurved below, a few sharp teeth distally, apex bluntly acute; costae stout, 60  $\mu$ m wide at base, ending about 5–10 cells below apex, smooth abaxially; cells of lamina mostly 7–10  $\mu$ m wide, slightly incrassate, upper cells 10–12  $\mu$ m long, median cells 12–25  $\mu$ m long, a few basal cells to 50  $\mu$ m long. Dioicous. Sporophyte unknown.

MAS A TIERRA: Trail to Portezuelo de Villagra, ca. 1400 ft, *H. & E.* 315A.

As presently known the species is endemic to Mas a Tierra.

### *Thamnobryum proboscideum*

*Thamnobryum proboscideum* (Broth.) H. Robinson, *Phytologia* 29(2):118, 1974.

*Thamniium proboscideum* Broth. in Skottsbl., *Nat. Hist. Juan Fernandez* 2:433, 1924. [Original material: Pangal, 205 m, Mas a Tierra, coll. C. & I. Skottsberg n. 256.]

Rather large plants with secondary stems to 7 cm long, stipitate for about 3 cm below, rather pinnately to subbipinnately branched above. Branches to 3 cm long. Stipe covered with scalelike leaves.

Main stem and branch leaves erect-spreading, ca. 2 mm long, lanceolate, rather concave; apices usually excised, sometimes minutely serrulate; costae stout throughout, 80–100  $\mu$ m wide below, excurrent in a stout, rough point, smooth abaxially; cells of lamina near apex oval or triangular, irregular, median cells mostly oblong hexagonal, cells longer toward base, at base linear. Dioicous. Sporophyte unknown.

The species is endemic to Mas a Tierra. No material has been seen in this study, but both Brothierus (1924) and Bartram (1957) emphasize the long-excurrent costa of the leaves.

### *Thamnobryum rigidum*

*Thamnobryum rigidum* (Mitt.) H. Robinson, *Phytologia* 29(2):118, 1974.

*Porotrichum rigidum* Mitt., *J. Linn. Soc., Bot.* 12:467, 1869. [Original material: Mas a Tierra, coll. Bertero, 1830.]

*Porotrichum latinerue* Mitt., *Rep. Sc. Res. Voyage Challenger Bot.* 1(4):81, 1885. [Original material: Mas a Tierra, coll. Moseley, 1875.]

*Thamniium crassinervium* Broth., *Nat. Pfl.* 1(3):862, 1906. [Original material: Mas a Tierra, coll. Bertero, 1830.]

*Thamniium assimile* Broth. in Skottsbl., *Nat. Hist. Juan Fernandez* 2:433, 1924. [Original material: Quebrada Dama-juana, 250 m, Mas a Tierra, coll. C. & I. Skottsberg n. 350.]

Rather robust plants with secondary stems to 10 cm long, with stipes to 6 cm long, becoming rather pinnately to subbipinnately branched above. Stipe leaves with squarrose-recurved tips. Main stems and branches densely foliate, scarcely complanate. Branches to 2.5 cm long. Main stem and larger branch leaves ca. 2.0 mm long, 1.0 mm wide, broadly ovate-lanceolate, slightly concave; smaller branch leaves 1.3–1.5 mm long, ca. 0.4 mm broad, more narrowly ovate; lateral margins subentire, slightly recurved below, a few very sharp teeth distally; costae stout throughout, ca. 80  $\mu$ m wide at base, subpercurrent, slightly spreading at tip into short-acuminate leaf apex, smooth abaxially; most cells of upper lamina slightly incrassate, short-rhomboidal to rounded-polygonal, 10–12  $\mu$ m in diameter, median cells mostly 7–10  $\mu$ m wide, 20–25  $\mu$ m long, a few cells near base to 40 or 50  $\mu$ m long. Dioicous. Sporophyte unknown.

MAS A TIERRA: Valley at base of Piramide, *H. & E.* 643.

The species is endemic to Mas a Tierra. It is

quite closely related to *Thamnobryum pandum* (Hook. f. & Wils.) Stone & Scott but is much more robust and has a sharper, more acuminate leaf apex.

## LEMBOPHYLLACEAE

As delimited in this study the family does not occur in Juan Fernandez. In an effort to make the family less unnatural I have placed *Acrocladium* in the Amblystegiaceae and *Rigodium* in the Brachytheciaceae. Removal of these and other genera leaves a somewhat more uniform series that is distinctly neckeroid. One member of the more narrowly delimited family that might eventually be found in Juan Fernandez is the Chilean *Campochaete orbiculata* (Thér.) H. Robinson (Robinson, 1970).

## HYPNODENDRACEAE

### Genus *Hypnodendron*

Plants yellowish to dark green, medium-sized to rather large, dendroid, densely branched with well-developed stipes, rhizoids on bases and older stipes, stems without central strands, without paraphyllia. Leaves of stipe distinct, usually scalelike. Leaves of stems and branches erect-spreading, ovate to lanceolate; margins strongly serrate; costae single, strong, subpercurrent, with series of teeth abaxially toward tip; cells of lamina short-rectangular to very narrowly rhomboidal, thin-walled and usually smooth; alar cells poorly differentiated. Dioicous. Perigonia and perichaetia in lateral buds in axils of stem leaves, clustered at bases of fronds. Setae elongate, smooth. Capsules rather erect or inclined to horizontal, narrowly cylindrical, sometimes curved, ribbed; annulus present; peristome double, complete with cilia, teeth with transverse striations; operculum rostrate. Calyptra cucullate, bare.

One species is known from Juan Fernandez.

### *Hypnodendron microstictum*

*Hypnodendron microstictum* Mitt., J. Linn. Soc., Bot. 12:566, 1869. [Original material: Colchaque, Chile, coll.? Herb. Hooker.]

*Hypnum krausei* C. Müll., Linnaea 38:619, 1874. [Original material: Corral, Chile, coll. Krause.]

Yellowish green, rather lustrous, dendroid plants to 6 cm high, with stipes to 4 cm long, stipes polished reddish brown, central strand of extremely slender cells in compact mass surrounded by much larger, thin-walled cells. Stipe leaves broadly deltoid with long, slender, acuminate tip, ca. 1.0 mm long, 0.6 mm wide, tips erect and slightly spreading; margins minutely serrulate; costa slender, percurrent, smooth; cells of lamina narrowly rhomboidal, 7–10  $\mu\text{m}$  wide, 60–100  $\mu\text{m}$  long, a few short-rectangular cells in the slightly rounded alar region that are ca. 10  $\mu\text{m}$  wide and 17–30  $\mu\text{m}$  long. Upper stipe, main stem, and larger branch leaves ovate with upper edges tapering evenly to slightly blunted apex, lower stem leaves to 2.0 mm long, to 0.9 mm wide, most branch leaves 1.0–1.5 mm long, 0.6–0.8 mm wide, margins scarcely recurved at extreme base, sharply serrate from lower 1/4 or 1/5; costa percurrent, slender, ca. 30  $\mu\text{m}$  wide at base, 4–7 teeth abaxially along distal 1/3; most cells of lamina narrowly rhomboidal or rectangular, 6–8  $\mu\text{m}$  wide, 40–60  $\mu\text{m}$  long, upper cells mostly 30–40  $\mu\text{m}$  long, apical cells 20–25  $\mu\text{m}$  long, extreme basal cells 25–30  $\mu\text{m}$  long, 2–3 subquadrate cells in indistinct alar region. "Under" surface of branches with leaves often smaller and less spreading, perichaetia directed toward "upper" surface. Setae to 2.5 cm long, reddish when mature. Capsule urn ca. 4 mm long, slender, slightly curved; operculum ca. 2 mm long.

MAS A TIERRA: Q. Damajuana, 550 m, K. 316/9a (B).

The species is known from only Juan Fernandez and the Chilean mainland. With the exception of this species, the family is restricted to the Australian-Indonesian-Western Pacific area.

## HYOPTERYGIACEAE

The members of the family from southern South America have been treated by Matteri (1973b).

### Genus *Lopidium*

Plants yellowish green, medium-sized, with creeping radiculose primary stems, secondary stems without central strand, with short stipes bearing erect, subpinately branched fronds. Lower stipe leaves appressed with tips erect-spreading; leaves of other parts 3-ranked, leaves of ventral rank smaller, lat-



eral leaves curving downward and enclosing stem when dry; margins bordered with narrow, elongate cells; costa percurrent to excurrent; median cells small, rounded, nearly smooth, alar cells not distinct. Perichaetia in lateral buds. Setae rather short, papillose. Capsule suberect; urn short-cylindrical, smooth; peristome double, basal membrane low, cilia lacking; operculum short-rostrate. Calyptra cucullate.

One species occurs in Juan Fernandez.

### *Lopidium concinnum*

*Lopidium concinnum* (Hook.) Wils. in Hook. f., Fl. Nov. Zcl. 2:119, 1954.

*Leskea concinna* Hook., Musci Exot. 1:34, 1818. [Original material: Dusky Bay, New Zealand, coll. D. Menzies, 1791.]

*Lopidium pallens* Hook. f. & Wils., Fl. Nov. Zcl. 2:119, 1854. [Original material: North & Middle Islands, New Zealand: Auckland & Waikahi, coll. Sinclair; Bay of Islands, coll. J. D. Hooker, 1839-1843; Bligh's Sound, Hutt Valley, Milford Sound, Wellington and Ship Cove, coll. Lyall. Also credited to Tasmania, South America, Chiloe.]

*Hypopterygium pallens* (Hook. f. & Wils.) Mitt., Kew J. Bot. 8:265, 1856.

*Hypopterygium flexisetum* Hampe in Lorentz, Bot. Zeit. 24: 187, 1866, *nom. nud.*

*Hypopterygium plumarium* Mitt., J. Linn. Soc., Bot. 12:329, 1869. [Original material: Fazendado do Lageado, near Curitiba, 2000 ft, Paraná, Brasil, coll. Weir n. 1; Chiloe Isl., Chile, coll. Lobb; Auckland Isl., coll. J. D. Hooker, 1839-1843.]

*Lopidium plumarium* (Mitt.) Hampe, Vid. Medd. Naturh. For. Kjoebenh. ser. 4, 1:162, 1879.

*Lopidium aristatum* C. Müll. in Ule, Hedwigia 38(Beibl. 1): 58, 1899, *nom. nud.*

*Hypopterygium araucarieti* C. Müll. in Kindberg, Hedwigia 40:281, 1901, *nom. nud. in syn.*

*Lopidium araucarieti* Fleisch., Hedwigia 63:213, 1922, *nom. nud.*

Plants to 10 cm tall, stipe 1-2 cm long, stipes bare or slightly radiculose below. Lowest stipe leaves very broadly ovate, ca. 0.7 mm long, 1.0 mm broad, very short and broadly acuminate; ecostate; median cells rhomboid, ca. 25  $\mu$ m wide, to 40  $\mu$ m long; cells toward border more quadrate, ca. 15  $\mu$ m in diameter. Upper stipe leaves and lower stem leaves of frond ovate-lanceolate, ca. 1.0-1.5 mm long, 0.6-0.9 mm wide; margin weaker; basal cells oval, 25-30  $\mu$ m long, strongly porose. Upper stem and branch leaves narrowly oblong, to 1.5 mm long, 0.7 mm wide; ventral leaves to 1.0 mm by 0.4 mm. All upper leaves with tips abruptly narrowed to

short, stout apiculus; margins with 1-2 rows of narrow cells often failing near tip, distal margin sharply serrate; costa slender, ca. 25  $\mu$ m wide near base; lamina cells mostly rounded with thickened angles, 7-12  $\mu$ m in diameter. Autoicous. Setae 2.5-9.0 mm long, nearly smooth or slightly roughened. Capsule urn 1.5-2.0 mm long; spores 12-14  $\mu$ m in diameter, smooth.

MAS A TIERRA: Ridge between Q. Piedra Aguerada and Q. Laura, 650 m, *Sk.* 332.

The species is known from Brazil, Argentina, Chile, Juan Fernandez, New Zealand, Tasmania, Australia, and the Auckland Islands. Some of the confusion regarding the history of the species is discussed by Dixon (1913-1929).

### Genus *Hypopterygium*

Medium-sized, yellowish green plants with creeping, radiculose primary stems, secondary stems with central strand, with long stipes bearing rather palmately bipinnate, reflexed fronds. Stipe leaves appressed, other leaves 3-ranked, leaves of ventral rank smaller, lateral leaves curving downward to enclose stem when dry; leaf margins bordered with narrow, elongate cells; costae single, ending shortly beyond midleaf; median cells short-rhomboidal to hexagonal, smooth; alar cells not distinct. Perichaetia in lateral buds, often crowded near base of frond. Setae slender, smooth. Capsule inclined to pendulous, short-cylindrical, smooth; peristome double, inner peristome with well-developed membrane, cilia present; operculum conico-rostrate. Calyptra cucullate, bare.

One species is known from Juan Fernandez.

### *Hypopterygium arbuscula*

*Hypopterygium arbuscula* Brid., Bryol. Univ. 2:717, 1827.

*Hypnum arbuscula* P. Beauv., Prodr. 61, 1805, *hom. illeg.* [Original material: Straits of Magellan, coll. Commerson, 1766-1769.]

*Hypnum thounii* Schwaegr., Sp. Musc. Suppl. 3(2):289, 1830. [Original material: Straits of Magellan, coll. Commerson, 1766-1769.]

*Hypopterygium speciosum* C. Müll., Linnaca 18:683, 1844. [Original material: Chile, coll. Philippi.]

*Hypopterygium thounii* (Schwaegr.) Mont., Ann. Sc. Nat. Bot. ser. 3, 4:86, 1845.

*Hypopterygium wolffhugelii* Herz., Hedwigia 64:15, 1923. [Original material: Lago "Todos Santos bei Osorno," Chile, coll. Wolffhügel, Herb. Herz. n. 5333 (JE).]

Plants to 10 cm tall. Stipe 3–6 cm long, bare or slightly radiculose below; stipe leaves appressed throughout, 2.5 mm long, 1.5 mm wide, lingulate, with broadly rounded tip; serrate with small, sharp teeth in distal half, costate to near tip; median cells rhomboidal, 12–25  $\mu\text{m}$  wide, 50–60  $\mu\text{m}$  long; cells toward margins becoming scarious, smaller, more quadrate, mostly 17–20  $\mu\text{m}$  in diameter. Stem leaves and lateral leaves of branches oblong-ovate, ca. 2.5 mm long, 1.5–2.0 mm broad, costa ending well before tip, branch leaves with dorsal margins much more rounded, tip short-apiculate. Ventral leaves symmetrical, broadly ovate, longer and more slenderly acuminate, with excurrent costa. All leaves of fronds with marginal 3–4 rows of narrow cells reaching to tip; margins strongly serrate, teeth long and rather ciliiform toward bases of stem leaves on ventral leaves; costae slender, 30  $\mu\text{m}$  wide near base; cells of lamina short-rhomboidal, ca. 25  $\mu\text{m}$  long, 17  $\mu\text{m}$  wide, arranged in longitudinal and oblique rows, a few short basal cells; most inner cells of stem leaves larger, 17–22  $\mu\text{m}$  wide, 30–60  $\mu\text{m}$  long. Dioicous. Setae ca. 8–12 mm long. Capsule urn ca. 2.0 mm long, with pustules at base; spores oval, 10–12  $\mu\text{m}$ , nearly smooth.

