GUIDE TO GROUPS AND A FEW ODDBALL SPECIES

shoots flattened, leaves in two rows, clasping stem or broadly attached → *Fissidens* — each leaf sheaths the one above; *Schistostega pennata* — tiny, pale, & fernlike; *Onchophorus wahlenbergii* — sheathing base, margins recurved, capsule with basal bump; *Distichium capillaceum* — long slender tips (If the branches are arching rather than flat seePlagiomnium or Mnium, Chart ii)

leaves arching outwards from erect bases → *Paludella squarrosa* — short papillose leaves in 5 rows; *Meesia* — longer, toothed leaves in 3 rows; *Dicranella schreberiana* — longer, untoothed leaves in more than 3 rows; leaves without a costa → *Hedwigia ciliata* — very papillose; *Andreaea rupestris* — smooth & thick-walled; capsule opens by 4 slits

leaves with lamellae or a border of long cells → GROUP 1; plants tiny, either ephemeral, or with persistent protonema, or with capsules surrounded by leaves → GROUP 2; cells smooth, leaves narrowly lanceolate, often toothed → GROUP 3

cells smooth, leaves more broadly lanceolate, with sharp tips → GROUP 4; cells smooth, leaves oval or round, with rounded tips → GROUP 5; cells bulging or papillose → GROUP 6

GROUP 1: LEAVES WITH LAMELLAE (VERTICAL RIDGES) OR A BORDER OF LONG CELLS OR BOTH

In this group the leaves are broadly or narrowly oval and the long border cells contrast strongly with the shorter ones inside them

leaves soft and often wavy, with a narrow band of elongate vertical ridges on the midrib; leaf bases not sheathing → *Atrichum*

leaves stiff, with the whole tip covered with ridges; leaf bases sheathing → *Polytrichum* — capsules angled, top cells of ridges smooth; *Polytrichastrum alpinum* — capsules round & inclined, leaves narrow, top cells of ridges smooth papillose; *Pogonatum* — capsules round & erect, leaves short & wider, often blue-green

middle cells elongate, capsules with necks, leaves smooth or weakly toothed, often with needle points → *Bryum*; shoots budlike or elongate

Bryum is a large genus, but most of the species look alike; also see *B. argenteum*, Chart vi

leaves toothed → *Rhodobryum roseum* — cells long, plants tree-like; *Plagiomnium* — teeth single, sterile shoots often arching and flattened; *Mnium* — teeth double, shoots less often flatened

Mnium stellare, Group 5, does not have a border

leaves without teeth → *Rhizomnium* — thick border, blunt or notched tip (bigger, dark green, heavy border); *Cinclidium stygium* — thick border, small point at tip, old leaves dark red; *Pseudobryum cinclidioides* — weak border, elongate hexagonal cells; *Cyrtomnium hymenophylloides* — very tiny, blue color, thin border

GROUP 2: EPHEMERALS & OTHER MINIMOSSES

The plants in this group are tiny, usually on soil, either ephemeral, or with persistent protonema, or with capsules surrounded by leaves

leaves absent or very small; protonema persistent → *Pogonatum* — erect cylindrical capsule, leaves with lamellae (pn); *Buxbaumia* — inclined capsule (capsule may be flattened, pn); *Micromitrium* — round capsule, lanceolate leaves (pn); *Ephemerum* — leaves with spiny teeth, protonema with enlarged, barrel-like cells (pn); *Tetradontium brownianum* — minute plants with protonematal leaves

leaves slender → *Bruchia flexuosa* — capsule w. broad neck; *Pleuridium* — no neck, smooth cells; *Astomum muhlenbergianum* — papillose cells, incurved leaf tips; *Diphysicum foliosum* — papillose cells, blunt sterile leaves, capsules look like fat penguins

leaves reverse-oval, cells large & thin-walled → *Physcomitrella* — capsule breaking irregularly, calyptera not lobed; *Physcomitrium* — capsule opening in line, calyptera beaked & lobed; *Aphanorrhegma* — capsule opening in line, capsule cells with thickened corners; leaves very tiny, cells rectangular → *Seligeria*

leaves oblong or oval, w. needle tips; cells smaller & rounder → *Acaulon muticum* — plants bulblike, w. broad, concave leaves; *Phascum cuspidatum* — leaves papillose, margins rolled under; *Pottia truncata* — leaves smooth, largest toward tips of sterns; capsules with stalks

