FIELD GUIDE TO

COMMON BRYOPHYTES

OF

NEW MEXICO

Kelly W. Allred

Russ Kleinman

Karen S. Blisard

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Moss

A blanket on a rock
green, fuzzy, and Small –
older than the Redwoods,
younger than the earth.
Everywhere they are
sleeping,
surviving.
Dormant for decades.
Only to wake by a drop of water.
sleeping,
surviving.

Finn Allred, age 11

Front Cover : *Syntrichia ruralis*

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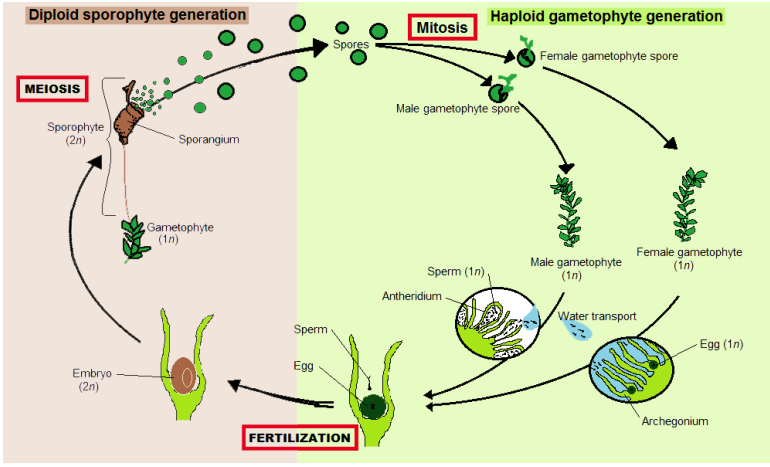
PART I : INTRODUCTION TO BRYOPHYTES

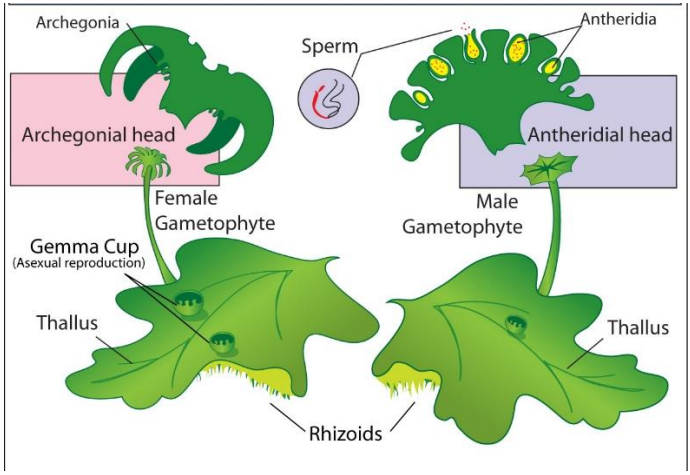
What are Bryophytes?

Bryophytes are green land plants that lack flowers, seeds, true roots, and conducting (vascular) tissue. Most bryophytes have stems and leaves, but many lack even those. They prefer moist to wet habitats, but many species can be found in protected habitats in desert environments. Bryophytes are composed of three lineages: mosses, liverworts, and hornworts (of which none have yet been found in New Mexico). There are about 20,000 species of bryophytes world-wide, and over 400 species in New Mexico.

Bryophytes reproduce mostly by means of microscopic spores, which are produced within a sporangium (capsule). Upon germination on a suitable substrate, the spores grow into the larger plant body with which we are familiar, producing stems and leaves. At some point, as the plant matures, sexual gametes are produced within an antheridium (sperm) and an archegonium (egg). The sperm cells are released from the antheridium and swim on a thin film of water to the archegonium, where they fertilize the egg, producing an embryo. This embryo eventually produces another capsule, often on a long stalk, which then produces spores, continuing the sexual, reproductive cycle.



Life cycle of a moss: by Htpaul (https://commons.wikimedia.org/wiki/File:Moss_alternation_of_generations_03-2012.png), used with permission.



Life cycle of a liverwort: by LadyofHats (https://en.m.wikipedia.org/wiki/File:Liverwort_life_cycle.jpg), used with permission.

Many bryophytes also reproduce asexually, enabling them to quickly occupy favorable environments. This can be done by fragmentation of leaf tissue, each fragment growing into a new plant. Sometimes, leaves produce specialized asexual propagules, called gemmae. They can be clustered on the tips of leaves, scattered along the leaf surface, or sometimes lifted up on specialized stalks, and can usually be seen with a hand lens or even the naked eye. In other cases, little rudimentary plants are produced, called bulbils, in the axils of the leaves. These drop off and grow into new plants.

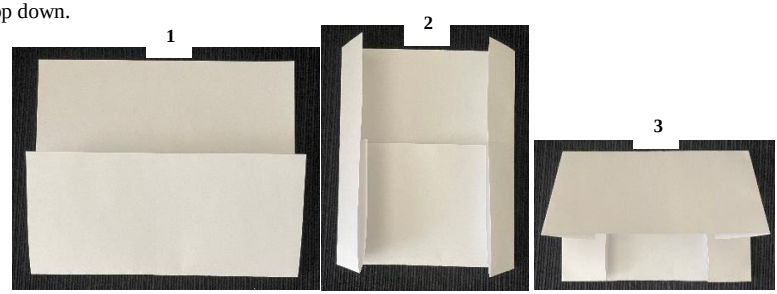
Moss gemmae and bulbils:

Liverwort gemmae:

Collecting and Studying Bryophytes

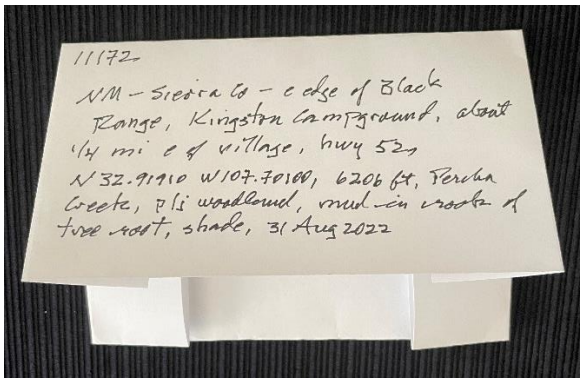
If you keep on the lookout, you can find bryophytes almost everywhere: in flower beds, in cracks in the sidewalk, at the base of leaky faucets, on decaying stumps and limbs, carpeting the forest floor, covering rocks and boulders, along brooks and ponds, and on roofs and under eaves. They are easily collected and preserved. To collect them, you may need permission or collecting permits if on private, state, or federal land.

Collecting packets are easily made from almost any type of available paper. **1**-Fold the paper widthwise about ⅔ or so to the top. **2**-Fold the edges in about an inch or so (if using 8½ x 11 inch paper). **3**-fold the top down.



Obtain a small sample by picking it off with the fingers, or you may need a knife blade to take samples off of tree trunks or limbs or from rock surfaces. We find an old bent spoon to be useful and safe, devised by Richard Zander and Patricia Eckel.

Record on the front of the packet complete collection information: Exact locality (e.g., state, county, road, mileage, landform, GPS coordinates), elevation, surrounding vegetation type, habitat, substrate, date, associates with you, and your name and collection number. Also include any notes or observations about features that strike you, such as color, growth form, abundance, etc. **Do this while in the field!** Your collection number should be associated with that plant sample wherever it goes. You can add the scientific name of the plant to the packet when you identify it.



The samples may stay in the closed packets for several hours, but it is best to finally lay them out partially open on a table or floor so they may dry completely; otherwise, mold will accrue (just like interest on a loan!). You may sometimes collect samples in plastic bags with a slip of paper for the information, but **never leave samples in the plastic bag** for more than a few hours. Once the samples are fully dry, the packets may be stored in a shoe box or similar container.

Resources

You can find numerous books and websites about bryophytes and their identification. We will mention only a few online sources that may be helpful for the beginning New Mexico bryologist.

- "Bryophyte Ecology" by Janice Glime and collaborators, an excellent online book with chapters on ecology, physiology, and methods, among other topics: https://digitalcommons.mtu.edu/bryophyte-ecology/.
- "Plants of the Gila Wilderness" by Russ Kleinman, with excellent photos of all Gila plants, including bryophytes: http://gilaflora.com/.

- “Flora Neomexicana” by Kelly Allred. The section on New Mexico Bryophytes will have further aids to identification, a template for a field collecting packet, and numerous other online sources: https://floraneomexicana.org/.

Acknowledgments

All photos are by the authors, primarily Russ Kleinman and Karen Blisard. We gratefully acknowledge the directors and curators of our southern New Mexico herbaria for liberal access to study their collections: Sara Fuentes-Soriano and Zach Rogers of New Mexico State University, and Bill Norris of Western New Mexico University.

PART II : COMMON BRYOPHYTES OF NEW MEXICO

HOW TO BEGIN

This little book is meant to be an enticement into the fascinating, miniature world of bryophytes. It is geared for the beginner without any training or equipment. Technical jargon has been kept to a minimum, but not avoided altogether; we are all capable of mastering a few expert or scientific terms.

We include here bryophytes that are likely to be encountered in New Mexico. Most of them are rather common in numerous localities; others are perhaps much less so, but because of their size or conspicuous nature, are often noticed (such as *Pleurozium schreberi*). A few (such as *Fissidens littlei*) are rare, but included to call attention to them in the hope that more might be found.

Even though illustrated books are helpful, bryophytes must be learned by searching for them in nature and then observing them closely and examining their features. We hope you will go outside, look around and down, bend over, grab a little clump or mat, squint a bit, turn it over, smell it, and enjoy. You will need a hand lens of at least 10x power; 15x will be even better, but those are more expensive. These can be found online. The keys are written for use with a hand lens. No dissection scopes or compound microscopes are required. To look at leaves, bend the stem into a loop and hold the ends between the fingers (if the stem is long enough); the leaves will usually project outward along the curved stem and can be observed more easily. Place the hand lens in one hand and bring it up close to your eye; with the other hand bring the plant up close to the lens until it comes into focus. You will be able to see more through the lens if you keep the hand lens very close to your eye.

Before you use your lens, look at the general growth form of the plant. Are there stems and leaves, or is the plant body a flattened ribbon or a thumb-shaped strap growing flat on the substrate? Are the stems branched? Do they sit upright or creep along the ground or rock surface?

With your hand lens, look closely at the leaves (if they are present). Are they pointed or rounded? Are the tips furnished with a slender hair-point? Is there a tiny midrib running along the center of the leaf? Are they lobed or toothed? Are they wider at the base, at the middle, or at the tip? Can you see a little line along the edges where the edges are curled under? If there are no leaves (some liverworts), look for scales or fringes of hairs. You will be surprised at what you will be able to discover.

Now compare your plant with the features in the identification keys. Go first to the MASTER KEY TO THE MAIN GROUPS (next page). The bryophytes are separated into their two main groups: mosses first, followed by liverworts. Each group is prefaced by a key to the genera, which follow alphabetically. The keys are dichotomous. You are always presented with two choices; compare the choices with your plant in hand. Each choice then leads to two more choices, until one reaches the genus, which follows alphabetically. Compare your plant and substrate with the descriptive material and the illustrations. Various species are included in the illustrations, but our goal is that you recognize the major features associated with common genera; you will not always be able to identify the species with full confidence with only a hand lens.

Very few bryophytes have real common names, that is, names used by local folks out on a walk through the forest or meadow. But, many bryophytes have been given a made-up English name, mostly created by misguided academics and so-called educators who think that others are not intelligent enough to use or remember Latin names. They need to talk to any 10-year-old interested in dinosaurs or Harry Potter spells to disabuse themselves of this deceit. You will find no common names for the plants herein, other than the Latinized scientific names. Use them a few times (just pronounce every letter) and they will become common to you!

WHAT TO LEARN FIRST

A few mosses are so common that you will find one or more of them almost everywhere. Take a moment and study the pages for ***Bryum argenteum***, ***Ceratodon purpureus***, various ***Grimmia*** species, ***Roaldia revoluta***, and ***Syntrichia ruralis***. We're guessing you will find one of them the first time you go out exploring. See, you've already started!

