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Mrs. N. L. Britton  
New York Botanical Garden

VOLUME 15

PART 2

# NORTH AMERICAN FLORA

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(BRYALES)

DICRANACEAE, LEUCOBRYACEAE

ROBERT STATHAM WILLIAMS



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## ANNOUNCEMENT

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The NORTH AMERICAN FLORA is designed to present in one work descriptions of all plants growing, independent of cultivation, in North America, here taken to include Greenland, Central America, the Republic of Panama, and the West Indies, except Trinidad, Tobago, and Curaçao and other islands off the north coast of Venezuela, whose flora is essentially South American.

The work will be published in parts at irregular intervals, by the New York Botanical Garden, through the aid of the income of the David Lydig Fund bequeathed by Charles P. Daly.

It is planned to issue parts as rapidly as they can be prepared, the extent of the work making it possible to commence publication at any number of points. The completed work will form a series of volumes with the following sequence:

Volume 1. Mycetozoa, Schizophyta, Diatomaceae.

Volumes 2 to 10. Fungi.

Volumes 11 to 13. Algae.

Volumes 14 and 15. Bryophyta.

Volume 16. Pteridophyta and Gymnospermae.

Volumes 17 to 19. Monocotyledones.

Volumes 20 to 32. Dicotyledones.

The preparation of the work has been referred by the Scientific Directors of the Garden to a committee consisting of Dr. N. L. Britton, Dr. W. A. Murrill, and Dr. J. H. Barnhart.

Professor George F. Atkinson, of Cornell University; Professor John M. Coulter, of the University of Chicago; Mr. Frederick V. Coville, of the United States Department of Agriculture; Professor Edward L. Greene, of the United States National Museum; Professor Byron D. Halsted, of Rutgers College; and Professor William Trelease, of the University of Illinois, have consented to act as an advisory committee.

Each author will be wholly responsible for his own contributions, being restricted only by the general style adopted for the work, which must vary somewhat in the treatment of diverse groups.

The subscription price is fixed at \$1.50 for each part; it is expected that four or five parts will be required for each volume. A limited number of separate parts will be sold at \$2.00 each. Address:

THE NEW YORK BOTANICAL GARDEN

BRONX PARK

NEW YORK CITY

## Family 6. DICRANACEAE

BY ROBERT STATHAM WILLIAMS

Dioicous, autoicous or pseudautoicous; male plants sometimes minute, the male flowers mostly budlike, rarely discoid, with filiform paraphyses. Plants large to very small, with dichotomously branching stems growing in compact hemispheric cushions or broad mats, or rarely gregarious; stems usually with a central strand, mostly densely leafy and radiculose to tomentose. Leaves from straight and erect to curved and secund or sometimes crispate, smooth or often mamillose or papillose on one or both sides; costa of heterogeneous cells (except in *Dicranum* § *Arctoa*), usually stout and percurrent or nearly so, sometimes strongly ribbed on the back; lower cells of the leaf-blade mostly pale and rectangular, the upper ones shorter, sometimes round, the cell-walls often thickened, pitted, and sinuous, the alar group from unchanged to greatly differentiated. Seta elongate, erect or curved. Capsule from irregular and curved to symmetric and erect, sometimes furrowed or strumose, usually with superficial stomata in the short neck; peristome single, rarely lacking, of 16 teeth from a low basal membrane, mostly divided more than one half down into two lanceolate or sometimes filiform forks, the outer face usually vertically striate below, more or less papillose above, the inner face with mostly prominent cross-walls; lid convex or conic, mostly beaked. Calyptra cucullate, never plicate nor hairy, sometimes ciliate at the base, the apex often rough.

Alar cells not differentiated.

Cells of the leaf-blade smooth; leaves not crispate when dry.

Cells of the leaf-blade more or less mamillose on both sides; leaves crispate when dry.

Alar cells mostly strongly differentiated (exceptions occur in the entire genus *Symblepharis* and in certain species of *Dicranoweisia* and *Oncophorus*).

I. DICRANELLEAE.

III. RHABDOWEISIEAE.

II. DICRANEAE.

### I. DICRANELLEAE

Seta erect or irregularly flexuous and weak.

Stem-leaves erect-appressed, with or without a more or less spreading bristle-like point; stems erect, filiform, often much elongate; male flowers conspicuous, more or less discoid.

Stem-leaves spreading from the base, or with clasping base and lanceolate spreading point; male flowers budlike and usually inconspicuous.

Seta stout, regularly and strongly curved, more or less sigmoid when moist.

1. ANGSTROEMIA.

2. DICRANELLA.

3. CAMPYLOPODIUM.

### II. DICRANEAE

Stems, with few branches, weak and flexuous, more or less pendent, up to 30 cm. or more long.

Stems erect or ascending, much shorter.

Capsule with stomata; seta erect; costa usually narrow and semi-terete. Autoicous.

Peristome-teeth not vertically striate on the outer face.

Peristome-teeth vertically striate on the outer face.

Costa of homogeneous cells.

Costa of heterogeneous cells.

Leaves with recurved and thickened borders, or capsule curved and strumose.

Leaves with flat borders and capsule symmetric.

Dioicous or pseudautoicous; costa of heterogeneous cells.

9. DICRANOLOMA.

4. DICRANOWEISIA.

11. DICRANUM.

5. ONCOPHORUS.

6. SYMBLEPHARIS.

- Alar cells not or very slightly differentiated.  
 Upper part of leaf-blade of one thickness of cells.  
 Upper part and border of leaf-blade of a double thickness of cells.
- Alar cells differentiated.  
 Leaves with a hyaline border.  
 Leaves without a hyaline border.  
 Peristome-teeth inserted well below the rim of the capsule, papillose.  
 Peristome-teeth inserted close to the rim of the capsule, mostly striate.
- Capsule without stomata; seta often strongly curved, geniculate, or cygneous when moist; costa usually broad.  
 Costa without stereid-bands.  
 Upper and lower surfaces of the costa of large, empty, and thin-walled cells.  
 Upper surface only of the costa of large, empty, and thin-walled cells.  
 Costa with stereid-bands.  
 Peristome-teeth regularly 2-forked.  
 Peristome-teeth divided about half way down, with a distinct median line below; calyptra mostly fimbriate at the base.  
 Peristome-teeth divided three fourths down or more, the forks slender; calyptra not fimbriate.  
 Peristome-teeth long and narrow, sometimes only faintly striate, not forked, or some of the teeth irregularly divided.  
 Capsule elliptic, with an annulus.  
 Capsule cylindrical, without an annulus.
6. SYMBLEPHARIS.  
 7. AUSTINELLA.  
 10. LEUCOLOMA.  
 8. HOLOMITRIUM.  
 11. DICRANUM.  
 12. BROTHERA.  
 13. CAMPYLOPUS.  
 13. CAMPYLOPUS.  
 16. DICRANODONTIUM.  
 14. THYSANOMITRIUM.  
 15. PILOPOGON.

## III. RHABDOWEISIEAE

- Capsule 8-ribbed; leaves scarcely or not mamilllose.  
 Capsule not ribbed; leaves mamilllose.  
 Capsule regular, erect; peristome-teeth mostly undivided, nearly smooth on the outer face, or faintly and more or less obliquely striate.  
 Capsule irregular and nodding to nearly regular and erect; peristome-teeth divided about half way down, papillose and vertically striate.
17. RHABDOWEISIA.  
 18. OREOWEISIA.  
 19. DICHODONTIUM.

1. *ANGSTROEMIA* B.S.G. Bryol. Eur. (33-36:) Ang. 1. 1846.

Dioicous: male plants with flowers conspicuous, terminal or becoming lateral by innovations from just below the perigonal leaves; antheridia large and numerous. Plants gregarious or in loose, golden- or greenish-brown tufts with simple or somewhat branching stems up to 6 cm. high. Leaves smooth, nearly or quite entire, the lower ones small with a short point, the upper larger, from ovate or obovate to ovate-lanceolate, more or less abruptly narrowed to the erect or sometimes abruptly spreading-incurved, elongate point; lower leaf-cells elongate with mostly pale, thin walls, the alar not differentiated, the upper mostly long and narrow, except in *A. vaginatum*, which has rather short, often nearly square cells, with some transversely elongate cells at the shoulder of the leaf. Seta erect, smooth, elongate. Capsule symmetric, erect, oval to cylindrical, smooth, mostly without annulus; peristome inserted just below the mouth or sometimes lacking, the teeth reddish-brown, lanceolate, entire or more or less divided into 2 forks, and somewhat vertically striate or papillose; lid somewhat persistent, conic, mostly long-beaked, falling with the upper part of the columella. Calyptra cucullate, smooth, entire at the base.

Type species, *Weisia longipes* Sommerf.

- Leaf-cells all elongate; leaf-point erect.  
 Capsule about 0.6 mm. high; seta 10-12 mm. long.  
 Capsule up to 2 mm. high; seta 3-5 mm. long.  
 Leaf-cells at shoulder of leaf transversely elongate, in upper part of leaf often nearly square; leaf-point abruptly spreading-incurved.
1. *A. longipes*.  
 2. *A. jamaicensis*.  
 3. *A. vaginata*.

1. *Angstroemia longipes* (Sommerf.) B.S.G. Bryol. Eur. (33-36:)

Ang. 3. 1846.

*Weisia longipes* Sommerf. Suppl. Fl. Lapp. 52. 1826.  
*Dicranum julaceum* Hook. in Drummond, Musci Am. 100. 1828.

Dioicous: male flowers subdiscoid, the inner perigonal leaves shorter than the outer, reddish-brown, ovate, concave, acutely pointed, entire, costate to a little below the apex,

enclosing numerous antheridia about 0.5 mm. long with filiform paraphyses: plants in loose, thin mats or densely gregarious, with filiform stems, radiculose at the base, mostly 3–5 mm. high, bearing solitary branches from just below the flower-buds: stem-leaves minute, appressed-convolute, shortly ovate-lanceolate, entire, rather obtusely pointed, 0.6–1 mm. long, the upper and perichaetial ones very similar but larger, about 1.5 mm. long, often slightly serrulate toward the apex; costa stout, vanishing a little below the apex; leaf-cells all elongate, the lower mostly rectangular, gradually becoming somewhat smaller upward and less regular, the median cells 8–10  $\mu$  wide and mostly 30–40  $\mu$  long, often somewhat hexagonal: seta erect, smooth, up to 12 mm. long: capsule about 0.6 mm. long, erect, oval, smooth, with thick walls apparently without stomata; peristome-teeth reddish-brown, lanceolate, projecting above the mouth about 250  $\mu$ , from entire to divided scarcely one half down, more or less vertically striate and papillose on the outer face with articulations distinct; annulus none; lid somewhat persistent, conic or shortly beaked, about two thirds the length of the capsule, falling with the upper part of the columella: calyptra cucullate, smooth, entire at the base: spores not quite smooth, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Lapland.

DISTRIBUTION: Alaska to British Columbia; Greenland; also in Europe.

ILLUSTRATIONS: B.S.G. Bryol. Eur. *pl.* 94; Rab. Krypt.-Fl. 4: *f.* 111.

EXSICC.: Drummond, Musci Am. 100; Macoun, Can. Musci 11a, 25.

## 2. *Angstroemia jamaicensis* C. Müll. Bull. Herb.

Boiss. 5 : 554. 1897.

*Angstroemia brevipes* Hampe; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 163; hyponym. 1872.

Dioicous: male plants of the same size as the fertile, usually bearing several elongate flower-buds, reddish-brown or golden within, the antheridial leaves broadly ovate, abruptly narrowed into a smooth hair-point often much longer than the blade and enclosing numerous antheridia up to 0.75 mm. long, without paraphyses: fertile plants in mostly glossy, golden-green, loose tufts or closely gregarious, with filiform stems, unbranched or with few, mostly short branches, up to 6 cm. high: lower stem-leaves very small, closely convolute, short-ovate, very shortly pointed, the upper gradually larger and longer-pointed, the uppermost and perichaetial with the blade up to 1.5 mm. long and a smooth, subulate point 2–5 mm. long, the upper margin of the blade sometimes not quite entire; costa stout, broader above than below, excurrent into the point; lower leaf-cells more or less rectangular, 8–10  $\mu$  wide by 20–40  $\mu$  long, the upper ones much narrower, somewhat elongate-hexagonal to linear-vermicular, with the walls slightly and uniformly thickened, the median cells about 5  $\mu$  wide by 25–40  $\mu$  long: seta smooth, erect, 3–5 mm. long: capsule erect, nearly cylindrical when dry, up to 2 mm. long, smooth, dark-colored when old with 1 or 2 rows of stomata near the base; peristome-teeth reddish, rather densely papillose, extending about 300  $\mu$  above the mouth, 40  $\mu$  wide at the base, more or less split or perforate along the median line; annulus none; lid obliquely beaked, less than one half as long as the capsule: spores nearly smooth, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Morce's Gap, Jamaica.

DISTRIBUTION: Jamaica and Mexico.

## 3. *Angstroemia vaginata* (Hook.) C. Müll. Syn. 2 : 608. 1851.

*Dicranum vaginatum* Hook. Musci Exot. *pl.* 141. 1820.

*Angstroemia acerosa* Hampe, in Triana & Planch. Ann. Sci. Nat. V. 3: 354. 1865.

*Anisothecium vaginatum* Mitt. Jour. Linn. Soc. 12: 39. 1869.

Dioicous: male plants mingled with the fertile, bearing solitary, terminal buds or finally, through single branches growing out from just below the perigonium, with several lateral buds at regular intervals; perigonial leaves with broad, convolute golden-brown base, rather abruptly narrowed to a spreading point with costa nearly percurrent and apex slightly serrulate; antheridia numerous, 0.7 mm. long or more, with numerous paraphyses: fertile plants somewhat gregarious or in loose tufts, with dull-green, slender stems up to 4 cm. high with radicles at the base: lower stem-leaves small with a very short point, the upper larger, 3–4 mm. long, with obovate, clasping base abruptly narrowed to a more or less widely spreading,

incurved point a little longer than the basal part with the costa nearly percurrent and the margin entire except at the slightly serrulate apex; lower leaf-cells mostly pale, more or less rectangular, 10–12  $\mu$  wide and 50–70  $\mu$  long, with thin walls, those above at the shoulder of the leaf small and transversely elongate, those in the leaf-point often rather obscure, from square to 2 or 3 times as long as broad with slightly thickened walls; perichaetial leaves like those of the stem with slightly longer clasping base: seta slender, erect, 12 mm. long: capsule oblong, erect, about 1.5 mm. long, with stomata in 1 or 2 rows near the base; peristome-teeth 16, reddish-brown, densely papillose all round, from a rather low basal membrane, divided almost to the base into 2 terete, slender forks about 250  $\mu$  long; lid conic, with an obliquely subulate beak as long as the capsule: calyptra smooth above, entire at the base: spores somewhat rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Colombia.

DISTRIBUTION: Honey Station, Puebla (*Pringle 15122*); also in Colombia and Ecuador.

ILLUSTRATION: Hook. Musci Exot. pl. 141.

## 2. DICRANELLA Schimp. Coroll. Bryol. Eur. 13. 1855.

*Angstroemia* C. Müll. Syn. 1: 430, in part. 1848.

*Anisothecium* Mitt. Jour. Linn. Soc. 12: 39. 1869.

*Microdus* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 161. 1872.

Mostly small, dioicous, terrestrial plants, growing in cushions or broad mats, or gregarious. Stems erect, simple or branching, sparsely radiculose below. Leaves smooth, often distant and smaller below, crowded above, from straight and erect-appressed to spreading-squarrose or curved-secund; leaf-base from spreading-lanceolate to clasping-ovate, gradually or abruptly narrowed to a grooved, linear to subulate, mostly entire limb with the apex denticulate; costa usually stout and percurrent or excurrent, sometimes vanishing five or six cells below the apex of the leaf and rarely serrulate on the back in the upper part; leaf-cells from nearly square to linear with cell-walls sometimes thickened but not pitted, the alar not differentiated, or sometimes slightly so in *D. squarrosa*. Seta usually twisted, mostly erect and straight or irregularly flexuous, never regularly cygneous or geniculate when mature. Capsule from globose to cylindric, erect or nodding, often curved and strumose, either smooth or ribbed when dry and empty; exothecal cells with walls straight or sinuous, often much thickened; annulus large and compound, or simple, or wanting: peristome-teeth 16, reddish, short or elongate, undivided or mostly divided to below the middle into 2 or sometimes 3 papillose forks, the outer plates below usually vertically striate, sometimes only papillose. Spores variable in size, from smooth to very coarsely papillose.

Type species, *Dicranum Grevilleanum* B.S.G.

Annulus none; peristome-teeth large, 250–450  $\mu$  high, usually divided scarcely one half down, with a basal membrane 2–4 rows high, of darker, narrow, smooth cells more or less projecting above the mouth.

Annulus present; peristome-teeth usually much less than 300  $\mu$  high, either very short and irregular or divided two thirds to three fourths down into slender terete forks, with a basal membrane of cells less differentiated than in I.

Peristome-teeth mostly 200–300  $\mu$  high and regularly divided two thirds to three fourths down into slender, terete, papillose forks.

Peristome-teeth mostly less than 200  $\mu$  high and divided into irregular, often very short forks, or not divided, with apex broad and blunt.

### I. ANISOTHECIUM.

### II. EUDICRANELLA.

### III. MICRODUS.

#### I. ANISOTHECIUM

Leaves squarrose from an enlarged, clasping base.

Costa 50–60  $\mu$  wide, about one sixth the width of the leaf-base; leaves not long-decurrent.

Costa smooth on the back.

Costa serrulate on the back above.

Costa about 50  $\mu$  wide and one twentieth the width of the leaf-base; leaves long-decurrent.

Leaves not squarrose and without enlarged clasping base.

Cells in margin of upper leaf narrow and indistinct, about 4  $\mu$  wide.

Cells in margin of upper leaf broad and distinct, 8–10  $\mu$  wide.

Capsule erect; marginal leaf-cells up to 40 or 50  $\mu$  long.

Capsule nodding, curved; marginal leaf-cells mostly 20–30  $\mu$  long.

1. *D. Grevilleana*.

2. *D. Schreberi*.

3. *D. squarrosa*.

4. *D. rubra*.

5. *D. rufescens*.

6. *D. Nicholsii*.

## II. EUDICRANELLA

- Leaves mostly with rounded-obtuse apex and costa vanishing well below the apex.
- Seta yellowish, weak and flexuous; capsule usually not contracted under the mouth when dry.
- Leaf-cells with lax, thin walls throughout, the upper and median short, irregular or square to short-rectangular. 7. *D. Hilariana*.
- Leaf-cells with somewhat thickened walls, the median 2-6 times as long as wide, 4-5  $\mu$  wide. ✓ 8. *D. Herminieri*.
- Seta reddish, rather stout and erect; capsule much contracted under the mouth when dry; median leaf-cells 6-7  $\mu$  wide. ✓ 9. *D. subinclinata*.
- Leaves mostly with acute apex and percurrent or excurrent costa. ✓ 10. *D. reticulata*.
- Leaves squarrose; leaf-blade distinct to the apex.
- Leaves not squarrose, often secund.
- Seta red.
- Capsule pale, erect, wide-mouthed and mostly tapering to the base when dry. 11. *D. crispa*.
- Capsule dark, more or less curved and nodding to horizontal. 12. *D. secunda*.
- Seta yellow, or finally becoming reddish.
- Costa of the stem-leaves slightly broader upward to the shoulder of the leaf, then tapering to the apex. 13. *D. pusilla*.
- Costa of the stem-leaves tapering from base to apex.
- Costa smooth on the back toward the apex.
- Annulus present.
- Capsule short-oval to oblong, nodding, not furrowed. 14. *D. Perrottetii*.
- Capsule oval, erect, furrowed when dry, about 1 mm. high. 15. *D. Harrisii*.
- Annulus lacking; capsule oval-cylindric, about 1.5 mm. high. 16. *D. Barnesii*.
- Costa rough on the back towards the apex. 17. *D. heteromalla*.
- III. MICRODUS
- Peristome-teeth vertically striate on the outer plates.
- Capsule short-oval, more or less nodding and strumose. 18. *D. guadelupensis*.
- Capsule oblong, symmetric, erect.
- Inner perichaetial leaves narrowed to a limb about as long as the clasping base. 19. *D. lagunaria*.
- Inner perichaetial leaves narrowed to a limb about twice as long as the basal part; spores very rough, 20-24  $\mu$  in diameter. 20. *D. brachyblepharis*.
- Inner perichaetial leaves narrowed to a limb 4-6 times as long as basal part; spores finely papillose, up to 16  $\mu$  in diameter. 21. *D. Dussii*.
- Peristome-teeth papillose, without vertical striae.
- Leaves obtuse; costa vanishing in or well below the apex.
- Capsule oval; spores with very large papillae. 22. *D. longirostris*.
- Capsule spheric; spores with minute papillae. 23. *D. sphaerocarpa*.
- Leaves acute.
- Costa percurrent; spores rough with minute papillae. 24. *D. barbensis*.
- Costa excurrent; spores rough with large papillae. 25. *D. alpina*.
- Species of uncertain position:
- Stems robust, up to 6 cm. high; leaves obtuse, the costa vanishing below apex. 26. *D. remotifolia*.
- Stems minute, weak, 5 or 6 mm. high; leaves distant, laxly spreading from the base. 27. *D. Mülleri*.

1. *Dicranella Grevilleana* (Brid.) Schimp. Coroll. Bryol.  
Eur. 13. 1855.

*Dicranum Schreberi Grevilleanum* Brid. Bryol. Univ. 1: 450. 1826.

*Dicranum Grevilleanum* B.S.G. Bryol. Eur. (37-40:) *Dicranum* 19. 1847.

Plants in soft, green cushions, with mostly simple, erect stems up to 2 cm. high: stem-leaves distant, about 1.5 mm. long, from an ovate, loosely clasping base rather abruptly narrowed to a flexuous-squarrose, narrow, grooved limb with a narrow blade extending to the slightly serrulate apex, the leaf-margin flat and slightly crenulate almost to the base; costa 50-60  $\mu$  wide at the base, scarcely one sixth the width of the leaf-base; leaf-cells distinct, thin-walled, rectangular or sometimes rather irregular, the median ones 8-10  $\mu$  wide and two or three times as long, the lower ones about 10  $\mu$  wide and up to 50  $\mu$  long; perichaetial leaves up to 4 mm. long, from an elongate, clasping base abruptly narrowed to a spreading, flexuous, narrow limb one and one half times to twice as long as the clasping part, with the apex denticulate; costa more or less excurrent and below paler and narrower than in the stem-leaves: seta red, erect, 8-10 mm. long; capsule short, nodding, curved, slightly strumose and more or less

ribbed when dry and empty, with high-conic, obliquely rostrate lid and no annulus; exothecal cells irregularly quadrate, about  $20\ \mu$  wide, not greatly elongate, with thickened walls; peristome-teeth reddish-brown, up to  $375\ \mu$  high, divided scarcely one half down into two papillose forks, vertically striate below, with the inner lamellae up to  $30\text{--}40\ \mu$  apart, the basal membrane two or three rows high of dark cells, slightly projecting: spores nearly smooth, up to  $17\ \mu$  in diameter.

TYPE LOCALITY: Scotland.

DISTRIBUTION: Alpine regions from Montana and Washington to Behring Sea; New Brunswick (Macoun); also in Europe and Asia.

ILLUSTRATIONS: Grev. Scot. Crypt. Fl. *pl.* 116 (as *Dicranum Schreberianum*); B.S.G. Bryol. Eur. *pl.* 54.

EXSICC.: Macoun, Can. Musci 482.

## 2. *Dicranella Schreberi* (Sw.) Schimp. Coroll. Bryol. Eur. 13. 1855.

*Dicranum Schreberi* Sw. Disp. Musc. Suec. 37, 88. 1799.

*Dicranum Schreberianum* Hedw. Sp. Musc. 144. 1801.

*Cynodontium canadense* Mitt. Jour. Linn. Soc. 8: 17. 1864.

*Leptotrichum canadense* Jaeger, Ber. St. Gall. Nat. Ges. 1870-71: 388. 1872.

*Dichodontium canadense* Lesq. & James, Man. 62. 1884.

Plants in green or yellowish-green cushions up to 5 cm. high: upper stem-leaves from an ovate, more or less erect base somewhat gradually narrowed to a flexuous-squarrose, lanceolate, grooved limb with a serrate point from broadly acute to subulate, the margins flat, from distantly and slightly toothed to closely serrate to well below the middle of the leaf; costa from vanishing below the apex to shortly excurrent, sometimes irregularly serrulate one half down on the back, at the base about  $50\ \mu$  wide and one sixth the width of the leaf-base; cells in the upper part mostly rectangular,  $6\text{--}12\ \mu$  wide and 2-3 times as long, at the shoulder of the leaf rather shorter and in the basal part paler and longer; perichaetial leaves up to 3.5 or 4 mm. long, from a clasping base more abruptly narrowed to a spreading limb 2-3 times as long as the sheathing part, the costa rather narrower below and the apex more slender than in the stem-leaves: seta red, sometimes yellowish, up to 18 mm. long, erect, flexuous: capsule short, curved, nodding, not strumose nor ribbed, with exothecal cells mostly thick-walled, short near the mouth, elongate below; annulus none; lid highly conic to shortly rostrate; teeth dark-red, usually divided not much more than one third down, below vertically striate, the lamellae of the inner face distant, often  $40\ \mu$  apart, the basal membrane four rows high, of narrow, thick-walled, smooth cells reaching slightly above the mouth of the capsule: spores slightly rough, up to  $18\ \mu$  in diameter.

TYPE LOCALITY: Sweden.

DISTRIBUTION: Pennsylvania to Hudson Bay, and Montana to Oregon and British Columbia; also in Europe and Asia.

ILLUSTRATION: Sw. Disp. Musc. Suec. *pl.* 2, *f.* 6.

EXSICC.: Drummond, Musci Am. 97; Holz. Musci Acroc. Bor. Am. 152 (these two numbers represent the typical form with narrower cells and leaf-apex and leaf-border sometimes nearly entire); Sull. & Lesq. Musci Bor. Am. ed. 2. 61; Aust. Musci App. 77; Macoun, Can. Musci 403, 495 (the last three numbers represent *D. Schreberi robusta* Schimp. and *D. Schreberi elata* Schimp., having a broader leaf-point with more serrulate border and wider leaf-cells).

## 3. *Dicranella squarrosa* (Schrad.) Schimp. Syn. 71. 1860.

*Dicranum squarrosium* Schrad. Jour. Bot. Schrad. 1801<sup>1</sup>: 68. 1803.

Plants in robust, green or yellowish-green tufts, with stems up to 12 cm. high: stem-leaves distant, long-decurrent, from an oblong, loosely-clasping base about 1.5 mm. long, scarcely narrowed to a broadly lanceolate, reflexed-squarrose, grooved limb about 2.5 mm. long, with flat, entire borders and a rounded-obtuse or somewhat acute, crenate apex; costa a little above the base  $50\ \mu$  wide, about one twentieth of the width of the leaf-base and vanishing below the apex; leaf-cells irregularly rectangular, thin-walled, the median ones about  $8\ \mu$  wide by  $45\text{--}60\ \mu$  long, the basal ones slightly paler and longer,  $12\text{--}20\ \mu$  wide and  $100\ \mu$  long; perichaetial leaves quite similar to the stem-leaves but often rather shorter and the inner with a more clasping base, more abruptly narrowed to a spreading limb shorter than the clasping part, with the leaf-cells below rather more lax and irregular: seta stout, reddish, erect, 12-18 mm. long: capsule short-oblong, nodding, not strumose, slightly curved, 2 mm. long without lid, the conic-acuminate lid two thirds as long; exothecal cells with thickened not sinuous walls,  $20\text{--}25\ \mu$  wide above and scarcely elongate, below more elongate; annulus none; peristome-teeth up to

100  $\mu$  wide at the base and 450  $\mu$  high, dark-red, striate, prominently articulate, divided one third or more down into 2 or 3 densely papillose forks, the basal membrane of 3 or 4 rows of dark-red narrow cells extending above the mouth of capsule: spores papillose, up to 22  $\mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: New Brunswick and Ontario to New Hampshire; British Columbia; Washington (Cascade Mountains, the only specimens in fruit from America); also in Europe and Asia.

ILLUSTRATIONS: Dill. Hist. Musc. *pl.* 46, *f.* 24; B.S.G. Bryol. Eur. *pl.* 17.

EXSICC. Sull. & Lesq. Musci Bor. Am. 162; ed. 2. 245 (as "*Meesia longiseta* var.?"); Macoun, Can. Musci 28, 475.

4. *Dicranella rubra* (Huds.) Kindb. Eur. & N. Am. *pl.* 2.  
Bryin. 208. 1897.

*Bryum rubrum* Huds. Fl. Angl. 413. 1762.

*Bryum simplex* L. Sp. Pl. ed. 2. 1587. 1763.

*Dicranum varium* Hedw. Descr. 2. 93. 1789.

*Bryum callistomum* Dicks. Pl. Crypt. Brit. 3: 5. 1793.

*Dicranella varia* Schimp. Coroll. Bryol. Eur. 13. 1855.

*Anisothecium rubrum* Lindb. Utkast 33. 1878.

*Dicranella Langloisii* Ren. & Card. Bot. Gaz. 15: 39. 1890.

*Dicranella Howei* Ren. & Card. Bull. Herb. Boiss. 4: 15. 1896.

*Dicranella chrysea* C. Müll. Hedwigia 37: 230. 1898.

Plants mostly dull-green or sometimes light-green, in loose mats, with branching stems about 1 cm., rarely up to 2.5 cm. high: stem-leaves about 1 mm. long, erect-spreading or usually somewhat curved-secund, from a lanceolate base gradually narrowed to a grooved point with entire, recurved or sometimes nearly flat borders of a double thickness of cells above and a slightly denticulate, narrowly obtuse or acute apex; costa about 45  $\mu$  wide at the base and one fifth of the width of the leaf-base, vanishing slightly below the apex or percurrent; leaf-cells rectangular, the lower ones about 8  $\mu$  wide and 2-3 times as long, the upper 4  $\mu$  wide and up to ten times as long; perichaetial leaves up to 2 mm. long, from a clasping, ovate base somewhat abruptly or gradually narrowed to a slender, lanceolate, nearly erect point about one and one half times as long with a denticulate, acute apex, the two or three inner leaves much shorter with a short point: seta erect or flexuous, reddish, up to 10 mm. long: capsule short-oval, up to 1 mm. long without lid, erect or usually nodding and slightly curved, when dry and empty much contracted under the broad mouth, not ribbed or strumose, without annulus and with a stout short-rostrate lid; exothecal cells near the mouth not elongate, those below 20  $\mu$  wide and from scarcely longer up to about twice as long as wide with usually somewhat thickened, not sinuous walls; peristome-teeth red, striate, about 60  $\mu$  wide at the base and 350  $\mu$  high, divided one half down or farther into two slender, papillose forks, with a basal membrane projecting well above the mouth: spores papillose, up to 18  $\mu$  in diameter.

TYPE LOCALITY: England.

DISTRIBUTION: New Brunswick to Alaska, and southward to Mexico, Florida, and Cuba; also in Europe, Asia, and Africa.

ILLUSTRATIONS: Dill. Hist. Musc. *pl.* 50, *f.* 59; Hedw. Descr. 2: *pl.* 34; B.S.G. Bryol. Eur. *pl.* 57, 58.

EXSICC.: Drummond, So. Mosses 50; Sull. Musci Allegh. 164; Sull. & Lesq. Musci Bor. Am. 47, 164; ed. 2. 63; Sull. Musci Cub. Wright. 37; Aust. Musci App. 78; Macoun, Can. Musci 26; Holz. Musci Acroc. Bor. Am. 151.

The specimens called *D. Langloisii* from Louisiana are a pale form of the species that sometimes occurs also in the North. *D. Howei* and *D. chrysea*, which are much alike, at first sight appear quite distinct from typical *D. rubra* in having more slender leaves, narrower cells and flatter leaf-margin, but they vary from the typical form about as does *D. rubra tenuifolia* of Europe. The leaf-margin in the upper, narrower part of the leaf is of a double thickness of cells, below of only one thickness, in all the specimens.

5. *Dicranella rufescens* (Dicks.) Schimp. Coroll. Bryol.  
Eur. 13. 1855.

*Bryum rufescens* Dicks. Pl. Crypt. Brit. 3: 6. 1793.

*Dicranum rufescens* Smith, Engl. Bot. *pl.* 1216. 1803.

*Anisothecium rufescens* Lindb. Utkast 33. 1878.

Plants in broad, loose mats, sometimes gregarious, of a brown color more or less tinged with red; stems slender, mostly simple, up to 15 mm. high, with rather distant, spreading lower leaves, more crowded and sometimes slightly secund above; lower stem-leaves shorter, the

upper about 1 mm. long, from an ovate-lanceolate base gradually narrowed to a broadish, somewhat grooved point with flat, entire or slightly serrulate margins and an acute serrulate apex; costa about  $40\ \mu$  wide at the base, one fifth the width of the leaf-base, nearly or quite percurrent; leaf-cells rectangular with thin walls, the upper ones about  $6\ \mu$  wide and  $40\text{--}60\ \mu$  long, the marginal row often slightly inflated, up to  $8\ \mu$  wide; perichaetial leaves very similar to the stem-leaves but larger, up to 1.75 mm. long; seta reddish-brown, flexuous-erect, 4–7 mm. long; capsule ovoid, about 0.75 mm. long without lid, symmetric, erect, wide-mouthed when empty and smooth or slightly furrowed; annulus none; lid conic, short rostrate, one half to two thirds as long as the capsule; peristome-teeth about  $60\ \mu$  wide at the base, red, striate, divided scarcely one half down, with the not striate, thick-walled cells of the basal membrane extending 3 or 4 rows up above the mouth of the capsule: spores slightly roughened, up to  $16\ \mu$  in diameter.

TYPE LOCALITY: England.

DISTRIBUTION: New Brunswick to Ontario and Virginia; Alaska to British Columbia; reported from Washington and Oregon; also in Europe and Asia.

ILLUSTRATIONS: Dicks. Pl. Crypt. Brit. *pl.* 8, *f.* 1; B.S.G. Bryol. Eur. *pl.* 59.

EXSICC.: Sull. & Lesq. Musci Bor. Am. 48; ed. 2. 64; Aust. Musci App. 74; Macoun, Can. Musci 27.

#### 6. *Dicranella Nicholsii* R. S. Williams, sp. nov.

Plants in brownish-green rather loose mats; stems about 5 mm. high with somewhat distant, spreading, variously curved leaves: stem-leaves, when moist, nearly straight and widely spreading, about 1 mm. long, from an ovate-lanceolate or lanceolate base gradually narrowed to a broad, grooved limb with mostly flat borders somewhat irregularly serrulate nearly one half down, the leaf-blade 2 or 3 cells wide on either side of the costa to the broadly acute apex; costa vanishing a few cells below the apex, narrow below,  $30\text{--}40\ \mu$  wide at base; leaf-cells pellucid, distinct to the apex, rather irregularly rectangular, the median ones about  $8\text{--}10\ \mu$  wide and  $40\ \mu$  long, those of the marginal row rather paler, broader, and shorter, forming an indistinct border; perichaetial leaves up to 2.5 mm. long, from an ovate, somewhat clasping base narrowed to a limb one and one half times to twice as long as the ovate part, otherwise very similar to the stem-leaves: seta flexuous, reddish, 8–10 mm. long; capsule short-ovate, about 0.8 mm. long, nodding, curved when dry, not ribbed; exothecal cells short and broad, rather thin-walled, highly convex on the incurved side of the capsule; annulus wanting; lid with a short, stout beak; peristome-teeth reddish-brown, up to  $350\ \mu$  high, mostly divided more than one half down into unequal, slender, papillose forks, vertically striate below with lamellae on the inner face not very prominent, mostly about  $20\ \mu$  apart, the basal membrane of three or four rows of darker cells projecting slightly above the mouth of the capsule: spores nearly smooth, up to  $14\ \mu$  in diameter.

Type collected between New Haven Gap and Vinegar Hill, Jamaica, *G. E. Nichols 155* (herb. N. Y. Bot. Gard.).

This species may be distinguished from *D. rubra* by the flat borders of the leaves, with much wider cells. It is nearest to *D. rufescens*, but differs in the more spreading leaves, nodding capsule, shorter marginal cells of the leaf and base of the peristome, in which the narrow, smooth cells with thickened walls do not extend well above the mouth of the capsule as in *D. rufescens*.

#### 7. *Dicranella Hilariana* (Mont.) Mitt. Jour. Linn.

Soc. 12: 31. 1869.

*Dicranum Hilarianum* Mont. Ann. Sci. Nat. II. 12: 52. 1839.

*Dicranum debile* Wilson, in Drummond, So. Mosses 51. 1841.

*Dicranum tenuirostre* Kunze; (Mont. Ann. Sci. Nat. II. 14: 347; hyponym. 1840) Schwaegr. Suppl. 4: *pl.* 108a. 1842.

*Angstroemia Liebmanniana* C. Müll. Syn. 2: 605. 1851.

*Dicranella Liebmanniana* Mitt. Jour. Linn. Soc. 12: 32. 1869.

*Campylochaetium mexicanum* Besch. Mém. Soc. Sci. Cherbourg 16: 168. 1872.

*Angstroemia mexicana* C. Müll. Linnaea 38: 630. 1874.

*Angstroemia trematodontifolia* C. Müll. Linnaea 38: 630. 1874.

*Dicranella mexicana* Jaeger & Sauerb. Ber. St. Gall. Nat. Ges. 1877–78: 373. 1879.

*Dicranella trematodontifolia* Jaeger & Sauerb. Ber. St. Gall. Nat. Ges. 1877–78: 376. 1879.

*Dicranella debilis* Lesq. & James, Man. 66. 1884.

*Dicranella leptorhyncha* Ren. & Card. Bull. Soc. Bot. Belg. 31: 143. 1893.

*Dicranella laxiretis* Ren. & Card. Rev. Bryol. 20: 30. 1893.

*Angstroemia pseudo-debilis* C. Müll. Hedwigia 37: 229. 1898.

? *Angstroemia Wrightii* C. Müll. Hedwigia 37: 229. 1898.

- Microdus cubensis* Paris, Index Bryol. Suppl. 244. 1900.  
*Microdus debilis* Besch.; Paris, Index Bryol. ed. 2. 3: 236. 1905.  
*Microdus laxiretis* Paris, Index Bryol. ed. 2. 3: 237. 1905.  
 ? *Microdus Wrightii* Paris, Index Bryol. ed. 2. 3: 240. 1905.

Plants in rather loose, green mats, with slender, often branching stems mostly 2–5 mm. high: stem-leaves when moist erect-spreading, sometimes slightly secund, the lower ones ovate-lanceolate, blunt, about 0.5 mm. long, the upper ones up to a little more than 2 mm. long, from a slightly broader, not clasping base gradually narrowed to an almost linear or slightly tapering, grooved limb, with the apex from broadly rounded to acutish and from nearly entire to crenate or toothed; leaf-margin more or less recurved and serrulate below the apex; costa stout, prominent on the back, sometimes rough or serrulate above and ending below the leaf apex: upper leaf-cells from nearly square to short-rectangular the lower one much larger and paler, with lax, rather thin walls throughout; perichaetial leaves scarcely clasping or different from the upper stem-leaves: seta weak, flexuous, up to 12 mm. long, yellowish or brown: capsule erect or slightly nodding, oval to short-cylindric, smooth, with a mostly broad mouth, an obliquely rostrate lid nearly as long as the capsule, and a large annulus; exothecal cells with somewhat thickened not sinuous walls about 20  $\mu$  wide and 25–40  $\mu$  long; peristome-teeth more than 200  $\mu$  high, vertically striate below, divided about three fourths down into slender, papillose segments: spores rough, about 16  $\mu$  in diameter.

TYPE LOCALITY: Southern Brazil.

DISTRIBUTION: Southern United States; Mexico; Central America; West Indies; also in South America.

ILLUSTRATIONS: Ann. Sci. Nat. II. 12: pl. 1, f. 3; Schwaegr. Suppl. 4: pl. 108a; Sull. Ic. Musc. pl. 20.

EXSICC.: Drummond, So. Mosses 51; Sull. Musci Cub. Wright. 34.

The specimens included here under *D. Hilariana* are somewhat variable but not more so than specimens from the United States that have been referred, and I believe correctly so, to *D. debilis*. The variation consists chiefly in the length of the upper leaves, the width of the leaf-apex, and the amount of serration on the leaf-border above and on the back of the costa near its termination. In all the specimens at least some of the leaves have a rounded-obtuse, crenate or dentate apex and leaf-cells pale, comparatively short, with lax, thin walls.

8. *Dicranella Herminieri* Besch. Ann. Sci. Nat. VI. 3: 180. 1876.  
~~*Trichostomum pyriforme* Lesq. + James Mun. p. 109, 1857.~~  
*Dicranella Tonduzii* Ren. & Card. Bull. Soc. Bot. Belg. 31<sup>1</sup>: 144. 1893.  
*Dicranella leptotrichoides* Ren. & Card. Bot. Gaz. 19: 237. 1894.  
*Angstroemia hydrophila* C. Müll. Hedwigia 37: 230. 1898.  
*Microdus hydrophilus* Paris, Index Bryol. Suppl. 245. 1900.  
*Dicranella substenocarpa* Ren. & Card. Bull. Soc. Bot. Belg. 41<sup>1</sup>: 11. 1905.  
*Microdus leptotrichoides* Paris, Index Bryol. ed. 2. 3: 237. 1905.

Plants mostly in dull-green, loose mats, or somewhat gregarious; stems usually simple, 4–6 mm. high or in wet places rarely up to 2.5 cm. high: leaves erect-appressed, slightly curved when dry, erect-spreading when moist; stem-leaves short, ovate-lanceolate to lanceolate, gradually narrowed to a rather broad, obtuse, nearly or quite entire apex, with a stout, scarcely percurrent costa, at the base about one fifth the width of the leaf-base; leaf-cells with walls slightly thickened nearly to the base, the median ones mostly narrowly rectangular, 4–5  $\mu$  wide and usually 2–6 times as long, the basal ones broader and longer; perichaetial leaves up to 3 mm. long, from an ovate base gradually narrowed to a grooved, narrowly lanceolate limb about twice as long with the borders often recurved and the costa vanishing below the obtuse or sometimes acute, entire or slightly crenate apex: seta usually yellowish, flexuous, 6–8 mm. long: capsule erect, symmetric, oval, with a large annulus and long-rostrate lid; peristome-teeth vertically striate below, more than 200  $\mu$  high, divided two thirds down or farther into 2 or rarely 3 slender, papillose forks: spores slightly rough, up to 18  $\mu$  in diameter.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: South Carolina to Louisiana and Florida; Cuba; Porto Rico; Jamaica; Guadeloupe; Martinique; Mexico; Costa Rica.

EXSICC.: Sull. & Lesq. Musci Bor. Am. 46b; ed. 2. 62; Aust. Musci App. 468; Holz. Musci Acroc. Bor. Am. 129; Sull. Musci Allegh. 177 (as *Trichostomum tenue*).

This species is nearest *D. Hilariana*, but has a narrower, more entire leaf-apex, longer, rather thicker-walled, narrower leaf-cells, and spores a little larger.

NOTE: *Dicranella compacta* (Schimp.) Mitt. Jour. Linn. Soc. 12: 37. 1869 (*Angstroemia compacta* C. Müll. Syn. 2: 606. 1851; *Dicranoweisia compacta* Schimp.; C. Müll. loc. cit., as synonym. 1851) is probably the same as *D. Herminieri*, in which case it will replace that name. The small amount and immature condition of the type material of *D. compacta* examined does not justify

making the change at present, however, as there are some differences in the descriptions that should be verified or disproved, the capsule of *D. compacta* being described as "cernua, incurva, pallida aurantiaca."

✓ 9. *Dicranella subinclinata* Lorentz, Moosst. 160. 1864.

*Dicranum caespitans* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 164. 1872.

*Dicranella stenocarpa* Besch. Ann. Sci. Nat. VI. 3: 182. 1876.

*Dicranella Martinicae* Broth. Symb. Ant. 3: 421. 1903.

Plants in rather loose, dull-green or brown tufts; stems mostly simple, about 1 cm. high, with the leaves erect-appressed, somewhat curved when dry, erect-spreading when moist: stem-leaves below small, gradually larger upward, about 1.5 mm. long, lanceolate or oblong-lanceolate with more or less recurved margins, a stout not quite percurrent costa, 60–70  $\mu$  wide at the base, and a narrowly obtuse, crenate apex; upper leaf-cells short, rectangular, mostly not more than twice as long as wide, 6–7  $\mu$  by 12–16  $\mu$ , the lower ones larger but mostly narrow, with colored, scarcely thinner walls to near the base; perichaetial leaves about 2.5 mm. long, from a scarcely clasping, ovate-lanceolate base gradually narrowed to a lanceolate-linear limb about twice as long, with recurved margins and an obtuse, crenate-toothed apex: seta reddish, at least when old, straight or somewhat flexuous, 1–1.5 cm. long: capsule symmetric, oval, smooth, erect or inclined, more or less contracted under the mouth when dry, with a large annulus and long, obliquely-rostrate lid; peristome-teeth 250–275  $\mu$  high, vertically striate below and papillose above, divided more than two thirds down into slender, papillose segments: spores 16–18  $\mu$  in diameter, finely papillose.

TYPE LOCALITY: Near Panama.

DISTRIBUTION: Mexico; Panama; Jamaica; Martinique. *Cuba (See below!)*

This species is larger than either *D. hilariana* and *D. Herminieri*, with leaf-cells more solid and regular than in the first and not so long and narrow as in the second, and the capsule, when dry and empty, usually more elongate and contracted under the mouth than in either.

✓ 10. *Dicranella reticulata* (C. Müll.) Paris, Index Bryol.

Suppl. 118. 1900.

*Angstroemia reticulata* C. Müll. Hedwigia 37: 228. 1898.

Plants in rather lax, green cushions; stems up to 1.5 cm. high, mostly simple, sometimes branching above: stem-leaves 1–1.5 mm. long, distant, from a scarcely clasping base rather gradually narrowed to a slightly incurved-spreading limb, entire or denticulate at the apex, with a percurrent costa and a distinct leaf-blade above; costa at the base about 65  $\mu$  wide; leaf-cells rectangular, toward the base about 8  $\mu$  wide and from nearly square at the margin to about four times as long as wide near the costa, the upper cells smaller, up to about twice as long as wide; perichaetial leaves up to 3 mm. long or more, from a clasping, often somewhat obovate base abruptly or truncately narrowed to a flexuous point 3–4 times as long as the clasping part, the leaf-blade more or less distinct to the apex; cells of perichaetial leaves below mostly long-rectangular, 8–12  $\mu$  wide and up to 100  $\mu$  long: seta pale, up to 10 mm. long: capsule oval, erect, more or less furrowed when dry, 1.5 mm. long with an abruptly rostrate lid nearly as long; annulus large; peristome-teeth 200  $\mu$  or more high, divided two thirds down, vertically striate below and densely papillose above: spores rough, often coarsely papillose, 18–23  $\mu$  in diameter.

TYPE LOCALITY: Cuba.

DISTRIBUTION: Cuba; Jamaica; Guadeloupe.

EXSICC.: Sull. Musci Cub. Wright. 36.

11. *Dicranella crispa* (Ehrh.) Schimp. Coroll. Bryol. Eur. 13. 1855.

*Dicranum crispum* Ehrh.; Hedw. Descr. 2: 91. 1789.

Plants in loose, mostly light-green mats; stems more or less branching, 5–12 mm. high, with rather distant, spreading-flexuous leaves: stem-leaves from an ovate or lanceolate, not or loosely clasping base, gradually narrowed to a very slender limb two to three times as long with nearly or quite entire, somewhat incurved margins and an acute, serrulate apex; costa excurrent, rather pale below, a little above the base about 40  $\mu$  wide and one sixth of the leaf-width, with the blade very narrow and indistinct some distance below its apex; leaf-cells narrowly rectangular, those in the upper part of the blade 5  $\mu$  wide and 6–8 times as long,

those toward the base wider; perichaetial leaves up to 3 mm. long, from an ovate-lanceolate, clasping base more abruptly narrowed to a spreading-flexuous grooved limb with the leaf-margin often distinctly crenulate at the shoulder: seta slender, reddish, up to 18 mm. long: capsule rather pale and thin-walled, obovate, when dry and empty wide-mouthed, deeply furrowed and obtuse, about 0.75 mm. long with a conic-rostrate lid of about the same length; exothecal cells mostly elongate, with slightly thickened somewhat sinuous walls; annulus large, often nearly simple; peristome-teeth up to 80  $\mu$  wide and 350  $\mu$  high, divided nearly one half down into slender forks, the low basal membrane of narrow, not striate, red cells extending slightly above the mouth of the capsule: spores slightly rough, up to 18  $\mu$  in diameter.

TYPE LOCALITY: Sweden.

DISTRIBUTION: Arctic America to Montana and Idaho; also in Europe and Asia.

ILLUSTRATIONS: Hedw. Descr. 2: *pl.* 33; B.S.G. Bryol. Eur. *pl.* 504; Rab. Krypt.-Fl. 4: *f.* 115.

EXSICC.: Drummond, Musci Am. 101; Macoun, Can. Musci 504.

This species usually seems to be dioicous, but sometimes fertile plants bear a short branch under the perichaetium with an inconspicuous male flower.

### 12. *Dicranella secunda* (Sw.) Lindb. Musci Scand. 26. 1879.

*Dicranum secundum* Sw. Sv. Vet.-Akad. Nya Handl. 16: 244. 1795.

*Dicranum subulatum* Hedw. Sp. Musc. 128. 1801.

*Dicranum curvatum* Hedw. Sp. Musc. 132. 1801.

*Dicranella curvata* Schimp. Coroll. Bryol. Eur. 13. 1855.