GROUP 3: CELLS SMOOTH, LEAVES SLENDER & LONG-POINTED, OFTEN TOOTHED

costa wide → *Leucobryum* — leaves all costa, with small green cells & large clear ones; *Paraleucobryum longifolium* — costa with alternating stripes of clear and green cells; *Dicranodontium denudatum* — leaf base with clasping lobes, older leaves dropping off; *Leptobryum glaucum* — cells long & skinny, capsule with neck

alar cells enlarged → *Blindia acuta* — stem red, leaves barely toothed, alar cells thick-walled; *Dicranoweisia crispula* — leaves untoothed, leaf surface with elongate ridges; *Dicranum* (b. br.) — leaves often toothed, curved or wavy; capsules often inclined; costa differentiated into thick-walled stereids and thin-walled guide cells; alar cells enlarged, costal cells not much differentiated (high elevations only) → *Kiaeria* — costa ending near tip, capsules curved; *Arctoa* — costa long excurrent, seta thick, teeth flaring

alar cells not enlarged, leaf bases often clasping → *Onchophorus wahlenbergii* — sheathing base, short upper cells, margins recurved, capsule with basal bump; *Trematodon ambiguus* — short clasping base with long excurrent costa; capsule with long neck; *Ditrichum* — peristome teeth slender, papillose, divided to base; capsules often erect; *Dicranella* — teeth broader, papillose only near tips, divided halfway; capsules rarely erect

Also see: *Distichium* (2-ranked, Guide to Groups); *Bruchia*, *Pleuridium* (ephemerals, Group 1); *Bartramia*, *Cynodontium*, *Dicranum*, *Tortella* (papillose, Group 6)

GROUP 4: SMOOTH CELLS, LEAVES LANCEOLATE OR WITH SHARP TIPS

alar cells enlarged and often colored → *Dicranum*

long cells, leaves weakly toothed, capsules long-necked → *Pohlia* (bb.)

small blue-green, leaves in 5 rows → *Conostomum tetragonum*

wavy-edged cells, often awned → *Racomitrium* (often much branched)

some or all cells thick-walled → *Drummondia prorepens* — main stem creeping, branches erect; costa not reaching tip; *Andreaea rothii* — dark red-green or black-green; all cells thick-walled, costa fills tip, capsule opens by slits; *Ulota* — inner basal cells elongate, outer basal cells thick-walled, capsules erect, calyptera hairy; *Schistidium & Grimmia* — a large, variable group of dark, cushion-forming mosses; always on rocks, often with needle tips, recurved edges, & enlarged, concave-side lower cells; leaves of some species are two cells thick

flat edges, thin-walled cells → *Saelania glaucescens* — pale blue-white color, cottony threads on surface; *Rhabdoweisia crispata* — toothed, oblong, keeled leaves; short, erect, furrowed capsules; *Ditrichum lineare* — short, blunt much-overlapping leaves

recurved edges, square thin-walled cells → *Ceratodon purpureus* — leaves straight-sided, toothed near tip; upper cells very square, capsule curved

Smooth forms of *Didymodon* (Chart 6) resemble both *Schistidium* and *Ceratodon* but have rounder cells & thicker tips.