MASTER KEY TO THE MAIN GROUPS

1 Plants with stems and leaves, not thalloid, often growing upright but also spreading flat on the substrate
  2 Leaves usually arranged spirally around the stem (but see *Fissidens*), the leaves rarely round, never lobed or deeply incised, a midrib often present; capsules usually opening by a rim of teeth at the top . .....**MOSSES** (p. 7)
  2 Leaves arranged in 2 opposing ranks, sometimes a 3rd rank on the underside of the shoot, the leaves usually round, lobed, or deeply incised, a midrib always absent; capsule opening by splitting into 4 valves .....**LEAFY LIVERWORTS** (p. 70)
1 Plants strap-shaped or ribbon-like and growing flat on the substrate (thalloid), lacking stems and leaves .. ..**THALLOUS LIVERWORTS** (p. 70)

MOSSES



LEAFY LIVERWORTS:



THALLOUS LIVERWORTS:





MOSSES

1 Leaves attached in two obvious rows on opposite sides of the stem
  2 Leaves appear to be arranged edgewise to the stem and split at the base, consisting of two sheathing blades which clasp the stem and base of the leaf above ..... **Fissidens**
  2 Leaves not placed edgewise to the stem or split at the base as above
    3 Prostrate shoots not branched; leaves distant and becoming gradually smaller toward the end of the stem; leaf edges with a border ..... **Plagiomnium**
    3 Prostrate shoots variously but obviously branched; leaves overlapping; leaf edges lacking a border. ..... **Neckera**
1 Leaves attached all around the stem (leafy stems sometimes flattened)
  4 Plants acrocarpous (sporophytes terminal on the stems); stems erect, mostly not branched or occasionally branched beneath inflorescences ..... **Group A** (below)
  4 Plants pleurocarpous (sporophytes lateral on the stems); stems mostly prostrate with lateral branches, often mat-forming ..... **Group B** (p. 41)

acrocarpous **pleurocarpous**


Group A: Plants acrocarpous

1 Leaves with a definite awn or hair-point, easily seen with a hand lens or even the naked eye
  2 Plants forming dense mats or cushions on rocks and boulders
    3 Leaves lacking a midrib ..... (go to pleurocarpous mosses) **Hedwigia**
    3 Leaves with a midrib (*Grimmia* and relatives; beware, this is a difficult group!)
      4 Leaves lacking a whitish awn or hair-point ..... **Schistidium**
      4 Leaves with a whitish awn or hair-point (capsules required from here on)
        5 Capsules sunken in the leaves, the stalks not visible
          6 Plants in flattened mats; leaves keeled ..... **Schistidium**
          6 Plants in rounded cushions; leaves pleated ..... **Coscinodon**
        5 Capsules emerging from the leaves, the stalks at least partly visible
          7 Stalk of capsule curled or coiled ..... **Grimmia**
          7 Stalk of capsule straight
            8 Most of the capsule stalk exceeding the leaves and easily visible ..... **Grimmia**
            8 Most of the capsule stalk not exceeding the leaves, but visible among the leaves
              9 Awns of the upper leaves usually as long as or longer than the blades .... **Coscinodon**
              9 Awns of the upper leaves usually shorter than the blades ..... **Grimmia**
  2 Plants not on rock, or sometimes on soil over rock
    10 Leaves narrowly lanceolate, 4-8:1, the bases expanded and sheathing the stem ..... **Polytrichum**
    10 Leaves broadly lanceolate to ovate, 1-3:1, the bases not sheathing
      11 Plants on bark; capsules sitting among the leaves, or partially emerging; leaves appressed and imbricated when dry (*O. diaphanum*) ..... **Orthotrichum** Group
      11 Plants on soil, soil over rock, sometimes on thin soil around tree bases; capsules immersed to exserted; leaves commonly contorted, crinkled, or coiled, when dry, but some also appressed and imbricated
        12 Whitish hair-point mostly shorter than the blades, firm ..... **Syntrichia**
        12 Whitish hair-point mostly longer than the blades, lax and thread-like ..... **Crossidium/Pterygoneurum**
1 Leaves lacking definite awns or hair-points, or the leaves merely awn-tipped (if uncertain, take this choice)
  13 Distal portion of leaves whitish, the entire plants generally appearing silvery-white ..... **Bryum**
  13 Distal portion of leaves not whitish, the plants generally not appearing silvery or whitish

14 Plants of marshes, seeps, springs, stream-sides, and other mostly constantly wet places
15 Stems lacking rhizoids
16 Stems 1-6 cm long; basal ¼-⅓ of leaf composed of clear white cells, distinctly set off from greenish more distal cells ..... **Eucladium**
16 Stems to 1.5 cm long; cells throughout the leaf all about the same .... **Didymodon** Group
15 Stems with usually copious rhizoids
17 Many of the stems ending a whorl of branches; male shoots topped with a crown-like splash cup; stems red ..... **Philonotis**
17 Most of the stems not branched at the ends; splash cups absent; stems red or not
18 Leaves pale green to yellowish green, almost transparent; stems dark but not red; some shoots terminated by bud-like growths (gemmae) on long stalks ..... **Aulacomnium**
18 Leaves green, hardly transparent; stems bright red; shoots lacking bud-like growths. ..... **Ptychostomum**
14 Plants of mostly drier substrates, only infrequently and temporarily wet from rains, run-off, flooding, etc.
19 Shoots markedly orange-reddish, only the upper portion greenish (sometimes all reddish); leaves folded lengthwise, with revolute edges (seen as a dark line) and toothed apices..... ..... **Bryoerythrophyllum**
19 Plants not as above, the shoots not orange-reddish, the leaves folded or plane, the edges revolute or not, the apices toothed or not
20 Stems covered with rhizoids; alar region orangish, plainly set off from rest of leaf base
21 Midrib covering about ⅓ or more the width of the leaf base ..... **Paraleucobryum**
21 Midrib covering no more than ¼ the width of the leaf base ..... **Dicranum**
20 Stems lacking rhizoids; alar region not orangish, visible or not
22 Leaves obviously coiled when dry
23 Leaves needle-like to narrowly lanceolate ..... **Ceratodon**
23 Leaves lanceolate to oblong
24 Plants dark green distally; stems to 1 cm long ..... **Weissia**
24 Plants yellowish green distally; stems to 2 cm long ..... **Pseudocrossidium**
22 Leaves straight, crumpled, crinkled, or irregularly curving, but generally not coiled when dry
25 Plants on boulders, large rocks, or bark
26 Capsules much exceeding the leaves on long setae, ridged at maturity, with a bulge on one side at the base; shoots very tightly disposed; leaves 1-3 mm long..... **Ceratodon**
26 Capsule at most only slightly exceeding the leaves on short setae, not ridge, lacking a bulge on one side at the base; shoots loosely disposed; leaves 2-5 mm long..... **Orthotrichum** Group
25 Plants on soil, sometimes thin soil over rocks
27 Leaves needle-like to linear or narrowly strap-shaped, 3-7 mm long
28 Leaves curving to flexuous when dry and wet, needle- to lanceolate, with a broad base abruptly narrowed to a needle-like blade; midrib filling the entire blade distally..... **Leptobryum**
28 Leaves coiled to crinkled when dry, rippled or wavy when wet, linear- to strap-shaped with ± parallel sides; midrib not filling the entire blade
29 Leaf edges toothed; lower ⅓ of leaf greenish; midrib prominent because of longitudinal plates (lamellae) ..... **Atrichum**
29 Leaf edges not toothed; lower ⅓ of leaf clear; midrib visible but not prominent, lamellae absent..... **Tortella**
27 Leaves lanceolate, ovate to oblong, 1-4 mm long
30 Leaves lanceolate
31 Stems reddish
32 Midrib prominently broadened at the base ..... **Ptychostomum**
32 Midrib not broadened basally ..... **Pohlia**
31 Stems not reddish, or so short to not be visible
33 Leaves strongly contorted when dry ..... **Ceratodon**
33 Leaves not much contored when dry ..... **Didymodon** Group
30 Leaves ovate, elliptic, to oblong

34 Plants tiny, 1-3 mm tall; leaves puffy-looking, the edges inrolled .....**Aloina**
34 Plants larger, or if tiny, then the leaves not as above
35 Leaves spirally contorted when dry
36 Leaves toothed..... **Mnium**
36 Leaves not toothed
37 Leaves strap-shaped, dull, not at all transparent..... .....**Barbula** Group
37 Leaves broadly ovate, shiny, somewhat transparent..... .....**Rosulabryum**
35 Leaves not spirally contorted when dry, but may be crinkled or crumpled
38 Leaves dull
39 Plants 10-30 mm tall; a cap covering the entire capsule, fringed below .....**Encalypta**
39 Plants 5-15 mm tall; a cap not covering the entire capsule, not fringed..... **Syntrichia** Group
38 Leaves shiny
40 Leaves generally widest about the middle; mouth of capsule offset to one side; plants lacking rhizoidal tubers ..... **Funaria**
40 Leaves generally widest below the middle; mouth of capsule symmetrical, not offset; plants commonly producing rhizoidal tubers ..... **Gemmabryum**

Aloina

HABIT: Plants upright, tiny, about 0.5 cm tall, almost solitary or in tufts.

LEAVES: in a basal rosette, ovate, puffy and deeply cupped, 1-3 mm long, the base expanded and somewhat sheathing, the edges infolded, the tips rounded, the midrib not visible with a hand lens (covered by microscopic filaments).

CAPSULES: cylindrical to ovoid, 2-3 mm long, on stalks 5-15 mm long.

HABITAT: Rock crevices and ledges, sandy soil,, deserts to forests.

REPRESENTATIVE SPECIES: a single species in New Mexico, ***Aloina rigida***.

Atrichum

HABIT: Plants upright, 2-8 cm tall, dark green, yellowing or browning in age, solitary or in loose tufts, the stems sparingly branched if at all.

LEAVES: oblong to ovate, 5-9 mm long, crisped and contorted when dry, flat, open, and cross-wrinkled when wet, the edges minutely toothed, the midrib easily visible (microscopically covered with longitudinal plates).

CAPSULES: cylindrical, inclined to curved, 2-7 mm long, on stalks 2-4 cm long.

HABITAT: Moist soil, disturbed banks or slopes, shady ground in the forests.

REPRESENTATIVE SPECIES: ***Atrichum selwynii***.

wet ***Atrichum selwynii*** dry

Atrichum selwynii showing longitudinal plates over the midrib

Aulacomnium

HABIT: Plants upright, pale yellow-green to brownish golden, densely leafy, the lower stems matted with brown fuzz (rhizoids); reproductive stems with terminal splash cups; some plants produce leafless stalks rising above the leaves and topped by round cluster of tiny points (asexual gemmae).

LEAVES: narrowly lanceolate, 2-4 mm long, narrowing to a point, the edges rolled under, the midrib extending nearly the full length, usually easy to see through the transparent leaves; dry leaves are crumpled and twisted, wet leaves are fuller and spreading.

CAPSULES: curved, ridged lengthwise, 2-4 mm long, on stalks 2-4 cm long.

HABITAT: Wetlands, fens, marshes, stream banks.

REPRESENTATIVE SPECIES: ***Aulacomnium palustre***

Barbula Group

HABIT: Plants upright, tiny, to about 1 cm tall, commonly yellowish green, loosely tufted to forming cushions,

LEAVES: oblong to ovate, 1-3 mm long, crumpled when dry, flat and open when wet, the tips rounded to pointed, the midrib extending the length of the blade, sometimes projecting as a minute point.

CAPSULES: upright, cylindrical, 1-2 mm long, the lid with a long beak, on stalks 1-2 cm long.

HABITAT: Moist soil, rock crevices and overhangs, often with limestone, garden plots, cement; deserts to mountains.

REPRESENTATIVE SPECIES: **1. *Streblotrichum convolutum*** leaves rounded at the tips. **2. *Barbula unguiculata*** leaves with a minute point at the tips.

Streblotrichum convolutum

Barbula unguiculata

Streblotrichum convolutum

Barbula unguiculata

Bryoerythrophyllum

HABIT: Plants upright, small, forming loose tufts or carpets, 1-2 cm tall, green distally, reddish brown proximally, the stems sometimes branched, orange-red.

LEAVES: lanceolate, 2-3 mm long, dull green near top of stem, reddish further down, spreading wide when wet, curling when dry, folded lengthwise, the midrib reaches the pointed (microscopically toothed) tip, the edges curled under (a dark line with a hand lens).

CAPSULES: slender, upright, 1-3 mm long, rusty-colored, on stalks to 1.5 cm long.

HABITAT: Soil, rock, ledges, bark, bluffs, moist banks; mountains.

REPRESENTATIVE SPECIES: A single species in New Mexico, ***Bryoerythrophyllum recurvirostrum***.

Bryum

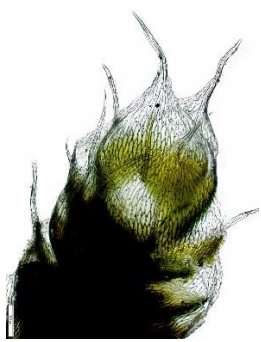
HABIT: Plants upright, silvery, white, to pale green when young, mostly no more than 1 cm tall, forming compact mats or low cushions, the stems strongly julaceous.

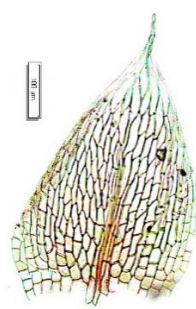
LEAVES: tiny, about 1 mm long, broadly ovate, often cupped, overlapping, whitish-colorless in the upper portion, green near the base, tapering abruptly to a point, the midrib mostly not visible with a hand lens, but extending to near the tip or into the terminal leaf point.

CAPSULES: cylindrical to pear-shaped, 1-2 mm long, hanging down from 1 cm long stalks.

HABITAT: Wide variety of dry substrates, often disturbed sites, hard soils, gravel, sand, concrete, stone, brick, pavement, cracks in sidewalks.

REPRESENTATIVE SPECIES: A single species in New Mexico: ***Bryum argenteum***.





Ceratodon

HABIT: Plants upright, forming low dense patches, cushions, or clumps, green to purplish, to 3 cm tall.

LEAVES: narrow-triangular, to 2 mm long, gradually tapering to a point, keeled, the edge is turned under, the midrib extends to the tip, which usually has microscopic teeth, needle-like and contorted or crumply/crinkly when dry, flattish and spreading when wet.

CAPSULES: inclined to horizontal, rusty-brown-purple, 1-2 mm long, longitudinally ridged in age, with a small bump on one side at the base, on purplish stalks 1-3 cm long.

HABITAT: Open, dry, disturbed soil, packed ground, burned area, also rock, asphalt and pavement cracks, roof tops.

REPRESENTATIVE SPECIES: A single, highly variable species in New Mexico, ***Ceratodon purpureus***.

Coscinodon

HABIT: Plants upright, in dense hoary cushions or mats, to 1.5 cm tall, olive-green to dark green or almost blackish

LEAVES: broadly lanceolate to ovate, 1-2 mm long, keeled toward the tip, the edge entire, often rolled under, the midrib extending into a whitish bristle-tip.