Plants in soft green tufts; stems up to 2 cm. high, with leaves more or less erect or spreading-flexuous, often curved-secund: upper stem-leaves from an ovate-lanceolate base rather gradually narrowed to a slender, grooved subula, denticulate to nearly entire at the apex; costa 40–45  $\mu$  wide at the base, about one fifth of the width of the leaf-base, more or less excurrent, the narrow leaf-blade becoming indistinct or wanting some distance below the apex; upper leaf-cells very narrow, 3–4  $\mu$  wide and up to 40  $\mu$  long, the basal ones about as long and twice as wide; perichaetial leaves denticulate at the apex and more or less crenulate-denticulate at the shoulder, up to about 3 mm. long, the inner one or two convolute often one half up, abruptly, sometimes almost truncately narrowed to an erect subula, usually shorter than the next outer leaves, which are less clasping, with shorter ovate or obovate base only about one fourth the subula in length: seta erect, red, 10–16 mm. long: capsule short-oblong, more or less curved and nodding to horizontal, not strumose, ribbed when dry, with broad annulus and long, obliquely rostrate lid; exothecal cells mostly irregularly elongate with somewhat sinuous, thickened walls; peristome-teeth 50–60  $\mu$  wide and 350  $\mu$  high, reddish-brown, divided scarcely one half down, striate below, with the inner lamellae often distant, and the basal membrane usually not evident above the mouth and 3 or 4 rows high of narrow, rather indistinct cells: spores slightly papillose, up to 18  $\mu$  in diameter.

TYPE LOCALITY: Sweden.

DISTRIBUTION: From subarctic America to the White Mountains in the East and to California in the West; also in Europe and Asia.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl.* 31, 34; B.S.G. Bryol. Eur. *pl.* 60, 61.

EXSICC.: Drummond, Musci Am. 98; Sull. & Lesq. Musci Bor. Am. 50; ed. 2. 66; Aust. Musci App. 469; Macoun, Can. Musci 28; Holz. Musci Acroc. Bor. Am. 305.

### 13. *Dicranella pusilla* (Hedw.) E. G. Britton.

*Dicranum pusillum* Hedw. Descr. 2: 80. 1789.

*Dicranum cerviculatum* Hedw. Descr. 3: 69. 1791.

*Dicranella cerviculata* Schimp. Coroll. Bryol. Eur. 13. 1855.

*Dicranella polaris* Kindb. Ottawa Nat. 5: 195. 1892.

Plants in rather compact, green or yellowish-green mats, with simple stems rarely more than 1 cm. high: stem-leaves erect-spreading, flexuous, sometimes curved-secund, from an ovate to ovate-lanceolate, scarcely clasping base, gradually narrowed to a slender, grooved limb, slightly crenulate-serrate almost to the base; costa rather pale, smooth on the back above, about 100  $\mu$  wide at the base, one third the width of the leaf below, gradually wider up to the shoulder of the leaf, from which it tapers to the excurrent, denticulate, acute apex; leaf-cells elongate-rectangular, in the upper very narrow part of the blade scarcely 5  $\mu$  wide and up to 40  $\mu$  long, in the basal part more or less hyaline, thin-walled, about 8  $\mu$  wide and 100  $\mu$  long or longer; perichaetial leaves much like stem-leaves but longer, up to 4 mm., with a broader, clasping

base and more abruptly narrowed to the slender, more or less sinuous and denticulate point: seta yellowish, flexuous, up to 12 or rarely 16 mm. long: capsule short-oval, slightly curved, nodding, strumose, ribbed when dry, with an imperfect annulus of one row of pale, hardly cohering cells that remain more or less attached to either the lid or the capsule; lid convex, obliquely rostrate; exothecal cells slightly transversely elongate in three or four rows just below the mouth, farther down greatly elongate with sinuous, thickened walls; peristome-teeth 60–70  $\mu$  wide at the base and 300  $\mu$  high or more, striate, divided about one half down into mostly two striate forks, with the basal membrane not projecting: spores slightly roughened, 16–20  $\mu$  in diameter.

TYPE LOCALITY: Near Berlin, Germany.

DISTRIBUTION: Arctic America to New York and New Jersey in the East and to British Columbia in the West; also in Europe.

ILLUSTRATIONS: Hedw. Descr. 2: pl. 29b; 3: pl. 37a. *P. S. A. 56.*

EXSICC.: Sull. Musci Allegh. 167; Sull. & Lesq. Musci Bor. Am. 49; ed. 2. 65, 66, in part; Macoun, Can. Musci 476.

14. *Dicranella Perrottetii* (Mont.) Mitt. Jour. Linn.  
Soc. 12: 35. 1869.

*Dicranum Perrottetii* Mont. Ann. Sci. Nat. II. 19: 241. 1843.

*Dicranella flava* Besch. Ann. Sci. Nat. VI. 3: 181. 1876.

Plants in yellowish or brownish-green tufts; stems up to 2.5 cm., rarely 4 cm. high, often branching: stem-leaves erect-spreading, often curved-secund, the lower from a lanceolate base gradually narrowed to a stout nearly entire point with a narrow blade extending to the apex, the upper and perichaetial leaves larger, from an ovate, somewhat clasping base, more abruptly narrowed to the entire or slightly denticulate apex, with the leaf-blade very narrow above, sometimes not distinct; costa stout, 80–100  $\mu$  wide at the base, about one fifth the width of the leaf-base, vanishing just below the apex in the lower leaves and often slightly excurrent in the upper leaves; lower leaf-cells in the stem-leaves elongate-rectangular, colored, the upper cells shorter, about 6  $\mu$  by 12  $\mu$ , the perichaetial leaves with the lower cells much larger, paler, often irregular: seta somewhat flexuous, often not twisted, yellowish, about 12 mm. long: capsule short-oval to oblong, more or less nodding, not furrowed, with a large annulus and an obliquely rostrate lid; exothecal cells up to 25  $\mu$  wide and from scarcely elongate to about twice as long as broad; peristome-teeth about 50  $\mu$  wide and 225–275  $\mu$  high, mostly divided more than two thirds down into unequal forks, vertically striate below, papillose and pale above, from a low basal membrane scarcely evident above the mouth of the capsule: spores minutely papillose, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Jamaica; Guadeloupe; Martinique.

ILLUSTRATION: Ann. Sci. Nat. II. 19: pl. 8, f. 1.

EXSICC.: Husnot, Pl. Ant. 126.

15. *Dicranella Harrisii* (C. Müll.) Broth. in E. & P. Nat.  
Pfl. 1<sup>3</sup>: 309. 1901.

*Angstroemia Harrisii* C. Müll. Bull. Herb. Boiss. 5: 554. 1897.

*Microdus Harrisii* Paris, Index Bryol. Suppl. 244. 1900.

Plants in rather compact, dull, yellowish-green cushions; stems about 8 mm. high, mostly simple: stem-leaves somewhat distant, short below, gradually larger upward, from a scarcely clasping, ovate base rather abruptly narrowed to a somewhat incurved-spreading limb with an indistinct blade or none above and a mostly denticulate apex; costa at base 60–100  $\mu$  wide; leaf-cells below narrowly rectangular, colored, with walls slightly thickened, above much smaller and indistinct; perichaetial leaves up to 4 mm. long, from a broad, clasping, sometimes obovate base, abruptly narrowed to a slender, terete, flexuous limb without a distinct lamina above and denticulate at the apex: seta yellow, or finally reddish, about 8 mm. long: capsule oval, about 1 mm. long, nearly erect and symmetric, sometimes slightly strumose at the base, furrowed when dry; exothecal cells irregular, 20  $\mu$  wide and mostly less than twice as long; lid obliquely rostrate, about as long as the capsule; annulus large; peristome-teeth 250–350  $\mu$

high, divided three fourths down, striate below, with densely papillose, paler forks: spores up to 20  $\mu$  in diameter, rough.

TYPE LOCALITY: Blue Mountain Peak, Jamaica.

DISTRIBUTION: Known only from the type locality.

This species is near *D. reticulata*, but without the distinct lamina of the upper leaf found in that species; also the spores are rather smoother and smaller.

16. *Dicranella Barnesii* Card. Rev. Bryol. 37: 118. 1910. <sup>part of the</sup>

Dioicous or autoicous, the male flower either at the apex of a distinct plant or on an elongate branch from well below the perichaetium: inner perigonal leaves with broadly ovate base rather abruptly narrowed to a smooth, flexuous point, denticulate at the apex, or sometimes without an elongate point, and enclosing 5 or 6 antheridia 0.4 mm. long, and about twice as many paraphyses: plants in rather loose tufts, with stems mostly 5–6 mm. high: stem-leaves up to 2.5 mm. long, from a narrow, erect, scarcely distinct base, gradually narrowed to a spreading, flexuous, somewhat tubulose or deeply grooved point, entire except at the apex; costa broad below, more than one third the width of the leaf-base, often rather indistinct, filling most of the leaf above; lower leaf-cells linear, those in the narrow blade above rectangular, about 5  $\mu$  wide and 4–6 times as long; perichaetial leaves like the stem-leaves but with broader, ovate base: seta yellowish, 12–14  $\mu$  long: capsule oblong-cylindric, erect and straight or somewhat curved, 1.5 mm. long; exothecal cells elongate, mostly 3–4 times as long as broad, with curved walls; lid obliquely subulate-pointed, about two thirds as long as the capsule; annulus none; peristome-teeth about 300  $\mu$  high and 45  $\mu$  wide at the base, red, vertically striate to above the middle, separate to near the base and divided three fourths down or more into slender forks: spores minutely roughened, up to 14  $\mu$  in diameter.

TYPE LOCALITY: Honey Station, Hidalgo.

DISTRIBUTION: Known only from the type locality.

17. *Dicranella heteromalla* (L.) Schimp. Coroll. Bryol.  
Eur. 13. 1855.

*Bryum heteromallum* L. Sp. Pl. 1118. 1753.

*Dicranum orthocarpum* Hedw. Sp. Musc. 131. 1801.

*Dicranella Fitzgeraldi* Ren. & Card. Bot. Gaz. 13: 197. 1888.

*Campylopus Henrici* Ren. & Card. Bot. Gaz. 13: 197. 1888.

Plants in dense, dark-green tufts or broad mats, with more or less branching stems mostly 1–4 cm. high and leaves somewhat erect-flexuous or usually appressed and curved-secund: stem-leaves from a lanceolate or ovate-lanceolate base, gradually narrowed to a rough subulate point formed by the excurrent costa, the leaf-blade only 1–3 cells wide above the middle of the leaf on either side and serrulate nearly to the base; costa about 70  $\mu$  wide at the base, one third of the width of the leaf-base and serrulate on the back in the upper part; leaf-cells rectangular, 2–6 times as long as wide, with slightly thickened, colored walls extending to the base; perichaetial leaves from a broader, more or less obovate, clasping base abruptly narrowed to a slender, rough subula 4–6 times as long as the clasping part, with the lower leaf-cells broader and less regular: seta erect or curved, yellowish, 5–15 mm., rarely up to 30 mm. long: capsule erect or nodding, 1–3 mm. long, ovoid to cylindric, usually more or less curved and becoming furrowed and contracted under the oblique mouth when dry and empty; exothecal cells excepting two or three rows of small, obscure cells just below the mouth, irregular, elongate, with very unequally thickened, sinuous walls; lid conic, long- and obliquely-rostrate; annulus imperfect, of a single row of small, roundish, hyaline, loosely cohering cells; peristome-teeth up to 80  $\mu$  wide at the base, red, striate, usually divided one half down into two papillose forks, the inner lamellae prominent, regular, about 20  $\mu$  apart, and the basal membrane scarcely projecting above the mouth: spores smooth, up to 17  $\mu$  in diameter.

TYPE LOCALITY: England.

DISTRIBUTION: Newfoundland to Florida and Alaska to California and Costa Rica; also in Europe and Asia.

ILLUSTRATIONS: Dill. Hist. Musc. pl. 47, f. 37; Hedw. Descr. 1: pl. 26; Hedw. Sp. Musc. pl. 30; B.S.G. Bryol. Eur. pl. 62; Bot. Gaz. 13: pl. 13.

EXSICC.: Drummond, Musci Am. 95, 96; Drummond, So. Mosses 53, 54; Sull. Musci Allegh. 165, 166; Sull. & Lesq. Musci Bor. Am. 51, 52; ed. 2. 67, 68; Aust. Musci App. 79, 80; Macoun, Can. Musci 29; Holz. Musci Acroc. Bor. Am. 5, 6, 28, 128.

18. *Dicranella guadelupensis* Mitt. Jour. Linn. Soc. 12 : 37. 1869.*Dicranella cespitans* Besch. Ann. Sci. Nat. VI. 3: 183. 1876.*Dicranella homomalla* Besch. Ann. Sci. Nat. VI. 3: 184. 1876.

Plants in compact yellowish-brown cushions; stems often branched, up to 4 cm. high, with the lower leaves erect-appressed, slightly curved when dry, the upper more or less curved-secund; stem-leaves about 2 mm. long, from a small, lanceolate base gradually narrowed to a nearly subulate, slightly grooved, mostly entire apex; costa 80–100  $\mu$  wide at the base, about one third of the width of the leaf-base; blade gradually narrowed, extending two thirds up or sometimes almost to the apex but very narrow and indistinct above; leaf-cells throughout narrowly rectangular, with thickened colored walls; perichaetial leaves up to 4 mm. long, from a short, often obovate, clasping base abruptly narrowed to a slender, slightly grooved limb 3–4 times as long as the clasping base and denticulate at the apex; leaf-cells larger and less regularly rectangular than in the stem-leaves but not lax and hyaline toward the base: seta mostly erect, 10–12 mm. long: capsule short-oval, nodding, more or less strumose; lid obliquely rostrate, a little shorter than the capsule, somewhat ribbed and blackish when dry: annulus broad; peristome-teeth irregular, scarcely 125  $\mu$  high, vertically striate and papillose nearly throughout, unequally divided nearly to the base with the broader fork sometimes again divided: spores rough, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Guadeloupe and Martinique.

19. *Dicranella lagunaria* (C. Müll.) Broth. in E. & P. Nat.Pfl. 1<sup>3</sup>: 309. 1901.*Angstroemia lagunaria* C. Müll. Bull. Herb. Boiss 5: 187. 1897.*Microdus lagunarius* Paris, Index Bryol. Suppl. 245. 1900.

Plants in low, scarcely cohering, dark-green cushions; stems simple, 5–8 mm. high, with leaves rather crowded, nearly straight and erect-appressed or slightly spreading: stem-leaves from an ovate-lanceolate base gradually narrowed to a rather stout limb of about equal length with entire, recurved borders and a very narrowly obtuse or acutish, often slightly crenate apex; costa about 40  $\mu$  wide and one fifth the width of the leaf-base, vanishing just below the apex of the leaf; leaf-cells with walls slightly thickened throughout, distinct above, rather broad and irregular, the median ones 6–8  $\mu$  wide and 20–40  $\mu$  long, the basal longer and more regularly rectangular; outer perichaetial leaves up to 3.5 mm. long with the base broader than in the stem-leaves and more abruptly narrowed to a limb nearly twice the basal part in length, the inner leaves shorter with a clasping base rather more than one half the length of the leaf: seta yellow, erect, 5–6 mm. long: capsule 1.5 mm. long, oblong, erect, with exothecal cells narrow, irregular, and thick-walled; lid with a long-rostrate beak; annulus large; peristome-teeth red, striate below, about 100  $\mu$  high and 35  $\mu$  wide at base, not divided or irregularly cleft: spores coarsely papillose, (immature) more than 16  $\mu$  in diameter.

TYPE LOCALITY: Laguna del Pino, Guatemala.

DISTRIBUTION: Known only from the type locality.

This species appears to differ from *D. brachyblepharis* chiefly in having the leaves closer together, shorter and straighter, with perichaetial leaves with a relatively shorter point; better and more abundant material may show the two to be scarcely distinct.

20. *Dicranella brachyblepharis* (C. Müll.) Mitt. Jour. Linn.

Soc. 12 : 34. 1869.

*Angstroemia brachyblepharis* C. Müll. Syn. 1: 435. 1848.*Angstroemia microdonta* C. Müll. Syn. 2: 606. 1851.*Dicranella microdonta* Mitt. Jour. Linn. Soc. 12: 34. 1869.*Microdus Liebmanni* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 162. 1872.*Microdus ovatus* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 162. 1872.*Microdus Sartorii* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 162. 1872.

Plants in low, dark-green cushions; stems simple or somewhat branched, 5–10 mm. high, with leaves more or less curved-secund at the apex: stem-leaves often distant, ovate-lanceolate to lanceolate, not clasping, gradually narrowed to the entire apex, with the leaf-blade above very narrow, often indistinct; costa vanishing or percurrent, at the base well defined, 50–60  $\mu$

wide; leaf-cells rectangular, the median ones 6–8  $\mu$  wide and up to 40  $\mu$  long, with scarcely thickened walls; perichaetial leaves longer, up to 4 mm., with ovate, somewhat clasping base, rather gradually narrowed to a limb up to twice as long, with an entire or slightly denticulate, acute apex: seta yellowish, slender, mostly erect, 5 mm. long: capsule oblong, symmetric, smooth or somewhat furrowed when dry, with elongate, irregular, thick, not sinuous-walled cells about 20  $\mu$  wide and 30–50  $\mu$  long; lid with a long obliquely rostrate beak; annulus large; peristome-teeth red, vertically striate below, pale, papillose above, about 60–120  $\mu$  high by 35  $\mu$  wide at the base, irregularly divided scarcely one half down into unequal forks: spores coarsely papillose, up to 22  $\mu$  in diameter or more.

TYPE LOCALITY: Near Jalapa, Vera Cruz.

DISTRIBUTION: Mexico and Guatemala.

A single plant from the type collection of *Microdus ovatus* has been received from the Museum d'Histoire Naturelle, Paris; it has the stems 5 mm. high, the pedicel brown, 4 mm. high, the capsule erect, oblong, with peristome wanting; the capsule contained spores very rough and up to 25  $\mu$  in diameter, this being rather larger than the average for *M. Liebmanni*, not smaller, as given by Bescherelle.

### 21. *Dicranella Dussii* R. S. Williams, sp. nov.

Plants in loose, brownish-green tufts; stems mostly branching, about 1 cm. high, with erect-spreading, flexuous leaves: lower stem-leaves small, lanceolate, gradually larger upward, from a short ovate-lanceolate base gradually narrowed to a mostly somewhat curved, grooved limb four or five times as long, with the blade distinct almost or quite to the denticulate apex; costa about 80  $\mu$  wide at the base, one fourth the width of the leaf-base, scarcely percurrent; lower leaf-cells rectangular, the upper ones shorter, about 6–7  $\mu$  wide and 10–20  $\mu$  long, rather thin-walled and distinct throughout; perichaetial leaves up to 3.5 mm. long with the base scarcely clasping or larger than in the stem-leaves but with a longer, flexuous limb often 6–7 times the broader part in length, with a narrow but distinct, more or less recurved blade extending to the denticulate apex and irregularly serrulate some distance down: seta erect, 10–15 mm. long: capsule oblong, symmetric, erect, a little more than 1 mm. long, with large annulus and long-rostrate lid; peristome-teeth scarcely 200  $\mu$  high, about 30  $\mu$  wide at the base, vertically striate below, papillose above, divided two thirds down into unequal forks: spores minutely roughened, up to 16  $\mu$  in diameter.

Type collected on rocks near La Soufrière, Guadeloupe, 1898, *Duss 833*, in part (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Known only from the type locality.

This species has leaves somewhat like *D. angustifolia* Mitt., but in the Guadeloupe plant they are distinctly serrulate above and the capsule is longer and erect. From *D. brachyblepharis* it is distinguished by the relatively much smaller basal part of the leaf and the smaller, smoother spores

### 22. *Dicranella longirostris* (Schwaegr.) Mitt. Jour. Linn.

Soc. 12: 30. 1869.

*Trematodon longirostris* Schwaegr. Suppl. 1<sup>2</sup>: 343. 1816.

*Coscinodon longirostris* Brid. Musc. Recent. Suppl. 4: 51. 1819.

*Weisia longirostris* Schwaegr. Suppl. 2<sup>1</sup>: 54. 1823.

*Seligeria longirostris* C. Müll. Syn. 1: 421. 1848.

*Microdus longirostris* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 162. 1872.

*Microdus crispulus* Besch. Ann. Sci. Nat. VI. 3: 179. 1876.

*Dicranella pseudolongirostris* Card. Rev. Bryol. 36: 68. 1909.

Plants in low, rather compact, brownish-green mats; stems mostly simple and less than 1 cm. high, with leaves more or less erect and appressed or somewhat curved: stem-leaves short-lanceolate, mostly a little more than 1 mm. long, with stout nearly percurrent costa about 70  $\mu$  wide below, and leaf-blade three or four cells wide on either side of the costa to the entire, narrowly obtuse apex; leaf-cells rectangular with walls somewhat thickened throughout, the basal ones narrow, about 8  $\mu$  wide and 50  $\mu$  long, the upper one and a half times to twice as long as wide; perichaetial leaves erect, scarcely clasping, up to 2.5 mm. long, from an ovate base gradually narrowed to a rather broad, grooved limb not much longer than the basal part, with recurved margins and an entire or scarcely crenate apex: seta erect, yellowish, 7 mm. long: capsule oval, symmetric, erect, 1.25 mm. long, when dry and empty dark and somewhat ribbed, the exothecal cells, with thickened walls, up to 50  $\mu$  long and 8–10  $\mu$  wide; annulus large; lid obliquely long-rostrate; peristome-teeth mostly less than 120  $\mu$  high, papillose, not striate, irregularly divided

about one half down or sometimes not divided or only perforate along the median line: spores up to  $18\ \mu$  in diameter, very coarsely papillose.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: St. John; Dominica; Guadeloupe; Martinique; Barbados; Mexico.

ILLUSTRATION: Schwaegr. Suppl. *pl.* 117.

EXSICC.: Husnot, Pl. Ant. 124 (as *D. Duchassaingii* Schimp.).

23. *Dicranella sphaerocarpa* Card. Rev. Bryol. 36: 69. 1909.

Plants in loose green mats or somewhat gregarious; stems up to 5 mm. high, branching, with leaves erect-flexuous when dry: upper stem-leaves lanceolate or oblong-lanceolate, about 2 mm. long, with a mostly narrowly obtuse, crenate apex and borders recurved above, the leaf-blade usually 3 or 4 cells wide on either side of the costa to near the apex; costa  $50\text{--}60\ \mu$  wide below and one fifth to one seventh the leaf-width, vanishing in or below the apex; leaf-cells, with thin walls, mostly rectangular, the lower ones about  $12\ \mu$  wide and  $60\text{--}80\ \mu$  long, the median  $8\text{--}10\ \mu$  by  $20\ \mu$ , the upper shorter; perichaetial leaves scarcely clasping, resembling the upper stem-leaves but with rather broader base: seta erect-flexuous, yellowish, about 5 mm. long: capsule erect, nearly globose, 0.6 mm. in diameter, the exothecal cells  $20\text{--}30\ \mu$  wide and from scarcely elongate to twice as long as wide, with the walls slightly thickened at the angles; lid obliquely rostrate, about the length of the capsule; annulus large, of 2 rows of cells; peristome-teeth pale rusty-brown, less than  $100\ \mu$  high, papillose, irregularly divided or sometimes not divided: spores minutely papillose, up to  $17\ \mu$  in diameter.

TYPE LOCALITY: Etzatlan, Jalisco.

DISTRIBUTION: On bare earth; known only from the type locality.

24. *Dicranella barbensis* Ren. & Card. Bull. Soc. Bot. Belg. 31<sup>1</sup>: 145. 1893.

Plants in thin, loose mats or somewhat gregarious; stems mostly simple, 5–6 mm. high, with leaves when dry erect-appressed, erect-spreading when moist: stem-leaves somewhat distant, lanceolate or ovate-lanceolate, the lower ones short, the upper gradually larger, with a percurrent costa about  $50\ \mu$  wide at the base and the leaf-blade distinct to the not quite entire apex; leaf-cells distinct, rather short rectangular throughout, mostly  $8\text{--}10\ \mu$  wide and  $16\text{--}20\ \mu$  long, with scarcely thickened walls; perichaetial leaves about 2 mm. long, from a broad-ovate base, rather gradually narrowed to an erect limb of about equal length, with the stout costa percurrent and slightly denticulate at the apex, and the cells of the lower part of the leaf more lax and irregular than in the stem-leaves: seta straight, straw-colored, 6–8 mm. long: capsule erect, oval, symmetric, with a large annulus and long, obliquely rostrate lid; peristome-teeth red, papillose, not vertically striate, irregular, two to three times forked, divided to the middle or below.

TYPE LOCALITY: Forests of Barba, Costa Rica.

DISTRIBUTION: Costa Rica; Jamaica.

The only specimens of the type collection seen are too immature for satisfactory examination of peristome and spores. Specimens collected by L. M. Underwood at Cinchona, Jamaica, and referred here, show peristome-teeth red, irregular, about  $150\ \mu$  high, papillose, not vertically striate, with forks often very unequal but not more than two in number, and spores  $16\ \mu$  in diameter, rough with minute papillae.

25. *Dicranella alpina* (C. Müll.) Paris, Index Bryol. Suppl. 115. 1900.

*Angstroemia alpina* C. Müll. Bull. Herb. Boiss. 5: 186. 1897.

*Dicranella gracilicaulis* Card. Rev. Bryol. 37: 118. 1910.

Dioicous: plants in low rather broad yellowish-brown cushions; stems very small, simple: leaves somewhat laxly imbricate, spreading when moist, from a very narrow base, lanceolate-acuminate, the broad percurrent costa occupying the very entire, elongate, more or less convolute subula, with basal cells rather lax, larger, those toward the apex much smaller, more rectangular; perichaetial leaves the longest: capsule on a yellowish, somewhat slender, elongate seta, very small, cylindric-elliptic, small-mouthed, with a conic, obliquely rostrate lid; annulus narrow, persistent; peristome short, normal: calyptra smooth. (Translated from the original description.)

TYPE LOCALITY: Naguala, Guatemala.

DISTRIBUTION: Mexico and Guatemala.

The only specimens in the herbarium of the New York Botanical Garden under this name were collected at Alta Verapaz (*Turckheim 6653*), and at Orizaba (*Smith*). The former are mostly not *Dicranella*; the few plants of *Dicranella* present have erect, appressed leaves, leaf-cells narrow with somewhat thickened walls even in the base of the perichaetial leaves, a broad annulus, peristome-teeth about 100  $\mu$  high, red and papillose, and spores rather coarsely papillose, up to 18  $\mu$  in diameter. The Mexican specimens are in fine condition, rather taller than those from Guatemala, but showing no essential differences.

26. *Dicranella remotifolia* Besch. Ann. Sci. Nat. VI. 3: 185. 1876.

Plants in compact, deep tufts, brownish below, yellowish-green above, the slender, somewhat branching stems up to 6 cm. high with rather distant leaves nearly uniform in size throughout, and spreading-crispate when dry, widely spreading and somewhat incurved when moist: leaves 2–2.5 mm. long, from a broad base gradually narrowed to a nearly linear, grooved, rather broad limb, with margins slightly revolute, the apex rounded-obtuse, somewhat cucullate and nearly or quite entire; costa stout, at base 80  $\mu$  wide, about one fifth the width of the leaf-base, not quite percurrent: leaf-cells short-rectangular below, mostly one and one half to three times as long as wide, gradually smaller above, from nearly square to about twice as long as wide: fruit unknown.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Known only from the type locality.

Specimens in the Mitten collection from Guadeloupe (*Marie 148*) seem to consist entirely of male plants; they are about 1.5 cm. high with abundant, axillary, scattered flowers.

27. *Dicranella Mülleri* Schimp.; Besch. Mém. Soc. Sci. Nat.  
Cherbourg 16: 163. 1872.

Dioicous: plants laxly cespitose, brownish-yellow with minute stems: older stem-leaves erect-spreading, flexuous, distant, long-cuspidate from an ovate-lanceolate base, with margin very entire and everywhere revolute, the younger leaves exactly linear-lanceolate and flat; costa vanishing below the apex: male plant slender with the flower growing from the base of the stem: capsule, on a flexuous, reddish seta, oblong-ovate, erect or pendulous; lid with a short straight subula (according to Bescherelle).

TYPE LOCALITY: Cordoba, Vera Cruz.

DISTRIBUTION: Known only from the type locality.

The specimens in the herbarium of the New York Botanical Garden are evidently part of the type collection; they are too immature to show any characters of the peristome; the filiform stems are 5–6 mm. high and, with the spreading leaves, scarcely 1 mm. across; the leaves at apex are mostly narrowly obtuse and crenate or denticulate and the costa vanishes 2 or 3 cells below the apex; leaf-cells rather pale, irregular and laxly rectangular throughout, the upper about 6  $\mu$  by 25  $\mu$ , the lower up to 10  $\mu$  by 40  $\mu$ .

EXCLUDED SPECIES

*Dicranella Belangeriana* Besch. Ann. Sci. Nat. VI. 3: 183 (1876), from Martinique, is a mixture of two species, *Rhamphidium dicranoides* (Schimp.) Broth. and *Dicranella Perrottetii* (Mont.) Mitt.

*Dicranella cerviculatula* Kindb. Ottawa Nat. 5: 195 (1892), is *Dicranum hyperboreum* (Gunn.) Smith.

*Dicranella parvula* Kindb.; Macoun, Bull. Torrey Club 16: 91 (1889), is *Didymodon parvulus* (Kindb.) E. G. Britton.

3. **CAMPYLOPODIUM** (C. Müll.) Besch. Ann. Sci. Nat.  
V. 18: 189. 1873.

*Angstroemia* § *Campylopodium* C. Müll. Syn. 1: 429. 1848.

Small mosses growing on earth; American species dioicous. Stems erect, simple, with radicles at the base. Upper leaves from a more or less clasping base abruptly narrowed to a spreading-flexuous subula; leaf-cells mostly rectangular with scarcely thickened, not pitted walls and alar cells not differentiated. Seta stout, twisted and sinuous when dry, regularly recurved, sigmoid, or geniculate above the middle when moist. Capsule symmetric, smooth or sometimes appearing slightly ribbed, with an annulus and a conic, obliquely rostrate lid;

peristome usually present, the teeth more or less divided along the median line, with the outer plates vertically striate and forks pale and papillose above.

The species, *Angstroemia euphoroclada* C. Müll.

Distinguished from *Dicranella* by the stout seta regularly recurved when moist, from *Campylopus* by the lack of differentiated alar cells.

#### 1. *Campylopodium pusillum* (Schimp.) R. S. Williams.

*Campylopus pusillus* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 165. 1872.

*Angstroemia Sartorii* C. Müll. Linnaea 38: 629. 1874.

*Angstroemia Pilopogon* C. Müll. Linnaea 38: 630. 1874.

*Dicranella Sartorii* Jaeger, Ber. St. Gall. Nat. Ges. 1877-78: 373. 1879.

*Dicranella Pilopogon* Jaeger, Ber. St. Gall. Nat. Ges. 1877-78: 373. 1879.

*Campylopodium Pilopogon* Paris, Index Bryol. 238. 1894.

*Campylopodium Sartorii* Paris, Index Bryol. 238. 1894.

*Dicranum magnirete* C. Müll. Bull. Herb. Boiss. 5: 186. 1897.

*Dicranum Türckheimii* C. Müll. Bull. Herb. Boiss. 5: 186. 1897.

Dioicous: plants in rather loose tufts with a few radicles at the base; stems simple, up to about 1 cm. high, with leaves from an erect base more or less spreading-flexuous, rarely somewhat secund at the apex of the stem: lower stem-leaves short, ovate-lanceolate, not clasping, the upper and perichaetial ones longer, up to about 4 mm. long, from an ovate, clasping base rather abruptly narrowed to a slender subula two or three times as long, the apex usually slightly denticulate and margins at the shoulder of the leaf crenulate; costa stout, about 80  $\mu$  wide near the base and one third to one fifth the width of the leaf-base, filling most of the subula, the very narrow leaf-blade often extending nearly to the apex; lower leaf-cells mostly rectangular, up to about 10  $\mu$  wide and 35-45  $\mu$  long, or the lowest basal cells in the stem-leaves often shorter and broader, 12  $\mu$  wide by 12-24  $\mu$  long, with scarcely thickened, not pitted walls; cells at the leaf-shoulder shorter and irregular, becoming very narrow in the blade above: seta stout, brown, up to 6 mm. long, sinuous and twisted when dry, regularly recurved, sigmoid, or geniculate above the middle when moist: capsule oval, 1-1.5 mm. long, smooth or appearing somewhat ribbed when dry, without stomata; exothecal cells, irregularly elongate, with uniformly much thickened walls, becoming small and short just below the mouth; lid conic with an obliquely rostrate beak sometimes nearly equaling the capsule in length; annulus large; peristome-teeth separate to near the rim of the capsule, at the base up to 40  $\mu$  wide, 200  $\mu$  or more high, vertically striate below, with articulations 9-12  $\mu$  apart, above paler and papillose, divided three fourths down or more or sometimes united above: spores coarsely papillose, up to 24  $\mu$  in diameter: calyptra entire at base, smooth, split on one side to above the middle.

TYPE LOCALITY: Orizaba, Vera Cruz.

DISTRIBUTION: Mexico; Guatemala; Jamaica; also in South America.

The specimens included here seem to differ chiefly in length of stem and point of leaf. The differences of peristome given by Mueller as distinguishing *A. Sartorius* and *A. Pilopogon* are apparently due to immaturity of the capsule.

#### 4. *DICRANOWEISIA* Lindb. Oefv. Sv. Vet.-Akad.

Förh. 21: 230. 1864.

Autoicous. Mostly rather small species, in compact tufts, with branching stems radicle only at the base. Leaves ovate-lanceolate or lanceolate-subulate, spreading on all sides, mostly crispate when dry, more or less subtubulose, grooved above, entire; costa vanishing in the apex or percurrent; lower cells rectangular with slightly or not thickened and not pitted walls; upper cells gradually shorter, often slightly transversely elongate, with rather thin walls, smooth or somewhat mamillate; alar cells either mostly short-rectangular and brownish or not differentiated; inner perichaetial leaves much like the upper stem-leaves or convolute to the truncate or rounded apex. Seta solitary, erect. Capsule erect, regular, elliptic or cylindrical, short-necked, smooth, finally becoming somewhat rugose or furrowed, especially at the base; exothecal cells thin-walled, square to hexagonal and somewhat elongate, much smaller just below the rim of the capsule and transversely elongate; annulus present or wanting; peristome-teeth inserted below the mouth of the capsule, lanceolate, entire or slightly split at the apex, the median line usually indistinct, usually papillose on the outer face (some-

what obliquely or variously striate near the middle in *D. contermina*) with articulations more or less distinct, sometimes projecting; lid with a beak one half the length of the capsule or longer. Calyptra smooth, entire at the base.

Type species, *Mnium cirrhatum* L.

Costa at least 40  $\mu$  wide at the base.

Leaf-border more or less recurved; annulus present.

Leaf-border flat or somewhat incurved.

Inner perichaetial leaves convolute to the truncate or broadly rounded apex; annulus none.

Inner perichaetial leaves narrowed to a distinct point.

Points of the perichaetial leaves short, usually much less than one half the height of the convolute bases; peristome-teeth papillose above, variously striate or smooth on the outer plates below.

Points of the perichaetial leaves longer than the convolute bases; peristome-teeth papillose throughout.

Costa less than 30  $\mu$  (mostly 16–25  $\mu$ ) wide at the base.

1. *D. cirrhata*

2. *D. crispula*.

3. *D. contermina*.

4. *D. Roellii*.

5. *D. subcompacta*.

### 1. *Dicranoweisia cirrhata* (L.) Lindb. Oefv. Sv. Vet.-Akad.

Förh. 21 : 230. 1864.

*Mnium cirrhatum* L. Sp. Pl. 1111. 1753.

*Weisia cirrhata* Hedw. Sp. Musc. 69. 1801.

Autoicous: male flower on the stem a little below the perichaetium or terminating a short branch, of 10–12 antheridia with more or less numerous paraphyses: plants in broad, mostly yellowish-green tufts, with stems 1–2 cm. high: stem-leaves spreading on all sides, crispate when dry, up to 2.5 or 3 mm. long, oblong-lanceolate, with entire borders often of a double layer of cells above, broadly recurved at least on one side below, gradually narrowed to the broadish, grooved, rather acute, entire point, nearly smooth on the back; costa plainly vanishing in the apex, 40–50  $\mu$  wide at the base and usually one sixth to one eighth the width of the lower part of the leaf; alar cells quadratic, often not forming a very distinct group; lower leaf-cells rectangular, mostly about 12  $\mu$  wide and 4–6 times as long toward the costa, shorter toward the margin, the upper ones nearly square, about 8  $\mu$  by 8–10  $\mu$ ; perichaetial leaves much like the upper stem-leaves, the inner a little broader and shorter, loosely clasping or slightly spreading, gradually narrowed to the broadish, obtuse or acute apex: seta yellowish, 6–10 mm. long: capsule erect, symmetric, about 2 mm. long, oval-cylindric, pale-brown, smooth or rugose when dry; annulus distinct, of 2 rows of cells; lid with a straight, subulate beak more than one half as long as the capsule; peristome-teeth reddish-brown below, pale and papillose above, without a distinct median line, the outer plates below nearly smooth, upward becoming finely papillose, with outer articulations prominent, about 12  $\mu$  apart: spores minutely roughened, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: British Columbia to California, eastward to Idaho; also in Europe, Asia, and Africa.

ILLUSTRATION: B.S.G. Bryol. Eur. pl. 25.

EXSICC.: Sull. & Lesq. Musci Bor. Am. ed. 2. 48; Macoun, Can. Musci 25; Ren. & Card. Musci Am. Sept. Exs. 202.

### 2. *Dicranoweisia crispula* (Hedw.) Lindb. Oefv. Sv. Vet.-Akad.

Förh. 21 : 230. 1864.

*Weisia crispula* Hedw. Sp. Musc. 68. 1801.

*Weisia convoluta* C. Müll. & Kindb.; Macoun, Cat. Can. Pl. 6: 14. 1892.

Monoicous: male flower either at the base of the perichaetium or terminating a branch, of about three short-ovate, costate or one half costate, entire leaves enclosing numerous antheridia and paraphyses: plants in compact, yellowish-green or sometimes blackish cushions, 1–2 cm., rarely up to 4 cm. high: stem-leaves spreading on all sides, crispate when dry, up to about 4 mm. long, from a narrowly ovate or oblong base gradually narrowed to a grooved, entire point, somewhat rough on the back with mamilllose cells, the margins somewhat incurved; costa nearly percurrent, mostly 40–55  $\mu$  wide at the base and one third to one fifth the width of the leaf-base; alar cells mostly distinct, colored, enlarged, short-quadratic; lower leaf-cells rectangular or linear, with thickened walls, toward the costa usually 6–12 times as long as wide, toward the margin shorter and broader, the upper ones short, oblong to slightly transversely

elongate, about  $6\ \mu$  by  $5\text{--}8\ \mu$ ; outer perichaetial leaves with a broadish base rather abruptly narrowed to the flexuous point, the inner convolute to a truncate or rounded apex: seta erect,  $8\text{--}15$  mm. long: capsule erect, symmetric, oval-cylindric, mostly pale-brown, somewhat rugose when dry, up to  $2.5$  mm. long; annulus wanting; lid with a slender beak one half as long as the capsule or longer; peristome-teeth when dry often incurved and scarcely visible above the mouth, rather coarsely papillose, at the apex entire or somewhat divided, without a distinct median line and with  $8\text{--}12$  articulations: spores smooth or nearly so, about  $13\ \mu$  in diameter.

TYPE LOCALITY: Austria.

DISTRIBUTION: Alaska to California and eastward to Wyoming and Montana; Greenland; Labrador; Mt. Marcy, New York; also in Europe, Asia, and Africa.

ILLUSTRATION: Hedw. Sp. Musc. *pl.* 12, *f.* 1-6.

EXSICC.: Drummond, Musci Am. 69; Macoun, Can. Musci 24, 477.

### 3. *Dicranoweisia contermina* Ren. & Card.; Holz. Contr. U. S. Nat. Herb. 3 : 269. 1895.

Autoicous: male flower usually close to the base of the perichaetium, of numerous antheridia and paraphyses within very broad, short-pointed, brownish perigonal leaves: plants in mostly extensive, rather compact, yellowish-green cushions, with stems up to  $3.5$  cm. high: leaves spreading on all sides when moist, crispate when dry, up to  $4$  mm. long, with flat, entire margins, gradually narrowed upward to a slender, grooved point often quite rough toward the apex with mamilllose cells; costa percurrent or slightly excurrent,  $40\text{--}65\ \mu$  wide at the base and one sixth to one eighth the width of the leaf-base; cells at the basal angles rather narrowly rectangular, mostly not forming distinct alar groups, in the lower part of the leaf rectangular, longer toward the costa, shorter toward the margin, in the upper part roundish, often transversely elongate, the median  $6\text{--}7\ \mu$  wide; outer perichaetial leaves from an ovate base rather abruptly narrowed to a flexuous point, the inner ones with a high, convolute base abruptly narrowed to a straight point, mostly filled by the excurrent costa and usually less than one half as long as the convolute part: seta brownish, up to  $16$  mm. long: capsule erect, symmetric, oval-cylindric, scarcely  $2$  mm. long, brown, more or less rugose when dry; annulus wanting; lid with a slender, erect beak more than one half as long as the capsule; peristome-teeth brownish, more or less papillose toward the apex, the outer plates variously striate a little above the base, the basal plates smooth, the median line mostly indistinct: spores nearly smooth, about  $12\ \mu$  in diameter.

TYPE LOCALITY: Idaho.

DISTRIBUTION: Alaska to California and eastward to Montana.

It is possible the differences between this and the preceding species are not sufficiently constant to justify considering *D. contermina* as more than a western variety of *D. crispula*.

### 4. *Dicranoweisia Roellii* Kindb.; Röhl, Hedwigia 35 : 59. 1896.

Autoicous: male flower near the base of the perichaetium, the inner perigonal leaves broad, pale, narrowly costate, rather abruptly and acutely pointed, less than twice as long as the  $10\text{--}12$  antheridia, the latter about  $0.3$  mm. long with paraphyses a little longer: plants in rather compact, brownish-green tufts, with often branching stems scarcely  $1$  cm. high: stem-leaves crispate when dry, up to about  $2.5$  mm. long, from a somewhat narrowly ovate base, rather gradually narrowed to a subulate, entire point, more or less rough with mamilllose cells, the leaf-margins somewhat incurved; costa near the base about  $50\ \mu$  wide, often excurrent one fifth its length; alar cells scarcely or not differentiated; lower leaf-cells rectangular, with slightly or not thickened walls, becoming gradually shorter upward, in the narrow blade above about  $6\ \mu$  by  $4\text{--}8\ \mu$ ; perichaetial leaves similar to the upper stem-leaves but with a little broader base more abruptly narrowed to the subula: seta erect, pale-reddish,  $5\text{--}7$  mm. long; capsule erect, symmetric, oval, about  $1$  mm. long, pale-brown, with thin walls, rugose and irregularly furrowed, especially at base, when dry; peristome-teeth projecting only  $60\text{--}70\ \mu$  above the mouth, undivided, reddish-brown, papillose throughout, with  $6\text{--}8$  rather distinct articulations; annulus wanting; lid low, with oblique subula, about one half as long as the capsule: spores slightly rough, up to  $14\ \mu$  in diameter.

TYPE LOCALITY: Mount Hood, Oregon, at  $2400$  meters elevation.

DISTRIBUTION: Known only from the type locality.

5. *Dicranoweisia subcompacta* Card. & Thér.; Holz. Bot.  
Gaz. 30 : 122. 1900.

Flowers and fruit unknown: plants in dense cushions, with more or less branching stems up to 8 mm. high: leaves close together, when moist nearly erect, when dry incurved, scarcely crispate, the upper ones 1–1.5 mm. long, from an ovate or oblong base gradually narrowed to a grooved, entire, nearly smooth point with flat or slightly incurved margins and a rather acute apex; costa nearly or quite percurrent, often pale and narrow below, near the base 15–25  $\mu$  wide; leaf-cells with rather thin walls throughout, the upper ones irregular, more or less angular, scarcely elongate, the lower ones pale, rectangular, 8–10  $\mu$  wide and 25–40  $\mu$  long, the alar cells either indistinct or forming a brown group of often slightly inflated cells scarcely reaching half way to the costa.

TYPE LOCALITY: Montana.

DISTRIBUTION: Known only from the type locality.

ILLUSTRATIONS: Bot. Gaz. 30: pl. 11, f. 1.

EXCLUDED SPECIES

*Dicranoweisia obliqua* Kindb. Ottawa Nat. 5: 195 (1892), from the Selkirk Mountains, British Columbia, is *Dicranum Schisti*.

5. **ONCOPHORUS** Brid. Bryol. Univ. 1 : 389. 1826.

*Cynodontium* Schimp. Coroll. Bryol. Eur. 12. 1855. Not *Cynodontium* Brid. 1806.

Autoicous: male flowers solitary, sessile at the base of the perichaetium, or 2 or 3 in number, usually on short, scarcely evident stalks, scattered at short intervals on the stem below. Mostly mosses of medium or small size growing on rock, damp earth along streams, or logs, and forming compact cushions or sometimes extensive mats. Leaves mostly crispate, never falcate-secund, linear-lanceolate or ovate-lanceolate, from smooth to highly mamillate, the border entire or serrate, usually of two layers of cells and more or less recurved on one or both sides (except in *O. Wahlenbergii*, which has the margins often flat and of one layer of cells); costa nearly percurrent or excurrent, in cross-section showing guide-cells with more or less distinct stereid-bands above (except in *O. strumulosum*) and below and differentiated outer cells; cells of blade in the upper part of the leaf mostly scarcely elongate, often rather obscure and irregular, in the lower part rectangular with scarcely or not thickened or pitted walls (or rarely slightly pitted in *O. Wahlenbergii*); alar cells mostly not distinct, sometimes quite well defined in *O. virens* and less so in *O. Wahlenbergii* and *O. polycarpus*. Seta straight or curved. Capsule ovate or oblong, from straight and erect to curved and horizontal, mostly deeply furrowed when dry and empty, but often nearly or quite smooth in *O. virens* and *O. Wahlenbergii*, with or without struma and with stomata in mostly one row at the base of the spore-sac; annulus present or wanting; peristome-teeth mostly divided half way down or farther into two papillose forks, the outer plates vertically striate, the inner with distinct articulations (in *O. Schisti* only are the teeth undivided at the apex and perforate below); lid with the base entire or notched and with an oblique beak not more than one half as long as the capsule. Spores rough.

Type species, *Fissidens polycarpus* Hedw.

Limpricht keeps *O. virens* and *O. Wahlenbergii* as a genus distinct from the others here included in *Oncophorus*, claiming that they differ in having distinct alar cells and accessory guide-cells in the costa. These differences however do not seem to hold, for *O. polycarpus* often has more distinct alar cells than are found in *O. Wahlenbergii*, while I have never found accessory guide-cells in either European or American specimens of the latter.

*Oncophorus* differs from *Dicranum* chiefly in having the leaves crispate with mostly recurved margins, often of a double thickness of cells. The leaves are never falcate-secund, the alar cells usually much less differentiated.

Peristome-teeth undivided above, more or less perforate below.

Peristome-teeth mostly divided into two forks.

Annulus present.

Upper leaf-cells more or less irregular and transversely elongate, about 8  $\mu$  wide, somewhat obscure and rough on both sides.

1. *O. Schisti*.

2. *O. polycarpus*.

- Upper leaf-cells square to short-rectangular, about  $12\ \mu$  wide, pellucid, nearly or quite smooth.  
Annulus lacking.  
Peristome-teeth divided more than one half down; leaf-base not abruptly widened.  
Costa papillose on the back one half down or more.  
Upper leaf-cells not pellucid, mostly  $6\text{--}8\ \mu$  in diameter.  
Leaves scarcely 1.5 mm. long; seta up to 6 mm. high.  
Leaves up to 3 mm. long; seta up to 1.5 cm. high; elongate cells in the blade extending about three fourths down the leaf, with a single, small papilla at the upper end of each cell.  
Upper leaf-cells pellucid,  $10\text{--}12\ \mu$  in diameter; no distinctly elongate cells below with papillae.  
Costa smooth on the back or slightly rough toward the apex.  
Peristome-teeth divided scarcely one half down; leaves more or less abruptly widened below.  
Leaf-base ovate; alar cells usually quite distinct; leaf-border of mostly two thicknesses of cells and recurved.  
Leaf-base obovate; alar cells usually not distinct; leaf-border of mostly a single thickness of cells, often not recurved.
3. *O. Jenneri*.  
4. *O. alpestris*.  
5. *O. gracilescens*.  
6. *O. strumulosus*.  
7. *O. tenellus*.  
8. *O. virens*.  
9. *O. Wahlenbergii*.

1. **Oncophorus Schisti** (Wahl.) Lindb. Musci Scand. 27. 1879.

*Weisia Schisti* Wahl. Fl. Lapp. 325. 1812.

*Rhabdoweisia Schisti* B.S.G. Bryol. Eur. (33-36:) Rhabd. 5. 1846.

*Cynodontium Schisti* Lindb. Oefv. Sv. Vet.-Akad. Förh. 21: 230. 1864.

Monoicous: male flowers 1-4, on very short stalks, often scarcely evident, attached to the stem at short intervals below the perichaetium, of few antheridia and few or no paraphyses, enclosed by 3 or 4 faintly costate, often obtuse perigonal leaves scarcely 0.5 mm. long: plants in rather compact green tufts with branching stems tomentose below and up to 2 cm. high: stem-leaves crispate when dry, the lower short, ovate-lanceolate, the upper much longer, up to 1.8 mm. long, mostly acutely pointed, keeled on the back, the margin crenulate, of a double thickness of cells and recurved often three fourths down, rough on both sides one half down with crowded, irregular papillae: upper leaf-cells rather obscure, often not more than  $4\ \mu$  wide and scarcely elongate, the lower ones paler, smooth, rectangular with rather thin walls, the alar cells not differentiated; perichaetial leaves much like the upper stem-leaves, often a little shorter, with a loosely clasping base extending one third to one half up the leaf: seta yellowish, up to 4 mm. long: capsule mostly erect, regular, about 0.8 mm. long, ovate, ribbed when dry; annulus wanting; lid with an entire margin and a short oblique beak scarcely one half as long as the capsule; peristome-teeth reddish throughout, lanceolate-subulate, the apex minutely papillose, not divided, below solid or perforate, the outer plates mostly vertically striate, the inner articulations not prominent: spores rough, up to  $16\ \mu$  in diameter.

