FLORA NEOMEXICANA

IV : BRYOPHYTES

(MOSSES & LIVERWORTS)

Kelly W. Allred
Russ Kleinman
Karen S. Blisard

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Front Cover: top – *Fabronia ciliaris* (Bridel) Bridel.
bottom – *Bartramia ithyphylla* Bridel
Back Cover: top – *Mannia californica* (Gottsche ex Underwood) L.C. Wheeler.
bottom – *Conocephalum salebrosum* Szweykowski, Odrzykoski, & Buczkowska

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INTRODUCTION

THIS IS THE FOURTH VOLUME IN THE FLORA NEOMEXICANA SERIES. Volume I presents a verified, annotated, and updated checklist of the names of all land plants (Embryophytes) occurring in the state. Volume II introduces the meaning and etymology of each of these names. Volume III provides a means of identifying the vascular plants in New Mexico. And now, **Volume IV** presents the first full account of the **Bryophytes (mosses & liverworts)** occurring in the state, including identification keys, descriptions, distribution maps, and illustrations. Updated editions of Volumes I and II are published concurrently with this first edition of Volume IV so that all volumes agree as to the names and occurrence of the land plants of New Mexico.

Volume I (Annotated Checklist) of the series gives brief accounts of the climate, geologic history, soils, ecoregions, vegetation types, and botanical history of New Mexico, so that information is not repeated here.

All volumes of the FLORA NEOMEXICANA series are available at lulu.com (print editions) or at floraneomexicana.org (pdf versions).

A note about common names. There are very few, if any, common names in use for New Mexico bryophytes. We take a stand against obviously contrived, so-called common names, so often ludicrous and unattractive, and do not promulgate their use herein. It is nonsensical to duplicate our long-standing and effective binomial system of scientific nomenclature with a parallel and artificial English-language hierarchy. Let the scientific names become your common names!

OUTLINE OF THE CLASSIFICATION OF NEW MEXICO BRYOPHYTE FAMILIES & GENERA

Adapted with modifications from the following:

Brinda, J.C. & J.J. Atwood (eds.). 2023. *A Classification of the Bryobiotina*. https://www.bryonames.org/nomenclator.

FNA: Flora of North America Editorial Committee (eds.). 2007, 2014. Flora of North America North of Mexico, Bryophyta. Vols. 27, 28. New York & Oxford.

Goffinet B. & W.R. Buck. 2023. Classification of the Bryophyta. On-line version available at http://bryology.uconn.edu/classification/. Checked on 11 Sep 2023.

Mosses

Amblystegiaceae: *Amblystegium, Campylium, Campylophyllopsis, Conardia, Cratoneuron, Drepanocladus, Hygroamblystegium, Hygrohypnella, Hygrohypnum, Leptodictyum, Palustriella, Platyhypnum, Pseudoamblystegium, Sanionia, Scorpidium, Tomentypnum.*

Amphidiaceae: *Amphidium.*

Andreaeaceae: *Andreaea.*

Anomodontaceae: *Anomodon, Haplohymenium.*

Aulacomniaceae: *Aulacomnium.*

Bartramiaceae: *Anacolia, Bartramia, Philonotis.*

Brachytheciaceae: *Brachytheciastrum, Brachythecium, Eurhynchiastrum, Oxyrrhynchium, Rhynchostegium, Sciuro-hypnum, Scleropodium.*

Bryaceae: *Anomobryum, Brachymenium, Bryum, Gemmabryum, Imbribryum, Leptostomopsis, Plagiobryoides, Ptychostomum, Rhodobryum, Rosulabryum.*

Bryoxiphiaceae: *Bryoxiphium.*

Calliergonaceae: *Sarmentypnum, Straminergon, Warnstorfia.*

Climaciaceae: *Climacium.*

Dicranaceae: *Dicranella, Dicranum, Paraleucobryum.*

Distichiaceae: *Distichium.*

Ditrichaceae: *Ceratodon.*

Encalyptaceae: *Encalypta*

Entodontaceae: *Entodon.*

Fabroniaceae: *Fabronia.*

Fissidentaceae: *Fissidens.*

Flexitrichaceae: *Flexitrichum.*

Fontinalaceae: *Fontinalis.*

Funariaceae: *Entosthodon, Funaria, Physcomitrium, Pyramidula.*

Grimmiaceae: *Bucklandiella, Coscinodon, Grimmia, Jaffueliobryum, Niphotrichum, Schistidium.*

Hedwigiaceae: *Braunia, Hedwigia.*

Helodiaceae: *Helodium.*

Hylocomiaceae: *Hylocomiastrum, Hylocomium, Pleurozium.*

Hymenolomataceae: *Hymenoloma.*

Hypnaceae: *Hypnum.*

Jocheniaceae: *Jochenia.*

Leskeaceae: *Claopodium, Haplocladium, Leskea, Lindbergia.*

Leucobryaceae: *Brothera, Campylopodiella, Campylopus.*

Mniaceae: *Mnium, Plagiomnium, Pohlia, Rhizomnium.*

Neckeraceae: *Neckera, Pseudanomodon.*

Orthotrichaceae: *Lewinskya, Nyholmiella, Orthotrichum, Zygodon.*

Plagiotheciaceae: *Isopterygiella, Plagiothecium, Platydictya, Redfearnia.*

Polytrichaceae: *Atrichum, Meiotrichum, Polytrichastrum, Polytrichum.*

Pottiaceae: *Acaulon, Aloina, Barbula, Bryoerythrophyllum, Chenia, Chionoloma, Crossidium, Crumia, Didymodon, Eucladium, Geheebia, Gertrudiella, Gymnostomum, Hennediella, Husnotiella, Hydrogonium, Hymenostylium, Leptodontium, Microbryum, Molendoa, Ozobryum, Pleurochaete, Pseudocrossidium, Pterygoneurum, Rhexophyllum, Stegonia, Syntrichia, Tortella, Tortula, Trichostomopsis, Trichostomum, Vinealobryum, Weissia.*

Pseudoleskeaceae: *Lescuraea.*

Pseudoleskeellaceae: *Pseudoleskeella.*

Ptychomitriaceae: *Ptychomitrium.*

Pylaisiaceae: *Buckia, Calliergonella, Homomallium, Pylaisia, Roaldia.*

Pylaisiadelphaceae: *Isopterygium, Platygyrium.*

Rhabdoweisiaceae: *Arctoa, Cynodontium, Dichodontium, Dicranoweisia, Oncophorus, Symblepharis.*

Rhytidiaceae: *Rhytidium.*

Sphagnaceae: *Sphagnum.*

Splachnaceae: *Tayloria.*

Stereophyllaceae: *Stereophyllum.*

Taxiphyllaceae: *Leptopterigynandrum, Taxiphyllum.*

Tetraphidaceae: *Tetraphis*
Thuidiaceae: *Abietinella, Herpetineuron, Thuidium.*
Timmiaceae: *Timmia.*

Liverworts

Adelanthaceae: *Syzygiella.*
Anastrophyllaceae: *Barbilophozia, Neoorthocaulis.*
Aytoniaceae: *Asterella, Mannia, Plagiochasma, Reboulia.*
Blepharostomataceae: *Blepharostoma.*
Cephaloziaceae: *Cephalozia, Fuscocephaloziopsis, Odontoschisma.*
Cephaloziellaceae: *Cephaloziella.*
Cleveaceae: *Clevea.*
Conocephalaceae: *Conocephalum.*
Dumortieraceae: *Dumortiera.*
Fossombroniaceae: *Fossombronia.*
Frullaniaceae: *Frullania.*
Geocalycaceae: *Geocalyx.*
Jungermanniaceae: *Gymnocolea, Jungermannia, Liochlaena.*
Lepidoziaceae: *Lepidozia.*
Lophocoleaceae: *Chiloscyphus, Lophocolea.*
Lophoziaceae: *Leiocolea, Lophozia.*
Marchantiaceae: *Marchantia.*
Metzgeriaceae: *Metzgeria.*
Obtusifoliaceae: *Obtusifolium.*
Oxymitraceae: *Oxymitra.*
Pelliaceae: *Apopellia, Pellia.*
Plagiochilaceae: *Plagiochila.*
Porellaceae: *Porella.*
Radulaceae: *Radula.*
Ricciaceae: *Riccia.*
Scapaniaceae: *Scapania, Schistochilopsis.*
Solenostomataceae: *Solenostoma.*
Targioniaceae: *Targionia.*

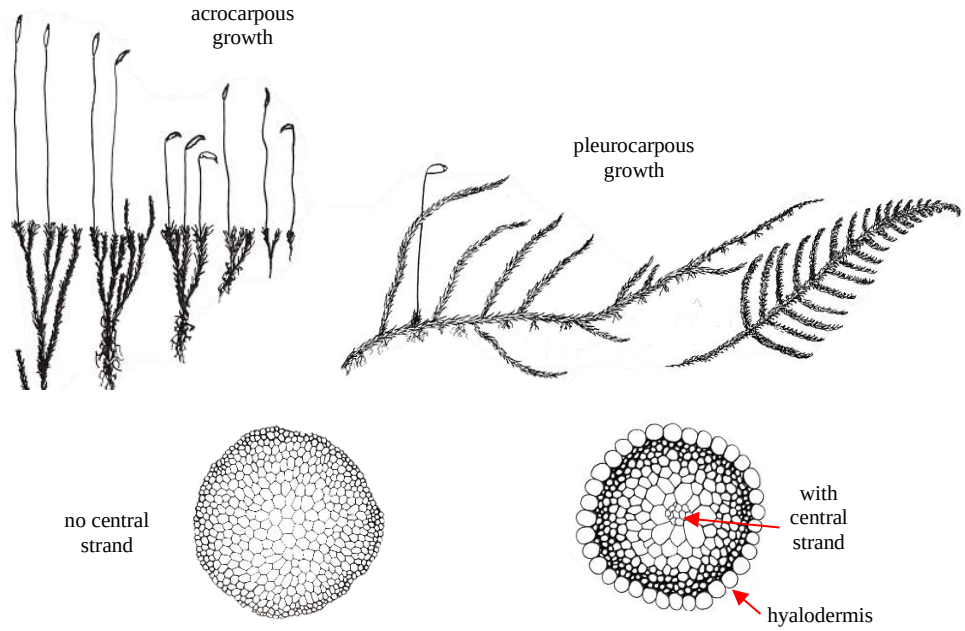
STATISTICAL SUMMARY OF NEW MEXICO BRYOPHYTES

Group	Families	Genera	Species	Infraspecific Taxa	Total Taxa
Mosses	52	166	385	12	397
Liverworts	28	40	85	0	85
Totals	**80**	**206**	**470**	**12**	**482**

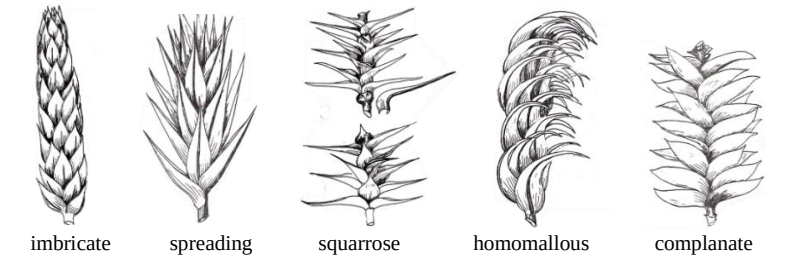
ILLUSTRATED PLANT PARTS AND TERMS FOR MOSSES

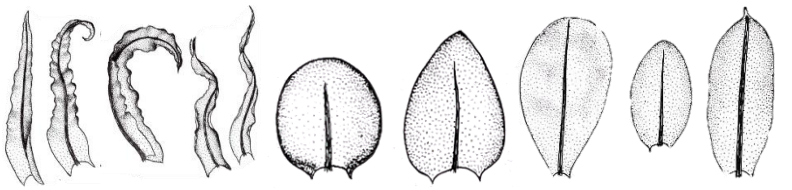
Adapted from Flowers, S. (A. Holmgren, ed.). 1973. Mosses: Utah and the West. Brigham Young University Press.

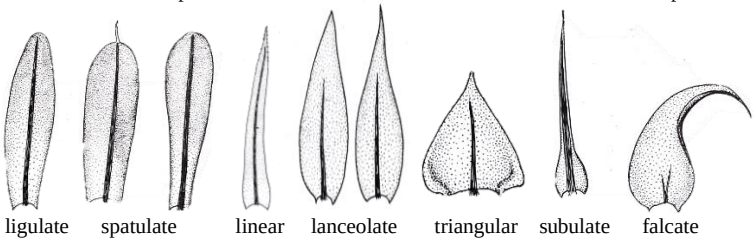
Stems

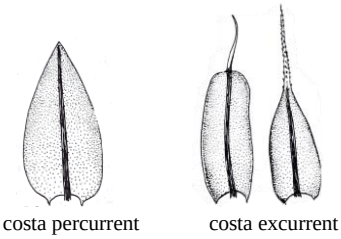


Leaves

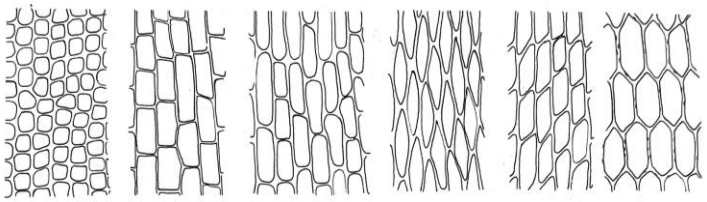




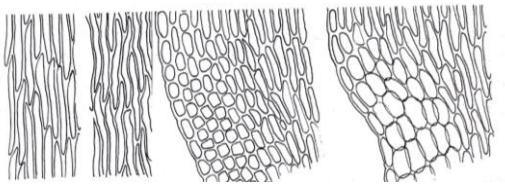




Cells

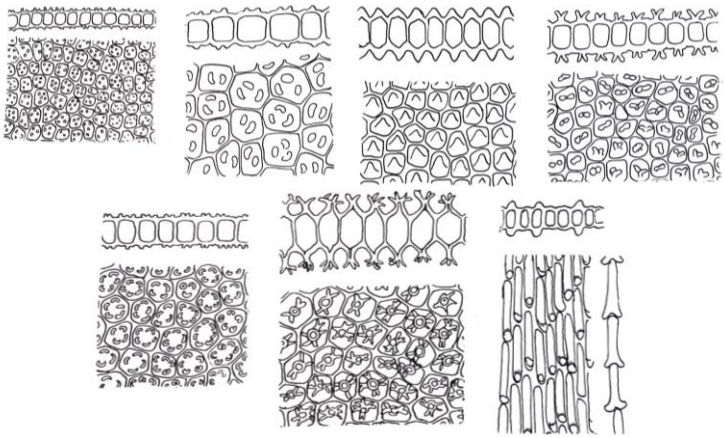


quadrate rectangular oblong/rectangular fusiform rhomboid hexagonal



linear quadrate alar cells inflated alar cells

Papillae



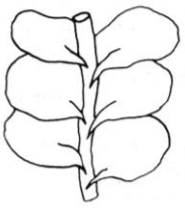
various papillae in cross-sectional (upper) and face (lower) views

ILLUSTRATED PLANT PARTS AND TERMS FOR LIVERWORTS

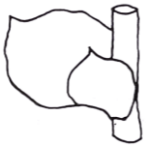
Adapted from Conard, H.S. & P.L. Redfearn, Jr. 1979. How to Know the Mosses and Liverworts. Wm. C. Brown Company, Dubuque, Iowa.

Leaves

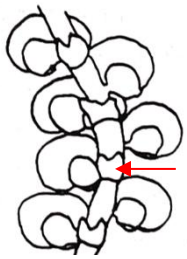
incubous leaf insertion
dorsal view



succubous leaf insertion
dorsal view



complicate bilobed leaf
dorsal view

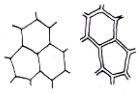


shoot with complicate bilobed leaves and underleaves (arrow) – ventral view

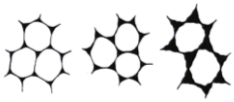
entire toothed ----------lobed----------

deeply divided into thread-like segments or rows of cells

Cells



walls equally thin-walled, equally thick-walled



walls thickened in the corners, forming trigones

ACKNOWLEDGMENTS

A work such as this rests on the innumerable efforts of mostly unappreciated, unthanked, and often unknown, but numerous, naturalists, both professional and amateur, of past and present. Beginning with the first recorded collectors of New Mexico bryophytes, Augustus Fendler (1813-1883) and Charles Wright (1811-1885), and ending with the one who will send us a specimen tomorrow, we thank you all! Your work has made this work possible.

Fearful of forgetting someone, we nonetheless call attention to the assistance and support of the following.

William A. Weber (1918-2020) offered numerous and continued kind encouragements and identifications to KWA as I began a novice's enquiry into mosses in the 1990s. Bill's infectious love of all things bryophyte steadily spun the strands of the moss web around me. Bill's response was typical of the community of bryologists in general as we navigated the intricacies of beginning bryology: welcoming, encouraging, and supportive. In particular, we acknowledge the influence of numerous SO BE FREE (Spring Outing; Botanical Excursion; Foray, Retreat, and Escape to the Environment) forays and their participants in raising our spirits and our expertise.

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We have examined thousands of specimens of bryophytes, all of them housed, cared for, and shared by curators and staff of numerous herbaria. Our home herbaria of NMC/NMCR and SNM have provided unfailing support in requesting and managing loans, databasing and housing our collections, and providing access to their facilities and collections. At NMC/NMCR we thank Zachary Rogers and his staff, who provided adept and consistent support. At SNM we thank William Norris, who also collected many of the specimens we photographed, Kathleen Coopman, Angela Flanders, Betsy Kaido, Karen Nakakihara, Jane Spinti, and Sarah Thrasher. Erin Tripp and Dina Clark at COLO put up with us for a week in the herbarium as we examined and photographed many of their collections in-house, then sent us numerous loans as follow-ups. Other herbaria kindly loaned specimens to photograph or to verify identifications: in particular, Blanka Shaw at DUKE, Matt von Konratt at F, John Atwood at MO, and Laura Briscoe at NY; also the curators and staffs at BRIT, CAS, CINC, FH, MICH and MIN. In addition, many herbaria world-wide have spent time and effort to put their collections and data online. We thank them all.

Every two weeks we meet online with a small group of like-minded (bewildered but enthusiastic) bryologists from Arizona, Colorado, and New Mexico: Stacey Anderson, Mo Ewing, Ries Lindley, Barbara Thiers, and Ron Wittmann. We thank them for their collegiality, encouragement, and valuable feedback on earlier versions of this work.

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Patrick Alexander provided an excellent online resource for generating distribution maps.

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Two botanists disagreed at a moss conference, and a bryophyte broke out! – Russ Kleinman

IDENTIFICATION KEYS TO THE BRYOPHYTES OF NEW MEXICO

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. 10)
  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). ..... **KEY TO LIVERWORTS** (p. 443)
1 Plants strap-shaped or ribbon-like and growing flat on the substrate (thalloid), lacking stems and leaves (thallose liverworts) ..... **KEY TO LIVERWORTS** (p. 443)

MOSSES



LEAFY LIVERWORTS:



THALLOSE LIVERWORTS:





1 Leaf cells arranged in a network of narrow green cells alternating with large hyaline cells; branches arranged in radiate clusters toward the apex of the stem, the stem terminated by a head-like cluster of short branches ..... **Sphagnum** (Sphagnaceae)

1 Leaf cells and branches not both as above

2 Stems with leaves definitely distichous in arrangement (attached in two obvious rows on opposite sides of the stem), and/or the shoots definitely complanate-foliate (the shoots flattened into a single plane and often appearing distichous) ..... **Group A**

2 Stems with leaves attached all around the stem, not appearing distichous or complanate-foliate

3 Leaves with lamellae or filaments on the adaxial (upper) surface of the costa (excluding propagula or gemmae) ..... **Group B**

3 Leaves without lamellae or filaments on the adaxial surface of the costa (but propagula or gemmae sometimes present)

4 Plants **acrocarpous** (sporophytes terminal); stems erect, mostly not branched or occasionally branched beneath inflorescences ..... **Group C**

4 Plants **pleurocarpous** (sporophytes lateral); stems mostly prostrate with lateral branches, often mat-forming ..... **Group D**

Group A: Stems with leaves definitely distichous in arrangement and/or the shoots definitely complanate-foliate

1 Leaves appearing to be arranged on edge to the stem and split at the base, consisting of two vaginant laminae which clasp the stem and base of the leaf above (equitant) ..... **Fissidens** (Fissidentaceae)

1 Leaves not on edge to the stem or split at the base

2 Leaves linear-subulate, abruptly divergent from an oblong clasping base, in 2 opposite rows; shoots plumose and delicate ..... **Distichium** (Distichiaceae)

2 Leaves obovate to oblong or ovate-lanceolate, not clasping at the base, in several rows but twisted to appear as if in 2 rows; shoots variously disposed

3 Shoots acrocarpous, erect (or drooping on vertical faces) ..... **Bryoxiphium** (Bryoxiphiaceae)

3 Shoots pleurocarpous, prostrate, creeping, or stoloniferous

4 Prostrate shoots not branched, stolon-like; leaves distant and becoming gradually smaller toward the end of the stem; margins mostly bordered with a limbidium ..... **Plagiomnium** (Mniaceae)

4 Prostrate shoots variously but obviously branched; leaves overlapping; margins not bordered

5 Costa long and single

6 Blades undulate when dry; stems with abundant paraphyllia (*N. menziesii*) ..... **Neckera** (Neckeraceae)

6 Blades not undulate; stems lacking paraphyllia

7 Leaf margins entire; mid-laminal cells rectangular, 2-4:1 ..... **Stereophyllum** (Stereophyllaceae)

7 Leaf margins manifestly serrate; mid-laminal cells much narrower, 6-10:1 or more ..... **Rhynchostegium** (Brachytheciaceae)

5 Costa short and double or lacking

8 Capsules immersed; flagelliform branches often present; blades undulate when dry (*N. pennata*) ..... **Neckera** (Neckeraceae)

8 Capsules on long setae; flagelliform branches absent; lamina not undulate when dry (sometimes faintly so)

9 Leaves strongly decurrent, the margins usually recurved ..... **Plagiothecium** (Plagiotheciaceae)

9 Leaves not decurrent or the decurrency of 1-3 cells, the margins usually plane

10 Pseudoparaphyllia foliose, 3-5-seriate at base ..... **Taxiphyllum** (Taxiphyllaceae)

10 Pseudoparaphyllia filamentous, 1(2)-seriate at base ..... **Isopterygium** (Pylasiadelphaceae)

Group B: Leaves with lamellae or filaments on the adaxial (upper) surface of the costa (excluding propagula or gemmae)

1 Leaves prominently toothed ..... POLYTRICHACEAE

1 Leaves entire

3 Plants larger, never bulbiform, the stems 10-100 mm or more long, the leaf body 5-10 mm or more long, with a basal sheath; hair-points, when present, stiff and awn-like ..... POLYTRICHACEAE

2 Plants small, sometimes bulbiform, the stems 1-10 mm long, the leaf body 1-3 mm long, lacking a sheath; hair-points, when present, delicate and thread-like

3 Leaves lacking hair-points, the distal margins broadly infolded, mostly obscuring the filaments) ..... **Aloina** (Pottiaceae)

3 Leaves with delicate, thread-like hair-points, the distal margins reflexed to revolute

4 Leaves with lamellae on the adaxial surface of the costa ..... **Pterygoneurum** (Pottiaceae)

4 Leaves with filaments on the adaxial surface of the costa ..... **Crossidium** (Pottiaceae)

Group C: Plants acrocarpous (sporophytes terminal); stems erect, not branched or occasionally branched beneath inflorescences

1 Plants with obvious gemmae- or brood-bearing structures at the ends of some stems
2 Gemmae elevated at the ends of nearly naked stalks ..... **Aulacomnium** (Aulacomniaceae)
2 Gemmae or brood bodies in leafy cups or in dense axillary clusters
3 Gemmae clusters produced inside broad leafy cups terminating the stems; leaves broadly elliptic, pellucid when wet..... **Tetraphis** (Tetraphidaceae)
3 Gemmae and terminal cups absent, but brood branchlets or clusters of brood leaves produced among the apical leaves; leaves narrowly lanceolate to nearly linear
4 Propagula of tiny brood branchlets produced near the ends of the stems, looking like tiny stems with leaves; leaf margins usually toothed distally (*D. montanum*)..... **Dicranum** (Dicranaceae)
4 Propagula of tiny leaves produced in dense axillary clusters toward the ends the stems, looking like little pom-poms; leaf margins entire ..... **Brothera** (Leucobryaceae)
1 Plants lacking special gemmae-bearing structures at the ends of the stems (but may be present in leaf axils)
5 Leaves glaucous blue-green, with a fine, white, cobwebby covering (actually a filamentous coating but often appearing as a powdery coating) ..... **Saelania** (Saelaniaceae)
5 Leaves not as above
6 Plants blackish or dark brown and quite brittle, strongly affixed to acidic rocks and boulders at elevations higher than 8500 ft
7 Costa present, prominent; leaves frequently with whitish awns; capsule opening by the dehiscence of an apical cap (operculum), revealing the teeth of the peristome..... GRIMMIACEAE
7 Costa absent (in our species); leaves awnless; capsule opening by four longitudinal slits extending the length of the capsule and bowing out when mature, resembling a Chinese lantern; peristome absent ..... **Andreaea** (Andreaeaceae)
6 Plants and/or habitat other than above
8 Plants tiny, the stems ephemeral, 1-2(5) mm long, on soil; capsules spherical, immersed, lacking a dehiscent operculum and rupturing when mature (cleistocarpous)
9 Leaves appressed when dry, the apices usually reflexed, red in KOH, the laminae broadly ovate to nearly round, the apices rounded; central strand present ..... **Acaulon** (Pottiaceae)
9 Leaves contorted or weakly spirally arranged when dry, but not appressed with reflexed apices, yellow in KOH, the laminae nearly oblong, the apices acute to obtuse; central strand absent (*T. acaulon*) ..... **Tortula** (Pottiaceae)
8 Plants generally larger, the stems often more than 5 mm long and/or persistent, on various substrates; capsules usually elongate, immersed to exserted, with a dehiscent operculum
10 Leaf cells smooth, neither papillose, prorate, nor bulging-mammillose..... Group C-1
10 Leaf cells papillose, prorate, or bulging-mammillose ..... Group C-2

Group C-1: Plants acrocarpous; leaf cells smooth

1 Alar region clearly differentiated, the cells usually larger and often colored
2 Costa broad, occupying ¼ to nearly all of the leaf base
3 Leaves mostly straight; costa in cross-section with stereid cells ..... LEUCOBRYACEAE
3 Leaves straight to strongly curved; costa in cross-section lacking stereid cells .... **Paraleucobryum** (Dicranaceae)
2 Costa narrow, occupying less than ¼ of the leaf base
4 Interior distal cells with longitudinal cuticular striations at high magnification that appear as small papillae in cross-section (*H. crispulum*) ..... **Hymenoloma** (Hymenolomataceae)
4 Interior cells lacking longitudinal striations as above
5 Alar cells 1-stratose, plants autoicous, the antheridia near the archegonia ..... **Arctoa** (Rhabdoweisiaceae)
5 Alar cells 1- or 2-stratose; plants dioicous, the antheridia and archegonia on separate plants..... **Dicranum** (Dicranaceae)
1 Alar region not clearly differentiated
6 Plants typically in dark green to blackish tufts or mats, often hoary from hyaline hair-points, usually on rock ..... GRIMMIACEAE
6 Plants lighter green, not hoary, on various substrates
7 Medial to distal leaf cells long-rectangular to linear
8 Costa broad, occupying ½ or more of the leaf base ..... LEUCOBRYACEAE
8 Costa narrower, occupying less than ½ of the leaf base
9 Leaves long-subulate to setaceous; axillary hairs present and with conspicuous red club-shaped bases ..... **Leptobryum** (Meesiaceae)
9 Leaves ovate-lanceolate to linear; axillary hairs absent or lacking red club-shaped bases
10 Leaves commonly flexuose when dry, at least somewhat falcate-secund when wet ..... **Dicranella** (Dicranaceae)

10 Leaves not flexuose when dry nor falcate-secund when wet
11 Distal leaf cells mostly linear; margin lacking a limbidium ..... **Pohlia** (Mniaceae)
11 Distal leaf cells long-rhomboidal; margin often with a strong limbidium.....**Bryum group** (Bryaceae)
7 Medial to distal leaf cells isodiametric or quadrate, to short-rectangular
12 Leaves with a sheathing base differentiated from the tubulous limb
13 Margins revolute, at least from about mid-leaf to the base..... **Oncophorus** (Rhabdoweisiaceae)
13 Margins plane
14 Margins coarsely toothed, at least apically; sporophytes single to multiple, the capsules lacking a spherical protuberance at the base .....**Symblepharis** (Rhabdoweisiaceae)
14 Margins entire to indistinctly toothed; sporophytes single, with a spherical protuberance at the base (*B. wahlenbergii*)..... **Brideliella** (Rhabdoweisiaceae)
12 Leaves without a sheathing base and limb commonly not tubulous
15 Distal leaf cells mostly isodiametric to squarish, never more than 2:1
16 Distal leaf margins bordered by a limbidium of elongate cells ..... MNIACEAE
16 Distal leaf margins not so bordered
17 Leaves widest at or above the middle ..... **Tortula** (Pottiaceae)
17 Leaves lanceolate to ovate, widest below the middle
18 Distal laminal cells (excluding margin) 2-stratose in strips, this easily seen in face view under magnification..... **Ptychomitrium** (Ptychomitriaceae)
18 Distal laminal cells lacking 2-stratose strips as above, or if so (*Hymenoloma*) then not easily seen in face view as above
19 Margins 2-stratose distally; proximal cells hyaline and rectangular to long-rectangular, often contrasting strongly with the distal region
20 Distal half or more of the leaf subulate, totally occupied by the costa..... ..... **Flexitrichum** (Flexitrichaceae)
20 Distal half or more of the leaf with some laminal tissue, not totally occupied by the costa
21 Costa prominently whitish abaxially in dry leaves; hyaline proximal cells inflated in several rows near the costa, contrasting with the narrower cells in several rows near the margin (*T. umbrosa*)..... **Trichostomopsis** (Pottiaceae)
21 Costa not whitish in dry leaves; hyaline proximal cells not contrasting laterally as above, most proximal cells quite similar from costa to margin
22 Leaf margins strongly recurved in many leaves; lamina smooth, 1-stratose except for the 2-stratose margins; axillary gemmae common..... .....**Dicranoweisia** (Rhabdoweisiaceae)
22 Leaf margins plane, erect to incurved; lamina longitudinally striate with narrow cuticular ridges, these appearing as papillae in cross-section, 1-stratose to 2-stratose in the upper half, the margins 2-stratose; axillary gemmae rare (*H. mulahaceni*) ..... **Hymenoloma** (Hymenolomataceae)
19 Margins 1-stratose distally, if 2-stratose (*Cynodontium*) then proximal cells not contrasting as above; proximal cells various
22 Discoid gemmae borne in cups formed by rosettes of rounded bracts at stem tips; moist rotting logs and stumps.....**Tetraphis** (Tetraphidaceae)
22 Gemmae cups as above absent; habitat various
23 Blades with nearly parallel sides, widest near the middle, or wider distally ....POTTIACEAE
23 Blades narrowing from base to apex, wider proximally
24 Margin 2-stratose, plane to weakly recurved ...**Cynodontium** (Rhabdoweisiaceae)
24 Margin 1-stratose, revolute nearly entire length..... **Ceratodon** (Ditrichaceae)
15 Distal leaf cells rhomboidal to short-rectangular, mostly more than 2:1
26 Leaves bordered by a limbidium of elongate cells
27 Leaf cells greater than 2:1.....BRYACEAE
27 Leaf cells 1-2:1 ..... MNIACEAE
26 Leaves not so bordered
28 Distal portions of the leaf white, lacking chlorophyll, giving the plant a silvery appearance (*B. argenteum*).....**Bryum** (Bryaceae)
28 Distal portions of the leaf with chlorophyll, the same color as the mid-leaf portion, the plants not silvery
29 Leaves ovate to lanceolate, widest below the middle .....BRYACEAE
29 Leaves obovate, widest above the middle
30 Leaf margins recurved at base; axils of upper leaves beset with reddish hairs .... **Tayloria** (Splachnaceae)
30 Leaf margins plane at the base; all leaf axils lacking reddish hairs..... FUNARIACEAE

Group C-2: Plants acrocarpous; leaf cells papillose, prorate, or bulging-mammillose

1 Leaf cells bulging-mammillose on the adaxial surface, flat on the abaxial surface, but not papillose nor prorate
2 Lamina 2-stratose ..... **Timmiella** (Pottiaceae)
2 Lamina 1-stratose ..... **Timmia** (Timmiaceae)
1 Leaf cells papillose or prorate, mammillose or not (but see *Hymenoloma* with cuticular striae appearing as lines in face view and as small papillae in cross-section)
3 Leaf cells prorate, the ends of the cell walls projecting ..... BARTRAMIACEAE
3 Leaf cells not prorate, but papillose over the lumen
4 Alar cells usually inflated, usually orangish or brownish; gemmae borne at the ends of naked stalks ..... **Aulacomnium** (Aulacomniaceae)
4 Alar cells not as above; gemmae-bearing stalks as above absent
5 Leaves lacking a costa ..... HEDWIGIACEAE
5 Leaves with a costa
6 Basal hyaline cells strongly differentiated and extending upward in a V-shaped pattern
7 Margins entire ..... **Tortella** (Pottiaceae)
7 Margins toothed ..... **Pleurochaete** (Pottiaceae)
6 Basal hyaline cells not as above, if differentiated then not running up the margin in a V-shape (but may be truncate or nearly so)
8 Leaves plane to involute on both margins
9 Margins strongly involute ..... **Weissia** (Pottiaceae)
9 Margins plane or only slightly inrolled near the apex
10 Leaves mostly widest near the middle or above
11 End cell walls of basal cells commonly thickened, usually colored brown to reddish; calyptra large, 3-7 mm long, completely covering the capsule ..... **Encalypta** (Encalyptaceae)
11 End cells walls of basal cells neither thickened nor colored; calyptra smaller or not covering the capsule or both ..... POTTIACEAE
10 Leaves mostly widest below the middle
12 Basal leaf margins serrate-dentate by projecting upward angles of the cells just above the area of enlarged basal cells, otherwise entire ..... **Eucladium** (Pottiaceae)
12 Margins of leaves toothed above the base or entire
13 Distal laminal cells papillose over both the lumina and transverse cell walls; peristome absent; forming lime-green mats on wet rock ..... **Amphidium** (Amphidiaceae)
13 Distal laminal cells smooth or papillose only over the lumina; peristome mostly present; color and habitat various
14 Laminal basal cell walls thickened; gemmae often produced in the leaf axils (in *Z. rupestris*), but not on the leaves; plants on trees or rock ..... **Zygodon** (Orthotrichaceae)
14 Laminal basal cell walls not thickened; gemmae production and substrate various
15 Costa broad basally, occupying about ⅓-½ or more of the leaf base ..... **Timmiella** (Pottiaceae)
15 Costa narrow basally, occupying no more than ¼ of the leaf base
16 Proximal marginal cells elongate-rectangular, clear, running upwards along the margins in clear longitudinal bands about 5 cell rows deep and markedly differentiated from the adjacent laminal cells ..... **Pleurochaete** (Pottiaceae)
16 Proximal marginal cells short-rectangular to quadrate, not forming marginal clear longitudinal bands of cells as above
17 Costa reaching the apex to shortly excurrent; wet leaves strongly spreading-recurving from the stem ..... **Rhexophyllum** (Pottiaceae)
17 Costa ending several cells short of the apex; wet leaves weakly spreading from the stem
18 Leaf margins 2-stratose (*C. tenellum*) ..... **Cynodontium** (Rhabdoweisiaceae)
18 Leaf margins 1-stratose (*D. pellucidum*) ..... **Dichodontium** (Rhabdoweisiaceae)
8 Leaves recurved to revolute, at least on one margin
19 Leaves mostly widest near the middle or above ..... POTTIACEAE
19 Leaves mostly widest below the middle
20 Leaves appressed and imbricated when dry; calyptra large, covering the capsule; costal stereid bands not differentiated; on dry rocks or bark ..... **Orthotrichum group** (Orthotrichaceae)
20 Leaves contorted or crisped when dry; calyptra small, not covering the capsule; costal stereid bands differentiated; on rocks or soil
21 Leaf margins 2-stratose, the lamina otherwise 1-stratose; costa ending several cells short of the apex; apex with coarse projecting papillae ..... **Cynodontium** (Rhabdoweisiaceae)
21 Leaf margins, laminae, costae, and apices not all as above ..... POTTIACEAE

Group D: Plants pleurocarpous (sporophytes lateral); stems mostly prostrate with lateral branches, often mat-forming

1 Plants large, tree-shaped, with erect secondary stems bearing clusters of branches at the summit, on damp to wet soil and humus
2 Primary stems subterranean, rhizome-like; secondary stems erect, bearing radiating branches; stems with abundant paraphyllia; alar cells subquadrate, opaque ..... **Climacium** (Climaciaceae)
2 Primary stems typically pleurocarpous, creeping to somewhat erect; stems lacking paraphyllia; alar cells inflated, hyaline (*B. rivulare*) ..... **Brachythecium** (Brachytheciaceae)
1 Plants not as above
3 Plants 2- to 3-pinnate
4 Secondary fronds in raised, stair-step, horizontal layers, each frond produced on an arching branch; leaf cells linear-flexuose..... **Hylocomium** (Hylocomiaceae)
4 Secondary fronds not as above; leaf cells rounded-quadrate to short-hexagonal ..... **Thuidium** (Thuidiaceae)
3 Plants 1-pinnate or irregularly branched
5 Plants aquatic, often completely submerged or floating, or growing over seeping rocks or attached to rocks in small streams and springs
6 Leaves 3-ranked ..... **Fontinalis** (Fontinalaceae)
6 Leaves not 3-ranked
7 Alar cells inflated and hyaline ..... **Brachythecium** (Brachytheciaceae)
7 Alar cells ± quadrate (with some enlarged cells below in *Rhynchostegium*)
8 Cells at the apex about the same length as those below ..... AMBLYSTEGIACEAE
8 Cells at the apex noticeably shorter than those below (*R. aquaticum*)..... **Rhynchostegium** (Brachytheciaceae)
5 Plants and habitats not as above, some plants growing in wet meadows, fens, and marshes, but not aquatic
9 Leaf cells papillose, prorate, or bulging-mammillose ..... Group D-1
9 Leaf cells smooth, not papillose nor prorate
10 Plants very small; leaves tiny, 0.1-0.5 mm long (sometimes slightly longer in *Fabronia* with toothed margins) ..... Group D-2
10 Plants and leaves larger
11 Costa none, short and double, or single and ending below mid-leaf ..... Group D-3
11 Costa single, reaching to mid-leaf and beyond ..... Group D-4

Group D-1: Plants pleurocarpous; leaf cells papillose, prorate, or bulging-mammillose

1 Leaves both plicate and rugose ..... **Rhytidium** (Rhytidiaceae)
1 Leaves not both plicate and rugose
2 Leaves lacking a costa; cells very strongly papillose, some elongate and branched or nipple-like; growing on siliceous rocks ..... HEDWIGIACEAE
2 Plants not as above
3 Cells densely multi-papillose
4 Leaves with hyaline hair-points ..... **Claopodium** (Leskeaceae)
4 Leaves without hair-points
5 Papillae scarcely visible without oil immersion; leaf cells 2-3:1; costa forked, short, rarely reaching mid-leaf ..... **Leptopterigynandrum** (Taxiphyllaceae)
5 Papillae easily visible with regular microscopy; leaf cells 1-2:1; costa single, longer, reaching past mid-leaf ..... **Anomodon** (Anomodontaceae)
3 Cells with a single papilla, prorate, or bulging-mammillose
6 Shoots ± complanate, flattened; leaves oblong-ovate, abruptly acute; cells rhombic to fusiform ..... **Stereophyllum** (Stereophyllaceae)
6 Shoots not complanate; leaves and cells otherwise
7 Leaves deeply sulcate, the sunken sulcus protruding as a sail-like flap on the opposite (abaxial) side, this facing up on a wet slide and very prominent, but obscure *in situ* in dry specimens, the costa hidden at the bottom of the sulcus; branched paraphyllia abundant on both the stems and leaf bases; many papillae as long as the leaf thickness ..... **Helodium** (Helodiaceae)
7 Leaves not sulcate and lacking a sail-like flap as above; paraphyllia on the stems only; papillae much shorter than the leaf thickness
8 Branch leaves ending in a translucent, multi-papillose cell ..... **Abietinella** (Thuidiaceae)
8 Branch leaves ending in a uni-papillose cell, or prorate
9 Stem and branch leaves strongly dimorphic
10 Leaf cells bulging-mammillose (*L. polycarpa*)..... **Leskea** (Leskeaceae)
10 Leaf cells papillose/prorate ..... **Haplocladium** (Leskeaceae)
8 Stem and branch leaves similar
11 Leaves widely spreading to squarrose when wet; paraphyllia absent; pseudoparaphyllia present ..... **Lindbergia** (Leskeaceae)

11 Leaves erect to spreading when wet; paraphyllia and pseudoparaphyllia present
12 Leaf cells prorate at the cell ends .....**Lescuraea** (Pseudoleskeaceae)
12 Leaf cells broadly 1-papillose over the lumen
13 Leaf margins strongly serrate; stems lacking paraphyllia (*C. whippleanum*)..... ..... **Claopodium** (Leskeaceae)
13 Leaf margins entire; stems with dense paraphyllia (*L. patens*) .**Lescuraea** (Pseudoleskeaceae)

Group D-2: Plants pleurocarpous; leaf cells smooth; plants very small; leaves tiny

1 Blade margins conspicuously dentate to ciliate-dentate (rarely nearly entire).....**Fabronia** (Fabroniaceae)
1 Blade margins entire to serrulate
2 Plants commonly olive-brownish-greenish or darker; leaves compactly arranged around the stem when dry, often obscuring the stem, often somewhat plicate; median leaf cells typically 1-2:1 (*P. tectorum*)..... .....**Pseudoleskeella** (Pseudoleskeellaceae)
2 Plants commonly light greenish to yellowish green; leaves loosely arranged when dry, rarely obscuring the stem, not plicate; median leaf cells typically 3-5:1
3 Costa commonly at least ½ leaf length, sometimes shorter; alar region commonly well differentiated..... .....**Amblystegium** (Amblystegiaceae)
3 Costa absent to very short, rarely reaching ⅓ leaf length; alar region commonly scarcely differentiated
4 Branches firmly attached to stems; leaf margins entire or nearly so; costa short but commonly present; rhizoids subtending or at the abaxial leaf insertion, not axillary, smooth; typically on bark .... **Pseudoamblystegium** (Amblystegiaceae)
4 Branches easily detached from stems; leaf margins serrulate; costa absent or nearly so; rhizoids axillary, granular-papillose at least when young; typically on rock .....**Platydictya** (Plagiotheciaceae)

Group D-3: Plants pleurocarpous; leaf cells smooth; costa none, short and double, or single and ending below mid-leaf

1 Shoots complanate, obviously flattened
2 Capsules immersed; flagelliform branches often present; lamina undulate when dry ..... **Neckera** (Neckeraceae)
2 Capsules on long setae; flagelliform branches absent; lamina not undulate when dry (sometimes faintly so)
3 Leaves strongly decurrent, the margins usually recurved.....**Plagiothecium** (Plagiotheciaceae)
3 Leaves not decurrent or the decurrency of 1-3 cells, the margins usually plane
4 Leaf margins mostly serrulate nearly to the base .....**Taxiphyllum** (Taxiphyllaceae)
4 Leaf margins mostly entire, or serrulate only distally (*Isopterygiella* often with 1-2 serrulate cells at alar region)
5 Stem hyalodermis present (look carefully, this is often obscure or vestigial) .....*Stereodon* (Stereodontaceae)
5 Stem hyalodermis absent
6 Pseudoparaphyllia present, filamentous; rhizoids smooth .....**Isopterygium** (Pylasiadelphaceae)
6 Pseudoparaphyllia absent; rhizoids papillose.....PLAGIOTHECIACEAE
1 Shoots not flattened or scarcely so
7 Leaves sharply squarrose-recurved at the base from the stem when wet, cordate-based
8 Plants small and slender; stem leaves mostly less than 1 mm long .....**Campylophyllopsis** (Amblystegiaceae)
8 Plants medium-sized; stem leaves 1.5-2.5 mm long (*C. stellatum*)..... **Campylium** (Amblystegiaceae)
7 Leaves spreading to appressed, not squarrose-recurved at the base (but may be falcate/circinate), usually not cordate-based
9 Branch tips curved upward or outward when dry; leaves mostly straight and not falcate (though the arrangement on the stem may be homomallous)
10 Brood branchlets evident or hidden among the leaves at the stem tips (usually detached by teasing the stem tips); operculum obliquely long-rostrate..... **Platygyrium** (Pylasiadelphaceae)
10 Brood branchlets absent; operculum apiculate to short-rostrate .....PYLAISIACEAE
9 Branch tips ± straight or curved downward when dry; leaves straight or falcate
11 Stem hyalodermis present, at least partially, sometimes ruptured or vestigial
12 Alar region well-defined, the alar cells thin-walled and balloon-inflated, abruptly delimited by 1-3 rows of thick-walled quadrate-rectangular cells immediately above; pseudoparaphyllia broad, the apices truncate, rounded, to irregular..... **Calliergonella** (Pylaisiaceae)
12 Alar region gradually differentiated and meager, the alar cells thickish-walled, enlarged somewhat but not balloon-inflated, gradually transitioning to the cells above; pseudoparaphyllia narrowly triangular, the apices pointed.....*Stereodon* (Stereodontaceae)
11 Stem hyalodermis absent
13 Leaves 2.5-5 mm long, strongly circinate-falcate and strongly plicate (obscuring the single costa extending into the acumen)..... **Sanionia** (Amblystegiaceae)
13 Leaves rarely longer than 1.5 mm long, weakly to strongly falcate, plicate or not, the costa double and short

14 Leaves falcate-secund
15 Leaf margin (at least one) strongly revolute almost its entire length; leaves strongly falcate-secund
16 Stem leaf margins serrate distally; leaves commonly spreading and not markedly down-turned; plants autoicous, capsules frequent; commonly on wood and bark.....**Jochenia** (Jocheniaceae)
16 Stem leaf margins entire distally, at least near the apex; leaves mostly markedly down-turned; plants dioicous, capsules infrequent; substrate various .....**Roaldia** (Pylaisiaceae)
15 Leaf margin plane, or revolute only on the lower ⅓ or less; leaves nearly straight to falcate-secund
17 Leaves not concave as below; leaf margins usually strongly serrulate from base to apex.....**Jochenia** (Jocheniaceae)
17 Leaves rounded on the back, deeply concave, with a glossy, shell-like texture; leaf margins weakly serrulate to entire
18 Pseudoparaphyllia surrounding branch bases broadly foliose; alar cells quadrate, green, all the same .....**Buckia** (Pylaisiaceae)
18 Pseudoparaphyllia surrounding branch bases filamentous; alar cells of two kinds, the upper quadrate and green, the lower ones larger, pale, and inflated .....**Hypnum** (Hypnaceae)
14 Leaves straight
19 Median leaf cells oval to rhomboidal
20 Leaf cells 3:1; leaves not catenulate ..... **Leptopterigynandrum** (Taxiphyllaceae)
20 Leaf cells 1-2:1; leaves catenulate .....**Pseudoleskeella** (Pseudoleskeellaceae)
19 Median leaf cells linear
21 Stems red; leaves orangish at the base
22 Paraphyllia abundant, the stems obscured; leaves strongly plicate ..... **Hylocomiastrum** (Hylocomiaceae)
22 Paraphyllia absent, the stems not obscured; leaves not or slightly plicate..... **Pleurozium** (Hylocomiaceae)
21 Stems not reddish; leaves not orangish at the base
23 Plants firmly attached to wet rocks along mountain streams..... **Hygrohypnum group** (Amblystegiaceae)
23 Plants growing on damp soil, rocks, and bases of trees in moist woods
24 Leaf tips rarely secund downward; capsules erect .....**Entodon** (Entodontaceae)
24 Many/most leaf tips secund downward in situ, but appearing flat upon dissection on a slide; capsules curved to horizontal
25 Pseudoparaphyllia absent.....PLAGIOTHECIACEAE
25 Pseudoparaphyllia present
26 Pseudoparaphyllia surrounding branch bases broadly foliose; alar cells quadrate, green, all the same.....**Buckia** (Pylaisiaceae)
26 Pseudoparaphyllia surrounding branch bases filamentous; alar cells of two kinds, the upper quadrate and green, the lower ones larger, pale, and inflated ..... **Hypnum** (Hypnaceae)

<u>Group D-4: Plants pleurocarpous; leaf cells smooth; costa single, reaching to mid-leaf and beyond</u>

1 Leaves widely spreading to squarrose-recurved when wet
2 Median leaf cells rhomboidal, 1-2:1; leaf tips flat, not channeled
3 Leaf margins recurved/revolute, at least partially; leaves commonly 1-2-plicate at least proximally (*L. arizonae*) .....**Lescuraea** (Pseudoleskeaceae)
3 Leaf margins plane; leaves not plicate (*L. mexicana*) ..... **Lindbergia** (Leskeaceae)
2 Median leaf cells oblong-linear, 4-8:1; leaf tips channeled
4 Alar cells enlarged and inflated, thick-walled in age; distal cells 8-11:1 (*D. polygamus*)..... .....**Drepanocladus** (Amblystegiaceae)
4 Alar cells not or only slightly inflated; distal cells 4-8:1
5 Leaves strongly decurrent .....**Pseudocampylium** (Amblystegiaceae)
5 Leaves scarcely decurrent (*C. chrysophyllum*)..... **Campylium** (Amblystegiaceae)
1 Leaves appressed to spreading when wet, but generally not widely so nor squarrose (not to be confused with out- or down-curving leaf tips when leaves are falcate)
6 Leaves falcate-secund
7 Leaves plicate
8 Paraphyllia present, thread-like; leaves entire distally; hyalodermis absent; central strand absent ....**Palustriella** (Amblystegiaceae)
8 Paraphyllia absent; leaves denticulate distally; hyalodermis present; central strand present..... ..... **Sanionia** (Amblystegiaceae)
7 Leaves not plicate
9 Alar cells inflated
10 Stem hyalodermis present (*S. cossonii*)..... **Scorpidium** (Amblystegiaceae)

10 Stem hyalodermis absent
11 Margins serrate to serrulate; leaves broadly ovate, about 2:1; paraphyllia few to many, foliose, rarely absent ..... **Cratoneuron** (Amblystegiaceae)
11 Margins entire; leaves ovate to lanceolate, more than 3:1; paraphyllia absent ..... **Drepanocladus** (Amblystegiaceae)
9 Alar cells not inflated (see also *Scorpidium*)
12 Terminal cells of leaf longer than 3:1 and not much different than the lower cells; alar cells abruptly differentiated ..... CALLIERGONACEAE
12 Terminal cell of leaf 1-3:1; alar cells only gradually differentiated
13 Plants mostly growing submerged in water or on frequently submerged rocks or ground; median leaf cells mostly more than 10:1 ..... **Leptodictyum** (Amblystegiaceae)
13 Plants growing on mesic to very wet habitats, but seldom submerged; median leaf cells seldom more than 8:1 ..... **Hygroamblystegium** (Amblystegium)
6 Leaves straight or slightly curved, not falcate-secund
14 Shoots complanate and obviously flattened
15 Leaves ovate, more gradually narrowed to the acuminate apex; proximal cells not porose; terminal cell of costa ending in a spine ..... **Rhynchostegium** (Brachytheciaceae)
15 Leaves oblong, abruptly narrowed to the acute apex; proximal cells distinctly porose; terminal cell of costa not spinose ..... **Neckera** (Neckeraceae)
14 Shoots not complanate
16 Distal leaf cells linear, the apical cells much shorter
17 Branches noticeably julaceous, especially when dry; leaves entire to slightly serrulate; rare in the state ..... **Scleropodium** (Brachytheciaceae)
17 Branches generally not julaceous; leaves entire to serrate
18 Costa variable on the same plant, forked on at least some leaves ..... **Hygrohypnum group** (Amblystegiaceae)
18 Costa reaching mid-leaf or beyond, single
19 Plants aquatic, on rock in running water of streams and springs, waterfalls (*R. aquaticum*) ..... **Rhynchostegium** (Brachytheciaceae)
19 Plants terrestrial, on soil, humus, rock, rotten logs, tree bases, sometimes rather moist substrates, but never in running water
20 Stem leaves deltoid to broadly lanceolate, broadest in the proximal ⅛ or less, very near the base, commonly plicate ..... **Eurhynchiastrum** (Brachytheciaceae)
20 Stem leaves broadly ovate to broadly oblong-lanceolate, broadest in the proximal ⅐-½, often near the middle, rarely plicate ..... **Oxyrrhynchium** (Brachytheciaceae)
16 Distal leaf cells quadrate to linear, the apical cells about the same
21 Mid- to upper leaf cells quadrate to short-rectangular or rhomboidal, mostly 1-3:1
22 Leaves coarsely toothed in the distal ⅓ to ¼; stems often noticeably attenuate to flagellate distally ..... **Herpetineuron** (Thuidiaceae)
22 Leaves not coarsely toothed (but may be serrulate or denticulate or entire); stems not noticeably attenuate/flagellate
23 Leafy shoots strongly and regularly pinnately branched; alar cells hyaline and inflated ..... **Cratoneuron** (Amblystegiaceae)
23 Leafy shoots weakly and irregularly branched; alar cells green to brownish, not hyaline, only weakly inflated if at all
24 Plants aquatic to subaquatic, in very wet environments (at least seasonally wet); cells thin-walled; costa often remaining as a spine in old degraded plants ..... **Hygroamblystegium** (Amblystegiaceae)
24 Plants of drier habitats, never aquatic or subaquatic; cells commonly thick-walled; costa never spine-like in old degraded plants
25 Costa shorter than and not entering the acumen ..... PSEUDOLESKEELLACEAE
25 Costa entering the acumen
26 Leaf margins plane (*L. mexicana*) ..... **Lindbergia** (Leskeaceae)
26 Leaf margins recurved/revolute, at least partially ..... **Lescuraea** (Pseudoleskeaceae)
21 Mid- to upper leaf cells rectangular to linear, 3-10:1
27 Distal leaf cells short, mostly 3-5:1
28 Distal cells prorate (*L. saxicola*) ..... **Lescuraea** (Pseudoleskeaceae)
28 Distal cells not prorate ..... AMBLYSTEGIACEAE
27 Distal leaf cells longer, more than 6:1
29 Leaves 0.6-1.5 mm long, plane, not plicate; costa vanishing into the acumen, often bearing papillose rhizoids and/or gemmae on the back; leaf margins toothed from apex to base, the teeth often flaring to reflexed below ..... **Conardia** (Amblystegiaceae)
29 Leaves, costa, and margins not all as above

30 Stems julaceous; leaves rounded to obtuse at the apex, not plicate ..... **Scleropodium** (Brachytheciaceae)

30 Stems not julaceous, or if so, the leaves acute to acuminate at the apex, plicate or not

31 Stems or branches with dense paraphyllia

32 Leaves 1.5-2.5 mm long; costa to about ⅔ the leaf length, never extending into the acumen; on soil, humus, old logs, rarely boulders... **Hylocomiastrum** (Hylocomiaceae)

32 Leaves 0.5-1.5 mm long; costa ¾ or more the leaf length, usually extending into the acumen; on boulders (*L. saxicola*)..... **Lescuraea** (Pseudoleskeaceae)

31 Stems and branches lacking paraphyllia; costa not especially thick, rarely percurrent; various habitats

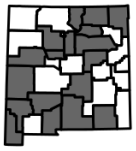
33 Leaves not plicate, 2-6 mm long, those of the main stem and branches not different in size or shape, the margins entire; wet to aquatic habitats ..... **Leptodictyum** (Amblystegiaceae)

33 Leaves plicate or not, 1-3 mm long, those of the main stem and branches often different in size or shape, the margins entire to serrulate; various habitats ..... **Brachythecium group** (Brachytheciaceae)

1 Leaves falcate-secund
  2 Leaves obviously plicate
    3 Paraphyllia present, thread-like; leaves entire distally; stem hyalodermis absent; central strand absent ..... **Palustriella**
    3 Paraphyllia absent; leaves denticulate distally; stem hyalodermis present; central strand present ..... **Sanionia**
  2 Leaves not plicate
    4 Costa none or short and double, or forked with one of the forks reaching to mid-leaf; plants growing firmly attached to wet rocks in or along streams in the mountains ..... **Hygrohypnum group**
    4 Costa otherwise; habitat various
      5 Alar cells inflated
        6 Stem hyalodermis present (*S. cossonii*) ..... **Scorpidium**
        6 Stem hyalodermis absent
          7 Margins serrate to serrulate; paraphyllia foliose, few to many, rarely absent; leaves broadly ovate, about 2:1 ..... **Cratoneuron**
          7 Margins entire; paraphyllia absent; leaves ovate to lanceolate, more than 3:1..... **Drepanocladus**
      5 Alar cells not inflated
        8 Terminal cells of leaf longer than 3:1 and not much different than the lower cells; alar cells abruptly differentiated ..... go to CALLIERGONACEAE
        8 Terminal cells of leaf 1-3:1, shorter than the lower cells; alar cells only gradually differentiated
          9 Plants mostly growing submerged in water or on frequently submerged rocks or ground; median leaf cells mostly more than 10:1 ..... **Leptodictyum**
          9 Plants growing on mesic to very wet habitats, but seldom submerged; median leaf cells seldom more than 8:1 ..... **Hygroamblystegium**
1 Leaves straight or slightly curved, not falcate-secund
  10 Leaves tiny, 0.1-0.5 mm long
    11 Costa commonly at least ½ leaf length, sometimes shorter; alar region commonly well differentiated ..... **Amblystegium**
    11 Costa absent to very short, rarely reaching ⅓ leaf length; alar region commonly scarcely differentiated
      12 Branches firmly attached to stems; leaf margins entire or nearly so; costa short but present; rhizoids subtending or at abaxial leaf insertion; typically on bark ..... **Pseudoamblystegium**
      12 Branches easily detached from stems; leaf margins serrulate; costa absent or almost so; rhizoids axillary, granular-papillose at least when young; typically on rock ..... go to **Platydictya** (Plagiotheciaceae)
  10 Leaves larger
    13 Leaves widely spreading to squarrose-recurved when wet
      14 Costa none or very short and double
        15 Plants slender with creeping stems; leaves finely serrate from base to apex; alar cells small and quadrate ..... **Campylophyllopsis**
        15 Plants more robust with erect-ascending stems; leaves entire; alar cells inflated (*C. stellatum*) ..... **Campylium**
      14 Costa single, well-developed, ending at or somewhat above mid-leaf
        16 Alar cells enlarged and inflated, thick-walled in age; distal cells 8-11:1 (*D. polygamus*) ..... **Drepanocladus**
        16 Alar cells not or only slightly inflated; distal cells 4-8:1
          17 Leaves strongly decurrent ..... **Pseudocampylium**
          17 Leaves scarcely decurrent (*C. chrysophyllum*) ..... **Campylium**
    13 Leaves appressed to spreading when wet, but not widely, nor squarrose
      18 Stems erect, tomentose throughout; leaves strongly multi-plicate; costa radiculose at back below ..... **Tomentypnum**
      18 Stems, leaves, and costa not as above
        19 Costa none or short and double, or forked with one of the forks reaching to mid-leaf; plants growing firmly attached to wet rocks in or along streams in the mountains ..... **Hygrohypnum group**
        19 Costa single and well-developed, ending at mid-leaf or beyond; habitats various
          20 Median leaf cells rhomboidal to linear, 6-15:1
            21 Leaves 0.6-1.5 mm long, often bearing papillose rhizoids and/or gemmae on the back; leaf margins toothed from apex to base, the teeth often flaring to reflexed below ..... **Conardia**
            21 Leaves 1-6 mm long, not bearing gemmae; leaf margins entire ..... **Leptodictyum**
          20 Median leaf cells short oblong-rhombic, 2-6:1
            22 Leaves oblong to oblong-ovate, rounded and hooded at the apex, often with rhizoids near the leaf apex ..... go to **Straminergon** (Calliergonaceae)
            22 Leaves lanceolate, acuminate and not hooded at the apex, lacking rhizoids at the leaf apex
              23 Costa extending into the acumen or beyond
                24 Basal cells hyaline, inflated; margins denticulate or serrulate ..... **Cratoneuron**
                24 Basal cells not or only slightly inflated, green to brownish; margins entire to finely denticulate ..... **Hygroamblystegium**

23 Costa less than ¾ the length of the leaf
25 Leaves mostly more than 1 mm long, entire .....**Leptodictyum**
25 Leaves mostly less than 1 mm long, commonly serrulate at least partially.....**Amblystegium**

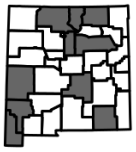
Amblystegium [a blunt covering (the operculum)].



Amblystegium serpens (Hedwig) Bruch & Schimper [creeping, serpent-like] [*Amblystegium juratzkanum* Schimper, *Amblystegium serpens* (Hedwig) Bruch & Schimper var. *juratzkanum* (Schimper) Rau & Hervey, *Hypnum serpens* Hedwig]. Pleurocarpous, in soft, green mats, the stems creeping; leaves rarely longer than about 1 mm; costa reaching to about mid-leaf (sometimes less or more), sometimes with smooth rhizoids attached; leaf margins entire to toothed; median cells 3-5:1; capsules curved. ●Damp to wet soil, rocks and boulders, tree trunks, living and rotting wood, seeps, brookside, roots of trees. ♦Small leaves, short-oblong median cells, and squarish alar cells are distinctive. The species is highly variable. See also *Pseudoamblystegium subtile* (Amblystegiaceae) and *Platydictya jungermannioides* (Plagiotheciaceae).

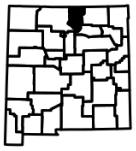
NM, Grant Co., Hanover Canyon, 24 Sep 2010, *Kleinman & Blisard* (SNM).

Campylium [bent or curved].
1 Costa ending at or beyond mid-leaf ..... ***C. chrysophyllum***
1 Costa none or very short and double..... ***C. stellatum***

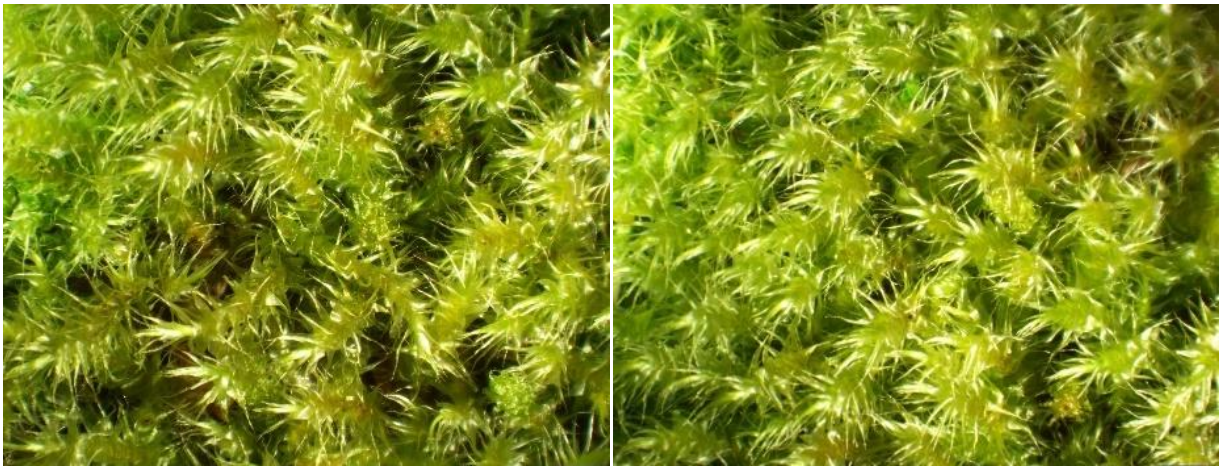


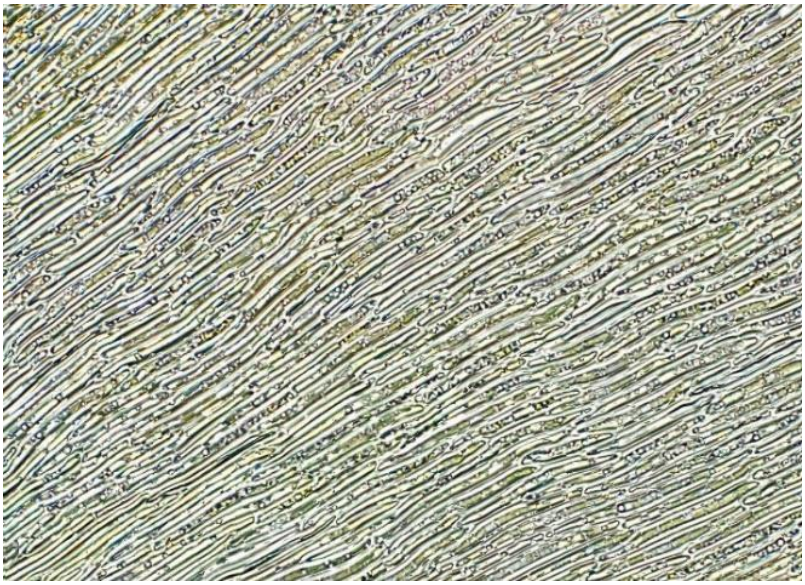
Campylium chrysophyllum (Bridel) J. Lange [with golden leaves] [*Campyliadelphus chrysophyllus* (Bridel) Kanda, *Hypnum chrysophyllum* Bridel]. Pleurocarpous, in green, yellowish, or brownish mats, the stems ascending; leaves widely spreading from the base, about 1 mm long, ± entire, the bases clasping, the tips tubulous and perpendicular to reflexed; costa usually longer than midlength; median cells rectangular to linear; alar cells squarish; capsule curved. ●Damp to wet soil, humus, and rocks in shaded sites. ♦Distinctive by the yellowish-brownish clumps with scraggly, loose stems and widely spreading, pointy leaves. Sometimes placed in the genus *Campyliadelphus*.

NM, Grant Co., Signal Peak, 30 Jun 2012, *Kleinman & Blisard* (SNM).



Campylium stellatum (Hedwig) C. Jensen [star-like] [*Campyliadelphus stellatus* (Hedwig) Kanda, *Hypnum stellatum* Hedwig]. Pleurocarpous, in green, yellowish, to brownish mats or loose clumps, the stems upright, lacking paraphyllia; leaves widely spreading to reflexed from the base, sometimes subfalcate, the bases broadened and nearly clasping, entire, sometimes inrolled, the slender tips comprising about ½ the leaf length; costa short, mostly double, sometimes absent; median cells elongate-linear; capsule angled to curved. ●Damp to wet soil and humus in shaded sites at high elevations, fens and stream banks; known only from Taos County. ♦Loose, pointy mats, reflexed leaves with suddenly narrowed tips, and a short double costa are distinctive. The similar *Campylium protensum* (Bridel) Kindberg, but with creeping stems and stem paraphyllia, may be looked for in the state.

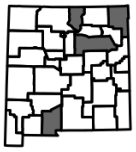


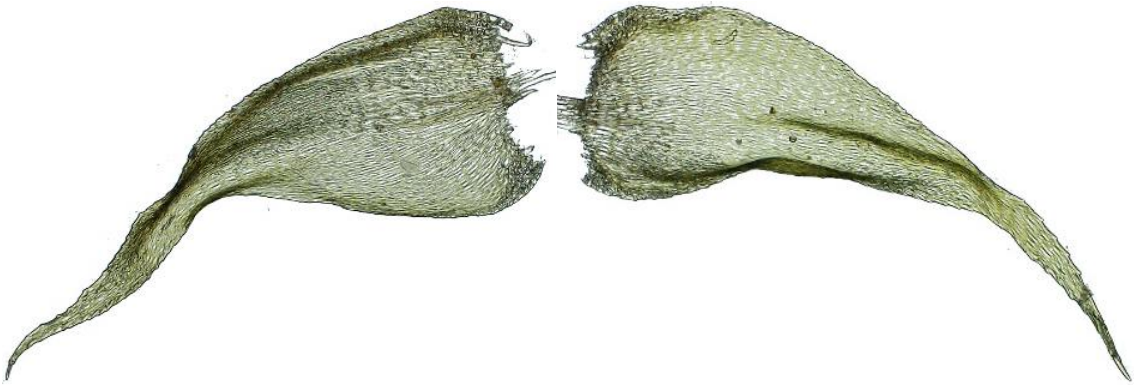


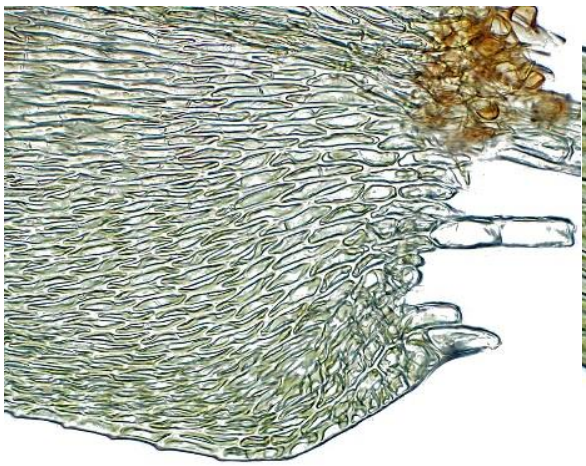
NM, Taos Co., Taos Ski Valley, 17 Sept 2017, *Kleinman & Blisard* (SNM).

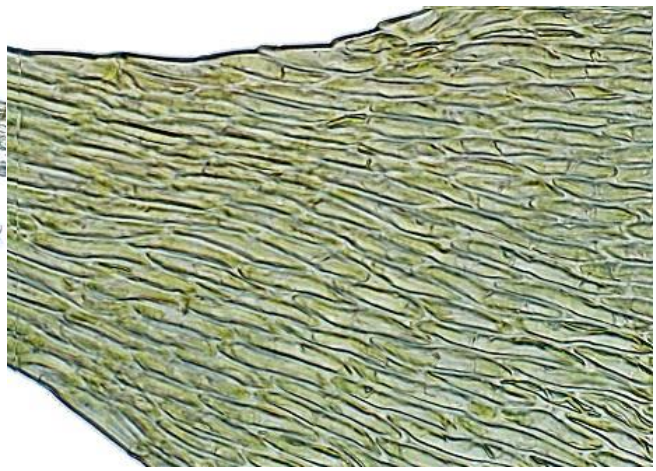
Campylophyllopsis [resembling *Campylopyllum*].

Campylophyllopsis hispidula (Bridel) Ochyra [somewhat bristly] [*Campylium hispidulum* (Bridel) Mitten, *Campylophyllum hispidulum* (Bridel) Hedenäs, *Hypnum hispidulum* Bridel]. Pleurocarpous, the stems lacking paraphyllia and hyalodermis, the central strand narrow or absent; leaves recurved to squarrose, ovate to cordate, to 1 mm long, the acumen about 50% of the leaf length; costa forked, short; alar region large; laminal cells elongate to linear. ●On damp to wet soil, rocks, rotten wood, in cool, shaded places.



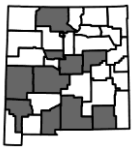




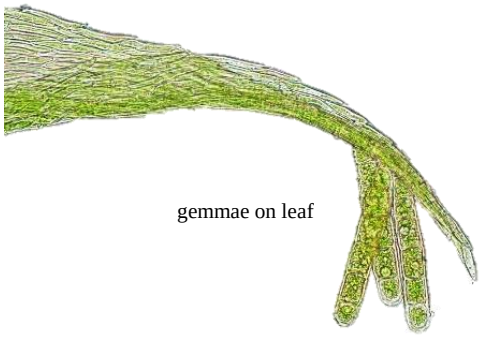


MI, Cheboygan Co., Douglas Lake, June 1990, *W.R. Norris* (SNM).

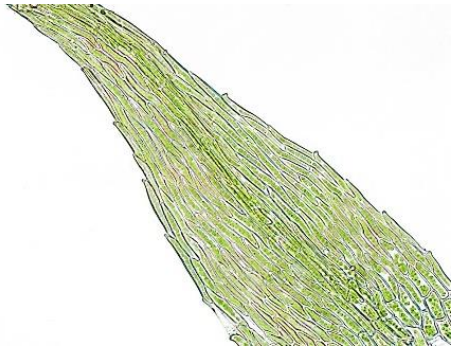
Conardia [for Henry Shoemaker Conard (1874-1971), eminent bryologist].

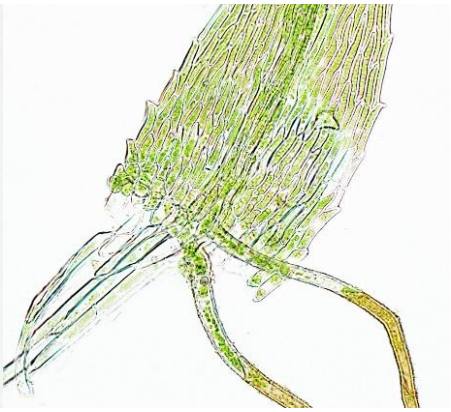


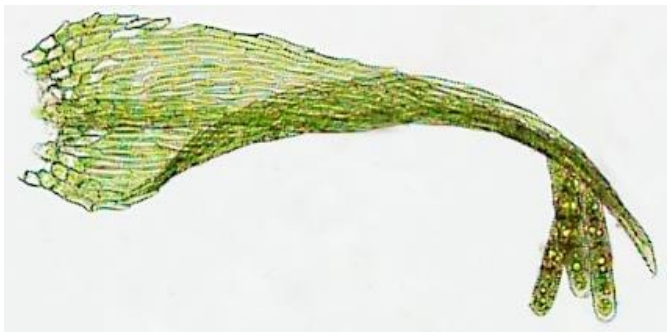
Conardia compacta (Hooker ex Müller Hal.) H. Robinson [compact, dense] [*Amblystegium compactum* (Hooker ex Müller Hal.) Austin, *Hypnum compactum* Hooker ex Müller Hal., *Hypnum serpens* Hedwig var. *compactum* Hooker (nom. illeg.) *Rhynchostegiella compacta* (Müller Hal.) Loeske]. Pleurocarpous, in small, light green or yellowish mats, the stems creeping; leaves erect to spreading, not plicate, acuminate, finely toothed; costa single, extending to the acumen, often with papillose rhizoids or gemmae on the back; median cells elongate to linear; capsule rarely found, leaning, slightly curved. ●Damp cliffs, logs, stumps, humus, and moist bark. ♦Distinguished by the warty-papillose rhizoids or gemmae on the back of the costa or near the leaf apex.



gemmae on leaf

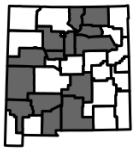




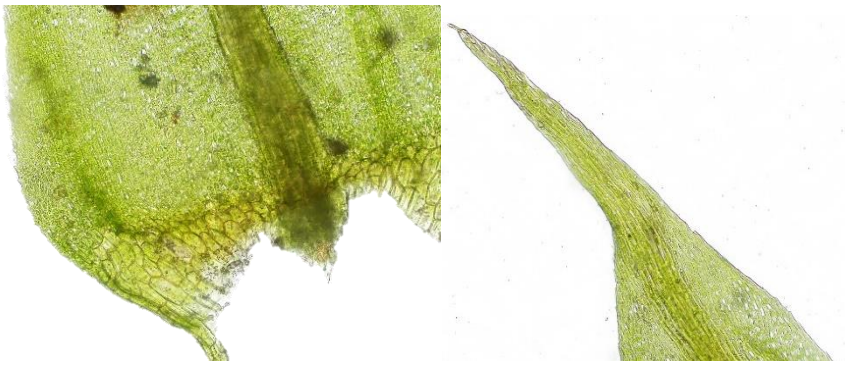


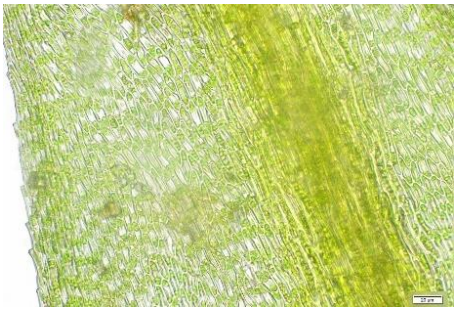
NM, Grant Co., Gila Cliff Dwellings Nat. Mon., 29 Oct 2011, *Kleinman & Blisard* (SNM).

Cratoneuron [strong-nerved].



Cratoneuron filicinum (Hedwig) Spruce [fern-like] [*Hypnum filicinum* Hedwig]. Pleurocarpous, in greenish, yellowish, or straw-colored mats or cushions, the stems creeping to upright, with a central strand, lacking a hyalodermis, often tomentose from rhizoids; leaves straight to falcate, not plicate, toothed; costa single, strong, extending well into the acumen; alar cells strongly hyaline-inflated, visible with a good hand lens; median cells elongate-hexagonal to rectangular or short-linear; capsule horizontal, curved. ●Damp to wet rocks, soil, and logs, submerged in springs and ponds. ♦Tomentose stems and non-plicate leaves with a strong costa and inflated alar cells are characteristic; checking for a central strand (present) and a hyalodermis (lacking) will confirm identification. *Palustriella falcata* is similar and the two are often found together, but that species has strongly plicate leaves.





paraphyllium

NM, Grant Co., Meadow Creek, 18 May 2013, *Kleinman & Blisard* (SNM).

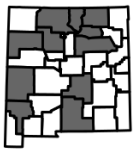
Drepanocladus [sickle-shaped shoots].

1 Costa of stem leaves long-excurrent ..... ***D. longifolius***

1 Costa of stem leaves ending well below the apex

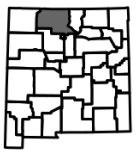
2 Leaves typically widely spreading from the stem, commonly straight; plants autoicous, capsules common ..... ***D. polygamus***

2 Leaves typically ascending from the stem, commonly falcate; plants dioicous, capsules infrequent ..... ***D. aduncus***



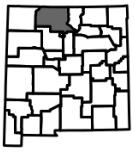
Drepanocladus aduncus (Hedwig) Warnstorf [hooked] [*Drepanocladus aduncus* (Hedwig) Warnstorf forma *aquaticus* (Sanio) Mönkemeyer, *Drepanocladus aduncus* (Hedwig) Warnstorf forma *gracilescens* (Schimper) Mönkemeyer, *Drepanocladus aduncus* (Hedwig) Warnstorf var. *kneiffii* (Schimper) Moenkemeyer, *Drepanocladus aduncus* (Hedwig) Warnstorf var. *polycarpus* (Blandow ex Voit) Roth, *Drepanocladus sendtneri* of NM reports, *Drepanocladus sendtneri* (Schimper ex H. Müller) Warnstorf var. *wilsonii* of NM reports]. Pleurocarpous, in soft, green, yellowish, or golden loose mats or erect tufts, when submerged then in very loose masses with very long stems, the stems with a central strand but lacking paraphyllia and a hyalodermis; pseudoparaphyllia foliose; leaves not plicate, mostly falcate-secund, forming dense hooks at the shoot tips, the lower leaves about the same color as the upper, plane and entire; costa single, fairly strong, extending to the acumen but no longer; alar cells hyaline-inflated; capsules horizontal, curved. ●Wet meadows, swamps, boggy ground, seepage areas, stream banks, wet ground. ♦Distinguishing features include hooked shoots, non-plicate, falcate leaves, and inflated alar cells. These features are shared with *Scorpidium cossonii*, but that species has a weak central strand, has a stem hyalodermis, and the lower leaves are commonly deep reddish brown.

NM, Grant Co., Hanover Canyon, 24 Sep 2010, *Kleinman* & *Blisard* (SNM).



Drepanocladus longifolius (Wilson ex Mitten) Brotherus ex Paris [long-leaved] [*Amblystegium longifolium* Wilson ex Mitten, *Drepanocladus aduncus* (Hedwig) Warnstorf forma *capillifolius* (Warnstorf) Mönkemeyer, *Drepanocladus aduncus* (Hedwig) Warnstorf var. *capillifolius* (Warnstorf) Riehmer, *Drepanocladus capillifolius* (Warnstorf) Warnstorf]. Pleurocarpous, in yellowish green loose mats, the shoots yellowish green distally and brownish proximally, the stems of submerged plants to 20 cm long, with a central strand but lacking paraphyllia and a hyalodermis; leaves distant, falcate, not plicate, 3-6 mm long, entire to finely toothed; costa single, stout, excurrent into an awn-tip, rarely shorter; alar cells enlarged/inflated; median cells linear; capsules horizontal, curved. ●Mostly submerged in ponds and slow-flowing brooks; known only from a single 1914 collection in Rio Arriba County. ♦Unmistakable by the long falcate leaves with excurrent costa and enlarged alar cells.

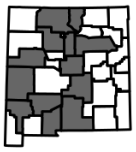
WY, Albany Co., Hanging Lake, 12 Jun 2014, *I. Kosovich-Anderson* (COLO).



Drepanocladus polygamus (Schimper) Hedenäs [many marriages] [*Amblystegium polygamum* Schimper, *Campylium polygamum* (Schimper) C.E.O. Jensen]. Pleurocarpous, in shiny green carpets and mats, the stems with a central strand, lacking a hyalodermis and paraphyllia; leaves straight to falcate, spreading, 1-4 mm long, entire, the apex furrowed; costa single or double, not reaching past ⅔ leaf length; alar cells enlarged; median cells linear; ●Nutrient-rich wetlands, marshy ground, fens. ♦Known from a single old collection in Rio Arriba County.

NM, Rio Arriba Co., Brazos Canyon, 1 Sep 1914, *Standley & Bollman* (MIN).

Hygroamblystegium [an *Amblystegium* of wet places]**.**



Hygroamblystegium varium (Hedwig) Mönkemeyer [varied] [*Amblystegium humile* (Beauvois) Bruch, Schimper, & Gumbel, *Amblystegium fluviatile* (Hedwig) Bruch, Schimper, & Gumbel, *Amblystegium tenax* (Hedwig) C. Jensen, *Amblystegium varium* (Hedwig) Lindberg, *Hygroamblystegium varium* (Hedwig) Mönkemeyer var. *humile* (P. Beauvois) Vanderpoorten & Hedenas, *Hygroamblystegium orthocladon* (P. Beauvois) Macoun & Kindberg, *Hygroamblystegium tenax* (Hedwig) Jennings, *Leptodictyum humile* (P. Beauvois) Ochyra, *Leptodictyum trichopodium* (Schulz) Warnstorf]**.** Pleurocarpous, in light to dark green or yellowish mats, the stems stiff and wiry, with a central strand and paraphyllia, lacking a hyalodermis; leaves mostly not falcate, not plicate, entire to finely toothed; costa single, slender to thick and strong, often extending well into the acumen to excurrent, remaining upon disintegration of the leaf; alar cells poorly differentiated, squarish; median cells rhombic to hexagonal, thin-walled; capsules inclined, curved. ●In and around streams, ditches, springs, and ponds, wet soil, bases of trees, rotten wood, rocks. ♦Distinctive by the strong costae which remain as little spines on older growth. Darker forms with very strong costae are sometimes recognized as separate species.

NM, Grant Co., Little Cherry Creek, 25 Oct 2010, *Kleinman & Blisard* (SNM).

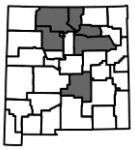
Hygrohypnum group (including ***Hygrohypnella***, ***Hygrohypnum***, and ***Platyhypnum***)

1 Laminal marginal cells exceedingly long, 60-250 µm ..... ***Hygrohypnella bestii***
1 Laminal marginal cells much shorter, rarely longer than 55 µm
  2 Leaves lanceolate to ovate, about 2 x or more longer than wide, straight to falcate
    3 Hyalodermis present ..... ***Hygrohypnella ochracea***
    3 Hyalodermis absent ..... ***Hygrohypnum luridum***
  2 Leaves broadly ovate to orbicular 1-1.5 x longer than wide, straight, never falcate
    4 Leaves about 1.5 times longer than wide; alar region not or scarcely differentiated; medial cells not prorate, generally about the same length as apical cells ..... ***Platyhypnum molle***
    4 Leaves mostly less than 1.5 times longer than wide; alar region clearly differentiated; medial cells prorate on the distal ends, generally longer than the apical cells ..... ***Platyhypnum duriusculum***

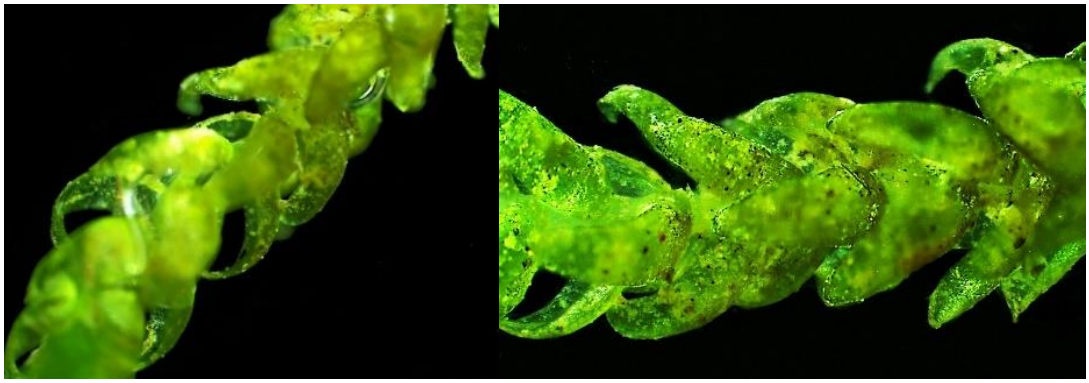
Hygrohypnella [resembling the genus *Hypnum*] [Keyed in **Hygrohypnum group**].

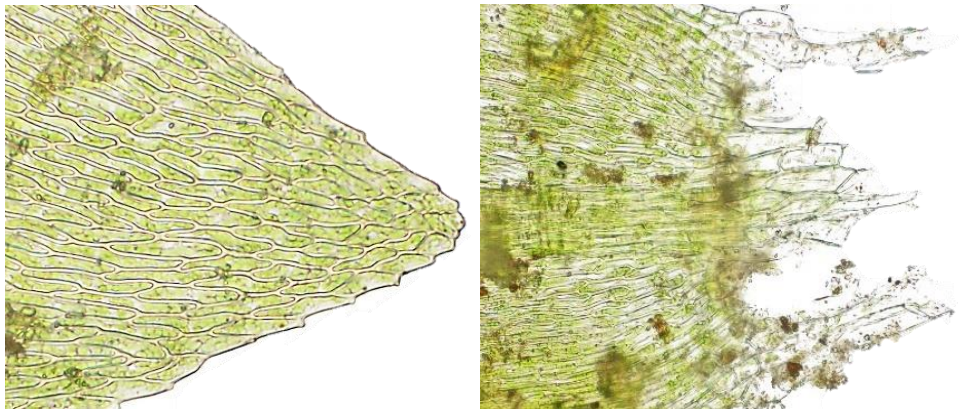
Hygrohypnella bestii (Renauld & Bryhn) Ignatov & Ignatova [for George Newton Best (1846-1926), American physician and bryologist] [*Hygrohypnum bestii* (Renauld & Bryhn) Holzinger, *Hypnum molle* (Hedwig) Loeske subsp. *bestii* Renauld & Bryhn]. Pleurocarpous, in stiff, olive-green to yellow-green mats, the stems lacking a hyalodermis, central strand (sometimes very weak), and paraphyllia; leaves straight, broadly ovate, entire to finely toothed apically; costa double, both branches reaching mid-leaf, or single and reaching beyond mid-leaf; alar cells irregular, the region poorly defined; medial cells linear-flexuose, the marginal cells (40)60-170 µm long; capsules erect-slanting, curved. ●On rocks in streams, at high elevations; known from a single verified specimen of unstated location in New Mexico, presumably in the northern mountains. ♦This species has been overlooked, and records may be hiding in collections of other species.

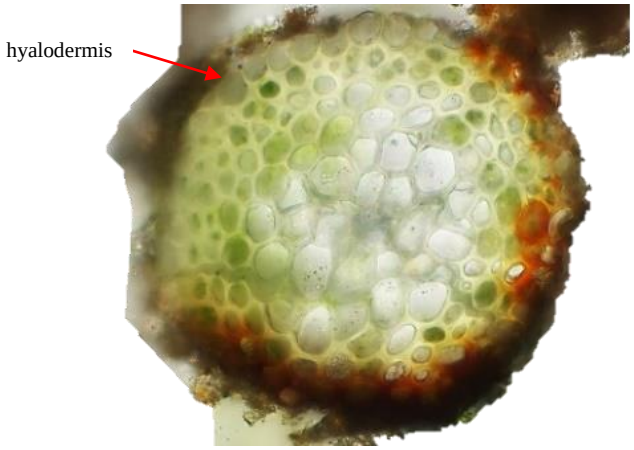
MT, Glacier Co., Glacier Nat. Park, 9 Aug 1993, *W.R. Norris* (SNM).



Hygrohypnella ochracea (Turner ex Wilson) Ignatov & Ignatova [pale yellow] [*Hygrohypnum ochraceum* (Turner ex Wilson) Loeske, *Hypnum ochraceum* Turner ex Wilson]. Pleurocarpous, in soft to coarse, bright yellow-green, to brownish mats, the stems with a hyalodermis and a central strand; leaves little changed upon drying, variable, about 2x longer than wide, straight to somewhat falcate, plane, entire to finely toothed; costa double and short to long, to single, to ecostate; alar cells quadrate to elongate; medial cells linear, longer than apical cells; capsules inclined, curved. ●In and around mountain streams, springs, seeps, and waterfalls. ♦This is a highly variable species; the presence of the hyalodermis is critical for identification.

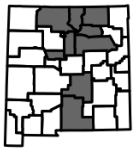




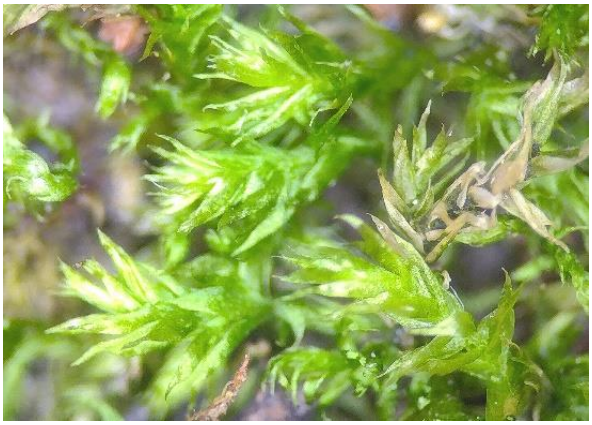


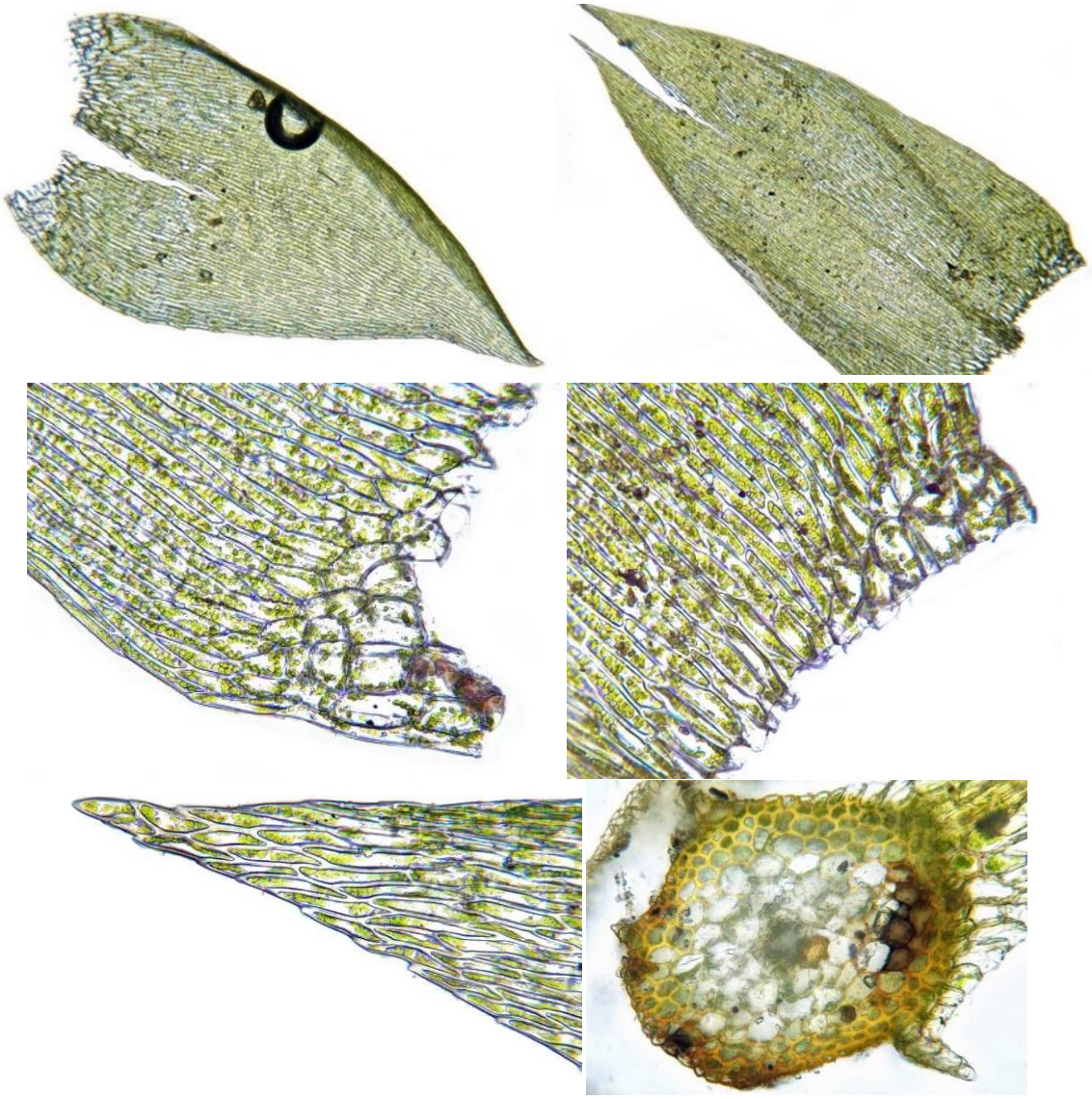
NM, Taos Co., Red River Ski Area, 22 Jul 2014, *Kleinman, Blisard, & Allred* (SNM).

Hygrohypnum [a *Hypnum* of wet places] [Keyed in **Hygrohypnum group**].



Hygrohypnum luridum (Hedwig) Jennings [pale yellow] [*Hygrohypnum luridum* (Hedwig) Jennings var. *julaceum* (Schimper) Podpera, *Hygrohypnum palustre* (Hedwig) Loeske]. Pleurocarpous, in soft, yellow-green, bright green, to dark green mats, the stems lacking a hyalodermis but a central strand present; leaves straight to ± falcate, about 2 x longer than wide, densely imbricate, little changed when dry, inrolled, entire, the cells to 60 µm long; costa single, double, or nearly absent; alar cells many, quadrate; medial cells rhombic to linear, longer than the basal cells; capsules erect to inclined, curved. ●In and around mountain streams, waterfalls, and dripping cliffs, submerged or on wet rocks, soil, or rotten logs. ♦Elongate leaves about 2 times or more longer than wide are distinctive.

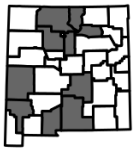


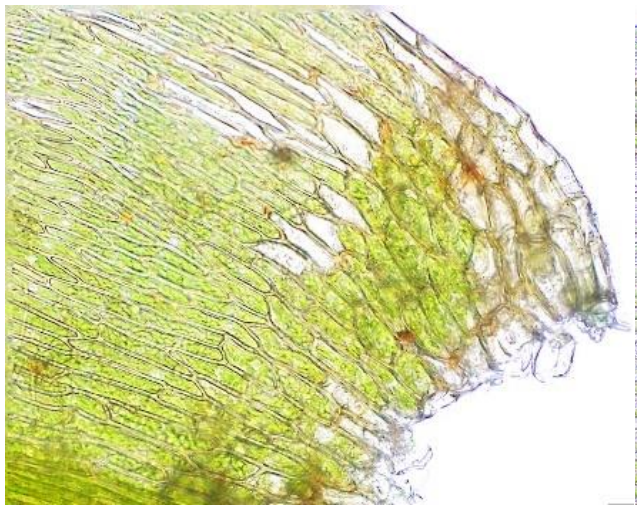


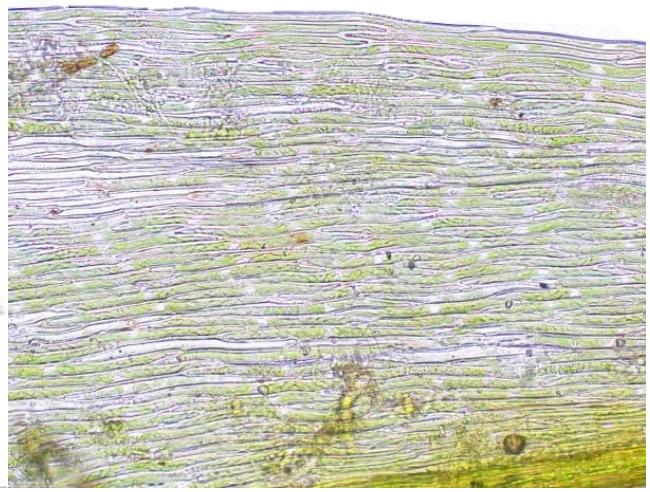
Photos by Ries Lindley, NM, Taos Co., 23 Jul 2022 (Lindley personal herbarium).

Leptodictyum [a slender net].

Leptodictyum riparium (Hedwig) Warnstorf [of streambanks] [*Amblystegium riparium* (Hedwig) Schimper, *Hypnum riparium* Hedwig]. Pleurocarpous, in loose, green to yellowish, trailing mats, the stems lacking a hyalodermis and paraphyllia, a central strand weakly developed; leaves often large, 1-6 mm long, widely spreading, entire; costa single, diminishing toward the acumen; alar region poorly developed; medial cells linear-filiform; capsules inclined, curved. ●On wet ground of stream banks, lake shores, ditches, and wet meadows, aquatic on rocks in streams.

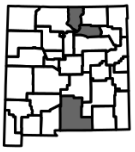






NM, Grant Co., Bear Creek, 15 Oct 2013, *Kleinman & Felger* (SNM).

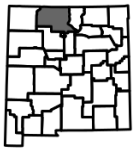
Palustriella [of marshy ground].



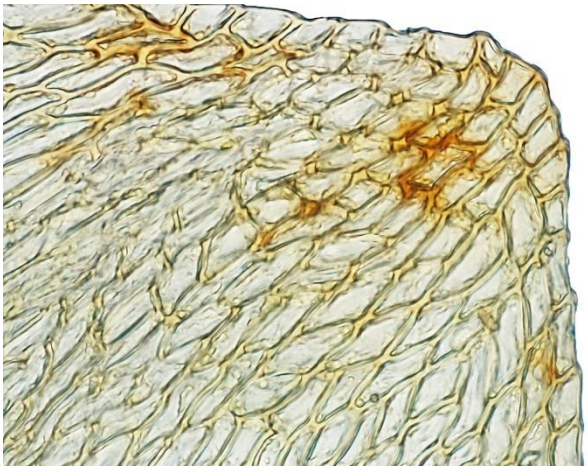
Palustriella falcata (Bridel) Hedenäs [sickle-shaped] [*Cratoneuron commutatum* of North American reports, *Cratoneuron decipiens* of North American reports, *Cratoneuron falcatum* (Bridel) G. Roth, *Cratoneuron williamsii* Grout, *Hypnum falcatum* Bridel, *Palustriella commutata* of North American reports, *Palustriella decipiens* of North American reports]. Pleurocarpous, in dense, yellowish green to golden mats or cushions, the stems upright, lacking a hyalodermis, a central strand weak or absent, and paraphyllia abundant, the branches hooked-tipped; leaves falcate, secund, strongly plicate, entire to finely toothed; costa single, ending near apex; alar cells inflated-hyaline (or yellow when young); medial cells linear; capsule horizontal, curved. ●Calcium-rich wet soil and rocks, often submerged in springs and streams, upper elevations. ♦The falcate, plicate leaves and abundant paraphyllia are important features, distinguishing it from the similar *Cratoneuron filicinum*, *Drepanocladus aduncus*, *Sanionia uncinata*, and *Scorpidium cossonii*.

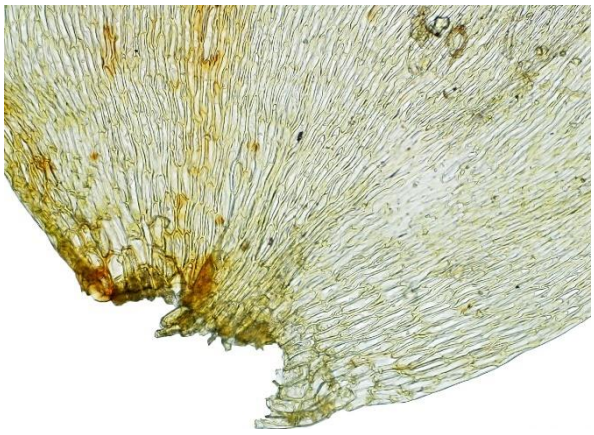
NM, Taos Co., Taos Ski Valley, 19 Mar 2015, *Kleinman, Blisard, & Allred* (SNM).

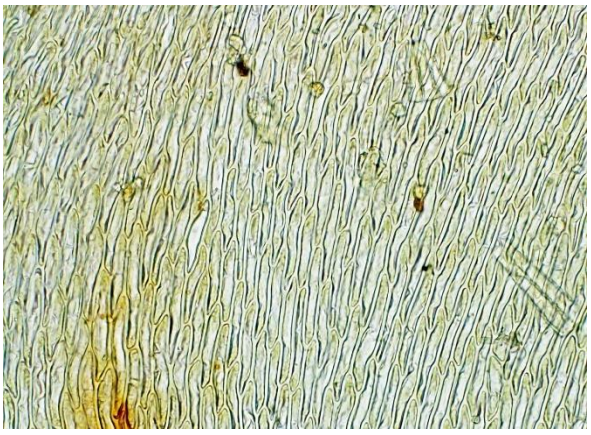
Platyhypnum [a wide-leaved *Hypnum*] [Keyed in **Hygrohypnum group**].

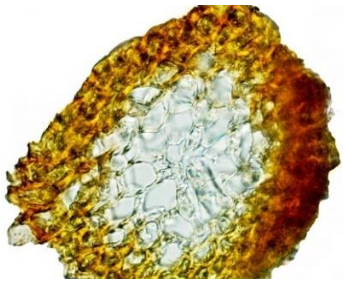


Platyhypnum duriusculum (DeNotaris) Ochyra [somewhat hard] [*Hygrohypnum duriusculum* (DeNotaris) D.W. Jamieson, *Limnobium duriusculum* DeNotaris]. Pleurocarpous, in coarse, stiff, yellowish to greenish mats, the stems lacking a hyalodermis but with a central strand; leaves shrinking or contorted when dry, broadly ovate to orbicular, mostly less than 1.5 times longer than wide, plane, usually entire, the cells to 90 µm long; costa double, short to long; alar region distinct; medial cells longer than the apical cells; capsules erect, curved. ●On wet rocks of mountain streams. ♦Easily confused with *P. molle*, but that species is soft to the touch and the leaves are little changed on drying.

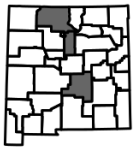




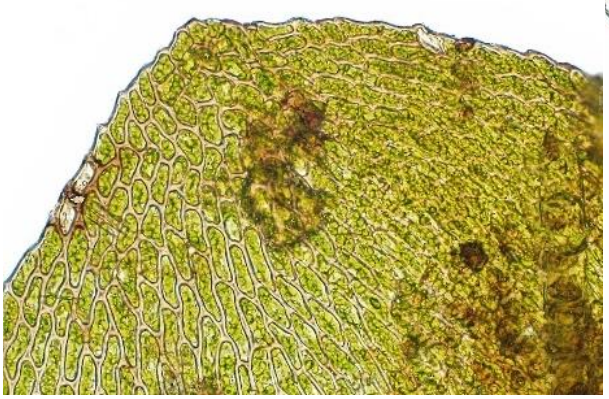


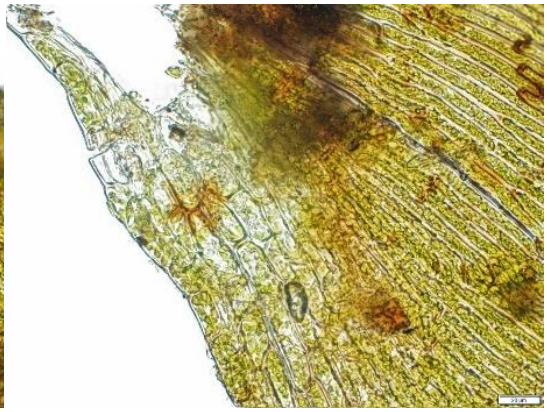


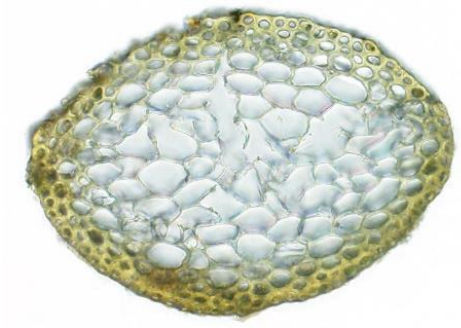
Canada, New Brunswick, Restigouche Co., 16 Aug 1970, *R.R. Ireland* (COLO).



Platyhypnum molle (Hedwig) Loeske [soft] [*Hygrohypnum molle* (Hedwig) Loeske, *Hypnum molle* Hedwig]. Pleurocarpous, in soft yellowish or olive-green mats, the stems lacking a hyalodermis but with a central strand; leaves little changed when dry, broadly ovate, about 1.5 times longer than wide, plane, entire to finely toothed, the cells to 60 µm long; costa usually double and short; alar region scarcely differentiated; medial cells shorter than basal cells, similar to apical cells; capsules erect, curved. ●Mostly on wet rocks of mountain streams; little collected. ♦Easily confused with *P. duriuscula*, but that species is harsh to the touch and the leaves are noticeably changed upon drying.



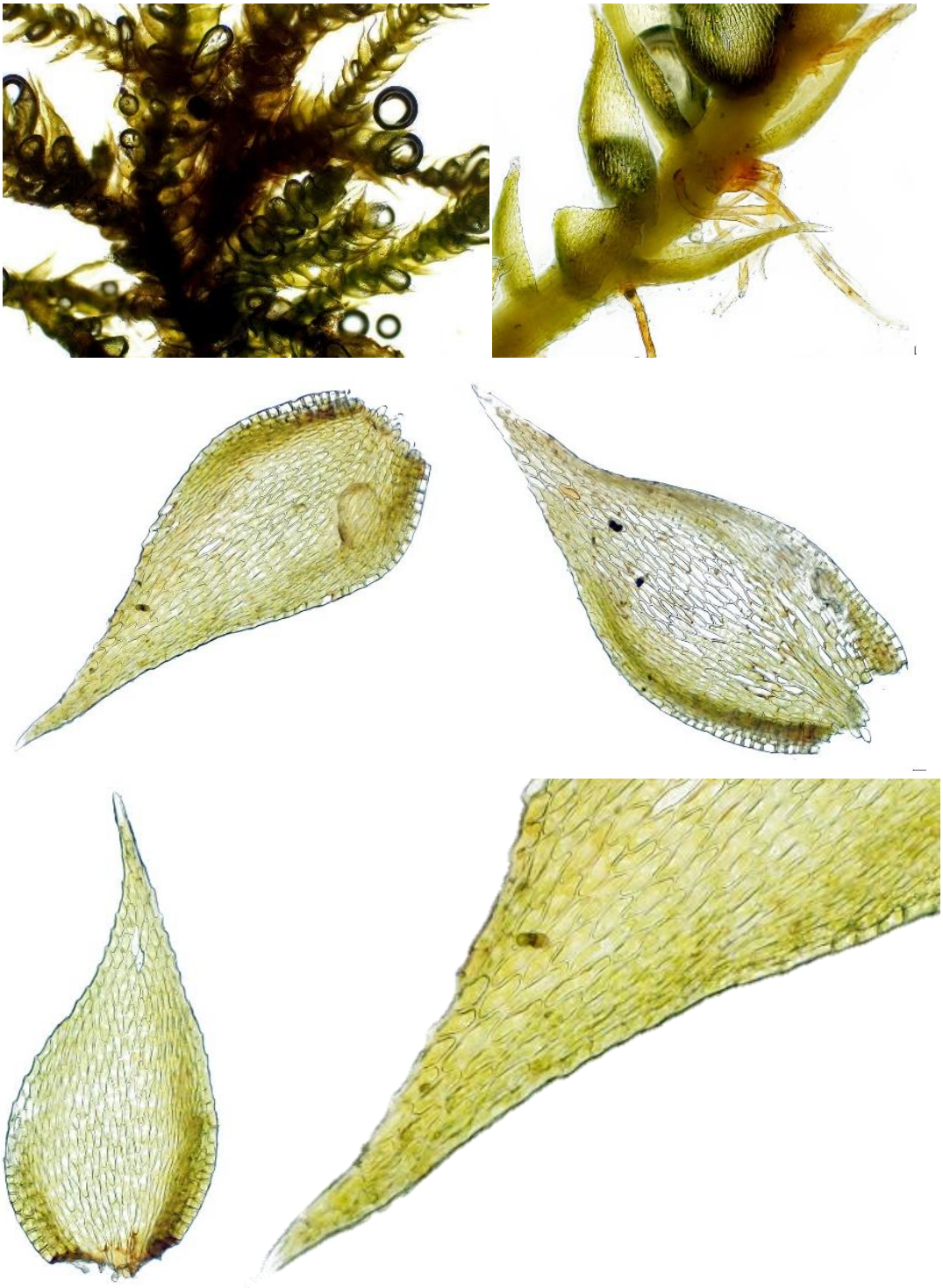




NM, Rio Arriba Co., Brazos Canyon, 30 Jun 2018, *Kleinman* & *Blisard* (SNM).

Pseudoamblystegium [resembling *Amblystegium*].

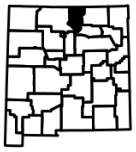
Pseudoamblystegium subtile (Hedwig) Vanderpoorten & Hedenäs [false *Amblystegium*] [*Leskea subtilis* Hedwig, *Platydictya subtilis* (Hedwig) Crum, *Serpoleskea subtilis* (Hedwig) Loeske]. Pleurocarpous, in green to brownish mats, the stems creeping, a central strand absent or weak, the branches widely spreading and firmly attached; rhizoids attached below or at the abaxial leaf insertion, smooth; leaves 0.5 mm or less long, commonly distant, plane, the margins entire; costa single, very short but present; alar cells subquadrate; median cells 3-5:1; capsules erect, symmetric. ●On bark of tree bases, exposed roots, logs. ♦Distinctive by the tiny, nearly ecostate, entire leaves with subtending rhizoids. See also *Amblystegium serpens* (Amblystegiaceae) and *Platydictya jungermannioides* (Plagiotheciaceae).

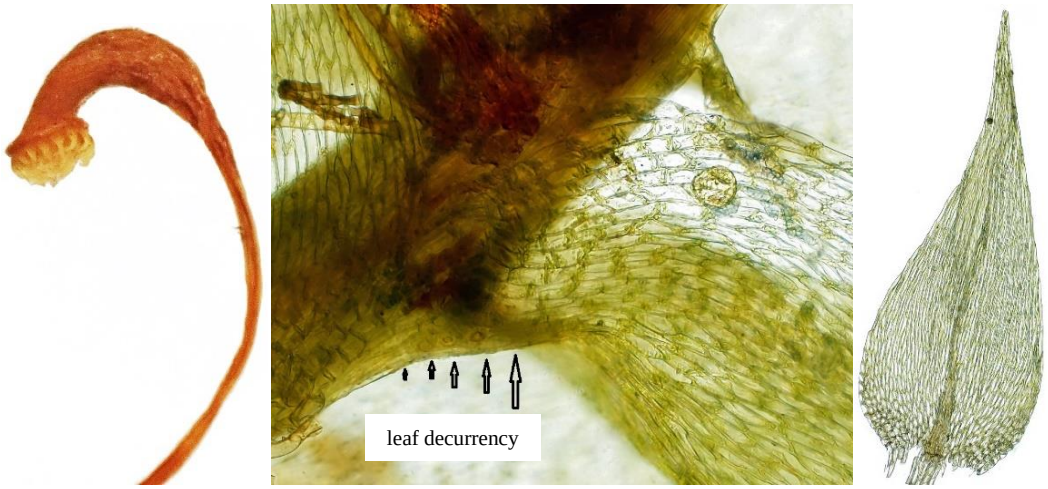


NM, Grant Co., Cherry Creek Canyon, *Kleinman, Blisard, & Allred* (SNM).

Pseudocampylium [resembling *Campylium*].

Pseudocampylium radicale (P. Beauvois) Vanderpoorten & Hedenäs [rooted, root-like] [*Campylium radicale* (P. Beauvois) Grout, *Hypnum radicale* P. Beauvois]. Pleurocarpous, in light green to yellowish mats, the stems creeping, with a central strand, lacking a hyalodermis and paraphyllia few; leaves widely spreading to reflexed, not plicate, plane, entire, the base narrowed; costa single, beyond mid-leaf; alar cells only somewhat inflated; distal cells 4-8:1; capsules horizontal, curved. ●Wet meadows and marshes, often under grasses and sedges; little-known in New Mexico.





WI, Sauk Co., Pine Hollow, 20 Aug 1965, *S. Flowers* (COLO).

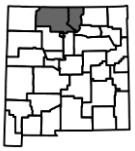
Sanionia [for Carl Gustav Sanio (1832-1891), German botanist].

Sanionia uncinata (Hedwig) Loeske [hooked] [*Drepanocladus uncinatus* (Hedwig) Warnstorf, *Hypnum uncinatum* Hedwig]. Pleurocarpous, in green to yellowish mats or cushions, the stems upright, with a hyalodermis and central strand, paraphyllia absent; leaves falcate/circinate, giving the stems hooked tips, rarely nearly straight, strongly plicate, plane, finely toothed; costa single, ending in the acumen; alar cells inflated-hyaline; medial cells linear; capsules commonly horizontal and curved. ●Wet to dry soil, rocks, and bases of trees, usually near streams or boggy ground but often on slightly drier soil. ♦Distinguished by the hyalodermis, plicate leaves, single costa, and inflated alar region.

NM, Catron Co., Willow Creek, 13 May 2011, *Kleinman & Felger* (SNM).

Scorpidium [a small scorpion].

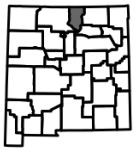
Scorpidium cossonii (Schimper) Hedenäs [for Ernest Saint-Charles Cosson (1819-1889), French botanist] [*Drepanocladus intermedius* (Lindberg) Warnstorf].



Pleurocarpous, in green, yellow-green, brownish, or reddish mats and clumps, the shoot tips sometimes hooked, the stems with a complete hyalodermis, a central strand weak, paraphyllia absent but pseudoparaphyllia broad and foliose; leaves ovate, falcate, not plicate, to 2.5 mm long, the margins entire to finely denticulate; costa single, ending beyond mid-leaf; alar cells strongly inflated. ●Calcium-rich fens and springs in the northern mountains; known from few collections. ♦Distinguishing features include hooked shoots, non-plicate, falcate leaves, and inflated alar cells. These features are shared with *Drepanocladus aduncus*, but that species lacks a stem hyalodermis and the lower leaves are about the same color as the upper.

NM, Rio Arriba Co., Canjilon Lakes, 16 Jun 2021, *Kleinman, Blisard, Anderson, & Ewing* (SNM).

Tomentypnum [a wooly *Hypnum*].



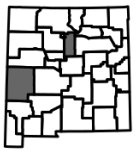
Tomentypnum nitens (Hedwig) Loeske [shining] [*Hypnum nitens* Hedwig]. Pleurocarpous, in golden to yellow-green mats and cushions, the stems upright, tomentose with rhizoids, with a central strand, hyalodermis and paraphyllia absent; leaves straight, strongly plicate, widest at the base, the apex long-acuminate; entire; costa single, ending near the apex, often with rhizoids on the back on stem leaves; alar region not or poorly differentiated; medial cells long-linear; capsules horizontal, curved. ●On swampy and boggy ground; little collected. ♦Unmistakable by the golden-yellow tufts, tomentose stems, and straight, strongly plicate leaves.

Canada, Manitoba, Churchill, 6 Jun 2019, *Kleinman,Edye, & Blisard* (SNM); MI, Emmet Co., 7 Jul 1990, *W.R. Norris* (SNM).

Amphidium [resembling a flask].

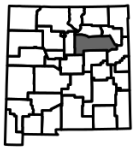
1 Plants autoicous, frequently fruiting; leaves ligulate-lanceolate; distal laminal cells 8-11 µm long, obscured by papillae; papillae relatively large, warty, not appearing as striae ..... ***A. lapponicum***

1 Plants dioicous, seldom fruiting; leaves linear-lanceolate; distal laminal cells 5-9 µm long, only slightly obscured by papillae; papillae small, elliptic, arranged in longitudinal rows, appearing as striae ..... ***A. mougeotii***



Amphidium lapponicum (Hedwig) Schimper [of Lapland] [*Anictangium lapponicum* Hedwig]. Acrocarpous, in dense cushions, the stems to 3.5 cm long; leaves ligulate-lanceolate, 2-3 mm long, the margins plane, entire, the proximal cells clear; distal cells 8-11 µm, obscured by the large papillae also on the transverse walls; capsule immersed to ½ emergent, the operculum shorter than the diameter of the capsule; peristome absent. ●Seasonally wet cliffs and crevices; only recently found in the state. ♦Distinctive by the large, warty papillae obscuring the lumens and cell walls.

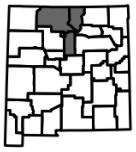
CO, Eagle Co., Missouri Creek, 25 Jul 1983, *H. Rolston III* (COLO).



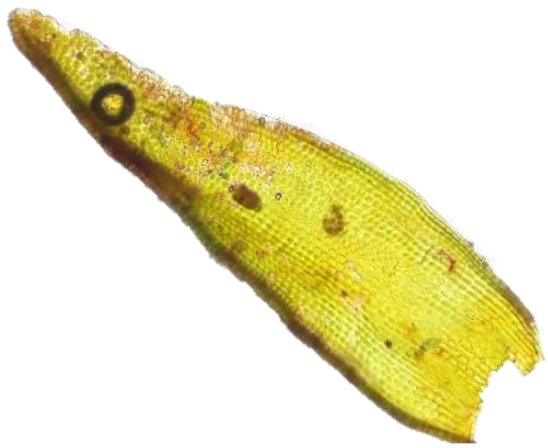
Amphidium mougeotii (Bruch & Schimper) Schimper [for Jean-Baptiste Mougeot (1776-1858), French physician-botanist] [*Zygodon mougeotii* Bruch & Schimper]. Acrocarpous, in dense cushions, the stems to 5 cm long; leaves linear-lanceolate, 1.5-3 mm long, the margins plane, entire or slightly serrulate apically, the proximal cells yellowish; distal cells 5-9 µm long, only slightly obscured by the small, elliptic papillae also on the cell walls and appearing as longitudinal striae; capsules infrequent, barely exserted, the operculum longer than the diameter of the capsule; peristome absent. ●Seasonally wet crevices and cliffs; only recently found in the state.

MT, Glacier Co., Reynolds Creek, 21 Aug 1962, *F.J. Hermann* (COLO).

Andreaea [for Johann Gerhard Reinhard Andreä (1724–1793), German scientist].



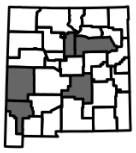
Andreaea rupestris Hedwig [rock-dwelling] [*Andreaea heinemannii* of NM reports]. Acrocarpous, in usually short, flattish, crusty, reddish brown to blackish mats or turf, tightly adhering to the substrate, the stems erect, lacking a central strand; leaves spiraling around the stem, spreading when wet, brittle when dry, about 1 mm long, ending in a tiny apiculus of a single cell, entire; costa absent; medial cells quadrate to short-rectangular, the lumens rounded; capsules opening by 4 valves when dry, closing when wet. ●On granitic boulders and ledges. ♦The tiny, Chinese-lantern capsules are unmistakable.



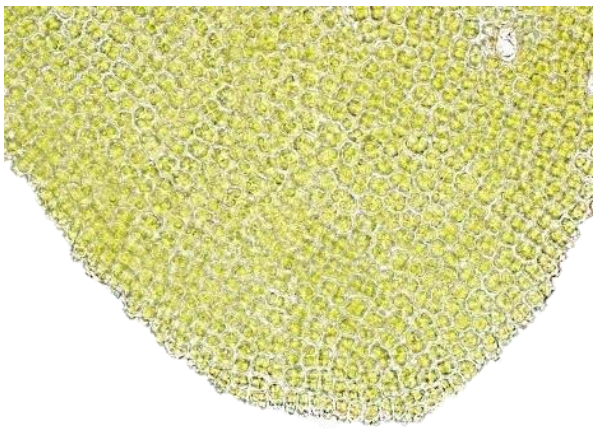
NM, Taos Co., Taos Ski Area, 6 Aug 2015, *Kleinman & Blisard* (SNM).

1 Laminal cells smooth; leaf margins coarsely serrate distally; costa flexuose ..... go to **Herpetineuron** (Thuidiaceae)
1 Laminal cells papillose; leaf margins entire or minutely toothed distally; costa ± straight
2 Many leaf tips broken; leaf margins plane; costa scarcely reaching mid-leaf ..... **Haplohymenium**
2 No or few leaf tips broken; leaf margins undulate; costa reaching near the apex ..... **Anomodon**

Anomodon [unequal teeth].
1 Leaves with hyaline hair-points; margins revolute (*C. rostratum*) ..... go to **Claopodium** (Leskeaceae)
1 Leaves without hair-points; margins plane or undulate, not revolute
2 Leaves obtuse, rounded; secondary branchlets not or only slightly attenuate ..... ***A. minor***
2 Leaves acute to apiculate; secondary branchlets noticeably attenuate (***P. attenuatus***)..... ..... go to **Pseudanomodon** (Neckeraceae)



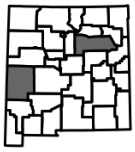
Anomodon minor (Hedwig) Fürnrohr [smaller, inferior] [*Neckera viticulosa* Hedwig var. *minor* Hedwig]. Pleurocarpous, in dark to yellow-green mats loosely hanging on the substrate, the stems julaceous when dry, complanate when moist; leaves ovate-ligulate, widest toward the base, undulate, entire distally, rounded; costa single, ending near apex; medial cells hexagonal, multi-papillose; capsules erect (rare). ●On rocks and bark at the bases of trees. ♦Tongue-shaped leaves with undulate margins are distinctive.