MAS AFUERA: Q. Casas, *H. & E.* 162, 357.

MAS A TIERRA: Western slope Piramide Ridge, south of Portezuelo de Villagra, *H. & E.* 28, 39.

The species is known from central Chile south to Tierra del Fuego. It is distinguished from the

other common Chilean species, *H. didictyon* C. Müll., by the lack of dense, reddish tomentum on the stipes.

## RHACOPILACEAE

### Genus *Rhacopilum*

Yellowish green plants forming mats with long, creeping stems, stems usually reddish radiculose below. Leaves of two types, a row on each side of larger leaves and two rows on upper surface of smaller leaves, lateral leaves curling inward over stem when dry. All leaves narrowed distally to an excurrent costa, margins slightly to strongly serrate; lamina cells mostly rather isodiametric, smooth or papillose, basal cells sometimes elongate, alar cells not distinct. Pseudoautoicous or autoicous. Perichaetia in lateral buds. Setae elongate, smooth or papillose. Capsules narrowly cylindrical, usually inclined to horizontal, slightly curved and distinctly ribbed when dry; peristome double, complete; operculum short-rostrate. Calyptra cucullate, pilose.

The genus is represented throughout most of tropical America by a single species. Juan Fernandez has been credited with another apparently endemic species. The present collections contain material of both species, which are distinguished as follows.

### Key to Species of *Rhacopilum*

- Most cells of lateral leaves 10–12  $\mu\text{m}$  in diameter, those in distal part very irregular ..... *R. fernandezianum*  
 Most cells of lateral leaves 12–20  $\mu\text{m}$  long, usually arranged in rather distinct rows throughout ..... *R. tomentosum*

### *Rhacopilum fernandezianum*

*Rhacopilum fernandezianum* Card. in Thér., Recueil Publ. Soc. Havraise Etud. Div. 88:33, 1921. [Original material: Mas a Tierra, coll. Bertero n. 1562, 1830 (PC!)]

Freely branching stems 1–2 cm long. Lateral leaves 1.5–2.0 mm long, 0.5 mm wide, broadly ovate-lanceolate, rather short-acute above with short- to rather long-excurrent costa; distal margins minutely serrulate; dorsal leaves usually smaller, ca. 1.0 mm long, 0.4 mm wide, more broadly ovate

and cordate at base, more tapering and more entire distally with longer excurrent costa; cells of lamina very irregular, smooth, mostly 8–12  $\mu\text{m}$  in width or length, some median and lower cells to 17  $\mu\text{m}$  long, shapes very irregular with some oval, narrowly hexagonal, rhomboidal, subquadrate, etc., very few arranged in distinct rows; only a few inner basal cells enlarged to 40  $\mu\text{m}$  long, 12  $\mu\text{m}$  wide. Autoicous. Setae ca. 1.5–2.0 cm long, smooth. Capsule urn 2–4 mm long.

MAS AFUERA: Between Sanchez and Toltén, 515



m, *Sk. 259* (S); Q. Casas, *Sk. 274* (S); Q. Mono, 475 m, *Sk. 280* (S); Q. Blindado, 440 m, *Sk. 283* (S); Q. Cabrerros, *Sk. M167* (S).

MAS A TIERRA: Without precise locality, *Bertero 1562* (type, PC); Q. Juanango, *Sk. 257* (S); Q. Choza, 250 m, *Sk. 258, 279* (S); Q. Monte Maderugo, *Sk. 260* (S); Valle Anson, near Plazoleta, ca. 260 m, *Sk. 277, 281* (S); ca. 100 m, *Sk. M43* (S); Cumberland Bay, Pico Central, 390 m, *Sk. 261* (S); Valle Colonial, Q. Seca, 435 m, *Sk. 278* (S); V. C., near trail to Portezuelo de Villagra ca. 220 m, *Sk. M10, M11, M14* (S); north slope of El Yunque, 400–500 m, *Sk. 282* (S); V. C., Q. Gutierrez, ca. 300 m, *Sk. 318, 322, 324* (S); Salsipuedes, 615 m, *Sk. 319* (S); ca. 1800 ft, *H. & E. 300*; between Villagra and Tres Puntas, *Sk. 323* (S); Cumberland Bay, El Pangal, *Sk. M52* part (S); forests of Villagra, 400–550 m, *Sk. M237* (S); Puerto Frances, *Sk. M276* (S); near Cumberland Bay, *K. 336/1* part (B); just before Plazoleta del Yunque, 800 ft, *M. 9532*; Pangal Valley, *H. & E. 20*; below and above base of Piramide, *H. & E. 560, 759*; near Portezuelo de Villagra, ca. 1800 ft, *H. & E. 705A, 705B*.

The species is endemic to Juan Fernandez. Most characters cited by Thériot (1921), such as larger dorsal leaves and more entire margins, are well-known variable traits of *R. tomentosum*. The leaf-cell difference mentioned by Brotherus (1924) is valid, however. It has remained necessary only to point out that the endemic species is not the only *Rhacopilum* on the islands.

### *Rhacopilum tomentosum*

*Rhacopilum tomentosum* (Hedw.) Brid., Bryol. Univ. 2:719, 1827.

*Hypnum tomentosum* Hedw., Sp. Musc. 240, 1801. [Original material: Hispaniola, coll. Swartz, 1783–1787.]

*Hypnum ornithopodioides* Brid., Musc. Rec. 2(2):124, 1801. [Original material: Patagonia.]

*Rhacopilum latistipulatum* Card., Rev. Bryol. 38:41, 1911. [Original material: Esperanza, Puebla, Mexico, coll. Purpus n. 4295, 1908; Boca del Monte, coll. Purpus n. 4280, 1909.]

Freely branching stems 1–3 cm long. Lateral

leaves 1.5–2.0 mm long, 0.5 mm wide, broadly ovate-lanceolate, rather short-acute above with short- to rather long-excurrent costa, distal margin serrulate to coarsely serrate; dorsal leaves usually smaller, ca. 1.0 mm long, 0.4 mm wide, more broadly ovate and cordate at base, with straighter tapering distal margins, less serrulate, costa longer-excurrent. Cells of all laminae mostly broadly oval, 12  $\mu$ m wide, 15–25  $\mu$ m long, with scattered subquadrate cells 10  $\mu$ m in diameter, most cells arranged in definite longitudinal and oblique rows; only a few inner basal cells more elongate with more thickened porose walls. Autoicous. Setae 1.5–3.0 cm long, smooth. Capsule urn 3–5 mm long.

MAS AFUERA: Q. Casas, ca. 200 m, *Sk. 326, M179* (S), *H. & E. 205, 571* part; Q. Óvalo, *Sk. M115* (S).

MAS A TIERRA: Valle Colonial, Q. Seca, 435 m, *Sk. 321* (S); Cumberland Bay, El Pangal, *Sk. M52* part (S); C. B., Cave 6, *Sk. M267* (S); C. B., Cave 8, *Sk. M270* (S); near Cumberland Bay, *K. 336/1* part (B); trail to Camote, 1400 ft, *M. 9619*.

The species is distributed throughout tropical and subtropical America. Some treatments extend the range into Africa but the most recent treatment of African species (Potier de la Varde, 1936) does not mention *Rhacopilum tomentosum*. The species has not been reported previously from Juan Fernandez.

## LESKEACEAE

### Genus *Thuidium*

Small or medium-sized, yellowish green, procumbent, pinnately to bipinnately branching heterophyllous plants forming loose mats on soil, rock, or trees. Stems with paraphyllia. Leaves ovate, unbordered, costate to near or beyond tip; cells mostly isodiametric, papillose, alar cells more quadrate. Perichaetia in lateral buds. Setae long, slender. Capsule inclined to horizontal, cylindrical, often curved, smooth; peristome double, complete with cilia; operculum short- to long-rostrate. Calyptra cucullate, bare or with a few hairs.

Two species are known from Juan Fernandez.

### Key to Species of *Thuidium*

- Stem leaves 0.7–1.0 mm long; leaf cells unipapillose ..... *T. masafuerae*  
 Stem leaves 0.4–0.5 mm long; leaf cells usually 3–4 papillose ..... *T. furfurosum*

*Thuidium furfurosum*

*Thuidium furfurosum* (Hook. f. & Wils.) Reichtd., Reise Oest. Freg. Novara Bot. 1 (3):187, 1870.

*Hypnum furfurosum* Hook. f. & Wils., Fl. Nov. Zel. 2:107, 1854. [Original material: New Zealand, coll. *Cunningham, Colenso, Lyall*, etc.]

*Hypnum sparsum* Hook. f. & Wils., Fl. Nov. Zel. 2:109, 1854. [Original material: Wangerei, North Isl., New Zealand, coll. *Bolton*.]

*Leskea fulvastra* Mitt., J. Linn. Soc., Bot. 4:92, 1859. [Original material: New Zealand, coll. *Bolton, Kerr, Knight, Milne, F. Müller*; Tristan da Cunha, coll. *Milne*.]

*Hypnum unguiculatum* Hook. f. & Wils., Fl. Tasm. 2:208, 1859. [Original material: Tasmania, Yorktown, coll. *Lawrence, Gunn nos. 1598, 37*; North-West Bay, coll. *Oldfield n. 313b*.]

*Hypnum suberectum* Hampe, Linnæa 30:638, 1860. [Original material: Tarwin River, Victoria, Australia, coll. *F. Müller*.]

*Hypnum denticulosum* Mitt. in Hook. f., Handb. New Zealand Fl. 472, 1867. [Original material: Auckland?, North Isl., New Zealand, coll. *Sinclair*.]

*Thuidium corralense* Broth. in Card. & Broth., K. Svensk. Vet. Ak. Handl. 63 (10):62, 1923, *nom. nud. in syn.* [Original material: Corral, Chile, coll. *Dusén n. 81*.]

*Thuidium valdiviæ* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:439, 1924. [Original material: Valdivia, Chile, coll. *A. Hofmann (H)*.]

Stems to 10 cm long with branches ca. 0.5 cm long, bipinnately branched with leaves incurved-catenulate when dry. Main stems including leaves ca. 0.7 mm wide, with paraphyllia unbranched, ending in multipapillose, unenlarged cells. Stem leaves deltoid to 0.5 mm long, to 0.3 mm wide, narrowly subulate, margins broadly reflexed in basal half, costa subpercurrent; cells of lamina ca. 6 µm wide, mostly 6–7 µm long, 3–4 papillae on each surface, a few distal cells to 10 µm long with only 1–2 papillae, apical cells 2–4 papillose, no elongated basal cells. Primary branch leaves ovate, to 0.4 mm long, ca. 0.25 mm wide, slightly acuminate, secondary branch leaves 0.2 mm long, 0.1 mm wide, ovate, rather obtusely acute; branch leaf cells, including marginal and apical, 6–7 µm in diameter, multipapillose. Dioicous. Perichaetial leaves long-filiform-acuminate, sparsely ciliate on margins. Setae 2–3 cm long, red, smooth. Capsule urn ca. 2 mm long, slightly curved; inner peristome with 2–3 cilia per segment; spores 10–12 µm in diameter, smooth; operculum ca. 1 mm long. Calyptra bare.

MAS AFUERA: Q. Casas, *H. & E. 163*.

MAS A TIERRA: Wand Damajuana, *K. 317/11d* (B); trail to Portezuelo de Villagra, ca. 1800 ft, *H. & E. 60*.

The species is known from Central and South America, the West Indies, Australia, Tasmania, New Zealand, South Africa, and islands of the South Atlantic and South Pacific.

*Thuidium masafuerae*

*Thuidium masafuerae* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:438, 1924. [Original material: Cordón del Barril, Mas Afuera, coll. *C. & I. Skottsberg n. 513*.]

Stems to 10 cm long with branches ca. 0.5 cm long, bipinnately branched with leaves incurved-catenulate when dry. Main stems including leaves ca. 1 mm wide, with paraphyllia unbranched, ending in multipapillose unenlarged cells. Stem leaves broadly deltoid, 0.7–1.0 mm long, 0.5–0.6 mm wide, narrowly subulate, margins broadly reflexed in basal half, costa subpercurrent; cells of lamina ca. 6 µm in diameter, upper cells 8–10 µm long, most cells, including apical, unipapillose; basal cells smooth, elongate to 25 µm long. Primary branches with numerous, scattered paraphyllia; leaves rather deltoid, short-acuminate, to 0.45 mm long, 0.35 mm wide, slightly reflexed below; secondary branches without paraphyllia; leaves narrowly ovate, 2.0–2.5 mm long, 1.0 mm wide, obtusely acute, margin plane; costae of branch leaves ending distinctly below apex; marginal cells with 2–3 papillae, usually 1 outward and 1 to each side; apical cells with 4–5 papillae; cells of lamina 6–7 µm in diameter, mostly with 1 sharp papilla on each surface. Dioicous. Sporophyte unknown.

MAS AFUERA: Below summit of Los Innocentes, ca. 4000 ft, *H. & E. 237*; Q. Casas, *H. & E. 335*.

The species is known only from Mas Afuera. In addition to other characters in the key, the species can be distinguished from *T. furfurosum* by the elongate basal cells of the stem leaves.

## BRACHYTHECIACEAE

Genus *Catagoniopsis*

Medium-sized, yellowish green, prostrate plants with irregularly sparsely branching stems in compact mats; stems with narrow, rather elongate,



hyaline surface cells, without paraphyllia. Leafy stems and branches somewhat flattened, not noticeably heterophyllous. Leaves erect-spreading, not altered when wet, ovate-lanceolate, slenderly acute, with margins completely entire; costae single, reaching to distal 1/4, not ending in spine; median cells linear, smooth; inner basal cells numerous, distinctly rounded with slightly thickened walls, extending across adaxial surface at base of costa; a small area of small alar cells. Dioicous. Perichaetia in lateral buds. Setae long, slender, smooth. Capsule inclined to horizontal, oval to short-oblong, slightly curved, smooth, scarcely constricted when dry; peristome double, complete with cilia; operculum conical. Calyptra cucullate, bare.

The genus is monotypic.

### *Catagoniopsis berteroaana*

*Catagoniopsis berteroaana* (Mont.) Broth., Nat. Pfl. 1 (3):1162, 1909.

*Hypnum berteroaanum* Mont., Ann. Sc. Nat. Bot. ser. 3, 4:89, 1845. [Original material: Near Quillota, Chile, coll. *Bertero n. 1052*.]

Stems to 5 cm long; surface cells ca. 12  $\mu\text{m}$  wide, 100  $\mu\text{m}$  long. Leaves rather complanate, ca. 1.5 mm long, 0.7 mm wide, ovate with lanceolate tip, ending in very small, slender acumination, rather concave and slightly plicate in lower 1/2; margins absolutely entire, slightly recurved below; median cells of lamina ca. 4  $\mu\text{m}$  wide, 50–75  $\mu\text{m}$  long; apical cells shorter, to 5  $\mu\text{m}$  wide, mostly 25–30  $\mu\text{m}$  long; lower leaf cells 5–7  $\mu\text{m}$  wide, 15–20  $\mu\text{m}$  long; inner basal cells rounded to oval with slightly thicker corners, 12–15  $\mu\text{m}$  in diameter, in 3–4 tiers across base; alar cells few, 5–10  $\mu\text{m}$  wide, 10–20  $\mu\text{m}$

long. Perichaetial leaves to 2.5 mm long, with longer, more slender, slightly spreading tips, entire. Setae to 2 cm long, reddish. Capsule urn 1.0–1.5 mm long; spores ca. 10  $\mu\text{m}$  in diameter, nearly smooth.