TYPE LOCALITY: Lapland.

DISTRIBUTION: Montana to Alaska; also in northern Europe.

ILLUSTRATION: B.S.G. Bryol. Eur. pl. 43.

EXSICC.: Macoun, Can. Musci 15a.

2. **Oncophorus polycarpus** (Hedw.) Brid. Bryol. Univ. 1: 397. 1826.

*Fissidens polycarpus* Hedw. Descr. 2: 85. 1789.

*Fissidens strumifer* Hedw. Descr. 2: 88. 1789.

*Dicranum polycarpon* Sw. Disp. Musc. Suec. 32. 1799.

*Dicranum strumiferum* Sw. Disp. Musc. Suec. 33. 1799.

*Cynodontium polycarpon* Schimp. Coroll. Bryol. Eur. 12. 1855.

*Cynodontium strumiferum* De-Not. Atti Univ. Genova 1: 280. 1869.

Autoicous: male flower close to the base of the perichaetium, of two ovate, entire, rather acute leaves, the inner smaller, sometimes costate, enclosing 6-8 antheridia and rather numerous paraphyses: plants in rather soft, extensive, green or brownish-green tufts, tomentose within, with branching stems up to 5 cm. high: stem-leaves up to 5 mm. long, flexuous or subcrispate when dry, ovate-lanceolate, acute, keeled above, the margins mostly of a double thickness of cells, recurved on one or both sides, irregularly serrulate above; costa nearly or quite percurrent or excurrent, often rough on the back above, in cross-section near the middle showing about 4 guide-cells with very small stereid-bands, mostly of 2-4 cells each, above and below, and large outer cells, especially on the under side of the costa; upper leaf-cells somewhat obscure,  $8\text{--}10\ \mu$  wide, mostly slightly transversely elongate, more or less mamillate on both sides, the lower ones

smooth, paler, rectangular, those at the angles broader, square to short-rectangular, sometimes inflated and  $20\ \mu$  or more wide, forming a rather distinct alar group; inner perichaetial leaves sheathing rather more than one half up: seta yellowish, about 8 mm. long: capsule from nearly straight and erect to curved and nodding, with or without struma, more or less contracted under the mouth and ribbed when dry; peristome-teeth reddish, divided to below the middle, vertically striate, papillose above, the inner articulations often distant,  $35\text{--}40\ \mu$  apart; lid irregularly notched around the base, with an oblique beak about one half as long as the capsule; annulus large: spores rough, up to  $20\ \mu$  in diameter.

TYPE LOCALITY: Germany.

DISTRIBUTION: Greenland to Alaska and south to New York, Lake Superior, and Montana; also in northern Europe.

ILLUSTRATIONS: Hedw. Descr. 2: *pl.* 31, 32.

EXSICC.: Drummond, Musci Am. 107; Sull. & Lesq. Musci Bor. Am. 45; ed. 2. 58; Macoun, Can. Musci 20, 21, 612.

### 3. *Oncophorus Jenneri* (Schimp.) R. S. Williams.

*Didymodon Jenneri* Schimp.; Howie, Trans. Bot. Soc. Edinb. 9: 314. 1868.

*Cynodontium polycarpon laxirete* Dixon, Handb. 73. 1896.

*Cynodontium laxirete* Grebe, Hedwigia 40: Beibl. 106. 1901.

Autoicous: male flower at the base of the perichaetium, of 2 ovate-lanceolate, more or less obtuse and costate, entire leaves, enclosing 6–8 antheridia and rather few paraphyses: plants in often extensive, not very compact, greenish tufts, with branching stems tomentose below and up to 5 cm. high or more: stem-leaves up to 6 mm. long by 0.6 mm. wide, mostly oblong-lanceolate, acute, keeled, spreading-flexuous, more or less recurved, subcrispate when dry, serrulate on the margin scarcely one fourth down, the borders flat toward the apex, more or less recurved below, of a single thickness of cells; costa scarcely percurrent, slightly serrulate on the back near the apex, in cross-section near the middle showing 4 guide-cells, a very small stereid-band above of only 2 or 3 cells, below a somewhat larger band, with the outer cells on both sides rather large; cells of the blade distinct, mostly quite smooth on both sides, the upper ones square to short-rectangular, about  $12\ \mu$  wide, those toward the base paler, rectangular, up to  $16\ \mu$  wide and about  $60\ \mu$  long, those at the angles mostly narrower than toward the costa and 3–4 times as long as wide; perichaetial leaves similar to the upper stem-leaves, loosely clasping about one third up: seta about 1 cm. long, erect, yellowish: capsule about 2.5 mm. long, oblong, nearly straight and erect, furrowed when dry and empty, not strumose but with a more or less distinct apophysis; peristome-teeth reddish,  $80\ \mu$  wide at the base, divided mostly more than one half down, vertically striate on the outer face, papillose above; annulus large, of 2 rows of cells; lid somewhat notched at the base, with an oblique beak about one half as long as the capsule: spores rough, up to  $24\ \mu$  in diameter.

TYPE LOCALITY: England.

DISTRIBUTION: Alaska, known only from Sheep Camp, Dyea Creek (*Williams 527*); also in Scotland and Germany.

ILLUSTRATION: Trans. Bot. Soc. Edinb. 9: *pl.* 5.

### 4. *Oncophorus alpestris* (Wahl.) Lindb. Musci Scand. 27. 1879.

*Dicranum alpestre* Wahl. Fl. Lapp. 339. 1812.

*Cynodontium alpestre* Milde, Bryol. Siles. 51. 1869.

Autoicous: male flowers 1 or 2, mostly sessile, at or a little below the base of the perichaetium, of about 4, ovate, acute, entire or subserrulate, ecostate, mostly smooth leaves enclosing few antheridia: plants in compact, green tufts, slightly radiculose below, with stems up to 1.5 cm high: leaves up to 1.5 mm. long, crispate when dry, lanceolate-linear with a usually broadly rounded apex, the borders papillose on the margins about two thirds down, recurved below, flat above and mostly of a single thickness of cells; costa vanishing in the apex, papillose on the back about one half down, in cross-section below showing 4 guide-cells, the stereid-band mostly wanting on the ventral side, of few cells on the dorsal side, the outer ventral cells only about 2, the outer dorsal 9 or 10 in number; upper leaf-cells rather obscure, irregular, mostly  $6\text{--}8\ \mu$  wide by  $8\text{--}10\ \mu$  long, sometimes roundish, highly mamillate on both sides about two thirds down the leaf, the lower cells smooth, more or less rectangular, those at the angles not differentiated; inner perichaetial leaves rather smaller than the upper stem-leaves, sometimes smooth and

loosely clasping nearly to the apex: seta yellowish, mostly erect, up to 6 mm. long: capsule oval, scarcely 1 mm. long, deeply furrowed and contracted under the mouth when dry; annulus wanting; lid with quite entire base and an oblique beak nearly as long as the capsule; peristome-teeth usually divided two thirds down into two forks, finely papillose above, the outer plates more or less vertically striate: spores rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Lapland.

DISTRIBUTION: Said to occur in Greenland (Lange, Consp. Fl. Groenl. 397. 1880); probably not known from British North America nor the United States; also in Lapland and Switzerland.

ILLUSTRATION: Wahl. Fl. Lapp. *pl.* 21.

### 5. *Oncophorus gracilescens* (Weber & Mohr) Lindb. Musci Scand. 27. 1879.

*Dicranum gracilescens* Weber & Mohr, Bot. Tasch. 467. 1807.

*Campylopus cirrhatus* Brid. Bryol. Univ. 1: 479. 1826.

*Cynodontium gracilescens* Schimp. Coroll. Bryol. Eur. 12. 1855.

Autoicous: male flower at the base of the perichaetium, mostly of 2, ovate, more or less acutely pointed leaves, crenulate above, enclosing several antheridia and numerous paraphyses: plants in compact, green tufts, with branching stems tomentose below and up to 5 cm. high: leaves crispate when dry, the upper ones up to 3 mm. long, rather broadly lanceolate, gradually narrowed to the broad, obtuse or somewhat acute apex, the borders, of a single thickness of cells, mostly recurved along the middle on both sides, flat toward the apex and serrulate-papillose three fourths down; costa scarcely percurrent, the upper half mostly rough on the back, with high papillae inclined toward the apex, in cross-section near the middle showing about 6 guide-cells and stereid-bands above and below with differentiated outer cells; upper leaf-cells rather small, obscure, scarcely or not elongate, 6–8  $\mu$  in diameter, highly mamillate or papillose on both sides, those about three fourths down the leaf with a single, small papilla at the upper end of each cell, the basal ones rectangular, pale, smooth, those at the angles often broader, sometimes colored and slightly inflated; inner perichaetial leaves costate, rather shorter than the outer, loosely clasping nearly to the apex and rather abruptly narrowed to a short smooth point or sometimes with a little longer rough point: seta slender, flexuous, yellowish, up to 1.5 cm. long, more or less curved or cygneus when moist: capsule oblong, mostly slightly curved and nodding, furrowed when dry, not strumose; lid with a not quite entire margin and an oblique beak about two thirds as long as the capsule; annulus wanting; peristome-teeth divided three fourths down into slender forks, pale and papillose above, the outer plates vertically striate, the inner articulations prominent: spores rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Germany.

DISTRIBUTION: Known in America only from near Port Arthur, Ontario (Kakabeka Falls, 1869, *Macoun 11*); also in Europe.

ILLUSTRATIONS: B.S.G. Bryol. Eur. *pl.* 45, 46; Rab. Krypt.-Fl. 4: *f.* 105.

### 6. *Oncophorus strumulosus* (C. Müll. & Kindb.) E. G. Britton.

*Cynodontium strumulosum* C. Müll. & Kindb.; *Macoun*, Cat. Can. Pl. 6: 16. 1892.

Autoicous: male flower on a short stalk below the perichaetium, of 3 or 4 ovate-lanceolate or oblong-linear, broadly acute, crenulate, more or less costate leaves up to one third as long as the upper stem-leaves, rarely longer, enclosing 2 or 3 antheridia nearly or quite without paraphyses: plants in dense tufts up to 1.5 cm. high: leaves crispate when dry, the upper about 2 mm. long, nearly linear, with a rounded or broadly acute apex, the margins recurved below, flat and crenulate above and of a single layer of cells; costa mostly vanishing a little below the apex, rough on the back about one half down, in cross-section showing 2 guide-cells, and in the lower part of the costa a more or less distinct stereid-band on the dorsal side with somewhat differentiated outer cells, in the upper part of the costa the stereid-cells nearly wanting; upper cells of the leaf-blade pellucid, rather irregular, scarcely elongate, 8–12  $\mu$  in diameter, mamillate on both sides, the lower ones rectangular, smooth, without differentiated alar cells; inner perichaetial leaves similar to the stem-leaves: seta brownish, 8 mm. long: capsule about 0.65 mm. long, mostly curved, nodding, sometimes strumose, furrowed when dry and empty; peristome-teeth divided to below the middle into slender forks, papillose above, the outer plates

vertically striate, the inner articulations distinct, about  $20\ \mu$  apart; lid convex with an oblique beak; annulus none: spores rough,  $20\text{--}24\ \mu$  in diameter.

TYPE LOCALITY: Hector, in the Rocky Mountains of British Columbia.

DISTRIBUTION: Known only from the type locality.

EXSICC.: Macoun, Can. Musci 518.

### 7. *Oncophorus tenellus* (B. S. G.) R. S. Williams.

*Dicranum gracilescens tenellum* B. S. G. Bryol. Eur. (37-40:) *Dicranum* 13. 1847.

*Cynodontium alpestre* Milde, Bryol. Siles. 51, in part. 1869.

*Cynodontium tenellum* Limpr. Krypt.-Fl. Schles. 1: 425. 1877.

*Cynodontium torquescens* Limpr. in Rab. Krypt.-Fl. 4<sup>1</sup>: 288. 1886.

*Dicranum torquescens* Bruch; Limpr. in Rab. Krypt.-Fl. 4<sup>1</sup>: 288, as synonym. 1886.

*Cynodontium subalpestre* Kindb.; Macoun, Cat. Can. Pl. 6: 257. 1892.

Autoicous: male flower at the base of the perichaetium, of mostly 2 obtuse, ovate to oblong-linear leaves, costate below: plants in usually rather low, compact, yellowish-green cushions with branching stems radiculose below and rarely more than 1 or 2 cm. high: stem-leaves up to 3 mm. long and about 0.2 mm. wide, crispate when dry, linear-lanceolate, obtusely or acutely pointed and from nearly entire and smooth throughout to rough on the margins and surfaces in the upper half, the borders more or less recurved and of a double thickness of cells along the middle; costa mostly vanishing in the apex, smooth on the back throughout or slightly rough above; upper leaf-cells rather variable, about  $8\ \mu$  wide, mostly scarcely elongate, or sometimes twice as long as wide, with slightly thickened walls, usually smooth or nearly so on both sides except near the margins, those toward the base rectangular, those at the angles often wider, nearly square, sometimes slightly inflated; perichaetial leaves similar to the upper stem-leaves, loosely clasping about one half up: seta brownish, straight, up to 1 cm. long: capsule oblong, mostly nearly erect and regular, not strumose, furrowed when dry; lid entire on the border, with an oblique beak one half as long as the capsule; peristome-teeth reddish-brown, mostly divided two thirds or more down into 2 forks, papillose above, the outer plates vertically striate, the inner articulations prominent, mostly about  $20\ \mu$  apart; annulus wanting: spores rough, up to  $20\ \mu$  in diameter.

TYPE LOCALITY: Germany.

DISTRIBUTION: Labrador and Alaska to the mountains of New England and Montana; also in Europe and Asia.

EXSICC.: Aust. Musci App. 467; Sull. & Lesq. Musci Bor. Am. 44; ed. 2. 57; Holz. Musci Acroc. Bor. Am. 304.

### 8. *Oncophorus virens* (Sw.) Brid. Bryol. Univ. 1: 399. 1826.

*Bryum virens* Sw. Nova Acta Soc. Sci. Upsal. 4: 241. 1784.

*Dicranum virens* Hedw. Descr. 3: 77. 1792.

*Cynodontium virens* Schimp. Coroll. Bryol. Eur. 12. 1855.

Autoicous: one or more male flowers sessile at short intervals below the perichaetium, of mostly 4 or 5 usually ovate, acute, entire, costate leaves enclosing 4 or 5 antheridia with few paraphyses: plants in usually rather extensive, not very compact, green cushions with branching stems somewhat tomentose below and 4-5 cm. high or more: stem-leaves more or less crispate when dry, up to 4 mm. long, from an ovate base usually somewhat abruptly narrowed to a lanceolate, nearly entire or irregularly serrate, acute point, the borders mostly recurved from a little below the point to near the base and of a double thickness of cells; costa mostly shortly excurrent, smooth on the back or nearly so, about  $100\ \mu$  wide at the base and one sixth of the leaf-width, in cross-section near the middle showing about 6 guide-cells, often 1 or 2 accessory cells nearly as large, and rather poorly differentiated stereid-bands above and below with somewhat distinct outer cells; leaf-cells distinct and nearly smooth throughout, the median often scarcely elongate, the lower ones paler, brown, laxly rectangular,  $8\text{--}10\ \mu$  wide by  $40\ \mu$  long, with thin walls, those at the angles usually forming rather distinct, darker brown, somewhat inflated alar groups; inner perichaetial leaves up to 5 mm. long, loosely clasping scarcely one half up and rather abruptly narrowed to a smooth point: seta yellow, erect, up to 3 cm. long: capsule oblong, curved, strumose, smooth when dry or somewhat furrowed; annulus wanting; lid not quite entire at the base, with an oblique beak one third as long as the capsule; peristome-teeth reddish-brown throughout, divided scarcely one half down, vertically striate to near

the papillose apex, 70  $\mu$  wide at the base, the inner articulations 20–30  $\mu$  apart: spores rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Lapland.

DISTRIBUTION: Greenland to Alaska and south to Gaspé County, Quebec, Minnesota, and California; also in Europe and Asia.

ILLUSTRATIONS: B.S.G. Bryol. Eur. *pl.* 48; Hedw. Descr. 3: *pl.* 32.

EXSICC.: Drummond, Musci Am. (as *Dicranum microcarpum*) 105 in part, 106; Sull. & Lesq. Musci Bor. Am. ed. 2. 59; Macoun, Can. Musci, 22, 26, 28, 488; Holz. Musci Acroc. Bor. Am. 127.

### 9. *Oncophorus Wahlenbergii* Brid. Bryol. Univ. 1 : 400. 1826.

*Dicranum Richardsoni* Hook. in Drummond, Musci Am. 104. 1828.

*Dicranum microcarpum* Hook. in Drummond, Musci Am. 105. 1828.

*Dicranum virens Wahlenbergii* Huebener, Musc. Germ. 231. 1833.

*Cynodontium virens Wahlenbergii* Schimp. Coroll. Bryol. Eur. 12. 1855.

*Cynodontium Wahlenbergii* Hartm. f. in Hartm. Skand. Fl. ed. 10. 2: 113. 1871.

*Dicranum Demetrii* Ren. & Card. Bot. Gaz. 22: 48. 1896.

Autoicous: one or more male flowers sessile at short intervals below the perichaetium, of several usually pale, acute, or the inner obtuse, ecostate, nearly entire leaves enclosing 5 or 6 antheridia with few paraphyses: plants in rather compact yellowish-green tufts, reddish-tomentose within and 1–2 cm., rarely up to 5 cm., high: stem-leaves up to 5 mm. long, from a short, more or less obovate, erect base abruptly narrowed into a slender, grooved point, crispate when dry, the borders flat or somewhat recurved, more or less serrulate about one half down, or rarely entire and of mostly one layer of cells; costa excurrent, somewhat serrulate on the back above, at the base about one fifth the width of the leaf, in cross-section near the middle showing 5 or 6 guide-cells, the stereid-bands above and below often not very well defined, with outer cells somewhat differentiated; upper cells of the blade smooth on both sides, irregular, angular, mostly slightly elongate, the median ones about 8  $\mu$  wide, the lower ones long and narrow, those toward the costa sometimes with slightly thickened, pitted walls, the alar cells not distinct or rarely forming a small, quite distinct cluster; inner perichaetial leaves about as long as the upper stem-leaves, clasping about one third up, abruptly narrowed to a slender, rough point: seta yellowish or sometimes red, erect, up to 2.5 cm. long: capsule short, curved, often horizontal, with prominent struma and smooth or finally somewhat furrowed; annulus wanting; lid not quite entire at the base, with an oblique beak about one half as long as the capsule; peristome-teeth dark-reddish, divided about two fifths down and vertically striate almost to the slightly papillose apex, the inner articulations distinct and about 20  $\mu$  apart: spores minutely roughened, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Lapland.

DISTRIBUTION: Greenland and Alaska to Pennsylvania, Ohio, and Wyoming; also in Europe and Asia.

EXSICC.: Drummond, Musci Am. 104, 105 in part; Macoun, Can. Musci 23, 31 (as *D. falcatum*), 32 (as *D. Blythii*); Ren. & Card. Musci Am. Sept. Exs. 270.

### 6. *SYMBLEPHARIS* Mont. Ann. Sci. Nat. II. 8 : 252. 1837.

Autoicous or dioicous. Plants mostly of medium size, growing in more or less extensive cushions mostly on wood; stems with a central strand, usually with few and distant branches and from sparsely radiculose to tomentose below. Leaves with a clasping base widening upward, then abruptly spreading into a narrowly lanceolate, grooved point, entire or denticulate at the apex and crispate when dry; costa percurrent or slightly excurrent, in cross-section showing a median row of guide-cells with large stereid-bands above and below and outer cells differentiated on the upper side or sometimes on both sides; cells of the blade above either smooth or papillose, short-rectangular or nearly square, in the basal part mostly rectangular, very pale-brown, smooth, without differentiated alar cells. Seta erect or curved, solitary or sometimes 3 or 4 in the same perichaetium. Capsule nearly or quite erect, regular, oval to cylindric, smooth; peristome inserted below the mouth, the teeth sometimes in pairs, from undivided to divided three fourths down or more, either vertically striate or papillose on the outer face. Spores papillose. Calyptra entire at the base.

Type species, *Symblepharis helicophylla* Mont.

Leaf-cells distinct, not papillose.

Leaf-cells rather indistinct, the upper ones finely papillose on both sides.

1. *S. helicophylla*.

2. *S. Schimperiana*.

1. *Symblepharis helicophylla* Mont. Ann. Sci.

Nat. II. 8: 252. 1837.

*Symblepharis Oerstediana* C. Müll. Syn. 2: 613. 1851.*Symblepharis Chrismari* C. Müll. Syn. 2: 614. 1851.

Autoicous: male flower inconspicuous, on a short stalk often some distance below the perichaetium, the perigonal leaves faintly costate, entire, ovate, concave, the outer ones with a short, spreading rather acute point, the inner shorter, scarcely 1 mm. long, enclosing 8–12 antheridia 0.4 mm. long, without paraphyses: fertile plants in large, soft, yellowish-green cushions, with somewhat branching stems usually 2–4 cm. high, tomentose below, in cross-section showing a large central strand, 60 by 120  $\mu$ , and walls of 4 or 5 rows of thick-walled, brown cells: stem-leaves crispate when dry, from a clasping, somewhat obovate or obcuneate base about 1.5 mm. high gradually narrowed to a grooved, spreading point 4–5 times as long, with margins flat, of a single thickness of cells and entire except at the mostly denticulate apex; costa percurrent or slightly excurrent, about 80  $\mu$  wide near the base, smooth except at the apex, in cross-section near the middle showing 7 or 8 guide-cells, stereid-bands above and below and outer cells differentiated; cells of the leaf-blade smooth, those in the lower part of the leaf very pale-brown, rectangular, often up to 12  $\mu$  wide and 100  $\mu$  long, those above, in the spreading part, browner, angular, often nearly square, the median ones 6–8  $\mu$  wide and 6–10  $\mu$  long with scarcely thickened walls; perichaetial leaves very similar to those of the stem but with a higher, clasping base: seta single or 3 or 4 from the same perichaetium, about 10 mm. long, straight or slightly sinuous: capsule 2–3 mm. long, oval to cylindrical, smooth, reddish at the rim, nearly straight and erect or somewhat nodding, with small stomata in about two rows at the base; peristome-teeth lanceolate, reddish, deeply inserted, rather unequally divided about four fifths down into mostly 2 forks, vertically striate on the outer face, densely papillose on the inner; annulus none; lid with a somewhat oblique beak, one fourth to one third as long as the capsule: calyptra entire at the base, slightly rough at the apex: spores not quite smooth, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Oaxaca.

DISTRIBUTION: Mexico; Guatemala; Costa Rica; Panama; also in Asia.

ILLUSTRATION: Jour. Linn. Soc. 33: pl. 25.

EXSICC.: Pringle, Musci Mex. 544, 10441.

2. *Symblepharis Schimperiana* (Paris) Card. Rev.

Bryol. 38: 99. 1911.

*Syrhopodon circinatus* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 172. 1872. Not *Symblepharis circinata* Besch. 1880.*Syrhopodon Schimperianus* Paris, Index Bryol. 1254. 1898.

Dioicous: male plants similar to the fertile, with several lateral and terminal, rather conspicuous buds, the larger perigonal leaves like those of the stem with usually a few inner, very small, pale leaves less than 1 mm. long, enclosing 10–15 antheridia about 0.5 mm. long and numerous, filiform paraphyses: fertile plants in large, yellowish-green tufts, with mostly freely branching stems, tomentose below and up to 4 or rarely 7 cm. high: stem-leaves crispate when dry, from a more or less obovate, erect, pale, clasping base rather more than 1 mm. high gradually narrowed to a lanceolate, somewhat grooved point 5–6 times as long with flat, papillose, otherwise entire margins; costa slightly excurrent, mostly finely papillose on the upper side and smooth on the under side, up to 100  $\mu$  wide near the base, in cross-section near the middle showing 6–9 guide-cells, large stereid-bands above and below and outer cells differentiated on the upper side; cells of the leaf-blade in the base pale, elongate-hexagonal to rectangular, mostly 20–40  $\mu$  long and 8–10  $\mu$  wide, usually with thickened, pitted walls toward the costa in the upper part of the base, the cells of the spreading point green, more or less obscure, mostly short, densely and minutely papillose on both sides with scarcely thickened walls, the median ones short-oblong to nearly square or slightly roundish, 6 by 6  $\mu$  to 7 by 10  $\mu$ ; perichaetial leaves very similar to those of the stem: seta erect, single or sometimes 2 from the same perichaetium, 1–1.5 mm. long: capsule erect, cylindrical, smooth, 2.5–3 mm. long, with few, scattered stomata at the base; peristome-teeth erect, pale, inserted below the mouth, often quite irregular, densely papillose, not striate, more or less divided into 2 or 3 forks or

sometimes only vertically grooved, projecting about  $200\ \mu$  above the rim; lid and calyptra not seen: spores rough,  $12\text{--}16\ \mu$  in diameter.

TYPE LOCALITY: Orizaba, Vera Cruz.  
 DISTRIBUTION: Mexico; Guatemala; Jamaica.  
 EXSICC.: Pringle, Musci Mex. 10472.

### 7. AUSTINELLA R. S. Williams, Bryologist 14: 70. 1911.

Dioicous. Stems with few radicles, a distinct central strand and brown outer walls composed of about three rows of thick-walled cells. Leaves spreading-flexuous, from a very broad, erect base, abruptly narrowed to a narrowly lanceolate, grooved point; leaf-margins flat or mostly so and serrulate above; cells of the leaf-blade distinct and nearly or quite smooth on both sides; costa stout, semiterete, excurrent, somewhat rough on the back above, in cross-section near the middle showing 9 or 10 guide-cells with large stereid-bands and more or less numerous accessory guide-cells both above and below, with outer cells somewhat differentiated; cells in the lower part of the leaf linear to somewhat elongate-hexagonal with more or less colored, mostly thickened, rarely slightly pitted walls, the alar not or slightly differentiated; upper part of the leaf of angular cells, nearly square to 2 or 3 times longer than wide, the narrow upper blade and margin of a double thickness of cells.

Type species, *Syrrhopodon Rauei* Aust.

#### 1. *Austinella Rauei* (Aust.) R. S. Williams, Bryologist 14: 70. 1911.

*Syrrhopodon ? Rauei* Aust. Bull. Torrey Club 6: 74. 1876.  
*Dicranodontium inundatum* Small, Mosses S. U. S. 51, hyponym. 1897.

Dioicous: male flowers 2 or 3 in number, scattered along the upper part of the stem on very short, axillary branches, the outer perigonal leaves abruptly narrowed and spreading from a short, broad base, the inner leaves much shorter, entire, enclosing about 6 antheridia with few, shorter, paraphyses: fertile plants in extensive mats, dull yellowish-green at the surface, dark-brown within; stem with a central strand and about 3 rows of thick-walled outer cells, slightly radiculose below, somewhat branching above, up to 3 cm. high: upper stem-leaves 4–5 mm. long, spreading-flexuous, scarcely crispate, from a clasping, ovate or obovate base scarcely 1 mm. long, with the margin not quite entire, abruptly narrowed to a somewhat grooved, lanceolate point 3–4 times as long, irregularly serrulate on the flat margins about one half down and smooth or nearly so on both sides or somewhat rough on the back towards the apex; costa at the base about  $100\ \mu$  wide and one fourth the width of the leaf, semiterete, slightly excurrent, in cross-section showing 9 or 10 guide-cells, with stereid-bands and some accessory guide-cells above and below and outer cells more or less differentiated; lower leaf-cells mostly rectangular with somewhat thickened, brownish walls, rarely slightly pitted, the alar ones often broader, very rarely forming a rather distinct group; upper leaf-cells shorter, square to rectangular, about  $6\ \mu$  wide and 1–3 times as long; narrow blade or border of the upper part of the leaf of a double thickness of cells; fruit unknown.

TYPE LOCALITY: Onoko Glen, Pennsylvania.  
 DISTRIBUTION: Known only from the type locality and Tallulah Falls, Georgia.  
 ILLUSTRATION: Bryologist 14: 71. f. 1–4.  
 EXSICC.: Small, Mosses S. U. S. 51.

### 8. HOLOMITRIUM Brid. Bryol. Univ. 1: 226. 1826.

Pseudautoicous. Male plants minute, mostly attached to the older perichaetial buds by tomentum or sometimes growing from small balls of protonema in the axils of leaves a little below the perichaetium. Fertile plants mostly of medium size, growing in compact tufts with branching, tomentose stems sometimes flagelliferous. Leaves mostly narrowed to a lanceolate, serrulate point, crispate when dry (in *H. piliferum* gradually narrowed to a flexuous, smooth hair-point, and in *H. Wrightii* and *H. Maxoni* the upper leaf about as broad as the basal part and tubulose, erect-incurved when dry); costa usually percurrent, smooth or somewhat serrulate on the back above, in cross-section showing mostly a median row of guide-cells with stereid-bands above and below and outer cells sometimes differentiated;

lower leaf-cells much elongate, the upper ones short, often quadratic; cell-walls more or less thickened and pitted and flat or mamilllose on both sides, with often furrows between the rows of cells; alar cells distinct; inner perichaetial leaves with a highly convolute base narrowed to a slender point often extending to or above the capsule. Seta erect, smooth, mostly solitary. Capsule erect, narrowly ovate to cylindric, smooth, with stomata in 1 or 2 rows near the base; peristome inserted well below the mouth, of mostly narrowly lanceolate, reddish, very papillose, not striate teeth, undivided or more or less divided along the median line; lid conic, beaked. Spores small,  $16\ \mu$  or less in diameter, not quite smooth. Calyptra smooth above, entire at the base.

Type species, *Trichostomum vaginatum* Hook.

Leaves without a hair-point; costa  $40\text{--}100\ \mu$  wide below.

1. Leaves narrowed from a distinctly broadened base to a lanceolate point, usually crispate when dry.

Stem-leaves more or less spreading from their insertion; leaf-base either narrowly ovate or ovate-lanceolate and about 3 mm. long, or the leaves gradually narrowed from near the base to the apex.

Alar cells forming a distinct, reddish or hyaline, nearly square group, about  $200\ \mu$  high, with some longer, narrower cells intervening between the alar ones and the costa.

Alar cells forming a rather ill-defined band, brown to nearly hyaline, extending upward scarcely  $100\ \mu$  and from the margin to the costa.

Stem-leaves with a broadly ovate or obovate, mostly erect, imbricate base, usually 2 mm. or less long, distinctly and often abruptly narrowed to a spreading lanceolate point.

Leaves with cells nearly or quite flat on both sides and without furrows between the rows; border or sometimes the upper part of the blade of a double thickness of cells.

Leaves with cells on both sides more or less mamilllose and with furrows between the rows.

Upper leaf-margin of a double thickness of cells; median cells about  $5\ \mu$  by  $5\text{--}8\ \mu$ .

Upper leaf-margin of a single thickness of cells; median cells about  $8\ \mu$  by  $8\text{--}10\ \mu$ .

2. Leaves linear or lingulate, the upper half about as wide, sometimes wider, than the basal part, never crispate.

Leaves 3.5 to 4.5 mm. long, broadly lanceolate-pointed, with marginal teeth extending down one third to one half way toward the base.

Leaves 2 to 3 mm. long, with a few coarse marginal teeth at the abruptly rounded apex and a stout apiculus formed by the excurrent costa.

Leaves with a pale to hyaline, smooth hair-point; costa below about  $35\ \mu$  wide.

1. *H. flexuosum.*

2. *H. terebellatum.*

3. *H. calycinum.*

4. *H. marginatum.*

5. *H. arboreum.*

6. *H. Wrightii.*

7. *H. Maxoni.*

8. *H. piliferum.*

### 1. *Holomitrium flexuosum* Mitt. Jour. Linn. Soc. 12: 57. 1869.

Antheridial flowers not known: plants in loose tufts with stout, slightly branching stems, brown and tomentose below, greenish-brown above, up to 8 cm. high: stem-leaves mostly 9–10 mm. long, from an oblong-lanceolate, somewhat spreading base, gradually narrowed to a slender, lanceolate, serrulate point, very crispate or spirally twisted when dry and 1–1.5 times as long as the base; costa shortly excurrent, dentate on the back about one third down,  $100\ \mu$  wide a little above the base, in cross-section near the middle showing 5 or 6 guide-cells, with stereid-bands above and below and outer cells differentiated mostly on the lower side only; cells throughout the leaf above the alar ones mostly elongate with thickened, pitted walls, except the marginal rows; median cells toward the costa  $4\text{--}6\ \mu$  wide and up to  $20\ \mu$  long; alar cells from dark reddish-brown to nearly hyaline, forming an almost square group extending upward about  $200\ \mu$  and two thirds of the way to the costa; fruit not seen; (according to Mitten) with perichaetial leaves long-convolute, at apex narrow, extending one half way up the yellow, very slender seta: capsule cylindric, with peristome-teeth red, narrow, elongate, and entire.

TYPE LOCALITY: Andes near Quito, on branches at 2100 meters.

DISTRIBUTION: Known from our region only by a fragment collected in Mexico by F. Mueller.

### 2. *Holomitrium terebellatum* C. Müll.; Ren. & Card. Bull. Soc.

Bot. Belg. 31<sup>1</sup>: 151. 1893.

“Monoicous”: stems flexuous, more or less branching, greenish-brown above, covered with reddish-brown tomentum below, 5–15 cm. long: stem-leaves mostly 9–10 mm. long, from an oblong-lanceolate, more or less spreading base, very gradually narrowed to a rather

stout, spreading-flexuous point, crispate or spirally twisted when dry; leaf-margins of a single thickness of cells, serrulate about one half down and somewhat crenulate nearly to the base; costa percurrent or slightly excurrent, somewhat rough on the back near the apex,  $80\ \mu$  wide or more a little above the base, in cross-section near the middle showing 5 or 6 guide-cells with thin stereid-bands above and below and no differentiated outer cells; alar and basal cells similar, very pale to yellowish-brown, mostly rectangular, with thin walls; cells next above more elongate,  $100\ \mu$  or more long, with quite uniformly thickened and pitted walls, extending about one sixth up the leaf, then mostly becoming much shorter, more irregular with greatly thickened walls to the apex of the leaf; median cells about  $6\ \mu$  wide and  $12\text{--}20\ \mu$  long, the marginal sometimes scarcely elongate; perichaetial leaves long-subulate, sometimes nearly equaling the seta: seta 2–3 cm. long: capsule (according to Renauld and Cardot) oblong or cylindrical, smooth; lid unknown; peristome-teeth red, lanceolate-subulate, entire.

TYPE LOCALITY: Forests of Barba, Costa Rica, at 2500–2700 meters.

DISTRIBUTION: Known only from the type locality.

### 3. *Holomitrium calycinum* (Sw.) Mitt. Jour. Linn. Soc. 12 : 60. 1869.

*Bryum calycinum* Sw. Prodr. 139. 1788.

*Weisia calycina* Hedw. Sp. Musc. 70. 1801.

~~*Calyptum scoparium*~~ Beauv. Prodr. Aethéog. 50. 1805.

*Dicranum calycinum* Sw. Fl. Ind. Occ. 1768. 1806

Antheridial flowers not known: plants in rather compact, dusky-green or greenish-brown tufts, with branching stems up to 5 cm. high, the older branches often bearing clusters of flagella about 1 cm. long: stem-leaves crispate when dry, mostly 5–6 mm. long, from a broadly ovate, entire base less than 2 mm. long, rather abruptly narrowed to a slender, serrulate, lanceolate point usually 2.5–3 times as long, with the margin toward the apex of a double thickness of cells; costa excurrent, slightly serrulate on the back near the apex,  $70\text{--}80\ \mu$  wide a little above the base, in cross-section near the middle showing about 6 guide-cells with stereid-bands above and below and the outer cells differentiated; alar cells forming a distinct, often nearly square cluster, brownish to nearly hyaline, extending about  $200\ \mu$  up with some much longer and narrower cells between them and the costa; cells throughout the broadened lower part of the leaf mostly very long and narrow with thickened, pitted walls, in the point above becoming much shorter with unevenly thickened scarcely pitted walls; inner perichaetial leaves with a convolute base 8–10 mm. high narrowed to a rough point mostly shorter than the base, often reaching above the capsule: seta 10–15 mm. long: capsule oblong-cylindrical, smooth, brownish, up to 3 mm. long; peristome-teeth rather dark-brown, lanceolate, densely papillose, attached well below the mouth, either divided along the median line nearly to the base or sometimes undivided; lid with a slender beak about two thirds as long as the capsule: calyptra entire below, nearly or quite smooth above: spores minutely roughened,  $14\text{--}16\ \mu$  in diameter.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Jamaica.

ILLUSTRATION: Hedw. Sp. Musc. pl. 14.

### 4. *Holomitrium marginatum* Mitt. Jour. Linn. Soc. 12 : 57. 1869.

Pseudautoicous: male plants minute, usually 1–2 mm. high, in clusters on tomentum of the older stems; inner antheridial leaves 0.5–1 mm. long with an ovate, concave base rather gradually narrowed to an entire, costate, lanceolate point, enclosing 4 or 5 oblong antheridia scarcely 0.2 mm. long and a few rather longer paraphyses: fertile plants in brownish-green tufts with branching stems, tomentose below, up to 5 cm. high; stem-leaves 5–6 mm. long, crispate when dry, from a more or less erect and imbricate, broadly ovate or obovate, nearly or quite entire base, usually less than 1.5 mm. long and often nearly 1 mm. wide, abruptly narrowed to a lanceolate point 2–3 times as long, with the margin of a double thickness of cells and serrulate two-thirds down or more; costa percurrent or slightly excurrent, serrate on the back above, about  $60\ \mu$  wide well above the base, in cross-section near the middle showing 4 or 5 guide-cells with stereid-bands above and below and outer cells scarcely or not differentiated; cells of the broadened leaf-base mostly much elongate, with thickened, pitted walls,

the alar ones forming a large group of broad cells, brownish throughout or nearly hyaline on the inner side and not quite extending to the costa; upper leaf-cells mostly short, the median often transversely elongate and from 5 by 3  $\mu$  to 5 by 5–8  $\mu$  in diameter; perichaetial leaves with high-convolute base rather gradually narrowed to a serrulate point often extending above the capsule: seta about 1.5 cm. long: capsule oblong to oblong-cylindric, about 3 mm. long, with stomata in mostly one row near the base; peristome-teeth lanceolate, projecting above the mouth 200  $\mu$  or more, dark reddish-brown below, paler above, densely papillose throughout, with rather indistinct articulations and more or less divided along the median line nearly to the base or sometimes almost entire; lid and calyptra not seen: spores nearly smooth, up to 14  $\mu$  in diameter.

TYPE LOCALITY: Cuba.

DISTRIBUTION: Known only from the type locality.

5. *Holomitrium arboreum* Mitt. Jour. Linn. Soc. 12 : 58. 1869.

*Holomitrium macrocarpum* C. Müll. Nuovo Giorn. Bot. Ital. II. 4: 36. 1897.

Pseudautoicous: male plants attached by tomentum mostly to the older perichaetial buds, minute, 1–3 mm. high, usually bearing 2 or 3 flower-buds, the antheridial leaves lanceolate-pointed, costate, acute and serrulate at the apex, enclosing 4 or 5 oblong antheridia about 0.2 mm. long with few paraphyses slightly longer: fertile plants in compact rather dark-green or brownish-green tufts with branching stems up to 5 cm. high: stem-leaves crispate when dry, up to 7 mm. long, from an oblong or somewhat ovate, erect and imbricate base 1.5–2 mm. long narrowed to a lanceolate, serrulate, acute point 1.5–4 mm. long, the lower leaves often much shorter than the upper; costa slightly excurrent, more or less toothed on the back toward the apex, 60–80  $\mu$  wide in the lower part of the leaf, in cross-section near the middle showing mostly 5 or 6 guide-cells with stereid-bands above and below and outer cells differentiated; basal leaf-cells much elongate, with thickened, pitted walls, the alar group very distinct, brownish, or often pale on the side toward the costa, the upper leaf-cells mostly short, somewhat angular, mamilllose, in rows with furrows between, mostly 7–8  $\mu$  wide by 7–10  $\mu$  long; perichaetial leaves high-convolute, reaching one half up the seta or more: seta 1.5–2 cm. long: capsule nearly cylindric, 4–6 mm. long, with stomata in one row at the base; peristome-teeth projecting more than 200  $\mu$  above the rim, lanceolate, densely papillose, dark below, pale and very slender above, scarcely divided along the median line; lid with a subulate point of variable length, sometimes nearly as long as the capsule: spores not quite smooth, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Andes of Peru, at 1300 meters.

DISTRIBUTION: Mexico to Bolivia.

6. *Holomitrium Wrightii* Sull. Proc. Am. Acad. 5 : 279. 1861.

Pseudautoicous: male plants minute, in clusters on tomentum of the older perichaetial buds, the stems about 1 mm. high, bearing 2 or 3 flowers, the inner antheridial leaves broadly ovate, short, acute, the outer leaves much longer, broadly lanceolate above, with often distant, spreading teeth on the margin and the costa faint; antheridia 5 or 6, about 0.25 mm. long, with paraphyses: fertile plants in rather dark-green tufts, with branching stems up to 6 cm. long: stem-leaves nearly linear, 3.5–4.5 mm. long and 0.4 mm. wide, more or less twisted and subtubulose above, never crispate when dry, about four fifths up the leaf narrowed to an acute point, the not thickened margins with irregular, spreading teeth extending downward one third to one half way to the base; costa shortly excurrent, 50–60  $\mu$  wide in the lower part of the leaf, smooth on the back, in cross-section showing about 4 large cells on the upper side, about the same number of similar cells on the under side with 5 or 6 much smaller cells enclosed within, all with rather thin walls; alar cells distinct, pale-yellowish to hyaline, extending about half way to the costa; cells of the blade rectangular from the base about three fourths of the way up the leaf, with somewhat thickened, pitted walls, the median ones about 10  $\mu$  wide by 30–40  $\mu$  long, the remaining cells in the upper part of the leaf becoming more or less obliquely elongate-hexagonal; perichaetial leaves convolute about one third up the seta, the inner gradually narrowed to a slender point usually shorter than the basal part and slightly serrulate

at the apex: seta yellowish, about 1.5 cm. long: capsule oblong-cylindric, 3 mm. long, smooth, with 2 rows of stomata near the base; peristome-teeth densely papillose, reddish-brown below, pale above, attached well below the rim and projecting above it about 150  $\mu$ , irregularly divided, more or less perforate below, the apex often blunt; lid with a subulate beak about one half as long as the capsule: spores not quite smooth, 12–14  $\mu$  in diameter.

TYPE LOCALITY: Cuba.

DISTRIBUTION: Known only from the type locality.

7. *Holomitrium Maxoni* R. S. Williams, Bull. Torrey Club 34 : 572. 1908.

Pseudautoicous: male plants minute, attached by radicles to the older perichaetial buds, the outer antheridial leaves ovate-lanceolate, very acute, entire, 0.5–0.65 mm. long, faintly costate to ecostate, the inner much shorter, concave, brownish, enclosing apparently only 1 or 2 well developed antheridia 0.2 mm. long and 2 or 3 paraphyses: fertile plants in rather dark-green tufts, with stems bearing few radicles up to 8 mm. high: leaves when dry incurved-imbricate with margins above rolled in, when moist spreading-recurved, oblong to linear, up to 2.5 mm. long and 0.4 mm. wide, at the apex mostly broadly rounded or somewhat truncate, with excurrent costa forming a stout apiculus, and a few coarse teeth on either side; costa a little above the base about 40  $\mu$  wide, in cross-section near the middle mostly showing about 2 guide-cells with 2 rather large cells on the upper side and no stereid-band, on the under side a stereid-band of somewhat variable size with the outer cells usually well differentiated; upper leaf-cells more or less hexagonal to oblong, about 12  $\mu$  wide by 20–30  $\mu$  long, gradually becoming more rectangular in the middle of the leaf and toward the base longer and narrower next the costa, toward the margin paler and rectangular to square, the alar either forming a distinct brownish cluster or scarcely different from the cells just above: seta up to 18 mm. long: capsule oblong-cylindric, erect, 3 mm. long, red at the slightly contracted mouth; peristome-teeth attached about one fourth their length below the mouth, red below, distinctly articulate, papillose on both sides and more or less divided along the median line either above or below or sometimes throughout; lid and calyptra not seen: spores nearly smooth, up to 12  $\mu$  in diameter.

TYPE LOCALITY: Posesion de Starck, ~~Atenas~~ Pateras, Oriente, Cuba, 500 meters.

DISTRIBUTION: Known only from the type locality.

This species is evidently nearest to *H. proliferum* Mitt. of Brazil, but is a rather smaller plant with the lower leaf-cells narrower and not so lax as in that species.

8. *Holomitrium piliferum* (Mitt.) Besch. Ann. Sci. Nat. VI. 3 : 189. 1876.

*Eucamptodon piliferus* Mitt. Jour. Linn. Soc. 12: 69. 1869.

Pseudautoicous: male plants minute, growing on tomentum of the stem a little below the perichaetial buds, the antheridial leaves from lanceolate to broadly ovate, one third to nearly 1 mm. long, ecostate, with a very acute entire or nearly entire point; antheridia few, oblong, with few paraphyses: fertile plants in rather loose, glossy, yellowish-brown to dark-brown tufts, with robust stems up to 4 cm. high and 0.28 mm. in diameter: stem-leaves 7–8 mm. long, rather crowded, inflated, loosely imbricate, ovate-lanceolate with involute entire borders, terminating in a pale, flexuous, smooth hair-point about 1 mm. long; costa weak, about 30  $\mu$  wide below, indistinct above, in cross-section showing usually 2 large thick-walled cells on the upper side and a row of 5 or 6 small stereid-cells on the under side; alar cells short and broad, forming a distinct, brownish cluster, the other cells quite uniform throughout the leaf, elongate, with much thickened and pitted walls, the median cells 40–80  $\mu$  long and about 12  $\mu$  wide; inner perichaetial leaves with a convolute base about 1 cm. long, gradually narrowed to a smooth point about one half as long: seta 15–18 mm. long: capsule oblong-cylindric, 3.5 mm. long, with stomata in 1 or 2 rows near the base; annulus none; peristome-teeth extending about 300  $\mu$  above the mouth, entire, narrowly lanceolate, very slender and pale above, reddish below, papillose throughout: calyptra smooth, about 5 mm. long, split on one side far above the middle: spores rough, about 12  $\mu$  in diameter.

TYPE LOCALITY: Trinidad.

DISTRIBUTION: Cuba; Guadeloupe; Martinique; also in Trinidad.

9. **DICRANOLOMA** Ren. Rev. Bryol. 28 : 85. 1901.

*Leucoloma* § *Dicranoloma* Ren. Prodr. Fl. Bryol. Madag. 61. 1897.

Dioicous. Leaves with a hyaline margin of narrow cells, this margin rarely indistinct or lacking; cells of the leaf-blade not dimorphous, elongate, with somewhat thickened, sinuous and pitted walls; dorsal papillae none or scarcely evident; costa nearly percurrent or excurrent; alar cells distinct, more or less subhexagonal. Capsule generally curved (erect and symmetric in a few species); peristome-teeth split to the middle or below. Calyptra cucullate, extending well below the base of the capsule.

Type species, *Dicranum platyloma* Besch.

1. **Dicranoloma meteoroides** R. S. Williams, Contr. U. S. Nat.

Herb. 16 : 23. 1912.

Apparently dioicous: plants in lax pendent tufts, with flexuous, somewhat branching stems up to 30 cm. long: leaves distant, three-ranked, 9–10 mm. long, 1 mm. wide a little above the base, spreading-flexuous, often spirally twisted above, distinctly serrulate three fourths of the way down the margin or more, from an ovate base gradually narrowed to a slender, lanceolate, keeled point, with costa short-excurrent; costa just above the colored base of the leaf 60–70  $\mu$  wide, smooth throughout, in cross-section near the middle showing about 4 guide-cells with thin stereid-bands on either side; alar cells brown, extending to the costa, about 20  $\mu$  wide and from square to twice as long as wide, often with somewhat thickened walls; cells throughout the rest of the leaf mostly elongate, with thickened more or less sinuous and pitted walls, the median cells 8–10  $\mu$  wide and 12–20  $\mu$  long; perichaetial leaves costate, the inner three or four from a convolute base, mostly abruptly narrowed to a serrulate, setaceous, erect point 3–4 mm. long, inclosing 8–10 archegonia without paraphyses: seta smooth, 12–14 mm. long: calyptra (from a very immature capsule) slightly rough above.

TYPE LOCALITY: Humid forest between Alto de las Palmas and top of the Cerro de la Horqueta, Chiriqui, Panama, alt. 2100–2268 meters.

DISTRIBUTION: Known only from the type locality.

The specimens, pendent from branches of trees and shrubs, are in very immature fruit. The generic position of this species is somewhat doubtful, as Dr. Brotherus has pointed out; he has suggested that it might better be placed under *Schliephackea*. I leave it as it is awaiting more complete material; it is a much stouter plant than the single species of *Schliephackea* known, with upper leaf-cells relatively shorter and broader and cell-walls thicker and more pitted, about as found in various species of *Dicranoloma*.

10. **LEUCOLOMA** Brid. Bryol. Univ. 2 : 218. 1827.

*Dicranum* § *Leucoloma* C. Müll. Syn. 1: 352. 1848.

*Poecilophyllum* Mitt. Jour. Linn. Soc. 12: 92. 1869.