CAPSULES: bell-shaped to cylindrical, nestled among or exceeding the leaves, on stalks to 3 mm long.

HABITAT: Boulders and bedrock exposures, sandstone, shale, granite, basalt.

REPRESENTATIVE SPECIES: **1. *Coscinodon calyptratus*** leaves not pleated, capsules emerging from the leaves, the stalks commonly visible. **2. *Coscinodon cribrosus*** leaves pleated, capsules nestled among the leaves, the stalks not visible.

Coscinodon calyptratus

Coscinodon calyptratus

Coscinodon cribrosus

Coscinodon cribrosus

Crossidium / *Pterygoneurum*

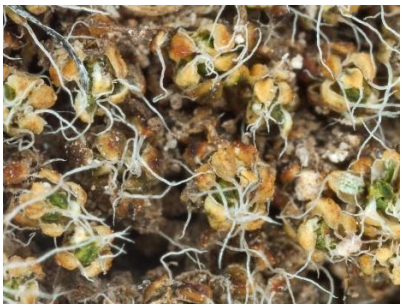
HABIT: Tiny upright plants, looking like minute greenish to brownish-reddish cabbages with white curly hairs, growing in scattered colonies to close clumps or mats, the stems to 1 cm long, often buried.

LEAVES: ovate, 1-3 mm long, broad-based, abruptly narrowed at the tip to a long, whitish thread-tip, the hair-point longer than the blade, straight to coiled when dry, the midrib covered with a mass of microscopic filaments or plates and appearing as a dark blotch with a hand lens.

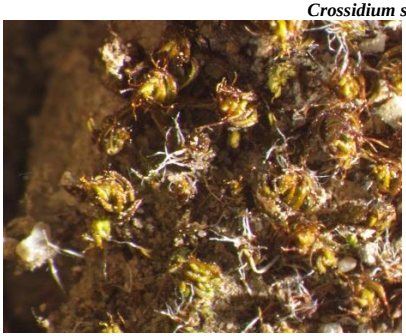
CAPSULES: cylindrical to goblet-shaped, 1-2 mm long, on stalks 1-3 cm long.

HABITAT: Soil, sand, and rocks, in shade or under vegetation but also sunny open sites, dry washes, soil crusts; mostly desert regions.

REPRESENTATIVE SPECIES: The genera and species are distinguished by microscopic features.

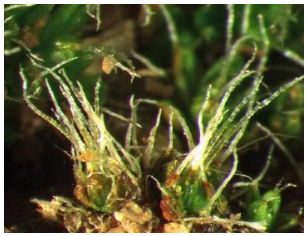



Crossidium squamiferum




Crossidium aberrans ***Crossidium crassinervium***


Pterygoneurum ovatum ***Pterygoneurum subsessile***



Pterygoneurum subsessile

Dicranum

HABIT: Plants upright, in mostly dense tufts, yellowish green to dark green, dull or shiny, the stems 1-10 cm tall, the stems covered with a dense white or brown fuzz.

LEAVES: narrowly lanceolate to hair-like,, narrowing from base to tip, 2-8 mm long, straight, sickle-shaped, or spirally contorted, the midrib running to the end of the leaf, more visible at the base, the outer basal shoulders orangish.

CAPSULES: upright to curved over, cylindrical, 1-4 mm long, on stalks 0.5-4 cm long.

HABITAT: Mountains, tree bases, rotting logs, on humus or organic soil, sometimes over rocks.

REPRESENTATIVE SPECIES: **1. *Dicranum montanum*** with tiny spirally contorted leaves when dry, gently curving when wet; straight capsules.. **2. *Dicranum rhabdocarpum*** with short, mostly straight leaves both wet and dry; straight capsules.

Dicranum montanum (dry)

Dicranum rhabdocarpum

Dicranum montanum (wet)

Dicranum rhabdocarpum

Dicranum montanum

Dicranum rhabdocarpum

Didymodon Group

HABIT: Plants upright, generally small, dull dark green, olive-colored, reddish, brownish, forming tufts, cushions, or sometimes mats, the stems to about 2 cm long.

LEAVES: lanceolate to ovate, crowded and overlapping, often coiled or curling when dry, mostly flat or folded and spreading when wet, the midrib extending to near the tip or into a tiny point.

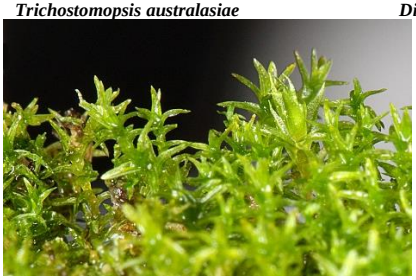
CAPSULES: cylindrical, upright to inclined, 1-3 mm long, on stalks 1-2 cm long.

HABITAT: Damp to wet calcareous rocks and soil, dripping cliffs and bluffs, sinks, ledges; also arid flats, concrete; deserts to mountains.

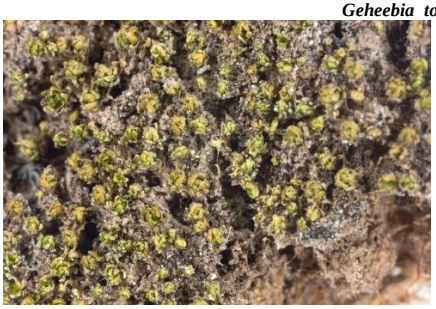
REPRESENTATIVE SPECIES:

Trichostomopsis australasiae

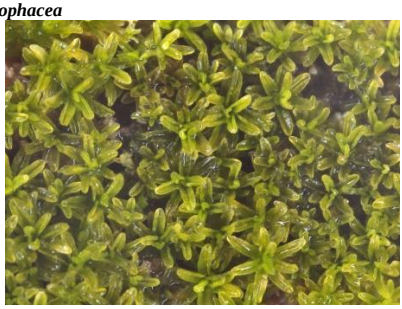
Didymodon rigidulus



Geheebia tophacea



dry



Husnotiella revoluta

wet

Vinealobryum vineale

Encalypta

HABIT: Plants upright, forming small tufts or colonies, the stems irregularly branched, sometimes fuzzy.

LEAVES: oblong to elliptic, dull, 3-6 mm long, round at the tip, sometimes with a hair-point, the edges usually flat, the midrib extending to near the tip or beyond.

CAPSULES: distinctive by the tubular hood (calyptra) that covers the entire capsule, the hood, 3-7 mm long, is fringed at the base and beaked at the tip, the capsule itself is smaller and hidden within the hood.

HABITAT: Shallow soil over rock, or in rock crevices, foothills and upwards in the mountains.

REPRESENTATIVE SPECIES:

Encalypta ciliata

Encalypta vulgaris

Encalypta procera

Encalypta rhaptocarpa

Encalypta procera

Encalypta ciliata

Enclaypta vulgaris

Eucladium

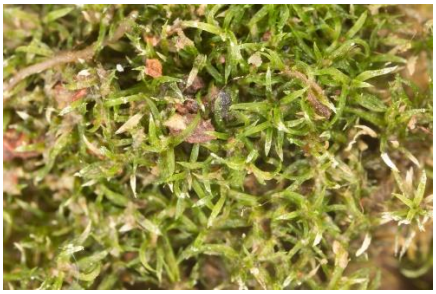
HABIT: Plants upright, forming deep tufts or cushions, yellow- to blue-green, 1-8 cm tall, often encrusted with lime or sediment, the stems forked with a whorl of leaves at the branching points,, yellowish brown proximally.

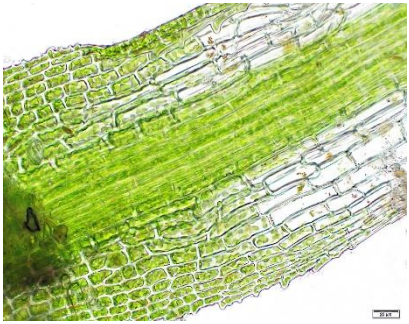
LEAVES: needle-like to narrowly lanceolate, 1-3 mm long, folded when dry, spreading when wet, the midrib thick, extending to the pointed tip, the base expanded, clear, microscopically toothed on the lower edges.

CAPSULES: rare, upright, ovoid to cylindrical, 1-2 mm long, on stalks to 1 cm long.

HABITAT: Wet rocks and cliff faces, soil, rotting wood, especially around seeps, springs, dripping cliffs; deserts to the mountains.

REPRESENTATIVE SPECIES: A single species in New Mexico, ***Eucladium verticillatum***.





Fissidens

HABIT: Plants upright, eventually forming dense or sometimes scattered mats, dark or sometimes light green, to about 5 cm tall but our plants much shorter, the leafy shoot feather- or fern-like, flattened.

LEAVES: attached on opposite sides of the stem in a two-sided arrangement, appearing to be arranged edge-wise and split at the base, ovate to lanceolate or oblong, the edges bordered, the midrib extending to nearly the tip.

CAPSULES: tiny, cylindrical cups, 1-2 mm long, on stalks 0.5-2 cm long.

HABITAT: Moist soil and rocks, often near water, moist to dry cliffs and ledges, one species in gypsum sinkholes.

REPRESENTATIVE SPECIES: **1. *Fissidens sublimbatus*** tiny plants, desert habitats. **2. *Fissidens crispus*** leaves contorted or twisted when dry. **3. *Fissidens littlei*** rare in gypsum sink holes in Doña Ana County.

wet

Fissidens sublimbatus dry

wet

Fissidens crispus dry

dry

Fissidens littlei wet

Funaria

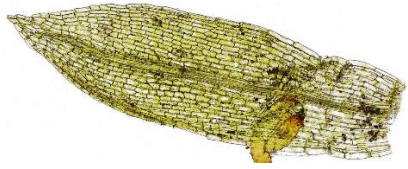
HABIT: Plants upright, small, pale green, to 1 cm tall, the stems reddish, with a rosette of leaves at the top (often at ground level), fuzzy-haired.

LEAVES: oblong-ovate, 2-4 mm long, transparent, the cells large and visible with a hand lens, the midrib extends to the minutely needle-like tip.

CAPSULES: Swollen pear shaped, 2-4 mm long, drooping, green with a red ring around the mouth when young, reddish brown and furrowed in age, the mouth offset to the side, on often curling stalks 2-5 cm long.

HABITAT: Disturbed ground, burned areas, campfire sites, roadsides, lawns, gardens, flower pots, crack in pavement.

REPRESENTATIVE SPECIES: ***Funaria hygrometrica***.



Gemmabryum

HABIT: Plants upright, small to medium-sized, in open to dense mats or turfs, 1-3 cm tall, green, yellow-green, to reddish, the stems bud-like to evenly leaved, commonly with specialized asexual reproductive bodies, such as tiny branchlets, bulblets, or brood bodies in the leaf axils or tiny tubers on the subterranean stems or rhizoids.

LEAVES: lanceolate to ovate or triangular, 1-3 mm long, spaced apart to strongly overlapping, generally erect when dry and not spirally twisted, the edges flat to rolled under.

CAPSULES: upright to inclined, 1-5 mm long, pear-shaped to ovoid.

HABITAT: Generally on soil or thin soil over rock, often periodically wet sites.

REPRESENTATIVE SPECIES: The species are told apart by technical and difficult microscopic features, but include the following:

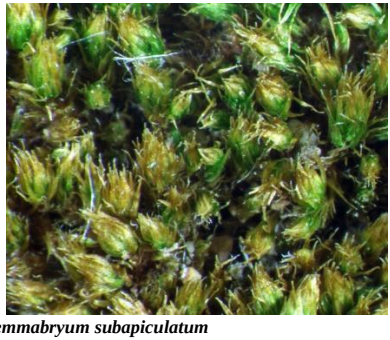
Gemmabryum caespiticium

Gemmabryum dichotomum with axillary bulblets

Gemmabryum subapiculatum

Gemmabryum valparaisense

both species with rhizoidal tubers



Gemmabryum subapiculatum

Gemmabryum dichotomum

Gemmabryum caespiticium

Grimmia

HABIT: Plants upright, in dense cushions to loose mats, olive-colored, dark blackish green, to rusty brown.

LEAVES: lanceolate, narrowly ovate, to oblong-ovate, cupped or keeled distally, 1-3 mm long, commonly with a whitish awn or bristle at the tip, these not longer than the blades.

CAPSULES: ovoid to goblet-shaped, nestled among the leaves to exserted beyond the leaves, the stalks straight to curved, 2-6 mm long.

HABITAT: Commonly rocks and boulders, sandstone, granite, basalt, also concrete and mortar, sometimes tree bases

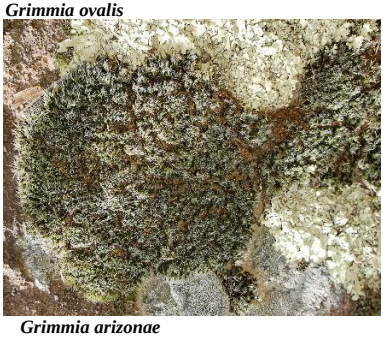
REPRESENTATIVE SPECIES:

Grimmia laevigata

Grimmia longirostris

Grimmia ovalis

Grimmia pulvinata



Grimmia arizonae

Grimmia crinitoleucophaea

Grimmia anodon

Leptobryum

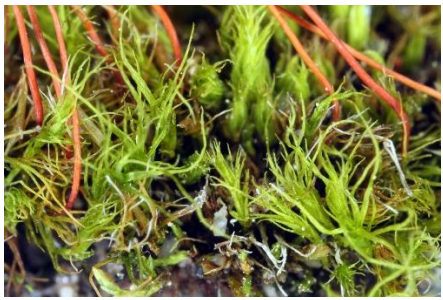
HABIT: Plants upright, loosely to densely tufted, green to yellowish green, the stems simple and slender, mostly less than 1 cm long/tall.