The species is known only from Chile but has been reported from Mas a Tierra on the basis of a Moseley collection. I have not been able to confirm the record. One specimen seen from Juan Fernandez under the name, *Bertero n. 1594* ex Herb. Duby, ex Herb. Boissier (S), proves to be *Hypnum lechleri*.

### Genus *Rhynchostegium*

Small to medium-sized, yellowish green plants with stems usually creeping and branches spreading or ascending. Stems with narrow, elongate surface cells and no paraphyllia. Leafy stems and branches often flattened, with erect-spreading leaves not noticeably altered when moist; not strongly heterophyllous. Leaves ovate to lanceolate with tips obtuse to slenderly acuminate; margins weakly to strongly serrulate; costae single, very slender, reaching beyond midleaf, sometimes ending in abaxial spine; median and lower cells of laminae linear, smooth, thin-walled; blunt-leaved species with short cells apically; very few subquadrate alar cells. Perichaetia in lateral buds. Setae long, slender, smooth or papillose. Capsules inclined to horizontal, oval to cylindrical, smooth; slightly curved, scarcely constricted when dry; peristome double, complete with cilia; operculum rostrate. Calyptra cucullate, bare.

Two species are reported from Juan Fernandez.

### Key to Species of *Rhynchostegium*

- Leaves ovate-lanceolate, not or slightly acuminate; median cells mostly 40–75  $\mu\text{m}$  long ..... *R. complanum*  
 Leaves broadly ovate, short- to rather long-acuminate; median cells 80–140  $\mu\text{m}$  long ..... *R. tenuifolia*

### *Rhynchostegium complanum*

*Rhynchostegium complanum* (Mitt.) Jaeg., Ber. St. Gall. Naturw. Ges. 1876–1877:374, 1878 (Ad. 2:440).

*Hypnum complanum* Mitt., J. Linn. Soc., Bot. 12:553, 1869. [Original material: Chile, coll.?, Herb. Montagne.]

Rather slender plants with prostrate stems to 5 cm long, branches spreading, to ca. 1 cm long, leafy stems and branches complanate. Leaves rather widely spreading on sides, to 1.5 mm long, 0.6 mm wide, only slightly concave at base, ovate-cordate

with lanceolate subula, scarcely acuminate; margins recurved near base, serrulate from near base; costae to  $3/5$  of leaf length, ending in small spine, ca. 25  $\mu\text{m}$  wide at base; median cells 6–7  $\mu\text{m}$  wide, 40–75  $\mu\text{m}$  long, linear; apical cells not noticeably shorter, ca. 50  $\mu\text{m}$  long; basal cells to 15  $\mu\text{m}$  wide, 25  $\mu\text{m}$  long; 8–10 short-rectangular alar cells which are 10–17  $\mu\text{m}$  wide, 20–30  $\mu\text{m}$  long, surrounded by longer, narrower cells. Autoicous. Perichaetial leaves subulate-acuminate, serrulate. Setae ca. 1.5 cm long or longer, smooth, reddish. Capsule urn curved, rather slender.

MAS AFUERA: Q. Blindado, 440 m, *Sk. 506* (S); Q. Casas, *Sk. M182* (S); Sanchez-Toltén forest, ca. 700 m, *Sk. M196* (S).

MAS A TIERRA: Q. Damajuana, *Sk. 432, 435* (S), 400–450 m, *Sk. M214* (S); below Portezuelo, ca. 500 m, *Sk. 433* (S); Portezuelo Ridge, ca. 550 m, *Sk. 434* (S); Valle Colonial, near trail to Portezuelo de Villagra, ca. 220 m, *Sk. M5, M11* (S); Cumberland Bay, El Pangal, *Sk. M49, M52* part (S); Q. Frances, slope of Cordon Chilladores, *K. M84* (S); Puerto Frances, *Sk. M85* (S); Q. östl. Plazoleta, 200 m, *K. 320/7* part (B); Plazoleta del Yunque, trail to, between 150–200 m, *K. 334/3* (B), forest above, 400–450 m, *Sk. M249* (S).

The species is known only from Chile.

### *Rhynchostegium tenuifolium*

*Rhynchostegium tenuifolium* (Hedw.) Reichdt., Reise Oest. Fieg. Novara Bot. 1 (3):191, 1870.

*Hypnum tenuifolium* Hedw., Sp. Musc. 283, 1801. [Original material: Insulae Australes, coll. Banks?]

*Hypnum collatum* Hook. f. & Wils., Fl. Tasm. 2:209, 1859. [Original material: Tasmania, coll. Gunn.]

Rather slender plants with creeping stems to 8 cm long, spreading to erect branches 1.0–1.5 cm

long, prostrate or spreading axes with leaves usually compressed, spreading, erect branches often with erect-spreading leaves. Leaves usually 1.0–2.5 mm long, 0.5–1.4 mm wide, stem leaves sometimes longer, concave, base ovate-cordate, rather abrupt, short- to rather long-acuminate tip, tip sometimes twisted; margins slightly recurved only at extreme base, usually distinctly serrulate along distal  $1/2$ ; costae reaching slightly beyond midleaf; median cells 7–10  $\mu\text{m}$  wide, mostly 80–140  $\mu\text{m}$  long, linear, sometimes pellucid; cells of acumination often shorter, rhomboidal, 25–30  $\mu\text{m}$  long; inner basal cells to 12  $\mu\text{m}$  wide, 25  $\mu\text{m}$  long; a few short-rectangular alar cells which are 10–12  $\mu\text{m}$  wide, 30–45  $\mu\text{m}$  long. Autoicous. Perichaetial leaves to 3.0 mm long with long, slenderly acuminate, slightly spreading, weakly serrulate tips. Setae 1.0–1.5 cm long or longer, smooth, reddish. Capsule urn ca. 2.0 mm long, curved, rather slender; spores 12–14  $\mu\text{m}$  in diameter, very minutely papillose.

MAS AFUERA: Q. Casas, *H. & E. 155*.

The species is known from New Zealand, Tasmania, Australia, and Chile.

### Genus *Rigodium*

Medium-sized to rather large, bi- or tripinnately branching plants in loose mats, with or without well-developed stipes. Leaves strongly heterophyllous; stem leaves squarrose-spreading or with squarrose-recurved tips, with median cells rather elongate; branch leaves broadly to narrowly ovate; costa usually reaching to acumination or subpercurrent; cells of lamina usually short, narrowly oval to rounded, smooth or papillose at cell ends. Dioicous. Perichaetia in lateral buds, with leaf tips prominently spreading-recurved. Setae elongate, smooth. Capsules inclined to horizontal, oval,

### Key to Species of *Rigodium*

1. Plants without long stipes, subpinnately branching throughout; main stem leaves with costa very short or lacking ..... *R. hylacomioides*
1. Plants with distinct stipes, frondose, often with attenuate branches; main stem leaves with costae of most leaves reaching base of acumination ..... 2
  2. Stipe leaves with walls of median cells very unequally thickened, porose and sometimes papillose at ends of cells, acumen less than  $1/2$  as long as blade ..... *R. arborescens*
  2. Stipe leaves with walls of median cells evenly thickened, smooth ..... 3
    3. Leaves acuminate throughout plant, stem leaves long-filiform-acuminate ... *R. toxarion*
    3. Branch leaves mostly narrowly acute, upper stem leaves rather short-acuminate ..... *R. robustum*



smooth; peristome double, teeth transversely striate below, cilia present; operculum short-rostrate. Calyptra cucullate, bare.

I have removed the genus *Rigodium* from the Lembophyllaceae to which it definitely does not belong. It is with less certainty that I return the genus to its former position (Brotherus, 1909) in the Brachytheciaceae. The habit and short leaf cells are more like *Thuidium* and other Leskeaceae, but paraphyllia and distinct leaf papillae are both lacking. The capsules are unlike the Amblystegiaceae. At least some known members of the Brachytheciaceae do possess each of the characters of *Rigodium*, and *Stokesiella* is very similar with its stipes and strong heterophylly.

Three or four species of *Rigodium* occur in Juan Fernandez. Reported species can be distinguished by the accompanying key.

### *Rigodium arborescens*

*Rigodium arborescens* (C. Müll.) Broth., Nat. Pfl. 1 (3):1160, 1909.

*Hypnum arborescens* C. Müll., Bot. Zeit. 172, 1858. [Original material: Near Colonia Arique, Prov. Valdivia, Chile, coll. Lechler n. 629.]

*Rigodium lechleri* Schimp. in Lor., Bot. Zeit. 24:180, 1866, nom. illeg. incl. spec. prior. [Original material: Near Colonia Arique, Prov. Valdivia, Chile, coll. Lechler n. 629.]

Yellowish green to dark green plants with creeping radiculose primary stems and arborescent, branched secondary stems, distinct stipes 1.0–4.0 cm long, branches 1.0–1.5 cm long. Stipe leaves usually squarrose from the base, rather concave, broadly deltoid, to 1 mm wide, ca. 0.8–1.0 mm long with abrupt, slender, short acumination 0.25–0.3 mm long; margin slightly serrulate, lower margin not recurved; costa reaching into acumination; inner cells of lamina mostly linear, 6–8  $\mu\text{m}$  wide, 17–40  $\mu\text{m}$  long; walls very unevenly thickened, porose with knobs on end walls projecting abaxially as papillae; cells becoming shorter, broader, slightly thicker-walled toward margin, 8–10  $\mu\text{m}$  wide, mostly 17–22  $\mu\text{m}$  long; a few very thick-walled cells inside margin at base, 12–40  $\mu\text{m}$  long; cells at basal margin in 3–4 rows, subquadrate to rounded, 10–12  $\mu\text{m}$  in diameter. Leaves of upper stem and primary branches ca. 0.35–0.6 mm long, 0.3–0.7 mm wide, deltoid to broadly ovate with short, broad acumination, erect-spreading when

moist, tips usually incurved when dry, margin slightly serrulate to subentire; costae percurrent, stout, 30–50  $\mu\text{m}$  wide; median cells small, short, 6–8  $\mu\text{m}$  wide, 7–14  $\mu\text{m}$  long, few to many projecting as papillae at upper ends abaxially; walls only slightly thickened; alar cells subquadrate to short-rectangular; 7  $\mu\text{m}$  wide, 7–15  $\mu\text{m}$  long. Secondary and ultimate branch leaves 0.2–0.3 mm long, 0.12–0.17 mm wide, narrowly ovate with tapering, short-acute tips which are incurved when dry, spreading when moist; costae and cells as in primary branch leaves. Setae 10–12 mm long. Capsule urn ca. 1.5 mm long.

I have seen essentially all material determined as *R. arborescens* by Brotherus (1924) and Bartram (1957) and all represent what I consider *R. robustum* or *R. toxarion*. At the present it seems *R. arborescens* is restricted to the mainland of Chile and does not occur on Juan Fernandez.

There are two additional, rather distinctive species of *Rigodium* that might be found on Juan Fernandez. *Rigodium implexum* Kunz. ex Schwaegr. can be distinguished by its stiff, straight stems and branches and all leaves strongly squarrose wet or dry. *Rigodium tamarix* C. Müll. (including *R. elegantulum* Card. nom. nud.) is a more slender, straggling plant with more appressed, nearly sheathing stipe leaves that have more strongly differentiated cells toward the margins. Both these species are found in Chile, Patagonia, or Tierra del Fuego. These by no means complete the roster of the genus, and a full-scale revision is much needed.

### *Rigodium hylacomiooides*

*Rigodium hylacomiooides* Card. & Broth., K. Svensk. Vet. Ak. Handl. 63 (10):69, 1923. [Original material: Southern Patagonia; Skyring, Puerto Pinto n. 841, Dawson Isl., Harris Bay n. 843, Tierra del Fuego; Seno Almirantazgo, Hope Bay n. 842. All coll. C. Skottsberg, 1907–1909.]

Yellowish green plants in loosely tangled mats to 4 cm high, without distinct, erect stipes, rhizoids in scattered patches but stems mostly bare. Mature stem leaves mostly squarrose from a concave base, with slender, usually recurved acumination, blade to 1.0 mm wide, 0.5 mm long, rather auriculate, tapering gradually into acumen which is 0.3–0.5 mm long; lower margins rather strongly recurved, serrulate; costa usually short and double, weak, rarely reaching acumen; inner cells of lamina short-

linear, ca. 6  $\mu\text{m}$  wide, 25–30  $\mu\text{m}$  long; cell walls only slightly thickened, not as wide as lumens; upper marginal cells scarcely shorter or broader than median cells; many alar cells subquadrate in cluster at base of small auricle, cells 12–15  $\mu\text{m}$  long. Branch leaves laxly spreading, ovate; primary branch leaves ca. 0.6 mm long, to 0.4 mm wide, slightly acuminate, margin serrulate, basal margin broadly reflexed; costa subpercurrent, ca. 20  $\mu\text{m}$  wide at base; inner cells of lamina 4–6  $\mu\text{m}$  wide, 12–20  $\mu\text{m}$  long; marginal cells more rounded, to 8  $\mu\text{m}$  wide, 12  $\mu\text{m}$  long; alar cells short-rhomboidal to subquadrate, ca. 10  $\mu\text{m}$  in diameter; secondary and ultimate branch leaves smaller, 0.4–0.5 mm long, acute not acuminate, less recurved on margin. Sporophyte not known.

MAS AFUERA: Correspondencia, ca. 1100 m, *Sk. 466* (S); Los Inocentes, below summit, ca. 4000 ft, *H. & E. 235*.

The species is known only from Patagonia, Tierra del Fuego, and Juan Fernandez. In Juan Fernandez it apparently is restricted to high open areas.

### *Rigodium robustum*

*Rigodium robustum* Broth. in Skotts., Nat. Hist. Juan Fernandez 2:443, 1924. [Original material: Salsipuedes, 625 m, Mas a Tierra, coll. C. & I. Skottsberg n. 429 (S!).]

*Rigodium looseri* Thér., Rev. Chil. Hist. Nat. 31:25, 1928. [Original material: Mas a Tierra, without locality, coll. Bertero, 1830; trail to Portezuelo, coll. G. Looser, n. 8 part, 1927.]

Yellowish green plants with creeping, slightly radiculose primary stems, frondosely branched secondary stems borne on distinct stipes. Stipes 1.0–1.5 cm long. Stipe leaves usually squarrose from a concave base with spreading, often flexuous, acumination, 0.6–1.0 mm wide, broadly ovate blade 0.7–1.0 mm long, subcordate, narrowed to an abrupt, slender acumination which is 0.3–0.5 mm long; margin weakly serrulate, lower margin only slightly recurved; costa reaching into acumination; inner cells of lamina mostly linear, 7–8  $\mu\text{m}$  wide, mostly 15–30  $\mu\text{m}$  long, with walls evenly thickened, as thick as some lumens, without papillae, grading into shorter cells toward margin that are 10–17  $\mu\text{m}$  long; alar cells to 12  $\mu\text{m}$  wide, 12–40  $\mu\text{m}$  long, very thick-walled in distinct, small cluster. Leaves of upper stem and primary branches ca. 0.6–0.7 mm

long, 0.4–0.5 mm wide, broadly ovate with short, broad acumination, erect-spreading when moist, tips usually incurved slightly when dry; costae subpercurrent, mostly ca. 30  $\mu\text{m}$  wide at base; median cells 5–7  $\mu\text{m}$  wide, 10–20  $\mu\text{m}$  long, grading into shorter, broader, slightly thicker-walled cells toward margin that are 8–10  $\mu\text{m}$  in diameter and smooth; a few rounded to subquadrate alar cells ca. 10  $\mu\text{m}$  in diameter. Secondary and ultimate branch leaves 0.3–0.4 mm long, to 0.2 mm broad, acute or very slightly acuminate, narrowly ovate, not appressed when dry; costae and cells as in primary branch leaves. Sporophyte not known.