Dioicous. Plants growing in pale- to dark-green, mostly soft, not very compact, often extensive mats; stems without radicles, usually dark-colored and often rough by the slightly projecting bases of the more or less deciduous leaves. Leaves somewhat curved-secund or spreading-flexuous, rarely circinate, mostly lanceolate-subulate, subtubulose, grooved above, the borders flat or slightly incurved and mostly entire except at the apex; upper leaf-cells, except the very narrow border cells, mostly roughened on the back with crowded, sometimes compound papillae, the marginal cells pale, much elongate, forming a distinct border, narrow above, gradually wider near the middle, often indistinct near the base of the leaf, the upper cells of the blade within mostly green and short (all elongate in *L. Mariei*), and the short cells extending along the costa as a broad band nearly to the base of the leaf or gradually becoming elongate below and not distinct from the other cells; alar cells large, sometimes forming auricles, from hyaline to mostly brownish; perichaetial leaves from a short, broad, sheathing base abruptly narrowed to a subulate point. Seta erect. Capsule nearly or quite symmetric, erect, mostly cylindrical, the lid with a long slender beak; annulus wanting; peristome-teeth divided to the middle or to near the base into two forks. Calyptra mostly rough above, the base nearly entire, sometimes irregularly slit. Growing on decayed logs, sometimes on earth.

Type species, *Leucoloma serrulatum* Brid.

Leaves falcate-secund or spreading on all sides, lanceolate-subulate with a straight or flexuous, not crispate point, when dry.

Upper leaf-cells mostly not elongate or partly elongate, up to 3 times as long as wide.

Short, green, papillose cells of the upper part of the leaf extending in a broad band next to the costa nearly to the base.

Short, papillose cells of the upper part of the leaf not extending into a distinct band next to costa in the basal part.

Leaves densely papillose on the back to below the middle.

Leaves about 6 mm. long, with a distinct, hyaline border extending to or nearly to the base and 8-12 cells wide a little above the base.

Leaves 3-5.5 mm. long, with a narrow border above, not or scarcely distinct in the lower part of the leaf from the cells within.

Leaves 4-5.5 mm. long, the point long and slender.

Leaves scarcely 3 mm. long, the point short and stout.

Leaves smooth on the back throughout or slightly rough at the apex.

Upper leaf-cells all elongate, 3-6 times as long as wide.

Leaves spreading on all sides, from an ovate base rather abruptly narrowed to a nearly linear, blunt point regularly crispate when dry.

1. *L. serrulatum*.

2. *L. albulum*.

3. *L. Crügerianum*.

4. *L. subimmarginatum*.

5. *L. Schwaneckeanum*.

6. *L. Mariei*.

7. *L. tortellum*.

### 1. *Leucoloma serrulatum* Brid. Bryol. Univ. 2 : 752. 1827.

*Dicranum Bridelianum* C. Müll. Syn. 1: 354. 1848.

*Poecilophyllum serrulatum* Mitt. Jour. Linn. Soc. 12: 93. 1869.

*Poecilophyllum vincentinum* Mitt. Jour. Linn. Soc. 12: 93. 1869.

*Leucoloma vincentinum* Jaeger, Ber. St. Gall. Nat. Ges. 1870-71: 412. 1872.

*Dicranum cryptocarpum* C. Müll. Linnaea 38: 626. 1874.

*Leucoloma cryptocarpum* Jaeger & Sauerb. Ber. St. Gall. Nat. Ges. 1877-78: 379. 1879.

*Leucoloma Riedlei* Besch. Jour. de Bot. 5: 146. 1891.

*Dicranum longicapillare* C. Müll. Bull. Herb. Boiss. 5: 553. 1897.

*Leucoloma longicapillare* Paris, Index Bryol. Suppl. 233. 1900.

Apparently dioicous: fertile plants in loose, green to pale-green tufts with more or less flexuous, inclined, branching stems up to 10 cm. high: leaves lanceolate-subulate, up to 7 mm. long, subtubulose, widely spreading, often nearly straight or somewhat curved-secund at the apex of the stem, the narrow point grooved and sharply serrulate about one fifth down the leaf; costa excurrent, pale, 25-40  $\mu$  wide below and one twelfth to one fifteenth the width of the lower part of the leaf; leaf-cells in the margin hyaline, very long and narrow, forming a distinct border, scarcely evident near the apex, 2 or 3 cells wide about one third down the leaf, gradually widening below and merging into the lower leaf-cells; green cells of the upper part of the blade mostly oblong, 4-5  $\mu$  wide by 6-12  $\mu$  long, minutely papillose on the back, gradually becoming somewhat larger below with slightly sinuous, unequally thickened walls and extending in a broad band along the costa nearly to the base, the other lower leaf-cells except the border and alar cells much elongate with unequally thickened and somewhat pitted walls, the alar group brownish, extending nearly to the costa, mostly of large short cells, not forming auricles; perichaetial leaves a little shorter than the stem-leaves, abruptly narrowed to a more serrulate point: seta erect, smooth, about 1.5 mm. long: capsule about 1 mm. long, erect, oblong, its mouth mostly below the tips of the perichaetial leaves; peristome-teeth divided nearly to the base into 2 slender forks, distinctly and regularly articulate more than one half up, the upper parts papillose: spores smooth, up to 18  $\mu$  in diameter. (Description of fruit from the Mexican plant called *Dicranum cryptocarpum* by C. Müller.)

TYPE LOCALITY: Haïti.

DISTRIBUTION: Jamaica; Haïti; Porto Rico; St. Kitts; Montserrat; Guadeloupe; St. Vincent; Mexico and Guatemala. On decayed logs and earth.

*L. Riedlei* Besch. seems to be an old, discolored specimen of *L. serrulatum* with much abraded leaves, having mostly lost the teeth at the apex and the papillae on the back.

### 2. *Leucoloma albulum* (Sull.) Jaeger, Ber. St. Gall.

Nat. Ges. 1870-71: 412. 1872.

*Dicranum albulum* Sull. Proc. Am. Acad. 5: 278. 1861.

*Poecilophyllum albulum* Mitt. Jour. Linn. Soc. 12: 93. 1869.

Dioicous: male flowers sessile, 3 or 4, scattered at intervals along the stem, the perigonal leaves much shorter than the stem-leaves, abruptly narrowed to a rough, often sinuous point chiefly formed by the excurrent costa, and enclosing numerous antheridia about 0.6 mm. long

and paraphyses slightly longer: fertile plants in extensive green mats, more or less whitish from the hyaline leaf-borders, with often branching stems 1–4 cm. high: stem-leaves about 6 mm. long, falcate-secund, lanceolate-subulate, subtubulose, the point variously flexuous, denticulate at the apex and sometimes minutely serrulate on the margins, rather densely papillose on the back one half down the leaf or more, less papillose on the inner face; costa excurrent, pale, about  $30\ \mu$  wide below and one ninth the width of the lower part of the leaf; hyaline border of the leaf extending from near the apex to the base, very narrow above, widest about three fourths down (12 cells wide), then narrowing to the base; upper leaf-cells green, from roundish to oblong,  $4\ \mu$  by  $4\text{--}6\ \mu$ , gradually becoming longer below, about  $6\ \mu$  by  $20\text{--}40\ \mu$  and smooth, with somewhat thickened not pitted or very slightly pitted walls, the alar ones oblong, brown, not or scarcely auriculate; perichaetial leaves about as long as the stem-leaves, the outer with a very broad base abruptly narrowed to the slender point, the inner with a longer clasping base less abruptly narrowed above: seta red, up to 18 mm. long: capsule erect, cylindric, nearly straight, about 2.5 mm. long, with a conic, slender-beaked lid one half as long; annulus none; peristome-teeth reddish to the apex, nearly smooth or slightly papillose above and indistinctly striate below, divided one half to three fourths down, the articulations below on the outer face prominent,  $8\text{--}12\ \mu$  apart: calyptra slightly rough one third down, split one half up or more on one side, the base entire or slightly notched: spores slightly roughened, up to  $16\ \mu$  in diameter.

TYPE LOCALITY: Cuba.

DISTRIBUTION: Cuba; Jamaica; Dominica; Guadeloupe; Martinique.

EXSICC.: Sull. Musci Cub. Wright. 35; Husnot, Pl. Ant. 120 (as *L. Bridelii* Hampe, ms.); Holz. Musci Acroc. Bor. Am. 308.

### 3. *Leucoloma Crügerianum* (C. Müll.) Jaeger, Ber. St. Gall. Nat.

Ges. 1870–71: 412. 1872.

*Dicranum Crügerianum* C. Müll. Syn. 2: 588. 1851.

*Poecilophyllum Crügerianum* Mitt. Jour. Linn. Soc. 12: 92. 1869.

*Dicranum asperrimum* C. Müll. Linnaea 42: 472. 1878.

*Leucoloma asperrimum* Paris, Index Bryol. 758. 1896.

Dioicous: fertile plants in low, soft tufts; stems fragile, with few branches and spreading-flexuous leaves: stem-leaves lanceolate-subulate, 4–5 mm. long, more or less subtubulose, the slender point grooved, entire except at the slightly denticulate apex, rather densely papillose on the back, to below the middle of the leaf; costa percurrent or slightly excurrent, mostly one twelfth or less the width of the lower part of the leaf; border of narrow elongate cells, in one row above, gradually widening downward and merging into the lower leaf-cells; cells in the upper part of the blade mostly short, about  $6\ \mu$  wide and from not elongate to 3 times as long as wide, gradually longer below, rather irregular, those toward the base with unequally thickened, slightly pitted walls, the alar ones brownish, forming a distinct group, scarcely or not auriculate, of large, often nearly square cells; perichaetial leaves from a broad, convolute base abruptly narrowed to a setaceous point: seta red, erect: capsule narrowly cylindric and symmetric; peristome-teeth red, divided to the middle into 2 subulate-lanceolate forks, trabeculate below.

TYPE LOCALITY: Trinidad.

DISTRIBUTION: Vera Cruz (Jalapa, alt. 1500 m.); Jamaica; also in Trinidad and Venezuela.

### 4. *Leucoloma subimmarginatum* (C. Müll.) Jaeger, Ber. St. Gall.

Nat. Ges. 1870–71: 412. 1872.

*Dicranum subimmarginatum* C. Müll. Syn. 2: 589. 1851.

*Poecilophyllum subimmarginatum* Mitt. Jour. Linn. Soc. 12: 94. 1869.

Very similar to *L. Crügerianum*, but smaller: leaves lanceolate-subulate, 2.5–3 mm. long, with margins incurved above and entire except at the sharply denticulate, rather stout apex; costa percurrent, at base about  $25\ \mu$  wide and one twelfth the width of the lower part of the leaf; leaf-cells in the margin smooth, narrow and elongate, forming a distinct, not hyaline border one cell wide in the upper part of the leaf, becoming gradually wider below and merging into the lower leaf-cells; cells of the blade above mostly not elongate, up to  $8\ \mu$  wide, more or less covered on the back with rather prominent, often compound or lobed papillae, extending

to below the middle of the leaf; lower leaf-cells elongate, with rather uniformly thickened, sometimes slightly curving walls, the alar ones mostly brownish, enlarged, scarcely forming auricles.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Known only from the type locality, in mountains at 1500–2500 meters.

#### 5. *Leucoloma Schwaneckeanum* (Hampe) E. G. Britton.

*Dicranum Schwaneckeanum* Hampe, *Linnaea* 25: 361. 1853.

*Dicranum portoricense* C. Müll. *Hedwigia* 37: 226. 1898.

*Leucoloma portoricense* Paris, *Index Byrol. Suppl.* 233. 1900.

Flowers and fruit unknown: plants in pale-green tufts, with often branching, erect-flexuous stems up to 4 cm. high: stem-leaves lanceolate-subulate, mostly falcate-secund with the point variously curved and twisted, up to 8 mm. long, subtubulose, on the back smooth or slightly papillose just below the apex, the slender point grooved and serrulate; costa pale, excurrent, about 30  $\mu$  wide below and one eighth to one tenth the width of the lower part of the leaf; hyaline border extending from near the apex to the base, very narrow above, widest about three fourths down, becoming 10–12 cells wide, then mostly narrowing to the base; the very pale-green cells of the blade above from nearly square to roundish or short-oblong, about 4  $\mu$  by 4–6  $\mu$ , gradually lengthening below to mostly 6  $\mu$  wide by 12–25  $\mu$  long, with somewhat thickened walls not pitted or sinuous; alar cells brownish to hyaline, often inflated and auriculate.

TYPE LOCALITY: Porto Rico.

DISTRIBUTION: Mountains of Porto Rico.

#### 6. *Leucoloma Mariei* Besch. *Jour. de Bot.* 5: 145. 1891.

Flowers and fruit unknown: plants in dusky, somewhat reddish-green tufts with more or less branching stems 1–2 cm. high: leaves somewhat curved-secund, up to 5 mm. long, lanceolate-subulate, subtubulose, entire except at the denticulate apex, rather densely covered on the back with low papillae to below the middle of the leaf except on the ill-defined border which is very narrow above, gradually widening below, and composed of narrower but scarcely paler cells than within; costa mostly somewhat excurrent, at the base about 30  $\mu$  wide; cells of the leaf-blade all elongate, the upper mostly 3–6 times as long as wide with slightly thickened walls, becoming longer toward the base with thickened more or less pitted walls; alar cells forming a large, reddish-brown group extending nearly to the costa.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Known only from the type locality.

#### ✓ 7. *Leucoloma tortellum* (Mitt.) Jaeger, *Ber. St. Gall.*

*Nat. Ges.* 1870–71: 413. 1872.

*Poecilophyllum tortellum* Mitt. *Jour. Linn. Soc.* 12: 94. 1869.

Flowers and fruit unknown: plants in low mats, yellowish or dull-green at the surface, dusky-brown within; stems branching, 1–2 cm. high, with leaves spreading on all sides from the base when either wet or dry, the apex when dry crispate: stem-leaves 2.5–3 mm. long, from a somewhat ovate base gradually narrowed to a mostly nearly linear, grooved point, with blunt, slightly denticulate apex; costa nearly or quite percurrent, about 30  $\mu$  wide below; leaf-surfaces minutely and densely papillose on both sides three fourths down the leaf or more, the margins above papillose, below from near the middle to the base hyaline, with 2 or 3 rows of long, narrow cells; upper leaf-cells rather obscure, roundish or nearly square, about 5 by 5  $\mu$ , the short cells extending three fourths down the leaf or more, gradually becoming rectangular in the base, about 6–8  $\mu$  wide by 12–25  $\mu$  long, with slightly thickened walls; alar cells brownish, forming a large, often inflated cluster, extending nearly to the costa.

TYPE LOCALITY: ~~Trinidad.~~

DISTRIBUTION: Guadeloupe; ~~also in Trinidad.~~

#### DOUBTFUL SPECIES

*Leucoloma Dussianum* Besch.; *Ren. & Card. Bull. Soc. Bot. Belg.* 41<sup>1</sup>: 16. 1905. No specimens have been seen; from the description, it seems to be much like *L. subimmarginatum*.

## 11. DICRANUM Hedw. Fundam. 2: 91. 1782.

Dioicous or monoicous. Plants varying in size from small, dense cushions to extensive deep mats, with usually erect, branching stems, abundantly tomentose or rarely nearly without radicles. Leaves lanceolate to lanceolate-subulate, mostly falcate-secund, smooth or mamilllose or papillose on the back above, more or less subtubulose or grooved, with the margin never more thickened than the blade within and never revolute in the upper half; costa rather narrow (except in *Paraleucobryum*) and percurrent or excurrent or sometimes vanishing in the apex, in cross-section near the middle of the leaf showing usually one of three types of cell-structure; in the first, the cells are not greatly differentiated among themselves (homogeneous) and form a more or less semiterete costa; in the second, there is a median row of large, mostly thin-walled cells (guide-cells) with bands of much smaller, thick-walled cells on either side (stereid-cells) and the costa semiterete, often with ribs on the back; in the third, the costa is very broad and composed of 3 or 4 layers of cells, of nearly uniform size and thickness of wall, that extend nearly or quite across the leaf, the middle or middle and lower rows with more or less chlorophyl; cells of the leaf-blade often much thickened and pitted, the lower ones rectangular, the upper elongate to roundish or square with the cells sometimes in two layers; alar cells often in more than one layer, and forming usually a nearly square group of brown, reddish or hyaline cells usually not reaching to the costa and rarely auriculate. Setae erect, solitary or aggregate. Capsule mostly cylindric, erect and symmetric or curved and inclined, often strumose; lid rostrate; annulus usually present; peristome-teeth 16, inserted near the rim of the capsule, usually divided to the middle or below into 2, rarely 3 or 4 forks, the outer plates of the teeth mostly vertically striate, sometimes only papillose, rarely smooth, the inner plates mostly with very distinct, projecting articulations. Calyptra cucullate, smooth or papillose above, without cilia at base. Spores more or less rough.

Type species, *Dicranum scoparium* Hedw.

Autoicous; costa semiterete, its cells homogeneous.

1. ARCTOA.

Dioicous.

Costa semiterete, its cells heterogeneous.

Capsule erect, mostly straight.

2. ORTHODICRANUM.

Capsule nodding, mostly curved.

3. EUDICRANUM.

Costa broad, not semiterete, its cells morphologically homogeneous, but only part of them chlorophyllose.

4. PARALEUCOBRYUM.

1. ARCTOA. Autoicous; mostly small alpine species; stems bearing few or no radicles above; costa semiterete, excurrent, of homogeneous cells; cell-walls usually somewhat thickened and not pitted, or only slightly so in the lower part of the leaf toward the costa; capsule erect, not strumose, on a short seta 3–8 mm. long, or curved, nodding, and strumose, on a longer seta; alar cells sometimes forming a rather small, not very distinct group; beak of the calyptra mostly papillose.

Capsule erect, regular or nearly so, not strumose; spores 20–28 $\mu$  in diameter.

Peristome-teeth divided to the middle or below into two forks.

Capsule about one and a half times as long as thick, exerted on a seta 5–8 mm. long.

1. *D. hyperboreum*.

Capsule about as long as thick, not exerted above the tips of the leaves, on a seta about 3 mm. long.

2. *D. Anderssonii*.

Peristome-teeth mostly not divided above, with short slits here and there about half way down.

3. *D. fulvellum*.

Capsule curved, nodding, more or less strumose; spores 13–16 $\mu$  in diameter.

Annulus narrow, obscure; calyptra densely papillose half way down or more.

4. *D. falcatum*.

Annulus broad, distinct; calyptra less papillose.

Leaf-cells in the upper half of the blade mostly short, from square to 4 times as long as broad.

Stem-leaves less than 2 mm. long, rough above, with high, crowded papillae; male flower close to the perichaetium.

5. *D. hispidulum*.

Stem-leaves up to about 4 mm. long, much smoother above, with mostly low, often indistinct papillae.

Male flower some distance below the perichaetium or on a separate branch; leaves not distinctly secund; capsule smooth.

6. *D. Schisti*.

Male flower at the base of the perichaetium; leaves secund; capsule furrowed.

7. *D. Starkii*.

Leaf-cells above mostly 8–12 times as long as wide; upper stem-leaves about 5 mm. long.

8. *D. arcticum*.

2. ORTHODICRANUM. Dioicous; species of medium size; costa semiterete, with mostly distinct guide-cells and one or two rows of smaller cells above and below, sometimes forming distinct stereid-bands; capsule mostly straight and erect, never strumose; beak of the calyptra smooth.

Annulus present.

Cells throughout the lower half of the leaf short, from nearly square to mostly 2-4 times as long as wide; capsule not ribbed.

Cells throughout the lower half of the leaf mostly elongate (except the alar), from 2-8 times as long as wide; capsule more or less ribbed when dry.

Stems usually with flagella 5-6 mm. long in the axils of the upper leaves; capsule usually 4-5 times as long as wide, mostly erect and straight.

Stems without flagella; capsule usually 3-4 times as long as wide, mostly slightly curved and nodding, the mouth slightly oblique.

Annulus lacking.

Leaves with a long-excurrent, terete costa, usually entire; capsule smooth.

Leaves with the costa vanishing in the slightly broadened, grooved point; capsule ribbed.

9. *D. fulvum*.

10. *D. flagellare*.

11. *D. montanum*.

12. *D. strictum*.

13. *D. rhabdocarpum*.

3. EUDICRANUM. Dioicous; male plants either large, in more or less separate tufts, or minute and growing on tomentum of the fertile stems; species of medium to large size; stems tomentose; costa semiterete, with guide-cells and stereid-bands above and below; capsule curved and nodding (rarely nearly straight), often strumose; peristome-teeth vertically striate on the outer plates (smooth only in *D. laevidens*); calyptra smooth.

Upper leaf-cells short, from mostly square to 2 or rarely 3 times longer than broad with cell-walls not pitted.

Plants robust, with leaves undulate. (In some of the smaller varieties not undulate.)

Setae aggregate.

Setae solitary.

Leaves lanceolate below, broadest near the base, mostly nearly smooth on the back; lower leaf-cells very narrow, about  $8\mu$  wide with greatly thickened, pitted walls; upper cells with mostly equally thickened walls.

Leaves ovate below, often broadest one third up, mostly papillose on the back; lower leaf-cells broader with slightly thickened, pitted walls; upper cells with rather unequally thickened walls.

Medium-sized species with leaves not undulate (or rarely undulate in *D. condensatum*); setae solitary.

Upper leaf-cells irregular with somewhat unequally thickened walls; leaf widest near the base.

Upper leaf-cells with uniformly thickened not sinuous walls.

Leaf with a short, stout point and the costa not excurrent or very shortly excurrent. (*D. elongatum* may be sought here.)

Lower leaf-cells broad,  $12-16\mu$  wide, with scarcely thickened or pitted walls; capsule 4-6 times as long as broad.

Lower leaf-cells narrower,  $8-10\mu$  wide, with somewhat thickened, pitted walls; capsule mostly 2.5-3 times as long as broad.

Leaf with a slender point and excurrent costa.

Leaves serrulate and rough on the back usually one half down; alar cells not extending to the costa.

Leaves entire or slightly serrulate and rough towards the apex; leaf point often broken; alar cells extending to the costa.

Upper leaf-cells elongate with pitted walls (except in *D. elongatum*, with walls not pitted and cells often oval or rounded with very thick walls).

Peristome-teeth smooth on the outer plates.

Peristome-teeth vertically striate on the outer plates.

Plants slender; leaves entire or slightly serrulate near the apex, mostly 3-4.5 mm. long; capsule sometimes nearly straight, about 1.5 mm. long, with a distinct annulus.

Leaf-cells with pitted walls not extending to the middle of the leaf; some of the upper cells not elongate.

Leaf-cells with pitted walls extending to above the middle of the leaf; cells all elongate.

Plants mostly large and stout; leaves serrate above (except sometimes in *D. neglectum* and varieties of *D. Bonjeani*) and more than 6 mm. long; capsule 2.5-5 mm. long; annulus wanting (except in *D. neglectum*).

Setae aggregate.

Leaves not undulate; costa percurrent or excurrent; tomentum not conspicuous on the stems; setae mostly yellow.

Leaves more or less undulate; costa vanishing in the narrow apex.

Leaves conspicuously undulate; stems thickened with abundant tomentum, grayish above, rusty-brown below; seta yellowish; capsule curved and nodding.

Leaves slightly undulate or not undulate; stems not conspicuously thickened with tomentum.

Upper stem-leaves up to 13 mm. long; seta dark-red, up to 6 cm. long; capsule curved, nodding to horizontal.

14. *D. Drummondii*.

15. *D. Bergeri*.

16. *D. spurium*.

17. *D. condensatum*.

18. *D. Mühlenbeckii*.

19. *D. brevifolium*. —

20. *D. fuscescens*. —

21. *D. fragilifolium*.

22. *D. laevidens*.

23. *D. elongatum*.

24. *D. groenlandicum*.

25. *D. majus*.

26. *D. rugosum*.

27. *D. frigidum*.

- Upper stem-leaves up to about 8 mm. long; seta yellowish or reddish, up to 3 cm. long; capsule nearly erect, slightly curved.
- Setae solitary.
- Leaves entire or slightly serrulate at the apex, not undulate; costa percurrent or short-excurrent; capsule with annulus.
- Leaves serrate above (nearly entire in some varieties of *D. Bonjeani*); costa vanishing below the apex; annulus wanting.
- Leaves falcate-secund, glossy, subtubulose, with a narrow point, rarely undulate.
- Inner perichaetial leaves abruptly or gradually narrowed to a slender point.
- Inner perichaetial leaves emarginate or rounded above, with or without a short point.
- Leaves mostly laxly spreading-flexuous or erect, the point rather broad and flattish or grooved, often scarcely subtubulose; plants often dull-green or yellowish-green and leaves undulate.
- Leaves with mostly short teeth on the margin toward the apex, sometimes indistinct.
- Leaves larger than in the preceding species, with mostly acute, very prominent teeth toward the apex.
28. *D. Sumichrasti*.
29. *D. neglectum*.
30. *D. scoparium*.
31. *D. consobrinum*.
32. *D. Bonjeanii*.
33. *D. lophoneuron*.
4. PARALEUCOBRYUM. Dioicous; species of medium size; costa very broad, not semiterete, without guide-cells, composed of 3 or 4 layers of cells of nearly uniform size and thickness of wall, extending nearly or quite across the leaf half way up, the middle layer with chlorophyl or the middle and lower layers somewhat interruptedly chlorophyllose; capsule erect, cylindric, straight or nearly so.
- Costa 400–600 $\mu$  wide at the base, nine tenths or more the width of the leaf; peristome-teeth distinctly vertically striate somewhat above the base on the outer plates.
- Costa 200–300 $\mu$  wide at the base, often more than one half the width of the leaf-base; peristome-teeth more or less obliquely striate on the outer plates.
- Costa about 120 $\mu$  wide at the base and usually less than one third the width of the leaf-base; peristome-teeth punctate or nearly smooth on the outer plates.
34. *D. enerve*.
35. *D. longifolium*.
36. *D. Sauteri*.

1. *Dicranum hyperboreum* (Gunn.) Smith, Fl. Brit. 1227. 1804.

*Bryum hyperboreum* Gunn. Fl. Norv. 2: 138. 1772.

*Dicranella cerviculatula* Kindb. Ottawa Nat. 5: 195. 1892.

Autoicous: male flower on the stem somewhat below the perichaetium: plants in dark-green, compact tufts often blackish within; stems 2–3 cm. high, more or less branching and radiculose: leaves erect-flexuous, somewhat incurved when dry, spreading when moist; lower leaves small, the upper larger, 3–4 mm. long, from an ovate-lanceolate base with incurved blade and not quite entire margins, gradually narrowed to a slightly crenate-serrulate point; costa 65–80  $\mu$  wide at the base, about one sixth the width of the leaf-base, often slightly papillose on the back, rather long excurrent; leaf-cells with thickened walls, those in the upper part of the blade rectangular to nearly square, 8–10  $\mu$  wide by 10–20  $\mu$  long, the alar cells often not very distinct or sometimes forming a distinct group of larger, colored cells; perichaetial leaves loosely sheathing, the inner 4–5 mm. long, rather gradually narrowed to a not quite entire point scarcely equaling the basal part in length: seta stout, erect, 5–8 mm. high: capsule oblong, furrowed when dry and empty, about 1.5 mm. long by 1 mm. in diameter; exothecal cells irregular, with unequally thickened walls, the median ones up to 20  $\mu$  wide by 80–100  $\mu$  long, with stomata about 35  $\mu$  by 45  $\mu$ , in one row near the base of the spore-sac; annulus large, compound; peristome-teeth mostly divided to below the middle, at the base 100–115  $\mu$  wide; lid convex, with an oblique beak, in height rather exceeding its basal diameter: calyptra smooth: spores rough, up to 28  $\mu$  in diameter.

TYPE LOCALITY: Norway.

DISTRIBUTION: Greenland and Labrador; Mount Hood, Oregon; also in northern Europe.

2. *Dicranum Anderssonii* (Wich.) Schimp. Syn. 689. 1860.

*Arctoa Anderssonii* Wich. Flora 42: 432. 1859.

Autoicous: plants in low, compact, dark-colored tufts; stems radiculose and more or less branching above: lower leaves small, the upper much larger, erect-spreading, flexuous when moist, incurved when dry, sometimes sub-secund; upper stem-leaves 2–3 mm. long, from an

ovate-lanceolate base gradually narrowed to a long flexuous point, slightly crenate on the incurved margin above; costa of homogeneous cells, often weak below, 25–40  $\mu$  wide, one sixth to one eighth the width of the leaf-base and rather long excurrent; leaf-cells in the upper part of the blade with thickened walls, rectangular, about 6  $\mu$  wide and 20–30  $\mu$  long, becoming much shorter and broader just above the colored, sometimes inflated, often not very distinct alar cells; inner perichaetial leaves rather faintly nerved below, longer than the stem-leaves, up to 4 mm. long, from a loosely clasping, involute base rather gradually narrowed to a not quite entire point shorter than the clasping part: seta stout, erect, about 3 mm. long: capsule short, scarcely projecting above the leaves, with a broad mouth, in diameter nearly equaling the height of capsule; exothecal cells with rather uniformly thickened walls, the median ones about 20  $\mu$  by 30–50  $\mu$ ; stomata in mostly one row near the base of the spore-sac, about 25  $\mu$  by 30  $\mu$ ; annulus compound; peristome-teeth 80  $\mu$  wide at the base, mostly divided more than one half down, vertically striate; lid convex, with a short oblique beak, its height about equal to its basal diameter: spores not quite smooth, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Lapland.

DISTRIBUTION: Port Wells, Alaska; also in northern Europe.

ILLUSTRATION: Flora 42: pl. 7.

### 3. *Dicranum fulvellum* (Dicks.) Smith, Fl. Brit. 1209. 1804.

*Bryum fulvellum* Dicks. Pl. Cryp. Brit. 4: 10. 1801.

Autoicous: male flower on a more or less distinct branch below the perichaetium: plants in compact, usually dark tufts, with branching stems 2–3 cm. high: leaves usually falcate-secund, sometimes erect-flexuous; stem-leaves 2–3 mm. long, from an ovate-lanceolate base gradually narrowed to a slender, flexuous, distinctly roughened point, denticulate at the apex; costa excurrent, 40–60  $\mu$  wide at the base and one sixth the width of the leaf-base; leaf-cells with somewhat thickened walls, those in the narrow upper part of the blade about 8  $\mu$  wide and 16–25  $\mu$  long, those toward the base within often longer and narrower, with the alar cells reddish, more or less inflated, forming a rather distinct group and the cells just above rather broad and short; perichaetial leaves 5–6 mm. long, from a loosely clasping base gradually narrowed to a rough, flexuous point rather longer than the basal part, with the leaf-cells longer and narrower above than in the stem-leaves and the cell-walls sometimes slightly pitted: seta yellowish, stout, about 4 mm. high: capsule short-oblong, nearly or quite erect and symmetric, about 1 mm. high and 0.6 mm. through, not reaching to the tips of the leaves, distinctly furrowed when dry; lid convex, obliquely short-rostrate; exothecal cells with thickened walls, mostly irregularly elongate, the median ones 15–20  $\mu$  wide and up to 50  $\mu$  long; stomata mostly few and scattered over the short neck; annulus compound, narrow; peristome-teeth about 75  $\mu$  wide at the base, undivided above, more or less slit near the middle, or sometimes divided into irregular forks, with the joints of the inner plates rather indistinct and close together, 10–12  $\mu$  apart: calyptra rough above: spores roughish, up to 24  $\mu$  in diameter.

TYPE LOCALITY: Ben More, Scotland.

DISTRIBUTION: New Hampshire; Northern New York; Yukon; also in Europe and Asia.

### 4. *Dicranum falcatum* Hedw. Sp. Musc. 150. 1801.

Autoicous: male flower at the base of the perichaetium or sometimes at the apex of a branch; plants in compact tufts, green above, brown or blackish within, with more or less radiculose, branching stems up to 4 cm. high: leaves falcate-secund, lanceolate-attenuate, subtubulose, those on the upper part of the stem 3.5–4 mm. long, with margins not quite entire and a point rough with coarse papillae; costa mostly long excurrent, of homogeneous cells, about 50  $\mu$  wide at the base, one fifth to one seventh the width of the leaf-base; leaf-cells with slightly thickened, not pitted walls, those in the upper part of the blade angular, short, about 6  $\mu$  by 6–12  $\mu$ , those below towards the costa up to 50  $\mu$  long, the nearly square or inflated alar cells forming usually a distinct, reddish group, with the cells just above square, smaller; perichaetial leaves about the length of the stem-leaves, from an ovate, convolute base rather gradually narrowed to the rough point: seta yellowish or brown, 8–12 mm. high: capsule 1–1.5 mm. long, ovate, nodding, slightly curved, strumose, smooth; exothecal cells with somewhat unequally thickened walls, varying from slightly elongate to 3–4 times as long as broad with

usually a single row of stomata about the base of the spore-sac; annulus obscure, mostly of two rows of pale cells adhering to the capsule; lid obliquely rostrate, about two thirds the length of the capsule; peristome-teeth from a low basilar membrane,  $70\ \mu$  wide at the base, divided about one half down: calyptra densely papillose one half down or more: spores nearly smooth, up to  $16\ \mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: Oregon to the Yukon River; also in Europe. Credited to eastern North America, but no specimens from the East have been seen.

ILLUSTRATION: Hedw. Sp. Musc. *pl.* 32.

5. *Dicranum hispidulum* R. S. Williams, Bull. N. Y. Bot.  
Gard. 2: 353. 1902.

Autoicous: perigonium close under the perichaetium: plants in compact, rather yellowish-green tufts; stems usually without radicles and with few branches, up to 2.5 cm. high, in cross-section nearly circular,  $180\ \mu$  in diameter, with a distinct central strand and outer cells with but slightly thickened walls: leaves spreading all round, incurved-flexuous, rough on the back and margins above with crowded, mamillate papillae, the upper stem-leaves scarcely 2 mm. long, in cross-section showing no stereid-band nor distinct guide-cells, the cells of the blade on either side of the costa near the middle of the leaf often doubled for 5 or 6 rows outward; costa excurrent, usually  $40\text{--}50\ \mu$  wide at the base and slightly broader above; leaf-cells slightly elongate, the upper ones rather irregular, the median about  $10\ \mu$  wide and  $10\text{--}20\ \mu$  long, the alar forming a distinct group of somewhat enlarged, nearly square or inflated colored cells; cell-walls not pitted nor distinctly thickened: capsule oval, slightly curved before opening, and slightly strumose, 1.5 mm. long without lid; lid obliquely rostrate, about 0.75 mm. high; exothecal cells rectangular, 2-4 times as long as broad; annulus well developed, 2-3 rows of cells high; peristome-teeth split to below the middle: spores smoothish, up to  $12\ \mu$  in diameter.

TYPE LOCALITY: Macdonald lake, Great Northern Railway, Montana.

DISTRIBUTION: Known only from the type locality.

ILLUSTRATION: Bull. N. Y. Bot. Gard. 2: *pl.* 34.

This plant should perhaps be considered as only the small, xerophytic form of *D. Schisti*, just as *D. Starkii* may be regarded as the larger, best developed form of the same species. —

6. *Dicranum Schisti* (Gunn.) Lindb. Acta Soc. Sci.  
Fenn. 10: 11. 1871.

*Bryum Schisti* Gunn. Fl. Norv. 2: 138. 1772.

*Dicranum Blyttii* B. S. G. Bryol. Eur. (37-40:) *Dicranum* 26. 1847.

*Dicranoweisia obliqua* Kindb. Ottawa Nat. 5: 195. 1892.

*Cynodontium Treleasei* Card. & Thér. Proc. Wash. Acad. Sci. 4: 295. 1902.

Autoicous: male flower on the stem well below the perichaetium, or on a short branch: plants in compact green tufts, dark-brown within; stems up to 3 cm. high, more or less branching, without radicles above, the leaves spreading-flexuous all round: upper stem-leaves about 4 mm. long, lanceolate-attenuate, concave, the margins slightly crenate, the point rough with low papillae; costa more or less excurrent, about  $50\ \mu$  wide at the base, in cross-section showing cell-walls of uniform thickness, the median row larger with mostly one row above and two below of smaller cells; leaf-cells with slightly thickened, usually not pitted walls, the upper about  $6\ \mu$  wide and from square to 2-3 times as long as broad, the lower up to  $60\ \mu$  long; alar cells indistinct or forming a rather irregular, reddish, often inflated group; inner perichaetial leaves about the length of the stem-leaves with a convolute base extending about one half up and gradually narrowed to the papillose point: seta reddish when old, up to 14 mm. long: capsule about 1.5 mm. long, ovate, nodding, slightly curved, often strumose, nearly or quite smooth when dry; exothecal cells with thin, somewhat sinuous walls, the median about  $25\ \mu$  by  $60\ \mu$ ; stomata in mostly 2 rows in the short neck; annulus broad, distinct, of 2 or 3 rows of cells; lid conic, with an obliquely rostrate beak half as long as the capsule; peristome-teeth  $75\ \mu$  wide at base, reddish, from a low basilar membrane, divided two thirds down, more or less perforate below: calyptra slightly papillose at the apex: spores minutely roughened, up to  $16\ \mu$  in diameter.

TYPE LOCALITY: Norway.

DISTRIBUTION: New Hampshire and New York; Washington, Idaho, and northward to the Yukon region; also in Europe.

ILLUSTRATION: B.S.G. Bryol. Eur. *pl.* 63.

7. *Dicranum Starkii* Weber & Mohr, Bot. Tasch. 189, 471. 1807.

'Autoicous: male flower at the base of the perichaetium, with sometimes a second flower a little below: plants in often extensive mats of a pale-green color, without radicles above and with more or less branching stems up to 6 cm. high: leaves mostly spreading falcate-secund; stem-leaves 3.5-4.5 mm. long, from a broadly ovate-lanceolate base gradually narrowed to a more or less rough serrulate point; costa excurrent, 40-70  $\mu$  wide at the base; leaf-cells above about 6  $\mu$  wide by 12-25  $\mu$  long, below long and narrow toward the costa with often slightly pitted walls, the alar ones brown, square or inflated, forming a distinct group with the cells just above short; inner perichaetial leaves 4.5-5.5 mm. long, from a higher clasping base a little more abruptly narrowed to a point about as long as the base with cells more lax, sometimes more distinctly pitted than in the stem-leaves: seta reddish, 10-15 mm. long: capsule up to 2 mm. long, oblong, nodding, curved, strumose, when ripe and empty furrowed and contracted under the oblique mouth; exothecal cells mostly irregular, elongate with rather thin walls; lid conic, obliquely rostrate; annulus broad, of three rows of cells; peristome from a low membrane, with teeth about 60  $\mu$  wide at base, divided one half to three fourths down into two forks, the joints of the inner plates distinct and 15-30  $\mu$  apart: calyptra rough above: spores nearly smooth, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Silesia.

DISTRIBUTION: Mountains of New England; Montana to Washington and northward to Alaska; also in Europe and Asia.

ILLUSTRATION: B.S.G. Bryol. Eur. pl. 64.

The eastern plants under this name do not seem to be typical. I incline to believe with Boulay that the species is rather only a better developed form of the preceding (*D. Schisti*); in examining a number of plants the position of the male flower is found to be somewhat variable, while the differences in the capsule are such as may occur in the same tuft.

8. *Dicranum arcticum* Schimp. Musci Eur. Novi (3-4:)

*Dicranum* 3. 1866.

*Dicranum Starkii molle* Wilson, Bryol. Brit. 74. 1855.

*Dicranum molle* Wilson (Bryol. Brit. 75, as synonym. 1855); Lindb. Musci Scand. 24. 1879.

Autoicous: plants in extensive, deep tufts, usually dark-brown within and olive-green at the surface; stems without radicles, 6-15 cm. high, mostly simple and erect with leaves straight and spreading, or sometimes curved-secund toward the apex: stem-leaves 5-7 mm. long, subtubulose, from an ovate-lanceolate base gradually narrowed to a subulate point with the leaf-margins entire to distantly crenulate from near the base to the apex; costa excurrent, at the base 40-60  $\mu$  wide, about one tenth the width of the leaf-base, in cross-section showing all the cells with walls of uniform thickness but the median row of 4-7 rather larger cells; leaf-cells, except the alar, linear throughout, with thickened walls more or less pitted in the lower ones, the median about 6  $\mu$  wide by 40-60  $\mu$  long; alar cells forming a nearly square, reddish-brown, sometimes inflated and auriculate group; inner perichaetial leaves rather shorter than the stem-leaves with leaf-cells broader, costa narrower and leaf above abruptly narrowed to a nearly smooth point scarcely as long as the broadly ovate base: seta brownish, 15 mm., rarely 25 mm. long: capsule 2 mm. long, nodding, curved, mostly distinctly strumose and ribbed when dry; exothecal cells irregularly elongate with unequally thickened walls; stomata at the base of the capsule in mostly one row; peristome-teeth 50-60  $\mu$  wide at the base, the outer plates 8-12  $\mu$  high, vertically striate, the inner plates, one fourth up, 25-30  $\mu$  high, papillose; annulus of about 3 rows of cells; lid obliquely rostrate: calyptra nearly smooth at the apex: spores rough, 16  $\mu$  in diameter.

TYPE LOCALITY: Norway.

DISTRIBUTION: Greenland, Labrador, and the Yukon region; also in Europe and Asia.

ILLUSTRATION: Schimp. Musci Eur. Novi (3-4:) *Dicranum* pl. 3.

9. *Dicranum fulvum* Hook. Musci Exot. pl. 149. 1820.

*Dicranum interruptum* B. S. G. Bryol. Eur. (37-40:) *Dicranum* 30. 1847.

*Campylopus viridis* Sull. & Lesq. Musci Bor. Am. 72. 1856.

*Dicranum viride* Lindb. Hedwigia 2: 70. 1863.

*Dicranum subfulvum* Ren. & Card. Bot. Gaz. 22: 49. 1896.

*Dicranum subsubulifolium* Kindb. Rev. Bryol. 37: 13. 1910.

Dioicous: male plants more slender than the fertile and mingled with them, bearing a number of rather large, scattered flowers, each with 10–12 antheridia about 0.4 mm. high and rather numerous paraphyses: fertile plants in greenish or yellowish-brown, often extensive mats, with tomentose stems up to 5 cm. high: stem-leaves 5–6 mm. long, spreading-flexuous all round, more or less crispate, or falcate-secund, long-lanceolate, gradually narrowed to a grooved point, often broken, mostly slightly serrulate toward the apex and smoothish to papillose on the back, the narrow blade above of a double thickness of cells; costa one third to one fourth the width of the leaf below, excurrent, often slightly serrulate on the back above, in cross-section below showing 14–20 guide-cells with stereid-bands above and below more or less interrupted by larger cells; alar cells brown to hyaline, extending to the costa, more or less auriculate; lower leaf-cells from elongate-rectangular to nearly square, with slightly thickened not pitted walls or rarely slightly pitted just above the alar cells near the costa; upper leaf-cells mostly square, sometimes short-rectangular with walls not pitted; inner perichaetial leaves with a convolute base 3–4 mm. high, abruptly or truncately narrowed with a sinuate or dentate margin to a slender subula, smooth or serrulate above and nearly as long as the basal part: seta solitary, yellow or finally turning reddish, up to 1.5 cm. high: capsule erect, cylindric, up to 3 mm. long, scarcely or not furrowed when dry; exothecal cells except near the mouth mostly elongate, very irregular, with slightly sinuous, unequally thickened walls; annulus of mostly 2 rows of cells; peristome-teeth reddish-brown, divided about one half down or often perforate below and the forks united above, the outer plates vertically or obliquely striate, sometimes nearly smooth; lid conic-subulate, about two thirds the length of the capsule: spores rough, up to  $25\ \mu$  in diameter.

TYPE LOCALITY: Nova Scotia.

DISTRIBUTION: Nova Scotia to Georgia and westward to Minnesota and Missouri; also in Europe and Asia.

ILLUSTRATIONS: Hook. Musci Exot. *pl.* 149; Sull. Ic. Musc. *pl.* 18.

EXSICC.: Sull. & Lesq. Musci Bor. Am. 57, 72; ed. 2. 73, 91; Sull. Musci Allegh. 159; Macoun, Can. Musci 37.

Examination of the type collection of *D. viride*, Musci Bor. Am. 72, shows leaves often quite as rough above as in *D. fulvum*. Limpricht says *D. viride* has leaves smooth on the back, by which character he separates it from *D. fulvum*, but European specimens called *D. viride* (Rab. Bryol. Eur. 1110) show some leaves sharply serrate-papillose on the back nearly one half down, this distinction certainly being of little value. Nor can any good difference be found in the width of the costa or in character of fruit that I have been able to discover. Specimens of *D. subsubulifolium* have not been seen, but every character in the description would place it under *D. fulvum*.

#### 10. *Dicranum flagellare* Hedw. Descr. 3: 1. 1791.

*Dicranum miquelonense* Ren. & Card. Bot. Gaz. 14: 93. 1889.

*Dicranum miquelonense crispatum* Röhl, Hedwigia 36: 42. 1897.

*Dicranum crispatum* Kindb. Eur. & N. Am. Bryin. 189. 1897.

Dioicous: fertile plants in compact, dark-green to pale yellowish-green tufts, with more or less abundant, deciduous, flagellate branches from the axils of the upper leaves, bearing minute, appressed, scale-like leaves: stem-leaves variable, 3–4 mm. long, usually curved and somewhat spreading all round or sometimes crispate or falcate-secund, lanceolate, subtubulose above, slightly serrulate on the margin and more or less rough on the back in the upper part, with a broadly acute or slightly obtuse apex; costa not quite percurrent, just above the broadened base about one fourth the width of the leaf-blade, in cross-section below showing 6–8 guide-cells with about 2 rows of smaller cells above and below scarcely or not forming stereid-bands; alar cells usually brownish, scarcely extending to the costa, the cells above all with uniformly slightly thickened, not pitted walls; lower leaf-cells rectangular, 2–8 times as long as wide, the upper ones shorter, from square to 2–3 times as long as wide; inner perichaetial leaves about the length of the stem-leaves, costate, from a convolute base abruptly, often truncately or retusely, narrowed to a smooth point about one third the broader part in length, the margin just below the base of the point crenulate or denticulate: seta finally reddish, about 1.5 cm. long: capsule cylindric, erect, straight or nearly so, up to 3 mm. long, slightly ribbed when dry; annulus of two rows of cells; lid with its beak nearly two thirds as long as the capsule; peristome-teeth divided more than three fourths down, red and vertically striate one half up, the very slender forks pale and papillose above: spores slightly rough, about  $16\ \mu$  in diameter.

TYPE LOCALITY: Germany.

DISTRIBUTION: Newfoundland to British Columbia, Montana, and South Carolina; also in Europe and Asia.

ILLUSTRATION: Hedw. Descr. 3: pl. 1.

EXSICC.: Sull. Musci. Allegh. 162.

The specimens called *D. miquelonense* Ren. & Card. are about the same as the European variety growing on rock and called *D. flagellare arenaceum* Milde (*Bryotheca Silesiaca 156c*). They are similar also to specimens collected in fruit by Austin at Closter, which have flagella almost wanting. These varieties all differ in having mostly shorter, smoother, rather straighter, leaves and flagella scarce or wanting.

### 11. *Dicranum montanum* Hedw. Sp. Musc. 143. 1801.

Dioicous: plants in dense cushions of usually a yellowish-green color; stems up to 4 cm. high, somewhat tomentose below: stem-leaves 3–4 mm. long, erect-spreading, when dry crispate, not secund, narrowly lanceolate, gradually and acutely long-pointed, grooved above rather than subtubulose, serrulate or crenulate one third down or more on the margins and the back of the costa; costa percurrent or shortly excurrent, one fourth to one fifth the width of the lower part of the leaf, in cross-section showing 4–6 guide-cells with stereid-bands above and below, of rather few and comparatively large cells, often not well differentiated; alar cells brown or often pale, the cells in the blade just above elongate, those towards the costa often 8–10 times as long as broad, becoming gradually short-rectangular or nearly square in the upper half of the leaf, the cell-walls slightly thickened and not pitted; leaf-blade on the back from nearly smooth to quite densely mamilllose one half down the leaf; inner perichaetial leaves strongly costate, rather loosely convolute, somewhat gradually narrowed to a rough point nearly as long as the broader part: seta up to 1.5 cm. long, either yellowish or reddish: capsule about 2 mm. long, cylindric, erect or slightly curved and nodding, when dry somewhat furrowed and contracted under the mouth, the exothecal cells with thin, somewhat sinuous walls mostly slightly thickened at the angles; annulus of two rows of pale cells; lid rostrate, two thirds the length of the capsule; peristome-teeth red, vertically striate, divided often three-fourths down: spores roughened, about 18  $\mu$  in diameter.

TYPE LOCALITY: Germany.

DISTRIBUTION: Newfoundland to West Virginia and westward to Manitoba and Minnesota, mostly on trunks and logs in mountains; Arizona; also in Europe and Asia.

EXSICC.: Drummond, Musci Am. 102; Sull. & Lesq. Musci Bor. Am. 55; ed. 2. 71; Ren. & Card. Musci Am. Sept. Exs. 357; Macoun, Can. Musci 34.

### 12. *Dicranum strictum* Schleich.; Schwaegr. Suppl. 1<sup>1</sup>: 188. 1811.

Dioicous: male plants rather more slender than the fertile ones and mingled with them, the flowers with 12–14 antheridia nearly 0.5 mm. long and numerous paraphyses: fertile plants in compact cushions of a green or pale glossy-green color: stems 1–4 cm. high, tomentose below and with mostly erect, nearly straight leaves often broken at the apex: upper stem-leaves often 5–6 mm. long, from a narrowly lanceolate base gradually narrowed to a very slender subulate point, usually entire, but sometimes distinctly serrulate toward the apex; costa, just above the broadened base, 60–100  $\mu$  wide, about one fifth the width of the blade, long-excurrent, in cross-section showing a row of 6–8 guide-cells with 1 or 2 rows of smaller, rather thin-walled cells above and below, not forming stereid-bands; alar cells brownish to hyaline, not extending to the costa; cells of the lower part of the blade narrowly rectangular with slightly thickened walls usually more or less pitted, those in the upper part of the blade shorter and not pitted; perichaetial leaves from a convolute base rather gradually narrowed to a long, slender, usually entire point: seta solitary, yellow, up to 2 cm. long: capsule erect, cylindric, straight or rarely slightly curved, up to 3 mm. long, pale, not furrowed when dry; lid conic-rostrate, about three fourths as long as the capsule; annulus wanting; peristome-teeth golden-brown, 40–60  $\mu$  wide at the base, divided two thirds down into slender forks or sometimes divided below almost to the base with the forks united above, the outer plates below nearly or quite smooth, often becoming somewhat obliquely striate above with the points of the teeth densely papillose: spores slightly rough, about 16  $\mu$  in diameter.