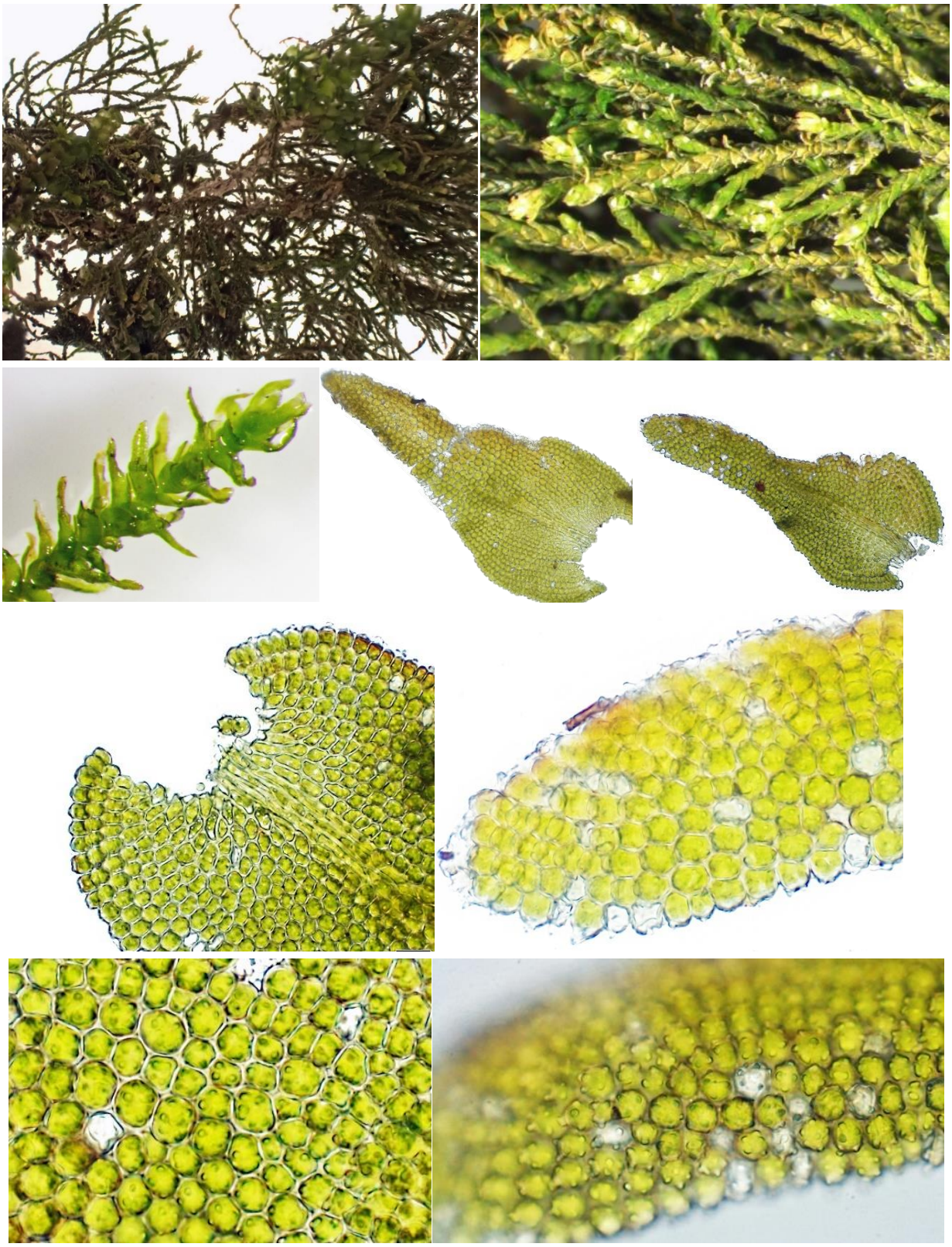


NM, Grant Co., Gila Cliff Dwellings Nat. Mon., 18 Oct 2011, *Kleinman & Blisard* (SNM).

Haplohymenium [an old name for the peristome].

Haplohymenium triste (Cesati) Kindberg [sad] [*Anomodon tristis* (Cesati) Sullivant & Lesquereux, *Leskea tristis* Cesati]. Pleurocarpous, in loose, wiry, brownish green mats and shags, the stems little-branched, with few rhizoids; leaves julaceous when dry, ligulate, the tips often broken off; costa weak, ending before mid-leaf; medial cells round, multi-papillose. ●Bark of trees; little known.



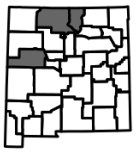


NM, San Miguel Co., Porvenir Canyon, 18 Jun 2021, *Kleinman, Blisard, & Anderson* (SNM).

Aulacomnium [a furrowed moss].

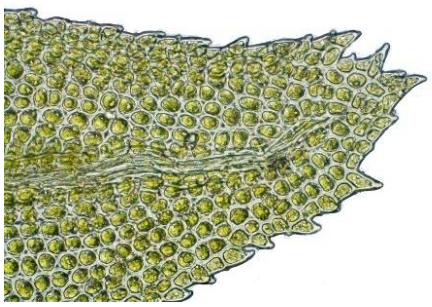
1 Gemmae numerous and borne in tight globose heads at the end of a naked stalk; leaves serrulate beyond mid-leaf; basal cells of leaves not at all inflated and not colored; hyalodermis absent .....***A. androgynum***

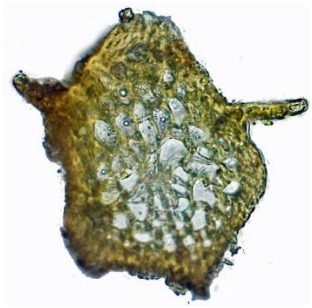
1 Gemmae relatively few and borne in loose clusters at the end of a somewhat leafy stalk; leaves entire to minutely toothed; basal cells of leaves inflated and often colored; hyalodermis present.....***A. palustre***

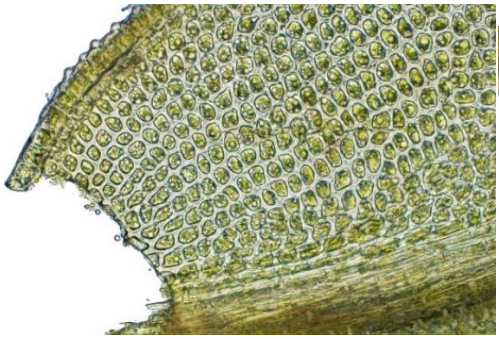


Aulacomnium androgynum (Hedwig) Schwägrichen [hermaphrodite] [*Bryum androgynum* Hedwig]. Acrocarpous, in small green mats or cushions, the stems roughly 5-sided, lacking a hyalodermis; leaves coarsely toothed distally; costa whitish, flexuose; medial cells round to oblong, 1-papillose; gemmae fusiform, born at the tip of a naked stalk in a tight globose cluster. ●On rotten logs and stumps, soil over rock, and rich forest soils; only recently re-found in the state on lava rock of Cibola County. ♦Plants are commonly a bit greener and smaller than *A. palustre*, quickly recognizable by the naked stalks supporting a dense globe of gemmae.

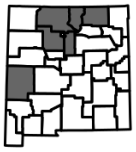
gemma



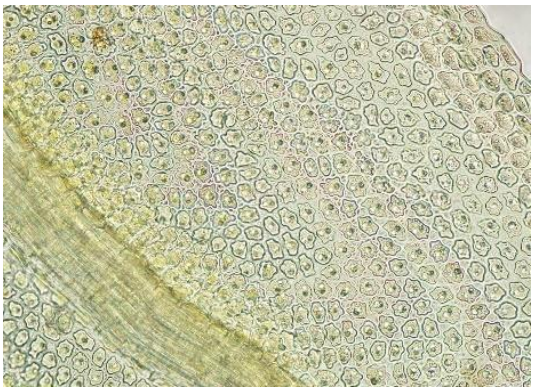


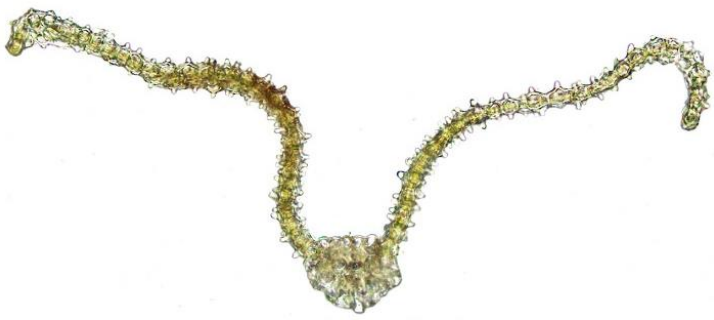


NM, Cibola Co., El Malpais Nat. Mon., 23 May 2019, *Kleinman et al.* (SNM).



Aulacomnium palustre (Hedwig) Schwägrichen [marsh-dwelling] [*Aulacomnium palustre* (Hedwig) Schwägrichen var. *imbricatum* Bruch & Schimper, *Mnium palustre* Hedwig]. Acrocarpous, in yellowish to yellow-green tufts and cushions, the stems to 10 cm long/tall, 5-sided, with a hyalodermis; leaves entire to sinuate/serrulate distally; costa whitish, flexuose; medial cells rounded-quadrate to elliptic, 1-papillose; gemmae bullet- or spear-shaped, borne at the tip of a leafy stalk in a loose cluster. ●On saturated soil in swampy ground and fens, rotting logs, soil over rock. ♦The more common of the two species, distinctive by the leafy gemmae stalks and nearly entire leaf tips.





NM, Catron Co., Willow Creek, 30 Apr 2011, *Kleinman, Felger, & Blisard* (SNM).

1 Leaves with a ± clasping or sheathing base, the basal portion differentiated and greatly enlarged, the blade subulate; hyalodermis present ..... **Bartramia**

1 Leaves not clasping or sheathing, the base usually ovate, the blade subulate or broader; hyalodermis absent or present

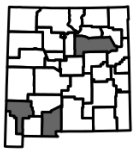
2 Blades lanceolate to ovate; branches frequently in whorls at the upper part of the stems; plants of wet places; hyalodermis present ..... **Philonotis**

2 Blades subulate or linear; plants of various habitats; hyalodermis absent ..... **Anacolia**

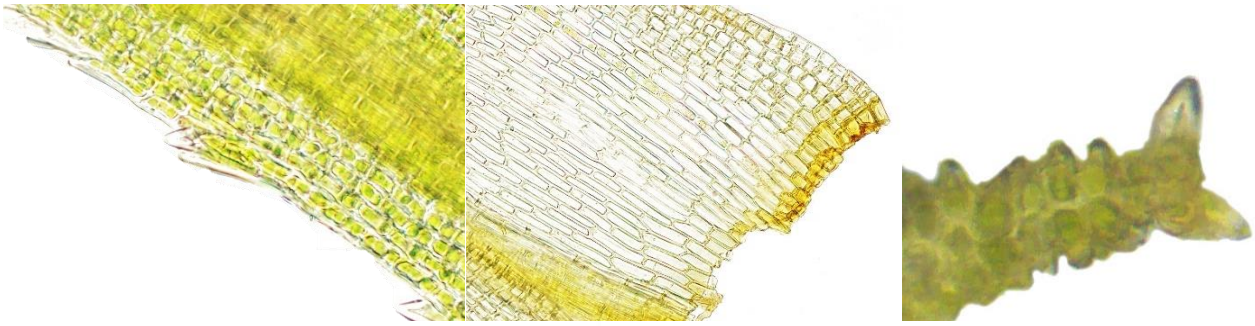
Anacolia [short-stalked].

1 Distal leaf cells prorate on both surfaces; inner basal cells linear; blade 2- to 3-stratose distally ..... ***A. laevisphaera***

1 Distal leaf cells smooth or only a few prorate on the abaxial surface; inner basal cells quadrate or short-rectangular; blade 1- to 2-stratose distally ..... ***A. menziesii***

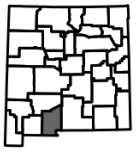


Anacolia laevisphaera (Taylor) Flowers [smooth-globed] [*Anacolia intertexta* of NM reports, *Anacolia subsessilis* (Taylor) Brotherus, *Glyphocarpa laevisphaera* Taylor]. Acrocarpous, in yellowish to reddish light green tufts or cushions, the stems upright and densely packed, with a strong flattened central strand (easily ruptured); leaves straight, long-linear, plicate basally, 2-4-stratose distally and near margins, coarsely toothed; costa strong, excurrent; medial cells linear, prorate. ●Dry soil in rock crevices, talus. ♦Distinctive by the multi-stratose blades, toothed margins, and prorate cells.



NM, Grant Co., Meadow Creek, 18 May 2013, *Kleinman* (SNM).

Anacolia menziesii (Turner) Paris [for Archibald Menzies (1754-1842), Scottish botanist] [*Bartramia menziesii* Turner]. Acrocarpous, in yellowish green to reddish brown tufts or cushions, the stems upright but loosely clustered, shaggy-looking; leaves narrowly lanceolate, long-acuminate, 1-2-stratose distally, toothed; costa single, short-excurrent; medial cells rectangular, smooth or a few cells prorate abaxially. ●On thin soil of rocks and ledges; known from a single collection. ♦Distinctive by the nearly smooth cells.

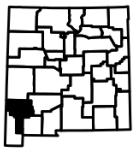


CA, Mendocino Co., Baechtel Creek, 1 May 2021, *Kleinman & Blisard* (SNM).

Bartramia [for John Bartram (1699-1777), American botanist].

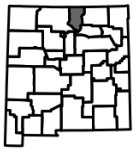
1 Leaf tips fragile and usually broken..... ***B. potosica***
1 Leaf tips not fragile, intact
  2 Leaf bases not sheathing, shoulders absent..... ***B. aprica***
  2 Many leaf bases sheathing, especially on the more proximal leaves, shoulders well-developed
    3 Margins plane; costa in cross-section nearly flat, scarcely bulging abaxially; capsule about 1 mm long ..... ***B. ithyphylla***
    3 Margins recurved to revolute; costa in cross-section conspicuously bulging abaxially; capsule 1.5-2 mm long..... ***B. brevifolia***

Bartramia aprica Müller Hal. [sun-loving] [*Bartramia stricta* Bridel]. Acrocarpous, in dense, glaucous to brownish green tufts, the stems congested to scattered; leaves stiff, narrowly lanceolate, not sheathing, shoulders absent, the margins recurved, toothed; costa excurrent; medial cells short-rectangular, low-prorate. ●On soil and rock in mountain forests; known from a single collection. ♦The stiff, non-sheathing leaves lacking shoulders are distinctive.



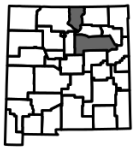
NM, Grant Co., Black Range, 29 Oct 1963, *Weber, Vaarama, & Khanna* (COLO).

Bartramia brevifolia Bridel [short-leaved] [*Bartramia microstoma* of NM reports]. Acrocarpous, in dense, glaucous to brownish green tufts; leaves narrowly lanceolate, sheathing, with well-developed shoulders, the margins revolute, toothed distally; costa excurrent, bulging abaxially; medial cells elongate, prorate. ●Rock crevices and ledges, thin soil; known from a single collection near timberline in Taos County. ♦Sheathing bases with shoulders of lower leaves and a conspicuously bulging costa in cross-section are distinctive.



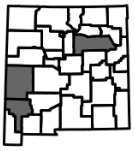
Dominican Republic, La Vega Province, 10 Jan 1987, *W.R. Buck* (NY 00646911).

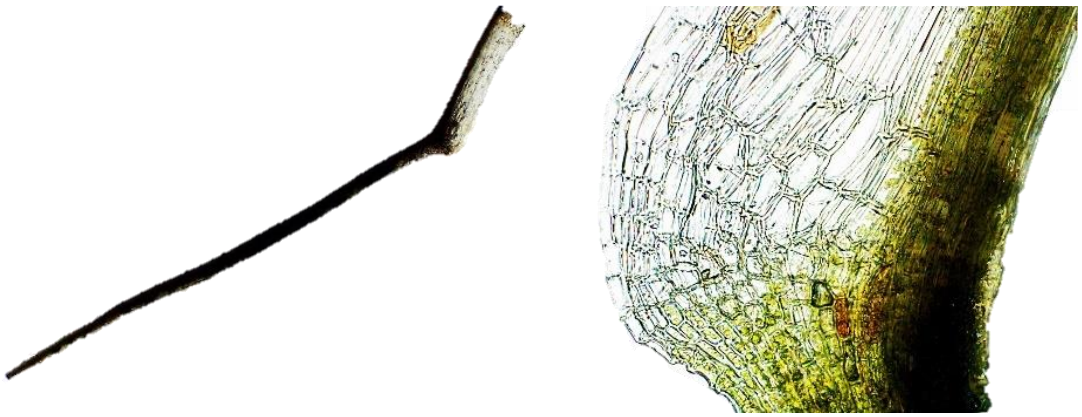
Bartramia ithyphylla Bridel [straight-leaved]. Acrocarpous, in loose to dense, green to glaucous tufts; leaves stiff, linear, prominently sheathing, shoulders well-developed, the margins plane, finely toothed distally; costa excurrent, with an abaxial stereid band 2-4 cells thick; medial cells rectangular, low-prorate. ●On soil or rock. ♦The nearly flat costa abaxially (in cross-section) is critical for identification.

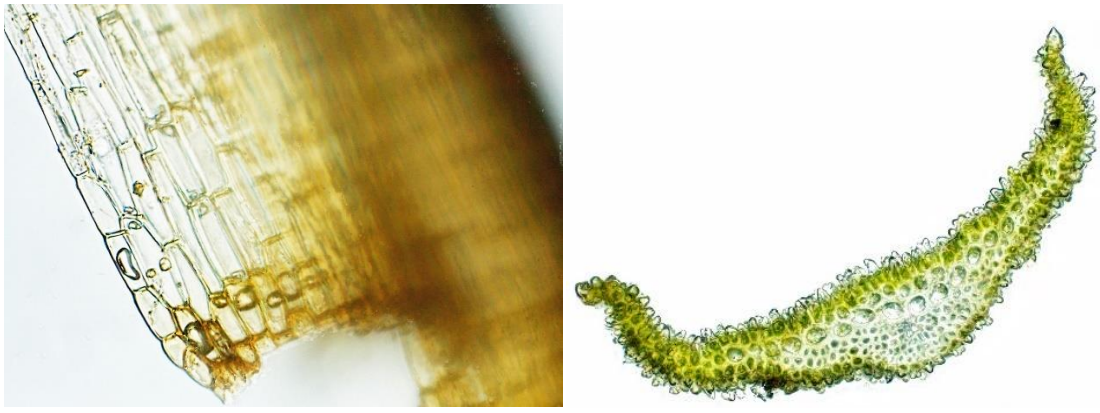


NM, Taos Co., trail to Williams Lake, 7 Aug 2015, *Kleinman* & *Blisard* (SNM).

Bartramia potosica Montagne [of wet places] [*Bartramia glauca* Lorentz]. Acrocarpous, in glaucous to yellowish green tufts; leaves narrowly lanceolate, 3-8 mm long, many broken off, sheathing, shoulders well developed but delicate, the margins plane or weakly revolute, toothed distally; costa prominent, excurrent, with abaxial stereid band 4-6 cells thick; distal cells 10-25 µm long, high-prorate. ●Rock faces, crevices, and ledges. ♦The broken-off and sheathing leaves are diagnostic.







NM, San Miguel Co., Upper Gallinas Canyon, 13 Aug 2018, *Kleinman & Blisard* (SNM).

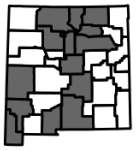
Philonotis [water-loving].

1 Leaf cells prorate at their proximal ends on abaxial surface; distal cells linear-oblong ..... ***P. fontana***

1 Leaf cells prorate at their distal ends on abaxial surface; distal cells oblong to rectangular

2 Marginal teeth paired distally, single proximally; basal cells quadrate to rectangular..... ***P. uncinata***

2 Marginal teeth single distally and proximally; basal cells oblong .....***P. marchica***

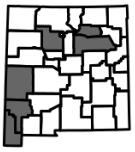


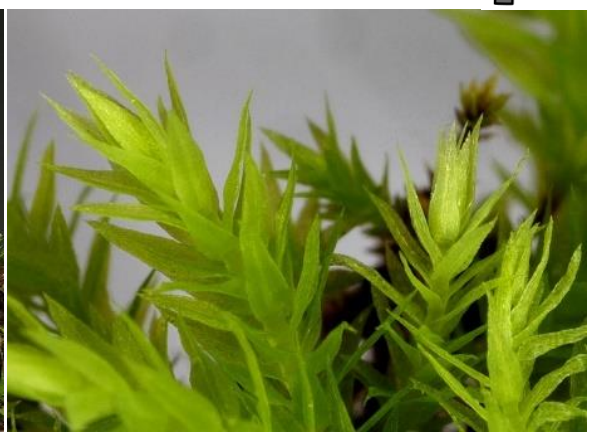
Philonotis fontana (Hedwig) Bridel [of fountains and springs] [*Mnium fontanum* Hedwig, *Philonotis fontana* (Hedwig) Bridel var. *americana* (Dismier) Flowers ex Crum, *Philonotis fontana* (Hedwig) Bridel var. *caespitosa* (Juratzka) Schimper, *Philonotis fontana* (Hedwig) Bridel var. *pumila* (Turner) Bridel, *Philonotis tomentella* Molendo]. Acrocarpous, in light to dark green tufts or turf, sometimes reddish or yellowish, the stems upright, crowded, reddish, sometimes with a whorl of branches near the top or with splash cups at the tips of male stems; leaves stiff, little changed wet or dry, the margins revolute, finely toothed, the teeth paired; costa strong, mostly excurrent; cells prorate at proximal ends, the distal cells 5-8:1. ●Wet places on rock and soil, often in or at the edge of streams and creeks. ♦Numerous forms have been named based on stem length, leaf size, plication, leaf orientation, and capsule size. This is one of the most common mosses of wet areas. Revolute leaf margins, proximally prorate cells, and paired teeth are diagnostic features.

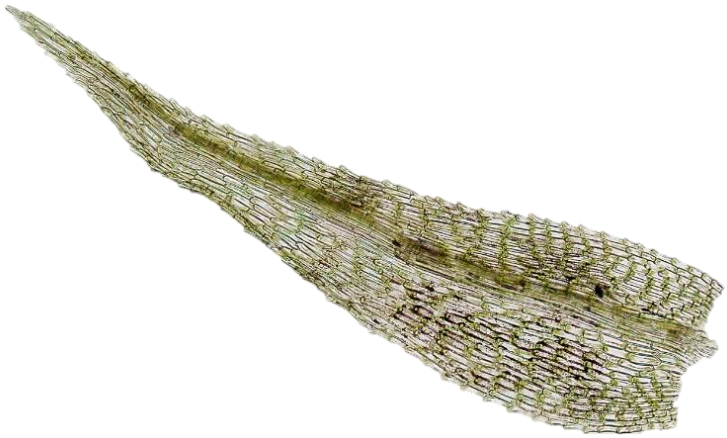
antheridial splash cups

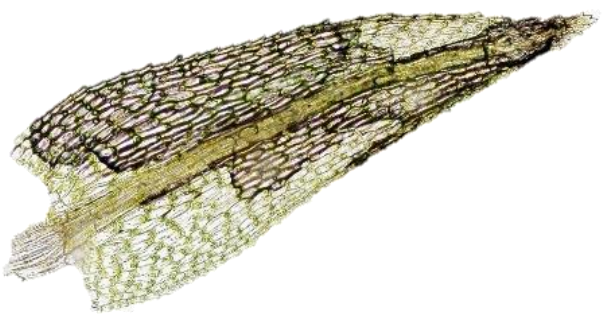
NM, Catron Co., Mogollon Mts, 10 Jun 2010, *Kleinman & Blisard* (SNM).

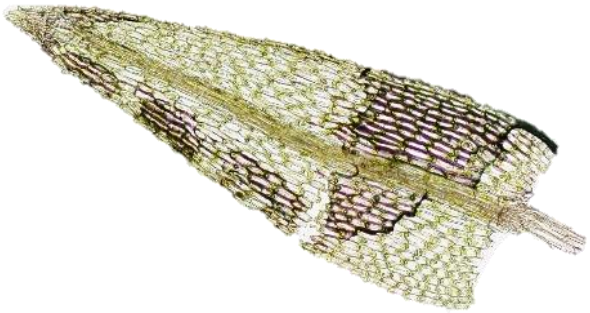
Philonotis marchica (Hedwig) Bridel [from the March of Brandenburg] [*Mnium marchicum* Hedwig].
Acrocarpous, in small, yellowish to bright green, loose to dense tufts; leaves somewhat more spreading when wet, commonly entire, finely toothed, the teeth single; costa percurrent to long-excurrent; cells prorate at their distal ends, 2-5:1. ●Rocks and soil in wet places. ♦Plane leaf margins, distally prorate cells, and single teeth (rather than paired) are diagnostic features.

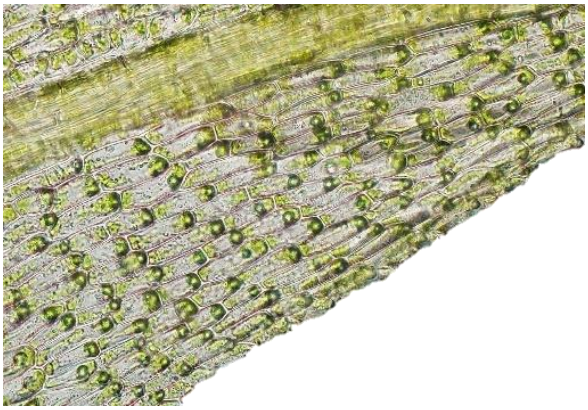




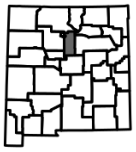




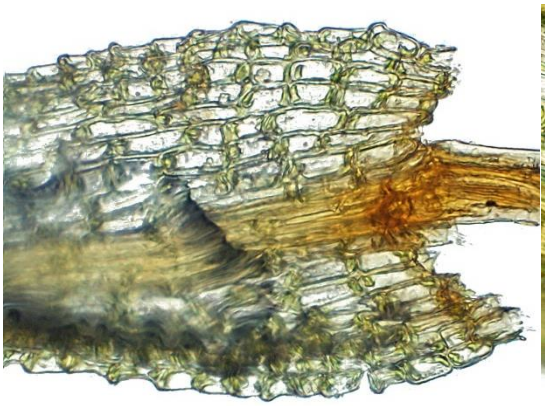


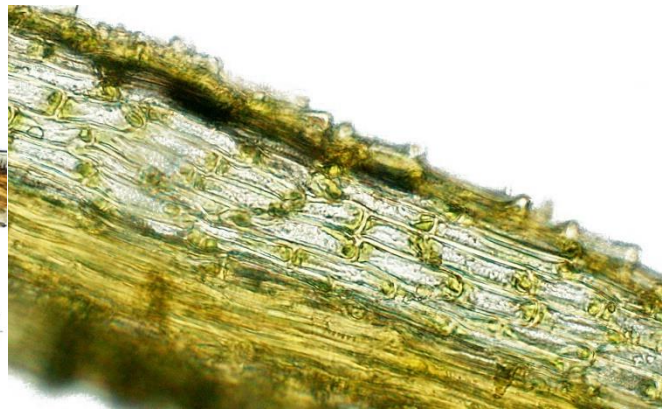


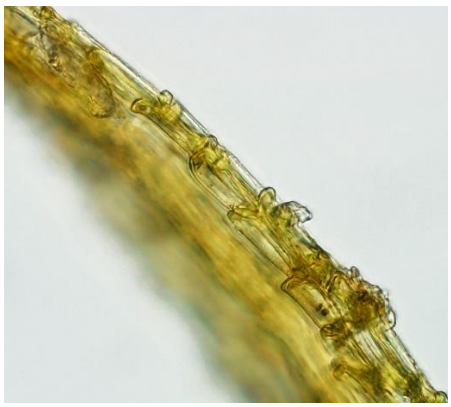
NM, Grant Co., Sycamore Canyon, 31 Aug 2010, *Kleinman & Blisard* (SNM).



Philonotis uncinata (Schwagrichen) Bridel [hooked]. Acrocarpous, in small yellowish tufts, the stems straight to hooked at the tips, to 3 cm tall/long; leaves triangular-lanceolate, to 1.3 mm long, the margins revolute distally, with paired teeth distally; costa percurrent to short-excurrent; basal cells quadrate to rectangular, 1-5:1; medial cells prorate at the distal ends, 4-6:1. ●On moist to wet soil or rocks. ♦Our plants belong to var. ***glaucescens*** (Hornschuch) Florschütz [somewhat glaucous] [*Bartramia glaucescens* Hornschuch], with straight stems, nearly straight leaves, and percurrent costae.







Ecuador, Galápagos Islands, 21 May 1976, *Colorado-Utrecht Expedition* (COLO).

1 Apical leaf cells conspicuously shorter than the linear distal or medial cells
  2 Branches noticeably julaceous, especially when dry; leaves entire to slightly serrulate; rare in the state ..... **Scleropodium**
  2 Branches not noticeably julaceous; leaves often strongly serrate
    3 Plants aquatic, on rock in running water of streams and springs, waterfalls (*R. aquaticum*) ..... **Rhynchostegium**
    3 Plants terrestrial, on soil, humus, rock, rotten logs, tree bases, sometimes rather moist substrates, but never in running water
      4 Stem leaves deltoid to broadly lanceolate, broadest in the proximal ⅛ or less, very near the base, commonly plicate ..... **Eurhynchiastrum**
      4 Stem leaves broadly ovate to broadly oblong-lanceolate, broadest in the proximal ⅐-½, often near the middle, rarely plicate ..... **Oxyrrhynchium**
1 Apical and distal/medial cells about the same length
  5 Stems stiffly erect, densely brown tomentose throughout; leaves appressed, linear-lanceolate, multi-plicate; costa slender and difficult to distinguish from the plicae ..... go to **Tomentypnum** (Amblystegiaceae)
  5 Plants not as above
    6 Plants small and slender; costa vanishing into the acumen, often bearing gemmae on the back toward the apex; leaves 0.6-1.2 mm long ..... go to **Conardia** (Amblystegiaceae)
    6 Plants mostly medium-sized (small in some *Brachythecium*); costa usually ending at ¾ the leaf length or less (extending into the acumen in *Brachythecium populeum*), lacking gemmae; leaves of various lengths
      7 Alar cells scarcely differentiated and leaf margins strongly toothed from apex to base and shoots appearing flattened (*R. serrulatum*) ..... **Rhynchostegium**
      7 Alar cells, leaf margins, and shoots not all as above ..... **Brachythecium group**

Brachythecium group (including ***Brachytheciastrum***, ***Brachythecium***, and ***Sciuro-hypnum***)

1 Costa disappearing into the acumen to percurrent or nearly so, 80-100% of leaf length (variable in *S.-h. reflexum*, check several leaves)
  2 Basal cells ± homogeneous and opaque across the base in 4-5 rows, quadrate to short-ovate; alar cells similar to juxtacostal cells ..... ***Sciuro-hypnum populeum***
  2 Basal cells not homogeneous, the cells of the alar region different from the juxtacostal cells; alar region extending about halfway to costa; juxtacostal cells wider and shorter than the laminal cells immediately above them ..... ***Sciuro-hypnum reflexum***
1 Costa ending well below the apex, 20-80% of leaf length
  3 Alar cells thin-walled and noticeably inflated or enlarged
    4 Stem leaves strongly plicate, the margins serrulate to serrate; a row of larger cells extending across the insertion from margin to costa ..... ***Brachythecium frigidum***
    4 Stem leaves not or rarely plicate, the margins entire to serrate; larger cells generally not extending all the way across the insertion
      5 Leaf margins usually serrulate throughout; leaf apices broadly acute to acuminate; alar cells strongly enlarged-inflated, rarely extending more than halfway to the costa; medial cells 8-13:1 ..... ***Brachythecium rivulare***
      5 Leaf margins entire or minutely serrulate in the acumen; leaf apices narrowly acuminate; alar cells thin-walled, enlarged but not strongly inflated, often extending more than halfway to the costa; medial cells 4-8:1 ..... ***Sciuro-hypnum latifolium***
  3 Alar cells thin- or thick-walled, but not or scarcely inflated, or not well-differentiated
    6 Alar region not clearly differentiated from adjacent basal cells; basal laminal cells in 3-8 rows, noticeably set off from the more distal cells
      7 Stem leaves deeply plicate; basal laminal cells 6-11 µm wide, in 3 rows, the region opaque ..... ***Brachythecium laetum***
      7 Stems leaves not or moderately plicate; basal laminal cells 11-19 µm wide, in 3-8 rows, the region pellucid
        8 Basal laminal cells in 5-8 rows; stem leaves 2-3 mm long ..... ***Brachythecium rotaeanum***
        8 Basal laminal cells in 3-4 rows; stem leaves 1-1.6 mm long ..... ***Brachythecium acuminatum***
    6 Alar region ± clearly differentiated, the cells different than the adjacent basal cells; basal laminal cells in 1-3 rows and gradually transitioning to the more distal cells
      9 Plants slender; branch leaves less than 1 mm long
        10 Shoots somewhat julaceous, often yellowish, but also green, the leaves generally appressed
          11 Capsules inclined to horizontal; leaves usually concave (causing folds or splits when flattened), tending toward ovate; terminal spine of costa absent ..... ***Brachytheciastrum collinum***
          11 Capsules straight and erect; leaves usually flat, tending toward lanceolate; terminal spine of costa present ..... ***Brachytheciastrum fendleri***
        10 Shoots not at all julaceous, usually green, the leaves spreading

12 Stem leaves falcate-secund to circinate when dry, especially at the stem tips, not concave, long-tapering to a slender point; green across the base; costa not narrowing much from the base ..... ***Brachytheciastrum velutinum***

12 Stem leaves straight, not falcate-secund or only slightly so, rounded and concave, abruptly narrowed to the apex; rusty-colored across the base; costa distinctly narrowing from a noticeably broad base ..... ***Sciuro-hypnum plumosum***

9 Plants thicker, often robust; branch leaves more than 1 mm long

13 Leaves highly concave, abruptly narrowed to the subulae, the shoots julaceous

14 Leaves not or only slightly plicate, tending to broadly elliptic-ovate, broadest at ¼-⅓ the leaf length from the base, the apical subulae long and conspicuous, often diverging; seta rough ..... ***Brachythecium cirrosum***

14 Leaves plicate, tending to narrowly ovate, broadest at ⅐ the leaf length from the base, the apical subulae less conspicuous; seta smooth ..... ***Brachythecium ruderale***

13 Leaves not markedly concave, gradually tapered to the apex, the shoots not or scarcely julaceous (but see *B. albicans* below)

15 Leaves strongly plicate

16 Blades usually distinctly falcate; margins entire to indistinctly serrulate; alar region of about 8(12) cells along the margin; terminal spine absent ..... ***Brachythecium erythrorrhizon***

16 Blades straight to slightly falcate; margins usually strongly serrulate to serrate; alar region of 3-6 cells along the margin; terminal spine present ..... ***Brachythecium salebrosum***

15 Leaves not or only lightly plicate

17 Alar cells numerous, 15-30 along the margin, pellucid-translucent, often somewhat enlarged, the cell walls thin ..... ***Sciuro-hypnum latifolium***

17 Alar cells few to numerous, 5-15 along the margin, opaque, not enlarged, the cell walls thickish

18 Costa noticeably broad at the base and distinctly narrowing to about ⅔ the leaf length; basal cells commonly rusty-colored; plants autoicous, often with capsules and cherry-red setae ..... ***Sciuro-hypnum plumosum***

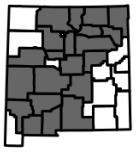
18 Costa not distinctly narrowed upward, to about ¾ the leaf length; basal cells not rusty-colored; plants autoicous or dioicous

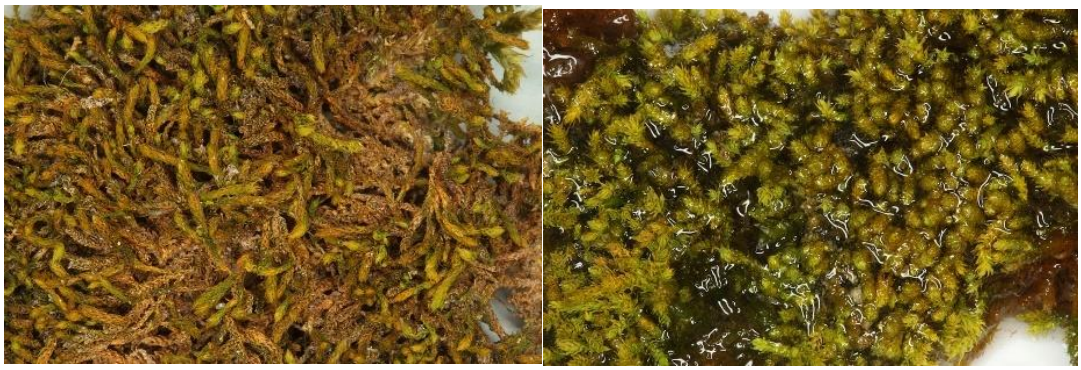
19 Leaves entire or nearly so (sometimes serrulate), the margins often revolute nearly the entire length; plants dioicous ..... ***Brachythecium albicans***

19 Leaves serrate to serrulate, the margins generally plane above and recurved below; plants autoicous ..... ***Sciuro-hypnum oedipodium***

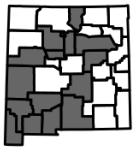
Brachytheciastrum [resembling *Brachythecium*] [Keyed in **Brachythecium group**].

Brachytheciastrum collinum (Schleicher ex Müller Hal.) Ignatov & Huttunen [of hills] [*Brachythecium collinum* (Schleicher ex Müller Hal.) Schimper, *Chamberlainia collinum* (Schleicher ex Müller Hal.) H. Robinson, *Chamberlainia collinum* (Schleicher ex Müller Hal.) H. Robinson var. *utahensis* (James) H. Robinson, *Hypnum collinum* Schleicher ex Müller Hal.]. Pleurocarpous, in yellowish to golden tufts and carpets, the stems creeping or ascending, the shoot commonly julaceous; stem leaves appressed, closely imbricate, small, not much plicate, serrate; costa to ¾ leaf length, lacking a terminal spine; alar cells subquadrate; medial cells linear; capsules inclined to horizontal. ●On soil, soil over rock, and in crevices; common and widespread. ♦Yellowish, julaceous shoots, toothed and somewhat concave leaves tending toward ovate, and horizontal capsules are distinctive.

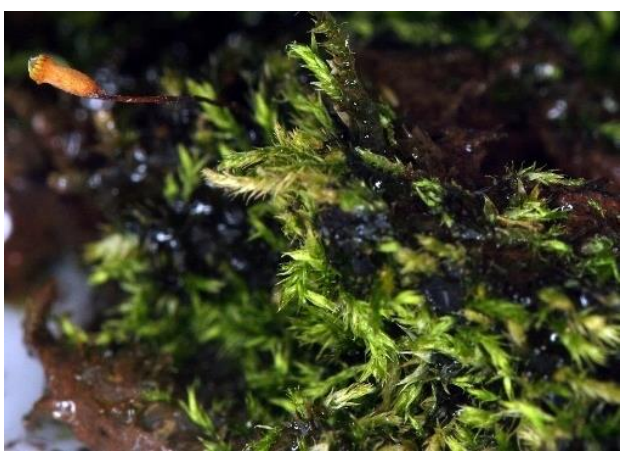




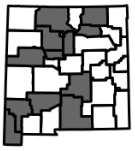
NM, Catron Co., Mogollon Mts, Rain Creek Canyon, 1 Jul 2010, *Kleinman, Felger, Wilder, & Blisard* (SNM).



Brachytheciastrum fendleri (Sullivant) Ochyra & Żarnowiec [for Augustus Fendler (1813-1883), botanical collector] [*Brachythecium fendleri* (Sullivant) Jaeger, *Brachythecium utahense* James, *Leskea fendleri* Sullivant]. Pleurocarpous, in yellowish to light green mats and tufts, the shoots creeping, julaceous; stem leaves small, appressed, loosely imbricate, serrulate; costa to ¾ leaf length, with a terminal spine; alar cells subquadrate; medial cells linear; capsules mostly erect. ●On soil and soil over rock; common and widespread. ♦At least somewhat greenish, julaceous shoots, toothed and hardly concave leaves tending toward lanceolate, and erect capsules are distinctive.



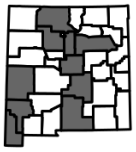
NM, Grant Co., Pinos Altos Range, 26 Apr 2010, *Kleinman & Blisard* (SNM).



Brachytheciastrum velutinum (Hedwig) Ignatov & Huttunen [velvety] [*Brachythecium suberythrorrhizon* Renauld & Cardot, *Brachythecium petrophilum* R.S. Williams, *Brachythecium velutinum* (Hedwig) Bruch & Schimper, *Brachytheciastrum velutinum* (Hedwig) Ignatov & Huttunen var. *salicinum* (Schimper) Ochyra & Zarnowiec, *Brachythecium velutinum* (Hedwig) Bruch & Schimper var. *venustum* (De Notaris) Arcangeli, *Hypnum velutinum* Hedwig]. Pleurocarpous, in green to yellowish tufts or mats, the stems creeping; stem leaves commonly spreading, falcate to circinate, not or 2-plicate, toothed to entire; costa to ¾ leaf length, thick distally, with a terminal spine; alar cells short-rectangular; medial cells linear; capsules horizontal. ●On soil, soil over rocks, or rotten wood in the mountains. ♦Small green mats, and spreading, falcate-circinate leaves help to distinguish this species. We include the phylogenetically distinct but nearly morphologically identical *salicinum* taxon.

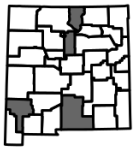
NM, Grant Co., Black Range, Rocky Canyon, 21 Nov 2012, *Kleinman & Blisard* (SNM).

Brachythecium [a small case] [Keyed in **Brachythecium group**].

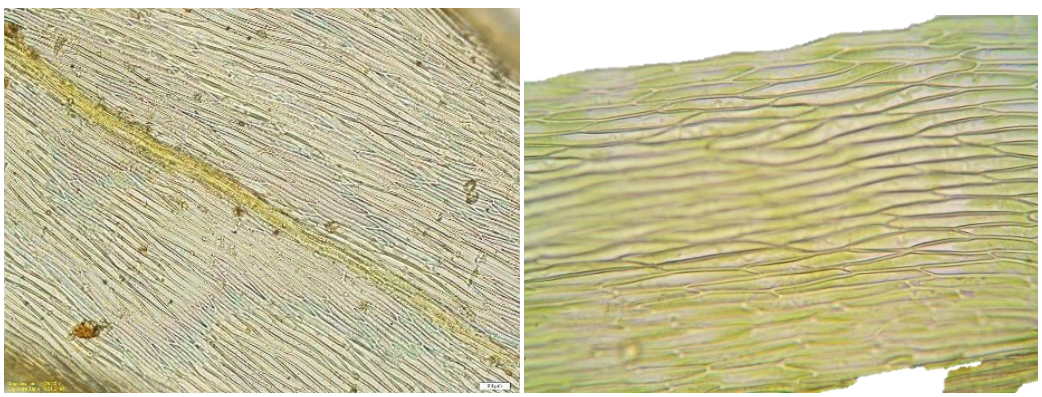


Brachythecium acuminatum (Hedwig) Austin [sharpened] [*Chamberlainia acuminata* (Hedwig) Grout, *Leskea acuminata* Hedwig]. Pleurocarpous, in yellowish, light green, or even whitish mats and tufts, the stems creeping; stem leaves appressed, imbricate, concave, not or only 2-plicate near the margin, finely toothed; costa to 80% leaf length, a terminal spine small or absent; alar region poorly differentiated; basal cells in 2-4 well-defined rows of subquadrate ± pellucid cells, markedly different than the linear medial cells; capsules erect (rarely seen). ●On bark and rotten logs, sometimes soil or rock, in the mountains. ♦Short, scarcely plicate leaves, with a few basal rows of nearly pellucid squarish cells mark this species.

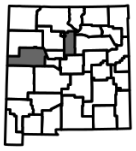
NM, Grant Co., Pinos Altos Range, Meadow Creek, 7 Apr 2011, *Kleinman, Allred, & Blisard* (SNM).



Brachythecium albicans (Hedwig) Schimper [whitish] [*Chamberlainia albicans* (Hedwig) H. Robinson, *Hypnum albicans* Hedwig]. Pleurocarpous, in small to large, straw-colored to light green mats, the stems creeping to ascending, somewhat julaceous, often disposed in parallel braids; stem leaves appressed, closely imbricate, slightly concave, not plicate, entire to serrulate, the margins recurved most of the length, the acumen filiform; costa to ¾ leaf length, lacking a terminal spine; alar cells subquadrate; medial cells linear. ●On rock, sandy soil, and grassy places, often in areas dry during part of the year; not as common as the map suggests. ♦Look for straw-colored mats with julaceous shoots in parallel braids, filiform acumen, and mostly entire and recurved leaf margins.



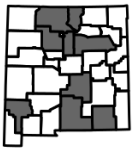
NM, Grant Co., Pinos Altos Range, Meadow Creek, 7 Apr 2011, *Kleinman, Allred, & Blisard* (SNM).



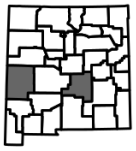
Brachythecium cirrosum (Schwagrichen) Schimper [abundantly curled] [*Hypnum cirrosum* Schwagrichen]. Pleurocarpous, in dense, light green mats, becoming white-stramineous or golden yellow when exposed, the stems creeping to ascending, julaceous; leaves closely overlapping, ovate, concave, broadest at ¼-⅓ the leaf length from the base, not or only slightly plicate, to 1.2 mm long, the margins plane distally, entire to serrate, the apices abruptly contracted, the subulae prominent, to ⅓ the leaf length; costa to ⅔ the leaf length, sometimes bifid from the base, lacking a terminal spine; alar cells subquadrate, about 6-8 cells along the margin; medial cells linear; seta rough. ●Wet cliffs, rock outcrops, and soil at high elevations. ♦Distinctive by the julaceous shoots, deeply concave leaves with prominent subulae from a rounded or obtuse apex, and scant or no plications.

AK, Point Barrow, 27 Jul 1958, *Sushan & Thomsom* (COLO).

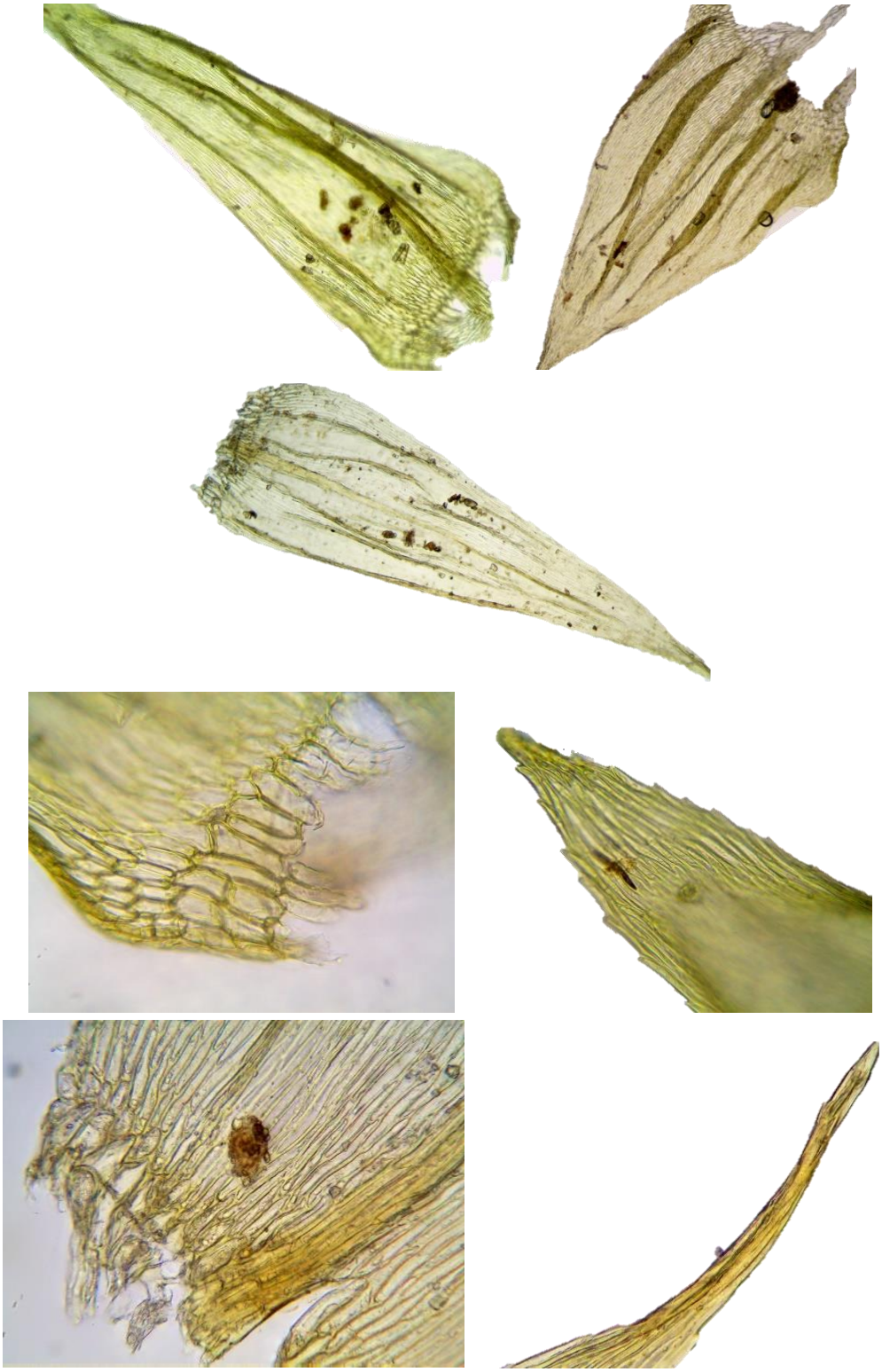
Brachythecium erythrorrhizon Schimper [red-rooted]. Pleurocarpous, in light green to straw-colored mats, the stems creeping; stem leaves mostly falcate, loosely imbricate, not to strongly plicate, entire to finely toothed distally, the margins plane to often recurved throughout; costa to ¾ leaf length, lacking a terminal spine; alar region small; medial cells linear; capsules horizontal. ●On soil or soil over rock. ♦Nearly all our plants belong to var. ***erythrorrhizon***¸ with falcate leaves, but a single collection from Tesuque Peak, Santa Fe County, over 11,000 ft, with shorter, straight leaves has been referred to var. ***alpinum*** Kosovich-Anderson & Ignatov.



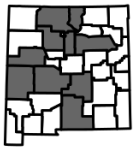
NM, Taos Co., Red River, 29 Jul 2021, *Kleinman & Blisard* (SNM).



Brachythecium frigidum (Müller Hal.) Bescherelle [of cold places] [*Brachythecium lamprochryseum* Müller Hal. & Kindberg, *Hypnum frigidum* Müller Hal.]. Pleurocarpous, in dense, green to golden mats, the stems creeping to erect; stem leaves erect to spreading, ovate-triangular, concave, strongly plicate, evenly toothed, the apex often twisted; costa to ¾ leaf length, with a strong terminal spine; alar cells enlarged, thin-walled, separated from the margin by rectangular chlorophyllose cells; medial cells linear. ●On wet soil and sometimes rocks or rotting wood; probably more widespread than indicated by the map. ♦Distinctive features include strongly plicate, toothed leaves, enlarged and pellucid alar cells, and a prominent row of enlarged cells across the base. Strong leaf plications should help distinguish this from *B. rivulare*. We suspect that some plants identified as *Sciuro-hypnum latifolium* are, in fact, *B. frigidum*.

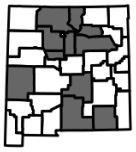


NM, Catron Co., Iron Creek, 7 Jun 2000, *Allred 7770* (NMC); Lincoln Co., south fork Rio Bonito, 22 May 2003, *Allred 8631* (NMC).



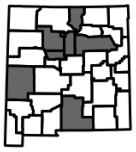
Brachythecium laetum (Bridel) Schimper [vivid] [*Brachythecium digastrum* Mull. Hall. ex Kindberg, *Brachythecium oxycladon* auctores]. Pleurocarpous, in greenish to yellowish mats, the stems creeping; stem leaves somewhat concave, deeply plicate (branch leaves less so), toothed; costa to ¾ leaf length, lacking a terminal spine; alar region not clearly differentiated; laminal cells elongate-linear; basal laminal cells opaque, in 3 rows, markedly different from the more distal cells. ●On rotting wood, tree trunks, or the forest floor, often among grasses, sometimes on soil over rock. ♦Deeply plicate and toothed stem leaves with 3 or so rows of markedly different cells across the base, the alar region not particularly set off, distinguish this species.

Catron Co., San Francisco Mts, 19 Jun 2012, *Kleinman & Blisard* (SNM); Otero Co., Sacramento Mts, Water Canyon, 16 May 2019, *Allred 10967 & Kleinman* (NMC).

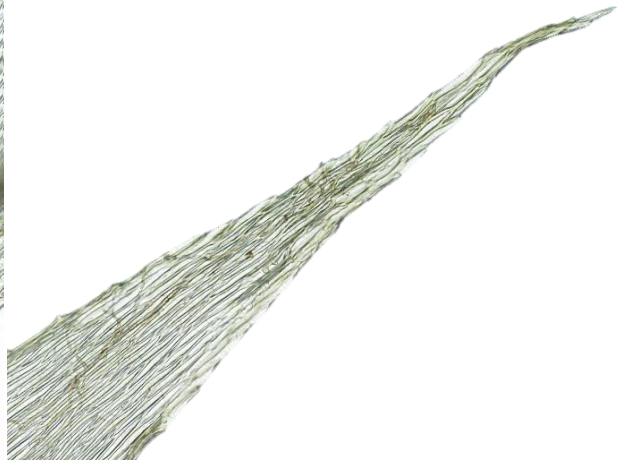


Brachythecium rivulare Bruch & Schimper [of rivulets] [*Brachythecium rivulare* Bruch & Schimper var. *laxum* Grout]. Pleurocarpous, in light to yellow-green or brownish mats and tufts, the stems creeping to erect and somewhat dendroid; stem leaves appressed to ascending, broadly ovate, not plicate to moderately so, finely toothed; costa to ¾ leaf length, a terminal spine absent (stem) or present (branch); alar cells strongly enlarged/inflated, hyaline. ●On wet ground or stones and boulders in or near streams. ♦Shoots are often somewhat tree-like, and possibly confused with *Climacium dendroides*, but that species has subterranean primary stems and squarish opaque alar cells. Plants with plicate leaves can be confounded with the much less common *B. frigidum*, but leaves of that species are usually strongly plicate, markedly toothed, and with about 3 rows of noticeably different basal cells from margin to costa.

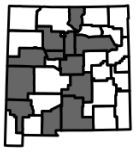
NM, Catron Co., Mogollon Mts, Bead Spring, 10 Jun 2010, *Kleinman & Blisard* (SNM).



Brachythecium rotaeanum De Notaris [for Lorenzo Rota (1818-1855), physician-botanist] [*Brachythecium capillaceum* (F. Weber & D. Mohr) Giacomini, *Chamberlainia rotaeana* (DeNotaris) H. Robinson]. Pleurocarpous, in light green to yellowish or brownish (sometimes slightly bluish) mats and tufts, the stems creeping; stem leaves appressed, concave, moderately plicate (but variable), entire to strongly toothed; costa to ¾ leaf length, with or without a terminal spine; alar region indistinct, the cells subquadrate; basal cells in 5-8 rows distinct from more linear distal cells. ●On moist soil, rocks, tree bases or logs in the northern mountains. ♦Similar to *B. salebrosum*, but that species has a distinctive alar region, is generally strongly toothed, and lacks the distinct rows of basal cells of this species.

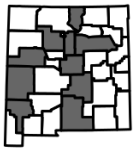


New York, Clinton Co., W.R. Buck (NY 00928455).

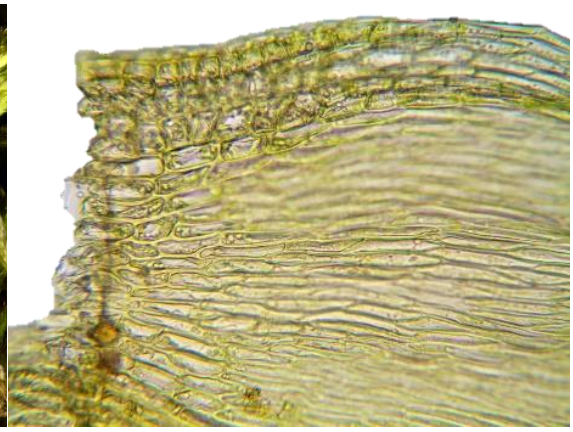


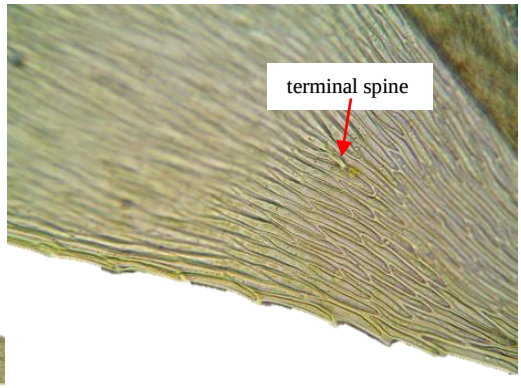
Brachythecium ruderale (Bridel) W.R. Buck [of waste places] [*Brachythecium stereopoma* (Spruce ex Mitten) Jaeger, *Brachythecium wootonii* Grout, *Hypnum ruderale* Bridel]. Pleurocarpous, in light green to yellowish mats and tufts, the stems creeping, somewhat julaceous; leaves appressed, broadly ovate, sometimes almost orbicular, concave, plicate, commonly less than 1.7 mm long (stem), nearly entire to sharply serrate, the apices abruptly or gradually narrowed to an inconspicuous subula; costa to ¾ the leaf length, lacking a terminal spine; alar cells subquadrate, thick-walled, opaque, the laminal cells linear; seta smooth. ●On moist shaded soil or rock in the mountains. ♦Similar to *B. salebrosum*, but that species has generally larger (>1.7 mm) and less concave stem leaves and possesses a strong terminal spine, and shoots not as julaceous.

NM, Cibola Co., Mt. Taylor, 20 Apr 2017, *Allred & Kleinman 10827* (NMC).



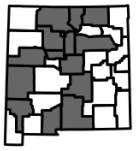
Brachythecium salebrosum (Weber & Mohr) Bruch & Schimper [rough] [*Chamberlainia salebrosa* (Weber & Mohr) H. Robinson, *Hypnum salebrosum* Weber & Mohr]. Pleurocarpous, in green to yellowish or brownish mats and carpets, the stems creeping; stem leaves erect to spreading, loosely imbricate, ovate to lanceolate, not much concave, plicate, more than 1.7 mm long, toothed; costa to ¾ leaf length, with a terminal spine; alar cells subquadrate, opaque; medial cells linear. ●On soil, rotting wood, tree trunks, rock, often among grasses. ♦Characterized by slightly curving, plicate, lanceolate leaves, with serrate margins, a small alar region of opaque cells, and a terminal spine of the costa. One of our more common mosses.





NM, Grant Co., Pinos Altos Range, 4 May 2011, *Kleinman & Blisard* (SNM).

Eurhynchiastrum [resembling *Eurhynchium*].

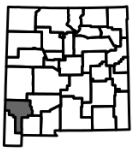


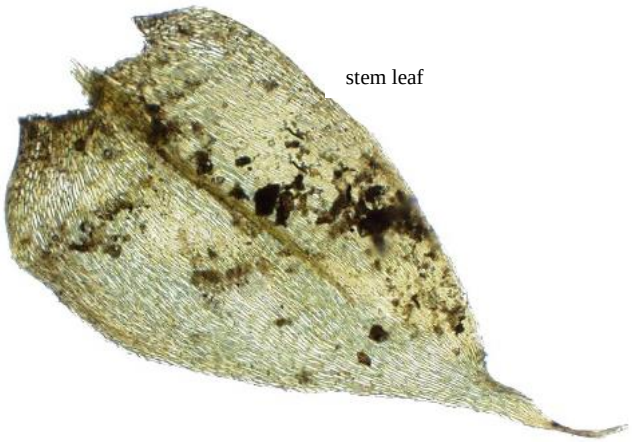
Eurhynchiastrum pulchellum (Hedwig) Ignatov & Huttunen [beautiful] [*Eurhynchiastrum pulchellum* (Hedwig) Ignatov & Huttunen var. *barnesii* (Renauld & Cardot) Ignatov, *Eurhynchium pulchellum* (Hedwig) Jennings var. *praecox* (Hedwig) Ochyra & Zarnowiec, *Eurhynchium diversifolium* Schimper, *Eurhynchium pulchellum* (Hedwig) Jennings, *Eurhynchium strigosum* (Hoffman ex Weber & Mohr) Schimper var. *barnesii* Renauld & Cardot, *Eurhynchium substrigosum* Kindberg, *Hypnum pulchellum* Hedwig, *Rhynchostegium pulchellum* (Hedwig) Robinson]. Pleurocarpous, in glossy, greenish to yellowish mats and tufts, the stems creeping to arching, with a central strand; stem leaves broadly ovate-triangular, not plicate or strongly plicate in var. *barnesii*, nearly entire to toothed, the apices tapered, blunt in branch leaves; costa to 80% or so leaf length, with a terminal spine; far distal cells nearly isodiametric or irregular, different than the linear more proximal cells; alar cells isodiametric. capsules inclined to horizontal. ●On soil, soil over rock, rotten logs, and tree roots, usually in moist forest habitats. ♦Distinguishing features include blunt branch leaves, short apical cells, long costa, and toothed margins. Amid expansive variation, plants with large, broadly triangular, deeply plicate leaves can be recognized as var. ***barnesii*** (Renauld & Cardot) Ignatov.

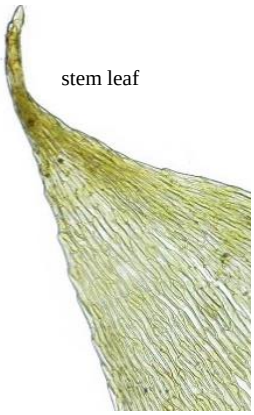
NM, Grant Co., Burro Mts, 10 Oct 2010, *Kleinman & Blisard* (SNM).

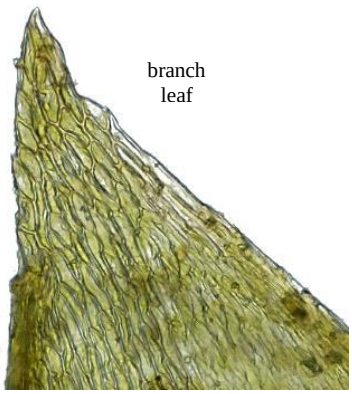
Oxyrrhynchium [sharp-beaked].

Oxyrrhynchium hians (Hedwig) Loeske [gaping] [*Eurhynchium hians* (Hedwig) Sande-Lacouture, *Hypnum hians* Hedwig]. Pleurocarpous, in glossy, light green to whitish or brownish tufts, the stems creeping to arching, frequently complanate, with a central strand; stem leaves loosely disposed, broadly ovate, broadest just below the middle, not plicate, acute to acuminate, strongly toothed; costa to about ¾ leaf length, strong, with a terminal spine; alar cells distinct, pellucid; medial cells linear; apical cells much shorter. ●On moist, sometimes seepy, soil, humus, rock, rotting wood, in the mountains; little known in the state. ♦Broad leaves, contrasting apical and medial cells, toothed margins, and a costal spine are distinctive.







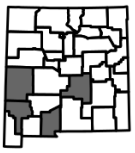


IA, Clayton Co., Bixby State Park, 25 May 2016, *Kleinman & Blisard* (SNM).

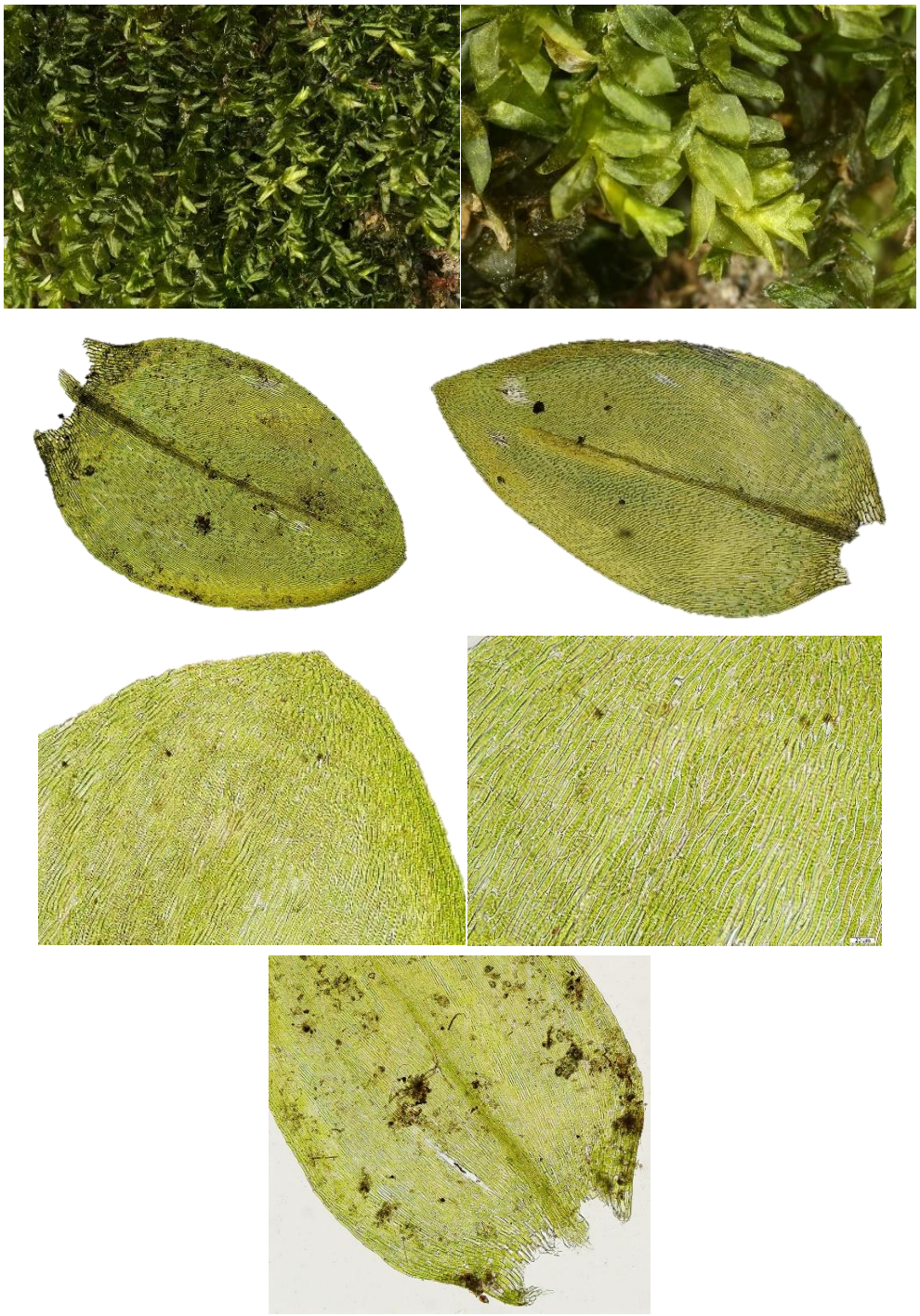
Rhynchostegium [a beaked covering].

1 Leaves broadly acute to rounded at the apex, not twisted at the tip; apical cells very much shorter than the distal or medial cells; plants on wet rocks (or seasonally so) of brooks or springs ..... ***R. aquaticum***

1 Leaves acuminate at the apex, the slender acumen usually twisted at the tip; apical cells hardly if at all shorter than the distal or medial cells; plants on soil, wood & bark, and rock in relatively dry habitats .....***R. serrulatum***

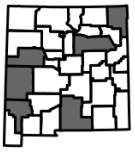


Rhynchostegium aquaticum A. Jaeger [in water] [*Eurhynchium riparioides* of NM reports, *Eurhynchium rusciforme* of NM reports, *Platyhypnidium aquaticum* (A. Jaeger) M. Fleischer, *Rhynchostegium riparioides* of NM reports]. Pleurocarpous, in large, deep green to brownish, loose tufts or mats, the shoots creeping, often complanate-foliate, with a central strand; stem leaves ovate, abruptly narrowed at the base, toothed; costa ¾ leaf length, a terminal spine inconspicuous; alar region indistinct; medial cells linear, the apical ones much shorter. ●Aquatic, attached to stones in or at stream side. ♦Aquatic habitat, usually or at least often complanate-foliate shoots, and short apical cells help to distinguish this species.



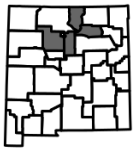
NM, Catron Co., Mogollon Mts, Rain Canyon, 26 Nov 2010, *Kleinman et al.* (SNM).

Rhynchostegium serrulatum (Hedwig) Jaeger & Sauerbeck [like a little saw] [*Hypnum serrulatum* Hedwig, *Steerecleus serrulatus* (Hedwig) Robinson]. Pleurocarpous, in light green to pale, loose tufts, the shoots creeping, usually complanate-foliate, with a central strand; stem leaves spreading, ovate-lanceolate, acuminate, often twisted mid-leaf, toothed; costa short to ¾ leaf length, lacking a terminal spine; alar region indistinct; medial cells linear, the apical cells not much shorter. ●On soil, humus, rotten wood, bark, and sometimes rock.

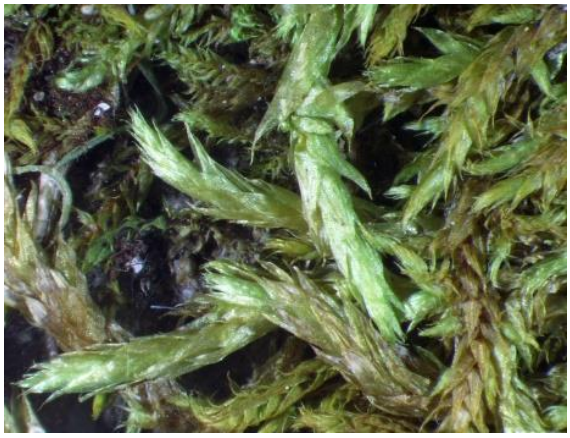


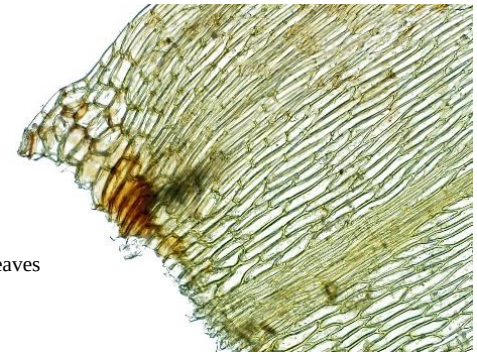
NM, Grant Co., Gila Cliff Dwellings Nat. Mon., 29 Oct 2011, *Kleinman & Blisard* (SNM).

Sciuro-hypnum [a squirrel-*Hypnum*] [Keyed in **Brachythecium group**].

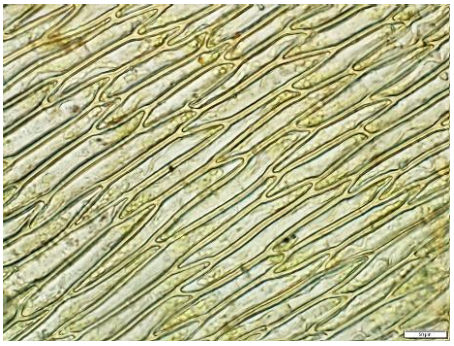


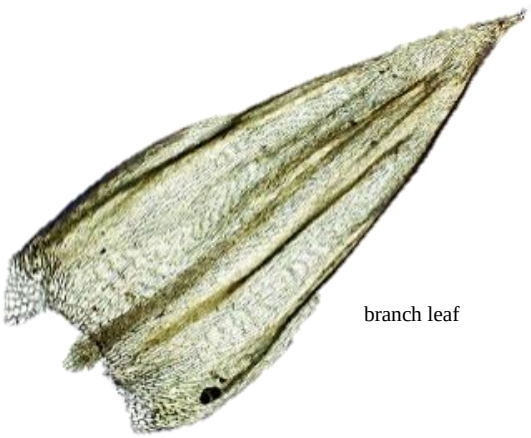
Sciuro-hypnum latifolium (Kindberg) Ignatov & Huttunen [broad-leaved] [*Brachythecium latifolium* Kindberg, *Brachythecium nelsonii* Grout]. Pleurocarpous, in light green to yellowish, loose tufts, the stems creeping to ascending; stem leaves appressed, imbricate, ovate, concave, not or only slightly plicate, entire to scarcely toothed, the branch leaves more plicate and more toothed; costa to ¾ leaf length, lacking a terminal spine; alar cells somewhat enlarged, thin-walled and clear. ●In wet places on rock and soil in the high mountains. ♦Slightly enlarged, thin-walled, hyaline alar cells, scant plication, entire margins, and absence of a terminal spine help to distinguish this species, which is easily confused with *Brachythecium rivulare*.





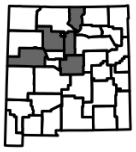
stem leaves





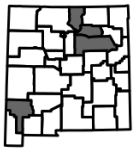
branch leaf

NM, Sandoval Co., Valles Caldera Nat. Preserve, 24 Jun 2009, *Allred* (NMC, SNM).



Sciuro-hypnum oedipodium (Mitten) Ignatov & Huttunen [swollen-footed] [*Brachythecium holzingeri* (Grout) Grout, *Brachythecium oedipodium* (Mitten) Jaeger, *Brachythecium starkei* of many North American works, *Hypnum oedipodium* Mitten]. Pleurocarpous, in light green to straw-colored tufts, the stems ascending/arching; stem leaves erect-spreading, ovate, slightly concave, not plicate, finely toothed; costa to ¾ leaf length, lacking a terminal abaxial spine; alar cells subquadrate, opaque; medial cells linear; capsules horizontal to drooping. ●On soil, logs, roots, and litter in the mountains; infrequently collected. ♦Characterized by pale greenish/brownish tufts, non-plicate, toothed leaves, opaque alar region with thickish cell walls, and relatively frequent capsules.

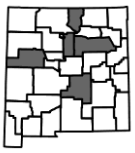
NM, Cibola Co., El Malpais Nat. Mon., 21 Jul 2016, *Kleinman et al.* (SNM).

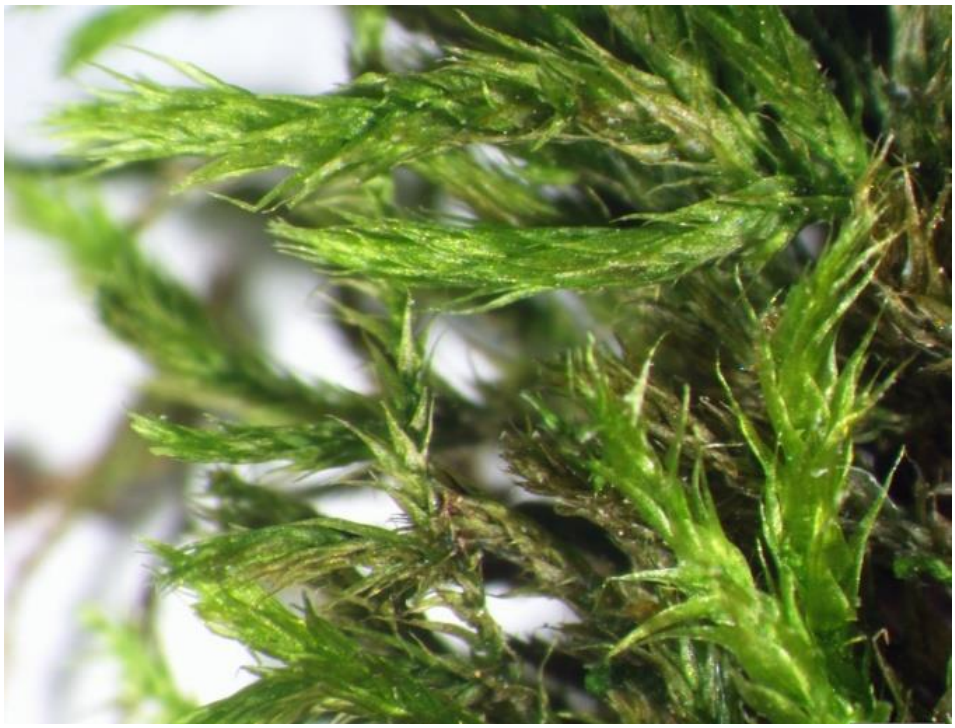


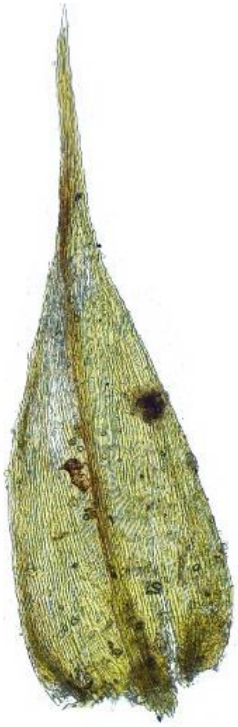
Sciuro-hypnum plumosum (Hedwig) Ignatov & Huttunen [feathery] [*Brachythecium plumosum* (Hedwig) Bruch & Schimper, *Hypnum plumosum* Hedwig]. Pleurocarpous, in green, brownish, to reddish golden tufts or mats, the stems creeping; stem leaves appressed, imbricate, not plicate, finely toothed, the apices usually twisted; costa to ⅔ leaf length, mostly lacking a terminal spine, distinctly narrowed distally; alar cells subquadrate, thick-walled, opaque; medial cells elongate-linear; basal cells isodiametric across the leaf base in 3-7 opaque rows. ●On wet rocks, usually near streams, sometimes in the water, also wet soil and tree bases. ♦Poorly known in the state, but distinctive features include the dark tufts often with reddish coloration, scant plication, costa narrowed distally, and a distinct band of rusty, opaque cells across the leaf base.

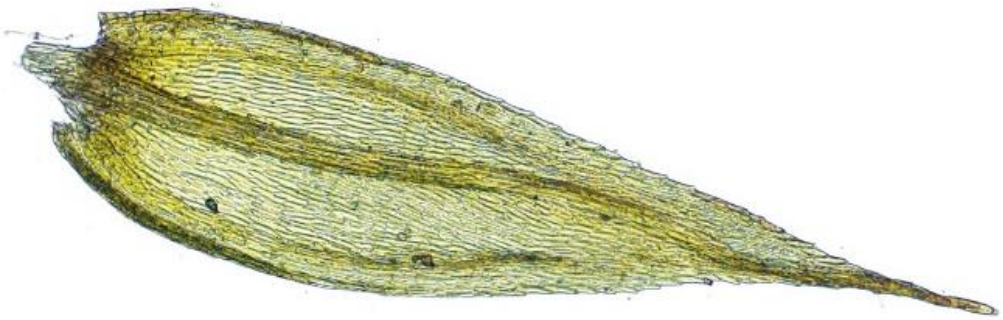
IN, Owen Co., near Carp, 28 Apr 1988, *W.R. Buck* (COLO).

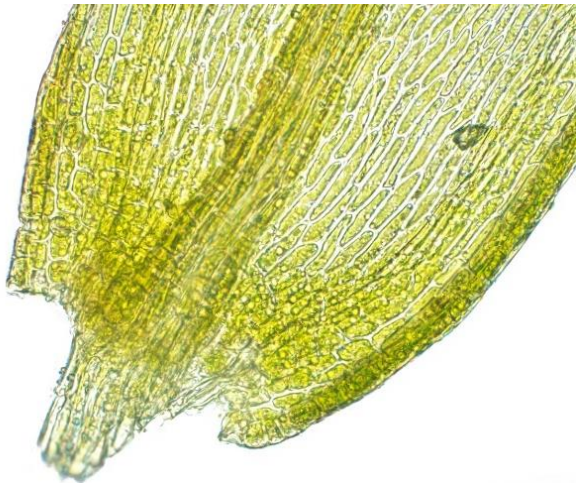
Sciuro-hypnum populeum (Hedwig) Ignatov & Huttunen [on poplars] [*Brachythecium populeum* (Hedwig) Bruch & Schimper, *Hypnum populeum* Hedwig]. Pleurocarpous, in green, yellowish, to brownish tufts, the stems creeping, the young shoots narrowed; stem leaves appressed, closely imbricate, weakly concave, not or scarcely plicate, entire to finely toothed; costa 80-100% leaf length, sometimes with a terminal spine; alar cells subquadrate, opaque; medial cells long-rhomboidal to elongate-linear; basal cells subquadrate, in 5 rows across the leaf base. ●On stones, soil, and tree bases. ♦Plants are distinctive by having a costa reaching or nearly reaching the apex, subquadrate basal cells across the base, and young terminal shoots narrow and whip-like.



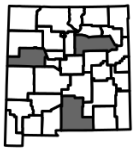




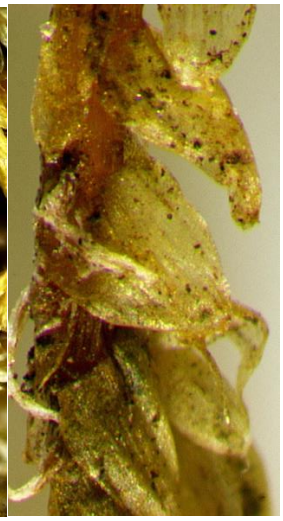




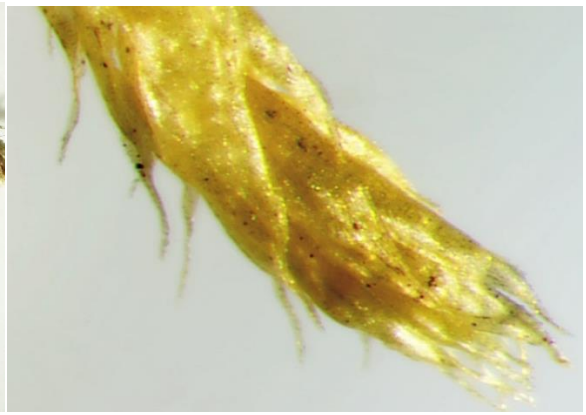
NM, Cibola Co., El Malpais Nat. Mon., 18 Apr 2018, *Kleinman et al.* (SNM).



Sciuro-hypnum reflexum (Starke) Ignatov & Huttunen [turned back] [*Hypnum reflexum* Starke]. Pleurocarpous, in dense to loose tufts or mats, the stems to 8 cm long, creeping to arching; stem leaves noticeably larger than the branch leaves, often loosely disposed, to 2 mm long, the base broadly decurrent, not or scarcely plicate, the margins serrulate; costa variable, at least many ending in the terminal 20% of the leaf, often obscure distally; alar cells ± quadrate-oblong and enlarged, the region reaching about half-way to the costa; basal juxtacostal cells shorter and wider than the elongate to linear laminal cells; seta rough. ●On bark, rotting wood, stumps, sometimes over rock.



branch leaf



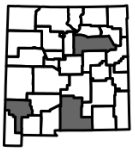
stem leaves

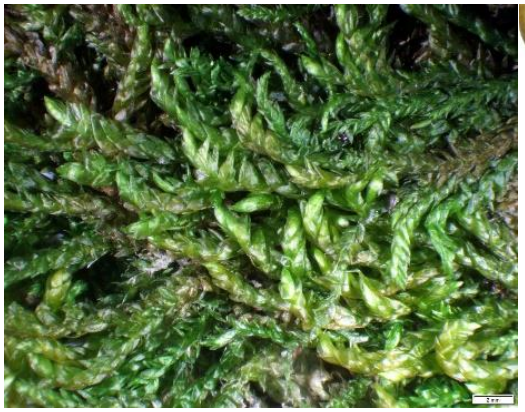
branch leaf

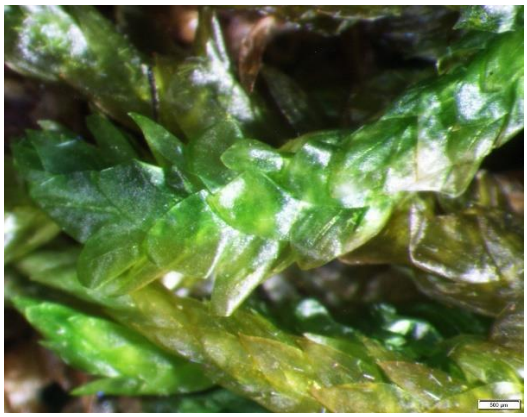
NM, Otero Co., Sacramento Mts, 18 Jun 2003, *Allred 8758* (NMC); San Miguel Co., near Cowles, 28 Jun 2000, *Allred* (NMC).

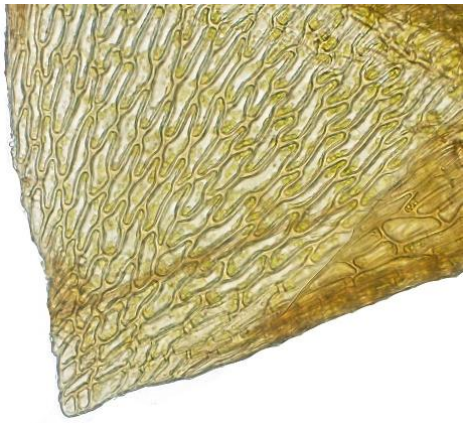
Scleropodium [a hard foot].

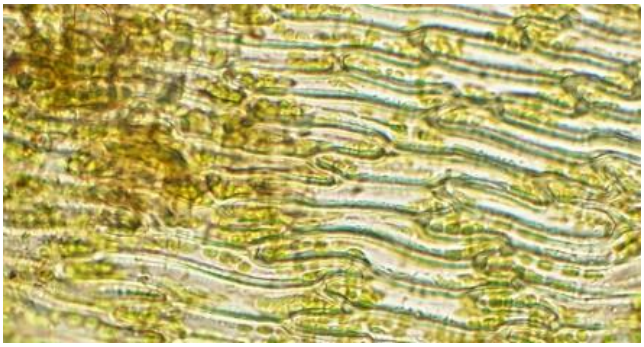
Scleropodium obtusifolium (Mitten) Kindberg [blunt-leaved] [*Stereodon obtusifolius* Mitten]. Pleurocarpous, in glossy, loose, green to golden mats, the shoots creeping to ascending, markedly julaceous, lacking a central strand; stem leaves broadly ovate, closely imbricate, not plicate, concave, obtuse to short-apiculate, slightly toothed on the revolute margins; costa to ¾ leaf length, lacking a terminal spine; alar cells subquadrate, thick-walled, the region indistinct; medial cells linear; basal cells next to costa elongate. ●Rock and soil in wet places, usually at least temporarily submerged, creek bottoms; known only from pre-1980 collections. ♦Shiny julaceous shoots and non-plicate blunt leaves help to distinguish this species.











CA, Mendocino Co., Baechtel Creek, 1 May 2021, *Kleinman & Blisard* (SNM).

1 Leaves large, 4-10 mm long, clustered in somewhat terminal rosettes of 18-55 leaves, this atop an erect secondary stem that arises from a horizontal (stoloniferous/rhizomatous) primary stem; leaf margins strongly revolute to mid-leaf or beyond, and serrate from mid-leaf to apex ..... **Rhodobryum**

1 Leaves, stems, and margins not all as above

2 Distal medial leaf cells mostly elongate-rhombic to linear; leaves lacking a limbidium

3 Leaves linear-subulate or setaceous from a broader, ± oblong or ovate base; costa occupying almost the entire distal portion of the leaf ..... go to **Leptobryum** (Meesiaceae)

3 Leaves mostly ovate to lanceolate (the extreme distal ones sometimes linear); costa slender

4 Stems often strongly julaceous, older ones string-like; leaves erect and tightly overlapping, rounded to obtuse; perichaetial bracts much longer than the leaves ..... **Anomobryum**

4 Stems scarcely julaceous except when young; not string-like; leaves commonly loosely erect to spreading, obtuse to acuminate; perichaetial bracts not exceeding the leaves ..... go to **Pohlia** (Mniaceae)

2 Distal leaf cells mostly oblong-hexagonal to rhomboidal; leaves often with a limbidium (obscure or absent in some species)

5 Costa percurrent to exserted, but not as a long, spinose, hyaline awn (but see *Rosulabryum torquescens*); capsules inclined to pendant; plants common, on various habitats, including down or rotting wood..... ..... **Bryum group**

5 Costa exserted into a long, spinose, hyaline awn (reddish at the base); capsules erect (but unknown in our plants); plants uncommon, on shaded rock (ours)..... **Leptostomopsis**

The generic classification of Bryaceae is varied and complicated, often unsatisfactory, and frequently controversial. Holyoak [Holyoak, D.T. 2021. European Bryaceae. Pisces Publications, UK] provides an admirable summary, calling attention to the incongruence of morphologic and phylogenetic/molecular analyses. While acknowledging the superior phylogenetic classifications based on molecular data, herein we follow for practical reasons the generic arrangement presented in FNA [Spence, J.R. 2014. Bryaceae, pp. 117-185. IN: Flora of North America, vol. 28, Bryophyta, part 2, Oxford University Press]. The two generic classifications are contrasted below:

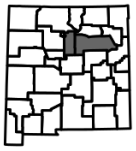
taxon	this treatment (FNA)	Holyoak and others
andicola	*Rosulabryum*	*Ptychostomum*
argenteum	*Bryum*	*Bryum*
caespiticium	*Gemmabryum*	*Ptychostomum*
capillare	*Rosulabryum*	*Ptychostomum*
cernuum	*Ptychostomum*	*Ptychostomum*
compactum	*Ptychostomum*	*Ptychostomum*
concinnatum	*Anomobryum*	*Anomobryum*
creberrimum	*Ptychostomum*	*Ptychostomum*
cyclophyllum	*Ptychostomum*	*Ptychostomum*
demaretianum	*Gemmabryum*	"*Bryum*"
dichotomum	*Gemmabryum*	*Bryum*
exile	*Gemmabryum*	-
flaccidum	*Rosulabryum*	*Ptychostomum*
gemmiparum	*Imbribryum*	*Bryum*
inclinatum	*Ptychostomum*	*Ptychostomum*
incrassatolimbata	*Plagiobryoides*	-
julaceum	*Anomobryum*	*Anomobryum*
kunzei	*Gemmabryum*	*Ptychostomum*
laevifilum	*Rosulabryum*	*Ptychostomum*
klotzschii	*Brachymenium*	*Brachymenium*
mexicanum	*Brachymenium*	*Brachymenium*
muehlenbeckii	*Imbribryum*	*Imbribryum*
ontariense	*Rhodobryum*	*Rhodobryum*
pallens	*Ptychostomum*	*Ptychostomum*
pallescens	*Ptychostomum*	*Ptychostomum*
pseudotriquetrum	*Ptychostomum*	*Ptychostomum*
renauldii	*Plagiobryoides*	-
subapiculatum	*Gemmabryum*	*Imbribryum*
systilia	*Leptostomopsis*	-
torquescens	*Rosulabryum*	*Ptychostomum*
turbinatum	*Ptychostomum*	*Ptychostomum*
valparaisense	*Gemmabryum*	"*Bryum*"
vinosula	*Plagiobryoides*	-
violaceum	*Gemmabryum*	*Bryum*

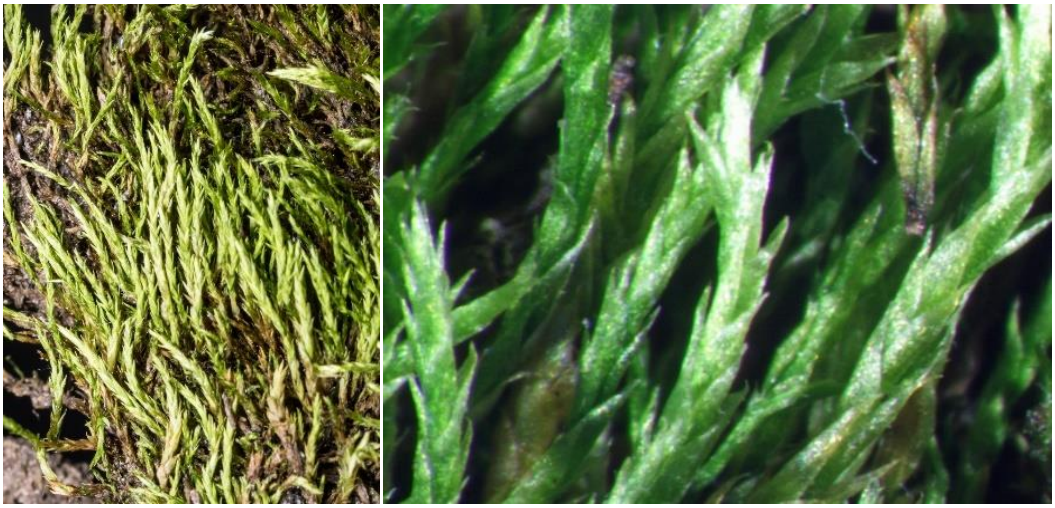
Anomobryum [an anomalous *Bryum*].

1 Costa percurrent to short-excurrent; stems ± julaceous; leaves flat to somewhat concave; bulbils sometimes in the leaf axils ..... ***A. concinnatum***

1 Costa to ⅔ leaf length; stems strongly julaceous; leaves strongly concave; bulbils absent ..... *A. julaceum*

Anomobryum concinnatum (Spruce) Lindberg [elegant] [*Bryum concinnatum* Spruce]. Acrocarpous, in light green to somewhat yellowish loose mats or cushions, the stems ± julaceous; leaves green, erect, overlapping, flat to somewhat concave, to 1.4 mm long, the tips not hyaline; costa percurrent to short-excurrent; distal cells 6:1; axillary bulbils red-brown, leafy, small. ●Seepy or wet rock, ledges.





axillary bulbils

NM, San Miguel Co., Pecos Wilderness, 30 Jul 2019, *Kleinman, Blisard, & Romig* (SNM).

Anomobryum julaceum (Schrader ex G. Gaertner, B. Meyer, & Scherbius) Schimper [catkin-like] [*Bryum julaceum* Schrader ex G. Gaertner, B. Meyer, & Scherbius]. Acrocarpous, in yellowish green mats or cushions, the stems strongly julaceous; leaves greenish, erect, strongly overlapping, strongly concave, to 1.2 mm long, the tips not hyaline; costa to ⅔ leaf length; distal cells 8-10:1; bulbils absent. ●Seepy rock or soil, ledges; not yet known from NM. ♦A previous report of this species for the state has been corrected to *Anomobryum concinnatum*, which is easily distinguished by the percurrent costae. Since *A. julaceum* is known from Colorado and might yet be found in the state, we include it here for comparison.

Mexico, Oaxaca, Sierra Juarez, 21 Dec 1962, *A.J. Sharp* (NY 00598783).

Bryum group (including ***Brachymenium***, ***Bryum***, ***Gemmabryum***, ***Imbribryum***, ***Plagiobryoides***, ***Ptychostomum***, and ***Rosulabryum***).

1 Distal portions of the leaf white, lacking chlorophyll, sometimes giving the plant a silvery appearance
2 Plants whitish, silvery, often hoary; nearly all leaves with hyaline apices ..... ***Bryum argenteum***
2 Plants greenish to yellowish green; only older leaves sometimes with hyaline apices ..... ***Gemmabryum kunzei***
1 Distal portions of the leaf with chlorophyll, the same color as the mid-leaf portion, the plants not silvery
3 Limbidium absent
4 Filiform gemmae present in the distal leaf axils
5 Innovations rosulate; leaves obovate, flat; filiform gemmae brown when mature ..... ***Rosulabryum laevifilum***
5 Innovations evenly foliate; leaves ovate to obovate, weakly concave; filiform gemmae brown to reddish brown ..... ***Rosulabryum flaccidum***
4 Filiform gemmae absent, but bulbils may be present
6 Leaf apices obtuse to rounded
7 Proximal laminal cells rectangular, 3-5:1, longer than the distal laminal cells ..... ***Plagiobryoides renauldii***
7 Proximal laminal cells quadrate or short-rectangular, 1-3:1, shorter than the distal laminal cells
8 Plants and leaves reddish, red-green, or reddish brown, red tints usually present; costa reddish, crooked; apical cells incrassate; proximal leaf cells abruptly quadrate, 1-2:1, with scattered short-rectangular cells ..... ***Imbribryum muehlenbeckii***
8 Plants and leaves bright green to yellow-green, lacking red tints, becoming straw-colored with age; costa brown to yellow-brown, mostly straight or sometimes crooked in some leaves; apical cells not incrassate; proximal leaf cells abruptly short-rectangular, 2-3:1, occasionally with scattered quadrate cells ..... ***Imbribryum gemmiparum***
6 Leaf apices acute to acuminate
9 Proximal cells long-rectangular, 4-5:1 ..... ***Plagiobryoides vinosula***
9 Proximal cells quadrate to short-rectangular, 1-3:1
10 Axillary bulbils present, usually 1-many in the upper leaf axils, becoming visible by their growth that causes the leaves to spread
11 Both bulbils and rhizoidal tubers present; stems string-like when dry; leaves folded along the costa when dry ..... ***Gemmabryum exile***
11 Bulbils present, rhizoidal tubers absent; stems bud-like to evenly foliate, not string-like when dry; leaves not folded along the costa
12 Axillary bulbils lacking leaf primordia, gemmae- or tuber-like, 100-200 µm long ..... ***Gemmabryum gemmilucens***
12 Axillary bulbils with leaf primordia, not gemmae-like, 250-750 µm long ..... ***Gemmabryum dichotomum***
10 Axillary bulbils absent
13 Rhizoidal tubers not developed
14 Plants dark red to red-green, sometimes mostly green but with red tints ..... ***Imbribryum torenii***
14 Plants green, yellow-green, or golden, red tints rare except perhaps at the leaf bases
15 Leaves 0.3-1(1.2) mm long, not twisted when dry, the apices often hyaline in age; awn ⅓-⅔ leaf length ..... ***Gemmabryum kunzei***
15 Leaves 1-3 mm long, only weakly twisted when dry, the apices never hyaline in age; awn shorter than ⅓ leaf length ..... ***Brachymenium mexicanum***
13 Rhizoidal tubers developed
16 Rhizoidal tubers yellow to orange-brown, 50-80 µm, in clusters on short lateral rhizoids at stem base ..... ***Gemmabryum demaretianum***
16 Rhizoidal tubers bright red to purple-red, rarely orange, not in clusters at stem base but on long rhizoids in the soil
17 Rhizoidal tubers purple-red or rarely orange, 60-80(100) µm; rhizoids pale to bright violet or purple ..... ***Gemmabryum violaceum***
17 Rhizoidal tubers bright red, 150-300 µm; rhizoids brown to red-brown ..... ***Gemmabryum subapiculatum***
3 Limbidium of longer marginal cells definitely present (weak in some *Rosulabryum* with filiform gemmae)
18 Leaf apices obtuse or rounded; leaves broadly ovate to orbicular; costa percurrent
19 Plants commonly markedly reddish, red-brown, or brown (also less commonly green); leaf bases reddish, noticeably decurrent ..... ***Plagiobryoides incrassatolimbata***
19 Plants green to yellow-green; leaf bases green, scarcely decurrent ..... ***Ptychostomum cyclophyllum***
18 Leaf apices definitely pointed, acute to long-acuminate or nearly awned; leaves lanceolate to elliptic; costa percurrent to excurrent
20 Leaves spirally twisted around the stem when dry (sometimes each individual leaf is spirally twisted, and not so much twisted together around the stem)

21 Filiform gemmae present in distal leaf axils
22 Leaves usually longer than 3 mm; margins strongly serrate distally; limbidium strong ..... ***Rosulabryum andicola***
22 Leaves usually less than 2 mm long; margins entire to serrulate distally; limbidium weak or absent
23 Innovations rosulate; leaves obovate, flat; filiform gemmae brown when mature ..... ***Rosulabryum laevifilum***
23 Innovations evenly foliate; leaves ovate to obovate, weakly concave; filiform gemmae brown to reddish brown ..... ***Rosulabryum flaccidum***
21 Filiform gemmae absent
24 Costa short-excurrent; distal cells 2-3:1; capsules erect to nearly so; rhizoidal tubers red to orange-red, 100-300 µm ..... ***Brachymenium klotzschii***
24 Costa long-excurrent; distal cells 3-4:1; capsules commonly drooping; rhizoidal tubers (when present) red-brown, 200-300 µm ..... ***Rosulabryum capillare***
20 Leaves straight or contorted when dry, but not spirally twisted around the stem
25 Basal leaf cells quadrate or nearly so across the width of the leaves, obviously set off from the longer cells upwards; plants small, the stems mostly less than 1 cm high, with leaves closely imbricated and straight, not contorted when dry
26 Leaf axils with conspicuous gemmae-like bulbils 100-200 µm long; rhizoidal tubers absent ..... ***Gemmabryum gemmilucens***
26 Leaf axils lacking bulbils or gemmae; rhizoidal tubers present, 40-80 µm diameter ..... ***Gemmabryum valparaisense***
25 Basal leaf cells ± rectangular, gradually transitioning to the cells upwards, not obviously set off; plants of various heights, but commonly taller; leaves commonly contorted when dry
27 Leaf margins plane throughout; limbidium weak, of 1-2 rows
28 Leaves obovate, widest above the middle; plants commonly with filiform gemmae in the upper leaf axils; plants growing on bark and rotten wood, less commonly rock or soil ..... ***Rosulabryum laevifilum***
28 Leaves ovate to ovate-lanceolate, widest below the middle; plants lacking gemmae; plants growing on wet soil and rock ..... ***Ptychostomum turbinatum***
27 Leaf margins recurved to revolute at least in the lower ⅓ to ½, sometimes to near the apex; limbidium weak to strong
29 Leaves strongly decurrent, especially on sterile stems, sometimes nearly reaching to the base of the next lower leaf
30 Leaf bases usually green; limbidium weak, of 1(2) rows, partially bistratose ..... ***Ptychostomum weigelii***
30 Leaf bases reddish; limbidium strong, of 2-3 rows, unistratose ..... ***Ptychostomum pseudotriquetrum***
29 Leaves not or only shortly decurrent
31 Margins 2-stratose (in thickness), at least in the proximal 1/3
32 Plant tufts green or yellow-green; distal and median cells 3-4:1; capsule curved-gibbous, asymmetric ..... ***Ptychostomum cernuum***
32 Plant tufts pale pink or reddish, rarely greenish; distal and median cells mostly 2-3:1; capsule not curved-gibbous (sometimes slightly curved), symmetric ..... ***Ptychostomum pallens***
31 Margins 1-stratose throughout
33 Plants with filiform gemmae in the upper leaf axils; limbidium weak, of 1-2 rows; plants growing on bark and rotten wood, rarely rock or soil ..... ***Rosulabryum laevifilum***
33 Plants lacking gemmae in leaf axils; limbidium various; substrate various
34 Rhizoidal tubers produced
35 Tubers (100)200-300 µm, common; leaves green at base; margins toothed, rarely entire; limbidium strong, of 2-4 rows; basal cells 3-5:1 ..... ***Rosulabryum torquescens***
35 Tubers 100-200 µm, rare; leaves commonly reddish at base; margins entire, rarely finely toothed; limbidium weak, of 1-2 rows; basal cells 1-2:1 next to costa ..... ***Gemmabryum caespiticium***
34 Rhizoidal tubers absent [go to lead 36, far left]
36 Plants quite low, mostly about 5 mm high, and nearly always less than 10 mm high
37 Awn smooth; proximal cells next to costa 1-2:1; distal cells 4-6:1; exostome free from endostome ..... ***Gemmabryum caespiticium***
37 Awn denticulate; proximal cells next to costa 3-4:1; distal cells 2-3:1; exostome adhering to endostome ..... ***Ptychostomum compactum***
36 Plants taller, mostly 10-20 mm or more high
38 Capsules present

39 Cilia short (less than ½ as long as endostome processes) or rudimentary; spores mostly more than 20 µm ..... ***Ptychostomum inclinatum***
39 Cilia long (more than ½ as long as endostome processes), nodulose or appendiculate; spores mostly less than 22 µm
40 Spores 18-20(22) ..... ***Ptychostomum pallescens***
40 Spores 10-18 µm
41 Plants dioicous; basal laminal cells next to costa 1-2:1; distal cells 4-6:1 ...***Gemmabryum caespiticium***
41 Plants synoicous; basal laminal cells 3-4:1; distal cells 3-4:1
42 Limbidium wide, 3-4 rows, the same color as the lamina..... ***Ptychostomum pallescens***
42 Limbidium narrow, 2-3 rows, yellowish.....***Ptychostomum creberrimum***
38 Capsules absent
43 Basal laminal cells next to costa 1-2:1; distal cells 4-6:1; limbidium weak, of 1-2 rows of elongate incrassate cells.....***Gemmabryum caespiticium***
43 Basal and distal laminal cells 3-4:1; limbidium strong, of 2-6 rows
44 Stems elongate, branched, forming deep sods bound together by rhizoids ..... ***Ptychostomum pallescens***
44 Stems short, mostly unbranched, not forming sods
45 Limbidium of 3-6 rows..... ***Ptychostomum pallescens***
45 Limbidium 2-3 rows
46 Limbidium yellowish.....***Ptychostomum creberrimum***
46 Limbidium the same color as the lamina ..... ***Ptychostomum inclinatum***

Brachymenium [a short membrane].

1 Leaves strongly spirally twisted around the stem when dry; limbidium present; rhizoidal tubers produced..... ..... ***B. klotzschii***

1 Leaves strongly imbricate, but only slightly twisted around the stem when dry; limbidium absent; rhizoidal tubers not produced.....***B. mexicanum***

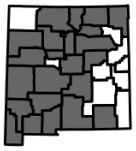
Brachymenium klotzschii (Schwägrichen) Paris [for Johann Friedrich Klotzsch (1805-1860), German pharmacist and botanist] [*Brachymenium macrocarpum* Cardot]. Acrocarpous, in dense, dark green to olive-green cushions, the stems to 2 cm tall/long, strongly rosulate; leaves strongly spirally twisted around the stem when dry, to 1.5 mm long, a limbidium present; the margins plane distally, serrate, the apices acute; costa short-excurrent; medial cells 2-3:1, the proximal quadrate; specialized asexual reproduction by red to orange-red rhizoidal tubers 100-300 µm; capsules erect or nearly so. ●On tree trunks, wood, rock, mineral soil; scarcely known in the state. ♦Reported by Spence for New Mexico (as *B. macrocarpum*) without locality (Spence, J.R. 2014. *Brachymenium*, pp. 122-124. IN: Flora of North America, vol. 28. Oxford University Press.).

Mexico, Veracruz, Zacuapan, Nov 1918, *C.A. Purpus* (COLO).

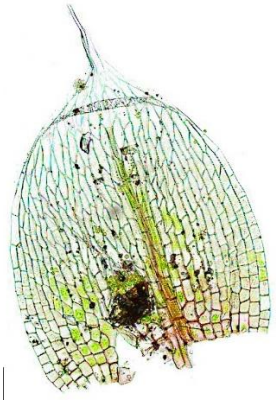
Brachymenium mexicanum Montagne [of Mexico] [*Gemmabryum mexicanum* (Montagne) J.R. Spence]. Acrocarpous, in loose to dense, green, yellow-green, or golden cushions or turfs, often lustrous, the stems to 2 cm tall/long, bud-like to rosulate; leaves strongly imbricate, only slight twisted around stem when dry, to 3 mm long, a limbidium absent, the margins plane distally, entire to serrate, the apices acute; costa mostly short-excurrent; medial cells 3-4:1, the proximal shorter, often quadrate; specialized asexual reproduction absent; capsule unknown. ●Dry rock outcrops and crevices; known from a single collection. ♦Distinctive by the ± straight, overlapping leaves lacking a limbidium, the excurrent costa, and rectangular cells of the blades.

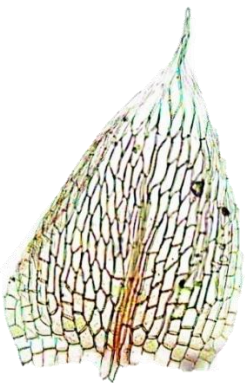
NM, Luna Co., Florida Mts, 12 Apr 2019, *J. Brinda* (MO).

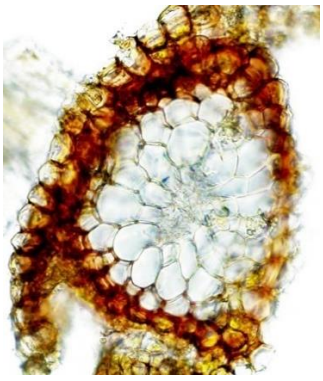
Bryum [ancient name for a moss] [Keyed in **Bryum group**].

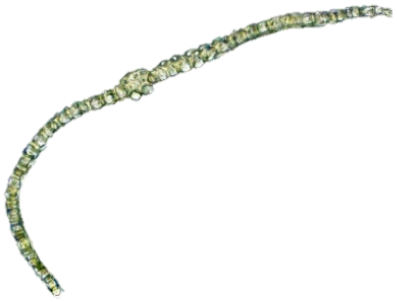


Bryum argenteum Hedwig [silvery] [*Bryum argenteum* Hedwig var. *muticum* Bridel, *Bryum lanatum* (P. Beauvois) Bridel]. Acrocarpous, in silvery, silvery-green, or whitish mats and cushions, the stems to 1.5 cm tall/long, usually julaceous, sometimes weakly so; leaves ovate, somewhat concave, to about 1 mm long, a limbidium absent, proximally green, distally hyaline, rarely entirely green on wet substrates, the margins entire; costa ending below apex to long-excurrent; mid-laminal cells 3-5:1; specialized asexual reproduction commonly absent, or sometimes by axillary leafy bulbils; capsules pendulous, reddish-brownish, 2-3 mm long. ●On dry to moist soil, rocks, walls, disturbed ground, sidewalks, and cracks in roadways, natural and human habitats; expected in all counties. ♦Distinctive because of the hyaline leaf tips. Extremely variable throughout its world-wide range, with more than 60 synonyms just at the species level. We accept the argument of Holyoak [Holyoak, D.T. 2021. European Bryaceae. Pisces Publications, UK] and others in subsuming *B. lanatum* (P. Beauvois) Bridel without infraspecific recognition.





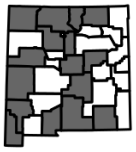




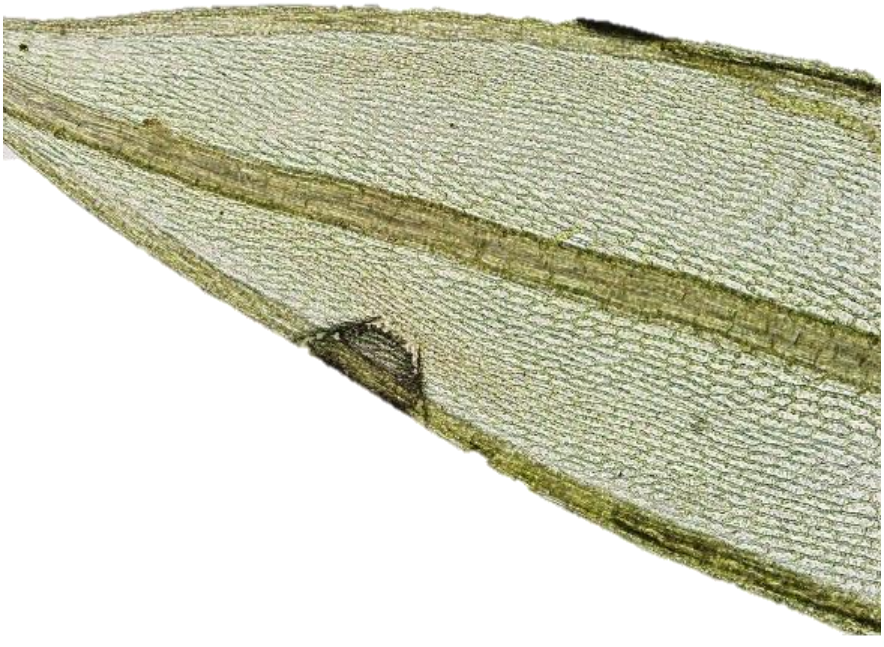
NM, Grant Co., Gila Cliff Dwellings Nat. Mon., 6 Nov 2011, *Kleinman & Felger* (SNM); Grant Co., Pinos Altos Range, 26 Apr 2010, *Kleinman & Blisard* (SNM).

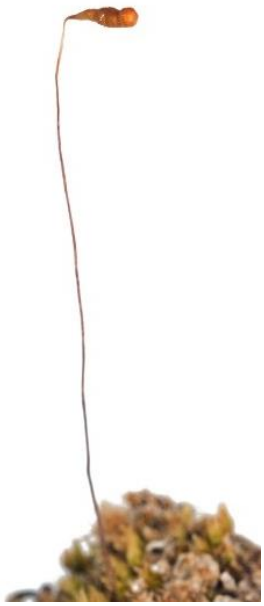
Gemmabryum [a budding *Bryum*] [Species also keyed in **Bryum group**].

1 Bulbils present in the leaf axils (appearing gemmae-like in *G. gemmilucens*)
  2 Both bulbils and rhizoidal tubers present; stems string-like when dry; leaves folded along the costa when dry ..... ***G. exile***
  2 Bulbils present, rhizoidal tubers absent; stems bud-like to evenly foliate, not string-like when dry; leaves not folded along the costa
    3 Bulbils 1-2 per axil, 250-750 µm, with prominent leaf primordia ..... ***G. dichotomum***
    3 Bulbils 5-numerous per axil, 100-200 µm, gemmiform, lacking leaf primordia ..... ***G. gemmilucens***
1 Bulbils absent in the leaf axils
  4 Rhizoidal tubers not developed or rarely so
    5 Limbidium absent or rarely very weak; margins plane; leaves usually smaller than 1 mm long; costa percurrent to long-excurrent; distal lamina hyaline in age ..... ***G. kunzei***
    5 Limbidium well-developed; margins plane to strongly revolute; leaves commonly more than 1 mm long; costa short- to long-excurrent; distal lamina not hyaline in age ..... ***G. caespiticium***
  4 Rhizoidal tubers common
    6 Rhizoidal tubers in clusters on short lateral rhizoids at stem base, yellow to orange-brown..... ***G. demaretianum***
    6 Rhizoidal tubers on long rhizoids in the soils, rarely at stem base, bright red, purple-red, brown, rarely orangish
      7 Rhizoidal tubers bright red, 150-300 µm ..... ***G. subapiculatum***
      7 Rhizoidal tubers purple-red or rarely orangish, or brown, 40-80(100) µm
        8 Rhizoidal tubers purple-red, rarely orangish, 60-100 µm; rhizoids pale to bright violet or purple; limbidium absent; medial cells 30-60 µm long, 3-4:1 ..... ***G. violaceum***
        8 Rhizoidal tubers brown 40-80 µm; rhizoids brown to reddish brown; limbidium absent to weakly developed; medial cells 60-80 µm long, 4-6:1 ..... ***G. valparaisense***



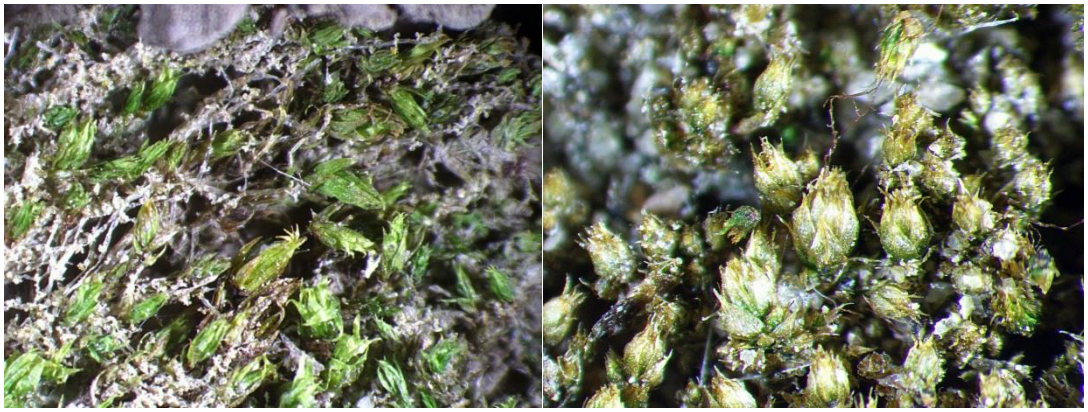
Gemmabryum caespiticium (Hedwig) J.R. Spence [turf-like] [*Bryum caespiticium* Hedwig, *Bryum cernuum* Bridel, *Ptychostomum imbricatulum* (Müller Hal.) Holyoak & N. Pedersen]. Acrocarpous, in dense, green, tufts or mats, the stems to 3 cm tall/long; leaves somewhat concave, ovate, to 3 mm long, the margins plane to revolute, the apices acuminate, the limbidium usually weak but distinct; costa short- to long-excurrent, the awn colored; medial cells 3-6:1; specialized asexual reproduction rare, by brood branchlets or red rhizoidal tubers; capsule inclined to pendulous. ●On damp to wet (sometimes dry) soil or sometimes rock; often disturbed ground. ♦Low, dense, green tufts, non-spiral leaves, acuminate apices, revolute margins, and excurrent costae help to distinguish this species.

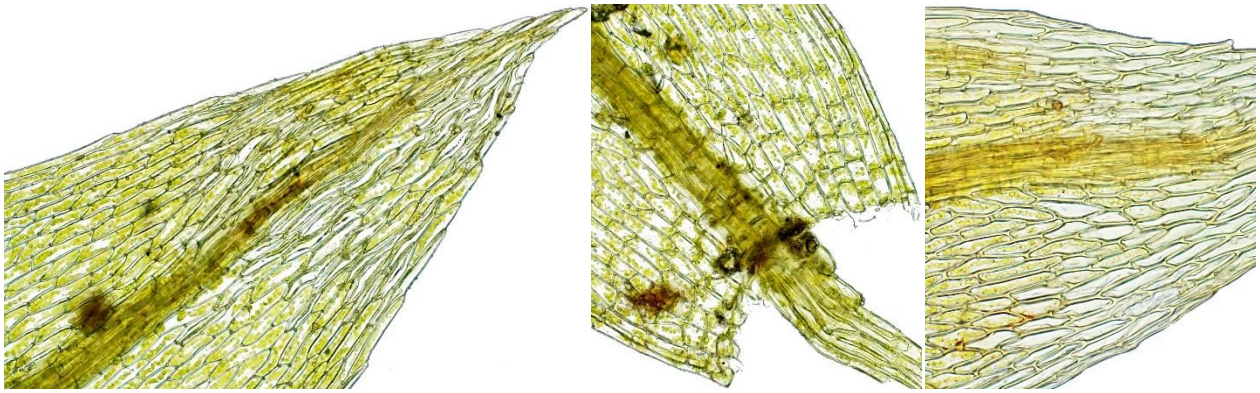


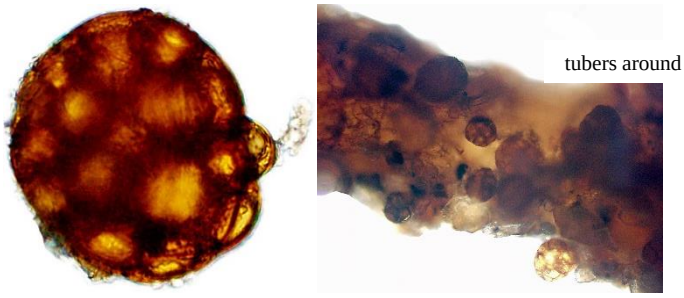


NM, Grant Co., Pinos Altos Range, 29 Apr 2010, *Kleinman & Blisard* (SNM).

Gemmabryum demaretianum (Arts) J.R. Spence [for Fernand Demaret (1911-2008), Belgian botanist] [*Bryum demaretianum* Arts]. Acrocarpous, in small green to yellow-green tufts or mats, often reddish-tinged, the stems to 1.5 cm tall/long; rhizoids clear, brownish, to reddish; leaves loosely disposed, narrow, ovate-lanceolate to lanceolate, weakly concave, to 2 mm long, 4-6:1, the margins mostly plane, entire to serrulate distally, the limbidium absent or indistinct, the apices acuminate; costa percurrent to short-excurrent; medial cells 3-4:1; specialized asexual reproduction by rhizoidal tubers, in clusters of 2-5 at base of stem, the tubers yellow to orange-brown, pyriform, 50-80 µm. ●On disturbed soil of agricultural fields, landscaped ground, or disturbed sites; scarcely known in the state; reported by Spence for New Mexico, without locality [Spence, J.R. 2014. *Gemmabryum*, pp. 129-140. IN: Flora of North America, vol. 28. Oxford University Press.]. ♦Distinguished by the adventive habitat, often narrow leaves, indistinct limbidium, short proximal cells, and clusters of rhizoidal tubers at the base of the stem.



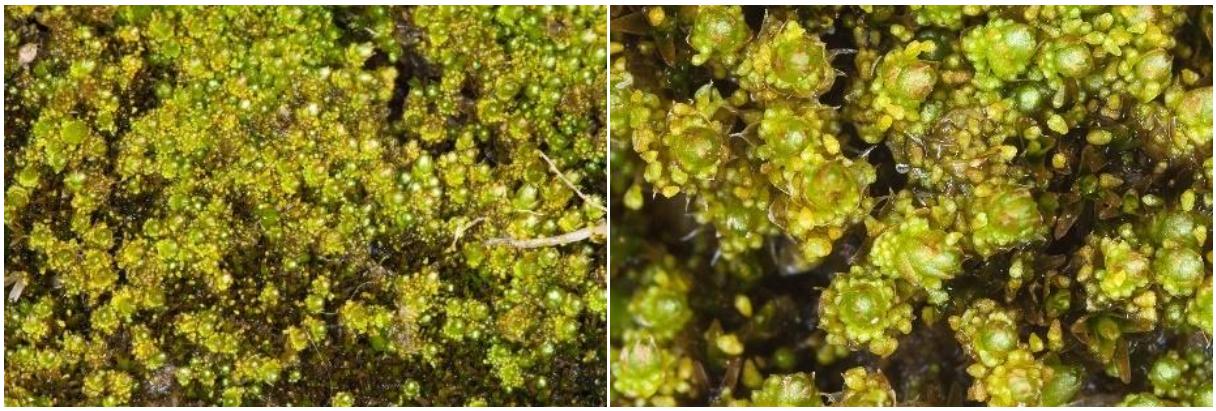




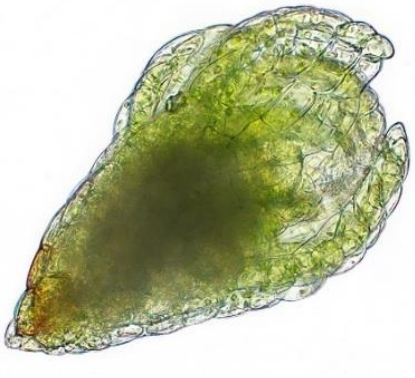
tubers around stem

CA, Lake Co., Clear Lake region, 1 May 2016, *Toring & Dearing* (CAS); Riverside Co., Joshua Tree Nat. Park, 5 Nov 2011, *J.C. Brinda* (CAS).