MAS AFUERA: Between Sanchez and Toltén, 515 m, *Sk. 423* (S); Q. Mono, 475 m, *Sk. 463* (S); Q. Casas, *Sk. 465, M98, M277* part (S), *H. & E. 50, 116, 149* part, 631; Sanchez-Toltén forest, ca. 700 m, *Sk. M195, M197* (S); Q. Blindado, *H. & E. 89*; without locality, *H. & E. 798* part.

MAS A TIERRA: Salsipuedes, *Sk. 425* (S), 625 m, *Sk. 429* (type, S); below Portezuelo, ca. 500 m, *Sk. 426* part (S); NE slope of Cerro Pirámide, 350–450 m, *Sk. M30* (S); below Pirámide, *H. & E. 3b, 560a*; Q. Damajuana, 400–450 m, *Sk. M211* (S); forests of Villagra, 400–550 m, *Sk. M235* (S); Q. östl. Plazoleta, 200 m, *K. 320/7* (B).

As presently known the species is endemic to Juan Fernandez. It is very closely related to *R. toxarion*, with which it may become intricately intermixed. *Rigodium robustum* differs by the broader, shorter-tipped, less spreading leaves of the upper stems and primary branches and by the mostly acute rather than acuminate, less appressed leaves of the ultimate branches. Plants are not characteristically large, nor are stems unusually nonradiculose as suggested by Brotherus (1924).

### *Rigodium toxarion*

*Rigodium toxarion* (Schwaegr.) Jaeg., Ber. St. Gall. Naturw. Ges. 1876–1877:244, 1878 (Ad. 2:310).

*Hypnum toxarion* Schwaegr., Sp. Musc. Suppl. 1 (2):283, 1816. [Original material: Hispaniola.]

*Rigodium nano-fasciculatum* C. Müll. ex Thér., Rev. Bryol. n. ser., 2:232, 1930. [Original material: Victoria, Chile, coll. Campo n. 10B part.]

Yellowish to dark green plants, with creeping radiculose primary stems, frondosely branched secondary stems borne on distinct stipes. Stipes 1.0–1.5 cm long. Stipe leaves usually squarrose from a



concave base, with spreading, flexuous acumination, 0.6–1.0 mm wide, very broadly ovate blade ca. 0.5–0.7 mm long, subcordate, narrowed to an abrupt, slender acumination which is 0.4–0.7 mm long; margin weakly to strongly serrulate, lower margin only slightly recurved; costa reaching into acumination, sometimes weak, very rarely short; inner cells of lamina mostly linear, 6–8  $\mu\text{m}$  wide, 20–30  $\mu\text{m}$  long, walls evenly thickened and as thick as some lumens, without papillae, grading into broader, shorter cells toward margin that are 12–17  $\mu\text{m}$  long; alar cells in distinct, small cluster, cells to 12  $\mu\text{m}$  wide and 25  $\mu\text{m}$  long, thick-walled. Leaves of upper stems and primary branches ca. 0.6 mm long, 0.35 mm wide, broadly ovate with spreading, slender-acuminate tips; costae subpercurrent, mostly ca. 30  $\mu\text{m}$  wide at base; inner cells of lamina 6–8  $\mu\text{m}$  wide, 12–30  $\mu\text{m}$  long, shorter toward upper margin, usually smooth, rarely with projecting upper ends; rounded to subquadrate alar cells 8–10  $\mu\text{m}$  in diameter. Secondary and ultimate branch leaves 0.3–0.4 mm long, ca. 0.2 mm wide, narrowly ovate with short to attenuate acumination, usually rather appressed when dry; costae and cells as in primary branch leaves.

MAS AFUERA: Q. Casas, *Sk. M277* part (S). *H. & E. 116* part, *149* part; near Camp Correspondencia, ca. 3500 ft, *H. & E. 70d*; trail to Los Inocentes, ca. 3000 ft, *H. & E. 451A. 558*; Q. Mono, *H. & E. 564*, ca. 400 m, *H. & E. 651, 654*.

MAS A TIERRA: Below Portezuelo, ca. 500 m, *Sk. 426* part (S); trail to Damajuana, 400 m, *K. 307/11* (B); west slope of Cordon Salsipuedes, 1700–2000 ft, *H. & E. 7c, 8b, 295*; trail to Portezuelo de Villagra, *H. & E. 315b*, 1800 ft. *H. & E. 326*; below east face, El Yunque, ca. 1600 ft, *H. & E. 363*.

The species is known from the West Indies and in South America from Venezuela and Colombia south to Chile. Descriptions often refer to the costae as long-excurrent, which is the impression given by the long, slender acuminations of the leaves.

## AMBLYSTEGIACEAE

### Genus *Amblystegium*

Small to medium-sized, freely branching, usually prostrate plants forming loose mats. Leafy stems not or slightly compressed, scarcely altered when

moist. Leaves ovate-lanceolate with evenly tapered or acuminate tips; margins entire or serrulate; costae distinct to midleaf, sometimes longer; cells of lamina mostly short-rhomboidal, smooth; alar cells rather small, subquadrate, in small group. Perichaetia in lateral buds. Setae erect, slender, smooth. Capsule inclined to horizontal, curved, smooth, more curved and strongly constricted under mouth when dry; peristome double, complete, teeth with transverse striations below; operculum conical. Calyptra cucullate, bare.

One species is known from Juan Fernandez.

### *Amblystegium serpens*

*Amblystegium serpens* (Hedw.) B.S.G., Byrol. Eur. 6:53, 1853 (fasc. 55–56, Mon. 9.3).

*Hypnum serpens* Hedw., Sp. Musc. 268, 1801. [Original material: England, coll. *Dillen.*]

Very small, slender, yellowish green plants, with irregularly pinnate, often erect branches. Leaves to 1.0 mm long, 0.4 mm wide, being smaller on branches, appressed or erect-spreading, slightly more spreading when moist, slenderly acute or acuminate; margins serrulate distally; costae ending near midleaf; median cells of lamina 15–20  $\mu\text{m}$  long, 5–7  $\mu\text{m}$  wide, some very slightly papillose at upper ends; alar cells subquadrate, 7  $\mu\text{m}$  wide, 7–10  $\mu\text{m}$  long. Autoicous. Setae ca. 7 mm long. Capsule urn ca. 1.0 mm long; peristome with cilia in groups of 1–3; spores 11–15  $\mu\text{m}$  in diameter, nearly smooth.

MAS A TIERRA: West slope of Cordon Salsipuedes, ca. 1800 ft, *H. & E. 309* part.

The species is distributed over most of the north temperate region and in New Zealand and the Falkland Islands to the south. It has not been previously reported from Juan Fernandez. The Juan Fernandez material has many parts (such as leaf cells, setae, and capsules) about half the size given for *A. serpens*. The species usually has leaf cells 30–110  $\mu\text{m}$  long, setae 1.0–1.5 cm long, and capsule urns 1.5–2.0 mm long. Some distinction may eventually be necessary.

### Genus *Sciaromium*

Coarse, dark green to brownish aquatic plants with sparsely branched, undifferentiated stems, without paraphyllia; cells of stem surface narrow,

elongated. Leaves ovate to ovate-lanceolate, erect-spreading and little altered when dry; margins and costae distinctly multistratose without differentiated internal structure, these all fusing distally and filling apex; cells of lamina mostly unistratose, often lacking through abrasion in older leaves, smooth or very slightly projecting at upper ends, rather thin-walled; basal cells not differentiated. Dioicous. Perichaetia in lateral buds. Sporophytes unknown.

One species is known from Juan Fernandez.

### *Sciaromium pachyloma*

*Sciaromium pachyloma* (Mont.) Par., Ind. Bryol. 1155, 1898.  
*Gymnostomum pachyloma* Mont., Ann. Sc. Nat. Bot. ser. 2, 9:51, 1838. [Original material: Near Valparaiso, Chile, coll. d'Orbigny.]

Dark green plants in large mats with stems to 20 cm long. Leaves ca. 0.7 mm wide, 2.0 mm long, ovate-lanceolate with narrowly acute tips; margins entire with a few slightly projecting cell tips at apex; costae and borders each 80–100  $\mu\text{m}$  wide, costa in section ca. 10 cells thick, borders ca. 6–8 cells thick, cells 5–8  $\mu\text{m}$  in diameter, outer surface of borders at base with a single layer of a few more lax cells; cells of lamina 6–7  $\mu\text{m}$  wide, mostly 12–25  $\mu\text{m}$  long, rhomboidal to short-rectangular, a few scattered cells to 50  $\mu\text{m}$  long, a few basal cells to 10  $\mu\text{m}$  wide.

MAS AFUERA: Q. Vaca, *H. & E.* 206.

MAS A TIERRA: Pangal Falls, *Sk. 239* (S), *H. & E.* 189.

The species is known only from Chile and Argentina.

### Genus *Acrocladium*

Yellowish green, often semiaquatic plants with erect to procumbent, sparsely to pinnately branching stems forming large mats or tufts; stems with central strand, with long, narrow surface cells, without paraphyllia. Leaves laxly to densely imbricate, often giving julaceous appearance, scarcely altered when dry, young leaves often in distinct, tight bud. Leaves broadly ovate to orbicular, concave, apex rounded or slightly apiculate; margins entire or nearly so, plane or incurved; costae short and double or reaching beyond midleaf; median cells of lamina linear, thin-walled; alar cells usually sharply differentiated, inflated; basal cells thick-

walled, porose. Perichaetia in lateral bud. Setae elongate, smooth. Capsule inclined to horizontal, curved, smooth, somewhat constricted below mouth when dry; peristome double, complete; operculum conical. Calyptra cucullate, bare.

Sainsbury (1955a) has reviewed some of the history leading to the inclusion of *Calliergon* in this genus. Karczmarz (1966) has reviewed the two subantarctic species. One species occurs in Juan Fernandez.

### *Acrocladium auriculatum*

*Acrocladium auriculatum* (Mont.) Mitt., J. Linn. Soc. Bot. 12:532, 1869.

*Hypnum auriculatum* Mont., Ann. Sc. Nat. Bot. ser. 2, 19:240, 1843. [Original material: Straits of Magellan, Tierra del Fuego, coll. M. Jouquinot (PC).]

Yellowish green plants growing on organic substrate, with stems rather erect to 10 cm long, central strand very small. Leaves 2 mm long, 1.5–2.0 mm wide, broadly oblong-cordate with auricles up to 1/2 basal width, concave; margins incurved above, plane and subserrate on auricles, erect and scarcely crenulate at tip; costa slender, up to 1/4 leaf length; most cells of lamina 4–5  $\mu\text{m}$  wide, mostly 40–60  $\mu\text{m}$  long, linear, slightly sinuous; grading into 2–3 rows of short cells along rounded apex that are ca. 10  $\mu\text{m}$  long; inner basal cells to 10  $\mu\text{m}$  wide, with thicker porose walls; large area of inflated alar cells rather sharply demarcated, cells to 30  $\mu\text{m}$  wide and 40  $\mu\text{m}$  long, thin-walled; 2 rows of small, narrow, incrassate cells at alar margin. Autoicous. Setae 2–4 cm long, slender. Capsule urn ca. 2.5 mm long, quite curved when dry; spores 12–17  $\mu\text{m}$  in diameter, nearly smooth.

MAS AFUERA: Trail to Los Innocentes, ca. 3000 ft, *H. & E.* 725.

The species is restricted to southern South America and adjacent islands. It has not been previously reported from Juan Fernandez. The capsule is not as erect as shown in most illustrations.

## PLAGIOTHECIACEAE

### Genus *Catagonium*

Slender, lustrous yellowish green plants in tangled patches; leafy stems very flattened, pseudodistichous, sparsely branched. Leaves spreading at



about 45° angle, not altered when dry, oblong, with or without apiculus; costae very short or lacking; cells of lamina narrowly linear, smooth; basal cells shorter, alar cells not distinct. Dioicous. Perichaetia in lateral buds. Setae long, smooth. Capsule inclined, rather cylindrical, smooth; annulus broad; peristome double, complete; operculum conic-rostrate. Calyptra cucullate, bare.

The family placement of the segregate genus, *Eucatagonium* Broth., has been discussed by Andrews (1949). As indicated by Wijk (1957) the leaves of these species are not really distichous. One species of this group occurs in Juan Fernandez.

### *Catagonium politum*

*Catagonium politum* (Hook. f. & Wils.) Broth., Nat. Pl. 1 (3): 1088, 1908.

*Hypnum politum* Hook. f. & Wils., London J. Bot. 3:553, 1844. [Original material: Hermite Isl., Cape Horn, coll. J. D. Hooker, 1839-1843 (lectotype, present designation; K).]

Slender, flexuous stems mostly 2 cm long. Leaves usually spreading at about 45° angle, on mature branches compressed into 2 apparent rows; leaves of mature stems usually contiguous to slightly imbricate or equitant, smaller and more irregular on flagellate branches, ca. 1.2 mm long, 0.45 mm wide, cymbiform, oblong-lanceolate when opened out; apex rather blunt, apiculate with short, slightly reflexed, slender tip; margins entire. Cells very narrowly linear, 3-4 µm wide, up to 150 µm long; basal cells mostly 25-40 µm long, to 7 µm wide. Setae 1.25-2.0 cm long. Capsules 2.0-2.5 mm long, distinctly apophysate; peristome with cilia in groups of 2; spores 12-16 µm in diameter, appearing smooth.

MAS AFUERA: Near summit of Los Innocentes, ca. 5000 ft, *H. & E.* 233c.

The species is known from Colombia southward to Tierra del Fuego in South America, Australia, Tasmania, New Zealand, and Kerguelen. It has not previously been reported from Juan Fernandez.

## HOOKERIACEAE

The relationships of the family have received considerable attention recently. In preliminary studies of some Colombian mosses (Robinson,

1967) and in a revised list of families (Robinson, 1971), the family has been placed in the relationship of the Plagiotheciaceae and Sematophyllaceae. This was done in the belief that there is a hypnoid complex with leaf costae basically short or double and with alar cells often undifferentiated. Similarity between peristomes of some Hookeriaceae and Sematophyllaceae was also a factor. It would seem that the strong double costa is derived from a reduced form and that the undifferentiated alar cells represent a derived condition. I feel it is because of the highly developed and sometimes single costae of the leaves that the true relationship of the Hookeriaceae has been overlooked for so long. Crosby (1969), in his revision of *Pilotrichum*, has questioned the naturalness of the Hookeriaceae, and he has reduced the Pilotrichaceae to synonymy. In more recent work, Crosby (1974) has recognized the segregate family, Daltoniaceae, partly on the basis of the papillose peristome teeth. Of the 13 genera segregated, only *Daltonia* occurs in Juan Fernandez. Most members of the Hookeriaceae from southern South America have been treated by Matteri (1972, and in press in *Nova Hedwigia*). Most recently the Chilean genus *Bryodusenia* has been transferred to the Hookeriaceae from the Meteoriaceae (Robinson, 1974).