TYPE LOCALITY: Switzerland.

DISTRIBUTION: Montana and Wyoming to Alaska and California, on logs; also in Europe.

ILLUSTRATION: Schwaegr. Suppl. pl. 43.

EXSICC.: Macoun, Can. Musci, 34a; Holz. Musci Acroc. Bor. Am. 32.

Sterile specimens of this species might be confused with *D. fragilifolium* which has a relatively broader costa, about one third the width of the leaf-base, alar cells extending to the costa, and cell-walls rather thicker throughout the leaf with the ends of the cells less angular.

13. *Dicranum rhabdocarpum* Sull. Mem. Am.

Acad. II. 4: 172. 1849.

*Dicranum scoparioides* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 164. 1872.

Dioicous: male plants in more or less separate tufts, more slender than the fertile, branching, with rather large flowers scattered along the stems, the antheridia about  $0.6 \mu$  long: fertile plants in compact, pale glossy-green tufts, with stems 3–4 cm. long and leaves erect-spreading, the points irregularly flexuous or straight when dry, never crispate and rarely subsecund: stem-leaves about 5 mm. long, ovate-lanceolate, acute, serrulate on the margins about one fourth down; costa pale, vanishing below the apex, serrulate on the back above, just above its broadened base about  $50 \mu$  wide and one tenth the width of the blade or less, in cross-section near the middle showing about 4 guide-cells with stereid-bands above and below of about 2 rows of cells not always well differentiated; alar cells golden-brown or hyaline, more or less inflated, not extending to the costa, the cells above elongate with unequally thickened walls pitted nearly to the apex, the median ones about  $8 \mu$  wide and  $40\text{--}60 \mu$  long; inner perichaetial leaves narrowly costate, rather gradually narrowed to a nearly smooth, slender point scarcely one half the broader part in length: seta yellow or finally reddish, solitary, up to 2.25 cm. high: capsule erect, cylindric, 3–3.5 mm. long, furrowed when dry, with exothecal cells, except near the mouth, elongate with unevenly thickened slightly sinuous walls; annulus wanting; lid with its erect beak nearly two thirds the length of the capsule; peristome-teeth reddish-brown, vertically striate, divided or perforate often three fourths down, the inner articulations prominent: spores slightly rough, up to  $18 \mu$  in diameter.

TYPE LOCALITY: Colorado.

DISTRIBUTION: Colorado, New Mexico, and Mexico.

ILLUSTRATION: Mem. Am. Acad. II. 4: pl. 3.

EXSICC.: Sull. &amp; Lesq. Musci Bor. Am. ed. 2. 82; Clements, Crypt. Form. Colo. 196, 392, in part.

14. *Dicranum Drummondii* C. Müll. Syn. 1: 356. 1848.*Dicranum undulatum* var. Hook. in Drummond, Musci Am. 86. 1828.

Dioicous: male plants minute, on tomentum of the fertile stems, the perigonal leaves ecostate, narrowed to a rather short, stout, scarcely serrulate point: fertile plants in extensive, dull-green, loosely cohering tufts, often densely tomentose within, with robust stems up to 10 cm. high: stem-leaves up to 9 mm. long and about 1 mm. wide, spreading flexuous, sometimes irregularly secund, usually somewhat undulate toward the apex, from a lanceolate base gradually narrowed to a slender, grooved, serrate, acute point exceeding the basal part in length; leaf-blade on the back above nearly smooth or with more or less scattered papillae, the margin more or less serrate three fourths down; costa just above the spreading base about  $125 \mu$  wide, and one fifth to one seventh the leaf-width, percurrent or slightly excurrent, dentate on the back toward the apex and papillose below to near the middle, in cross-section one half down showing about 8 guide-cells with thick stereid-bands above and below, the outer row of cells differentiated on the dorsal side only; alar cells brown; cells of the lower part of the blade mostly narrowly linear,  $8\text{--}10 \mu$  wide and  $60\text{--}100 \mu$  long, with somewhat thickened, pitted walls extending about one fifth up the leaf, then shorter with slightly and mostly uniformly thickened, not pitted walls, the median cells rather irregular, mostly from twice longer than broad to nearly square, about  $8 \mu$  wide, becoming toward the apex rather more elongate again; inner perichaetial leaves shorter than the stem-leaves, with a convolute base abruptly narrowed to a slender, serrulate point about one half the clasping part in length: setae aggregate, 1–4 in the perichaetium, yellowish, 2–2.5 cm. long: capsule about 2.5 mm. long, curved, nodding, not strumose, furrowed and contracted under the mouth when dry; peristome-teeth  $100 \mu$  wide at the base, vertically striate, divided one half down or more into 2 or 3 forks; annulus distinct, of 2 rows of cells: spores somewhat rough, up to  $20 \mu$  in diameter.

TYPE LOCALITY: North America.

DISTRIBUTION: Maine to Manitoba and Montana, and southward to New Jersey and Colorado.

ILLUSTRATION: Sull. Ic. Musc. Suppl. pl. 33.

EXSICC.: Drummond, Musci Am. 86; Sull. &amp; Lesq. Musci Bor. Am. 69b; ed. 2. 88; Macoun, Can. Musci 43, 47; Holz. Musci Acroc. Bor. Am. 131.

*D. elatum* Lindb. of Europe is near this species, but *D. Drummondii* is rather smaller, the leaves are slightly shorter, only two thirds as wide below, with the point grooved rather than subtubulose and the leaf-margin serrulate farther down. From the other North American species of *Dicranum* having short, not pitted upper cells, *D. Drummondii* is distinguished by its aggregate capsules not strumose, by its dull-green color and by the laxly spreading, long-pointed leaves.

15. *Dicranum Bergeri* Blandow, Musci Frond. Exs. 114. 1805.—  
Bot. Zeit. Regensb. 5: 52. 1806.

*Dicranum Schraderi* Weber & Mohr, Bot. Taschen. 177. 1807.

*Dicranum stenodictyon* Kindb.; Macoun, Bull. Torrey Club 16: 92. 1889.

*Dicranum rugosum* Kindb. Ottawa Nat. 4: 61. 1890.

Dioicous: male plants minute, on tomentum of fertile stems: fertile plants in deep, rather compact tufts, yellowish-green above with tomentose stems up to 20 cm. high: stem-leaves 6–7 mm. long, often somewhat secund from an erect, lanceolate or oblong base gradually narrowed to the undulate, somewhat flattish or grooved, lanceolate point more or less recurved or twisted, and serrulate at the broadish, rounded-obtuse or acute apex; leaf-blade smooth or sometimes with prominent, scattered papillae on the back; costa usually vanishing below the apex, sometimes slightly excurrent, from nearly smooth to papillose or serrate on the back above, in cross-section showing 8–10 guide-cells with thick stereid-bands above and below, and scarcely differentiated outer cells; alar cells brown, more or less inflated; lower leaf-cells with much thickened and pitted walls, mostly about 8  $\mu$  wide and 60–80  $\mu$  long, the upper ones rather irregular and angular, from transversely elongate to 2–3 times as long as wide, sometimes nearly square or triangular, with mostly uniformly thickened walls not pitted; inner perichaetial leaves shorter than the stem-leaves, convolute more than one half up and mostly sinuately truncate to a slender, usually smooth point: seta solitary, yellow or reddish, 2–4 cm. long: capsule cylindric, nodding, curved, somewhat furrowed when dry, not strumose; annulus of 2 or 3 rows of pale cells rather loosely cohering; lid with its oblique beak nearly as long as capsule; peristome-teeth vertically striate, often irregular, divided into 2, sometimes 3 or 4 forks densely papillose above: spores rough, up to 24  $\mu$  in diameter.

TYPE LOCALITY: Germany.

DISTRIBUTION: Labrador to Alaska and southward to New Jersey, Ohio, and Colorado; mostly alpine in bogs and wet meadows; also in Europe and Asia.

EXSICC.: Sull. Musci Allegh. 163; Sull. & Lesq. Musci Bor. Am. 67; ed. 2. 84; Drummond, Musci Am. 87, 88; Aust. Musci App. 93; Macoun, Can. Musci 32, 45; Ren. & Card. Musci Am. Sept. Exs. 12.

The smaller forms of *D. Bergeri* are often confusing. The leaves may be scarcely undulate and the upper leaf-cells nearly all somewhat elongate with rather unequally thickened walls. *D. spurium* always has, I believe, the upper leaf-cells shorter, with more unequally thickened walls than are found in *D. Bergeri*.

16. *Dicranum spurium* Hedw.; Timm, Fl. Megapol. 217. 1788.

*Dicranum brachycaulon* Kindb.; Macoun, Cat. Can. Pl. 6: 34. 1892.

Dioicous: male plants minute, often scarcely 1 mm. high, attached to tomentum of the fertile stems and bearing about 3 flowers in a cluster, the inner perigonal leaves costate above or ecostate, rather abruptly narrowed to a broadish point, serrulate on the margin and often rough on the back with high papillae, the 2 or 3 antheridia about 0.25 mm. high with few paraphyses: fertile plants in yellowish-green tufts, with robust, usually interruptedly foliate stems up to 8 cm. high: stem-leaves loosely imbricate all round, mostly less than 6.5 mm. long and about 1 mm. wide, from an ovate base often widest nearly one half up, somewhat abruptly narrowed to a mostly subtubulose, rather finely serrulate, more or less undulate and twisted, incurved or variously flexuous, acute point shorter than the basal part; leaf-blade on the back usually densely papillose about one half down; costa just above the broadened base about 100  $\mu$  wide and one seventh the width of the leaf, nearly percurrent, in cross-section near the middle showing 6 or 7 guide-cells with stereid-bands above and below and more or less differentiated cells next the dorsal surface; alar cells brownish to hyaline, the cells above, for about one fourth up the leaf, pale, rather thin-walled, pitted, soon becoming short and irregular, often transversely elongate, square or triangular, with usually unequally thickened walls not pitted; inner perichaetial leaves shorter than the stem-leaves, convolute three fourths up or more, abruptly narrowed or retuse at the base of the short, nearly entire point: seta solitary, yellow-

ish, 2-3 cm. long: capsule nodding, curved, furrowed and contracted under the mouth and more or less strumose when dry, about 2 mm. long, with an obliquely rostrate lid of equal length; annulus distinct, of about two rows of roundish or oblong, loosely cohering cells; peristome-teeth vertically striate, divided one half or more down into 2 or 3 forks, at the base about 100  $\mu$  wide: spores somewhat rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Germany.

DISTRIBUTION: Newfoundland to the Lake Superior region and southward to Virginia and Missouri, mostly on dry sandy soil in shade, sometimes on rock; also in Europe and Asia.

ILLUSTRATIONS: Hedw. Descr. 2: pl. 30; B.S.G. Bryol. Eur. pl. 81.

EXSICC.: Drummond, Musci Am. 90; Drummond, So. Mosses 47; Aust. Musci App. 95; Macoun, Can. Musci 30; Holz. Musci Acroc. Bor. Am. 228.

In some of their smaller forms *D. spurium* and *D. Bergeri* are not unlike in general appearance, but *D. spurium* may usually be distinguished from *D. Bergeri* by having the lower leaf-cells with less thickened walls and the upper ones with walls unequally thickened, also by its leaves with the broadest part farther up from the base and by its strumose capsule. *D. brachycaulon* Kindb. seems to be a stunted form with very short leaves.

### 17. *Dicranum condensatum* Hedw. Sp. Musc. 139. 1801.

*Dicranum pallidum* B.S.G. Bryol. Eur. (37-40:) *Dicranum* 39; hyponym. 1847. Not *D. pallidum* Weber & Mohr, 1807.

*Dicranum spurium condensatum* Lesq. & James, Man. 76. 1884.

*Dicranum sabuletorum* Ren. & Card. Bot. Gaz. 14: 91. 1889.

Dioicous: male plants on tomentum of the fertile stems, 2-3 mm. high, with flowers containing 3 or 4 antheridia 0.25 mm. long and few paraphyses: fertile plants in pale yellowish-green to brown, compact tufts, with densely tomentose stems, occasionally interruptedly foliate, mostly 1.5-2 cm., rarely 4 cm. high or more: stem-leaves erect-spreading, nearly straight when moist, not or scarcely secund, variously curved or somewhat crispate when dry, sometimes undulate, about 5 mm. long and 0.8-1 mm. wide, oblong-lanceolate, gradually narrowed to a stout, slightly serrulate, grooved, acute apex; leaf-blade above smooth or papillose on the back; costa 80  $\mu$  wide a little above the base, nearly percurrent or excurrent in the upper leaves; serrulate on the back at the apex and papillose lower down, or nearly smooth, in cross-section near the middle showing 7 or 8 guide-cells with well defined stereid-bands above and below; alar cells golden-brown; leaf-cells toward the base linear with slightly thickened, more or less pitted walls, becoming short and irregular in the upper part of the leaf with angular, somewhat unequally thickened, sinuous, not pitted walls, the median cells about 8  $\mu$  wide and often nearly square; inner perichaetial leaves shorter than the stem-leaves, from a convolute base abruptly narrowed to a rough, slender point one half to two thirds the broader part in length: seta yellow, solitary, 2-2.5 cm. long: capsule scarcely 2 mm. long, oblong, nodding, slightly strumose, curved and somewhat furrowed when dry, with a conic, obliquely rostrate lid; annulus distinct, of two rows of cells; peristome-teeth dark-reddish, 70-80  $\mu$  wide at the base, mostly divided more than one half down, with the outer plates vertically striate: spores rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Lancaster, Pennsylvania.

DISTRIBUTION: Nova Scotia to Florida and westward to Missouri; in rather dry sandy places.

ILLUSTRATIONS: Hedw. Sp. Musc. pl. 34; Bot. Gaz. 14: pl. 13.

EXSICC.: Sull. Musci Allegh. 160; Sull. & Lesq. Musci Bor. Am. 68, 68b; ed. 2. 85, 86; Holz. Musci Acroc. Bor. Am. 54.

It seems that the type sheet of *D. condensatum* contains at the present time three species, namely *D. condensatum*, *D. scoparium* and a third in very small amount, probably *D. flagellare*, with elongate, straight capsule and smaller cells in the upper part of the leaf than in *D. Mühlenbeckii*, to which species Cardot has referred it. From an examination of these three first mentioned species in the Muhlenberg herbarium now in the Philadelphia Academy, and which does not contain any specimens of *D. Mühlenbeckii*, it is quite evident that Hedwig properly distinguished his *D. condensatum* from the other two. *D. scoparium* is excluded from both description and figure by lack of annulus and seta not yellow, while *D. flagellare* has an erect, straight capsule and reddish seta. This leaves *D. condensatum* to represent just what Hedwig evidently intended and there seems to be no valid reason why his name should not hold. It may be noted that the original description does not say the leaves are either straight or crispate; it does state that they are not rugose-undulate (*crispabilia*) although they are occasionally so and the figures show the leaves too straight for any of the species when dry, although when moist they are usually straighter in *D. condensatum* than in either *D. scoparium* or *D. flagellare*. *D. condensatum* much resembles a small form of *D. spurium* but has the leaf usually not or scarcely undulate, broadest much nearer the base and the costa more nearly percurrent or excurrent in the upper leaves.

18. *Dicranum Mühlenbeckii* B. S. G. Bryol. Eur. (37-40):

Dicranum 38. 1847.

*Dicranum Rauei* Aust. Bot. Bull. [Bot. Gaz.] 1: 28. 1876.

Dioicous: male plants on tomentum of the fertile stems, 1-4 mm. high with 1 or rarely 2 flowers, each containing 4-6 antheridia with about twice as many paraphyses, the perigonial leaves from an enlarged base rather gradually narrowed to a stout, costate point, serrulate above: fertile plants in extensive, compact, mostly yellowish-green mats, with tomentose stems up to 7 cm. high or more: stem-leaves 4-6 mm. long, mostly erect-spreading all round, rarely falcate-secund, with the point incurved, crispate, or variously bent and twisted when dry, nearly erect when moist, from a lanceolate base gradually narrowed to a subtubulose, stout, serrulate to nearly entire, acute point; costa vanishing or short-excurrent, about 125  $\mu$  wide at the base and one fifth the width of the leaf-base, from nearly smooth on the back to serrulate one half down, in cross-section near the middle of the leaf showing 8-10 guide-cells with stereid-bands above and below and a row of medium-sized cells next the ventral and dorsal surfaces; alar cells reddish-brown, reaching almost to the costa, those just above short-rectangular, 12-16  $\mu$  wide and 40-60  $\mu$  long with thin, slightly pitted walls, soon becoming shorter upward with somewhat thickened not pitted walls, the angular mostly square or slightly elongate cells, about 10  $\mu$  wide, extending from one fourth or one third up the leaf to near the apex; leaf-blade on the back mostly smooth to near the apex, sometimes rough one half down; inner perichaetial leaves variable, almost truncate with a short apiculus or rather gradually narrowed to a slender, serrulate point two thirds the lower part in length: seta solitary, yellowish, mostly 2-2.5 cm. long: capsule cylindric, nearly straight and erect or usually somewhat nodding and curved, up to 4 mm. long, its length 4-6 times its diameter, when dry contracted under the mouth and furrowed or nearly smooth, not strumose; lid with its obliquely rostrate beak scarcely as long as the capsule; peristome-teeth dark, reddish-brown, vertically striate, divided more than one half down, 80-100  $\mu$  wide at the base; annulus distinct, of about 2 rows of cells: spores slightly rough, 20-24  $\mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: New England; Ontario to Alaska, and southward to New Jersey and New Mexico; also in Europe and Asia.

ILLUSTRATION: B.S.G. Bryol. Eur. pl. 78.

EXSICC.: Sull. &amp; Lesq. Musci Bor. Am. 65; ed. 2. 81; Macoun, Can. Musci 38, 57.

This species is especially known by its long, narrowly cylindric capsule and its broad and short lower leaf-cells with scarcely thickened and slightly pitted or not pitted walls, the upper cells becoming nearly square. It has been confused in both Europe and this country with *D. Bergeri*, a species which has much narrower, thicker-walled, more pitted cells, as in Husnot, Musci Galliae 409, which is evidently in part a small form of *D. Bergeri*. It has also been confused with *D. fuscescens*, which has a shorter capsule, narrower leaf-point, and smaller cells, and even with smaller forms of *D. Drummondii*, when sterile, in which the lower leaf-cells are narrower and the upper ones smaller, scarcely in distinct rows, with thin walls.

19. *Dicranum brevifolium* Lindb. Musci Scand. 24. 1879.*Dicranum Mühlenbeckii brevifolium* Lindb. Bot. Not. 1865: 80. 1865.

Dioicous: male plants minute, on tomentum of the fertile stems, the perigonial leaves costate, of uniform color to the base, more or less abruptly narrowed to the serrulate apex: fertile plants in compact, yellowish-green or brownish tufts, with tomentose stems up to 5 cm. high: stem-leaves 4-6 mm. long, mostly erect-spreading all round with the point incurved or variously curved or crispate when dry, from a lanceolate base gradually narrowed to a subtubulose, stout, serrulate to nearly entire, acute point; costa mostly percurrent or slightly excurrent, usually nearly smooth on the back, about one fourth the width of the leaf just above the base and 125  $\mu$  wide, in cross-section near the middle showing 8 or 9 guide-cells with stereid-bands above and below without differentiated outer cells; alar cells reddish-brown, reaching almost to the costa, those just above rectangular, mostly 8-10  $\mu$  wide and 40-60  $\mu$  long with somewhat thickened, pitted walls, those next above abruptly shorter, with uniformly thickened not pitted walls, extending to near the apex, the median cells mostly about 8  $\mu$  wide, often quite irregular, from scarcely elongate to twice as long as wide; leaf-blade on the back mostly quite smooth; inner perichaetial leaves abruptly narrowed to a nearly smooth point one third to two thirds the broader part in length: seta solitary, yellowish, 1.5-2.5 cm. high: capsule

short-cylindric, nodding, curved, 2–2.5 mm. long, mostly 2.5–3 times longer than broad, somewhat furrowed when dry, not strumose; lid with its slender beak about as long as the capsule; peristome-teeth reddish-brown, vertically striate, divided over one half down; annulus distinct, of 1 or 2 rows of cells: spores slightly rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Scandinavia.

DISTRIBUTION: Alaska to British Columbia, on earth and rock, mostly alpine; also in northern Europe.

EXSICC.: Macoun, Can Musci 481.

This species differs from *D. Mühlenbeckii* in having narrower more irregular leaf-cells, a shorter capsule, and costa without differentiated outer cells; in size it is near *D. condensatum*, which has leaf-cells more gradually shortened upward, with cell-walls unequally thickened and somewhat sinuous above.

## 20. *Dicranum fuscescens* Turner, Musc. Hib. 60. 1804.

*Dicranum congestum* Brid. Musc. Recent. Suppl. 1: 176. 1806.

*Dicranum sulcatum* Kindb.; Macoun, Bull. Torrey Club 17: 87. 1890.

*Dicranum crispulum* C. Müll. & Kindb.; Macoun, Cat. Can. Pl. 6: 27. 1892.

*Dicranum leucobase* C. Müll. & Kindb.; Macoun, Cat. Can. Pl. 6: 30. 1892.

*Dicranum trachyphyllum* Ren. & Card. Bot. Gaz. 22: 48. 1896.

*Dicranum camptophyllum* Kindb. Eur. & N. Am. Bryin. 193. 1897.

Dioicous: male plants nearly as large as, and mingled with, the fertile plants, bearing several flowers, each containing 10–15 antheridia about 100  $\mu$  long and numerous paraphyses, the inner perigonal leaves with a broad, brown base abruptly narrowed to a faintly costate, serrulate point: fertile plants in mostly soft, greenish, slightly tomentose mats, with more or less branching stems up to 8 cm. high: stem-leaves falcate-secund, sometimes spreading-flexuous all round, up to 7 mm. long, from a lanceolate base gradually narrowed to a slender, grooved, serrulate point, usually rough on the back one half down or more; costa about 100  $\mu$  wide just above the base and one fifth the width of the leaf, serrate on the back, excurrent, in cross-section near the middle showing 7 or 8 guide-cells with stereid-bands above and below with differentiated cells on the dorsal side only; alar cells brown, sometimes hyaline, not reaching to the costa, the cells just above rectangular, mostly 8–10  $\mu$  wide by 40–80  $\mu$  long, with slightly thickened and pitted or often not pitted walls, the upper leaf-cells with scarcely thickened not pitted walls, 6–8  $\mu$  wide and from square or triangular to 3 or 4 times as long as wide; inner perichaetial leaves convolute scarcely one half up, abruptly narrowed to a slender, costate point denticulate toward the apex: seta solitary, yellowish, about 2 cm. long: capsule oblong, mostly 2–2.5 mm. long, 2–3 times as long as broad, curved and nodding or horizontal, more or less furrowed and strumose when dry; lid rostrate, about as long as the capsule; annulus rather narrow, of 1 or 2 rows of cells; peristome-teeth dark-reddish, divided about one half down, vertically striate, the inner plates with prominent lamellae 25–30  $\mu$  apart: spores roughish, 20–22  $\mu$  in diameter.

TYPE LOCALITY: Scotland.

DISTRIBUTION: Labrador to South Carolina; Alaska to California; also in Europe and Asia.

EXSICC.: Drummond, Musci Am. 82; Sull. Musci Allegh. 157, 158; Sull. & Lesq. Musci Bor. Am. 157, 158; ed. 1. 64, 80; Macoun, Can. Musci 39, 40, 41; Ren. & Card. Musci Am. Sept. Exs. 8.

This species may be distinguished from *D. Mühlenbeckii* by its shorter capsule, smaller and more irregular upper leaf-cells, and narrower, rougher leaf-point with longer excurrent costa. It is nearer *D. brevifolium* in the size and shape of the capsule, but that species has mostly shorter, broader-pointed, smoother leaves, the perichaetial leaves much shorter and smoother-pointed, and the costa in cross-section without differentiated cells next to either the ventral or dorsal surface.

## 21. *Dicranum fragilifolium* Lindb. Oefv. Sv. Vet.-Akad.

Förh. 14: 125. 1857.

Dioicous: male plants slender, up to 6 mm. high, growing, often 2 or 3 together, on tomentum of the upper fertile stems and bearing 1–3 flowers, each with 4 or 5 antheridia about 0.5 mm. long and few paraphyses, the perigonal leaves, mostly distinctly costate, from a brown base abruptly narrowed to a long, slender, more or less serrulate point: fertile plants in compact, mostly pale-green tufts, with slender stems up to 9 cm. high, tomentose to near the apex: stem-leaves erect-spreading, somewhat flexuous above, 6–7 mm. long, narrowly lanceolate and gradually long-subulate, from entire to more or less rough on the margin and back toward the apex, the fragile, often broken, nearly straight, grooved point mostly filled by the excurrent

costa; costa one third to one fourth the width of the lower part of the leaf, in cross-section below showing 8–12 guide-cells with stereid-bands above and below, each of about two rows of cells of mostly uniform size; alar cells brown to hyaline, extending to the costa; lower leaf-cells elongate with slightly thickened and pitted or not pitted walls, becoming shorter and not pitted above, the upper ones about  $8\ \mu$  wide and from nearly square to 2 or 3 times as long as broad; perichaetial leaves from a convolute base rather abruptly narrowed to a slender, smoothish point as long as the clasping part: seta 1.5 cm. long, finally reddish: capsule about 2 mm. long, oblong, curved, nodding, not strumose, furrowed when dry; annulus of mostly 2 rows of cells; lid conic-subulate, about as long as the capsule; peristome-teeth brown, vertically striate nearly to the apex, divided about one half down: spores rough, up to  $25\ \mu$  in diameter.

TYPE LOCALITY: Sweden.

DISTRIBUTION: Labrador to Alaska and southward to Minnesota, Montana, and British Columbia, on logs; also in Europe and Asia.

EXSICC.: Macoun, Can. Musci 22a.

## 22. *Dicranum laevidens* R. S. Williams, sp. nov.

Dioicous: male plants attached to the tomentum of the fertile stems, minute, sometimes less than 1 mm. high, with ecostate, ovate, acute or obtuse perigonal leaves: fertile plants in extensive, compact, glossy, brownish-green mats; stems mostly 7 or 8, rarely 15 cm. high, somewhat tomentose nearly to the apex, with nearly straight leaves, erect-spreading all round: stem-leaves 5–6 mm. long and 1 mm. wide, from a broadly ovate-lanceolate base rather gradually narrowed to a subtubulose, smooth or sometimes slightly serrulate, narrow point; costa just above the broadened base  $60\text{--}100\ \mu$  wide, one eighth to one tenth the width of the leaf, percurrent, smooth on the back, in cross-section near the middle with 5 or 6 guide-cells, a stereid-band above of one or two rows of cells, below of one or two rows of cells and sometimes an outer row of differentiated cells; alar cells brown toward the margin with hyaline cells within reaching nearly to the costa, the cells above elongate to the apex with more or less pitted walls, the median cells  $8\text{--}10\ \mu$  wide and  $40\text{--}60\ \mu$  long, those in the upper part of the leaf often much shorter, sometimes scarcely pitted; inner perichaetial leaves scarcely as long as the stem-leaves, faintly costate about one half up, from a convolute base abruptly narrowed to a smooth, straight point up to 2 mm. long: seta yellow or reddish, 2.5–3 cm. long: capsule oblong, nodding, slightly curved, 2 mm. long, furrowed when dry, not strumose, with stomata in mostly one row near the base, the exothecal cells with unequally thickened, somewhat pitted lateral walls; annulus large, of 2 or 3 rows of cells; peristome-teeth reddish-brown, neither distinctly vertically striate nor papillose,  $80\text{--}100\ \mu$  wide at the base and  $400\ \mu$  high, divided more than one half down, the articulations on the inner face prominent,  $25\text{--}35\ \mu$  apart about one fourth up the teeth, on the outer face less distinct, about  $12\ \mu$  apart; lid with its obliquely subulate beak about the length of the rest of capsule: calyptra 4 mm. long, smooth throughout: spores rough,  $20\text{--}24\ \mu$  in diameter.

Type collected on the Klondike River near the mouth of Bonanza Creek, 3 miles from Dawson, Yukon, July 23, 1899, R. S. Williams 539 (herb. N. Y. Bot. Garden).

DISTRIBUTION: Dawson and Lake Lindeman at the Head of the Yukon (from the latter locality not fruiting); also I should refer to this species the sterile specimens collected by G. Comer on the N. W. shore of Hudson Bay that have been called *D. angustum* Lindb.

According to description *D. angustum* has the habit of *D. Bonjeani*, the perichaetial leaf narrowed to a slender point up to 4 mm. long, peristome-teeth coarsely striate below, papillose above and spores  $16\text{--}20\ \mu$  in diameter. It is credited to Scoresby Sound (Paris. Index Bryol. ed. 2. 2: 35), but up to the present time it may be considered of doubtful occurrence in this country.

## 23. *Dicranum elongatum* Schleich.; Schwaegr. Suppl. 1<sup>1</sup>: 171. 1811.

*Dicranum subflagellare* Card. & Thér. Proc. Wash. Acad. Sci. 4: 298. 1902.

Dioicous: male plants mingled with the fertile tufts, slender, elongate, with usually 2 or 3 scattered flowers containing 3–5 antheridia and rather numerous paraphyses: fertile plants in compact, broad mats up to 15 cm. high, with slender stems tomentose to near the apex: stem-leaves more or less erect-appressed or incurved when dry, the upper rarely somewhat curved-secund, 3–4 mm. long, from a lanceolate base gradually narrowed to a subtubulose, acute point, entire above or serrulate on the margin and slightly rough on the back; costa a little above the base about one fourth the width of the leaf, percurrent or excurrent, in cross-section near the

middle with 7 or 8 guide-cells and stereid-bands above and below of 2 or 3 rows of cells, the outer scarcely differentiated; alar cells golden-brown; cells of the lower part of the blade elongate, with thickened, pitted walls, the median and upper ones shorter, often scarcely elongate, with thickened, not pitted walls; inner perichaetial leaves about the length of the stem-leaves, rather abruptly narrowed to a slender, entire point nearly as long as the broader part and mostly formed of the excurrent costa: seta 15–18 mm. long, slender, mostly pale-reddish: capsule about 1.5 mm. long, slightly nodding, curved, somewhat furrowed when dry, the exothecal cells elongate with slightly sinuous, unequally thickened walls, with stomata in mostly 1 row near the base; annulus of 2 or 3 rows of cells; lid with the oblique beak about as long as the capsule; peristome-teeth dark-red, vertically striate to near the apex, divided two thirds down or more, with distinct articulations on the inner face about 20  $\mu$  apart: spores roughish, up to 24  $\mu$  in diameter.

TYPE LOCALITY: France.

DISTRIBUTION: Greenland to Alaska and southward to the mountains of New England and Montana; also in Europe and Asia.

EXSICC.: Drummond, Musci Am. 91, 92; Aust. Musci App. 471; Ren. & Card. Musci Am. Sept. Exs. 91, 92.

24. *Dicranum groenlandicum* Brid. Musc. Recent. Suppl. 4: 68. 1819.

*Dicranum labradoricum* C. Müll. Syn. 1: 366. 1848.

*Dicranum tenuinerve* J. E. Zett. Sv. Vet.-Akad. Handl. II. 13<sup>13</sup>: 14. 1876.

*Dicranum Macounii* Aust. Bot. Gaz. 2: 96. 1877.

Dioicous: male plants mixed with the fertile and much more slender, with elongate stems bearing several scattered, brown buds containing 7 or 8 antheridia about 0.4 mm. long and numerous paraphyses, the inner perigonal leaves ecostate, broadly ovate, short-pointed, the outer faintly costate, longer-pointed: fertile plants in compact, glossy mostly brownish-green tufts, with tomentose stems up to 10 cm. high: stem-leaves 3–4.5 mm. long, lanceolate, subtubulose, entire or slightly denticulate at the very apex; costa percurrent, the apex rather blunt, a little above its base one eighth to one tenth the width of the leaf, in cross-section near the middle with about 8 guide-cells and well defined stereid-bands above and below, the outer cells somewhat differentiated on the dorsal side; alar cells brown, reaching about half way to the costa, the cells above to the apex elongate with much thickened walls pitted to above the middle of the leaf or to near the apex, the median cells 40–60  $\mu$  long and 6  $\mu$  wide; inner perichaetial leaves convolute, faintly costate, abruptly narrowed to a smooth, subulate point up to two thirds as long as the broader part: seta pale-reddish, up to 2 cm. long: capsule short-cylindric, 1.5 mm. long, nearly straight and erect, furrowed when dry, with stomata in nearly one row at the base; lid with a slender beak, rather longer than the capsule; annulus of 1 or 2 rows of cells; peristome-teeth dark-red, vertically striate nearly to the apex: spores rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Greenland.

DISTRIBUTION: Greenland to Alaska and southward to the mountains of New England; also in Europe and Asia.

ILLUSTRATION: B.S.G. Bryol. Eur. pl. 76. (This plate is called *D. elongatum*, but more nearly represents *D. groenlandicum* by both the relatively much narrower costa and the narrower upper leaf-cells.)

EXSICC.: Sull. & Lesq. Musci Bor. Am. 63, 79.

*D. groenlandicum* is much like *D. elongatum*, but usually of a browner color, a little more robust, with straighter capsule and especially differs in the relatively narrower costa and more elongate upper leaf-cells with irregularly thickened walls pitted to well above the middle of the leaf. In *D. elongatum* the cell-walls are pitted only near the leaf-base, the upper leaf-cells often oblong or roundish with evenly thickened, not pitted walls.

> 25. *Dicranum majus* Smith, Fl. Brit. 1202. 1804.

Dioicous: male plants minute, attached to tomentum of the fertile stems, with flowers more or less in clusters: fertile plants in rather loose, glossy-green tufts, tomentose within; stems up to 10 cm. or more high, with usually falcate-secund leaves (almost straight in var. *orthophyllum*) up to 15 mm. long, from an ovate-lanceolate base gradually narrowed to a subtubulose, acute point, dentate on the margins and back about one third down, the teeth toward the apex larger, with the acute point often slightly incurved; costa percurrent or excurrent, just

above the greatly broadened base about  $100\ \mu$  wide and one twelfth the width of the leaf, in cross-section showing usually a double row of guide-cells, with stereid-bands above and below, the outer cells differentiated at least on the under side; alar cells brownish or hyaline; inner basal cells hyaline, the cells above elongate with thickened pitted walls throughout, the intramarginal ones occasionally of a double layer in the upper part of the leaf and bearing scattered teeth on the dorsal side; inner perichaetial leaves shorter than the stem-leaves, from a convolute base abruptly narrowed to a more or less serrulate point of variable length: setae aggregate, mostly yellow or brown, 2.5–4 mm. long: capsule comparatively small, 2.5–3 mm. long, nodding to horizontal, scarcely furrowed when dry; annulus wanting; lid with a slender beak, mostly longer than the capsule; peristome-teeth  $125\ \mu$  wide at the base, dark-reddish, vertically striate, the articulations on the inner face prominent, divided about one half down into 2 or 3 forks: spores slightly rough, up to  $21\ \mu$  in diameter.

TYPE LOCALITY: England.

DISTRIBUTION: Greenland to Maine; Alaska; also in Europe and Asia.

7 EXSICC.: Macoun, Can. Musci 35.

*Dicranum majus orthophyllum* A. Br.; Milde, Bryol. Siles. 71 (1869), with rather shorter, nearly straight leaves, should perhaps be considered a distinct species. I have not seen European specimens. Specimens so called, from Alaska, have been quite frequently collected and they have a single row of guide-cells in the costa. However, leaves from plants that seem to be typical *D. majus* show a remarkable variation in the costal cells and there seems to be no difference in the fruit of the two forms.

## 26. *Dicranum rugosum* (Hoffm.) Brid. Bryol. Univ. 1: 414. 1826.

*Bryum rugosum* Hoffm. Deuts. Fl. 2: 39. 1796.

*Dicranum undulatum* Ehrh.; Hoffm. Deuts. Fl. 2: 39, as synonym. 1796.

Dioicous: male plants minute, on tomentum of the fertile stems, the perigonal leaves up to 2 mm. long, not undulate, abruptly narrowed to a lanceolate, serrulate, acute point, the faint costa often vanishing in the upper half of the leaf; antheridia 4 or 5, about 0.4 mm. long, with few paraphyses: fertile plants in extensive, loosely cohering, mostly glossy, light-green tufts, with robust stems up to 20 cm. high, conspicuously thickened with dense tomentum extending almost to the apex and grayish above, rusty-brown below: stem-leaves long-lanceolate, undulate, acute, up to 10 mm. long and 1.5 mm. wide, spreading-flexuous, subsquarrose or somewhat curved-secund, sharply serrate on the borders one half down and more or less recurved below on one or both sides; costa vanishing below the apex, a little above the base  $100\ \mu$  wide and one tenth to one twelfth of the leaf-width with two sharply serrate wings on the back above, in cross-section scarcely one half up the leaf showing about 6 guide-cells with stereid-bands above and below, and about two outer cells differentiated on the dorsal side, forming ribs; alar cells golden-brown, those within often hyaline, extending rather more than one half way to the costa, the cells in the blade above smooth, elongate to the apex, with thickened, pitted walls, the median ones about  $12\ \mu$  wide and  $40\text{--}60\ \mu$  long; perichaetial leaves closely convolute, rather longer than the stem-leaves, very faintly costate above the middle, abruptly narrowed to a slender, nearly smooth or sometimes serrate point often not more than one sixth the broader part in length: setae aggregate, 1–7, mostly yellow, 2–3 cm. long: capsule cylindric, 2–3 mm. long, curved, nodding to horizontal, smooth or irregularly furrowed when dry, not strumose, with few stomata in mostly one row; annulus wanting; lid obliquely rostrate, often longer than capsule; peristome-teeth about  $400\ \mu$  long, finely and indistinctly vertically striate, papillose on the margins, divided sometimes almost to the base: spores somewhat rough, about  $20\ \mu$  in diameter.

TYPE LOCALITY: Germany.

DISTRIBUTION: Newfoundland to British Columbia and southward to West Virginia, Ohio, and Oregon; also in Europe and Asia.

EXSICC.: Sull. Musci Allegh. 156; Sull. & Lesq. Musci Bor. Am. 69; ed. 2. 87; Drummond, Musci Am. 85; Aust. Musci App. 97; Holz. Musci Acroc. Bor. Am. 134.

## 27. *Dicranum frigidum* C. Müll. Bot. Zeit. 17: 219. 1859.

Dioicous: male plants minute, 2–3 mm. high, growing in clusters on the tomentum or sometimes on the older leaves of the fertile stems, the 5 or 6 antheridia with few paraphyses: fertile plants in extensive, soft mats, tomentose within, with robust stems up to 18 cm. high:

stem-leaves up to 13 mm. long, often more or less undulate, spreading-flexuous, rarely somewhat falcate-secund at the apex of the stem, long-lanceolate, acute, sharply serrate on the margins one half down; costa just above its broadened base about  $75\ \mu$  wide and one tenth the width of the leaf or less, ending just below the apex, with two sharply serrate ribs on the back above, in cross-section near the middle showing about 5 guide-cells with stereid-bands above and below, the lower band with 2 or 3 larger cells on the dorsal side; alar cells brown, extending half way to the costa, the cells above all elongate, with thickened, pitted walls extending to the apex, the lower cells about  $12\ \mu$  wide and  $125\ \mu$  long or more, the median ones  $40\text{--}50\ \mu$  long; inner perichaetial leaves with a convolute base up to 9 mm. long, more or less costate, abruptly narrowed to a slender point 2–4 mm. long, serrulate at the apex: setae aggregate, 1–4, dark-red, up to 6 cm. high: capsule cylindric, 3–5 mm. long, curved, nodding or horizontal, scarcely or not furrowed when dry, the exothecal cells with walls uniformly thickened, those on the convex side elongate, those on the incurved side and at the mouth of the capsule nearly square to hexagonal; annulus wanting; lid conic-rostrate, rather shorter than the capsule; peristome-teeth reddish-brown, vertically striate, divided more than one half down, the inner plates with prominent articulations  $20\text{--}25\ \mu$  apart: spores rough, up to  $25\ \mu$  in diameter.

TYPE LOCALITY: Venezuela.

DISTRIBUTION: Mexico and southward into South America.

28. *Dicranum Sumichrasti* Duby, Mém. Soc. Genève 20: 353. 1870.

Dioicous: male plants 2–3 mm. high, on tomentum of the fertile stems: fertile plants in compact, broad, glossy-green mats with tomentose stems up to 6 cm. high: stem-leaves falcate-secund, narrowly lanceolate, subtubulose above, sometimes undulate, 7–8 mm. long, sharply serrate one third down; costa ending just below the apex, with 2 serrate ribs on the back in the upper part, in cross-section near the middle showing about 4 guide-cells with stereid-bands above and below, the lower band with some larger cells on the dorsal side; alar cells golden-brown, the cells above to the apex of the leaf elongate, those in the lower part of the blade  $10\text{--}12\ \mu$  wide and about  $100\ \mu$  long, gradually shorter upward with slightly thickened, pitted walls throughout; inner perichaetial leaves rather longer than the stem-leaves, convolute about four fifths up, rather abruptly narrowed to a slender point serrulate at the apex: setae aggregate, 2–5, rarely solitary, 2–3 cm. long, mostly yellowish: capsule cylindric, nearly erect, slightly curved, 3.5 mm. long, furrowed when dry, not strumose, the exothecal cells elongate except near the mouth, with unequally thickened walls and stomata in 2 or 3 rows near the base; annulus wanting; lid rostrate, about the length of the capsule; peristome-teeth reddish-brown, vertically striate, divided about one half down: spores rough, up to  $28\ \mu$  in diameter.

TYPE LOCALITY: Mirador, Vera Cruz.

DISTRIBUTION: Vera Cruz and Puebla.

ILLUSTRATION: Mém. Soc. Genève 20: pl. 3, f. 1.

29. *Dicranum neglectum* Juratzka, Laubm. 47. 1882.

*Dicranum algidum* Kindb. Rev. Bryol. 23: 17. 1896.

Dioicous: male plants minute, attached to tomentum of the fertile stems: fertile plants intermediate in habit between *D. scoparium* and *D. Mühlenbeckii*; tufts compact, usually 4–5 cm. high, somewhat glossy, sparingly tomentose: stem-leaves erect-spreading, sometimes slightly secund, when dry somewhat curved and laxly appressed, 4.5–6 mm. long, from an ovate-lanceolate base gradually narrowed to a tubulose, subulate point either nearly smooth or serrulate on the margins and rough on the back about one fourth down the leaf; costa percurrent or shortly excurrent, more or less rough toward the apex, just above its broadened base about one ninth the leaf-width, in cross-section in the lower part of the leaf showing about 6 guide-cells with stereid-bands above and below, the outer cells more or less differentiated; leaf-blade smooth on the back, the cells mostly elongate with thickened, more or less pitted walls, extending to the apex or sometimes with shorter cells in the upper half of the leaf, more or less mingled with longer ones, with walls not pitted; alar cells brown, extending not quite to the costa; inner perichaetial leaves convolute, abruptly narrowed to a slender, smoothish

point up to about two thirds (1–2 mm.) as long as the broader part: seta solitary, yellow, sometimes turning reddish, about 2 cm. long: capsule 2–2.5 mm. long, cylindrical, curved, slightly nodding, its length about 3 times its diameter, when dry more or less furrowed, not strumose, with distinct annulus; peristome-teeth vertically striate, divided to below the middle, the articulations of the inner plates one third up the teeth 25–40  $\mu$  apart: spores rough, up to 20  $\mu$  in diameter. (Description of sporophyte from Yellowstone Park specimens collected by A. and E. Nelson.)

TYPE LOCALITY: Mountains of southern Tyrol, Austria.

DISTRIBUTION: British Columbia, Oregon, Montana, and Wyoming, alpine on rock; also in Europe and Asia.

*D. algidum*, according to Kindberg, has leaves not convolute, but in specimens named by him the leaves are convolute or tubulose just as in *D. neglectum*. Otherwise his description and Macoun's specimens, Can. Musci 32a, agree well in every way with *D. neglectum*. This last is known from *D. scoparium* by its excurrent costa and annulus; from *D. Mühlenbeckii* by its narrower, more pitted leaf-cells and leaves more erect-spreading and straighter when dry; from *D. brevifolium* by its elongate, pitted cells extending to the middle of the leaf or above and also by straighter more spreading leaves; *D. brevifolium* has short-rectangular not pitted cells extending two thirds down leaf or more.

### 30. *Dicranum scoparium* (L.) Hedw. Fundam. 2: 92. 1782.

*Bryum scoparium* L. Sp. Pl. 1117. 1753.

*Dicranum pallidum* C. Müll. Syn. 1: 359. 1848. Not *D. pallidum* Weber & Mohr, 1807.

*Dicranum mexicanum* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 164. 1872.

*Dicranum Howellii* Ren. & Card. Bot. Gaz. 14: 93. 1889.

*Dicranum angustifolium* Kindb.; Macoun, Bull. Torrey Club 17: 86. 1890.

*Dicranum canadense* Kindb.; Macoun, Bull. Torrey Club 17: 87. 1890.

*Dicranum Kindbergii* Paris, Index Bryol. 356. 1895.

*Dicranum scopariiforme* Kindb. Eur. & N. Am. Bryin. 193. 1897.

Dioicous: male plants minute, attached to tomentum of the fertile stems, or large and in more or less separate tufts: fertile plants in extensive, compact, mostly glossy-green tufts, with tomentose stems up to 10 cm. high: stem-leaves usually curved-secund, lanceolate-subulate, subtubulose above, up to about 9 mm. long and 1.5 mm. wide, rarely undulate, serrate about one third down the margin; leaf-blade smooth on the back; costa not quite percurrent, up to 120  $\mu$  wide near the base and one seventh the width of the leaf, with more or less prominent, serrate wings on the back above, rarely nearly smooth, in cross-section below showing 5–8 guide-cells with stereid-bands on either side, the band on the dorsal side more or less interrupted with larger cells; leaf-cells pitted and elongate throughout the blade, the median about 12  $\mu$  wide and usually 2–4 times as long, the alar reddish-brown, not extending to the costa; inner perichaetial leaves nearly as long as the stem-leaves, with a clasping base either abruptly or gradually narrowed to a smoothish or serrulate point of variable length: seta solitary, yellowish or reddish, usually about 2.5 cm. long: capsule short-cylindric, about 3 mm. long, curved, nodding, smooth or somewhat furrowed when dry, with a conic-rostrate lid nearly as long; exothecal cells with thickened walls, from square to elongate-hexagonal on the incurved side and 20–25  $\mu$  wide, longer and narrower on the convex side; stomata roundish, about 35  $\mu$  in diameter and mostly in two rows near the base of the capsule; annulus wanting; peristome-teeth 100–150  $\mu$  wide at the base, vertically striate, mostly divided more than one half down into 2, sometimes 3, reddish, papillose forks: spores papillose, up to 24  $\mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: Newfoundland to Alabama; Alaska to Mexico; Guadeloupe (*C. S. Parker 1182*, in herb. Mitten); also widely distributed in Europe and Asia.

ILLUSTRATIONS: B.S.G. Bryol. Eur. pl. 74, 75; Braithw. Brit. Moss-Fl. pl. 22A.

EXSICC.: Drummond, Musci Am. 80; Sull. Musci Allegh. 155; Sull. & Lesq. Musci Bor. Am. 59, 60, 61, 62; ed. 2. 75, 76, 77, 78; Macoun, Can. Musci 36, 37; Holz. Musci Acroc. Bor. Am. 7, 55, 176, 206.  $\nabla$  / 2 2

### 31. *Dicranum consobrinum* Ren. & Card. Bot. Gaz. 15: 39. 1890.

Dioicous: male plants minute, on tomentum of the fertile stems: fertile plants in densely cespitose yellowish-green tufts; stems erect, simple or dichotomous, tomentose, 5–8 cm. long: leaves rather crowded, secund or erect-spreading, narrowly lanceolate-subulate, serrate in the upper half, 6–7 mm. long, 0.75–1 mm. wide at the base; costa serrate on the back toward the apex; cell-walls thickened, porose, elongate throughout, the median 8–12  $\mu$  wide and 20–30  $\mu$

long; perichaetial leaves sheathing, truncate or emarginate at the apex, sometimes muticous, generally tipped with a short or slightly elongate subula: seta yellow, 2–3 cm. long: capsule cernuous or horizontal, narrowly cylindraceous, curved, not sulcate, long-attenuate below, 3.5–4 mm. long, 0.5–0.75 mm. broad; lid long-subulate.

TYPE LOCALITY: Minnesota.

DISTRIBUTION: Known only from the type locality.

ILLUSTRATION: Bot. Gaz. 15: pl. 5B.

EXSICC.: Ren. & Card. Musci Am. Sept. Exs. 11.

This moss is so near *D. scoparium*, scarcely differing except in the perichaetial leaves, that farther collections are desirable to determine its proper rank.

### 32. *Dicranum Bonjeanii* De-Not.; Lisa, Elenco 29. 1837.

*Dicranum palustre* B.S.G. Bryol. Eur. (37–40:) *Dicranum* 39. 1847.

?*Dicranum dipteroneuron* C. Müll. Flora 70: 221. 1887.

*Dicranum leioneuron* Kindb.; Macoun, Bull. Torrey Club 16: 92. 1889.

*Dicranum congestiforme* C. Müll. & Kindb.; Macoun, Cat. Can. Pl. 6: 29. 1892.

*Dicranum plano-alare* C. Müll. & Kindb.; Macoun, Cat. Can. Pl. 6: 31. 1892.

*Dicranum undulifolium* C. Müll. & Kindb.; Macoun, Cat. Can. Pl. 6: 32. 1892.

*Dicranum subpalustre* C. Müll. & Kindb.; Macoun, Cat. Can. Pl. 6: 33. 1892.

*Dicranum Roellii* Kindb.; Röhl, Hedwigia 35: 60. 1896.

*Dicranum hyalinum* Kindb.; Röhl, Hedwigia 35: 61. 1896.

*Dicranum perichaetiale* Kindb.; Röhl, Hedwigia 35: 61. 1896.

*Dicranum alatum* Card. & Thér. Bot. Gaz. 37: 364. 1904.