Gemmabryum dichotomum (Hedwig) Spence & Ramsay [forked] [*Bryum bicolor* Dickson, *Bryum dichotomum* Hedwig]. Acrocarpous, in green to yellow-green tufts or cushions, the stems to 2 cm tall/long; leaves narrowly ovate, to 2 mm long, the margins revolute proximally, the apices acute to acuminate; costa percurrent, rarely short- to long-excurrent; medial cells 3-4:1; specialized asexual reproduction by axillary bulbils, rhizoidal tubers absent or rare; capsules nodding. ●On damp or moist soil, soil over rock. ♦Distinguished by the acute leaves mostly lacking a limbidium, with leafy bulbils peeking out from the axils.



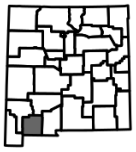
axillary bulbils



NM, Grant Co., Pinos Altos Range, Bear Creek, 1 Mar 2012, *Kleinman & Bisard* (SNM).

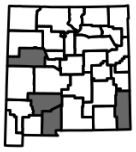
Gemmabryum exile (Dozy & Molkenboer) J.R. Spence & H.P Ramsay [slender (the stems)] [*Brachymenium exile* (Dozy & Molkenboer) Bosch & Sande Lacoste, *Bryum exile* Dozy & Molkenboer]. Acrocarpous, in green to yellow-green tuft or low cushions, the stems to 2 cm tall/long, slender, string-like, evenly foliate; leaves folded around the stem when dry, ovate, a limbidium absent, the margins plane, the apices acute; costa percurrent to short-excurrent; medial cells 4-5:1; specialized asexual reproduction by axillary bulbils, and by smooth rhizoidal brown tubers 100-200 µm long; capsules erect, red-brown, 1-2 mm long. ●On concrete, rock; scarcely known in the state; reported by Spence for New Mexico, without locality [Spence, J.R. 2014. *Brachymenium*, pp. 122-124. IN: Flora of North America, vol. 28. Oxford University Press.]. ♦Distinctive by the string-like stems and folded leaves with plane margins when dry.

Papua New Guinea, Goroka, 22 Jun 1968, *Weber & McVean* (COLO).



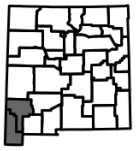
Gemmabryum gemmilucens **(**(R. Wilczek & Demaret) J.R. Spence) [with shining gemmae] [*Bryum gemmilucens* R. Wilczek & Demaret]. Acrocarpous, the stems to 1 cm long; leaves concave, to 1.5 mm long, the margins plane to revolute proximally, a limbidium absent or quite weak, the apices acute/acuminate; costa percurrent to excurrent (ours); proximal cells abruptly quadrate to short-rectangular, 1-2:1; medial cells 3-4:1; specialized asexual reproduction by leaf axil bulbils, these 5-many per axil, gemmae-like, lacking leaf primordia, oblong, 100-200 µm long; capsule unknown. ●On seasonally damp soil in arid regions; recently found in the state. ♦Distinctive by the tiny stature, quadrate proximal cells, excurrent costa, and abundant axillary gemmae-like bulbils.

NM, Luna Co., Tres Hermanas Mts, 15 Mar 2022, *Kleinman & Allred* (SNM).

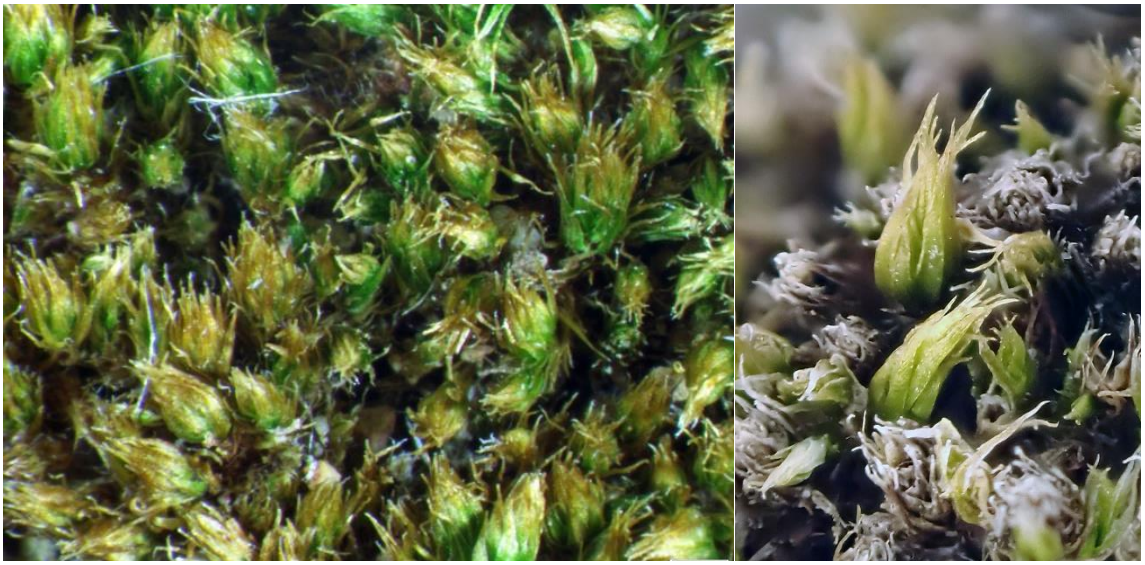


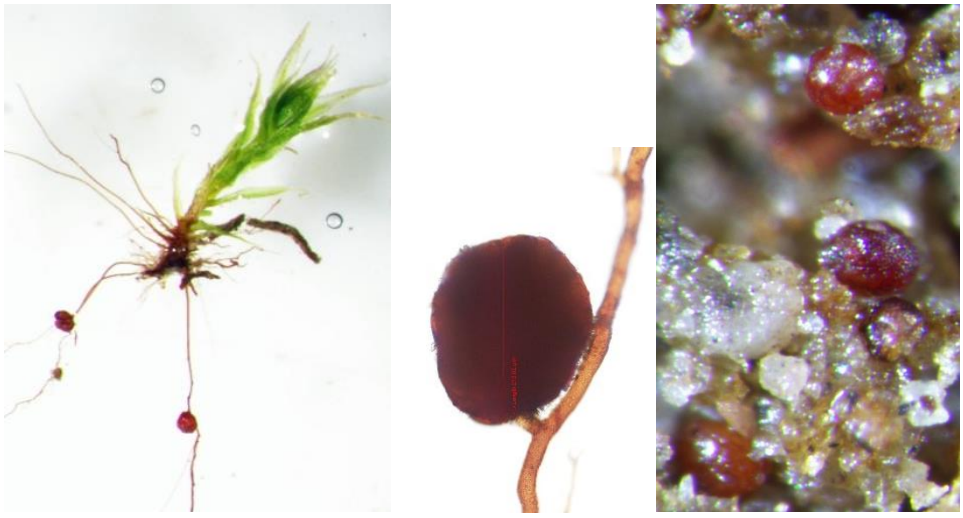
Gemmabryum kunzei (Hornschuch) J.R. Spence [for Gustav Kunze (1973-1851), German botanist] [*Bryum caespiticium* Hedwig subsp. *kunzei* (Hornschuch) Podpera, *Bryum kunzei* Hornschuch]. Acrocarpous, in low, loose tufts, the stems to 1 cm tall/long; leaves concave, to 1 mm long, a limbidium absent, the margins plane, the apices often hyaline in age; costa highly variable, percurrent to long-excurrent; basal cells 1-2:1; medial cells 3-4:1; specialized asexual reproduction unknown; capsules inclined to pendulous, rare. ●Sandy ground and rock, arid habitats. ♦This is undoubtedly more common than inferred from the few extant herbarium collections. Distinguished by the small, plane leaves lacking a limbidium, and the lack of tubers or bulbils. Even though some leaves may be hyaline in the distal portion, the plants are never silvery or whitish, and should not be confused with *B. argenteum*.

NM, Dona Ana Co., Jornada Experimental Range, 15 Feb 2017, *Allred* (NMC).

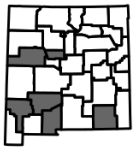


Gemmabryum subapiculatum (Hampe) J.R. Spence & H.P. Ramsay [somewhat pointed] [*Bryum subapiculatum* Hampe]. Acrocarpous, in small, green to yellow-green clumps, often with a reddish tinge, the stems to 1.5 cm tall/long; leaves loosely disposed, narrowly ovate, weakly concave, to 2 mm long, a limbidium absent, the margins plane to revolute proximally, the apices acute to acuminate; costa short-excurrent; medial cells 3-5:1, proximal cells shorter; specialized asexual reproduction by rhizoidal tubers on long rhizoids in soil or occasionally at base of stem, bright red, 150-300 µm, smooth; capsules inclined to drooping. ●On dry to damp soil and soil over rock; southwestern mountains. ♦Distinguished by the smooth bright red tubers on long rhizoids.

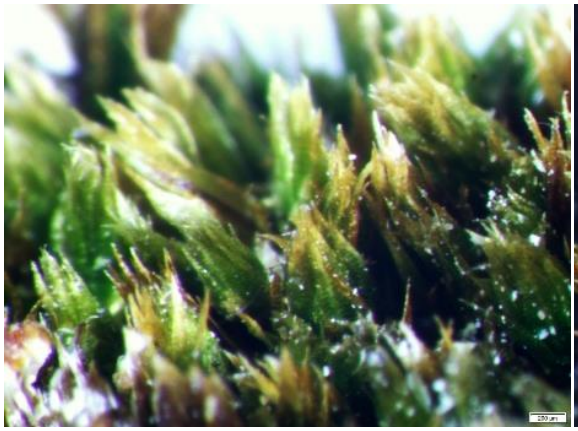
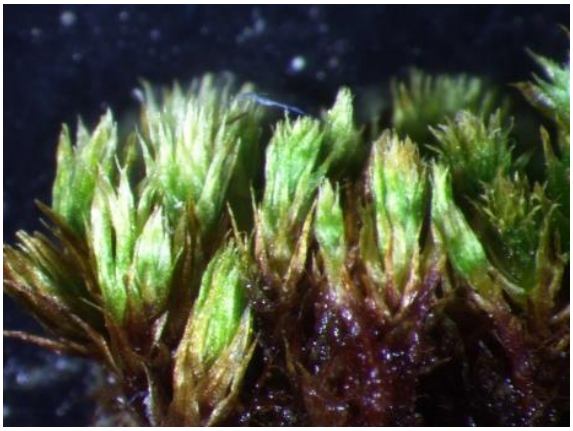


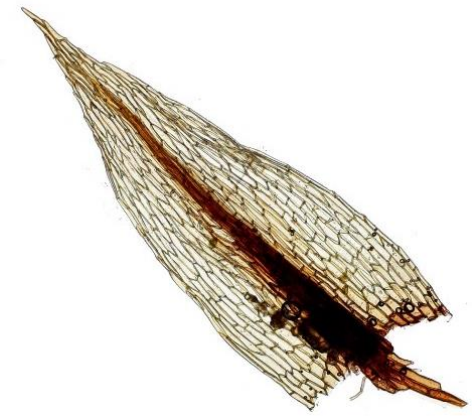
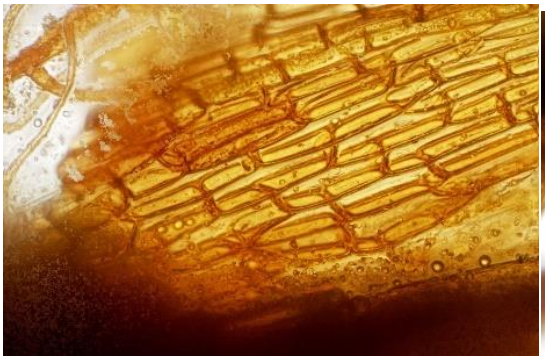
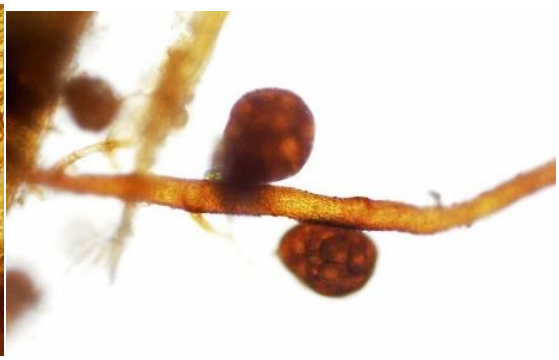
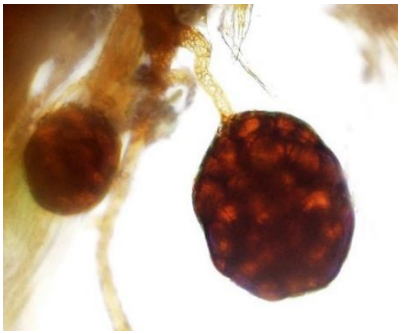


NM, Hidalgo Co., Animas Mts, Indian Creek área, 4 Apr 2019, *Kleinman* (SNM).

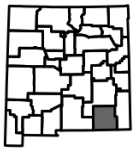


Gemmabryum valparaisense (Thériot) J.R. Spence [for Valparaiso, Chile] [*Bryum pyriferum* Crundwell & Whitehouse, *Bryum valparaisense* Thériot]. Acrocarpous, in bright green to yellowish green tufts, the stems to about 1 cm tall/long; leaves densely overlapping, plane, to 2 mm long, a weak limbidium present (sometimes absent), the margins ± plane, the apices acute; costa percurrent to short-excurrent; medial cells 4-6:1, the proximal much shorter; specialized asexual reproduction by rhizoidal tubers, on long rhizoids in the soil, sometimes axillary, 40-80 µm, brown, smooth; capsules nearly erect to pendulous. ●Moist soil and soil over rock, seepy ground; arid habitats. ♦Distinctive features include the small brownish pyriform tubers, weak limbidium, and short cells across the base of the leaf.

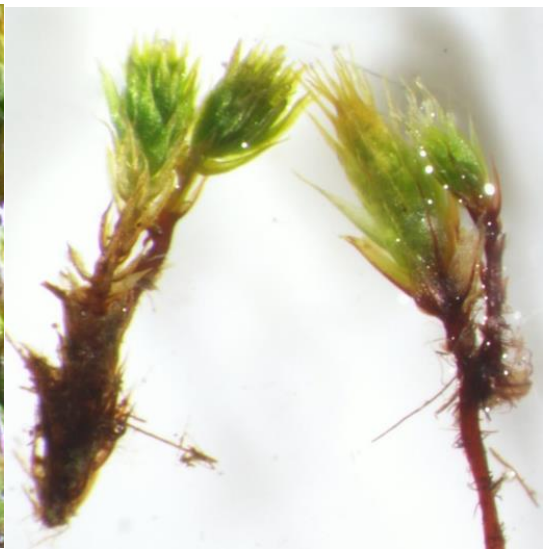



NM, Eddy Co., Carlsbad Canyon Nat. Park, Rattlesnake Canyon, 11 May 2016, *Kleinman & Blisard* (SNM).



Gemmabryum violaceum (Crundwell & Nyholm) J.R. Spence [violet] [*Bryum violaceum* Crundwell & Nyholm]. Acrocarpous, in green, yellow-green or red-green tufts or clumps, the stems to 1.5 cm tall/long, with pale to bright violet, purple rhizoids, rarely reddish; leaves loosely disposed along the stem, weakly concave, to 1.5 mm long, a limbidium absent, the margins mostly plane, the apices acute-acuminate; costa short-excurrent; medial cells 3-4:1, the proximal somewhat shorter; specialized asexual reproduction by purple-red rhizoidal tubers on long rhizoids in the soil, 60-80(100) µm, smooth; capsules nodding. ●Damp soil and soil over rock, disturbed ground. ♦Distinguished by the pointed leaves, violet rhizoids, and tiny tubers.



NM, Eddy Co., Carlsbad Canyon Nat. Park, Rattlesnake Canyon, 11 May 2016, *Kleinman & Blisard* (SNM).

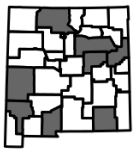
Imbribryum [an overlapping *Bryum*] [Also keyed in **Bryum group**].

1 Leaf apices acute to acuminate; costa reaching or exceeding the apex, commonly straight ..... ***I. torenii***

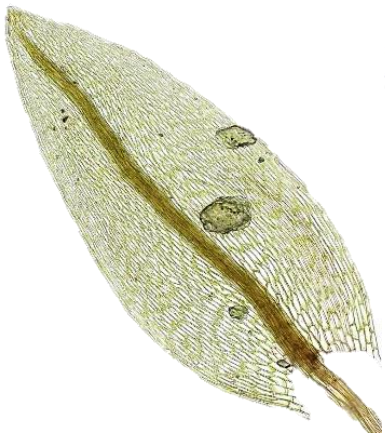
1 Leaf apices obtuse to rounded; costa not reaching the apex, commonly crooked

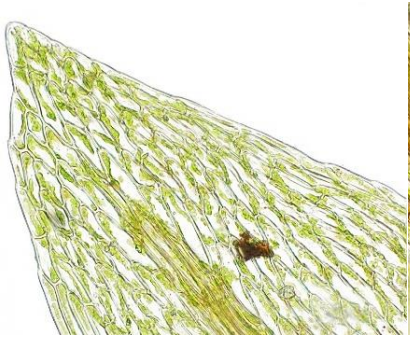
2 Plants and leaves reddish, red-green, or reddish brown, red tints usually present; leaves closely overlapping; costa reddish, crooked; apical cells incrassate; proximal leaf cells abruptly quadrate, 1-2:1, with scattered short-rectangular cells ..... ***I. muehlenbeckii***

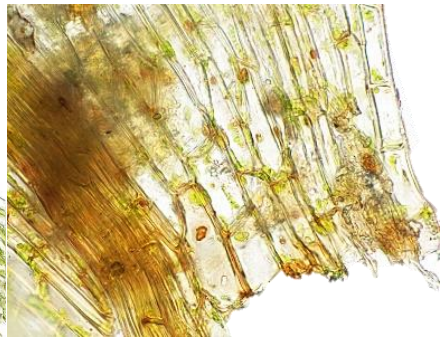
2 Plants and leaves bright green to yellow-green, lacking red tints, becoming straw-colored with age; leaves loosely disposed; costa brown to yellow-brown, mostly straight or sometimes crooked in some leaves; apical cells not incrassate; proximal leaf cells abruptly short-rectangular, 2-3:1, occasionally with scattered quadrate cells ..... ***I. gemmiparum***



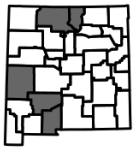
Imbribryum gemmiparum (De Notaris) J.R. Spence [bearing gemmae] [*Bryum gemmiparum* De Notaris]. Acrocarpous, in bright green tufts or clumps, the stems to 3 cm long; leaves loosely disposed, concave, yellowish when young, to 3 mm long, a limbidium absent, the margins plane, entire, the apices obtuse, the cells not strongly thickened; costa brownish, straight to sometimes crooked; medial cells 3:1, the basal shorter; specialized asexual reproduction rare, by pink to orange tubers, 100-200 µm; capsules nodding. ●On wet calcareous soil and rocks, around springs. ♦Distant obtuse leaves, no limbidium, and shorter proximal cells across the base help to identify this species.







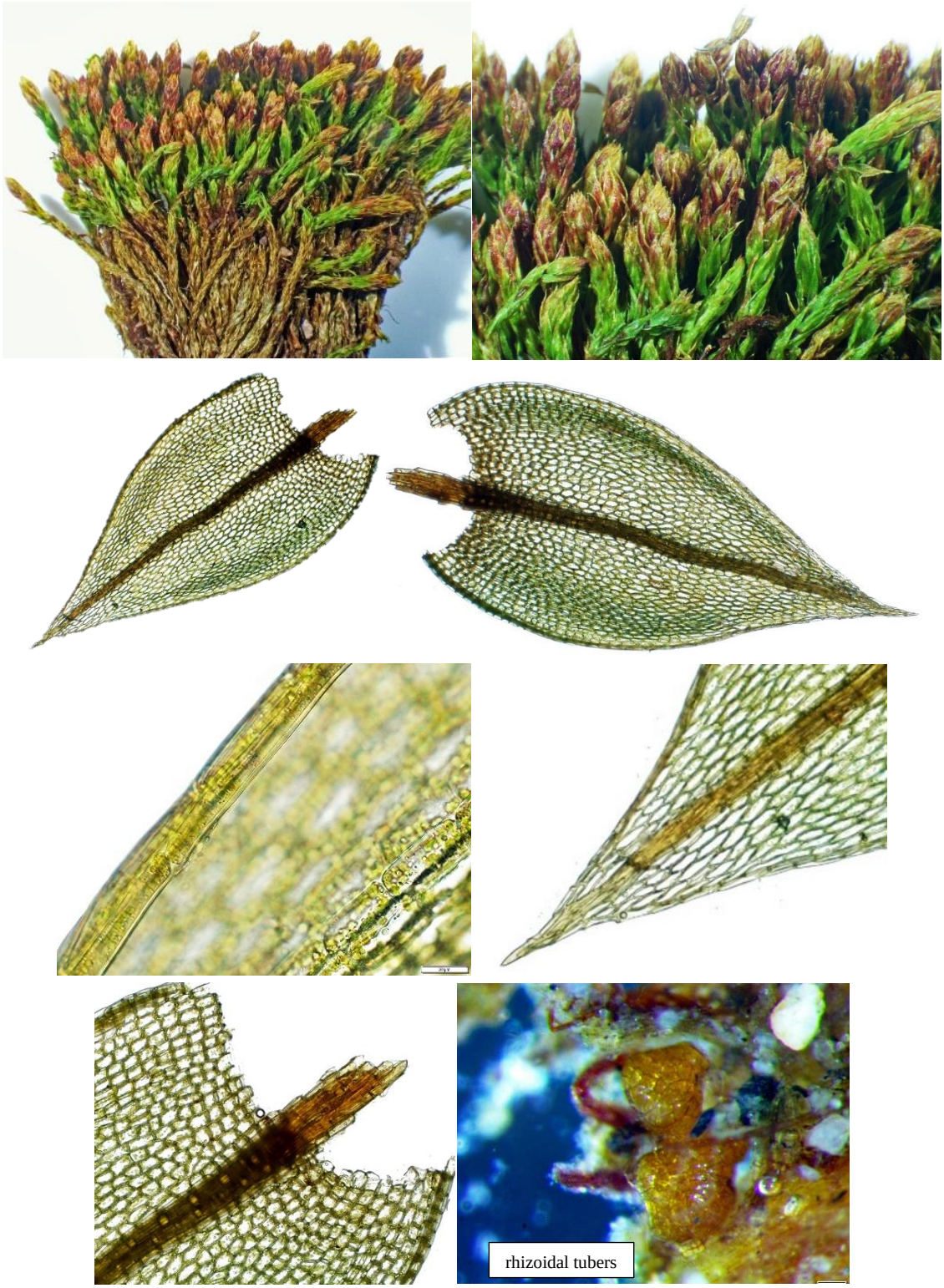
NM, Grant Co., Black Range, Spring Canyon, 18 Apr 2012, *Kleinman* & *Allred* (SNM).



Imbribryum muehlenbeckii (Bruch & Schimper) Pedersen [for Heinrich Gustav Mühlenbeck (1798-1845), Alsatian physician] [*Bryum muehlenbeckii* Bruch & Schimper, *Imbribryum miniatum* of NM reports]. Acrocarpous, in reddish green clumps or tufts, the stems to 3 cm tall/long, julaceous; leaves strongly overlapping, commonly reddish tinged, rarely all green, concave, to 3 mm long, a limbidium absent, the margins plane distally, mostly entire, the apices rounded to obtuse, rarely pointed, the cells strongly thickened; costa reddish, often crooked; medial cells 3-4:1, longer than the nearly quadrate proximal cells; specialized asexual reproduction rare, by axillary rhizoidal reddish tubers, 100-200 µm; capsules nodding. ●On seeping rocks. ♦Distinctive by the obtuse imbricate leaves, reddish coloration, crooked costa, thickened apical cells, and nearly quadrate proximal cells. Plants with sharply pointed apices may belong to an undescribed species related to *G. alpinum* (Hudson ex Withering) Pedersen.

NM, Catron Co., Trout Creek, 24 Jun 1998, *Allred 7205, 7206* (NMC).

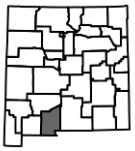
Imbribryum torenii Spence & Shevock [for David Roy Toren, (1950-x), California bryologist and author of *A Moss Flora of Lake County, California*], Acrocarpous, in loose to dense, dark red to red-green turfs, the stems to 3 cm tall/long, evenly foliate, not julaceous; leaves to 3 mm long, reddish, strongly imbricate when dry, broadly ovate, concave, a limbidium absent, the margins strongly revolute, entire to finely serrulate distally, the apices acute; costa strong, reddish, percurrent to short-excurrent; medial cells, thin- to firm-walled but not incrassate, 3-4:1, the proximal shorter, 1-2:1; specialized asexual reproduction absent or infrequent reddish rhizoidal tubers 110-300 µm; capsule drooping. ●Mostly wet rocks; only recently found in the state. ♦Distinctive features include the reddish coloration, pointed overlapping leaves, revolute margins, percurrent to short-excurrent costa, and non-incrassate distal cells.



NM, Hidalgo Co., Last Chance Draw, 8 Apr 2019, *J. Brinda* (MO).

Leptostomopsis [resembling *Leptostomum*]

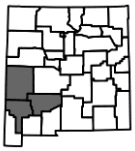
Leptostomopsis systylia (Müller Hal.) J.R. Spence [with connate pillars] [*Brachymenium systylium* (Müller Hal.) Jaeger, *Bryum systylium* Müller Hal.]. Acrocarpous, in dense green-silver to pink-silver cushions or turfs, the stems to 2 cm tall/long; leaves appressed, spatulate to elongate-ovate, to 2 mm long, a limbidium absent, the margins serrate; costa long-excurrent in distal leaves, pigmented proximally, the awn recurved when dry; medial cells 3-4:1; capsules erect, unknown in our plants. ●On shaded rock (ours), tree trunks elsewhere; known in the state from a single collection in 1980. ♦Distinctive by the conspicuous, spinose awn.



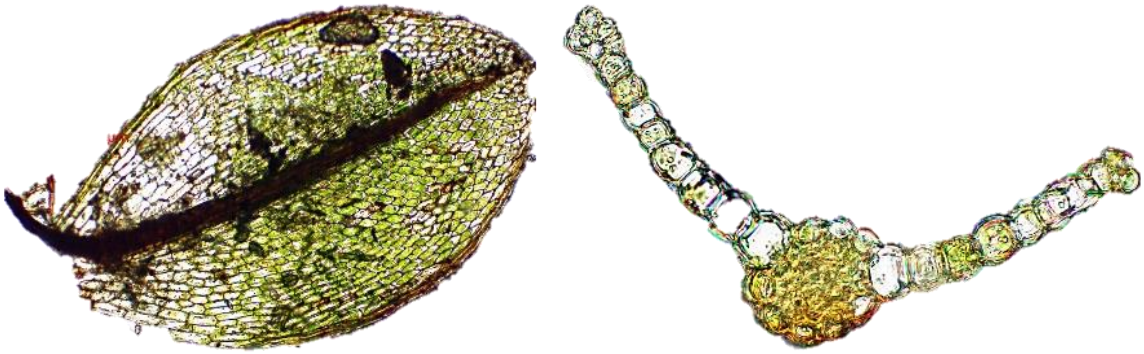
NM, Dona Ana Co., Organ Mts, 10 Jul 1980, *Stark & Castetter* (MO).

Plagiobryoides [resembling *Plagiobryum*] [Also keyed in **Bryum group**].

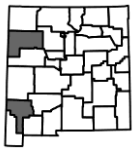
1 Limbidium definitely present.....***P. incrassatolimbata***
1 Limbidium absent
  2 Leaf apices obtuse to rounded.....***P. renauldii***
  2 Leaf apices acute to acuminate.....***P. vinosula***



Plagiobryoides incrassatolimbata (Cardot) J.R. Spence [thick-bordered] [*Bryum incrassatolimbatum* Cardot]. Acrocarpous, in dark red or reddish brown cushions or tufts, sometimes greenish, the stems to 4 cm tall/long, branched; leaves closely disposed, ovate, to 3 mm long, the bases long-decurrent, reddish, a limbidium present, the margins plane, multi-stratose, the apices obtuse; costa short of the apex to percurrent; medial cells 1-3:1, thin-walled, the proximal cell longer; specialized asexual reproduction absent; capsule suberect. ●On wet rocks and soil. ♦Characterized by the reddish color, multi-stratose leaf border, and lack of tubers.



NM, Sierra Co., Black Range, 22 Feb 2022, *Kleinman & Blisard* (SNM).



Plagiobryoides renauldii (Röll ex Renauld & Cardot) J.R. Spence [for Ferdinand François Gabriel Renauld (1837-1910), French bryologist] [*Bryum renauldii* Röll ex Renauld & Cardot]. Acrocarpous, in dark green to olive green clumps or mats, the stems to 4 cm tall/long, not julaceous, hardly branched; leaves distant, broadly ovate to orbicular, concave, to 3.5 mm long, a limbidium absent, the bases only somewhat decurrent, red-green, the margins plane, 1-stratose, the apices broadly obtuse; medial cells 1-3:1, wall thin, the proximal cells longer; specialized asexual reproduction by large rhizoidal tubers at base of stem and in most proximal leaves, (200)300-500 µm; capsules unknown. ●On wet soil or rocks, in streams; known only from a single recent collection. ♦Easily confused with *P. incrassatolimbata* or *Imbribyum muehlenbeckii*, but distinguished by its distant leaves, lack of limbidium, longer proximal cells, thin-walled distal cells, and supposedly production of rhizoidal tubers on rhizoids and in leaf axils (not found). ♦Photos A & B by Stacey Anderson.

NM, Grant Co., Pinos Altos Range, 22 Jul 2010, *Kleinman & Blisard* (SNM); McKinley Co., near Fort Wingate, 26 Mar 2017, *J. Brinda* (MO). CO, Mesa Co., 12 Apr 2021, *S. Anderson* (NMC).

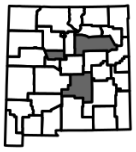
Plagiobryoides vinosula (Cardot) J.R. Spence [slightly wine-colored] [*Brachymenium vinosulum* Cardot]. Acrocarpous, in bright green clumps or cushions, the stems bright green, to 3 cm tall/long, not julaceous, many-branched; leaves loosely disposed, ovate, mostly flat, to 3 mm long, a limbidium absent or very weak, the bases not decurrent, reddish, the margins plane distally, 1-stratose, the apices acute; costa percurrent to short-excurrent; medial cells 1-3:1, thin-walled, the proximal longer; specialized asexual reproduction by rhizoidal tubers at base of stem, 200-400 µm; capsules nearly erect to inclined. ●Damp calcareous rock, springs. ♦A slight reddish tinge comes from the leaf bases and decurrencies; plants are otherwise green. Reported by FNA for the state [Spence, J.R. 2014. *Plagiobryoides*, pp. 148-152. IN: Flora of North America, vol. 28. Oxford University Press.] but without locality; specimens not yet known.

CO, Grand Co., Hot Sulphur Springs, 7 Jun 2002, *V. Evenson* (COLO).

Ptychostomum [a pleated mouth] [Also keyed in **Bryum group**].

1 Leaf apices obtuse or rounded; leaves broadly ovate to orbicular; costa percurrent ..... ***P. cyclophyllum***
1 Leaf apices definitely pointed, acute to long-acuminate or nearly awned; leaves lanceolate to elliptic; costa percurrent to excurrent
2 Leaf margins plane throughout; limbidium strong, of 2-3 rows ..... ***P. turbinatum***
2 Leaf margins recurved to revolute at least in the lower ⅓ to ½, sometimes to near the apex; limbidium weak to strong
3 Leaves strongly decurrent, especially on sterile stems, sometimes nearly reaching to the base of the next lower leaf
4 Leaf bases usually green; limbidium weak, of 1(2) rows, partially bistratose ..... ***P. weigelii***
4 Leaf bases reddish; limbidium strong, of 2-3 rows, unistratose ..... ***P. pseudotriquetrum***
3 Leaves not or only slightly decurrent
5 Leaf margins revolute from base to near the apex; plants pinkish to reddish ..... ***P. pallens***
5 Leaf margins revolute in proximal half, if more then plants not pinkish or reddish
6 Margins 2-stratose (in thickness), at least in the proximal ⅓
7 Plant tufts green or yellow-green; distal and median cells 3-4:1; capsule curved-gibbous, asymmetric ..... ***P. cernuum***
7 Plant tufts pale pink or reddish, rarely greenish; distal and median cells mostly 2-3:1; capsule not curved-gibbous (sometimes slightly curved), symmetric ..... ***P. pallens***
6 Margins 1-stratose throughout
8 Plants quite low, mostly about 5 mm high, and nearly always less than 10 mm high ..... ***P. compactum***
8 Plants taller, mostly 10-20 mm or more high
9 Capsules present
10 Cilia short (less than ½ as long as endostome processes) or rudimentary; spores mostly more than 20 µm ..... ***P. inclinatum***
10 Cilia long (more than ½ has long as endostome processes), nodulose or appendiculate; spores mostly less than 22 µm
11 Spores 18-20(22) ..... ***P. pallescens***
11 Spores 10-18 µm
12 Limbidium wide, 3-4 rows, the same color as the lamina ..... ***P. pallescens***
12 Limbidium narrow, 2-3 rows, yellowish ..... ***P. creberrimum***
9 Capsules absent
13 Stems elongate, branched, forming deep sods bound together by rhizoids ..... ***P. pallescens***
13 Stems short, mostly unbranched, not forming sods
14 Limbidium of 3-6 rows ..... ***P. pallescens***
14 Limbidium 2-3 rows
15 Limbidium yellowish ..... ***P. creberrimum***
15 Limbidium the same color as the lamina ..... ***P. inclinatum***

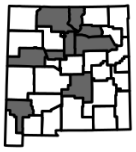
Ptychostomum cernuum Hornschuch [drooping] [*Bryum cernuum* Hedwig, *Bryum uliginosum* (Bridel) Bruch & Schimper]. Acrocarpous, in green to yellow-green turfs, the stems to 3 cm tall/long; leaves crowded, contorted or shrunken when dry, flat, to 4 mm long, the bases green, the margins 2-stratose with smaller cells, revolute proximally, plane distally, the limbidium of 2-3 rows; costa percurrent to short-excurrent medial cells 3-4:1, thin-walled; capsules 4-7 mm long, curved. ●On damp to wet soil. ♦Similar to *P. turbinatum*, but that species has broader leaves plane throughout with 1-stratose margins, and very different capsules.



NM, San Miguel Co., Gallinas Canyon, 20 Jun 1936, *Studhalter & Marr* (COLO).

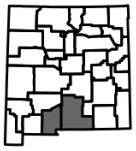
Ptychostomum compactum Hornschuch [compact] [*Bryum algovicum* Sendtner ex Müller Hal., *Bryum pendulum* (Hornschuch) Schimper, *Ptychostomum pendulum* Hornschuch]. Acrocarpous, in green, yellow-green, or red-green turfs, the stems to 1.5 cm tall/long; leaves clustered at the stem tips, at least somewhat contorted when dry, reddish at base, to 2.5 mm long, the margins revolute below, the limbidium of 2-3 rows; costae long-excurrent, toothed; laminal cells 2-4:1; capsules red-brown, pyriform, 2-3 mm long, the mouth red. ●Dry soil or rock. ♦Distinctive by the dry habitat, low stature, revolute leaves with limbidium, and long-excurrent toothed costa.

UT, Salt Lake Co., near Saltair, *S. Flowers 1219* (COLO).



Ptychostomum creberrimum (Taylor) J.R.Spence & H.P. Ramsay [crowded together] [*Bryum affine* Lindberg & Arnell, *Bryum creberrimum* Taylor, *Bryum lisae* De Notaris var. *cuspidatum* (Bruch ex Schimper) Margadant]. Acrocarpous, in green to yellow-green dense turfs, the stems to 3 cm tall/long, comose to evenly foliate; leaves green, twisted to contorted when dry, to 3.5 mm long, reddish at the base, the margins revolute at least in the proximal half, sometimes to near the tip, the limbidium yellowish, of 2-3 cells; costa long-excurrent, the awn smooth; laminal cells 3-4:1; capsules brown, the mouth yellow, the cilia long, the spores 10-16 µm across, finely papillose. ●On damp to wet soil, rocks, and rotting wood.

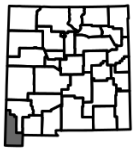
NM, Lincoln Co., Eagle Creek, 10 Jul 2005, *R.D. Worthington* (COLO).

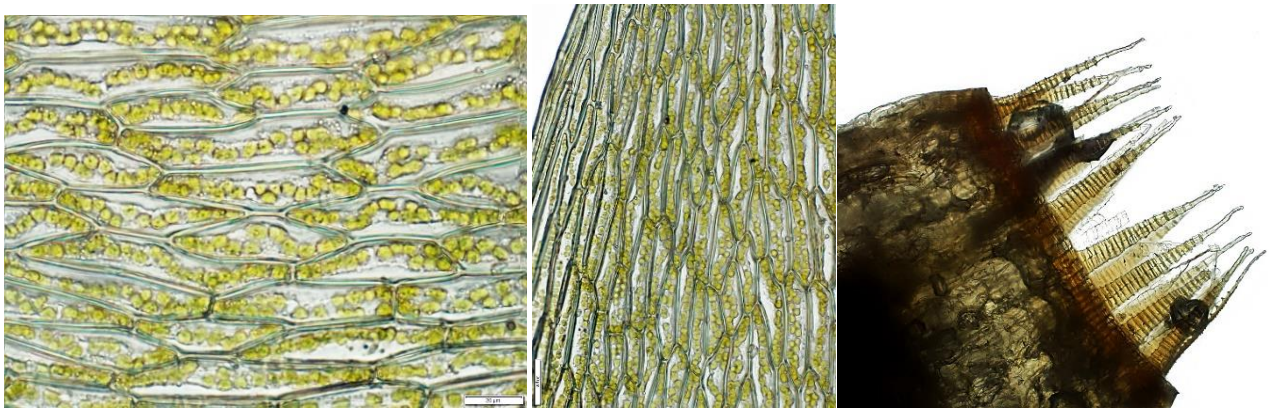


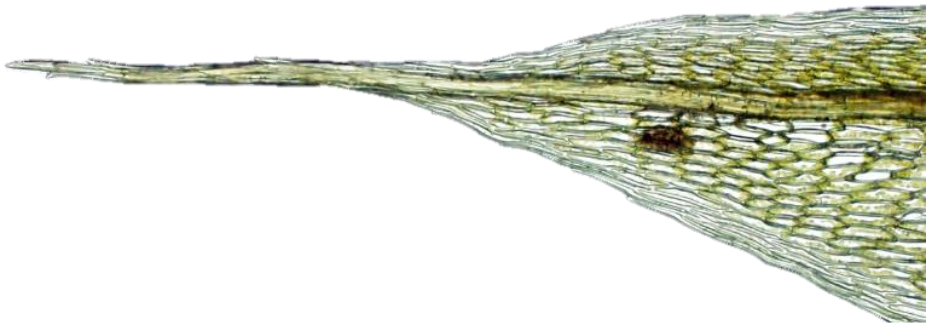
Ptychostomum cyclophyllum (Schwägrichen) J.R. Spence [orbicular-leaved] [*Bryum cyclophyllum* (Schwägrichen) Bruch & Schimper, *Bryum tortifolium* Bridel, *Mnium cyclophyllum* Schwägrichen]. Acrocarpous, in green to yellow-green tufts, the stems to 4 cm tall/long, comose to evenly foliate; leaves green, commonly distant, broadly ovate to orbicular, to 3 mm long, strongly shrunken when dry, the base green the margins plane, the limbidium of 2-3 rows; costa short of apex; proximal cells 3-5:1; medial/distal cells 2-3:1; specialized asexual reproduction rare, by axillary filamentous gemmae; capsules brown to yellow-brown, the mouth yellow. ●On damp or wet soil or humus. ♦Distinctive by the pale green to yellow-green orbicular leaves.

Canada, Alberta, Banff, 11 Jul 1891, *J. Macoun* (COLO).

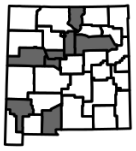
Ptychostomum inclinatum (Swartz ex Bridel) J.R. Spence [inclined] [*Pohlia inclinata* Swartz ex Bridel]. Acrocarpous, in green, reddish green, or yellow-green tufts or patches, the stems to 3 cm tall/long; leaves yellow-green to reddish green, contorted or shrunken when dry, to 3 mm long, the base reddish, the margins revolute at least below, the limbidium strong, of 2-3 rows; costa long-excurrent, the awn smooth to denticulate; laminal cells 3-4:1; capsules brown, 2-4 mm long. ●Dry soil; scarcely known in the state.. ♦Distinctive by the leaves with strong limbidium, reddish base, and long-excurrent costa.





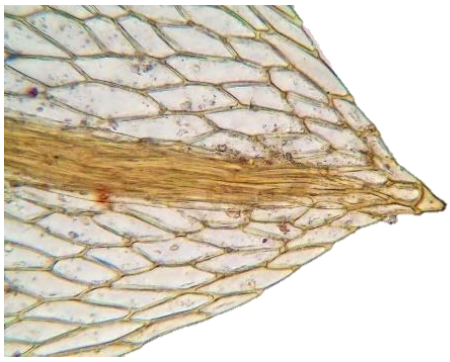
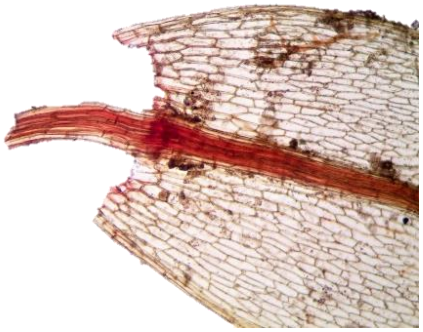


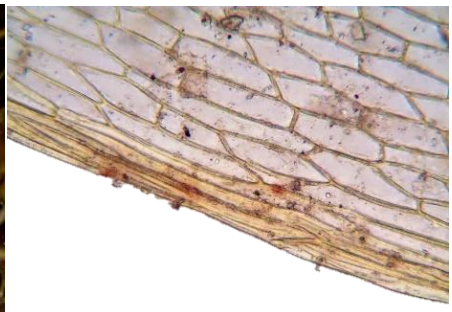
NM, Hidalgo Co., Animas Mt, 4 Apr 2019, *J. Brinda* (MO).



Ptychostomum pallens (Bridel) J.R. Spence [pale] [*Bryum pallens* (Bridel) Swartz]. Acrocarpous, in pinkish to reddish, open turfs, rarely green, the stems to 6 cm tall/long, even foliate when mature, brittle; leaves ± concolorous, pinkish to reddish, rarely greenish, crowded, contorted when dry, ovate, to 4 mm long, the base not or only shortly decurrent, the margins recurved and 2-stratose at least proximally, the limbidium strong, of 2-3 rows; costa percurrent to short excurrent; laminal cells mostly 2-3:1, sometimes longer; specialized asexual reproduction rare, by axillary filamentous gemmae; capsule yellow-brown, pyriform, 4-5 mm long, the mouth yellow-brown. ●On damp or wet soil. ♦Distinctive by the pinkish-reddish color when fresh, strong limbidium, and recurved 2-stratose margins at least proximally.

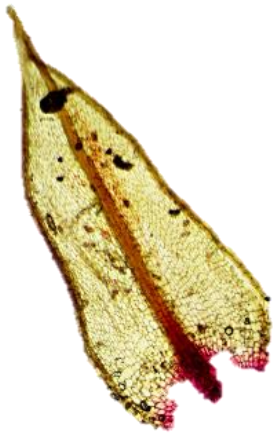


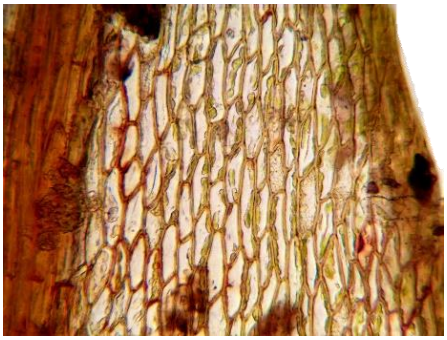




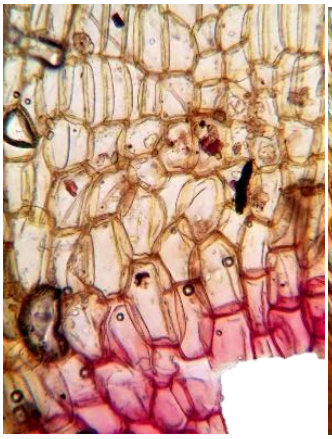


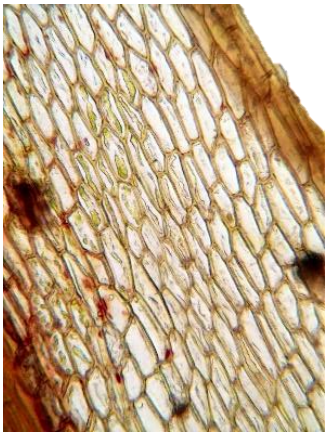

NM, Valencia Co., near Ojo Alamo Spring, 16 May 2002, *D. Bleakely* (NMC).

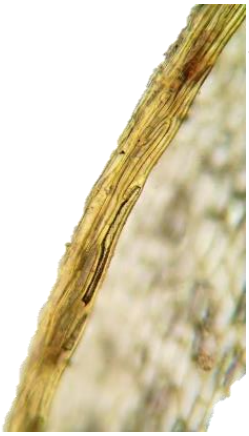
Ptychostomum pallescens (Schleicher ex Schwägrichen) J.R. Spence [becoming pale] [*Bryum lonchocaulon* Müller Hal., *Bryum pallescens* Schleicher ex Schwägrichen, *Ptychostomum lonchocaulon* (Müller Hal.) J.R. Spence]. Acrocarpous, in rather deep, green to yellow-green turfs bound together by rhizoids, the stems to 4 cm tall/long; leaves green, twisted when dry, to 3.5 mm long, the bases reddish, the margins revolute at least below, the limbidium strong, in 2-3 rows; costa long-excurrent, the awn ± smooth; laminal cells 3-4:1; capsules brown, elongate-pyriform, 2-4 mm long, the mouth yellow; spores 16-22 µm. ●On wet soil, sometimes rocks. ♦We include here *Ptychostomum lonchocaulon* (Müller Hal.) J.R. Spence, which differs only in sexuality.

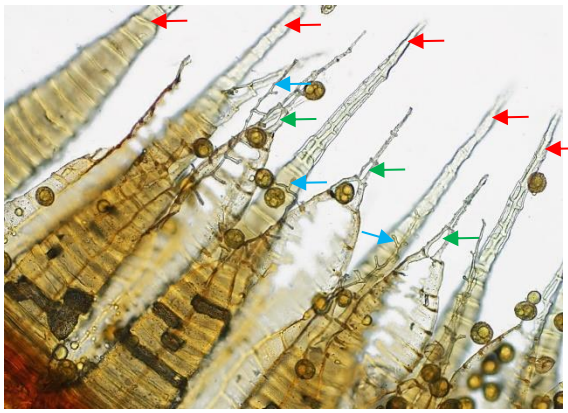






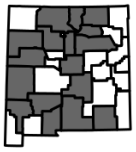




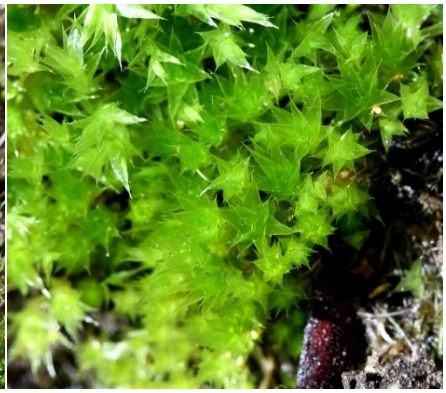


red = exostome teeth
green = perforate endostome segments
blue = appendiculate endostome cilia

NM, Sandoval Co., Valles Caldera Nat. Preserve, *K. Romig 126* (NMC); NM, Grant Co., Black Range, Lower Gallinas Canyon, 15 June 2024, *Kleinman & Blisard* (SNM).

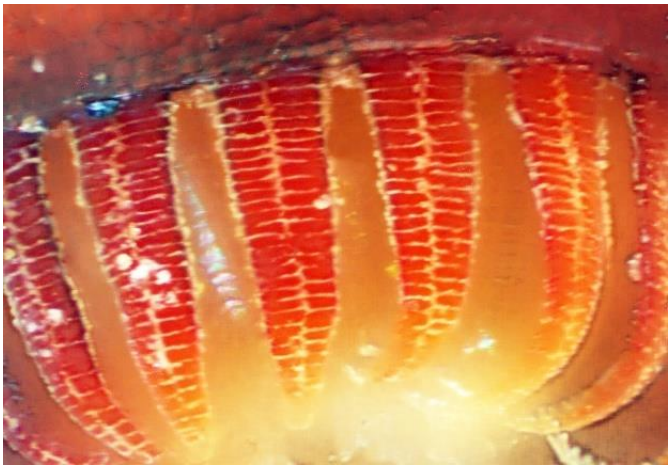


Ptychostomum pseudotriquetrum (Hedwig) J.R. Spence & H.P. Ramsay ex Holyoak & N. Pedersen [appearing 3-cornered] [*Bryum pseudotriquetrum* (Hedwig) Gaertner, Meyer, & Scherbius]. Acrocarpous, in green, red-green, or yellow-green, dense turfs or cushions, the stems to 6 cm tall/long, usually abundantly radiculose well toward the tips; leaves evenly spaced, glossy, green to reddish or yellowish, contorted or not when dry, to 4 mm long, the bases reddish, strongly decurrent, the margins revolute at least proximally, the limbidium strong, of 2-3 rows; costa short-excurrent, reddish, the awn smooth; laminal cells 3:1; specialized asexual reproduction occasional, by axillary gemmae, rhizoidal tubers absent; capsule brown, 3-5 mm long, the mouth yellow. ●On damp or wet soil, rock, or rotten wood. ♦One of our most common mosses of wet places, characterized by rather long radiculose stems, evenly spaced leaves, reddish costa, and strongly decurrent leaf bases.

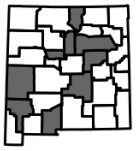





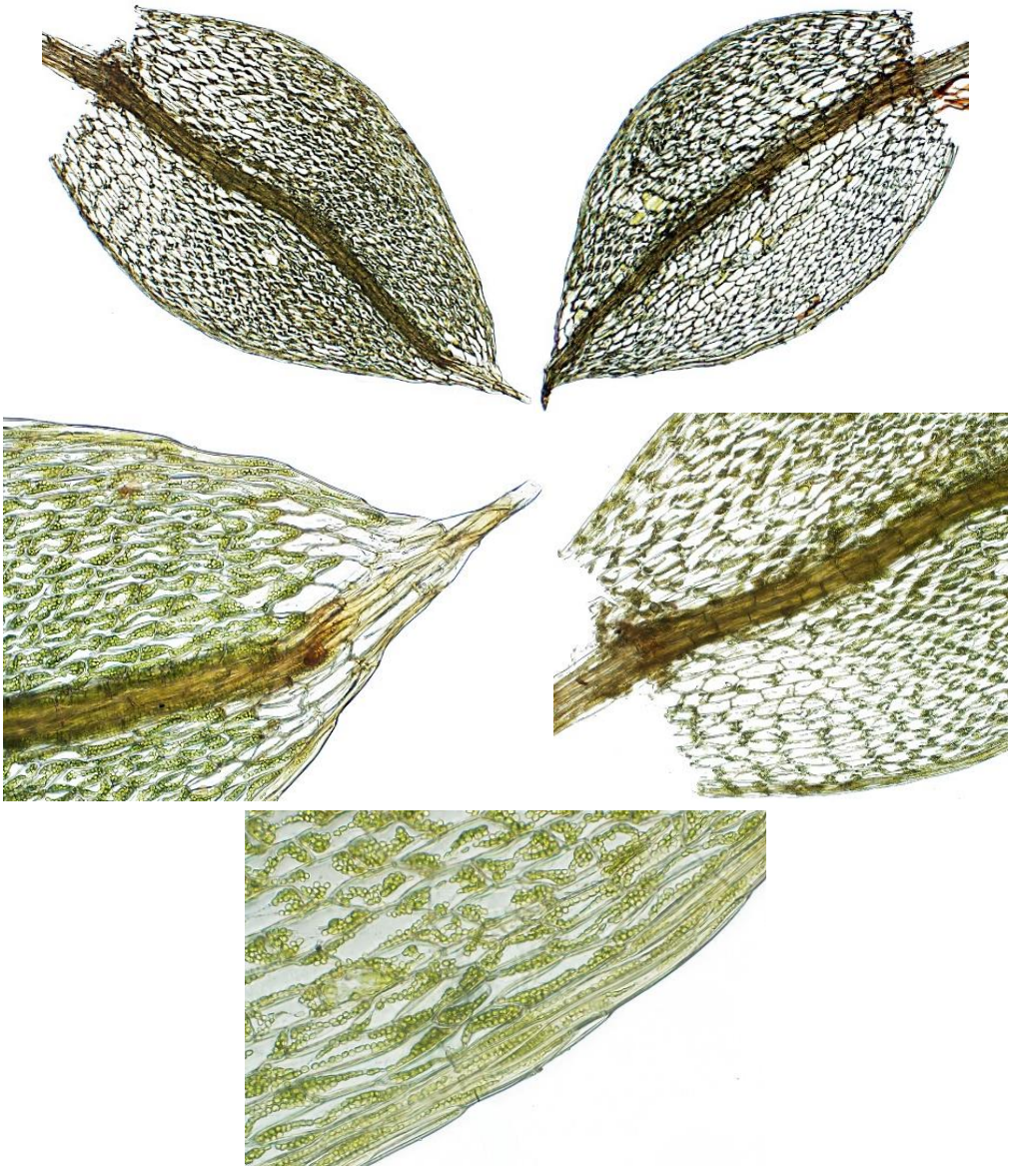




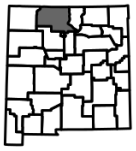
NM, Grant Co., Fort Bayard, *Kleinman & Blisard* (SNM).



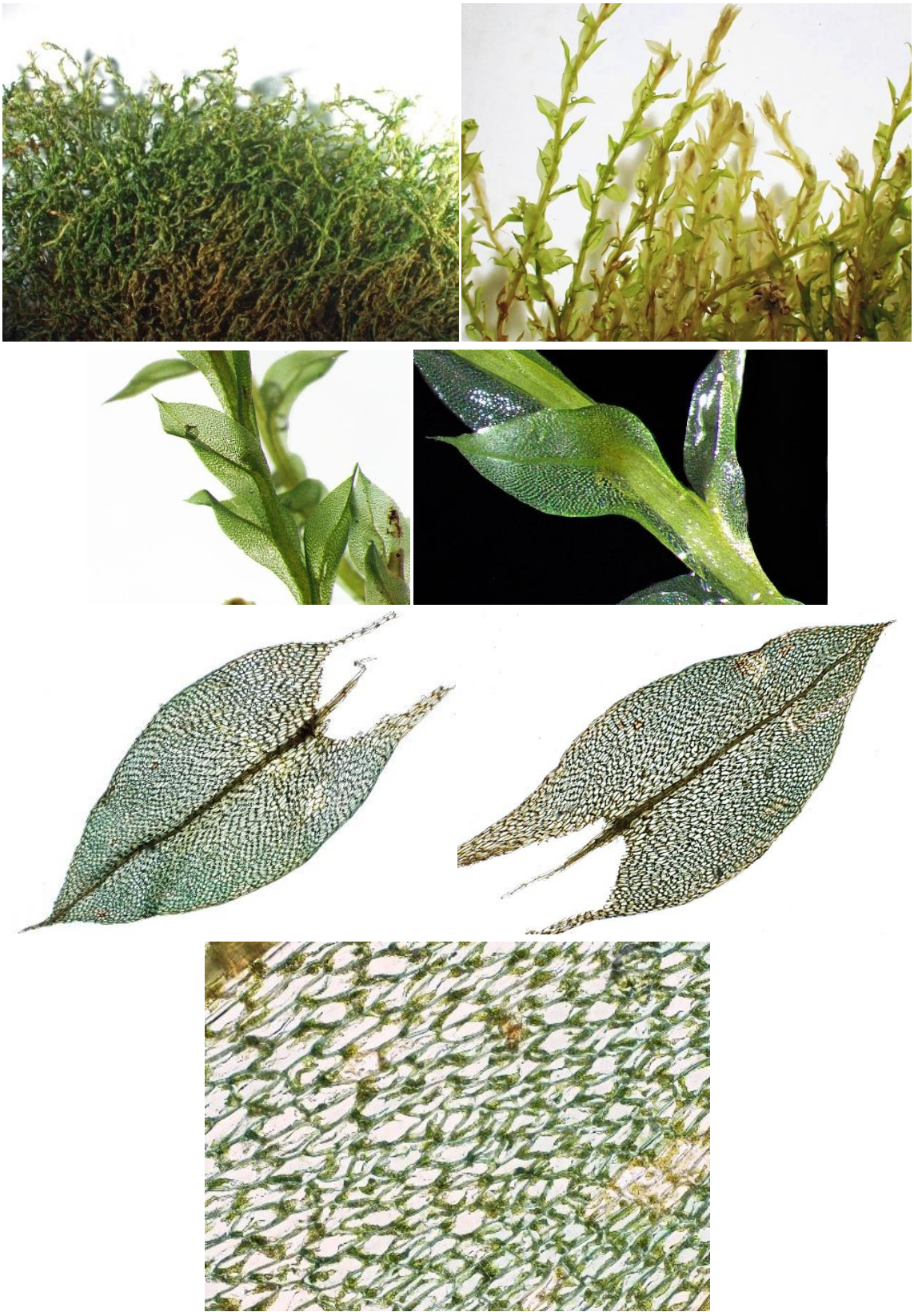
Ptychostomum turbinatum (Hedwig) J.R. Spence [top-shaped] [*Bryum turbinatum* (Hedwig) Turner]. Acrocarpous, in green yellow-green, or brownish turfs or cushions, the stems to 6 cm tall/long; leaves greenish, crowded, strongly contorted when dry, to 3 mm long, the bases green, the margins mostly plane, the limbidium of 2-3 rows, sometimes weak; costa percurrent to short-excurrent; proximal cells 3-4:1; distal cells 2-3:1; capsules pale yellow to brownish, darker in age, turbinate, 1-3 mm long, the mouth yellow, strongly constricted below the mouth in age. ●On wet soil and rocks, streambanks, seeps, dripping cliffs, often in the water. ♦Distinctive by the dull green color, strongly contorted dry leaves, and short, broad capsules constricted below the mouth in age.



CO, Gunnison Co., above Green Lake, 12 Sep 1972, *W.A. Weber* (COLO).

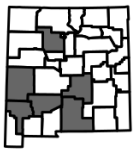


Ptychostomum weigelii (Biehler) J.R. Spence [for Johann Adam Valentin Weigel (1740-1806), German pastor and scientist] [*Bryum weigelii* Biehler]. Acrocarpous, in green or pinkish tufts and cushions, the stems to 6 cm long; leaves green, yellow-green, or pinkish, distant, strongly contorted when dry, 1-3 mm long, the bases usually green, strongly decurrent, the margins revolute proximally, the limbidium weak, in 1(2) rows, partially bistratose; costa not reaching apex to short-excurrent; proximal cells 3-4:1; distal cells 2-3:1; capsules brown, turbinate to pyriform, 3-4 mm long, the mouth yellow. ●Wet soil, stream banks; little known in the state. ♦Distinctive by the long decurrencies and weak limbidium.

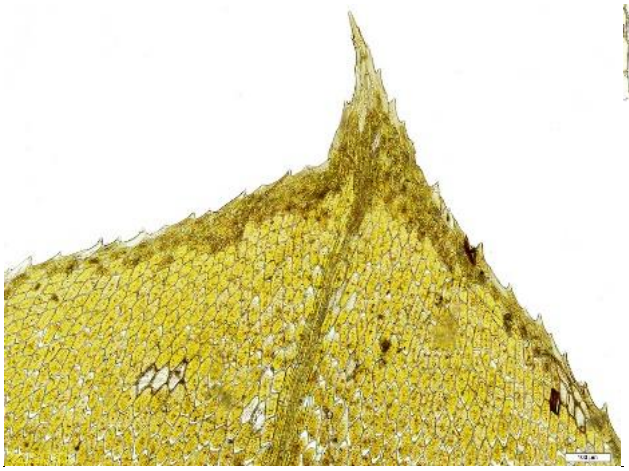


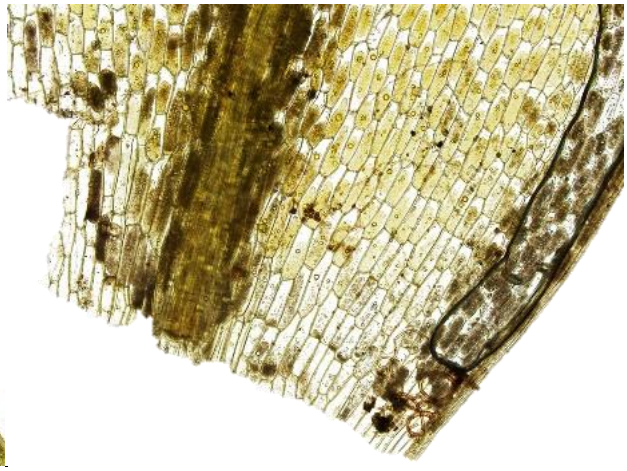
NM, San Miguel Co., Pecos Wilderness, 16 Aug 2019, *J. Brinda* (MO).

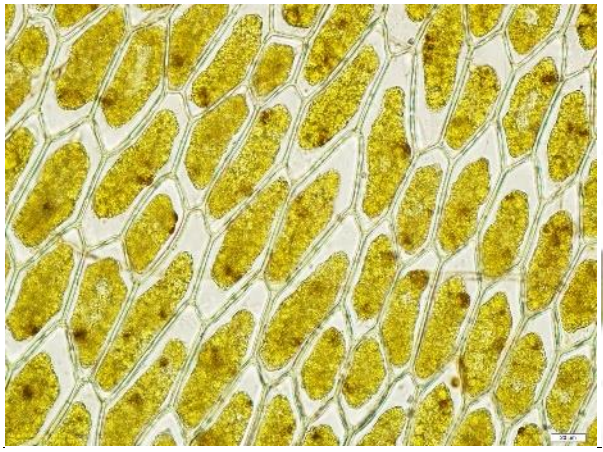
Rhodobryum [a rose-*Bryum*].



Rhodobryum ontariense (Kindberg) Kindberg [for Ontario, Canada] [*Bryum ontariense* Kindberg]. Acrocarpous, in dark green to olive green mats, the secondary aerial stems to 5 cm tall/long, arising from primary stoloniferous/rhizomatous primary stems; leaves numerous (to 55) in distal rosettes, 4-10 mm long, strongly contorted when dry, the margins revolute to beyond mid-leaf, strongly serrate in distal half, the limbidium weak or absent; costa percurrent to short-excurrent; laminal cells 3-4:1; perichaetial inner leaves with costa long-excurrent, the awn denticulate. ●On rich forest soils and humus, rotten logs, tree bases, and moist rocks. ♦*Rhodobryum ontariense* might be confused with *Roellobryon roellii* (Brotherus) Ochyra (Roellobryaceae and not yet found in New Mexico), but the latter lacks primary stolons/rhizomes, and the margins are revolute only proximally.



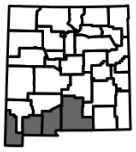




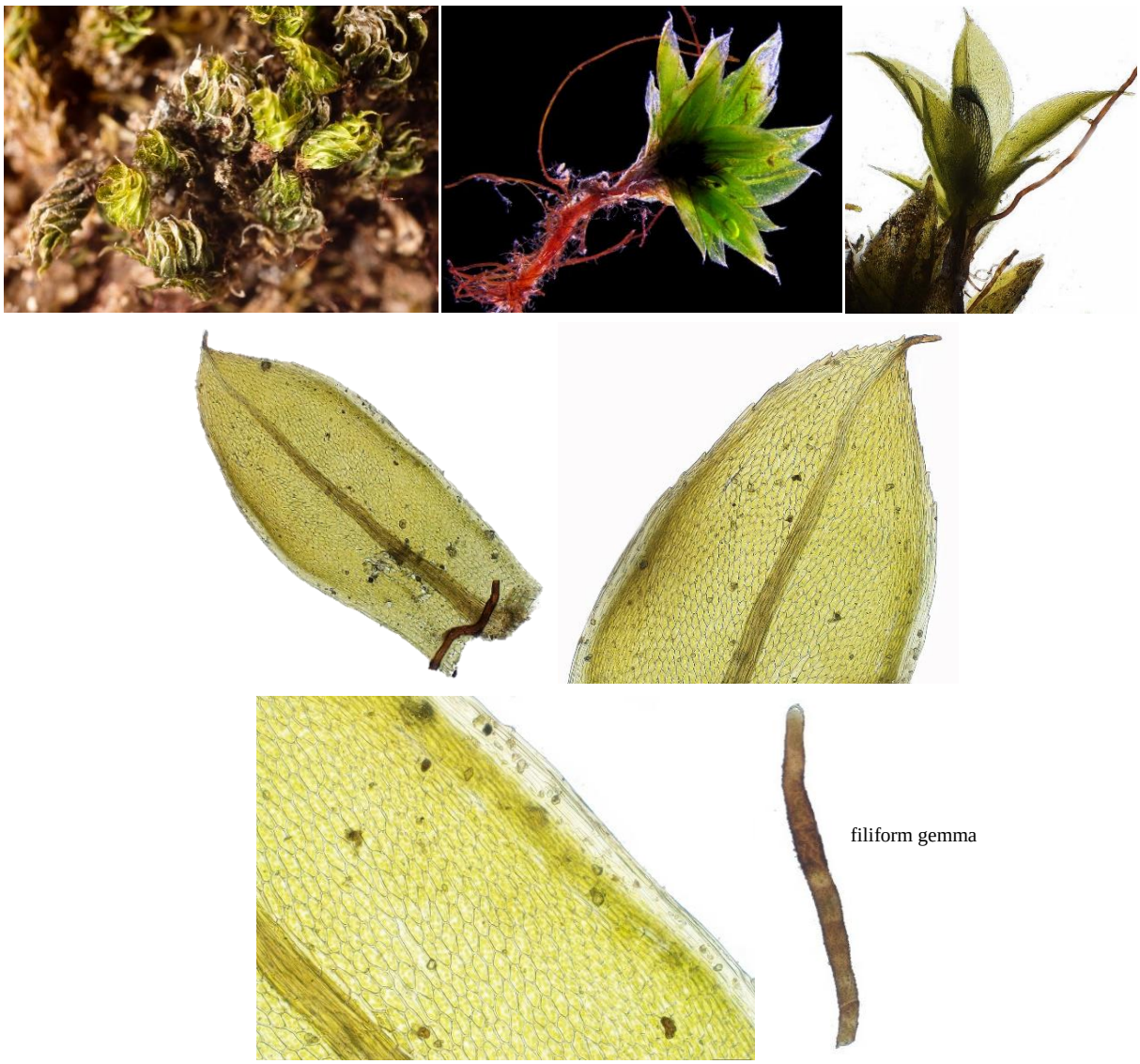
NM, Catron Co., Willow Creek, 30 Apr 2011, *Kleinman, Felger, & Blisard* (SNM).

Rosulabryum [a rosette-*Bryum*] [Also keyed in **Bryum group**].

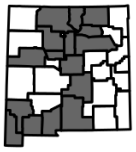
1 Leaves spirally twisted around the stem when dry
  2 Filiform gemmae absent in leaf axils ..... ***R. capillare***
  2 Filiform gemmae present in distal leaf axils
    3 Leaves usually longer than 3 mm; margins strongly serrate distally; limbidium strong .....***R. andicola***
    3 Leaves usually less than 2 mm long; margins entire to serrulate distally; limbidium weak or absent
      4 Innovations rosulate; leaves obovate, flat; filiform gemmae brown when mature..... ***R. laevifilum***
      4 Innovations evenly foliate; leaves ovate to obovate, weakly concave; filiform gemmae brown to reddish brown..... ***R. flaccidum***
1 Leaves contorted when dry, but not spirally twisted around the stem
  5 Plants with filiform gemmae in the upper leaf axils; limbidium weak, of 1-2 rows; plants growing on bark and rotten wood, rarely rock or soil..... ***R. laevifilum***
  5 Plants lacking gemmae in leaf axils; limbidium strong, or 2-4 rows; plants commonly on rock or soil, but also on bark and wood ..... ***R. torquescens***



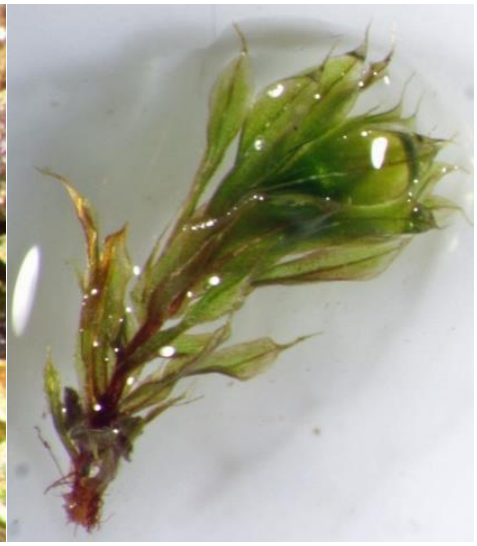
Rosulabryum andicola (Hooker) Ochyra [Andes-dweller] [*Bryum andicola* Hooker, *Bryum billarderi* Schwägrichen]. Acrocarpous, in green to red-green tufts, the stems to 5 tall/long; leaves rosulate, spirally twisted around the stem when dry, 1-4 mm long, the bases green, the margins recurved in larger leaves, serrate, the limbidium strong, or 3-4 rows; costa short-excurrent; laminal cells 3-6:1; capsules drooping, brown, 3-6 mm. ●Moist to dry soil and rock in the southern mountains. ♦Long, toothed leaves with a strong, light-colored limbidium are distinctive. We follow the nomenclature in FNA [Spence, J.R. 2014. Bryaceae, pp. 117-185. IN: Flora of North America, vol. 28, Bryophyta, part 2, Oxford University Press] for the application of the *alpicola*, *flaccidum*, and *laevifilum* epithets.



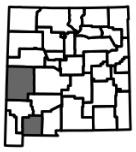
NM, Luna Co., Tres Hermanas Mts, 9 Mar 2016, *Kleinman et al.* (SNM).



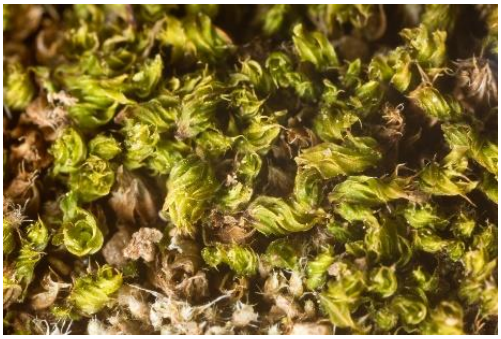
Rosulabryum capillare (Hedwig) J.R. Spence [hair-like] [*Bryum capillare* Hedwig]. Acrocarpous, in small, bright green clumps, the stems to 1.5 cm tall/long, distinctly rosulate; leaves spirally twisted around the stem when dry, obovate, to 2.5 mm long, the bases green, not decurrent, the margins recurved to mid-leaf, serrulate distally, the limbidium of 1-3 rows; costa long-excurrent; medial laminal cells 3-4:1, the proximal longer; specialized asexual reproduction by red-brown rhizoidal tubers 200-300 µm; capsules drooping, red-brown, 3-5 mm long. ●On moist to wet shady soil and humus, at bases of trees and rocks, often densely tufted and suggestive of *Mnium* patches, or scattered among other mosses. ♦Distinctive by the spiral leaves when dry, long awn, distinct limbidium, serrulate margin, and rhizoidal tubers same color as rhizoids.

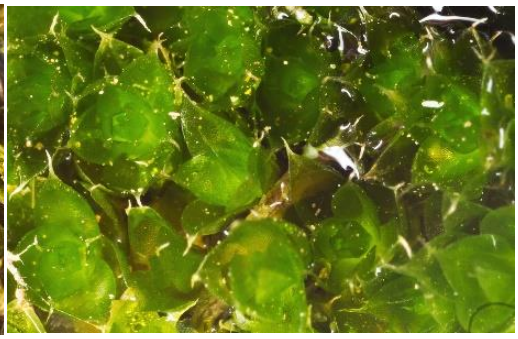


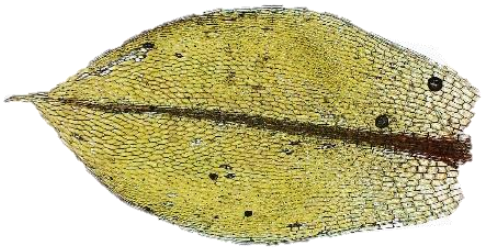
NM, Cibola Co., El Malpais Nat. Mon., Piggly Wiggly Cave, 23 May 2019, *Kleinman & Blisard* (SNM).

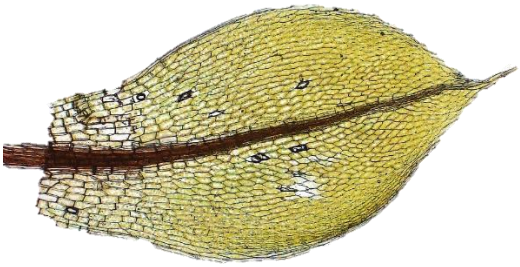


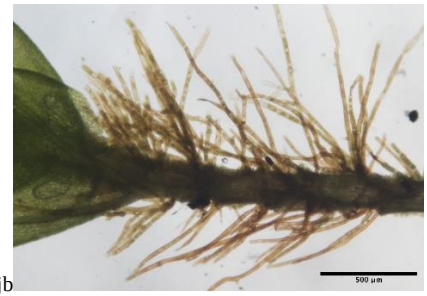
Rosulabryum flaccidum (Bridel) J.R. Spence [relaxed, weak] [*Bryum flaccidum* Bridel]. Acrocarpous, in small, brown-green to red-green or even bright green tufts or mats, the stems to 2 cm tall/long; rosette leaves spirally twisted around the stem when dry, or merely irregularly contorted or twisted, ovate to obovate, to 2 mm long, the bases green, not decurrent, the margins plane or recurved in lower half, entire to weakly serrulate distally, the limbidium absent or weak, of 1 row; costa short-excurrent; medial laminal cells 3-5:1; specialized asexual reproduction by finely papillose axillary filiform gemmae (sometimes absent), and reddish brown rhizoidal tubers 150-300 µm; capsules drooping, 2-3 mm long. ●Shaded soil, rock, rotting wood, bark. ♦We follow the nomenclature in FNA [Spence, J.R. 2014. Bryaceae, pp. 117-185. IN: Flora of North America, vol. 28, Bryophyta, part 2, Oxford University Press] for the application of the *alpicola*, *flaccidum*, and *laevifilum* epithets. ♦Photo "jb" by John Brinda.











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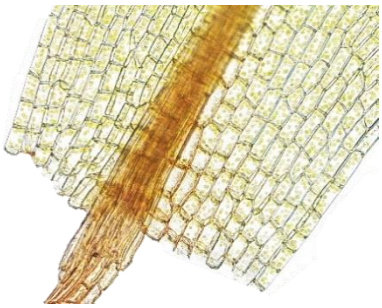
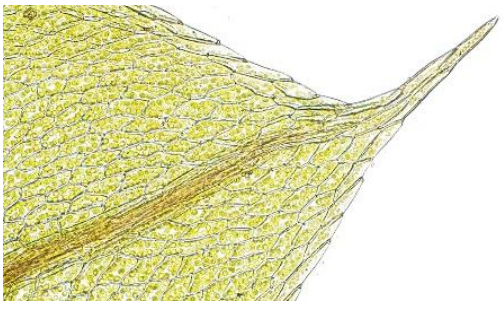
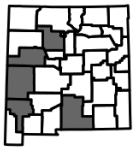


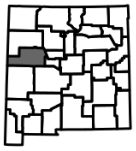


NM, Luna Co., Tres Hermanas Mts, 26 Feb 2016, *Kleinman & Allred* (SNM).

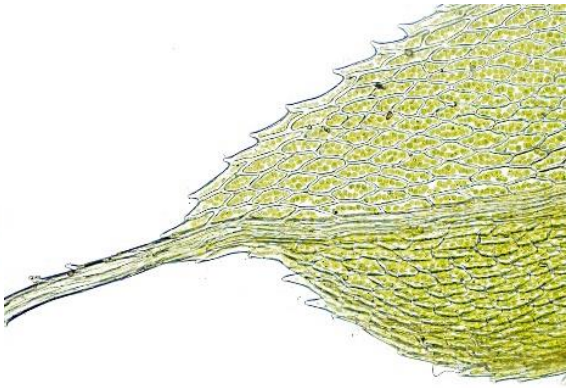


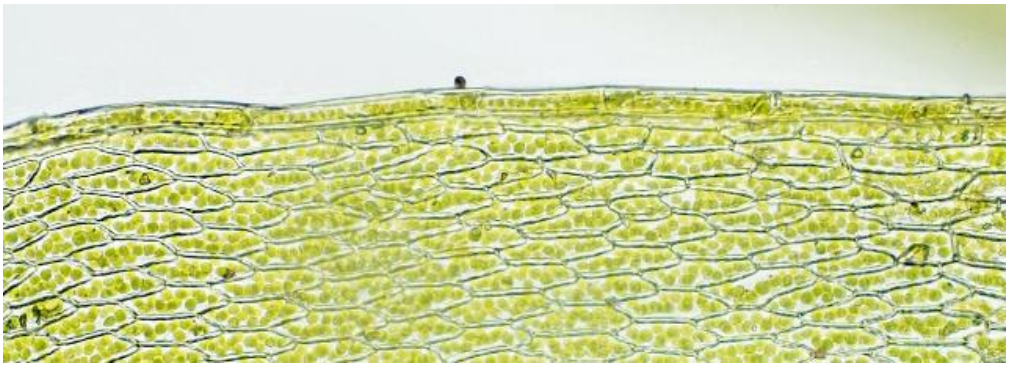
Rosulabryum laevifilum (Syed) Ochyra [smooth-threaded] [*Bryum laevifilum* Syed]. Acrocarpous, in bright green clumps or mats, the stems to 1.5 cm tall/long, distinctly rosulate; leaves irregularly shrunken or contorted but generally not much spirally twisted around the stem when dry, obovate, flat, to 3 mm long, the bases green, slightly decurrent, the limbidium weak, of 1-2 rows; costa not reaching apex to long-decurrent; laminal cells 3-4:1; specialized asexual reproduction by axillary filiform gemmae, finely papillose to smooth, brownish when mature, and by brown rhizoidal tubers 70-200 µm; capsules nodding, brownish, 2-4 mm long. ●On bark and rotten wood, sometimes rock or soil. ♦Distinctive by the contorted but scarcely spiral leaves, filiform gemmae, and wood substrate. We follow the nomenclature in FNA [Spence, J.R. 2014. Bryaceae, pp. 117-185. IN: Flora of North America, vol. 28, Bryophyta, part 2, Oxford University Press] for the application of the *alpicola*, *flaccidum*, and *laevifilum* epithets.

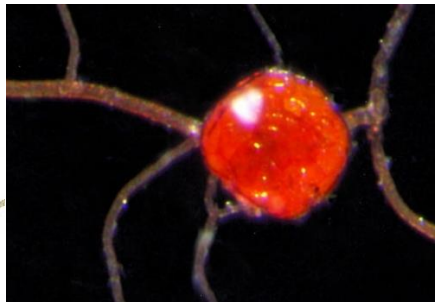
NM, Catron Co., Mogollon Mts, Bursum Road, 30 May 2010, *Kleinman & Blisard* (SNM).



Rosulabryum torquescens (Bruch & Schimper) J.R. Spence [becoming twisted] [*Bryum torquescens* Bruch & Schimper, *Ptychostomum torquescens* (Bruch & Schimper) Ros & Mazimpaka]. Acrocarpous, in green to red-green clumps or individual stems scattered among other mosses, the stems to 2 cm tall/long, distinctly rosulate; leaves slightly twisted to contorted when dry but not spiral around the stem, ovate to obovate, 1.5-3 mm long, the bases green, not decurrent, the margins recurved from mid-leaf to near apex, distinctly serrate distally, the limbidium strong, of 2-4 rows; costa short-excurrent to excurrent; laminal cells 3-5:1; specialized asexual reproduction by scarlet, crimson, or red rhizoidal tubers (100)200-300 µm; capsules drooping, reddish, 3-6 mm long. ●Disturbed soil, earth banks, rotten wood, rock; only recently found in the state. ♦Distinctive by the large, bright crimson tubers, serrate leaves, and rosulate stems.

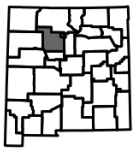






NM, Cibola Co., El Malpais Nat. Mon., 23 May 2019, *Kleinman et al.* (SNM).

Bryoxiphium [sword-moss].



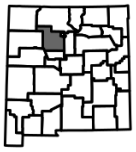
Bryoxiphium norvegicum (Bridel) Mitten [of Norway] [*Phyllogonium norvegicum* Bridel]. Acrocarpous, in dense tufts or mats, the stems to 3 cm tall/long, with small, incrassate, pigmented epidermal cells; leaves distichous, folded, tightly imbricate, the medial to 2 mm long; distal leaves to 6 mm long with a twisted subula, the apices apiculate to aristate, the margins subentire, the costa ending in subula, the interior medial cells 1-2:1, the marginal medial cells 10:1. ●On moist shaded rocks, particularly overhangs and walls; known in the state by only two collections. ♦Unmistakable by the overlapping, folded, distichous leaves with the distal leaves long-aristate.

NM, Sandoval Co., Santa Fe Nat. For., 4 May 2022, *Kleinman & Blisard* (SNM).

1 Leaves straight, commonly with rhizoids on the leaf apices.....**Straminergon**
1 Leaves mostly falcate, lacking leaf rhizoids or these sometimes present in *Warnstorfia*
2 Stem hyalodermis present
3 Alar cells few, the region at most halfway to costa .....go to **Scorpidium** (Amblystegiaceae)
3 Alar cells many, the region almost all the way to costa.....**Sarmentypnum**
2 Stem hyalodermis absent
4 Translucent red pigment common; costa strong .....**Sarmentypnum**
4 Translucent red pigment extremely rare, the plants commonly brownish; costa weak to strong ..... **Warnstorfia**

Sarmentypnum [a twiggy *Hypnum*].

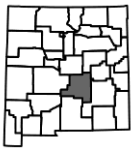
Sarmentypnum exannulatum (Schimper) Hedenäs [lacking an annulus] [*Hypnum exannulatum* Schimper, *Warnstorfia exannulata* (Schimper) Loeske]. Pleurocarpous, green or yellowish, with red secondary pigment, the stems with a partial hyalodermis; leaves falcate or sometimes nearly straight, the margins distinctly denticulate proximately or distally or both; costa 60-90% leaf length; alar regions extending from margin nearly to the costa. ●Fens, springs, lakes and ponds; known from scant collections.

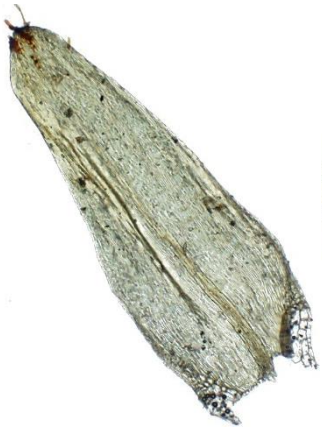


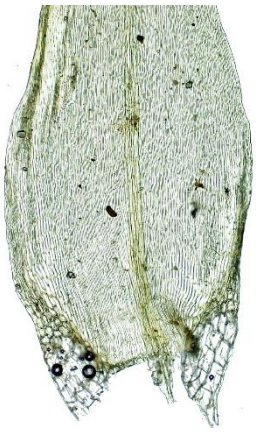
CO, Boulder Co., near Blue Lake, 10 Sep 1976, *F.J. Hermann*, (COLO).

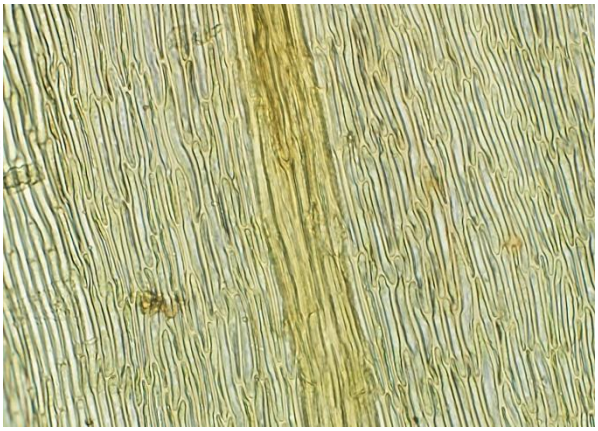
Straminergon [a straw-like *Calliergon*].

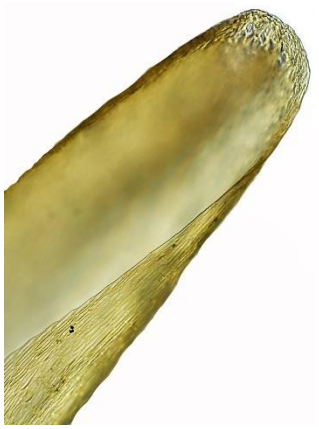
Straminergon stramineum (Bridel) Hedenäs [straw-colored] [*Calliergon stramineum* (Dicson ex Bridel) Kindberg, *Hypnum stramineum* Dickson ex Bridel]. Pleurocarpous, in pale to whitish-green or yellowish green mats, the stems lacking a hyalodermis, a central strand present; paraphyllia absent, but pseudoparaphyllia broad; leaves straight, concave, not plicate, often with rhizoids near the apex, the margins entire, the apices often hooded; costa single, 60% or more the leaf length; alar cells quadrate to rectangular, inflated, hyaline; median cells 2-6:1. ●Wet meadows and boggy ground, creek banks; known from a single 1934 collection along Ruidoso Creek. ♦Distinguished by the pale shoots, and non-plicate, straight leaves with blunt, hooded apices and apical rhizoids.





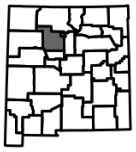




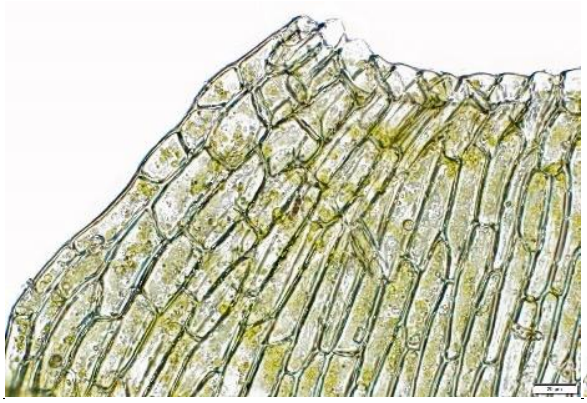


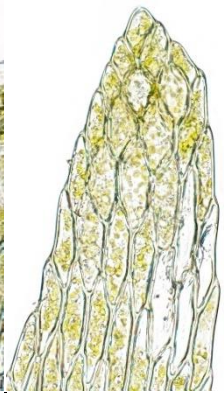
Canada, British Columbia, Mt. Seymour, 18 Aug 1996, *W.B. Schofield* (COLO).

Warnstorfia [for Carl Friedrich Warnstorf (1837-1921), German bryologist and teacher].



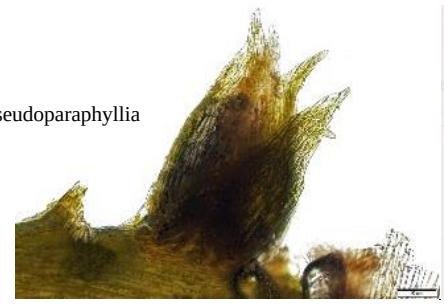
Warnstorfia fluitans (Hedwig) Loeske [floating] [*Drepanocladus fluitans* (Hedwig) Warnstorf, *Hypnum fluitans* Hedwig]. Pleurocarpous, in green, yellow-green, to brownish or reddish mats, the stems lacking a hyalodermis, a central strand present; paraphyllia absent but pseudoparaphyllia lanceolate; leaves curved or falcate, sometimes straight, often with rhizoids, the margins denticulate; costa to 80% leaf length, sometimes double; alar cells quadrate to short-rectangular, somewhat inflated. ●Wet meadows and bogs or fens, slow streams and ponds, often submerged; known only from quiet ponds and marshy ground of Alamo Canyon, Sandoval County.

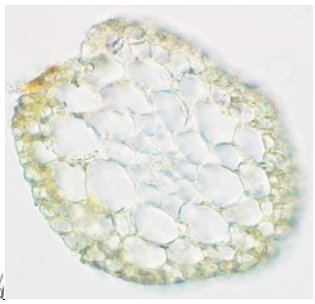




leaf rhizoids

pseudoparaphyllia



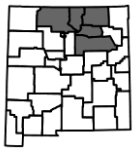


NM, Sandoval Co., Alamo Fen, 22 Jun 2019, *Kleinman & Blisard* (SNM).

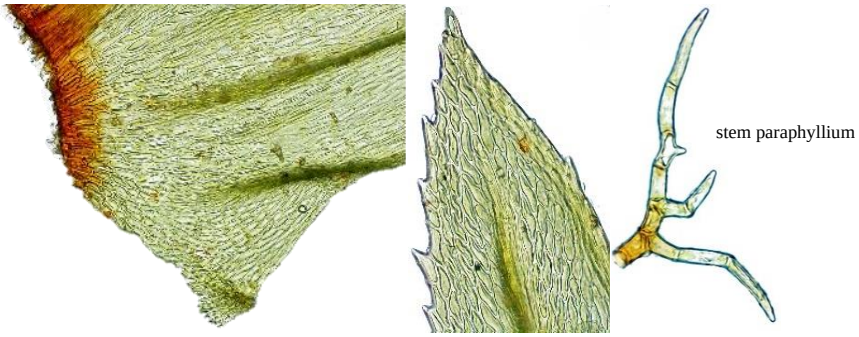
Climacium [a ladder or staircase].

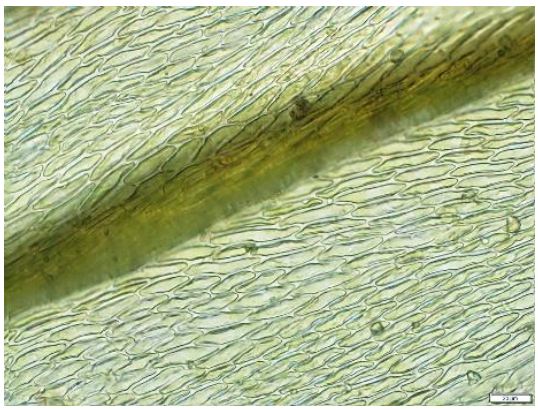
1 Branch leaf medial cells mostly 3-6:1; stem leaf apices broadly to sharply acute, sometimes apiculate, the basal laminal cells with very thick walls; branch leaf bases sharply flexuose-auriculate, the apices acute .... ***C. americanum***

1 Branch leaf medial cells mostly 7-13:1; stem leaf apices obtuse, often abruptly apiculate, the basal laminal cells with thin walls; branch leaf bases not or only somewhat auriculate, the apices obtuse ..... ***C. dendroides***

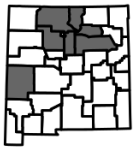


Climacium americanum Bridel [of America]. Pleurocarpous, in loose tufts or clumps, dull when dry, somewhat creeping, the aerial stems arising from below-ground horizontal stems, with numerous filiform-branched paraphyllia; leaves sulcate-plicate; stem leaves scale-like, achlorophyllous, the apices broadly to sharply acute, sometimes apiculate, the basal laminal cells with thick porose walls; branch leaves chlorophyllous, sharply auriculate at the shoulders, the margins coarsely serrate, the apices acute, the laminal cells 3-6:1; capsules infrequent, 3-6 mm long. ●Wet soil of wetlands, boggy ground, along streams, in seeps; apparently less common than *C. dendroides*.





IA, Clayton Co., Bixby St. Park, 28 May 2011, *Kleinman & Blisard* (SNM).



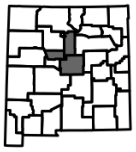
Climacium dendroides (Hedwig) Weber & Mohr [tree-like] [*Leskea dendroides* Hedwig]. Pleurocarpous, in loose tufts or clumps, glossy when dry, somewhat creeping, the aerial stems arising from below-ground horizontal stems, with numerous filiform-branched paraphyllia; leaves sulcate-plicate; stem leaves scale-like, achlorophyllous, the apices obtuse, often abruptly apiculate, the basal laminal cells with thin non-porose walls; branch leaves chlorophyllous, not or only somewhat auriculate at the shoulders, the margins coarsely serrate, the apices obtuse, the laminal cells 7-13:1; capsules infrequent, 2-3 mm long. ●Wet soil and boggy ground along springs, streams, and brooks, often covering wet rocks, sometimes on rotten logs. ♦Upright main shoots of *Pleurozium* can mimic the upright, tree-like secondary shoots of *Climacium*, but the former occurs on somewhat drier forest floors, and has red stems, thick-walled, orange-brown alar cells, and a double costa.

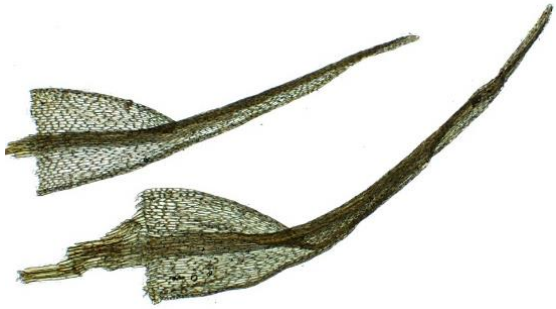
NM, Catron Co., Mogollon Mts, Willow Creek, 30 Apr 2011, *Kleinman et al.* (SNM).

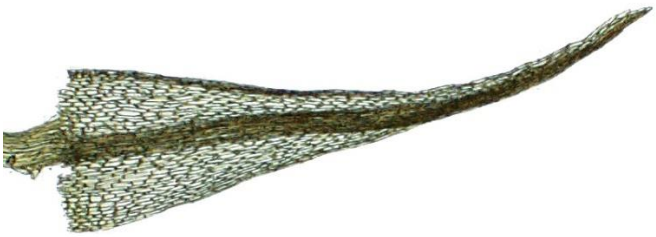
1 Costa broad, occupying ½ to nearly all of the leaf base
  2 Dense clusters of tiny spindle-shaped brood bodies produced in axils of upper leaves; leaves 2-3 mm long..... ..... go to **Brothera** (Leucobryaceae)
  2 Brood bodies absent; leaves 2-8 mm long
    3 Leaves in cross-section with at least some stereid cells, both above and below the band of larger guide cells, or only above the band of guide cells (*Campylopodiella*, *Campylopus*).....go to LEUCOBRYACEAE
    3 Leaves in cross-section lacking stereid cells (*P. enerve*, *P. longifolium*) ..... **Paraleucobryum**
1 Costa narrower, occupying ⅓ or less of the leaf base
  4 Alar cells not or scarcely differentiated.
    5 Interior distal cells with longitudinal cuticular striations at high magnification that appear as small papillae in cross-section (*H. mulahaceni*).....go to **Hymenoloma** (Hymenolomataceae)
    5 Interior distal cells lacking longitudinal cuticular striations as above
      6 Leaves flexuose or falcate when dry, not contorted or crisped .....**Dicranella**
      6 Leaves contorted or crisped when dry ..... go to RHABDOWEISIACEAE
  4 Alar cells differentiated, hyaline or commonly orangish or brownish
    7 Costa filling ¼ to ⅓ of leaf base; leaves mostly falcate-curving wet and dry (*P. sauteri*) .....**Paraleucobryum**
    7 Costa filling less than ¼ of leaf base; leaves various, falcate-curving, straight, coiled, or crisped
      8 Alar cells 2-stratose..... **Dicranum**
      8 Alar cells 1-stratose
        9 Leaves strongly crisped-coiled when dry
          10 Interior distal cells with longitudinal cuticular striations at high magnification that appear as small papillae in cross-section; distal leaf margins scarcely toothed (*H. crispulum*)..... .....go to **Hymenoloma** (Hymenolomataceae)
          10 Interior distal cells lacking longitudinal cuticular striations as above; distal leaf margins prominently toothed (*D. montanum*)..... **Dicranum**
        9 Leaves mostly straight to falcate when dry, or curled only at the tips in *Arctoa*
          11 Plants autoicous, the antheridia and perichaetium on the same stem; leaves mostly somewhat falcate-secund..... go to **Arctoa** (Rhabdoweisiaceae)
          11 Plants dioicous, the antheridia and archegonia on separate plants; leaves mostly straight (*D. rhabdocarpum*)..... **Dicranum**

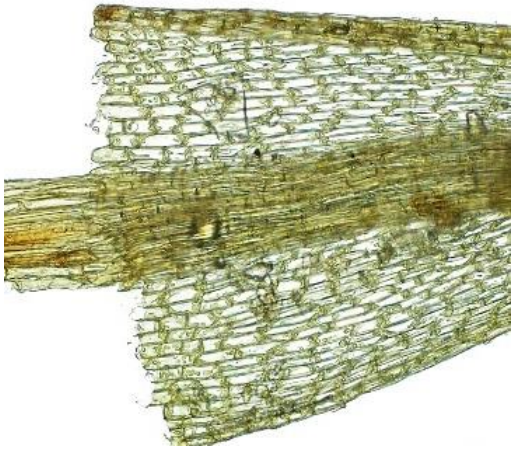
Dicranella [resembling *Dicranum*].

Dicranella varia (Hedwig) Schimper [varied] [*Dicranum varium* Hedwig]. Acrocarpous, in dull, light green to yellowish tufts, the stems to 15 mm tall/long; leaves spreading to falcate, to 2 mm long, the margins recurved, bistratose, entire except at the apex; costa percurrent; distal cells about 6-9:1. ●On damp, shaded soil, streambanks, seepy ground; known from few collections.









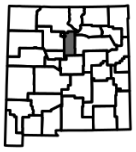
NE, Cherry Co., w of Sparks, 17 Aug 1983, *S.P. Churchill* (COLO).

Dicranum [two-pronged].

1 Most leaf tips deciduous and absent, the blades with zones of abscission ..... ***D. tauricum***
1 Most leaf tips present, the blades lacking zones of abscission
  2 Leaves mostly strongly coiled or crisped when dry
    3 Alar cells 1-stratose; capsule generally straight and erect; very common mosses, nearly always on rotting stumps and logs ..... ***D. montanum***
    3 Alar cells 2-stratose; capsule generally curved; quite uncommon mosses, mostly on humus, soil, or rock
      4 Costa and frequently the blade spinose/papillose on abaxial surface in cross-section in distal part of leaf ..... ***D. fuscescens***
      4 Costa and blade not spinose/papillose
        5 Costa with enlarged adaxial epidermal cells above the stereid cells in cross-section ..... ***D. muehlenbeckii***
        5 Costa lacking enlarged adaxial epidermal cells above the stereid cells
          6 Leaves strongly crisped when dry; proximal cells usually less than 45 µm long ..... ***D. brevifolium***
          6 Leaves merely curled when dry; proximal cells often more than 45 µm long ..... ***D. acutifolium***
  2 Leaves mostly straight to curved when dry, but not coiled nor crisped
    7 Alar cells 1-stratose; capsules generally straight and erect ..... ***D. rhabdocarpum***
    7 Alar cells 2-stratose; capsules generally curved
      8 Distal leaf cells elongate, sinuous, and distinctly pitted; relatively common mosses ..... ***D. scoparium***
      8 Distal leaf cells short (quadrate to short-rectangular), neither sinuous nor pitted; very uncommon mosses
        9 Costa and frequently the blade spinose/papillose on abaxial surface in cross-section in distal part of leaf ..... ***D. fuscescens***
        9 Costa and blade not spinose-papillose ..... ***D. acutifolium***

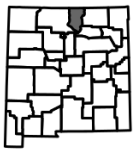
Dicranum acutifolium (Lindberg & Arnell) Jensen [with pointed leaves] [*Dicranum bergeri* Blandow var. *acutifolium* Lindberg & Arnell]. Acrocarpous, in dull, light green to light brown tufts, the stems to 7 cm tall/long; leaves slightly curled when dry, to 10 mm long, mostly 1-stratose, broadly incurved in cross-section (sometimes referred to as tong-shaped), the margins toothed distally, mostly 1-stratose; costa to ¼ the leaf width, lacking abaxial ridges, the adaxial cells not enlarged; leaf cells smooth to weakly papillose, 2-4:1 distally, irregularly arranged, the alar cells 2-stratose, the proximal cells porose, not much different from the median cells; capsule to 3 mm long, inclined to horizontal, furrowed when dry. ●On peaty soil in the alpine. ♦Reported without locality by Ireland [2007. *Dicranum*, pp. 397-420. IN: Flora of North America, vol. 27. Oxford University Press.]; New Mexico specimens unknown.

Canada, British Columbia, Omineca Mts, Katherine Lake, 25 Jul 1977, *Ireland & Bellolo-Trucco* (COLO).



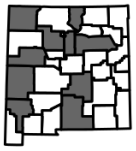
Dicranum brevifolium (Lindberg) Lindberg [short-leaved] [*Dicranum muehlenbeckii* Bruch & Schimper var. *brevifolium* Lindberg, *Dicranum muehlenbeckii* Bruch & Schimper var. *cirrhatum* (Schimper) Meddeland]. Acrocarpous, in dull, green to brownish dense tufts or cushions, sometimes nearly black, the stems to 8 cm tall/long, densely tomentose; leaves spreading to falcate, crisped-contorted when dry, to 8 mm long, 1-2-stratose, broadly incurved in cross-section, the margins serrulate distally, 1- to sometimes 3-stratose; costa percurrent to short-excurrent, to ¼ the leaf width at base, abaxial ridges absent, the adaxial cells not enlarged; laminal cells smooth to papillose distally on abaxial surface, 1-2:1 distally, longitudinally arranged, the distal cells appearing to bulge over the cell walls and collapsed between the walls, the proximal cells eporose, different from the median cells; alar cells 2-stratose; capsule 2-4 mm long, inclined to horizontal. ●On humus or soil over rock; known only from an old collection in the foothills near Santa Fe. ♦Distinctive by the long leaves, crisped when dry, the blades supposedly partially 2-stratose distally and broadly incurved in cross-section (sometimes referred to as tong-shaped), the adaxial epidermal layer above the costa not enlarged. Unfortunately, the single known collection of this species from New Mexico (from 1847) scarcely possesses these features. Indeed, the somewhat enlarged epidermal cells over the costa and absence of conspicuous 2-stratose regions in the blade suggest *D. muehlenbeckii*. However, because the specimen has been identified as *D. brevifolium* by a *Dicranum* monographer, and accepted as this in Fora of North America, we tentatively include the species for New Mexico.

NM, Santa Fe Co., Santa Fe, in 1847, *A. Fendler* (COLO).

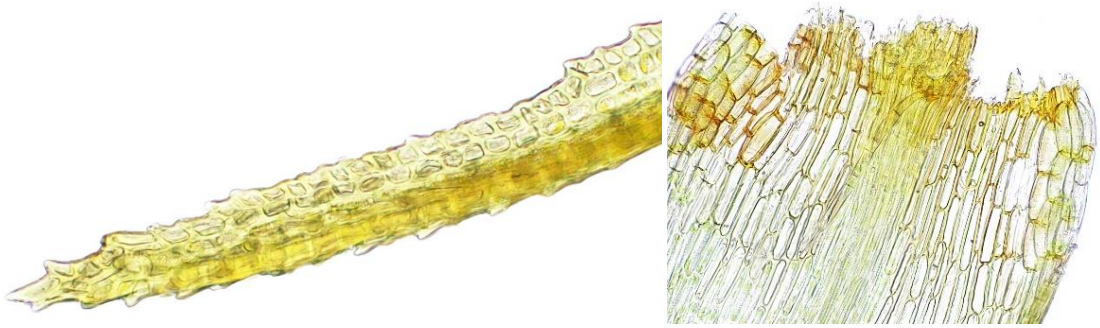


Dicranum fuscescens Turner [becoming swarthy]. Acrocarpous, in dull, green to brownish, loose tufts, the stems to about 6 cm tall/long, sometimes much more, tomentose or not; leaves falcate, strongly curled or not when dry, to 10 mm long, 1-stratose, the margins serrate distally, 2-stratose; costa excurrent, ⅙ to ¼ the blade width at base, spinose-papillose abaxially, abaxial ridges absent; alar cells 2-stratose; laminal cells papillose to spinose-prorate distally on abaxial surface, the proximal cells elongate and pitted, the distal cells quadrate to short-rectangular and not pitted; capsules curved, inclined to horizontal, strongly furrowed when dry. ●On tree trunks, rotten stumps and logs, soil, and rock outcrops; known from a single old collection at 8000 ft. ♦Our plants belong to var. ***fuscescens***, readily told by the spinose-papillose costa abaxially and 2-stratose margins..

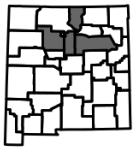
NM, Taos Co., Twining, 4 Jul 1938, *Ikenberry* (COLO).



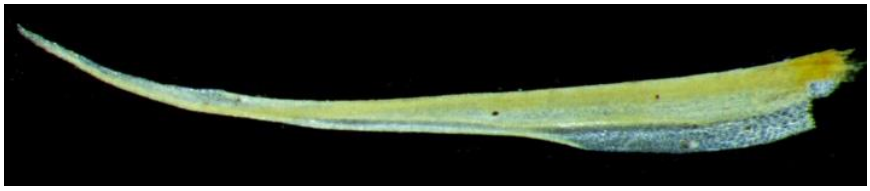
Dicranum montanum Hedwig [of mountains] [*Orthodicranum montanum* (Hedwig) Loeske]. Acrocarpous, in dull, yellowish green to dark green clumps or cushions, often with weak, clustered, deciduous branchlets near the shoot apices or sitting on the clump, the stems to 4 cm tall/long; leaves erect-spreading when wet, strongly coiled or crisped when dry, to 4 mm long,, 1-stratose, the margins serrulate distally; costa percurrent to short-excurrent, ⅙ to ¼ the leaf width at the base, abaxial ridges absent; alar cells 1-stratose; laminal cells smooth proximally, mammillose or usually abaxially prorate distally, the proximal cells rectangular, not pitted or sparsely pitted, the distal cells mostly quadrate to short-rectangular, not pitted; capsules straight and erect, 1-2 mm long, smooth to striate. ●Mostly rotten logs and stumps, sometimes tree bases or soil over rock; common and widespread. ♦Distinctive by the small stature, strongly coiled/crisped leaves when dry, the straight, erect capsules, and the occasional presence of detachable brood branchlets. Similar to *Hymenoloma mulahaceni* at first glance, but that species lacks obvious alar cells and the distal margins are usually entire.

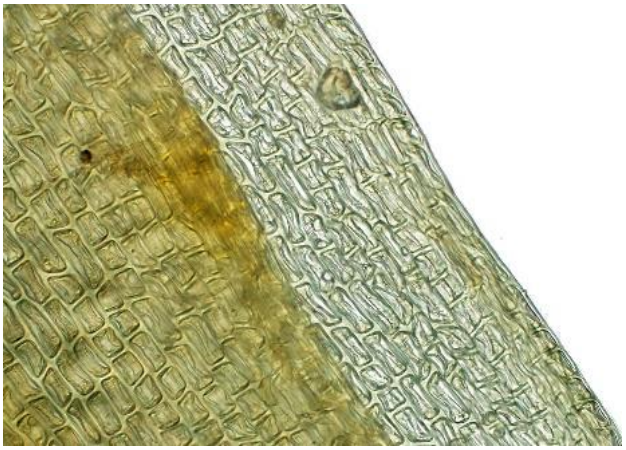


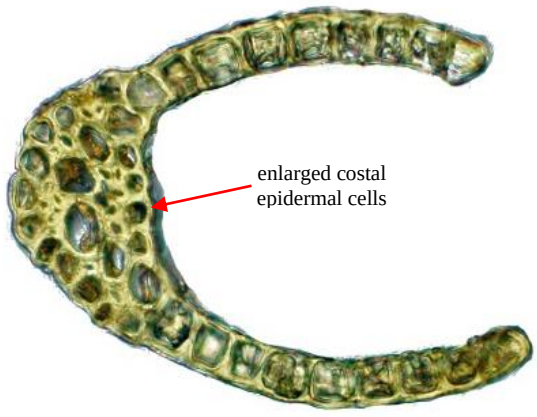
NM, Grant Co., Railroad Canyon, 19 Jan 2012, *Kleinman & Blisard* (SNM).



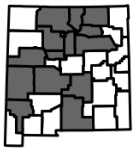
Dicranum muehlenbeckii Bruch & Schimper [for Heinrich Gustav Mühlenbeck (1798-1845), Alsatian bryologist]. Acrocarpous, in dull, green to yellow-green dense tufts or cushions, the stems to 7 cm tall/long, densely tomentose; leaves erect-spreading, strongly crisped to coiled when dry, to 8 mm long, 1-stratose, tubulose distally, the margins slightly serrate to entire distally, 1-stratose; costa excurrent, ⅛ to ¼ the leaf width at base, abaxial ridges absent, with enlarged adaxial epidermal cells; alar cells 2-stratose; laminal cells smooth, the proximal rectangular and pitted, the distal short and not pitted; capsules rare, curved and inclined, sometimes straight and nearly erect, smooth to weakly striate. ●On soil, often over boulders and among rocks. ♦Characterized by leaves strongly crisped when dry, 1-stratose blades, and enlarged adaxial epidermal cells.





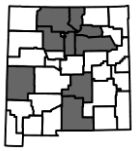


SD, Custer Co., Cicero Peak, 19 May 1977, *S.P. Churchill* (COLO).

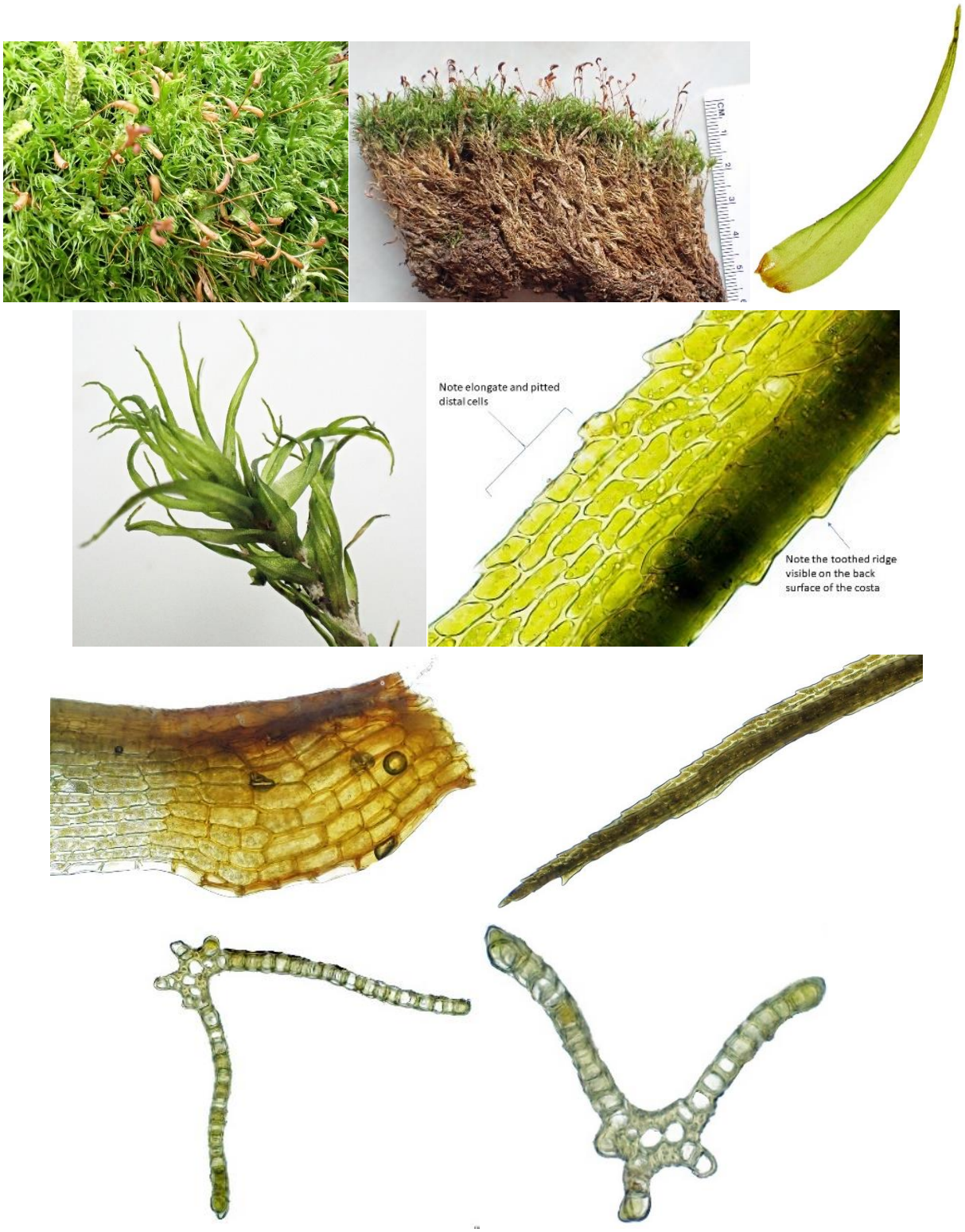


Dicranum rhabdocarpum Sullivant [with striated capsules] [*Dicranum flagellare* of NM reports]. Acrocarpous, in ± glossy, green to yellowish green or brownish tufts of clumps, the stems to 8 cm tall/long, tomentose; leaves straight or nearly so, little changed when dry, to 5 mm long, tubulose distally, 1-stratose, the margins serrate near apex; costa percurrent, ⅒ to ⅛ the leaf width at the base; alar cells 1-stratose, sometimes partially 2-stratose; laminal cells smooth, the proximal cells linear-rectangular and pitted, the distal cells shorter, narrow, pitted or with few pits; capsules 2-4 mm long, erect, straight, furrowed when dry. ●On soil, soil over rock, and rotting wood; probably our most common *Dicranum*. ♦Distinctive by the straight leaves wet or dry, mostly 1-stratose alar cells, and erect, straight capsule. Though not reported for this species, occasionally one finds plants with deciduous leaf tips that might belong to *D. rhabdocarpum*; see discussion under *D. tauricum*.

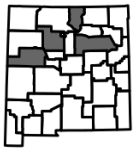
NM, Grant Co., Pinos Altos Range, McMillan Campground, 6 Sep 2018, *Kleinman & Blisard* (SNM).



Dicranum scoparium Hedwig [broom-like] [*Dicranum howellii* of NM reports]. Acrocarpous, in usually glossy, light to dark green dense cushions, the stems to 10 cm tall/long, tomentose with white to brown rhizoids; leaves variable, our mostly falcate-secund, little changed when dry, to 12 mm long, 1-stratose, the margins strongly serrate distally; costa percurrent to excurrent, 1/10 to 1/5 the leaf width at the base, usually with 2-4 toothed ridges on the abaxial surface; alar cells 2-stratose; laminal cells smooth, the proximal cells linear-rectangular and pitted, the distal cells shorter, sinuose, and pitted; capsules 3-4 mm long, inclined to horizontal, smooth to striate. ●On soil, soil over rock, decaying stumps and logs, tree bases. ♦Without close examination, this can be easily confused with *Paraleucobryum sauteri*, which has much broader costae.



NM, Taos Co., near Red River, 29 Jul 2021, *Kleinman & Blisard* (SNM).



Dicranum tauricum Sapjegin [of Crimea] [*Dicranum fragilifolium* of NM reports, *Orthodicranum tauricum* (Sapjegin) Smirnova]. Acrocarpous, in glossy, light green to yellowish green tufts or clumps, the stems to 3 cm long, tomentose below; leaves straight, little changed when dry, to 6 mm long, 0.2-0.4 mm wide, most of the leaf tips deciduous from cellular zones of abscission, distally tubulose, 1-stratose or partially 2-stratose near apex, the margins entire or serrulate distally; costa long-excurrent, ⅙ to ¼ leaf width at the base, abaxial ridges absent; alar cells 1-stratose; laminal cells smooth, the proximal cells linear to rectangular, with a few pits, the distal cells quadrate to short-rectangular, not pitted; capsules straight and erect, smooth or wrinkled when dry. ●Mostly on rotting logs or stumps; known from scant collections. ♦Occasionally one finds plants with deciduous leaf tips that might belong to *D. rhabdocarpum*; the two species can be distinguished as follows:

a Most leaves with deciduous tips; potential zones of abscission discernible in non-deciduous leaves; stems tomentose below with whitish to reddish brown rhizoids; leaves 0.2-0.4 mm wide; costa ⅙ to ¼ the leaf width at the base ..... *D. tauricum*

a Most leaves without deciduous tips; zones of abscission absent; stems tomentose with reddish brown rhizoids; leaves 0.6-1.2 mm wide; costa ⅒ to ⅛ the leaf width at the base..... *D. rhabdocarpum*

Photos : NM, Cibola Co., El Malpais Nat. Mon., 10 Nov 2022, *K. Allred* (NMC, SNM).

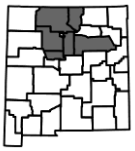
Paraleucobryum [resembling *Leucobryum*].

1 Costa narrow, occupying ¼ to ⅓ of the leaf base ..... ***P. sauteri***

1 Costa broad, occupying ½ to nearly all of the leaf base

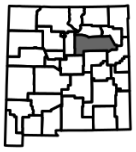
2 Leaves conspicuously and strongly curving to markedly falcate-circinate; costa occupying ½ to ⅔ of the leaf base; leaf margins serrulate near the apex; at medium elevations, about 7800 ft ..... ***P. longifolium***

2 Leaves ± straight to weakly curving; costa occupying ¾ to nearly all of the leaf base; leaf margins entire or rarely with a few teeth at the apex; at high elevations above 10,000 ft ..... ***P. enerve***

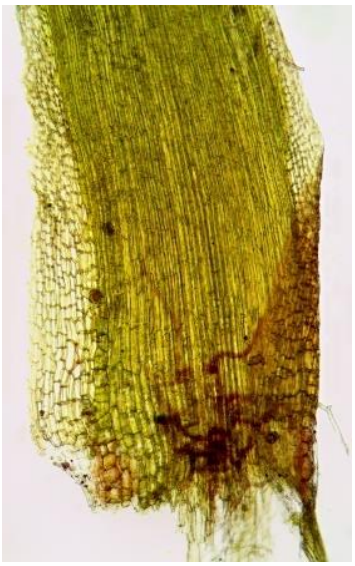


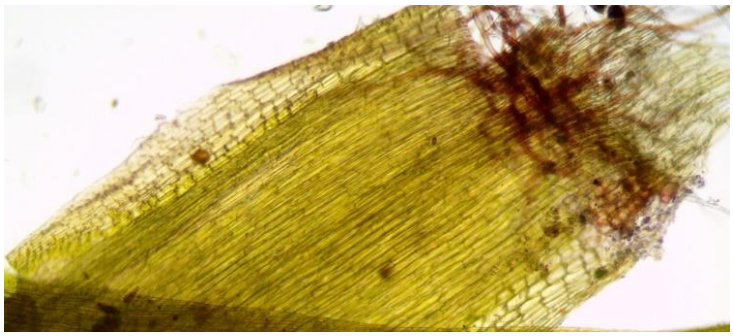
Paraleucobryum enerve (Thedenius) Loeske [without a nerve] [*Dicranum enerve* Thedenius]. Acrocarpous, in glossy, whitish green to yellowish green tufts or clumps, the stems to 8 cm tall/long; leaves erect-spreading, straight to weakly curving, to 5 mm long, 1-stratose, the margins entire, rarely sparsely toothed apically; costa ⅘ or more the leaf width at the base, in cross-section with a single middle band of chlorophyllose cells, the adaxial and abaxial hyaline cells larger than the median cells and devoid of intercalary chlorophyllose cells; alar cells 1-stratose; laminal cells smooth, the proximal elongate, weakly pitted; capsules not known in NM material. ●On soil, or thin soil over rocks, ledges, and boulders. ♦The exceedingly wide costa is distinctive.

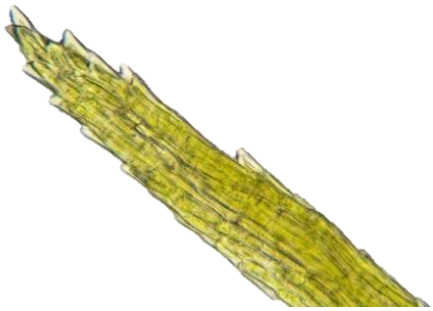
NM, Taos Co., Taos Ski Area, 3 Aug 2017, *K. Allred* (NMC, SNM).



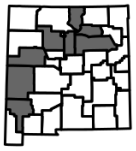
Paraleucobryum longifolium (Hedwig) Loeske [long-leaved] [*Dicranum longifolium* Ehrhart ex Hedwig]. Acrocarpous, in glossy, light green, gray-green, to dark green tufts or clumps, the stems to 6 cm tall/long; leaves curved to weakly falcate, to 8 mm long, 1-stratose, the margins serrate distally; costa ½ to ⅔ the leaf width at the base, commonly ridged abaxially, in cross-section with a single band of chlorophyllose cells, the adaxial and abaxial hyaline cells about the same size or larger than the median cells and with intercalary chlorophyllose cells; alar cells 1-stratose; laminal cells smooth, the proximal cells elongate, weakly pitted; capsules uncommon, straight, erect to somewhat inclined, smooth. ●On rock faces, outcrops, boulders, sometimes wood; known from a single collection in the state. ♦Distinctive by the curved leaves, broad costa, and the central chlorophyllose cells mostly smaller than the adjacent hyaline surface cells.







NM, San Miguel Co., Gallinas Canyon, 15 Jul 2021, *K. Allred* (NMC, SNM).

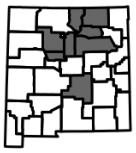


Paraleucobryum sauteri (Bruch & Schimper) Loeske [for Anton Eleutherius Sauter (1800-1881), Austrian botanist] [*Dicranum sauteri* Bruch & Schimper]. Acrocarpous, in glossy green tufts or clumps, the stems to 5 cm tall/long; leaves mostly strongly falcate to circinate, to 6 mm long, 1-stratose, rarely with deciduous tips, the margins serrulate distally; costa ¼ to ⅓ of the leaf width at the base, weakly to moderately ridged abaxially, in cross-section with a single band of chlorophyllose cells, the adaxial and abaxial hyaline cells smaller; alar cells 1-stratose; laminal cells smooth, the proximal cells elongate, pitted; capsules erect, straight, smooth. ●Thin soil over rocks and boulders, bases of trees, moist loamy ground, sometimes rotting wood. ♦This is the common *Paraleucobryum* in the state, distinctive by strongly falcate leaves, relatively narrow costa, and large central chlorophyllose cells. Easily confused with *Dicranum scoparium*, which has less falcate leaves and much narrower costae that are ridged abaxially.