### Genus *Daltonia*

Yellowish green, usually epiphytic plants with stems erect in small tufts. Leafy stems not compressed. Stem without central strand, with large, reddish brown surface cells. Leaves crowded, slightly more flexuous when dry, lanceolate, bordered with slender, elongate cells; costa single, reaching to distal 1/5 of leaf; cells of upper lamina small, narrowly to broadly oval, smooth, walls very slightly incrassate; lower cells lax and elongate; alar cells not distinct. Autoicous or synoicous. Perichaetia in lateral buds, but base hidden in tufts and often appearing apical. Setae elongate, smooth or rough. Capsules erect or inclined, oval, smooth; peristome double, teeth and segments papillose, cilia lacking; operculum rostrate. Calyptra mitrate, covering only top of urn, with a dense fringe on basal margin.

The American species of the genus have been revised by Bartram (1931). Only one species is known from Juan Fernandez.

*Daltonia gracilis*

*Daltonia gracilis* Mitt., J. Linn. Soc., Bot. 12:402, 1869. [Original material: Canelos, Andes Quitenses, 3000 ft, Ecuador, coll. *Spruce n. 560.*]

*Daltonia lorifolia* C. Müll., Flora 58:550, 1875. [Original material: Candelaria, Costa Rica, coll. *Oersted.*]

*Daltonia wallisii* C. Müll., Flora 58:550, 1875. [Original material: San Isabel, above 8000 ft, Antioquia, Colombia, coll. *G. Wallis*, 1874.]

*Daltonia ocanniana* C. Müll., Flora 58:551, 1875. [Original material: Ocanna, Colombia, coll. *G. Wallis*, 1874.]

*Daltonia hampeana* Geh., Rev. Bryol. 6:67, 1879; Geh., in Hampe, Vid. Medd. Naturh. For. Kjoebenh. ser. 4, 1:122, 1879. [Original material: near Apiahy, Prov. São Paulo, Brasil, coll. *Puiggari*, June 1877.]

*Daltonia minutifolia* C. Müll., Nuov. Giorn. Bot. Ital. n. ser., 4:148, 1897. [Original material: Near Choquecamata, Prov. Cochabamba, 10,000–12,000 ft, Bolivia, coll. *Germain*, 1889.]

*Daltonia curvicauspis* C. Müll., Hedwigia 39:268, 1900. [Original material: Serra Ouro Preto, Minas Geraes, Brasil, coll. *E. Ule n. 1438*, Feb. 1892.]

*Daltonia krauseana* C. Müll. ex Dus., Bot. Not. 1905:307, 1905. [Original material: Valdivia, Chile, coll. *Krause.*]

Small, epiphytic tufts to 9 mm high. Leaves to 2.5 mm long, 0.4 mm wide, apex very slenderly acuminate; margins narrowly recurved, entire, with 2–4 rows of marginal cells; costa ca. 35  $\mu\text{m}$  wide at base; median cells of lamina mostly ca. 8  $\mu\text{m}$  wide, upper cells 20–25  $\mu\text{m}$  long; lower median cells 25–50  $\mu\text{m}$  long; basal cells mostly linear-oblong, to 50  $\mu\text{m}$  long, a few to 20  $\mu\text{m}$  wide or more. Setae ca.

6 mm long, roughened above. Capsule urn to 1.2 mm long.

MAS AFUERA: Near Camp Correspondencia, ca. 3800 ft, *H. & E. 138*; Q. Mono, 400–430 m, *H. & E. 166* part.

The species is known from Mexico and Central America and throughout South America. It has not previously been reported from Juan Fernandez.

Genus *Distichophyllum*

Small to medium-sized, yellowish green plants with freely branching, usually prostrate stems. Leafy stems compressed, usually complanate; stem surface of large reddish brown cells, central strand present but sometimes weak. Leaves crowded, slightly contorted when dry, rather obovate, usually bordered with slender, elongate cells; costa single, reaching midleaf or beyond; cells of upper lamina small, oval-hexagonal to rounded, smooth, walls thin but firm; basal cells lax and more elongate; alar cells not distinct. Perichaetia in lateral buds. Setae slender. Capsules inclined to horizontal, oval, smooth; peristome double, teeth with longitudinal median groove, with transverse striations below, cilia rudimentary or lacking; operculum rostrate. Calyptra mitrate, covering only upper part of urn, dense fringe on basal margin, surface sometimes rough.

Two species are known from Juan Fernandez.

Key to Species of *Distichophyllum*

- Leaves bordered throughout by long, narrow cells ..... *D. assimile*  
 Leaves not bordered in apical half ..... *D. subelimbatum*

*Distichophyllum assimile*

*Distichophyllum assimile* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:434, 1924. [Original material: SW side of Portozuelo, ca. 550 m, Mas a Tierra, coll. *C. & I. Skottsberg n. 307* (S!).]

*Distichophyllum fernandezianum* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:435, 1924. [Original material: Near Camp Correspondencia, 1100 m, Mas Afuera, coll. *C. & I. Skottsberg n. 303* (S!).]

Small, pale green plants becoming brownish and radiculose below, with stems erect to procumbent in tufts 1.0–2.5 cm high. Leafy stems to 3.0 mm broad, when procumbent rather compressed or

complanate. Leaves 1.1–1.7 mm long, 0.6–1.0 mm wide, broadly elliptical to obovate, sharply apiculate; margins with border of narrow, elongate cells throughout, in ca. 3 rows, often narrowly recurved below, remotely, sharply serrulate in distal 1/2; costa rather slender, reaching to distal 1/5 of leaf, 40–50  $\mu\text{m}$  wide at base; cells of lamina mostly 12–17  $\mu\text{m}$  wide; upper cells mostly short-rhomboidal, 15–25  $\mu\text{m}$  long; basal cells lax, to 25  $\mu\text{m}$  wide and 75  $\mu\text{m}$  long. Dioicous (?). Sporophyte unknown.

MAS AFUERA: Near Camp Correspondencia, 1100 m, *Sk. 303* (type of *D. fernandezianum*, S); Q. Doña Maria (also called Floripa), *Sk. M172* (S);



Los Innocentes, near summit, 4500–5000 ft, *H. & E.* 95; trail to Los Innocentes, ca. 3000 ft, *H. & E.* 585.

MAS A TIERRA: SW side of Portozuelo, ca. 550 m, *Sk.* 307 (type, S); summit region of El Yunque, ca. 900 m, *K. M339* (S).

The species has also been reported from Australia. The primary distinction of *D. fernandezianum* was lamina cells 7–10  $\mu\text{m}$  in diameter, but the type material was in very poor condition and measurements were misleading.

### *Distichophyllum subelimbatum*

*Distichophyllum subelimbatum* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:434, 1924. [Original material: On ridge between valles Piedra Agujereada and Laura, 650 m, Mas a Tierra, coll. C. & I. Skottsberg n. 306 (lectotype, present designation; S).]

Small, pale green prostrate plants on rotten wood or moist sandstone. Leafy stems very complanate, 2–3 mm broad, sparingly radiculose. Leaves to 1.5 mm long, 1.0 mm wide, broadly obovate, some mature leaves with very narrowly cuneate bases, apex rounded or apiculate; margins plane, bordered by 1–2 rows of narrow, elongate cells in lower half, distal margin minutely and very closely serrulate; costa very slender, ending near distal 1/3 of leaf, ca. 25  $\mu\text{m}$  wide at base; cells of lamina mostly 12–15  $\mu\text{m}$  wide; upper cells oval-hexagonal, 15–20  $\mu\text{m}$  long, with slightly thickened ends; basal cells lax, 17–23  $\mu\text{m}$  wide, 30–50  $\mu\text{m}$  long. Dioicous. Setae ca. 8 mm long, smooth. Calyptra scabrous apically.

MAS AFUERA: Near Camp Correspondencia, ca. 3800 ft, *H. & E.* 79.

MAS A TIERRA: Wall of cave, Valle Colonial, Cumberland Bay, *Sk. s.n.*; W slope, Piramide Ridge south of Portezuelo de Villagra, *H. & E.* 37.

The species is endemic to Juan Fernandez. The mostly unbordered leaves are very distinctive in the genus.

### Genus *Calyptrochaeta*

Small to medium-sized, yellowish green plants with suberect or spreading stems in dense tufts. Leafy stems complanate; stem surface of large, thin-walled, hyaline cells, with central strand. Leaves usually crowded, only slightly contorted when dry, broadly elliptical to obovate, bordered with narrow, elongate cells, serrate; costa short, double, sometimes reaching midleaf or lacking; cells of lamina rather large, smooth, mostly hexagonal or short-rhomboidal, more lax and elongate toward base; alar cells not distinct. Perichaetia in lateral buds. Setae slender, with bulging cells or hairlike projections covering surface. Capsule inclined to horizontal, oval, smooth; peristome double, teeth usually with median, longitudinal furrow, lamellae projecting, cilia rudimentary; operculum short-rostrate. Calyptra mitrate, covering only top of urn, dense fringe on basal margin, surface sometimes rough.

The name *Calyptrochaeta* takes priority over the familiar name *Eriopus* as indicated by Margadant (1959) and Crosby (1974). Conservation of the name *Eriopus* is desirable but no attempts have been made and there is no assurance regarding the results of such attempts. New combinations are provided here for the two species known from Juan Fernandez.

### Key to Species of *Calyptrochaeta*

- Leaves bordered by a single row of elongate cells; dioicous ..... *C. grandiretis*  
 Leaves bordered by 2–3 rows of elongate cells; autoicous ..... *C. leptoloma*

### *Calyptrochaeta grandiretis*

*Calyptrochaeta grandiretis* (Broth.) H. Robinson, new comb. *Eriopus grandiretis* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:436, 1924. [Original material: Quebrada de las Casas, Mas Afuera, coll. C. & I. Skottsberg n. 265.]

Whitish green plants, with sparingly branched stems 2–6 cm long, prostrate to ascending in rather

loose mats, leafy stems to 9 mm broad. Dorsal and ventral leaves very broadly ovate, to 2.5 mm wide and 3.5 mm long, slightly asymmetric; lateral leaves broadly oblong-elliptical, to 3.0 mm wide and 4.5 mm long, bases of laminae very unequal with costa inserted to one side, leaves rounded at base, minutely apiculate at apex; costa often reaching to midleaf; margins plane, sharply serrate in upper half

with teeth split by a longitudinal septa, a single row of marginal cells 10–20  $\mu\text{m}$  wide; submarginal cells sometimes elongate; inner cells 80–150  $\mu\text{m}$  long, 50–60  $\mu\text{m}$  wide, rhomboidal, thin-walled; cells nearer margins shorter, rhomboidal to hexagonal, 40  $\mu\text{m}$  wide, 40–60  $\mu\text{m}$  long. Dioicous. Sporophyte unknown.

MAS AFUERA: Q. Casas, *H. & E.* 240.

MAS A TIERRA: Pangal Falls, *H. & E.* 5, 191; E slope below Portezuelo de Villagra, 1400–1800 ft, *H. & E.* 181.

As presently known the species is endemic to Juan Fernandez.

### *Calyptrochaeta leptoloma*

*Calyptrochaeta leptoloma* (Broth.) H. Robinson, new comb. *Eriopus leptoloma* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:436, 1924. [Original material: V. Colonial, Q. Gutierrez, ca. 300 m, Mas a Tierra, coll. C. & I. Skottsberg n. 302 (packet marked type; S!)]

Plants pale green, with sparingly branched, erect or ascending stems ca. 1 cm long, leafy stems to 5 mm broad. Leaves 2.0–2.5 mm long, oval to slightly obovate, with narrow bases and slightly but sharply acuminate apex; lateral leaves slightly asymmetrical; costa very short, indistinct; margins plane, distinctly serrulate in upper half, border of 2–3 rows of narrow cells ca. 10  $\mu\text{m}$  wide; upper median cells oval-hexagonal, mostly 30–35  $\mu\text{m}$  wide, mostly 60  $\mu\text{m}$  long; cells toward upper margins and tip 40–50  $\mu\text{m}$  long; cells near base to 100  $\mu\text{m}$  long. Autoicous. Setae ca. 4 mm long, yellow, rough with low mamillae. Capsules and calyptrae not known.

MAS A TIERRA: V. Colonial, Q. Gutierrez, ca. 300 m, *Sk.* 302 (type, S).

The species is apparently endemic. There have been no reports since the original description by Brotherus (1924).

### Genus *Achrophyllum*

Small to large, whitish to yellowish green, very fleshy plants with stems erect or ascending in loose tufts. Leafy stems complanate, dorsal and ventral leaves smaller; stem surface of slightly enlarged, elongate, thin-walled, hyaline cells, central strand present. Leaves laxly imbricated, slightly to greatly contorted when dry, oblong-spathulate to nearly orbicular; not bordered by elongate cells, crenate to grossly dentate; costa usually reaching to near midleaf, often forking near tip; cells of lamina large, smooth, mostly hexagonal, those toward base more elongate; alar cells not distinct. Dioicous. Perichaetia in lateral buds. Setae elongate, slender, smooth. Capsules inclined to pendant, oval, smooth except sometimes at base; peristome double, teeth usually with median, longitudinal furrow and projecting lamellae, cilia rudimentary or lacking; operculum conic-rostrate. Calyptrae mitrate, covering only operculum; lobed but not fringed at base, smooth.

The genus includes those species that have been called *Pterygophyllum* in recent treatments. The name *Pterygophyllum*, as indicated in Index Muscorum, is invalid, having originally included the type-species of the genus *Hookeria*. The genus *Achrophyllum* is concentrated in the regions of southern South America and Australia, with one species as far north as the Philippine Islands.

The three species known from Juan Fernandez can be distinguished by the following key.

### Key to Species of *Achrophyllum*

1. Leaf margin with short, obtuse teeth, leaf apex rounded ..... *A. dentatum*
1. Leaf margin with large, sharp teeth, leaf apex usually acute ..... 2
  2. Costa 1/4 or less of leaf length; median cells of lamina mostly 50–100  $\mu\text{m}$  in diameter ..... *A. tenuinerve*
  2. Costa 1/4–1/2 of leaf length; most cells in distal half of leaf 50  $\mu\text{m}$  or less in diameter ..... *A. anomalum*

### *Achrophyllum anomalum*

*Achrophyllum anomalum* (Schwaegr.) H. Robinson, *Phytologia* 29 (2):118, 1974.

*Racopilum anomalum* Schwaegr., *Sp. Musc. Suppl.* 3 (2):278,

1830. [Original material: Given as western North America, almost certainly in error, coll. *Menzies*.]

*Hookeria obscura* Mont., *Ann. Sc. Nat. Bot. ser.* 3, 4:93, 1845.

Not *H. obscura* Wils.

*Pterygophyllum obscurum* [Mont.] Mitt., *J. Linn. Soc., Bot.*



12:398, 1869. Not *P. obscurum* Mitt. 1860.

*Pterygophyllum crassirete* Matteri, Rev. Mus. Argent. Cienc. Nat. Bern. Rivadav. 4 (2):250, 1972, *nom. nov.* (*Hookeria obscura* Mont.).