Dioicous: male plants minute on tomentum or large and in more or less separate tufts: fertile plants in extensive, mostly dull-green or pale, yellowish-green tufts, with tomentose stems up to 15 cm. high: leaves erect or spreading-flexuous, undulate or smooth, usually not curved-secund, mostly 6–8 mm. long and 1–1.5 mm. wide, lanceolate, gradually narrowed to a broadish obtuse or acute, serrate to entire point more or less grooved but usually scarcely tubulose; costa vanishing below the apex, from serrate-winged to nearly smooth on the back, in cross-section as in *D. scoparium*; leaf-cells more or less thickened pitted and elongate throughout, the median ones about 12  $\mu$  wide and 25–50  $\mu$  long or sometimes not more than one and one half times as long as wide, the alar forming a reddish-brown or more or less hyaline cluster extending about half way to the costa: sporophyte as in *D. scoparium*.

TYPE LOCALITY: Italy.

DISTRIBUTION: Labrador to Alaska and southward to Virginia, Ohio, and Colorado; also in Europe and Asia.

ILLUSTRATIONS: B.S.G. Bryol. Eur. pl. 79; Braithw. Brit. Moss-Fl. pl. 22B.

EXSICC.: Sull. & Lesq. Musci Bor. Am. 66; ed. 2. 83; Aust. Musci App. 92; Macoun, Can. Musci 408, 409; Holz. Musci Acroc. Bor. Am. 205.

Most of the characters relied on to distinguish this species from *D. scoparium* seem to fail. The costa is not excurrent in either, it varies from serrate-winged to nearly smooth on the back in both, and the capsule may finally become furrowed in both. Evidently the shining, glossy plants with falcate-secund, more or less tubulose, narrowly pointed, rarely undulate leaves with mostly narrow cells should be placed under *D. scoparium*, while those plants with mostly dull or pale, yellowish-green, rarely secund leaves, either strongly undulate or not undulate, with broader, flatter, often very short and blunt point and often wider, shorter leaf-cells should be referred to the scarcely specifically distinct *D. Bonjeanii*.

*D. dipteroneuron* C. Müll., from Alaska, has been referred to *D. brevifolium* (see Paris, Index Bryol. ed. 2. 2: 53), but from Müller's description and remarks it appears to be a form of *D. Bonjeanii*.

Specimens collected at Fort Conger, Greenland, in 1902 (*Peary 16a*) have been described as *D. spadiceum obtusum* Bryhn, Forh. Vid.-Selsk. Christ. 1908<sup>o</sup>: 15. 1908. In the herbarium of the New York Botanical Garden under this number are two species of *Dicranum*. One has the upper cells of the leaf elongate, the leaves smooth on back and the costa vanishing; it seems to be a form of *D. Bonjeanii*. The other has the upper cells of the leaf much shorter, more or less angular and irregular, the leaf rough on the back often one half down and the costa more or less percurrent or excurrent; it is near some of the forms of *D. fuscescens* with short-pointed leaves.

### 33. *Dicranum lophoneuron* C. Müll. Syn. 2: 589. 1851.

*Dicranum Andrieuxii* Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 164. 1872.

Dioicous: male plants 2–3 mm. high, on tomentum of the fertile stems: fertile plants in deep tomentose tufts, resembling the larger forms of *D. Bonjeanii* in size and habit: leaves laxly spreading-flexuous, scarcely secund and more or less undulate; upper stem-leaves 9–10 mm. long, from an ovate-lanceolate base gradually narrowed to a rather stout, grooved, often twisted point, sharply dentate on the margins and costa about one third down; costa nearly or quite percurrent, just above its broadened base about one eighth the width of the leaf, with 2

or more serrate ribs on the back, in cross-section near the middle with 5 or 6 guide-cells, stereid-bands above and below, and the outer cells on the dorsal side differentiated; leaf-cells with much thickened and pitted walls, elongate to the apex, the median ones about  $12\ \mu$  wide by  $60\ \mu$  long, the alar forming a reddish-brown group reaching about one half way to the costa; inner perichaetial leaves convolute, abruptly narrowed to a slender, serrulate point scarcely one half the broader part in length: seta solitary, red, 4 cm. long or more: capsule cylindrical, somewhat curved; peristome-teeth divided along the median line only at the apex. (Character of teeth from Bescherelle under *D. Andrieuxii*.)

TYPE LOCALITY: Michoacan.

DISTRIBUTION: Apparently known only from the type locality and from "Totonihó" and "Chiquo" (the last two localities given for *D. Andrieuxii*).

*D. Andrieuxii* is described as monoicous but the minute male plants grow on the tomentum of the fertile stems just as in *D. lophoneuron*. I have not seen the capsule, but according to Bescherelle the species especially differs from the other large members of the group by the scarcely divided teeth of the peristome, which if normal is certainly unique among North American species of large size.

#### 34. *Dicranum enerve* Thed.; Hartm. Skand. Fl. ed. 5. 393. 1849.

*Dicranum albicans* B. S. G. Bryol. Eur. (43:) *Dicranum* Suppl. 1. 1850.

*Campylopus Hallii* Lesq. in Porter & Coult. Syn. Fl. Colo. 155. 1874.

Dioicous: male flowers unknown: fertile plants in compact, glossy tufts, usually whitish-green above, brown within, with more or less branching stems scarcely radiculose above or somewhat tomentose in the axils of the leaves: stem-leaves from erect-spreading to falcate-secund, 5–6 mm. long, from an ovate-lanceolate base gradually narrowed to a smooth, grooved or subtubulose point entire or denticulate at the apex; costa 400–600  $\mu$  wide at the base, often nine tenths or more the width of the leaf, widening upward for a short distance, then tapering to the apex and forming most of the leaf, (the narrow blade extending scarcely one fifth up), in cross-section one half up showing mostly 3 layers of cells rather uniform in size, the outer rows hyaline, the middle row with chlorophyll; cells of the leaf-blade pale, elongate, with walls slightly thickened and pitted just above the alar; alar cells golden-brown, reaching to the costa; inner perichaetial leaves much shorter than stem-leaves, from a very broad, short base abruptly narrowed to a smooth, erect point: seta solitary, 12–20 mm. long, yellow finally turning reddish: capsule erect, cylindrical, sometimes slightly curved, small-mouthed, about 2 mm. long with a rostrate lid two thirds as long and a distinct annulus; stomata in 2 rows near the base of the capsule, the exothecal cells one half up mostly 25–30  $\mu$  wide and 30–50  $\mu$  long with uniformly slightly thickened walls; peristome-teeth at base about 60  $\mu$  wide, the outer plates below indistinctly striate, above becoming vertically striate to near the middle, then papillose to the apex: spores rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: Yakutat Bay, Alaska; British Columbia; Colorado and New Mexico; also in Europe and Asia.

ILLUSTRATION: B.S.G. Bryol. Eur. pl. 73.

EXSICC.: Macoun, Can. Musci 56, 404.

#### 35. *Dicranum longifolium* Hedw. Descr. 3: 24. 1791.

*Dicranodontium nitidum* T. P. James, Bull. Torrey Club 6: 34. 1875.

*Dicranum serratum* Kindb. Eur. & N. Am. Bryin. 190. 1897.

*Campylopus canadensis* Kindb. Rev. Bryol. 32: 35. 1905.

Dioicous: male plants more slender than the fertile and mingled with them: fertile plants in dense, often extensive tufts, light to dark, glossy-green, with paler leaf-bases giving a characteristic appearance to the rather slender stems 3–4 cm., rarely 8 cm., high: stem-leaves up to 8 mm. long, mostly falcate-secund, long-lanceolate, subtubulose and rough above; costa broad, filling all of the upper part of the leaf, ribbed on the back, the ribs and margins rather uniformly and finely serrulate more than one half down, about 200  $\mu$  wide at the base, often more than one half the width of the leaf, gradually becoming slightly wider upward, then tapering gradually to the apex, in cross-section showing a thickness of 3 or 4 rows of cells of nearly uniform size, the middle and lower rows interruptedly chlorophyllose, with cell-walls somewhat unequally thickened; alar cells brownish to hyaline, extending to the costa, more or less auriculate; cells of the narrow blade elongate, 8–10  $\mu$  wide and 30–60  $\mu$  long toward the costa,

with more or less thickened, pitted walls; inner perichaetial leaves rather narrowly costate, convolute, abruptly narrowed to a slender, rough point about as long as the broader part: seta straw-colored, sometimes reddish, solitary, 1–2 cm. long: capsule erect, cylindric, nearly straight, 2–2.5 mm. long, somewhat furrowed when dry, with a slender-beaked lid scarcely as long; annulus wanting; peristome-teeth reddish, more or less obliquely striate on the outer face, mostly unequally divided two thirds down or more into two forks, 60  $\mu$  wide at the base, with the inner articulations about 12  $\mu$  apart: spores slightly roughened, up to 28  $\mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: Newfoundland to St. Paul's Island, Behring Sea, and southward to North Carolina and Colorado; also in Europe and Asia.

ILLUSTRATIONS: Hedw. Descr. 3: *pl.* 9; B.S.G. Bryol. Eur. *pl.* 72.

EXSICC.: Drummond, Musci Am. 94; Sull. Musci Allegh. 161; Sull. & Lesq. Musci Bor. Am. 58; ed. 2. 74; Aust. Musci App. 84; Macoun, Can. Musci 38, 38a, 54, 589; Ren. & Card. Musci Am. Sept. Exs. 204; Holz. Musci Acroc. Bor. Am. 132. *mi. 254*

### 36. *Dicranum Sauteri* B.S.G. Bryol. Eur. (37–40:)

*Dicranum* 33. 1847.

*Campylopus frigidus* Lesq. in Porter & Coult. Syn. Fl. Colo. 155, in part. 1874.

This species is in habit similar to *D. longifolium*, from which it may be distinguished by the leaves smoother above with broader leaf-blade, by the narrower costa only about 120  $\mu$  wide at the base and usually less than one third the leaf-width, and by the peristome-teeth which are punctate or nearly smooth on the outer face below, not or scarcely striate: spores about 25  $\mu$  in diameter.

TYPE LOCALITY: Austria.

DISTRIBUTION: Selkirk Mountains, British Columbia; Colorado; Chiricahua Mountains, Arizona; also in Europe and Asia.

ILLUSTRATION: B. S. G. Bryol. Eur. *pl.* 71.

#### DOUBTFUL AND EXCLUDED SPECIES

*Dicranum caespitans* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 164 (1872), is *Dicranella subinclinata*.

*Dicranum Demetrii* Ren. & Card. Bot. Gaz. 22: 48 (1896), is *Oncophorus Wahlenbergii*.

*Dicranum Pittieri* Ren. & Card. Bull. Soc. Bot. Belg. 31<sup>1</sup>: 146 (1893), is *Dicranodontium costaricense*.

*Dicranum sublongisetum* C. Müll. Bull. Herb. Boiss. 5: 185 (1897), is *Dicranodontium longisetum*.

*Dicranum subulifolium* Kindb.; Macoun, Bull. Torrey Club 17: 87. 1890. This is a rather doubtful species. There are no specimens from the type locality, Cedar Hill, Vancouver Island, either in collections at Ottawa or in the herbarium of the New York Botanical Garden, but under this name occur in Macoun collections no less than five species, as follows: *D. fragilifolium*, *D. groenlandicum*, *D. elongatum*, *D. Bergeri*, and *D. flagellare*.

### 12. *BROThERA* C. Müll. Gen. Musc. 258. 1901.

Dioicous. Fertile plants in compact, pale, glossy-green, low cushions with scarcely branching stems, radiculose below and often bearing in the axils of the upper leaves numerous, small, deciduous, rudimentary leaflets. Stem-leaves erect-spreading, lanceolate-subulate, subtubulose above, entire except at the apex, often slightly ribbed on the back; costa filling most of the upper part of the leaf, in cross-section near the middle showing a row of large outer cells on the under side similar to the row of large cells on the upper side and no distinct stereid-band; cells of the leaf-blade thin-walled, rectangular, narrow in the margin, toward the costa broader and often lax, the alar ones pale and fragile, often scarcely distinct. Seta erect, smooth, slightly sinuous. Capsule erect, oblong to elliptic, without stomata, not furrowed; annulus large; peristome-teeth inserted below the mouth, divided to near the base into two subulate, papillose forks; lid with a long, erect beak. Calyptra large, cucullate, with cilia at the base.

Type species, *Brothera Ankerkronae* C. Müll.

1. *Brothera Leana* (Sull.) C. Müll. Gen. Musc. 259. 1901.

*Leucophanes? Leanum* Sull. Musci Allegh. 172. 1845.  
*Campylopus Leanus* Sull. in A. Gray, Man. ed. 2. 619. 1856.  
*Leucobryum Leanum* Kindb. Eur. & N. Am. Bryin. 176. 1897.  
*Brothera Ankerkronae* C. Müll. Gen. Musc. 258. 1901.

Dioicous: fertile plants densely tufted, rather light-green, glossy, with mostly unbranched, more or less radiculose stems scarcely 1 cm. high, uniformly foliate with erect-spreading, lanceolate-subulate leaves, 3–3.5 mm. long on the upper part of the stem, with a subtubulose point entire except at the very apex, and often bearing in the axils of the upper leaves numerous, nearly linear, pale, deciduous, rudimentary leaflets 0.5 to nearly 1 mm. long; costa filling most of the upper part of the leaf, one third or more the width of the leaf below, in cross-section near the middle showing large outer cells on the under side of the costa similar to the outer cells of the upper side with some smaller more or less disconnected median cells mostly in one row, not forming a distinct stereid-band; cells of the leaf-blade pale, thin-walled, rectangular, narrow at the margin, broader and often lax within, the alar group pale, fragile, often scarcely distinct from those of the blade; perichaetial leaves very similar to the upper stem-leaves: seta up to 7 mm. long, smooth, erect, somewhat sinuous and twisted: capsule oblong to elliptic, 1–1.3 mm. long, without stomata, smooth above, slightly rugose at the base, the exothecal cells narrow, elongate, with thick, somewhat flexuous walls; annulus large, of two rows of cells; peristome-teeth inserted below the mouth, divided to near the base into two subulate, indistinctly articulate, densely papillose forks; lid with a long, erect beak: calyptra large, cucullate, ciliate at the base: spores nearly smooth, 10–12  $\mu$  in diameter. (Description of fruit mostly from a Japanese specimen.)

TYPE LOCALITY: Ohio.

DISTRIBUTION: Pennsylvania; Ohio; Minnesota; Mexico; also in Japan, the Amur region of Siberia, and the Himalaya region.

ILLUSTRATION: Sull. Ic. Musc. pl. 18.

EXSICC.: Sull. Musci Allegh. 172; Sull. & Lesq. Musci Bor. Am. 74; ed. 2. 94; Holz. Musci Acroc. Bor. Am. 9.

13. *CAMPYLOPUS* Brid. Musc. Recent. Suppl. 4: 71. 1819.

*Dicranum* § *Campylopus* C. Müll. Syn. 1: 383. 1848.

Dioicous. Plants in more or less compact tufts with radiculose, branching stems bearing leaves rather uniformly placed or comose at intervals or at summit and, sometimes, flagellaceous branchlets in the axils of the leaves. Leaves straight or curved, often secund, mostly from an ovate or ovate-lanceolate base extending into a grooved or tubulose, subulate and usually dentate point; costa percurrent or excurrent, more or less ribbed or lamellose on the back, very broad below and usually filling most of the upper part of the leaf, sometimes excurrent into a hyaline hair-point; alar cells extending to the costa, from scarcely differentiated to inflated and from hyaline to red: leaf-cells at the margin of the lower part of the leaf sometimes pale and very narrow with thin walls, forming a rather distinct border, the cells within often with much thickened and pitted walls. Seta usually arcuate when moist, sinuous-erect when dry. Capsule regular or curved, sometimes strumose, from smooth to deeply furrowed when dry, sometimes very rough at the base; annulus compound; peristome-teeth broad at the base, with a median line, divided about one half down and vertically striate on the outer face between the distinct articulations of the lower part; lid beaked. Calyptra cucullate and mostly ciliate at the base, sometimes entire.

Type species, *Bryum flexuosum* L.

Costa without stereid-bands.

1. PSEUDOCAMPYLOPUS.

Costa with stereid-bands.

Stereid-band on the under side of the costa only.

2. EUCAMPYLOPUS.

Stereid-bands on both sides of the costa.

3. PALINOCRASPIS.

## 1. PSEUDOCAMPYLOPUS

Large cells in 1 row across the costa in cross-section; costa ribbed on the back.

Leaves 2–3 mm. long; seta 5 mm. long.

1. *C. Schimperi*.

Leaves 5–7 mm. long; seta 10–15 mm. long.

2. *C. Chrismari*.

Large cells in 2 rows across the costa; costa not ribbed.

3. *C. delicatulus*.

## 2. EUCAMPYLOPUS

Leaves without hyaline hair-point.

Plants commonly fertile.

Calyptra not fimbriate at the base.

Calyptra fimbriate at the base.

Capsule irregular.

Leaf-blade one half up the leaf wanting or only 1 or 2 cells wide.

Thick-walled, more or less pitted, colored, short cells within, extending down to the alar cells.

Thin-walled, pale, oblong or rectangular cells just above the alar cells.

Leaf-blade one half up 4-10 cells wide.

Leaves dentate at the apex only.

Leaves sharply serrate on the margin one third down.

Capsule regular.

Costa 200 $\mu$  wide or more near the base.

Lower part of the blade mostly of pale, thin-walled, oblong to rectangular cells, without distinct alar cells.

Lower part of the blade mostly of short, nearly square, colored cells extending almost to the distinct alar group.

Costa 150 $\mu$  wide or less near the base.

Leaf-cells about one fourth up the leaf mostly short-rhomboidal, nearly as broad as long.

Leaf-cells about one fourth up the leaf mostly 3-4 times as long as broad.

Plants commonly sterile, the sporophytes unknown.

Cells throughout the lower half of the leaf mostly not in distinct, straight rows, elongate, prosenchymatose, with thickened walls.

Leaves up to 15-20 mm. long.

Cells in the lower part of the leaf much pitted from near the margin to the costa; costa about one third the width of the leaf below.

Cells in the lower part of the leaf scarcely or not pitted, or slightly pitted near the costa; costa about five sevenths the width of the leaf below.

Leaves not more than 12 mm. long.

Leaves 9-12 mm. long.

Cells below much pitted from near the margin to the costa; leaves serrulate one third down.

Cells below pitted near the costa only; leaves serrulate only at the apex.

Leaves scarcely 5 mm. long, serrulate below the apex.

Cells throughout the lower part of the leaf in distinct rows, mostly rectangular toward the base, becoming rhomboidal upward.

Costa 120-160 $\mu$  wide near the base; small plants with filiform stems and pale alar cells.

Costa up to 200 $\mu$  wide or more near the base; alar cells reddish.

Costa scarcely excurrent, the leaf-point grooved to the apex.

Leaf below often oblanceolate, the blade just above the alar cells only 40-80 $\mu$  wide, often becoming slightly broader higher up; costa mostly three fourths or more the width of the leaf below.

Stems 1-2 cm. high, leaf-point serrulate below the apex.

Stems 6-7 cm. high; leaf-point with a few teeth mostly clustered at the very apex.

Leaf below mostly ovate to ovate-lanceolate, the blade just above the alar cells mostly 100-200 $\mu$  wide; costa usually less than two thirds the width of the leaf below.

Costa excurrent into a terete point, dentate all around; blade serrulate one third to one half down.

Leaves with a hyaline hair point (sometimes poorly developed).

Costa with lamellae 2 or 3 cells high on the back.

Costa without lamellae, somewhat ribbed on the back.

4. *C. saxatilis*.

5. *C. cygneus*.

6. *C. Cacuminis*.

7. *C. flexuosus*.

8. *C. gracilicaulis*.

9. *C. fragilis*.

10. *C. subleucogaster*.

11. *C. retinervis*.

12. *C. Sargii*.

13. *C. Hoffmanni*.

14. *C. Brittonae*.

15. *C. prealtus*.

16. *C. Underwoodii*.

17. *C. angustiretis*.

18. *C. leucogaster*.

19. *C. Roellii*.

20. *C. Hellerianus*.

21. *C. tallulensis*.

22. *C. Donnellii*.

23. *C. introflexus*.

24. *C. Oerstedianus*.

## 3. PALINOCRASPIS

Plants commonly fertile.

Calyptra not ciliate at the base.

Calyptra ciliate at the base.

Cells of the leaf just above the alar ones without pitted walls or very slightly pitted near the costa; costa excurrent into a dentate point.

Leaf serrate to the middle or below.

Leaf nearly entire or slightly serrulate scarcely one third down.

25. *C. humilis*.

26. *C. filifolius*.

27. *C. porphyreodictyos*.

- Cells of the leaf just above the alar ones with thickened pitted walls, except the narrow marginal cells.
- Costa scarcely excurrent or for the length of 3 or 4 cells only, not forming a slender terete point; leaf-blade above 3 or 4 cells wide to near the apex.
- Leaf-cells of blade above the pitted lower cells in rows, more or less angular and short, not obliquely oval. 28. *C. arctocarpus*.
- Leaf-cells of blade above the pitted basal cells not in regular rows, mostly obliquely oval or narrow and much elongate. 29. *C. cubensis*.
- Costa excurrent into a terete rough point; leaf-blade only one or 2 cells wide for some distance below the apex. 30. *C. Harrisii*.
- Plants commonly sterile, the sporophytes unknown. 31. *C. tortuosus*.
- Plants robust; leaves 12–18 mm. long; costa lamellose, 400 $\mu$  wide.
- Plants of medium size; leaves 6 mm. long or less; costa up to 225 $\mu$  wide.
- Costa with lamellae 2 or 3 cells high on the back; leaves serrate about one half down. 32. *C. bermudianus*.
- Costa without lamellae; leaves entire except at the apex. 33. *C. guadelupensis*.

1. *Campylopus Schimperii* Milde, Crypt.-Fl. Süd-Tirols (Bot. Zeit. Beil.) 13. 1864.

*Campylopus frigidus* Lesq. in Porter & Coult. Syn. Fl. Colo. 155, in part. 1874.  
*Leptotrichum tomentosum* Kindb. Ottawa Nat. 7: 18. 1893.

Plants in compact tufts, 2–3 cm. high, with stems reddish-tomentose below and yellowish-brown at the summit, bearing few, erect branches: leaves about 3 mm. long, uniformly placed along the stems, closely appressed when dry, more or less spreading when moist, gradually lanceolate from an oblong base, tubulose above, entire on the margin to near the apex, which usually bears a few somewhat clustered teeth; costa excurrent nearly one half its length, more or less ribbed on the back, about 120  $\mu$  wide near the base and extending two thirds across the leaf-base, without stereid-bands, in cross-section showing a row of large, thin-walled cells on the ventral side with 2 or 3 rows of smaller cells beneath; alar cells red to hyaline, the cells just above pale, thin-walled, rectangular, toward the margin very narrow, farther up all more or less oblong to oval and rhomboidal with slightly thickened, scarcely or not pitted walls ( ; perichaetial leaves half-sheathing, abruptly narrowed to an awl-shaped point: seta pale, 5 mm. long, at first bent downward, finally erect: capsule ovate, furrowed; lid with a beak half as long as the capsule; annulus broad; peristome small, the teeth split to the middle: spores 21–24  $\mu$  in diameter, finely papillose.—Juratzka, Laubm. 55).

TYPE LOCALITY: Europe.

DISTRIBUTION: Greenland; St. Paul Island, Alaska; Rocky Mountains of Colorado; also in Europe.

2. *Campylopus Chrismari* (C. Müll.) Mitt. Jour. Linn. Soc. 12: 88. 1869.

*Dicranum areodictyon* C. Müll. Syn. 1: 394, in part. 1848.  
*Dicranum Chrismari* C. Müll. Bot. Zeit. 13: 761. 1855.  
*Dicranum destructile* C. Müll. Bot. Zeit. 17: 220. 1859.  
*Dicranum friabile* Hampe; C. Müll. Bot. Zeit. 17: 220. 1859.  
*Dicranum Krauseanum* Hampe & Lorentz; Hampe, Bot. Zeit. 27: 434. 1869.  
*Campylopus destructilis* Jaeger, Ber. St. Gall. Nat. Ges. 1870–71: 430. 1872.  
*Campylopus friabilis* Jaeger, Ber. St. Gall. Nat. Ges. 1870–71: 432. 1872.  
*Campylopus poasensis* Ren. & Card. Bull. Soc. Bot. Belg. 31: 148. 1893.

Plants in compact tufts, up to 5 cm. or more high, with stems often branched above and more or less tomentose below: stem-leaves erect-spreading all round or somewhat curved-secund, 5–7 mm. long, from a lanceolate or ovate-lanceolate base extending into a long, tubulose nearly smooth point with a denticulate apex; costa one half to three fifths the width of the leaf-base, widening upward for a short distance, then tapering to the long-excurrent point with more or less prominent, smooth ribs on the back, in cross-section one half down showing a row of large cells on the ventral side extending about one half through, with a band of two or three rows of medium-sized cells on the dorsal side with thin walls or becoming somewhat uniformly thickened with age; alar leaf-cells few, pale-brown or hyaline, fragile, the cells just above pale, thin-walled, more or less rectangular, broad toward the costa, narrow and elongate at the margin, forming a distinct border, the two forms merging above into shorter, irregular mostly rather thin-walled cells; perichaetial leaves rather shorter than the upper stem-leaves,

the inner ones convolute more than one half up and abruptly narrowed to a slender subula, denticulate at the apex: seta 12–15 mm. long, smooth, sinuous above when dry: capsule oblong, about 2 mm. long, slightly or not curved, deeply furrowed when dry and empty, with a large annulus and a rostrate lid two thirds as long as the capsule; exothecal cells narrow, mostly 4 or 5 times as long as broad, with much thickened lateral walls and thin end-walls; peristome-teeth dark-red, closely articulate and striate below, divided to below the middle: calyptra not ciliate at the base: spores slightly rough, up to 13  $\mu$  in diameter.

TYPE LOCALITY: Mexico.

DISTRIBUTION: Mexico, Costa Rica, and Guatemala; high alpine.

This species is much like *C. areodictyon* (C. Müll.) Mitt., of northern South America, but distinguished at once by the cross-section of the costa, *C. areodictyon* having a stereid-band both above and below the median row of cells; it also has longer, narrower cells in the upper part of the short leaf-blade. The ribs on the back of the costa in *C. Chrismari* vary greatly, sometimes being very prominent, at other times scarcely distinct, in specimens from the same tuft.

### 3. *Campylopus delicatulus* R. S. Williams, sp. nov.

Flowers and fruit unknown: plants in loose, green mats, with very slender, erect, simple stems 12–15 mm. high, bearing rather distant, nearly straight, widely spreading leaves rather uniformly placed along the stem and of nearly the same size below as at the apex of the stem; stem in cross-section oval-hexagonal, 200  $\mu$  by 130  $\mu$ , with a large central strand and walls of mostly 2 or 3 layers of small, thick-walled cells: leaves about 3.5 mm. long, narrowly lanceolate, tapering from near the base to a subtubulose point often sharply denticulate at the apex formed by the shortly excurrent costa; costa smooth on the back to a little below the apex, about 160  $\mu$  wide at the base and one third the width of the leaf-base, in cross-section below showing 12–15 large median cells with an equal number of large cells in one row on the upper side and about 2 rows of smaller cells on the under side, with no stereid-band; alar cells forming a large group, hyaline to reddish-brown and more or less inflated, extending to the costa; cells just above the alar ones often nearly square, about 20  $\mu$  wide, soon becoming narrower and elongate, mostly prosenchymatous, with somewhat thickened, not pitted walls, the median cells of the blade 4–6  $\mu$  wide and up to 40–50  $\mu$  long.

Type collected at Herradura, province of Pinar del Rio, Cuba, August 27, 1910, *E. G. Britton* 6523 (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Pinar del Rio, Cuba.

### 4. *Campylopus saxatilis* R. S. Williams, sp. nov.

Plants in rather pale-green tufts, tomentose within, about 3 cm. high: leaves mostly uniformly placed along the stems, erect-spreading, flexuous, about 5 mm. long, from an ovate or lanceolate base gradually narrowed to a long, slender, serrulate apex, the narrow leaf-blade extending far above the middle; costa about 250  $\mu$  wide below and one half the width of the leaf-base, in cross-section showing large cells on the ventral side extending one third through and a median row of much smaller cells with a stereid-band below; alar cells red to hyaline, the cells at the margin just above hyaline, narrowly rectangular, those within broader, mostly short-oblong with thickened walls slightly pitted, those farther up all shorter, more or less obliquely oblong to rhomboidal with rather uniformly thickened walls; inner perichaetial leaves about 7 mm. long, with a convolute base extending one half up and gradually narrowed to a serrulate subula: seta flexuous, smooth, 10 mm. long: capsule without lid 1.25 mm. long, curved-ovate, nearly smooth at the base, furrowed when dry, distinctly strumose, with an obliquely rostrate lid 1 mm. long; peristome-teeth about 55  $\mu$  wide at the base; annulus large: calyptra not ciliate: spores rough, up to 16  $\mu$  in diameter.

Type collected at Cinchona, Jamaica, on rock at about 1500 meters, March, 1907, *Harris 11143* (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Known only from the type locality.

### 5. *Campylopus cygneus* (Hedw.) Brid. Bryol. Univ. 1: 475. 1826.

*Dicranum cygneum* Hedw. Sp. Musc. 148. 1801.

*Campylopus jamaicensis* Mitt. Jour. Linn. Soc. 12: 82. 1869.

*Pilopogon jamaicensis* Broth. in E. & P. Nat. Pfl. 13: 336. 1901.

Plants in rather loose tufts, with slender, more or less branching, sparsely radiculose stems up to 4 cm. high; stems rather equally foliate or somewhat comose above: upper leaves about

7 mm. long, nearly straight when moist, somewhat appressed or spreading and flexuous when dry, from an ovate-lanceolate base gradually narrowed to a long, grooved subula, slightly hyaline and denticulate at the apex, the very narrow leaf-blade above slightly serrulate on the border and extending well above the middle of the leaf; costa up to  $300\ \mu$  wide just above the alar cells and nearly one half the width of the lower part of the leaf, in cross-section showing ventral cells extending almost one half through the leaf, with a median row of smaller cells and a stereid-band on the dorsal side; alar cells large, inflated, auriculate, red to hyaline; cells just above at the margin pale, very narrow, those within broad, short, thick-walled, mostly from nearly square to twice as long as broad, sometimes colored and pitted; inner perichaetial leaves a little longer than the stem-leaves, convolute about one third up and rather abruptly narrowed to a long, denticulate subula: seta flexuous, smooth, 8–12 mm. high: capsule oval, curved, furrowed and slightly strumose when dry; exothecal cells rectangular; lid conic-subulate; peristome-teeth reddish-brown, about  $60\ \mu$  wide at the base, undivided to well above the middle: calyptra copiously ciliate at the base: spores rough, up to  $14\ \mu$  in diameter.

TYPE LOCALITY: Santo Domingo.

DISTRIBUTION: Santo Domingo and Jamaica.

ILLUSTRATION: Hedw. Sp. Musc. *pl.* 37.

#### 6. *Campylopus Cacuminis* (C. Müll.) Paris, Index Bryol.

Suppl. 90. 1900.

*Dicranum Cacuminis* C. Müll. Hedwigia 37: 227. 1898.

Dioicous: plants in broad, light-green, shining cushions, at the base somewhat reddish-tomentose; stems scarcely 2.5 cm. high, slenderly caudate-attenuate, curved or falcate above, capituliform-divided with very short, uniform, appressed branches: stem-leaves rather densely imbricate, small, narrow, subuliform, from a broader base with few, rather large, lax, purplish alar cells, forming a somewhat congested, concave auricle, extending into a more or less lanceolate-acuminate or acute, straight, very entire blade, with the margin a little involute and with thick-walled elliptic cells, at the base rectangular and broader, the broad nerve, laxly reticulate, filling the entire leaf above; perichaetial leaves much longer-subulate, sometimes denticulate at the apex: seta short, yellowish, very flexuous, smooth: capsule small, oblong, nodding, sulcate, ribbed, with a slightly strumose collum and an obliquely rostrate conic lid: calyptra small, at the base shortly fimbriate: spores very minute, brownish-yellow. (Translated from the original description.)

TYPE LOCALITY: Blue Mountain Peak, Jamaica. —

DISTRIBUTION: Known only from the type locality.

No authentic specimens of this species have been seen. The plants referred here were collected by Dr. Rothrock in the Blue Mountains, Dec. 13, 1890. They have leaves up to 8 mm. long, slightly serrulate at the apex, the very narrow blade extending almost to the apex; the costa, up to  $325\ \mu$  wide near the base, shows in cross-section a row of large thin-walled cells on the ventral side extending nearly one half through the leaf with differentiated cells on either side of the stereid-band on the dorsal side of the leaf; cell-walls of the blade thin and lax below, somewhat thickened above; seta 10 mm. long; capsule 1.5 mm. long; spores somewhat rough, up to  $15\ \mu$  in diameter.

#### 7. *Campylopus flexuosus* (L.) Brid. Musc. Recent.

Suppl. 4: 71. 1819.

*Bryum flexuosum* L. Sp. Pl. 1118. 1753.

Plants in compact, green or yellowish-green tufts, tomentose within; stems up to 5 cm. high, often bearing flagellate, clustered branches: leaves about 4.5 or sometimes up to 6 mm. long, rather uniformly placed along the stems, mostly erect when dry or curved-secund at the apex of the stem, from an oblong-lanceolate base gradually narrowed to a point nearly smooth except at the sharply denticulate apex; costa percurrent or slightly excurrent, about  $275\ \mu$  wide at the base and one half the width of the lower part of the leaf, ribbed and slightly serrulate on the back above, in cross-section below showing a row of large ventral cells, a median row nearly as large and a stereid-band on the dorsal side with one row of differentiated cells; alar cells reddish, more or less inflated and auriculate; cells of the blade just above rectangular, broad, often reddish toward the costa, narrow and pale toward the margin, but not forming a distinct border, with walls thin, not pitted, soon becoming smaller above, from nearly square to rhomboidal, the median cells  $4\text{--}6\ \mu$  wide and  $8\text{--}10\ \mu$  long; perichaetial leaves longer than the stem-

leaves, rather gradually narrowed a little more than one half up to a slender denticulate point: seta 8–10 mm. long, reddish: capsule about 2 mm. long, oval, when dry and empty cylindric, furrowed, and slightly curved; exothecal cells narrow with much thickened walls; peristome-teeth reddish-brown, vertically striate, divided about one half down, the inner articulations only about 6–8  $\mu$  apart; lid red, obliquely beaked, about two thirds the length of the capsule; annulus broad, of 2 or 3 rows of cells: calyptra fimbriate at the base: spores finely papillose; about 12  $\mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: Vancouver Island; Mexico; also in Europe.

ILLUSTRATION: B.S.G. Bryol. Eur. *pl.* 89.

#### 8. *Campylopus gracilicaulis* Mitt. Jour. Linn. Soc. 12: 83. 1869.

Plants in rather loose tufts; stems slender, up to 3 cm. high; lower stem-leaves appressed, more or less covered with radicles, the upper ones and those of the short branches somewhat larger and forming compact comas, all more or less lanceolate from an oblong base, serrulate nearly one third down, with the costa excurrent, the leaf blade often extending nearly to the apex and half way up on either side of the costa 6–10 cells wide; costa extending about one third across the leaf-base, nearly smooth on the back below, rough above with serrulate ribs, in cross-section showing a row of large cells across the ventral side, a median row of about the same size, and on the dorsal side a narrow row of more or less interrupted stereid-cells with the outer cells differentiated; alar cells distinct, reddish to hyaline or sometimes quite indistinct, the lower leaf-cells mostly oblong, pale, lax toward the costa, narrow and sometimes forming a distinct border at the margin, farther up becoming somewhat thick-walled, smaller, mostly rhomboidal; inner perichaetial leaves sheathing more than one half up, somewhat abruptly narrowed to a rough, scarcely or not hyaline subula: capsule (immature) oval, unequal, rough at the base, hidden among the comal leaves on a reflexed seta about 9 mm. long: calyptra fimbriate at the base.

TYPE LOCALITY: Brazil.

✓DISTRIBUTION: Florida, Cuba, and Jamaica; also in Brazil.

The Florida specimens of this species are all sterile, and mature fruit has apparently never been collected.

#### 9. *Campylopus fragilis* (Dicks.) B.S.G. Bryol. Eur. (41:)

*Campylopus* 4. 1847.

*Bryum fragile* Dicks. Pl. Crypt. Brit. 3: 5. 1793.

Plants in compact, pale, glossy-green tufts, up to 4 cm. high; stems tomentose below, branching above, more or less whitish within from the pale bases of the leaves: leaves about 5 mm. long, densely imbricate, rather uniformly placed and more or less erect-spreading on all sides, from an oblong base, narrowly lanceolate, somewhat serrulate in the upper third with the costa shortly excurrent; costa extending about one half across the leaf-base, somewhat ribbed on the back above, in cross-section below showing a row of large cells on the ventral side extending about one half through and a stereid-band on the dorsal side with a row of more or less differentiated cells on either side of the band; alar cells wanting, the lower cells toward the costa thin-walled, lax, up to 20  $\mu$  wide by 80  $\mu$  long, narrower toward the margin, scarcely forming a distinct border, hyaline or very pale about one fourth up the leaf to the rather abruptly narrowed part of the blade where the cells become short and more or less obliquely elongate or rhomboidal with somewhat thickened walls, the cells in the very narrow blade above mostly short, more or less rhomboidal; perichaetial leaves sheathing about one half up, gradually narrowed to a subulate point: seta sinuous above when dry, 5–8 mm. long: capsule regular, elliptic, ribbed; lid about one half as long as the capsule: calyptra ciliate at the base: spores 14–16  $\mu$  in diameter, finely papillose.

TYPE LOCALITY: Great Britain.

✓DISTRIBUTION: Florida and Jamaica (sterile specimens); also in Europe, Asia, and Africa.

ILLUSTRATION: B.S.G. Bryol. Eur. *pl.* 90.

The Florida specimens are like the European, but the specimens from Jamaica differ slightly in having a rather broader leaf-blade just above the pale basal cells, composed of more numerous, obliquely elongate cells.

10. *Campylopus subleucogaster* (C. Müll.) Jaeger & Sauerb. Ber.  
St. Gall. Nat. Ges. 1877-78: 381. 1879.

*Dicranum subleucogaster* C. Müll. in C. Mohr, Bull. Torrey Club 5: 49. 1874.  
*Dicranum zygodonticarpum* C. Müll. Linnaea 42: 471. 1878.

Plants in loosely cohering tufts, with stems 1-2.5 cm. high, branching above and tomentose below: stem-leaves about 5 mm. long, often somewhat curved and spreading-secund, from a short-ovate base gradually narrowed to a long, subulate, sharply denticulate point, the leaf-blade very narrow above and more or less serrulate one half down; costa shortly excurrent, rough on the back above, about 200  $\mu$  wide near the base and extending about one third across the leaf-base, in cross-section showing a ventral row of rather irregular cells with somewhat thin walls extending scarcely one third through the costa, a median row of cells of nearly the same size with a stereid-band on the dorsal side; alar cells reddish to hyaline, broad, lax, rather poorly defined from the cells above, which are more or less inflated, often up to 25  $\mu$  wide and scarcely elongate toward the costa, somewhat smaller and narrower toward the margin, all becoming gradually smaller upward with somewhat thickened not pitted walls, the majority of the cells in the broader part of the leaf varying from nearly square to twice as long as broad; inner perichaetial leaves convolute nearly one half up, gradually narrowed to a rough subula: seta sinuous above, smooth, 10-12 mm. long: capsule elliptic, regular, smooth at the base, deeply furrowed and nearly cylindrical when dry and empty, 1.2 mm. long, with a lid two thirds as long; annulus large; peristome-teeth split to the middle, at the base 40  $\mu$  wide: calyptra ciliate: spores rough, 12-14  $\mu$  in diameter.

TYPE LOCALITY: Alabama.

DISTRIBUTION: Alabama; Costa Rica; Guatemala.

11. *Campylopus retinervis* (C. Müll.) Paris, Index Bryol.  
Suppl. 95. 1900.

*Dicranum retinerve* C. Müll. Bull. Herb. Boiss. 5: 552. 1897.

Plants in low, glossy-green, lax tufts; stems small, mostly simple, slender, few-leaved: stem-leaves more or less straight, erect, when moist spreading, 2-4 mm. long, from a narrow base, narrowly cymbiform-lanceolate, extending into a subulate grooved acumen, denticulate at the apex; costa broad, about 150  $\mu$  wide near the base, laxly reticulate, striate, excurrent, in cross-section below showing ventral cells extending one half through with median cells about one half as large and a stereid-band below; cells of the leaf-blade dense, minutely quadratic, at the base more lax and larger with alar cells flat, or concave, hyaline, often not distinctly defined; perichaetial leaves longer-subulate: seta flexuous, short, smooth: capsule small, oval, erect; lid shortly conic: calyptra very small, split one half up, ciliate at the base: peristome short, narrow.

TYPE LOCALITY: Cinchona, Jamaica.

DISTRIBUTION: Known only from the type locality.

12. *Campylopus Sargii* Röhl; Ren. & Card. Bull. Soc. Bot.  
Belg. 38<sup>1</sup>: 8. 1900.

Plants cespitose, yellowish or rusty-green; stems erect or ascending, about 1 cm. high, below somewhat reddish-tomentose: stem-leaves 3-4 mm. long, erect-flexuous or subsecund, from an oblong base extending into a long subula acutely dentate and often reddish above; costa 100-140  $\mu$  wide near the base, occupying about one fourth the width of the leaf-base, in cross-section showing 3 or 4 layers of cells, the ventral thin-walled and hyaline, the others thick-walled and indistinct; leaf-cells near the base laxly rectangular, upward gradually smaller, oblong; alar cells hyaline to rusty-brown, subhexagonal, more or less distinct; perichaetial leaves somewhat similar to the stem-leaves but the inner longer with a narrower costa, only about 40  $\mu$  wide: seta flexuous, geniculate when wet, 5-7 mm. long: capsule symmetric, oblong, when dry subcylindric, deeply sulcate; lid obliquely long-rostrate; peristome-teeth rusty-brown, about 48  $\mu$  wide at the base, divided into two unequal, papillose, filiform forks: calyptra ciliate at the base: spores rough, about 12  $\mu$  in diameter.

TYPE LOCALITY: Juan Vifias, Costa Rica, at 1130 meters.

DISTRIBUTION: Known only from the type locality.

13. *Campylopus Hoffmanni* (C. Müll.) Ren. & Card. Bull. Soc. Bot.  
Belg. 31<sup>1</sup>: 147. 1893.

*Dicranum Hoffmanni* C. Müll. Linnaea 38: 592. 1874.

Plants in yellowish, laxly cespitose tufts, with slender, hardly radiculose or divided, flexuous stems 10 cm. high: stem-leaves rather distantly and uniformly imbricate, erect-spreading all around, 15–20 mm. long, tubulose below and grooved above, from a narrowly ovate-lanceolate base gradually attenuate into a long, straight, setaceous point, the lamina very narrow above, extending to or near the apex and serrulate about one fourth down the leaf; costa mostly slightly excurrent, a little above the base about 400  $\mu$  wide, scarcely one third the width of the leaf, smooth on the back, in cross-section below showing a row of large cells on the ventral side, and a median row of cells about one half as large, with a stereid-band on the dorsal side containing a single row of larger cells; alar cells forming prominent, red or hyaline auricles; cells just above the alar roundish to oblong, up to 20  $\mu$  wide and 30–40  $\mu$  long, those within with very unequally thickened walls, toward the margin becoming gradually very narrow and above in the broader part of the leaf long and narrow, 12  $\mu$  wide by 50–80  $\mu$  long, with thickened pitted walls, in the narrow upper part of the leaf all elongate with somewhat thickened not pitted walls.

TYPE LOCALITY: In bogs of the Barba volcano, Costa Rica.

DISTRIBUTION: Known only from the type locality.

14. *Campylopus Brittonae* R. S. Williams, sp. nov.

Plants in extensive, rather loose, glossy, yellowish-green mats, with widely branching stems tomentose below, up to 7 cm. high: leaves up to 16 mm. long, rather uniformly placed along the stems, widely spreading, flexuous, slightly secund, from a narrowly lanceolate base gradually narrowed to a slender, minutely serrulate flexuous hair-point; costa long-excurrent, denticulate and pale at the apex, at the base about five sevenths the width of the leaf and 0.65 mm. wide, in cross-section below showing a ventral row of large cells scarcely reaching one half through the leaf and a stereid-band on the dorsal side with a row of differentiated cells on either side of the band; alar cells reddish or hyaline, forming more or less conspicuous auricles; cells just above short, 15–20  $\mu$  long and often nearly as broad toward the costa, gradually much narrower toward the margin but scarcely forming a distinct border, soon becoming more or less obliquely elongate upward, not in straight rows, with very unequally thickened walls, sometimes slightly pitted near the costa, and about one half up in the very narrow blade becoming small, oval to rhomboidal, about 6  $\mu$  wide and 8–12  $\mu$  long.

Type collected on Sir John's Peak, Blue Mountains, Jamaica, October, 1908, E. G. Britton 1167 (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Known only from the type locality.

This species has leaves in shape much like *C. Hoffmanni*, but they are widely spreading and flexuous, with the costa much broader and the leaf-cells shorter and scarcely or not pitted.

✓ 15. *Campylopus praealtus* (C. Müll.) Paris, Index Bryol.  
Suppl. 96. 1900.

*Dicranum praealtum* C. Müll. Hedwigia 37: 227. 1898.

Plants in robust, laxly cohering, glossy-yellow tufts, up to 24 cm. high; stems stout, radiculose nearly to the apex, simple or dichotomously divided, and terminating in more or less penicillate apices: leaves 10–12 mm. long, the older cauline bristly spreading, the younger more or less imbricate, from a fibrillose base ovate-lanceolate, subtubulose above, gradually produced into an acute, rather short, sharply dentate apex; costa about 800  $\mu$  wide below, laxly reticulate, in cross-section showing large ventral cells extending more than one half through the leaf and a stereid-band below enclosing two rows of rather small cells; cells of the leaf-blade just above the alar and toward the costa broadly oblong with much thickened and pitted walls, in the margin narrower and paler, forming a rather distinct border; cells above becoming more or less obliquely and narrowly oblong to linear, with walls much pitted in the broad part of the leaf-blade.

TYPE LOCALITY: Sierra de Luquillo, Porto Rico. —

X DISTRIBUTION: Known only from the type locality.

16. *Campylopus Underwoodii* R. S. Williams, sp. nov.

Plants in compact, yellowish-green, glossy tufts; stems up to 12 cm. high, scarcely or not branched, slightly radiculose below: leaves uniformly placed along the stems, erect-spreading all around, 10 mm. long, tubulose below, from a lanceolate base gradually narrowed to a flexuous, filiform point, very smooth except at the minutely denticulate apex; costa just above the alar cells about 500  $\mu$  wide, more than three-fifths the width of the leaf-base, smooth on the back with a very narrow leaf-blade extending five-sixths up or more, in cross-section showing ventral cells extending nearly two thirds through the leaf with a stereid-band below enclosing two rows of small cells; alar cells conspicuous, red to hyaline, the cells just above, toward the costa, short and broad with walls thickened at the angles, those toward the margin gradually much narrower and paler with thin walls; cells farther up becoming somewhat obliquely elongate and gradually smaller with rather uniformly thickened not pitted walls.

Type collected on Blue Mountain Peak, Jamaica, April, 1903, *Underwood 2539* (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Known only from the type locality.

17. *Campylopus angustiretis* (Aust.) Lesq. & James,  
Man. 80. 1884.

*Dicranum angustirete* Aust. Bot. Gaz. 4: 150. 1879.

Plants in rather loose, green to brownish tufts; stems mostly simple, about 3 cm. high, without radicles above: leaves nearly straight, equally spreading all around, rather loosely imbricate below, more or less comose at the summit, the lower ones 3.5–4 mm., the upper about 5 mm. long; costa just above the alar cells 150  $\mu$  wide or more, shortly excurrent into a dentate point, slightly ribbed on the back, in cross-section showing a row of thin-walled cells on the ventral side, a median row of cells nearly as large, and a stereid-band below; alar cells pale-reddish to hyaline, the cells just above broad, short, often nearly square toward the costa, much smaller and narrower toward the margin, in the upper part of the leaf becoming narrowly oblong or rhomboidal to linear and slightly vermicular, 4–6  $\mu$  wide and about 30  $\mu$  long, with rather uniformly thickened walls, not in straight rows.

TYPE LOCALITY: Jacksonville, Florida.

DISTRIBUTION: Known only from the type locality.

18. *Campylopus leucogaster* (C. Müll.) Mitt. Jour.  
Linn. Soc. 12: 75. 1869.

*Dicranum leucogaster* C. Müll. Syn. 1: 387. 1848.

*Dicranum filiforme* Hornsch.; C. Müll. Syn. 1: 387, as synonym. 1848.

Plants in laxly cespitose tufts; stems somewhat elongate, simple, caudate, flexuous, soft, flaccid, yellowish, subfiliform but lax-leaved: stem-leaves at the apex, forming a somewhat elongate, erect, spreading, slightly compressed coma, erect-spreading from a broadish base, lanceolate-subulate, somewhat curved, at the very apex on the back and margin serrulate, otherwise very smooth; alar cells very lax, large, hyaline, ventricose and delicate with basal cells lax and thin-walled, the cells above very minute; costa extending to the tip and filling almost the entire leaf above. (Translated from the original description.)

TYPE LOCALITY: Jalapa, Vera Cruz.

DISTRIBUTION: Known only from the type locality. "By its caudate stems resembling *D. porphyreodictyon*. Perhaps with stems of two forms." (C. Müller.) A stem from the type collection, received through the kindness of I. Urban, is filiform, a little more than 2 cm. high and with the appressed leaves about 0.5 mm. across; leaves up to 4 mm. long with cells empty and more or less collapsed, often giving a rough appearance to the back of the leaf; costa in cross-section with a ventral row of thin, large cells, sometimes almost entirely worn away, a median row of cells nearly as large, and a stereid-band below, of about two rows of cells.