LEAVES: needle-like to narrowly lanceolate, the upper ones 2-4 mm long, the midrib road and occupying nearly the entire blade, visible at base of leaf.

CAPSULES: with a narrow base and a globe-like upper portion, on straight to curving stalks 1-3 cm long.

HABITAT: Wet or damp soil, rotten logs, rocks, sometimes a weed in greenhouses or similar sites.

REPRESENTATIVE SPECIES: a single species in New Mexico, ***Leptobryum pyriforme***.



Mnium

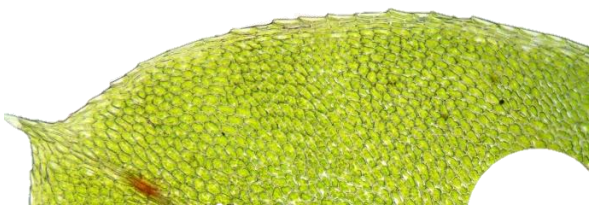
HABIT: Plants upright, in loose to compact tufts or mats, sometimes cushion-like, 2-4 cm tall, commonly dark green, often tinged with red, the stems reddish to brown, simple or branched distally.

LEAVES: elliptic, oblong, to reverse ovate, 2-7 mm long (the lower leaves much smaller), slightly transparent, often crisped or contorted, sometimes spirally twisted when dry, spreading when wet, flat, the edges bordered and with minute teeth at least near the tip, the midrib extending to near the tip or beyond.

CAPSULES: horizontal to drooping, oblong, 2-7 mm long, on stalks 1-5 cm long.

HABITAT: Wet to rather dry soil and humus, rock crevices, bases of fallen trees, rotting logs, along brooks.

REPRESENTATIVE SPECIES: Among several species, ***Mnium arizonicum*** is the most common.



Orthotrichum Group

HABIT: Plants upright, in loose or dense tufts or cushions, to 10 cm tall, often dark green to dark olive-colored, sometimes yellowish.

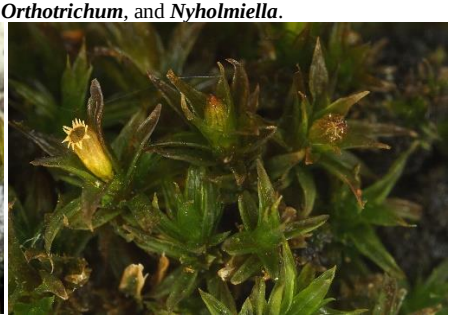
LEAVES: lanceolate, oblong to ovate, 2-5 mm long, overlapping on the stem, appressed when dry, spreading when wet, the edges rolled under, the midrib extending to near the tip, generally without an awn-tip.

CAPSULES: nestled among the leaves to exserted beyond, nearly globose to cylindrical, sometimes ribbed, sometimes with a hairy cap, on stalks to 6 mm long.

HABITAT: On tree trunks and branches, or rocks and boulders.

REPRESENTATIVE SPECIES: Including ***Lewinskya***, ***Orthotrichum***, and ***Nyholmiella***.

Orthotrichum anomalum



Orthotrichum diaphanum

Orthotrichum pumilum

Lewinskya rupestris

Nyholmiella obtusifolia

Lewinskya pycnophylla

Paraleucobryum

HABIT: Plants upright, in rather dense tufts and cushions to 4 cm tall, whitish green, grey-green, to yellowish green, brighter green when wet, the lower stems covered with fuzz.

LEAVES: linear, almost hair-like, 4-8 mm long, gently curving to sickle-shaped, the midrib covering ⅓ or more of the width of the leaf blade (pull off a leaf and examine its base to see the midrib).

CAPSULES: upright, cylindrical, 2-3 mm long, on stalks 1-2 cm long.

HABITAT: Mountains, on rocks or on soil over boulders, or rotting wood.

REPRESENTATIVE SPECIES: ***Paraleucobryum sauteri***.




Philonotis

HABIT: Plants upright, 3-10 cm tall, whitish, yellowish, to bluish green, the stems bright red, with brownish fuzz toward the base; often forked or by late season many shoots bear an irregular whorl of short branches at the tips; male plants with terminal splash cups.

LEAVES: narrowly triangular, 1-2 mm long, tapering to a sharp point, straight to sickle-shaped, sometimes pleated, the midrib extends to the tip, the edges are folded under, when dry the leaf base angles outward but the blade bends parallel to the stem

CAPSULES: globose when wet, ovate and furrowed when dry, horizontal, 2-3 mm long, on stalks 2-5 cm long.

HABITAT: Wet rocks and soil, along or in streams, seepy ground, ditch banks.

REPRESENTATIVE SPECIES: ***Philonotis fontana*** and ***Philonotis marchica*** told apart by microscopic features.

Philonotis fontana

Philonotis fontana

Philonotis fonatana

Philonotis marchica

Philonotis marchica

Philonotis marchica

Philonotis fonatana

Plagiomnium

HABIT: Plants upright, in dense to open mats, 2-6 cm tall, the stems green to yellowish green, the fertile stems upright, the sterile stems leaning to prostrate like runners, to 20 cm long.

LEAVES: appearing to be attached in two opposite, flattened rows, flat and spreading when wet, crinkled or contorted when dry, 3-6 mm long or sometimes more, toothed, the midrib extending to the tip, which is often pinched.

CAPSULES: horizontal to drooping, oblong, 2-5 mm long, on stalks 2-5 cm long.

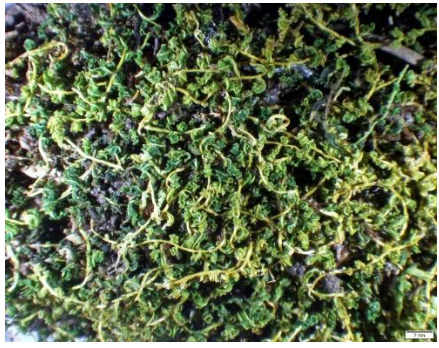
HABITAT: Damp to wet soil, humus, rotten logs, thin soil over rocks, along streams, seeps, and springs.

REPRESENTATIVE SPECIES:

wet

Plagiomnium medium dry

Plagiomnium cuspidatum



Plagiomnium ellipticum

Plagiomnium cuspidatum

Plagiomnium rostratum

Pohlia

HABIT: Plant upright, very small to large, green to yellow-green, shiny or dull, often in turfs, but also as scattered plants, to 10 cm tall but often much shorter, the stems commonly red, sometimes with a matted fuzz on the lower portion.

LEAVES: narrowly lanceolate to ovate, 1-4 mm long, clustered at the stem tip or scattered along the stem, the tips pointed, the edges bordered or not, the midrib extends to near the tip or beyond.

CAPSULES: inclined to horizontal, cylindrical to broadened at the far end, 2-6 mm long, on stalks 1-3 cm long.

HABITAT: Moist soil banks, logs, tree bases, rock crevices, shady ground, also disturbed sites.

REPRESENTATIVE SPECIES:

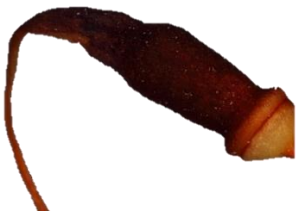
Pohlia bolanderi

Pohlia nutans

Pohlia elongata

Pohlia wahlenbergii

Pohlia wahlenbergii



Pohlia nutans

Polytrichum

HABIT: Plants upright, medium-sized to quite robust, in loose to compact tufts or colonies, 1-8 cm tall, dark green, blue-green, gray-green, to reddish green, arising from an underground stem, the aerial stems covered with minute fuzz (rhizoids), at least below and often throughout, the male stems crowned by orange splash cups.

LEAVES: narrowly lanceolate, with a clasping base, 4-8 mm long, the edges folded (inrolled) over much of the leaf, the midrib visible at the base, the tips needle-like.

CAPSULES: upright to horizontal, squarish, 2-5 mm long, covered with a hairy hood when young, on stalks 2-6 cm long.

HABITAT: Forest floors, well-drained ground, often in open areas, thin soil over rock, sometimes burned areas

REPRESENTATIVE SPECIES: **1. *Polytrichum juniperum*** leaves tipped by a rusty-colored awn. **2. *Polytrichum piliferum*** leaves tipped by a whitish awn.

Polytrichum juniperinum

Polytrichum juniperinum

Polytrichum juniperinum

Polytrichum juniperinum

wet

Polytrichum piliferum

dry

Pseudocrossidium

HABIT: Plants upright, in cushions or loose turf, to 2 cm tall, yellowish green to brownish or reddish brown.

LEAVES: lanceolate to ovate, 1-2 mm long, flat and spreading when wet, often spiraled when dry, the midrib thick and extending into the short-awned or rounded tip.

CAPSULES: upright, cylindrical, 1-3 mm long, on stalks 1-2 cm long.

HABITAT: Dry soil, sand, rock, limestone, sandstone, basalt; deserts to mountains.

REPRESENTATIVE SPECIES: **1. *Pseudocrossidium crinitum*** leaves tipped by a stout needle-point. **2. *Pseudocrossidium replicatum*** leaves blunt.

dry ***Pseudocrossidium crinitum*** wet

dry ***Pseudocrossidium replicatum*** wet

Pseudocrossidium crinitum ***Pseudocrossidium replicatum***

Ptychostomum

HABIT: Plants upright, in reddish to greenish turfs, to 4 cm tall.

LEAVES: shrunken or contorted when dry, spreading when moist, egg-shaped to lance-shaped, 1-4 mm long, the midrib usually extending out to a tiny needle-tip.

CAPSULES: nearly erect to inclined or drooping, 2-4 mm long, on stalks 1-3 cm long.

HABITAT: On wet to moist soil or rocks, beside ponds or seeps, along streams.

REPRESENTATIVE SPECIES:

Ptychostomum pseudotrichquetrum

Ptychostomum pallens

Ptychostomum creberrimum

Ptychostomum weigelii

Rosulabryum

HABIT: Plants upright, in open to dense turfs or mats, green to red-tinged, 0.5-6 cm tall, the stems commonly with a rosette of leaves toward the tip, sometimes with tiny tubers on the rhizoids.

LEAVES: ovate to tongue-shaped, commonly spirally twisted or contorted around the stem when dry, spreading when wet, 1-4 mm long, sometimes with tiny asexual reproductive bodies (gemmae or bulbils) in the axils, the midrib usually extending out to a tiny needle-tip.

CAPSULES: inclined to drooping, 2-6 mm long, on stalks 2-4 cm long.

HABITAT: On bark, rotten wood, rock, soil, shady soil banks.

REPRESENTATIVE SPECIES: ***Rosulabryum laevifilum*** is perhaps our most common species.

Rosulabryum laevifilum

Rosulabryum laeviffilum

Rosulabryum andicola

Rosulabryum laevifilum

Rosulabryum capillare

Rosulabryum laevifilum, with thread-like gemmae

rhizoidal tubers

Schistidium

HABIT: Plants upright, in dense cushions to loose mats, olive-colored, green, brownish or blackish green, often with orange or red tones.

LEAVES: lanceolate-ovate, cupped or keeled distally, 1-3 mm long, awnless to long-awned.

CAPSULES: nestled among the leaves, cylindrical to bell-shaped, the interior central column falling with the lid, on short, straight stalks.

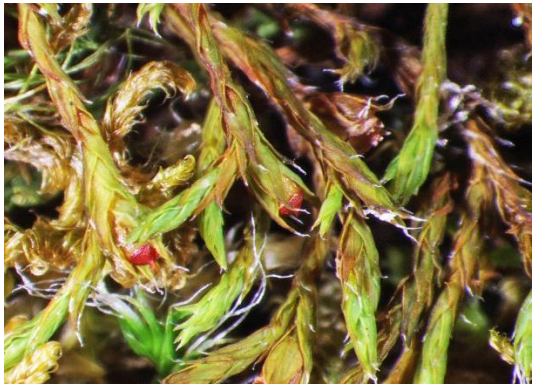
HABITAT: Rocks and boulders, cliffs, ledges, sandstone, granite, basalt, rarely tree bases.

REPRESENTATIVE SPECIES:

Schistidium ambiguum

Schistidium ambiguum

Schistidium frigidum



Schistidium papillosum

Schistidium rivulare

Schistidium rivulare

Syntrichia

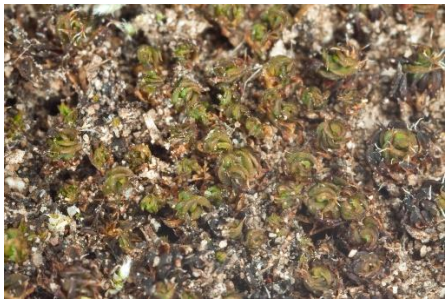
HABIT: Plants upright, in small to large tufts or loose cushions, 5-30 mm tall, dull green, yellowish, reddish brown, the shoots reddish below, the stems simple to forked.

LEAVES: spatulate, obovate, strap-shaped, commonly broadest toward the tip, 1-4 mm long, spreading to recurved when wet, twisted when dry, the midrib strong, extending to the tip or beyond as a bristle or awn.

CAPSULES: upright, mostly straight, cylindrical, red to brown,2-4 mm long, the terminal teeth prominently twisting, on stalks 1-2 cm long.