NM, Catron Co., Mogollon Mts, above Sandy Point, 1 Nov 2010, *Kleinman & Blisard* (SNM).

Distichium [2-ranked].

1 Capsules erect, cylindrical, straight to slightly curved; spores 15-25 µm.....***D. capillaceum***
1 Capsules inclined, ovoid, straight; spores 30-48 µm .....***D. inclinatum***



Distichium capillaceum (Hedwig) Bruch & Schimper [hair-like] [*Cynontodium capillaceum* Hedwig]. Acrocarpous, the stems to about 6 cm tall/long; leaves distichous, the narrow blade spreading from a clasping base; costa occupying most of the subula, roughened-papillose; paroicous; capsules brown, 1-2 mm long, erect, ± cylindrical, straight to weakly curved; spores 15-25 µm, finely papillose. ●On wet or damp stream banks, rotten logs, rocks, seeps, dripping cliffs, often in crevices.

NM, Taos Co., Taos Ski Valley, 24 Jul 2014, *Kleinman et al.* (SNM).

Distichium inclinatum (Hedwig) Bruch & Schimper [leaning] [*Cynontodium inclinatum* Hedwig]. Acrocarpous, the stems to about 3 cm tall/long, often much shorter; leaves distichous, the narrow blade spreading from a clasping base; costa occupying most of the subula, roughened-papillose; paroicous; capsules brown, 1-1.5 mm long, inclined, ovoid, straight; spores 26-48 µm, finely papillose. ●Rocks, ledges, sandy crevices; known from only two collections. ♦In addition to the key features, this species tends to be shorter, darker, duller green, with less spreading blades, and less conspicuous distichous arrangement than *D. capillaceum*.

UT, Summit Co., Blacks Fork, 1 Aug 1952, *S. Flowers* (COLO).

1 Leaves in two rows, the base ± sheathing, abruptly narrowed to a ± roughened subula..... go to **Distichium** (Distichiaceae)

1 Leaves not as above

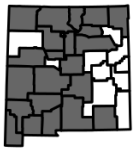
2 Leaves glaucous blue-green ..... go to **Saelania** (Saelaniaceae)

2 Leaves yellow-green to green, never glaucous

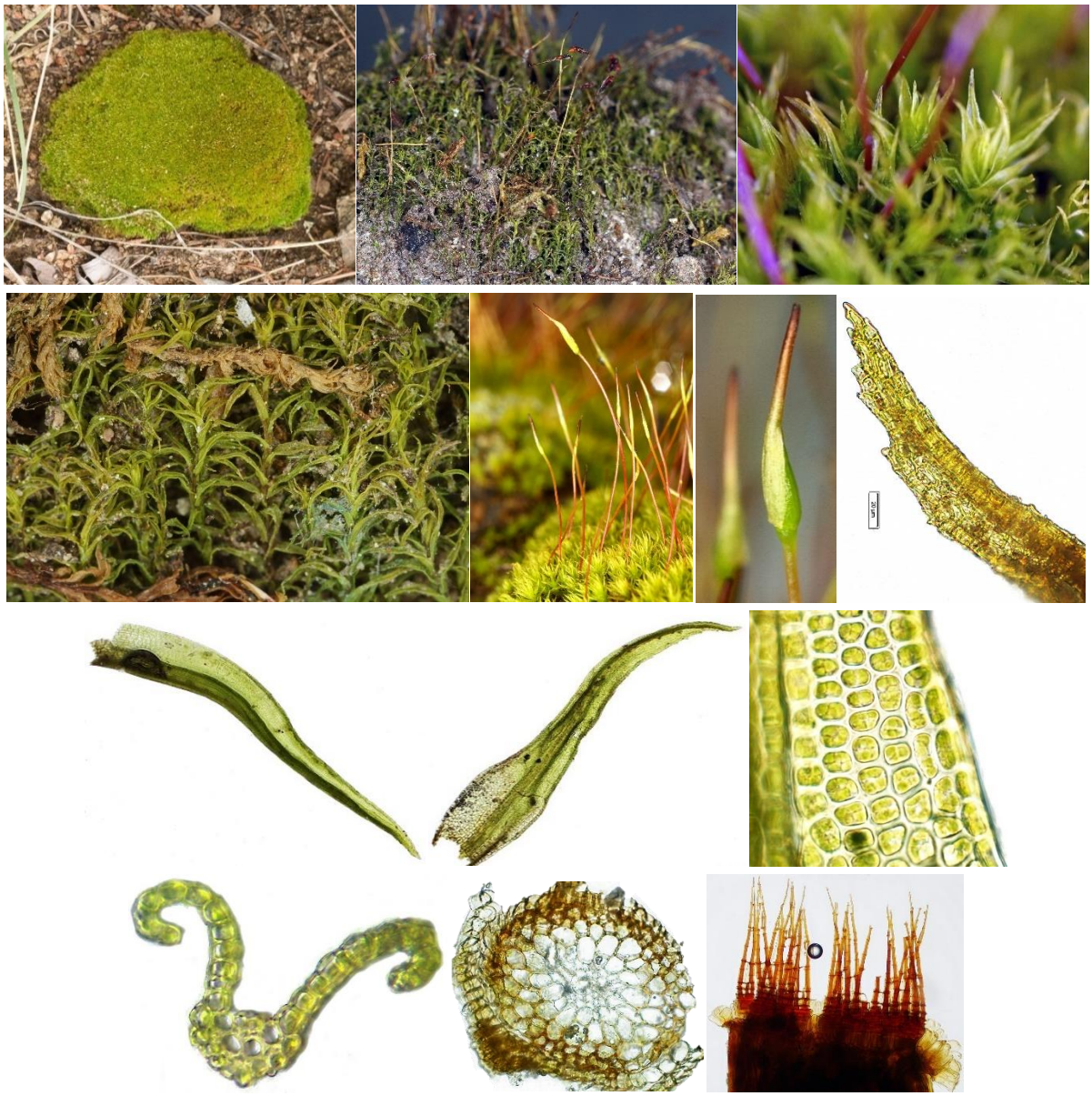
3 Leaves lanceolate to triangular-ovate, the margins recurved; seta reddish purple to orangish; capsule strongly sulcate when dry, often strumose ..... **Ceratodon**

3 Leaves lanceolate to subulate, the margins mostly plane; seta pale yellow to reddish brown; capsule not sulcate when dry, not strumose ..... go to **Flexitrichum** (Flexitrichaceae)

Ceratodon [a horned tooth].



Ceratodon purpureus (Hedwig) Bridel [purple] [*Dicranum purpureum* Hedwig]. Acrocarpous, in dense, green to dark, light, or yellow- green tufts or cushions, the stems to 4 cm tall/long; leaves crowded spreading to contorted or crisped when dry, to 3 mm long, 1-stratose, the margins generally revolute and toothed; costa strong, percurrent to excurrent, sometimes awn-like; alar region not developed; laminal cells 1-2:1, smooth; seta 1-4 cm long, reddish to yellowish; capsule to 3 mm long, smooth to strongly sulcate when dry, strumose. ●Usually on exposed soil, wet to dry places, but also on wood and in crevices where soil collects on rocks, also known on large obsidian boulders; expected in every county. ♦Plants are notoriously variable, in both form and habitat, usually preferring disturbed, well-drained sites, but found almost everywhere. Leaves are usually truncate at base upon dissection. Plants with yellowish setae, capsules not strumose and sometimes smooth when dry have been called subsp. *stenocarpus* (Bruch & Schimper) Dixon.

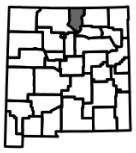


NM, Grant Co., Pinos Altos, 22 Aug 2012, *R. Kleinman* (SNM).

Encalypta [a covering].

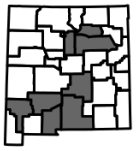
1 Some or all vegetative leaves with distinct awns or hair-points; apex acute
  2 Leaves narrowly oblong; calyptra fringed; peristome absent ..... ***E. alpina***
  2 Leaves lanceolate; calyptra entire to erose; peristome weak but present ..... ***E. rhaptocarpa***
1 Vegetative leaves without awns or hair-points; apex obtuse to mucronate
  3 Plants usually sterile; stems usually with copious amounts of axillary gemmae ..... ***E. procera***
  3 Plants commonly with capsules; stems lacking gemmae
    4 Leaves 4-6 mm long, the margins recurved below mid-leaf; calyptra fringed at base ..... ***E. ciliata***
    4 Leaves 3-4 mm long, the margins plane or weakly incurved; calyptra not fringed at base ..... ***E. vulgaris***

Encalypta alpina Smith [alpine or of high mountains]. Acrocarpous, the stems to 5 cm tall/long, with a weak central strand, lacking rhizoidal gemmae; leaves lanceolate to 4 mm long, the apices acute to acuminate, mucronate to apiculate, the margins plane; costa percurrent to excurrent to a short awn; capsules 1-3 mm long, ribbed, a peristome absent, the spores 30-36 µm; calyptra 3-6 mm long, fringed basally. ●Moist soil and rock; only recently found in Taos County. ♦Distinctive by the lanceolate, short-awned leaves and absent peristome.

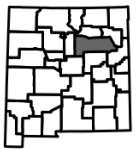


Canada, Alberta, near Athabasca Glacier, 1-2 Jul 1955, *Crum & Schofield* (COLO).

Encalypta ciliata Hedwig [fringed]. Acrocarpous, the stems to 2 cm tall/long, a central strand absent, lacking rhizoidal gemmae; leaves oblong to elliptic, 4-6 mm long, the apices broadly acute to rounded, mucronate/cuspidate, the margins recurved proximally; costa subpercurrent to excurrent; capsules 2-3 mm long, constricted below the mouth, the cells smooth, the peristome single, the spores 30-40 µm; calyptra 3-7 mm long, fringed basally. ●Rock crevices and soil. ♦Distinguished by the excurrent costa, smooth capsule, and fringed calyptra.



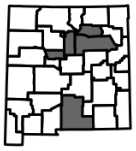
NM, Grant Co., Pinos Altos Range, 18 Aug 2010, *Kleinman* & *Allred* (SNM).



Encalypta procera Bruch [long or high]. Acrocarpous, the stems 4-8 cm tall/long, a central strand small, with conspicuous tufts of filamentous rhizoidal gemmae; leaves broadly ovate, elliptic, to spatulate, to 5 mm long, the apices broadly obtuse to broadly acute, mucronate, weakly cucullate, the margins recurved, at least one; costa ending before apex, percurrent, to occasionally short-excurrent; capsules 2-4 mm long, spirally ribbed, the peristome double, the spores 14-24 μm; calyptra 4-8 mm long, fringed basally, papillose. ●Soil and rock crevices, ledges; known only from a single collection. ♦Easily distinguished by the copious axillary, rhizoid-like gemmae or brood bodies of sterile plants.

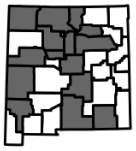
NM, San Miguel Co., Holy Ghost Canyon, 4 Aug 2015, *Kleinman et al.* (SNM).

Encalypta rhaptocarpa Schwägrichen [with stitched fruit]. Acrocarpous, the stems to 3 cm tall/long, a central strand absent, lacking rhizoidal gemmae; leaves oblong-lanceolate, to 3.5 mm long, the apices acute, mucronate to hair-pointed, the margins plane; costa percurrent to long-excurrent; capsules 2-3 mm long, ribbed, the peristome single, the spores 35-40 µm; calyptra 3-4 mm long, entire to erose basally, smooth to papillose proximally, the rostrum papillose. ●Soil and thin soil over rock. ♦Distinctive by the oblongish leaves, awned costa, weak peristome, and entire to erose calyptra.



papillae on beak of calyptra

NM, San Miguel Co., Gallinas Creek, 8 Jun 2022, *Kleinman et al.* (SNM).

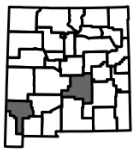


Encalypta vulgaris Hedwig [common]. Acrocarpous, the stems to 2 cm tall/long, the central strand small, lacking rhizoidal gemmae; leaves broadly oblong to strap-shaped, 3-4 mm long, the apices obtuse to broadly acute, the margins plane or weakly incurved; costa percurrent, papillose; capsules 2-4 mm long, weakly furrowed, a peristome absent or a short hyaline membrane present, the spores 22-35 µm; calyptra 4-5 mm long, entire to weakly erose, smooth to papillose. ●Thin soil over rock. ♦Similar to *E. rhaptocarpa*, but that species presents a developed peristome, ribbed capsule, and often awn-tipped vegetative leaves.

NM, Grant Co., North Fork Little Walnut Creek, 18 Nov 2011, *Kleinman & Blisard* (SNM).

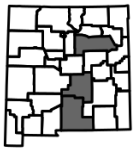
Entodon [an inner tooth].

1 Stem leaves broadly rounded at the apex; alar cells 2- to 3-stratose ..... ***E. concinnus***
1 Stem leaves gradually or abruptly acute to acuminate; alar cells 1-stratose
  2 Plants golden brown to reddish or rusty colored; leaves abruptly acute to acuminate; terminal cell of leaf 1-2:1; exostome teeth papillose proximally ..... ***E. beyrichii***
  2 Plants yellow-green to light brownish; leaves gradually narrowed; terminal cell of leaf various; exostome teeth cross-striolate proximally
    3 Branches at least somewhat flattened; stem leaves 2-2.2 mm long; terminal cell of leaf elongate, 3.5-5:1; annulus absent ..... ***E. schleicheri***
    3 Branches usually obviously terete-foliate; stem leaves 1.8-2 mm long; terminal cell of leaf scarcely longer than wide, 1-2:1; annulus present ..... ***E. sullivantii***



Entodon beyrichii Schwägrichen [for Heinrich Karl Beyrich (1796-1834), German botanist] [*Entodon seductrix* of NM reports]. Pleurocarpous, in golden brown to reddish mats, the stems to 8 cm long, terete-foliate; leaves abruptly acute, 0.8-1.5 mm long, the margins mostly plane, serrulate distally, the apices acute; costa double, to ½ leaf length; alar cells 1-stratose; medial cells linear; capsules 2.5-4 mm long, an annulus present, the exostome teeth densely papillose proximally, the spores 10-12 µm. ●Logs, boulders; known from few collections.

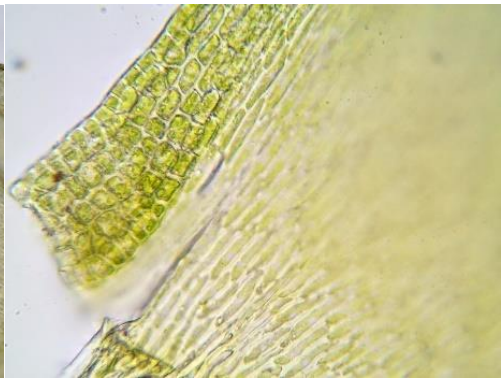
NM, Grant Co., Railroad Canyon, 15 Aug 2015, *Kleinman et al.* (SNM).

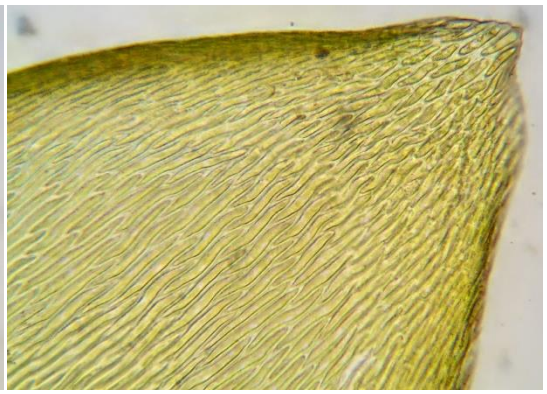


Entodon concinnus (DeNotaris) Paris [elegant] [*Entodon orthocarpus* (Bridel) Lindberg, *Hypnum concinnum* DeNotaris]. Pleurocarpous, in yellow-green to brownish yellow mats, the stems to 10 cm long, spreading to ascending, terete-foliate; leaves 1.5-2 mm long, smaller on the branches, the margins incurved distally, entire, the apices rounded-obtuse; costa absent to very short and double; alar cells 2-3-stratose; medial cells linear; capsules unknown in North America. ●On shaded moist ground and humus, sometimes rock or bark, in the forests. ♦Distinctive by the 2-3-stratose alar cells.

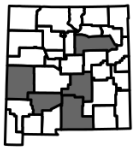




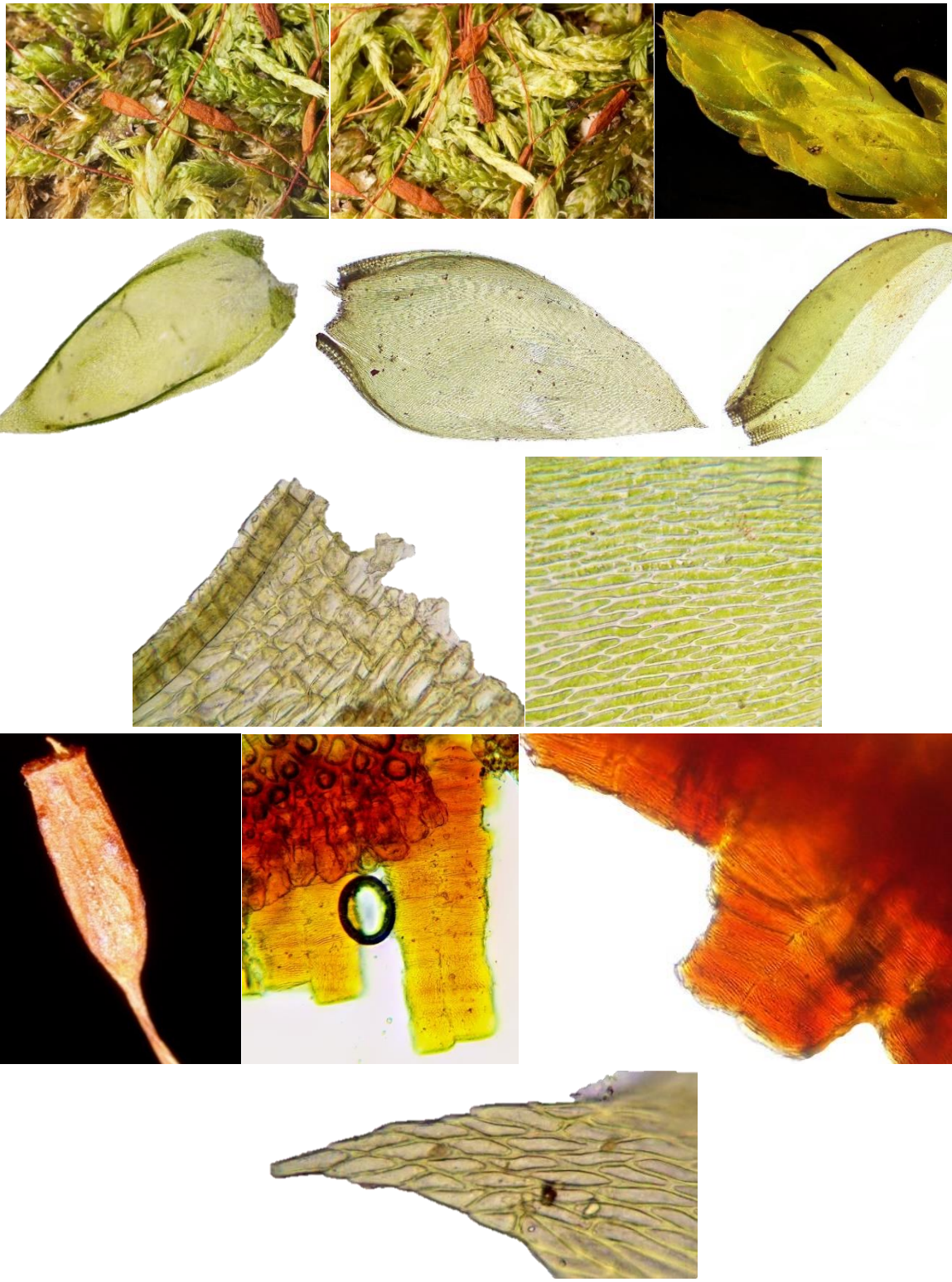





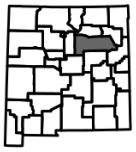
NM, Otero Co., Sacramento Mts, Bluff Springs, 10 Jul 2012, *Kleinman et al.* (SNM).



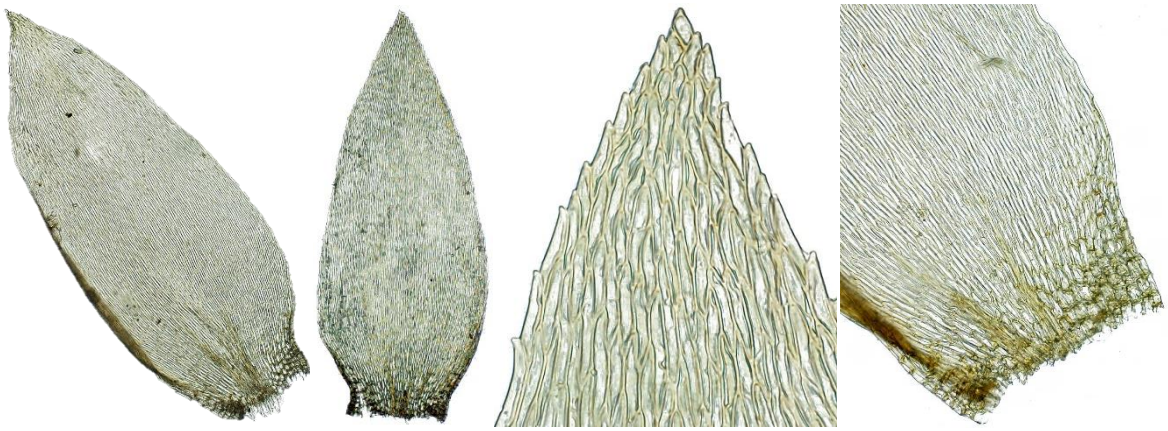
Entodon schleicheri (Schimper) Demeter [for Johann Christoph Schleicher (1768-1834), Swiss-German botanist] [*Entodon cladorrhizans* of NM reports, *Isothecium schleicheri* Schimper]. Pleurocarpous, in yellow-green mats, sometimes extensive, the stems to 8 cm long, the branches ± flattened; leaves ovate-lanceolate, 2-2.5 mm long, the branch leaves somewhat smaller, the margins plane, weakly serrulate distally, the apices broadly and abruptly acuminate, the terminal cell elongate, 3.5-5:1; costa short, double; alar cells 1-stratose; medial cells linear; capsules 2-3 mm long, an annulus absent, the exostome teeth papillose apically, the spores 13-20 µm. ●On shaded moist ground, and tree bases (oak), mostly in the southern mountains. ♦These plants were reported as *Entodon cladorrhizons* (Hedwig) Müller Hal. by earlier workers, but that species occurs eastward.

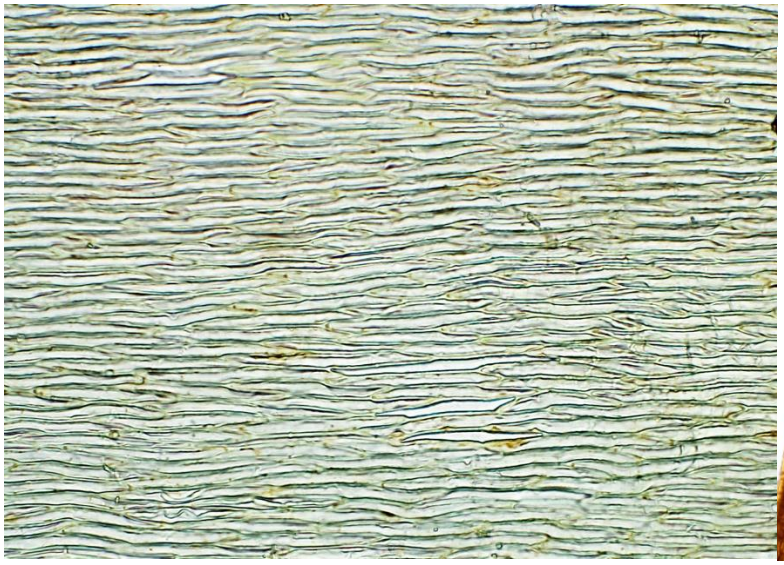


NM, Lincoln Co., White Mts, Fall Creek, 25 Feb 2015, *Kleinman et al.* (SNM).

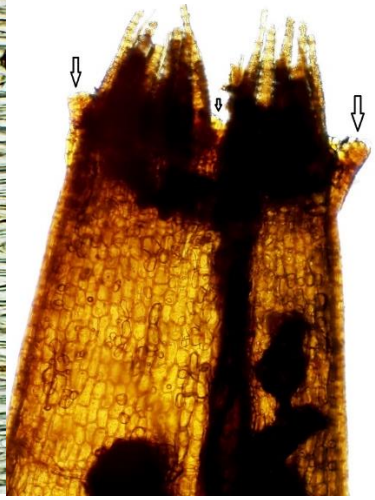


Entodon sullivantii (Müller Hal.) Lindberg [for William Starling Sullivant (1803-1872), eminent American bryologist] [*Neckera sullivantii* Müller Hal.]. Pleurocarpous, in green to yellow-green or whitish green mats, the stems to 6 cm long, the branches terete-foliate but sometimes appearing somewhat flattened; leaves oblong-ovate, 1.8-2 mm long, the margins plane, serrulate distally, the apices gradually short-acuminate; costa absent or very short and double; alar cells 1-stratose; medial cells linear; capsules 2-3 mm long, the annulus persistent, the exostome teeth cross-striolate proximally, the spores 10-13(19) µm. ●On rocks and cliffs in moist woods; known from a single collection.





arrows = annulus

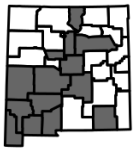


TN, Morgan Co., near Wartburg, *J. Sharp* (COLO).

Fabronia [for Giovanni Valentino Matteo (Mattia) Fabbroni (1752-1822), Italian naturalist].

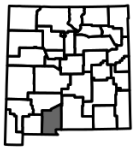
1 Leaf margins nearly entire to prominently toothed, but the teeth composed of 1 or rarely 2 cells; medial and distal cells mostly 3-4:1; alar region often to 10 cells along the margin.....***F. ciliaris***

1 Leaf margins conspicuously serrate to jagged-toothed, the larger teeth composed of 2-3 cells alternating with somewhat shorter 1-celled teeth; medial and distal cells mostly 4-6:1; alar region about 4-6 cells along the margin.... .....***F. pusilla***



Fabronia ciliaris (Bridel) Bridel [fringed] [*Fabronia ciliaris* (Bridel) Bridel var. *wrightii* (Sullivant) Buck, *Fabronia gymnostoma* Sullivant & Lesquereux ex Sullivant, *Fabronia octoblepharis* (Schleicher) Schwägrichen, *Fabronia wrightii* Sullivant, *Hypnum ciliare* Bridel]. Pleurocarpous, in silky mats, the stems prostrate; leaves spreading when wet, less than 1 mm long, the margins wavy, short-toothed, to prominently long-toothed but the teeth nearly all one-celled, the apices acute to long-acuminate to a hair-point; medial and distal cells mostly 3-4:1, a few longer; alar region often as long as 10 cells long, 4-5 cells wide. ●On rocks and tree bark. ♦Forms with long, unicellular teeth have been confused with *F. pusilla*, which differs in having multi-celled teeth, a smaller/shorter alar region along the margin, and longer distal cells.

NM, Grant Co., Pinos Altos Range, 23 Oct 2022, *Kleinman & Blisard* (SNM).

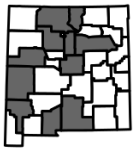


Fabronia pusilla Raddi [very small]. Pleurocarpous, in silky mats, the stems prostrate; leaves spreading when wet, less than 1 mm long, the margins coarsely dentate to prominently ciliate, at least some of the teeth on each leaf 2-3(4)-celled, interspersed with 1-celled teeth only slightly shorter, the apices long-acuminate to a long hair-point; medial and distal cells mostly 4-6:1, a few shorter; alar region a small group about 4-6 x 3-4 cells long and wide; capsules not yet known from New Mexico material. ●Known from a single collection on the undersurface of a boulder in oak-piñon-juniper woodland; to be looked for also on tree bark in shaded, protected sites. ♦Distinguished by having at least a few 2-3-celled teeth on each leaf, medial and distal cells 4-6:1, and a smaller alar region. What we call *pusilla* in New Mexico is scarcely different than the forms of *Fabronia ciliaris* with very long, unicellular teeth, and quite different from typical *F. pusilla* of Europe with 3-5-celled teeth.

NM, Dona Ana Co., Organ Mts, 12 Dec 1980, *S. Talbot* (UBC).

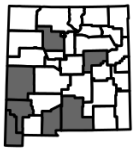
Fissidens [a split tooth].

1 Plants aquatic, attached to various substrates in stagnant or flowing water, up to 12 cm long..... ***F. fontanus***
1 Plants terrestrial, rarely as much as 5 cm long
2 Leaf margins, especially the distal half and apex, coarsely and unevenly toothed.....***F. dubius***
2 Leaf margins entire to scarcely serrulate
3 Leaves strongly coiled, curled, or twisted when dry.....***F. crispus***
3 Leaves flat or nearly so when dry
4 Leaf apices rounded to obtuse, not apiculate .....***F. obtusifolius***
4 Most leaf apices at least apiculate, to acute
5 Laminal cells mammillose, with a single nipple-like projection; leaf margins lacking a limbidium and appearing crenulate because of bulging cells..... ***F. littlei***
5 Laminal cells bulging to flat, without a nipple-like projection; leaf margins with a limbidium, or if elimbate, then the margins lacking bulging cells
6 Leaves mostly 1-3 mm long; usually moist habitats .....***F. bryoides***
6 Leaves mostly 0.7-1 mm long; usually dry habitats.....***F. sublimbatus***



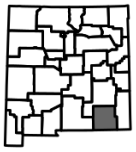
Fissidens bryoides Hedwig [resembling *Bryum*] [*Fissidens bryoides* Hedwig var. *pusillus* (Wilson) Pursell, *Fissidens bryoides* Hedwig var. *viridulus* (Swartz) Brotherus, *Fissidens exiguus* Sullivant forma *emarginatus* Grout, *Fissidens viridulus* (Swartz) Wahlenberg]. Acrocarpous, the stems to 1 cm tall/long, a central strand usually present; leaves as many as 20 pairs, to 3 mm long, one blade about ½ the length as the other, the margins entire to serrulate distally, the limbidium 1-3-stratose, the apices acute to apiculate; costa subapical to excurrent; laminal cells smooth, not mammillose but often slightly bulging. ●On soil and rocks in moist shaded places.

NM, Catron Co., Mogollon Mts, Bead Spring, 14 May 2012, *Kleinman & Blisard* (SNM).



Fissidens crispus Montagne [wavy] [*Fissidens limbatus* Sullivant]. Acrocarpous, the stems to 1 cm tall/long, a central strand present or absent; leaves as many as 20 pairs, to 2 mm long, one blade ⅓-¾ the length of the other, the margins serrulate distally, the limbidium 1-2-stratose, the apices acute to apiculate; costa rarely excurrent; laminal cells smooth, strongly bulging, in rows in the distal part of the leaf. ●Moist soil, often near water. ♦Distinctive by the twisted or curled leaves when dry and the obvious limbidium.

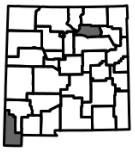
NM, Grant Co., Pinos Altos Mts, Ben Lilly Memorial, 15 Nov 2010, *Kleinman & Blisard* (SNM).



Fissidens dubius P. Beauvois [doubtful] [*Fissidens cristatus* Mitten]. Acrocarpous, the stems (ours) to 7-8 mm tall/long, a central strand present; leaves in numerous pairs, one blade about ⅔ the length of the other, the margins coarsely and unevenly serrate, lacking a limbidium but the marginal cells often lighter-colored, the apices acute; costa subapical to percurrent; laminal cells mostly 1-stratose with 2-stratose patches or streaks, obviously bulging. ●Shaded boulders, splash zones (ours), also soil and trees; known from a single collection. ♦Distinctive by the obviously toothed distal margins and lack of a limbidium of elongated cells.

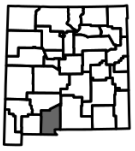
NM, Eddy Co., Guadalupe Mts, Middle Fork Big Canyon, 5 Sep 2010, *R.D. Worthington 36357* (NMCR).

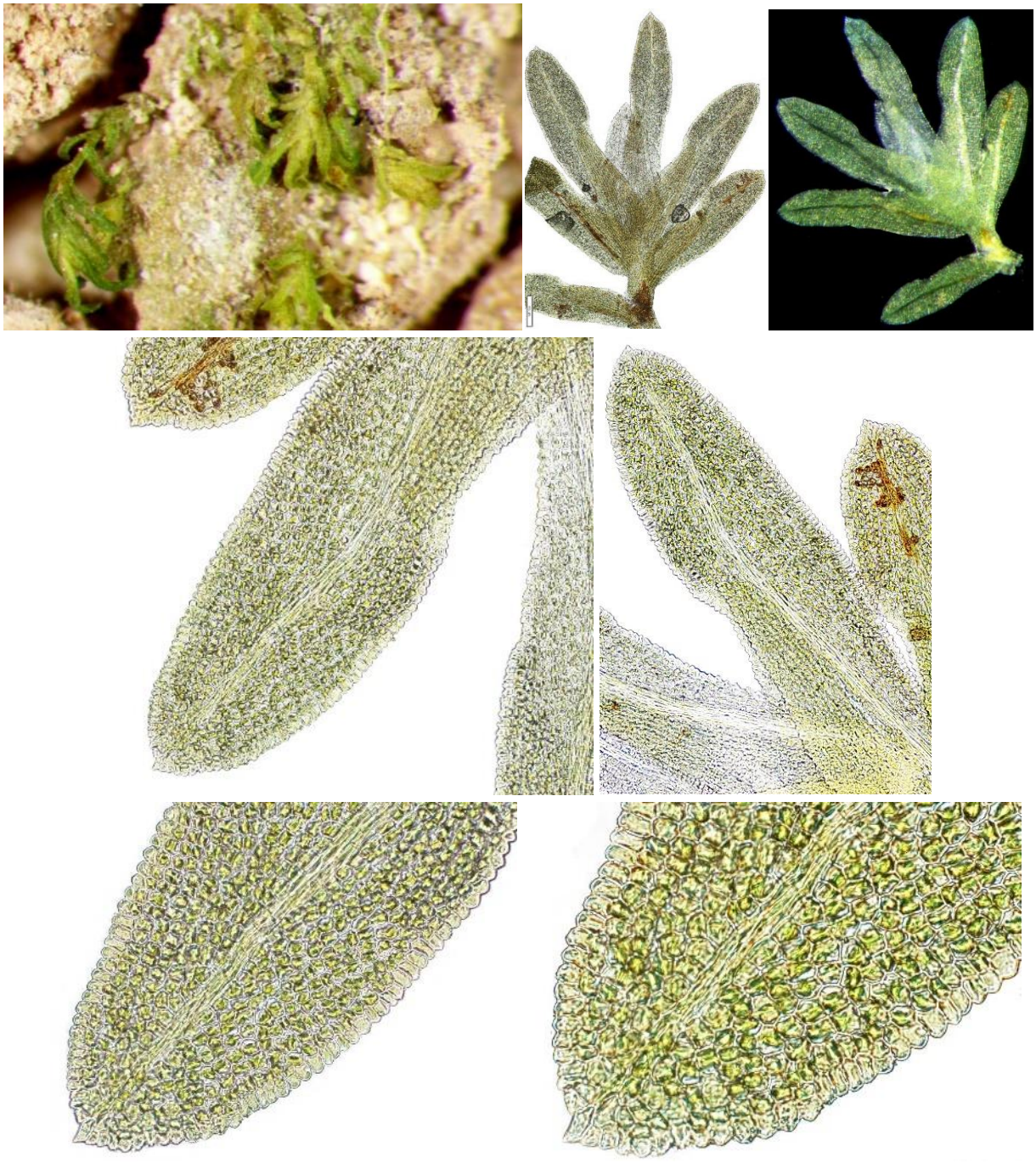
Fissidens fontanus (Bachelot de la Pylaie) Steudel [of springs] [*Skitophyllum fontanum* Bachelot de la Pylaie]. Acrocarpous, the stems to 12 cm tall/long, highly branched, a central strand absent; leaves in numerous pairs, long and narrow, one blade ⅓-½ the length of the other, the margins entire, lacking a limbidium, the apices acute; costa subapical; laminal cells mostly 1-stratose, slightly bulging. ●In stagnant and slow-moving water, attached to various substrates.



NM, Mora Co., Canadian River, 18 Sep 1957, *R.A. Pursell* (COLO).

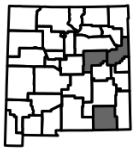
Fissidens littlei (Williams) Grout [for Elbert Luther Little, Jr. (1907-2004), eminent American botanist] [*Moenkemeyera littlei* Williams]. Acrocarpous, the stems to 3 mm tall/long, sparingly branched, a central strand absent; leaves as many as 8 pairs, one blade ½-⅔ the length of the other, the margins crenulate, lacking a limbidium, the apices obtuse-apiculate; costa subapical; laminal cells 1-stratose. ●Known only from walls of gypsum sinks on the Jornada Plain in Doña Ana County. ♦Perhaps one of the rarest plants in the world, found only twice from a single locality.

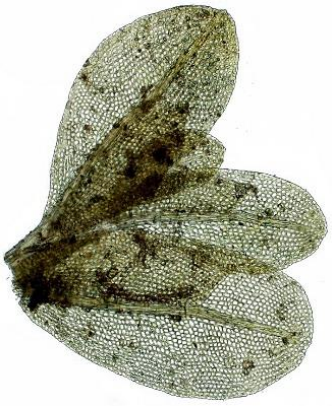


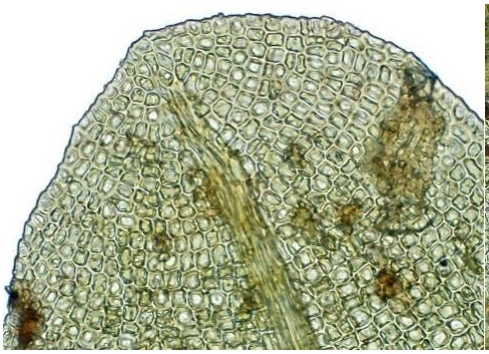


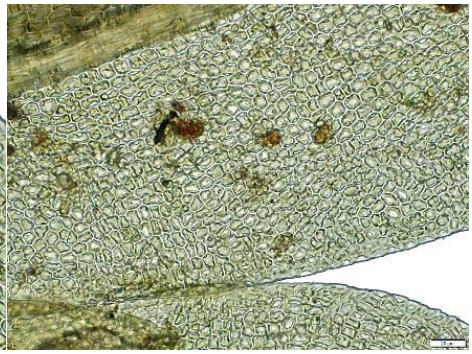
NM, Dona Ana Co., Jornada del Muerto, 27 Oct 1934, *E.L. Little Jr.* (Jornada Exp. Range Herbarium).

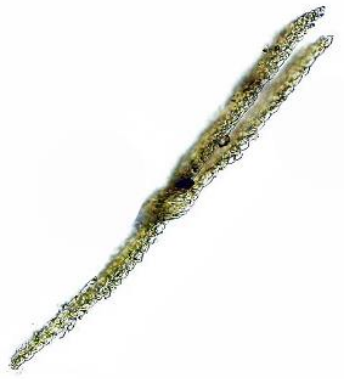
Fissidens obtusifolius Wilson [blunt-leaved]. Acrocarpous, the stems to 8 mm tall/long, a central strand weak or absent; leaves as many as 20 pairs, one blade ½-⅘ the length of the other, the margins entire, the limbidium absent, weak, to strong, the apices rounded to obtuse; costa subapical; laminal cells 1-stratose, smooth, ± bulging. ●On moist limestone substrates along streams.





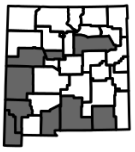






IA, Webster Co., Dolliver State Park, 7 Aug 1991, *W.R. Norris* (SNM).

Fissidens sublimbatus Grout [somewhat bordered] [*Fissidens obtusifolius* Wilson var. *apiculatus* Grout]. Acrocarpous, the stems to 6 mm tall/long, a central strand present; leaves as many as 22 pairs, one blade ½-¾ the length of the other, the margins serrulate distally, with or without a limbidium, the apices rounded to obtuse-apiculate, the apiculus of a single clear sharp cell; costa subapical to percurrent; laminal cells 1-stratose, smooth, strongly bulging. ●On soil, often in overhangs or shady places. ♦Distinctive by the tiny, apiculate leaves, weak limbidium, flattish (non-papillose) cells, and desert habitats.

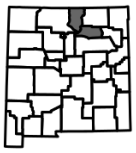


NM, Grant Co., Burro Mts, Saddlerock Canyon, 8 Jan 2014, *Kleinman & Blisard* (SNM).

Flexitrichum [a bent hair].

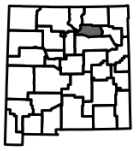
1 Stems 1-4 cm long; leaves to 3 mm long, from an ovate base sharply contracted to the subula; lamina cells near costa with weakly nodulose longitudinal walls; plants commonly fruiting.....***F. flexicaule***

1 Stems to 7 cm or more long; leaves from an elongate-ovate base tapering gradually to the long slender subula; basal laminal cells with weakly to strongly nodulose longitudinal walls; plants rarely found fruiting.....***F. gracile***

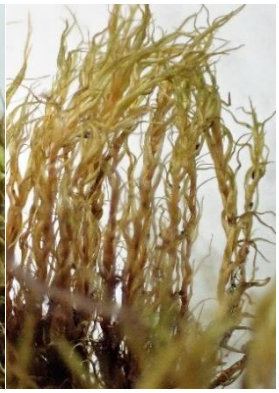


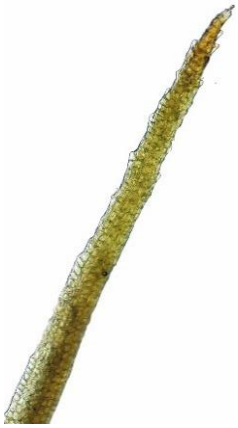
Flexitrichum flexicaule (Schwägrichen) Ignotov & Fedosov [curve-stemmed] [*Cynodontium flexicaule* Schwägrichen, *Ditrichum flexicaule* (Schwägrichen) Hampe]. Acrocarpous, in dull, green to brownish tufts, the stems 1-4 cm tall/long, tomentose below; leaves stiff to flexuose, to about 3 mm long, the base somewhat sheathing, the limb contracted suddenly to the subula, 1-stratose, the margins ± entire, often 2-stratose distally; costa ¼-⅓ the leaf width at the base; laminal cells weakly nodulose near the costa; capsules 1-1.5 mm long, the spores 9-12 µm. ●On dry rocks, cliffs, ledges, and crevices; known from few collections.

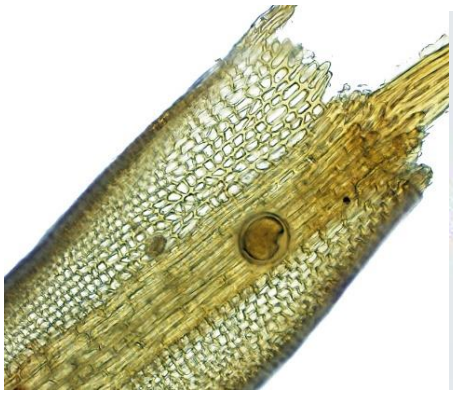
CO, Moffat Co., Yampa River, 24 Jul 1960, *S. Flowers* (COLO).



Flexitrichum gracile (Mitten) Kuntze [graceful] [*Ditrichum gracile* (Mitten) Kuntze, *Leptotrichum gracile* Mitten]. Acrocarpous, in often shiny, yellowish brown to dark green tufts, the stems variable, to 7 cm or more tall/long, sparingly to densely tomentose; leaves often ± falcate, 4-7 mm long, 1-stratose to 2-stratose in the subula, the base sheathing, the limb gradually narrowing to the subula, the margins denticulate distally or entire, often 2-stratose; costa ¼-⅓ the leaf width at the base; laminal cells weakly to strongly nodulose near the costa; capsules 1.5-2 mm long, the spores 12-15 µm. ●On soil and dry rocks; known from a single collection.







NM, Mora Co., Pecos Baldy Lake, 30 Jul 1997, *K.W. Allred* (NMC).

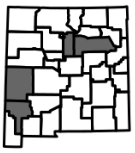
Fontinalis [of fountains or springs].

1 Leaves usually plane ..... ***F. hypnoides***

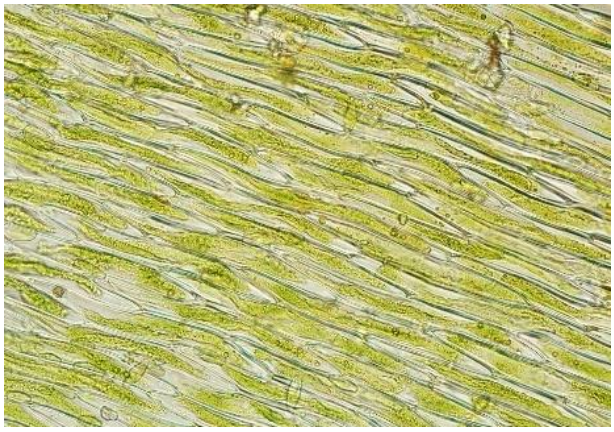
1 Leaves usually keeled or folded

2 Ends of leafy stems and branches conspicuously elongated; leaf keel gently curved from the insertion to near mid-leaf, ± straight from mid-leaf to apex; leaf apices acute ..... ***F. neomexicana***

2 Ends of leafy stems and branches not conspicuously elongated; leaf keel ± equally curved from the insertion to the apex of the leaf; leaf apices sub-obtuse to broadly obtuse ..... ***F. antipyretica***

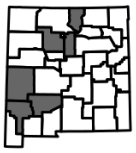


Fontinalis antipyretica Hedwig [fire-proof]. Pleurocarpous, yellow-red, yellow-green, green, to 40 cm long, the stems rigid, short-attenuate; leaves 3-ranked, keeled and folded, 2-8 mm long, the apices ± obtuse, the keel equally curved from the insertion to the leaf apex. ●Generally in slow-moving water.



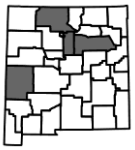
NM, Catron, Willow Creek, 30 Apr 2011, *Kleinman* & *Blisard* (SNM).

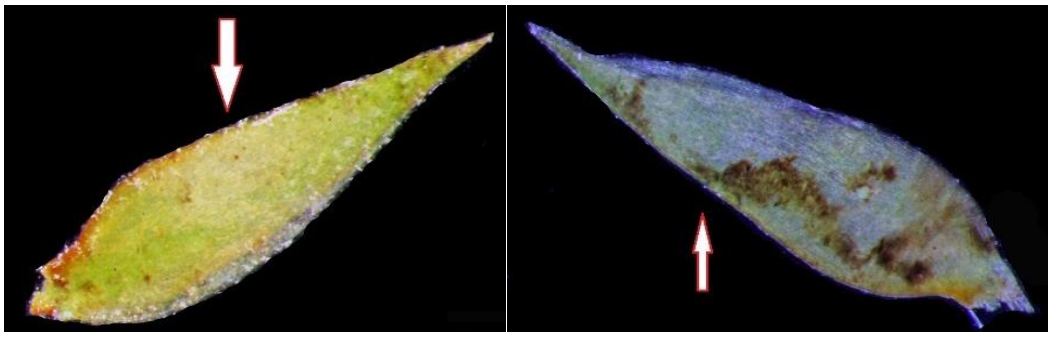
Fontinalis hypnoides Hartman [moss-like]. Pleurocarpous, green, yellowish, to pale green, to 30 cm long, the stems flaccid, at most short-attenuate; leaves plane, not folded or keeled, 3-7 mm long, the apices obtuse, acute, to acuminate. ●Generally in slow-moving water.



NM, Grant Co., Pinos Altos Range, Bear Creek Road, 6 May 2010, *Kleinman & Blisard* (SNM).

Fontinalis neomexicana Sullivant & Lesquereux [of New Mexico]. Pleurocarpous, green, yellow-green, to golden, to 50 cm long, the stems long-attenuate; leaves 3-ranked, keeled and folded, 2-5 mm long, the keel gently curved from the insertion to near mid-leaf, ± straight from mid-leaf to apex, the apices acute. ●Often in swift-moving water.

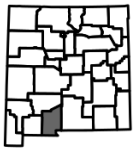




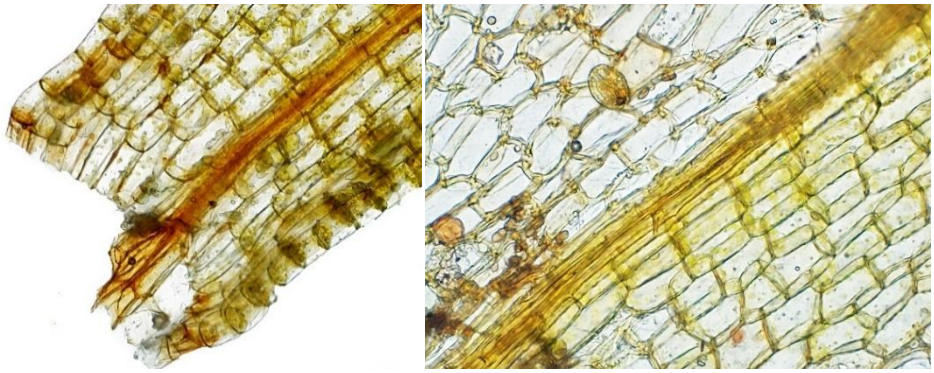
NM, San Miguel Co., Holy Ghost Creek, 29 Jul 2019, *Kleinman & Blisard* (SNM).

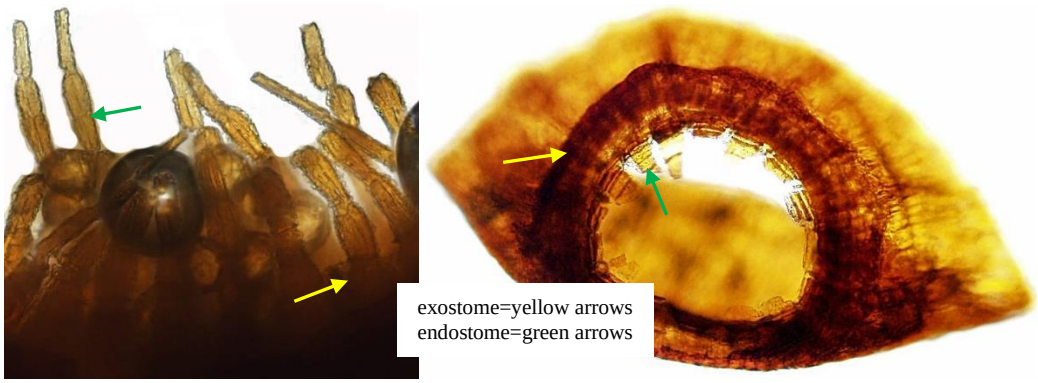
1 Distal leaves with a hair point or awn
  2 Plants tiny, the stems about 1 mm long; seta 0.5-1.5 mm long; calyptra completely enclosing the mature capsule, 4-ridged, long-persistent ..... **Pyramidula**
  2 Plants small, the stems mostly 2-6 mm long; seta 3-15 mm long; calyptra generally not enclosing the capsule, not ridged, deciduous ..... **Entosthodon**
1 Distal leaves lacking a hair point or awn
  3 Leaves bordered almost to the apex by at least two rows of often orangish, narrow cells (*E. attenuatus*) ..... **Entosthodon**
  3 Leaves not bordered by rows of orangish, narrow cells
    4 Costa of distal leaves ending 7-10 cells short of the apiculus (*E. sonorae*) ..... **Entosthodon**
    4 Costa of distal leaves percurrent to excurrent
      5 Capsule erect and symmetric ..... **Physcomitrium**
      5 Capsule strongly inclined and usually very asymmetric ..... **Funaria**

Entosthodon [an inside tooth].
1 Distal leaves with a hair point or awn
  2 Leaves bordered almost to the apex by at least two rows of often orangish, narrow cells ..... ***E. attenuatus***
  2 Leaves not bordered by rows of orangish, narrow cells
    3 Costa of distal leaves ending within the acumen or entering the hair point
      4 Peristome well-developed; annulus absent; blade abruptly contracted to a hyaline-tipped awn; seta 3-6 mm long, hygroscopic ..... ***E. apiculatopilosus***
      4 Peristome absent or rudimentary; annulus present; blade gradually narrowed to a slender, non-hyaline acumen; seta 6-10 mm long, nearly straight, not hygroscopic ..... ***E. rubiginosus***
    3 Costa of distal leaves ending well below the hair point
      5 Leaf margins entire or nearly so distally; capsule inclined ..... ***E. muhlenbergii***
      5 Leaf margins serrulate distally by projecting, rounded end of cell walls; capsule erect or nearly so
        6 Leaves mostly 1.5-2 mm long; costa ending 7-10 cells before the apiculus; seta and capsule yellow; spores 18-25 µm, smooth ..... ***E. sonorae***
        6 Leaves 2-4 mm long; costa ending 5-8 cells before the apiculus; seta and capsule deep brownish red; spores 24-30, with low papillae µm ..... ***E. rubrisetus***
1 Distal leaves lacking a hair point or awn
  7 Leaves bordered almost to the apex by at least two rows of often orangish, narrow cells; leaves mostly 2-3 mm long; costa of distal leaves ending 3-5 cells before the tip ..... ***E. attenuatus***
  7 Leaves not bordered by rows of orangish, narrow cells; leaves mostly 1-2 mm long; costa of distal leaves ending 7-10 cells before the tip ..... ***E. sonorae***



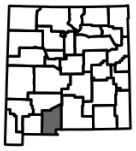
Entosthodon apiculatopilosus (Cardot) Fife [hair-like apex] [*Funaria apiculatopilosa* Cardot, *Funaria orcuttii* Bartram]. Acrocarpous, yellowish green, the stems 3-5 mm tall, with a short antheridial branch at the base, the leaves crowded apically; distal leaves about 1.7-2.3 mm long, abruptly contracted to a flexuose, hyaline-tipped awn; costa sinuose, excurrent with a hyaline tip; seta 3-6 mm long; annulus absent; truncate exostome segments about ¼ the length of the elongate endostome teeth. ●On shaded soil and rock; known in New Mexico only from the Organ Mts. ♦Distinguished by the long excurrent costae, lack of annulus, and truncate exostome segments.

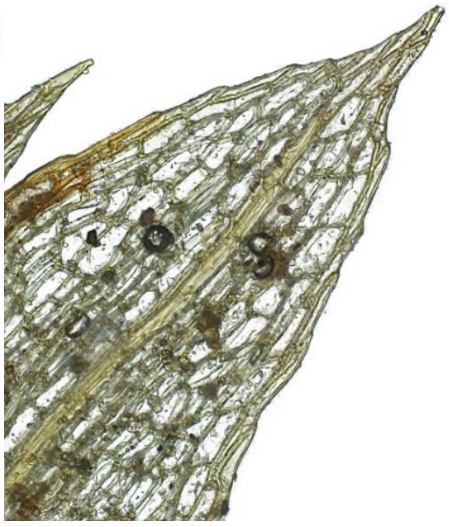


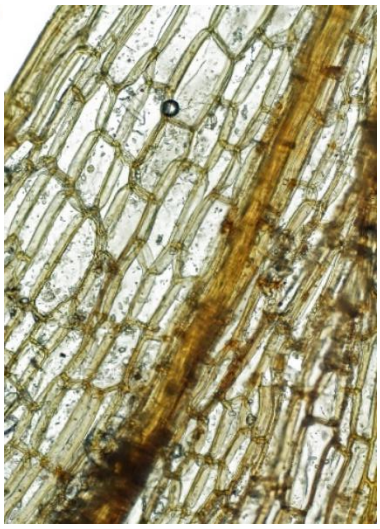


NM, Dona Ana Co., Filmore Canyon, 27 Jun 1992, *R.D. Worthington* (COLO).

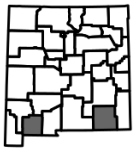
Entosthodon attenuatus (Dickson) Bryhn [tapering] [*Bryum attenuatum* Dickson, *Funaria attenuata* (Dickson) Lindberg]. Acrocarpous, the stems to 5 mm tall/long; leaves variously contorted when dry, 2-3 mm long, the margins crenulate-serrulate, bordered by a row of orangish narrow cells, the apices acute, with a sharp, 1-2-celled apiculus; costa subapical; laminal cells rectangular basally, hexagonal to oblong distally. ●Disturbed wet sandy soils along stream bed and ditches; known from very few collections.







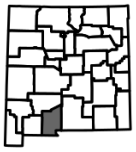
Scotland, Forfarshire, in 1869, *Rev. J. Ferguson* (COLO).

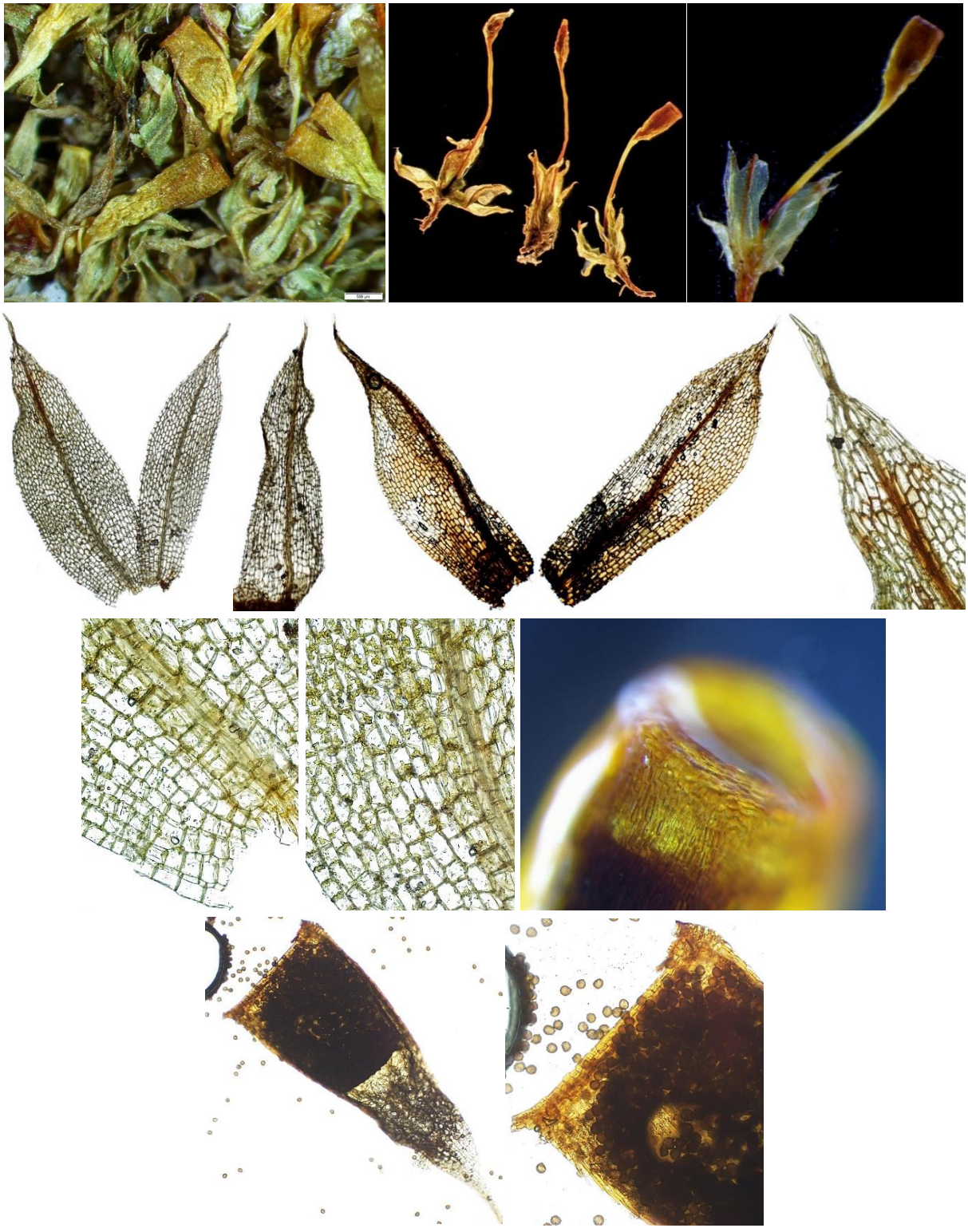


Entosthodon muhlenbergii (Turner) Fife [for Gotthilf Heinrich Ernst Muhlenberg (1753-1815), Lutheran pastor of Pennsylvania] [*Funaria muhlenbergii* Turner, *Funaria muhlenbergii* Turner var. *lineata* Grout]. Acrocarpous, green to yellow-green, the stem 2-6 mm tall, with the leaves crowded at the tip; distal leaves 1.5-3 mm long, the acuminate tip about ⅙ the leaf length, entire to serrulate distally; costa not entering the acumen; seta 5-15 mm long, reddish, straight; annulus absent; endostome segments about ⅔ the length of the exostome teeth. ●Ephemeral on seasonally moist soil and under rock overhangs; maturing in the early spring.

NM, Eddy Co., Carlsbad Caverns Nat. Park, Lower Walnut Canyon, 13 May 2014, *Kleinman & Blisard* (SNM).

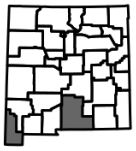
Entosthodon rubiginosus (R.S. Williams) Grout [rust-colored] [*Funaria rubiginosa* R.S. Williams]. Acrocarpous, pale yellow-green, the stems 2-5 mm tall/long; leaves slightly contorted when dry, broadly ovate, to 2.4 mm long, the margins entire, the apices acute, with a subulate tip; costa percurrent to excurrent into the subula; laminal cells rectangular basally, hexagonal to oblong distally, little differentiated at the margins; peristome absent or rudimentary. ●Sandy soil along ditches and streams; known from a single collection.

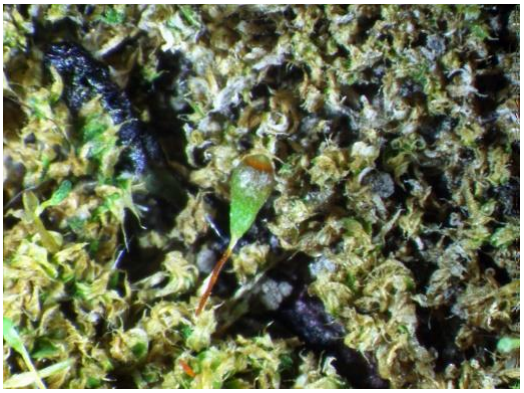


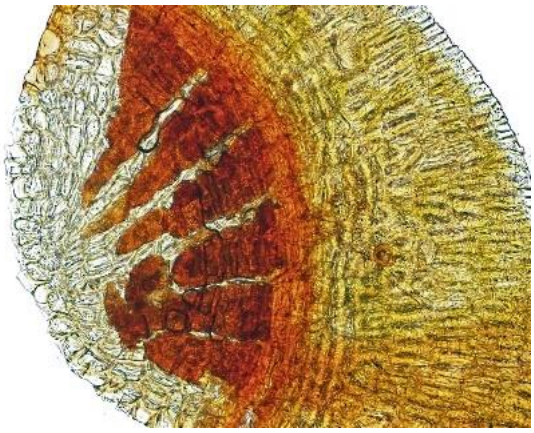


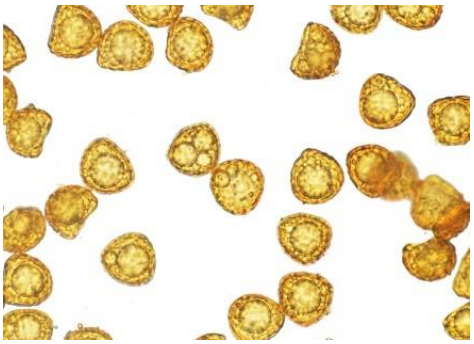
TX, El Paso Co., Hueco Tanks, 20 Mar 1995, *R.D. Worthington* (COLO).

Entosthodon rubrisetus (Bartram) Grout [red-bristled] [*Funaria rubriseta* Bartram]. Acrocarpous, pale yellow-green, the stems 2-5 mm tall/long; leaves little contorted when dry, 2-4 mm long, the margins serrulate distally, the apices gradually narrowed to a filiform tip; costa subapical; laminal cells rectangular basally, quadrate to oblong distally, the marginal cells not differentiated; seta and capsule deep brownish red. ●Sandy soil, soil over rock, canyons and washes; known from only two collections.

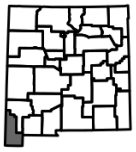








NM, Hidalgo Co., Animas Mts, 4 Apr 2019, *Kleinman et al.* (SNM).



Entosthodon sonorae (Cardot) Steere [of Sonora, Mexico] [*Funaria sonorae* Cardot]. Acrocarpous, pale yellow-green, the stems 2-4 mm tall/long; leaves variously contorted when dry, 1.5-2 mm long, the margins serrulate, the apices acute, with a 1-3-celled apiculus; costa subapical; laminal cells rectangular basally, short-rectangular distally; seta and capsule yellowish. ●Mineral soils, often in shade of rocks or crevices; known from a single recent collection. ♦Morphology is variable within a single specimen, the leaves lacking to possessing a hair-point, the capsules erect to somewhat horizontal; distinguished by the key features.

AZ, Pima Co., near Tucson, in 1945, *I. Haring* (NY 00780329, 00780330, 00780331, 00780332, 00780333).

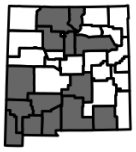
Funaria [cord-like].

1 Seta 8-30(40) mm long, ± straight; capsule smooth when wet, becoming striate when dry; leaf distal cells not much different near the margin; endostome segments blunt and only about ¼ the length of the peristome teeth ..*F. flavicans*

1 Seta 12-80 mm long, flexuose, hygroscopic; capsule sulcate wet or dry; leaf distal cells somewhat narrower near the margin; endostome segments long-pointed about ⅔ as long as the peristome teeth .....***F. hygrometrica***

Funaria flavicans Michaux [yellowing]. Acrocarpous, yellow-green, the stems 2-5 mm tall, with a basal antheridial branch; leaves 2-3 mm long, scarcely contorted when dry, abruptly narrowed to an acuminate tip, the margins entire; seta 8-20 mm long, mostly straight; annulus large and revoluble; endostome segments about ¼ the length of the exostome teeth. ●Barren soil; not known from NM, but perhaps to be found in moist spots in the southern counties. ♦Sometimes reported for the state, but all specimens called this that we have seen belong to *Funaria hygrometrica*.

LA, Washington Parrish, Foster Creek, 15 Mar 1974, *W.D. Reese* (COLO).

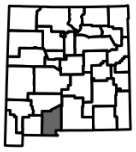


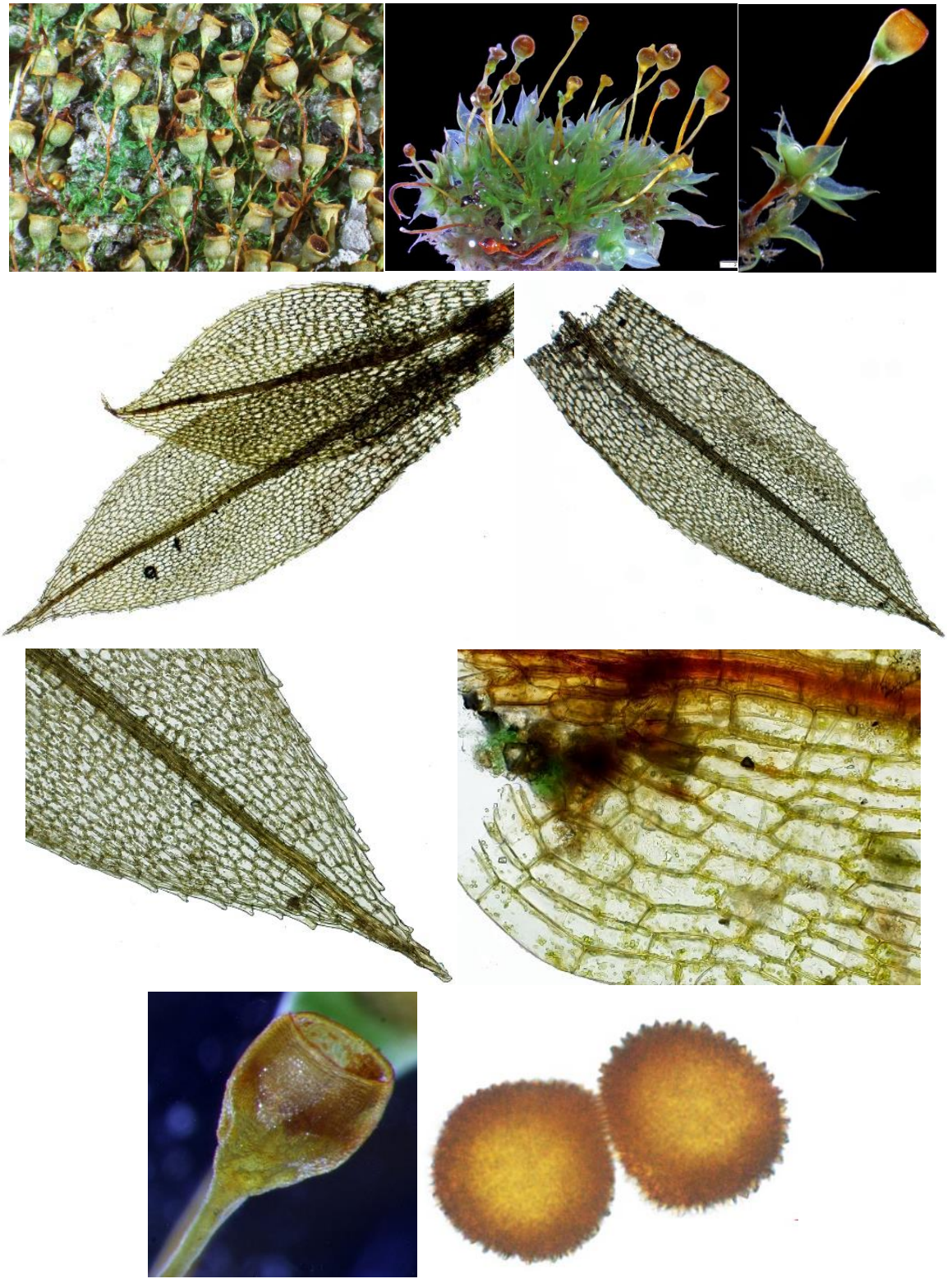
Funaria hygrometrica Hedwig [wet-measuring (moving when wet)] [*Funaria calvescens* Schwägrichen, *Funaria hygrometrica* Hedwig var. *utahensis* Grout]. Acrocarpous, green to yellowish green, the stems 4-10 mm or more tall, with a basal antheridial branch, the leaves crowded distally; distal leaves 2-4 mm long, acute to apiculate, entire or weakly serrulate distally; costa subpercurrent to short-excurrent; seta (12)20-45(80) mm long, flexuose, usually hygroscopic; annulus revoluble; endostome segments about ⅔ as long as the exostome teeth. ●In disturbed sites, often burned soil or wood; very common. ♦Plants with inclined to erect, straight capsules with a long slender neck and wide mouth have been called var. *calvescens* (Schwägrichen) Montagne

NM, Grant Co., Burro Mts, Saddlerock Canyon, 11 Jun 2020, *Kleinman & Blisard* (SNM).

Physcomitrium [a sausage-turban].

Physcomitrium pyriforme (Hedwig) Hampe [pear-shaped] [*Gymnostomum pyriforme* Hedwig]. Acrocarpous, light green to yellowish green, the stems to 2.5 cm tall; leaves 2-5 mm long, the margins mostly toothed; costa percurrent to rarely short-excurrent; capsules erect, symmetrical, urn-shaped, the spores mostly greater than 40 µm dia; calyptra mitrate, deeply split into 2-4 spreading lobes. ●Wet soil of meadows, springs, and other moist sites; scarcely known in the state.

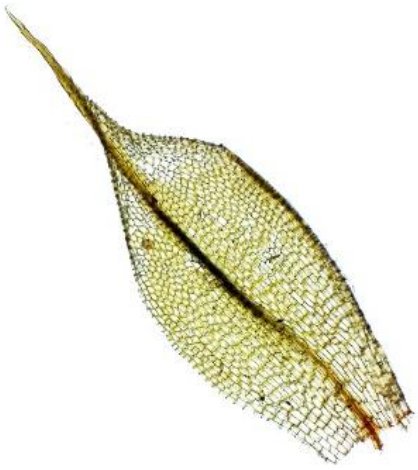


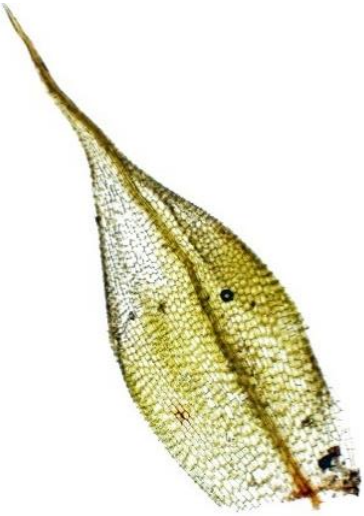


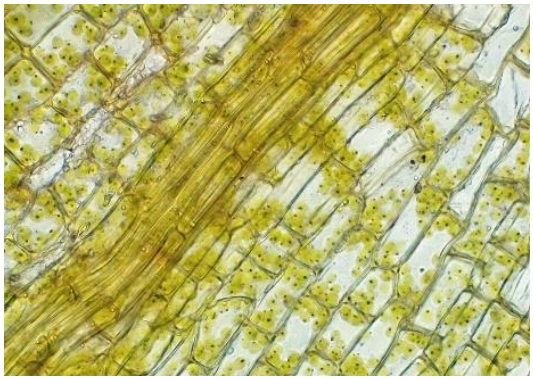
IA, Clayton Co., Bixby State Park, 29 May 2012, *Kleinman & Blisard* (SNM).

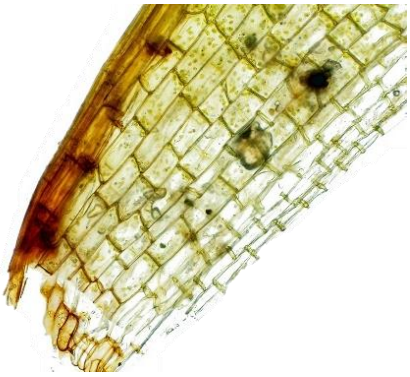
Pyramidula [a little pyramid].

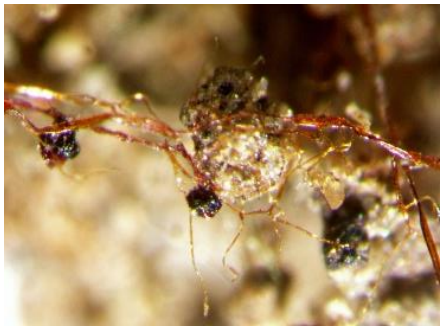
Pyramidula tetragona (Bridel) Bridel [four-angled] [*Gymnostomum tetragonum* Bridel]. Acrocarpous, very small, the stems to 1 mm tall; leaves somewhat crisped when dry, 1.5-2.5 mm long, the margins entire, the apices acuminate; costa single, percurrent; specialized asexual reproduction by dark purple rhizoidal tubers; seta to 2 mm long; capsules globose, hidden in calyptra, sharply constricted to the neck, urceolate after dehiscence; calyptra long-persistent, enclosing the entire capsule and seta, four-angled, beaked, opening by longitudinal slits nearly the entire length to the clasping base. ●On soil; few collections. ♦Distinctive by the tiny plants and four-angled calyptra enclosing the entire sporophyte.

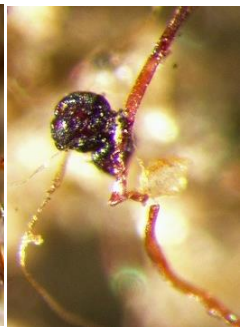












NM, Dona Ana Co., Fillmore Canyon, 23 Mar 2010, *J. Brinda* (MO).

Key to genera, emphasizing reproductive features:

1 Plants cladocarpous, the sporophytes arising from the tips of branches, rather than from the tips of main stems
  2 Laminal cells strongly papillose ..... **Niphotrichum**
  2 Laminal cells smooth or appearing weakly papillose by the strongly sinuous cells ..... **Bucklandiella**
1 Plants acrocarpous, the sporophytes arising from the tips of the main stems, rather than from the tips of branches
  3 Columella usually attached to operculum and deciduous with it; calyptra small, covering only the operculum, mitrate (with several splits or clefts around the base) or cucullate (with only one split at the base, like a hood), smooth; capsule immersed to emergent, longer than the seta; seta straight; leaf margins plane to recurved ..... **Schistidium**
  3 Columella not attached to the operculum; calyptra small to large, mitrate, cucullate, erose, smooth or plicate; capsule exserted, occasionally immersed; seta straight, sigmoid, or arcuate; leaf margins plane, recurved, or incurved
    4 Calyptra small, less than ½ the length of the capsule, mitrate or cucullate, smooth; awns on distal leaves usually shorter than the blades ..... **Grimmia**
    4 Calyptra large, covering at least ½ the length of the capsule, campanulate-mitrate, plicate; awns on distal leaves typically longer than the blades
      5 Stem leaves lanceolate to ovate, keeled distally, plicate or not; distal blades 1- to 2-stratose; plants olivaceous to blackish green, acidiphilic ..... **Coscinodon**
      5 Stem leaves broadly ovate to obovate, concave or only somewhat keeled distally, not plicate; distal blades 1-stratose; plants yellow-green to dark olivaceous, calciphilic ..... **Jaffueliobryum**

Key to all species, emphasizing vegetative features:

1 Nearly all leaves lacking hyaline hair-points
  2 Clusters of gemmae present at leaf tips or on abaxial surface at mid-leaf; capsules exserted when present
    3 Gemmae in globular clusters on deformed and modified leaf tips; leaves imbricate when dry; laminal cells 1-papillose ..... ***Grimmia anomala***
    3 Gemmae in clusters on abaxial leaf surface, at base of leaf; leaves contorted to spirally twisted when dry; laminal cells lacking papillae ..... ***Grimmia torquata***
  2 Gemmae absent; capsules immersed when present
    4 Central strand absent; peristome well-developed ..... ***Schistidium canadense***
    4 Central strand distinct; peristome well-developed to rudimentary
      5 Distal costa cross-section prominently circular ..... ***Schistidium teretinerve***
      5 Distal costa cross-section semi-circular
        6 Plants 2-5 cm high, the stems elongate, loosely arranged and freely branched, the branches and main stems similar; tufts dark green to olivaceous, sometimes brownish, on wet to dry rock in or along water; peristome 350-570 µm long ..... ***Schistidium rivulare***
        6 Plants to 1 cm high, the stems very short, densely tufted, the branches short and obviously lateral to the longer main stems; tufts brown, dark brown, to nearly black, on dry open rock surfaces usually away from water; peristome various
          7 Leaves commonly 2-stratose distally; mats dark brown to nearly black; costa usually plane in distal half; peristome very short or rudimentary, 30-100 µm long; exothecial cells of capsule lacking stomata ..... ***Schistidium atrofuscum***
          7 Leaves mostly 1-stratose distally or with 2-stratose patches; mats brownish; costa recurved to near the apex; peristome well-developed, 200-380 µm long; exothecial cells of capsule with stomata ..... ***Schistidium dupretii***
1 Nearly all or at least most leaves with hyaline hair-points
  8 Distal laminal cells distinctly papillose
    9 Costa weak, extending ½-¾ the leaf length, not extending into the apical awn, often forked in many leaves ..... ***Niphotrichum canescens***
    9 Costa strong, extending to the leaf tip or into the awn, never forked ..... ***Schistidium papillosum***
  8 Distal laminal cells lacking papillae or papillae quite obscure (costae and marginal cells papillose in some)
    10 Leaves rounded on the back, not conspicuously keeled, many lying flat on the slide, the costa at least somewhat flat
      11 Median and distal laminal cells elongate rectangular and conspicuously sinuose-nodulose ..... ***Bucklandiella subsecunda***
      11 Median and distal laminal cells not both elongate and sinuose as above
        12 Awns of distal leaves nearly as long as or longer than the blades; leaves to about 1 mm long, appressed-julaceous at least distally
          13 Distal portion of the leaf acute to acuminate; some leaves keeled in cross-section; proximal stem leaves mostly spreading ..... ***Jaffueliobryum rauii***
          13 Distal portion of the leaf broadly acute-rounded; leaves not keeled; proximal stem leaves mostly appressed ..... ***Jaffueliobryum wrightii***
        12 Awns of distal leaves rarely if ever as long as the blades; leaves more than 1 mm long, spreading, elongate-ovate to lanceolate, the apices acute to acuminate

14 Blades 2-3-stratose; seta straight or sigmoid
15 Basal juxtacostal cells quadrate to elongate, with thin lateral walls; basal marginal cells with thick transverse walls
16 Hair-point 1-1.4 mm long; costa prominent to near the apex; capsule unknown ..... ***Grimmia texicana***
16 Hair-point 0.3-0.6 mm long; costa prominent proximally, fading distally; capsule often present ***Grimmia tergestina***
15 Basal juxtacostal cells elongate, with thick lateral walls; basal marginal cells with thick or thin transverse walls
17 Hyaline awn portion not decurrent, narrowly attached; basal juxtacostal cells usually sinuose or porose; costa narrow at the base, about the same width as distally ..... ***Grimmia ovalis***
17 Hyaline awn portion decurrent, broadly attached; basal juxtacostal cells straight; costa much broader at the base than distally ***Grimmia laevigata***
14 Blades 1-stratose, sometimes with 2-stratose patches; seta sigmoid
18 Basal cells short-rectangular to quadrate from costa to margin; peristome present ..... ***Grimmia plagiopodia***
18 Basal cells elongate-rectangular near costa, becoming quadrate near margins; peristome absent ***Grimmia anodon***

10 Leaves keeled at least distally, many lying folded on the slide, the costa semi-terete to terete
19 Leaves merely 1-stratose distally, with one or both margins recurved; capsules commonly present, exserted
20 Basal juxtacostal cells thin-walled, straight
21 Larger leaves longer than 2 mm; calyptra large, enclosing the capsule; seta straight ..... ***Coscinodon calyptratus***
21 Larger leaves shorter than 2 mm; calyptra small, less than ½ the length of the capsule; seta arcuate.... ***Grimmia pulvinata***
20 Basal juxtacostal cells thick-walled, often nodulose
22 Hyaline hair-point very short, to 0.4 mm long; basal marginal cells quadrate, sinuose with equally thickened walls ***Bucklandiella sudetica***
22 Hyaline hair-point prominent, 0.5-1 mm long or more; basal marginal cells elongate, straight, the transverse walls thicker
23 Blade ± abruptly contracted to the awn, the margins recurved in the middle of the leaf on one or both sides; gemmae clusters always absent; capsules usually present, smooth to weakly ribbed ***Grimmia orbicularis***
23 Blade gradually narrowed to the awn, the margins recurved from the middle or lower to near the apex on one or both sides; gemmae clusters sometimes produced in leaf axils; capsules sometimes present, striate ***Grimmia trichophylla***
19 Leaves 2- to 3-stratose distally, the margins incurved, plane, or recurved; capsules present or not, exserted to immersed
24 Margins plane or incurved
25 Basal marginal cells long-rectangular, thin-walled on all sides, typically hyaline across much of the base ***Grimmia donniana***
25 Basal marginal cells shorter or with thick walls or not hyaline
26 Distal costa cross-section prominently circular; leaves merely awn-tipped, the hyaline awns to 0.3 mm long ***Schistidium teretinerve***
26 Distal costa cross-section semi-circular; leaves commonly with hyaline awns longer than 0.3 mm
27 Leaves plicate, at least above the base; calyptra large, enclosing the capsule; seta to 1.2 mm long ***Coscinodon cribrosus***
27 Leaves not plicate; calyptra small, less than ½ the length of the capsule; seta 2-3 mm long
28 Basal marginal laminal cells with thick transverse walls and thin lateral walls, hyaline or not ***Grimmia sessitana***
28 Basal marginal laminal cells thick-walled on all sides, hyaline or not
29 Basal juxtacostal leaf cells short- to long-rectangular, distinct from the quadrate to short-rectangular, not hyaline basal marginal cells; medial leaf cells rounded, thick-walled, not bulging ***Grimmia montana***
29 Basal juxtacostal and marginal leaf cells quadrate to short-rectangular, the basal marginal cells hyaline or not; medial leaf cells quadrate to short-rectangular, thin-walled, generally bulging ***Grimmia alpestris***
25 Margins recurved on one or both sides, at least in the lower half of the blade
30 Basal laminal cells straight-walled
31 Basal marginal cells, at least of perichaetial leaves, elongate-rectangular, often clear; mid- and distal cells usually strongly sinuous; distal margins 1-2-stratose ***Schistidium frigidum***
31 Basal marginal cells quadrate or short-rectangular, not obviously elongate when compared to medial cells, clear or opaque; mid- to distal cells sinuous or not; distal margins 2-4-stratose

32 Transverse and longitudinal walls of basal marginal cells equally thickened .... ***Schistidium sinensiapocarpum***

32 Transverse and longitudinal walls of basal marginal cells unequally thickened, the transverse walls thicker

33 Awns of upper leaves or perichaetial leaves commonly ¼ to ⅓ or more the blade length; margins of leaf blades commonly plane (at least one margin); spores 6-8 µm .... ***Schistidium ambiguum***

33 Awns of upper leaves short, rarely as much as ¼ the blade length; margins of leaf blades recurved to plane; spores 8-12 µm ..... ***Schistidium confertum***

30 Basal laminal cells with sinuose-nodulose lateral walls

34 Leaf margins 2-stratose, not thickened; stem central strand present, the epidermis thin

35 Capsules immersed, the operculum short-beaked, about ⅓ the length of the urn; both leaf margins recurved proximally; leaves sheathing; costa semi-circular in cross-section; central strand absent or present ..... ***Grimmia pilifera***

35 Capsules exserted, the operculum long-beaked, about ¾ the length of the urn; only one leaf margin recurved proximally; leaves not sheathing; costa reniform in cross-section; central strand present ..... ***Grimmia longirostris***

34 Leaf margins multi-stratose and thickened; stem central strand absent, the epidermis thick

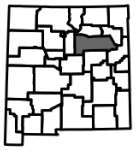
36 Leaves narrowly lanceolate from an ovate base, usually narrowly recurved on both margins; distal lamina without multi-stratose bands, never papillose; costa rounded or scarcely bulging laterally..... ***Grimmia pilifera***

36 Leaves broadly lanceolate, broadly recurved on one margin; distal lamina with multi-stratose bands, occasionally papillose; costa bulging laterally ..... ***Grimmia elatior***

Bucklandiella [for Monte Buckland, Tierra del Fuego, and William Buckland (1784-1856), English theologian/botanist].

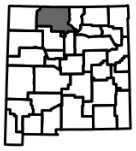
1 Leaves commonly falcate-secund at the ends of the stems and branches; costa 2 cells thick; medial cells 3-4:1 .... ***B. subsecunda***

1 Leaves ± straight at the ends of the stems and branches; costa 3-4 cells thick; medial cells 1-2:1..... ***B. sudetica***

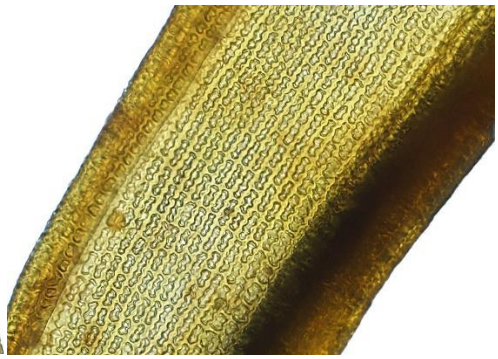


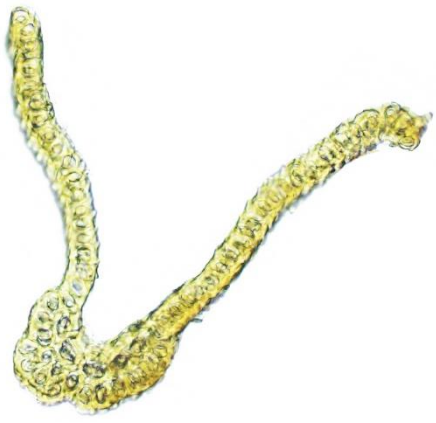
Bucklandiella subsecunda (Hooker & Greville ex Harvey) Bednarek-Ochyra & Ochyra [turned to one side] [*Grimmia subsecunda* (Hooker & Greville ex Harvey) Mitten, *Trichostomum subsecundum* Hooker & Greville ex Harvey]. Cladocarpous, in dull greenish brown mats, the stems to 8 cm long, prostrate to ascending; leaves 2-4 mm long, falcate-secund at the stem tips, the margins recurved, 1-stratose, the apices with a hyaline hair-point to 0.5(1) mm long, smooth to weakly denticulate; costa 2-stratose; medial cells smooth or appearing weakly papillose by the strongly sinuous cells, about 3-4:1; seta 2-5 mm long; capsules 2-3 mm long, the calyptrae 2-3 mm long, laciniate basally. ●On rocks and boulders, cliff faces, often in seasonally wet situations; known from a single recent collection.

Tanzania, Arusha District, Mt. Meru, 15 Jun 1986, *T. Pocs* (COLO).



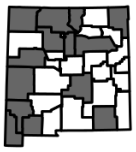
Bucklandiella sudetica (Funck) Bednarek-Ochyra & Ochyra [of the Südetenland] [*Trichostomum sudeticum* Funck]. Cladocarpous, in dull yellow-green, olivaceous, to brownish mats or cushions, the stems, to 5(8) cm tall/long, rarely prostrate; leaves 1-3 mm long, 1-stratose, straight to slightly curved, not falcate-secund, the margins recurved, 2-3-stratose, the apical hair-point 0-0.5 mm long, denticulate; costa 3-4-stratose at middle and base; medial cells smooth to pseudopapillose, 1-2:1, the central basal cells longer, sinuose-nodulose, the marginal basal cells quadrate; seta 2-4 mm long; capsules 1-1.5 mm long. ●Rock, boulders, cliff ledges; known from a single recent collection.





CO, Larimer Co., Fern Lake, *F.J. Hermann* (COLO).

Coscinodon [a sieve-tooth].
1 Leaves not plicate; blades 1-stratose distally, the margins plane or recurved on one side at mid-leaf .....***C. calyptratus***
1 Leaves plicate at least in the distal portions; blades 2-stratose distally, the margins incurved distally .....***C. cribrosus***



Coscinodon calyptratus (Hooker) C. Jensen ex Kindberg [capped] [*Grimmia calyptrata* Hooker]. Acrocarpous, the stems 7-10 mm tall/long; leaves 1.5-2.5 mm long, not plicate, 1-stratose, the margins plane or one margin recurved at mid-leaf, 2-stratose, the apices awned 0.4-2.4 mm; basal juxtacostal cells long-rectangular, basal marginal cells quadrate to long-rectangular, the end walls thin or thick; capsule exserted, constricted at rim, the peristome present, the calyptra plicate. ●On boulders, ledges, and outcrops,








Grant Co., Burro Mts, Blackhawk Canyon, 21 Feb 2021, *Kleinman* & *Blisard* (SNM).

Coscinodon cribrosus (Hedwig) Spruce [sieve-like] [*Grimmia cribrosa* Hedwig]. Acrocarpous, the stems to 7 mm tall/long; leaves 1-2 mm long, 2-plicate, 2-stratose distally, the margins incurved distally, the apices awned to 1 mm; basal juxtacostal cells quadrate to long-rectangular, evenly thick-walled, the basal marginal cells quadrate to rectangular, with thin or thick end walls and thin lateral walls; capsules emergent, the peristome present, the calyptra plicate. ●On boulders and rocky outcrops.

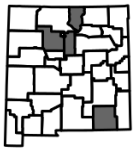
NM, Catron Co., Mineral Creek, 18 Feb 2015, *Kleinman et al.* (SNM).

Grimmia [for Johann Friedrich Karl Grimm (1737-1831), German botanist-physician].

1 Seta attached eccentrically to the capsule base; capsule immersed, smooth, swollen on one side
  2 Distal leaves broadly concave, the blades 2-stratose with 2-stratose margins; annulus prominent; operculum rostrate
    3 Basal leaf cells thin-walled; guide cells indistinct or indistinguishable from the laminal cells, their adaxial cell walls not or slightly thickened; peristome rudimentary ..... ***G. tergestina***
    3 Basal leaf cells thick-walled; guide cells distinctly present, usually 2, their adaxial cell walls strongly thickened; peristome fully developed ..... ***G. laevigata***
  2 Distal leaves concave-keeled, the blades 1-stratose or with 2-stratose patches, the margins 1- or 2-stratose; annulus absent or reduced to 1-2 rows of small cells; operculum mammillose
    4 Basal cells short-rectangular to quadrate from costa to margin; peristome present ..... ***G. plagiopodia***
    4 Basal cells elongate-rectangular near costa, becoming quadrate near margins; peristome absent ..... ***G. anodon***
1 Seta attached centrally to the capsule base; capsule immersed to exserted, smooth to plicate, not swollen on one side
  5 Leaves merely 1-stratose distally, the margins at most narrowly 2-stratose, with one or both margins recurved
    6 Leaves gradually tapering to the awns or tips, the apices acute; plants dioicous
      7 Clusters of gemmae absent or in obscure clusters in leaf axils (very rarely at leaf tips or on abaxial surface at mid-leaf); leaves slightly twisted when dry ..... ***G. trichophylla***
      7 Clusters of gemmae easily visible at leaf tips or on abaxial surface at mid-leaf; leaves imbricate or contorted when dry
        8 Gemmae in globular clusters on deformed and modified leaf tips; leaves imbricate when dry ..... ***G. anomala***
        8 Gemmae in clusters on abaxial leaf surface, at base of leaf; leaves contorted when dry ..... ***G. torquata***
    6 Leaves abruptly narrowed to the awns, the apices rounded; plants autoicous
      9 Operculum rostrate; calyptra mitrate, with several basal slits; leaf margins 2-stratose; juxtacostal basal cells shorter, 1-3:1 ..... ***G. pulvinata***
      9 Operculum mammillose to obtuse; calyptra cucullate, with a single slit; leaf margins 1-stratose; juxtacostal basal cells longer, 3-9:1 ..... ***G. orbicularis***
  5 Leaves 2- to 3-stratose distally or 1-stratose with distal margins widely 2-stratose (*G. sessitana*), the margins incurved, plane, or recurved
    10 Leaves concave; costa not prominent; margins plane or incurved; plants dioicous
      11 Leaves oblong-ovate to oblong-lanceolate; basal marginal leaf cells oblate to quadrate; costa broad at base; awn broadly attached and decurrent ..... ***G. laevigata***
      11 Leaves ovate-lanceolate from an ovate base; basal marginal leaf cells quadrate to long-rectangular; costa narrow at base; awn typically narrowly attached and not decurrent ..... ***G. ovalis***
    10 Leaves keeled; costa prominent; margins recurved, plane, or incurved; plants autoicous or dioicous
      12 Margins plane or incurved
        13 Costa transverse section circular distally; awn hyaline-tipped to 0.3 mm, decurrent; basal marginal laminal cells oblate to quadrate, thick-walled all around, not hyaline ..... go to *Schistidium teretinerve*
        13 Costa transverse section semicircular distally; awn 0.3-1.3 mm, not decurrent; basal marginal cells various, but generally not all as above
          14 Basal marginal laminal cells thin-walled on all sides, long-rectangular, typically hyaline across the base ..... ***G. donniana***
          14 Basal marginal laminal cells not thin-walled all around, but thickened on transverse sides or lateral sides or both, hyaline or not, quadrate to short-rectangular or long-rectangular
            15 Basal marginal laminal cells with thick transverse walls and thin lateral walls, hyaline or not ..... ***G. sessitana***
            15 Basal marginal laminal cells thick-walled on all sides, hyaline or not
              16 Basal juxtacostal leaf cells short- to long-rectangular, distinct from the quadrate to short-rectangular, not hyaline basal marginal cells; medial leaf cells rounded, thick-walled, not bulging ..... ***G. montana***
              16 Basal juxtacostal and marginal leaf cells quadrate to short-rectangular, the basal marginal cells hyaline or not; medial leaf cells quadrate to short-rectangular, thin-walled, generally bulging ..... ***G. alpestris***
      12 Margins recurved on one or both sides, at least in the lower half of the blade
        17 Sporophytes present
          18 Capsule immersed
            19 Stem central strand absent, the epidermis thick; distal leaf margins 3(4)-stratose, thicker than juxtacostal blade, usually both margins recurved ..... ***G. pilifera***
            19 Stem central strand present, the epidermis thin; distal leaf margins 2-stratose, not thickened, one or both margins recurved
              20 Stems 0.5-1 cm long, ± unbranched; margins plane to recurved on one side; basal juxtacostal laminal cells rectangular, with thin to slightly incrassate walls ..... ***G. texicana***
              20 Stems 1-3 cm long, branched; margins frequently recurved on two sides; basal juxtacostal laminal cells elongate with incrassate and sinuous walls ..... ***G. pilifera***

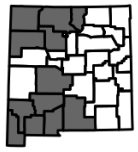
18 Capsule exserted
21 Seta arcuate; plants dioicous; costa ± flattened and bulging laterally ..... ***G. elatior***
21 Seta straight; plants autoicous; costa more rounded and not or only slightly bulging laterally
22 Annulus small, of one row of quadrate cells; basal juxtacostal cells straight and thin-walled... ..... ***G. sessitana***
22 Annulus prominent, of 2 rows of rectangular cells; basal juxtacostal cells sinuous and thick-walled ..... ***G. longirostris***
17 Sporophytes absent
23 Basal juxtacostal cells straight, thin-walled; distal juxtacostal cells 1-stratose, the cells often bulging; plants small (less than 1 cm long), blackish; moist, alpine habitats ..... ***G. sessitana***
23 Basal juxtacostal cells sinuous, thick-walled; distal juxtacostal cells at least 2-stratose, the cells not bulging; plants robust (greater than 1 cm long), yellow-green to very dark olivaceous; dry habitats, widely distributed
24 Leaf margins 2-stratose, not thickened; stem central strand present, the epidermis thin
25 Plants autoicous; costa transverse section reniform; leaves sheathing ..... ***G. longirostris***
25 Plants dioicous; costa transverse section semi-circular; leaves not sheathing
26 Stems 0.5-1 cm long, ± unbranched; margins plane to recurved on one side; basal juxtacostal laminal cells rectangular, with thin to slightly incrassate walls ..... ***G. texicana***
26 Stems 1-3 cm long, branched; margins frequently recurved on two sides; basal juxtacostal laminal cells elongate with incrassate and sinuous walls ..... ***G. pilifera***
24 Leaf margins multi-stratose and thickened; stem central strand absent, the epidermis thick
27 Leaves narrowly lanceolate from an ovate base, usually narrowly recurved on both margins; distal lamina without multi-stratose bands, never papillose; costa rounded or scarcely bulging laterally ..... ***G. pilifera***
27 Leaves broadly lanceolate, broadly recurved on one margin; distal lamina with multi-stratose bands, occasionally papillose; costa bulging laterally ..... ***G. elatior***

Grimmia alpestris (Weber & Mohr) Schleicher [growing in the alps] [*Grimmia ungeri* of New Mexico reports, *Trichostomum pulvinatum* (Hedwig) Weber & Mohr var. *alpestre* Weber & Mohr]. Acrocarpous, the stems to 1.5 cm tall/long, the central strand weak; leaves 1-2 mm long, keeled, not plicate, the margins incurved distally, the awn to 0.8 mm long; basal juxtacostal leaf cells quadrate to short-rectangular; distal laminal cells 2-stratose, sometimes bulging, the marginal cells 2-stratose; seta straight, 2-3 mm; capsule exserted, the peristome fully developed. ●On exposed granite and sandstone.

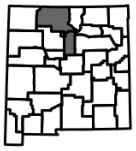


NM, Taos, Wheeler Peak Trail, 23 Aug 2014, *Kleinman et al.* (SNM).

Grimmia anodon Bruch & Schimper [toothless]. Acrocarpous, the stems to 1 cm tall/long, central strand present; leaves 1-2 mm long, concave-keeled, the to 1.2 mm; basal juxtacostal cells quadrate to long-rectangular, thin-walled; medial cells quadrate, sinuose, thick-walled; distal cells 1-stratose with 2-stratose patches, the margins 2-stratose; seta S-shaped, to 0.3 mm; capsule commonly present, immersed, the peristome absent. ●On exposed calcareous rock. ♦Distinctive by the S-shaped seta, immersed capsule, and absent peristome.

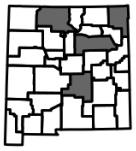


NM, Grant Co., Pinos Altos Range, Bear Mt. Road, 28 Apr 2011, *Kleinman & Blisard* (SNM).



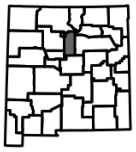
Grimmia anomala Hampe ex Schimper [unusual]. Acrocarpous, the stems to 3.5 cm tall/long, a small central strand present; leaves imbricate when dry, 1.5-2.5 mm long, keeled, the margins recurved on one or both sides, the apices gradually narrowed to a blunt chlorophyllose point, awns absent to very short; basal juxtacostal cells quadrate to short-rectangular, straight, thin-walled, the basal marginal cells with thickened transverse walls; medial cells rounded-quadrate, the walls slightly sinuose, thin- or thick-walled; distal cells 1-stratose with 2-stratose patches, the margins 1-stratose; gemmae in globular clusters on hyaline deformed leaf tips; seta straight to slightly arcuate, 3-5 mm long; capsules rarely found, exserted, the peristome developed. ●Exposed damp rock and boulders, moderate to high elevations; only recently found in the state. ♦Distinctive by the abundant gemmae and modified apices of the leaves.

CO, Routt Co., near Slavonia, *Weber & Nelson* (COLO).

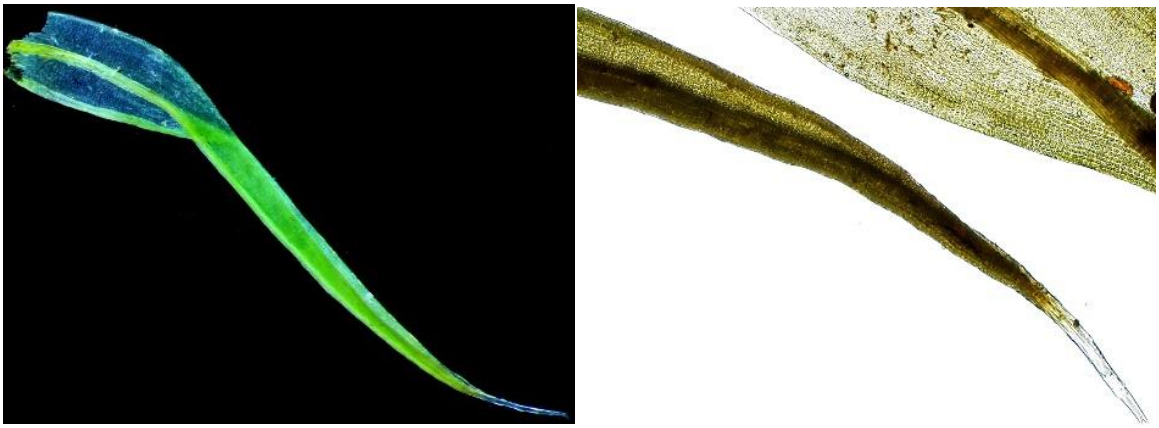


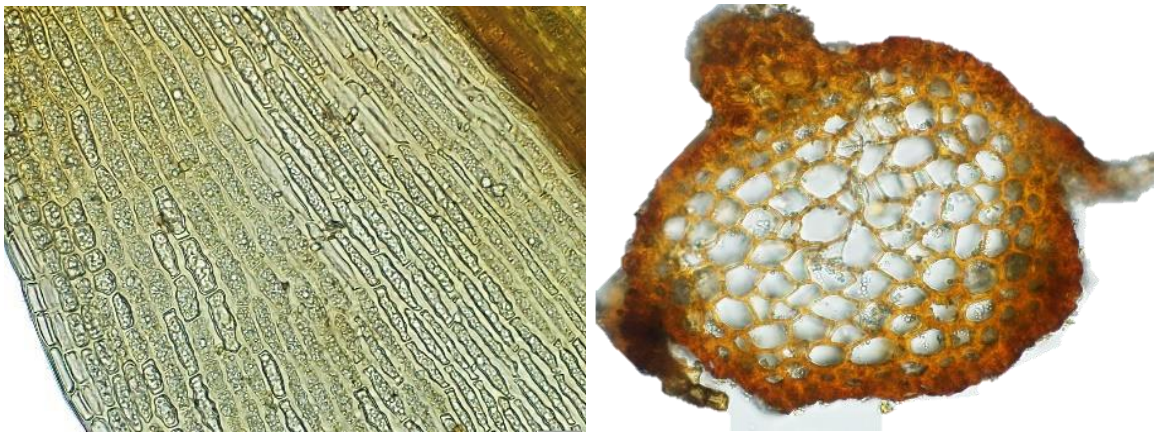
Grimmia donniana Smith [for George Don (1798-1856), Scottish botanist]. Acrocarpous, the stems to 1.5 cm tall/long, a central strand present; leaves to 2.2 mm long, keeled, not plicate, the margins plane, the awn to 1.3 mm; basal juxtacostal and marginal cells long-rectangular, thin-walled; medial cells short-rectangular, sinuose, thick-walled; distal cells 2-stratose, not bulging, the margins 2-stratose; seta straight, 2-3 mm long; capsules usually present, exserted, the peristome fully developed. ●Granite and sandstone boulders. ♦Recognized by 2-stratose laminae, plane margins, and hyaline basal region with long-rectangular thin-walled cells.

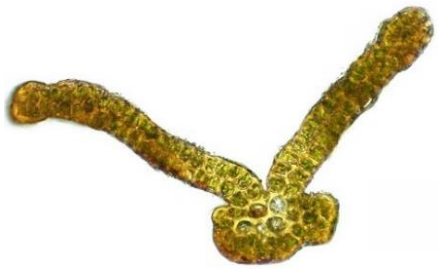
NM, Otero Co., Cloudcroft, 29 Aug 1938, *A. Barnett* (NMCR).



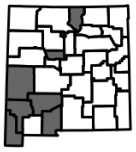
Grimmia elatior Bruch ex Balsamo-Crivelli & DeNotaris [taller]. Acrocarpous, the stems to 5 cm tall/long, a central strand absent; leaves loosely appressed to slightly twisted when dry, to 3 mm long, keeled, the margin broadly recurved on one side, the awns short to long; costa strongly projecting, bulging laterally, commonly flattened abaxially; basal juxtacostal and marginal cells short- to long-rectangular, sinuose-nodulose, thick-walled; medial cells quadrate to short rectangular, sinuose, thick-walled; distal cells 2-stratose with thick, prominent multi-stratose bands, the margins multi-stratose and thick; seta arcuate, 2-3 mm long; capsule emergent to exserted, the peristome well-developed. ●On exposed rock; known from a single specimen.







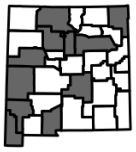
CO, Boulder Co., Rocky Mts. Nat. Park, along Thunder Lake Trail, 7 Aug 2006, *Miller & Wittmann* (COLO).

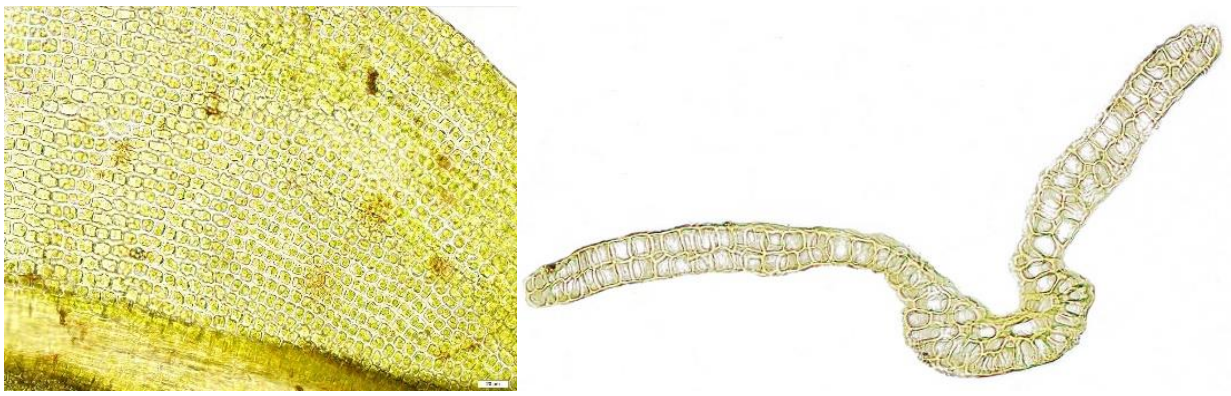


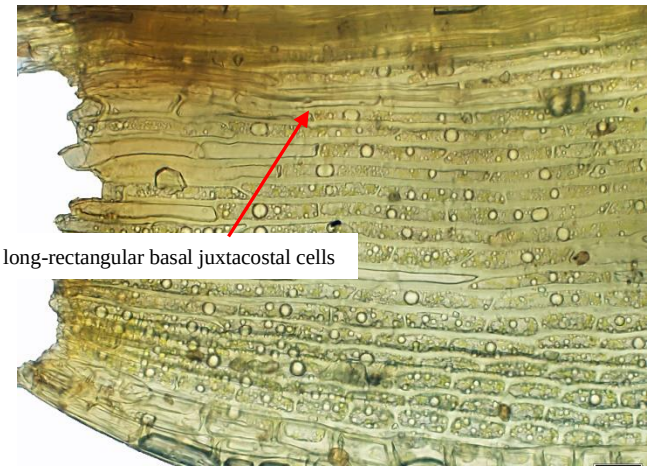
Grimmia laevigata (Bridel) Bridel [smooth] [*Campylopus laevigatus* Bridel, *Grimmia americana* Bartram]. Acrocarpous, the stems to 2 cm tall/long; leaves to 3 mm long, the margins plane, the awns to 2 mm, decurrent and broadly attached; basal juxtacostal cells elongate, straight, with thick lateral walls, the marginal cells oblate to quadrate, with thick transverse walls; medial cells rounded quadrate, thick-walled; distal cells 2-stratose, quadrate, thick-walled; seta straight, 1.5-3 mm long; capsules exserted, the peristome present. ●On dry rock; low to medium elevations.

NM, Grant Co., Burro Mts, C-Bar Ranch Road, 11 Sep 2012, *Kleinman & Blisard* (SNM).

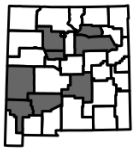
Grimmia longirostris Hooker [long-beaked] [*Grimmia affinis* Hornschuch, *Grimmia catalinensis* Bartram]. Acrocarpous, the stems to 3 cm tall/long, with a strong central strand; leaves to 3 mm long, keeled, one margin recurved proximally, the awn to 1.5 mm; basal juxtacostal cells long-rectangular to linear, sinuose, thick-walled, the marginal cells short-rectangular; medial cells short-rectangular, sinuose, thick-walled; distal cells 2-stratose, not bulging, the margins 2-stratose; seta straight, 2-4 mm long; capsules usually present, mostly exserted, the peristome fully developed. ●On dry rock and boulders.



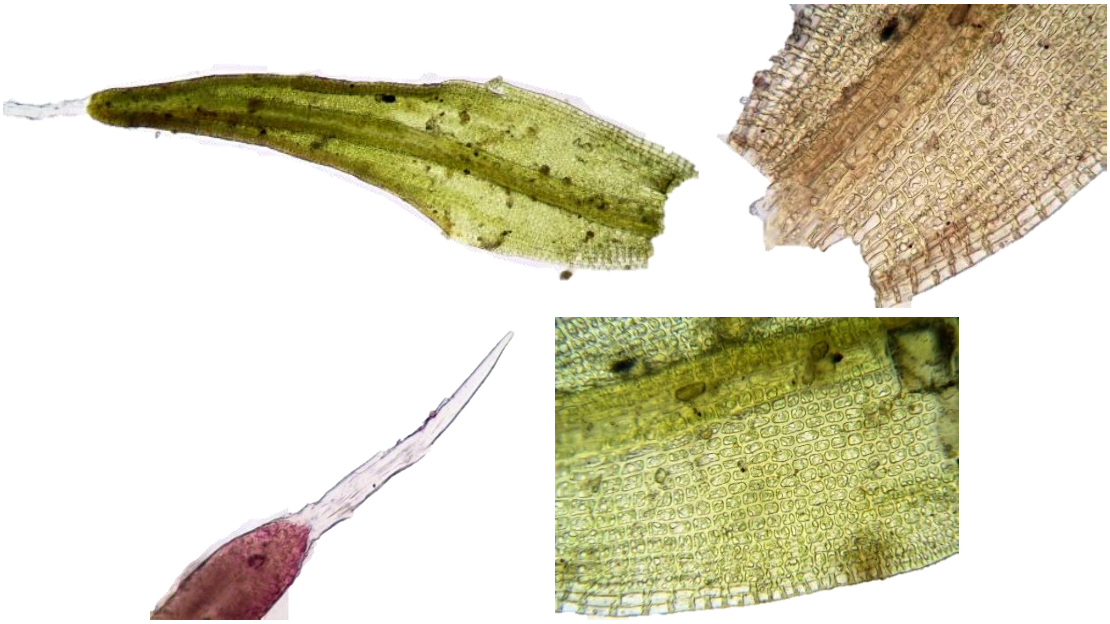




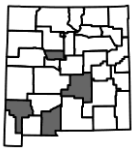
NM, Grant Co., Black Range, McKnight Cabin, 18 Aug 2010, *Kleinman et al.* (SNM).



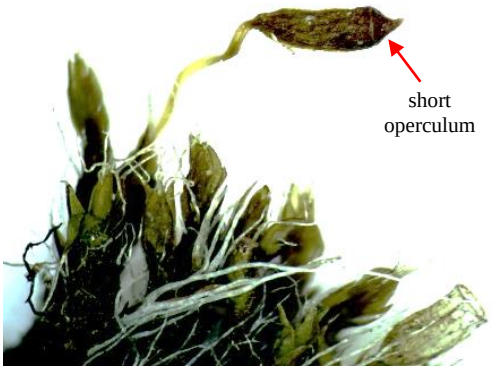
Grimmia montana Bruch & Schimper [of mountains]. Acrocarpous, in hoary cushions, the stems to 1.5 cm tall/long, with a weak central strand; leaves to 2 mm long, concave-keeled, not plicate, the margins plane, usually narrowly incurved distally, the awn to 1.3 mm long; basal juxtacostal cells short- to long-rectangular, straight, thick-walled; basal marginal cells quadrate to short-rectangular; medial cells rounded, thick-walled; distal cells 2-stratose, not bulging, the margins 2-stratose; seta straight, 2-3 mm long; capsules exserted, the peristome present. ●On exposed acidic rock. ♦Distinctive by the 2-stratose lamina distally, longer juxtacostal cells, shorter basal marginal cells, and rounded median cells.

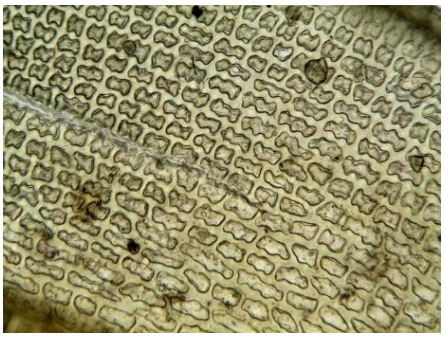


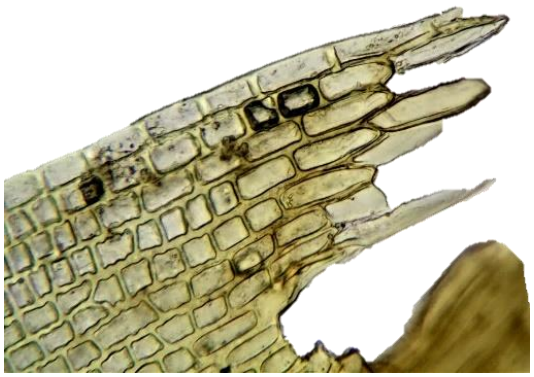
NM, Mora Co., Pecos Wilderness, Beatty's Cabin area, 29 Jul 1997, *K.W. Allred 6813* (NMCR).

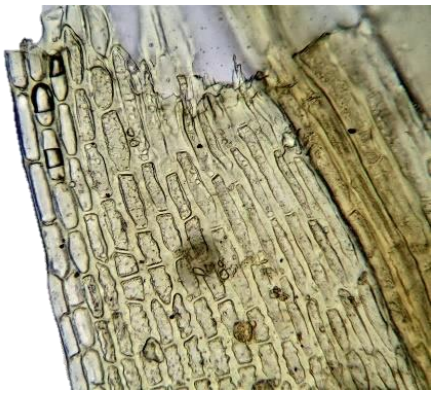


Grimmia orbicularis Bruch ex Wilson [circular]. Acrocarpous, in hoary cushions, the stems to 5 cm tall/long, with a central strand; leaves appressed and twisted when dry, abruptly contracted into an awn, to 2.5 mm long, keeled, the margins recurved in the middle and on one or both sides, the awn short to long; basal juxtacostal cells short- to long-rectangular, sinuose-nodulose, thick-walled; basal marginal cells short- to long-rectangular, straight, with thickened transverse walls; medial cells subquadrate, sinuose, thick-walled; distal cells 1-stratose; seta arcuate, 2-3 mm long; capsule exserted, bent down into the cushion, the peristome developed. ●On exposed rock; little known in the state. ♦Similar to *Grimmia pulvinata*, and probably overlooked as being that, but commonly a darker or blackish green, the operculum shorter, the calyptra with a single long slit, and the basal juxtacostal and marginal cells longer.

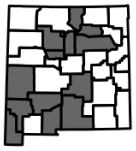




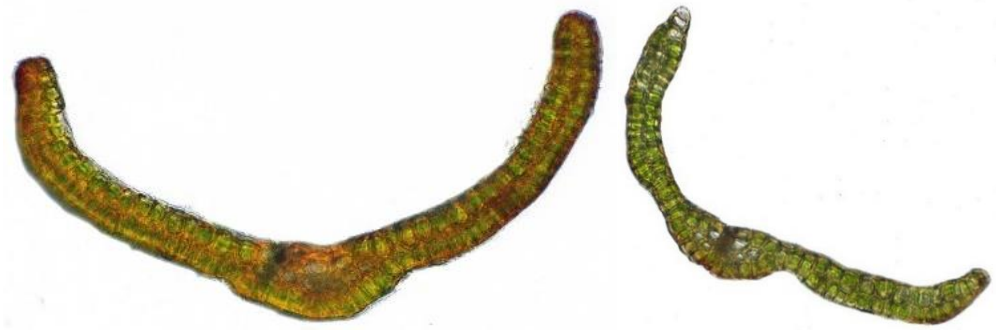




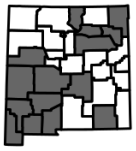
NM, Lincoln Co., Ruidoso, 6 May 1939, *Barnett 36* (NMCR).



Grimmia ovalis (Hedwig) Lindberg [oval] [*Dicranum ovale* Hedwig]. Acrocarpous, the stems to 3 cm tall/long, with a central strand; leaves to 4 mm long, the margins plane, incurved distally, the awn to 1 mm long, not decurrent; basal juxtacostal cells elongate, sinuose, with thick lateral walls; basal marginal cells quadrate to long-rectangular, with thick transverse walls, green to hyaline; medial cells rounded to quadrate, thick-walled; distal cells 2-stratose, quadrate, thick-walled; seta straight, 4-6 mm long; capsules exserted, the peristome present. ●Dry rocks in the mountains. ♦*Grimmia bernoullii* Mueller Hal. has been reported from the state, but the specimens were later determined (at least by some) to be *G. ovalis*; *G. bernoullii* is distinguished by the costa broad at the base and disappearing about mid-leaf.

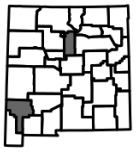


NM, Grant Co., Gila Cliff Dwellings Nat. Mon., 29 Aug 2012, *Kleinman et al.* (SNM).



Grimmia pilifera Beauvois [hairy] [*Grimmia arizonae* Renauld & Cardot]. Acrocarpous, in robust loose tufts, the stems to 4 cm tall/long, a central strand present or not; leaves keeled, one or both margins recurved proximally, thick or thin, sheathing, the awn to 1.5 mm long; basal juxtacostal cells short-rectangular to linear, sinuose, with thick lateral walls; basal marginal cells quadrate to short-rectangular, straight to sinuose, hyaline, with thick transverse walls; medial cells quadrate to short-rectangular, sinuose, thick-walled; distal cells 2-4-stratose, not bulging, the marginal cells 3-stratose; seta straight, to 1 mm long; capsule immersed, the peristome present. ●Exposed to shaded rocks. ♦Plants with a consistent central strand, merely 2-stratose margins, and only one margin recurved have been referred to a disputed *Grimmia arizonae* Renauld & Cardot. We follow Maier [The genus *Grimmia* Hedw. (Grimmiaceae, Bryophyta), a morphological-anatomical study. Boissiera 63. 2010.] and others in merging the controversial *arizonae* herein.

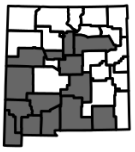
NM, Hidalgo Co., Animas Mts, Indian Creek, 3 Apr 2019, *Kleinman et al.* (SNM).



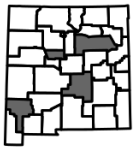
Grimmia plagiopodia Hedwig [oblique-footed]. Acrocarpous, the stems to 1 cm tall/long; leaves to 1.7 mm long, concave-keeled, the awn to 1 mm long; basal juxtacostal and basal marginal cells quadrate to short-rectangular, thin-walled; medial cells quadrate to short-rectangular, slightly sinuose, slightly thick-walled; distal cells 1-stratose, the margins 1-2-stratose. seta S-shaped, to 0.3 mm long; capsule usually present, immersed, an annulus absent, the peristome present. ●On exposed calcareous rocks; known from few specimens. ♦Distinctive by the immersed capsules on a sigmoid seta, lacking a annulus, but with a peristome.

NM, Cibola Co., El Malpais Nat. Mon., 19 Apr 2017, *Kleinman et al.* (SNM).