19. *Campylopus Roellii* Ren. & Card. Bull. Soc. Bot.  
Belg. 38<sup>1</sup>: 9. 1900.

Plants densely cespitose, yellowish to rusty-green; stems erect, simple or divided, much attenuate, tomentose below, 1.5–2 cm. high: leaves about 5 mm. long, rather closely imbricate,

suberect or subsecund, often deciduous, from an oblong-lanceolate base gradually long-subulate, somewhat tubulose, the apex sparsely denticulate, the very narrow blade extending to near the apex; costa shortly excurrent, 300–400  $\mu$  wide near the base and extending three fourths or more across the leaf-base, slightly ribbed on the back, in cross-section showing three layers of cells, the ventral large and empty, the median and dorsal layers small and thick-walled with stereid-cells intermixed; alar cells lax, thin, hyaline or fuscous, the cells next above them elongate-rectangular, about 12  $\mu$  by 60  $\mu$  half way to the costa, those toward the margin narrower but not forming a distinct border, farther up irregular, becoming short, subrectangular to sub-rhomboidal, with somewhat thickened not pitted walls: fruit unknown.

TYPE LOCALITY: Juan Viñas, Costa Rica, at 1130 meters.

DISTRIBUTION: Known only from the type locality.

This species is near *C. tallulensis*, but seems always to have a costa rather broader below, with the leaf-blade on either side narrower.

20. **Campylopus Hellerianus** (Hampe) Jaeger, Ber. St. Gall. Nat. Ges. 1870–71: 417. 1872.

*Dicranum Hellerianum* Hampe, Verh. Zool.-Bot. Ges. Wien 19: 507. 1869.

Plants in rather loosely cohering, greenish-brown tufts, with strict, scarcely branching stems tomentose below and up to 7 cm. high: leaves up to 6 mm. long by 0.8 mm. wide, uniformly placed along the stems, erect when dry, slightly spreading when moist, lanceolate-pointed from a base with mostly parallel margins extending about one fourth up the leaf, the margins above incurved and entire to near the denticulate apex; costa percurrent or slightly excurrent, about three fourths the width of the lower part of the leaf, with smooth ribs less than one cell high on the back, in cross-section near the middle showing large ventral cells extending about one half through the costa and a stereid-band on the dorsal side with differentiated cells on either side of the band; alar cells more or less reddish, inflated, forming rather small or indistinct auricles; cells of the lower part of the blade pale, rectangular, with thin walls, the marginal ones gradually narrower, not forming a distinct border, upward becoming more or less rhomboidal with slightly thickened walls, those in the very narrow upper part of the blade small, short and obscure: fruit unknown.

TYPE LOCALITY: Huatusco, Vera Cruz.

DISTRIBUTION: Known only from the type locality.

21. **Campylopus tallulensis** Sull. & Lesq.; Sull. Ic. Musc. 27. 1864.

Plants in compact tufts, yellowish to dark-green above, dark reddish-brown and radiculose below with more or less divided stems up to 4 cm. high: leaves up to 6 mm. long, uniformly placed along the stems, when moist slightly curved and somewhat spreading all around, lanceolate above from an ovate or oblong base, tubulose near the middle and grooved above to the short, stout, more or less denticulate apex; costa mostly less than two thirds the width of the leaf near the base, 200–350  $\mu$  wide just above the alar cells, ribbed and dentate on the back above, in cross-section a little below the middle showing a row of large, thin-walled cells on the ventral side extending one half through the costa, and a median row of much smaller cells, with a stereid-band on the dorsal side; alar cells from reddish brown to hyaline, the cells just above usually pale, lax, thin-walled, more or less rectangular, often 16–20  $\mu$  wide by 25–60  $\mu$  long toward the costa, gradually narrower toward the margin, upward becoming smaller and shorter, square to rhomboidal, about 10 by 12–16  $\mu$  with thicker walls and in the very narrow blade of the upper part of the leaf mostly elongate-rhomboidal.

TYPE LOCALITY: Tallula Falls, Georgia.

DISTRIBUTION: Georgia and Alabama.

ILLUSTRATION: Sull. Ic. Musc. pl. 17.

EXSICC.: Sull. & Lesq. Musci Bor. Am. 73b; ed. 2. 93.

The type specimens of this species have the apex of the leaf mostly in poor condition and do not well show the teeth on the back and margins.

22. **Campylopus Donnellii** (Aust.) Lesq. & James, Man. 79. 1884.

*Dicranum Donnellii* Aust. Bot. Gaz. 4: 150. 1879.

Plants in loose, yellowish-green tufts; stems erect, simple, radiculose below, up to 2.5 cm. high: leaves rather loosely imbricate and appressed below, comose at the summit, the

lower 4 mm., the upper about 7 mm. long; costa up to 200  $\mu$  wide near the base, somewhat rough on the back above, excurrent into a terete, dentate point, in cross-section about halfway down showing a ventral row of large cells, a median row of cells nearly as large, and a stereid-band on the dorsal side; alar cells reddish to hyaline, often much inflated, those next above more or less pale, laxly rectangular within, gradually smaller toward the margin, soon becoming smaller upward, with thickened, colored walls, the leaf-blade very narrow one half up with narrow cells 3–5 times as long as wide and the margin serrulate to the apex.

TYPE LOCALITY: Florida.

DISTRIBUTION: Florida.

EXSICC.: Aust. Musci App. 470; Holz. Musci Acroc. Bor. Am. 207 (both as *C. subleucogaster*).

### 23. *Campylopus introflexus* (Hedw.) Brid. Bryol.

Univ. 1: 472. 1826.

- Dicranum introflexum* Hedw. Sp. Musc. 147. 1801.  
*Campylopus polytrichoides* De-Not. Syll. Musc. 222. 1838.  
*Dicranum Liebmanni* C. Müll. Syn. 2: 601. 1851.  
*Dicranum Lamellicosta* C. Müll. Syn. 2: 601. 1851.  
*Dicranum lutescens* C. Müll. Syn. 2: 602. 1851.  
*Dicranum proliferum* C. Müll. Syn. 2: 602. 1851.  
*Campylopus leucotrichus* Sull. & Lesq.; Sull. Ic. Musc. 28. 1864.  
? *Campylopus Vitzliputzli* Lorentz, Moosst. 158. 1864.  
*Campylopus bicolor* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 166. 1872. Not *C. bicolor* Hornsch. 1854.  
*Campylopus Lamellicosta* Schimp.; (C. Müll. Syn. 2: 601, as synonym. 1851) Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 167. 1872.  
*Campylopus strictus* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 167. 1872.  
*Campylopus luridus* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 168. 1872.  
*Campylopus pilosissimus* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 168. 1872.  
*Campylopus subproliferus* C. Müll.; Ren. & Card. Bull. Bot. Soc. Belg. 31<sup>1</sup>: 149. 1893.  
*Campylopus Liebmanni* Schimp.; Paris, Index Bryol. 253. 1894.  
*Thysanomitrium jamaicense* C. Müll. Bull. Herb. Boiss. 5: 552. 1897.  
*Campylopus Cinchonae* Paris, Index Bryol. Suppl. 90. 1900.  
*Pilopogon Liebmanni* Broth. in E. & P. Nat. Pfl. 1<sup>3</sup>: 336. 1901.  
*Campylopus pachycomus* Besch.; Paris, Index Bryol. ed. 2, 1: 321. 1904.

Plants in rather rigid, compact tufts, greenish or yellowish above and brown or blackish below; stems erect, tomentose below, 1–7 cm. high, with leaves appressed or erect-spreading and rather uniformly placed along the stems or comose at intervals: stem-leaves narrowly lanceolate to oblong-lanceolate, ending rather abruptly in a few hyaline teeth or extended into a more or less elongate, denticulate, hyaline point often geniculate at the base when dry, the gradually narrowed leaf-blade scarcely extending to the base of the hyaline point and entire or nearly so; costa 300  $\mu$  wide or more near the base, about one half to three fifths the width of the lower part of the leaf, with more or less serrulate lamellae up to 3 cells high on the back extending to below the middle of the leaf, in cross-section below showing a row of ventral cells extending about two fifths through the leaf, and a median row about one half as large, with a stereid-band below; alar cells from rather inconspicuous to inflated and from reddish to hyaline, the cells next above more or less narrowly rectangular, thin-walled and hyaline, those higher up somewhat thick-walled, colored and short-rhomboidal to obliquely oval; inner perichaetial leaves with a convolute blade extending nearly to the base of the more or less elongate, hyaline, rough point: seta 6–9 mm. long, sinuous, rough near the capsule: capsule not quite regular, oval, rugose at the base, furrowed when dry, with the lid obliquely short-rostrate; peristome-teeth reddish-brown, 45–60  $\mu$  wide at the base, split about half way down from the apex: calyptra ciliate at the base: spores rough, up to 13  $\mu$  in diameter.

TYPE LOCALITY: New Zealand.

DISTRIBUTION: North Carolina; Georgia; Mexico; Central America; Jamaica; Cuba; also in South America, Africa, and Australasia.

ILLUSTRATIONS: Hedw. Sp. Musc. pl. 29; Sull. Ic. Musc. pl. 17.

### 24. *Campylopus Oerstedianus* (C. Müll.) Mitt. Jour. Linn.

Soc. 12: 81. 1869.

*Dicranum Oerstedianum* C. Müll. Syn. 2: 596. 1851.

Plants in very densely compacted tufts, below reddish, above glossy-yellow, very rigid, laxly cohering, hardly tomentose; stems about 2.5 cm. high, slender, fragile, flexuous, with

appressed dichotomous branches of two colors, indistinctly angulate, with acute, slender, somewhat incurved apices: stem-leaves very straight and densely appressed, narrowly canaliculate, lanceolate-subulate, the apex slightly truncate and serrulate with rather distinct teeth; costa very broad, occupying the entire convolute subula above; alar cells above the fibrillose decurrent base, as well as the marginal cells, thin, lax and pellucid. (Translated from the original description.)

TYPE LOCALITY: On the Irasu volcano, Costa Rica, at 3300 meters.

DISTRIBUTION: Known only from the type locality.

There is little in the above description to separate this species from *C. introflexus*; a small specimen in the collection of the New York Botanical Garden, named by C. Müller and evidently a cotype, has perichaetial leaves with long, dentate, hyaline points; leaf-cells and cross-section of the costa of the lower part of the leaf about as in *C. introflexus* also, but the alar cells apparently always ill-defined and the back of the costa ribbed only above, not with serrulate lamellæ. The specimen evidently is in poor condition but may possibly represent a distinct species.

### 25. *Campylopus humilis* Mont. Ann. Sci. Nat. III. 4: 110. 1845.

Plants in soft cushions, with very slender stems up to 2 cm. high: leaves comose at regular intervals along the stem, lanceolate-subulate and somewhat falcate-secund or spreading-flexuous, up to 6.5 mm. long, the margins more or less serrulate about one third down the leaf; costa excurrent, in cross-section a little below the middle showing stereid-bands above and below the guide-cells with outer cells rather distinctly differentiated on the dorsal side only; leaf-cells with walls not pitted nor greatly thickened, mostly rectangular, the lower cells toward the costa up to 40  $\mu$  long by 12  $\mu$  wide, toward the margin narrower, the alar group enlarged, auriculate, mostly reddish: seta about 12 mm. long, mostly slightly curved or sinuous: capsule nodding, curved, furrowed when dry, scarcely strumose, about 1.3 mm. long without lid; lid conic, obliquely rostrate, a little more than 1 mm. long; annulus large; peristome-teeth reddish, 50–60  $\mu$  wide at the base, divided rather more than one half down into 2 filiform, papillose forks, the outer plates vertically striate, the inner articulations crowded, 5–8  $\mu$  apart: calyptra slightly rough at the apex, the base not fimbriate: spores not quite smooth, up to 12  $\mu$  in diameter.

TYPE LOCALITY: Brazil.

DISTRIBUTION: Near Newhaven Gap, Jamaica; also in Brazil.

The Jamaica specimens agree very well with Montagne's specimens and description except in regard to the calyptra which he describes as white-fimbriate at the base. This however may be a mistake, as Montagne remarks that he was unable to find any lids to the capsules.

### 26. *Campylopus filifolius* (Hornsch.) Mitt. Jour. Linn.

Soc. 12: 76. 1869.

*Dicranum filifolium* Hornsch. in Mart. Fl. Bras. 1<sup>2</sup>: 12. 1840.

Plants in soft green tufts; stems slender, up to 5 cm. high, radiculose below, interruptedly foliate: stem-leaves below the comal ones 4–7 mm. long, appressed, involute, somewhat curved, from an ovate-lanceolate base rather gradually narrowed to a rough, grooved subula, with a narrow blade extending nearly to the apex and mostly serrulate one half down; costa serrulate and ribbed on the back to below the middle, in cross-section showing a row of large median cells, a narrow stereid-band on the ventral side, and a much broader band on the dorsal side enclosing one row of medium-sized cells in the lower part of the leaf and two rows in the upper part; alar cells red to hyaline and more or less auriculate, the cells just above short-oblong soon becoming rectangular, toward the margin often pale and narrow, toward the costa broader, with sometimes thickened and slightly pitted walls, the cells of the upper part of the leaf mostly square or oblong to rhomboidal; comal leaves similar to those below but larger, about 10 mm. long, and more or less squarrose or secund with a flexuous apex; inner perichaetial leaves smaller than the comal, with a broad, involute base extending about one half up and somewhat abruptly narrowed to a rough subula: seta flexuous, cygneous when moist, smooth, 10–15 mm. long: capsule oblong, curved, smooth at the base and strumose, furrowed when dry, with an obliquely rostrate lid; peristome-teeth red, 50  $\mu$  wide at the base: calyptra ciliate: spores rough, about 12  $\mu$  in diameter.

TYPE LOCALITY: Nova Friburgo, Brazil.

DISTRIBUTION: Costa Rica; Guatemala; also in Brazil.

27. *Campylopus porphyreodictyos* (C. Müll.) Mitt. Jour. Linn.  
Soc. 12: 75. 1869.

*Dicranum porphyreodictyon* C. Müll. Syn. 1: 395. 1848.  
*Campylopus tenuissimus* Sull. Proc. Am. Acad. 5: 279. 1861.

Plants loosely cespitose; stems yellowish, ascending, sparsely tomentose, of two forms; fertile stems low, proliferous, the proliferations short, obliquely placed, below nearly bare, at the apex sparsely or falcately comose; sterile stems simple, elongate, caudate, curved, strongly appressed-foliate, somewhat terete: stem-leaves of fertile plants from a very short, rather broad base, lanceolate-subulate, with a rather broad strongly furrowed costa; lower leaf-cells elongate, the upper ones dense, green, minutely elliptic, the alar cells showy, purple; leaf-apex denticulate on the margin and back; perichaetial leaves loosely clasping, rather abruptly subulate, laxly areolate, at the base with numerous purple cells often solitary; costa purplish below; leaves of sterile plants broader, shorter, more acute, with inflated, purple alar cells: seta rather short, twisted, slender: capsule obovate, somewhat nodding, slightly strumose, sulcate, olivaceous; lid red, obliquely subulate; peristome-teeth divided to the middle, the forks hyaline and somewhat rough: calyptra fringed with a few yellow, flexuous hairs. (Translated from the original description.)

TYPE LOCALITY: Colombia.

DISTRIBUTION: Specimens referred to this species are from Cuba (*Wright 40*); Barbados (*Parker*, as *C. filifolius*); and Jamaica (*Harris 11135*, in part; *Cinchona*, *E. G. Britton*, without number).

No type material of this species has been seen. If *C. tenuissimus* has been correctly referred to *C. porphyreodictyos*, the last differs chiefly from *C. filifolius* in having the upper part of the leaf much less serrate on the borders and back.

28. *Campylopus arctocarpus* (Hornsch.) Mitt. Jour. Linn.  
Soc. 12: 87. 1869.

*Dicranum arctocarpum* Hornsch. in Mart. Fl. Bras. 1<sup>o</sup>: 12. 1840.  
*Thysanomitrium scabrisetum* Hampe, Ic. Musc. pl. 23. B. 1844.  
*Dicranum stenopus* C. Müll. Syn. 1: 404. 1848.

Plants in rather compact green tufts; stems branching, up to 10 cm. high, radiculose to near the apex, rather equally foliose or with the leaves comose at intervals: leaves rather crowded, erect-spreading, somewhat curved or flexuous, often secund toward the apex of the stem, 6–8 mm. long, from an oblong-lanceolate base, gradually narrowed to a short, stout, denticulate point, the leaf-blade 3 or 4 cells wide a little below its termination and serrulate about one fourth down; costa shortly excurrent, ribbed and serrulate on the back above, about 175  $\mu$  wide just above the base, in cross-section showing a median row of large cells with stereid-bands above and below, the lower band with one row of larger cells near the dorsal surface; alar cells more or less conspicuous, from red to hyaline, the cells next above mostly rhomboidal to rectangular with pitted walls except near the margin, higher up becoming shorter, oblong to rhomboidal, in distinct rows with not pitted walls; perichaetial leaves shorter than the stem-leaves, convolute about one half up and rather abruptly narrowed to a serrulate point: seta 7 mm. long, somewhat rough above, slightly curved when moist, nearly straight when dry: capsule oblong, 1.5 mm. long without the lid, not quite regular, furrowed when dry, rugulose at the base; peristome-teeth 50  $\mu$  wide at the base; lid conic-rostrate, as long as the capsule: calyptra ciliate at the base: spores rough, 12  $\mu$  in diameter.

TYPE LOCALITY: Montevideo, Uruguay.

DISTRIBUTION: Near *Cinchona*, Jamaica; also in South America.

ILLUSTRATION: Hampe, Ic. Musc. pl. 23. B.

29. *Campylopus cubensis* Sull. Proc. Am. Acad. 5: 278. 1861.

Plants in rather loose, green tufts; stems up to 6 cm. high, more or less branched, tomentose to the apex, rather uniformly leafy or somewhat comose: stem-leaves flexuous, spreading, 6–9 mm. long, lanceolate, the apex stout, formed by the shortly excurrent, dentate costa with the leaf-blade on either side 4–6 cells wide a little below its termination and serrulate nearly one half down; costa 225–275  $\mu$  wide below, about one third the width of the lower part of the leaf, smooth on the back below, ribbed and serrulate above, in cross-section showing a median row

of not very large cells with thick stereid-bands above and below, the lower band enclosing one row of larger cells near the dorsal surface; alar cells usually forming large, red, inflated auricles, the cells just above thick-walled, pitted toward the costa, much smaller, narrower, not pitted toward the margin, higher up becoming more or less obliquely oval, not in straight rows, with thickened not pitted walls; inner perichaetial leaves a little longer than the stem-leaves, convolute about one third up and narrowed to a slender denticulate subula: seta 12–16 mm. long, flexuous, nearly smooth above: capsule without lid slightly less than 2 mm. long, curved, furrowed when dry, not quite smooth at the base; lid obliquely rostrate, slightly more than one half as long as the capsule; peristome-teeth 50–60  $\mu$  wide at the base: calyptra with base ciliate: spores rough, up to 14  $\mu$  in diameter.

TYPE LOCALITY: Cuba.  
DISTRIBUTION: Cuba.

30. *Campylopus Harrisii* (C. Müll.) Paris, Index Bryol.  
Suppl. 92. 1900.

*Dicranum Harrisii* C. Müll. Bull. Herb. Boiss. 5: 553. 1897.

Plants in loose tufts, green above, dark-brown or blackish within; stems simple or divided, somewhat tomentose below, rather uniformly leafy with the leaves at the apex more or less curved-secund: stem-leaves rather spreading, 7–10 mm. long, narrowly lanceolate, with usually a long-excurrent, terete, rough costa, the leaf blade, for some distance below its termination, only 1 or 2 cells wide either side of the costa and serrulate about one half down; costa about 225  $\mu$  wide just above the alar cells, ribbed and serrulate toward the apex, in cross-section showing stereid-bands above and below the median row of cells, the dorsal band enclosing in the leaf near the base a single row of larger cells, near the apex a double row; alar cells forming large, inflated, red to hyaline clusters, the cells just above mostly narrow, rectangular, with thickened, pitted walls except toward the margin of the leaf, upward becoming shorter, mostly rhomboidal and angular, in rows with somewhat equally thickened not pitted walls; inner perichaetial leaves narrowed to a slender subula longer than the convolute base: seta about 12 mm. long, flexuous, distinctly roughened near the capsule: capsule obovate, curved, roughened at the base and slightly strumose, with an obliquely rostrate lid a little more than one half as long; peristome-teeth 60–70  $\mu$  wide at the base: calyptra ciliate: spores rough, up to 14  $\mu$  in diameter.

TYPE LOCALITY: Jamaica.  
DISTRIBUTION: Blue Mountains, Jamaica.

31. *Campylopus tortuosus* (Hampe) Paris, Index Bryol.  
Suppl. 98. 1900.

*Dicranum tortuosum* Hampe, Linnaea 25: 361. 1853.  
*Campylopus giganteus* Sull. Proc. Am. Acad. 5: 278. 1861.

Plants in deep, soft, loosely cohering tufts; stems robust, simple or dichotomous, up to 12 cm. high, somewhat tomentose to near the apex, rather equally foliate; leaves spreading-recurved below the apex, 12–18 mm. long, ovate-lanceolate, gradually long-subulate, the narrow leaf-blade extending to near the apex and serrulate in the upper half; costa about 400  $\mu$  wide just above the alar cells, from about one fourth up covered on the back with numerous serrulate lamellae mostly two cells high, in cross-section near the middle of the leaf showing a median row of large cells, a stereid-band on the ventral side, and one row of medium-sized cells enclosed in a stereid-band on the dorsal side; alar cells forming a large, auriculate, hyaline or reddish group; lower leaf-cells in the margin very narrow, elongate, with much thickened walls not pitted, gradually larger toward the costa with thickened, pitted walls, higher up somewhat obliquely elongate, not in distinct rows, gradually merging into the small oval or oblong, not pitted or angular upper leaf-cells, the cell-walls somewhat thickened to the apex of the leaf.

TYPE LOCALITY: Porto Rico.  
DISTRIBUTION: Cuba; Haïti; Porto Rico.  
EXSICC.: Sull. Musci Cub. Wright. 38.

*C. lamellinervis* (C. Müll.) Mitt. is very similar to the above, but seems always to have cell-walls thinner, the upper leaf-cells paler, shorter and more angular, and those just above the rectangular basal cells in more distinct rows.

32. *Campylopus bermudianus* R. S. Williams; Britton, Jour. N. Y.  
Bot. Gard. 13: 193. 1913.

Plants in rather dull-green, not very compact tufts, tomentose within; stems about 4 cm. high, branching, often with flagella, more or less interruptedly foliate: leaves often comose at the apex, mostly laxly spreading-flexuous all around, the upper about 6 mm. long, lanceolate, grooved above, not subtubulose, sharply serrate at the apex and more or less serrulate on the margin one half down or more; costa percurrent or slightly excurrent, about 225  $\mu$  wide below and one third the width of the lower part of the leaf, with prominent serrate lamellae 2 or 3 cells high on the back above, in cross-section near the middle showing a median row of 7 or 8 large cells with stereid-bands above and below, the lower band with a row of differentiated outer cells; alar cells reddish, inflated, the cells just above mostly rectangular, pale, broad toward the costa, narrow toward the margin, with scarcely thickened or pitted walls, in the leaf above soon becoming smaller, with slightly thickened walls rarely pitted near the costa; median and upper cells of the blade mostly 6–8  $\mu$  wide and 8–20  $\mu$  long, with uniformly slightly thickened walls: flowers and fruit unknown.

TYPE LOCALITY: Paget Marsh, Bermuda.

DISTRIBUTION: Known only from the type locality.

33. *Campylopus guadelupensis* (Brid.) Mitt. Jour. Linn.  
Soc. 12: 77. 1869.

*Dicranum guadalupense* Brid. Musc. Recent. Suppl. 1: 213. 1806.

Plants cespitose but laxly cohering, very simple, strict, rigid, rather low, sparsely tomentose, below filiform, above spreading-comose: stem-leaves erect-appressed, strict, short, exactly lanceolate, on the back scarcely lamellose, concave, broadly nerved, at the very apex denticulate; alar cells subventricose, very conspicuous, delicate, brownish, the lower leaf-cells subquadrate, the upper ones very minute: male flower compound; outer perigonal leaves broadly convolute, acuminate, very entire, slightly nerved, the inner rather obtuse, not acuminate, scarcely nerved, all colored. (Description according to C. Müller.)

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Guadeloupe.

A single stem of the type from the Bridel herbarium has been examined. It is 2.5 cm. high, appearing comose at the apex, with straight, appressed leaves below; leaves 3–4 mm. long, entire except at the apex which usually bears 5 or 6 clustered, somewhat spreading teeth; costa one half to three fifths the width of the leaf-base, slightly ribbed on the back to below the middle, in cross-section showing a median row of large cells with stereid-bands above and below, the dorsal band only with differentiated cells on the outer side; alar cells red to hyaline, the cells of the lower part of the blade often nearly hyaline, rectangular, thin-walled, gradually much narrower toward the margin, those in the obscure upper part of the blade narrowly rhomboidal, often indistinct.

Specimens collected by Père Duss, 187, seem to be correctly referred here although the stems are scarcely comose above and the leaves more spreading and curved; the cross-sections of the costa and leaf-cells are similar.

14. **THYSANOMITRIUM** Schwaegr. Suppl. 2<sup>1</sup>: 61. 1823.

*Campylopus* § *Thysanomitrium* Mitt. Jour. Linn. Soc. 12: 89. 1869.

*Pilopogon* § *Thysanomitrium* Broth. in E. & P. Nat. Pfl. 1<sup>3</sup>: 335. 1901.

Dioicous. Plants in broad, deep mats, the younger parts mostly green, the older, dark chestnut-colored or blackish. Stems stout, often tomentose, somewhat branching. Leaves straight, erect-spreading or appressed, lanceolate, often hyaline and serrulate pointed; costa broad, somewhat ribbed on the back, in a cross-section of the lower part of the leaf showing stereid-bands above and below the guide-cells; alar cells forming a distinct, mostly brownish cluster. Flower-buds aggregate. Seta solitary, short, cygneous or strongly sinuous, often slightly rough above. Capsule elliptic, rough at the base, somewhat furrowed when dry, without stomata; annulus large; peristome-teeth very slender, solid or more or less divided along the distinct median line, densely papillose nearly to the base, often slightly striate at the base. Calyptra fimbriate on the lower margin.

Type species, *Campylopus Richardi* Brid.

1. *Thysanomitrium Richardi* (Brid.) Schwaegr.Suppl. 2<sup>1</sup>: 61. 1823.

- Campylopus Richardi* Brid. Musc. Recent. Suppl. 4: 73. 1819.  
*Grimmia Richardi* Spreng. Syst. 4: 154. 1827.  
*Dicranum Richardi* C. Müll. Syn. 1: 413. 1848.  
*Dicranum laevigatum* C. Müll. Syn. 2: 601. 1851.  
*Campylopus laevigatus* Schimp.; Besch.; Mém. Soc. Sci. Nat. Cherbourg 16: 167. 1872.  
~~*Thysanomitrium yunqueanum* C. Müll. Hedwigia 37: 225. 1898.~~  
*Campylopus yunqueanus* Paris, Index Bryol. Suppl. 99. 1900.  
*Pilopogon laevigatus* Broth. in E. & P. Nat. Pfl. 1<sup>3</sup>: 336. 1901.  
*Pilopogon Richardi* Broth. in E. & P. Nat. Pfl. 1<sup>3</sup>: 336. 1901.  
*Pilopogon yunqueanus* Broth. in E. & P. Nat. Pfl. 1<sup>3</sup>: 336. 1901.

Dioicous: male flowers 5 or 6 together in a compact terminal head, dark golden-brown, the inner perigonal leaves ovate, short-pointed, enclosing 8–10 antheridia about 0.6 mm. long with paraphyses slightly exceeding them: fertile plants in extensive mats, mostly dark chestnut-colored to blackish, or the younger leaves greenish, with robust, sometimes branching stems up to 8 cm. high bearing nearly straight, erect-spreading leaves rather uniformly placed along the stems or appearing somewhat comose at the flower-clusters: stem-leaves up to 8 mm. long, oblong-lanceolate, subtubulose, with a short, hyaline, serrulate point; costa about 350  $\mu$  wide and scarcely tapering in the broader part of the leaf, somewhat ribbed on the back, in cross-section showing in the lower part of the leaf on the dorsal side a stereid-band interrupted by the differentiated outer cells, on the ventral side a very small stereid-band, often scarcely evident, without outer cells, while in the upper part of the leaf sections show both stereid-band and outer cells wanting; alar cells brownish, forming a distinct cluster; cells of the lower part of the blade elongate with walls mostly thickened and pitted, those toward the margin narrower and paler, scarcely forming a distinct border, becoming in the upper part of the leaf shorter and more or less obliquely elongate: archegonial flowers aggregate, with the inner leaves convolute scarcely one half up, rather gradually narrowed to a lanceolate point, hyaline and rough toward the apex: seta solitary, cygneous or sinuate, mostly 6–8 mm. long, slightly rough above: capsule regular, elliptic, 1.5–2.5 mm. long, rough at the base, somewhat furrowed when dry, without stomata; annulus broad; lid conic-rostrate, about two thirds as long as the capsule; peristome-teeth about 40  $\mu$  wide at base and 400  $\mu$  high, papillose nearly or quite to the base or somewhat striate below and entire or more or less split along the distinct median line, sometimes almost to the base: calyptra fimbriate on the lower margin: spores nearly smooth, about 10  $\mu$  in diameter.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Mexico; Costa Rica; Jamaica, Porto Rico, Guadeloupe, and St. Kitts; also in South America.

15. *PILOPOGON* Brid. Bryol. Univ. 1: 519. 1826.

Dioicous. Plants mostly in broad, deep tufts with slender stems, branching above. Leaves straight, appressed or erect-spreading, lanceolate-subulate, denticulate at the apex and somewhat ribbed on the back; costa broad, with stereid-bands above and below the guide-cells; alar cells not differentiated or often forming a more or less distinct pale or reddish group; lower cells of the blade rectangular, rather thin-walled, sometimes slightly pitted; perichaetial leaves high-convolute, sometimes reaching the capsule. Seta elongate, erect, slightly flexuous, more or less roughened above. Capsule cylindrical, slightly curved, smooth when dry, without stomata or annulus; peristome-teeth undivided, narrow, filiform above, densely papillose nearly to the base, at the base more or less striate, without a distinct median line. Calyptra fimbriate at the base.

Type species, *Didymodon gracilis* Hook.1. *Pilopogon gracilis* (Hook.) Brid. Bryol. Univ. 1: 519. 1826.

- Didymodon gracilis* Hook. Musci Exot. pl. 5. 1818.  
*Pilopogon calycinus* Schimp.; C. Müll. Syn. 2: 586. 1851.  
*Pilopogon Mohrii* C. Müll. Linnaea 38: 626. 1874.  
*Pilopogon glabrisetus* C. Müll. Bull. Herb. Boiss. 5: 551. 1897.

Dioicous: male flowers 5 or 6 together in a compact, terminal head, golden-brown, the inner perigonal leaves ovate, short-pointed, faintly costate, enclosing 7 or 8 antheridia about

0.6 mm. long, with paraphyses slightly longer: fertile plants in mostly compact, glossy, yellowish-green tufts, brown within, with slender, more or less radiculose stems up to 8 cm. or more high, mostly branching toward the apex, with erect-appressed or slightly spreading, uniformly placed leaves: stem-leaves 5–6 mm. long, from an oblong or somewhat linear base rather gradually narrowed to a lanceolate, subtubulose point about equaling or a little exceeding the basal part in length and denticulate at the apex; costa shortly excurrent, about one half the width of the leaf-base, somewhat ribbed on the back, in cross-section showing stereid-bands above and below the guide-cells, with the outer cells differentiated on the dorsal side only; alar cells often somewhat differentiated, from hyaline to reddish; cells of the lower part of the blade rather pale, rectangular, thin-walled, scarcely or not pitted, higher up more irregular, shorter, with slightly thickened, more or less pitted walls; inner perichaetial leaves 2–3 times as long as the stem-leaves, convolute about three fourths up, gradually narrowed to a denticulate point sometimes reaching to the capsule: seta up to 2 cm. long, erect, slightly flexuous, more or less roughened above: capsule cylindric, slightly curved, sometimes nodding, smooth when dry, without stomata; annulus wanting; lid conic-rostrate, one third the length of the capsule; peristome-teeth 45–60  $\mu$  wide at the base and about 400  $\mu$  high, slender, terete, undivided, without a distinct median line, indistinctly articulate except near the somewhat striate base, above densely papillose: calyptra reaching well down on the capsule, fimbriate at the base: spores nearly smooth, up to 12  $\mu$  in diameter.

TYPE LOCALITY: Colombia.

DISTRIBUTION: Mexico; Guatemala; Costa Rica; Jamaica; Guadeloupe; also in South America.

ILLUSTRATION: Hook. Musci Exot. pl. 5.

EXSICC.: Holz. Musci Acroc. Bor. Am. 309.

## 16. DICRANODONTIUM B.S.G. Bryol. Eur. (41:)

Dicranod. 1. 1847.

*Dicranum* § *Campylopus* C. Müll. Syn. 1: 383, in part. 1848.

*Atractylocarpus* Mitt. Jour. Linn. Soc. 12: 71. 1869.

*Metzleria* Schimp.; Milde, Bryol. Siles. 75. 1869. Not *Metzleria* Presl, 1839.

*Dicranum* § *Dicranodontium* Kindb. Eur. & N. Am. Bryin. 186. 1897.

Dioicous or autoicous. Plants in usually compact-tufts with rather slender stems, sometimes radiculose and bearing rather few branches. Leaves more or less falcate-secund or sometimes nearly straight and erect or variously flexuous, rather uniformly and closely placed along the stems, often easily detached, ovate-lanceolate, subtubulose, with a rough setaceous point, radiculose on the under side of the costa near the base; costa thin, broad, filling most of the leaf above, at the base one third as wide as the leaf or wider, slightly ribbed and sometimes sharply denticulate on the back above, in cross-section near the middle of the leaf showing stereid-bands above and below the guide-cells with differentiated outer cells on the dorsal and usually on the ventral side; alar cells mostly hyaline, sometimes reddish, more or less fugacious, often forming distinct auricles; cells of the lower part of the blade short-oblong or nearly square to elongate-rectangular, broad toward the costa, narrower and smaller toward the margin but scarcely forming a distinct border, with mostly rather thin, more or less pitted walls. Seta twisted when dry, erect and straight, often becoming sinuous-erect or bent bow-like when moist, or recurved or flexuous either dry or wet. Capsule oblong or cylindric, without stomata, the exothecal cells near the mouth in several rows not elongate, below irregular, elongate, with somewhat thickened, slightly flexuous lateral walls; annulus well developed or wanting; peristome-teeth separate to below the mouth of the capsule, divided to near the base or about three fourths down, the articulations rather distant, often indistinct, not prominent on the inner face, the outer face more or less vertically or obliquely striate below and papillose above or sometimes striate. Calyptra entire at the base (except in *D. circinatum* of Europe and Asia), often reaching to or below the base of the capsule, sometimes not split to the base and adhering to the seta.

Type species, *Dicranum denudatum* Brid.

I have not been able to find any constant differences between the various mosses here grouped under *Dicranodontium*, that seem to be of generic value. The general structure of the costa, the shape of the leaf and leaf-cells are very similar in all. The peristome varies chiefly in the width of

the teeth at the base in proportion to their length and in the amount of vertical or oblique striation on the outer face. The inflorescence is not at all uniform, often, in the same species. It is as constant and as nearly alike in the European *Metzleria alpina* and *Atractylocarpus mexicanus*, probably, as in any of those under consideration; these two also have calyptras and peristomes very similar but the first has the annulus wanting, the second a finely developed annulus. The striation of peristome is the greatest in *Dicranodontium longirostre* and the least in *A. mexicanus*, being intermediate between these two in *M. alpina*. *Dicranodontium longisetum* has the most variable striation. Specimens from Peru (*Spruce 62*) and from Bolivia (*Williams 1755*), scarcely show any striation on some teeth or they may be more striate above than below on the outer face; on the whole the teeth are very similar to those of *Dicranodontium asperulum*; *D. longisetum* also has the inflorescence more variable than has been found elsewhere. It appears at times distinctly dioicous, or the male flowers may be at the termination of elongate branches arising from the lower part of the stem, or rarely several flowers are found on very short stalks a little below the perichaetium, as in *M. alpina*. The seta varies greatly amongst individuals of the same species in the amount of curvature.

Annulus none; capsule mostly short-oblong, up to 3 times as long as broad.

Peristome-teeth  $40\mu$  wide at the base or less, vertically striate; capsule smooth when dry.

Leaves serrulate one third to one half down or sometimes nearly smooth.

Leaves sharply serrulate on the border to below the ovate part of the leaf or almost to the alar cells.

Peristome-teeth  $60-70\mu$  wide at the base, obliquely striate; capsule furrowed when dry.

Annulus present; capsule more or less cylindrical, up to 4 or 5 times as long as broad.

Male flowers mostly clustered on short stalks a little below the perichaetium; alar cells not auriculate; flagellate branches wanting.

Male flowers mostly on elongate branches from the lower part of the stem, or the plants dioicous; alar cells more or less auriculate; plants often with rather large, blackish-jointed flagella.

1. *D. denudatum*.

2. *D. asperulum*.

3. *D. longisetum*.

4. *D. costaricense*.

5. *D. flagellaceum*.

### 1. *Dicranodontium denudatum* (Brid.) E. G. Britton.

*Dicranum denudatum* Brid. Musc. Recent. Suppl. 1: 184. 1806.

*Didymodon longirostris* Starke; Weber & Mohr, Bot. Taschen. 155. 1807.

*Dicranodontium longirostre* Schimp.; B.S.G. Bryol. Eur. (41): Dicranod. 2. 1847.

*Dicranodontium virginicum* E. G. Britton; Millsp. Bull. W. Va. Exp. Sta. 2: 488. 1892.

*Dicranodontium Millspaughii* E. G. Britton; Millsp. Bull. W. Va. Exp. Sta. 2: 488. 1892.

Dioicous: male flowers solitary, terminal, with numerous antheridia and somewhat longer paraphyses, the inner perigonal leaves from a broad, rotundate base abruptly narrowed to a setaceous point: fertile plants in compact tufts, with stems 4-8 cm. high bearing more or less falcate-secund leaves often readily deciduous: stem-leaves rather uniform, closely placed, mostly 5-7 mm. long, from an ovate-lanceolate base rather gradually narrowed to a setaceous, subtubulose point 4-5 times as long as the ovate part, the margins and costa on the back serrulate one third to one half down or sometimes nearly smooth; costa one third the width of the leaf-base, excurrent, in cross-section showing in the lower part of the leaf on the dorsal side a stereid-band interrupted by large outer cells, on the ventral side often only a single row of outer cells, sometimes scarcely evident or higher up the leaf a narrow stereid-band between the outer cells and guide-cells; alar cells hyaline or reddish, more or less auriculate, reaching to the costa; cells in the lower part of the blade oblong to rectangular, with thin not pitted or slightly pitted walls, toward the costa  $12-16\mu$  wide and  $40-60\mu$  long, gradually narrower toward the margin but scarcely forming a distinct border; inner perichaetial leaves rather longer than the outer, convolute about one third up, rather gradually narrowed to a rough point: seta about 1 cm. long, mostly erect-sinuous when dry, sometimes cygneous or geniculate either wet or dry: capsule oblong, smooth, about 1.5 mm. long, without annulus or stomata, the lid with a rostrate beak scarcely shorter than the capsule; peristome-teeth separate to below the mouth, at the base about  $40\mu$  wide, divided into two forks three fourths down or more or sometimes only perforate below, the articulations rather distant and slightly prominent on the inner face, vertically striate on the outer face to near the apex or the points papillose: calyptra entire at the base, extending to below the middle or to near the base of the capsule: spores  $10-15\mu$  in diameter.

TYPE LOCALITY: Thuringia, Germany.

DISTRIBUTION: New England to Florida, and westward to Wisconsin; Orca, Alaska; Oaxaca; also throughout Europe.

ILLUSTRATION: B.S.G. Bryol. Eur. pl. 88.

EXSICC.: Sull. & Lesq. Musci Bor. Am. 71; ed. 2. 90; Holz. Musci Acroc. Bor. Am. 102.

## 2. *Dicranodontium asperulum* (Mitt.) Broth. in E. & P. Nat.

Pfl. 1<sup>3</sup>: 336. 1901.

*Dicranum asperulum* Mitt. Jour. Linn. Soc. 3: Suppl. 22. 1859.

*Dicranodontium aristatum* Schimp. Syn. 695. 1860.

*Dicranum virginicum* Aust. Bot. Gaz. 4: 150. 1879.

*Campylopus virginicus* Lesq. & James, Man. 80. 1884.

Dioicous: male flowers in separate tufts, terminal, thick, bud-like; inner perigonal leaves abruptly short-pointed with the costa faint or wanting (*vide* Limpricht): fertile plants in compact rather dark-green tufts, with stems 3–10 cm. high: leaves often readily deciduous, more or less falcate-secund or sometimes erect-spreading, 5–7 mm. long, from a broadly ovate base rather abruptly narrowed to a rough setaceous point five or six times as long, the leaf-margin finely serrulate to and well down the enlarged base; costa one third the width of the leaf-base, long-excurrent, in cross-section near the base showing stereid-bands above and below the guide-cells with the outer cells differentiated on the dorsal side only, in the upper part of the leaf with cells differentiated on both ventral and dorsal sides; alar cells mostly hyaline, not auriculate, reaching to the costa; cells in the lower part of the blade oblong, pale, thin-walled, toward the costa up to 20  $\mu$  wide and 20–30  $\mu$  long, toward the margin gradually narrower and smaller but scarcely forming a distinct border; inner perichaetial leaves rather longer than the outer, with a convolute base extending one third up and abruptly narrowed to a very rough, often sinuous point: seta about 15 cm. long, mostly erect, straight, strongly twisted when dry, erect-sinuous or slightly curved when moist: capsule oblong, about 1.75 mm. long, without annulus or stomata, the lid with a rostrate beak a little shorter than the capsule; peristome-teeth separate to below the mouth, about 200  $\mu$  high by 40  $\mu$  wide at base, divided three fourths down into two rather stout forks, the articulations rather distant, mostly vertically striate on the outer face two thirds up, papillose above: calyptra entire at the base: spores minutely roughened, up to 13  $\mu$  in diameter.

TYPE LOCALITY: Sikkim.

DISTRIBUTION: Virginia to Georgia; Baranoff Islands, Alaska; also in Europe and Asia.

EXSICC.: Ren. & Card. Musci Am. Sept. Exs. 155. *Small. Mosses. N. S., no.*

## 3. *Dicranodontium longisetum* (Hook.) R. S. Williams.

*Dicranum longisetum* Hook. Musci Exot. pl. 139. 1820.

*Dicranum strigulosum* C. Müll.; Ren. & Card. Bull. Soc. Bot. Belg. 31<sup>1</sup>: 147. 1893.

*Dicranum sublongisetum* C. Müll. Bull. Herb. Boiss. 5: 185. 1897.

*Metzleria strigulosa* Broth. in E. & P. Nat. Pfl. 1<sup>3</sup>: 337. 1901.

Dioicous, or autoicous with the male flowers at the termination of an elongate branch arising from the lower part of the stem or very rarely on short upper branches: antheridia 10–12 with numerous longer paraphyses, the inner perigonal leaves broadly ovate, short-pointed, becoming gradually longer-pointed outwardly: plants in compact cushions, with somewhat branching, radiculose stems 1–5 cm. high, bearing leaves more or less falcate-secund or sometimes nearly straight and erect: stem-leaves 8–12 mm. long, lanceolate or ovate-lanceolate, subtubulose, with a long setaceous point, serrulate about one third down on the margin, nearly smooth on the back, in cross-section below showing, on the dorsal side, a rather narrow stereid-band interrupted by the large outer cells, on the ventral side often an outer row of very small cells with or without a narrow band of stereid-cells between them and the guide-cells; costa about one third the width of the lower part of the leaf, long-excurrent; alar cells mostly pale, fragile, usually not forming distinct auricles, the cells of the lower part of the blade rectangular with thin, slightly pitted walls, about 16  $\mu$  wide and 60–80  $\mu$  long toward the costa, gradually narrower toward the margin sometimes forming a rather distinct border; inner perichaetial leaves rather longer than the outer, convolute about one third up, rather gradually narrowed to the setaceous, rough point: seta 1.5–3 cm. long, twisted, erect or somewhat sinuous, especially when moist: capsule oblong, 1.5–2.5 mm. long, more or less furrowed when dry, without stomata and annulus; peristome-teeth about 300  $\mu$  high and 70  $\mu$  wide at the base, separate to below the mouth of the capsule, divided to near the base or only perforate below along the median line, with articulations not prominent, the outer face below mostly obliquely striate, sometimes nearly smooth, the forks and inner face rather densely papillose; lid with a rostrate beak sometimes as long as the capsule: calyptra entire below, reaching to below the middle of the capsule: spores rough, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Chimborazo, Ecuador.

DISTRIBUTION: Forests of Barba, Costa Rica; also in northern South America.

ILLUSTRATION: Hook. Musci Exot. *pl.* 139.

#### 4. *Dicranodontium costaricense* (C. Müll.) R. S. Williams.

- Leptotrichum costaricense* C. Müll. Bot. Zeit. 16: 161. 1858.  
*Atractylocarpus mexicanus* Mitt. Jour. Linn. Soc. 12: 71. 1869.  
*Leptotrichum leptocarpum* Schimp.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 174. 1872.  
~~*Leptotrichum mexicanum* Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 175. 1872. =~~  
*Dicranum Pittieri* Ren. & Card. Bull. Soc. Bot. Belg. 31: 146. 1893.  
*Ditrichum leptocarpum* Hampe; Paris, Index Bryol. 394. 1895.  
*Metzleria Pittieri* Broth. in E. & P. Nat. Pfl. 1<sup>3</sup>: 337. 1901. †  
~~*Metzleria leptocarpa* Card. Rev. Bryol. 38: 100. 1911.~~  
~~*Ditrichum Mülleri* Paris, Index 2: 195. 1904.~~

Autoicous: male flowers on very short branches a little below the archegonium, often 3 or 4 together, the inner perigonal leaves short, ovate, narrowly, often faintly costate, enclosing 6–8 antheridia about 0.25 mm. long, with paraphyses slightly longer: plants in broad yellowish to dark-green mats, with stems 1–2 cm. high bearing more or less falcate-secund leaves 5–7 mm. long: stem-leaves lanceolate-setaceous, subtubulose, serrulate on the margins and back nearly one half down, the leaf-blade vanishing about one half up; costa one half the width of the lower part of the leaf, in cross-section near the base showing, on the dorsal side, a rather narrow stereid-band interrupted by the large outer cells, on the ventral side often only 3 or 4 cells above the guide-cells but becoming more numerous up near the middle of the leaf where a narrow band of stereid-cells may be developed below the outer cells; alar cells hyaline, fugacious, not forming auricles, the cells of the lower part of the blade rectangular, with thin not pitted walls, those toward the costa 12–16  $\mu$  wide and 30–60  $\mu$  long, smaller and narrower toward the margin, not forming a distinct border; inner perichaetial leaves about the length of the outer, from a convolute base extending about one third up, rather gradually narrowed to the rough point: seta straight or somewhat flexuous, 8–15 mm. long: capsule cylindrical, erect, smooth, when dry without stomata, 2.5–3.5 mm. long; annulus large, compound; peristome-teeth slender, about 30  $\mu$  wide at the base and 325  $\mu$  long or more, separate to below the mouth, divided almost to the base into terete forks, the articulations often indistinct, papillose or the outer plates near the base more or less vertically striate; lid with a rostrate beak one half to two thirds the length of the capsule: calyptra often reaching to the base of the capsule, split on one side from above the middle to the base or only part way down as in *D. alpina*: spores smooth, about 12  $\mu$  in diameter.

TYPE LOCALITY: Las Nubes, Costa Rica.

DISTRIBUTION: Mexico, Costa Rica, and Guatemala.

#### 5. *Dicranodontium flagellaceum* (C. Müll.) R. S. Williams.

- Dicranum flagellaceum* C. Müll. Syn. 2: 597. 1851.  
*Campylopus flagellaceus* Mitt. Jour. Linn. Soc. 12: 77. 1869.  
*Leptotrichum Pinetorum* C. Müll. Linnaea 38: 627. 1874.

Appearing dioicous, or autoicous with male flowers on slender branches distant from the perichaetium, rarely on short branches close to the perichaetium: plants in broad mats with somewhat tomentose stems 1–2 cm. high, often bearing flagellate blackish-jointed branches clothed with rather short, stout-pointed leaves: stem-leaves more or less falcate-secund or erect-flexuous, lanceolate-setaceous, subtubulose, mostly 4–5 mm. long, the point serrulate on the back and margins about one half down; costa nearly one half excurrent, toward the base about one third the width of the leaf, in cross-section near the middle of the leaf showing a narrow band of stereid-cells on the dorsal side, interrupted by large outer cells, on the ventral side a more or less evident stereid-band with or without differentiated outer cells; alar cells reddish or hyaline, more or less inflated and auriculate, the cells of the lower part of the blade pale, thin-walled, rectangular, mostly 8–12  $\mu$  wide and 40–50  $\mu$  long toward the costa, toward the margin narrower, not forming a distinct border; inner perichaetial leaves about the length of the outer, convolute nearly one half up, rather gradually narrowed to a rough point: seta mostly 10–15 mm. long, straight or more or less curved or flexuous, especially when moist: capsule oblong to cylindrical, about 2 mm. long; annulus large; peristome-teeth narrow, at the base about 26  $\mu$  wide, the outer plates vertically striate below, papillose above; lid with a

subulate beak a little shorter than the capsule: calyptra reaching to near the base of the capsule: spores nearly smooth, about  $13\ \mu$  in diameter.

TYPE LOCALITY: Cerro San Andres, Michoacan.  
DISTRIBUTION: Mexico.

### 17. RHABDOWEISIA B.S.G. Bryol. Eur. (33-36:)

Rhabd. 1. 1846.