Yellowish green plants becoming dark green or brownish below, with stems to 15 cm high. Leaves slightly contorted when dry, to 4 mm long, 1.8 mm wide, mostly spathulate with narrow bases, some dorsal and ventral leaves shorter and oval, apices narrowly rounded to acute; margins plane, with a number of large, sharp teeth, teeth 30–60  $\mu\text{m}$  long; costa stout at base, ca. 70  $\mu\text{m}$  wide, usually reaching 1/4–1/2 leaf length, often unequally forked, especially when short; cells of lamina hexagonal to rounded, becoming more elongate toward base, collenchymatous, median cells mostly 50–60  $\mu\text{m}$  in diameter, upper and marginal cells mostly 30–40  $\mu\text{m}$  in diameter, lower cells near costa to 80  $\mu\text{m}$  long. Sporophyte unknown.

MAS A TIERRA: Pangal Falls, 205–220 m, *Sk. 290, M47, Sp. M363* (all S).

Discounting the original citation, the species is known only from southern South America and Juan Fernandez.

### *Achrophyllum dentatum*

*Achrophyllum dentatum* (Hook. f. & Wils.) Vitt & Crosby, Bryologist 75:175, 1972.

*Hookeria dentata* Hook. f. & Wils., London J. Bot. 3:550, 1844. [Original material: Lord Auckland's Group and Campbell's Isl., coll. *J. D. Hooker*, 1839–1843.]

*Hookeria denticulata* Hook. f. & Wils., Fl. Antarct. 1:143, 1845, *nom. illeg. incl. sp. prior.* (*H. dentata* Hook f. & Wils.).

*Hookeria nigrella* Hook. f. & Wils., Fl. Nov. Zel. 2:124, 1854. [Original material: Throughout islands, New Zealand, coll. *Colenso*.]

*Hookeria robusta* Hook. f. & Wils., Fl. Nov. Zel. 2:124, 1854. [Original material: Northern Island, New Zealand, coll. *Colenso*.]

*Hookeria hepaticaefolia* Hampe & C. Müll., Linnæa 26:503, 1855. [Original material: Bunik Creek, Dandenong Range, Australia, coll. *F. Müller*.]

*Pterygophyllum nigrellum* (Hook. f. & Wils.) Mitt., Kew J. Bot. 8:264, 1856.

*Pterygophyllum obscurum* Mitt., J. Linn. Soc., Bot. 4:96, 1860. [Original material: Cheshunt, Tasmania, coll. *Archer*.]

*Pterygophyllum denticulatum* (Hook. f. & Wils.) Mitt., J. Linn. Soc., Bot. 12:397, 1869, *nom. illeg. incl. sp. prior.*

*Pterygophyllum robustum* (Hook. f. & Wils.) Jaeg., Ber. St. Gall., Naturw. Ges. 1875–1876:343, 1877 (Ad. 2:247).

*Pterygophyllum hookeri* Jaeg., Ber. St. Gall., Naturw. Ges.

1875–1876:343, 1877 (Ad. 2:247), *nom. illeg. incl. sp. prior.* [Original material: Cheshunt, Tasmania, coll. *Archer*.]

*Pterygophyllum hepaticaefolium* (Hampe & C. Müll.) Jaeg., Ber. St. Gall., Naturw. Ges. 1875–1876:343, 1877.

*Hookeria ramulosa* Col., Trans. New Zealand Inst. 18:232, 1886. [Original material: Near Norsewood, Waipawa Co., New Zealand, coll. *W. Colenso*, 1885.]

*Hookeria subsimilis* Col., Trans. New Zealand Inst. 18:232, 1886. [Original material: Near Norsewood, Waipawa Co., New Zealand, coll. *W. Colenso*, 1885.]

*Hookeria macroneura* Col., Trans. New Zealand Inst. 18:283, 1886. [Original material: Near Norsewood, Waipawa Co., New Zealand, coll. *W. Colenso*, 1885.]

*Hookeria telmaphila* Col., Trans. New Zealand Inst. 19:279, 1887. [Original material: Near Norsewood, Waipawa Co., New Zealand, coll. *W. Colenso*, 1886.]

*Pterygophyllum magellanicum* Besch., Miss. Sc. Cape Horn 5 (Bot.):297, 1889. [Original material: Port Galant, Magallanes, Chile, coll. *Savatie* 1939 (BM lectotype, Matteri, 1972).]

*Pterygophyllum macroneuron* (Col.) Par., Ind. Bryol. 1053, 1898.

*Hepaticina cyclophylla* C. Müll., Hedwigia 41:124, 1902 *nom. illeg.* [Original material: Near Wellington, New Zealand, coll. *T. Kirk*.]

*Hepaticina parvula* C. Müll., Hedwigia 41:125, 1902, *nom. illeg.* [Original material: North Island, New Zealand, coll. *F. Reader*, 1883.]

*Hepaticina pseudo-obscura* C. Müll., Hedwigia 41:125, 1902, *nom. illeg.* [Original material: Near Greymouth, South Island, New Zealand, coll. *R. Helms*, 1885.]

*Hepaticina nanocaulis* C. Müll., Hedwigia 41:126, 1902, *nom. illeg.* [Original material: Near Greymouth, South Island, New Zealand, coll. *R. Helms*, 1885.]

*Hepaticina zuerniana* C. Müll., Hedwigia 41:126, 1902, *nom. illeg.* [Original material: Near Coromandel, Prov. Auckland, North Island, New Zealand, coll. *G. Züur*, Mar. 1882.]

*Pterygophyllum cyclophyllum* Broth., Nat. Pfl. 1 (3):932, 1907. Based on *Hepaticina cyclophylla* C. Müll. *nom. illeg.*

*Pterygophyllum nanocaulis* Broth., Nat. Pfl. 1 (3):932, 1907. Based on *Hepaticina nanocaulis* C. Müll. *nom. illeg.*

*Pterygophyllum pseudo-obscurum* Broth., Nat. Pfl. 1 (3):932, 1907. Based on *Hepaticina pseudo-obscura* C. Müll. *nom. illeg.*

*Pterygophyllum ramulosum* (Col.) Broth. ex Par., Coll. 27, 1909.

*Pterygophyllum subsimile* (Col.) Broth. ex Par., Coll. 27, 1909.

*Pterygophyllum telmaphilum* (Col.) Broth. ex Par., Coll. 27, 1909.

*Pterygophyllum dentatum* (Hook. f. & Wils.) Dix., J. Linn. Soc., Bot. 40:455, 1912.

Dark green, brownish, or blackish plants to 5 cm high. Leaves much crisped when dry, 2–4 mm long, 1–1.5 mm wide, dorsal and ventral leaves broadly ovate to nearly orbicular, lateral leaves often spathulate and sometimes with narrow bases,

apices broadly rounded; margins plane with small, usually obtusely pointed teeth, teeth 10–30  $\mu\text{m}$  long; costa stout at base, to 100  $\mu\text{m}$  wide, usually  $1/3$ – $1/2$  leaf length, usually unequally forked near tip; cells of lamina hexagonal, becoming more elongate toward base, thin-walled but slightly collenchymatous, median cells mostly 40–60  $\mu\text{m}$  long and 40  $\mu\text{m}$  wide, cells near margin 25–30  $\mu\text{m}$  wide and 25–40  $\mu\text{m}$  long, some lower cells near costa to 75  $\mu\text{m}$  long. Setae 1.25–2.0 cm long. Capsules 1.0–2.0 long.

MAS AFUERA: *Q. Loberia*, *Sk.* 291 (S); *Q. Vacas*, *H. & E.* 41.

The species is known from Australia, Tasmania, New Zealand, and southern South America.

### *Achrophyllum tenuinerve*

*Achrophyllum tenuinerve* (Broth.) H. Robinson, *Phytologia* 29(2):118, 1974.

*Pterygophyllum tenuinerve* Broth. in Skottsberg, *Nat. Hist. Juan Fernandez* 2:435, 1924. [Original material: Salsipuedes, 660 m, Mas a Tierra, coll. C. & I. Skottsberg n. 330 (marked type on packet, S!)]

Pale green plants becoming dark below, with stems 1–3 cm high. Leaves not evidently contorted when dry, to 4 mm long and 1.8 mm broad, elliptical to slightly spatulate with narrowed and rounded bases, acute at tip; margins plane with many large, sharp teeth in distal half, teeth 30–80  $\mu\text{m}$  long; costa stout at base, 50–70  $\mu\text{m}$  wide, reaching  $1/5$ – $1/3$  leaf length, often forked; cells of lamina hexagonal to rounded, becoming more elongate toward costa and base, thin-walled and slightly collenchymatous, median cells mostly 60–80  $\mu\text{m}$  long, upper and marginal cells mostly 40–50  $\mu\text{m}$  in diameter, lower cells near costa to 110  $\mu\text{m}$  long. Setae ca. 12 mm long, blackish. Capsule urn minute, shortly oblong.

MAS A TIERRA: Ridge between valles Piedra Agujereada and Laura, 650 m, *Sk.* 287 (S); Salsipuedes, 660 m, *Sk.* 330 (type, S); W slope Piramide Ridge south of Portezuelo de Villagra, *H. & E.* 37 part.

The species seems to be endemic to Mas a Tierra. All collections are from organic substrates.

### Genus *Schimperobryum*

Very large, prostrate, broadly complanate plants in large mats. Stems with surface of narrow-

rectangular cells, no central strand. Leaves broadly elliptical or oval, acute; lateral leaves larger, more asymmetrical; margins not bordered, serrate distally; costae lacking or very short and double; cells of lamina laxly rhomboidal; alar cells not distinct. Dioicous. Perichaetia in lateral buds. Setae short, smooth. Capsules erect, oval, smooth; peristome double, teeth with zigzag median line, transversely striate below, cilia lacking; operculum rostrate. Calyptra mitrate, covering only the operculum, with nearly entire lower margin, unfringed, smooth.

The genus is monotypic. The name *Schimperobryum* Marg. replaces *Lamprophyllum* Schimp., which is a later homonym.

### *Schimperobryum splendidissimum*

*Schimperobryum splendidissimum* (Mont.) Marg., *Act. Bot. Neerl.* 8:275, 1959.

*Hookeria splendidissima* Mont., *Ann. Sc. Nat. Bot. ser. 2*, 4:97, 1835. [Original material: Mas a Tierra, coll. Bertero, 1830.]

*Lamprophyllum splendidissimum* (Mont.) Broth., *Nat. Pfl.* 1(3):964, 1907.

Pale greenish plants with stems to 25 cm long, leafy stems strongly complanate to 12 mm broad. Leaves broadly rounded-elliptical 2.0–2.5 mm broad; dorsal and ventral leaves 3.5–4.0 mm long, lateral leaves to 5.0 mm long, symmetrical except in basal part, rather broadly cuneate at base and very slightly decurrent, apex short-acute with very slight apiculus; margins plane, sharply serrulate in distal  $1/3$ – $1/2$ , larger teeth divided by longitudinal wall; median cells rather regularly narrowly rhomboidal, 12–15  $\mu\text{m}$  wide, ca. 100  $\mu\text{m}$  long; cells near margin gradually smaller, to 6  $\mu\text{m}$  wide and 50  $\mu\text{m}$  long; walls of basal cells slightly thickened and porose. Perichaetial leaves short, with tips reaching to base of capsule. Setae, urn, and operculum all ca. 1.5 mm long. Spores 12–15  $\mu\text{m}$  in diameter, finely papillose.

MAS AFUERA: *Q. Mata Maqui*, trail to Camp Correspondencia, 1500 ft, *M.* 9402; *Q. Casas*, *H. & E.* 134, 136, 276, 722; *Q. Mono*, *H. & E.* 378A.

MAS A TIERRA: Salsipuedes, 660 m, *Sk.* 292; trail to Portezuelo de Villagra, 1400–1800 ft, *H. & E.* 87; Pangal Falls, *H. & E.* 171.

The species is known only from Patagonia, Chile, and Juan Fernandez. This is one of the most distinctive species on the islands.



## PTYCHOMNIACEAE

A number of genera of the family show peristome teeth with longitudinal furrows, a character that I consider hookerioid. This, combined with the lack of costae and the often poorly developed alar cells, leads me to place the family near the Hookeriaceae and Leucomiaceae. The previous placement near the Lepyrodontaceae was probably partly because the two families share a southern hemisphere distribution. Also, the tendency for ribbed capsules might have induced Brotherus to place the Ptychomniaceae early in his series.

### Genus *Ptychomnion*

Rather robust to very robust, pale yellowish green plants with prostrate to erect stems forming loose mats. Stems reddish when mature, sometimes radiculose at base. Leaves broad, often somewhat plicate, spreading or squarrose-recurred from erect bases, scarcely altered when dry, short-acute to long-acuminate; margins subentire to coarsely serrate; costae short or lacking; leaf cells elongate, walls more or less thickened and porose; alar cells not distinct. Dioicous. Perichaetia in lateral buds. Setae slender. Capsules cylindrical, curved, ribbed; annulus broad; peristome double, teeth with median furrow; operculum long-rostrate. Calyptra cucullate, bare.

The present treatment contains a number of basic changes from the version in my recent paper in *Phytologia* (Robinson, 1970). Since that earlier work I have seen type material of *P. falcatum* Broth., *P. horridum* Card. & Broth., and *P. latifolium* Ångstr. along with fragments that may be typical of *P. subaciculare* Besch. On the basis of these and a review of original descriptions, the following conclusions are possible.

Bescherelle (1885) cited four different collections for his *Ptychomnion subaciculare*: two by Bertero from Juan Fernandez, one by Gay from Chile, and

one by Savatier from Isla Wellington, which is in Prov. Magallanes of Chile. I have not seen the Juan Fernandez material, but if other collections are any indication the species in that material could hardly have been anything but *P. falcatum*, a species that does not agree with Bescherelle's description "foliis tamen a medio recurvatis." From Stockholm I have a specimen collected by Gay from Chile that is *P. cygnisetum*, a species with leaves somewhat recurved and which might agree best with Bescherelle's statement "margine tantum medio parce revoluto." Still, there are two small fragments, one from Stockholm without collection data and one from Paris labelled "Terres Magellaniques." Both of these fragments have the leaves rather sharply spreading from erect sheathing bases, and they represent the species that has more recently been named *P. horridum*. I suspect the fragments are from Savatier n. 1858 from Port Eden, Isla Wellington. In any case, I consider *P. subaciculare* to be the same as what has been called *P. horridum*, a species with erect and sheathing but not much imbricated leaf bases. As such, *P. horridum* is not much different from *P. cygnisetum*, which has less sheathing and much more imbricated leaf bases.

The plant that Brotherus and others, including myself, have called *P. subaciculare* is, in fact, not specifically distinct from *P. falcatum* of Brotherus. The species is covered in detail below.

The small fragment obtained from Stockholm that is apparently the type of *P. latifolium* is so obviously *P. aciculare* (Brid.) Mitt. that I suspect an error in Ångström's labelling of the specimen. No other specimens of *P. aciculare* are known from South America otherwise, and there are perfectly good specimens of the species in the Ångström collection from the natural range in the western Pacific.

The three species of *Ptychomnion* presently known from Juan Fernandez can be separated by the following key.