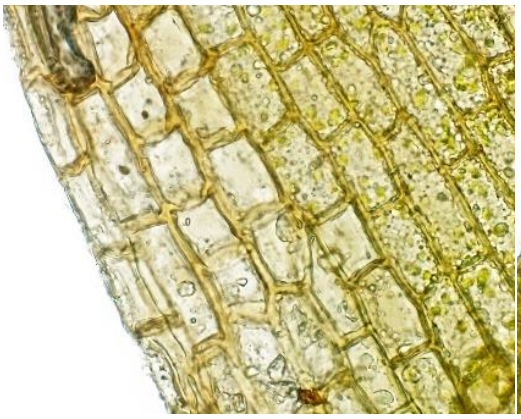
Grimmia pulvinata (Hedwig) Smith [cushion-like] [*Fissidens pulvinatus* Hedwig]. Acrocarpous, in hoary cushions, the stems to 3 cm tall/long, a central strand present; leaves flexuose when dry, to 1.7 mm long, keeled, the margins recurved on both sides, abruptly contracted into a short to long awn; basal juxtacostal and marginal cells quadrate to short-rectangular, thin-walled or some marginal cells thick-walled; medial cells rounded quadrate, slightly sinuose, thin-walled; distal cells 1-stratose, the margins 2-stratose; seta arcuate, 3-4 mm long; capsule usually present, exserted, the peristome developed. ●On rocks and tree trunks; common. ♦Similar to *Grimmia orbicularis*, but this commonly a grayer or lighter green, the operculum longer, the calyptra with a several slits, and the basal juxtacostal and marginal cells shorter.

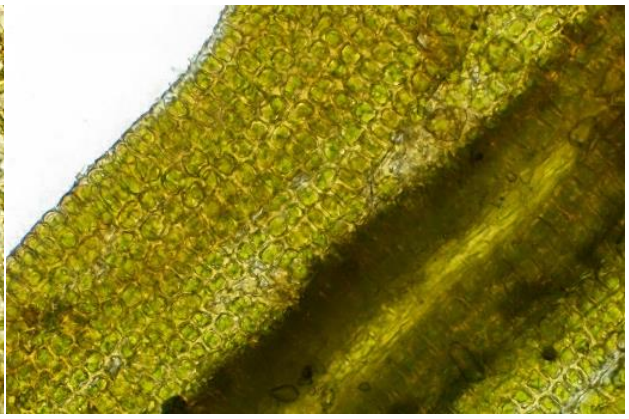


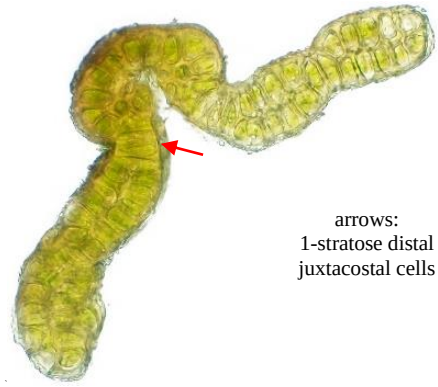
NM, Grant Co., Pinos Altos, 27 Mar 2010, *R. Kleinman* (SNM).



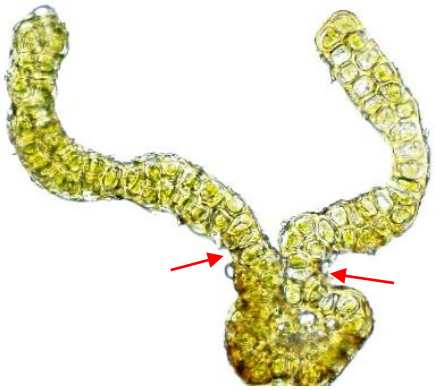
Grimmia sessitana DeNotaris [from Valle della Sessia, northwestern Italy] [*Grimmia tenerrima* Renauld & Cardot]. Acrocarpous, the stems to 1 cm tall/long, with a strong central strand; leaves to 2 mm long, keeled, not plicate, one margin commonly recurved, or both plane, the awn to 0.8 mm long; basal juxtacostal cells rectangular to elongate, thin-walled; basal marginal cells short- to long-rectangular, hyaline or not, with thick transverse walls; medial cells quadrate, sinuose, thick-walled; distal juxtacostal cells 1-stratose, often bulging, the margin widely 2-stratose; seta straight, 1-2.5 mm long; capsule usually present, exserted, the peristome and annulus present. ●On rocks at high elevations; known from few collections. ♦Distinguished by the blackish color, conspicuous hair-point, and 1-stratose distal juxtacostal cells.





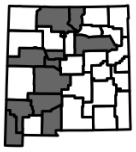


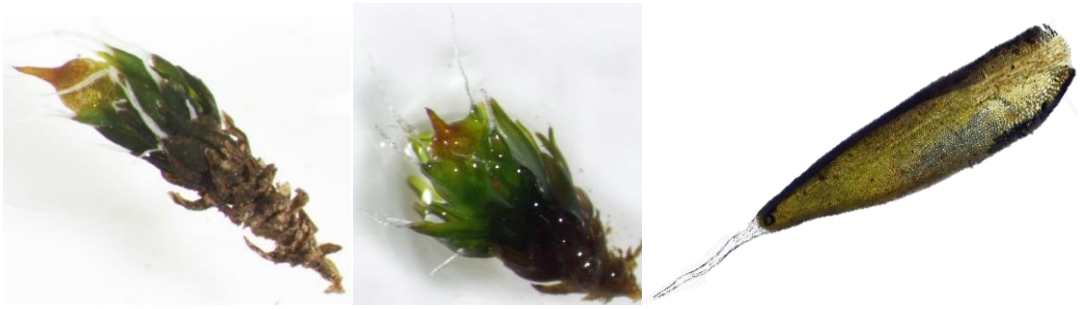
arrows:
1-stratose distal
juxtacostal cells

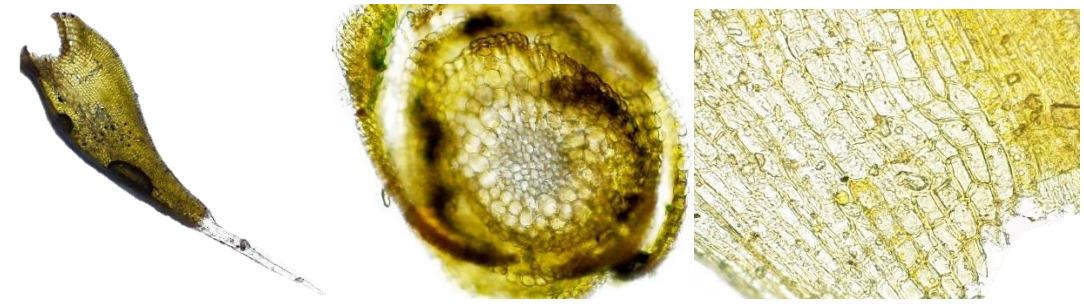


CO, Clear Creek Co., Mt. Evans, 2 Aug 2005, *Weber et al.* (COLO).

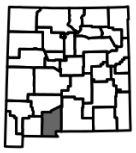
Grimmia tergestina Bruch & Schimper [from Trieste, Italy] [*Grimmia crinitoleucophaea* Cardot, *Grimmia poecilostoma* Cardot & Sebille]. Acrocarpous, the stems to 1 cm tall/long; leaves to 2 mm long, concave, the awn 0.3-0.6 mm long, not decurrent; basal marginal and juxtacostal cells quadrate to long-rectangular, thin-walled; medial cells rounded, thick-walled; distal cells 2-stratose, the margins 2-stratose; seta S-shaped, to 0.5 mm long; capsule usually present, immersed, the annulus present, the peristome rudimentary. ●On rock, boulders, outcrops. ♦We include here *Grimmia crinitoleucophaea* Cardot.





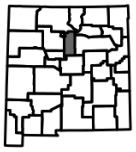


NM, Grant Co., Gila Nat. For., near Scott's Peak, 29 Mar 2023, *Kleinman* & *Blisard* (SNM).

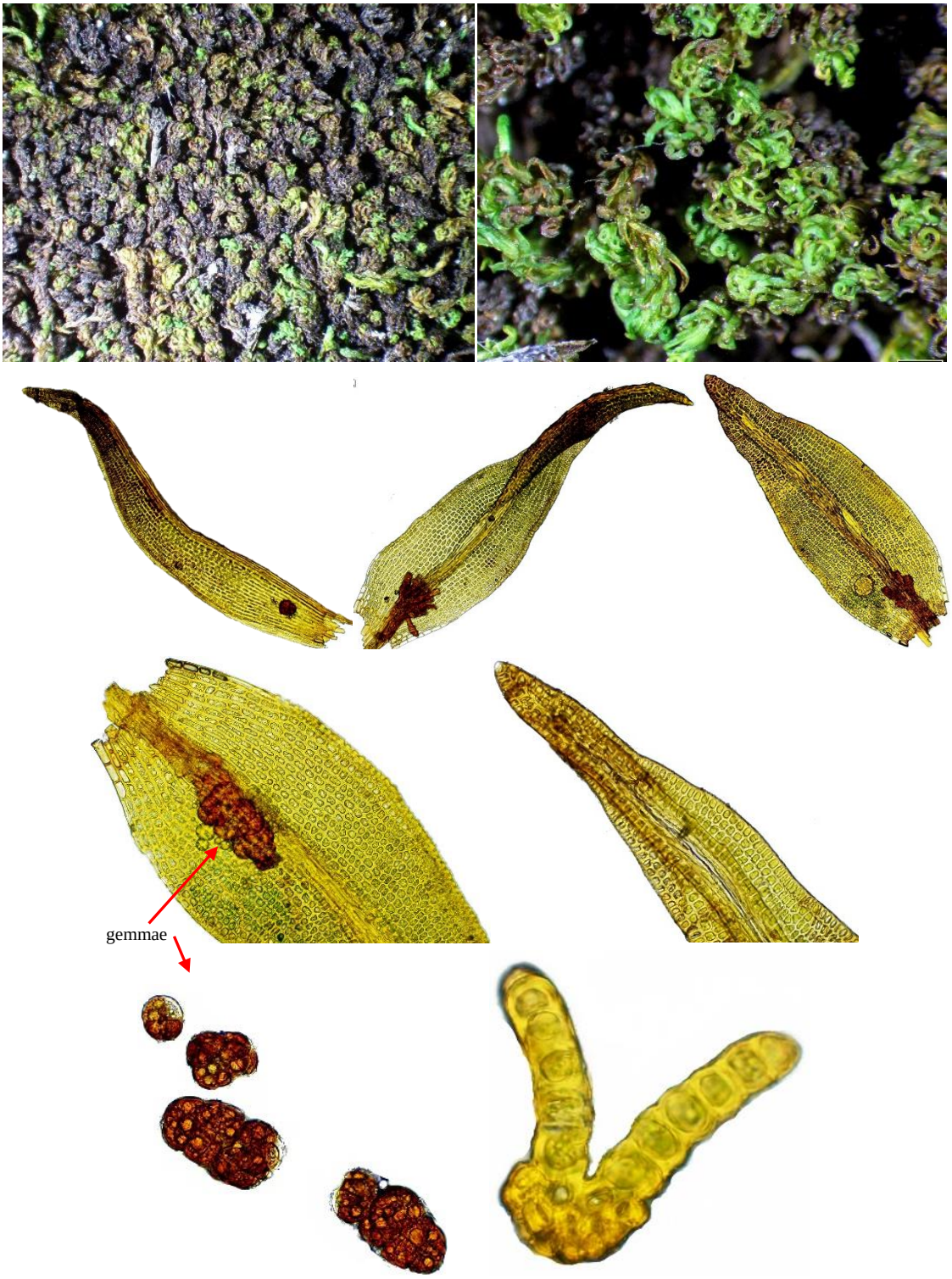


Grimmia texicana Greven [from Texas]. Acrocarpous, in ± crescent-shaped mats, with die-off in the center and young shoot at the periphery, reproducing by young rhizoidal shoots, the stems to 1 cm tall/long, little branched, the central strand well-developed; leaves about 2 mm long, concave-caniculate, with a prominent ovate base, the margins plane, the awn 1-1.4 mm long; basal juxtacostal cells rectangular, thin-walled, basal marginal cells quadrate to short-rectangular, with thick transverse walls; medial and distal cells bistratose, rounded to quadrate, thick-walled, the margins 2-stratose; seta and capsule unknown. ●On granitic rocks in the southern mountains and foothills; known from a single collection. ♦This may only be a form of *G. pilifera*.

TX, Jeff Davis Co., 11 mi n of Fort Davis, along route 166, 17 Mar 2009, *H. Greven* (NY).



Grimmia torquata Drummond [twisted]. Acrocarpous, in readily disintegrating cushions, the stems to 4 cm tall/long, with a small central strand; leaves contorted when dry, gradually tapering to an acute apex, to 2 mm long, keeled, the margins slightly recurved proximally, plane distally, the awns very short and smooth; basal juxtacostal cells linear, extremely sinuose, thick-walled, the marginal cells long-rectangular, sinuose, hyaline; medial cells rectangular, extremely sinuose, thick-walled; distal cells 1-stratose; gemmae in short-stalked, brown clusters on abaxial costa of many distal leaves, at base of leaf; seta slightly curved or straight when dry, 3-5 mm long; capsule very rare, exserted, the annulus and peristome present. ●Damp rock faces, moderate to high elevations in the mountains; only recently found in the state. ♦Distinctive by the twisted dry leaves and the brown, globular, gemmae clusters. This is called by some "bear-poop moss" (referring to the gemmae).



CO, Boulder Co., Rocky Mts. Nat. Park, along Thunder Lake Trail, 26 Jul 2003, *R.C. Wittmann* (COLO).

Grimmia trichophylla Greville [hairy-leaved]. Acrocarpous, the stems to 4 cm tall/long, with a central strand; leaves slightly twisted when dry, tapering to an acute apex, 2-3.5 mm long, sharply keeled, the margins recurved on one or both sides, plane to erect distally, the awns variable, short to long, smooth to denticulate, not conspicuously flattened at the base; basal juxtacostal cells usually long-rectangular, somewhat nodulose, thick-walled, the marginal cells short- to long-rectangular, with thickened transverse walls; medial cells quadrate to short-rectangular, slightly sinuose, thick-walled; distal cells 1-stratose, sometimes with 2-stratose ridges; gemmae clusters occasionally present in distal leaf axils; seta arcuate, 2-4 mm long; capsule sometimes present, exserted, the annulus and peristome present. ●Boulders, acidic rock; little known from two collections.

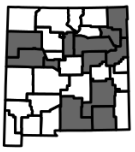
CA, Mendocino Co., Willits, above Baechtel Creek, 1 May 2021, *Kleinman & Blisard* (SNM).

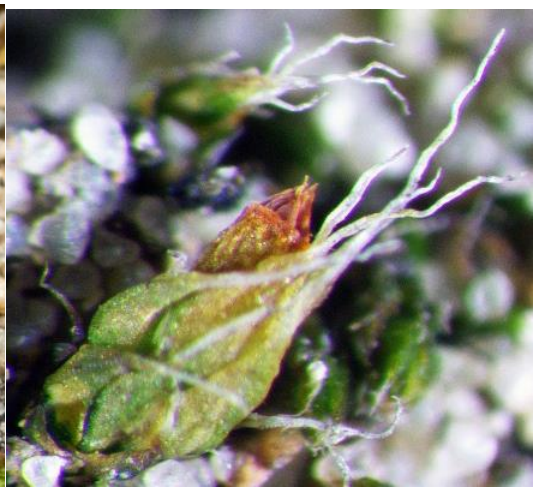
Jaffueliobryum [for P. Félix Jaffuel (1857-1931), clergyman plant collector].

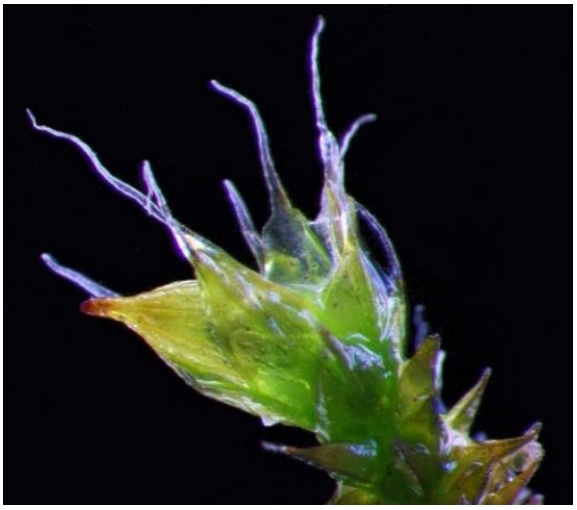
1 Distal portion of the leaf acute to acuminate; leaves distinctly keeled; proximal stem leaves mostly spreading ..... ***J. rauii***

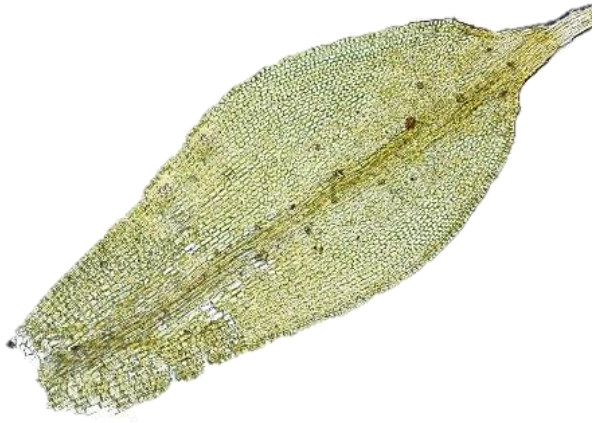
1 Distal portion of the leaf broadly acute-rounded; leaves not keeled; proximal stem leaves mostly appressed..... ***J. wrightii***

Jaffueliobryum rauii (Austin) Thériot [for Eugene Abraham Rau (1848-1932), American pharmacist-bryologist] [*Grimmia rauii* Austin]. Acrocarpous, in small dense cushions or tufts, the stems to 2 cm tall/long; leaves crowded, 1-stratose, the distal ones appressed, the proximal ones spreading, distinctly keeled, to 1.2 mm long excluding awn, the apex acute to acuminate, the awn 0.3-1.4 mm long, hyaline; proximal cells rectangular; medial cells ± isodiametric; distal cells a bit longer than the medial; capsule nestled among leaves. ●On dry sandstone and limestone rock and compacted sandy ground, in dry regions; less common than the subsequent and perhaps at higher (or more mesic) elevations.

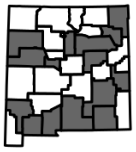








NM, Cibola Co., El Malpais Nat. Mon., sandstone bluffs, 22 Jul 2016, *Kleinman et al.* (SNM).

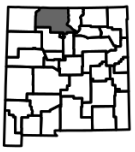


Jaffueliobryum wrightii (Sullivant in Gray) Thériot [for Charles Wright (1811-1885), outstanding American botanical collector] [*Coscinodon wrightii* Sullivant, *Grimmia wrightii* (Sullivant)]. Acrocarpous, in small dense cushions or tufts, the stems to 1.5 cm tall/long; leaves crowded, appressed-julaceous throughout, not keeled, 1-stratose, to 1 mm long excluding awn, the apex rounded-obtuse, the awn variable, 0.2-1.3 mm long, hyaline; proximal cells quadrate to short-rectangular; medial cells rhomboidal; distal cells longer than the medial, somewhat hyaline; capsule nestled among the leaves. ●Dry sandstone and limestone rock, compacted sandy ground, in arid regions; more common than the previous and perhaps at lower (or more xeric) elevations.

NM, Grant Co., Bear Mt, 8 Jul 2014, *Kleinman & Blisard* (SNM).

Niphotrichum [a snowy hair].

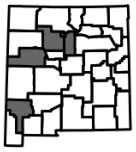
Niphotrichum canescens (Hedwig) Bednarek-Ochyra & Ochyra [ash-gray] [*Racomitrium canescens* (Hedwig) Bridel, *Trichostomum canescens* Hedwig]. Cladocarpous, in loose to dense patches, often hoary when dry, the stems to 12 cm tall/long, lacking a central strand, often pinnately branched; leaves straight to falcate, to 3 mm long, the margins recurved, the apices often abruptly narrowed, the awns serrulate, papillose; costa to ¾ leaf length; laminal cells strongly papillose; seta 5-25 mm long; capsule brown, to 2.5 mm long. ●Gravelly or gritty soil; only recently found in the state.



WA, Pierce Co., Mt. Ranier Nat. Park, 9 Jun 2018, *Kleinman & Blisard* (SNM).

Schistidium [a cleft].

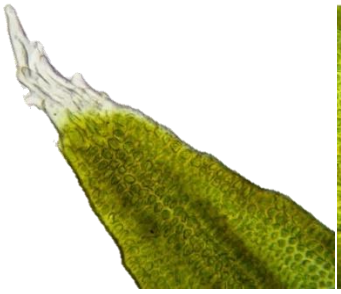
1 Distal laminal cells obviously and clearly papillose ..... ***S. papillosum***
1 Distal laminal cells smooth
  2 Hyaline hair-points absent or nearly so on nearly all leaves (costa sometimes excurrent as a chlorophyllose mucro in *S. canadense*)
    3 Central strand absent; peristome well-developed ..... ***S. canadense***
    3 Central strand distinct; peristome well-developed to rudimentary
      4 Stems elongate, loosely arranged and freely branched, the branches and main stems similar; tufts green, dark green, to olivaceous, sometimes brownish, on wet to dry rock in or along water courses
        5 Tufts lighter green; leaves 1-2-stratose, rarely strictly 1-stratose; capsules 2:1 ..... ***S. canadense***
        5 Tufts dark green to olivaceous; leaves 1-stratose; capsules 1:1..... ***S. rivulare***
      4 Stems very short, densely tufted, the branches short and obviously lateral to the longer main stems; tufts brown, dark brown, to nearly black, on dry open rock surfaces usually away from water courses
        6 Leaves mostly 2-stratose distally or with 2-stratose patches or streaks; tufts dark brown to nearly black; margins usually plane in distal half; peristome very short or rudimentary, 30-100 µm long..... ***S. atrofuscum***
        6 Leaves mostly 1-stratose distally or with 2-stratose streaks; tufts brownish; margins recurved to near the apex; peristome well-developed, 250-380 µm long ..... ***S. dupretii***
  2 Hyaline hair-points present on most or many leaves, sometimes short
    7 Basal marginal cells, at least of perichaetial leaves, elongate-rectangular, often clear; mid- and distal cells usually strongly sinuous; distal margins 1-2-stratose..... ***S. frigidum***
    7 Basal marginal cells quadrate or short-rectangular, not obviously elongate when compared to medial cells, clear or opaque; mid- to distal cells sinuous or not; distal margins 2-4-stratose
      8 Transverse and longitudinal walls of basal marginal cells unequally thickened, the transverse walls thicker
        9 Awns of upper leaves or perichaetial leaves commonly ¼ to ⅓ or more the blade length; margins of leaf blades commonly plane (at least one margin); spores 6-8 µm ..... ***S. ambiguum***
        9 Awns of upper leaves short, rarely as much as ¼ the blade length; margins of leaf blades recurved to plane; spores 8-12 µm..... ***S. confertum***
      8 Transverse and longitudinal walls of basal marginal cells equally thickened
        10 Costa transverse section circular distally; leaves to 1.2 mm long; margins plane ..... ***S. teretinerve***
        10 Costa transverse section semicircular distally; leaves 1.5-2.5 mm long; margins recurved ..... ***S. sinensiapocarpum***

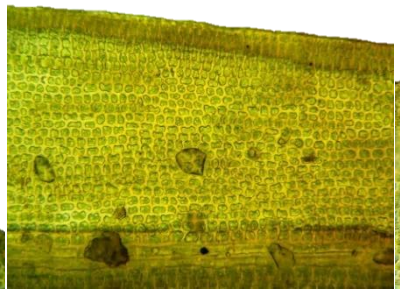


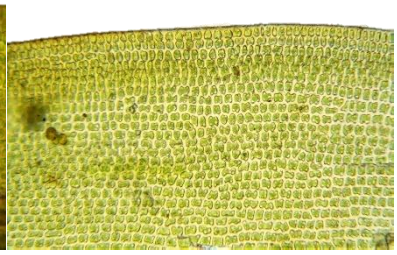
Schistidium ambiguum Sullivant [doubtful] [*Grimmia ambigua* (Sullivant) Sullivant, *Grimmia apocarpa* of NM reports, p.p., *Grimmia apocarpa* Hedwig var. *ambigua* (Sullivant) G. Jones]. In low, flattish, gray-green tufts, the stems to 1 cm tall, longer when spreading; leaves appressed when dry, keeled, the lower leaves muticous or with very short awns, the upper and perichaetial leaves with prominent hyaline, denticulate awns commonly ¼ to ⅓ or more the blade length, the margins plane, at least one; proximal cells quadrate to short-rectangular, the transverse wall of the marginal cells thickened; distal cells rounded quadrate; seta straight, about 1 mm long; capsule 1-1.5 mm long, immersed. the calyptra often cucullate, the peristome reddish, strongly papillose, the spores 6-8 µm. ●On rocks.

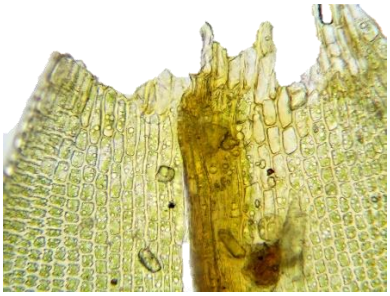
NM, Grant Co., Pinos Altos Range, Cherry Creek Campground, 20 Apr 2016, *Kleinman & Blisard* (SNM).

Schistidium atrofuscum (Schimper) Limpricht [dark brown] [*Grimmia atrofusca* Schimper]. In compact, dark, cushions or tufts, the stems to 2.5 cm long, the central strand distinct; leaves usually straight or slightly curved, keeled, to 2.1 mm long, 2-stratose distally or with 2-stratose striae, the margins weakly recurved proximally, plane in the distal half or so, 2-3-stratose; costa percurrent to excurrent as a tiny denticulate hyaline awn; basal marginal cells rounded to short-rectangular, the transverse walls sometimes thicker; distal cells rounded to short-rectangular, smooth, weakly sinuose; capsule to 1 mm long, the peristome absent to very short. ●On limestone; uncommon.

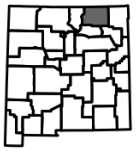






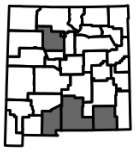


NM, Valencia Co., Manzano Mts, JFK Campground, 10 Mar 2022, *Allred et al.* (NMC).



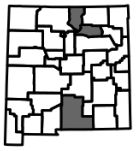
Schistidium canadense (Dupret) Ignatova & H.H. Blom [from Canada] [*Grimmia apocarpa* Hedwig var. *canadense* Dupret, *Schistidium apocarpum* (Hedwig) Bruch & Schimper subsp. (Dupret) H.H. Blom ex B.H. Allen & Pursell]. In loose to dense tufts or mats, the stems to 2.5 cm long, a central strand absent or sometimes obscurely developed; leaves slightly falcate-secund, 2-3 mm long, sharply keeled, 1-2-stratose, sometimes 1-stratose with 2-stratose strips, a hyaline hair-point absent but the costa short-excurrent to a chlorophyllose mucro and epapillose abaxially, sometimes twinning, the margins recurved, 2-stratose; basal cells rectangular, the marginal cells subquadrate; medial cells quadrate to short-rectangular, sinuose; distal cells irregular-shaped, subquadrate to transversely elongate, not sinuose; capsule to 1 mm long, 2:1, the peristome well developed, the teeth long-attenuate, the spores about 15-17 µm. ●On boulders and rocks along water courses; only recently found in the state. ♦The absence of a hyaline hair-point, most leaves at least partially 2-stratose, the costa excurrent to a chlorophyllose mucro, and capsules 2:1 are distinctive. Our plants do not fit *S. canadense* strictly, and perhaps represent a distinct taxon.

NM, Colfax Co., Colin Neblett Wildlife Area, 5 Jan 2018, *J.C. Brinda* (MO).



Schistidium confertum (Funck) Bruch & Schimper [crowded] [*Grimmia apocarpa* of NM reports, p.p., *Grimmia apocarpa* Hedwig var. *conferta* (Funck) Sprengel]. In compact, often flattish tufts, the stems to 2 cm tall/long, a central strand narrow or absent; leaves sharply keeled distally, to 2 mm long, 1-stratose or 2-stratose in lines, the margins usually unequally recurved, one margin less recurved to plane, 2-stratose, the hair-point present but short, spinulose-denticulate, smooth; basal marginal cells quadrate to short-rectangular, the transverse walls thickened; distal cells mostly irregular-shaped, rounded, angular, to short-rectangular, weakly sinuose; capsules immersed, the peristome present, the spores 8-12 µm. ●On dry boulders and rocks; known from few specimens.

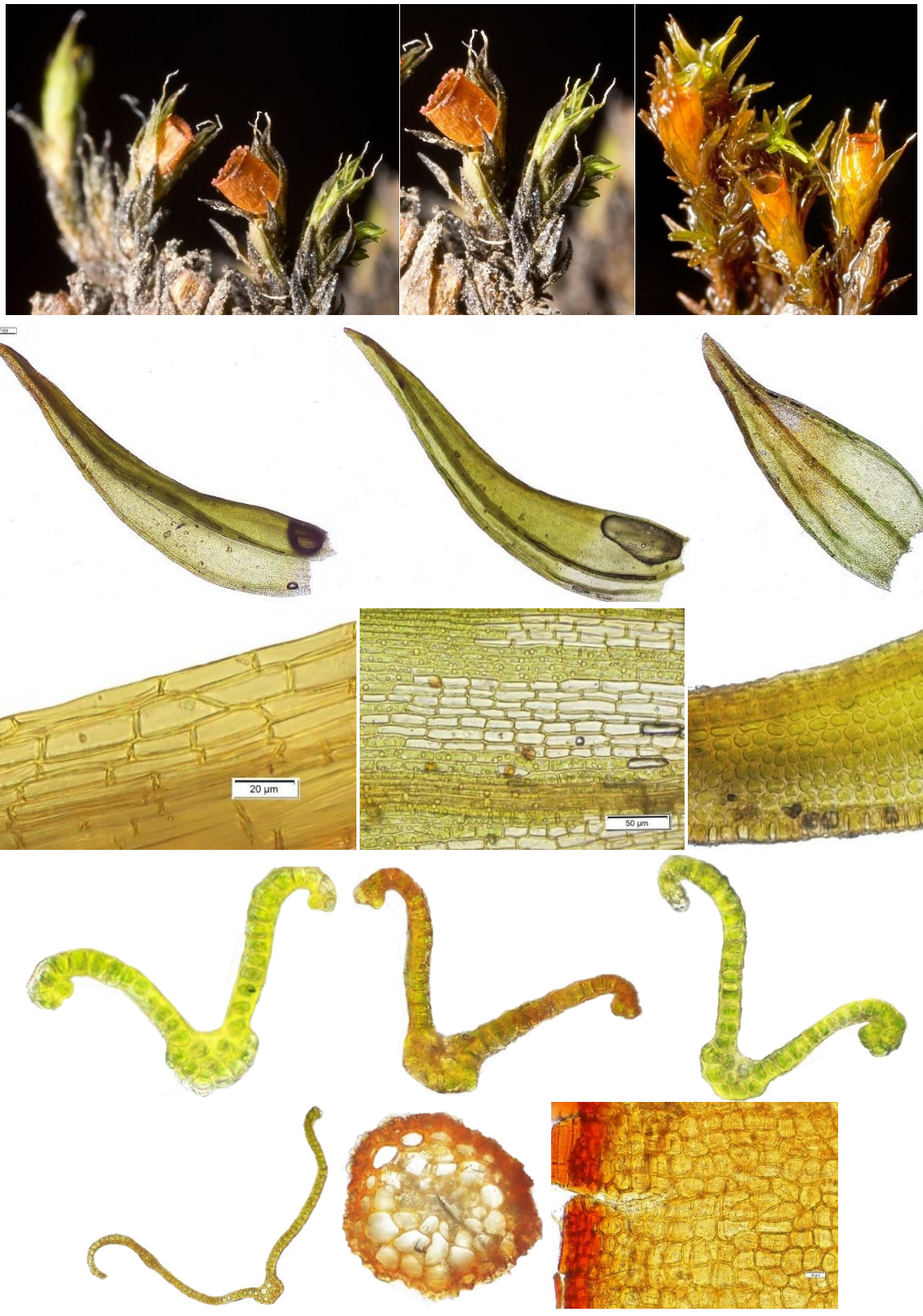
NM, Otero Co., Sacramento Mts, Pinyon Draw, 24 Mar 2010, *R. Worthington 35955* (NMCR).



Schistidium dupretii (Thériot) W.A. Weber [for Abbe François Hippolyte Dupret, French-Canadian priest-biologist] [*Grimmia dupretii* (Thériot) W.A. Weber]. In open flattish tufts, the stems to 2 cm long, the central strand distinct; leaves 1-2 mm long, keeled, mostly 1-stratose, sometimes with 2-stratose streaks, the margins usually recurved, sometimes unequally, 2-stratose, the hair-point present but short, denticulate, smooth; basal marginal cells oblate or quadrate, the transverse walls about same thickness as longitudinal ones; distal cells short-rectangular to quadrate or rounded, straight to slightly sinuose; capsule to 1.3 mm long, immersed, the peristome present, well-developed, the spores 8-13 μm. ●On exposed rock in dry habitats.

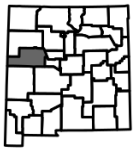
UT, Emery Co., Huntington Canyon, 8 May 1930, *S. Flowers* (COLO).

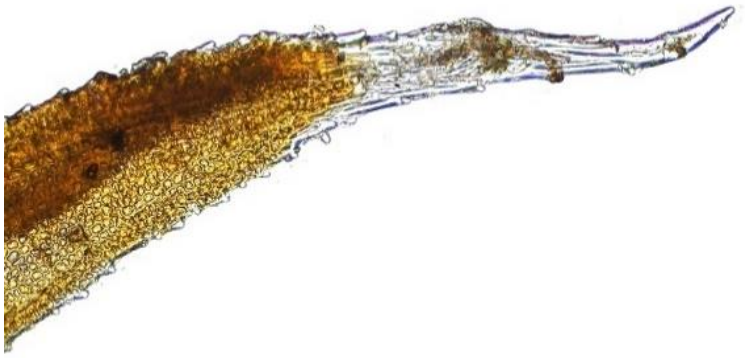
Schistidium frigidum H.H. Blom [of cold places]. In open tufts or cushions, the stems to 4 cm tall/long, the central strand distinct or absent; leaves to 2 mm long, 1-stratose or with 2-stratose lines, the margins recurved, 1-2-stratose, a hair-point present and decurrent on stems bearing sporophytes, absent on sterile stems; some basal cells sometimes much lighter and hyaline than adjacent cells; marginal cells elongate-rectangular, often with thickened transverse walls; distal cells various-shaped, usually strongly sinuose; capsules immersed, the peristome present, the spores 10-14 µm. ●On boulders and rocks.

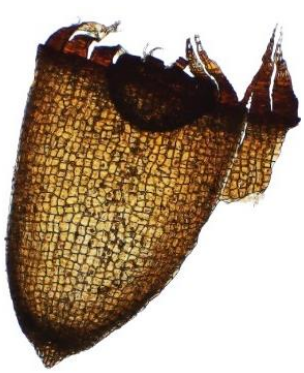


NM, Taos Co., Taos Ski Valley, 24 Jul 2014, *Kleinman et al.* (SNM).

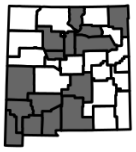
Schistidium papillosum Culmann [quite papillose]. In open tufts or mats, often with red, yellow, or orange tones, the stems 1-10 cm tall/long, a central strand indistinct to absent; leaves to 2.4 mm long, sharply keeled, 1-stratose or with 2-stratose lines, the margins recurved, usually 2-stratose, the hair-points present but short, not decurrent, often flexuose; abaxial leaf surfaces distinctly papillose; basal marginal cells quadrate to short-rectangular, usually trigonous; distal cells short-rectangular, angular or ovate, sinuose; capsules dark reddish brown, the peristome present, papillose, the spores 10-13 μm. ●On boulders and rock (ours), rarely bark; only recently found in the state.





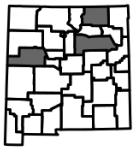


NM, Cibola Co., El Malpais Nat. Mon., 5 Nov 2016, *Kleinman et al.* (SNM).



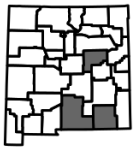
Schistidium rivulare (Bridel) Podpera [of rivulets] [*Grimmia alpicola* of Amer. authors, *Grimmia alpicola* Swartz ex Hedwig var. *rivularis* (Bridel) Wahlenberg, *Grimmia rivularis* Bridel, *Schistidium alpicola* of Amer. authors, *Schistidium rivulare* (Bridel) Podpera var. *latifolium* (Zetterstedt) Crum & Anderson]. In open to compact, often extensive, tufts or mats, dark green to brown, the stems 2-18 cm long, the central strand distinct; leaves often somewhat contorted when dry, to 3.2 mm long, keeled, 1-stratose or with 2-stratose patches, the margins usually recurved, 1-2-stratose; costa epapillose abaxially, sub-percurrent to percurrent, a hair-point mostly absent but sometimes present on perichaetial leaves; basal marginal cells quadrate; distal cells roundish to short-rectangular, slightly sinuose; capsules immersed, 1:1, the peristome present, the spores 14-24 μm. ●On wet to dry rocks along water courses and lakes or ponds, often submerged or in splash zones, sometimes also along seasonally wet cliffs and ledges.

NM, Grant Co., Pinos Altos Range, Signal Peak, 20 Oct 2010, *Kleinman* & *Blisard* (SNM).



Schistidium sinensiapocarpum (Müller Hal.) Ochyra [the *apocarpum* from China] [*Grimmia sinensiapocarpum* Müller Hal.]. In loose or dense tufts or mats, often hoary, the stems to 2.5 cm long, with a weak central strand; leaves straight, to 2.5 mm long, sharply keeled distally, 1-stratose, 2-stratose in strips, smooth or with a few papillae, the hyaline hair-point to 0.6 mm long, not decurrent, coarsely and densely spinulose-denticulate, the margins recurved, 2-4-stratose distally; costa papillose abaxially; basal marginal cells subquadrate to transversely rectangular, thick-walled equally; basal cells rectangular, thick-walled; medial cells quadrate to short-rectangular, distinctly sinuose; distal cells quadrate to short-rectangular, slightly sinuose; capsule immersed, the peristome present, the spores 9-12 μm. ●On rock and thin soil pockets on boulders.

China, Qinghai Prov., Hengduan Mts, 20 Aug 2018, *J.R. Shevock* (NY 04504026).



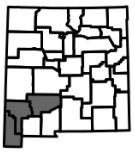
Schistidium teretinerve (Limpricht) Limpricht [round-nerved] [*Grimmia teretinervis* Limpricht]. Acrocarpous, the stems to 3 cm tall/long, the central strand strong; leaves to 1.2 mm long, keeled, not plicate, the margins plane, the awn nearly absent to 0.3 mm long, commonly long-decurrent; costa circular in cross-section distally; basal juxtacostal cells quadrate to short-rectangular, thin- to thick-walled; basal marginal cells oblate to quadrate, thick-walled, not hyaline; medial cells rounded quadrate, thick-walled; distal cells 2-stratose, bulging, the margins 2-stratose; seta and capsules unknown. ●On dry to somewhat moist boulders and outcrops; known from few specimens. ♦Commonly placed in *Grimmia*.

NM, Eddy Co., Carlsbad Caverns Nat. Park, Lower Walnut Canyon, 8 Apr 2013, *Kleinman & Blisard* (SNM).

1 Leaf apices hyaline ..... **Hedwigia**
1 Leaf apices colored ..... **Braunia**

Braunia [Alexander Carl Heinrich Braun (1805-1877), German botanist].

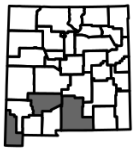
1 Distal leaf cells with sinuous walls, 2-3:1; leaf margins revolute from the base up to about ¾ the leaf length..... ..... ***B. secunda***
1 Distal leaf cells with straight walls, 1.5-2:1; leaf margins plane or revolute from the base only to about 1/3 the leaf length.....***B. andrieuxii***

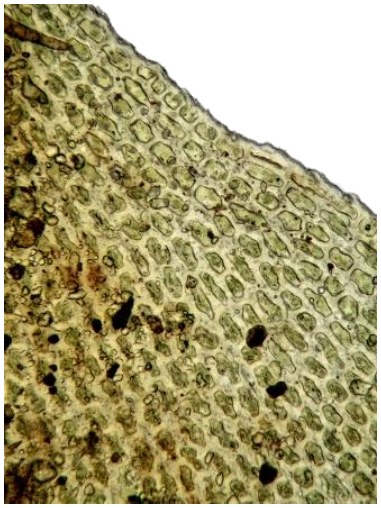


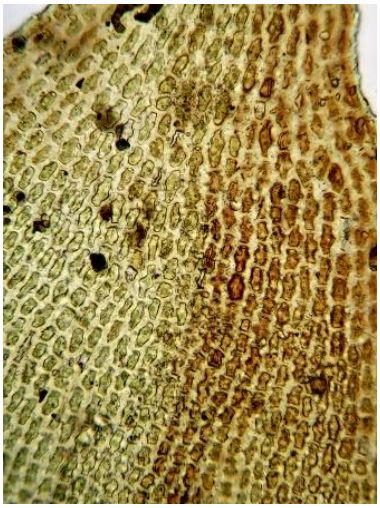
Braunia andrieuxii Lorentz [for G. Andrieux (*fl*. 1830-1836), A collector of Mexican plants] [*Braunia secunda* (Hooker) Bruch var. *andrieuxii* (Lorentz) Thériot]. Cladocarpous, in loose mats, the stems erect-ascending, with stoloniferous, whip-like lateral branches; leaves plicate-undulate, to 2 mm long, multi-papillose distally, the margins recurved proximally, plane distally; central basal cells elongate-linear, smooth; distal cells subquadrate, mostly 1.5-2:1, papillose, straight or only weakly sinuose. ●On rocks and boulders.

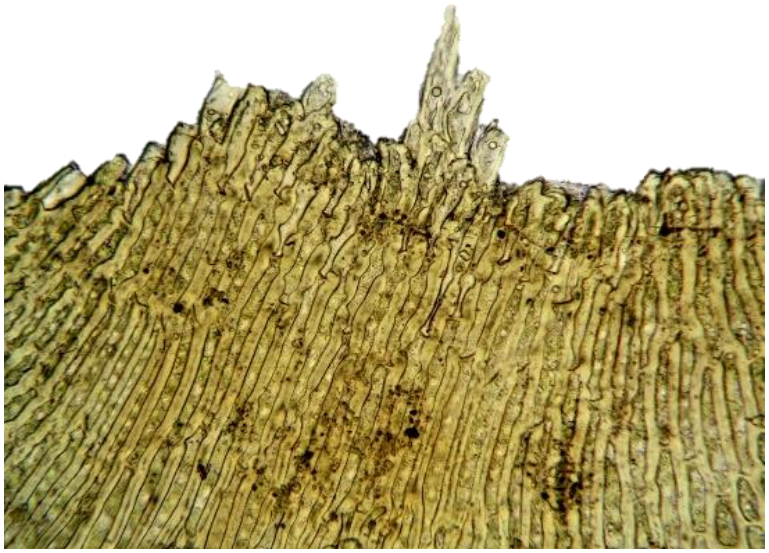
NM, Grant Co., Black Range, North Percha Creek, 17 Sep 2011, *Kleinman et al.* (SNM).

Braunia secunda (Hooker) Bruch & Schimper [one-sided] [*Hedwigia secunda* Hooker]. Cladocarpous, in loose mats, the stems erect-ascending, with stoloniferous, whip-like lateral branches; leaves plicate-undulate, to 2 mm long, multi-papillose distally, the margins recurved throughout; central basal cells elongate-linear, smooth; distal cells rectangular, about 2-3:1, papillose, strongly sinuose. ●On rocks and boulders, sometimes burned, down logs.



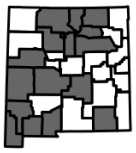






NM, Otero Co., Sacramento Mts, 24 Mar 2010, *R.D. Worthington 35951* (NMCR).

Hedwigia [for Johann Hedwig (1730-1799), the "father of bryology"].



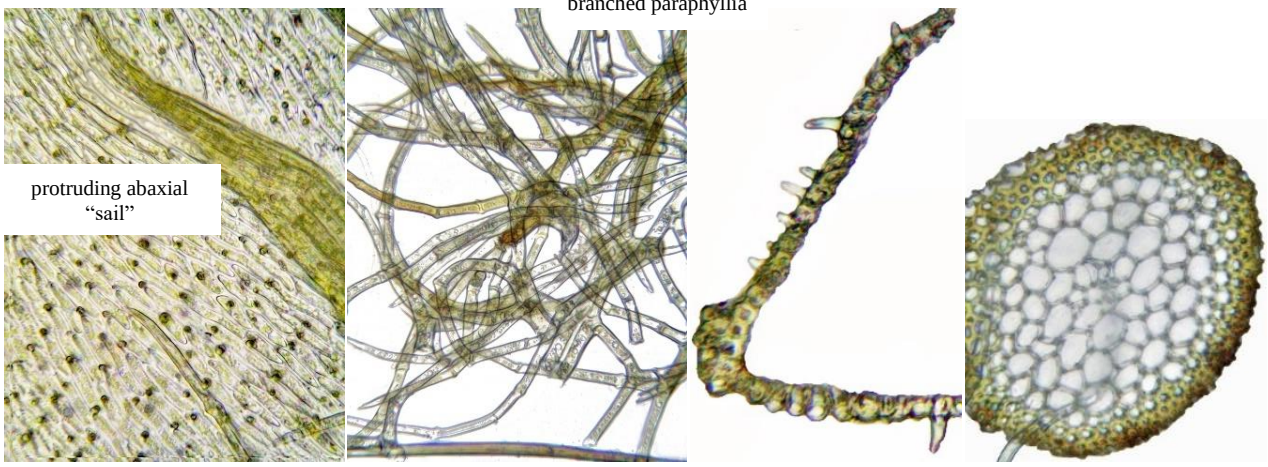
Hedwigia ciliata (Hedwig) P. Beauvois [fringed] [*Anictangium ciliatum* Hedwig, *Hedwigia albicans* Lindberg]. Cladocarpous, the stems to 10 cm tall/long; leaves slightly to widely spreading apically when dry, 1.6-2.3 mm long, the hyaline portion 10-55% of leaf length, strongly papillose, the apical cell truncate to acute, the leaf margins reflexed in proximal ½, the margins of hyaline portion erect to incurved, channeled; medial cells with 2-3 single to forked papillae; perichaetial leaves conspicuously ciliate; capsule immersed, the calyptra glabrous to somewhat hairy. ●On rocks and boulders in the mountains. ♦We apply this name only provisionally in the traditional sense, as a catch-all for all New Mexico *Hedwigia*; many of our plants likely belong to *H. nivalis* (Müller Hal.) Mitten, but construction of a satisfactory key to separate the two eludes us.

NM, Grant Co., McMillan Campground, 5 Apr 2010, *R. Kleinman* (SNM).

Helodium [frequenting marshes].

Helodium blandovii (Weber & Mohr) Warnstorf [for Otto Christian Blandow (1778-1810), German apothecary and botanist] [*Elodium blandowii* (Weber & Mohr) Eckel, *Hypnum blandovii* Weber & Mohr]. Pleurocarpous, the stems 1-pinnate, yellowish to brownish, densely covered with branched, filamentous, many-celled paraphyllia, these also abundant on the bases of leaves, the central strand absent to weakly developed; leaves broadly ovate, concave, deeply plicate-sulcate in the costal region, the sulcus protruding on the abaxial side and appearing as a flap or sail, the margins serrate-dentate by protruding cell ends or papillae; costa ⅔ or more the leaf length, buried in the sulcus; leaf cells fusiform, with a single papilla on the distal half or end, these often as long as the thickness of the leaf. ●Wet meadows, fens, and boggy ground; known from a single recent collection. ♦Unmistakable by the pinnate branching, dense paraphyllia on stems and leaves, sail-like sulcus in the leaves, and long, nipple-like papillae on the distal end of the cells.

branched paraphyllia



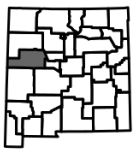
protruding abaxial "sail"

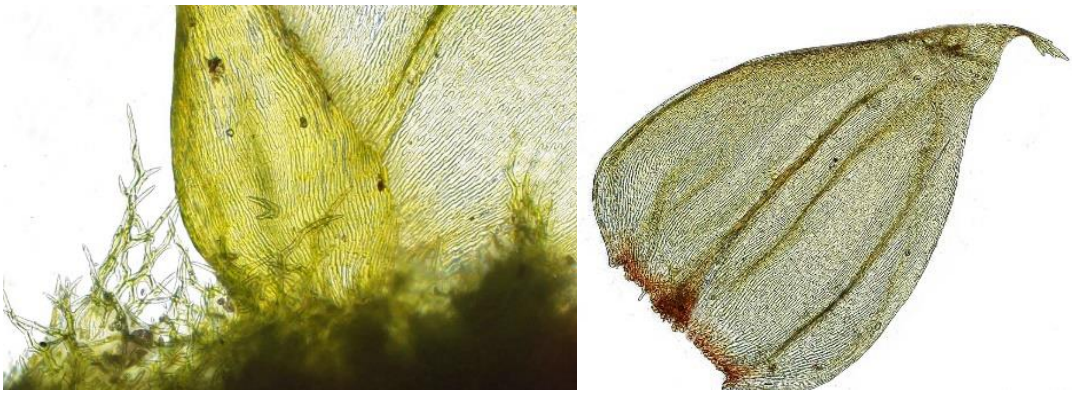
NM, Taos Co., Pecos Wilderness, just below Serpent Lake, 3 Sep 2023, *R.C. Sivinski 9781* (NMC).

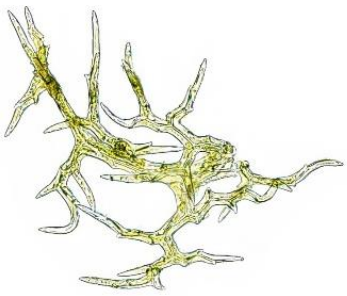
1 Stems lacking paraphyllia; shoots 1-pinnate..... ***Pleurozium***
1 Stems with abundant paraphyllia, easily seen with the naked eye; shoots 1-3-pinnate
2 Shoots irregularly 1-pinnate; leaves strongly plicate, the apices gradually narrowed to an acuminate apex; stems and branches not in a stair-step arrangement; costa single ..... ***Hylocomiastrum***
2 Shoots 2-3-pinnate; leaves lightly plicate, the apices abruptly contracted to a blunt apex; stems and branches in a stair-step arrangement; costa double..... ***Hylocomium***

Hylocomiastrum [resembling *Hylocomium*].

Hylocomiastrum pyrenaicum (Spruce) M. Fleischer ex Brotherus [from the Pyrenees] [*Hypnum pyrenaicum* Spruce]. Pleurocarpous, the stems creeping, to 12 cm long, irregularly 1-pinnate, with abundant paraphyllia; leaves ovate, to 2.5 mm long, strongly plicate, not rugose, serrate distally; costa single; laminal cells 6-8:1. ●Soil, humus, logs, rock; known only from a recent collection in lava tube caves.



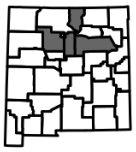




NM, Cibola Co., El Malpais Nat. Mon., 5 Nov 2016, *Kleinman et al.* (SNM).

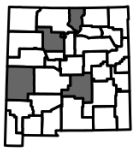
Hylocomium [a forest-dweller].

Hylocomium splendens (Hedwig) Schimper [gleaming, full of splendor] [*Hypnum splendens* Hedwig]. Pleurocarpous, the stems creeping to ascending, with abundant branched paraphyllia, the branches forming an annual ascending series of flat, frondose steps, the fronds, (1)2-3-pinnate, 2-5 cm wide; leaves ovate to elliptic, to 2 mm long; cells strongly prorate abaxially; costa double. ●On moist soil, humus, rotten logs in the mountains.



NM, Taos Co., Taos Ski Valley, 22 Jul 2014, *Kleinman et al.* (SNM).

Pleurozium [rib-cage branching].



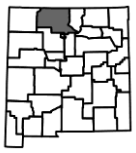
Pleurozium schreberi (Bridel) Mitten [for Johann Christian Daniel von Schreber (1739-1810), German physician-naturalist] [*Hypnum schreberi* Willdenow ex Bridel]. Pleurocarpous, forming deep shiny mats, the stems red, erect-ascending, to 16 cm tall/long, irregularly 1-pinnate, lacking paraphyllia, the shoots ± julaceous; leaves concave, wrinkled-plicate when dry, to 1.5 mm wide, the margins entire except apically, the apices recurved; costa double to nearly absent; alar cells orange-brown; laminal cells linear. ●On forest floors in the mountains. ♦Upright main shoots of *Pleurozium* mimic the upright secondary shoots of *Climacium*.

NM, Taos Co., Taos Ski Valley, 22 Jul 2014, *Kleinman et al.* (SNM).

Hymenoloma [a papery/membranous border].

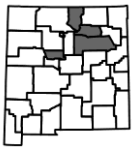
1 Leaf margins 2-stratose; distal laminae scattered 2-stratose; alar region not or only weakly differentiated; proximal hyaline cells thin-walled.....***H. mulahaceni***

1 Leaf margins 1-stratose; distal laminae 1-stratose; alar region usually well differentiated by enlarged cells; proximal hyaline cells thick-walled.....***H. crispulum***



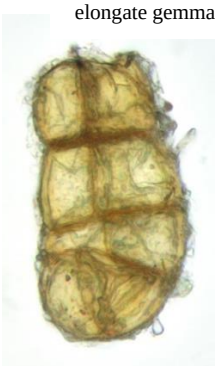
Hymenoloma crispulum (Hedwig) Ochyra [somewhat curled] [*Dicranoweisia crispula* (Hedwig) Lindberg ex Milde, *Weissia crispula* Hedwig]. Acrocarpous, in yellowish green tufts, the stems 1-6 cm long; leaves crisped and curled when dry, 2-3.4 mm long, 1-stratose in distal half, the margins plane, 1-stratose, entire to weakly toothed distally; costa stout, extending to the tip; alar region differentiated, the cells enlarged, often colored; proximal cells hyaline, rectangular, thick-walled; distal cells quadrate to shortly rectangular, with longitudinal cuticular striae appearing as papillae in cross-section, especially near the costa (pseudopapillae); gemmae supposedly rare, but found in our specimen, globose, in clusters on the adaxial surface. ●On boulders and in moist rock crevices, sometimes logs and wood; mountains; rare. ♦Most of what was called this is now referred to *Hymenoloma mulahaceni*. Also, compare with *Dicranum montanum*, which is more prominently toothed distally and critically lacks the longitudinal cuticular striae present in this species.

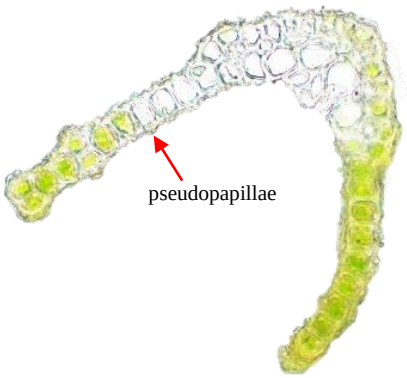
NM, Rio Arriba Co., glacial cirque below North Truchas Peak, 19 Aug 2023, *R.C. Sivinski 9735* (NMC).



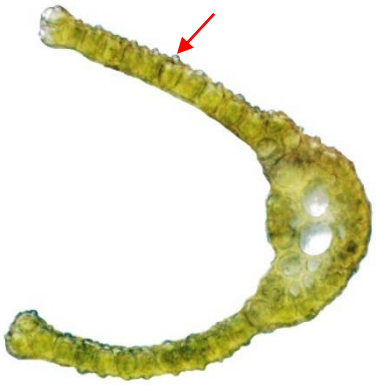
Hymenoloma mulahaceni (Höhnel) Ochyra [from mount Mulhacén, in Spain] [*Dicranoweisia contermina* Renauld & Cardot, *Dicranoweisia intermedia* J.J. Amann, *Oroweisia mulahaceni* Höhnel]. Acrocarpous, in blackish to dark green tufts, the stems 1-2 cm long; leaves crisped and curled to merely incurved when dry, 2-3 mm long, mostly 1-stratose in the distal half with 2-stratose patches or streaks, the margins plane, 2-stratose in the upper half, entire to weakly toothed distally; costa stout, extending to the tip or several cells below; alar region not or weakly differentiated; proximal cells hyaline, rectangular, thin-walled; distal cells isodiametric, somewhat bulging, pseudopapillose by means of longitudinal cuticular striae appearing as small papillae in cross-section; gemmae infrequently present, elongate-oblong. ●On rock and rotting wood. ♦Our material has been lumped within *Hymenoloma crispulum*, but is easily distinguished by the key features. Similar to *Dicranum montanum* at first glance, but that species has well-developed, orangish, inflated alar cells and usually prominently toothed distal margins.

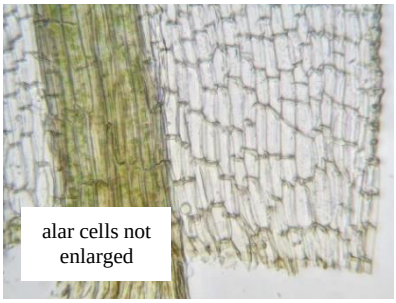
elongate gemma



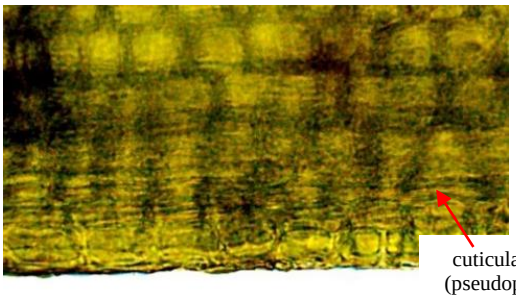


pseudopapillae





alar cells not enlarged



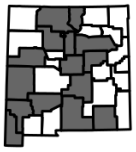
cuticular striae (pseudopapillae)

NM, Grant Co., Black Range, Trail 78, 17 Jul 2012, *Kleinman & Blisard* (SNM).

1 Median and distal leaf cells prorate (papillose because of projecting cell ends) ...go to **Taxiphyllum** (Taxiphyllaceae)
1 Median and distal leaf cells smooth
2 Plants small and slender; leaves tiny, 0.1-0.5 mm long; rhizoids densely papillose ....go to **Platydictya** (Plagiotheciaceae)
2 Plants larger, slender to robust; leaves longer than 0.5 mm long; rhizoids smooth or papillose
3 Leaves sharply squarrose-recurved-reflexed from the stem when wet, cordate-based; plants small and slender; stem leaves mostly less than 1 mm long .....go to **Campylophyllopsis** (Amblystegiaceae)
3 Leaves spreading to appressed, not sharply recurved-reflexed (not to be confused with falcate leaves appressed at the base but curving outward/downward above midlength), usually not cordate-based; plants and stem leaves various (*Hypnum* s.l.)
4 Stem hyalodermis present, at least partially
5 Alar region well-defined, the alar cells thin-walled and balloon-inflated, abruptly delimited by 1-3 rows of thick-walled quadrate-rectangular cells immediately above; pseudoparaphyllia broad, the apices truncate, rounded, to irregular (*C. lindbergii*)..... go to **Calliergonella** (Pylaisiaceae)
5 Alar region gradually differentiated and meager, the alar cells thickish-walled, enlarged somewhat but not balloon-inflated, gradually transitioning to the cells above; pseudoparaphyllia narrowly triangular, the apices pointed (*S. pratensis*) .....go to *Stereodon* (Stereodontaceae)
4 Stem hyalodermis absent
6 Leaves 2.5-5 mm long, strongly circinate-falcate and strongly plicate (obscuring the single costa extending into the acumen).....go to **Sanionia** (Amblystegiaceae)
6 Leaves rarely longer than 1.5 mm long, weakly to strongly falcate, plicate or not, the costa double and short
7 Leaves falcate-secund
8 Leaf margins (at least one) strongly revolute almost its entire length; leaves strongly falcate-secund
9 Stem leaf margins serrulate distally; leaves commonly spreading and not markedly down-turned; epiphytic and on rotting wood; commonly fruiting.....go to ***Jochenia pallescens*** (Jocheniaceae)
9 Stem leaf margins entire distally, at least near the apex; leaves mostly markedly down-turned; various substrates, commonly soil and rock; commonly not fruiting..... .....go to ***Roaldia revoluta*** (Pylaisiaceae)
8 Leaf margins plane, or revolute only on the lower ⅓ or less; leaves nearly straight to falcate-secund
10 Leaves not concave as below; leaf margins usually serrulate from base to apex..... .....go to ***Jochenia pallescens*** (Jocheniaceae)
10 Leaves rounded on the back, deeply concave, with a glossy, shell-like texture; leaf margins weakly serrulate to entire
11 Pseudoparaphyllia surrounding branch bases broadly foliose; alar cells quadrate, green, all the same; medial cells shorter and broader, 25-40 µm long, 5-6 µm wide ....go to ***Buckia vaucheri*** (Pylaisiaceae)
11 Pseudoparaphyllia surrounding branch bases filamentous; alar cells of two kinds, the upper quadrate and green, the lower ones larger, pale, and inflated; medial cells longer and narrower, 50-100 µm long, 3-4 µm wide (*H. cupressiforme*) ..... **Hypnum**
7 Leaves straight
12 Branch tips curved upward or outward when dry, often with many leaves directed towards the side, erect when moist
13 Brood branchlets evident or hidden among the leaves at the stem tips (usually detached by teasing the stem tips); operculum obliquely long-rostrate; leaf margins recurved..... ..... go to **Platygyrium** (Phylaisiadelphaceae)
13 Brood branchlets absent; operculum apiculate to short-rostrate; leaf margins plane to erect ....go to PYLAISIACEAE
12 Branch tips ± straight with the leaves directed forward
14 Shoots terete-foliate
15 Pseudoparaphyllia surrounding branch bases broadly foliose; alar cells quadrate, green, all the same; medial cells shorter and broader, 25-40 µm long, 5-6 µm wide..... .....go to ***Buckia vaucheri*** (Pylaisiaceae)
15 Pseudoparaphyllia surrounding branch bases filamentous; alar cells of two kinds, the upper quadrate and green, the lower ones larger, pale, and inflated; medial cells longer and narrower, 50-100 µm long, 3-4 µm wide (*H. cupressiforme*)..... **Hypnum**
14 Shoots at least somewhat flattened, complanate-foliate
16 Rhizoids smooth
17 Pseudoparaphyllia absent ..... go to **Redfearnia** (Plagiotheciaceae)
17 Pseudoparaphyllia present.....go to **Isopterygium** (Pylaisiadelphaceae)
16 Rhizoids papillose
18 Pseudoparaphyllia absent .....go to **Isopterygiella** (Plagiotheciaceae)
18 Pseudoparaphyllia present.....go to **Taxiphyllum** (Taxiphyllaceae)

Hypnum [ancient name for a moss-like plant].

1 Leaves 1.5-2.5 mm long; stem hyalodermis present
  2 Alar region well-defined, the alar cells thin-walled and balloon-inflated, abruptly delimited by 1-3 rows of thick-walled quadrate-rectangular cells immediately above; pseudoparaphyllia broad, the apices truncate, rounded, to irregular (*C. lindbergii*) ..... go to **Calliergonella** (Pylaisiaceae)
  2 Alar region gradually differentiated and meager, the alar cells thickish-walled, enlarged somewhat but not balloon-inflated, gradually transitioning to the cells above; pseudoparaphyllia narrowly triangular, the apices pointed (*S. pratensis*) .....go to *Stereodon* (Stereodontaceae)
1 Leaves mostly less than 1.5 mm long; stem hyalodermis absent
  3 Leaf margin (at least one) strongly revolute almost its entire length; leaves strongly circinate-falcate
    4 Stem leaf margins serrate distally; leaves commonly spreading and not markedly down-turned; epiphytic or on rotting wood; commonly fruiting ..... go to ***Jochenia pallescens*** (Jocheniaceae)
    4 Stem leaf margins entire distally, at least near the apex; leaves mostly markedly down-turned; on trees, bark, and commonly rock or soil; not commonly fruiting.....go to ***Roaldia revoluta*** (Pylaisiaceae)
  3 Leaf margin plane, or revolute only on the lower 1/3 or less
    5 Leaves not concave as below; leaf margins usually strongly serrulate from base to apex .... go to ***Jochenia pallescens*** (Jocheniaceae)
    5 Leaves rounded on the back, deeply concave, with a glossy, shell-like texture; leaf margins weakly serrulate to entire
      6 Pseudoparaphyllia surrounding branch bases broadly foliose; alar cells quadrate, green, all the same; medial cells shorter and broader, 25-40 µm long, 5-6 µm wide ..... go to ***Buckia vaucheri*** (Pylaisiaceae)
      6 Pseudoparaphyllia surrounding branch bases filamentous; alar cells of two kinds, the upper quadrate and green, the lower ones larger, pale, and inflated; medial cells longer and narrower, 50-100 µm long, 3-4 µm wide ..... ***H. cupressiforme***

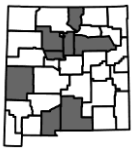


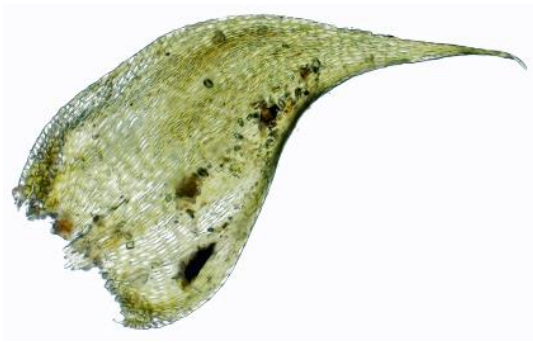
Hypnum cupressiforme Hedwig [*Cupressus*-shaped]. Pleurocarpous, in often glossy, greenish, tufts or mats, the stems creeping to erect, to 8 cm or more tall/long, the central strand poorly developed, the hyalodermis absent; pseudoparaphyllia surrounding branch bases filamentous; leaves falcate-secund or not, to 2 mm long, the margins recurved to plane proximally, serrulate; costa short, double; alar cells of two kinds, the upper quadrate and green, the lower larger, pale and inflated; medial cells long and narrow, 50-100 µm long, 3-4 µm wide. ●On soil, rock, and trees. ♦Easily confused with *Buckia vaucheri* (Pylaisiaceae), which has foliose pseudoparaphyllia, alar cells mostly all quadrate and green, and shorter and broader medial cells.

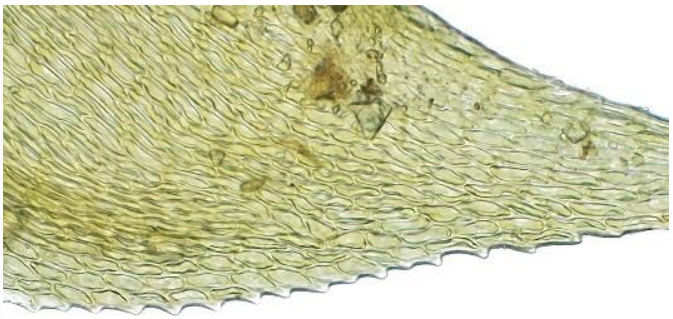
NM, San Miguel Co., Upper Gallinas Canyon, 13 Aug 2018, *Kleinman & Blisard* (SNM).

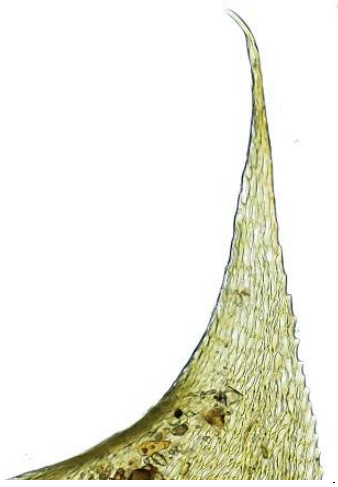
Jochenia [for Jochen Heinrichs (1969-2018) German bryologist].

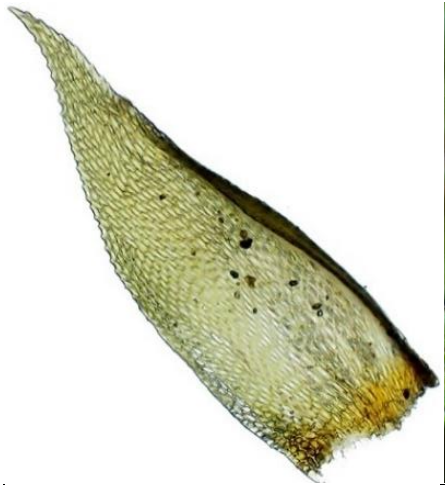
Jochenia pallescens (Hedwig) Hedenäs [becoming pale] [*Hypnum pallescens* (Hedwig) P. Beauvois, *Hypnum reptile* Michaux, *Leskea pallescens* Hedwig]. Pleurocarpous, autoicous, in small mats, the stems to 5 cm long, usually creeping, a hyalodermis absent, central strand weak; pseudoparaphyllia few, lanceolate; leaves commonly falcate-secund, to 1 mm long, not decurrent, the margins serrulate or sometimes nearly entire proximally; costa double; laminal cell walls pitted, weakly prorate; capsules commonly present. ●Commonly rotten wood and tree bases, sometimes rocks and boulders. ♦Formerly treated in *Hypnum*. Distinctive by the blades falcate, serrulate, and usually one margin revolute, growing on wood.

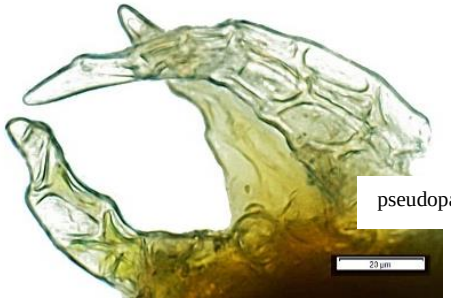












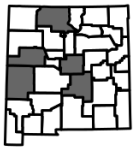
pseudoparaphyllia

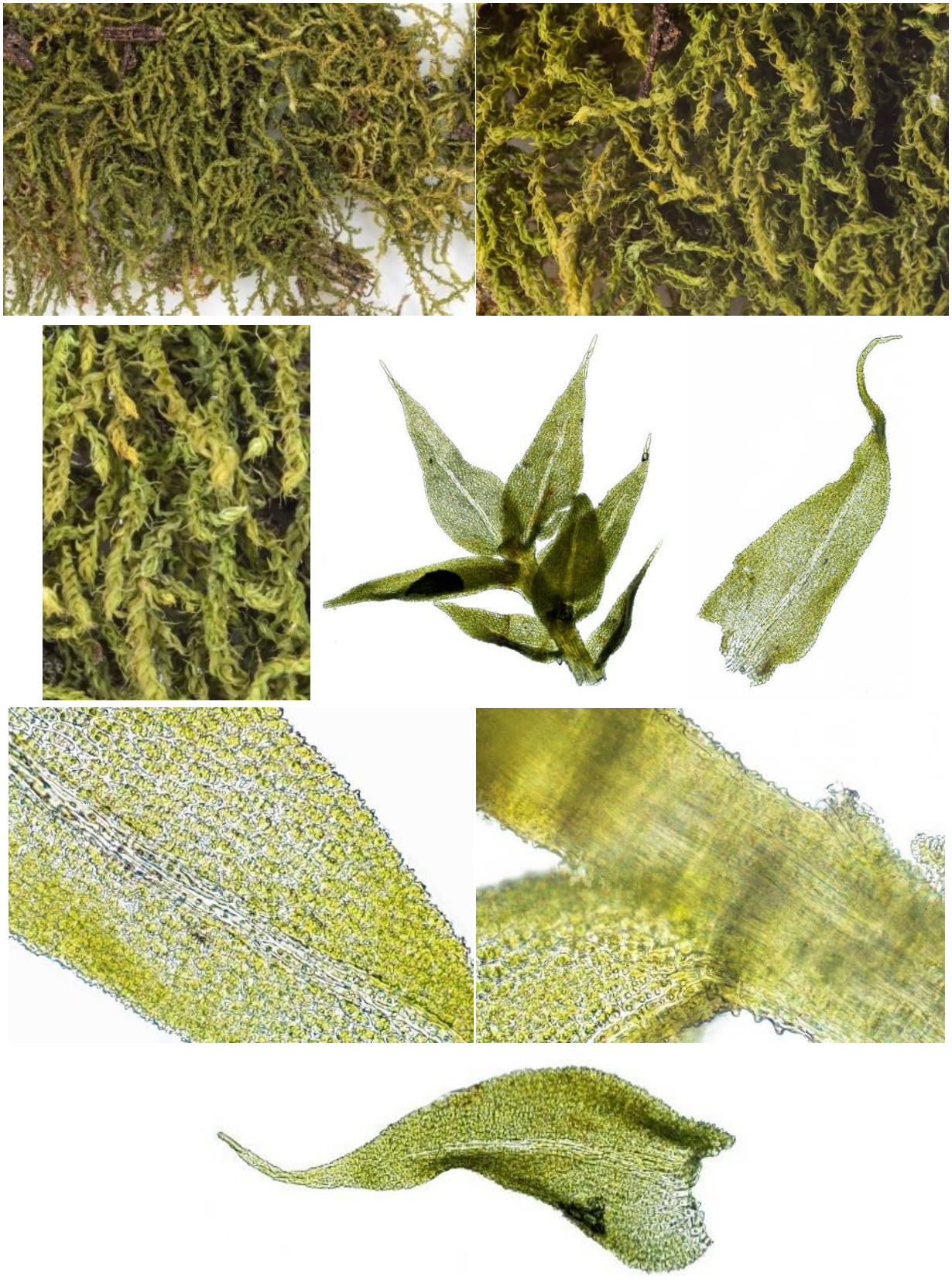
NM, Otero Co., Sacramento Mts, Telephone Canyon, 21 May 2009, *K.W. Allred 9926* (NMCR).

1 Leaves with hair-points..... **Claopodium**
1 Leaves without hair-points
  3 Costa short, ½ or less the leaf length
    4 Cells minutely multi-papillose (oil immersion); leaf cells 2-3:1; plants light green or yellowish brown.....
      .....go to **Leptopterigynandrum** (Taxiphyllaceae)
    4 Cells smooth or prorate (papillose at the ends); leaf cells 1-2:1; plants dark olive-green to yellow-green (*P. tectorum*).....go to **Pseudoleskeella** (Pseudoleskeellaceae)
  3 Costa long, more than ½ the leaf length
    5 Leaf cells smooth, not papillose, prorate, or bulging-mammillose
      6 Leaves squarrose when wet..... **Lindbergia**
      6 Leaves erect to spreading when wet
        7 Costa rarely reaching the acumen (*P. rupestris*).....go to **Pseudoleskeella** (Pseudoleskeellaceae)
        7 Costa disappearing well into the acumen .....go to **Lescuraea** (Pseudoleskeaceae)
    5 Leaf cells papillose, prorate, or bulging-mammillose
      8 Cells densely multi-papillose ..... go to **Anomodon** (Anomodontaceae)
      8 Cells uni-papillose, prorate, or bulging-mammillose
        9 Stem and branch leaves strongly dimorphic
          10 Leaf cells bulging-mammillose (*L. polycarpa*)..... **Leskea**
          10 Leaf cells papillose/prorate ..... **Haplocladium**
        9 Stem and branch leaves similar
          11 Leaves widely spreading to squarrose when wet; paraphyllia absent ..... **Lindbergia**
          11 Leaves erect to spreading when wet; paraphyllia present
            12 Leaf cells prorate at the cell ends .....go to **Lescuraea** (Pseudoleskeaceae)
            12 Leaf cells broadly 1-papillose over the lumen
              13 Leaf margins distinctly serrate; stems lacking paraphyllia (*C. whippleanum*)..... **Claopodium**
              13 Leaf margins revolute and entire; stems with dense paraphyllia (*L. patens*).....
                .....go to **Lescuraea** (Pseudoleskeaceae)

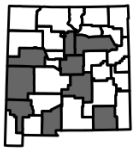
Claopodium [a broken foot].
1 Leaf cells uni-papillose; leaf margins serrate, the apices acuminate, but not drawn out into a hair-point.....
  ..... ***C. whippleanum***
1 Leaf cells multi-papillose; leaf margins entire, the apices drawn out into a hair-point
  2 Leaf margins revolute; stems ± smooth, lacking paraphyllia .....***C. rostratum***
  2 Leaf margins plane; stems papillose, with a few scale-like paraphyllia.....***C. pellucinerve***

Claopodium pellucinerve (Mitten) Best [clear-nerved] [*Leskea pellucinervis* Mitten]. Pleurocarpous, in loose, dark green to yellowish mats, the stems densely papillose, with few scale-like paraphyllia; leaves to 1.5 mm long, the margins entire, the apices tapering to a hair-point; costa ¾ leaf length; laminal cells multi-papillose. ●On rocks or crevices.





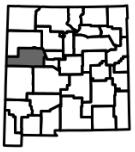
NM, Cibola Co., El Malpais Nat. Mon., 16 Apr 2018, *Kleinman et al.* (SNM).

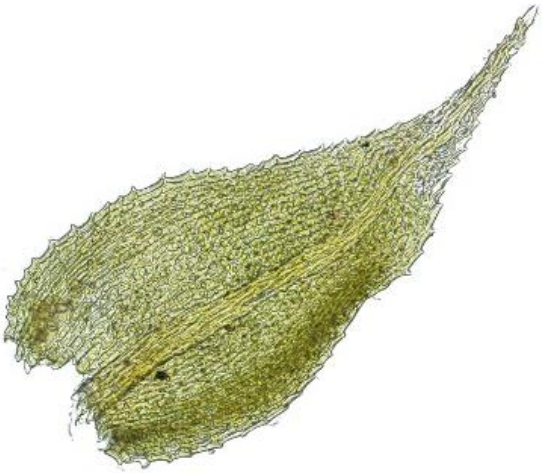


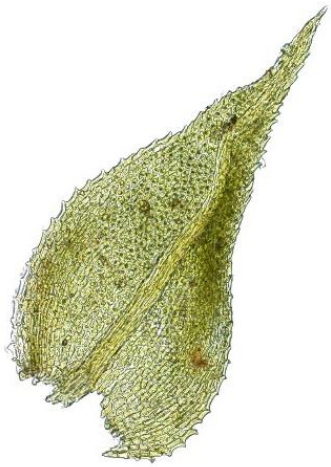
Claopodium rostratum (Hedwig) Ignatov [beaked] [*Anomodon rostratus* (Hedwig) Schimper, *Leskea rostrata* Hedwig]. Pleurocarpous, in thick, light to yellowish green mats, the stems to 2 cm long, profusely branched, a central strand developed, paraphyllia absent; branch leaves imbricate and julaceous when dry, to 1.4 mm long, the margins revolute and entire, the apices ending in a hair-point; costa strong; medial laminal cells multi-papillose, the proximal ones smooth. ●Tree bases, soil, seasonally wet cliff faces and boulders. ♦Formerly placed in *Anomodon*.

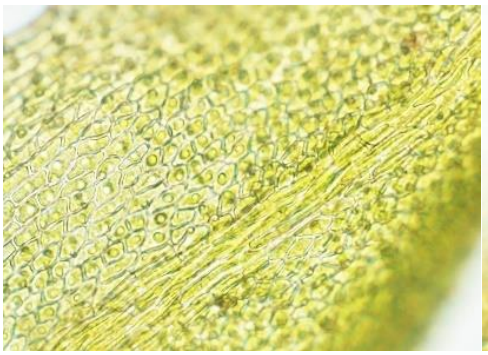
NM, Grant Co., San Vicente Creek, 24 Feb 2021, *Kleinman & Blisard* (SNM).

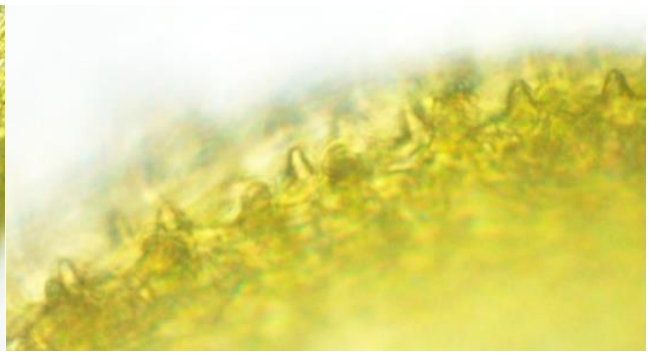
Claopodium whippleanum (Sullivant) Renauld & Cardot [for Amiel Weeks Whipple (1817-1863), topographical engineer for the U.S. Army Corps of Engineers] [*Hypnum whippleanum* Sullivant]. Pleurocarpous, in dark green to yellowish mats, the stems to 4 cm long, non-papillose, lacking paraphyllia but with pseudoparaphyllia subtending the branches and buds; leaves to 1 mm long, the margins serrate, the apices tapering but without a hair-point; costa ending in the acumen; medial cells 1-papillose. ●Soil over rock; known only from El Malpais National Monument.

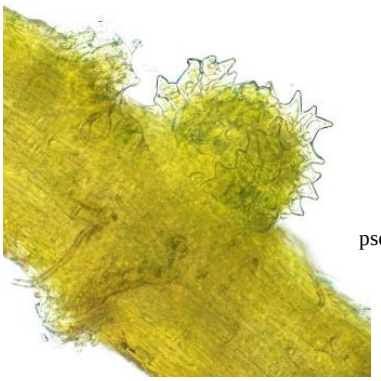








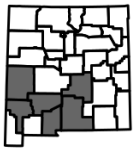




pseudoparaphyllia

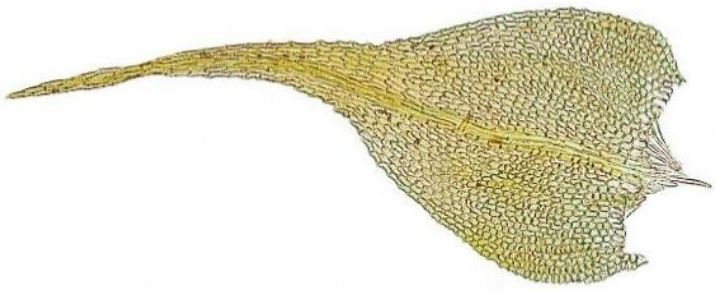
NM, Cibola Co., El Malpais Nat. Mon., Apr 2018, *Kleinman et al.* (SNM).

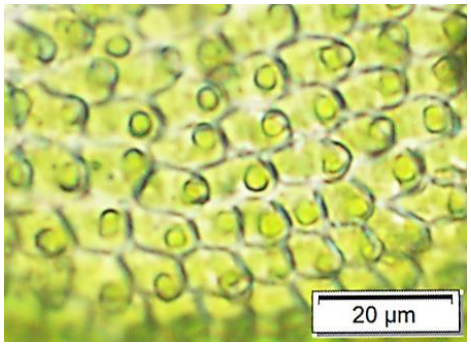
Haplocladium [a simple branchlet].
1 Stem leaves not plicate; papillae shifted distally, often appearing prorate; paraphyllia abundant..... ***H. angustifolium***
1 Stem leaves 2-plicate basally; papillae over lumen; paraphyllia few ..... ***H. microphyllum***

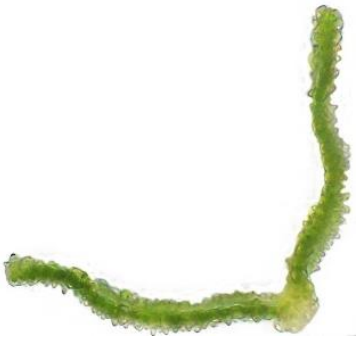
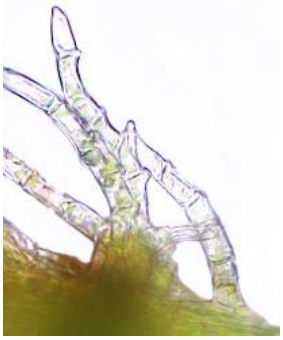


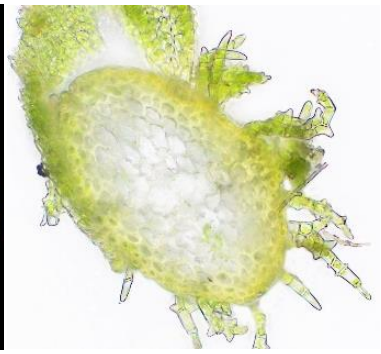
Haplocladium angustifolium (Hampe & Müller Hal.) Brotherus [narrow-leaved] [*Bryohaplocladium angustifolium* (Hampe & Müller Hal.) Watson & Iwatsuki, *Hypnum angustifolium* Hampe & Müller Hal.]. Pleurocarpous, in small mats, the stems frequently branched, with abundant branched paraphyllia; leaves erect, imbricate, not plicate, to 0.8 mm long, the margins plane, serrulate; costa percurrent; laminal cells 1-papillose over the lumen, distally prorate from end walls. ●On rock, wood, and humus.





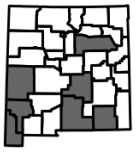


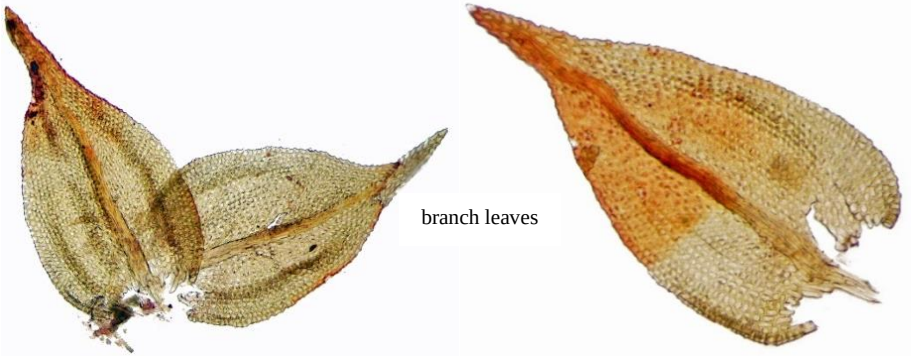





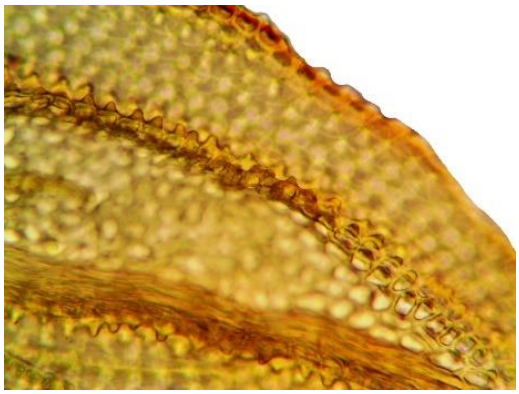
NM, Catron Co., Mogollon Mts, Little Dry Creek Trail, 30 Jan 2011, *R. Kleinman* (SNM).

Haplocladium microphyllum (Hedwig) Brotherus [small-leaved] [*Bryohaplocladium microphyllum* (Hedwig) Watson & Iwatsuki, *Hypnum calyptratum* Sullivant]. Pleurocarpous, in medium mats, the stems with few little-branched paraphyllia; leaves somewhat distant, 2-plicate basally, to 1.5 mm long, the margins plane, serrulate; costa percurrent or shorter; medial laminal cells smooth to 1-papillose over the lumen. ●On soil, wood, rocks, and humus.

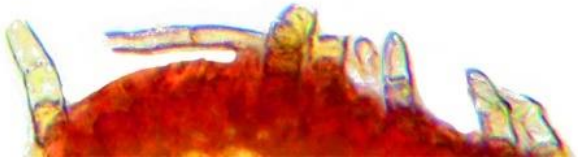


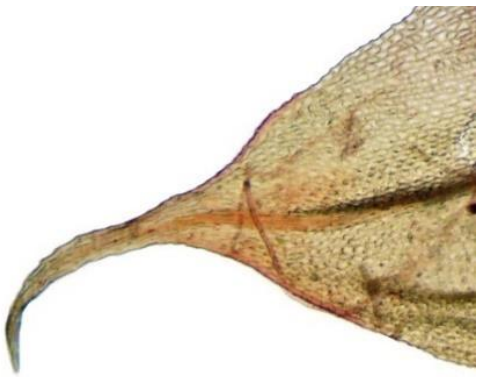


branch leaves



paraphyllia

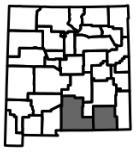




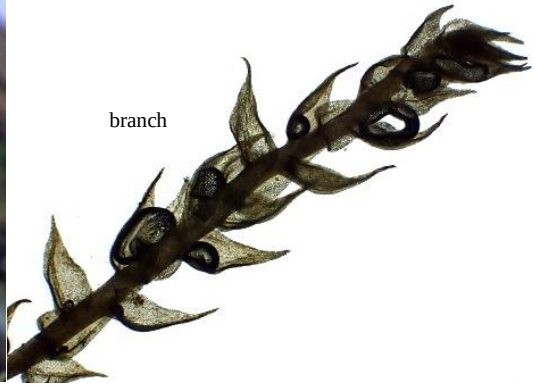
stem leaf

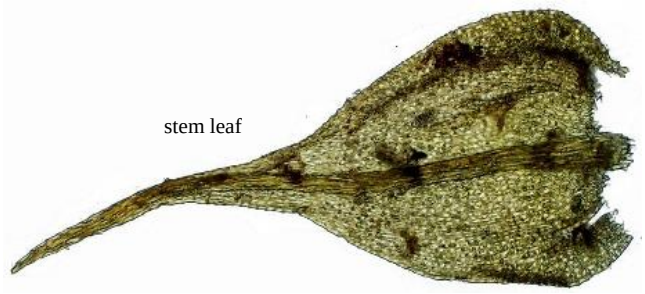
NM, Otero Co., Sacramento Mts, La Luz Canyon, 24 Oct 2016, *K.W. Allred 10793* (NMCR).

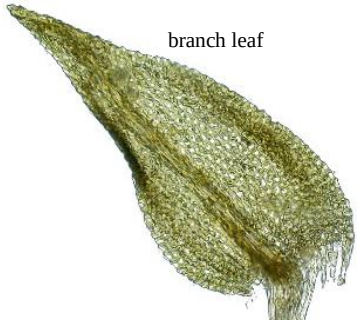
Leskea [for Nathanael Gottfried Leske (1751-1786), German botanist].

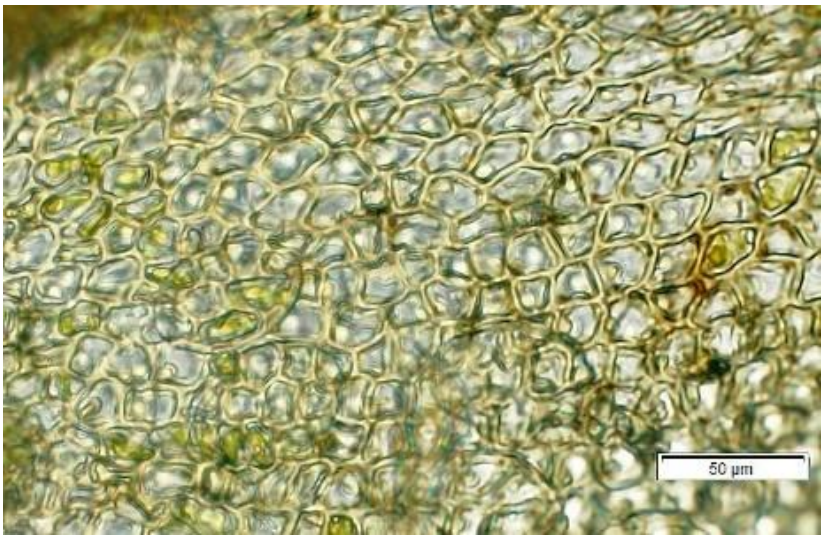


Leskea polycarpa Hedwig [many-fruited]. Pleurocarpous, in small, pale green to brownish mats, the stems with few smooth paraphyllia, the branches curved apically; stem and branch leaves differentiated, the stems leaves distinctly long-acuminate apically, to 1.2 mm long, the branch leaves acute to short-acuminate, to 0.8 mm long; costa ending near the apex; distal cells 1-papillose (bulging mammillose) abaxially; capsules curved, 2-3 mm long. ●On lower trunks, logs, sometimes rock, ours on oak bark; known from very few collections.









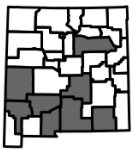
FL, Wakula Co., Apalachicola Nat. For., 20 Mar 1992, *A.C. Risk 6175* (SNM).

Lindbergia [for Sextus Otto Lindberg (1835-1889), Swedish botanist-physician].

1 Branches not julaceous when dry; brood branches commonly clustered in the leaf axils; leaf cells distinctly and rather coarsely papillose ..... ***L. brachyptera***

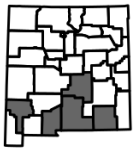
1 Branches julaceous when dry; brood branches absent; leaf cells minutely or indistinctly papillose ..... ***L. mexicana***

Lindbergia brachyptera (Mitten) Kindberg [short-winged] [*Pterogonium brachypterum* Mitten]. Pleurocarpous, in dull mats, the stems usually straight, not julaceous when dry; leaves widely spreading wet or dry, to 1.4 mm long, the margins entire or weakly serrulate distally; costa ½-⅔ the leaf length; medial cells ovoid to rhombic, 1-papillose, the apical cells smooth; specialized asexual reproduction by brood branches in leaf axils. ●On bark of maples and other deciduous trees.



NM, Grant Co., Pinos Altos Range, Myer Canyon, 9 Dec 2010, *Kleinman et al.* (SNM).

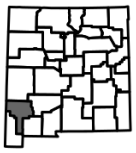
Lindbergia mexicana (Bescherelle) Cardot [of Mexico] [*Leskea mexicana* Bescherelle]. Pleurocarpous, in dull mats, the stems often curved, subjulaceous when dry; leaves appressed when dry, widely spreading when wet, to 1 mm long, the margins entire; costa subpercurrent; medial cells ovoid, indistinctly 1-papillose, the apical cells smooth; specialized asexual reproduction absent. ●On bark, rotten wood, and frequently rock.



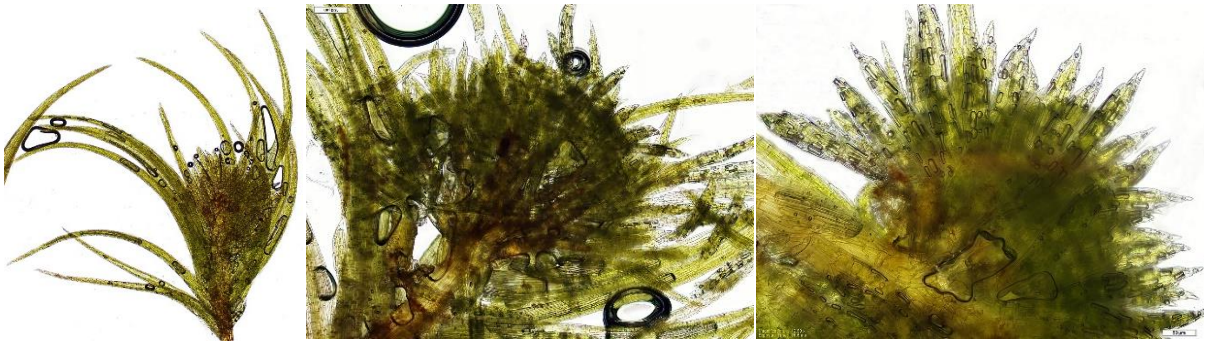
NM, Eddy Co., Guadalupe Mts, 7 Jul 2010, *R.D. Worthington* (NMCR).

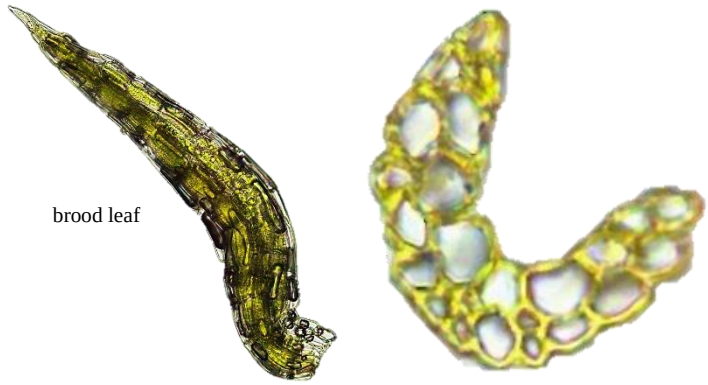
1 Plants with dense clusters of brood leaves at the stem tips; leaf apices entire ..... **Brothera**
1 Plants lacking clusters of brood leaves as above; leaf apices serrate, at least with a few teeth
2 In cross-section, costa always with stereid cells on both sides of the central guide cells..... **Campylopodiella**
2 In cross-section, costa with stereids only abaxially..... **Campylopus**

Brothera [for Viktor Ferdinand Brotherus (1849-1929), Finnish bryologist].



Brothera leana (Sullivant) Müller [for Thomas Gibson Lea (1785-1844), Cincinnati botanist] [*Leucophanes leanum* Sullivant]. Acrocarpous, in dense mats or tufts, the stems 3-6 mm tall/long; leaves lanceolate, to 3 mm long, the margins entire, including the apex; costa occupying about ⅔ of the leaf base, in cross-section with a median chlorophyllose cells enclosed on both sides by a single row of hyaline cells; alar cells weakly differentiated; specialized asexual reproduction by dense clusters of spindle-shaped brood leaves at stem tips. ●On rotting stumps in shade; known from a single site.

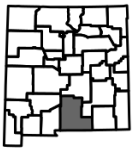




NM, Grant Co., Pinos Altos Range, Signal Peak, 18 Nov 2010, *Kleinman et al.* (SNM).

Campylopodiella [resembling *Campylopus*].

Campylopodiella stenocarpa (Wilson) P. Müller & J.-P. Frahm [narrow-fruited] [*Trichostomum stenocarpum* Wilson]. Acrocarpous, in loose, yellowish green tufts, the stems erect, to 15 mm tall/long; leaves ending in a long acumen, to 5 mm long, very narrow, the margins entire but for a few teeth apically; costa filling ⅓-⅔ or more of the leaf base, with 2-3 adaxial stereid cells above and below the median band of large guide cells; alar cells weakly differentiated; basal cells hyaline, in 15-18 rows. ●Rotten logs and stumps; known only from a recent collection in Otero County.



Mexico, Guerrero, 27 Oct 1944, *A.J. Sharp* (COLO).

Campylopus [a bent foot].

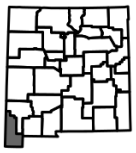
1 Distal laminal cells rectangular, about 4:1; leaves appressed; costa filling ½-⅔ leaf width at base ..... *C. schimperi*

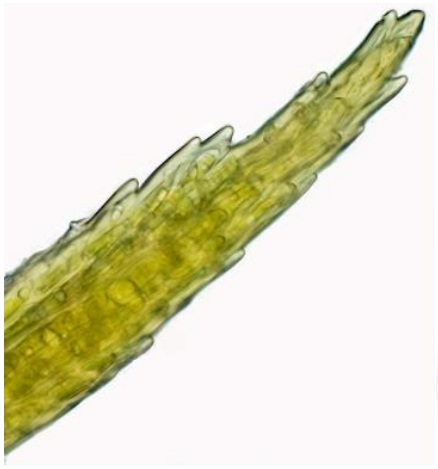
1 Distal laminal cells short-rectangular, less than 4:1; leaves spreading somewhat; costa filling about ½ leaf width at base ..... ***C. tallulensis***

Campylopus schimperi Milde [for Wilhelm Phillipe Schimper (1808-1880), Alsatian bryologist] [*Campylopus subulatus* Schimper var. *schimperi* (Milde) Husnot]. Acrocarpous, in light green compact tufts, the stems to 3 cm tall/long; leaves appressed, to 5 mm long; costa filling ½-⅔ of leaf base, lacking abaxial stereids; alar cells little differentiated; basal laminal cells hyaline, rectangular; specialized asexual reproduction by broken off shoot tips containing a few leaves and lying on the surface of the clump. ●On soil in high elevation alpine sites; thought to be present in San Miguel County, but awaiting verification.

CO, Boulder Co., Indian Peaks, Niwot Ridge, 15 Jul 2005, *Wittmann et al.* (COLO).

Campylopus tallulensis Sullivant & Lesquereux [from Tallulah Falls, northeast Georgia]. Acrocarpous, in yellowish green tufts, the stems to 5 cm tall/long; leaves about 5 mm long, sometimes deciduous, the apex serrate; costa filling about ½ leaf base, with abaxial stereids; alar cells hardly differentiated, hyaline or reddish; basal cells hyaline, rectangular; distal cells incrassate. ●On rock and thin soil over rock.

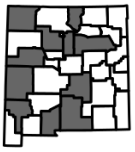


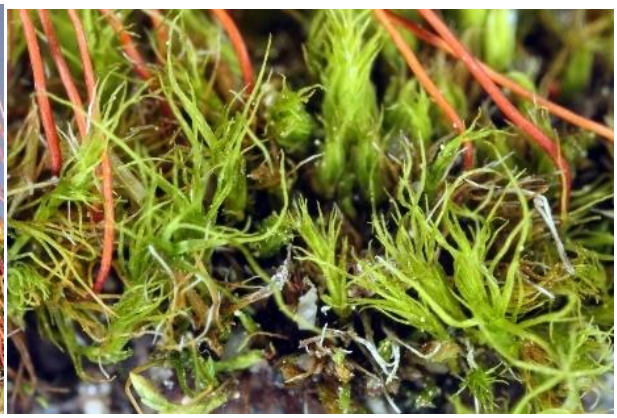


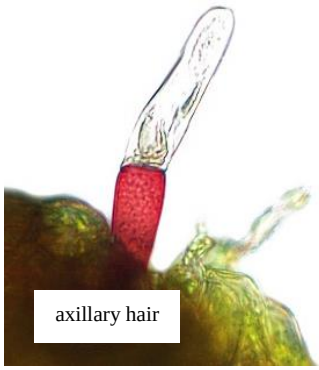
NM, Hidalgo Co., Peloncillo Mts, 24 Nov 2000, *K.W. Allred 7948* (NMCR).

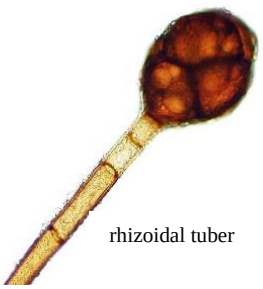
Leptobryum [a slender *Bryum*].

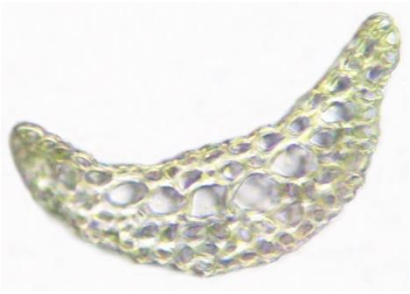
Leptobryum pyriforme (Hedwig) Wilson [pear-shaped] [*Webera pyriformis* Hedwig]. Acrocarpous, in slender tufts, the stems to 6 cm tall/long; leaves flexuose, erect to spreading, linear, to 5 mm long, the margins plane, entire or sometimes denticulate apically; costa filling about ½ of the leaf base; laminal cells long-rectangular; specialized asexual reproduction by red, rounded brood bodies in leaf axils or on rhizoids; seta 1-5 cm long; capsule to 2.5 mm long, nodding, pyriform. ●A common weed of moist disturbed soil, especially greenhouses.











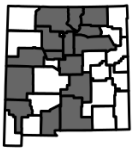
NM, Catron Co., Johnson Canyon, 14 Jun 2010, *Kleinman & Blisard* (SNM).

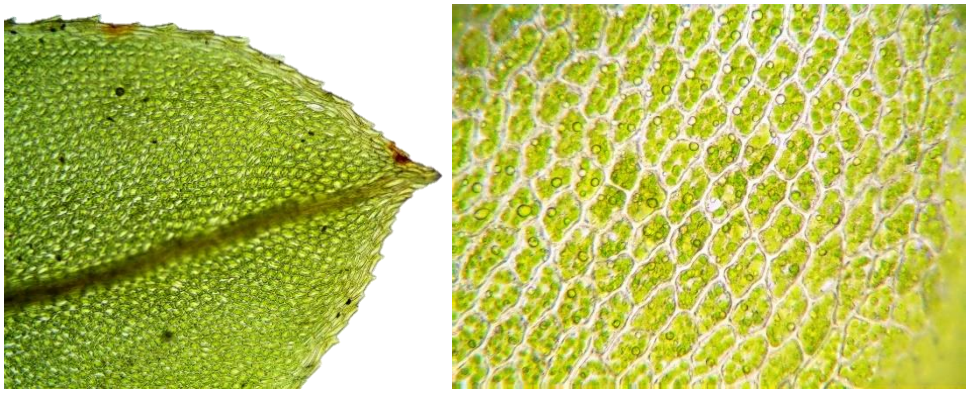
1 Distal leaf cells mostly elongate-rectangular to linear; leaves lacking a limbidium ..... **Pohlia**
1 Distal leaf cells mostly oblong-hexagonal to isodiametric; leaves usually with a limbidium, though sometimes obscure
  2 Leaves entire, the margins partly or entirely 2- or multi-stratose; stems red to brown or blackish, densely clothed with large, freely branched rhizoids ..... **Rhizomnium**
  2 Leaves toothed to almost entire, the margins 1-2-stratose; stems reddish to green, naked or obscurely clothed with rhizoids
    3 Marginal teeth single, not in pairs; stoloniferous stems present, green, sterile ..... **Plagiomnium**
    3 Marginal teeth in pairs (single or almost lacking in *M. arizonicum* or *M. blyttii*); stoloniferous stems absent, erect stems green at the young tips and reddish below, fertile ..... **Mnium**

Mnium [a moss].

1 Laminal cells elongate, 1.5-2.5:1, commonly ± radiating in diagonal rows from costa to margin, the walls usually pitted (appearing sinuous-edged); leaves not decurrent or only moderately so ..... ***M. arizonicum***
1 Laminal cells quadrate-hexagonal 1-1.5:1, not in diagonal rows, the walls not pitted; leaves strongly decurrent
  2 Leaf margins entire or weakly toothed; limbidium of 1-2 rows ..... ***M. blyttii***
  2 Leaf margins markedly toothed; limbidium of 2-4 rows
    3 Cell walls not or only slightly thickened at the corners, so the cells are angular-hexagonal; medial laminal cells 10-25 µm diameter ..... ***M. thomsonii***
    3 Cells walls obviously thickened at the corners, so the cells are rounded-quadrate; medial laminal cells greater than 25 µm diameter ..... ***M. marginatum***

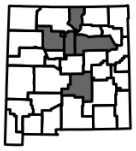
Mnium arizonicum Amann [of Arizona]. Acrocarpous, in thick mats, the stems erect, to 4 cm tall, reddish brown; leaves contorted and twisted when dry, to 4 mm long, the margins 1-2-stratose, toothed in distal half, rarely entire, the teeth paired or single, the apices apiculate, the bases mostly not decurrent; costa percurrent; medial cells elongate, 1.5-2.5:1, commonly radiating in diagonal rows from costa to margin, smaller near the margins, the walls usually pitted, not or scarcely collenchymatous, blue post-mortal color absent. ●On dry to moist soil and humus in the mountains. ♦One of our most common mountain mosses.

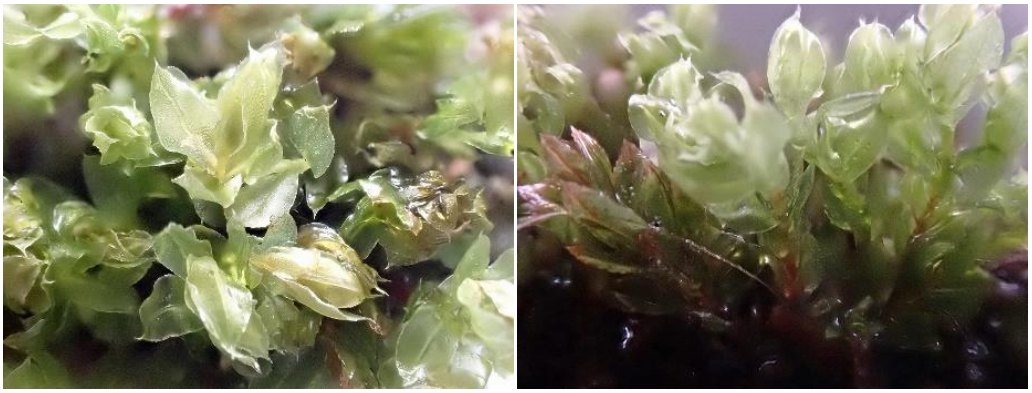




NM, Taos Co., Middle Fork Lake Trail, 29 Jul 2021, *Kleinman & Blisard* (SNM).

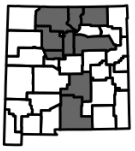
Mnium blyttii Bruch & Schimper [for Mathias Numsen Blytt (1789-1862), Norwegian botanist]. Acrocarpous, the stems to 7 cm tall/long, reddish brown; leaves undulate or contorted when dry, to 4 mm long, short- to long-decurrent, the margins mostly 1-stratose, entire to weakly toothed distally, the teeth single or rarely paired; laminal cells short-elongate to isodiametric, not in diagonal rows, not or scarcely collenchymatous, a blue post-mortal color often present. ●Wet soil along brooks and creeks; relatively uncommon.

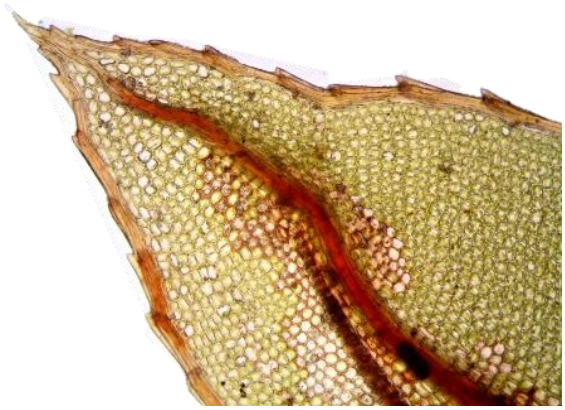


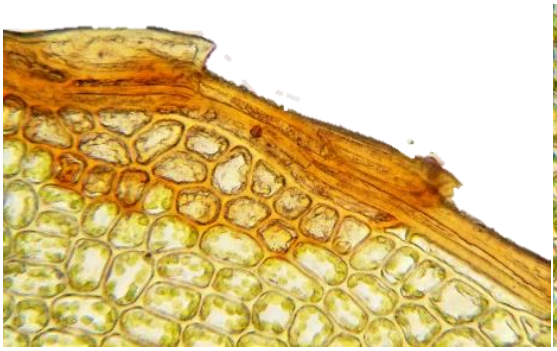


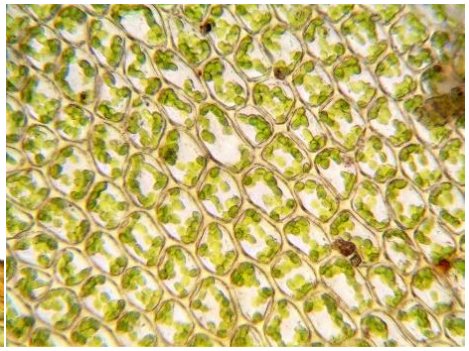
NM, Santa Fe Co., Santa Fe Ski Basin, 26 May 2021, *K.W. Allred 11007* (NMCR).

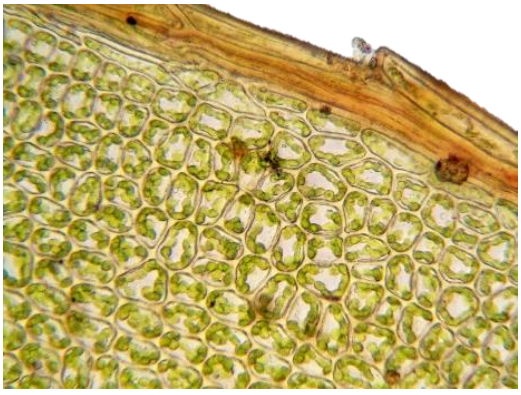
Mnium marginatum (Dickson ex Withering) Bridel ex P. Beauvois [bordered] [*Bryum marginatum* Dickson ex Withering, *Mnium riparium* Mitten, *Mnium serratum* Schrader ex Bridel]. Acrocarpous, the stems reddish, to 6 cm tall/long; leaves contorted and twisted when dry, to 5 mm long, the bases long-decurrent, the margins 2-stratose, reddish, toothed to below mid-leaf, the teeth paired; costa commonly sinuous distally; laminal cells isodiametric to short-elongate, in diagonal or longitudinal rows, strongly collenchymatous, blue post-mortal color absent. ●On wet to damp soil, humus, and rotten wood.





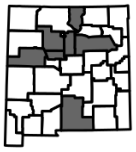




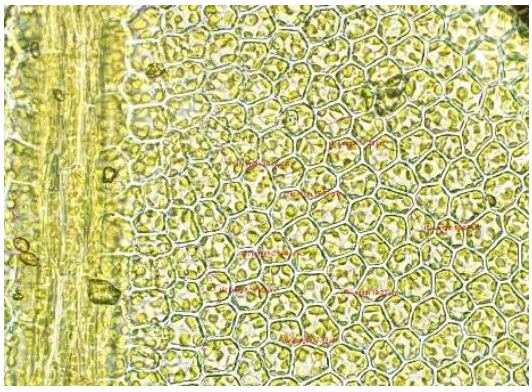


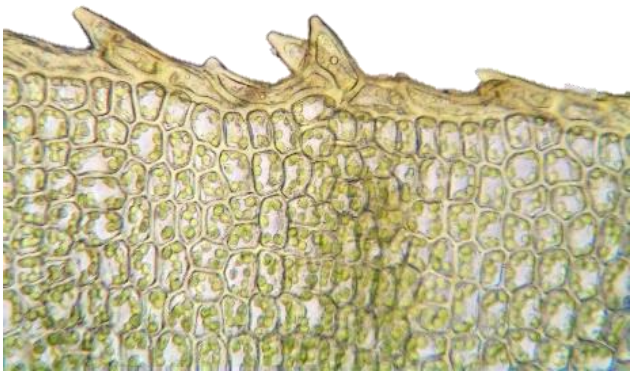
leaf decurrency

NM, San Miguel Co., Holy Ghost Campground, 9 Jun 1996, *K.W. Allred 6367* (NMCR).



Mnium thomsonii Schimper [for Thomas Thomson (1817-1878), Scottish surgeon-botanist-naturalist] [*Mnium lycopodioides* Schwägrichen var. *orthorrhyncum* (Harman) Müller Hal., *Mnium orthorrhynchum* (Hartman) Müller Hal.]. Acrocarpous, the stems reddish, to 7 cm tall/long; leaves crisped and somewhat coiled around stem or contorted when dry, to 4 mm long, the bases long- but thinly decurrent, the margins green, 2-stratose, toothed below mid-leaf, the teeth paired or single; costa commonly sinuous distally; laminal cells nearly isodiametric to somewhat elongate, small, 10-25 µm diameter, in longitudinal rows, mostly not collenchymatous, a blue post-mortal color absent. ●On wet to damp soil. ♦Distinguished by the small cells.



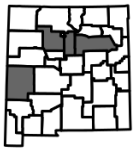


NM, Taos Co., Taos Ski Valley, 17 Sep 2017, *Kleinman & Blisard* (SNM).

Plagiomnium [a slanting *Mnium*].

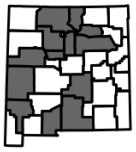
1 Leaf bases distinctly and broadly decurrent (best seen with leaves still attached to the stem); margins strongly toothed (weakly so in *P. medium*), easily seen with a hand lens; cells not in rows
  2 Leaf margins strongly toothed in the upper ½-⅔; cell walls not pitted; setae single in the perichaetium ..... ***P. cuspidatum***
  2 Leaf margins strongly toothed nearly to the base; cells walls inconspicuously to noticeably pitted
    3 Marginal teeth strongly developed, of 1-4 cells; laminal cells 1.5-2:1; setae single ..... ***P. ciliare***
    3 Marginal teeth weakly developed but definite, of mostly a single cell; laminal cells 1-1.5:1; setae 1-5 per perichaetium ..... ***P. medium***
1 Leaf bases not or scarcely (and narrowly) decurrent; margins weakly toothed to nearly entire; cells in rows or not
  4 Medial laminal cells usually elongate, the cells increasing in size towards the costa, the walls usually pitted, not or weakly thickened at the corners; plants dioicous; setae 1-3 per perichaetium; capsule lid conical ..... ***P. ellipticum***
  4 Medial laminal cells short-elongate to nearly isodiametric, the cells hardly increasing in size towards the costa, the walls scarcely pitted, strongly thickened at the corners (collenchymatous); plants synoicous; setae 1-5 per perichaetium; capsule lid rostrate ..... ***P. rostratum***

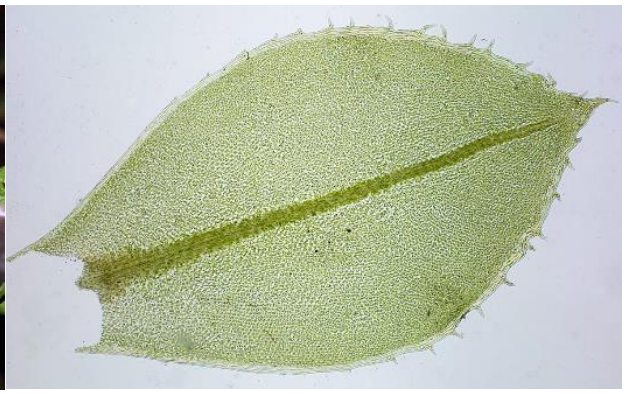
Plagiomnium ciliare (Müller Hal.) Koponen [fringed] [*Mnium affine* Blandow ex Funck var. *ciliare* Müller Hal.]. Acrocarpous, erect stems to 9 cm tall/long, sterile stems to 10 cm long; leaves crisped and contorted when dry, to 10 mm long, the bases long-decurrent, the margins toothed to near base, smaller leaves nearly entire, the teeth single; medial cells elongate, ½ size near the margins, in ± longitudinal rows, collenchymatous, commonly pitted. ●On damp soil, humus, and wood.



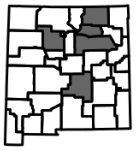
NC, Wake Co., Durant Nature Preserve, 21 Jun 2020, *M. Donnell* (SNM).

Plagiomnium cuspidatum (Hedwig) Koponen [sharp-pointed] [*Mnium cuspidatum* Hedwig]. Acrocarpous, erect stems to 3.5 cm tall, sterile stoloniferous stems to 7 cm long; leaves dark green, contorted when dry, to 5 mm long, the bases broadly long-decurrent, the margins toothed from mid-leaf to apex, the teeth single, the apices long-cuspidate; costa percurrent to excurrent; medial cells isodiametric to short-elongate, sometimes in longitudinal rows, strongly collenchymatous, not pitted. ●On wet to damp soil, humus, rotting logs, and rocks. ♦Large, sharp teeth in the distal half are distinctive.

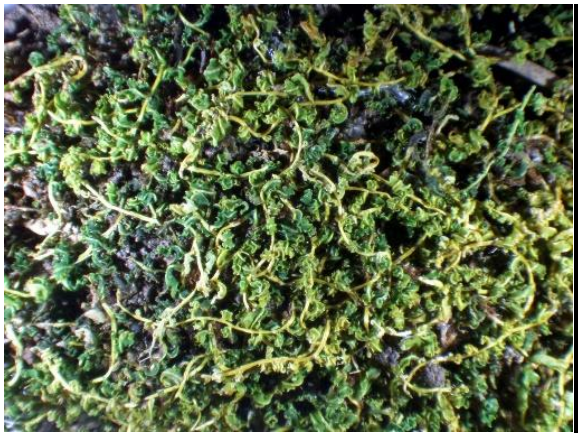


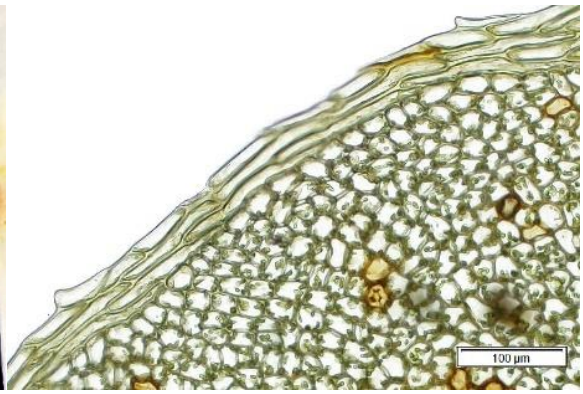


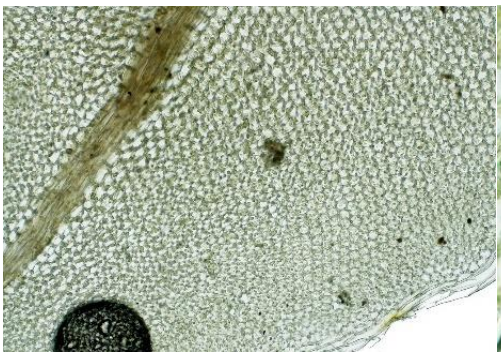
NM, Grant Co., Pinos Altos Range, Meadow Creek, 18 May 2013, *Kleinman & Blisard* (SNM).

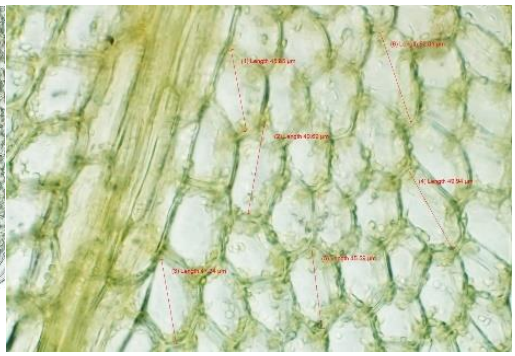


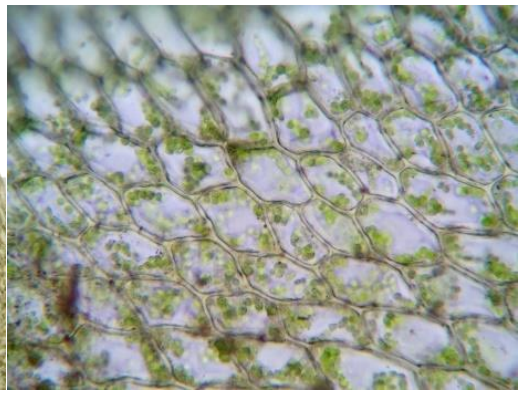
Plagiomnium ellipticum (Bridel) Koponen [elliptic] [*Mnium affine* Bland. ex Funck var. *rugicum* (Laurer) Bruch & Schimper, *Mnium ellipticum* Bridel, *Mnium rugicum* Laurer]. Acrocarpous, sometimes forming large mats, erect stems to 5 cm tall, sterile stoloniferous stems to 12 cm long; leaves crisped and contorted when dry, to 8 mm long, the bases not or rarely short-decurrent, the margins moderately toothed to ¾ leaf length, often entire on sterile stems, the teeth single; costa percurrent to excurrent; medial cells elongate or sometimes ± isodiametric, distinctly smaller near the margins, in longitudinal and diagonal rows, not to weakly collenchymatous, pitted. ●On wet soil and humus.