Autoicous, the male flowers mostly on short stalks just below the perichaetium. Small mosses, mostly about 1 cm., rarely up to 3 cm. high, growing in compact cushions, often on sandstone; stems somewhat five-angled, without a central strand, bearing short, readily separating branches and radicles at the base. Leaves lanceolate to linear, more or less acutely pointed, mostly crispate when dry, spreading-flexuous on all sides when moist, smooth on both surfaces or often mamilllose, chiefly on the upper surface, never papillose; leaf-borders flat or somewhat recurved on one side below and entire or serrulate at the apex; costa stout, ending just below the apex, in cross-section showing 4-7 guide-cells and a strong stereid-band on the under side which is quite absent or very small on the upper side; cells of the blade distinct, mostly roundish or somewhat square to transversely elongate above, toward the base becoming rectangular and paler, without differentiated alar cells; perichaetial leaves resembling the upper stem-leaves. Seta erect, 2-5 mm. long. Capsule erect, regular, less than 1 mm. in height, when dry and empty deeply 8-furrowed, with few stomata at the base; annulus none; peristome-teeth 16, from a low, basal membrane, narrowly lanceolate, the point often filiform, the median line wanting and the surface from smooth to faintly striate or papillose; lid with a long, obliquely subulate beak. Calyptra cucullate, smooth above, entire at the base.

Type species, *Weisia fugax* Hedw.

Stem-leaves all narrowly lanceolate-pointed; peristome-teeth very narrow, mostly filiform from near the base.

1. *R. fugax*.

Stem-leaves, at least in part, more or less broadly and abruptly pointed; peristome-teeth lanceolate.

2. *R. crispata*.

#### 1. *Rhabdoweisia fugax* (Hedw.) B.S.G. Bryol. Eur. (33-36:)

Rhabd. 4. 1846.

*Weisia fugax* Hedw. Sp. Musc. 64. 1801.

*Weisia vulcanica* C. Müll. Syn. 1: 649. 1849.

*Weisia Lindigiana* Hampe, in Triana & Planch. Ann. Sci. Nat. V. 3: 352. 1865.

*Rhabdoweisia vulcanica* Mitt. Jour. Linn. Soc. 12: 55. 1869.

Autoicous: male flower mostly on a short stalk just below the perichaetium, the antheridia, without paraphyses, about 0.16 mm. long, loosely enclosed by the perigonal leaves, the inner perigonal leaves ovate, acutely pointed, ecostate, often not quite entire on the margin, the outer ones longer pointed, costate: plants in compact tufts 1-3 cm. high, with branching, fragile stems, radiculose at the base: lower stem-leaves very small, the upper ones 2-3 mm. long, more or less crispate when dry, spreading-flexuous when moist, nearly linear to linear-lanceolate, narrowly and acutely pointed, keeled above, entire or nearly entire and flat on the margins, the leaf-surfaces mostly smooth, sometimes, chiefly on the upper side, mamilllose; costa not quite percurrent, smooth on the back, in cross-section near the middle showing 4-7 guide-cells, 1 or 2 rows of large cells on the upper side with rarely a small stereid-band, on the under side a large stereid-band and outer cells differentiated; upper leaf-cells from roundish to nearly square or transversely elongate with somewhat thickened walls becoming paler and mostly rectangular near the base, without differentiated alar cells; perichaetial leaves much like the stem-leaves: seta erect, 2-4 mm. long: capsule ovate, 0.75 mm. high, when dry and empty furrowed and often tapering from the wide mouth to the wedge-shaped base, with a few stomata in the base; annulus none; peristome-teeth 16, reddish, mostly smooth, projecting about  $140\ \mu$  above the mouth, filiform to near the base, the abruptly broadened base usually scarcely projecting above the rim; lid obliquely subulate-beaked, with usually 2 or 3 rows of somewhat transversely elongate cells at the base: calyptra cucullate, smooth above, entire at the base: spores roughened, up to  $16\ \mu$  in diameter.

TYPE LOCALITY: Germany.

DISTRIBUTION: Mexico; also in South America and Europe. (All the specimens from north of Mexico that have been referred to *R. fugax* evidently belong to *R. crispata*.)

ILLUSTRATIONS: B.S.G., Bryol. Eur. *pl.* 41; G. Roth, Eur. Laubm. *pl.* 10, *f.* 16.

2. *Rhabdoweisia crispata* (Dicks.) Kindb. Eur. & N. Am.  
Bryin. 211. 1897.

*Bryum crispatum* Dicks. Pl. Crypt. Brit. 3: 3. 1793.

*Weisia crispata* Brid. Musc. Recent. 2: 73. 1798.

*Grimmia striata* Schrad. Jour. Bot. Schrad. 1799<sup>2</sup>: 55. 1799. Not *G. striata* Hedw. 1782.

*Weisia denticulata* Brid. Musc. Recent. Suppl. 1: 108. 1806.

*Rhabdoweisia denticulata* B.S.G. Bryol. Eur. (33-36:) Rhabd. 5. 1846.

Autoicous: male flowers small, nearly sessile on the stem below the perichaetium, the few antheridia without paraphyses and loosely surrounded by few, readily deciduous, ovate to oblong-linear, pale, often nearly ecostate leaves with a somewhat acute or bluntish nearly entire apex: plants in compact, pale, yellowish-green to brownish tufts, with fragile, branching stems, radiculose at the base, mostly less than 1 cm., rarely up to 3 cm. high: stem-leaves below small, above 2-3 mm. long, when dry more or less crispate, spreading-flexuous on all sides when moist, linear-lanceolate or almost linear from a slightly broader base, keeled above with a narrowly or broadly acute apex and flat or nearly flat margins irregularly serrulate to nearly entire in the upper part, the leaf-surfaces either smooth or with the cells somewhat mamilllose, chiefly on the upper side; costa not quite percurrent, nearly or quite smooth on the back, in cross-section near the middle showing 4-6 guide-cells, a single row of large cells or sometimes a double row and small stereid-band on the upper side, on the under side a broad stereid-band with the outer cells differentiated; upper leaf-cells roundish or nearly square to somewhat transversely elongate, the median 8 by 10  $\mu$  to 10 by 12  $\mu$ , with somewhat thickened walls, the lower ones becoming pale and rectangular without differentiated alar cells; perichaetial leaves scarcely different from the upper stem-leaves: seta erect, 2-5 mm. long: capsule ovate, about 0.7 mm. high, when dry and empty, furrowed and often tapering from the wide mouth to the base, with a few stomata in about 1 row near the base; annulus none; peristome-teeth 16, reddish, projecting nearly 200  $\mu$  above the mouth, gradually lanceolate from a rather broad base, somewhat nodose-articulate and from nearly smooth to mostly slightly striate and papillose; lid with a subulate beak and 2 or 3 rows of cells at the base usually reddish and not much elongate: calyptra cucullate, smooth above, entire at the base: spores roughened, 16-18  $\mu$  in diameter.

TYPE LOCALITY: England.

DISTRIBUTION: Newfoundland to Virginia, and westward to Missouri, Wisconsin, Manitoba, and Alaska; also in Europe.

ILLUSTRATIONS: B.S.G. Bryol. Eur. *pl.* 42; G. Roth, Eur. Laubm. *pl.* 10, *f.* 15.

18. *OREOWEISIA* De-Not. Atti Univ. Genova 1: 489. 1869.

*Weisia* § *Oreoweisia* B.S.G. Bryol. Eur. (33-36:) *Weisia* 11. 1846.

Autoicous, mostly small, compactly tufted rock-mosses. Stems somewhat three-sided, with a central strand and more or less radiculose below. Leaves when dry spreading-incurved to somewhat crispate, ovate-lanceolate to linear-lanceolate, the apex acute or blunt, with borders flat and crenulate or serrulate above, mostly slightly recurved below; costa stout, vanishing below the apex, in cross-section near the middle showing often few (2-6) guide-cells and a stereid-band mostly on the under side; lower leaf-cells square to rectangular, smooth, pale, the alar ones not differentiated, the upper roundish to nearly square, green, mamilllose or pointed-mamilllose on both sides; perichaetial leaves very similar to the upper stem-leaves. Seta erect. Capsule erect to somewhat curved and nodding, not furrowed when dry; annulus none; peristome-teeth 16, lanceolate, undivided or divided nearly to the base, not papillose, somewhat striate to nearly smooth; lid mostly short-beaked. Calyptra cucullate, entire at the base.

Type species, *Weisia serrulata* Funck.

1. *Oreoweisia serrulata* (Funck) De-Not. Atti. Univ.  
Genova 1: 489. 1869.

*Weisia serrulata* Funck; Brid. Bryol. Univ. 1: 804. 1827.

*Oreoweisia obtusata* Kindb. Rev. Bryol. 23: 18. 1896.

*Cynodontium obtusatum* Kindb. Eur. & N. Am. Bryin. 184. 1897.

Autoicous: male flower on a short stalk below the perichaetium, the perigonal leaves few, the inner ovate, bluntly pointed, ecostate, pale-brown to the apex, the outer ones ovate-lanceolate, strongly costate, green and mamilllose toward the apex, loosely enclosing a few antheridia about 0.3 mm. long with filiform paraphyses nearly twice as long: plants in compact green or rather dark-green tufts 2–5 cm. high; stems simple or with short branches, bearing scattered, mostly papillose (or nearly smooth in the American plant) radicles up to the latest innovations: leaves spreading-incurved when dry, mostly erect-spreading on all sides when moist, up to 2.5 mm. long, from broadly ovate-lanceolate to linear-lanceolate, rather broadly acute to blunt at the apex, crenulate-serrulate on the margins about three fourths down, deeply keeled above with flat borders, the borders somewhat recurved below; costa stout, mamilllose chiefly on the under side, vanishing just below the apex, in cross-section near the middle showing mostly 2–4 guide-cells, a single row of rather large cells on the upper side, a more or less interrupted stereid-band on the under side with the outer cells differentiated; cells of the leaf-blade green, highly mamilllose or pointed-mamillos on both sides often three fourths down the leaf and roundish to nearly square, the median ones 6–7  $\mu$  in diameter, those toward the base becoming pale-brown, square to short-rectangular, smooth, the alar not differentiated; perichaetial leaves very similar to the longer stem-leaves: seta erect, about 5 mm. long: capsule erect, regular, oblong or sometimes slightly curved and nodding, smooth, up to 1.2 mm. long with usually a rather distinct neck and few stomata; annulus none; peristome-teeth golden-brown, separated mostly to below the rim of the capsule, lanceolate, mostly undivided and without a median line, smooth or nearly so, with distinct articulations; lid obliquely conic or shortly beaked, its height 1–1.5 times the basal diameter: calyptra cucullate, reaching well down the capsule, smooth above, entire at the base: spores rough, 18–20  $\mu$  in diameter.

TYPE LOCALITY: Switzerland.

DISTRIBUTION: New York; New Jersey; Pennsylvania; Minnesota; Port Arthur, Ontario; Hector, British Columbia; Alaska (according to Lesquereux & James, the specimens said to be fruiting); also in Europe and Siberia.

ILLUSTRATIONS: B.S.G. Bryol. Eur. pl. 27; Rab. Krypt.-Fl. 4: f. 108.

EXSICC.: Aust. Musci App. 70.

The American plants on the average have rather smaller leaves than the European and the radicles are mostly smooth but occasionally papillose. The only fruiting specimens known from America seem to be those credited to Alaska, and the description of fruit above given is based entirely on European plants.

19. *DICHODONTIUM* Schimp. Coroll. Bryol. Eur. 12. 1855.

Dioicous: plants in rather compact, yellowish to dark-green cushions or sometimes in extensive, lax mats; stems with a central strand, three-sided, radiculose below with often very slender innovations from just below the apex. Stem-leaves when dry mostly spreading-incurved or somewhat crispate from an erect base, when moist widely spreading, from oblong or ovate to oblong-lanceolate or somewhat lingulate with a broad, keeled point and rounded or broadly acute apex, the margins above flat and serrulate or irregularly serrate; costa stout, not quite percurrent, in cross-section near the middle showing a single row of guide-cells with stereid-bands above and below and outer cells differentiated; upper leaf-cells mostly not elongate, quadratic or roundish, more or less papillose on both sides, often obscure, the lower ones mostly paler, not hyaline, smooth just above the base, the alar not differentiated. Seta elongate, erect: capsule erect or nodding, nearly symmetric or more or less curved, oblong or shortly cylindrical, the walls of thick texture, smooth, with stomata at the base; annulus wanting; peristome dark, attached below the mouth, the teeth lanceolate, united below, more or less divided about one half down, minutely papillose and vertically or variously striate on the outer face. Calyptra cucullate, entire at the base, more or less rough above.

Type species, *Byrum pellucidum* L.

Leaf-margins more or less recurved below; capsule not strumose.  
 Leaf-margins flat; capsule strumose.

1. *D. pellucidum*.
2. *D. olympicum*.

### 1. *Dichodontium pellucidum* (L.) Schimp. Coroll. Bryol.

Eur. 12. 1855.

*Bryum pellucidum* L. Sp. Pl. 1118. 1753.

*Bryum flavescens* Dicks. Pl. Crypt. Brit. 2: 4. 1790.

*Dichodontium flavescens* Lindb. Bot. Not. 1878: 113. 1878.

*Dichodontium subflavescens* Kindb.; Röll, Hedwigia 35: 59. 1896.

Dioicous: male plants of the same size as the fertile and mixed with them or in separate tufts, the perigonal leaves from a broad, concave base rather abruptly narrowed to a lanceolate point with the costa vanishing below the more or less obtuse or acute apex, the antheridia numerous, more than 0.5 mm. long, with slender paraphyses: plants in small tufts to often extensive mats, yellowish-brown to dark-green, with radiculose stems 1–10 cm. long, often bearing slender, distantly-leaved innovations from just below the apex: stem-leaves ovate-lanceolate or lingulate to linear-lanceolate, up to about 3.5 mm. long (or in *D. pellucidum fagimontanum* Brid. pointed-ovate or oblong and mostly 1 mm. or less long), when dry incurved-spreading, somewhat crispate or variously flexuous from an erect base, when moist widely spreading, the broad point keeled, with a rounded or acute apex and flat, not thickened margins, from finely serrulate to coarsely and irregularly serrate (*D. pellucidum serratum* Schimp.), the margin in the lower part of the leaf just above the base entire and somewhat farther up more or less recurved on one or both sides; costa stout, rough on the back in the upper part and vanishing below the apex, in cross-section near the middle showing 4 guide-cells, stereid-bands above and below and outer cells differentiated; upper leaf-cells rather irregular, mostly quadratic and slightly or not elongate, the median ones about 8 by 8–10  $\mu$ , the lower leaf-cells toward the costa more or less rectangular, 8–10  $\mu$  wide and 20–40  $\mu$  long, those toward and in the margin nearly square, the alar cells not differentiated; perichaetial leaves very similar to the stem-leaves but slightly longer with a somewhat broader base: seta erect, yellowish, 1–2 cm. long: capsule oblong, from nearly symmetric and erect to curved and nodding, 1.5–1.75 mm. long, when dry often showing a short collum and more or less contracted under the broad mouth, with smooth, thick walls and 1 or 2 rows of stomata at the base; annulus none; peristome-teeth up to 80  $\mu$  wide and more than 400  $\mu$  high, dark-reddish, lanceolate, divided about one half down into mostly 2 forks, finely papillose above, more or less vertically striate on the outer face, from a darker, smooth, basilar membrane extending 2 or 3 rows of cells above the rim of the capsule and attached about the same distance below the rim; lid conic, obliquely rostrate, sometimes about as long as the capsule: calyptra cucullate, entire below, slightly rough at the apex: spores not quite smooth, 18–20  $\mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: Labrador to New Jersey, westward in the region of the Great Lakes, and from Alaska and Montana to California; also in Europe. Growing in cool, damp places, mostly along streams, sometimes in water.

ILLUSTRATIONS: Dill. Hist. Musc. pl. 46, f. 23; B.S.G. Bryol. Eur. pl. 50, 51.

EXSICC.: Drummond, Musci Am. 108; Sull. & Lesq. Musci Bor. Am. ed. 2. 60 (as *D. pellucidum americanum*); Macoun, Can. Musci 451, 402; Ren. & Card. Musci Am. Sept. Exs. 355; Holz. Musci Acroc. Bor. Am. 101, 260.

### 2. *Dichodontium olympicum* Ren. & Card. Rev. Bryol. 19: 74. 1892.

Dioicous: male plants very similar to the fertile ones, bearing an inconspicuous, terminal, antheridial bud, with the 1 or 2 inner leaves much shorter than the outer, costate, broadly ovate, with a short, obtuse, rough, darker point, the 5 or 6 antheridia about 0.3 mm. long with few paraphyses: fertile plants in rather compact, dark-green cushions, with stems scarcely 1 cm. high: stem-leaves when dry more or less erect-appressed or incurved, when moist widely spreading, up to about 1.7 mm. long, ovate-lanceolate to nearly oblong-linear with a broad, mostly rounded apex, the margins flat all around and papillose-serrate to a little above the insertion of the leaf; costa stout, nearly percurrent, very rough on both sides, about 60  $\mu$  wide below, in cross-section near the middle showing 4 guide-cells, stereid-bands above and below, and outer cells strongly differentiated; leaf-cells above obscure, roundish, mostly 6–7  $\mu$  in diameter, with high papillae on both sides, the cells near the base becoming smooth and oblong or rec-

tangular from the margin of the leaf to the costa, up to 8–12  $\mu$  wide and 20–40  $\mu$  long; perichaetial leaves rather longer than the stem-leaves, with the base more lax: seta 8 mm. long: capsule oblong, about 1.5 mm. long, nodding, somewhat curved and strumose, with obliquely rostrate lid; peristome-teeth dark, lanceolate, with 15–20 articulations, divided about one half down into 2 or 3 forks, more or less vertically striate and minutely papillose: calyptra 1.75 mm. long, entire below, rough in the upper half.

TYPE LOCALITY: Olympic Mountains, Washington.

DISTRIBUTION: Known only from the type locality.

ILLUSTRATION: Bot. Gaz. 30: pl. 2, f. 1.

This species is in size and color much like *D. pellucidum fagimontanum* Brid., but differs in the leaf-margins not recurved below and more serrulate, and in the strumose capsule.]

## Family 7. LEUCOBRYACEAE

BY ROBERT STATHAM WILLIAMS

Dioicous, autoicous, or pseudautoicous. Perennial, cespitose plants of medium to large size, usually pale-green to whitish-green or pale-brown in color. Stems without a central strand, bearing crowded, sometimes fragile and deciduous leaves and radicles mostly at the base of the stems or sometimes at the apex of the leaves. Leaves consisting for the greater part of a broad costa of three or more layers of two different kinds of cells, the outer large, hyaline and porose on the internal walls (leucocysts), enclosing usually a single row of small, green, three- or four-sided cells (chlorocysts). Seta solitary and erect. Capsule erect and regular or irregular, nodding and strumose; annulus rarely present; peristome inserted mostly below the mouth, the teeth 16 or sometimes only 8, lanceolate, mostly strongly articulate, either vertically striate or papillose to nearly smooth; lid subulately beaked. Calyptra cucullate.

Costa with a stereid-band.

Costa without a stereid-band.

Capsule regular, erect.

Capsule irregular, nodding.

1. LEUCOPHANES.

2. OCTOBLEPHARUM.

3. LEUCOBRYUM.

### 1. LEUCOPHANES Brid. Bryol. Univ. 1: 763. 1827.

Dioicous. Plants of medium size, in mostly pale-yellowish or greenish, compact tufts with rather slender stems usually without radicles and with fastigate branches. Leaves mostly crowded, erect-spreading to somewhat squarrose, rather broadly lanceolate to linear-lanceolate, sometimes bearing gemmae at the tips, or scattered radicles that produce new plants, in cross-section showing mostly a single layer of leucocysts on either side of the nearly median layer of four-sided chlorocysts and a costa-like stereid-band extending down the middle of the leaf on the under side, also the border of the leaf of a compact stereid-band. Seta terminal or lateral, slender, elongate. Capsule oblong or cylindrical, erect, thin-walled, mostly somewhat irregularly ribbed when dry and empty; peristome-teeth lanceolate, without a median line, papillose on both sides, the articulations mostly indistinct; lid with a long, slender beak. Calyptra cucullate, extending well down the capsule, the margin entire.

Type species, *Leucophanes octoblepharoides* Brid.

Costa-like median band sharply denticulate on the back, 40–50 $\mu$  wide.

Costa-like median band smooth on the back, less than 25 $\mu$  wide.

1. *L. guadalupense*.

2. *L. Mittenii*.

### 1. *Leucophanes guadalupense* Lindb. Oefv Sv. Vet.-Akad.

Förh. 21: 608. 1865.

Flowers and fruit unknown. Plants in densely cespitose, somewhat shining, greenish-brown cushions; stems short, branching, densely foliate: leaves up to about 4 mm. long, greenish from a paler base, erect-flexuous or somewhat spreading-recurved, narrowly lanceolate, acute, carinate, the colored border flat and serrulate above, of stereid-cells extending from the apex to near the base; costa-like stereid-band shortly excurrent, 40–50  $\mu$  wide, slightly tapering above and sharply denticulate one third down on the back, in cross-section showing 4 or 5 rather small guide-cells near the upper side of the band; leaf-blade chiefly of a single layer of leucocysts on either side of the chlorocysts except in the lower part of the leaf where there are

sometimes 2 layers on the dorsal side in the thickest part and a single layer of hyaline cells toward the margin; leucocysts mostly short-rectangular, with thin straight walls, or the walls finally becoming sinuous, the inner more or less porose; median cells about  $10\ \mu$  wide by  $12\text{--}16\ \mu$  long.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Known only from the type locality.

2. *Leucophanes Mittenii* Card.; Paris, Index Bryol.  
ed. 2. 3: 192. 1905.

*Octoblepharum angustifolium* Mitt. Jour. Linn. Soc. 12: 110. 1869. Not *Leucophanes angustifolium* Ren. & Card. 1895.

Flowers and fruit unknown. Plants growing in low, pale-green cushions: leaves 4–4.5 mm. long, erect-spreading, narrowly elliptic in the lower part, gradually narrowed above to a nearly linear, keeled point with an obtuse, minutely serrulate apex often gemmiferous; gemmae fusiform, up to  $100\ \mu$  long, with 8–10 cross-walls; leaves in cross-section near the middle showing a single layer of leucocysts on either side of the nearly median chlorocysts, a median costa-like stereid-band and the leaf border also of a stereid-band; costa-like band percurrent or nearly so,  $16\text{--}20\ \mu$  wide two thirds down the leaf, only slightly tapering and smooth on the back; leaf-border extending from the apex to near the base, mostly recurved in the lower half; lower part of the leaf on either side towards the margin of a single layer of leucocysts; median cells of the leaf short-rectangular to elongate-hexagonal, about  $12\ \mu$  wide by  $20\text{--}40\ \mu$  long, in the lower part of the leaf larger, mostly short rectangular.

TYPE LOCALITY: Ecuador.

DISTRIBUTION: Guadeloupe; also in Trinidad and Ecuador.

2. *OCTOBLEPHARUM* Hedw. Descr. 3: 15. 1791.

Autoicous. Male flowers inconspicuous, often several, nearly sessile, scattered along the stem below the perichaetium. Plants mostly pale-greenish or brownish-white, sometimes reddish- or purplish-tinged, of medium size, growing usually in compact tufts with branching stems 1–3 cm. high. Leaves close together, fragile, (in some species the tips mostly broken off) erect-spreading to widely spreading or squarrose, often consisting chiefly of the large, thick, ligulate costa which tapers below to a narrow base, the small, hyaline lamina of the leaf sometimes scarcely evident, of one or partly of a double thickness of cells; costa in cross-section near the middle showing a row of small, triangular chlorocysts, sometimes becoming four-sided below with usually 3 or 4 rows of leucocysts above, and 2 or 3 rows below the chlorocysts, the hyaline cells all more or less porose; perichaetial leaves scarcely differentiated. Seta erect, more or less elongate. Capsule erect, regular, oval to cylindrical, with stomata, often rather obscure, in 1 or 2 rows near the base; peristome pale- or golden-brown, of 8 lanceolate, not quite smooth teeth with a median line, or of 16 teeth in pairs without a median line; lid with a subulate, oblique beak. Calyptra cucullate, entire at the base.

Type species, *Bryum albidum* L.

Leaves less than 10 mm. long, usually less than 7 mm. long, in cross-section one half down showing thick, abruptly rounded margins.

Peristome-teeth 8.

Leaf mostly abruptly rounded to the apiculate and serrulate apex; seta up to 7 mm. long; capsule ovate to oblong, 1–1.5 mm. long.

Leaf mostly rather gradually acutely pointed, scarcely apiculate or serrulate; seta 10–20 mm. long; capsule oblong-cylindric, 1.5–2 mm. long.

Peristome-teeth 16; leaf-apex mostly entire or slightly undulate, broad and rounded to a stout apiculus.

Leaves up to 20 mm. or more long, very fragile, in cross-section one half down showing margins with mostly acute, not rounded edges.

1. *O. albidum*.

2. *O. cylindricum*.

3. *O. pulvinatum*.

4. *O. erectifolium*.

1. *Octoblepharum albidum* (L.) Hedw. Descr. 3: 15. 1791.

*Bryum albidum* L. Sp. Pl. ed. 2. 1793. 5

*Octoblepharum pallidum* Besch.; Card. Mém. Soc. Sci. Nat. Cherbourg 32: 41; *nomen nudum*. 1900.

*Octoblepharum martinicense* Mitt.; Card. Mém. Soc. Sci. Nat. Cherbourg 32: 41; *nomen nudum*. 1900.

Autoicous: male flowers minute, nearly sessile, often quite numerous, scattered along the stem below the perichaetium, the pale, faintly costate or ecostate, lanceolate, entire perigonal leaves enclosing 4–10 antheridia about 0.15 mm. high, apparently without paraphyses: plants in compact greenish- or brownish-white cushions, sometimes tinged with reddish or purple, with branching stems 0.5–3 cm. high; leaves up to 6 mm., rarely to 9 mm. long, spreading or recurved, from a more or less broadened, obovate or sometimes narrowed, obtuse base extending into a ligulate point 2–3 times as long with an abruptly rounded serrulate and apiculate apex, in cross-section near the middle showing mostly 4 layers of cells above and 3 layers below the triangular chlorocysts; cells of the small, hyaline leaf-blade, in a single layer, from elongate rhomboidal to rectangular; perichaetial leaves scarcely differentiated: seta mostly solitary, sometimes 2 from the same perichaetium, erect, 5–7 mm. long; capsule somewhat ovate to oblong, 1–1.5 mm. long, with several rows of transversely elongate cells about the mouth ~~and~~ stomata, often rather obscure, in 1 or 2 rows near the base; lid obliquely rostrate, at least half as long as the capsule; peristome-teeth 8, golden-brown, rather distant, at base about 60  $\mu$  wide and projecting above the mouth 130  $\mu$ , faintly, somewhat vertically striate, sometimes perforate along the median line: spores rough, up to 20  $\mu$  in diameter.

TYPE LOCALITY: Island of New Providence, Bahamas.

DISTRIBUTION: Florida (also credited to Texas by Austin); Mexico, Central America, and the West Indies; also widely scattered throughout tropical regions.

ILLUSTRATION: Hedw. Descr. 3: pl. 6 A.

EXSICC.: Sull. Musci Cub. Wright. 55; Aust. Musci App. 478; Ren. & Card. Musci Am. Sept. Exs. 213; Small, Mosses S. U. S. 52. *Heb. Musci Cuba Wright. 55.*

## 2. *Octoblepharum cylindricum* Schimp.; C. Müll.

Syn. 1: 87. 1848.

Autoicous: male flowers minute, usually several, on very short stalks, scattered along the stem below the perichaetium, the pale, ovate, acute, costate, entire perigonal leaves enclosing 5 or 6 antheridia about 0.2 mm. long, either with or without paraphyses: plants in compact, pale-greenish or brownish-white tufts with stems up to 4 cm. high: stem-leaves mostly 5–6 mm. long, from a usually broadened, more or less ovate base narrowed to a ligulate point with an acute, entire or slightly serrulate, scarcely distinctly apiculate apex, in cross-section showing, near the apex, 2 layers of cells above and 2 below the chlorocysts, near the middle mostly 4 layers above and 3 below with the margins of the leaf thick and rounded; cells of the hyaline leaf-blade sometimes partly of a double thickness of cells, from square to elongate rhomboidal or hexagonal, with thin pitted walls; perichaetial leaves scarcely differentiated: seta 10–20 mm. long; capsule erect, oblong-cylindric, 1.5–2 mm. long, with stomata in about 2 rows near the base and 4 or 5 rows of more or less transversely elongate cells about the mouth; peristome-teeth pale, slightly punctate, broadly lanceolate, extending above the mouth about 150  $\mu$  and 35–40  $\mu$  wide at the base, with a prominent median line and articulations; lid with a subulate beak about one half the length of the capsule: spores somewhat rough up to about 16  $\mu$  in diameter.

TYPE LOCALITY: British Guiana.

DISTRIBUTION: Jamaica (specimen so labeled communicated by W. Hans to von Thümen in 1869, now in the Jaeger herbarium in herb. N. Y. Bot. Gard.; no name of collector nor date of collection; perhaps not from Jamaica); also in Colombia, Guiana, and Brazil.

## 3. *Octoblepharum pulvinatum* (Dozy & Molk.) Mitt. Jour. Linn.

Soc. 12: 109. 1869.

*Arthrocormus pulvinatus* Dozy & Molk. Prodr. Fl. Bryol. Surinam. 6. 1854.

Autoicous: male flowers several, minute, on short stalks scattered along the stem below the perichaetium, the perigonal leaves ovate or ovate-lanceolate, acute, slightly serrulate or entire, with a narrow, pale costa, enclosing 4 or 5 antheridia 0.3 mm. long, with rather numerous paraphyses: plants in mostly compact, pale-green tufts with stems 0.5–3 cm. high: leaves fragile, 5–7 mm. long, from a usually broadened, obovate base, often abruptly narrowed to a ligulate point with a broad, rounded, mostly entire, apiculate apex, in cross-section showing, near the apex, 2 layers of cells above and 2 below the chlorocysts, at the middle mostly 4 layers

above and 3 below, and near the base, 2 layers above and 2 below, with the leaf-blade one half way between the costa and margin often of a double thickness of cells; cells of the hyaline leaf-blade mostly rectangular, often nearly square, with thin, pitted walls, the upper margin of the blade slightly crenulate; perichaetial leaves scarcely differentiated: seta erect, at least 10 mm. long: capsule about 2 mm. long, erect, ovate-oblong, with 3-5 rows of transversely elongate cells about the mouth, and stomata near the base, often rather obscure; peristome-teeth 16, in pairs, linear-lanceolate, nearly smooth, without a median line, the articulations prominent; lid subulately beaked, at least two thirds the length of the capsule: calyptra extending nearly one half way down the capsule, with an entire base and mouth apex: spores rough, about  $16 \mu$  in diameter.

TYPE LOCALITY: Surinam.

DISTRIBUTION: Cuba, Jamaica, Porto Rico, Guadeloupe, and St. Vincent; also in northern South America.

#### 4. *Octoblepharum erectifolium* Mitten, sp. nov.

Flowers and fruit unknown: plants in pale-green or brownish-white tufts, with stems mostly less than 2 cm. high: stem-leaves crowded, fragile, mostly broken in the older plants, slightly curved to almost straight and erect, up to 2 cm. long or more, from a small, oblong base about 1.5 mm. long, more or less abruptly narrowed to a long-ligulate point with a rounded or broadly acute, slightly apiculate and serrulate or entire apex, in cross-section near the middle showing about 4 layers of cells above and 3 layers below the triangular chlorocysts, near the base 2 layers above and 2 below the often quadrate chlorocysts; hyaline lamina of the leaf-blade of one thickness of cells with walls thin and more or less pitted, the marginal cells of the blade elongate-rhomboidal, within larger and longer,  $20-30 \mu$  wide by  $100 \mu$  long or more, the leaf-margin above somewhat crenate-serrate.

Type collected in Trinidad, *Cruger* (herb. Mitten, in herb. N. Y. Bot. Gard.).

DISTRIBUTION: Jamaica; also in Trinidad.

#### DOUBTFUL SPECIES

≈ *Octoblepharum Mitteni* Jaeger (*O. longifolium* Mitt.) of the Amazon region has been credited to Guadeloupe, apparently through mistaken determination. See Besch. Ann. Sci. Nat. VI. 3: 191. 1876.

#### 3. *LEUCOBRYUM* Hampe, Flora 20: 282. 1837.

Pseudautoicous. Male plants minute, mostly 2-3 mm., rarely up to 6 mm. high, growing in clusters on dense tufts of tomentum either enclosed by archegonial leaves of sterile flowers below fruit-bearing branches or sometimes scattered along the inner surface of the tubulose point of stem-leaves; antheridia few, 2-4, with few paraphyses. Fertile plants in greenish-white often very compact cushions with branching stems from 2 cm. up to 20 cm. high. Leaves more or less crowded, with an appressed-imbricate base and a spreading, straight or flexuous, subtubulose, sometimes falcate-secund point, mostly minutely denticulate at the apex; leaf consisting mostly of a broad nerve 2-8 layers of hyaline cells in thickness, enclosing a single row of small, green cells (chlorocysts) more or less quadrangular in cross-section, the blade forming a hyaline border in the lower part of the leaf, 5-10 rows of narrow, elongate cells in width, gradually narrowing and disappearing in the upper part of the leaf, the inner cell-walls of both costa and blade usually very porose; radicles often growing from the apex of the stem-leaves, and frequently numerous linear or linear-lanceolate deciduous leaves much smaller than the ordinary leaves occurring in great numbers on abundantly fruiting as well as on sterile plants. Fruit dicranoid, very similar in the different species. Capsule without stomata; annulus mostly lacking; peristome-teeth strongly articulate, vertically striate, with slender papillose points. Calyptra cucullate.

Type species, *Dicranum glaucum* (Hedw.)

This genus has usually been described as dipicous and so figured by both Schimper and Braithwait, who illustrate male plants of *L. glaucum* several centimeters high, with large flowers containing 12-14 antheridia. I have never seen such plants from either Europe or North America; a specimen of *L. glaucum* in the herbarium of the New York Botanical Garden (Musci Eur. Stirp. Norm.) marked "e manu Schimper 1860 ♂" has only sterile archegonial flowers.

Leaves more than two layers of hyaline cells in thickness near the base; chlorocysts one half up the leaf median or nearest the ventral surface.

Leaves in cross-section near the base mostly showing a thickness of 3 layers of cells across the median line of the leaf, usually 2 layers above and 1 layer or sometimes 2 layers below the chlorocysts; thickest part of the leaf on either side of the median line with up to 6 or 7 layers of cells. (In the less robust forms of *L. giganteum* sometimes only 2 layers are found across the middle of the leaf, but the greater length of leaf will distinguish it from others of our region with the exception of *L. albicans*.)

Leaves 5-8 mm. long.

Leaves 14-22 mm. long; annulus wanting.

Leaves in cross-section near the base showing 1 layer of cells above and 1 or rarely 2 layers below the chlorocysts along median line of leaf.

Thickest part of the leaf on either side of the median line near the base of mostly 2 layers of cells above and 2 layers below the chlorocysts.

Leaves 8-14 mm. long with an ovate base 2-3 mm. long; annulus present.

Leaves from scarcely 2 up 4.5 mm. long from an ovate base narrowed to a subtubulose point scarcely as long as or often much shorter than the ovate base.

Leaves mostly 5-7 mm. long, from an ovate base about 1 mm. long, narrowed to a subtubulose point 3-6 times as long.

Thickest part of the leaf near the base of 2 or 3 layers of cells above and 3 or sometimes 4 layers below the chlorocysts.

Leaves 5-10 mm. long, with a subtubulose point from a little longer than the ovate base to 2-3 times as long.

Leaves 3-4.5 mm. long, with a subtubulose point mostly slightly longer than the more or less ovate base.

Leaves only 2 layers of hyaline cells in thickness near the base; chlorocysts one half up the leaf much nearer the dorsal than the ventral surface.

1. *L. glaucum*.
2. *L. giganteum*

3. *L. albicans*.

4. *L. albidum*.

5. *L. crispum*.

6. *L. Antillarum*.

7. *L. Polakowskyi*.

8. *L. Martianum*.

### 1. *Leucobryum glaucum* (L.) Schimp. Coroll. Bryol.

Eur. 19. 1855.

*Bryum glaucum* L. Sp. Pl. 1118. 1753.

*Dicranum glaucum* Hedw. Fundam. 2: 92. 1782.

*Leucobryum vulgare* Hampe, Flora 20: 282. 1837.

Pseudautoicous: male plants minute, from 2 to rarely 6 mm. high, growing on tufts of tomentum enclosed by perichaetial leaves of sterile flowers below fruiting branches; flowers mostly solitary, with antheridial leaves scarcely differentiated, containing 2 or 3 antheridia 0.4 mm. long, with few paraphyses: fertile plants in compact, pale-yellowish to dull-green cushions, with branching stems up to 5 cm. or rarely 10 cm. or more high, bearing crowded, erect-spreading, sometimes secund leaves: stem-leaves 4-11 mm. long, from an ovate base narrowed to a subtubulose point of variable length with an acute, minutely denticulate, incurved apex; costa in cross-section near the base showing mostly 6 layers of large, empty cells enclosing a median row of small, quadrate chlorocysts, usually 2 layers of large cells extending across the chlorocysts in the middle of the costa on the upper side and 1 layer on the lower side; hyaline blade of the lower part of the leaf about 5 cells wide on either side: seta dark-red, about 1.5 cm. long: capsule nodding, usually distinctly strumose, strongly curved and furrowed when dry, without stomata; annulus none; peristome-teeth divided to below the middle into slender papillose forks, the articulations below close, vertically striate; lid with a slender beak about the length of the capsule: spores slightly rough, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Europe.

DISTRIBUTION: Newfoundland to Minnesota, and southward to Florida and Louisiana; Bermuda; also throughout Europe.

ILLUSTRATIONS: B.S.G. Bryol. Eur. pl. 97, 98; Lesq. & James, Man. pl. 2.

EXSICC.: Ren. & Card. Musci Am. Sept. Exs. 277 (as *L. albidum*), 361; Sull. Musci Allegh. 168; Sull. & Lesq. Musci Bor. Am. 76; ed. 2. 97, 98, in part; Aust. Musci App. 99; Macoun, Can. Musci 55; Drummond, Musci Am. 89.

### 2. *Leucobryum giganteum* C. Müll. Syn. 1: 79. 1849.

*Leucobryum robustum* Sull. Proc. Am. Acad. 5: 279. 1861.

Pseudautoicous: male plants minute, usually 2-3 mm. high, borne on tomentum enclosed by the perichaetial leaves of the sterile archegonia or along the inner surface of the tubulose point of the stem-leaves; flowers solitary, the antheridial leaves few, ovate, acute,

about 0.5 mm. long, enclosing 2 or 3 antheridia and few paraphyses: fertile plants in robust, loose mats, with branching stems up to 15 cm. high, bearing crowded leaves, spreading-flexuous or somewhat squarrose in the upper part, from an appressed base: stem-leaves 14–22 mm. long, from an ovate or ovate-lanceolate base gradually narrowed to a long tubulose often twisted point slightly denticulate at the acute apex; costa in cross-section near the base showing mostly 4 or often 6 layers of cells, except near the middle, where there are usually 2 layers above and one layer below the chlorocysts; leaf-blade mostly 7 or 8 cells wide below; inner perichaetial leaves 5–6 mm. long, narrowed to a point scarcely as long as the oblong base: seta red, up to 3.5 mm. long, solitary, appearing more or less aggregate from the crowding of the perichaetial buds on short branches, finally becoming lateral; capsule nodding, about 2 mm. long, strongly contracted, curved and ribbed when dry; peristome-teeth reddish-brown, closely articulate and vertically striate below, divided more than one half down into 2 filiform, papillose forks; lid conic, with a slender beak about as long as the capsule: spores nearly smooth, about 16  $\mu$  in diameter.

TYPE LOCALITY: Colombia.

DISTRIBUTION: Cuba; Jamaica; Barbados; Costa Rica; also in northern South America.

EXSICC.: Sull. Musci Cub. Wright. 44; Holz. Musci Acroc. Bor. Am. 307.

### 3. *Leucobryum albicans* (Schwaegr.) Lindb. Oefv. Sv. Vet.-Akad. Förh. 20: 402. 1863.

*Dicranum albicans* Schwaegr. Suppl. 2<sup>o</sup>: 122. 1827.

*Leucobryum longifolium* Hampe; C. Müll. Linnaea 17: 317. 1843.

Pseudautoicous: male plants as in *L. giganteum*: fertile plants large, approaching the smaller forms of *L. giganteum* in size, with branching stems up to 4 cm. or more high and bearing spreading-flexuous, often somewhat secund, crowded leaves: stem-leaves 8–14 mm. long, from an ovate base, gradually tapering to a tubulose point 2–4 times as long with the apex denticulate to entire; costa in cross-section near the base showing 1 layer of cells above and 1 below the chlorocysts along the middle, with mostly a few rows of cells in a double layer above and below, usually nearer the margin than the middle of the costa; leaf-blade 6–9 cells wide below; perichaetial leaves shorter than the upper stem-leaves, the inner ones with a convolute base about one half their length: seta 15–25 mm. long: capsule nodding, often distinctly strumose, much contracted, curved and ribbed when dry, scarcely 2 mm. long; annulus finely developed, of 2 or 3 rows of cells; peristome-teeth divided one half down or more, about 120  $\mu$  wide at the base; lid with a slender beak about as long as the capsule: spores slightly rough, 12–14  $\mu$  in diameter.

TYPE LOCALITY: Near Rio de Janeiro, Brazil.

DISTRIBUTION: Cuba; also in South America.

ILLUSTRATION: Schwaegr. Suppl. pl. 186.

This is, so far as known, the only species of *Leucobryum* having an annulus.

### 4. *Leucobryum albidum* (Brid.) Lindb. Oefv. Sv. Vet.-Akad. Förh. 20: 403. 1863:

*Dicranum albidum* Brid. Musc. Recent. 2<sup>o</sup>: 167. 1798.

*Dicranum glaucum pumilum* Michx. Fl. Bor. Am. 2: 297. 1803.

*Dicranum glaucum albidum* Brid. Bryol. Univ. 1: 409. 1826.

*Leucobryum vulgare minus* Hampe, Linnaea 13: 42. 1839.

*Leucobryum sediforme* C. Müll. Syn. 1: 75. 1848.

*Leucobryum minus* Hampe; Sull. in A. Gray, Man. ed. 2. 624. 1856.

*Leucobryum pumilum* E. G. Britton, Bull. Torrey Club 19: 190. 1892.

*Leucobryum incurvifolium* C. Müll. Bull. Herb. Boiss. 5: 174. 1897. —

*Leucobryum glaucum albidum* Card. Rev. Bryol. 38: 80. 1911.

Pseudautoicous: male plants 1–3 mm. high, on tomentum enclosed by old perichaetial leaves of sterile archegonia; flowers with 2 or 3 antheridia about 0.25 mm. high, without paraphyses, surrounded by 4 or 5 lanceolate-pointed leaves from a somewhat broader, concave base: fertile plants in compact cushions, with branching stems up to 3 cm. high, bearing crowded leaves erect-appressed or widely spreading at the tips: stem-leaves 2–4.5 mm. long, from an ovate base narrowed to a subtubulose point usually scarcely as long as or often much shorter than the base; costa in cross-section near the base showing 2 layers of cells above and

2 layers below the chlorocysts in the thicker parts and 1 layer on either side near the middle of the costa; perichaetial buds mostly appearing terminal and solitary, the inner perichaetial leaves longer and projecting well above the stem-leaves: seta red, erect, 12–18 mm. long: capsule about 1.5 mm. long, nodding, scarcely or not strumose or rarely distinctly strumose, when dry curved and furrowed, without stomata; annulus wanting; lid rostrate, about as long as the capsule; peristome-teeth divided about one half down: spores rough, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Virginia.

DISTRIBUTION: New Jersey to Ohio, and southward to Florida and Louisiana (Cuba; Andros, Bahamas; Mexico; Guatemala.

EXSICC.: Drummond, Musci Am. 40, 45; Sull. Musci Allegh. 169; Aust. Musci App. Suppl. 477; Sull. & Lesq. Musci Bor. Am. 77; ed. 2. 98, in part; Small, Mosses S. U. S. 17; Ren. & Card. Musci Am. Sept. Exs. 18; Holz. Musci Acroc. Bor. Am. 56.

*Muscifolium*:

5. *Leucobryum crispum* C. Müll. Syn. 1: 78. 1849.

*Leucobryum subulatum* Hampe, Linnaea 25: 359. 1853. = *V. p.*,  
*Leucobryum tenuifolium* Sull. Proc. Am. Acad. 5: 279. 1861.

Male plants unknown: fertile plants in rather lax tufts, with stems 2–3 cm. high and irregularly spreading-flexuous leaves: stem-leaves 5–7 mm. long, from an ovate base about 1 mm. long narrowed to a subtubulose point 3–6 times as long, with an entire or slightly denticulate apex; costa in cross-section near the base with 1 layer of cells above and 1 below the chlorocysts in the middle and 1 or mostly 2 layers above and 2 below, in the thicker parts on either side; hyaline lamina of the lower part of the leaf 7–10 cells in width; inner perichaetial leaves 6–7 mm. long, with a convolute base gradually tapering into a point of about equal length: rather immature fruit shows a nodding, not strumose capsule, scarcely larger than the long-beaked lid, on a seta about 2 cm. long.

TYPE LOCALITY: Colombia.

DISTRIBUTION: Cuba; Guadeloupe; also in northern South America.

EXSICC.: Sull. Musci Cub. Wright. 43.

I have not seen type material; the description is based on specimens from Guadeloupe named by C. Müller.

6. *Leucobryum Antillarum* Schimp.; Besch. Ann. Sci. Nat.

VI. 3: 190. 1876.

*Leucobryum costaricense* Besch. Jour. de Bot. 11: 153, hyponym. 1897.

*Leucobryum jamaicense* C. Müll. Bull. Herb. Boiss. 5: 547. 1897.

*Leucobryum subglaucum* C. Müll. Bull. Herb. Boiss. 5: 548. 1897.

*Leucobryum sciuroides* C. Müll. Hedwigia 37: 221. 1898.

*Leucobryum Eggersianum* C. Müll. Hedwigia 37: 221. 1898.

*Leucobryum glaucovirens* Card. Rev. Bryol. 36: 69. 1909.

*Leucobryum flaccidulum* Card. Rev. Bryol. 37: 119. 1910.

Male plants unknown: fertile plants in rather loose tufts, with flexuous stems up to 8 cm. high and leaves from an imbricate base, spreading-flexuous all round or sometimes secund: stem-leaves 5–10 mm. long, from an ovate base 1.5–2 mm. long, tapering to a subtubulose point, denticulate at the apex, from a little longer than the base of the leaf to 3 times as long; costa in cross-section near the base showing 1 layer of cells above and 1 below the chlorocysts in the middle and mostly 3 layers above and 3 below in the thicker parts; hyaline blade 6–10 rows of cells wide below.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Throughout the West Indies; Mexico; Costa Rica and Panama; also in northern South America.

EXSICC.: Holz. Musci Acroc. Bor. Am. 306.

7. *Leucobryum Polakowskyi* (C. Müll.) Card. Mém. Soc. Sci.

Nat. Cherbourg 32: 82. 1900.

*Ochrobryum Polakowskyi* C. Müll.; Besch. Jour. de Bot. 11: 151. 1897.

*Leucobryum minusculum* C. Müll. Hedwigia 37: 220. 1898.

Male flowers unknown: fertile plants in low, compact tufts, with stems about 1 cm. high and irregularly spreading, flexuous leaves: stem-leaves mostly ovate-lanceolate, 3.5–4.5 mm.

long, from a rather narrow base gradually narrowed to a more or less subtubulose point mostly a little exceeding the basal part in length; costa in cross-section showing single layers of cells above and below the chlorocysts in the middle, with 2 or 3 layers of cells above and 3 below in the thicker parts; hyaline blade in the lower part of the leaf of 8–10 rows of cells; inner perichaetial leaves somewhat convolute nearly to the apex, rather shorter than the outer: seta about 1 cm. long: capsule not strumose, 1.25 mm. long, with a rostrate lid of about equal length.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Jamaica; Mexico; Guatemala; Costa Rica.

### 8. *Leucobryum Martianum* (Hornsch.) Hampe; C. Müll.

*Linnaea* 17: 317. 1843.

*Dicranum Martianum* Hornsch. in Mart. Fl. Bras. 1<sup>2</sup>: 11. 1840.

Pseudautoicous: male plants 2–3 mm. high, in clusters on dense tufts of tomentum enclosed by archegonial leaves of sterile flowers; antheridia 2 or 3, about 0.3 mm. long, with few paraphyses, enclosed by several perigonal leaves with an ovate, concave base tapering to a lanceolate point scarcely equaling the base in length: fertile plants in rather low, loose mats, with stout, spreading, short stems or somewhat taller and more compactly growing; stems mostly 1–3 cm. high, with crowded leaves usually more regularly falcate-secund than in the other species: stem-leaves 5–6 mm. long, very gradually narrowed from an ovate-lanceolate base to a slender subtubulose point denticulate at the apex; costa in cross-section showing but a single row of cells above and below the chlorocysts throughout the lower part of the leaf with chlorocysts in the upper part of the leaf much nearer the dorsal than ventral surface; hyaline blade narrow, 5 or 6 cells wide below; perichaetial leaves 2.5–3 mm. long, with a broad, convolute base abruptly narrow to a point of about equal length: seta red, flexuous, 1.5–2 cm. long: capsule curved, nodding, strumose, about 1.5 mm. long, deeply furrowed when dry; lid conic-rostrate, about the length of the capsule; peristome-teeth reddish-brown, densely vertically striate below, divided about one half down, the forks filiform and papillose above: spores somewhat rough, up to 16  $\mu$  in diameter.

TYPE LOCALITY: Brazil.

DISTRIBUTION: Porto Rico, Guadeloupe, Martinique, St. Vincent, and Grenada; also in northern South America.





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