HABITAT: Rock crevices, bark, trunks, rock, soil; deserts to the high mountains.

REPRESENTATIVE SPECIES:



Syntrichia bartramii dry

Syntrichia laevipila with gemmae

Syntrichia norvegica

Syntrichia norvegica

wet

Syntrichia ruralis dry

Syntrichia ruralis

Syntrichia ruralis

Tortella

HABIT: Plants upright, in loose to dense tufts or cushions, 1-5 cm tall, dull green to yellow-green, the older parts turning brownish, their stems with a dense reddish fuzz (rhizoids).

LEAVES: narrowly lanceolate, 3-6 mm long, spreading when wet, curled and twisted when dry, the midrib extending to the pointed tip, the edges wavy when wet, the basal portion with a V-shaped transition from the green upper cells and the clear lower cells (strip leaf from stem).

CAPSULES: upright, cylindrical, 2-3 mm long, on stalks 1-3 cm long.

HABITAT: Rock crevices, soil in rock overhangs, sometimes also rotting wood; mountains.

REPRESENTATIVE SPECIES: ***Tortella tortuosa*** is our common species.

dry

wet

Weissia

HABIT: Plants upright, tiny, in low cushions or turf, sometimes scattered clumps, to 1 cm tall, green, yellow-green.

LEAVES: lanceolate, strap-shaped, to triangular, 1-3 mm long, spreading when wet, rolled and twisted when dry, the midrib extending to the tip, the edges rolled upwards.

CAPSULES: ovoid to cylindrical, 1-2 mm long, on stalks about 1 cm long.

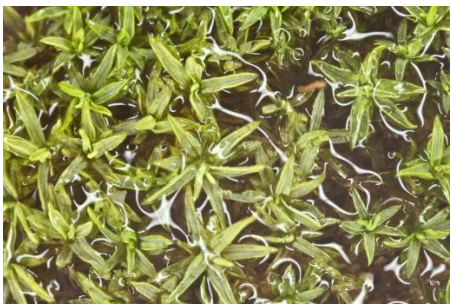
HABITAT: Soil, rocks, crevices; desert to mountains.

REPRESENTATIVE SPECIES:

Weissia controversa

Weissia controversa

Weissia ligulifolia



Weissia ligulifolia

Weissia controversa

Weissia ligulifolia

Group B: Plants pleurocarpous

1 Plants large, 4-10 cm tall, tree-shaped, with erect secondary stems bearing clusters of branches at the summit, on damp to wet soil and humus..... **Climacium**
1 Plants not as above
2 Plants 2- to 3-pinnate
3 Secondary fronds in raised, stair-step, horizontal layers, each frond produced on an arching branch; stem leaves nearly transparent, clearly exposing the red stems..... **Hylocomium**
3 Secondary fronds not as above; stem leaves green, obscuring the red stems..... **Thuidium**
2 Plants 1-pinnate or irregularly branched
4 Plants of frequently to constantly wet habitats, sometimes completely submerged or floating, growing in seeps, springs, streams, wet stream banks, bogs, fens, or marshy ground
5 Plants trailing in the current of streams; leaves 3-ranked, the branches triangular in cross-section ..... **Fontinalis**
5 Plants and leaves otherwise
6 Midrib essentially absent, very short and not visible with a hand lens (*H. lindbergii*)..... ..... **Hypnum** Group
6 Midrib present, generally visible with a hand lens
7 Plants tightly attached to acidic wet rocks in or adjacent to streams and waterfalls, often somewhat coppery in color ..... **Hygrohypnum** Group
7 Plants not so attached, but sometimes growing on rocks or in wet soil pockets on rock
8 Leaves markedly sickle-shaped, at least ½ of the leaf curving
9 Leaves obviously pleated, curving into loops
10 Paraphyllia present (tear off a leaf, usually visible with a hand lens)..... ..... **Palustriella**
10 Paraphyllia absent..... **Sanionia**
9 Leaves not pleated, curving into loops or not
11 Midrib extending nearly to tip of leaf, prominent ..... **Cratoneuron**
11 Midrib extending about halfway to tip of leaf, obscure ..... **Drepanocladus**
8 Leaves not sickle-shaped, sometimes the distal ¼ or less curving
12 Stems and branches mostly prostrate on the wet substrate; leaves about 1 mm long, nearly transparent..... **Amblystegium**
12 Stems and branches mostly ascending to erect, or if prostrate then leaves definitely longer than 1 mm
13 Alar region of large clear cells (strip a leaf from the stem) (*B. rivulare*)..... ..... **Brachythecium**
13 Alar region not of large clear cells
14 Stems red, usually with copious rhizoids (go to acrocarpous mosses)..... ..... **Philonotis**
14 Stems not red, lacking rhizoids
15 Midrib about ½ the leaf length..... **Leptodictyum**
15 Midrib extending into the leaf apex almost to the tip
16 Plants irregularly branched, not at all feather-like; old stems often with bristly remains of the leaf midribs ..... **Hygroamblystegium**
16 Plants pinnately branched, feather-like; old stems without bristly remains of leaf midribs..... **Cratoneuron**
4 Plants of drier habitats, not nearly constantly wet, sometimes along streams on drier ground
17 Leaves markedly sickle-shaped, at least ½ of the leaf curving
18 Leaves noticeably wrinkled cross-wise
19 Leaves acute-pointed..... **Rhytidium**
19 Leaves rounded apically (*A. minor*)..... **Anomodon** Group
18 Leaves not at all wrinkled cross-wise, but sometimes wrinkled/folded lengthwise
20 Leaves 3-4 mm long, most curved into loops..... **Sanionia**
20 Leaves 1-2 mm long, curved but not into loops..... **Hypnum** Group
17 Leaves not sickle-shaped, sometimes the distal ¼ or less curving
21 Leaves rounded or blunt at the tips; stems julaceous..... **Entodon**
21 Leaves noticeably acute-pointed at the tips
22 Leaves markedly white-tipped; plants forming loose mounds on boulders and cliff faces..... **Hedwigia**
22 Leaves not white-tipped; plants various, but generally not mounds on rock
23 Shoots large, strongly pinnate, commonly 5-16 cm long
24 Stems distinctly reddish, easily observable through the transparent stem leaves..... **Pleurozium**
24 Stems not or scarcely reddish, the stem leaves opaque..... **Abietinella**

23 Shoots smaller, irregularly branched or scarcely pinnate, rarely as much as 5 cm long
25 Stem and branch tips curved outward, away from the substrate; leaves tend to point to one side
26 Plants with tiny brood branchlets in the axils of the upper leaves, found by teasing the branch tips; on rock ..... **Platygyrium**
26 Plants lacking brood bodies; mostly on bark or wood
27 Capsules spreading to horizontal ..... **Homomallium**
27 Capsules upright ..... **Pylaisia**
25 Stem and branch tips not curved; leaves mostly pointing toward the branch tip; growing on various substrates
27 Midrib present, usually visible with a hand lens
28 Leaves about 2 mm long
29 Leaves longitudinally pleated ..... **Brachythecium**
29 Leaves not pleated ..... **Anomodon** Group
28 Leaves tiny, about 1 mm long
30 Plants forming soft, flexible mats, commonly green ..... **Amblystegium**
30 Plants forming thicker, stiffer mats, commonly green to straw-colored or golden
31 Midrib slender, obscure ..... **Brachytheciastrum**
31 Midrib stout, thick, visible with a hand lens (*Lescuraea. arizonae*) ..... **Pseudoleskeella** Group
27 Midrib absent or very short, not visible with a hand lends
32 Leaves concave, shiny, about 2 mm long (*H. cupressiforme*) ..... **Hypnum** Group
32 Leaves flat, not shiny, about 1 mm long or less
33 Leaves toothed ..... **Fabronia**
33 Leaves entire (*P. tectorum*) ..... **Pseudoleskeella** Group

Abietinella

HABIT: Plants form dull, dark olive-green to golden mats, stiff and wiry when dry, but more pliable and bushier when wet, the stems arching, once pinnate, feather-like, with a fuzzy covering of paraphyllia, seen when dry.

LEAVES: triangular (stem) to ovate (branch), the stem leave larger, 1-2 mm long, pleated, the midrib reaching to midleaf, orangish at the base, the tips narrowed to a long point.

CAPSULES: not seen in our plants, 2-3 mm long, on stalks 2-3 cm long.

HABITAT: Rock outcrops and forest floor, often at base of cliffs and rock faces

REPRESENTATIVE SPECIES: A single species in New Mexico, ***Abietinella abietina***.

stem leaf branch leaf

Amblystegium

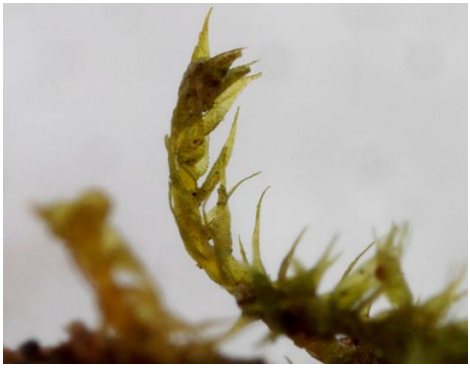
HABIT: Plants small, green to yellowish, the stems irregularly branched, forming soft mats, mostly prostrate.

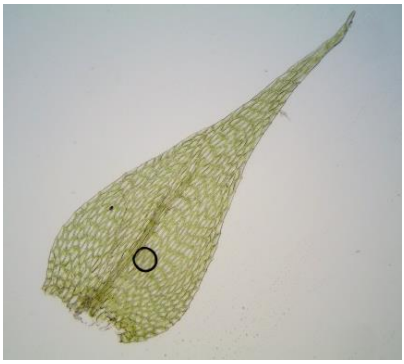
LEAVES: lanceolate to ovate, tiny, to 1mm long, straight, erect to spreading, not pleated, the edges flat, the tips acuminate, the midrib single, reaching about mid-leaf.

CAPSULES: not infrequent, inclined to horizontal, cylindric, curved, pinched immediately below the mouth.

HABITAT: Wet boulders and soil, bases of small trees or shrubs, exposed roots, rotten logs, streambanks.

REPRESENTATIVE SPECIES: A single species in the state, ***Amblystegium serpens***.





Anomodon Group

HABIT: Plants form thin to thick, shaggy mats, green, yellow-green, to dark olive-green, the stems are weakly pinnate (not feather-like).

LEAVES: lanceolate to ovate or strap-shaped, 1-2 mm long, the apices rounded and blunt to finely drawn out to a hair-like tip, the edges flat to rolled under, the midrib extending to nearly the leaf tip or beyond.

CAPSULES: upright, 1-3 mm long, on stalks 1-3 cm long.

HABITAT: Rock faces and boulders, bases of trees, fallen logs.

REPRESENTATIVE SPECIES: **1.** ***Pseudanomodon attenuatus*** leaves are acute, and the branch ends are either blunt and curled under or narrowed and stringy. **2.** ***Anomodon minor*** leaves are wrinkled and rounded at the tip. **3. Claopodium** ***rostratum*** leaves taper to a tiny white hair-like tip.

Pseudanomodon attenuatus

Anomodon minor

Claopodium rostratum

Pseudanomodon attenuatus

Anomodon minor

Claopodium. rostratum

Brachytheciastrum

HABIT: Plants in loose to dense mats or tufts, green, yellowish, to golden or red-brownish, the stems reddish, creeping to rarely erect, ours often julaceous, irregularly branched (not feather-like).

LEAVES: lanceolate to ovate, about 1 mm long or a bit longer, generally not pleated, concave to flat, the stem leaves larger than the branch leaves, the midrib about ½ to ¾ the leaf length.

CAPSULES: inclined to horizontal, reddish brown at maturity, on stalks about 1 cm long.

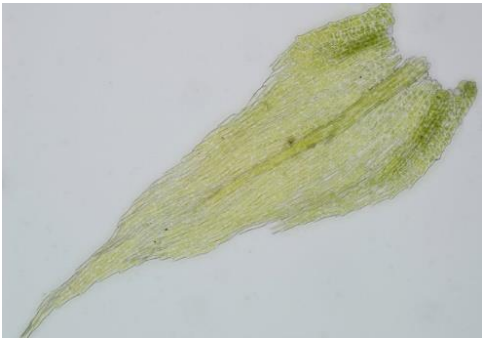
HABITAT: Dry to damp soil, humus, thin soil over rocks, decaying logs, on exposed tree roots, moist ledges, commonly in shady places.

REPRESENTATIVE SPECIES: **1. *Brachytheciastrum collinum*** with concave, ovate leaves on noticeably julaceous shoots. **2. *Brachytheciastrum fendleri*** with flat, lanceolate leaves on looser shoots.

Brachytheciastrum collinum

Brachytheciastrum fendleri

Brachytheciastrum collinum



Brachytheciastrum fendleri

Brachythecium

HABIT: Plants in loose to dense, shaggy mats, greenish to straw-colored or yellow-brown, the stems creeping to erect, densely covered with leaves, irregularly pinnate (not particularly feather-like).

LEAVES: lanceolate to broadly ovate or triangular, about 2 mm long, tightly overlapping to loosely spreading, weakly to strongly pleated, the tips abruptly to gradually drawn out to needle-tips, the midrib ½ to ¾ the leaf length, present but usually not prominent, the branch leaves smaller than the stem leaves.

CAPSULES: infrequent, inclined to horizontal, straight to curved, on stalks 1-2 cm long.

HABITAT: Dry, damp, to wet soil, rotting logs, springs and seepage areas, bases of trees.