### Key to Species of *Ptychomnion*

1. Leaves from 1 to 1.5 times as long as wide, very short-acute ..... *P. ptychocarpon*
1. Leaves at least twice as long as wide, with apices distinctly and often abruptly elongate ..... 2
  2. Leaves mostly spreading from insertion, scarcely concave; cells of lamina with walls as wide as or wider than the lumens ..... *P. falcatum*
  2. Leaves recurving from rather erect bases, rather concave in median part; cells of lamina with walls not as wide as lumens ..... *P. cygnisetum*

### *Ptychomnion cygnisetum*

*Ptychomnion cygnisetum* (C. Müll.) Kindb., Enum. Bryin. Exot. 31, 1888.

*Hypnum cygnisetum* C. Müll., Flora 68:425, 1885. [Original material: Hermite Isl., coll. J. D. Hooker, 1839-1843; Burnst Isl., Darwin Sound and Port Cook and Beagle Channel in SE Fuegia, all coll. *Spegazzini*, Mar.-May 1882.]

Robust, tufted, yellowish green plants with stems erect or ascending, flexuous, to 10 cm long. Leaves with blades spreading from a rather erect, sometimes sheathing base, blade rather concave in middle, mostly 6 mm long, 2 mm wide, blade lanceolate from a broadly ovate base, rather gradually narrowed to a slender, twisted tip; lower margins slightly but distinctly recurved, upper margins with many large, sharp teeth; median and upper cells of lamina mostly 12  $\mu$ m wide, 50-75  $\mu$ m long, walls slightly thickened and porose, lumens much wider; some lower cells to 100  $\mu$ m long; extreme basal cells wider, to 18  $\mu$ m wide, thicker-walled, dark yellowish to reddish. Setae 12-30 mm long. Capsule urn 3 mm long, slightly curved, inclined to horizontal; spores elliptical, 8-10  $\mu$ m in diameter, weakly papillose.

MAS AFUERA: Los Inocentes, below summit, ca. 4000 ft, *H. & E. 214*.

The species seems to be the commonest member of the genus in southern South America, where it has often been determined as *P. aciculare*. It has not previously been reported from Juan Fernandez.

### *Ptychomnion falcatum*

*Ptychomnion falcatum* Broth. in Skottsbl., Nat. Hist. Juan Fernandez 2:425, 1924. [Original material: Ridge between valles Piedra Agujereada and Laura, 650 m, Mas a Tierra, coll. C. & I. Skottsberg n. 356 (S!)]

*Ptychomnion falcatum* var. *gracilescens* Broth. in Skottsbl., Nat. Hist. Juan Fernandez 2:429, 1924. [Original material: Ridge between valles Piedra Agujereada and Laura, 650 m, Mas a Tierra, coll. C. & I. Skottsberg n. 245 (S!)]

Robust, tufted, yellowish green plants with stems erect or ascending, flexuous, to 10 cm long. Leaves erect-spreading from the insertion, only slightly clasping below, only slightly hollowed above, mostly 5 mm long, 1.8 mm wide, blade broadly elliptical, strongly narrowed to a very slender, twisted tip; margins narrowly recurved at extreme

base, with many rather remote, sometimes very sharp teeth distally; median and upper cells of lamina 8-10  $\mu$ m wide, mostly 40-60  $\mu$ m long; walls very thick and porose, as wide as or wider than lumens; cells of extreme leaf base wider, to 20  $\mu$ m wide, dark yellowish or reddish. Setae ca. 2.5 cm long, blackish. Capsule urn 3 mm long, curved, inclined to horizontal; spores elliptical, 12-14  $\mu$ m long, weakly papillose.

MAS A TIERRA: Ridge between valles Piedra Agujereada and Laura, 650 m, *Sk. 356* (type, S), *245* (type of var. *gracilescens*, S); above Pangal, 795 m, *Sk. 243* (S); Salsipuedes, 625 m, *Sk. 244, 353, 355* (S); Cordón Centinela, 530 m, *Sk. 354* (S); Valle Anson, slope of El Yunque, 400-450 m, *Sk. M42* (S); Valle Frances, Cordón Chifladores, *K. M72* (S); ridge back of Pto. Ingles, 600-630 m, *Sp. M206* (S); Cerro Damajuana, ca. 700 m, *K. M322* (S); El Yunque, near summit, ca. 900 m, *K. M346* (S); Portezuelo (Mirador), 500 m, *K. 308/26* (B); Cerro Salsipuedes, 2020 ft, *M. 9531*; El Yunque, S slope to right of ridge at Camote pass, 1700 ft, *M. 9618*; Q. Piedra Agujereada, ca. 500 m, *H. E. Moore 301*; below Pangal Falls, *H. & E. 386*.

The species is almost entirely restricted to Mas a Tierra. I have seen one specimen from Valdivia in central Chile; *Lechler*, pl. Chil. Id. R. F. Hohenacker, n. 620, Prope urbem Valdivia, Nov. 1850 (S). The history of the species provides a good example of the inexplicable lack of feeling that some authors such as Brotherus have had for concepts in this strikingly beautiful group of mosses. *Ptychomnion falcatum* is undoubtedly the closest ally in South America to *P. aciculare*, being distinguished primarily by the thicker cell walls in the leaf. Still, it is *P. cygnisetum* that was usually determined as *P. aciculare*, while *P. falcatum* was usually confused with *P. subaciculare*, which was described as having an entirely different leaf base. Why Brotherus separated two specimens out as *P. falcatum* is totally beyond explanation.

### *Ptychomnion ptychocarpon*

*Ptychomnion ptychocarpon* (Schwaegr.) Mitt., J. Linn. Soc., Bot. 12:536, 1869.

*Hypnum ptychocarpon* Schwaegr., Linnaea 18:561, 1845. [Original material: Valdivia and Colenagna, Chile, coll. A. Cuming.]



Plants with rather slender stems and widely diverging branches in large, tangled masses. Leaves spreading from the insertion, squarrose to rather erect, usually 1.5 mm long and 1.0 mm wide, broadly ovate with a very short, broad, slightly acuminate tip; surface weakly but distinctly longitudinally plicate, plications reaching to near tip; margins plane, slightly serrulate distally; median and upper cells of lamina 5  $\mu\text{m}$  wide, mostly 40–50  $\mu\text{m}$  long; walls porose, lumen much wider than walls; extreme basal cells dark yellowish, 10–20  $\mu\text{m}$  long, with thicker walls. Setae ca. 1.5 cm long. Capsules horizontal, 2 mm long, not curved.

MAS AFUERA: Trail to Los Innocentes, ca. 3000 ft, *H. & E.* 231, 450, 548, below summit, ca. 4100 ft, *H. & E.* 628; near Camp Correspondencia, ca. 3800 ft, *H. & E.* 438A.

The species is known from Chile, Patagonia, and Mas Afuera. The species is very distinct from all others in the genus by its short, spreading leaves and uncurved capsules.

## SEMATOPHYLLACEAE

### Genus *Sematophyllum*

Small to medium-sized, yellowish green, prostrate to procumbent, irregularly to pinnately branched plants. Stems without central strands or paraphyllia, surface cells not enlarged. Plants not distinctly heterophyllous. Leaves erect-spreading or falcate-secund, entire or serrate, short and broadly to long and slenderly acute; costae lacking; median cells rhomboidal to linear, rather thin-walled, smooth; alar cells distinct in 2 or more rows, basal row a series of 3–6 enlarged, thin-walled, hyaline cells. Perichaetia in lateral buds. Setae long and slender, smooth or rough distally. Capsules inclined to horizontal, sometimes curved, smooth; exothecial cells collenchymatous; peristome double, complete, teeth with vertical zigzag midline, transverse striations below, cilia present; operculum rostrate. Calyptra cucullate, bare.

The five species reported from Juan Fernandez can be separated by the following key.

### Key to Species of *Sematophyllum*

1. Dioicous; hyaline alar cells in 2–4 tiers; capsules suberect ..... 2
  2. Leaves mostly 2.5–3.0 mm long, very lustrous green; alar cells very lax, in 3–4 tiers ..... *S. masafuerae*
  2. Leaves mostly ca. 2.0 mm long, slightly shining, yellowish green; alar cells forming distinct auricle of 2–3 tiers ..... *S. kunkelii*
1. Autoicous; hyaline alar cells usually in 1 row or rarely 2 rows; capsules suberect to horizontal or pendulous ..... 3
  3. Leaves ca. 1 mm long, cells 5 times as long as wide or shorter; capsules suberect ..... *S. caespitosum*
  3. Leaves ca. 1.5 mm long, median cells linear, often 10 or more times as long as wide; capsules horizontal to pendant ..... 4
    4. Leaves slightly secund, lanceolate to linear-lanceolate; cells often with walls as thick as lumens ..... *S. aberrans*
    4. Leaves usually homomallous, upturned, broadly ovate to oblong; cells with lumens wider than walls ..... *S. brachycladulum*

### *Sematophyllum aberrans*

*Sematophyllum aberrans* (Broth.) Bartr., Ark. Bot. ser. 2, 4:41, 1957.

*Rhaphidostegium aberrans* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:441, 1924. [Original material: Quebrada del Monte Maderugo, Mas a Tierra, coll. C. & I. Skottsberg n. 377 (lectotype, present designation; S!).]

*Rhaphidostegium caespitosoides* Broth. in Skottsberg, Nat. Hist. Juan Fernandez 2:442, 1924. [Original material: Quebrada de las Casas, ca. 200 m, Mas Afuera, coll. C. & I. Skottsberg n. 493 (lectotype, present designation; S!).]

Small, pale yellowish green, prostrate, frequently but irregularly branched, sparingly radiculose plants, with main stems 1–2 cm long, branches 2–4 mm long. Leaves laxly spreading, slightly secund, concave, to ca. 1.5–1.7 mm long, 0.3–0.5 mm wide, narrowly ovate-lanceolate to linear-lanceolate, tapering to a long, slender tip; margins slightly recurved below, slightly serrulate above; median cells linear, 6–7  $\mu\text{m}$  wide, 60–80  $\mu\text{m}$  long, walls slightly thickened and nearly as wide as the very narrow lu-

mens; upper cells scarcely shortened, those in the very slender apex almost as long; inner basal cells yellow, to 10  $\mu\text{m}$  wide, 40  $\mu\text{m}$  long, thick-walled and porose; alar cells with 1 series of 3–4 very enlarged, rectangular, thin-walled, yellowish cells, ca. 20  $\mu\text{m}$  wide, to 60  $\mu\text{m}$  long; supraalar cells few, short-rhomboidal to subquadrate, ca. 25  $\mu\text{m}$  long. Autoicous. Perichaetial leaves to 1.5 mm long, longest having plane, rather broad, tapering, subulate tips, becoming rather obtusely pointed at apex with distinct, small, apical teeth and shorter apical cells, cells ca. 25  $\mu\text{m}$  long. Setae 7–10 mm long, red, smooth. Capsule horizontal to pendant; urn ca. 0.7 mm long, very slightly pustulose at base, broadly oval and constricted below mouth when dry. Spores 10–15  $\mu\text{m}$  in diameter when very young, 15–18  $\mu\text{m}$  in diameter when mature, very minutely papillose.

MAS AFUERA: Q. Casas, *Sk.* 371, 493 (lectotype of *Rhaphidostegium caespitosoides*), 494, 495 (all S); Q. Mono, 475 m, *Sk.* 388 (S); between Sanchez and Toltén, 515 m, *Sk.* 390 (S); Q. Blindado, 440 m, *Sk.* 489 (S); Cordón Barril, *Sk.* 498 (S); Q. Chozas, *Sk.* M111 (S).

MAS A TIERRA: Q. Monte Maderugo, *Sk.* 377 (type, S); Plazoleta in V. Anson, ca. 260 m, *Sk.* 379 (S); Q. Juanango, ca. 250 m, *Sk.* 384 (S); Centinela, ca. 530 m, *Sk.* 385, 389 (S); Salsipuedes, 660 m, *Sk.* 386 (S); Q. Gutierrez, ca. 300 m, *Sk.* 387 (S); Q. Frances, slope of Cordón Chifladores, *K.* 80 (S); Cerro Damajuana, *K.* M326 (S); El Yunque, near summit, ca. 900 m, *K.* M343, M347 (S); trail to Portezuelo de Villagra, 1400–1800 ft, *H. & E.* 85.

As presently known the species is endemic to Juan Fernandez. Brotherus (1924) placed his *Rhaphidostegium aberrans* and *R. caespitosoides* in different subgenera but there seems to be no specific difference.

### *Sematophyllum brachycladulum*

*Sematophyllum brachycladulum* (Broth.) Broth., *Nat. Pfl.* ed. 2, 11:432, 1925.

*Rhaphidostegium brachycladulum* Broth. in Skottsberg, *Nat. Hist. Juan Fernandez* 2:442, 1924. [Original material: Valle Colonial, Quebrada Seca, 435 m, Mas a Tierra, coll. C. & I. Skottsberg n. 369.]

Slender, densely caespitose, yellowish green plants with elongate, creeping stems and numerous short branches. Stems brownish radiculose; branches densely foliate with leaves turned upward. Leaves

erect-spreading when wet or dry, ca. 1.5 mm long, to 0.6 mm wide, concave, oblong-elliptical, becoming shortly lanceolate-acuminate distally; margins erect, entire; cells of lamina very narrow, with slightly thickened walls; median cells 50–80  $\mu\text{m}$  long, 5–8  $\mu\text{m}$  wide, lumens usually much wider than walls; apical cells 25–40  $\mu\text{m}$  long; basal cells yellow, often rather thickened, mostly ca. 40  $\mu\text{m}$  long; alar cells short-rectangular, distinctly inflated, usually hyaline, often forming rather prominent auricle, mostly in 1 series; 4–5 supraalar cells thick-walled, quadrate, ca. 20  $\mu\text{m}$  in diameter. Autoicous. Perichaetial leaves to 2 mm long, inner leaves ovate-lanceolate, entire. Setae scarcely over 5 mm long, slender, red, smooth. Capsule horizontal, symmetrical, oblong, ca. 0.5 mm long, constricted below mouth when dry; operculum to 0.8 mm long.

MAS AFUERA: Q. Lobería, 280 m, *Sk.* 496 (S); Q. Ovalo, *Sk.* M117 (S); Q. Mono, *Sk.* M118 (S).

MAS A TIERRA: V. Colonial near trail to Portezuelo de Villagra, ca. 220 m, *Sk.* M3 (S); Cumberland Bay, El Pangal, *Sk.* M54 (S); E slope Salsipuedes, ca. 200 m, *Sk.* M315 (S).

As presently known the species is endemic to Juan Fernandez. It has much of the appearance of *S. caespitosum*, but the alar cells are more prominent, the median cells are longer, and the capsules are less erect.

### *Sematophyllum caespitosum*

*Sematophyllum caespitosum* (Hedw.) Mitt., *J. Linn. Soc., Bot.* 12:479, 1869.

*Leskea caespitosa* Hedw., *Sp. Musc.* 233, 1801. [Original material: Hispaniola, coll. Swartz.]

*Hypnum loxense* Hook. in Kunth, *Syn. Pl. Acquin.* 1:62, 1822. [Original material: Near Loxam and Gonzanamam, Peru, 1080 hexap., coll. Humboldt & Bonpland, 1799–1804.]