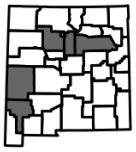


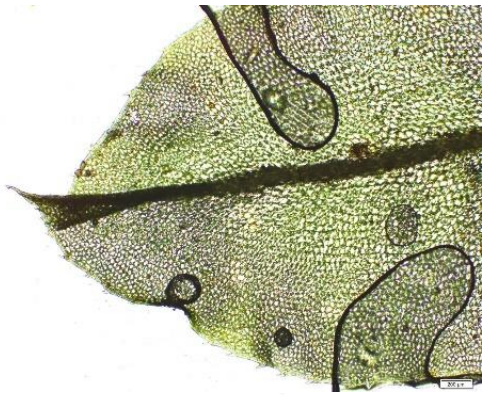


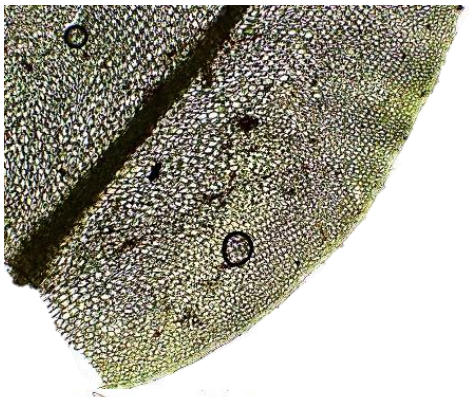


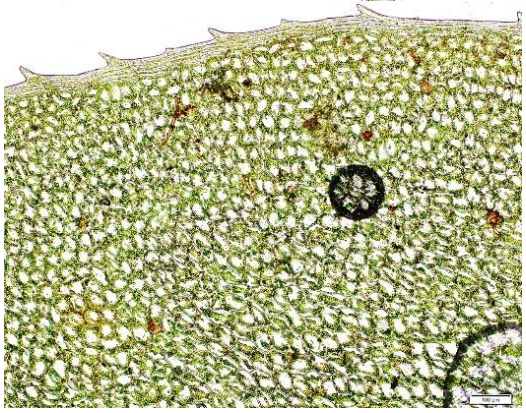
NM, San Miguel Co., Winsor Creek, 28 Jun 2000, *K.W. Allred 7805* (SNM).

Plagiomnium medium (Bruch & Schimper) Koponen [middle, intermediate] [*Mnium medium* Bruch & Schimper]. Acrocarpous, erect stems to 4 cm tall, sterile stoloniferous stems to 8 cm long; leaves crisped and contorted when dry, to 10 mm long, the bases long-decurrent, the margins toothed to near the base, the teeth single, hooked forward when more than one cell; costa percurrent to excurrent; medial cells elongate to nearly isodiametric, much smaller near the margin, longitudinal or diagonal rows, collenchymatous, pitted. ●On wet rock, soil, and humus.

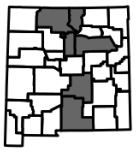




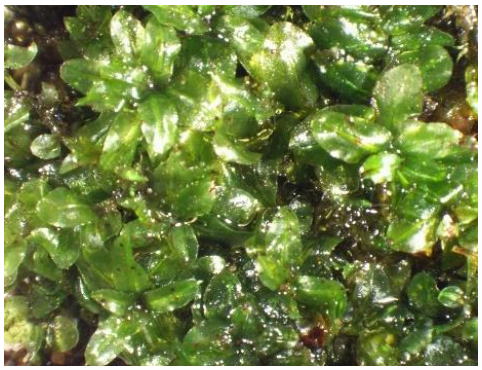


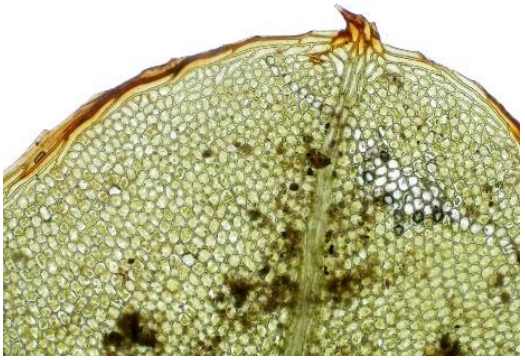


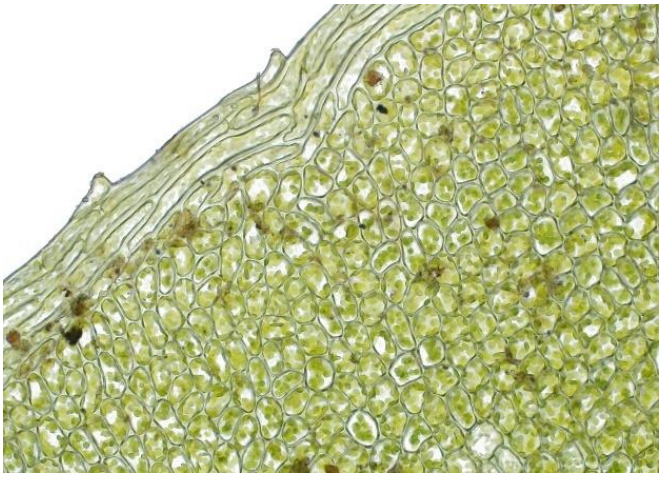
NM, Grant Co., Upper Mimbres River, in 2011, *Keith & Stevens* (SNM).



Plagiomnium rostratum (Schrader) Koponen [beaked] [*Mnium longirostrum* Bridel, *Mnium rostratum* Schrader]. Acrocarpous, erect stems to 2 cm tall, sterile stoloniferous stems to 6 cm long; leaves crisped and contorted when dry, to 7 mm long, the bases not or weakly decurrent, the margins weakly toothed distally or to near the base, the teeth single; the apices often retuse or emarginate; costa percurrent to short-excurrent; medial cells isodiametric to short-elongate, slightly smaller near the margins, in indistinct longitudinal or diagonal rows, strongly collenchymatous, not pitted. ●On wet soil and humus. ♦Distinguished by the small size, emarginate leaf apices, and scarcely decurrent leaf bases.





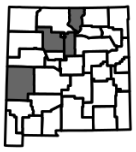


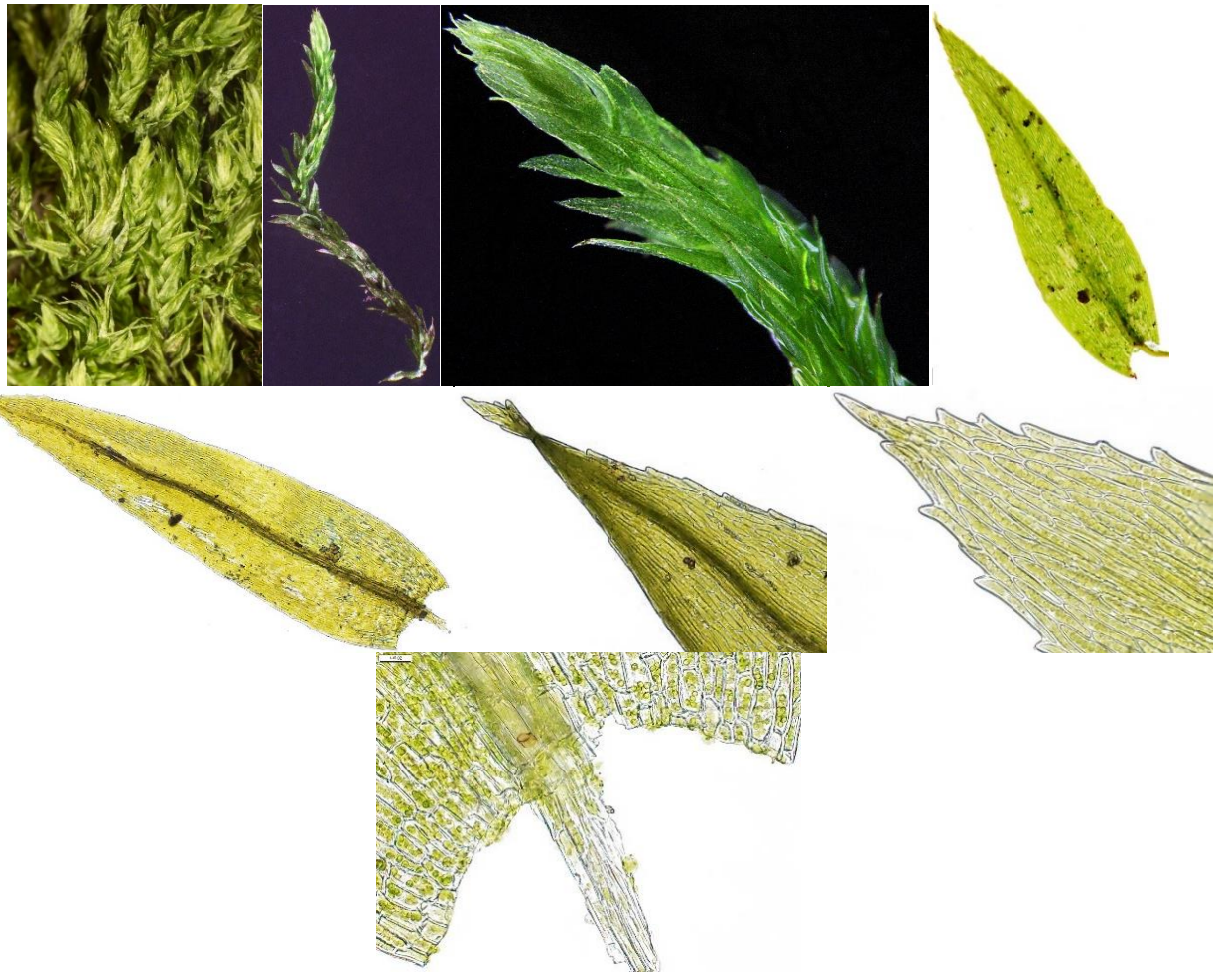
NM, San Miguel Co., Gallinas Canyon, 13 Jul 2021, *Kleinman & Allred* (SNM).

Pohlia [for Johann Baptist Emanuel Pohl (1782-1834), Czech-Austrian botanist]. Note: Species in italics but not bolded are not yet known from New Mexico, but are included here for comparison.

1 Plants with axillary gemmae or bulbils
  2 Gemmae in clusters of 2-8 per leaf axil, linear to oblong, yellow, pink, or green ..... ***P. tundrae***
  2 Gemmae usually single in the leaf axil, bulbiform, red to blackish ..... ***P. drummondii***
1 Plants lacking axillary gemmae or bulbils
  3 Plants dull; distal leaf cells hexagonal to rhomboidal
    4 Peristome cilia absent
      5 Neck of the capsule ½ to as long as or longer than the urn; distal cell walls thickish; leaves not at all cucullate ..... ***P. elongata***
      5 Neck of the capsule ⅓ the urn; distal cell walls thin; leaves subtly cucullate ..... *P. obtusifolia*
    4 Peristome cilia present and long
      6 Plants whitish pale green; costa ending well before the apex; capsule hanging straight down, the neck less than 1/3 the urn length ..... ***P. wahlenbergii***
      6 Plants greenish; costa subpercurrent to shortly excurrent; capsule horizontal to drooping, the neck about ½ the urn length ..... ***P. nutans***
  3 Plants shiny or glossy; distal leaf cells linear-rhomboidal
    7 Neck of the capsule ½ or less the urn length ..... ***P. cruda***
    7 Neck of the capsule ½ to equaling the urn length
      8 Leaves 1.5-2.6 mm long; plants paroicous (having antheridia and archegonia on same branch, but the antheridia found below the archegonia) ..... ***P. longicolla***
      8 Leaves 0.8-1.6 mm long; plants dioicous (having antheridia and archegonia on separate plants) .... ***P. bolanderi***

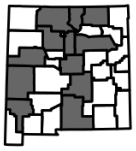
Pohlia bolanderi (Sullivant) Brotherus [for Henry Nicholson Bolander (1831-1897), California State Botanist] [*Bryum bolanderi* Sullivant]. Acrocarpous, dioicous, green to whitish, somewhat shiny, the stems to 1.5 cm long; leaves to 1.6 mm long, the margins toothed distally; costa percurrent; distal cells linear-rhomboidal, 55-100 µm long, thin-walled; capsule neck ½ to equaling the urn. ●High elevation soil and rock crevices, commonly above 10,000 ft but occasionally lower.

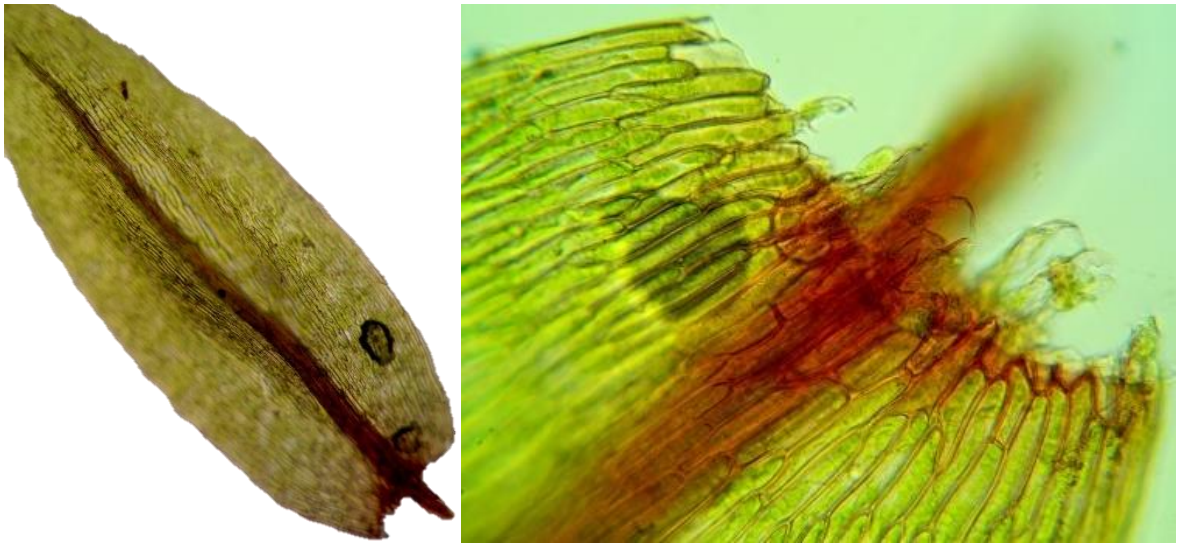


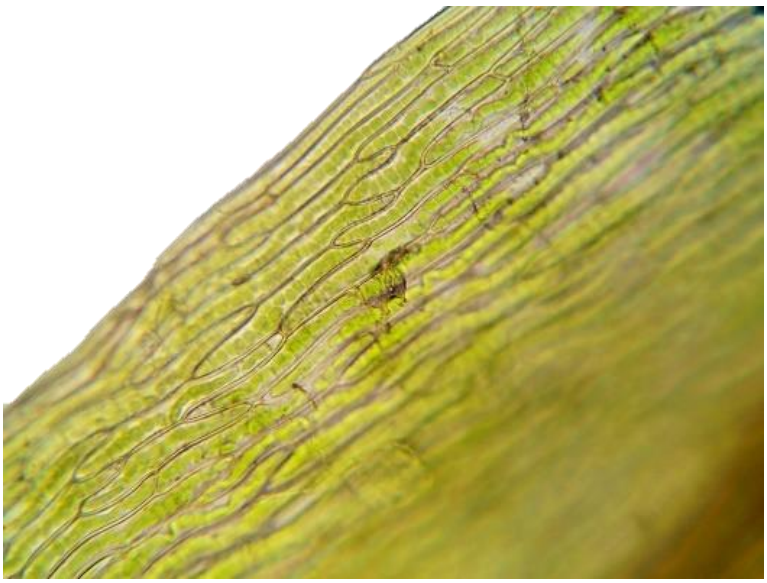


NM, Taos Co., Taos Ski Valley, 6 Aug 2015, *Kleinman & Blisard* (SNM).

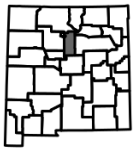
Pohlia cruda (Hedwig) Lindberg [unripe, rough] [*Mnium crudum* Hedwig]. Acrocarpous, paroicous, green to whitish, shiny, the stems to 2.5 cm long; leaves narrowly elliptic, to 2 mm long, the margins toothed distally; costa subpercurrent; distal cells linear-rhomboidal, vermicular; capsule neck about ½ urn length. ●On soil banks, stream-sides, rock crevices; moderate to high elevations. ♦Distinguished by glossy, pale, narrowly elliptic leaves, linear-vermicular cells, and capsule neck about as long as the urn.







NM, Cibola Co., El Malpais Nat. Mon., 21 Jul 2016, *Kleinman et al.* (SNM).

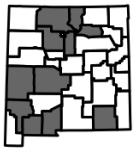


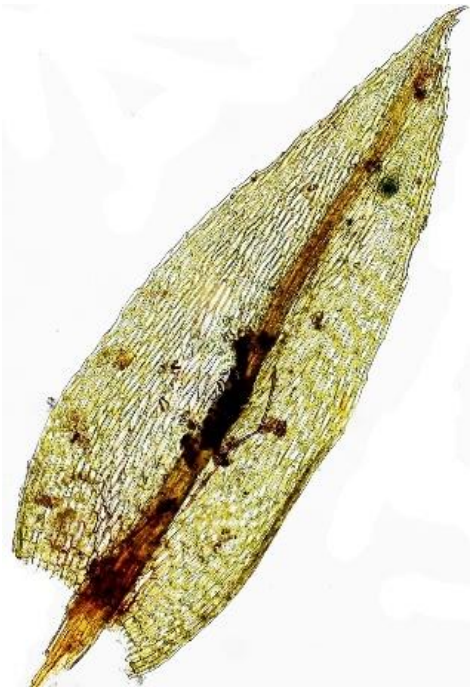
Pohlia drummondii (Müller Hal.) Andrews [for Thomas Drummond (1790-1831), Scottish naturalist] [*Bryum drummondii* Müller Hal.]. Acrocarpous, doicous, dark green to reddish, the stems reddish when wet, to 3.5 cm long; leaves keeled, to 1.5 mm long, the margins toothed distally; costa subpercurrent; distal cells rhomboidal, thin-walled; specialized asexual reproduction by bulbiform gemmae in leaf axils, these usually single but may be more; capsule neck ⅓ the urn. ●Rich soils and stream banks, generally high elevations. ♦Plants reported from the Organ Mts of Doña Ana County are questionable.

axillary bulbil

UT, Salt Lake Co., near Brighton, 4 Oct 1956, *S. Flowers* (COLO).

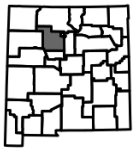
Pohlia elongata Hedwig [elongated]. Acrocarpous, in scattered, green, dull, clumps, the stems to 2.5 cm long; leaves to 2 mm long, the margins toothed distally or sometime nearly entire; costa percurrent; distal cells hexagonal to rhomboidal, thickish-walled; capsule neck ½ to equaling the urn. ●Rich soils, humus, bases of trees. ♦Capsules are similar to *Pohlia longicolla*, but that species is very shiny with longer laminal cells that are thin-walled.



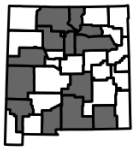


NM, Taos Co., Taos Ski Valley, 6 Aug 2015, *Kleinman & Blisard* (SNM).

Pohlia longicolla (Hedwig) Lindberg [long-necked] [*Webera longicolla* Hedwig]. Acrocarpous, paroicous, in very shiny, green to yellowish tufts, the stems to 3.5 cm long; leaves long-lanceolate, to 2.6 mm long, the margins toothed distally; costa percurrent; distal cells linear-rhomboidal, vermicular, thin-walled; capsule neck ½ to equaling the urn. ●Rich soils, stream banks, uncommon. ♦Capsules are similar to *Pohlia elongata*, but that species is rather dull with shorter laminal cells that are thickish-walled.



NM, Sandoval Co., Valles Caldera Nat. Pres., 20 Jun 2009, *K. Romig 131* (NMCR).



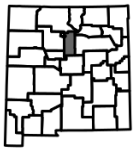
Pohlia nutans (Hedwig) Lindberg [nodding] [*Webera nutans* Hedwig]. Acrocarpous, in dull, usually greenish tufts, the stems to 8 cm long; leaves ovate-lanceolate, to 2 mm long, the margins nearly entire to toothed distally; costa percurrent or rarely short-excurrent; distal cells hexagonal to rhomboidal, thick-walled; capsule neck about ½ the urn. ●On soil, logs, tree bases, very common. ♦Among our species, only this and *Pohlia elongata* have thick laminal cell walls; that species has a longer neck of the capsule than *P. nutans*.

NM, Catron Co., San Francisco Mts, Johnson Canyon, 14 Jun 2010, *Kleinman & Norris* (SNM).

Pohlia obtusifolia (Villars ex Bridel) Koch [blunt-leaved] [*Bryum obtusifolium* Villars ex Bridel]. Acrocarpous, in dull, pale green tufts, the stems short, to 1 cm long; leaves broadly lanceolate, to 1.4 mm long, the margins toothed in the distal ⅓; costa subpercurrent; distal cells hexagonal to broadly rhombic, thin-walled; capsule neck about ⅓ the urn. ●On moist soil in high elevation areas; erroneously reported for New Mexico, and not yet verified.

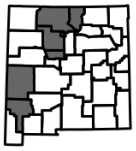
CA, Mono Co., Hoover Wilderness, Glines Canyon, 13 Jul 2012, *J.R. Shevock* (NY 01797224).

Pohlia tundrae A.J. Shaw [of the tundra]. Acrocarpous, dioicous, in greenish, glossy tufts, the stems to 2.5 cm long; leaves to 1.5 mm long, toothed distally; costa subpercurrent; distal cells rhomboidal, thin-walled; specialized asexual reproduction by 2-8 linear to oblong, axillary gemmae; capsule neck ⅓ the urn. ●Rich soils and stream banks; known from only a few collections above 11,000 ft. ♦Among our species, only this and *Pohlia drummondii* produce axillary gemmae.



CO, Pitkin Co., Independence Pass, 6 Aug 1978, *J. Shaw* (COLO).

Pohlia wahlenbergii (F. Weber & D. Mohr) Andrews [for Georg (Göran) Wahlenberg (1780-1851), Swedish physician-botanist] [*Hypnum wahlenbergii* F. Weber & Mohr]. Acrocarpous, dioicous, in whitish, dull tufts or cushions, the stems greenish to reddish, to 10 cm long; leaves to 1.2 mm long, decurrent, the margins toothed distally; costa ending well before the apex; distal cells laxly and broadly hexagonal to rhomboidal, thin-walled; capsule neck less than ⅓ the urn; peristome cilia long. ●Disturbed soil and stream banks. ♦Characterized by whitish to pale green leaves on long slender stems.



NM, Santa Fe Co., 2 Mile Reservoir, 14 Jul 2021, *Kleinman et al.* (SNM).

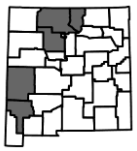
Rhizomnium [a rooted *Mnium*].

1 Larger leaves 7-15 mm long; stems with micronemata; plants dioicous .....***R. magnifolium***

1 Larger leaves 4-7 mm long; stems with or without micronemata; plants dioicous or synoicous

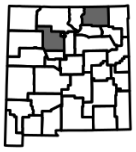
2 Distal cells conspicuously pitted; costa ending well below the apex, only rarely with a suggestion of a mucro; micronemata present; plants synoicous .....***R. pseudopunctatum***

2 Distal cells not or only slightly pitted; costa ending at or very near the apex, usually with a noticeable mucro; micronemata absent; plants dioicous .....***R. punctatum***

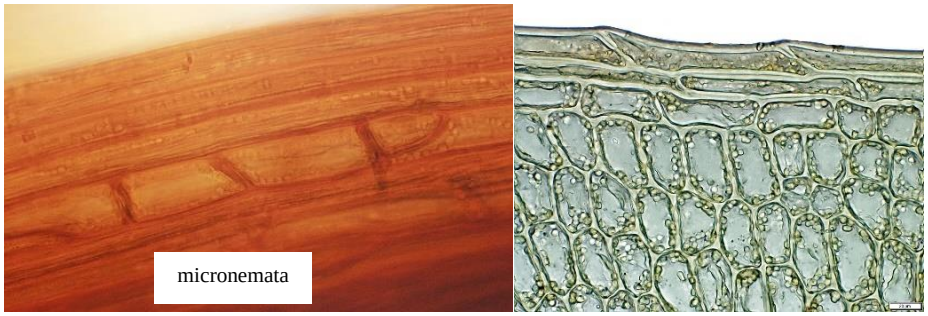


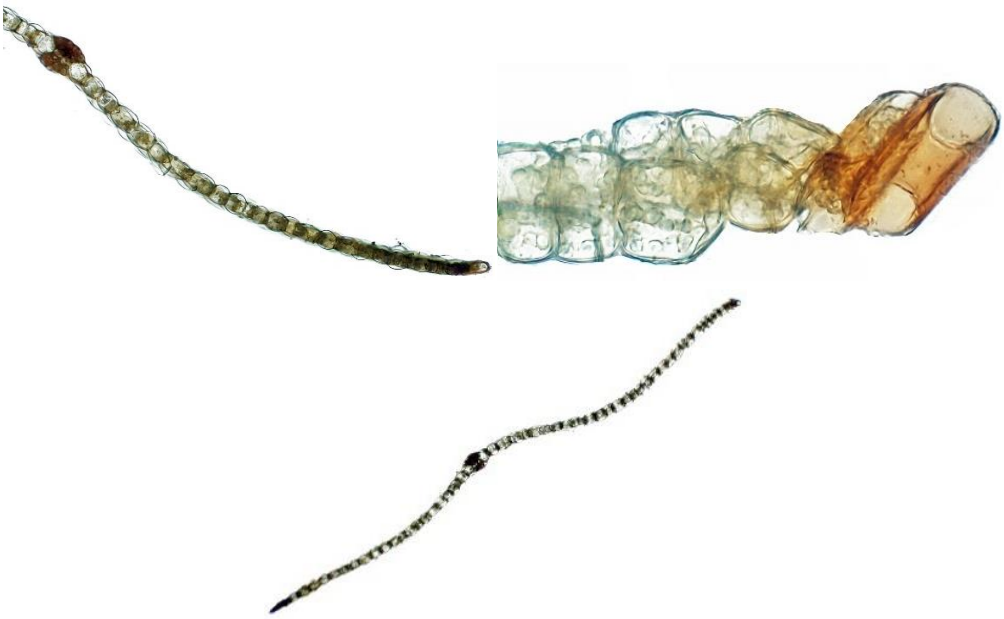
Rhizomnium magnifolium (Horikawa) Koponen [large-leaved] [*Mnium magnifolium* Horikawa, *Mnium punctatum* Hedwig var. *elatum* Schimper]. Acrocarpous, dioicous, the stems to 10 cm long, dark to black in age, with micronemata; leaves contorted when dry, (4)7-15 mm long, the apices rounded to retuse; costa ending well before the apex, sometimes bifid; median cells elongate, weakly collenchymatous, the walls lightly pitted. ●On wet soil in the mountains, around springs and seeps, humus, rock. ♦Small-leaved plants can be confused with *R. pseudopunctatum*, but that species is synoicous and the cells are more pitted.

NM, Catron Co., Mogollon Mts, Bead Spring, 14 May 2012, *Kleinman & Blisard* (SNM).

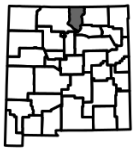


Rhizomnium pseudopunctatum (Bruch & Schimper) Koponen [resembling *Mnium punctatum*] [*Mnium pseudopunctatum* Bruch & Schimper]. Acrocarpous, synoicous, the stems to 9 cm tall/long, dark red to brownish in age, with micronemata; leaves somewhat contorted when dry, occasionally orbicular, to 7 mm long, the apices rounded or occasionally obtuse or truncate; costa nearly to the apex, sometimes bifid; median cells elongate, weakly collenchymatous, the wall weakly pitted. ●On wet soil and humus, fens, seeps; little-known in the state. ♦Similar to small-leaved plants of *Rhizomnium magnifolium*.

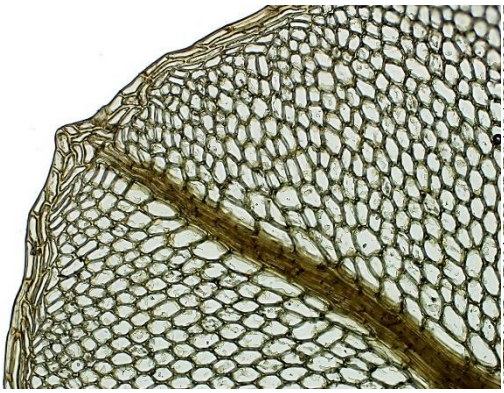




NM, Colfax Co., Osha Pass Road, 1 Jul 1979, *Wm.F. Mahler 8637* (BRIT).



Rhizomnium punctatum (Hedwig) T. Koponen [spotted] [*Mnium punctatum* Hedwig]. Acrocarpous, dioicous, the stems to 5 cm tall/long, dark reddish in age, lacking micronemata; leaves contorted when dry, to 7 mm long, the margins 2-4-stratose, the apices rounded to truncate, apiculate; costa percurrent or sometimes shorter; medial cells elongate. ●On damp to wet soil, rock, and rotting wood, in shaded sites. ♦Formerly reported from numerous counties, but all known specimens but two from Taos County have been re-identified to other species.



leaf margins

stem without micronemata

MI, Emmett Co., Pellston, 22 Jul 1960, *A.J. Sharp* (COLO).

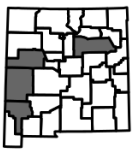
Mosses – Family NECKERACEAE

1 Shoots complanate-foliate when dry and wet; leaf cells smooth; capsules immersed ..... **Neckera**
1 Shoots terete-foliate when dry, somewhat complanate when wet; leaf cells densely papillose; capsules exserted on long setae ..... **Pseudanomodon**

Neckera [for Noël Martin Joseph de Necker (1729-1793), French-Belgian botanist].

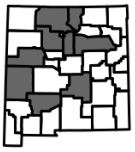
1 Costa well-developed, extending beyond mid-leaf; paraphyllia abundant ..... ***N. menziesii***
1 Costa nearly absent, short and double, never extending even to mid-leaf; paraphyllia few to absent ..... ***N. pennata***

Neckera menziesii Drummond [for Archibald Menzies (1754-1842), Scottish botanist] [*Metaneckera menziesii* (Drummond) Steere, *Porothamnium neomexicanum* Cardot, *Porotrichum neomexicanum* (Cardot) Wagner]. Pleurocarpous, the stems to 15 cm long, complanate-foliate, with numerous paraphyllia, the branches narrowed to flagelliform tips; stem leaves undulate, to 6 mm long, the margins serrulate, the apices obtuse to acute; costa to about ¾ leaf length; distal cells linear, smooth; branch leaves smaller; capsules immersed. ●On shaded rocks and tree trunks in the mountains; less common than the next.



NM, Grant, near Mule Creek, 5 Aug 2018, *Kleinman & Blisard* (SNM).

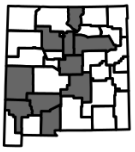
Neckera pennata Hedwig [feathery] [*Neckera oligocarpa* Bruch, *Neckera pennata* Hedwig var. *tenera* Müller Hal.]. Pleurocarpous, the stems to 11 cm long, complanate-foliate, little-branched, with few or no paraphyllia; stem leaves undulate, to 5 mm long, the margins serrulate distally, the apices acute; costa absent or double, not reaching mid-leaf; alar cells few; distal cells oblong-linear; capsule immersed. ●On shaded rocks in the mountains; more common than the preceding. ♦We include here the poorly defined and intergrading *Neckera oligocarpa* Bruch.



NM, Catron Co., Willow Creek, 20 May 2011, *Kleinman & Blisard* (SNM).

Pseudanomodon [a false *Anomodon*].

Pseudanomodon attenuatus (Hedwig) Ignatov & Fedosov [tapering] [*Leskea attenuata* Hedwig, *Neckera attenuata* (Hedwig) Myrin, *Anomodon attenuatus* (Hedwig) Hübener]. Pleurocarpous, in large, dense, yellowish green mats, the stems to 3 cm long, terete-foliate dry, somewhat complanate wet, profusely branched, the branches commonly attenuate/flagelliform; leaves to 2 mm long, broadly decurrent basally, the margins plane, papillose-denticulate apically, the apices acute; costa strong, ending just before the apex; distal cells quadrate, multi-papillose; capsules exserted on setae to 1.5 cm long. ●On rock, soil, and bark at the bases of trees. ♦Formerly classed in *Anomodon*, and before that *Neckera*.



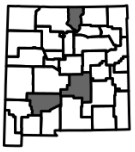
NM, Grant Co., Pinos Altos Range, Little Cherry Creek Ranch Road, 14 Feb 2021, *Kleinman* & *Blisard* (SNM).

1 Distal leaf cells with (3)4-7 small, conic to clavate papillae; numerous gemmae often produced in the leaf axils (in *Z. rupestris*), but not on the leaf surface; seta slender, long; capsule long-exserted; calyptra cucullate ..... **Zygodon**
1 Distal leaf cells with 1-3(4) branched, conic or irregular papillae or smooth; gemmae, when present, produced on the leaf surface, and not in the leaf axils; seta stout, short; capsule emergent to shortly exserted; calyptra mitrate ..... **Orthotrichum group**

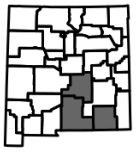
Orthotrichum group (including ***Lewinskya***, ***Orthotrichum***, and ***Nyholmiella***)
1 Leaves ending in a hyaline awn or hair-point; plants on bark, rarely on rock ..... ***Orthotrichum diaphanum***
1 Leaves awnless and without a hair-point; substrate various
2 Plants on bark
3 Leaf margins erect-incurved; leaves ovate or elliptic, concave with broadly obtuse or rounded apices; laminal gemmae abundant; calyptrae papillose, neither plicate nor hairy ..... ***Nyholmiella obtusifolia***
3 Leaf margins plane to revolute; leaves ± lanceolate or oblong, plane to keeled, with narrowly obtuse, acute, or acuminate apices; laminal brood bodies absent, few, or abundant; calyptrae smooth, rarely papillose, plicate, hairy or naked
4 Basal leaf cells markedly elongate, ± thick-walled and nodose; stomata superficial; stems 1-4 cm long..... ***Lewinskya pycnophylla***
4 Basal leaf cells nearly quadrate to rectangular, thin-walled and not nodose; stomata immersed (may appear superficial in *O. pallens*); stems 0.4-2.3 cm long
5 Leaves loosely twisted when dry; papillae conspicuous, sharp-pointed; stems 0.5-2.3 cm long..... ..... ***Orthotrichum alpestre***
5 Leaves erect-incurved when dry; papillae conic, low; stems to 1 cm long
6 Distal cells 9-14 μm long/wide; papillae low but noticeable; calyptra glabrous..... ***Orthotrichum pallens***
6 Distal cells 14-21 μm long/wide; papillae very small to absent; calyptra sparsely hairy..... ..... ***Orthotrichum pumilum***
2 Plants on rock
7 Capsules exserted, the setae evident
8 Stems 0.5-4 cm long; capsules long cylindric, smooth; stomata superficial ..... ***Lewinskya laevigata***
8 Stems to 5 mm long; capsules ovoid, usually 16-ribbed, visible at the base; stomata immersed..... ..... ***Orthotrichum anomalum***
7 Capsules immersed to only emergent, the setae not visible
9 Basal leaf cells elongate, ± thick-walled and nodose; stomata superficial..... ***Lewinskya rupestris***
9 Basal leaf cells rectangular, thin-walled and not nodose; stomata immersed
10 Leaves with low papillae or papillae lacking; leaves 2-stratose in distal portion ..... ***Orthotrichum hallii***
10 Leaves with conspicuous, simple or forked papillae; leaves mostly 1-stratose
11 Capsules strongly 16-ribbed..... ***Orthotrichum cupulatum***
11 Capsules 8-ribbed
12 Leaves sharply pointed, loosely twisted when dry; basal cells rectangular; peristome double..... ***Orthotrichum alpestre***
12 Leaves blunt, erect-incurved when dry; basal cells short-rectangular to quadrate; peristome single ..... ***Orthotrichum pellucidum***

Lewinskya [for Jette Lewinsky-Haapasaari (1948-1998), Danish bryologist] [Keyed in **Orthotrichum group**].

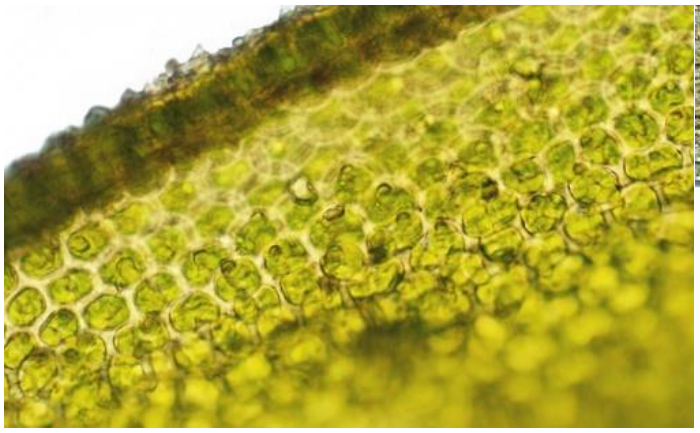
Lewinskya laevigata (Zetterstedt) F. Lara, Garilleti, & Goffinet [smooth] [*Orthotrichum laevigatum* Zetterstedt, *Orthotrichum macounii* Austin]. Acrocarpous, the stems to 4 cm long; leaves stiff, appressed, to 4.3 mm long, the margins revolute from base to near apex; basal cells rectangular to elongate; distal cells quadrate, 1-stratose, 1-3-papillose; capsule fully exserted, smooth, the stomata superficial. ●On boulders, rarely at base of trees; known from few collections.

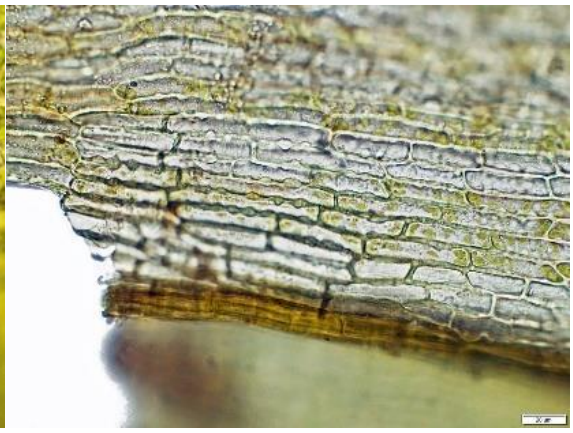


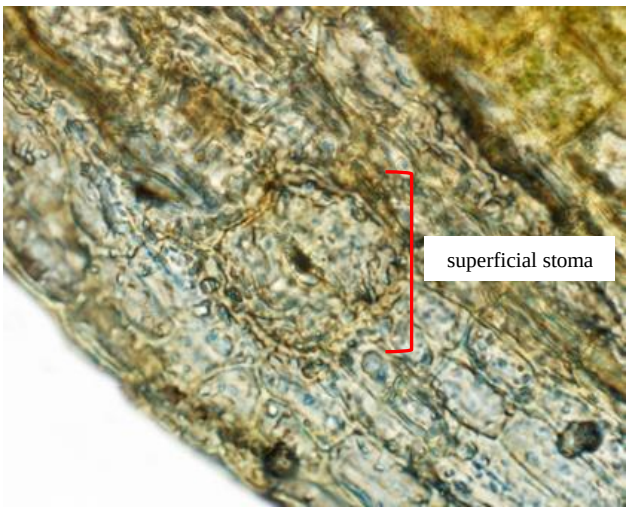
CO, Boulder Co., Lower Boulder Canyon, 17 Apr 2004, *Weber et al.* (COLO).



Lewinskya pycnophylla (Schimper) F. Lara, Garilleti, & Goffinet [densely-leaved] [*Orthotrichum pycnophyllum* Schimper]. Acrocarpous, the stems to 4 cm long; leaves somewhat spreading when dry, to 4 mm long, the margins revolute, often wavy and slightly notched near the apex, the apices acuminate; basal cells elongate, thick-walled, nodose; distal cells nearly quadrate, 1-2-papillose; capsules usually at least ¾ emergent, smooth to slightly 8-ribbed, the stomata superficial, the calyptra hairy. ●Branches and tree trunks.

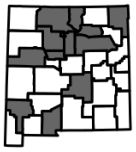


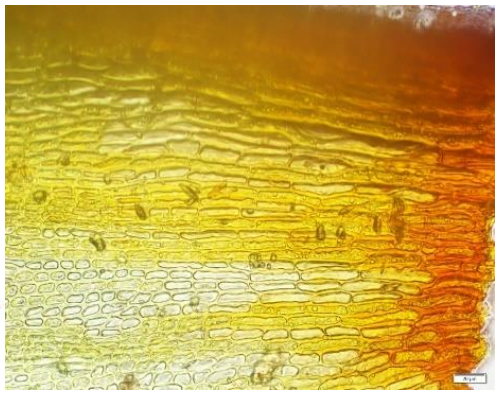


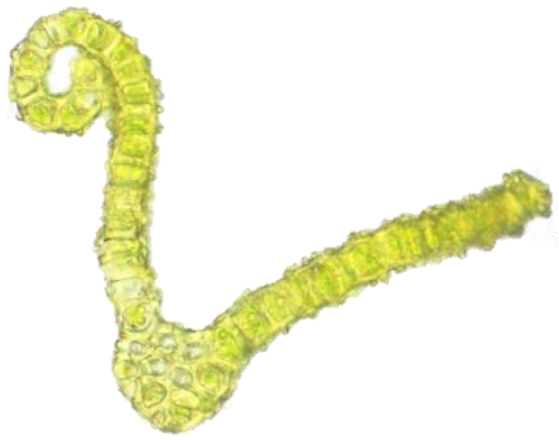


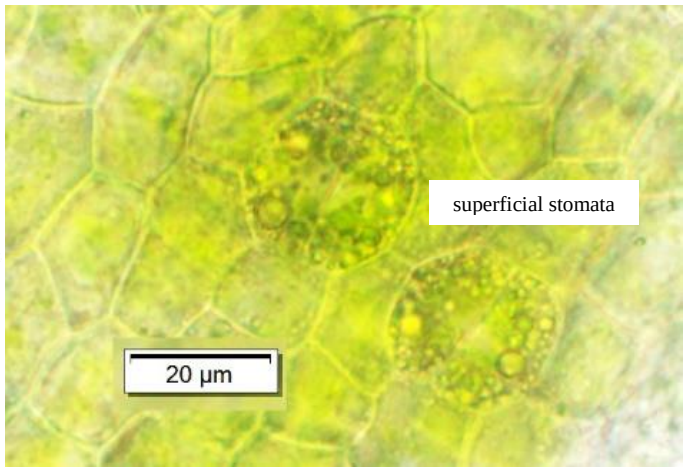
NM, Otero Co., Sacramento Mts, Russia Canyon, 14 Jul 2020, *Kleinman & Blisard* (SNM).

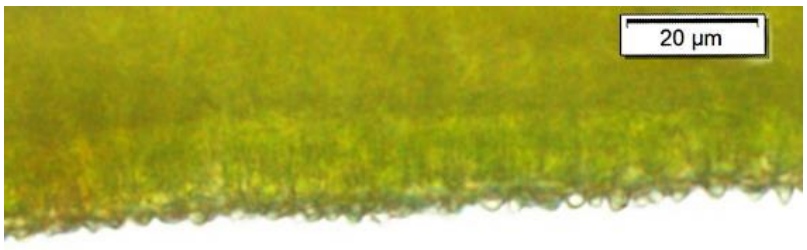
Lewinskya rupestris (Schleicher ex Schwägrichen) F. Lara, Garilleti, & Goffinet [rock-dwelling] [*Orthotrichum rupestre* Schleicher ex Schwägrichen, *Orthotrichum texanum* Sullivant]. Acrocarpous, the stems to 12 cm long, often much-branched; leaves stiff, appressed when dry, to 4.5 mm long, the margins recurved, entire; basal cells elongate to rectangular, thick-walled, nodose; distal cells elongate, 1-2-papillose; capsules immersed to emergent, to 1.8 mm long, 8-ribbed, the stomata superficial, the calyptra usually with finely papillose hairs. ●On boulders and cliff faces in forests.

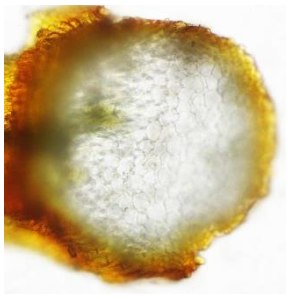








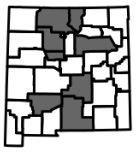


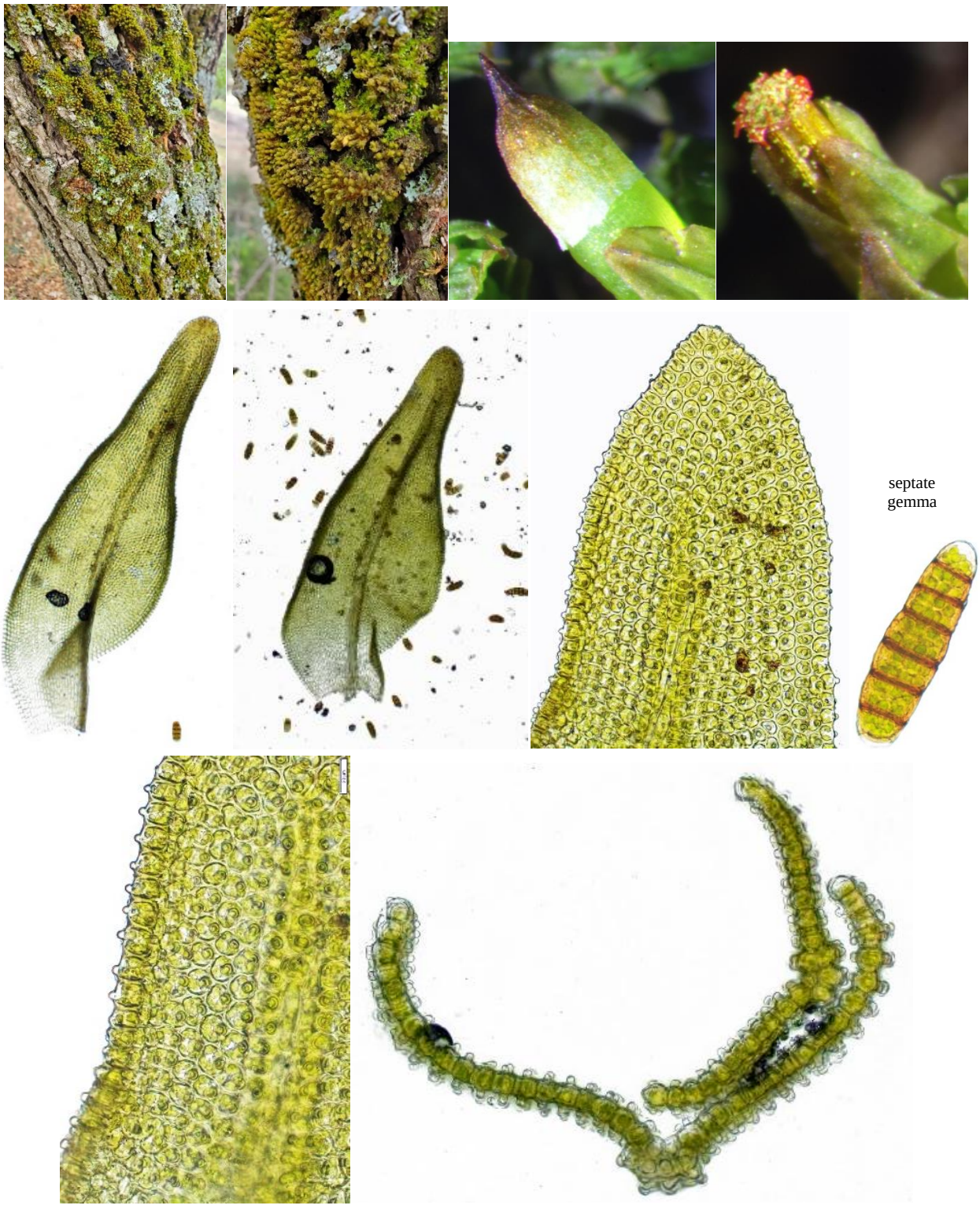


NM, Grant Co., Pinos Altos Range, McMillan Campground, 7 Jun 2014, *Kleinman & Blisard* (SNM).

Nyholmiella [for Elsa Cecilia Nyholm (1911-2002), Swedish bryologist] [Keyed in **Orthotrichum group**].

Nyholmiella obtusifolia (Bridel) Holmen & Warncke [blunt-leaves] [*Orthotrichum obtusifolium* Bridel]. Acrocarpous, the stems to 1.5 cm long; leaves appressed when dry, to 2 mm long, the margins erect-incurved, entire; basal cells rectangular, thick-walled, not nodose; distal cells 1-stratose, 1-papillose, the papillae conic and large; specialized asexual reproduction by gemmae on both surfaces of the leaf; capsules emergent, strongly 8-ribbed, the stomata superficial, the peristome double with 8 exostome teeth, the calyptra glabrous. ●On bark.

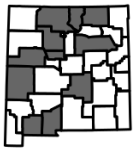


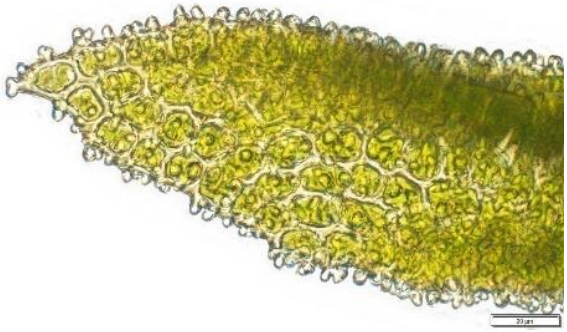


NM, Otero Co., Sacramento Mts, Russia Canyon, 24 Jul 2020, *Kleinman & Blisard* (SNM).

Orthotrichum [straight hairs] [Keyed in **Orthotrichum group**].

Orthotrichum alpestre Hornschuch ex Bruch & Schimper [mountain-dwelling]. Acrocarpous, the stems to 2.5 cm long; leaves loosely appressed, twisted when dry, to 3.5 mm long, the margins revolute; basal cells long-rectangular, thin-walled, the lowermost sometimes nodose; distal cells sub-quadrate, 1-stratose, 2-3-papillose; capsules emergent, 8-ribbed, the stomata immersed, the calyptra with papillose hairs. ●On rock, moist boulder crevices, sometimes tree bases, in forests at medium to high elevations.



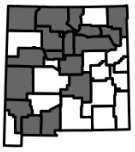


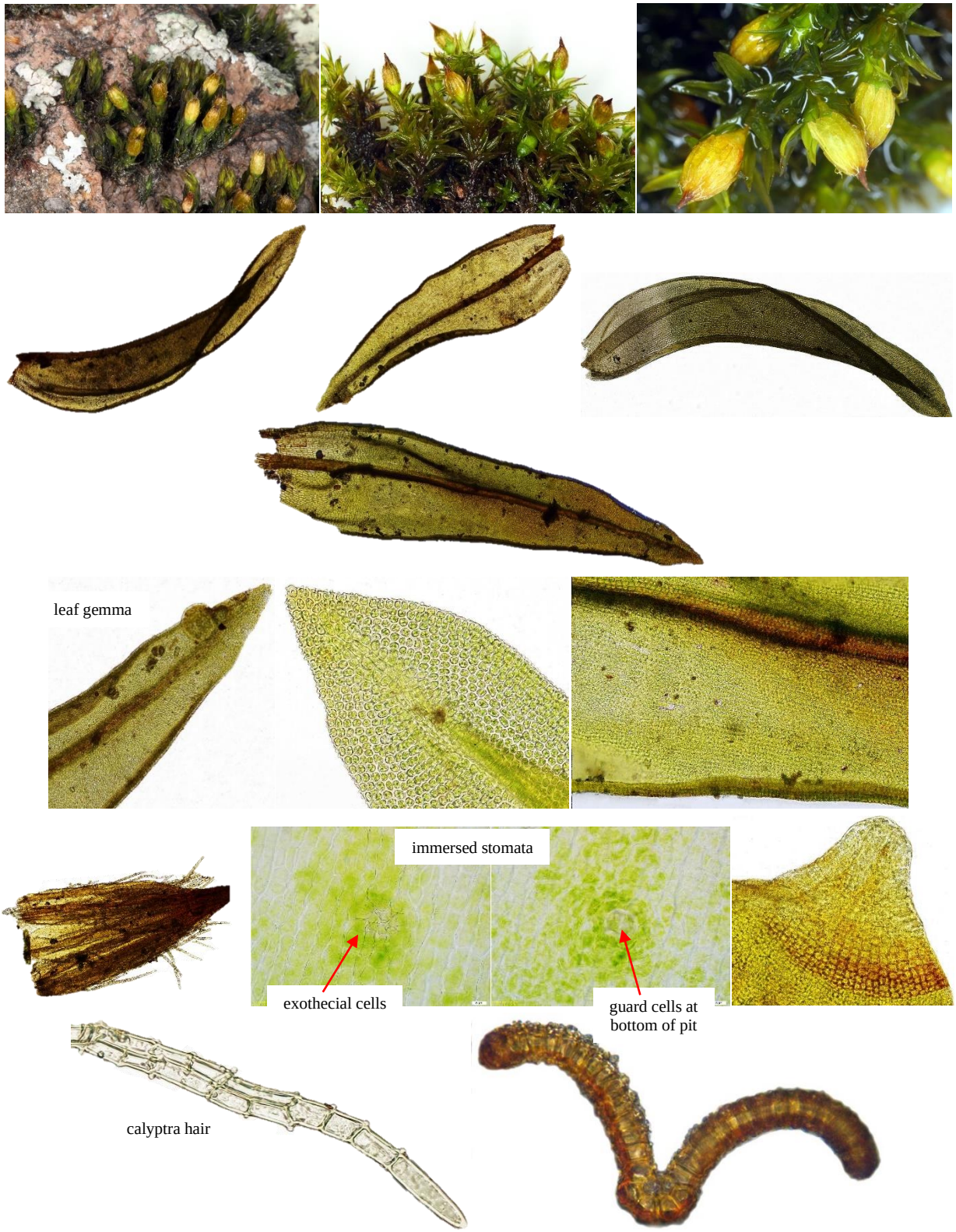
immersed stoma

papillose calyptra hair

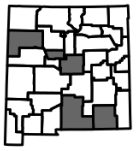
NM, Cibola Co., El Malpais Nat. Mon., Four Windows Cave, 5 Nov 2015, *Kleinman et al.* (SNM).

Orthotrichum anomalum Hedwig [unusual]. Acrocarpous, the stems to 5 mm long; leaves stiff, appressed when dry, to 4 mm long, the margins recurved, entire; basal cells long-rectangular, thin-walled, sometimes slightly nodose; distal cells squarish, 1-stratose, 1-3-papillose; capsules exserted, 16-ribbed (8 ribs shorter), constricted below the mouth when dry, the stomata immersed, calyptra papillose-hairy. ●On rock, especially limestone, sometimes also dead branches or tree bases.

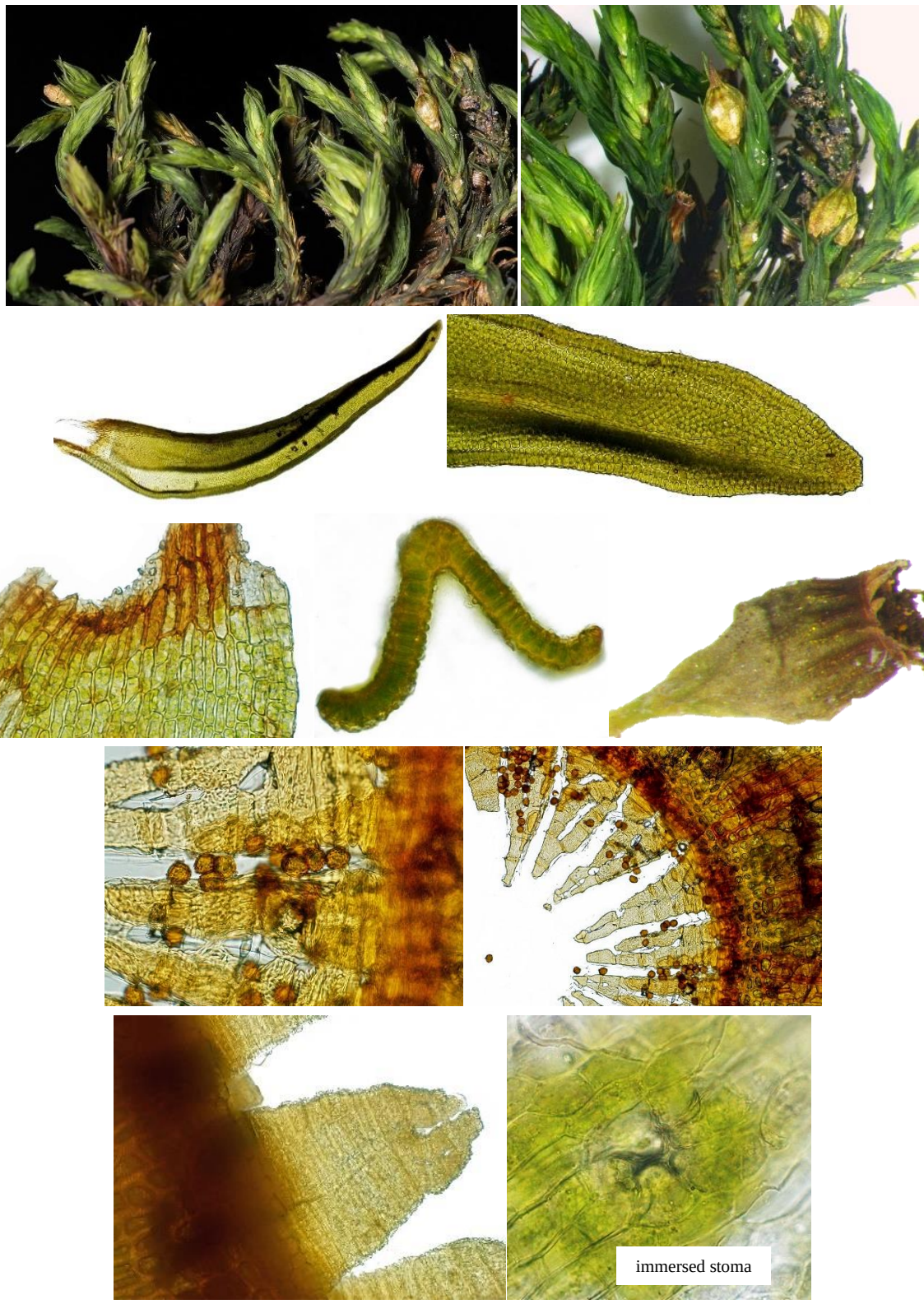




NM, Grant Co., Pinos Altos Range, Little Cherry Creek Ranch Road, 4 Apr 2010, *Kleinman & Blisard* (SNM).

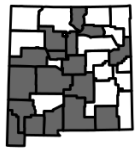


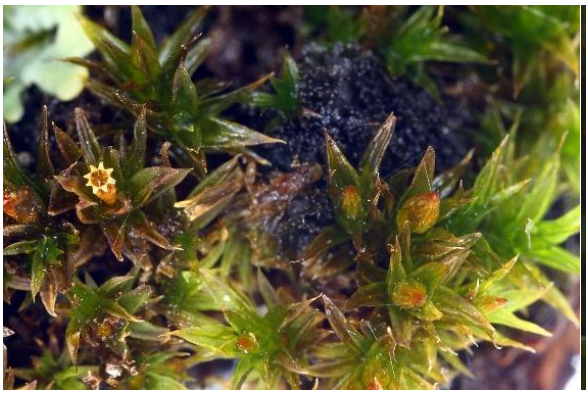
Orthotrichum cupulatum Bridel [like a small cup] [*Orthotrichum utahense* Lesquereux]. Acrocarpous, the stems to about 1 cm long; leaves appressed when dry, rounded to sharply acute, to 4 mm long, the margins recurved; basal cells rectangular, thin-walled, not nodose; distal cells quadrate, mostly 1-stratose, 2-3-papillose; capsules immersed to ½ emergent, 16-ribbed, constricted below the mouth when dry, the stomata immersed, the exostome papillose, the calyptra with papillose hairs, the spores papillose. ●On boulders in coniferous forests, sometimes cliff faces.

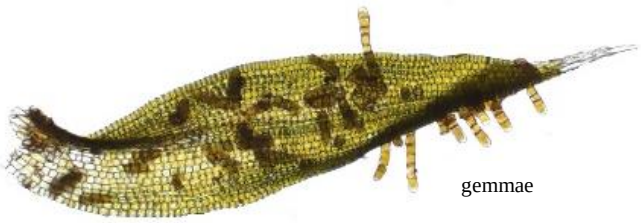


CA, Tulare Co., Sequoia Nat. Park, near Marble Falls, 29 Mar 2017, *Kleinman & Blisard* (SNM).

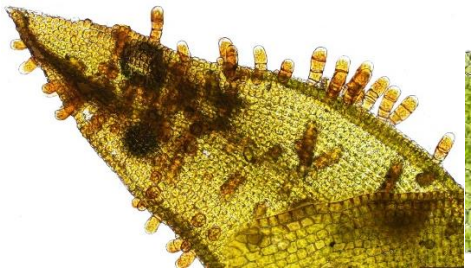
Orthotrichum diaphanum Bridel [transparent]. Acrocarpous, the stems to 1 cm long; leaves loosely erect when dry, to 3 mm long, the margins revolute, serrulate in the hyaline awn; basal cells broadly rectangular, thick-walled, not nodose; distal cells quadrate, 1-stratose, smooth or 1-2-papillose; capsules immersed to emergent, wrinkled to 8-ribbed, the stomata immersed, the calyptra glabrous or with very few hairs. ●On bark, rarely on rock. ♦Distinguished by the hyaline awn of the distal leaves.

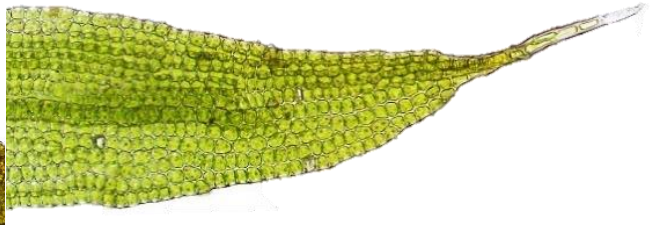




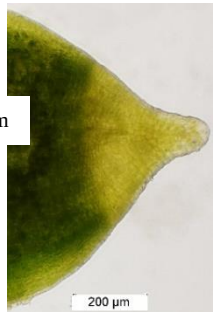


gemmae





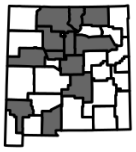
operculum



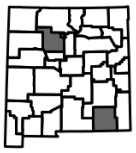
gemma

NM, Grant Co., Pinos Altos, 5 May2010, *Kleinman & Blisard* (SNM).

Orthotrichum hallii Sullivant & Lesquereux [for Elihu Hall (1822-1882), prolific American plant collector]. Acrocarpous, the stems to 2.5 cm long; leaves appressed when dry, to 3.5 mm long, the margins revolute to almost plane, entire; basal cells rectangular, grading to quadrate at margins, thin-walled, not nodose; distal cells quadrate, 2-stratose, 1-3-papillose, the papillae low to almost absent; capsules immersed to emergent, strongly 8-ribbed, sometimes constricted below the mouth when dry, the stomata immersed, the calyptra sparsely hairy. ●On rock.



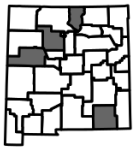
NM, Lincoln Co., White Mts, 3 Rivers Campground Trail, 25 Feb 2015, *Kleinman et al.* (SNM).

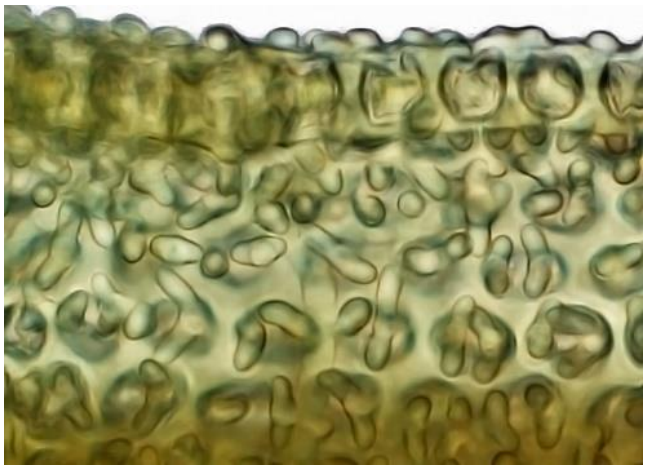


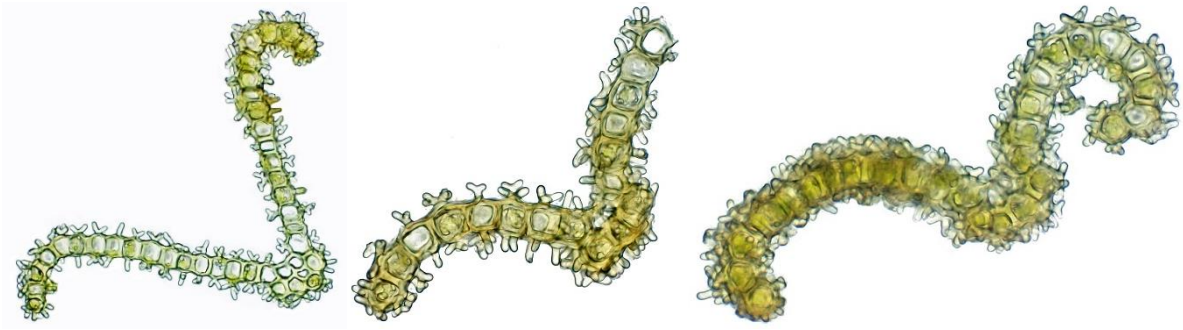
Orthotrichum pallens Bridel [pale]. Acrocarpous, the stems to 1 cm long; leaves appressed when dry, to 3 mm long, the margins recurved, entire (ours) to crenulate apically; basal cells rectangular, thin- to thick-walled, straight to sinuous; distal cells quadrate, the shape obscured by the papillae,, 1-stratose, 2-3-papillose, at least some papillae bifid; specialized asexual reproduction occasional by gemmae on the leaves; capsules emergent to barely exserted, strongly 8-ribbed, the peristome reflexed in age, the stomata immersed but may appear superficial because guard cells are sometimes fully evident and not covered by thin-walled subsidiary cells, the calyptra glabrous to sparsely hairy. ●On trunks and tree branches; little known in the state.

MT, Flathead Co., Glacier Nat. Park, Lake McDonald, 3 Aug 1960, *S. Flowers* (COLO).

Orthotrichum pellucidum Lindberg [transparent]. Acrocarpous, the stems to 2.5 cm long; leaves stiff, often appearing glaucous, appressed-incurved when dry, to 2.7 mm long, the margins recurved, entire, the apices blunt; basal cells short-rectangular to quadrate, thin-walled, not nodose; distal cells 1-stratose, 1-3-papillose, the papillae large; capsules emergent to short-exserted, strongly 8-ribbed (rarely 16-ribbed), constricted below the mouth when dry, the stomata immersed, the peristome single, the calyptra with papillose hairs. ●On boulders and cliff faces.

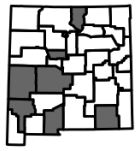


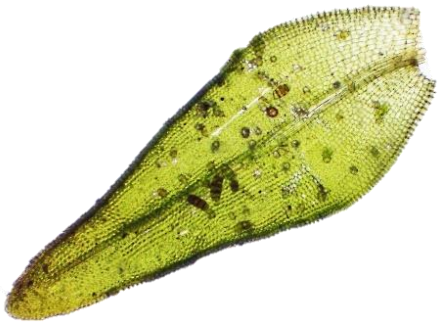


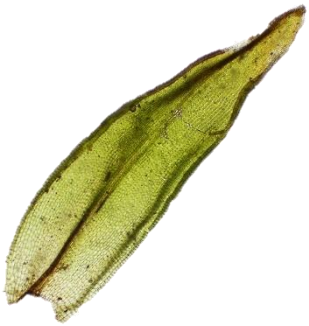


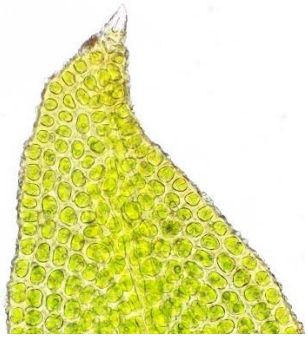
NM, Cibola Co., El Malpais Nat. Mon., Marchantia Ice Cave, 12 Jun 1992, *D.C. Lightfoot* (COLO).

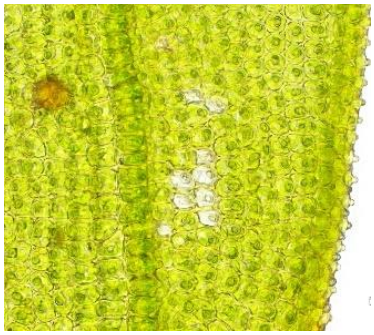
Orthotrichum pumilum Swartz [dwarf]. Acrocarpous, the stems to 5 mm long; leaves stiff, loosely appressed when dry, to 2.8 mm long, the margins revolute, entire, the apices sharply acute; basal cells rectangular, grading to quadrate at the margins, thin-walled, not nodose; distal cells 1-stratose, smooth or 1-2-papillose with very low papillae; capsules immersed to emergent, strongly 8-ribbed, the stomata immersed, the peristome double, the calyptra sparsely hairy with smooth hairs. ●On trunks and branches, sometimes in rock crevices.

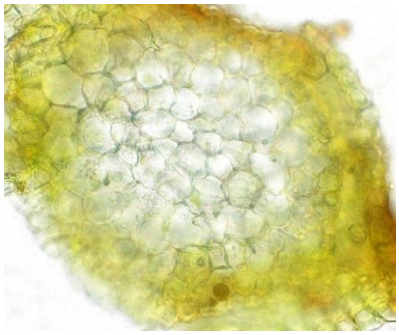


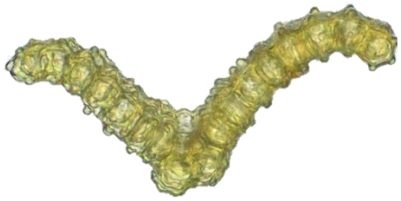


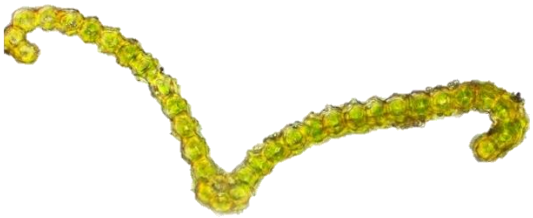


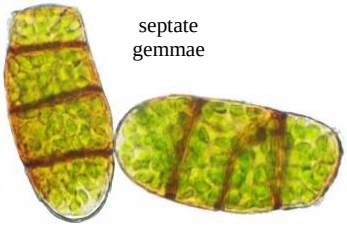


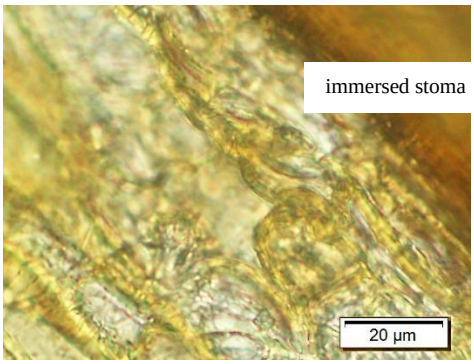










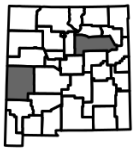


NM, Grant Co., McComas Peak, 5 May 2013, *Kleinman & Blisard* (SNM).

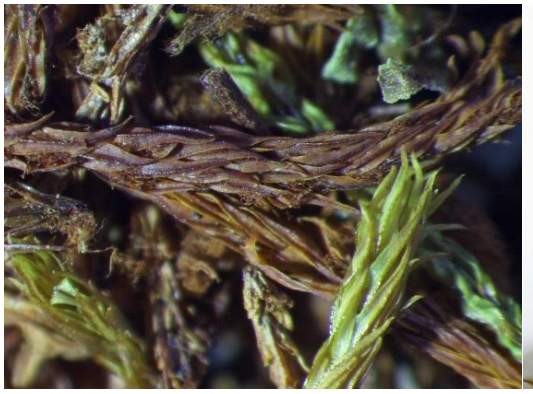
Zygodon [yoked teeth].

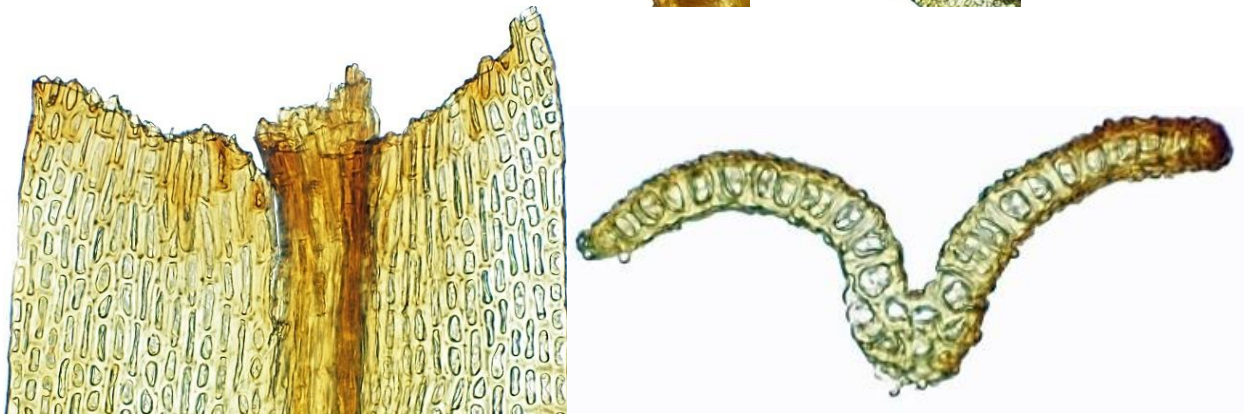
1 Leaves squarrose-recurved when moist, the lower ones commonly broken, the margins irregularly toothed distally, the bases decurrent; gemmae not seen ..... ***Z. campylophyllus***

1 Leaves erect-imbricate-spreading when moist, the lower ones infrequently broken, the margins entire distally, the bases scarcely or not decurrent; gemmae common .....***Z. rupestris***

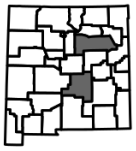


Zygodon campylophyllus Müller Hal. [bent-leaved]. Acrocarpous, the stems to 15 cm long, tomentose below; leaves loosely flexuose-twisted when dry, squarrose-recurved when moist, the shoot mimicking a millipede, to 2.2 mm long, strongly keeled, the lower leaves often broken, the bases decurrent, the margins usually with 5-10 irregular teeth distally; basal cells elongate, smooth, nodose, grading to quadrate at the margins; distal cells subquadrate-hexagonal, thick-walled, 2-multi-papillose; capsules exserted, strongly 8-ribbed, the calyptra cucullate, glabrous. ●On tree trunks and boulders; known from few collections.





Costa Rica, Cartago Prov., Cerro de la Muerte, 14 Nov 1999, *I. Holz* (DUKE).



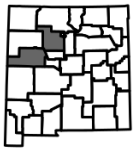
Zygodon rupestris Schimper ex Lorentz [rock-dwelling] [*Zygodon viridissimus* (Dickson) Bridel var. *rupestris* Lindberg ex Hartman, *Zygodon viridissimus* (Dickson) Bridel var. *vulgaris* Malta, *Zygodon vulgaris* Nyholm]. Acrocarpous, the stems to 2.3 cm long; leaves erect-imbricate-spreading when moist, to 2 mm long, the bases not decurrent, the margins entire; basal cells subquadrate to rectangular, thick-walled, smooth; distal cells subquadrate, 1-stratose, 3-6-papillose, thick-walled; specialized asexual reproduction by clusters of axillary gemmae with transverse walls, only rarely with longitudinal or oblique walls; capsules emergent, 8-ribbed, the calyptra cucullate, glabrous. ●Mostly on trees, sometimes also rocks; known from few collections.

NM, Lincoln Co., Bonito Creek, 13 Jul 2015, *Kleinman et al.* (SNM).

1 Leaves minute, 0.1-0.3(0.5) mm long ..... **Platydictya**
1 Leaves larger, 0.7-4 mm long
2 Costae, at least one fork, ⅓ to ½ the leaf length; leaves with noticeable decurrencies ..... **Plagiothecium**
2 Costa absent to ¼ the leaf length (but see also *Plagiothecium laetum*); leaves lacking decurrencies
3 Rhizoids papillose; median distal cells 5-7 µm wide; short alar cells absent or present only on the margin ..... **Isopterygiella**
3 Rhizoids smooth; median distal cells 6-11µm wide; short alar cells present interior to the margin ..... **Redfearnia**

Isopterygiella [resembling *Isopterygium*].

Isopterygiella pulchella (Hedwig) Ignatov & Ignatova [beautiful] [*Isopterygiopsis pulchella* (Hedwig) Iwatsuke, *Isopterygium pulchellum* (Hedwig) Jaeger, *Leskea pulchella* Hedwig, *Plagiothecium pulchellum* (Hedwig) Schimper].



Pleurocarpous, forming light green to yellowish mats, the stems to 2 cm long, somewhat complanate-foliate, lacking a hyalodermis, lacking pseudoparaphyllia, with papillose rhizoids; leaves narrow, to 1.5 mm long, the margins plane, entire or sometimes minutely serrulate at the apex and base; short alar cells absent or subquadrate only at the margins; specialized asexual reproduction sometimes present as filiform gemmae. ●Rocky banks, cliff faces and crevices, bases of trees, decaying wood; known from few collections.

NM, Cibola Co., El Malpais Nat. Mon., Ice Cave, 19 Apr 2017, *Kleinman et al.* (SNM).

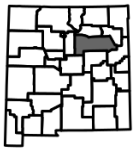
Plagiothecium [a slanting case].

1 Leaf decurrencies composed of many inflated cells; leaf margins broadly recurved nearly to apices; median laminal cells 12-21 µm wide ..... ***P. denticulatum***

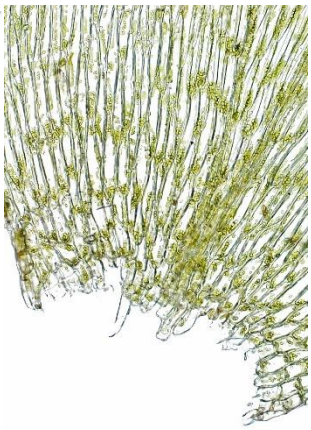
1 Leaf decurrencies composed of mostly non-inflated cells; leaf margins plane or narrowly recurved; median laminal cells 4-17 µm wide

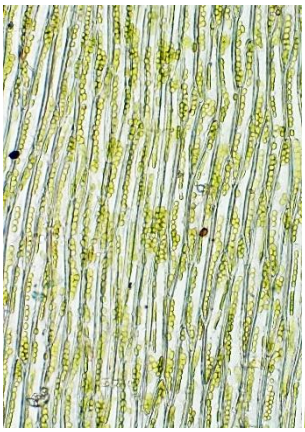
2 Leaves symmetric or nearly so, concave ..... ***P. cavifolium***

2 Leaves asymmetric, flat ..... ***P. laetum***

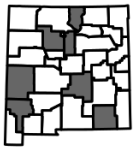


Plagiothecium cavifolium (Bridel) Z. Iwatzuki [hollow-leaved] [*Hypnum cavifolium* Bridel]. Pleurocarpous, in green to yellowish mats, usually glossy, the stems to 4 cm long, commonly julaceous but also sometimes complanate, sometimes flagelliform; leaves strongly concave, to 3 mm long, the margins plane or narrowly recurved, mostly entire; costa with one branch often reaching mid-leaf; cells of the decurrencies elongate, not inflated; median cells 7-17 µm wide; specialized asexual reproduction sometimes present as gemmae in the axils or on the leaves; capsules rare. ●Shaded soil and humus on boulders and cliffs, rotten logs, stumps, tree bases; only recently found in San Miguel County. ♦Distinguished by the concave leaves with recurved margins on commonly julaceous stems.

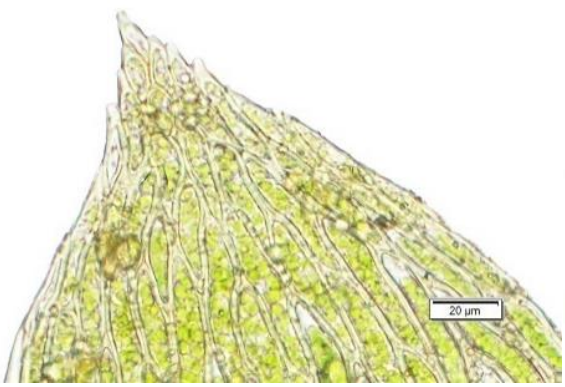


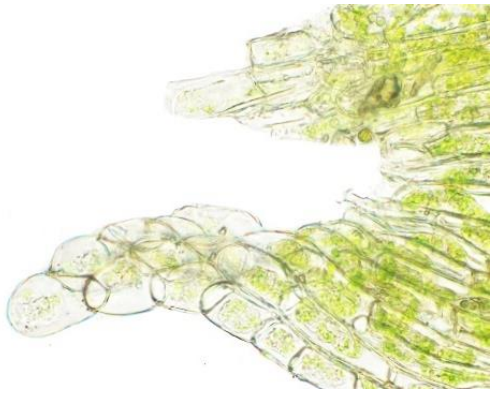


Canada, Ontario, Grey Co., below Eugenia Falls, 19 Aug 1961, *H. Crum* (COLO).

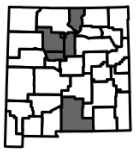


Plagiothecium denticulatum (Hedwig) Schimper [slightly toothed] [*Hypnum denticulatum* Hedwig]. Pleurocarpous, in green to yellowish mats, dull or glossy, the stems to 5 cm long, complanate-foliate or julaceous (commonly ours); leaves asymmetric, flat to concave (mostly ours), to 4 mm long, the margins broadly recurved or sometimes plane, serrulate apically; costa with one branch sometimes reaching mid-leaf; many cells of leaf decurrencies inflated, nearly spherical; median cells 12-21 μm wide; specialized asexual reproduction often present as axillary gemmae; capsules often present, drooping, to 3.5 mm long, striate or wrinkled. ●On rotten logs, stumps, bases of trees, humus, sometimes soil or soil over rock. ♦See *Plagiothecium laetum* for confusion with that species.





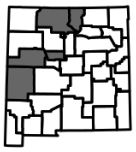
NM, Taos Co., Taos Ski Area, 22 Jul 2014, *Kleinman et al.* (SNM).

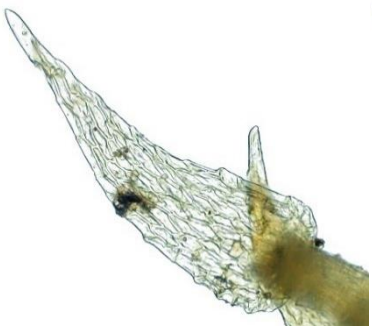


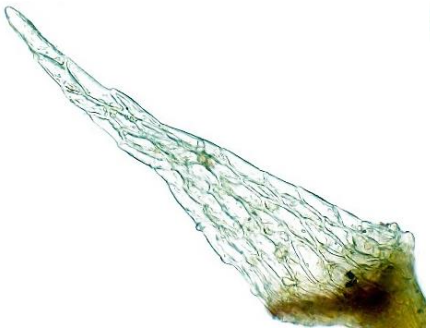
Plagiothecium laetum Schimper [vivid] [*Plagiothecium denticulatum* (Hedwig) Schimper var. *laetum* (Schimper) Lindberg]. Pleurocarpous, in dense, green to yellowish, glossy mats, the stems to 2 cm long, complanate-foliate; leaves asymmetric, flat, often slightly undulate, to 2.6 mm long, the margins plane or narrowly recurved, mostly entire; costa short, rarely reaching to mid-leaf; cells of the decurrencies elongate, not inflated; median cells 4-10 µm wide; specialized asexual reproduction usually present as axillary gemmae; capsules often present, erect to drooping, to 2 mm long, smooth when dry. ●On rotten logs, stumps, bases of trees, soil, frequently on soil over rock. ♦Sometimes confused with *Plagiothecium denticulatum*, but that species has leaves to 4 mm long, median cells 12-21 µm wide, decurrencies with inflated oval cells, and striate capsules when dry.

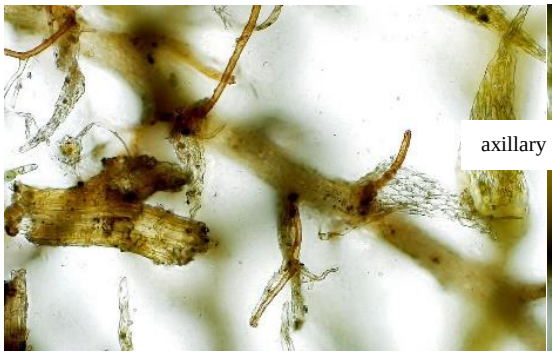
CA, Santa Cruz Co., Henry Cowell State Park, 30 Mar 2014, *Kleinman & Blisard* (SNM).

Platydictya [a flat net].

Platydictya jungermannioides (Bridel) Crum [resembling *Jungermannia*] [*Hypnum jungermannioides* Bridel]. 
Pleurocarpous, in loose, soft, silky, green to yellowish mats, the stems branching at a narrow angle and easily detached, with axillary rhizoids purplish and granular-papillose at least when young; leaves to 0.5 mm long, the margins serrulate, especially proximally; costa absent or nearly so; alar cells few, subquadrate; median cells 3-4:1; specialized asexual reproduction by axillary rhizoids; capsules erect, to 1 mm long, on setae to 10 mm long. ●On rocks and soil in crevices and ledges, hollows of roots, shady places. ♦Easily recognized by the tiny serrulate leaves, absent costa, and axillary rhizoids. See also *Pseudoamblystegium subtile* (Amblystegiaceae).



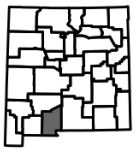


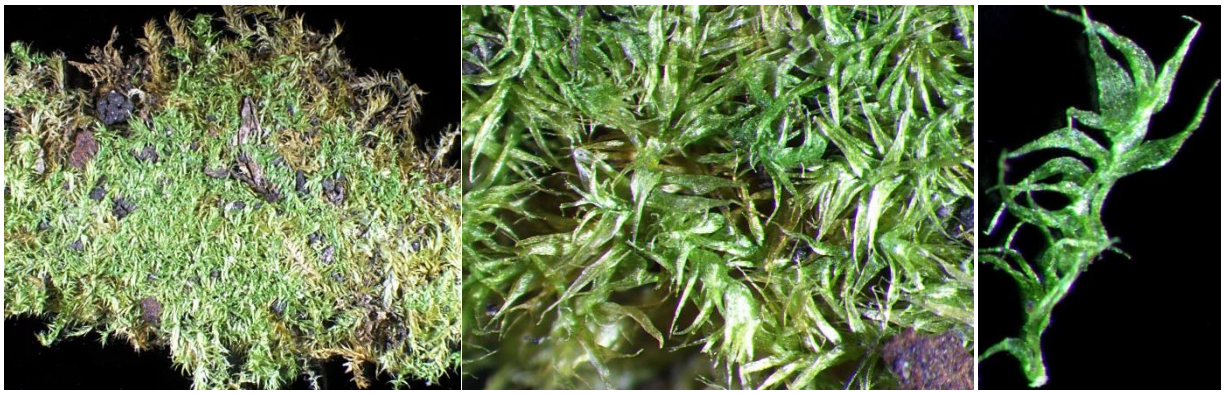


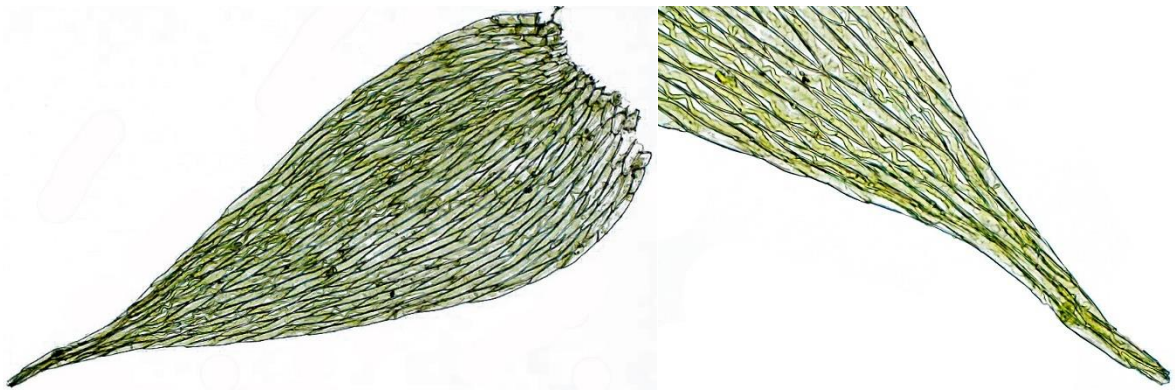
NM, Catron Co., near west fork of Gila River, 13 Aug 1903, *O.B. Metcalfe* (NMC).

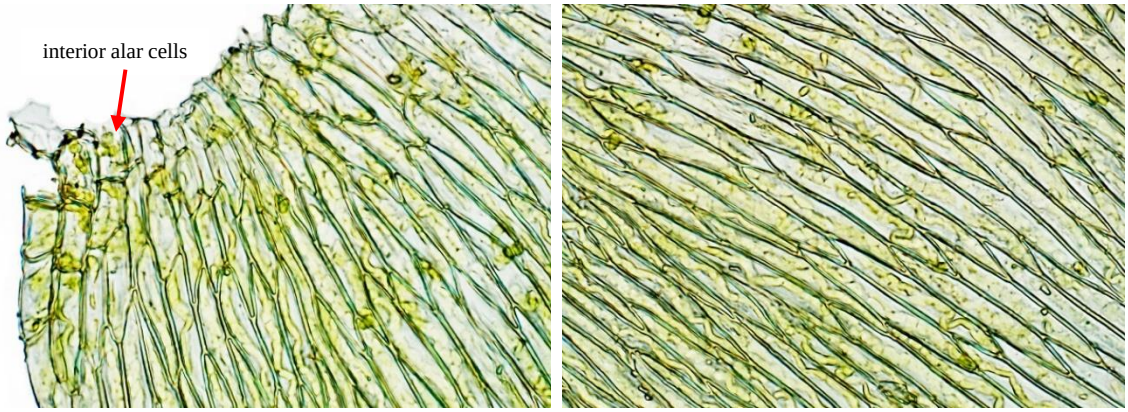
Redfearnia [for Paul Leslie Redfearn, Jr. (1926-2018), American bryologist].

Redfearnia homomallifolia (Redfearn) J.T. Wynns [with leaves to one side] [*Isopterygium homomallifolium* Redfearn, *Pseudotaxiphyllum homomallifolium* (Redfearn) Ireland]. Pleurocarpous, in yellowish mats, the stems to 1.5 cm long, pseudoparaphyllia absent; leaves upturned-homomallous, to 1.2 mm long, the margins plane, serrulate to nearly entire, the apices long-acuminate; costa lacking or very short and double; alar cells weakly differentiated, with a few rectangular interior cells; median cells 5-9 µm wide. ●On rock, under ledges; scarcely known in the state from a single collection.







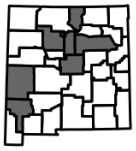


TX, Kimble Co., south of Roosevelt, 14 Apr 1971, *P.L. Redfearn* (DUKE).

1 Leaves strongly crisped or contorted when dry, lacking a sheath, the margins strongly toothed; costa narrow, occupying about ⅙ or less of the limb width ..... **Atrichum**
1 Leaves not at all crisped or contorted when dry, with an abruptly expanded sheath, the margins entire or toothed; costa broad, occupying most of the limb width
2 Leaf margins infolded over the lamellae, entire
3 Leaf awn ± reddish throughout ..... ***Polytrichum juniperinum***
3 Leaf awn hyaline, ± whitish throughout ..... ***Polytrichum piliferum***
2 Leaf margins not infolded over the lamellae, toothed (except for *Polytrichastrum alpinum* var. *septentrionale* with ± entire leaves)
4 Stems with basal clusters of branches; terminal cells of lamellae appearing finely papillose because of cuticular striations ..... ***Polytrichastrum lyallii***
4 Stems little branched basally; terminal cells of lamellae coarsely papillose or smooth
5 Terminal cells of lamellae coarsely papillose ..... ***Polytrichastrum alpinum***
5 Terminal cells of lamellae smooth
6 Terminal cells of lamellae notched ..... ***Polytrichum commune***
6 Terminal cells of lamellae rounded or flat-topped ..... ***Polytrichum ohioense***

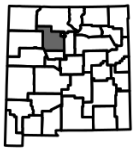
Atrichum [hairless].
1 Leaves strongly undulate, with oblique rows of teeth on abaxial surface; median cells 27-48 μm wide..... ***A. selwynii***
1 Leaves at most only weakly undulate, with scattered few teeth on abaxial surface; median cells 16-24 μm wide ..... ***A. tenellum***

Atrichum selwynii Austin [for Alfred Richard Cecil Selwyn (1824-1902), British geologist] [*Atrichum undulatum* of NM reports]. Acrocarpous, the stems to 4 cm long; leaves to 8 mm long, strongly undulate, rosulate, commonly with oblique rows of teeth abaxially, the margins with usually paired teeth; lamellae 2-6, 8-14 cells high; median cells 27-48 µm wide, collenchymatous; capsules to 8 mm long, inclined to sometimes erect. ●On moist soil along roadcuts and creek banks.



NM, Taos Co., Red River, Middle Fork Lake Trail, 29 Jul 2021, *Kleinman & Blisard* (SNM).

Atrichum tenellum (Röhling) Bruch & Schimper [quite delicate] [*Catharinea tenella* Röhling]. Acrocarpous, the stems to 2 cm long; leaves to 6 mm long, rarely weakly undulate, with few teeth scattered abaxially, the margins strongly toothed; lamellae 2-3, 4-7 cells high; median cells 16-24 µm wide, not or weakly collenchymatous; capsules to 2 mm long, erect to inclined. ●Moist soil of exposed habitats in the mountains; known from a single collection.

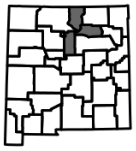


NM, Sandoval Co., Valles Caldera Nat. Preserve, 26 May 2010, *K. Romig 243* (NMCR).

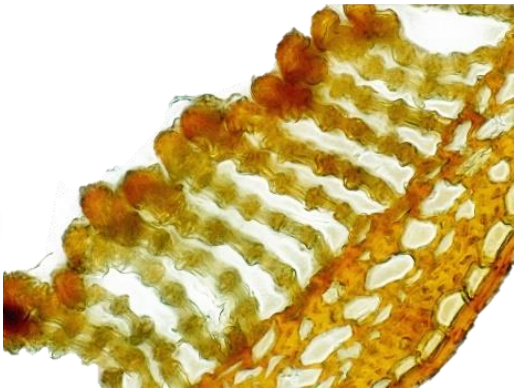
Polytrichastrum [resembling *Polytrichum*].

Polytrichastrum alpinum (Hedwig) G.L. Smith [alpine or of high mountains] [*Pogonatum alpinum* (Hedwig) P. Beauvois, *Polytrichum alpinum* Hedwig, *Polytrichum norvegicum* Hedwig, *Polytrichum sexangulare* of Mahler (1978)]. Acrocarpous, the stems to 6(14) cm long, densely leafy above but often leafless and thread-like below, sometimes with branch clusters basally; leaves to 5-8(19) mm long, the limb margins coarsely toothed with multicellular teeth to sometimes nearly entire, the apices awn-tipped; lamellae 5-8 cells high, the terminal cells coarsely papillose, the walls greatly thickened; capsules to 8 mm long, terete. ●On soil, humus, and shaded siliceous rock outcrops and banks. ♦Plants with sharply toothed margins belong to var. ***alpinum***, known from several collections; those with entire margins belong to var. ***septentrionale*** (Bridel) G.L. Smith, known from a single collection.

NM, Taos Co., Taos Ski Valley, 24 Jul 2014, *Kleinman et al.* (SNM).



Polytrichastrum lyallii (Mitten) G.L. Smith [for David Lyall (1817-1895), British physician-botanist] [*Meiotrichum lyallii* (Mitten) G.L. Smith, *Polytrichadelphus lyallii* Mitten, *Polytrichum lyallii* (Mitten) Kindberg]. Acrocarpous, the stems to 7 cm tall, typically with clustered branches near the base and few branches distally; leaves to 10 mm long, not contorted when dry, the sheath to 2 mm long, the limb ending in a short spine, the margins erect, not covering the lamellae, toothed; lamellae 36-38, 5-6 cells high, the terminal cells with only the free wall thickened, the cuticle striate and appearing finely papillose; capsules to 4 mm long, bilaterally compressed, bringing the angles together. ●On damp soil and humus, occasionally in rock crevices. ♦Basal branch clusters and striated cuticles of the terminal lamellar cells are distinctive.

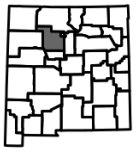


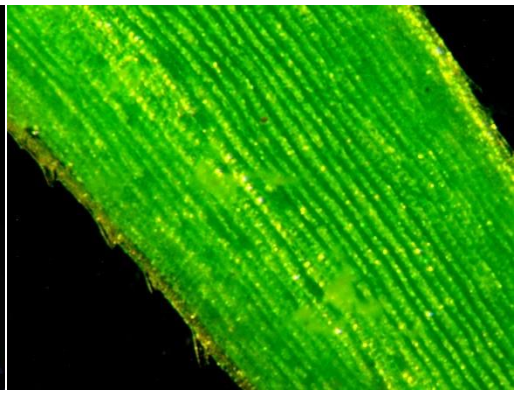
NM, Mora Co., Trailrider's Wall, 30 Jul 1997, *K.W. Allred s.n.* (NMCR).

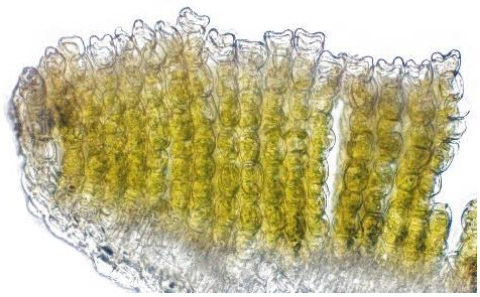
Polytrichum [many hairs].

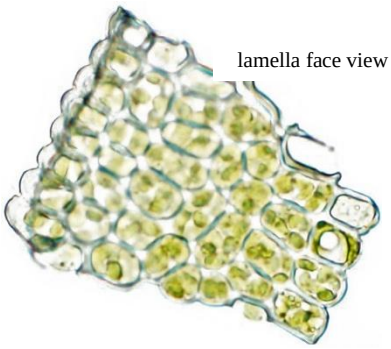
1 Margins of the blade plane, not infolded over the lamellae, strongly toothed
  2 Margins of the blades extending upward well beyond the lamellae ..... ***P. longisetum***
  2 Margins of the blades scarcely extending beyond the lamellae, if at all
    3 Terminal cells of lamellae notched apically ..... ***P. commune***
    3 Terminal cells of lamellae rounded or flat apically ..... ***P. ohioense***
1 Margins of the blade infolded over the lamellae, entire
  4 Hair-points of the leaves stout and ± reddish throughout, or absent ..... ***P. juniperinum***
  4 Hair-points of the leaves slender and hyaline, ± whitish throughout ..... ***P. piliferum***

Polytrichum commune Hedwig [common]. Acrocarpous, dark green to brownish, the stems to 10 cm or more long, rarely forked; leaves to 12 mm long, flexuose or curving when wet, sometimes reflexed from the base, the sheath abruptly contracted to the blade, the blade toothed; lamellae 5-9 cells high, the margins grooved as seen from above, the terminal cells notched apically, thick-walled, smooth; capsules to 6 mm long, 4-winged, on setae to 9 cm long, the calyptrae densely covered with entwined hairs. ●Moist organic soils, meadows, fens; only recently found in the state.





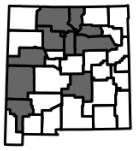


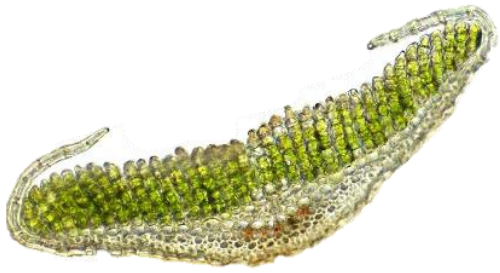


lamella face view

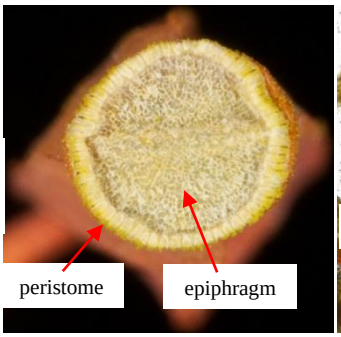
NM, Sandoval Co., Valles Caldera Nat. Preserve, 3 Jul 2019, *Kleinman & Blisard* (SNM).

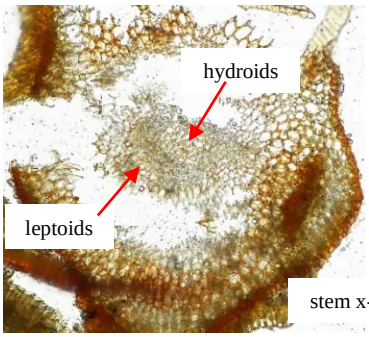
Polytrichum juniperinum Hedwig [resembling *Juniperus*]. Acrocarpous, gray-green, blue-green, to reddish brown, in loose tufts, forming extensive patches, the stems to 10 cm long, simple, tomentose proximally; leaves to 8 mm long, erect and straight when dry, spreading when wet, the sheath tapering to the blade; blade flat, the margins infolded over the lamellae, entire; costa excurrent to a toothed, reddish-brown awn; lamellae 6-8 cells high, the terminal cells thick-walled, knobby, smooth; capsules to 5 mm long, sharply 4-angled, the setae to 5 cm long, the calyptrae densely covered with entwined hairs. ●Exposed, well-drained soils in the forests, along road cuts and trails.



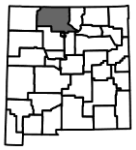


capsule top – calyptra & operculum removed



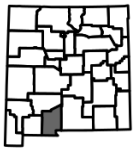


NM, Catron Co., San Francisco Mts, Johnson Canyon, 14 Jun 2010, *Kleinman et al.* (SNM).

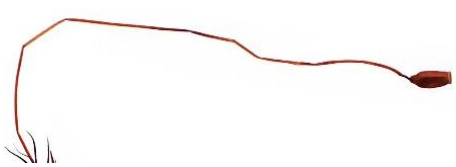


Polytrichum longisetum Swartz ex Bridel [long-bristled]. Acrocarpous, dark green, in loose tufts, the stems to 5(10) cm long, simple; leaves to 10 mm long, somewhat contorted when dry, spreading-recurved when wet, the sheath tapering to the blade, hyaline-margined; blade flat, the marginal laminae 5-12 cells wide, not infolded over the lamellae but erect or only slightly inflexed, sharply toothed nearly throughout; costa excurrent to an awn; lamellae 3-7 cells high, the terminal cells scarcely wider than those below, elongate, smooth; capsules to 5 mm long, nearly terete to gently 4-angled, the setae to 7 cm long, often longer than the shoots, the calyptrae densely covered with entwined hairs. ●Over rock in wet meadows; only recently found in the state. ♦Distinctive by the toothed, erect leaf margins of several cells, nearly terete capsules, and smooth terminal cells of the lamellae.

NM, Rio Arriba Co., Sangre de Cristo Mts, below North Truchas Peak, 19 Aug 2023, *R.C. Sivinski 9727* (NMC).

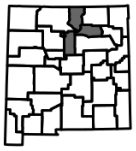


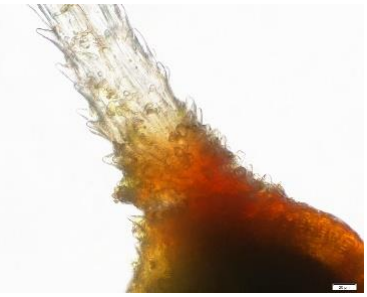
Polytrichum ohioense Renauld & Cardot [from Ohio] [*Polytrichastrum ohioense* (Renauld & Cardot) G.L. Smith]. Acrocarpous, dark green to brown, the stems to 6 cm high, mostly unbranched; leaves to 10 mm long, erect when dry, spreading when wet, the sheath contracted to the blade, the cells at the shoulders forming a hinge; blades coarsely toothed, the margins not infolded over the lamellae; costa excurrent to a short, sparsely toothed, reddish awn; lamellae 6-7 cells high, the terminal cells rounded, the free walls conspicuously thickened, flat-topped, with a small lumen, smooth; capsules to 5 mm long, 4-angled, the setae to 9 cm long, the calyptrae cucullate, covered by entwined hairs. ●On rock on a stream bank in the San Andres Mountains, otherwise endemic to eastern North America.



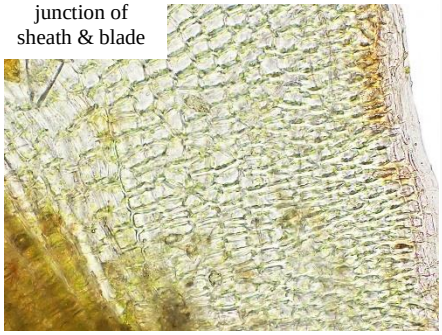
TN, Sevier Co., Great Smokey Mts Nat. Park, Newfound Gap, 8 Mar 1993, *W.R. Norris* (SNM).

Polytrichum piliferum Hedwig [hairy]. Acrocarpous, bluish green to reddish brown, in loose tufts, the stems to 4 cm tall, wiry, unbranched; leaves to 4 mm long, erect and straight when dry, spreading when wet, the sheath contracted to the blade; blades turgid, the margins infolded over the lamellae, entire; costa long-excurrent to a toothed, hyaline awn; lamellae 6-8 cells high, the terminal cells knobby, smooth; capsules to 4 mm long, 4-angled, short and almost cubic, the setae to 3 cm long, the calyptrae covered with entwined hairs. ●On shallow soils, sandy, gravelly, or rocky.

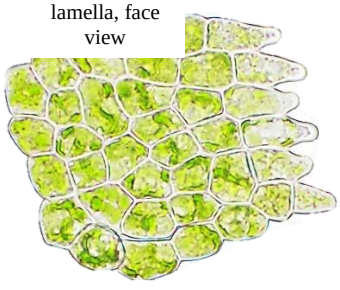




junction of sheath & blade



lamella, face view



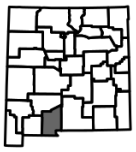
NM, Taos, Red River, Middle Fork Lake Trail, 29 Jul 29 Jul 2021, *Kleinman & Blisard* (SNM).

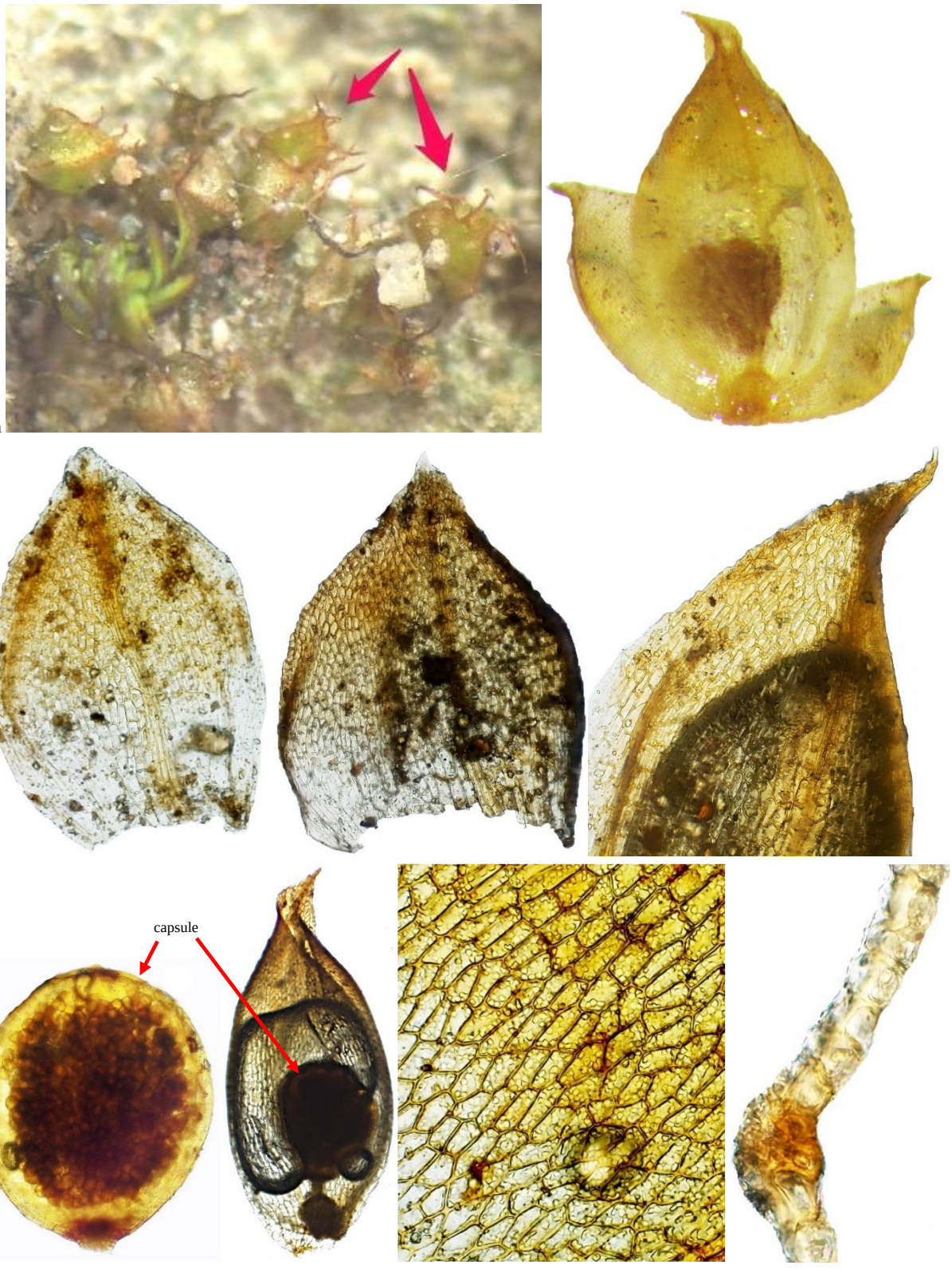
1 Leaves with ± erect lamellae or filaments on the adaxial (upper) surface of the costa (excluding propagula or gemmae) (lamellae sometimes 1-2 cells high and obscure in *Crossidium seriatum*)
2 Leaves with lamellae on the adaxial surface of the costa ..... **Pterygoneurum**
2 Leaves with filaments on the adaxial surface of the costa
3 Leaf margins broadly inrolled (and mostly obscuring the filaments) ..... **Aloina**
3 Leaf margins reflexed to revolute ..... **Crossidium**
1 Leaves without lamellae or filaments on the adaxial surface of the costa
4 Tiny, bud-like plants; capsules immersed and cleistocarpous (see also *Stegonia*, a tiny bud-like plant, but with exserted capsules)
5 Leaves contorted or weakly spirally arranged when dry, but not appressed with reflexed apices, yellow in 2% KOH, the laminae oblong, the apices acute to obtuse; central strand absent (*T. acaulon*)..... **Tortula**
5 Leaves appressed when dry, the apices usually reflexed, red in 2% KOH, the laminae broadly ovate to nearly round, the apices rounded; central strand present ..... **Acaulon**
4 Plants larger and not bud-like and/or capsules exserted and stegocarpous
6 Leaves with a definite, whitish, golden, or reddish hair-point or awn at least ⅓ the length of the lamina
7 Leaves mostly broadest below the middle and tapering toward the tip; yellow in 2% KOH..**Pseudocrossidium**
7 Leaves mostly broadest near the middle or above; red or yellow in 2% KOH
8 Large basal cells abruptly differentiated from the smaller distal cells, usually forming U-shaped basal windows of clear cells on both sides of the costa; red in 2% KOH ..... **Syntrichia**
8 Basal and distal cells not differentiated as above, and without windows as above; yellow in 2% KOH .... **Tortula**
6 Leaves lacking a distinct hair-point, or with a very short awn less than ¼ the length of the lamina
9 Small densely tufted mosses of moist, seepy tufa cliffs and seeps, the leaves often encrusted with lime
10 Basal cells abruptly differentiated, bulging, thin-walled, giving a vivid contrast between the green laminal cells and the clear basal ones; basal leaf margins serrate-dentate by projecting ends of the cells just above the area of the enlarged basal cells..... **Eucladium**
10 Basal cells gradually differentiated, thicker-walled and not bulging, lacking a vivid contrast as above; basal leaf margins serrate-dentate as above or entire
11 Leaf apices rounded to obtuse; leaf margins mostly plane..... **Gymnostomum**
11 Leaf apices obtuse to acute; leaf margins, at least one, mostly revolute
12 Stem central strand absent; basal marginal and adjacent cells transparent and appearing empty; peristome absent; apical cell at leaf apex pellucid and slightly enlarged ..... **Hymenostylium**
12 Stem central strand present; basal marginal and adjacent cells opaque with cell contents; peristome present; apical cell not as above (*G. tophacea*) ..... **Geheebia**
9 Small to large mosses not of wet tufa cliffs or seeps
13 Leaves mostly broadest near the middle or above; costa with a stereid band only on the abaxial surface
14 Leaves large, 2-6 mm long, if slightly smaller then with basal hyaline windows of clear cells on both sides of the costa
15 Margins bordered with several rows of enlarged, thick-walled cells often tinged with orange, these conspicuous; papillae on the blade usually distant; blades reddish orange in 2% KOH ..... **Crumia**
15 Margins not so bordered; papillae on the blade usually crowded; blades brick-red in 2% KOH ..... **Syntrichia**
14 Leaves smaller, up to 2 mm long, lacking hyaline windows
16 Leaves coarsely toothed in the upper ⅓..... **Leptodontium**
16 Leaves entire to minutely serrate
17 Papillae absent on laminal cells (except for projections along the margin)
18 Leaves broadly ovate to nearly circular, aggregated into a cabbage-like head; costa excurrent ..... **Stegonia**
18 Leaves oblong to oblanceolate, not so aggregated, the stem elongate; costa percurrent .... **Chenia**
17 Papillae present on laminal cells
19 Leaves red in 2% KOH
20 Distal laminal margins not differentiated from the interior cells; papillae simple ..... **Microbryum**
20 Distal laminal margins differentiated into a distinctive border of nearly smooth cells, very different than the densely papillose interior cells; papillae simple or bifid ..... **Hennediella**
19 Leaves yellow in 2% KOH
21 Sclerodermis present on the stem; leaves tending to be wider near the middle (*B. unguiculata*) ..... **Barbula**
21 Sclerodermis absent on the stem; leaves tending to be wider above the middle **Tortula**
13 Leaves mostly broadest near the base or at least below the middle, ± gradually narrowed upward; costa with stereid bands on both surfaces (often weak on the adaxial surface)
22 Leaf margins (at least one) recurved or revolute

23 Distal leaf margins tightly revolute, nearly meeting apically, the inside of the rolled margin packed with bugling cells ..... **Pseudocrossidium**
23 Distal leaf margins merely recurved
24 Plants and leaves distinctly reddish proximally (but can be greenish distally); leaves with a few large, coarse teeth at the apex ..... **Bryoerythrophyllum**
24 Plants and leaves greenish, brown, or blackish, not reddish; leaf apices lacking large, coarse teeth
25 Basal marginal and adjacent few rows of cells transparent, clear, contrasting with the opaque inner cells toward the costa; central strand absent; peristome absent ..... **Hymenostylium**
25 Basal marginal and adjacent cells opaque, similar to the inner cells toward the costa; central strand present, usually distinct; peristome developed
26 Many leaves with split or forked tips, the costa splitting apically or further down and one fork projecting to the side; laminal cells lacking papillae; plants on rocks in water (*H. bolleanum*)..... **Hydrogonium**
26 No leaves with split or forked tips; leaves strongly or weakly papillose; habitat various
27 Axillary hairs with a clear basal cell; leaves usually strongly papillose. **Barbula group**
27 Axillary hairs with a brownish basal cell; leaves usually weakly papillose .... **Didymodon group**
22 Leaf margins plane or involute
28 Margins distinctly involute ..... **Weissia**
28 Margins plane or merely up-turned (somewhat involute in *Trichostomum crispulum*)
29 Leaf margins coarsely toothed in the upper half
30 Marginal cells differentiated from laminal cells in a narrow band of clear cells of about equal width running from insertion to about mid-leaf; perichaetia lateral ..... **Pleurochaete**
30 Marginal cells differentiated running straight across the base or rising in a V- or U-shaped pattern
31 Leaves 1.5-2.5 mm long, loosely twisted when dry, the apices fragile and breaking off, 2-stratose in patches, red in 2% KOH..... **Rhexophyllum**
31 Leaves 3.5-5 mm long, incurved and tubulose when dry, the apices persistent, mostly 2-stratose except 2-3 rows along the margin, yellow in 2% KOH..... **Timmiella**
29 Leaf margins entire to serrulate
32 Basal and more distal cells scarcely differentiated
33 Leaf apices rounded to obtuse; central strand present, but weak ..... **Gymnostomum**
33 Leaf apices mostly acute; central strand absent ..... **Hymenostylium**
32 Hyaline basal cells markedly differentiated from the opaque cells upwards
34 Basal leaf margins serrate-dentate by projecting ends of cell walls; central strand absent..... **Eucladium**
34 Basal leaf margins mostly entire; central strand present (absent in *Ozobryum*) [go to lead 35, far left]
35 Perichaetia lateral to the main stems, at the apex of small branches and somewhat hidden or obscured by the main stem leaves
36 Leaves erect-curving when dry, not contorted, commonly 2-stratose distally, the cells bulging mammillose with a single central papilla; stems lacking a sclerodermis or this weak ..... **Ozobryum**
36 Leaves contorted when dry, mostly 1-stratose distally, the cells 2-more-papillose; the stems with a strong or weak sclerodermis
37 Plants with a bluish cast when dry, green when wet; proximal hyaline marginal cells quadrate to slightly elongate, forming a weak border of 1-2 longitudinal rows..... **Molendoa**
37 Plants yellow-green to orangish when dry, green when wet; proximal hyaline marginal cells rectangular-elongate, forming a strong border of 4-10 longitudinal rows ..... **Pleurochaete**
35 Perichaetia terminal on the main stems, not hidden or obscured in the axils of the main stem leaves
38 Proximal hyaline cells strongly differentiated in a V-shape, or at least the laterally differentiated cells rising higher along the margin as a tapering border..... **Tortella**
38 Proximal hyaline cells differentiated straight across the leaf or in a U shape
39 Leaves brittle, easily broken upon handling, lanceolate, the base dilated; apex acute; basal cells commonly running up the margins in a U-shaped pattern..... **Chionoloma**
39 Leaves not brittle, ovate or elliptic to long-lanceolate; apex usually rounded or rounded-acute; basal cells evenly differentiated across the leaf base, not running up the margins in a U-shaped pattern .. **Trichostomum**

Acaulon [stemless].

Acaulon triquetrum (Spruce) Müller Hal. [3-cornered] [*Phascum triquetrum* Spruce]. Acrocarpous, the plants bulbiform, the stems less than 1 mm long, a central strand absent; leaves appressed when dry, to 2 mm long, keeled, the outer ones shorter; costa excurrent to an apiculus, sometimes short-awned; laminal cells smooth, 1-3:1, 1-stratose; seta about as long as the capsule; capsule spherical, lacking an apiculus, cleistocarpous; KOH reaction red. ●Dry, sandy, protected soil in the southern deserts; known from a single collection.

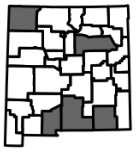




NM, Dona Ana Co., Jornada del Muerto, 13 Feb 2015, *K.W.* Allred (NMC); MO, Howard Co., Fayette, 28 Mar 1963, *D.H. Norris* (NY 00586186).

Aloina [resembling the genus *Aloë*].

Aloina rigida (Hedwig) Limpricht [stiff] [*Barbula rigida* Hedwig]. Acrocarpous, the stems to 3 mm tall/long, a central strand present; leaves to 2.5 mm long, thick, partly 2-stratose, rosette-forming, tongue-shaped, the margins infolded and nearly reaching each other across the top of the leaf; costa broad percurrent, beset with adaxial filaments of 3-9 cells; laminal cells smooth; seta to 15 mm long; capsules to 3.5 mm long, the operculum long-rostrate, the peristome very large, strongly twisted. ●On rocky crevices and soil banks. ♦Reports of *Aloina aloides* (Schultz) Kindberg belong here.



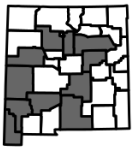
NM, Otero Co., Sacramento Mts, Bluff Springs, 10 Jul 2012, *Kleinman et al.* (SNM).

Barbula group (including ***Barbula***, ***Hydrogonium***, and ***Streblotrichum***).

1 Many leaves with split or forked tips, the costa and blade splitting apically or further down and one fork projecting to the side; laminal cells lacking papillae; plants on rocks in water ..... ***Hydrogonium bolleanum***
1 No leaves with split or forked tips; leaves usually strongly papillose; habitat various
  2 Leaves rather flaccid when wet; distal cells 11-15 µm, quadrate to rectangular, not or weakly papillose ..... ***Hydrogonium bolleanum***
  2 Leaves usually firm when wet; distal cells 7-12 µm, quadrate, usually distinctly and strongly papillose
    3 Leaves with multicellular axillary gemmae; adaxial costa cells prorate at both ends ..... ***Hydrogonium orientale***
    3 Leaves lacking gemmae; costa cells not prorate
      4 Costa percurrent, ending 1-6 cells before the apex; rhizoidal tubers present, often within a dense mass of rhizoids buried in the soil ..... ***Streblotrichum convolutum***
      4 Costa shortly excurrent as a mucro; rhizoidal tubers absent ..... ***Barbula unguiculata***

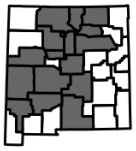
Barbula [a small beard] [Keyed in **Barbula group**].