REPRESENTATIVE SPECIES:

Brachythecium rivulare

Brachythecium salebrosum

Brachythecium salebrosum

Brachythecium ruderale

Brachythecium salebrosum

Climacium

HABIT: Plants relatively large, looking like miniature palm trees, the primary stems usually below ground, creeping, giving rise to erect, aerial secondary stems 3-7 cm tall, densely branched in the distal region, the branches ascending to spreading, the stems and branches reddish, with a minute coat of fuzzy paraphyllia.

LEAVES: 2-3 mm long, commonly pleated, those of the main stem ovate, cupped, widely spaced, clasping the stem; those of the branches lanceolate to long-triangular, overlapping, the distal edges toothed, the midrib strong, orangish at the base, with expanded lobes basally.

CAPSULES: rarely produced, 2-3 mm long, upright, on stalks 2-5 cm long.

HABITAT: Wet soil and humus in seepage areas, along streams, fens.

REPRESENTATIVE SPECIES: ***Climacium dendroides***.

Cratoneuron

HABIT: Plants medium-sized, green to yellowish, forming loose mats or erect tufts, the stems commonly prominently pinnately branched and feather-like.

LEAVES: triangular, straight to sickle-shaped, not pleated, longer than 1 mm, the stems leaves markedly larger than the branch leaves, the midribs strong, thick, dark.

CAPSULES: horizontal, curved, infrequent.

HABITAT: Damp or wet rocks, soil, and logs, often submerged in springs, ponds, or swamps.

REPRESENTATIVE SPECIES: A single species in New Mexico, ***Cratoneuron filicinum***.

Drepanocladus

HABIT: Plants small to large, green to yellowish, the stems sometimes pinnate and feather-like.

LEAVES: ovate, gradually narrowed to the tip, 1-5 mm long, mostly sickle-shaped, the midrib to about mid-leaf, not especially noticeable.

CAPSULES: horizontal, curved, infrequent.

HABITAT: Wet meadows, swamps, seepage areas, often among grasses and sedges, stream banks and ponds, waterfalls.

REPRESENTATIVE SPECIES: ***Drepanocladus aduncus***

Entodon

HABIT: Plants pleurocarpous, forming extensive, cushiony, glossy mats, green, yellow-green, to bronze or coppery colored in age or when dry, the stems creeping to sometimes ascending, julaceous, irregularly branched (not feather-like), the branches round to compressed in cross-section.

LEAVES: broadly lanceolate to ovate or oblong, 1-3 mm long, overlapping, not pleated, rounded to pointed at the tips, the edges entire, the midrib short and forked, scarcely or not visible with a hand lens, the tips rounded to pointed.

CAPSULES: infrequent to unknown in our species, upright, 1-3 mm long, on stalks 2-3 cm long.

HABITAT: Moist soil, shaded rocks and low boulders, cool mountain sites.

REPRESENTATIVE SPECIES:


Entodon concinnus

Entodon beyrichii

Entodon concinnus

Entodon schleicheri

Entodon concinnus

Entodon beyrichii

Entodon schleicheri

Fabronia

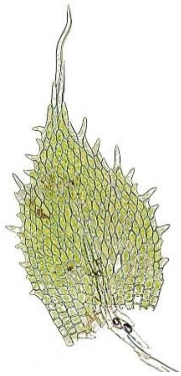
HABIT: Very small plants, often in silky mats, green to yellow-green, the stems creeping, irregularly branched, in scattered tufts.

LEAVES: tiny and difficult to observe with a hand lens, less than 1 mm long, overlapping when dry, spreading when wet, oblong to ovate, the edges flat, toothed or not, the tips hair-like, the midrib single, to about ⅓ the leaf length.

CAPSULES: upright, goblet-shaped, on stalks 2-4 mm long.

HABITAT: Shady sites on rock faces, bark.

REPRESENTATIVE SPECIES: ***Fabronia ciliaris*.**



Fontinalis

HABIT: Plants aquatic, glossy, green, olive-colored, to blackish, the stems tough, commonly denuded and stringy at the base trailing in flowing water, with rhizoids on the primary stems, the branches distant and sparingly rebranched.

LEAVES: lanceolate to ovate, sometimes narrower or broader, 2-8 mm long, arranged in 3 rows, flat to folded, the midrib absent (but sometimes simulated by the central fold).

CAPSULES: rare, 2-3 mm long, nearly sessile in the leaf axils.

HABITAT: In frequently flowing streams, ponds, ditches, floodplains.

REPRESENTATIVE SPECIES:

Fontinalis antipyretica

Fontinalis neomexicana

Fontinalis hypnoides

Fontinalis neomexicana

Fontinalis antipyretica

Hedwigia

HABIT: Plants form loose cushions on boulders; conspicuously different wet and dry; when dry, the plants are olive-green to grayish, the leaves tightly pressed against the branches, with whitish shoot tips, and the clump looks wormy or scraggly; when wet, the plants are brighter yellow green or brownish, the leaves spread outward from the stems, and the clump looks more bushy or cushiony.

LEAVES: ovate, 1-3 mm long, cupped, with whitish tips, lacking a midrib, the bases orangish.

CAPSULES: ball-shaped, tiny, orange, in the axils of the distal leaves on very short stalks and surrounded by fringed leaves.

HABITAT: Dry large rocks and boulders.

REPRESENTATIVE SPECIES: ***Hedwigia ciliata***.

Homomallium

HABIT: Plants in dense flat mats, dark green to yellowish, glossy, the stems creeping, irregularly branched, the branches curved upward and outward at the tips away from the substrate.

LEAVES: lanceolate to ovate, about 1 mm long, sometimes pointing in one direction away from the stem, not pleated, the edges usually flat, the tips abruptly drawn to a point, the midrib short and not visible with a hand lens.

CAPSULES: inclined to horizontal, on stalks to 1.5 cm long.

HABITAT: Tree bases, soil at base of trees, boulders.

REPRESENTATIVE SPECIES:

Homomallium mexicanum

Homomallium incurvatum

Homomallium mexicanum

Hygroamblystegium

HABIT: Plants forming small to large mats, greenish, sometimes yellow-green or blackish, the stems scraggly, irregularly branched.

LEAVES: lanceolate to ovate, mostly straight, not pleated, about 1 mm long, the edges flat, the midrib single, extending nearly to the leaf tip, usually noticeable with a hand lens, and remaining on old stems as bristles after the rest of the blade wears away.

CAPSULES: erect to inclined, cylindric, pinched below the mouth, on stalks 1-3 cm long.

HABITAT: Damp to wet soil, rocks, bases of trees, rotten wood, stream banks, ponds, usually shady places

REPRESENTATIVE SPECIES: A single variable species in the world, ***Hygroamblystegium varium***. Easily confused with *Leptodictyum riparium*, in which the midrib ends well below the leaf tip, and never remains on old stems as a tiny bristle.

Hygrohypnum Group

HABIT: Plants forming thick mats tightly attached to wet acidic rocks, dark green or blackish, green, to yellow-green, shiny when dry, encrusted with dirt, the stems prostrate to tufted, irregularly branched.

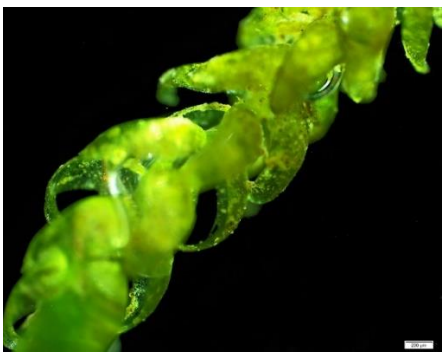
LEAVES: broadly lanceolate, ovate, to circular, straight to sickle-shaped, not pleated, 1-2 mm long, the edges flat, the midrib single or forked, extending to about midleaf, not easily seen with a hand lens.

CAPSULES: erect to inclined, curved, on stalks 1-2 cm long.

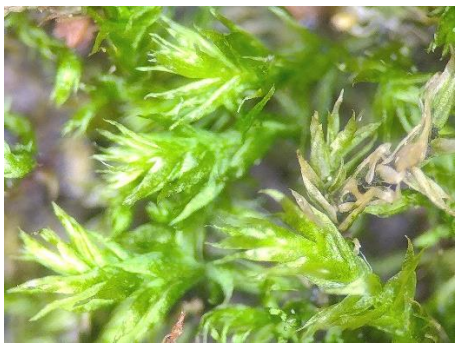
HABITAT: Tightly attached to wet acidic rocks in or adjacent to streams and waterfalls.

REPRESENTATIVE SPECIES: ***Platyhypnum molle*** with nearly circular leaves, ***Hygrohypnum luridum*** and ***Hygrohypnella ochracea*** with ovate to lanceolate leaves.

Platyhypnum molle



Hygrohypnella ochracea



Hygrohypnum luridum

Hygrohypnella ochracea

Platyhypnum molle

Hylocomium

HABIT: Plants medium- to large-sized, to about 20 cm tall/long, in layered tiers for each year, the stems regularly 2-3-pinnate, feather-like, the next year's growth arising from the back of the previous year's frond, the fronds about 2-4 cm long, the stems creeping to more commonly arching in a stair-step arrangement, red, with a fuzzy covering of paraphyllia.

LEAVES: ovate, cupped, sometimes pleated, abruptly narrowed to a long, crumpled tip, the midrib short and double, not visible with a hand lens, 2-3 mm long, the branch leaves smaller

CAPSULES: curved-horizontal, stubby, 2-3 mm long, on stalks 1-3 mm long.

HABITAT: Shaded forest floors, humus, rotten logs, at high elevations in the northern mountains.

REPRESENTATIVE SPECIES: A single species in New Mexico, ***Hylocomium splendens***.

Hypnum Group

HABIT: Plants in tufts or mats, yellowish, green, to coppery (when dry), glossy to dull, the stems creeping to sometimes erect, pinnately branched and feathery-looking.

LEAVES: narrowly to broadly ovate, 1-3 mm long, commonly sickle-shaped and all pointing downward, but also straight, not to strongly pleated, the edges often recurved, the midrib short and not visible with a hand lens, the tips pointed or drawn out to a fine hair-like point.

CAPSULES: curved-inclined, 2-3 mm long, on stalks 2-5 cm long.

HABITAT:

REPRESENTATIVE SPECIES: **1. *Roaldia revoluta*** is one of our most common mosses in the mountains. **2. *Hypnum cupressiforme*** with glossy, cupped, commonly straight, shell-like leaves. **3. *Calliergonella lindbergii*** in wet meadows and marshes in the northern mountains, large leaves.


Roaldia revoluta

Hypnum cupressiforme

Calliergonella lindbergii

Roaldia revoluta

Hypnum cupressiforme

Calliergonella lindbergii

Leptodictyum

HABIT: Plants medium-sized, green to yellow-green, in flat, loose, trailing mats, the stems irregularly branched, to 20 cm long.

LEAVES: lanceolate to oblong, 2-6 mm long, not pleated, the edges flat, entire, acute to drawn out into needle-tips, the midrib single, to the middle or beyond but not into the leaf tip.

CAPSULES: infrequent, inclined to horizontal, curved, on stalks 1-2 cm long.

HABITAT: Along rivers and streams, wet ditches, wet meadows, drinking troughs, aquatic on rocks in streams.

REPRESENTATIVE SPECIES: A single species in New Mexico, ***Leptodictyum riparium***.

Neckera

HABIT: Plants shelf-forming, light to dark green, turning brownish, sometimes yellowish, usually shiny, the stems creeping, clinging to the substrate, irregularly branched, the leafy shoots commonly flattened and the leaves appearing two-ranked.

LEAVES: oblong or ovate, large, 2-4 mm long, flat to cross-wrinkled, the midrib single or short and not visible, the tip rounded with a little point.

CAPSULES: cylindrical, 1-3 mm long, among the leaves on short stalks.

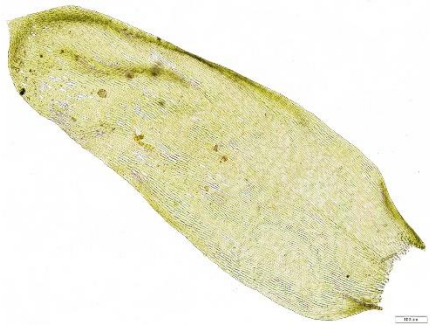
HABITAT: Shaded rock faces, boulders, tree trunks

REPRESENTATIVE SPECIES: **1.** ***Neckera pennata*** with cross-wrinkled leaves. **2.** ***Neckera menziesii*** with flat leaves and an obscure midrib.

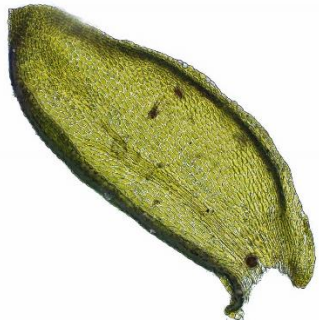
Neckera pennata

Neckera menziesii

Neckera pennata



Neckera pennata



Neckera menziesii

Palustriella

HABIT: Plants medium-sized to large, green to yellowish or brownish, growing in thick mats or deep tufts, the stems sparsely pinnately branched (not very feather-like) to irregularly branched, paraphyllia present and usually able to be seen with a hand lens by stripping off a leaf.

LEAVES: lanceolate, ovate, to somewhat triangular, 1-3 mm long, usually sickle-shaped, strongly pleated, the edges flat, the midrib strong but easily confused with the pleats in the leaf blade.

CAPSULES: horizontal, curved, not common, on stalks 1-2 cm long.