Rather small to medium-sized, coarse, yellowish green, prostrate plants with stems to 4 cm long. Branches frequent, irregular, to 1 cm long, ascending. Leaves crowded, more appressed when dry, distinctly homomalous, 0.8–1.2 mm long, to 0.5 mm wide, oblong-ovate to oblong, rather concave, acute to obtusely pointed; margins entire, narrowly reflexed in basal 2/3–3/4; median cells short-rhomboidal, ca. 7  $\mu\text{m}$  wide, mostly 50  $\mu\text{m}$  long, a few to 70  $\mu\text{m}$  long, upper cells mostly 40  $\mu\text{m}$  long, apical cells mostly 25  $\mu\text{m}$  long; basal cells yellowish; alar cells yellowish brown, usually with row



of 3–4 inflated, rectangular cells, largest 25  $\mu\text{m}$  wide and 50  $\mu\text{m}$  long; a few supraalar cells quadrate to oblique, to 25  $\mu\text{m}$  long. Autoicous. Perichaetial leaves to ca. 1.5 mm long, elliptical with short-acute tip; margins recurved, entire or very slightly crenulate. Setae 5–12 mm long, red, smooth. Capsule suberect, urn 1.0–1.3 mm long; spores 12–15  $\mu\text{m}$  in diameter.

The species is known from Florida, Mexico, the West Indies, and Central and South America. It was reported by Brotherus from both Mas Afuera and Mas a Tierra, but two specimens determined by Brotherus, including all known records from Mas Afuera, prove to be *S. brachycladulum*. One specimen has not been seen but it is probable that all records are erroneous.

### *Sematophyllum kunkelii*

*Sematophyllum kunkelii* H. Robinson, Phytologia 29 (2):118, 1974. [Original material: Wand Damajuana, Mas a Tierra, 550 m, coll. G. Kunkel 317/18a (B).]

Medium-sized, yellowish to yellowish green, prostrate plants with stems to 6 cm long. Branches dense, irregular. Leaves slightly falcate-secund, ca. 2 mm long, 0.35 mm wide, becoming narrowly and rigidly acuminate from an oblong-ovate, slightly concave base; margins erect to slightly incurved, slightly serrulate distally; median cells linear, 6–7  $\mu\text{m}$  wide, 60–80  $\mu\text{m}$  long; apical cells becoming progressively shorter, extreme apical cells to 25  $\mu\text{m}$  long; extreme basal cells yellow with thicker porose walls, to 40  $\mu\text{m}$  long; alar cells much enlarged, hyaline or yellowish, forming prominent auricle, cells in 2–3 tiers of 4–5 rows, larger cells rectangular, 25  $\mu\text{m}$  wide and 75  $\mu\text{m}$  long, supraalar cells of older leaves often producing rhizoids. Dioicous. Perichaetial leaves ca. 1.5 mm long, oblong-ovate, with abrupt, rather shortly acuminate tip ca. 0.25 mm long, margin distinctly, densely, minutely dentate, apical cells ca. 25  $\mu\text{m}$  long. Setae ca. 10 mm long, becoming reddish, smooth. Capsule suberect, oval; urn ca. 1.5 mm long. Spores 12–15  $\mu\text{m}$  in diameter, minutely papillose.

MAS A TIERRA: Wand Damajuana, Nordgrat, 550 m, freistehend, *K. 317/18a* (holotype, B; isotype, US); Cordon rechts v. Yunque, Muster vom Waldboden in 500 m Höhe, *K. 312/3b* (B); Q. Damajuana, 400–450 m, *Sk. M208* (S); forests of Villagra, 400–550 m, *Sk. M232* (S).

The species seems to be endemic to Mas a Tierra. Material was reported by Bartram (1957) as *S. masafuerae*, to which the species is very closely related. *Sematophyllum kunkelii* differs by its smaller and less lustrous leaves.

### *Sematophyllum masafuerae*

*Sematophyllum masafuerae* (Broth.) Bartr., Ark. Bot. ser. 2, 4:42, 1957.

*Rhaphidostegium masafuerae* Broth. in Skottsbl., Nat. Hist. Juan Fernandez 2:440, 1924. [Original material: Correspondencia, 1150 m, Mas Afuera, coll. G. & I. Skottsberg n. 499 (S).]

*Hypnum masafuerae* Bartr., Ark. ser. 2, 4:42, 1957. [Original material: SE coast escarpment, Chorro de Dona Maria (Floripa), Mas Afuera, coll. G. & I. Skottsberg n. M174 (S).]

Medium-sized, pale yellowish green, often lustrous, sparsely branching plants in dense mats, with procumbent stems to 10 cm long. Stems without central strand; surface cells elongate, 12–15  $\mu\text{m}$  wide. Leaves densely imbricate when young, more lax and less appressed in older parts, very slightly falcate-secund, 2.5–3.0 mm long, 0.7–0.8 mm wide, becoming flattened and very slenderly long-acuminate from an oblong, rather concave base; margins erect to slightly incurved, distinctly serrulate on subula; median cells linear, 6–8  $\mu\text{m}$  wide, 50–80  $\mu\text{m}$  long; apical cells becoming progressively shorter, extreme apical cells to 25  $\mu\text{m}$  long; extreme basal cells yellow with thicker, more porose walls, length 40–80  $\mu\text{m}$ ; alar cells much enlarged, hyaline or yellowish, forming prominent auricle which is 100–125  $\mu\text{m}$  in diameter, cells in 3–4 tiers of 5–6 rows, largest cell rectangular, to 25  $\mu\text{m}$  wide and 75  $\mu\text{m}$  long. Dioicous. Perichaetial leaves ca. 1.5 mm long, oblong-ovate with rather strongly and narrowly acuminate tip, distal margins with numerous small but sharply erect teeth, apical cells short, a few cells of acumen projecting as papillae abaxially at upper ends. Setae to 13 mm long. Capsule urn 1 mm long, oval.

MAS AFUERA: Camp Correspondencia, 1150 m, *Sk. n. 499* (type, S); Chorro de Doña Maria (Floripa), *Sk. n. M174* (type of *Hypnum masafuerae*, S); Los Inocentes, near summit, 4500–5000 ft, *H. & E. 96*; trail to Los Inocentes, ca. 3000 ft, *H. & E. 490, 584*; below summit, ca. 4000 ft, *H. & E. 498, 499, 629*.

The species is apparently endemic to Mas Afuera. Brotherus seems to have erred in calling the species autoicous. Bartram seems to have erred in considering his *Hypnum masafuerae* distinct. Bartram's records of *Sematophyllum masafuerae* from Mas a Tierra were based on specimens of *S. kunkelii* Robinson.

## HYPNACEAE

### Genus *Hypnum*

Small to medium-sized, yellowish green, prostrate to procumbent, usually pinnately branched plants. Stems with or without central strand, surface cells narrow or enlarged, paraphyllia lacking. Plants only slightly heterophyllous. Leaves usually strongly falcate-secund, giving braided appearance when viewed from above; margins plane to slightly incurved, rarely revolute, subentire; tip often very long and slender; costae very short and double; median cells linear, thin-walled, extreme basal cells thicker-walled and porose; alar cells distinct, either small or thick-walled or inflated, irregularly arranged. Perichaetia in lateral buds. Setae long and slender, smooth. Capsules slightly inclined to horizontal, sometimes curved, smooth or sometimes wrinkled when dry; peristome double, complete with cilia; operculum conical. Calyptra cucullate, bare.

One species is known from Juan Fernandez.

### *Hypnum lechleri*

*Hypnum lechleri* C. Müll., Bot. Zeit. 14:455, 1856. [Original material: Near Valdivia, Chile, coll. *Lechler*, Pl. Chil. Hohenacker n. 619, Nov. 1850.]

Medium-sized, usually pinnately branching plants with stems to 5 cm long; mature stems reddish, without central strand, surface cells to 15  $\mu\text{m}$  wide. Leaves strongly falcate-secund, with very long, slender, subentire tips; stem leaves 1.5 mm long, 0.7 mm wide, gradually narrowed upwardly from a broad, slightly cordate base; margins erect to slightly incurved; median cells 5–6  $\mu\text{m}$  wide, mostly 60–80  $\mu\text{m}$  long; extreme basal cells with thicker porose walls, to 25  $\mu\text{m}$  long, to 10  $\mu\text{m}$  wide, reddish yellow; alar region with a cluster of rather small, obliquely rhomboidal cells at base of auricle,

cells to 20  $\mu\text{m}$  long, to 25  $\mu\text{m}$  wide; below alar cells a decurrent angle formed of slightly to greatly enlarged, thin-walled, hyaline cells, cells to 50  $\mu\text{m}$  long and 25  $\mu\text{m}$  wide; branch leaves ca. 1.0 mm long, 0.35 mm wide, scarcely or not cordate at base, cluster in alar region with very few smaller cells above and a few slightly enlarged cells below, whole cluster often reddish. Dioicous. Setae ca. 17 mm long. Capsule urn 2 mm long, inclined, curved; spores 17–20  $\mu\text{m}$  in diameter, minutely papillose.

MAS AFUERA: Trail to Los Inocentes, ca. 3000 ft, *H.* & *E.* 253; Q. Mono, ca. 400 m, *H.* & *E.* 650.

MAS A TIERRA: Without precise locality, *Bertero* n. 1574 (S); northern ravine, El Yunque; 400–500 m, *Sk.* 391 (S); below east face, El Yunque, ca. 1600 ft, *H.* & *E.* 322; near summit, El Yunque, ca. 900 m, *K.* M341 (S); Portezuelo de Villagra, ca. 500 m, *Sk.* 394, 455 (S), ca. 550 m, *Sk.* 456 (S); forests of Villagra, 400–550 m, *Sk.* M233 (S); Cordon Salsipuedes, ca. 600 m, *Sk.* 395 (S), ca. 500 m, *Sk.* M224 (S); V. Colonial, Q. Seca, 435 m, *Sk.* 396 (S); V. Colonial, near trail to Portezuelo de Villagra, 220 m, *Sk.* M9, M274 (S); along trail to Portezuelo de Villagra, *Sk.* M65, M309 (S); ridge between Q. Piedra Agujereada and Q. Laura, 650 m, *Sk.* 398 part (S); Puerto Frances, ca. 500 m, *Sk.* 399 (S); Q. Frances, slope of Cordon Chifladores, *K.* M71 (S); Villagra, Q. de la Choza, ca. 250 m, *Sk.* 452 (S); Cordon Centinela, 530 m, *Sk.* 453, 457 (S); Puerto Ingles, ca. 575 m, *Sk.* 454 (S); Q. Damajuana, *Sk.* 459 (S); Q. Gutierrez, *Sk.* 490 (S); NE slope of Cerro Piramide, 350–450 m, *Sk.* M34 (S); W slope of Piramide Ridge, S of Portezuelo de Villagra, *H.* & *E.* 25; base of Piramide, *H.* & *E.* 530A; Cumberland Bay, El Pangal, *Sk.* M51 (S); ridge between Rabanal and Q. Piedra Agujereada.

The species is apparently restricted to Chile, Patagonia, and Juan Fernandez. I do not know the basis of reports from the area of South Africa. The variety *fernandezianum* Card. ex Thér. is supposed to have cells 100–110  $\mu\text{m}$  long, but this is well within the normal range of variation.

### Genus *Isopterygium*

Yellowish or pale green, usually small prostrate plants with irregular branching, leafy stems complanate; cells of stem surface long and narrow; pseudoparaphyllia uniseriate or lacking. Leaves slightly shrivelled when dry, spreading laterally,



lanceolate; margins plane to narrowly recurved, usually serrulate; costae lacking or very short and double; lamina cells linear, smooth; alar cells essentially undifferentiated, a very few short cells at basal corner. Perichaetia in lateral buds. Setae long and slender. Capsules inclined to horizontal, cylindrical, usually slightly curved, smooth, often becoming wrinkled when dry; peristome double, complete with cilia; operculum conical or very shortly rostrate. Calyptra cucullate, bare.

The genus is usually associated with *Plagiothecium* as in the recent treatments by Ireland (1969) and Iwatsuki (1970); however, Brotherus (1925), perhaps impressed with the longer costa sometimes found in *Plagiothecium*, placed *Isopterygium* in the Hypnaceae. Distinctions between families in this area are not clear, but I would agree that *Isopterygium*, *Ectropothecium*, *Vesicularia*, *Taxiphyllum*, and *Herzogiella* (including *Dolichotheca*) probably belong together as indicated by Brotherus. One species of *Isopterygium* is known from Juan Fernandez.

### *Isopterygium tenerum*

*Isopterygium tenerum* (Sw.) Mitt., J. Linn. Soc. Bot. 12:499, 1869.

*Hypnum tenerum* Sw., Fl. Ind. Occ. 3:1817, 1806. [Original material: Jamaica, coll. Swartz.]

*Hypnum micans* Sw., Adnot. Bot. 175, 1829. [Original material: North America, coll. Mühlenberg.]

*Hypnum fulvum* Hook. & Wils. in Drumm., Musci Bor. Am. ed. 2, n. 110, 1841, *hom. illeg.* [Original material: Louisiana, coll. Drummond.]

*Hypnum album* C. Müll., Syn. 2:280, 1851. [Original material: Near Montgomery, Alabama, coll. Sullivant.]

*Hypnum chapmanni* Duby, Flora 58:285, 1875. [Original material: Florida, coll. Chapman.]

*Rhaphidostegium ludovicianum* Ren. & Card., Rev. Bryol. 20:21, 1893. [Original material: Cloutierville, Louisiana, coll. A. B. Langlois n. 210, Sept. 1886.]

*Plagiothecium groutii* Card. & Ther., Bot. Gaz. 37:379, 1904. [Original material: Hempstead, New York (as Delaware), coll. A. J. Grout, Dec. 1899.]

*Isopterygium fernandezianum* Broth. in Skotts., Nat. Hist. Juan Fernandez 2:440, 1924. [Original material: Centinela Ridge, 530 m, Mas a Tierra, coll. C. & I. Skottsberg n. 479.]

*Isopterygium drummondii* Crum, Steere & Anders., Bryologist 68:434, 1964, based on *Hypnum fulvum* Hook. & Wils.

Plants in thin mats with stems 2–3 cm long, stems with leaves ca. 1.5 mm wide; uniseriate pseudoparaphyllia present. Leaves not or scarcely imbricated; 2 mm long, 0.3 mm wide, lanceolate, slightly asymmetric, very narrowly acute; margin in distal half slightly but sharply serrulate; cells of lamina 6–7  $\mu\text{m}$  wide, 100–150  $\mu\text{m}$  long, slightly sinuous; a series of shorter cells ca. 25  $\mu\text{m}$  long at base; 3–4 short alar cells. Autoicous. Setae 0.5–1.5 cm long. Capsule horizontal, oval.

MAS A TIERRA: Trail to Plazoleta del Yunque, 150–200 m, K. 334/5b (B); W slope, Cordón Salsipuedes, 1700–2000 ft, H. & E. 7d; trail to Portezuelo de Villagra, 1400–1800 ft, H. & E. 14; below E face, El Yunque, ca. 1600 ft, H. & E. 528.

The species is known from the eastern United States, Mexico, the West Indies, Central and South America, and Asia. Ireland (1969) suggests other tropical American species that will probably prove synonyms. For the present, I add only *I. fernandezianum*, which Brotherus did compare with *I. tenerum* but considered to be more robust.

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