Barbula unguiculata Hedwig [short-clawed]. Acrocarpous, the stems to 2 cm long, a central strand present; leaves to 2.5 mm long, contorted when dry, the base widened, the margins recurved proximally at least; costa excurrent as a short mucro; distal cells quadrate, papillose; gemmae or tubers absent; KOH reaction yellow. ●On soil and rock, dry and wet ground, crevices of boulders, lawns, gardens, roadsides.

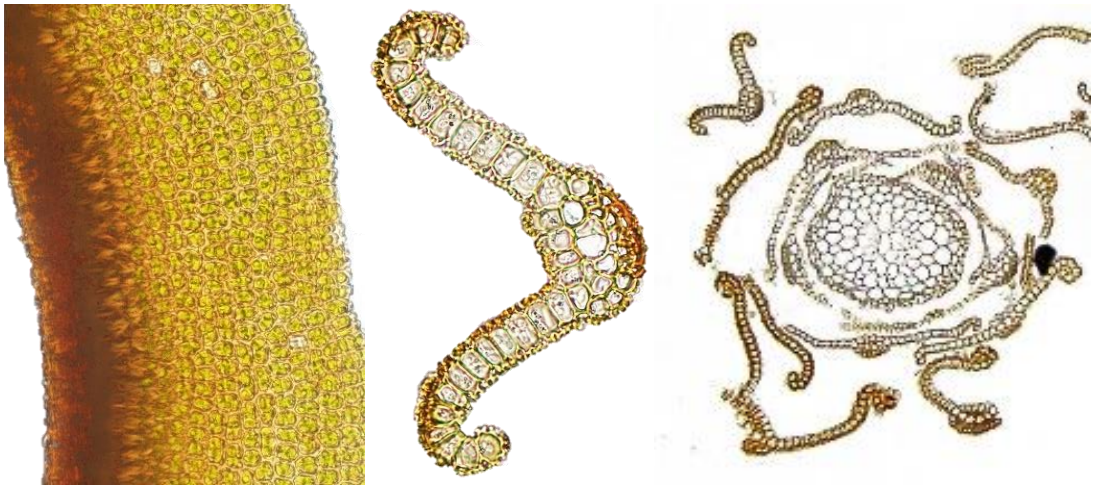


NM, Grant Co., Pinos Altos Range, Georgetown Road, 28 Jul 2011, *Kleinman & Blisard* (SNM).

Bryoerythrophyllum [a red-leaved moss].

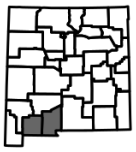


Bryoerythrophyllum recurvirostrum (Hedwig) Chen [with a recurved beak] [*Bryoerythrophyllum recurvirostrum* (Hedwig) Chen var. *dentatum* (Schimper) Crum, Steere, & Anderson, *Didymodon rubellus* Bruch & Schimper, *Didymodon recurvirostrum* (Hedwig) Jennings, *Weissia recurvirostra* Hedwig]. Acrocarpous, the plants red-brown proximally, the stems short in fertile plants, to 2 cm long in sterile plants, a central strand usually present; leaves to 3 mm long, 1-stratose distally, the margins recurved at least in lower half, commonly with coarse teeth apically; costa percurrent; medial cells 3-1:1, papillose; capsules to 2 mm long, the operculum to 1 mm long; KOH reaction red. ●On damp soil and rocks, along streams, roadcuts, overhanging rocks and ledges; in the mountains.



NM, Grant Co., Pinos Altos Range, Signal Peak Road, 14 Sep; 2010, *Kleinman & Blisard* (SNM).

Chenia [for Chen Pan Chieh (1907-1970), Chinese bryologist].



Chenia leptophylla (Müller Hal.) R.H. Zander [narrow-leaved] [*Chenia rhizophylla* (Sakurai) R.H. Zander, *Phascum leptophyllum* Müller Hal., *Tortula rhizophylla* (Sakurai) Iwatsuki & Saito]. Acrocarpous, the stems to 3 mm long, a central strand present; leaves to 2.5 mm long, lacking basal windows, 1-stratose, the margins weakly recurved proximally, denticulate from cellular projections, otherwise epapillose; costa percurrent, composed of only 5-10 cells (including epidermal cells); proximal cells 2-4:1, smooth; distal cells quadrate, smooth (except for margins); specialized asexual reproduction sometimes by globose rhizoidal tubers or plantlets, 100-130 μm; capsules unknown; KOH reaction reddish (cell walls). ●On bare soil in disturbed open areas; southern deserts; known from few collections.

Australia, Queensland, Bunya Mts, 8 Mar 1974, *D. Norris* (COLO).

Chionoloma [a snow-fringe].

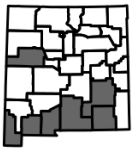
Chionoloma tenuirostre (Hooker & Taylor) M. Alonso [slender-beaked] [*Oxystegus tenuirostris* (Hooker & Taylor) A.J.E. Smith, *Trichostomum tenuirostre* (Hooker & Taylor) Lindberg, *Weissia tenuirostris* Hooker & Taylor]. Acrocarpous, turf-forming, the stems to 3 cm tall, a central strand commonly present; leaves contorted when dry, brittle when handled, leaving angular fractures, the margins somewhat undulate, plane, entire to weakly toothed, the apices acute, with a mucro of 3-6 cells; basal cells elongate-rectangular, differentiated across the base as a U or V, commonly running up the margins; distal cells quadrate, multi-papillose. ●On soil, rocks, cliffs, overhangs; poorly known in the state.

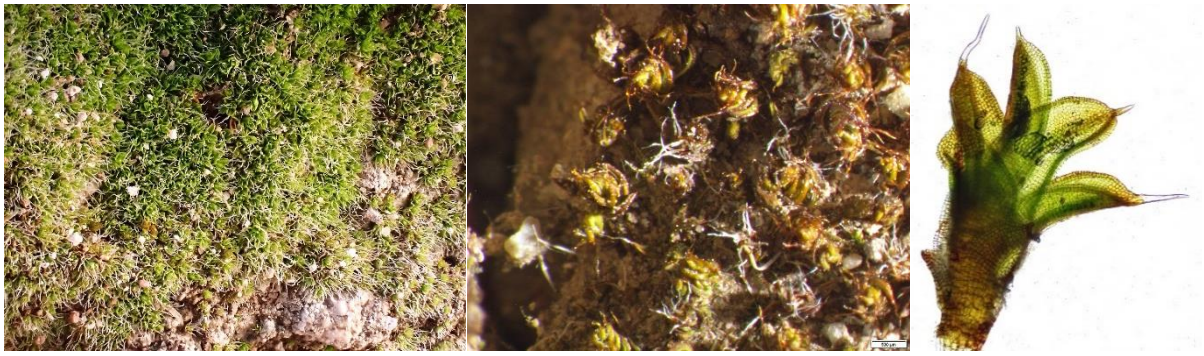
NM, Catron Co., Mogollon Mts, Bursum Camp, 28 Apr 2012, *Kleinman* & *Blisard* (SNM).

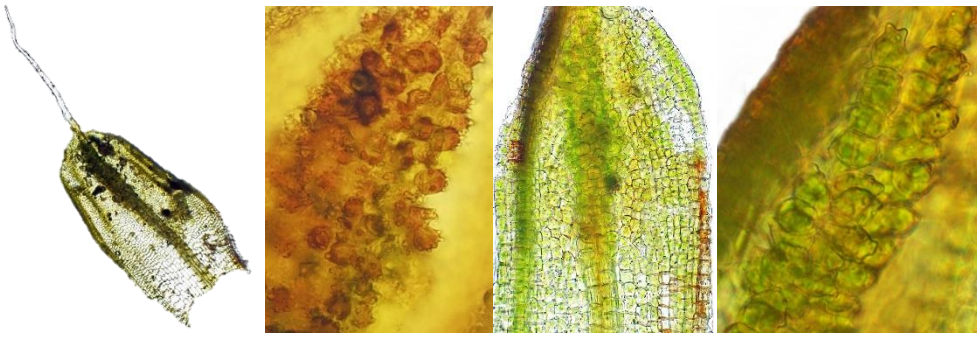
Crossidium [a small fringe].

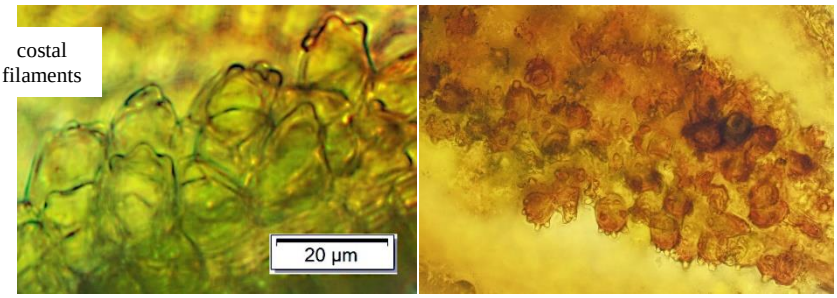
1 Filaments long and sometimes branched, commonly 5-10 cells long, the mass of filaments spreading over half or more the width of the leaf
  2 Distal cells of the leaf very thick-walled, the lumen almost obliterated, giving the distal marginal area a bleached, whitish appearance; cells of the filaments thick-walled ..... ***C. squamiferum***
  2 Distal cells of the leaf not excessively thick-walled, the lumen well-developed, the distal marginal area greenish-pellucid; cells of the filaments thin-walled..... ***C. crassinervium***
1 Filaments short and rarely branched, generally 2-6 cells long, the mass of filaments scarcely exceeding the costal zone
  3 Distal cells of leaf multi-papillose..... ***C. seriatum***
  3 Distal cells of leaf smooth or 1- or rarely 2-papillose ..... ***C. aberrans***

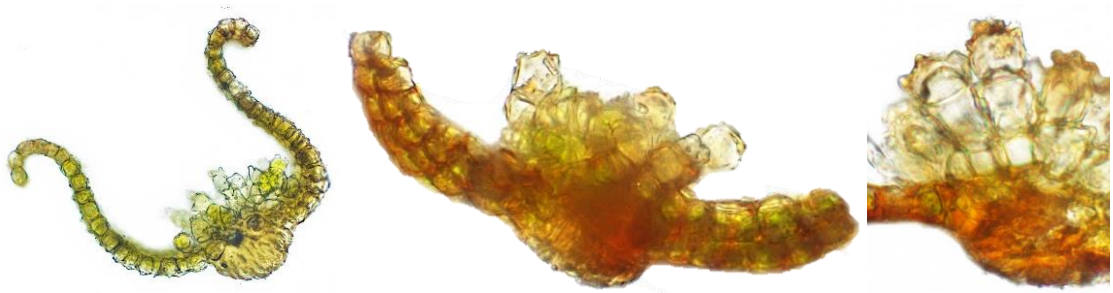
Crossidium aberrans Holzinger & Bartram [astray, aberrant]. Acrocarpous, the stems to 4 mm long, a central strand present; leaves to 1.5 mm long, the margins recurved; costa excurrent as a thread-like awn, the adaxial surface covered by filaments of 1-4 nearly spherical papillose cells; medial and distal cells smooth to papillose; seta to 16 mm long; capsules to 2 mm, the peristome strongly twisted, large. ●On soil and rocks.





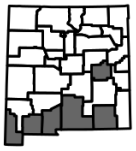


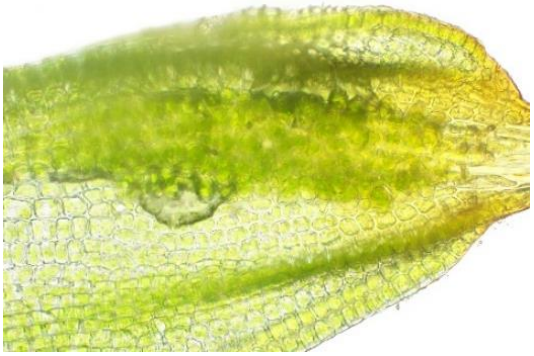




NM, Grant Co., City of Rocks State Park, 15 Oct 2022, *Kleinman & Norris* (SNM).

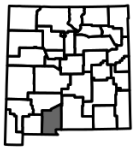
Crossidium crassinervium (De Notaris) Juratzka [thick-nerved] [*Crossidium deserti* of NM reports, *Crossidium desertorum* Holzinger & Bartram, *Tortula crassinervia* DeNotaris]. Acrocarpous, the stems to 5 mm long, with a central strand; leaves to 1.3 mm long, the margins recurved/revolute; costa excurrent as a thread-like awn, with a mass of filaments covering about ½ or more of the leaf, the filaments of 2-12 thin-walled cells, the terminal cell papillose; medial and distal cells smooth; seta to 13 mm long; capsules to 2.2 mm long, the peristome strongly twisted. ●On soil and rocks, dry washes, open or under shrubs; desert areas.

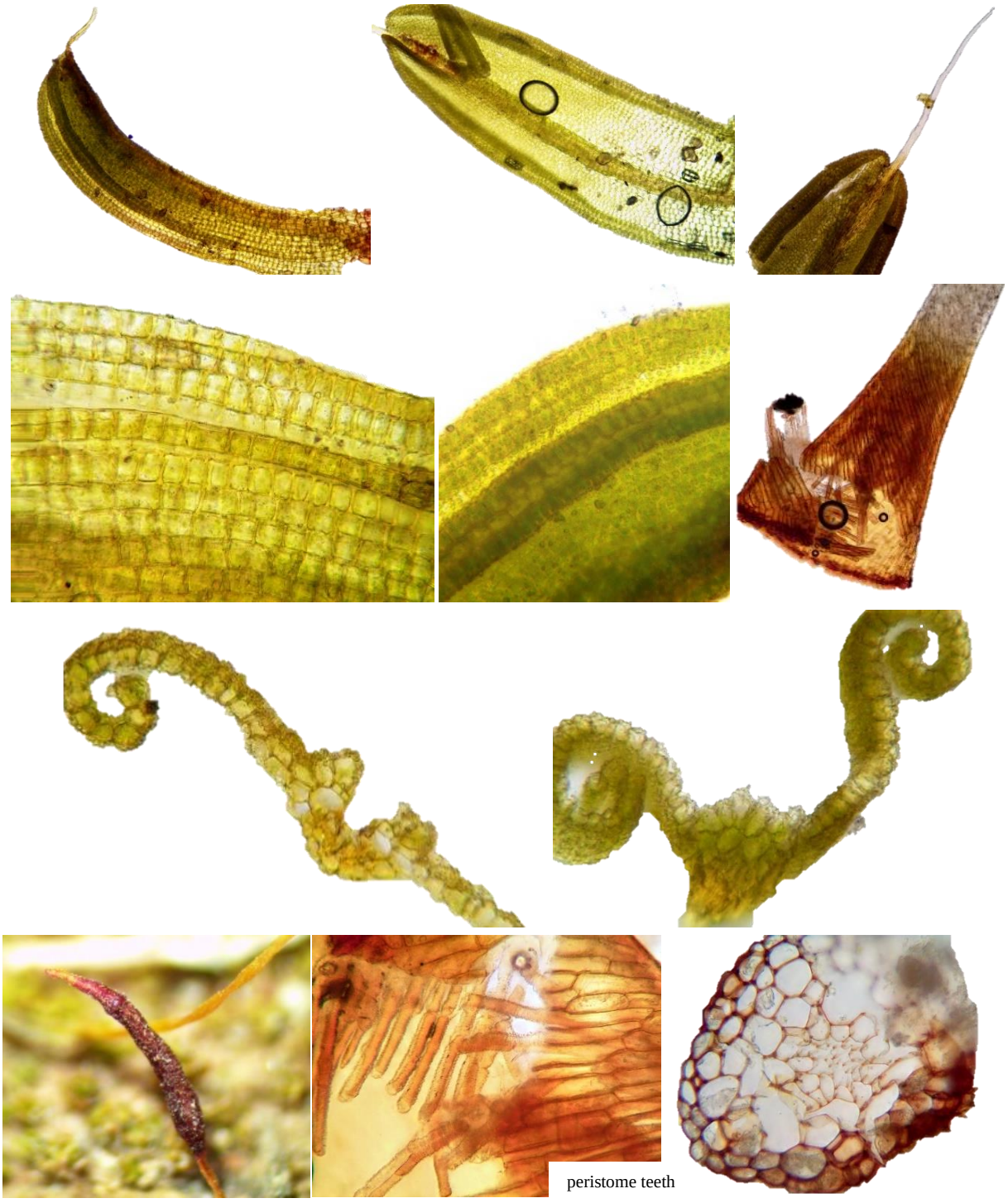




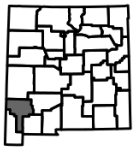
NM, Dona Ana Co., Tortugas Mts, 3 Nov 2014, *K.W. Allred* (NMCR).

Crossidium seriatum Crum & Steere [arranged in a series]. Acrocarpous, the stems to 2 mm long, with a central strand; leaves to 1.3 mm long, the margins revolute, smooth-celled below the middle; costa excurrent as a thread-like awn, the filaments of 2-6 papillose cells and scarcely covering the costal region; median and distal cells multi-papillose; seta to 13 mm long; capsules to 2.3 mm long, the peristome strongly twisted. ●Sandy soil and rocks, dry washes; deserts; known from two collections.





NM, Dona Ana Co., White Sands Missile Range, *D.L. Anderson 7446* (NMCR).



Crossidium squamiferum (Viviani) Juratzka [scale-bearing] [*Barbula squamifera* Viviani]. Acrocarpous, the stems to 10 mm long, with a central strand; leaves to 2 mm long, the margins recurved at least below, serrulate, papillose; costa excurrent into a thread-like awn, the filaments of 4-10 papillose cells, the mass of filaments spreading over ½ or more the leaf width; medial and distal cells smooth, very thick-walled; seta to 20 mm; capsules to 2.7 mm, the peristome strongly twisted. ●Sandy soil and rocks along washes in arid areas; known from few collections. ♦Recognized by the whitish, thick-walled cells in the distal half of the leaves and the broad mass of filaments.

NM, Grant Co., Sycamore Canyon, 1 Oct 2011, *Kleinman & Blisard* (SNM).

Crumia [for Howard Alvin Crum (1922-2002), eminent American bryologist].

Crumia latifolia (Kindberg) Schofield [broad-leaved] [*Merceya latifolia* Kindberg]. Acrocarpous, the stems to 3 mm long, a central strand absent to very weak; leaves to 4 mm long, spatulate, the margins recurved at least below, bordered by about 6 rows of enlarged thick-walled cells; costa percurrent, lacking an adaxial stereid band, the abaxial stereid band strong; seta to 1.5 mm; capsules to 3 mm long, the peristome weakly twisted. ●Moist areas along streams, roadcuts. ♦Distinctive by the enlarged, thick-walled marginal cells and large leaves.

NM, Grant Co., Black Range, Railroad Canyon, 21 Jul 2023, *Kleinman & Blisard* (SNM).

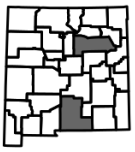
Didymodon group (including ***Didymodon***, ***Geheebia***, ***Gertrudiella***, ***Husnotiella***, ***Trichostomopsis***, and ***Vinealobryum***)

1 Most leaf apices missing
- 2 Leaf apices, when present, apically swollen as a propagulum ..... ***Didymodon anserinocapitatus***
- 2 Leaf apices, when present, not swollen, usually evenly narrowing..... ***Didymodon rigidulus***

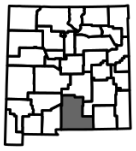
1 Leaf apices intact or only occasionally broken
- 3 Costa with elongate superficial adaxial (side opposite the bulging costa) cells in the distal half (*Geheebia*)
  - 4 Leaves ligulate to ovate-lanceolate, apex often obtuse, costa often ending before the apex ..... ***Geheebia tophacea***
  - 4 Leaves short- to long-lanceolate, apex always acute, costa subpercurrent to short-excurrent
    - 5 Leaves when moist spreading to weakly recurved, usually lying flat, costa usually distinctly widened at base..... ***Geheebia fallax***
    - 5 Leaves when moist strongly recurved and keeled, lying on their sides, costa little widened at base..... ***Geheebia ferruginea***
- 3 Costa with quadrate or occasionally short-rectangular superficial adaxial cells in the distal half, or, if elongate then the distal laminal cells 2-stratose
  - 6 Leaves adaxially with a narrow medial channel about the width of the costa at least at leaf apex, the apex often apiculate by one or more conical cells; costa usually percurrent; margins usually recurved, often to near the apex
    - 7 Leaves short- to long-lanceolate or long-triangular, to 4 mm long; margins recurved near base or up to proximal 2/3 of leaf; propagula rare ..... ***Vinealobryum vineale***
    - 7 Leaves deltoid to short-lanceolate or ovate, to 1.5 or rarely to 2 mm; margins recurved or revolute to near apex; propagula sometimes present
      - 8 Costal section showing adaxial epidermal cells thin-walled, remainder of costa thick-walled; costa blunt apically, wider at mid-leaf than below, with a bulging adaxial surface forming a long-elliptic 1-stratose pad of cells; guide cells in 2(-3) layers, leaf margins loosely revolute..... ***Gertrudiella nevadensis***
      - 8 Costal section showing all cells about equally thickened; costa often with an apical conical cell or costa short-excurrent, gradually narrowing distally, the adaxial surface nearly flat and not forming a wide pad of cells (but costa occasionally thickened and bulging adaxially); guide cells usually in 1 layer, leaf margins narrowly to loosely recurved
        - 9 Leaves 0.7-1 mm long, ovate, the apex rather blunt, cucullate or weakly concave; margins weakly recurved; costa percurrent or very weakly excurrent by 1-3 cells; fresh blades reddish in nature and in KOH ..... ***Vinealobryum brachyphyllum***
        - 9 Leaves 1-2 mm, lanceolate to narrowly ovate, the apex drawn out, straight or somewhat reflexed; margins strongly recurved to revolute; costa excurrent as a several-celled blunt mucro; fresh blades green in nature and in KOH
          - 10 Costa stout, nearly round in cross-section, with 3-5 adaxial stereid layers; central strand weakly differentiated..... ***Didymodon cordatus***
          - 10 Costa thin, flattened somewhat in cross-section, with 2-3 adaxial stereid layers; central strand strongly differentiated..... ***Didymodon tectorum***
  - 6 Leaves adaxially very widely channeled medially or merely slightly concave across leaf, the apex seldom apiculate by a conical cell; costa percurrent or excurrent as a multicellular, stout mucro; margins plane to recurved
    - 11 Axillary gemmae present
      - 12 Gemmae mostly unicellular; leaf apex broadly obtuse, often cucullate; costa usually spurred..... ***Husnotiella revoluta***
      - 12 Gemmae all multicellular; leaf apex acute, not cucullate; costa not spurred..... ***Didymodon rigidulus***
    - 11 Axillary gemmae absent
      - 13 Distal lamina 1-stratose or occasionally 2-stratose in small patches..... ***Didymodon rigidulus***
      - 13 Distal lamina 2-stratose totally or 2-stratose just along margins
        - 14 Distal lamina entirely 2-stratose..... ***Didymodon rigidulus***
        - 14 Distal lamina 2-stratose just along margins
          - 15 Leaves short-lanceolate, smooth to strongly papillose; marginal basal cells not or weakly differentiated from the adjacent medial cells; basal juxtacostal cells not inflated; adaxial superficial cells of costa quadrate at mid-leaf..... ***Trichostomopsis australasiae***
          - 15 Leaves long-lanceolate, usually smooth or weakly papillose; marginal basal cells narrowly rectangular, in 2-4 rows along the margin; basal juxtacostal cells inflated; adaxial superficial cells of costa usually elongate at mid-leaf ..... ***Trichostomopsis umbrosus***

Didymodon [double teeth] [Keyed in **Didymodon group**].

Didymodon anserinocapitatus (X.J. Li) R.H. Zander [like a goose head] [*Barbula anserinocapitata* X.J. Li]. Acrocarpous, the stems to 1.5 cm, a central strand present; leaves to 2 mm long, the margins recurved, entire, the apices thickened, cylindric to clavate, this portion usually early deciduous and absent in mature leaves; costa extending into the thickened portion; distal cells quadrate, smooth, 1-stratose except in deciduous portion; KOH reaction reddish orange. ●On rock, cliffs, near water; known in the state from only two collections. ♦Distinctive by the thickened, deciduous apical leaf portion,

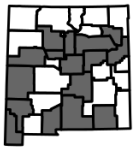


NM, San Miguel Co., woods along Pecos River, 21 Oct 1939, *Richards & Drouet* (COLO).



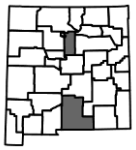
Didymodon cordatus Juratzka [heart-shaped] [*Trichostomum cordatum* (Juratzka) Milde, *Vinealobryum cordatum* (Juratzka) R.H. Zander]. Acrocarpous, the stems to about 1 cm long, with a weadly developed central strand; leaves broadly cordate, to about 1.8 mm long, narrowly grooved along the costa distally, 1-stratose, the margins recurved, entire, 1-stratose; costa percurrent to shortly exserted as a short mucro, very thick and stout, 70-100 µm wide, the adaxial superficial cells quadrate to hexagonal in distal half; proximal cells smooth; median and distal cells papillose; specialized asexual reproduction by globose, several-celled, axillary gemmae about 30 µm, these arising from the stem about midway between leaves; KOH reaction greenish; capsule unknown. ●On soil over rock; known from a single collection; possibly also Santa Fe County. ♦Distinctive by the ovate, drawn-out, 1-stratose leaves, stout costa nearly round in cross-section, common axillary gemmae, and greenish in KOH.

Austria, Klosterneuburg, 21 Apr 1903, *Schiffner & Baumgartner* (COLO).



Didymodon rigidulus Hedwig [somewhat stiff] [*Barbula acuta* Bridel, *Barbula acuta* (Bridel) Bridel) var. *bescherellei* (Sauerbeck ex Jaeger) Crum, *Barbula bescherellei* Sauerbeck, *Barbula icmadophila* Müller Hal., *Didymodon acutus* (Bridel) Saito, *Didymodon rigidulus* Hedwig var. *gracilis* (Schleicher ex Hooker & Greville) R.H. Zander, *Didymodon rigidulus* Hedwig var. *icmadophilus* (Müller Hal.) R.H. Zander, *Tortula gracilis* Schleicher ex Hooker & Greville]. Acrocarpous, often in dark green to blackish turfs, the stems to 2 cm long, with a central strand; leaves lanceolate, broadly channeled, 1-2-stratose, the margins recurved, the apices acute to acuminate/subulate; costa percurrent to excurrent, the adaxial superficial cells quadrate at mid-leaf; basal cells rectangular; distal cells quadrate, papillose or smooth; specialized asexual reproduction by axillary multicellular gemmae, these sometimes absent; KOH reaction yellow or red-orange. ●On soil, cliffs, rock outcrops, sandstone boulders. ♦Extremely variable, with 5 varieties, not distinguished herein.

NM, Grant Co., Pinos Altos Range, near McMillen Campground, 2 Mar 2011, *Kleinman & Blisard* (SNM).



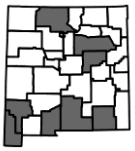
Didymodon tectorum (Müller Hal.) Saito [of roofs] [*Barbula tectorum* Müller Hal.]. Acrocarpous, fresh plants green, the stems to 2 cm long, with a strongly developed central strand; leaves to 2 mm long, deltoid-lanceolate, narrowly grooved along the costa at least distally, the margins revolute, entire; costa short-excurrent as a mucro, little widening upwards, lacking an adaxial pad of cells; distal cells quadrate, smooth to papillose; specialized asexual reproduction by hidden axillary gemmae; KOH reaction greenish. ●On rocks, cliffs, bluffs, and ledges; known from only two collections. ♦Distinctive by the ovate leaves drawn out apically, narrowly channeled apices, the somewhat flattened costa, common axillary gemmae, and greenish in KOH. This is very similar to *D. cordatus*, and our illustrated plant from Santa Fe County, though identified by Bartram (and confirmed by R. Zander) as *D. tectorum*, may belong to *D. cordatus*.

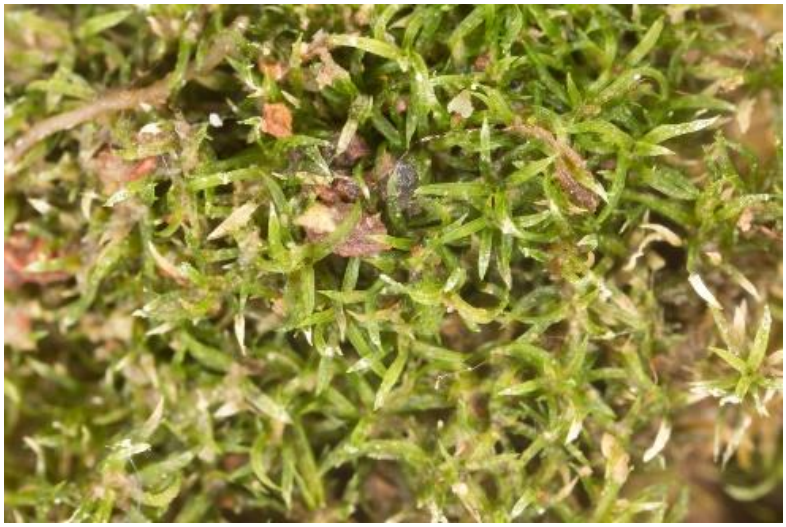
gemmae

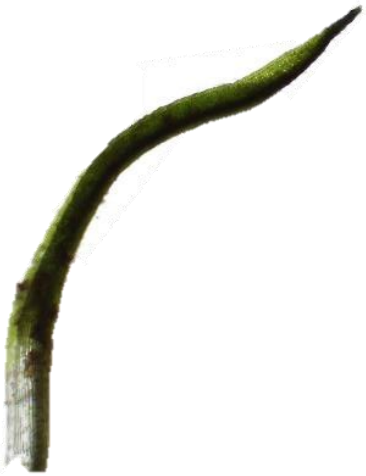
NM, Santa Fe Co., Apache Canyon, 14-18 Dec 1922, *E.B. Bartram 99* (NY).

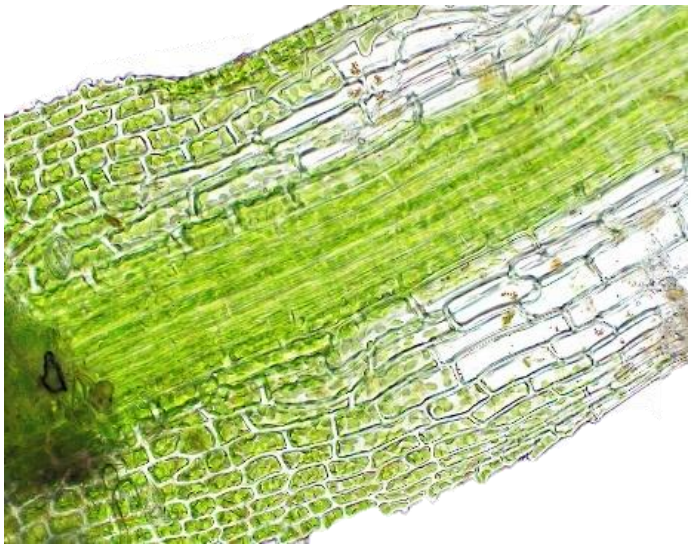
Eucladium [well-branched].

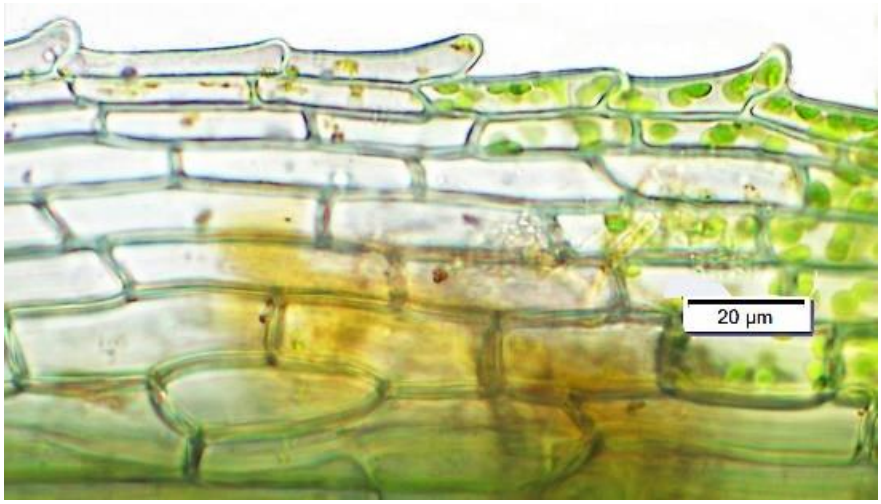
Eucladium verticillatum (Bridel) Bruch & Schimper [whorled] [*Weissia verticillata* Bridel]. Acrocarpous, in yellowish green to bluish green turfs or cushions, often encrusted with calcium deposits, the stems to 6 cm long, freely branched, a central strand absent; leaves to 2.5 mm long, only slightly twisted when dry, the base hyaline, somewhat dilated, the margins flat, usually toothed proximally, entire distally, the apices narrowly acute; costa very stout; proximal cells enlarged, elongate, hyaline, smooth; distal cells quadrate to short-rectangular, papillose; seta yellow to reddish; capsules rare. ●Seeping or dripping calcareous rock faces, bluffs, and cliffs.





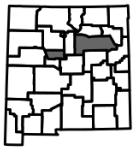






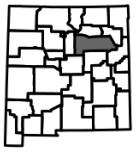
NM, Hidalgo Co., Lower Gila Box, 27 Dec 2012, *Kleinman & Blisard* (SNM).

Geheebia [for Adalbert Geheeb (1842-1909), German bryologist] [Keyed in **Didymodon group**].

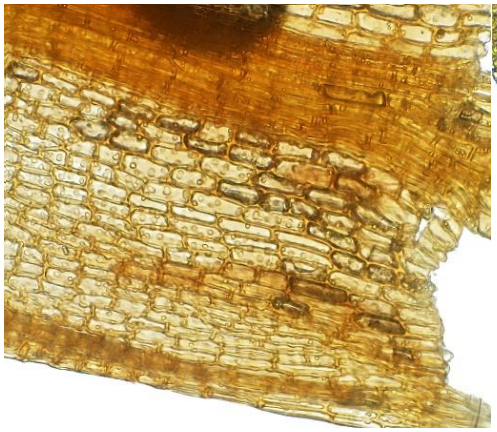


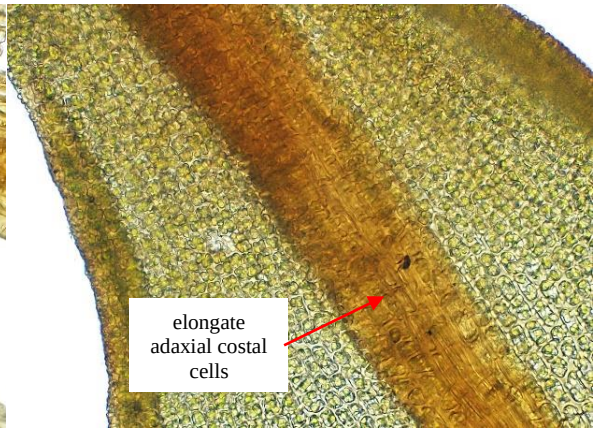
Geheebia fallax (Hedwig) R.H. Zander [deceptive] [*Barbula fallax* Hedwig, *Didymodon fallax* (Hedwig) R.H. Zander]. Acrocarpous, forming dense cushions, the stems to 3 cm long, the central strand present but weak in poorly developed stems; leaves to 2 mm long, keeled, spreading to weakly recurved when wet, the margins plane to recurved, entire, the apices acute to acuminate; costa usually wider at base and narrowing upwards, short-excurrent, lacking an adaxial pad of cells, the adaxial superficial cells elongate at mid-leaf; basal and distal cells quadrate, papillose or smooth, 1-stratose, the distal lumens round; gemmae absent; seta red, to 1.5 cm long; capsules infrequent, to 2 mm long, the peristome twisted counter-clockwise once (rarely twice); KOH reaction red or yellow-brown. ●On damp or wet soil and rocks, around springs and brooks; known from only two collections.

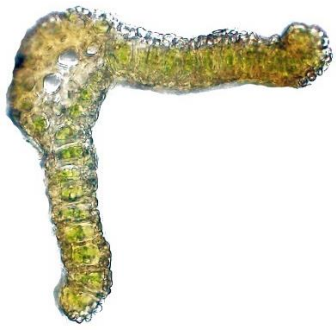
Canada, Ontario, Grey Co., Inglis Falls, 12 Jul 1982, *R.R. Ireland* (COLO).

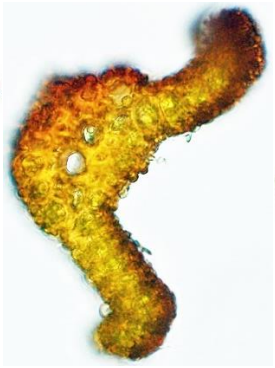


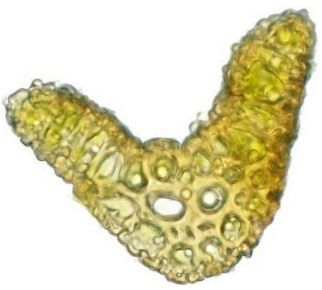
Geheebia ferruginea (Schimper ex Bescherelle) R.H Zander [rust-colored] [*Barbula ferruginea* Schimper ex Bescherelle, *Barbula reflexa* (Bridel) Bridel, *Didymodon fallax* (Hedwig) R.H. Zander var. *reflexus* (Bridel) R.H. Zander, *Didymodon ferrugineus* (Schimper ex Bescherelle) M.O. Hill]. Acrocarpous, plants usually red-brown, the stems to 2.5 cm long, with a central strand; leaves strongly recurved and keeled when wet, to 2 mm long, adaxially grooved along the costa, the margins plane to recurved, usually entire; costa percurrent to short-excurrent, not much wider at base than at apex, lacking an adaxial pad of cells, the superficial adaxial cells elongate at mid-leaf; proximal and distal cells quadrate, 1-stratose, the distal ones papillose; gemmae absent; seta to 1.2 cm; capsules infrequent, the peristome nearly straight to twisted once; KOH reaction reddish. ●On soil, ledges, and rock outcrops; known from a single collection. ♦Distinctive by the rusty color and strongly spreading to reflexed leaves when wet.



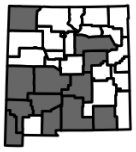




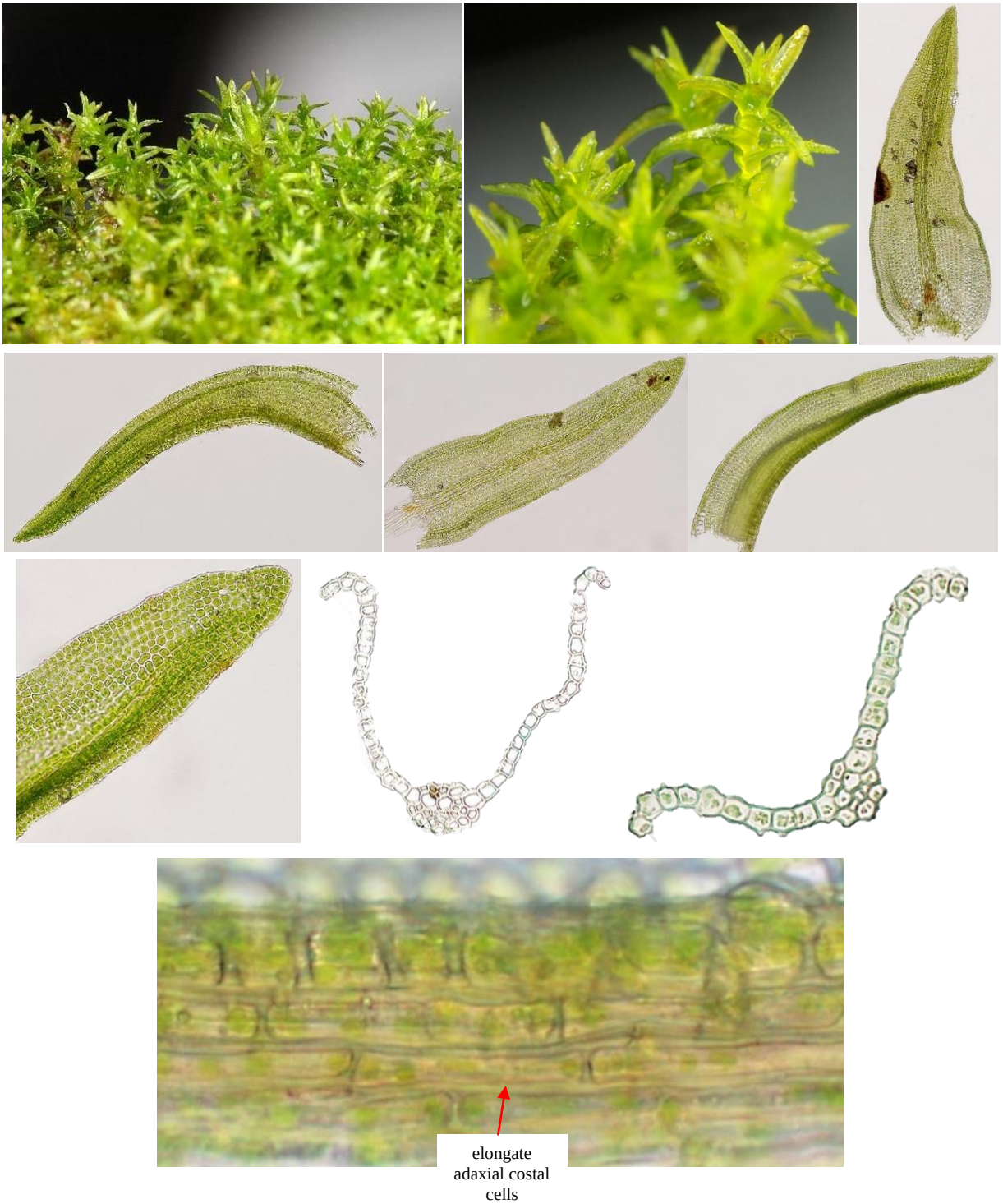




Costa Rica, San Jose Prov., Paramo Buena Vista, 20 Jan 2000, *I. Holz* (COLO).

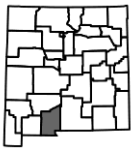


Geheebia tophacea (Bridel) R.H. Zander [of travertine] [*Didymodon tophaceus* (Bridel) Lisa, *Trichostomum tophaceum* Bridel]. Acrocarpous, in dark green to reddish green turfs, often infiltrated with silt or calcareous deposit, the stems to 2 cm long, with a central strand; leaves spreading and keeled when wet, to 2 mm long, adaxially grooved along the costa or broadly channeled, often decurrent, the margins recurved, entire, the apices broadly acute to obtuse or rounded; costa subpercurrent, sometimes broadened at the base, an adaxial pad absent, the superficial adaxial cells elongate at mid-leaf; distal cells quadrate, mostly smooth, 1-stratose; gemmae absent; seta to 1.2 cm; capsules to 1.5 mm, the peristome teeth straight; KOH reaction reddish. ●On wet calcareous rocks and seepy cliffs. ♦Distinctive by the lime-encrusted habitat, 1-stratose leaves with rounded tips, and non-excurrent costa with elongate adaxial cells.



NM, Grant Co., Burro Mts, Gold Gulch Spring, 11 Oct 2010, *Kleinman & Blisard* (SNM).

Gertrudiella [for Gertrude (Locherer) Herzog (1888-?), wife of bryologist T.K.J. Herzog] [Keyed in **Didymodon group**].

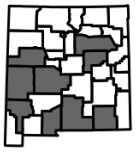


Gertrudiella nevadensis (R.H. Zander) A. Jiménez & Cano [of Nevada] [*Didymodon nevadensis* R.H. Zander]. Acrocarpous, plants green with reddish tint, the stems to 1 cm long, with a central strand; leaves spirally twisted and appressed when dry, not keeled when moist, narrowly channeled apically, to 1 mm long, 1-stratose, the margins recurved, entire, the apices acute to obtuse; costa percurrent, thickened medially (abaxial view), with an adaxial pad of thin-walled cells, the superficial adaxial cells quadrate to short-rectangular at mid-leaf; distal cells quadrate or sometimes short-rectangular, 8-10 µm wide, papillose to smooth; specialized asexual reproduction by rhizoidal tubers or adaxial gemmae; sporophytes unknown; KOH reaction inconclusive. ●On soil and rock outcrops, on gypsum; known from only two collections. ♦Very similar to *Tortula atrovirens*, but that species has a broadly channeled leaf apex, a costa thickened distally, and larger distal cells to 9-18 µm wide.

UT, San Juan Co., Lake Canyon, 15 Jul 1958, *S. Flowers* (COLO).

Gymnostomum [a naked mouth].

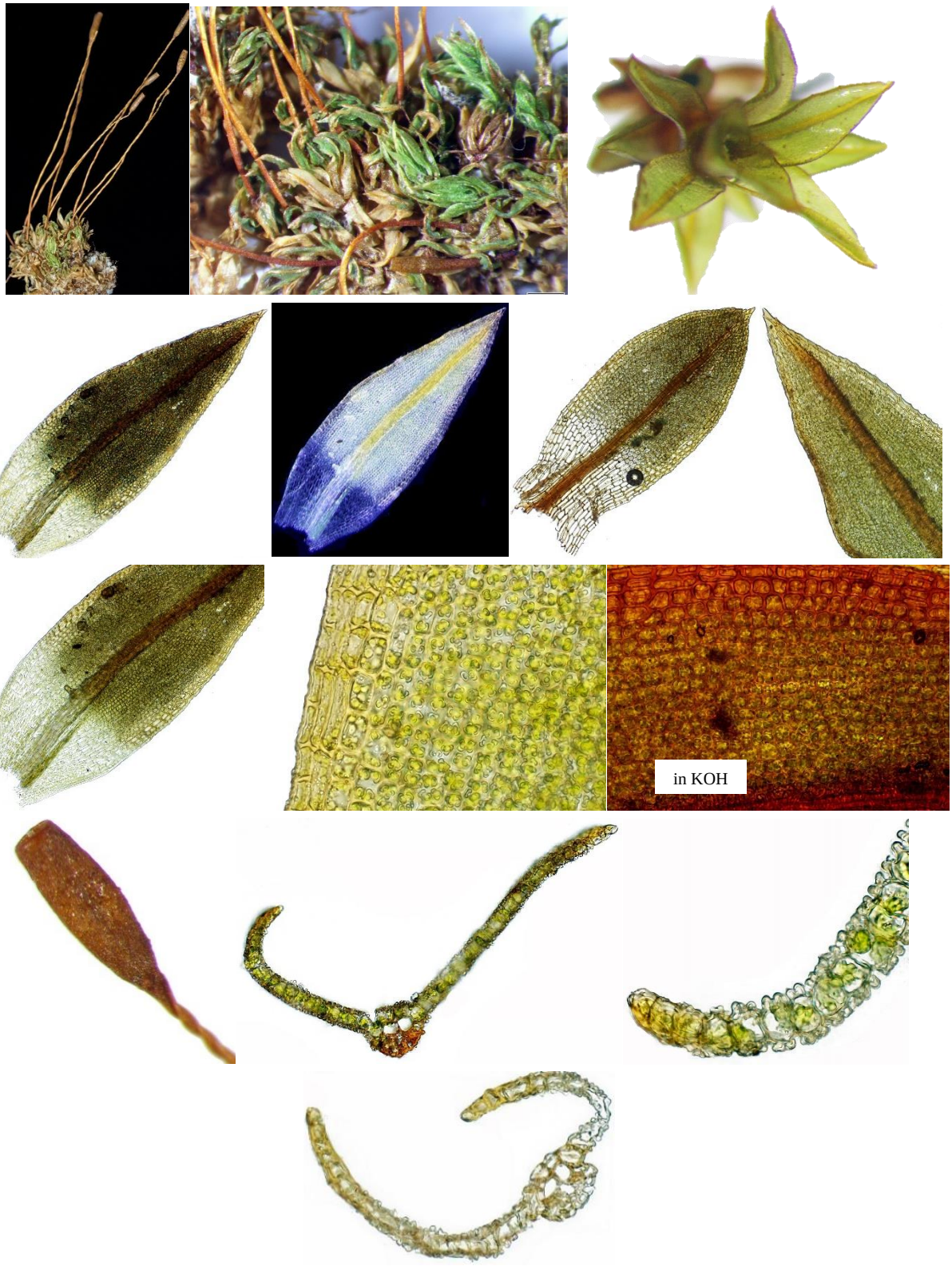
Gymnostomum aeruginosum Smith [rust-colored] [*Gymnostomum calcareum* of NM reports]. Acrocarpous, light green clumps, the stems to 2 cm long, with a weak central strand; leaves to 2 mm long, the apices obtuse, the margins plane, entire to obscurely serrulate; costa ending before the apex; basal cells not much differentiated, elongate; distal cells quadrate, papillose; capsule wide-mouthed, lacking peristome teeth; KOH reaction yellow to orangish. ●Wet rocks and cliffs, tufa.



NM, Grant Co., Gila Cliff Dwellings Nat. Mon., 18 Oct 2011, *Kleinman* & *Blisard* (SNM).

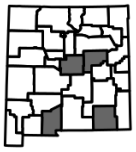
Hennediella [for Roger Hennedy (1809-1877), Scottish phycologist].

Hennediella heimii (Hedwig) R.H. Zander [for Ernst Ludwig Heim (1774-1834), German physician-naturalist] [*Desmatodon heimii* (Hedweg) Mitten, *Gymnostomum heimii* Hedwig, *Pottia heimii* (Hedwig) Hampe]. Acrocarpous, in loose turf or cushions, green distally, reddish proximally, the stems to 1 cm long, a central strand present; leaves ovate, to 4 mm long, the apices acute, the margins plane, dentate to entire apically, with a distinctive border of nearly smooth cells, very different than the densely papillose interior cells; costa percurrent; proximal cells differentiated across the leaf, rectangular; distal cells quadrate to short-rectangular, papillose; seta to 2 cm; capsules short-cylindric, to 3 mm long, the peristome absent; KOH reaction red. ●On soil or thin soil over rock. ♦Distinctive by the plane, smooth margins reddish in KOH.

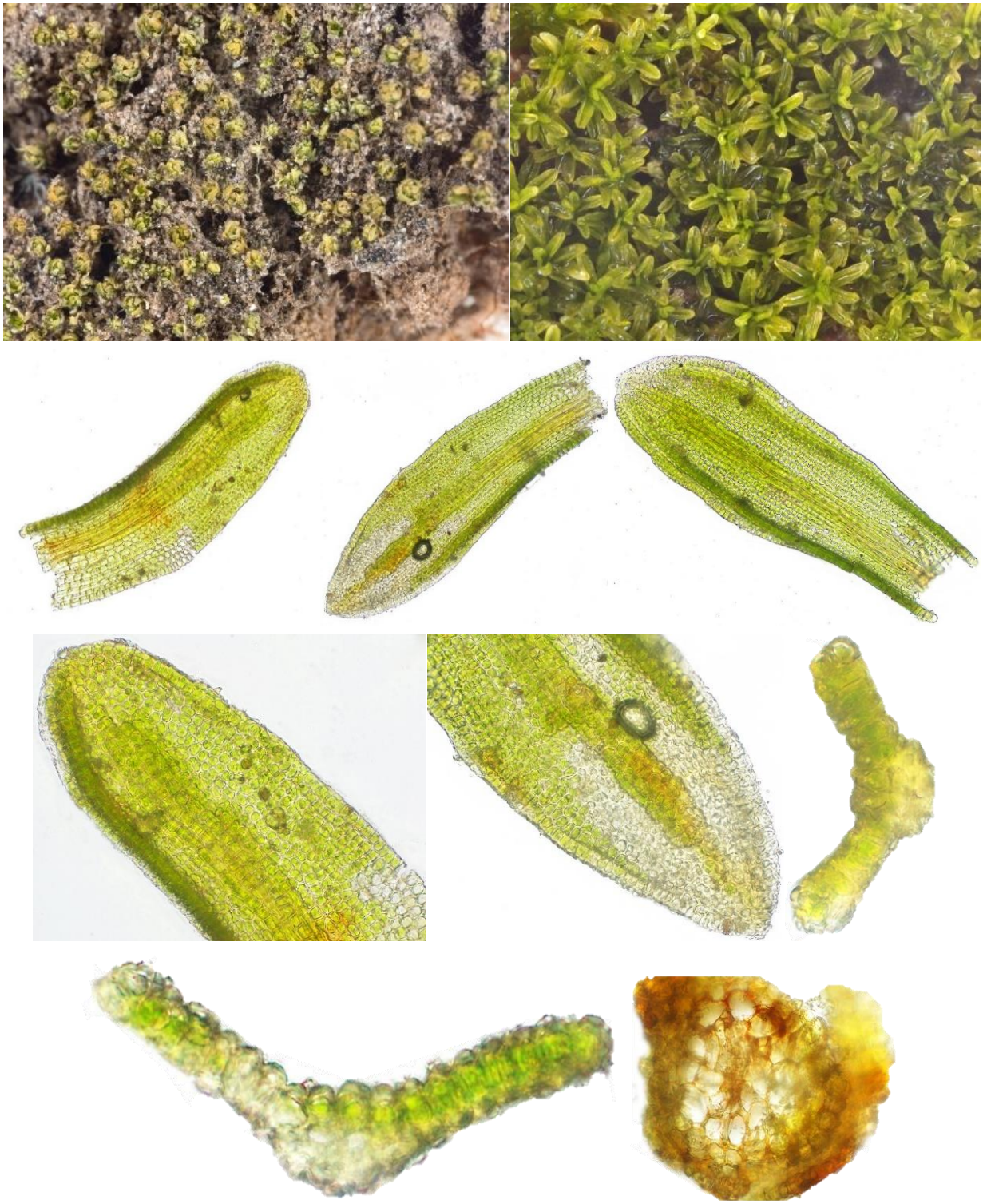


CO, Montezuma Co., Mesa Verde Nat. Park, 7 Jun 1959, *J. Erdman* (COLO).

Husnotiella [for Pierre Tranquille Husnot (1840-1929), French bryologist] [Keyed in **Didymodon group**].



Husnotiella revoluta Cardot [rolled back] [*Didymodon revolutus* (Cardot) Williams]. Acrocarpous, the stems to 6 mm long, a central strand present; leaves not keeled when moist, ovate to elliptic, to 1.5 mm long, the margins recurved, entire, the apices obtuse to rounded, often cucullate; costa percurrent or shorter, usually spurred, the superficial adaxial cells quadrate at mid-leaf; distal cells quadrate, smooth to low-papillose, mostly 1-stratose; axillary unicellular gemmae rare; seta to 1 cm long; capsule to 1.5 mm long, the peristome absent to rudimentary; KOH reaction light brown to orange-brown. ●On cliffs and rock outcrops. ♦Distinctive feature include the rounded, cucullate leaves with spurred costae.



NM, Eddy Co., Carlsbad Caverns Nat. Park, Slaughter Canyon Trail, 9 Apr 2013, *Kleinman et al.* (SNM).

Hydrogonium [growing in water] [Also keyed in **Barbula group**].

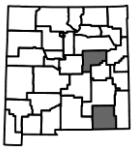
1 Many leaves with split or forked tips, the costa and blade splitting apically or further down and one fork projecting to the side; laminal cells lacking papillae; plants on rocks in water ..... ***Hydrogonium bolleanum***

1 No leaves with split or forked tips; leaves usually strongly papillose; habitat various

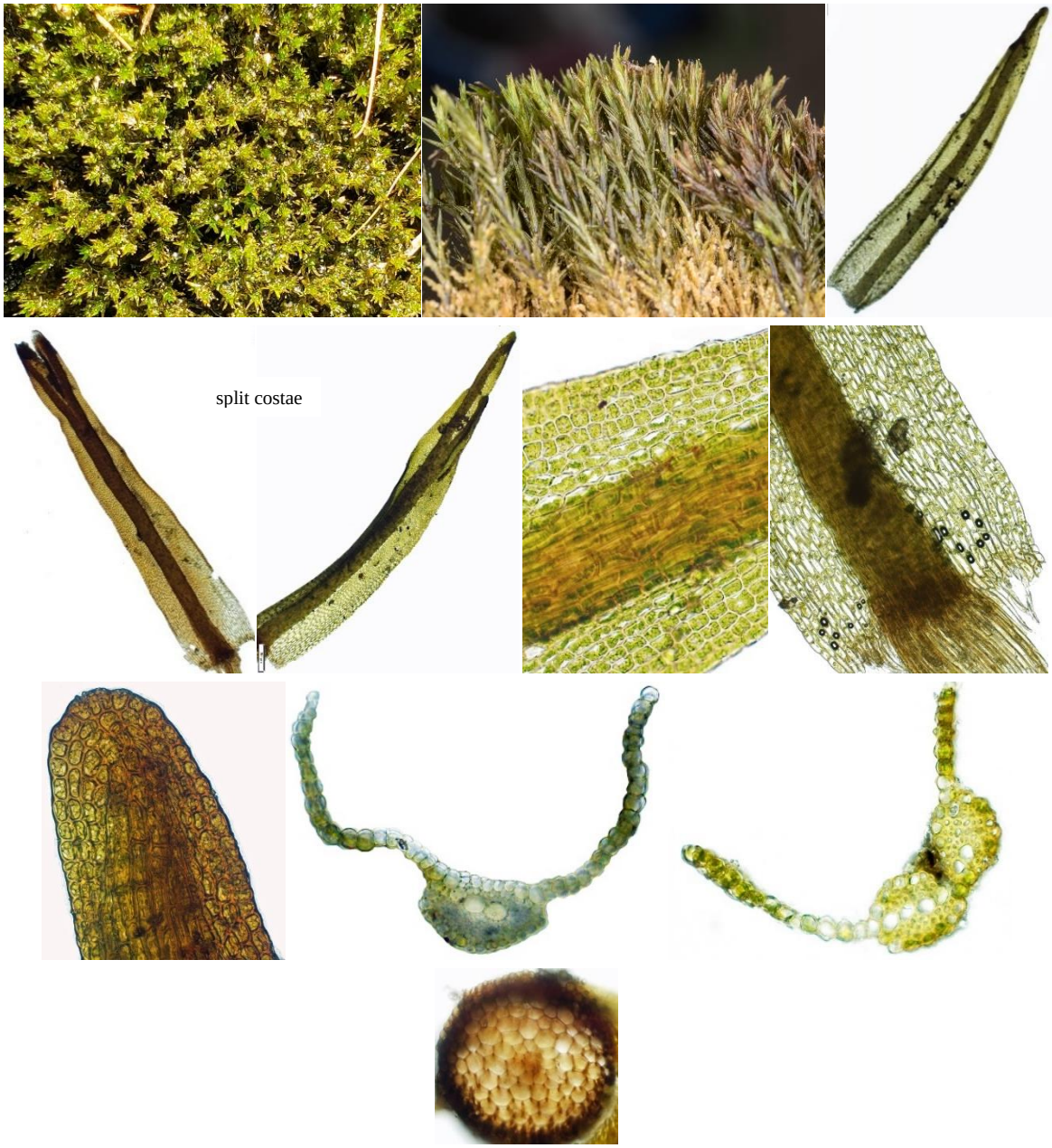
2 Leaves rather flaccid when wet; distal cells 11-15 µm, quadrate to rectangular, not or weakly papillose ..... ***Hydrogonium bolleanum***

2 Leaves usually firm when wet; distal cells 7-12 µm, quadrate, usually distinctly and strongly papillose

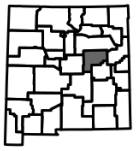
3 Leaves with multicellular axillary gemmae; adaxial costa cells prorate at both ends ..... ***Hydrogonium orientale***



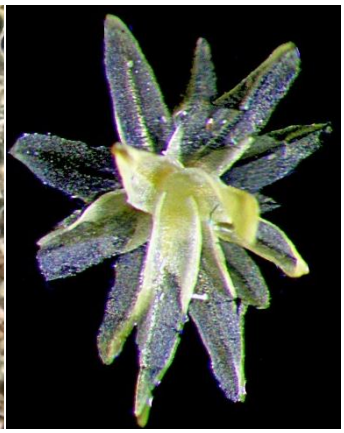
Hydrogonium bolleanum (Müller Hal.) A. Jaeger [for Carl Bolle (1821-1909), a German forester] [*Barbula bolleana* (Müller Hal.) Brotherus, *Barbula ehrenbergii* (Lorentz) Fleischer, *Meesia bolleana* Müller Hal., *Trichostomum ehrenbergii* Lorentz]. Acrocarpous, the stems to 3 cm long, with a central strand; leaves to 2.7 mm long, some on a stem split or forked at the tips or further down, with each fork composed of costa and lamina, the margins plane to weakly recurved; costa percurrent or nearly so, smooth abaxially; distal cells short-rectangular, generally smooth, 11-15 µm wide; specialized asexual reproduction by axillary fusiform stalked gemmae, to 185 µm long; capsules unknown in our plants; KOH reaction yellowish. ●Wet rocks in streams; in New Mexico, known from only two localities. ♦The forking leaf tips are distinctive, though developed in a minority of the leaves.

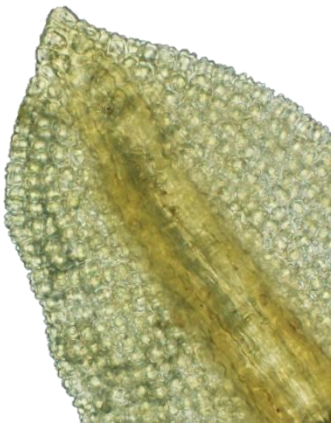


NM, Eddy Co., Sitting Bull Falls, 22 May 2020, *Kleinman & Blisard* (SNM).

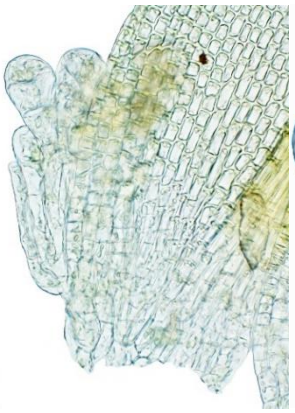


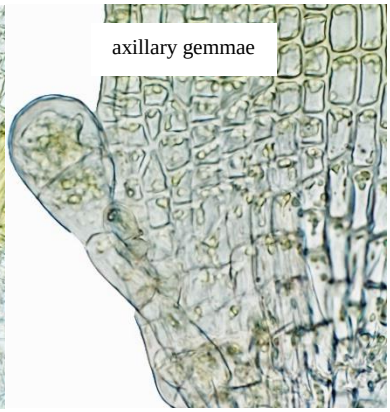
Hydrogonium orientale (F. Weber) Jan Kučera [eastern] [*Barbula indica* (Hooker) Sprengel, *Tortula indica* Hooker, *Trichostomum orientale* F. Weber]. Acrocarpous, the stems to 1.2 cm long, with a central strand; leaves to 2 mm long, the apices acute to rounded, the margins plane to weakly recurved; costa percurrent or shorter, not known to split, the abaxial cells prorate at both ends; distal cells quadrate, papillose, 7-10 µm wide; specialized asexual reproduction by obovoid axillary stalked gemmae. ●On rock and soil; known from a single collection on wet soil near a spring.



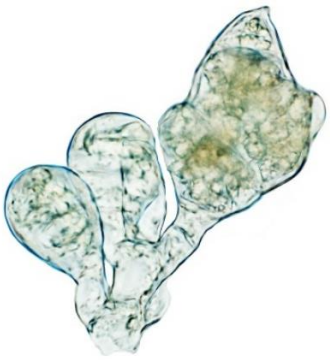


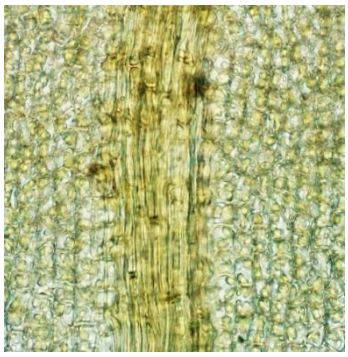
↑ doubly prorate costal cells

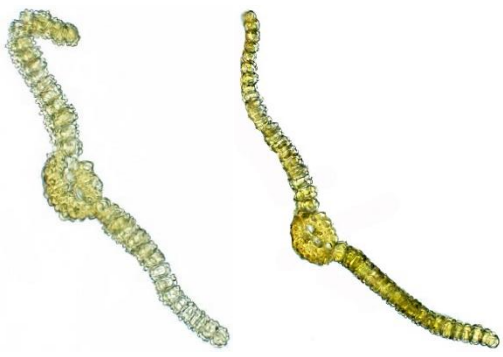




axillary gemmae

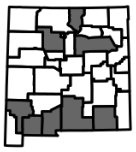




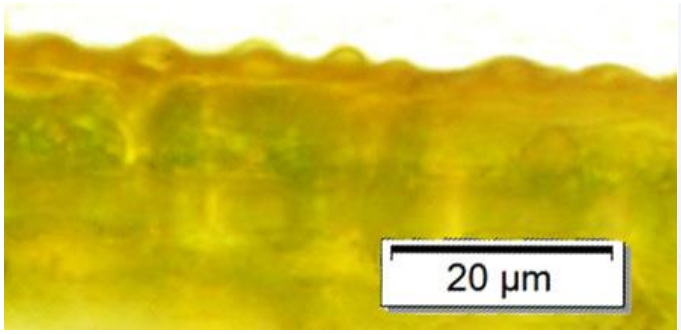


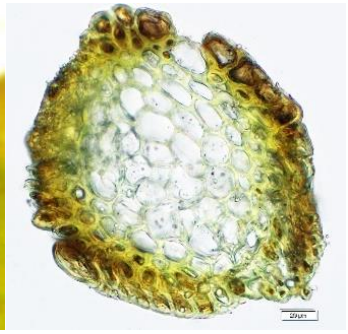
UT, Kane Co., Kane Creek, 1 Aug 1958, *S. Flowers* (COLO).

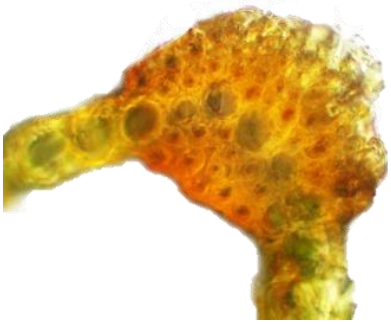
Hymenostylium [a membranous column].



Hymenostylium recurvirostrum (Hedwig) Dixon [with a curved beak] [*Ardeuma recurvirostrum* (Hedwig) R.H. Zander & Hedderson, *Gymnostomum recurvirostrum* Hedwig, *Hymenostylium curvirostrum* Mitten, *Hymenostylium sinense* (Hedwig) Dixon]. Acrocarpous, in green to yellow-green cushions or turfs, the stems to 7 cm long, slender and fragile, without a central strand; leaves to 3 mm long, keeled, the apices obtuse to acute, the margins recurved on one or sometimes both sides, entire or sometimes denticulate at the base by projecting cell walls; costa stout, ending below the apex; proximal cells rectangular, clear, smooth or weakly papillose; distal cells quadrate to rectangular, strongly papillose; seta to 1 cm long; capsule ovoid, the operculum long-beaked to one side; KOH reaction yellow. ●Wet or dripping bluffs, rock faces, cliffs, wet soil along streams.



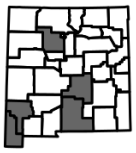




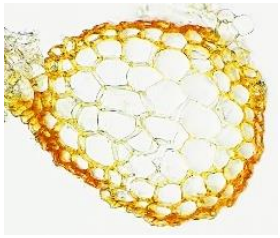
NM, Eddy Co., Carlsbad Canyon Nat. Park, Big Seep, 1 Jan 2013, *Kleinman et al.* (SNM).

Leptodontium [a small slender tooth].

Leptodontium flexifolium (Withering) Hampe [with curved leaves] [*Bryum flexifolium* Dickson]. Acrocarpous, in yellowish to brownish mats or turf, the stems to 1 cm long, lacking a central strand; leaves to 1 mm long, keeled, with a distal border of 1-5 rows of less papillose thick-walled cells, the margins recurved at least at mid-leaf and below, coarsely toothed distally; costa subpercurrent; distal cells quadrate; specialized asexual reproduction by clusters of short-stalked gemmae; KOH reaction yellow to orange-yellow. ●On soil and rocks, and sometimes old bark.



gemmae

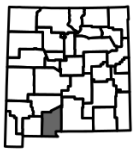


NM, Grant Co., Black Range, Railroad Canyon, 26 Jan 2012, *Kleinman & Blisard* (SNM).

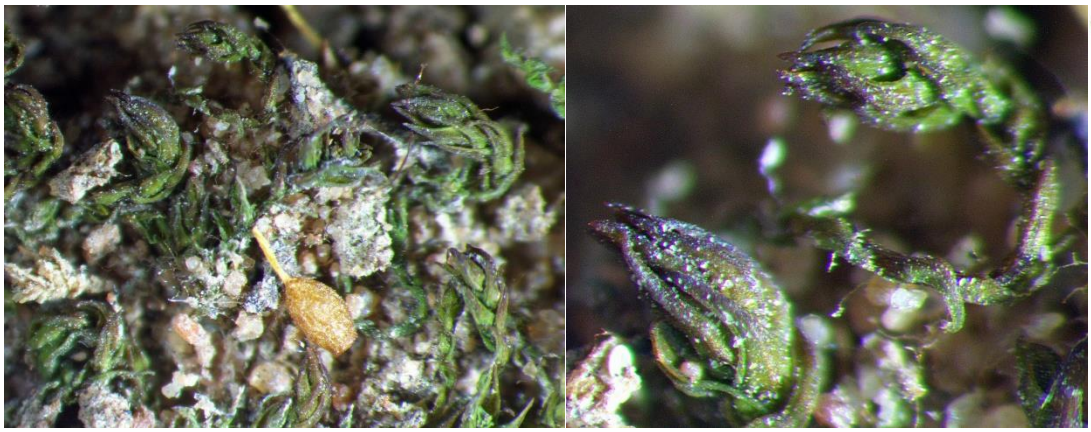
Microbryum [a small moss].

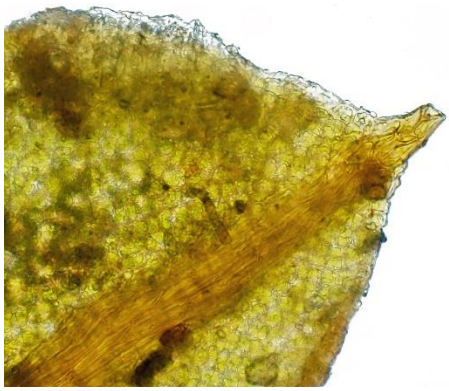
1 Leaves mostly less than 2:1, with a yellow apiculus; spores smooth or tuberculate (seldom also weakly papillose), 22-30 µm ..... ***M. starckeanum***

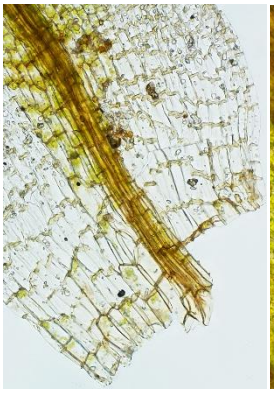
1 Leaves mostly more than 2:1, with a reddish apiculus; spores papillose or spiculose, 28-39 µm ..... ***M. davallianum***

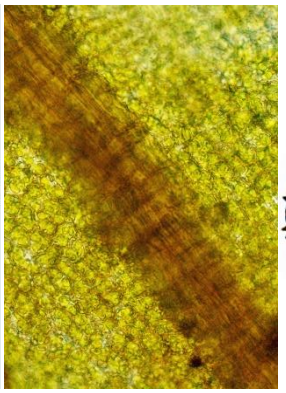


Microbryum davallianum (Smith) R.H. Zander [for Edmund Davall (1763-1798), Swiss-English botanist] [*Gymnostomum conicum* Schwägrichen, *Microbryum davallianum* (Smith) R.H. Zander var. *conicum* (Schwägrichen) R.H. Zander *Pottia texana* Wareham]. Acrocarpous, the stems tiny, less than 1 mm long, a central strand present or absent; leaves to 1.8 mm long, usually more than 2:1, ovate, the distal margins recurved, mostly entire, less papillose than the interior cells; costa excurrent as a reddish apiculus; proximal cells rectangular; distal cells quadrate to short-rectangular, 1-stratose, papillose; KOH reaction red; spores papillose or spiculose, 28-39 µm. ●On dry soil; known from a single collection.



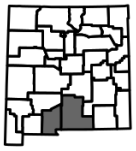




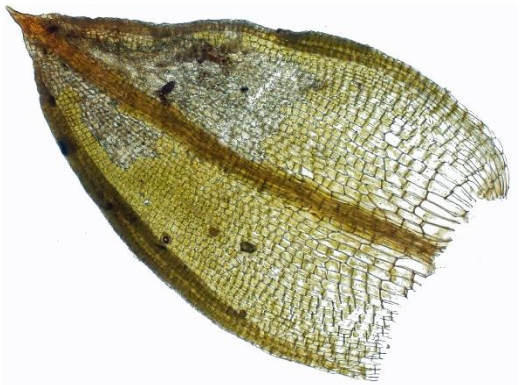


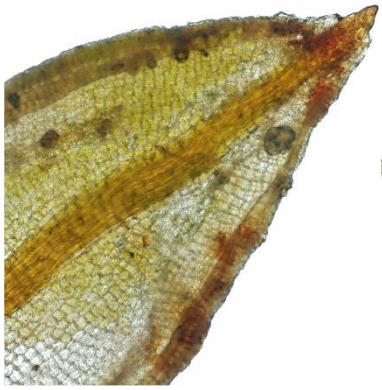
spores

UT, San Juan Co., Lake Canyon, 14 Jul 1958, *S. Flowers* (COLO).



Microbryum starckeanum (Hedwig) R.H. Zander [for Johann Christian Starcke/Starke (1744-1808), pastor and bryologist of Silesia] [*Microbryum starckeanum* (Hedwig) R.H. Zander var. *brachyodus* (Bruch & Schimper) R.H. Zander, *Microbryum starckeanum* (Hedwig) R.H. Zander var. *fosbergii* (Bartram) R.H. Zander, *Pottia arizonica* Wareham, *Pottia arizonica* Wareham var. *mucronulata* Wareham, *Pottia fosbergii* Bartram, *Weissia starckeana* Hedwig]. Acrocarpous, the stems tiny, less than 1 mm long, a central strand present or absent; leaves to 1.8 mm long, usually less than 2:1, ovate, the distal margins recurved, mostly entire, less papillose than the interior cells; costa excurrent as a yellowish apiculus; proximal cells rectangular; distal cells quadrate to short-rectangular, 1-stratose, papillose; KOH reaction red; spores smooth to tuberculate, 22-30 µm. ●On dry soil; known from only two collections.



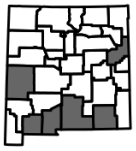


spores

peristome hardly developed

CA, Riverside Co., west of Desert Center Road, 28 Jan 1981, *D.H. Norris* (COLO).

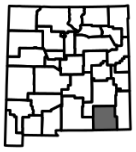
Molendoa [for Ludwig Molendo (1833-1902), German botanist].



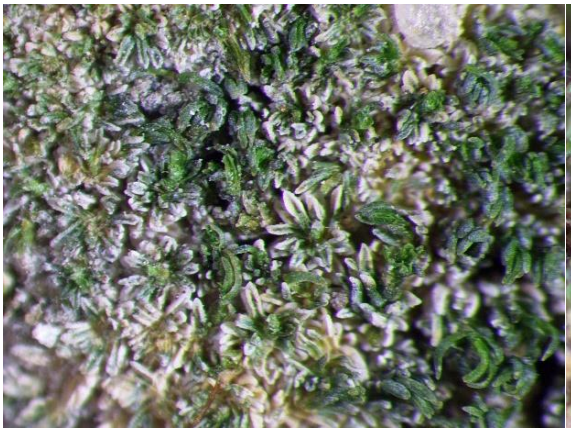
Molendoa sendtneriana (Bruch & Schimper) Limpricht [for Otto Sendtner (1813-1859), German botanist] [*Anoectangium obtusifolium* (Brotherus & Paris) Grout, *Anoectangium sendtnerianum* Bruch & Schimper]. Cladocarpous, in a dense bluish-yellowish turf, the stems to 3 cm long, with a strong central strand; leaves to 2 mm long, ovate to almost linear, usually twisted-contorted when dry, the margins plane at least distally; costa subpercurrent to short-excurrent as a stout mucro; guide cells 2-4; distal cells 1:1-2, sometimes 2-stratose at the margins, multi-papillose with broad papillae; perichaetia terminal on short lateral branches; KOH reaction yellow to yellow-orange. ●On soil and rock, under overhangs, cliff faces, boulders. ♦Distinctive by the bluish color, lateral perichaetia, contorted dry leaves, and multi-papillose distal laminal cells. Compare with *Ozobryum ogalalensis*.

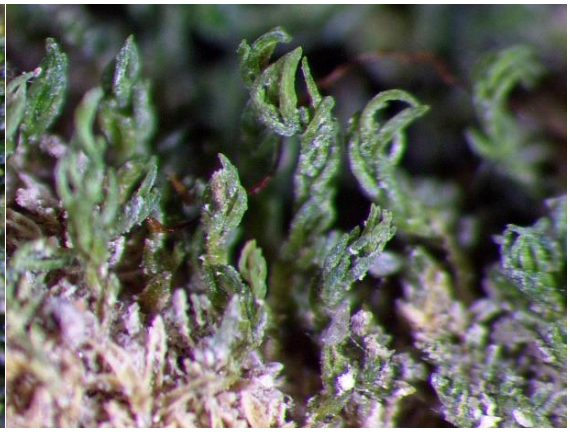
NM, Grant Co., Gila Cliff Dwellings Nat. Mon., Cliff Dweller Canyon, 1 Oct 2011, *Kleinman & Blisard* (SNM).

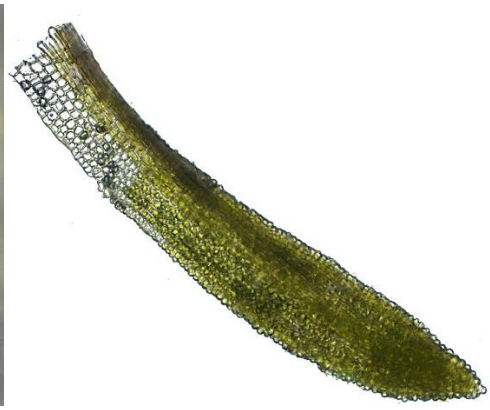
Ozobryum [a moss from the Land of Oz].

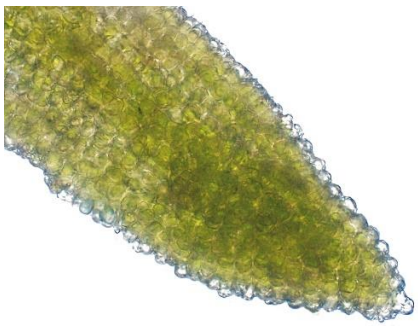


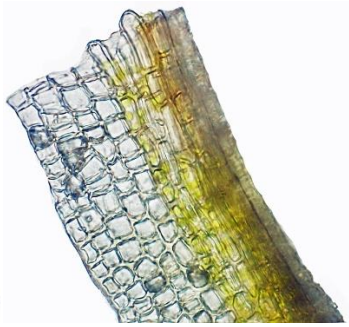
Ozobryum ogalalense G.L. Merrill [from the Ogallala Formation] [*Molendoa ogalalensis* (G.L. Merrill) R.H. Zander]. Cladocarpous, in green compact cushions, the stems to 2 cm long, without a central strand; leaves erect when dry, not contorted or curled, concave, to 0.6 (1) mm, 2-3-stratose at least distally, the apices rounded, the margins plane, entire; costa ending well below the apex; guide cells 2; proximal cells hyaline and subquadrate; distal cells bulging-mammillose on both surfaces with a single, broad, knob-like papilla centered over the lumen; perichaetia lateral; KOH reaction yellow to yellow-orange. ●Known from a single collection, on soil of a cutbank in juniper woodland. ♦Distinctive by the lateral perichaetia, non-contorted dry leaves, and bulging cells each with a single papilla. Compare with *Molendoa sendtneriana*.

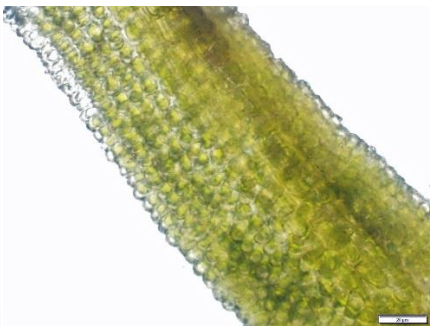


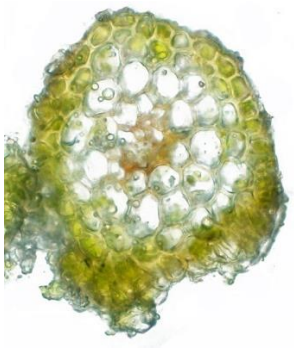






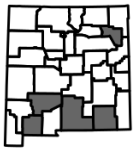






KS, Decatur Co., west of Dresden, 30 Apr 1991, *Merrill & Wranosky* (COLO).

Pleurochaete [a side mane].

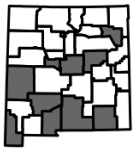


Pleurochaete luteola (Bescherelle) Thériot [yellowish] [*Pleurochaete squarrosa* of New World reports, *Trichostomum luteolum* Bescherelle]. Acrocarpous, forming deep loose turfs when abundant, sordid yellow-green, older portions orange-brown, the stems to 5 cm long, a weak central strand present; leaves to 4 mm long, strongly incurved-contorted when dry, squarrose-recurved when wet, 1-stratose, the margins undulate, incurved to plane, irregularly denticulate-serrulate distally or sometimes coarsely toothed, bordered in the proximal ¼-¾ with 4-10 longitudinal rows of elongate, hyaline, thin-walled cells; costa excurrent as a short awn or mucro; basal cells elongate, hyaline, smooth; distal cells subquadrate, densely 1-4-papillose; perichaetia lateral, at the apices of short branches, obscured by the stem leaves; KOH reaction pale lemon-yellow. ●Exposed soil over rock.

NM, Eddy Co., Carlsbad Canyon Nat. Park, Yucca Canyon, 19 Dec 2016, *Kleinman & Blisard* (SNM).

Pseudocrossidium [resembling *Crossidium*].

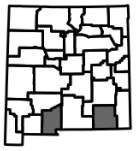
1 Leaves long-mucronate to long-awned.....***P. crinitum***
1 Leaves merely apiculate to short-mucronate
  2 Plants coarse; leaves comparatively long, 1-1.5 mm, ligulate to oblong-lanceolate, the apex obtuse; costa concave adaxially, with (4)6 guide cells.....***P. replicatum***
  2 Plants delicate; leaves short, 0.7-1.2 mm, ovate to ovate-deltoid, the apex broadly acute; costa convex adaxially, with 2-3 guide cells.....***P. obtusulum***



Pseudocrossidium crinitum (Schultz) R.H. Zander [long-haired] [*Barbula crinita* Schultz, *Pseudocrossidium aureum* (Bartram) R.H. Zander, *Tortula aurea* Bartram]. Acrocarpous, the stems to 1.5 cm long, with a central strand; leaves to 2 mm long including the awn, spirally contorted when dry, the distal margins recurved-revolute; costa excurrent, with 4 guide cells in cross-section; distal cells quadrate; KOH reaction yellow to orange. ●Sandy soil, rocks and ledges where sand or silt accumulates, in arid regions.

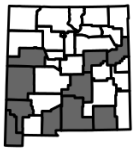
NM, Catron, San Francisco River, near hot springs, 27 Dec 2010, *Kleinman* (SNM).

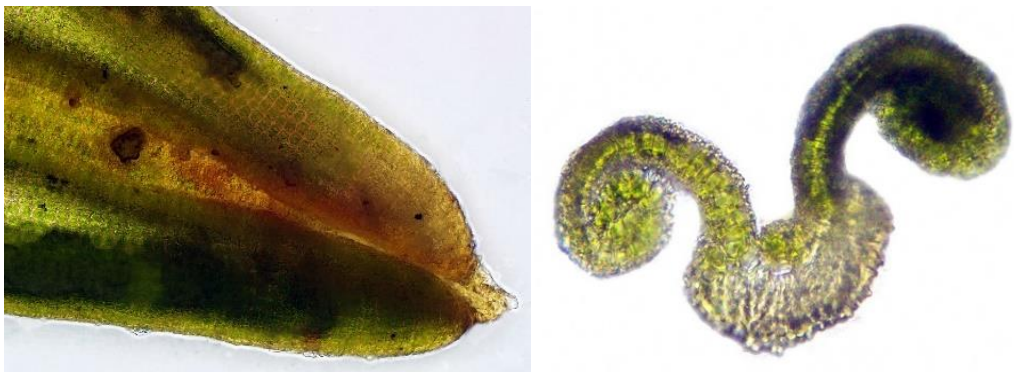
Pseudocrossidium obtusulum (Lindberg) Crum [somewhat obtuse] [*Barbula obtusula* Lindberg]. Acrocarpous, the stems to 2 cm long, with a central strand; leaves to 1.2 mm long, the distal margins 1-2-revolute; costa ending in a apiculus, with 2-3 guide cells in cross-section; distal cells quadrate; gemmae sometimes found on costa or as rhizoidal brood bodies; KOH reaction yellow to orange. ●On soil, calcareous outcrops and ledges, in the southern desert areas.



NM, Eddy Co., Carlsbad Canyon Nat. Mon., Slaughter Canyon, 9 Apr 2013, *Kleinman et al.* (SNM).

Pseudocrossidium replicatum (Taylor) R.H. Zander [doubly folded] [*Barbula replicata* Taylor, *Barbula spiralis* (Schimper) ex Müller Hal.]. Acrocarpous, the stems to 1.5 cm long, with a central strand; leaves to 2 mm long, the distal margins usually 2-revolute; costa ending in an apiculus or short mucro, with (4)6 guide cells in cross-section; distal cells quadrate; KOH reaction yellow to orange. ●On soil, boulders, ledges, in the desert and dry grassland regions.



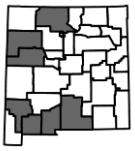


NM, Grant Co., Sycamore Canyon, 6 Mar 2021, *Kleinman & Blisard* (SNM).

Pterygoneurum [a winged nerve].

1 Capsule emergent to exserted; calyptra cucullate, often longer than the capsule .....***P. ovatum***

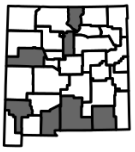
1 Capsule immersed to emergent; calyptra small, mitrulate, shorter than the capsule and splayed out on the sides ....***P. subsessile***



Pterygoneurum ovatum (Hedwig) Dixon [egg-shaped] [*Gymnostomum ovatum* Hedwig, *Pterygoneurum cavifolium* (Ehrhart) Juratz ka]. Acrocarpous, the plants bulbiform, forming a thin turf when abundant, greenish brown, the stems buried, with a central strand; blades 0.5-1.5 mm long, the hair-point 1.5-2 mm long, the margins plane to incurved; costa excurrent into a hyaline hair-point, with 3-4 lamellae 8-16 cells in height; distal cells quadrate to short-rectangular, smooth to rarely papillose; capsule emergent to exserted, ovoid, the calyptra cucullate; KOH reaction yellow. ●On desert soil.

NM, Cibola Co., El Malpais Nat. Mon., Calderon Area, 20 Apr 2017, *Kleinman et al.* (SNM).

Pterygoneurum subsessile (Bridel) Juratzka [nearly sessile] [*Gymnostomum subsessile* Bridel]. Acrocarpous, the plants bulbiform, forming a thin turf when abundant, greenish brown, the stems buried, with a central strand; blades 0.5-1.5 mm long, the hair-point 1.5-2 mm long, the margins plane to incurved; costa excurrent into a hyaline hair-point, with 3-4 lamellae 10-12 cells in height; distal cells quadrate to short-rectangular, smooth; capsule immersed to emergent, short-ovoid, the calyptra mitrate; KOH reaction yellow. ●On desert soils.



lamellae

NM, Cibola Co., El Malpais Nat. Mon., Calderon Area, 20 Apr 2017, *Kleinman et al.* (SNM).

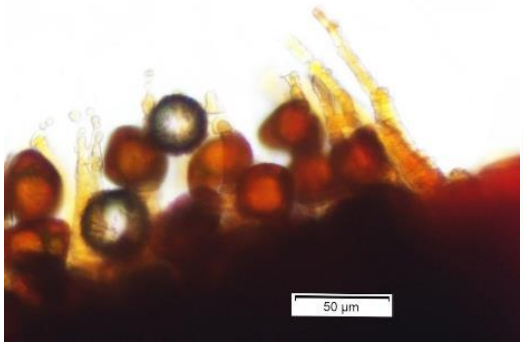
Rhexophyllum [a ruptured leaf].

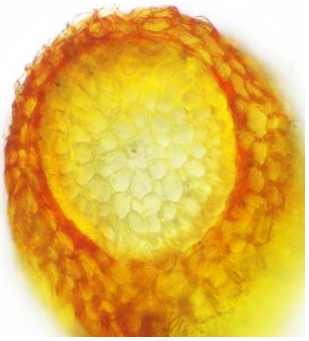
Rhexophyllum subnigrum (Mitten) Thériot ex Hilpert [nearly black] [*Neocardotia subnigra* (Mitten) Thériot & Bartram, *Tortula subnigra* Mitten]. Acrocarpous, in green to reddish or blackish wiry tufts, the stems prominent, to 4 cm long, often branching, with a central strand; leaves to 2.5 mm long, widely spreading-recurved when moist, keeled, 1-stratose or with 2-stratose patches, the margins recurved proximally, coarsely toothed, fragile; costa excurrent as a sharp mucro; basal cells elongate, often clear, smooth; distal cells subquadrate, papillose, or the apices tending to be smooth; capsules unknown in our plants; KOH reaction red. ●Shaded rock faces and crevices.

NM, Grant Co., Little Cherry Creek Ranch Road, 21 Nov 2021, *Kleinman & Blisard* (SNM).

Stegonia [a cover].

Stegonia latifolia (Schwägrichen) Venturi ex Brotherus [broad-leaved] [*Weissia latifolia* Schwägrichen]. Acrocarpous, the plants bulbiform, whitish to light greenish, the stems to 3 mm long, a central strand present (sometimes weak); leaves appressed, broadly ovate to nearly circular, to 2 mm long, the margins recurved distally, commonly serrulate near the apex; costa excurrent; distal cells 2-3:1, usually hyaline, thick-walled, smooth; seta to 1 cm long, sometimes very short; capsule 1-2 mm long, the calyptra cucullate; KOH reaction yellow. ●On soil, rocks, and bases of trees; known from a single site above tree line.





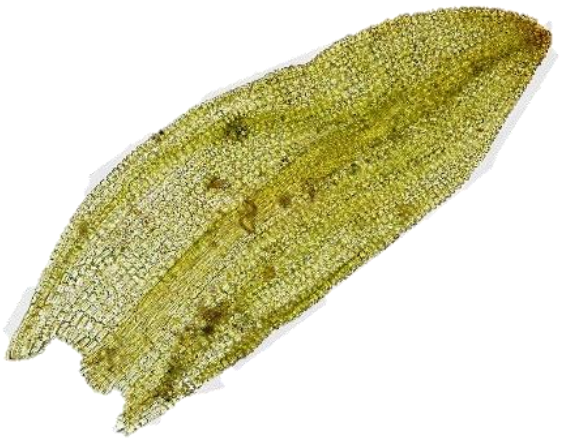
stem x-section

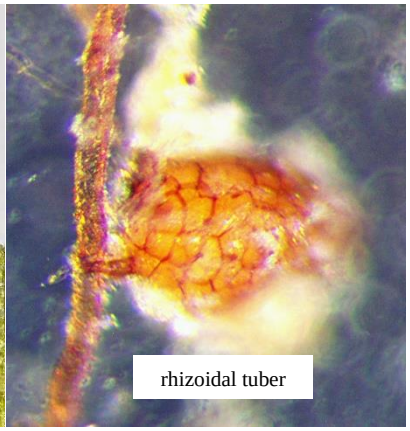
NM, San Miguel Co., summit Elk Mt, 5 Aug 2015, *Kleinman et al.* (SNM).

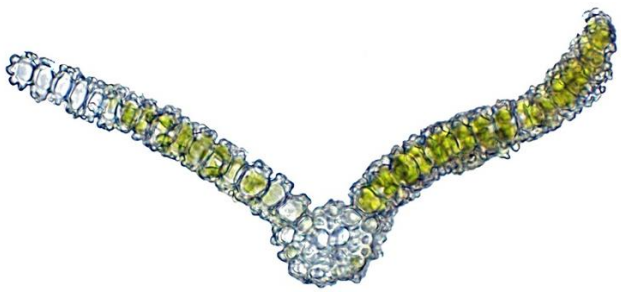
Streblotrichum [a twisted hair] [Keyed in **Barbula group**].

Streblotrichum convolutum (Hedwig) P. Beauvois [rolled together] [*Barbula convoluta* Hedwig]. Acrocarpous, in green to bright yellow-green turfs, the stems to 1.5 cm long, with a central strand; leaves long-ligulate, to 1.8 mm long, the margins plane or weakly recurved proximally, the apices obtuse to rounded, sometime apiculate; costa ending before the apex; distal cells quadrate, papillose; specialized asexual reproduction by large red-brown rhizoidal tubers buried in the soil, 100-250 μm; seta yellow.

●On rock and thin soil, sand, cement. ♦Formerly treated in *Barbula*. Distinctive by the percurrent or subpercurrent costa.







NM, Grant Co., Pinos Altos Range, 4 Sep 2010, *Kleinman & Blisard* (SNM).

Syntrichia [joined hairs]. Note: Species in italics but not bolded are not yet known from New Mexico, but are included here for comparison.

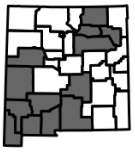
1 Costa percurrent or short-excurrent into a mucro or apiculus
- 2 Lamina 2-stratose ..... ***S. chisosa***
- 2 Lamina 1-stratose
  - 3 Leaves breaking apart into sheets of cells, the margins revolute to plane; propagula absent ..... ***S. fragilis***
  - 3 Leaves not breaking apart into sheets of cells, the margins plane; clusters of small, costate, leaf-like propagula absent or present
    - 4 Leaf-like propagula borne on stalks in the axils of distal leaves or at the tips of the stems; leaf margins plane ..... ***S. ammonsiana***
    - 4 Leaf-like propagula absent; leaf margins revolute (awnless form) ..... ***S. ruralis***

1 Costa excurrent as an awn or hair point
- 5 Laminal cells collenchymatous, with a single papilla on the abaxial surface ..... ***S. papillosa***
- 5 Laminal cells with evenly thickened walls, not collenchymatous, with multiple papillae on both surfaces
  - 6 Leaf margins plane or slightly recurved at mid-leaf
    - 7 Costa smooth abaxially; awn entire or with a few short teeth; on bark..... ***S. pagorum***
    - 7 Costa strongly papillose abaxially; awn serrulate; on soil and rock..... ***S. bartramii***
  - 6 Leaf margins strongly revolute at mid-leaf
    - 8 Leaves 2-stratose or thicker ..... ***S. caninervis***
    - 8 Leaves 1-stratose
      - 9 Costa lacking hydroids but having a row of large-lumined cells abaxial to guide cells; stem lacking a central strand; leaves tapered to the apex from their widest point about one-third the way up from the base, without a constriction near mid-leaf
        - 10 Distal cells with tall, bulging mammillae, as high as the thickness of the lamina, sometimes higher, also bearing 1-2 papillae ..... ***S. papillosissima***
        - 10 Distal cells with mammillae much lower than thickness of the lamina
          - 11 Hair points mostly red; distal cells 13-18 µm wide ..... ***S. norvegica***
          - 11 Hair points mostly white; distal cells 8-12 µm wide ..... ***S. ruralis***
      - 9 Costa with hydroids; stem with a central strand; leaves constricted near mid leaf
        - 12 Awns short, to 0.5 mm, smooth or with a few short teeth..... ***S. sinensis***
        - 12 Awns long, 0.5-3 mm, serrate
          - 13 Leaves 1-3 mm long, the margins revolute well above the middle; distal laminal cells 8-12 µm..... ***S. montana***
          - 13 Leaves 3-4 mm long, the margins revolute to about the middle; distal laminal cells 12-23 µm ..... ***S. obtusissima***

Syntrichia ammonsiana (H.A. Crum & L.E. Anderson) Ochyra [for Nellie Perrel Ammons (1889-1988), American bryologist] [*Tortula ammonsiana* H.A. Crum & L.E. Anderson]. Acrocarpous, the stems to 1 cm long; leaves infolded and twisted when dry, recurved when moist, broadly spatulate, to 2.5 mm long, the margins plane, mostly entire; costa percurrent; distal cells quadrate to hexagonal, 1-stratose, bulging, papillose specialized asexual reproduction by stalked, axillary, leaf-like propagula; KOH reaction brick-red. ●Sandy ground and boulders. ♦Distinctive by the axillary propagula and 1-stratose, non-awned blades. *Syntrichia chisosa* also produces axillary propagula but its leaves are mostly 2-stratose.

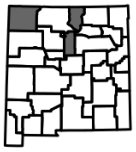
NM, Grant Co., Bear Canyon, Signal Peak Road, 14 Jul 2022, *Kleinman & Blisard* (SNM).

Syntrichia bartramii (Steere) R.H. Zander [for John Bartram (1699-1777), American botanist] [*Tortula bartramii* Steere]. Acrocarpous, the stems to 1 cm long; leaves infolded and spirally twisted around the stem when dry, spreading when moist, to 2 mm long, the margins plane, entire with papillose crenulations, the apices acute to truncate; costa spinulose abaxially, with hydroids, excurrent into a serrate awn; distal cells isodiametric, bulging, densely papillose, mostly 1-stratose; propagula absent; KOH reaction brick-red. ●On dry soil and rocks.

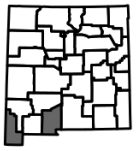


NM, Grant Co., Little Creek, 18 Dec 2010, *Kleinman & Blisard* (SNM).

Syntrichia caninervis Mitten [gray-nerved] [*Tortula bistratosa* Flowers, *Tortula caninervis* (Mitten) Brotherus]. Acrocarpous, in blackish or olive-green low turfs, the stems to 2 cm long; leaves infolded and imbricate (or weakly twisted) when dry, spreading when moist, to 2.5 mm long, 2-3-stratose, the margins revolute, entire; costa with hydroids, excurrent into a serrate, hyaline awn, grayish; distal cells non-bulging, polygonal to quadrate, multi-papillose; propagula absent. ●On dry soils of the northern cool deserts.

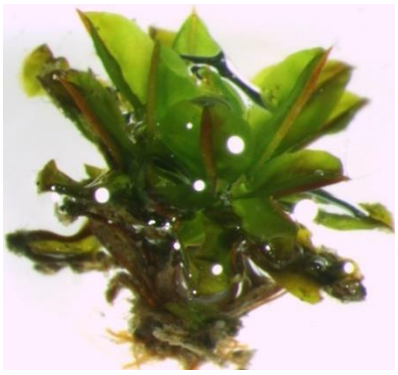


NM, San Juan Co., Bisti/De-Na-Zin Wilderness, 16 May 2018, *Kleinman & Blisard* (SNM).



Syntrichia chisosa (Magill, Delgadillo, & Stark) R.H. Zander [from the Chisos Mts] [*Tortula chisosa* Magill, Delgadillo, & Stark]. Acrocarpous, the stems to 6 mm long; leaves infolded and spirally twisted around the stem when dry, wide-spreading when moist, to 1 mm long, distally 2-stratose, the margins plane, entire; costa red, strongly serrate abaxially, with hydroids, excurrent into a short mucro; distal cells hexagonal to polygonal or isodiametric, densely papillose; specialized asexual reproduction by stalked, axillary leaf-like propagula; KOH reaction brick-red. ●On desert soils and thin soil over rocks; known from few collections. ♦*Syntrichia ammonsiana* also produces axillary propagula but its leaves are mostly 1-stratose.



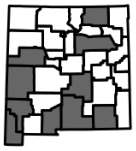







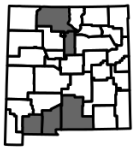
Photos : NM, Dona Ana Co., Organ Mts, Fillmore Canyon, 15 Apr 2019, *Kleinman & Brinda* (SNM).

Syntrichia fragilis (Taylor) Ochyra [fragile] [*Tortula fragilis* Taylor]. Acrocarpous, the stems to 2.5 cm long; leaves longitudinally folded and spirally twisted around the stem when dry, wide-spreading when moist, to 3.5 mm long, fragile, with sheets of cells breaking off, the margins revolute to plane, entire to crenulate; costa yellow or red, with hydroids, percurrent to slightly excurrent as a mucro a few cells long; distal cells quadrate, bulging, papillose; propagula absent; KOH reaction brick-red. ●On rocks and tree bark.

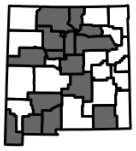


NM, Grant Co., Pinos Altos Range, Little Cherry Creek Road, 19 Aug 2010, *Kleinman et al.* (SNM).

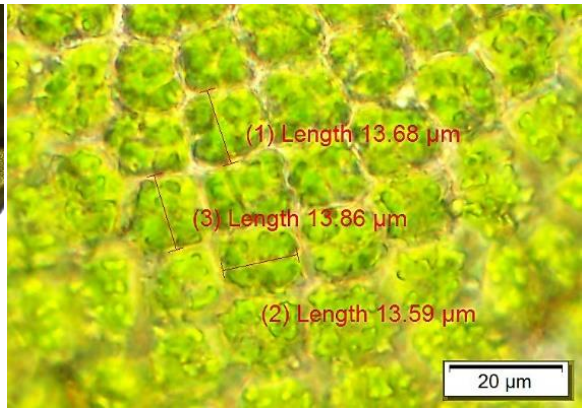
Syntrichia montana Nees [of mountains] [*Tortula intermedia* (Bridel) Berkeley, *Tortula montana* (Nees) Lindberg]. Acrocarpous, the stems to 1 cm long; leaves infolded and twisted around the stem when dry, ascending when moist, to 3 mm long, the margins revolute in the proximal half, entire, the apices rounded-emarginate; costa brown or red, often papillose abaxially and serrulate near the apex, with hydroids, excurrent into a short hyaline awn; distal cells polygonal or quadrate, papillose; propagula absent; KOH reaction brick-red. ●On soil and rock, occasionally on bark.

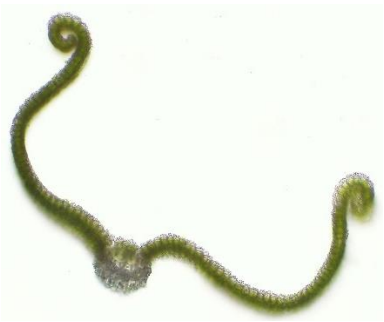


UT, Tooele Co., Stansbury Island, Aug 1928, *S. Flowers* (COLO).

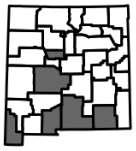


Syntrichia norvegica Weber & Mohr [from Norway] [*Tortula norvegica* (Weber & Mohr) Wahlenberg ex Lindberg]. Acrocarpous, the stems to 2.5 cm long; leaves infolded and twisted around the stem when dry, squarrose-recurved when moist, to 3.5 mm long, the margins revolute in the proximal ¾, the apices acute to acuminate; costa papillose abaxially, hydroids absent, excurrent into a serrulate awn usually reddish throughout (sometimes hyaline at the base), sometimes rarely awnless or nearly so; distal cells quadrate, polygonal, to rectangular, 13-18 µm wide, papillose; propagula absent. ●On soil and rocks, generally 7500-11850 ft (rarely lower in a few desert collections on lava).





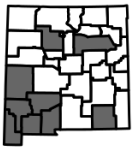
NM, Taos Co., top of Red River Ski Lift, 22 Jul 2014, *Kleinman et al.* (SNM).

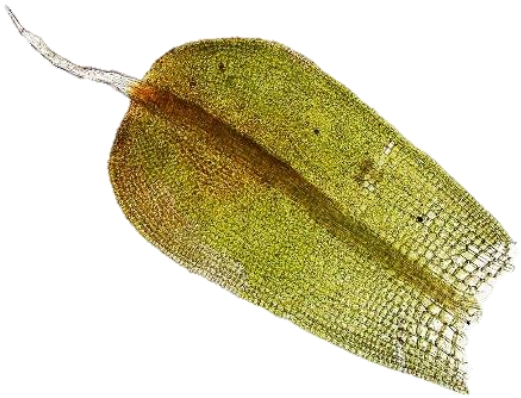


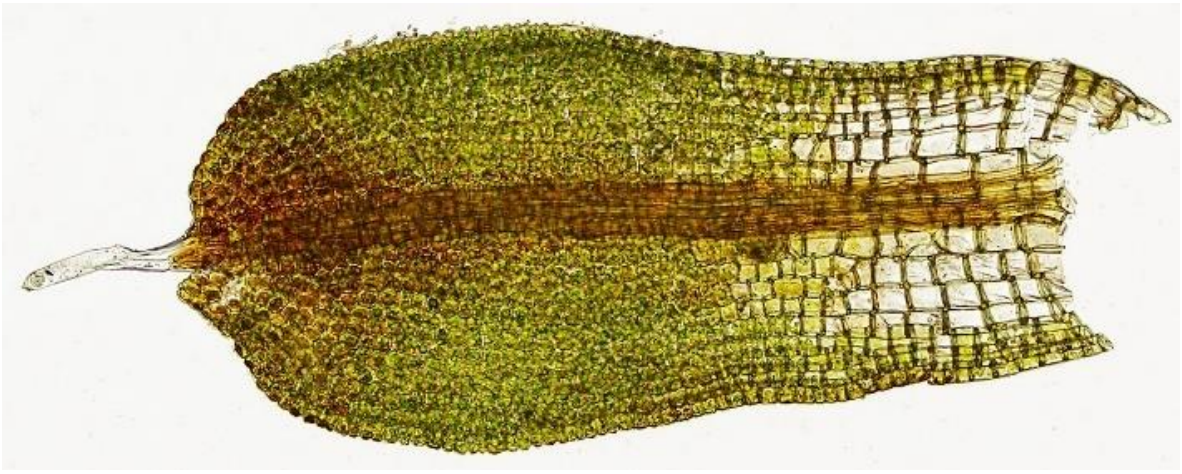
Syntrichia obtusissima (Müller Hal.) R.H. Zander [very blunt] [*Barbula obtusissima* Müller Hal., *Tortula obtusissima* (Müller Hal.) Mitten]. Acrocarpous, the stems to 2 cm long, with a central strand; leaves infolded and twisted around the stem when dry, widely spreading to squarrose when moist, to 4 mm long, the margins revolute in the proximal ¾ or more, entire, often somewhat undulate, the apices commonly emarginate to retuse; costa yellow to brown, with hydroids, excurrent into a toothed, hyaline awn usually longer than the blade; distal cells quadrate to polygonal, 15-23 µm wide, bulging, papillose; KOH reaction brick-red. ●On soil and rock, rarely tree bases.

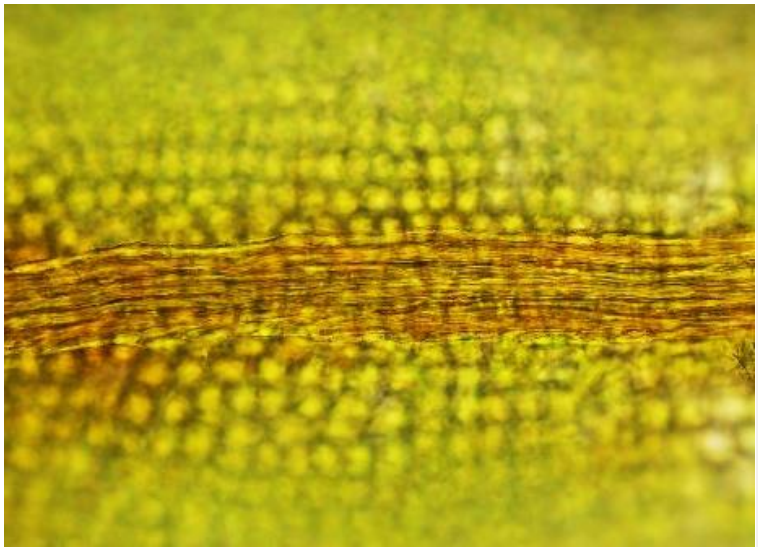
NM, Hidalgo Co., Big Hatchet Mts, 11 Apr 2019, *J. Brinda* (SNM).

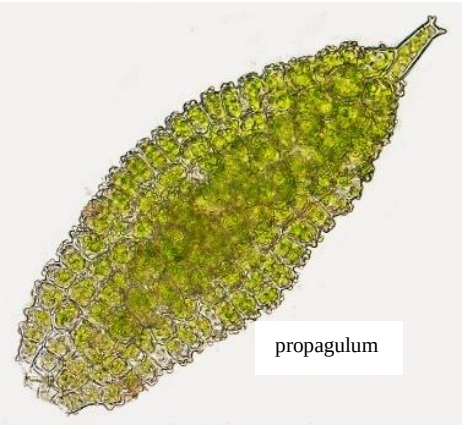
Syntrichia pagorum (Milde) J.J. Amann [of villages] [*Barbula pagorum* Milde, *Syntrichia laevipila* of NM reports, *Tortula pagorum* (Milde) De Notaris]. Acrocarpous, the stems to 5 mm long; leaves infolded and somewhat twisted around the stem when dry, ascending when moist, to 1.8 mm long, the margins plane to somewhat erect, crenulate; costa yellow or red, smooth abaxially, with hydroids, excurrent into a smooth yellowish or hyaline awn; distal cells quadrate to hexagonal, bulging, papillose; fusiform, papillose propagula in the leaf axils and at stem tips; KOH reaction brick-red. ●On tree bark, rarely on rock. ♦We use the *pagorum* epithet for all our plants formerly called *laevipila*, which is a European species also perhaps found in California.



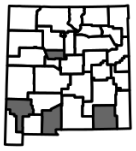








NM, Grant Co., Burro Mts, off Bill Evans Road, 3 Jan 2011, *Kleinman* & *Blisard* (SNM).

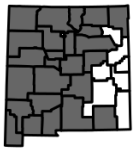


Syntrichia papillosa (Wilson) Juratzka [papillose] [*Tortula papillosa* Wilson]. Acrocarpous, the stems to 8 mm long; leaves incurved and only slightly twisted around the stem when dry, spreading when wet, to 3 mm long, the margins incurved when dry, plane to erect when moist, mostly entire, the apices acute; costa yellow or red, papillose abaxially, with hydroids, excurrent into a short, hyaline or yellowish awn; distal cells quadrate to hexagonal, 14-22 µm wide, with a single abaxial papilla, the cells collenchymatous and elongate near the apex; multicellular gemmae borne on the adaxial costa, spherical to ovoid, smooth; KOH reaction brick-red. ●On oak bark, commonly at the bases of trees. ♦See also *S. pagorum*, with fusiform, papillose propagula.

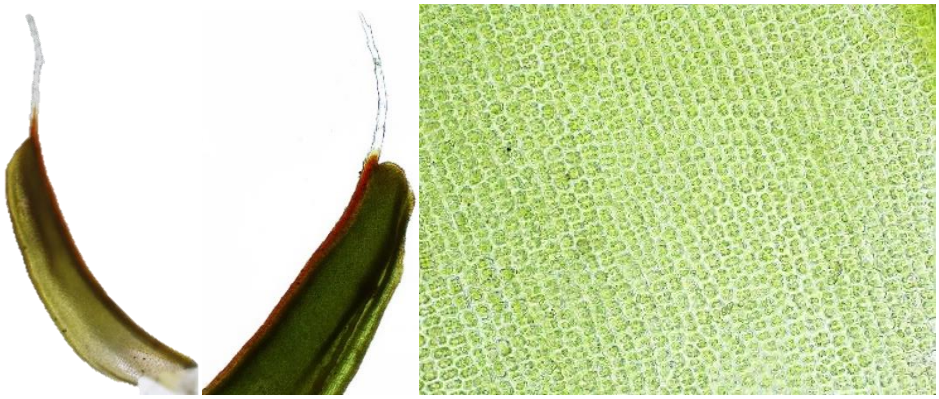
NM, Grant Co., Pinos Altos, 26 Nov 2016, *Kleinman & Blisard* (SNM).

Syntrichia papillosissima (Coppey) Loeske [very papillose] [*Barbula papillosissima* Coppey, *Tortula papillosissima* (Coppey) Brotherus, *Tortula ruralis* (Hedwig) Gaertner var. *hirsuta* (Venturi) Paris]. Acrocarpous, the stems to 2.5 cm long; leaves infolded and twisted around the stem when dry, squarrose-recurved when moist, to 4 mm long, the margins revolute in the proximal ¾ or more, entire; costa yellow-brown, strongly papillose abaxially from projecting cell ends, hydroids absent, excurrent into a serrate hyaline awn; distal cells quadrate to polygonal, 11-18 µm wide, with very tall mammillae themselves 1-2-papillose; propagula absent; KOH reaction brick-red. ●On soil and rock at upper elevations; presumably in the northwest region; reported for the state by Flowers [Flowers, S. (A. Holmgren, ed.). 1973. Mosses: Utah and the west. Brigham Young Univ. Press.] and Zander [Zander, R.H. 2007. *Syntrichia*, pp. 618-627. IN: Flora of North America, vol. 27. Oxford University Press.], but without locality, and specimens not yet located.

NV, Churchill/Lander Co. line, east of Fallon, 22 Jul 1966, *J.L. Smith* (COLO).



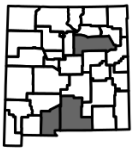
Syntrichia ruralis (Hedwig) Weber & Mohr [in the countryside] [*Barbula ruralis* Hedwig, *Tortula ruralis* (Hedwig) Gaertner, Meyer, & Scherbius, *Tortula ruralis* (Hedwig) Gaertner, Meyer, & Scherbius var. *crinita* DeNotaris]. Acrocarpous, the stems to 1.5 cm long, without a central strand; leaves infolded and twisted around the stem when dry, wide-spreading to squarrose-recurved when moist, to 3.5 mm long, the margins revolute almost to the apex, entire, the apices emarginate to acute; costa red-brown, papillose abaxially, lacking hydroids, excurrent into a serrate hyaline awn (sometimes reddish at the base), awnless to merely awn-tipped in some forms; distal cells quadrate to polygonal, 8-12 µm wide, papillose; propagula absent; KOH reaction brick-red. ●Widespread on soil and rock; one of our most common mosses.



nearly
awnless form

NM, Grant Co., Pinos Altos, 29 Dec 2011, *Kleinman & Blisard* (SNM).

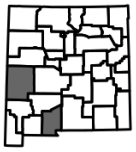
Syntrichia sinensis (Müller Hal.) Ochyra [from China] [*Barbula sinensis* Müller Hal.]. Acrocarpous, the stems to 1.5 cm long; leaves folded and spirally twisted around the stem when dry, wide-spreading when moist, to 4.5 mm long, the margins revolute in the proximal ½, entire, the apices acute; costa brown or reddish, smooth, with hydroids, excurrent into a smooth to slightly toothed hyaline awn; distal cells quadrate to polygonal, 12-20 µm wide, papillose; propagula absent; KOH reaction brick-red. ●On vertical limestone rock.



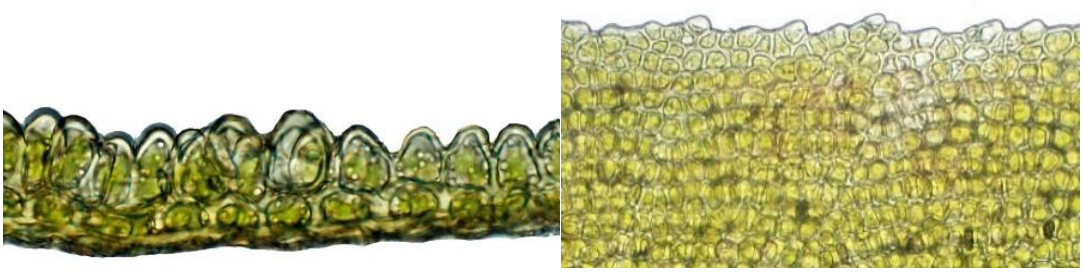
CO, El Paso Co., Williams Canyon, 25 Jun 2001, *T. Kelso* (COLO).

Timmiella [resembling *Timmia*].

Timmiella anomala (Bruch & Schimper) Limpricht [unusual] [*Barbula anomala* Bruch & Schimper].



Acrocarpous, in loose green cushions, the stems to 1.5 cm long, usually branched, the central strand very strong; leaves tubulose when dry, flat when moist, 2-stratose with staggered cells, 1-stratose in a few rows along the margins, the margins plane, denticulate or serrulate to serrate near the apex; costa percurrent, much broadened before mid-leaf and tapering to the apex; proximal cells differentiated straight across the leaf, clear, rectangular; distal cells quadrate, smooth, bulging; KOH reaction yellow. ●On soil, rock, cliff faces, rock crevices; known from only two collections.



CA, Butte Co., Lime Saddle Recr. Area, 25 Mar 2011, *Kleinman & Blisard* (SNM).

Tortella [somewhat twisting].

1 Stems almost absent, to about 5 mm long, with a distinct central strand; quadrate distal cells 6-8 μm wide, the medial cells ± gradually differentiated from the elongate proximal cells; leaves not undulate; plants autoicous, frequently with capsules ..... ***T. humilis***

1 Stems 10-60 mm long, without a central strand; quadrate distal cells larger, 7-12 μm wide, abruptly differentiated from the elongate proximal cells; leaves undulate or not; plants dioicous, seldom with capsules

2 Leaves about 1-2 mm long, the margins not undulate; laminal cells with thick adaxial and abaxial walls, and thin lateral walls, making the papillae appear pedestalled; adaxial costal cells smooth throughout ..... ***T. densa***

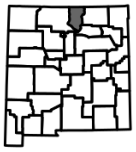
2 Leaves 2-7 mm long, the margins slightly to strongly undulate; laminal cells with equal cell wall thickness; adaxial costal cells papillose in the proximal half

3 Leaf tips not deciduous, all present (var. *tortuosa*) ..... ***T. tortuosa***

3 Leaf tips regularly deciduous and mostly absent, at least in the lower leaves

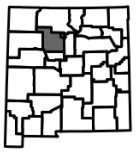
4 Marginal cells near the apex smooth and elongate ..... ***T. fragilis***

4 Marginal cells near the apex papillose and quadrate (var. *fragilifolia*) ..... ***T. tortuosa***



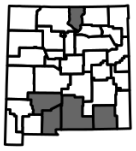
Tortella densa (Lorentz & Molendo) Crundwell & Nyholm [compact] [*Barbula inclinata* (R. Hedwig) Schwägrichen var. *densa* Lorentz & Molendo, *Tortella inclinata* (R. Hedwig) Limpricht var. *densa* (Lorentz & Molendo) Limpricht]. Acrocarpous, in dark clumps, the stems to 2 cm long, many-branched, reddish orange, without a central strand, the tomentum hidden in the leaf axils; leaves 1-2 mm long, not undulate, somewhat twisted on the stem when dry, the margins plane, nearly parallel and hardly tapering, the apices acuminate; costa short-excurrent by 1-3 cells, the cells of the adaxial surface smooth and 8:1 throughout; proximal cells transparent, elongate; distal cells quadrate, the papillae appearing pedestaled on thick adaxial and abaxial walls, 7-10 µm wide; orange in KOH. ●Rock crevices, ledges, slides; known from a single collection.

Ireland, East Mayo, Loch Carra, Keel Bridge, 9 Sep 1970, *E. Hegewald* (COLO).

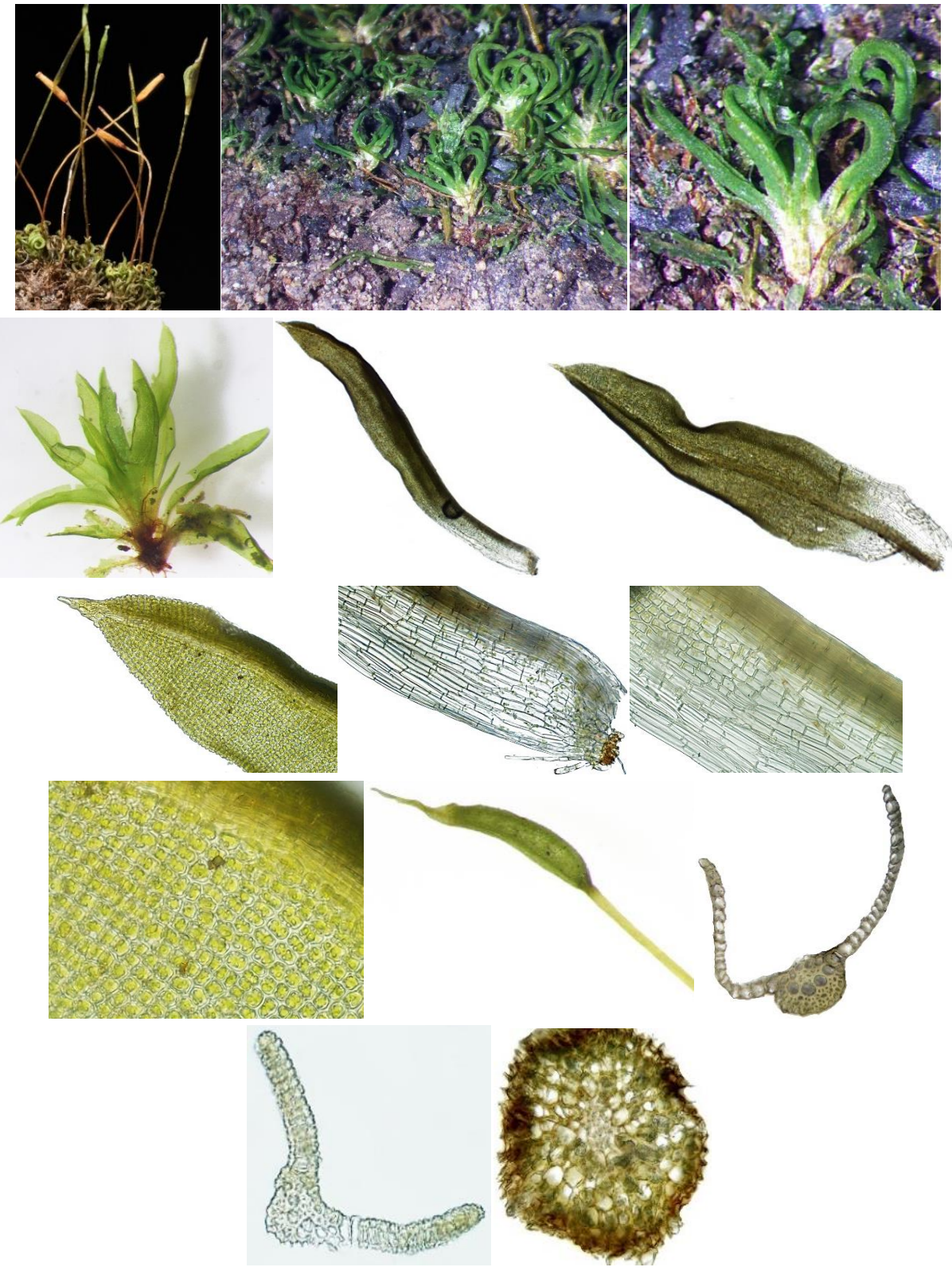


Tortella fragilis (Drummond) Limpricht [fragile] [*Didymodon fragilis* Drummond]. Acrocarpous, the stems 1-5 cm long, without a central strand, densely radiculose; leaves rigid, 4-6 mm long, not undulate, narrowing to a distal subulate region modified into a deciduous propagulum, the lowermost leaves mostly without leaf tips; costa short-excurrent as a mucro of 1-5 cells, the adaxial cells quadrate to short-rectangular and papillose, except for the propaguloid portion where the cells are elongate, 8:1, and smooth; elongate, smooth, proximal cells abruptly differentiated from the quadrate papillose distal cells; marginal cells near the apex smooth and elongate; capsules seldom present. ●Rock, cliffs, ledges; known from a single site. ♦Distinctive by the long, subulate, rigid leaves that are only slightly contorted when dry and bear the terminal deciduous propagula, and the smooth, elongate cells of the leaf margin near the apex.