HABITAT: Wet soil and rock, stream banks, marshy ground, often partly submerged in springs or seepy areas.

REPRESENTATIVE SPECIES: A single species in the state, ***Palustriella falcata***.

o

paraphyllia

Platygyrium

HABIT: Plants forming dense mats, yellowish to brownish or coppery, glossy, the stems creeping, irregularly branched, the shoots with tiny, deciduous branchlets hidden in the upper leaves that can be popped out by teasing the shoot tips with a needle.

LEAVES: lanceolate to ovate, acute to acuminate, 1-2 mm long, overlapping, sometimes all drawn to one side, not to weakly pleated, the edges recurved, the midrib short, indistinct, not visible with a hand lens.

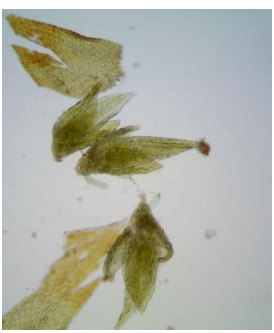
CAPSULES: upright, about 2 mm long, on stalks 1-2 cm long.

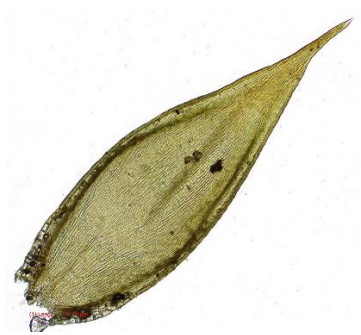
HABITAT: Old logs, tree stumps, damp boulders and rock faces, shaded stream banks.

REPRESENTATIVE SPECIES: ***Platygyrium fuscoluteum***.









Pleurozium

HABIT: Plants in large, thick, shaggy mats, with sprawling to upright sprays, bright green to yellowish, the stems irregularly pinnate (but not particularly feather-like), red, lacking a fuzzy layer of paraphyllia,

LEAVES: ovate to elliptic, 1-3 mm long, cupped or wrinkled lengthwise, the upper edges curl inward, creating a peaked tip, the outside lower shoulders orangish, the midrib short and double, not visible with a hand lens, the stem leaves larger than the branch leaves.

CAPSULES: curved-horizontal, about 2 mm long, on stalks 2-4 cm long.

HABITAT: Shaded forest floors, humus, rotten logs, at high elevations in the northern mountains.

REPRESENTATIVE SPECIES: A single species in New Mexico, ***Pleurozium schreberi***.

Pseudoleskeella Group

HABIT: Plants pleurocarpous, small, forming spreading, thin mats or patches, the branches narrow and tightly or weakly appressed to the substrate, sometimes covering large areas on boulders or cliff faces.

LEAVES: Ovate to lanceolate, flat to slightly pleated, the edges flat to recurved, the tips pointed but lacking a hair-point, the midrib prominent to nearly obsolete, the stem leaves somewhat larger and narrower than the branch leaves.

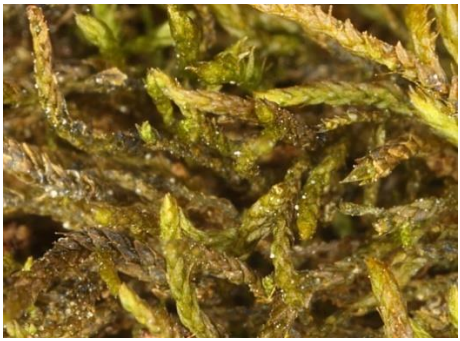
CAPSULES: not common on our plants, erect to inclined, cylindric, commonly curved, 1-2 mm long, the seta 1-3 mm long.

HABITAT: Shaded rock and boulder faces, tree bases, logs, thin soil over rock.

REPRESENTATIVE SPECIES: **1. *Pseudoleskeella tectorum*** mats are a darker green, the branches are thinner, the midrib is nearly absent, and the leaf edges are plane. **2. *Lescuraea arizonae*** mats are a lighter green, the branches are thicker, the midrib is prominent, and the leaf edges are curled under (seen as a darker line with the hand lens).

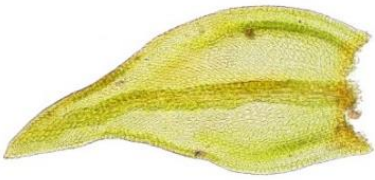
Lescuraea arizonae

Pseudoleskeella tectorum



Lescuraea arizonae

Pseudoleskeella tectorum



Lescuraea arizonae

Pseudoleskeella tectorum

Pylaisia

HABIT: Plants in low mats, green to yellowish, sometimes whitish, shiny, the stems creeping, regularly to irregularly pinnate (but not particularly feather-like), the branches crowded, curling upward and outward at the tips away from the substrate.

LEAVES: lanceolate to ovate, about 1 mm long, tapering to a long narrow tip, the edges flat, the midrib short and not visible with a hand lens, the leaves appressed when dry, spreading when wet.

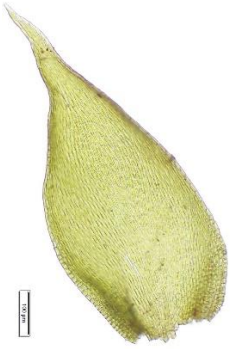
CAPSULES: upright, cylindrical, 1-2 mm long, on stalks to 1.5 cm long.

HABITAT: Tree trunks, rotting logs.

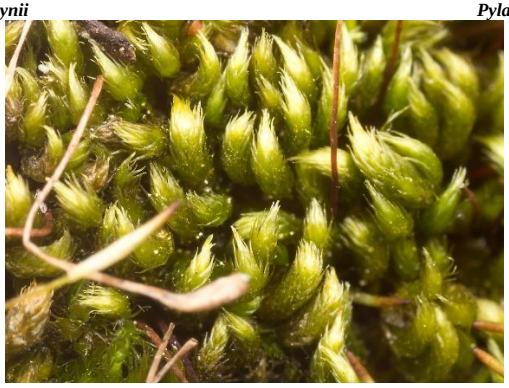
REPRESENTATIVE SPECIES:

Pylaisia polyantha

Pylaisia selwynii



Pylaisia selwynii



Pylaisia selwynii

Rhytidium

HABIT: Plants robust, olive-green to golden brown, forming loose, shaggy mats, the stems creeping to sometimes upright, often hooked at the tips like a scorpion, irregularly branched to somewhat feather-like, the shoots becoming plump when wet.

LEAVES: broadly lanceolate to ovate, sickle-shaped at the end of the stems, turned downward, 3-4 mm long, smaller on the branches, strongly wrinkled/pleated, the midrib extending to midleaf but hidden among the folds.

CAPSULES: rarely seen, inclined to horizontal, about 2 mm long, on stalks 2-3 cm long.

HABITAT: On rocks and boulders, cliffs, or thin soil over rock.

REPRESENTATIVE SPECIES: a single species in New Mexico, ***Rhytidium rugosum***.

Sanionia

HABIT: Plants commonly in dense tufts, usually bright green to shiny yellowish or golden, the stems irregularly branched, not feather-like.

LEAVES: narrowly lanceolate, 3-5 mm long, drawn out to long needle-like tips, strongly sickle-shaped, pleated, the edges flat, the midrib strong but easily confused with the pleats in the leaf blade.

CAPSULES: horizontal, curved, pinched beneath the mouth, on stalks 2-3 cm long.

HABITAT: on damp to dry soil, rocks, bases of trees, also frequently on rather wet ground in seepage areas, along streams, in the mountains.

REPRESENTATIVE SPECIES: A single species in the state, ***Sanionia uncinata***.

Thuidium

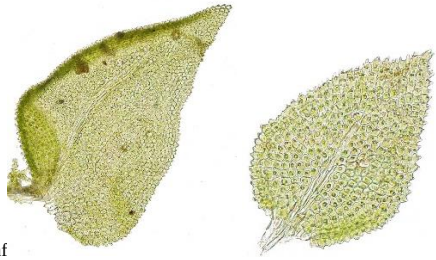
HABIT: Plants fern-like, forming mats of dull green to yellowish or bronze, the stems regularly 2-3-pinnate, feather-like, with a fuzzy covering of paraphyllia.

LEAVES: ovate, 1-2 mm long, smaller on the branches, tapering to a drawn-out point, not pleated, microscopically warty (papillose), the midrib single but obscure under a hand lens.

CAPSULES: curved-inclined, 2-4 mm long, on stalks 2-4 cm long.

HABITAT: Forest floor, rotting logs, shaded rocks, damp shady sites.

REPRESENTATIVE SPECIES: A single species in New Mexico, ***Thuidium delicatulum***.



stem leaf branch leaf

LIVERWORTS

1 Plants strap-shaped or ribbon-like and growing flat on the substrate (thalloid), lacking stems and leaves (thallous liverworts)
- 2 Plant body with a distinct midrib
  - 3 Thallus a single cell thick, translucent, 1-2 mm wide ..... **Metzgeria**
  - 3 Thallus 3 or more cells thick, opaque, 10-20 mm wide ..... **Marchantia**
- 2 Plant body lacking a midrib
  - 4 Plant body rolled up into a blackish tube when dry; ends of thalli with a clump of conspicuous, whitish scales ..... **Mannia**
  - 4 Plant body never rolled up into a tube; ends of thalli without a clump of whitish scales, but with purplish scales
    - 5 Thallus 10-20 mm wide, frequently with gemmae splash cups ..... **Marchantia**
    - 5 Thallus 6-8 mm wide, lacking gemmae cups ..... **Reboulia**

1 Plants with stems and leaves, not thalloid, the leaves arranged in 2 opposing ranks, sometimes with a 3rd rank on the underside of the shoot, the plants often growing upright but also spreading flat on the substrate (leafy liverworts)
- 6 Leaves simple-lobed, with the lobes adjacent to each other and not overlapping (not complicate bilobed as below)
  - 7 Leaves minute, about 0.5 mm wide or less ..... **Cephaloziella**
  - 7 Leaves larger, about 1 mm or more wide
    - 8 Leaves mostly 2-lobed ..... **Lophozia**
    - 8 Leaves mostly 4-lobed ..... **Barbilophozia**
- 6 Leaves deeply bilobed, the 2 lobes overlapping, one lobe lying over the other (complicate-bilobed)
  - 9 Underleaves (a 3rd row of leaves on the underside of the shoot) absent; gemmae often along the leaf edges ..... **Radula**
  - 9 Underleaves present; gemmae absent
    - 10 Shoots 3 mm or more wide; underleaves entire (smooth-edged) ..... **Porella**
    - 10 Shoots 1-2 mm wide; underleaves bilobed ..... **Frullania**

Barbilophozia

HABIT: Leafy liverwort; plants light to dark green (darker in the sun), 3-8 cm long, 2-5 mm wide, little-branched, with dense rhizoids on the stem.

LEAVES: squarish, 4-toothed/lobed, attached obliquely to the stem and often appearing succubous; underleaves small and inconspicuous, hidden in the rhizoids; gemmae absent or present

HABITAT: On rocks, boulders, cliffs.

REPRESENTATIVE SPECIES:

Barbilophozia barbata

Barbilophozia barbata

Barbilophozia hatcheri

Barbilophozia hatcheri

Barbilophozia lycopodioides

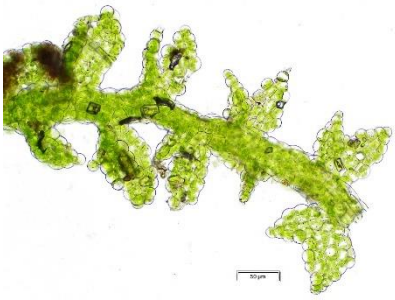
Cephaloziella

HABIT: Leafy liverwort; plants very tiny, light green to brownish or reddish or even blackish; little branched.

LEAVES: simple-lobed, distant along the stem, transversely attached, bilobed.

HABITAT: On rock, boulders, along stream beds.

REPRESENTATIVE SPECIES: ***Cephaloziella divaricata***.



Frullania

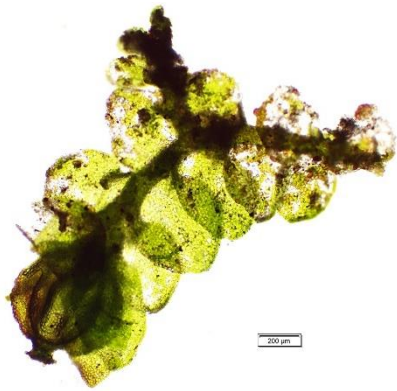
HABIT: Leafy liverwort.

LEAVES: complicate-bilobed, incubous, the larger lobe on top, the smaller ventral lobe helmet-shaped and connected by a small stalk to the upper lobe; also with bilobed underleaves.

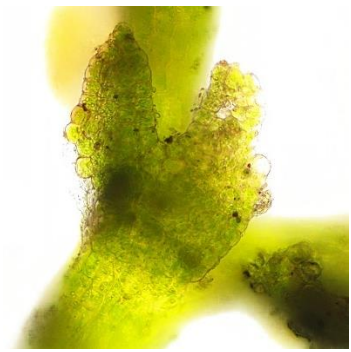
HABITAT: On boulders, cliffs, bark.

REPRESENTATIVE SPECIES:


Frullania riparia




Frullania inflata ventral lobe



Frullania inflata underleaf

Lophozia

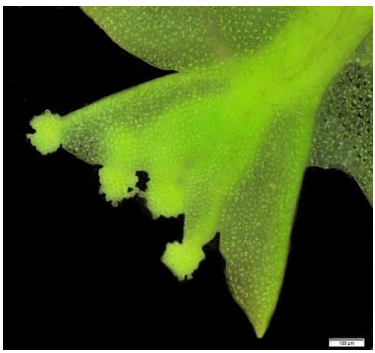
HABIT: Leafy liverwort; plants small, creeping, light green, sometimes becoming reddish in the sun; often with a dense, cabbage-like appearance.