GROUP 5: SMOOTH CELLS, LEAVES ROUNDED ALONG SIDES OR AT TIP

large cells, tight worm-like shoots, clear upper cells, green lower ones → *Bryum argenteum* — long leaf tip, short basal cells; *Plagiobryum zierii* — short leaf tip, longer basal cells

large cells, loose shoots, both upper & lower cells green → *Funaria hygrometrica* — short tip, no teeth, curved capsules, on open or burned soil; *Tayloria serrata*; *Tetraplodon*; *Splachnum* — short or long tips, often with teeth; capsules with enlarged and sometimes colored necks; always on dung.

leaves oblong, with a needle tip; edges recurved → *Tortula mucronifolia*

leaves oval, without needle tips or inrolled edges → *Anoobryum filiforme* — long cells, worm-like shoots with closely overlapping leaves; *Mnium stellare* — leaves with small teeth, capsules with 16 teeth, gemmae cups absent; *Tetraphis pellucida* — leaves without teeth, capsules with 4 teeth, gemmae cups present

leaves oblong or straplike → *Aulacomnium heterostichum* — rounded oblong leaves with coarse teeth; *Pseudobryum cinclidioides* — large oblong cells in diagonal rows; may have a weak border; *Meesia uliginosa* — strap-like leaves with recurved edges and wide costa; *Racomtrium aciculare* — cells with wavy edges

GROUP 6: PAPILLOSE OR MAMMALOSE CELLS

This last group is tough. See the *Graphic Guide* for more details.

cells elongate with wavy edges, leaves often with needle tips → *Racomitrium*

cells round, with straight edges, leaves with needle tips → *Encalypta* — tubular calyptera, cross-walls of lower cells thickened; *Tortula & Syntrichia* — hood-like calyptera, cross-walls of lower cells not thickened

The leaves of many of these genera are sharply folded.

strap-like leaves with rounded tips → *Encalypta* — calyptera tubular; crosswalls of lower marginal cells thickened; *Tortula obtusifolia* — upper margins recurved, peristome poorly developed; *Barbula* — upper margins flat, peristome well developed; *Diphysicum foliosum* — upper cells in several layers, cells hard to see

some papillae small & oval, crossing cell walls → *Plagiopus oederiana* — leaves with sharp teeth, in 3 vertical rows; *Amphidium* — leaves untoothed, not in vertical rows

clear cells at base sharply demarcated from colored cells above; leaf margins flat → *Tortella* — demarcation line v-shaped; *Trichostoum tenuirostre* — demarcation line straight

leaf edges inrolled when dry → *Hyophila involuta* — cells bulging (mamillose), leaves spoon-shaped; *Weissia controversa* — cells papillose, leaves lanceolate

costa homogenous, papillae few, capsules often ridged, cells often thick-walled → *Ulota* — very hairy calyptera, cross-walls of lower marginal cells thickened; *Orthotrichum* — somewhat hairy calyptera, cross-walls of lower cells not thickened; *Zygodon* — edges not reflexed, cells with three or more papillae

with sharp, regular teeth near leaf tip; → *Timmia megapolitana* — cells mammilose, base strongly sheathing; *Dicranum* — alar cells enlarged; *Bartramia pomiformis* — margins recurved, teeth double; *Cynodontium* — margins recurved, teeth single; *Aulacomnium* — leaves broadly lanceolate, brood bodies common; *Dichodontium pellucidum* — margins flat, cells bulging papillose tips with jagged teeth; *Philonotis* — margins flat, cells elongate, papillose at ends

costa with stereids, papillae often numerous, capsules not ridged, cells not thick-walled → *Bryoerythrophyllum recurvirostrum* — old leaves often red, papillae often c-shaped, margins recurved to tip; *Hymenostylium recurvirostrum* — margins weakly recurved, costa exposed above and below; *Anoectangium aestivum* — about the same?; *Gymnostomum aeruginosum* — margins flat, costa covered with short cells above; *Didymodon* — lower side of costa covered with short cells, tips often thickened and 2-layered

MOSS GENERA OF THE NORTHERN FOREST

CHART 1: ACROCARPS

JERRY JENKINS, 2016

lanceolate; strap-like; ovate; obovate; elliptical; oblong; sheathing base; squarrose

flat; keeled; concave; inrolled; recurved edges; wide costa; ridged costa

smooth cells; papillose cells; clear cells; clear cells; green cells; excurrent costa; border of long cells; needle tip; lamellae on blade; sheathing base; calyptra; operculum; peristome; urn; seta

immersed capsule; exerted capsule; beaked; erect; strumose; curved; long-necked; persistent protonema; perichaetal leaves; penguin-like

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