LEAVES: succubous; simple, 2-lobed; commonly with gemmae on the edges; underleaves present or absent.

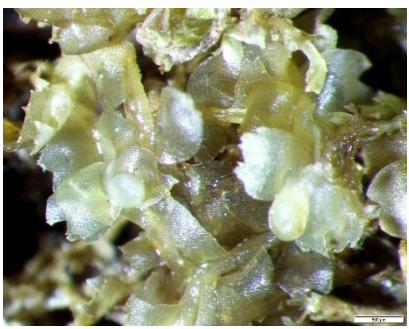
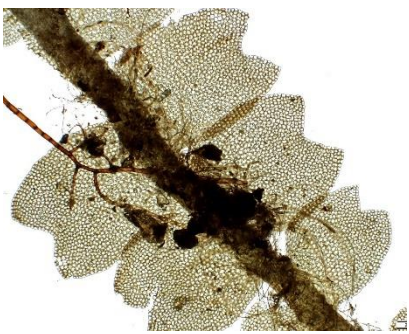
HABITAT: Damp outcrops, among springs, cliffs and ledges.

REPRESENTATIVE SPECIES:


Lophozia ventricosa



Lophozia ventricosa, leaf gemmae

Lophozia obtusa (mostly lacks leaf gemmae)

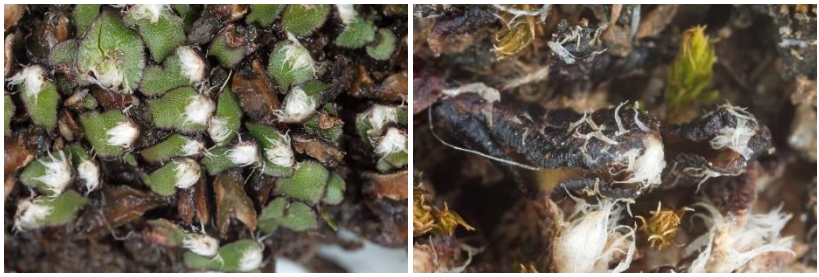
Mannia

HABIT: Complex-thallous liverwort.

THALLUS: gray-green, rolling into a tube when dry, the pores bounded by concentric rings of cells; fragrant when crushed.

HABITAT: On ledges, boulders, along seasonal drainages.

REPRESENTATIVE SPECIES: ***Mannia fragrans***.



moist ***Mannia fragrans*** dry

Mannia fragrans

Marchantia

HABIT: Complex-thallous liverwort.

THALLUS: Quite large, to 10 cm long and 2 cm wide, usually with a darkened midrib (absent in one subspecies); often with gemmae within splash cups

HABITAT: Often disturbed and shaded sites; along streams.

REPRESENTATIVE SPECIES: ***Marchantia polymorpha***.


thallus with a midrib

thallus without a midrib

splash cup with gemmae

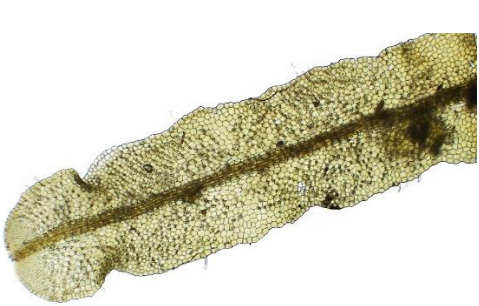
Metzgeria

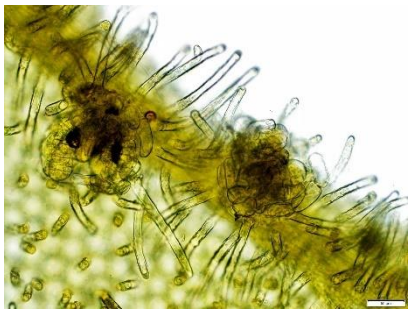
HABIT: Simple-thallous liverwort.

THALLUS: narrow and tongue- or ribbon-shaped, about 1-2 mm wide, with a distinct midrib, pale green, commonly forked at the ends, with minute hairs on the edges.

HABITAT: On rock, boulders, cliffs, ledges.

REPRESENTATIVE SPECIES: ***Metzgeria conjugata***.





Porella

HABIT: Leafy liverwort, growing in large mats, with pinnately branching shoots

LEAVES: complicate-bilobed, incubous, ovate, the dorsal lobe larger, the ventral lobe smaller; underleaves present, large, and smooth-edged; gemmae absent.

HABITAT: On rock surfaces and crevices, cliff faces.

REPRESENTATIVE SPECIES:

Porella platyphylla

Porella cordeana

Radula

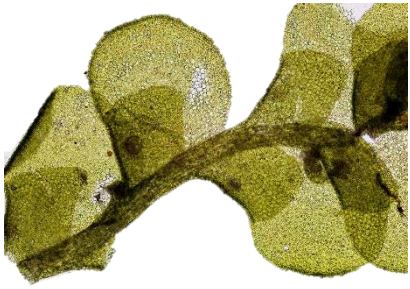
HABIT: Leafy liverwort, the plants small to medium-sized, yellow-green, irregularly branched.

LEAVES: complicate-bilobed, incubous, the lobes round, the larger lobe on top, the smaller lobe squarish and about ¼-⅓ the size; underleaves absent; gemmae often present on leaf edges.

HABITAT: On bark and rotting wood, rocks, boulders, cliff-faces.

REPRESENTATIVE SPECIES: ***Radula complanata***.



Reboulia

HABIT: Complex-thallous liverwort.

THALLUS: medium-sized, the segments 2-4 cm long, 6-8 mm wide, dull light green on top, generally not rolling up when dry, lacking a midrib, the pores encircled by rings of cells, the edges purplish.

HABITAT: On soil over rocks and boulders.

REPRESENTATIVE SPECIES: ***Reboulia hemisphaerica***.

PART III : REFERENCE

GLOSSARY

A

acrocarpous: with the gametophyte producing the sporophyte at the end of the stem or main branch. Most acrocarpous mosses grow erect in tufts, and they are not or only sparsely branched; see **pleurocarpous**.

acuminate. tapering to a slender apex, at first curving inward and then reversing direction and narrowing more gradually to a slender tip.

acute: terminating in a distinct but not protracted point, the converging edges separated by an angle of 45–90°.

alar cells: specialized cells at the basal angles of a leaf, often distinctive in their size, shape, color or ornamentation.

appressed: closely applied, as for leaves lying closely or flat against the stem.

ascending: sloping or curved upwards.

attenuate: tapering gradually.

awn: a hair point or bristle, usually hyaline and formed from the projecting costa.

axil: the angle between the stem and the leaf.

axillary: originating in a leaf axil.

B

beaked: having a slender point on the operculum or lid; rostrate.

blade; the flat portion of the leaf.

border: a edge that is differentiated in shape, size, color or thickness.

bryophyte: a non-vascular, green, land plant with a gametophyte generation that is free-living and a separate comparatively ephemeral sporophyte generation; a collective name for mosses, liverworts, and hornworts.

bulbiform: bulb-shaped.

bulbil: a small deciduous, bulb-shaped, axillary, vegetative propagule; often with rudimentary leaves.

C

calyptra (pl. **calyptrae**)**:** a thin hood covering the lid of the capsule; derived largely from the archegonial venter.

capsule: the terminal, spore-producing part of a moss sporophyte.

complicate-bilobed: having two unequal leaf lobes with the smaller lobed folded against the larger

crisped (or **crispate**)**:** strongly curled, twisted and contorted.

D

decurrent: applied to the basal edges of leaves that extend down the stem, as ridges or narrow wings, below the insertion of the leaf.

distal: away from the base or point of attachment; the converse of **proximal**.

distant: widely spaced, e.g. leaves with space between adjacent leaves.

distichous: leaves alternating in two opposite rows on a stem, as in *Fissidens*.

dorsal: upper; in liverworts, the top surface away from the substrate.

E

elliptical: having the shape of an ellipse, oblong but convex at the sides and ends.

emergent: partly exposed, as a capsule only partly protruding from among the perichaetial leaves.

entire: with a smooth outline, not toothed or lobed.

erect: upright, almost parallel to main axis (such as leaves to a stem), but not appressed.

exserted: exposed, as in a capsule protruding beyond the perichaetial leaves.

F

filamentous: thread-like.

filiform: very slender and elongate, thread-like.

flexuose: wavy or twisted.

fringed: with a short-ciliate margin or edge.

frond: the branched or leafy part of an erect stem; adj. **frondose**.

G

gametophyte: the plant generation that produces the gametes (egg and sperm); in bryophytes, this is the green plant that we commonly see.

gemma (pl. **gemmae**)**:** uni- or multi-cellular, globose, clavate, filiform, cylindrical, or discoid structures, borne on the aerial part of the plant and functioning in vegetative reproduction.

H

habit: general appearance.
hair point: the hair-like and often colorless leaf tip, formed from an excurrent costa or a tapering of the leaf lamina.
heteromorphic: having two or more different shapes or phases.
hoary: greyish or whitish, appearing frosted from numerous massed hair points.

I

imbricate: closely appressed and overlapping.
immersed: submerged below the surface; immersed capsules occur below the tips of the perichaetial leaves; immersed stomata have guard cells that are sunken below the surrounding exothecial cells.
inclined: applied to a capsule that is tilted between the vertical and horizontal.
incubous: in liverworts, with leaves in dorsal view overlapping so that each leaf lies on top of the next leaf distal to it; compare **succubous**.
incurved: curved upward and inward, the opposite of **recurved**; applied to leaf edges and tips.
inflated: swollen, puffed up.

J

julaceous: smoothly cylindrical; applied to rounded shoots with crowded, imbricate leaves.

L

lamella (pl. **lamellae**)**:** a longitudinal ridge, sheet, or plate on the leaf blade of some mosses (e.g. Polytrichaceae).
lanceolate: shaped like the blade of a spear, narrow and tapered from near the broader base.
lax: soft or loose, commonly referring to a tissue of large, thin-walled cells as well as the spacing of leaves.
lid: operculum.
linear: very narrow and elongate, with the sides nearly parallel; narrower than **ligulate**.

M

mat: a densely interwoven, horizontal growth form.

N

neck: the sterile basal part of moss capsule; also the cylindrical upper part of an archegonium.

O

ob-: a prefix indicating inversion, as in **obovate**.
oblanceolate: reverse-lanceolate, with the narrow end lowermost.
oblong: rectangular and usually rounded at the corners.
obovate: with the reverse profile of an egg, the broad end distal.
obtuse: broadly pointed, at an angle of greater than 90°; sometimes used loosely to indicate blunt.
ovate: with the profile of an egg, the base broader than the apex and about twice as long as wide.
ovoid: usually of solid objects, like capsules, ovate or oval in outline.

P

paraphyllium (pl. **paraphyllia**)**:** small, green, filiform, lanceolate, or leaf-like scales or outgrowths borne superficially on the stems between branches of many pleurocarpous mosses; see also **pseudoparaphyllia**.
pinnate: with spreading branches on either side of a stem, rather like a feather.
pleurocarpous: having sporophytes produced laterally on short, usually specialized branches rather than from the apex of the main stem; mosses with stems usually prostrate, creeping, and freely branched, growing in flattish mats rather than erect tufts; see **acrocarpous**.
prostrate: lying flat on ground.
proximal: the part nearest to the base or place of origin.

Q

quadrate: usually of cells, square or nearly so.

R

recurved: curved down (abaxially) and inward, the opposite of **incurved**; in leaves referring to edges, apices, or marginal teeth; in the peristome, teeth curved outward and ± downward.
reflexed: bent down (abaxially) and inward, the opposite of **inflexed**; generally referring to leaf edges or leaves of a stem.
rhizoids: filamentous, branched outgrowths from the stems serving to attach the moss to the substratum; sometimes called radicles.
rosette: the leaves clustered and spreading in rose-like fashion.

S
sheathing: surrounding or clasping a stem, seta, or capsule.
shoulder: the distal part of the leaf base where it is abruptly narrowed to the upper lamina or limb.
splash-cup: a cup-shaped androecium in which the dispersal of antherozoids is aided by the action of falling raindrops.
sporophyte: the plant generation that produces spores, initiated by the fertilization of an egg; consists of foot, seta and capsule; attached to and partially dependent on the gametophyte.
spreading: of leaves inserted at 46–90° to the stem; said to be widely spreading when close to 90°.
substrate: the surface on which a moss grows, e.g. soil, bark, or rock.
succubous: in liverworts, with leaves in dorsal view overlapping so that each leaf lies under the next leaf distal to it; compare **incubous**.

T
thalloid: like a thallus, flat and ribbon-like, not leafy.
thallus (pl. **thalli**)**:** a flat plant body, not differentiated into stems and leaves
transverse: in liverworts, leaves attached at a 90° angle to the stem; neither incubous nor succubous (*q.v.*)
tuber: a gemma borne on rhizoids, usually underground.
tuft: a growth form with stems erect but radiating at the edges and forming small cushions.

U
underleaves: a 3rd row of leaves found on the underside of some leafy liverworts
undulate: wavy.

V
verticillate: whorled, with three or more branches arising from the same point.
ventral: lower; in liverworts, the surface toward the substrate.

W
weft: a loosely interwoven growth, often somewhat ascending.
whorled: arranged in a ring or circle, often with numerous branches.

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