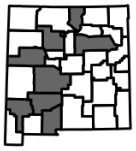
MI, Emmet Co., 7 Jul 1990, *W.R. Norris* (SNM).



Tortella humilis (Hedwig) Jennings [dwarfish] [*Barbula humilis* Hedwig]. Acrocarpous, the stems to 1 cm long, with a central strand; leaves 1.5-4 mm long, contorted or somewhat crisped when dry, not or only weakly undulate; costa short-excurrent, the adaxial cells typically quadrate to short-rectangular and papillose; proximal cells elongate, gradually transitioning to the quadrate distal cells; distal cells small, 6-8 µm; autoicous, commonly fruiting; seta to 1.7 cm long; capsule to 3 mm long, the peristome teeth longer than 1 mm, spirally wound 2-3 times. ●On moist exposed rocks and soil, often near streams. ♦Distinctive by the nearly acaulescent shoots with a central strand and leaves with small distal cells.



NM, Eddy Co., Guadalupe Mts, Big Canyon, 7 Jul 2010, *R. Worthington* (NMC).



Tortella tortuosa (Hedwig) Limpricht [twisted] [*Tortella tortuosa* (Schrader ex Hedwig) Limpricht var. *fragilifolia* (Juratzka) Limpricht, *Tortula tortuosa* Hedwig]. Acrocarpous, the stems 1-6 cm long, tomentose, lacking a central strand; leaves soft, strongly crisped or contorted with spirally curled tips when dry, usually strongly undulate, in some populations the leaves fragile and irregularly breaking, the margins crenulate-papillose; costa excurrent as a mucro or awn of 5-10 cells, the adaxial cells smooth and elongate 8:1 in the proximal half of the leaf, quadrate and papillose in the distal half; hyaline proximal cells abruptly differentiated from the distal cells; distal cells quadrate, 7-10(13) µm wide; capsule infrequent. ●On rocks, boulders, crevices, rotten wood. ♦Plants with deciduous leaf tips or irregularly fractured laminae can be referred to var. *fragilifolia* Juratzka; compare these forms with *Tortella fragilis*.

NM, Catron Co., Mogollon Mts, Little Dry Creek Trail, 30 Jan 2011, *R. Kleinman* (SNM).

Tortula [somewhat twisted]. Note: Species in italics but not bolded are not yet known from New Mexico, but are included here for comparison.

1 Capsules immersed within the leaves, lacking a dehiscent operculum and rupturing when mature (cleistocarpous); plants bud-like, the leaves not or weakly spreading ..... ***T. acaulon***

1 Capsules exserted, dehiscent by an operculum; plants not very bud-like, the leaves usually distinctly to widely spreading or even reflexed

2 Leaves strongly bordered by thicker walled cells, either just proximally or nearly throughout; cells smooth to strongly papillose

3 Costa long-excurrent into a hair-point; distal cells 10-15 µm wide, strongly 2-4-fid papillose ..... *T. muralis*

3 Costa short-excurrent to percurrent; distal cells 14-28 µm wide, weakly papillose

4 Leaves bordered at least in the lower 2/3 of the blade, sometimes throughout; costa scarcely excurrent as a short apiculus; capsule inclined to curved-horizontal ..... ***T. cernua***

4 Leaves bordered only at the base; costa excurrent as a short awn; capsule erect ..... ***T. mucronifolia***

2 Leaves not so bordered, or only slightly so; cells smooth to papillose

5 Leaves awnless, apiculate, or short-mucronate

6 Costa with an adaxial pad of swollen cells at the distal region ..... ***T. atrovirens***

6 Costa lacking an adaxial pad of swollen cells distally

7 Distal costa narrow, of 2-3 cells across the adaxial surface; spores 20-23 µm diameter ..... ***T. hoppeana***

7 Distal costa broader, of 3-6 cells across the adaxial surface; spores 11-18 µm diameter

8 Distal laminal cells 15-18 µm wide ..... ***T. inermis***

8 Distal laminal cells 10-13 µm wide ..... ***T. obtusifolia***

5 Leaves, at least the distal, manifestly awned

9 Leaf cells smooth or only weakly papillose

10 Leaf margins recurved at the base or somewhat higher; costa 3-5 cells across the adaxial surface; peristome well developed ..... ***T. mucronifolia***

10 Leaf margins plane; costa 2-3 cells across the adaxial surface distally; peristome absent ..... ***T. nevadensis***

9 Leaf cells manifestly papillose, at least adaxially

11 Operculum indehiscent, with the peristome attached to the inside; distal laminal cell 13-18 µm wide ..... ***T. protobryoides***

11 Operculum dehiscent; distal laminal cells of various width

12 Distal laminal cells 15-20 µm wide; spores 13-23 µm diam, papillose

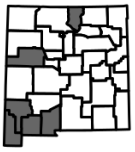
13 Leaves 2-3 mm long; costa excurrent as a weak whitish hair point; distal marginal cells and adjacent 2-3 rows not less papillose than the interior medial cells; spores 20-23 µm wide ..... ***T. hoppeana***

13 Leaves 1-1.5(2) mm long; costa excurrent as a stout greenish or yellowish awn; distal marginal cells and adjacent 2-3 rows usually less papillose than the interior medial cells; spores 13-18 µm wide ..... ***T. guepinii***

12 Distal laminal cells 8-13 µm wide; spores 6-12 µm diam, finely papillose to smooth

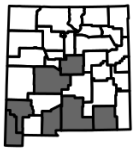
14 Urn about 2 mm long, the operculum 0.5-1 mm long; peristome 120-200 µm long, or sometimes dehiscent with the operculum, the teeth of 16 segments ..... ***T. plinthobia***

14 Urn 2-3.5 mm long, the operculum 1-1.5 mm long; peristome 800-1000 µm long, the teeth of 32 segments ..... ***T. brevipes***

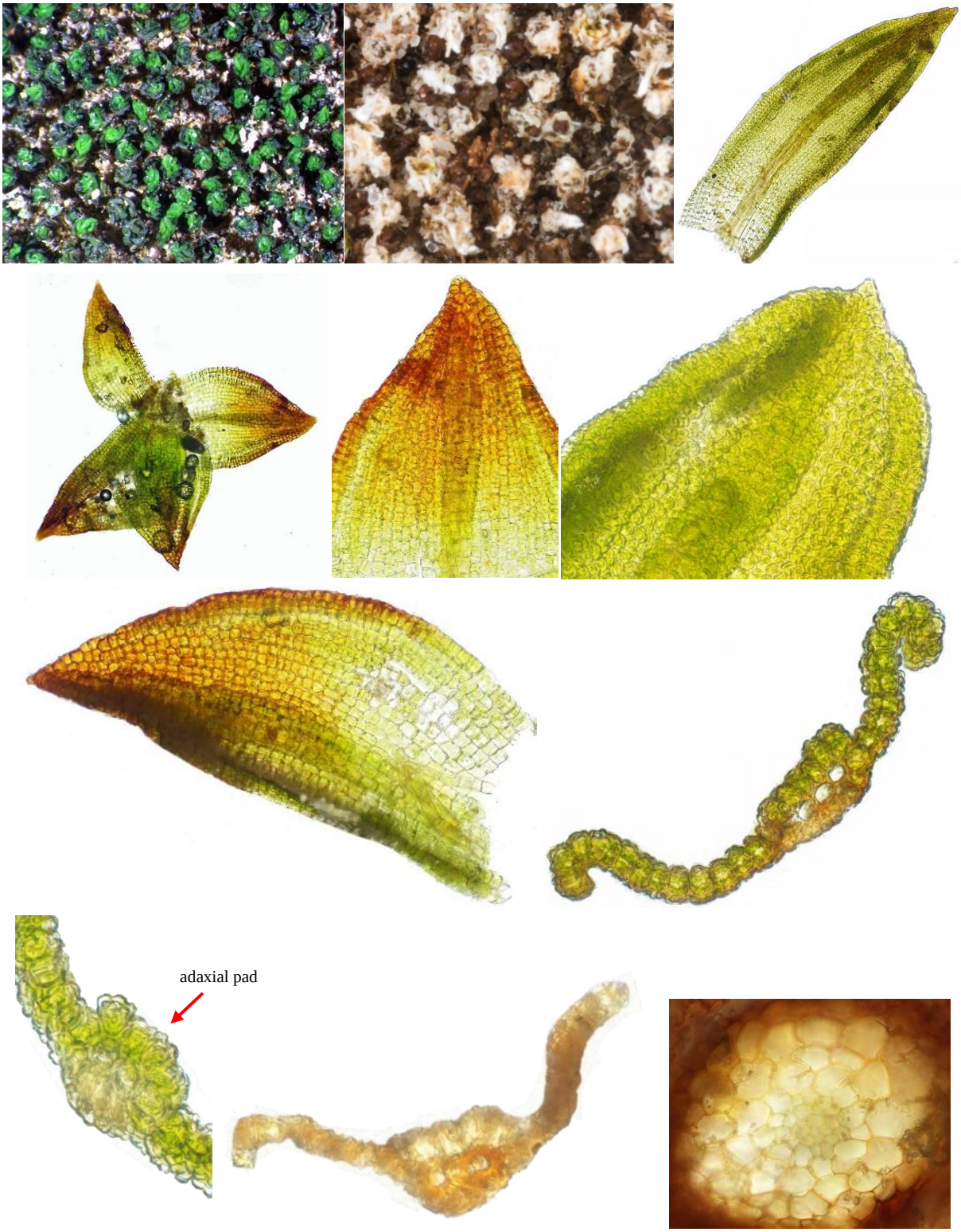


Tortula acaulon (Withering) R.H. Zander [stemless] [*Phascum cuspidatum* Hedwig, *Tortula acaulon* (Withering) R.H. Zander var. *pilifera* (Hedwig) R.H. Zander, *Tortula acaulon* (Withering) R.H. Zander var. *schreberiana* (Dickson) R.H. Zander]. Acrocarpous, in tiny yellow-green tufts, sometimes gregarious, the stems short, 1-2 mm long; leaves closely imbricated, infolded or twisted when dry, the margins recurved proximally to nearly plane; costa excurrent to a yellowish smooth mucro or awn; distal cells quadrate, weakly 1-papillose to smooth; seta much shorter than to twice the capsule length; capsules immersed to emergent, nearly globose, cleistocarpic, to 1.3 mm. ●On dry soil, often in open areas, among grasses or shrubs, around human habitations.

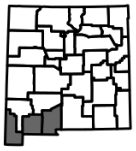
NM, Grant Co., Burro Mts, just past Deadman Canyon, 3 Apr 2017, *Kleinman & Blisard* (SNM).



Tortula atrovirens (J.E. Smith) Lindberg [dark green] [*Desmatodon convolutus* (Bridel) Grout, *Grimmia atrovirens* J.E. Smith]. Acrocarpous, the stems 2-8 mm long; leaves apiculate to mucronate, the apices broadly channeled, the margins revolute or occasionally plane, often bordered proximally with rectangular cells hidden in the revolute margin; costa percurrent to short-exserted, thickened distally near the apex (abaxial view), with a massive adaxial pad of swollen cells 4-8 cells wide; distal cells subquadrate, 9-18 µm wide, strongly papillose; capsules exserted. ●Exposed soil and rock. ♦*Gertrudiella nevadensis* (not *Tortula nevadensis*) has a similar adaxial costal pad, but in that species the leaf apex is narrowly channeled, the costa is thickened medially, and the distal cells are 8-10 µm wide.

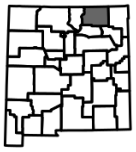


NM, Eddy Co., Yeso Hills, 8 Apr 2013, *Kleinman et al.* (SNM).



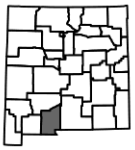
Tortula brevipes (Lesquereux) Brotherus [short-stalked] [*Barbula brevipes* Lesquereux]. Acrocarpous, the stems 1-2 mm long; leaves infolded and twisted around the stems when dry, to 2 mm long, the margins recurved, not bordered, entire; costa short- to long-excurrent into a smooth hair-point, lacking an adaxial pad of cells, about 3-4 cells wide; distal cells hexagonal, 8-13 µm wide, multi-papillose, the papillae tiny in cross-section, C-shaped in face view; capsules exserted. ●Calcareous soil; known from few collections. ♦Distinguished by leaves awned and revolute, cells papillose, and long urn, operculum, and peristome. See also *Tortula muralis* and *T. plinthobia*.

UT, Davis Co., near Great Salt Lake, 1 Jun 1930, *S. Flowers* (COLO).

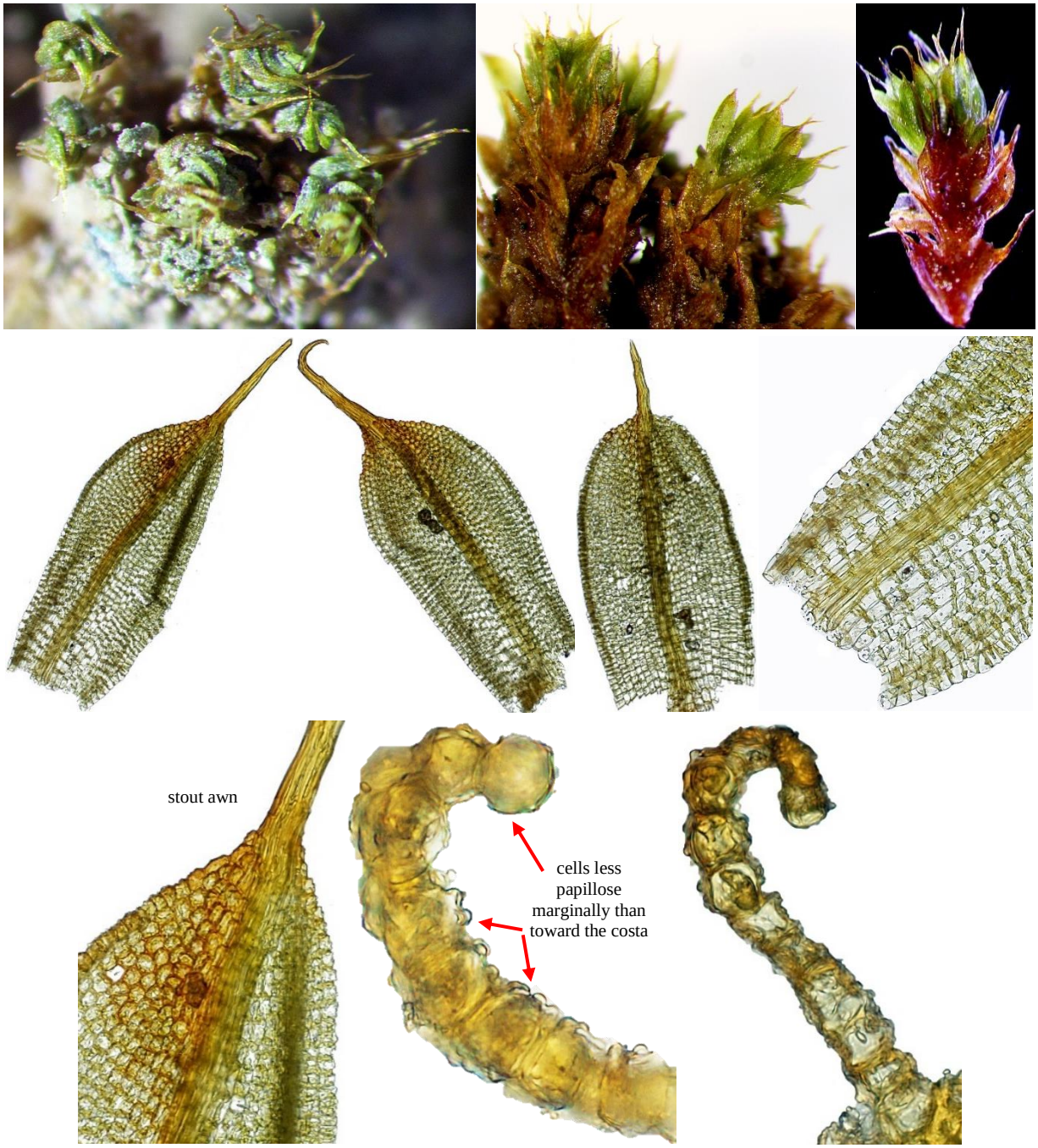


Tortula cernua (Hübener) Lindberg [nodding] [*Desmatodon cernuus* (Hüberner) Bruch & Schimper]. Acrocarpous, the stems to 5 mm; leaves to 3 mm long, somewhat contorted when dry, the margins recurved, bordered at least in the lower ⅔ with thicker-walled cells 1-2-stratose; costa percurrent to short-excurrent, lacking an adaxial pad of cells, 3-4 cells wide; distal cells 1-2:1, 14-28 µm wide, smooth to weakly papillose; capsules exserted, commonly inclined to horizontal or nodding. ●On calcareous soil; known from a single old collection.

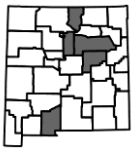
UT, Cache Co., upper Logan Canyon, 7 Jul 1928, *S. Flowers* (COLO).



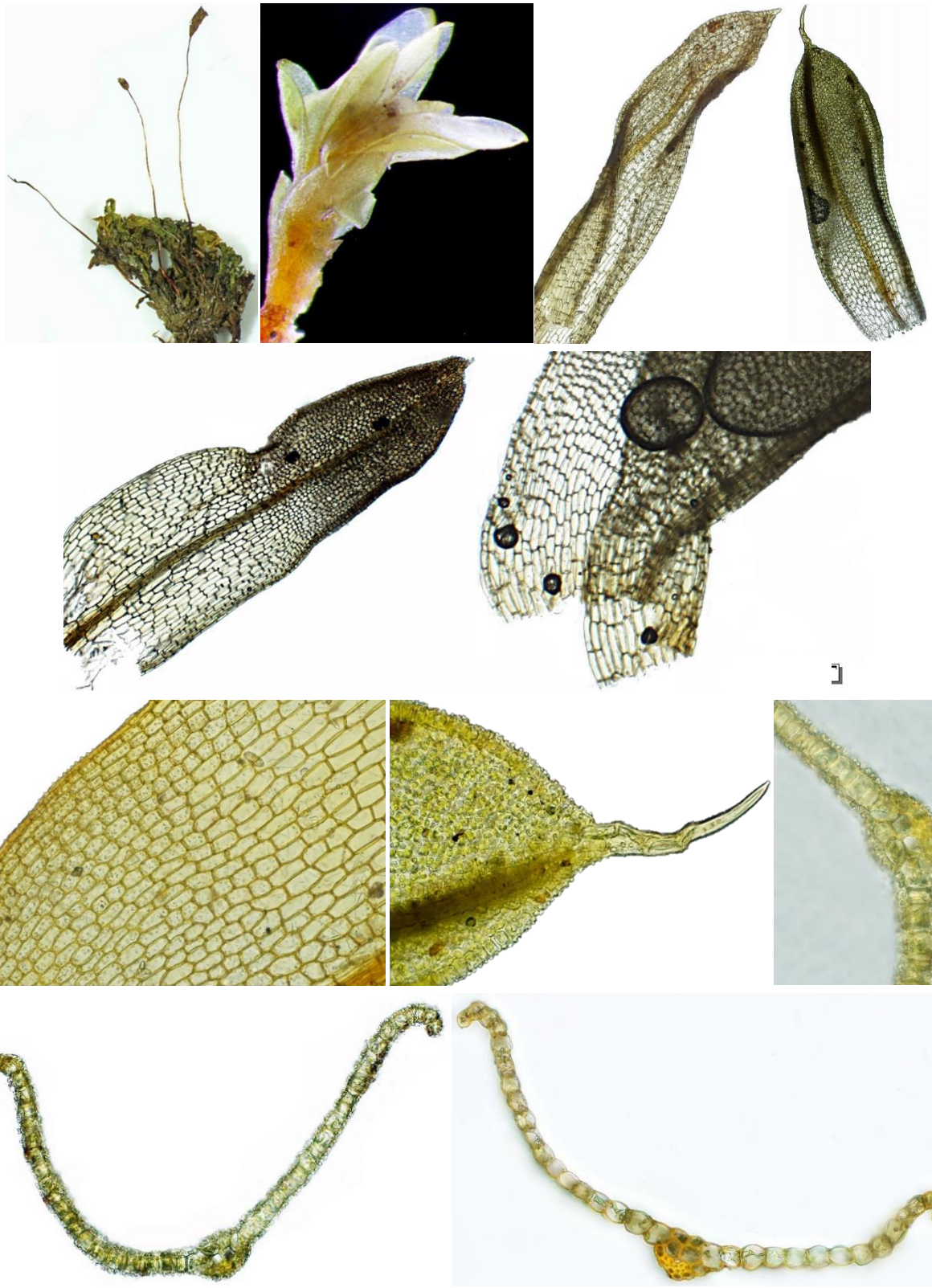
Tortula guepinii (Bruch & Schimper) Brotherus [for Jean Baptiste-Pierre Guépin (1779-1858), French physician-botanist] [*Desmatodon guepinii* Bruch & Schimper]. Acrocarpous, the stems to 2 mm; leaves erect-incurved when dry, weakly spreading when moist, to 2 mm long, the margins recurved, usually somewhat bordered distally with 2-3 rows of less-papillose cells; costa excurrent into a stout green to hyaline awn, supposedly without an adaxial pad of cells, but our plants have enlarged cells on the costa appearing pad-like; distal cells quadrate, 16-19 µm wide; capsules long-exserted, about 1.4 mm long. ●Dry soil at low elevations in semi-desert habitats; known from a single collection. ♦Helpful identification features include leaves about 1.5 mm long, stout apical awn, distal cells of the leaf margins and adjacent 2-3 rows less papillose than cells further interior toward the costa, and spores 13-18 µm.



NM, Dona Ana Co., Robledo Mts, 8 Feb 1981, *T.K. Todsen T8103* (MO).

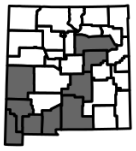


Tortula hoppeana (Schultz) Ochyra [for David Heinrich Hoppe (1760-1846), German physician-botanist] [*Desmatodon latifolius* (Hedwig) Bridel, *Desmatodon latifolius* (Hedwig) Bridel var. *muticus* (Bridel) Bridel, *Tortula euryphylla* R.H. Zander, *Tortula latifolia* (Hedwig) Lindberg, *Trichostomum hoppeanum* Schultz]. Acrocarpous, the stems to 2 mm; leaves to 3 mm long, the margins recurved in the middle ⅔ of the leaf to almost plane, crenulate by bifid papillae, not or weakly bordered with less papillose cells; costa subpercurrent to short-excurrent, lacking an adaxial pad of cells, 2-3 cells wide; distal cells hexagonal 1:1, 15-20 µm wide, densely papillose; capsules exserted. ●On soil, low to high elevations.



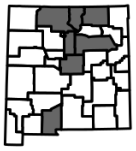
NM, Santa Fe Co., Tesuque Peak, 10 Aug 2001, *W.R. Buck* (NY 00524659); CO, Gilpin Co., outlet of Corona Lake, 20 Jul 1914, *A.J. Grout* (COLO).

Tortula inermis (Bridel) Montagne [awnless] [*Syntrichia inermis* (Bridel) Bruch, *Syntrichia subulata* (Hedwig) Weber & Mohr var. *inermis* Bridel]. Acrocarpous, the stems 5-10 mm; leaves folded and spirally twisted or sometimes slightly contorted, to 3.5 mm long, the margins recurved, not bordered, the apices obtuse; costa subpercurrent to very short-excurrent, yellow, lacking an adaxial pad of cells, 3-4 cells wide; distal cells hexagonal 1:1, 13-18 µm wide; capsules exserted; KOH reaction yellow or orange. ●On soil and rock; low to moderate elevations from deserts to mountains.



NM, Grant Co., Burro Mts, Blackhawk Canyon, 21 Feb 2021, *Kleinman & Blisard* (SNM).

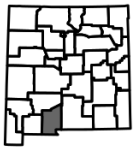
Tortula mucronifolia Schwägrichen [with pointed leaves]. Acrocarpous, the stems 2-5 mm long; leaves twisted-contorted when dry, to 4 mm long, the margins recurved proximally, bordered or not at base by 3-5 rows of thicker-walled cells 1-3:1; costa excurrent into a smooth apiculus to short hair-point, lacking an adaxial pad of cells, 3-5 cells wide; distal cells hexagonal 1:1, not or only very weakly papillose; capsules exserted on a seta 1-2 cm long. ●On soil, rocks, and cliffs.



IA, Clayton Co., Bixby State Park, 9 Jun 2015, *Kleinman* & *Blisard* (SNM).

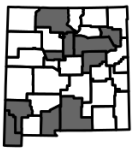
Tortula muralis Hedwig [of walls]. Acrocarpous, the stems to 1.5 mm long/tall, a central strand present; leaves infolded to incurved, often twisted apically when dry, 1.5-3 mm long, the margins commonly bordered distally with 2-4 rows of thicker-walled, less papillose cells; costa short- to long-excurrent, lacking an adaxial pad of cells, the awn smooth, 2-4(6) cells wide; distal cells hexagonal, 1:1, strongly 2-4-fid papillose; capsules exserted on a seta 6-15 mm long, the peristome tube lacking or very short. ●On calcareous rock, often bricks, cement, and mortar of stone walls, sometimes soil; not yet known from the state, but expected to be found.

Canada, British Columbia, Vancouver, Spanish Banks, 9 Apr 1961, *W.B. Schofield* (COLO).

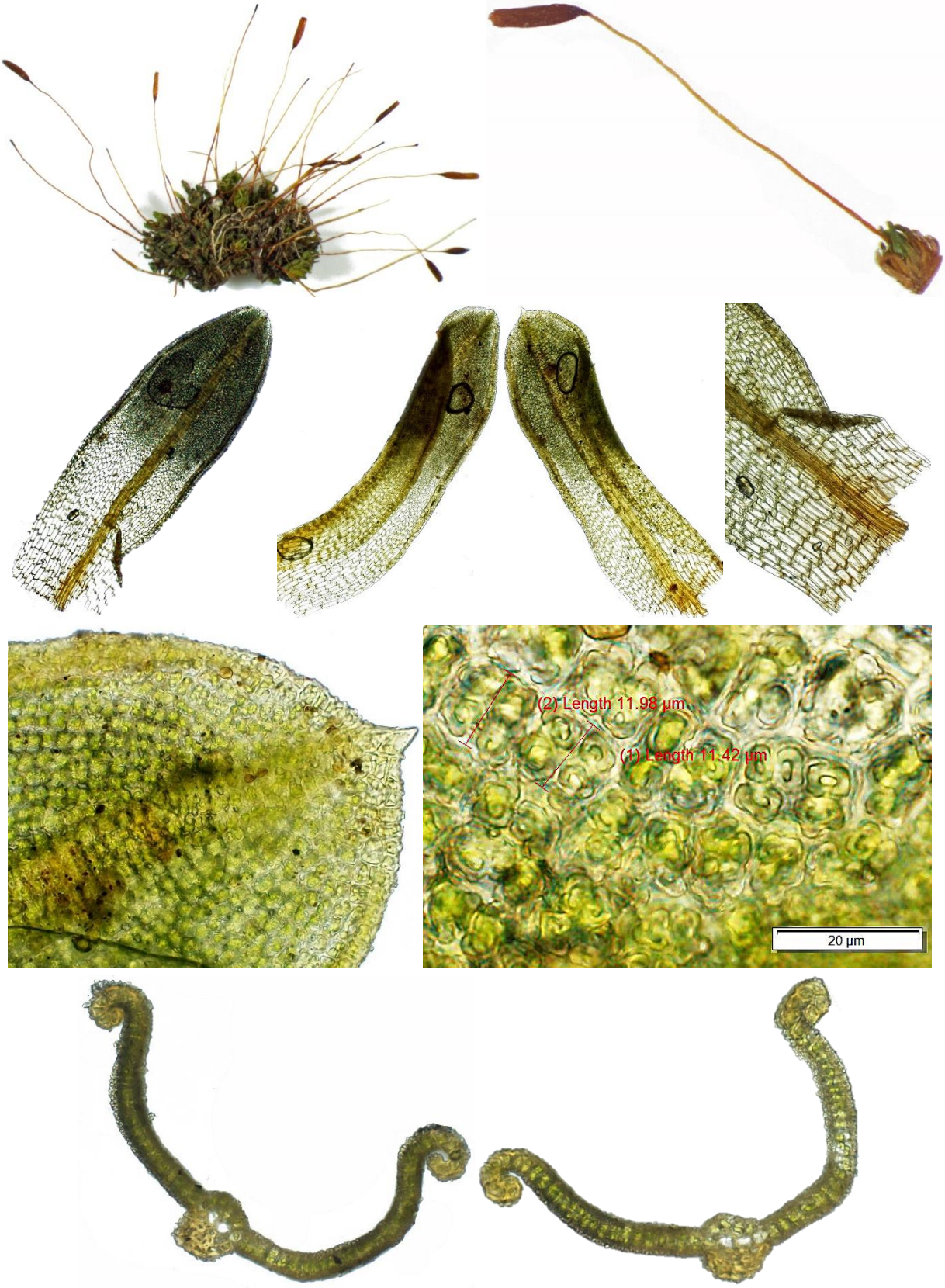


Tortula nevadensis (Cardot & Thériot) R.H. Zander [from Nevada] [*Pottia nevadensis* Cardot & Thériot]. Acrocarpous, the stems 1-3 mm long; leaves infolded and often twisted when dry, about 2 mm long, the margins mostly plane, not bordered, minutely toothed apically; costa long-excurrent into a hair-point, lacking an adaxial pad of cells, 2-3 cells wide distally; distal cells subquadrate, generally 1:1, smooth or with rare papillae; capsules exserted on a seta to 1.4 cm long. ●On soil; known from a single collection. ♦Distinguished by the nearly smooth cells, long operculum, and absent peristome.

UT, Boxelder Co., east side of Pilot Peak, 3 May 1937, *S. Flowers* (COLO).

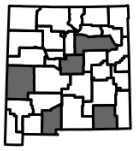


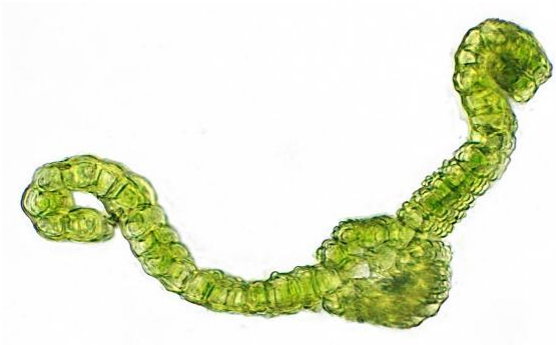
Tortula obtusifolia (Schwägrichen) Mathieu [blunt-leaved] [*Barbula obtusifolia* Schwägrichen, *Desmatodon obtusifolius* (Schwägrichen) Schimper]. Acrocarpous, the stems 1-10 mm long; leaves infolded and somewhat twisted or crisped when dry, the margins strongly recurved, sometimes bordered distally with about 4 rows of thicker-walled cells; costa short-excurrent into an apiculus or sometimes shorter, lacking an adaxial pad of swollen cells, 5-6 wide; distal cells 1:1, 10-13 m wide; capsules exserted on a seta to 8 mm long. ●On soil, rock, ledges, stone walls.



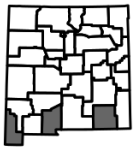
Photos : SD, Lawrence Co., Spearfish Canyon, 15 Jul 1951, *E. Whitehouse* (COLO).

Tortula plinthobia (Sullivant & Lesquereux) Austin [on brick] [*Desmatodon plinthobius* Sullivant & Lesquereux]. Acrocarpous, the stems 3-4 mm long; leaves 2-3 mm long, the margins recurved to revolute, not bordered; costa short- to long-excurrent into an awn, lacking an adaxial pad of swollen cells, about 4 cells wide; distal cells 1:1, 10-13 µm wide; capsules exserted on a seta to 1 cm long, the peristome to 200 µm. ●On rocks, outcrops, concrete, pavements.





NM, Grant Co., Gila Cliff Dwellings Nat. Mon., Cliff Dweller Canyon, 17 Mar 2011, *Kleinman* & *Blisard* (SNM).



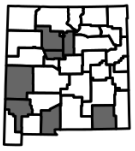
Tortula protobryoides R.H. Zander [the original *Phascum bryoides*] [*Phascum bryoides* Dicson, *Pottia bryoides* (Dickson) Mitten]. Acrocarpous, the stems about 2 mm long; leaves folded and curved or spiraled when dry, to 1.5 mm long, the margins revolute, weakly bordered; costa excurrent into a smooth awn, supposedly lacking an adaxial pad of swollen cells, but seemingly present in some plants, 3-4 cells wide; distal cells subquadrate 1-1.5:1, 13-18 µm wide; capsule exserted on a seta to 4 mm long, the peristome attached to the inside of the persistent operculum. ●On moist to dry desert soil. ♦Distinctive by the tiny leaves, smooth awn, hidden peristome, and persistent operculum.

NM, Dona Ana Co., Organ Mts, La Cueva Trail, 16 Apr 2019, *Kleinman & Brinda* (SNM).

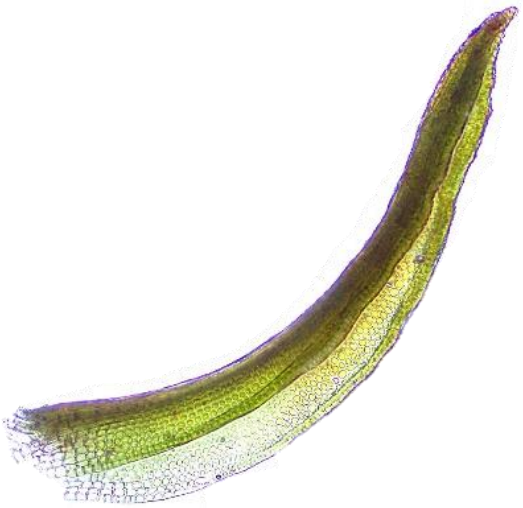
Trichostomopsis [resembling *Trichostomum*] [Also keyed in **Didymodon group**].

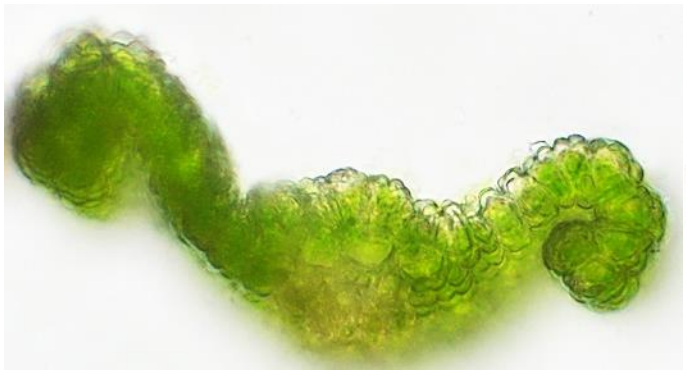
1 Leaves short-lanceolate, smooth to strongly papillose; costa brownish abaxially when dry; marginal basal cells not or weakly differentiated from the adjacent medial cells; basal juxtacostal cells not inflated; adaxial superficial cells of costa quadrate at mid-leaf ..... ***T. australasiae***

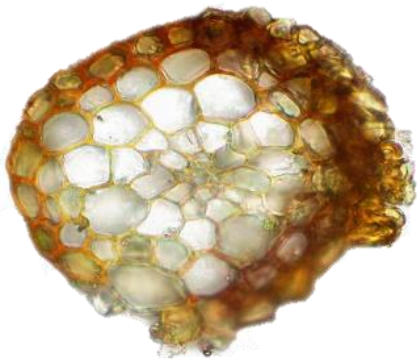
1 Leaves long-lanceolate, usually smooth or weakly papillose; costa whitish abaxially when dry; marginal basal cells narrowly rectangular, in 2-4 rows along the margin; basal juxtacostal cells inflated; adaxial superficial cells of costa usually elongate at mid-leaf ..... ***T. umbrosa***



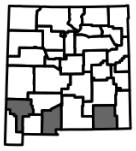
Trichostomopsis australasiae (Greville & Hooker) Robinson [of southern Asia] [*Didymodon australasiae* (Hooker & Greville) R.H. Zander, *Husnotiella torquescens* (Cardot) Bartram, *Tortula australasiae* Hooker & Greville]. Acrocarpous, in blackish-green mats, the stems about 1 cm long, with a central strand; leaves to 2.5 mm long, often spirally twisted or curled when dry, the margins recurved, entire, 2-stratose; costa percurrent or nearly so, broader at mid-leaf and sometimes weakly spurred, with hydroids, the adaxial cells quadrate at mid-leaf; distal cells quadrate, papillose. ●On soil, rock, ledges.



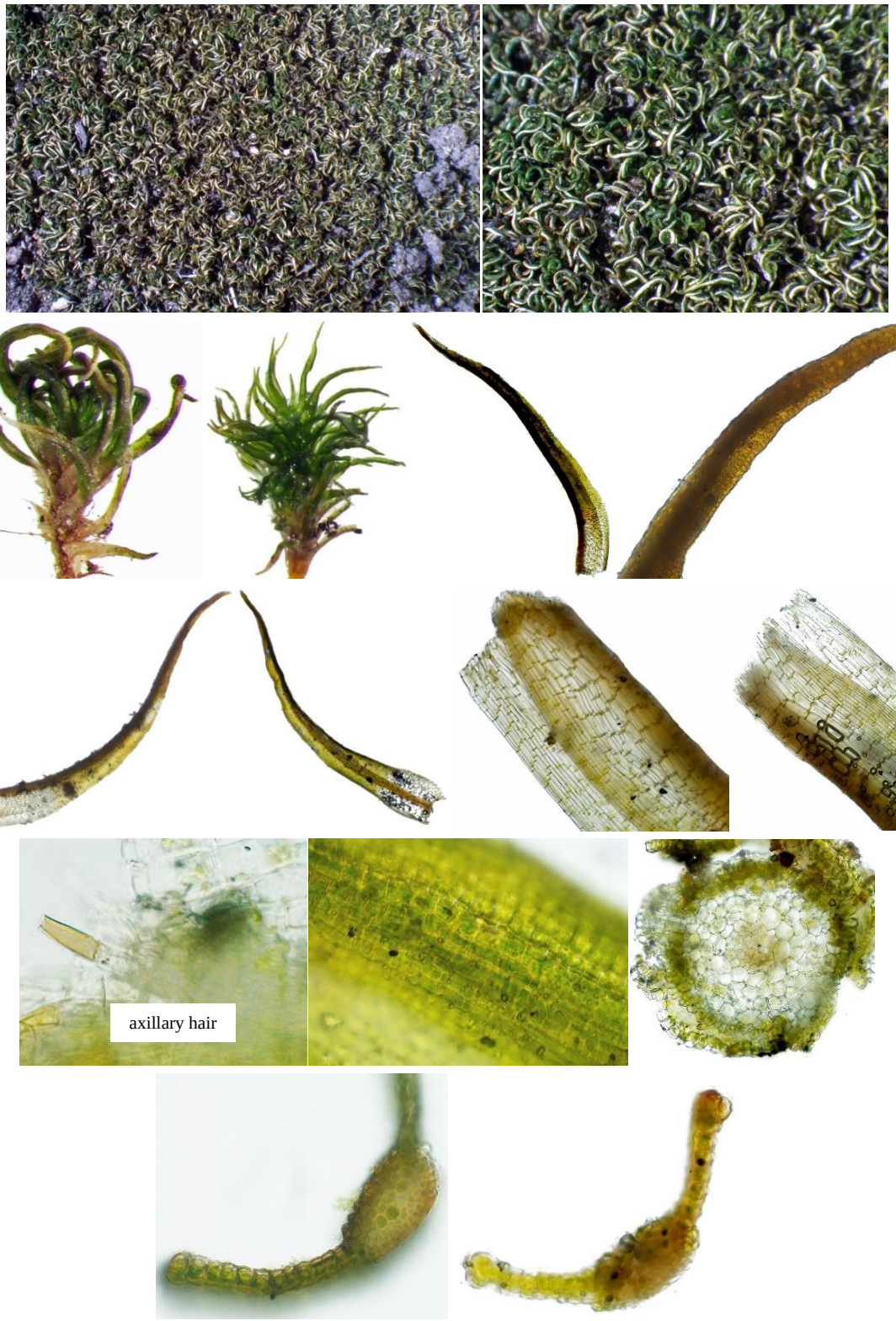




NM, Grant Co., Gila Cliff Dwellings Nat. Mon., 29 Oct 2012, *Kleinman & Blisard* (SNM).



Trichostomopsis umbrosa (Müller Hal.) H. Robinson [shady] [*Barbula umbrosa* Müller Hal., *Didymodon australasiae* (Hooker & Greville) R.H. Zander var. *umbrosus* (Müller Hal.) R.H. Zander, *Didymodon umbrosus* (Müller Hal.) R.H. Zander]. Acrocarpous, in green to grayish green mats, the stems about 1 cm long, with a central strand; leaves twisted or curled when dry, to 4 mm long, the margins usually plane, entire, 2-stratose; costa subpercurrent, broader at mid-leaf and sometimes weakly spurred, with hydroids, the adaxial cells rectangular at mid-leaf; proximal cells hyaline, inflated in several rows near the costa, contrasting with the narrower cells in several cells near the margin; distal cells 1-1.5:1, usually smooth; specialized asexual reproduction by rhizoidal tubers. ●On soil, rock, cliff faces, lava; known from few collections. ♦Distinctive by the whitish costa when dry, elongate basal marginal cells, and larger inner cells by the costa.



NM, Dona Ana Co., San Andres Mts, Ropes Spring, 11 May 2022, *Kleinman & Blisard* (SNM).

Trichostomum [a hairy mouth].

1 Leaves brittle, easily broken, lanceolate, the base dilated; apex acute; basal cells commonly running up the margins in a U-shaped pattern ..... go to ***Chionoloma tenuirostre***

1 Leaves soft, not brittle, ovate or elliptic to long-lanceolate; apex usually rounded or rounded-acute; basal cells evenly differentiated across the leaf base, generally not or weakly running up the margins in a U-shaped pattern

2 Leaves ovate to ovate-lanceolate or long-lanceolate, naviculate (prow-shaped), the apex pointed-cucullate; distal margins erect to somewhat involute; costa subpercurrent to percurrent, commonly ending in an cellular apiculus ... . ***T. crispulum***

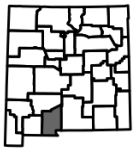
2 Leaves ovate to elliptical or very long-ligulate, flattened or keeled, the apex plane or grooved; distal margins plane; costa excurrent as a sharp costal mucro

3 Plants autoicous; mucro short-conic, of 3-4 cells ..... ***T. planifolium***

3 Plants dioicous; mucro short-conic to stout and narrowly tapering, of 3-6 or more cells..... ***T. brachydontium***

Trichostomum brachydontium Bruch [short-toothed]. Acrocarpous, the stems to 2.5 cm, a central strand present; leaves tubulose and coiled when dry, to 2.5 mm long, the margins plane, the apices keeled to cucullate; costa short-excurrent to a mucro of 3-6 or more cells; hyaline basal cells rectangular, evenly differentiated across the base, only weakly running up the margins if at all; distal cells subquadrate, papillose. ●On soil and rock; known from two collections.

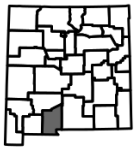
Mexico, Dist. Federal, near Contreras, 12 Nov 1944, *A.J. Sharp* (COLO).

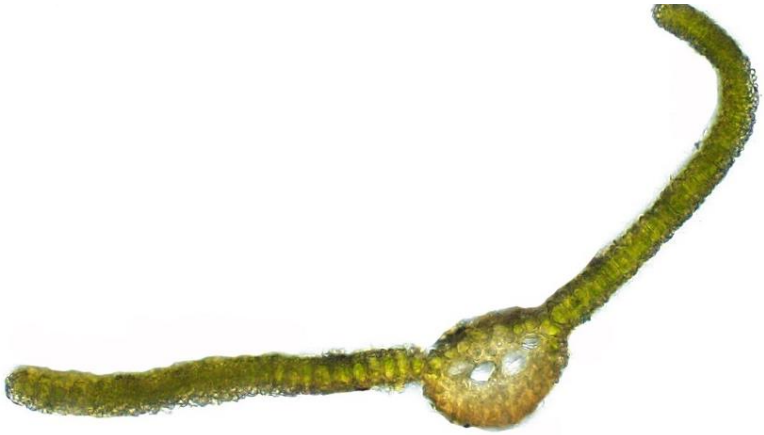


Trichostomum crispulum Bruch [somewhat curled]. Acrocarpous, the stems to 5 mm long, black or brown, a central strand present; leaves tubulose and curled when dry, deeply concave even when moist, the apices prow-shaped to cucullate, blunt to rounded, the margins erect or slightly incurved, entire; costa generally short-excurrent as a mucro of 3-6 cells; hyaline basal cells differentiated across the leaf base in a U shape, commonly running up the margins as a narrow band of non-papillose cells; distal cells subquadrate, papillose. ●On soil and rock; known from a single collection. ♦Perhaps more common in the southern deserts than currently known, but in the field plants might be taken for *Weissia controversa* because of the curling leaves when dry, but that species has distinctly involute leaf margins, easily seen even in face view when wet.

Greece, Olympia, on wall of ruins, 24 Jul 1971, *Weber & Richards* (COLO).

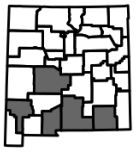
Trichostomum planifolium (Dixon) R.H. Zander [flat-leaved] [*Trichostomum sweetii* (Bartram) Stark, *Weissia planifolia* Dixon, *Weissia sweetii* Bartram]. Differing from *Trichostomum crispulum* in the features in the key. ●On soil and rock crevices; known from a single collection.



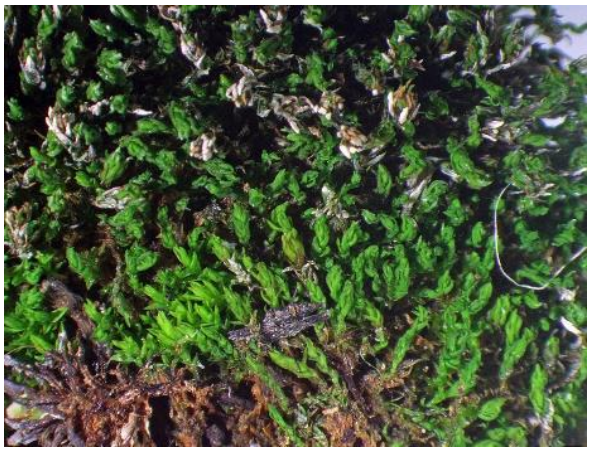


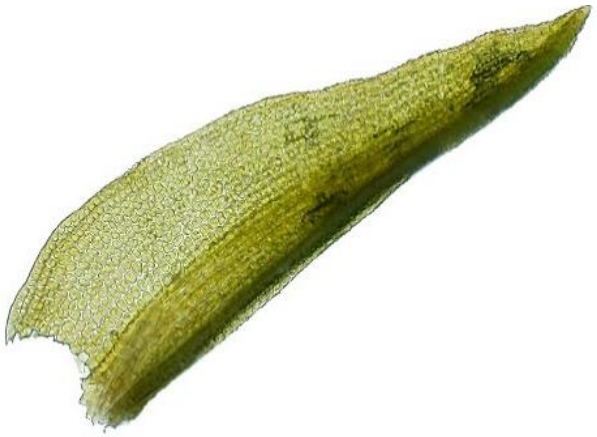
CO, Moffat Co., Green River at Rainbow Park, 5 Aug 1962, *S. Flowers* (COLO).

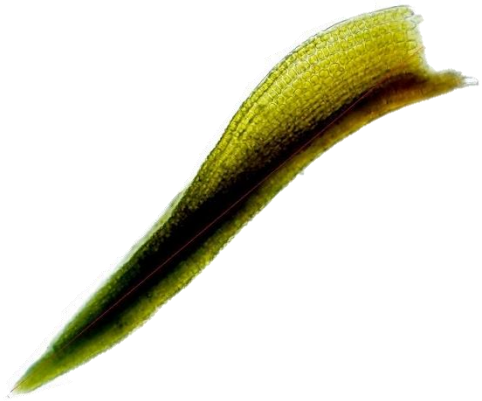
Vinealobryum [the *Vineale* mosses] [Also keyed in **Didymodon group**].
1 Leaves ovate, 0.8-1 mm long; margins recurved to very near leaf apex..... ***V. brachyphylla***
1 Leaves lanceolate, 1-4 mm long; margins recurved to about ⅔ leaf length ..... ***V. vineale***

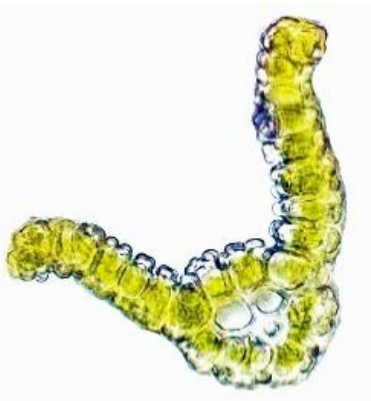


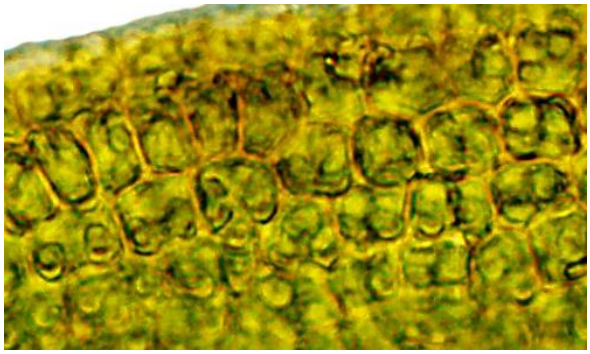
Vinealobryum brachyphyllum (Sullivant) R.H. Zander [short-leaved] [*Barbula brachyphylla* Sullivant, *Didymodon brachyphyllus* (Sullivant) R.H. Zander, *Didymodon luridus* of NM reports]. Acrocarpous, the plants greenish with a reddish cast, the stems to 1 cm long, a central strand present; leaves deltoid-ovate, 0.7-1 mm long, not keeled, often somewhat cucullate apically, the margins recurved to near the apex, entire; costa percurrent or shorter, lacking an adaxial pad of swollen cells, 4-6 cells wide, the adaxial cells quadrate to short-rectangular at mid-leaf; distal cells quadrate, nearly smooth to papillose, 1-stratose, sometimes 2-stratose in patches; specialized asexual reproduction sometimes by axillary gemmae; capsules exserted; KOH reaction yellow or red-brown. ●On soil, rock, roadsides, sandstone cliffs.

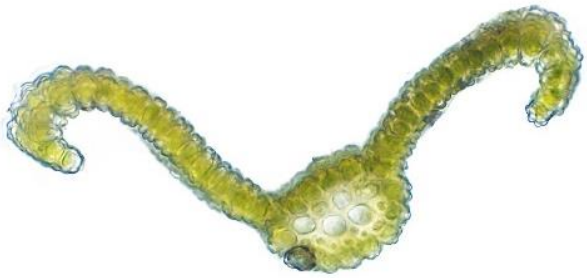




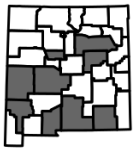








NM, Grant Co., Black Range, Railroad Canyon, 3 Apr 2022, *Kleinman et al.* (SNM).



Vinealobryum vineale (Bridel) R.H. Zander [of vineyards] [*Barbula vinealis* Bridel, *Didymodon vinealis* (Bridel) R.H. Zander]. Acrocarpous, the green, usually with a reddish cast, the stems to 2 cm long, a central strand present; leaves frequently twisted when dry, lanceolate, 1-4 mm long, the margins recurved to about ⅔ leaf length, entire; costa percurrent to short-excurrent, lacking an adaxial pad of swollen cells, 4 cells wide, the adaxial cells quadrate to short-rectangular at mid-leaf; distal cells quadrate, nearly smooth to papillose, 1-stratose or 2-stratose in patches; gemmae absent; capsules exserted; KOH reaction light to dark red-brown. ●On soil and rock outcrops and ledges.

NM, Catron Co., Mogollon Mts, Little Dry Creek Trail, 30 Jan 2011, *Kleinman & Blisard* (SNM).

Weissia [for Friedrich Wilhelm Weiss (1744-1826), German botanist].

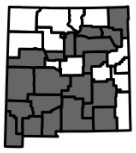
1 Hyaline basal portion of leaf scarcely wider than the slightly narrower green upper portion; setae 5-7 mm long..... ..... ***W. ligulifolia***

1 Hyaline basal portion of leaf much wider than the much narrower green upper portion; setae various, 1-8 mm long

2 Seta 1-2 mm long; operculum persistent; capsule cleistocarpous; leaf apices narrowly channeled..... ***W. phascopsis***

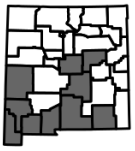
2 Seta 3-8 mm long; operculum deciduous; capsule stegocarpous; leaf apices broadly channeled ..... ***W. controversa***

Weissia controversa Hedwig [uncertain] [*Weissia condensa* of NM reports, *Weissia tortilis* of NM reports, *Weissia viridula* Hedwig]. Acrocarpous, the stems 2-5 mm long, branched; leaves crisped and curled when dry, becoming larger upward, to 2.5 mm long, the hyaline basal portion much wider than the green upper portion, the distal margins strongly inrolled; distal cells quadrate; capsules exserted, the setae 3-8 mm long. ●Weedy and disturbed areas, flower gardens, roadsides, on soil and rock.



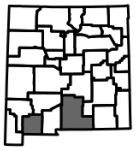
NM, Grant Co., Pinos Altos Peak, 12 Feb 2011, *Kleinman & Blisard* (SNM).

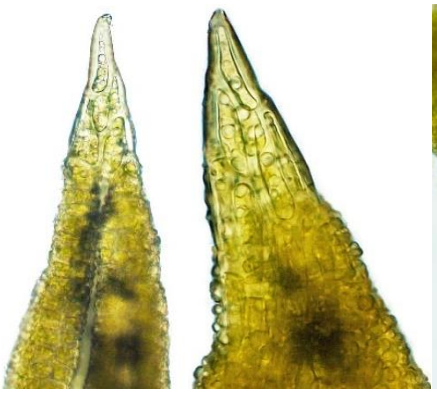
Weissia ligulifolia (Bartram) Grout [with strap-like leaves] [*Hymenostomum ligulifolium* Bartram, *Weissia andersoniana* R.H. Zander, *Weissia glauca* Bartram]. Acrocarpous, the stems to 4 mm long; leaves crisped and curled when dry, to about 2 mm long, the hyaline basal portion scarcely wider than the green upper portion, the distal margins strongly inrolled; distal cells quadrate; capsules exserted, the setae 5-7 mm long. ●On soil, rock crevices, shaded areas; common in the desert mountains.

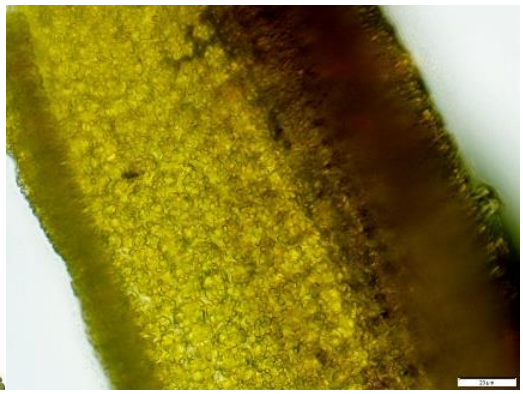


NM, Luna Co., Florida Mts, Spring Canyon, 26 Feb 2021, *Kleinman & Blisard* (SNM).

Weissia phascopsis R.H. Zander [resembling *Phascum*] [*Astomum phascoides* (Drummond) Grout]. Acrocarpous, the stems to 3 mm long; leaves curled or crisped when dry, to about 2.5 mm long, the hyaline basal portion much wider than the green upper portion, the distal margins strongly inrolled, the apices narrowly channeled, the mucro strong, of 6-10 cells; seta 1-2 mm long; capsules cleistocarpic, the operculum persistent. ●On soil; known from two collections.





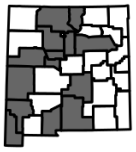


NM, Dona Ana Co., Organ Mts, lower Fillmore Canyon, 23 Mar 2010, *J. Brinda* (SNM).

Lescuraea [for Charles Léo Lesquereux (1806-1889), Swiss-American bryologist].

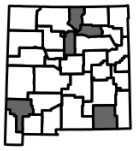
1 Leaf cells smooth
  2 Median and proximal cells smooth, but the apical or distal ones prorate at the ends, especially on the branch leaves, many/most leaf cells elongate, 3-5:1; paraphyllia many on branches, few on stems.....***L. saxicola***
  2 All cells smooth, not prorate, most cells 2-3:1; paraphyllia absent.....***L. arizonae***
1 Leaf cells papillose or prorate, at least the distal cells
  3 Cells 1-papillose over the lumens (infrequently off to one side)..... ***L. patens***
  3 Cells not papillose over the lumens, but prorate at the cell ends
    4 Many/most cells elongate, 3-5:1; paraphyllia many on branches, few on stems .....***L. saxicola***
    4 Most cells 1-3:1; paraphyllia many on branches and stems
      5 Apical cells mostly 1-2:1; lumens of medial cells smaller than 8 µ diameter, the walls thin, the shapes heterogeneous..... ***L. incurvata***
      5 Apical cells mostly 2-3:1; lumens of medial cells larger than 10 µ diameter, the walls thin, the shapes homogeneous..... ***L. radicosa***

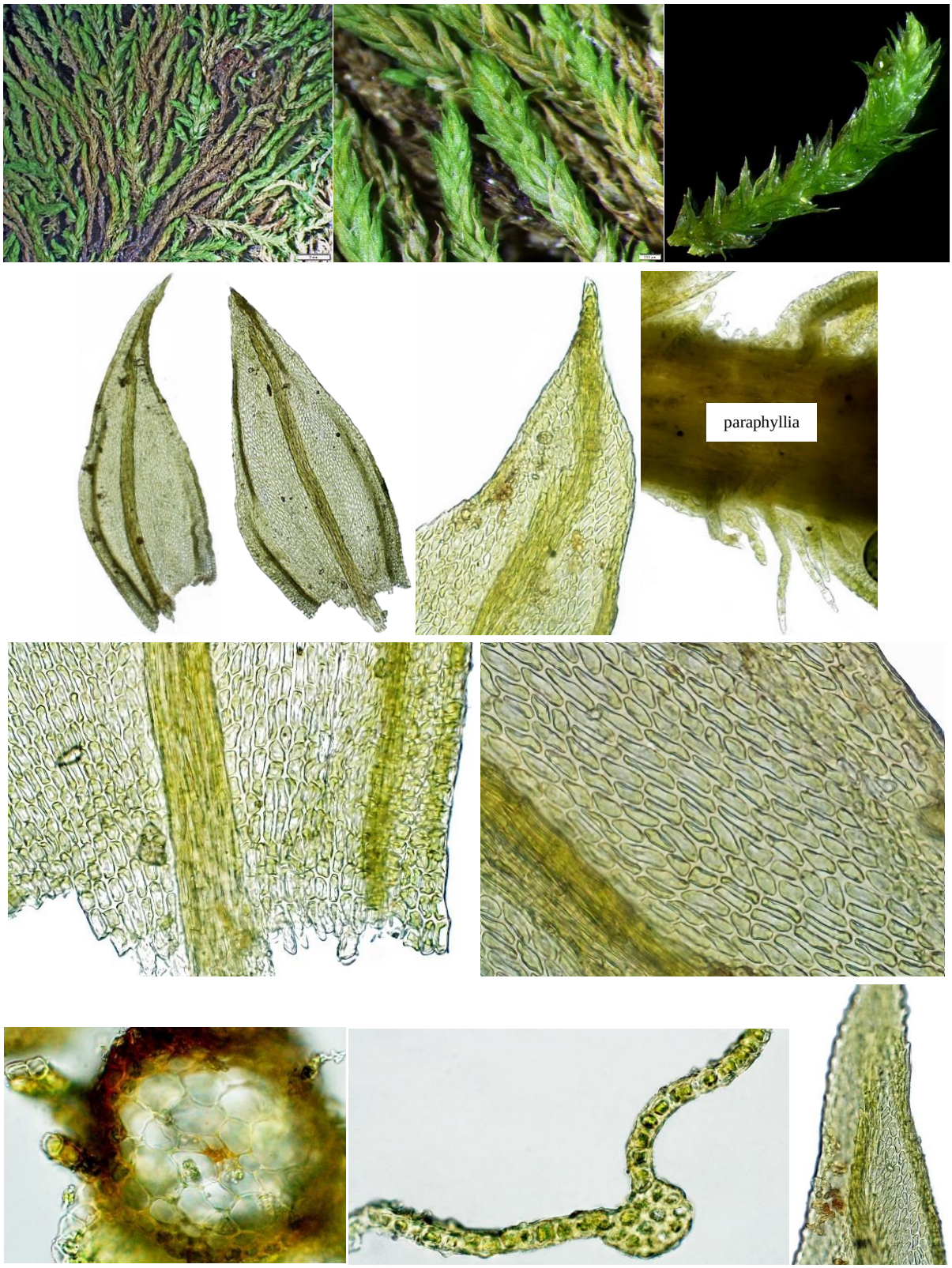
Lescuraea arizonae (Williams) P. Wilson & Norris [of Arizona] [*Leskeella arizonae* (Williams) Flowers, *Pseudoleskea arizonae* Williams, *Pseudoleskeella arizonae* (Williams) Lawton]. Pleurocarpous, in dense green to brown mats; paraphyllia absent; leaves ovate, concave, pinched in at about the upper ⅓ point, usually evidently 2-plicate, to 2 mm long, the base cordate, the margins recurved, serrulate distally; costa single, strong, from mid-leaf to percurrent, often sinuous; medial cells 2(3):1, the walls firm, not much thickened on stem leaves, thickened on branch leaves. ●Shaded rock and tree bases, thin soil over rock, sometimes wood. ♦Distinctive by the smooth cells, absence of paraphyllia, plicate leaves, and sinuous costa disappearing into the acumen.



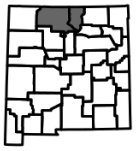
NM, Grant Co., Pinos Altos Range, McMillen Campground, 5 Apr 2010, *R. Kleinman* (SNM).

Lescuraea incurvata (Hedwig) Lawton [curved inwards] [*Leskea incurvata* Hedwig, *Pseudoleskea atrovirens* (Dickson ex Bridel) Schimper, *Pseudoleskea incurvata* (Hedwig) Loeske]. Pleurocarpous, in thick mats, the stems with many paraphyllia; leaves often somewhat falcate, to about 1.5 mm long, the margins strongly recurved; costa sub- to percurrent, orange-green, sometimes sinuous; medial cells 1-2(3):1, prorate, the walls firm to strongly thickened. ●Boulders, calcareous rock, mineral soil.

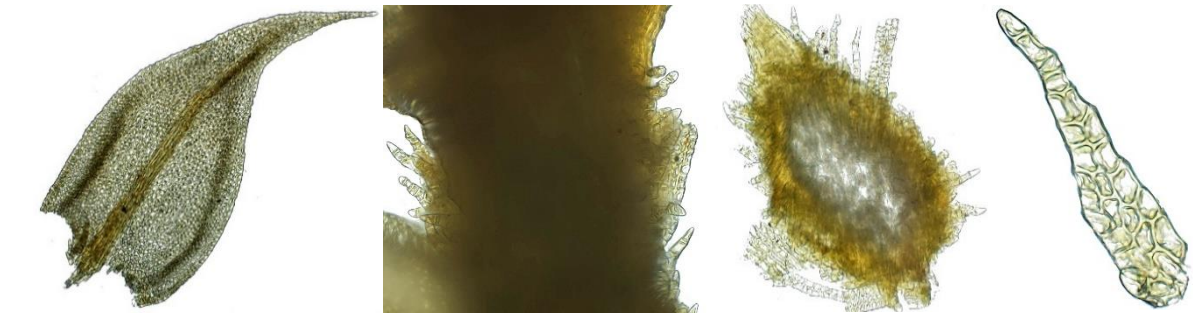




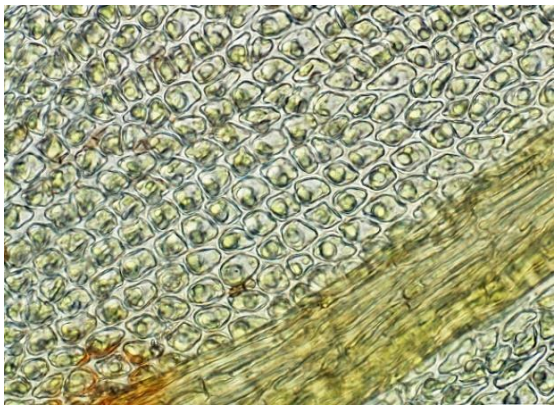
NM, Mora Co., Pecos Wilderness, Sebadillosos Trail, 30 Jul 1997, *K.W. Allred* (COLO).

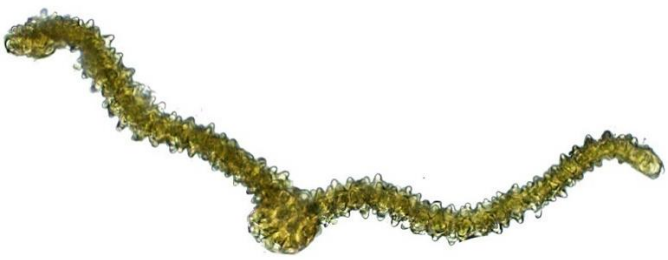


Lescuraea patens (Lindberg) Arnell & C.E.O. Jensen [spreading] [*Lesquereuxia patens* Lindberg, *Pseudoleskea patens* (Lindberg) Kindberg]. Pleurocarpous, in dark thin mats, the stems julaceous, with many paraphyllia; leaves appressed when dry, to 1 mm long, rarely falcate, the margins recurved at least proximally; costa barely reaching the acumen, green to orange-green, somewhat sinuous; medial cells 1(2):1, 1-papillose over the lumen or sometimes off-center, the walls thickened. ●Shaded to exposed rock and outcrops, mineral soil; known from only two collections. ♦Distinctive by the abundant paraphyllia and the subquadrate cells with a single, large, centered papilla.



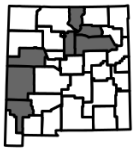
paraphyllium





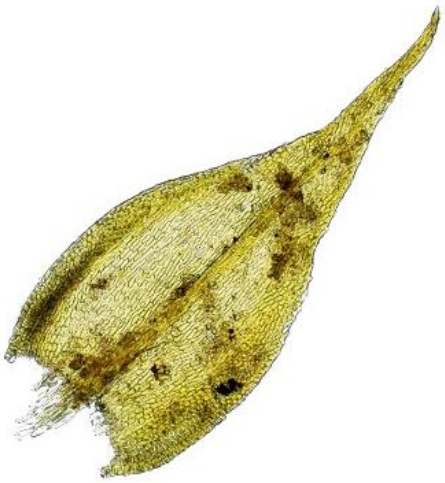
WA, Snohomish Co., near Silverton, Perry Creek Trail, 2 Jul 1963, *F.J. Hermann* (COLO).

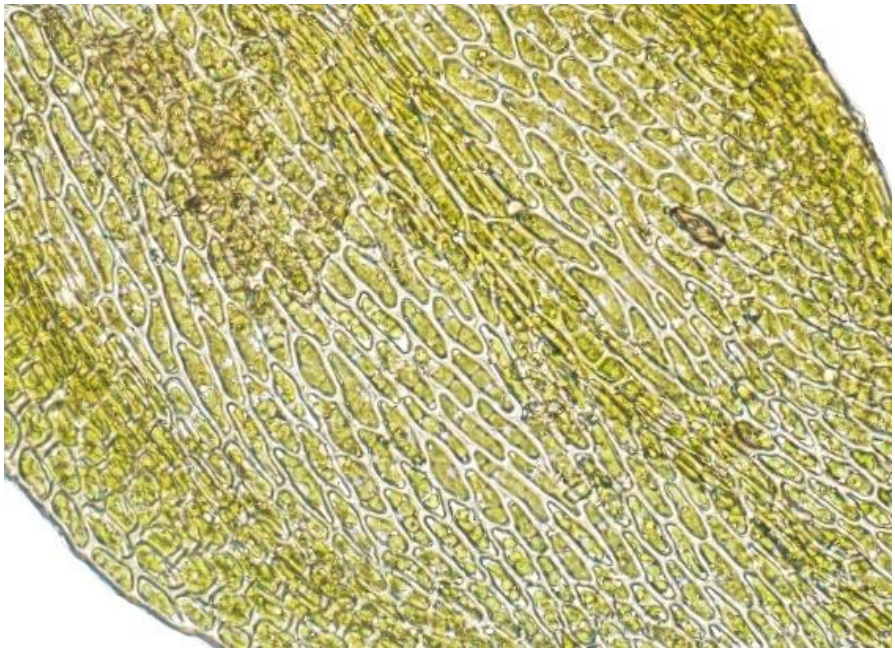
Lescuraea radicosa (Mitten) Mönkemeyer [with abundant paraphyllia] [*Hypnum radicosum* Mitten, *Pseudoleskea radicosa* (Mitten) Macoun & Kindberg]. Pleurocarpous, in thick greenish to yellow-green mats, the stems julaceous when dry, with many branched paraphyllia; leaves to 1.7 mm long, somewhat falcate, 2-plicate, the margins recurved; costa sub- to percurrent, yellow-green, sometimes sinuous; medial cells 1-2(4):1, prorate, the walls thin. ●Shaded boulders and outcrops, tree bases; above 7000 ft.

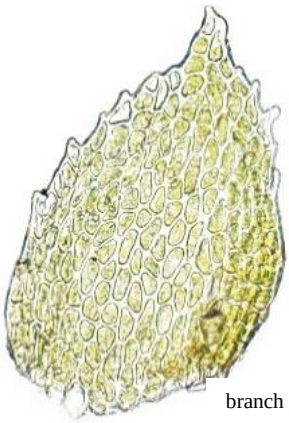


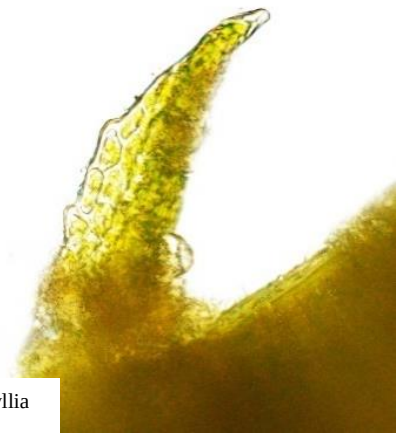
NM, Catron Co., Mogollon Mts, trail to Hummingbird Saddle, 7 Nov 2012, *Kleinman et al.* (SNM).

Lescuraea saxicola (Schimper) Milde [rock-dwelling] [*Lescuraea striata* (Schwägrichen) Schimper var. *saxicola* Schimper]. Pleurocarpous, in yellow-green to brownish golden mats, the stems with few paraphyllia, the branches with many foliose paraphyllia and often hooked apically; leaves weakly falcate, 1(2)-plicate, to 1.4 mm long, the margins recurved, serrulate apically; costa orangish at least at the base; many/most cells 3-5:1, thin-walled, prorate apically, smooth proximally. ●Boulders, outcrops, mineral soils; known from few collections. ♦Distinctive by the elongate, thin-walled cells.









branch paraphyllia

NM, Cibola Co., El Malpais Nat. Mon., Lava Wall, 13 Dec 2018, *Kleinman et al.* (SNM).

Pseudoleskeella [resembling *Leskeella*].

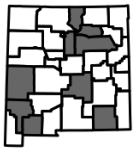
1 Many stems and branches with clusters of brood branchlets near the tips; costa single and reaching at least ¾ the leaf length and commonly well into and nearly filling the narrow acumen; capsules erect to inclined, the peristome reduced ..... ***P. nervosa***

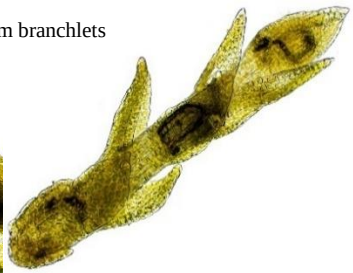
1 Brood branchlets generally absent from stems and branches; costa single or double, reaching at most to about ¾ the leaf length, never nearly filling the acute acumen; capsules inclined, the peristome well-developed

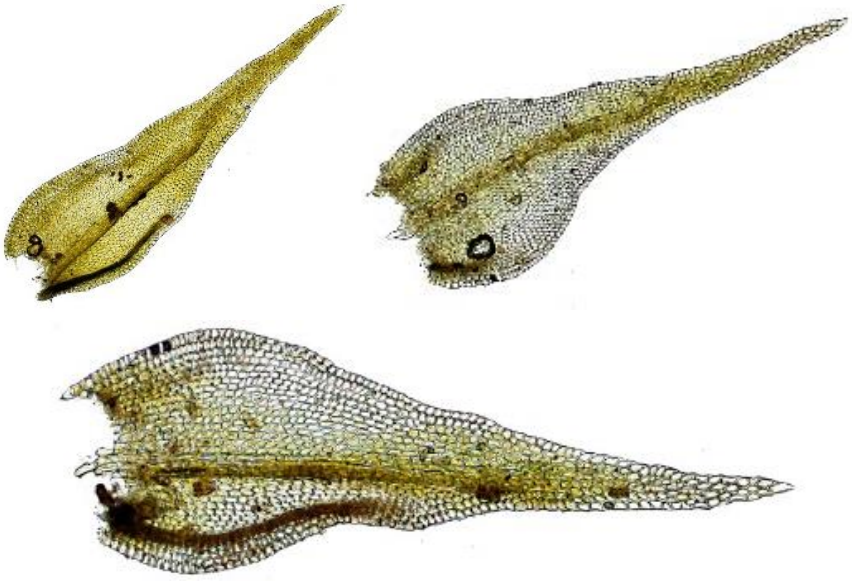
2 Costa commonly double, sometimes single, rarely reaching mid-leaf; leaves 1-2:1; medial cells mostly 1-2:1 with firm but not noticeably thick walls ..... ***P. tectorum***

2 Costa single, frequently reaching mid-leaf or beyond; leaves about 3:1; medial cells mostly 2-3:1 with thick walls..... ***P. rupestris***

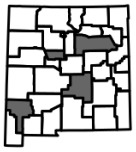
Pseudoleskeella nervosa (Bridel) Nyholm [prominently nerved] [*Leskea nervosa* (Bridel) Myrin, *Leskeella nervosa* (Bridel) Loeske, *Pterigynandrum nervosum* Bridel]. Pleurocarpous, in thin mats, the stems many-branched; leaves to 1.2 mm long, the branch leaves smaller, the slender acumen commonly longer than the ovate basal portion, not plicate, the margins recurved proximally, entire; costa flattening and filling the acumen; medial cells 1-2:1, smooth; specialized asexual reproduction by branchlets in distal leaf axils, these sometimes becoming stoloniform. ●Shaded cliffs and bluffs, boulders, bark.





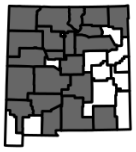


NM, San Miguel Co., along Pecos River across from Mora Campground, 30 Jul 2019, *Kleinman et al.* (SNM).



Pseudoleskeella rupestris (Bridel) Nyholm [rock-dwelling] [*Leskea rupestris* Berggren, *Leskeella nervosa* (Bridel) Loeske var. *sibirica* (Arnell) Brotherus, *Pseudoleskeella sibirica* (Arnell) P. Wilson & Norris]. Pleurocarpous, in greenish, reddish green, or orangish mats, sometimes producing stoloniform branches; leaves broadly lanceolate, gradually narrowed to apex, not plicate, to 1.5 mm long, the margins mostly plane, entire; costa single, strong, frequently to mid-leaf or somewhat beyond; medial cells 2-3:1, thick-walled. ●Cliffs, bluffs, boulders; in the mountains.

CO, Larimer Co., Big South Trail, south of Chambers Lake, 7 Oct 1992, *Hermann* & *Rolston* (COLO).



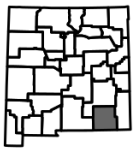
Pseudoleskeella tectorum (Funck ex Bridel) Kindberg ex Brotherus [of rooftops] [*Hypnum tectorum* Funck ex Bridel, *Leskea tectorum* (Funck ex Bridel) Lindberg, *Leskeella tectorum* (Funck ex Bridel) Hagan, *Leskeella williamsii* Best, *Pseudoleskea tectorum* (Funck ex Bridel) Schimper, *Pseudoleskeella tectorum* (Funck ex Bridel) Kindlberg ex Brotherus var. *flagellifera* (Best) Amann]. Pleurocarpous, in dark mats; leaves ± catenulate when dry, ovate, abruptly narrow or pinched to the apex, not plicate, 0.4-1.4 mm long, the margins plane, entire; costa double or sometimes single, sometimes forked apically, not reaching mid-leaf, sometimes nearly obsolete; medial cells 1-2:1, not or somewhat thick-walled. ●Shaded rock, boulders, outcrops and cliff faces, tree bases, stumps. ♦One of our most common rock-dwelling mosses, characterized by the short to nearly absent double costa.

NM, Grant Co., Pinos Altos Range, Aspen Grove, 8 May 2010, *Kleinman & Blisard* (SNM).

Ptychomitrium [a folded cap].

1 Leaf margins coarsely toothed distally ..... ***P. serratum***

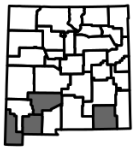
1 Leaf margins entire distally ..... ***P. sinense***

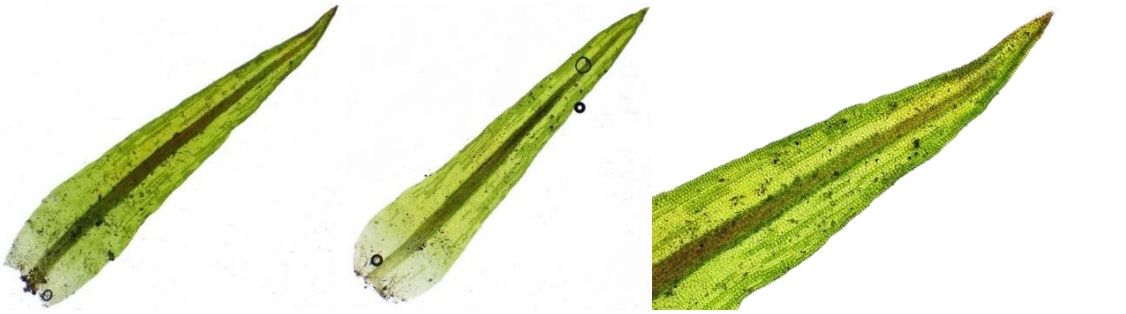


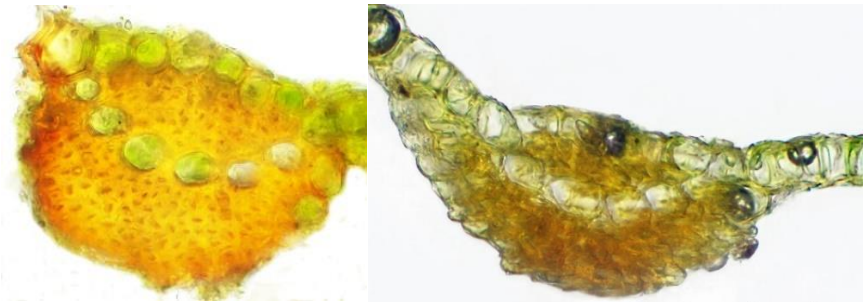
Ptychomitrium serratum Bruch & Schimper [toothed]. Acrocarpous, the stems erect to horizontal, to 1.5 cm long; leaves crispate when dry, 3-4 mm long, the margins coarsely serrate distally; laminal cells quadrate, smooth, 1-stratose except for 2-stratose, darker green strips (face view, light microscope); seta 3-4 mm long; peristome teeth densely papillose; calyptra lobes less than ½ the calyptra length. ●On calcareous rock; Guadalupe Mountains, known from two collections.

NM, Eddy Co., Guadalupe Mts, lower fork Big Canyon, 6 Sep 2010, *R. Worthington* (COLO).

Ptychomitrium sinense (Mitten) A. Jaeger [of China] [*Glyphomitrium sinense* Mitten, *Ptychomitrium leibergii* Best]. Acrocarpous, the tufts glossy, yellowish green, the stems erect, to 1 cm long; leaves crispate-curled when dry, 2.5-4 mm long, the margins entire; costa nearly to the apex, very conspicuous in dry curled leaves; laminal cells quadrate, 1-stratose except for 2-stratose, darker green strips (face view, light microscope); seta 3-4 mm long; peristome teeth smooth; calyptra lobes ½ or more the calyptra length. ●Mostly on rocks and boulders, or thin soil over rock; southern foothills.





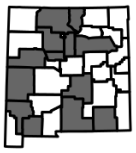


NM, Hidalgo Co., Animas Mt, Indian Creek, 15 Apr 2019, *Kleinman et al.* (SNM).

1 Stem hyalodermis present, at least partially; alar region well-defined, the alar cells thin-walled and balloon-inflated, abruptly delimited by 1-3 rows of thick-walled quadrate-rectangular cells immediately above ..... **Calliergonella**
1 Stem hyalodermis absent; alar region generally not as above
2 Leaves falcate-secund
3 Leaf margin (at least one) strongly revolute almost its entire length; leaves strongly falcate-secund ..... **Roaldia**
3 Leaf margin plane, or revolute only on the lower ⅓ or less; leaves weakly falcate-secund ..... **Buckia**
2 Leaves straight
4 Branch tips ± straight with the leaves directed forward ..... **Buckia**
4 Branch tips curved upward or outward when dry, often with many leaves pointed towards one side, the leaves pointed towards the branch tips when moist
5 Median leaf cells 9-16:1; quadrate alar cells 5-15 along the margin
6 Capsules erect; central strand present; mostly on bark, common (*P. polyantha*) ..... **Pylaisia**
6 Capsules inclined to curving/horizontal; central strand absent; on rock, rare (*H. incurvatum*) ..... **Homomallium**
5 Median leaf cells 4-8:1; quadrate alar cells 20-25 or more along the margins
7 Capsules inclined to horizontal, asymmetric; proximal leaf margins recurved; central strand absent; plants green to somewhat yellow-green ..... **Homomallium**
7 Capsules erect to nearly so, symmetric; proximal leaf margins plane to incurved; central strand present; plants markedly yellow-green (*P. selwynii*) ..... **Pylaisia**

Buckia [for William Russel Buck (1950-x), American bryologist].

Buckia vaucheri (Lesquereux) Rios, Gallego, & Guerra [for Jean Pierre Étienne Vaucher (1763-1841), Swiss pastor-botanist] [*Hypnum vaucheri* Lesquereux, *Stereodon vaucheri* (Lesquereux) Lindberg ex Brotherus].



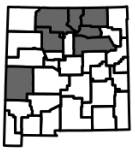
Pleurocarpous, the stems to 6 cm long, creeping to somewhat rising, a hyalodermis absent, a central strand present, the branches to 1.5 cm long; pseudoparaphyllia surrounding branch bases broadly foliose; leaves straight to falcate-secund, to 1.5 mm long, the margins broadly recurved distally, entire to serrulate; costa short, single or double; alar cells quadrate, green, all the same; medial cells short and broad, 25-40 µm long, 5-6 µm wide. ●On rocks, boulders, cliffs, thin soil over rock, also tree bases or mineral soil; mountain habitats, usually with seasonal water flow. ♦Easily confused with *Hypnum cupressiforme* (Hypnaceae), which has filamentous pseudoparaphyllia, alar cells of two kins, the distal quadrate and green, the proximal inflated and hyaline, and longer and narrower medial cells.

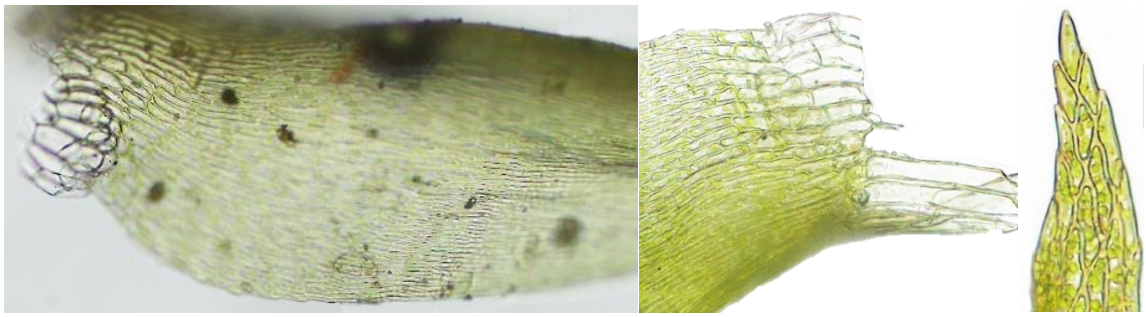
foliose pseudoparaphyllia

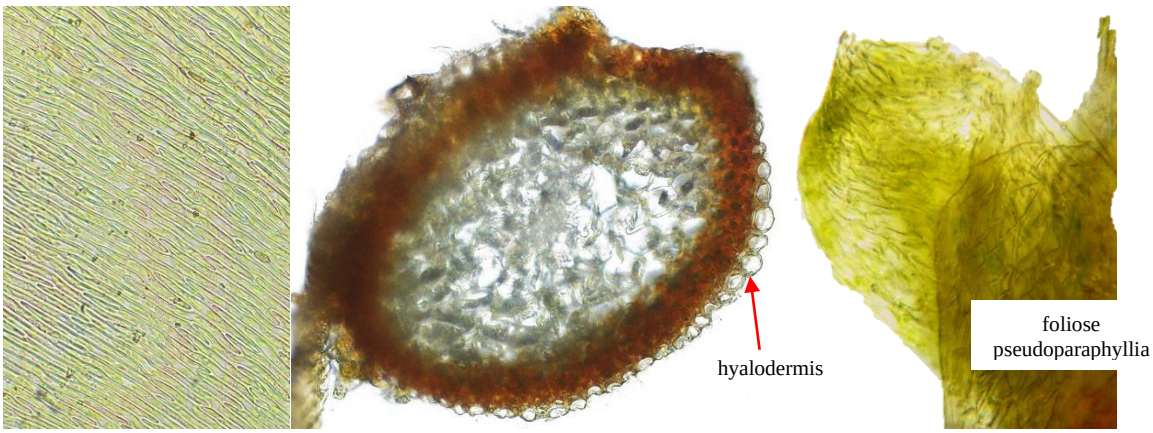
NM, Grant Co., Pinos Altos Range, Little Cherry Creek Road, 24 Nov 2010, *Kleinman & Blisard* (SNM).

Calliergonella [resembling *Calliergon*].

Calliergonella lindbergii (Mitten) Hedanäs [for Sextus Otto Lindberg (1835-1889), Swedish botanist-physician] [*Breidleria arcuata* (Lindberg) Loeske, *Hypnum lindbergii* Mitten]. Pleurocarpous, in golden-green to yellow-green mats, the stems to 5 cm long, reddish to greenish, flattened, a hyalodermis present at least partially, a central strand well-developed, the pseudoparaphyllia foliose, truncate, the branches to 2 cm long; leaves falcate-secund, 0.5-2 mm long, the bases decurrent, the margins plane, entire to serrate apically; costa double, short; alar region well-defined, thin-walled and balloon-inflated, with 1-3 rows of thick-walled quadrate-rectangular cells immediately above; median cells narrowly linear. ●Wet to moist soil and humus, wet meadows, stream banks, spring, boggy ground; mountains.







NM, Catron Co., Mogollon Mts, Willow Creek, Ben Lilly Campground, 24 Jun 2013, *Kleinman & Blisard* (SNM).

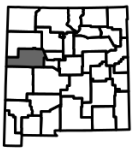
Homomallium [like wool].

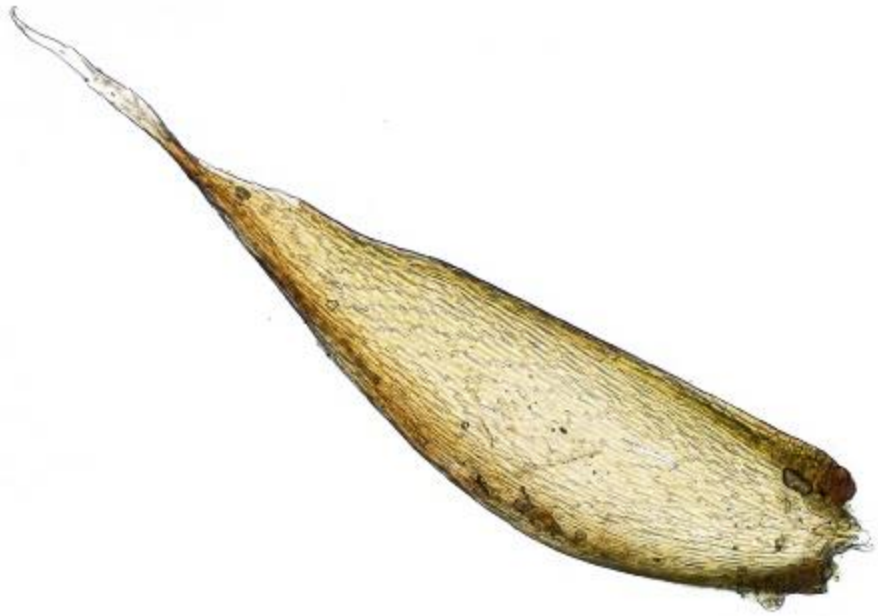
1 Leaves 0.5-0.8 mm long, the apices shortly and broadly acuminate; branches with nearly all leaves neatly directed forward (not or only slightly homomallous); mid-laminal cells somewhat sinuous-walled.....*H. adnatum*
1 Leaves 0.8-1.5 mm long, the apices slenderly acuminate to subulate; branches with many leaves directed to the side, at least at the branch tips (homomallous), the branches appearing to be shaggy; mid-laminal cells ± straight-walled
2 Median leaf cells 9-12:1; quadrate alar cells 5-15 along the margin; leaf apices subulate; on rock, rare ..... ***H. incurvatum***
2 Median leaf cells 4-8:1; quadrate alar cells 20-25 or more along the margins; leaf apices not subulate; on bark, soil, and rock, common..... ***H. mexicanum***

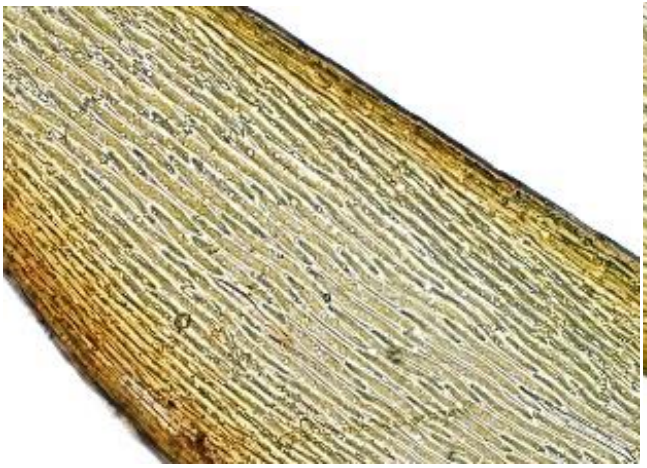
Homomallium adnatum (Hedwig) Brotherus [attached] [*Hypnum adnatum* Hedwig]. Pleurocarpous, in dark green mats, the stem and branch tips straight and not curled upward; leaves 0.5-0.8 mm long, the apices shortly and broadly acuminate, the branch leave directed forward and not to one side; alar region with quadrate cells 20-25 along the margin; median cells 4-6:1, somewhat sinuous, thick-walled; capsules inclined to horizontal. ●Not yet known from the state, but to be looked for in the northern mountains on boulders, bases of trees, and exposed roots. ♦As yet, all plants reported as this from New Mexico have been *Homomallium mexicanum*.

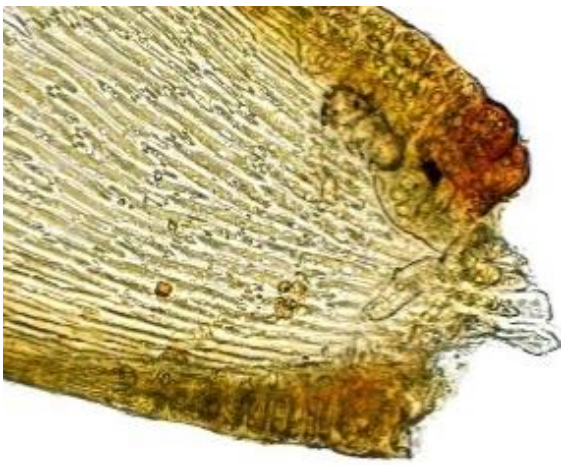
KS, Bourbon Co., Point les Rand, 30 May 1949, *L.J. Gier* (NY 00610409).

Homomallium incurvatum (Schrader ex Bridel) Loeske [curved inwards] [*Hypnum incurvatum* Schrader ex Bridel]. Pleurocarpous, in green to yellowish brown mats, the stems lacking a central strand, the branches straight; leaves disposed to one side, at least at branch tips, 0.8-1.3 mm long, the margins erect, the apices abruptly acuminate, becoming subulate; quadrate alar cells 5-15 along the margin; distal cells 9-16:1; capsules inclined to horizontal. ●On rocks and boulders, calcareous substrates, rarely deciduous trees; known only from lava tubes of the Grants lava field.



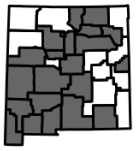


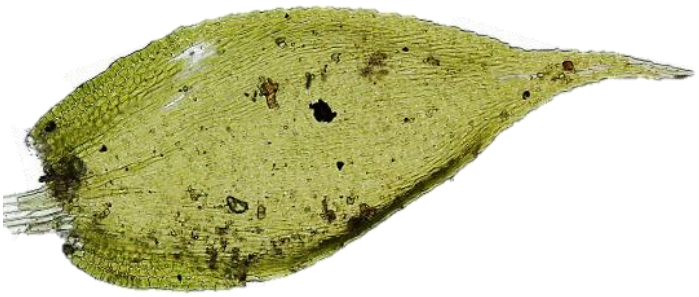


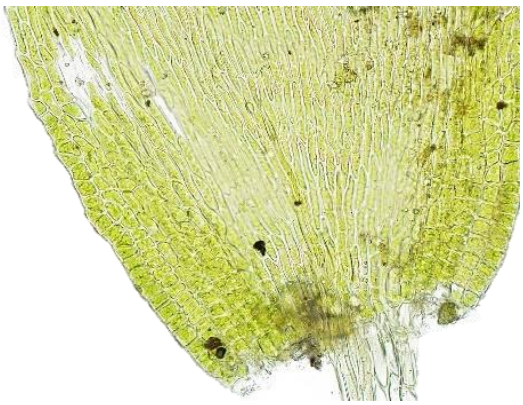


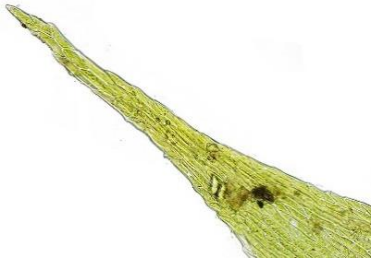
NM, Cibola Co., El Malpais Nat. Mon., 17 Feb 2017, *L. Baumann* (SNM).

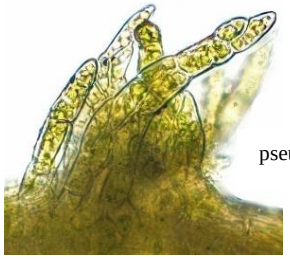
Homomallium mexicanum Cardot [of Mexico] [*Homomallium mexicanum* Cardot var. *latifolium* Cardot]. Pleurocarpous, in green to yellowish green mats, the stem lacking a central strand, the branches curved upwards at the tips; leaves 0.8-1.5 mm long, disposed to one side, the margins recurved basally, entire to serrulate, the apices slender-acuminate, but not subulate; quadrate alar cells 20-25 along the margin; distal cells 5-6:1; capsules inclined to horizontal. ●Bark and soil at base of trees, boulders; mountain habitats, also city parks. ♦Plants with entire leaves have been referred to var. *latifolium*.











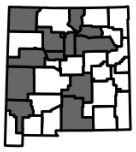
pseudoparaphyllia

Photos : NM, Grant Co., Pinos Altos Range, Little Cherry Creek Road, 19 Sep 2020, *Kleinman* & *Blisard* (SNM).

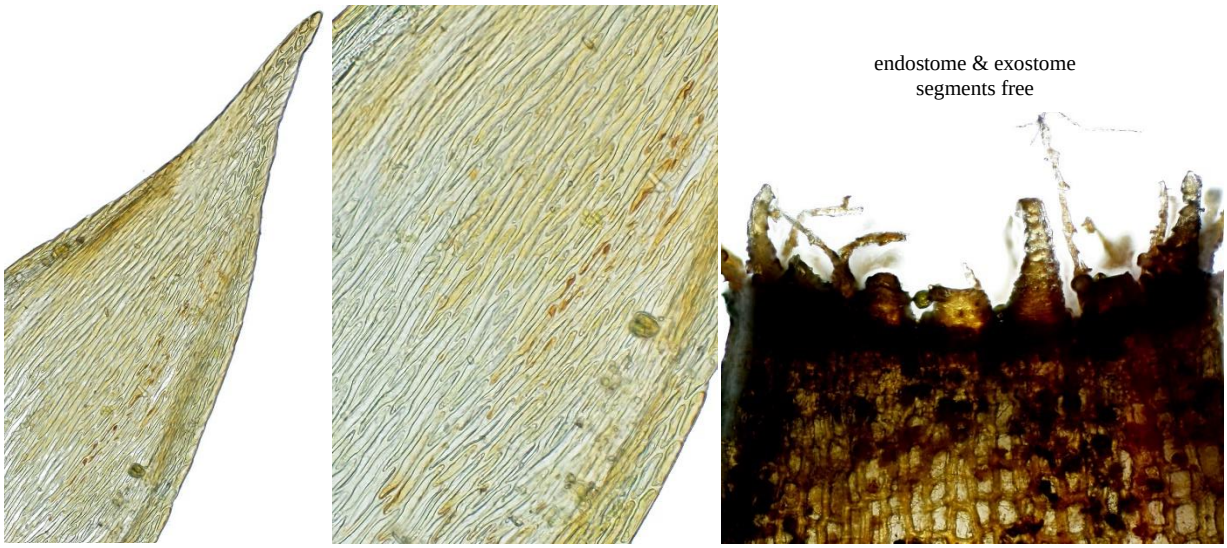
Pylaisia [for Auguste Jean Marie Bachelot de la Pylaie (1786-1856), French bryologist].

1 Stem leaves 1.3-2 mm long; quadrate alar cells of stem leaves 8-10 along the margin.....***P. polyantha***

1 Stem leaves 0.9-1.2 mm long; quadrate alar cells of stem leaves 20-25 along the margin.....***P. selwynii***

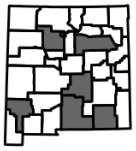


Pylaisia polyantha (Hedwig) Schimper [many-flowered] [*Leskea polyantha* Hedwig, *Pylaisia polyantha* (Hedwig) Schimper var. *brevifolia* (Lindberg & Arnell) *Pylaisiella polyantha* (Hedwig) Grout]. Pleurocarpous, in light green mats, the stems with a central strand, the branches loosely curled when dry; leaves 1.3-2 mm long, slightly plicate, the margins plane; costa double, short; quadrate alar cells 8-10 or so along the margin; median cells 12-16:1; capsules erect, the exostome and endostome segments free. ●Mostly at the bases of trees, sometimes on logs or stumps, rarely on rock; mountains and foothills.



endostome & exostome segments free

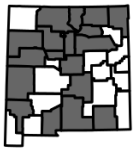
NM, Grant Co., Burro Mts, CF Canyon, 29 Mar 2010, *Kleinman & Blisard* (SNM).



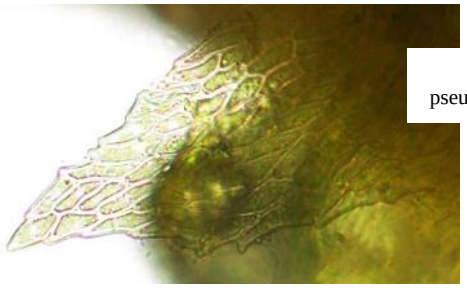
Pylaisia selwynii Kindberg [for Alfred Richard Cecil Selwyn (1824-1902), British geologist] [*Pylaisiella selwynii* (Kindberg) Crum, Steere, & Anderson]. Pleurocarpous, in yellowish to light greenish mats, the stems with a central strand, the branches usually strongly upcurved at the tips; leaves 0.9-1.2 mm long, not plicate, the margins plane, the branch leaves smaller; costa double, short; quadrate alar cells 20-25 along the margin; medial cells 5-7:1; capsules erect. ●At the bases of trees and on stumps or downed logs; mountains. ♦The growth form is often distinctive, with horizontal main stems and older yellowish branches held erect with the tips curved over.

NM, Grant Co., Black Range, Tadpole Ridge Trail, 19 Jul 2015, *Kleinman & Blisard* (SNM).

Roaldia [for Roald Engelbregt Gravning Amundsen (1872-1928), celebrated Norwegian explorer].



Roaldia revoluta (Mitten) Câmara & Carvalho-Silva [rolled-back] [*Hypnum ravaudii* Boulay, *Hypnum revolutum* (Mitten) Lindberg, *Hypnum revolutum* (Mitten) Linderg var. *ravaudii* (Boulay) Ando, *Stereodon revolutus* Mitten]. Pleurocarpous, in rusty brownish, yellowish green, to golden mats, the stems lacking a hyalodermis, a central strand weak; leaves straight to mostly falcate-secund downward, 0.5-1.8 mm long, sometimes plicate, the margins revolute or rarely entire; costa short, double; quadrate alar cells 8-15 along the margin; medial cells 5-8:1; capsules rarely seen in our plants. ●On soil, rock, bases of trees, logs; one of our most common mountain mosses, rarely fruiting.



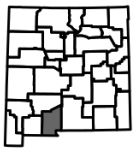
foliose pseudoparaphyllium

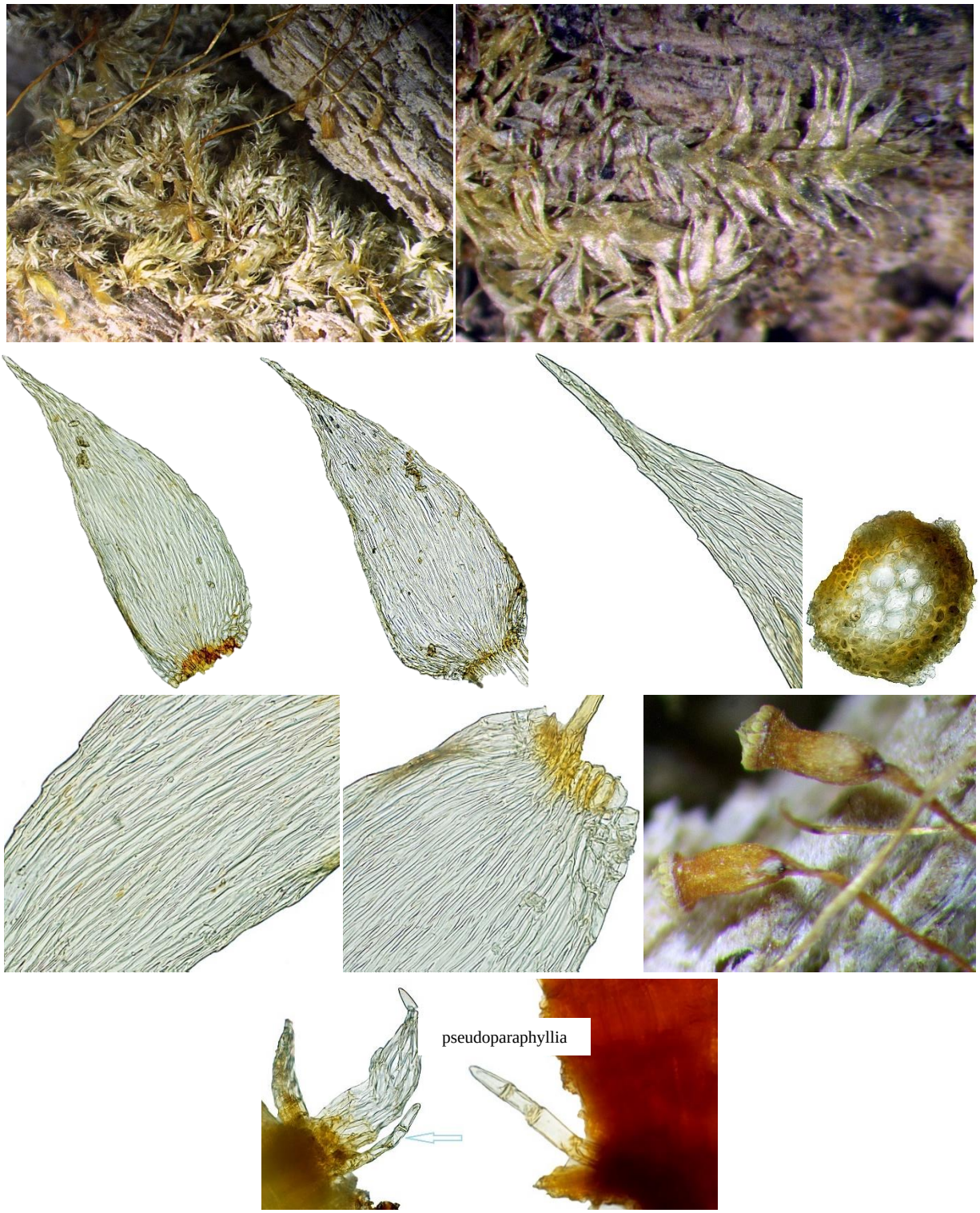
NM, Grant Co., Silver City Range, north of 80 Mountain, 7 May 2010, *Kleinman & Blisard* (SNM).

1 Shoots complanate-foliate; central strand absent; brood branchlets absent ..... **Isopterygium**
1 Shoots terete-foliate; central strand present; small deciduous brood branchlets at branch apices (sometimes hidden) ..... **Platygyrium**

Isopterygium [equal little wings].

Isopterygium tenerum Mitten [delicate] [*Hypnum tenerum* Swartz]. Pleurocarpous, in thin, pale mats, the stems to 5 cm long, complanate-foliate, lacking a hyalodermis, with pseudoparaphyllia; leaves to 1.8 mm long, the margins plane, serrulate distally; costa very short, double, sometimes obsolete; alar region small; medial cells linear-fusiform, 10-18:1; specialized asexual reproduction sometimes present as multicellular filaments on the stem, similar to pseudoparaphyllia. ●On soil, bases of trees, rotten logs, wet rock; known from two collections.



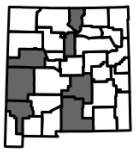


FL, Alachua Co., west of Gainsville, 23 Jan 1959, *Anderson & Crum* (COLO).

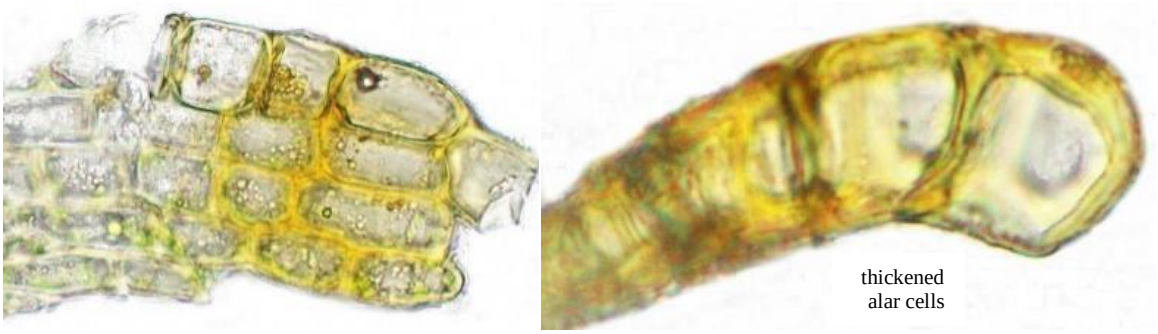
Platygyrium [a wide ring].

1 Leaves 0.8-1.1 mm long, ascending to imbricate, not plicate: brood branchlets many, conspicuous ..... ***P. repens***

1 Leaves 1.3-1.6 mm long, homomallous, somewhat plicate; brood branchlets few, inconspicuous or hidden ..... ***P. fuscoluteum***

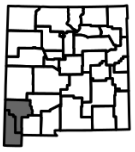


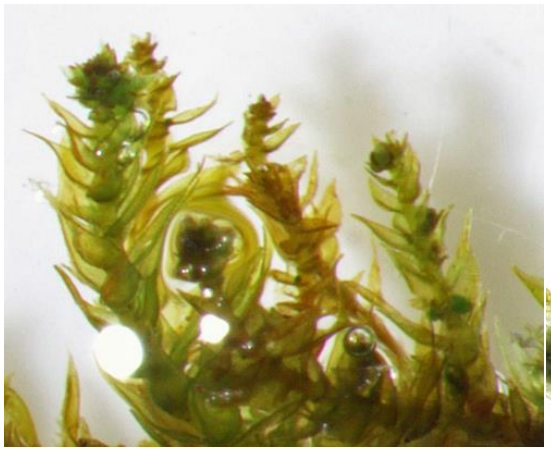
Platygyrium fuscoluteum Cardot [dark yellow]. Pleurocarpous, in thick yellowish brown or golden mats, the stems creeping, up-curved apically when dry; leaves directed to one side (homomallous), somewhat plicate, 1.3-1.6 mm long, the margins recurved proximally; alar cells quadrate; medial cells about 10:1; brood branchlets few, hidden in the axils of the apical leaves. ●On old logs, stumps, tree trunks, damp boulders, rock faces, and shaded banks. ♦Distinctive by the (obscure) brood bodies, sub-plicate leaves, and often brownish golden color; compare carefully with *Homomallium mexicanum*.

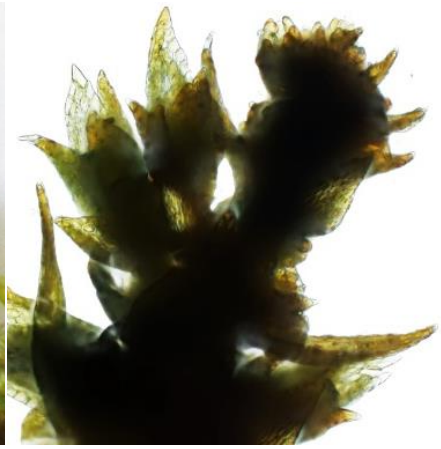


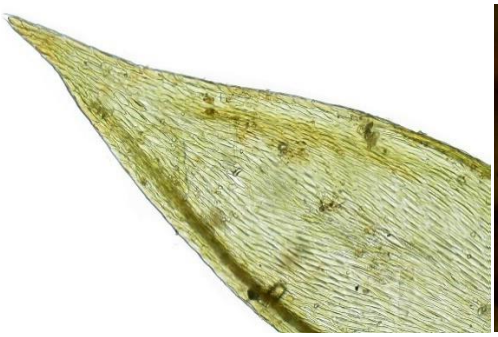
NM, Grant Co., Black Range, Iron Creek Campground, 4 Sep 2012, *Kleinman & Blisard* (SNM).

Platygyrium repens (Bridel) Schimper [creeping] [*Pterigynandrum repens* Bridel]. Pleurocarpous, in green to bronze mats, the stem up-curved apically when dry or sometimes straight; leaves not homomallous, not plicate, 0.8-1.1 mm long, the margins recurved proximally; alar cells quadrate; medial cells 8-10:1; brood branchlets conspicuous at the branch apices. ●Shady forests on logs, stumps, and tree trunks, sometimes also soil and rocks; poorly known.









pseudoparaphyllium

IA, Clayton Co., Bixby State Park, 28 May 2011, *Kleinman & Blisard* (SNM).

1 Alar cells clearly differentiated; leaf margins 1-stratose
  2 Leaves not much contorted when dry; interior cells lacking longitudinal striations as below (*A. starkei*) ..... **Arctoa**
  2 Leaves strongly crisped-curly-contorted when dry; interior distal cells with longitudinal cuticular striations that appear as papillae in cross-section at high magnification (*H. crispulum*) ..... go to **Hymenoloma** (Hymenolomataceae)
1 Alar cells not or scarcely differentiated; leaf margins 1- or 2-stratose
  3 Leaf bases markedly expanded and strongly sheathing
    4 Margins revolute, at least from about mid-leaf to the base ..... **Oncophorus**
    4 Margins plane
      5 Margins coarsely toothed, at least apically; sporophytes single to multiple, the capsules lacking a spherical protuberance at the base (*S. vaginata*) ..... **Symblepharis**
      5 Margins entire to indistinctly toothed; sporophytes single, with a spherical protuberance at the base (*B. wahlenbergii*) ..... **Brideliella**
  3 Leaf bases hardly if at all expanded, not sheathing
    6 Leaf cells clearly papillose in face view
      7 Leaf margins 2-stratose (*C. tenellum*) ..... **Cynodontium**
      7 Leaf margins 1-stratose (*D. pellucidum*) ..... **Dichodontium**
    6 Leaf cells smooth in face view (but see striations of *Hymenoloma*)
      8 Leaf margins plane, erect to incurved; lamina longitudinally striate with narrow cuticular ridges, these appearing as papillae in cross-section, 1-stratose to 2-stratose in the upper half, the distal margins 2-stratose; axillary gemmae rare (*H. mulahaceni*) ..... go to **Hymenoloma** (Hymenolomataceae)
      8 Leaf margins strongly recurved distally in many leaves; lamina smooth, lacking cuticular striae, 1-stratose except for the 2-stratose margins distally; axillary gemmae common (*D. cirrata*) ..... **Dicranoweisia**

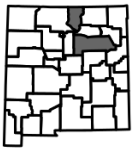
Arctoa [bear regions].

Arctoa starkei (F. Weber & D. Mohr) Loeske [for Johann Christian Starcke/Starke (1744-1808), pastor and bryologist of Silesia] [*Dicranum starkei* F. Weber & D. Mohr, *Kiaeria starkei* (F. Weber & D. Mohr) I. Hagen]. Acrocarpous, in shiny, yellowish green tufts, the stems to 4 cm long; leaves mostly falcate-secund, to 4.5 mm long, only the tips curled-contorted when dry, the margins 1-stratose; alar cells strongly differentiated, enlarged, and usually colored, 1-stratose; distal cells mostly 2-4:1, smooth or weakly mammillose-roughened; antheridia close to perichaetia, the capsules distinctly ribbed when dry, weakly strumose. ●Rock crevices and cliff faces; known from a single collection.

CO, Eagle Co., White River area, Missouri Creek, 25 Jul 1984, *H. Rolston* (COLO).

Brideliella [for Samuel Élisée von Bridel (1761-1828), eminent Swiss bryologist].

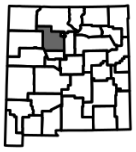
Brideliella wahlenbergii (Bridel) Fedosov [for Georg (Göran) Wahlenberg (1780-1851), Swedish physician-botanist] [*Oncophorus wahlenbergii* Bridel]. Acrocarpous, in small, loose tufts, the stems to 2.5 cm long; branch leaves 3-6 mm long, strongly crisped-curled when dry, abruptly subulate, strongly sheathing basally, the margins plane, entire to toothed distally, 2-stratose; distal cells 1-stratose, quadrate to short-rectangular, thick-walled; alar cells not differentiated; capsules strumose, with a spherical protuberance at the base. ●Rotting logs and stumps, moist rocky outcrops; known from few collections. ♦Plane leaf margins and strumose capsules are distinctive.



CO, Larimer Co., Nunn Creek, Bald Mtn Trail, 30 Jun 1980, *H. Rolston* (COLO).

Cynodontium [like a dog's tooth].

Cynodontium tenellum (Schimper) Limpricht [delicate] [*Cynodontium polycarpon* (Hedwig) Schimper var. *tenellum* Schimper]. Acrocarpous, in light green tufts or clumps, the stems to about 2 cm long; leaves to 3.5 mm long, the margins weakly recurved to plan, 2-3-stratose; distal cells smooth or with scattered papillae abaxially; capsules erect, not strumose. ●On rock and moist soil in the mountains; known from a single collection.



Canada, Labrador, Kaipokok Bay, 30 Jul 1976, *G.R. Brassard* (COLO).

Dichodontium [split tooth].

Dichodontium pellucidum (Hedwig) Schimper [transparent] [*Dicranum pellucidum* Hedwig]. Acrocarpous, in loose cushions or mats, the stems to 8 cm long; leaves 1-4 mm long, the margins recurved at least proximally, 1-stratose, strongly toothed; costa not reaching the apex; distal cells 1-stratose, strongly papillose; specialized asexual reproduction sometimes by multicellular, stalked gemmae in the leaf axils; capsules smooth when dry, not strumose. ●On damp or wet soil and rocks, along streams, in the mountains; known from only two collections.

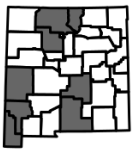
CA, Del Norte Co., near Cedar Creek, 5 Oct 1968, *D.H. Norris* (COLO).

Dicranoweisia [resembling *Dicranum* & *Weissia*].

1 Leaf margins strongly and widely recurved in many leaves; lamina smooth, lacking cuticular ridges .....***D. cirrata***

1 Leaf margins plane, erect to incurved; lamina longitudinally striate with narrow cuticular ridges, these appearing as papillae in cross-section .....go to **Hymenoloma** (Hymenolomataceae)

Dicranoweisia cirrata (Hedwig) Lindberg ex Milde [curly] [*Weissia cirrata* Hedwig]. Acrocarpous, in green to yellow-green tufts, the stems to 8 mm long; leaves 1-2 mm long, crisped and incurved when dry, 1-stratose except for the 2-stratose margins, the margins plane to recurved, 2-stratose in distal half; distal cells subquadrate, smooth, lacking cuticular striae; alar cells not differentiated; proximal and basal cells thick-walled; multicellular gemmae frequent on abaxial surface of leaves; capsules long-exserted, erect. ●On tree trunks and rotting logs.



gemma

NM, Otero Co., Sacramento Mts, 16 Springs, 6 Oct 2021, *K.W. Allred 11073* (NMC).

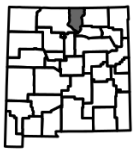
Oncophorus [bearing a tumor].

1 Leaf margins plane, mostly entire; alar cells not or only a little enlarged (*B. wahlenbergii*) .....go to **Brideliella**

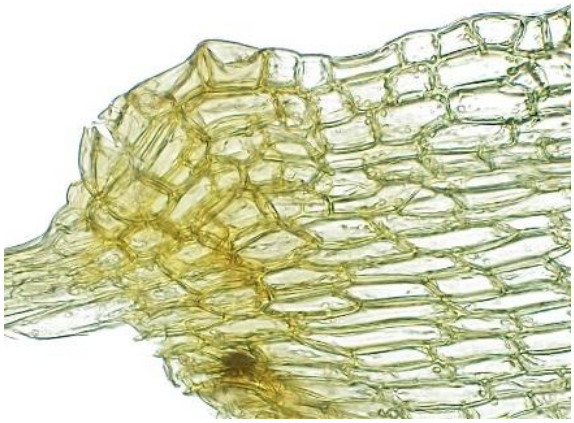
1 Leaf margins recurved or revolute, at least from about mid-leaf to the base, coarsely toothed to entire; alar cells enlarged somewhat and pellucid

2 Distal leaf margins entire to nearly so.....***O. integerrimus***

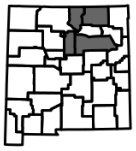
2 Distal leaf margins coarsely toothed .....***O. virens***



Oncophorus integerrimus Hedenäs [entire]. Acrocarpous, in loose, green to yellow-green tufts, the stems to 10 cm long, with a large central strand, rarely with a hyalodermis; leaves 2.5-5 mm long, loosely curled or twisted when dry, the narrow acumen about half the leaf, the margins partly recurved proximally, 1-2-stratose, entire below, entire to obscurely denticulate above; costa nearly filling the acumen; alar cells slightly to strongly inflated, partly 2-stratose; distal cells quadrate to short-rectangular, thick-walled; seta 15-25 mm long; capsule cylindric, curved, with a distinct spherical protuberance at the base (struma). ●Wet soil along streams; known from a single collection, but perhaps more common than currently known.



NM, Taos Co., Beaver Lake, 3-4 Aug 1965, *J.R. Crutchfield* (COLO).

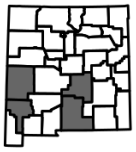


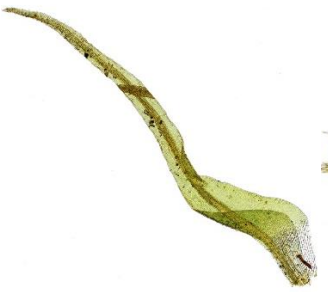
Oncophorus virens (Hedwig) Bridel [green] [*Dicranum virens* Hedwig]. Acrocarpous, in loose green to yellow-green tufts, the stems to 8 cm long, with a large central strand, lacking a hyalodermis; leaves 2-4 mm long, folded to tightly curled when dry, the narrow acumen about half the leaf, the margins revolute at least proximally, at least distally coarsely toothed, 1-2-stratose; costa nearly filling the acumen; alar cells slightly to strongly inflated; distal cells quadrate to short-rectangular, thick-walled; seta 12-30 mm long; capsule cylindric, curved, with a distinct spherical protuberance at the base (struma). ●Moist to wet soil, rocks, and rotting wood, streamside, wet meadows, in the mountains.

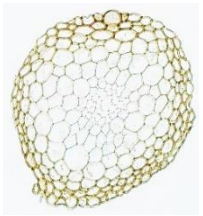
NM, Colfax Co., For. Rd. 76 near Osha Pass Rd., 1 Jul 1979, *Wm.F. Mahler* (BRIT).

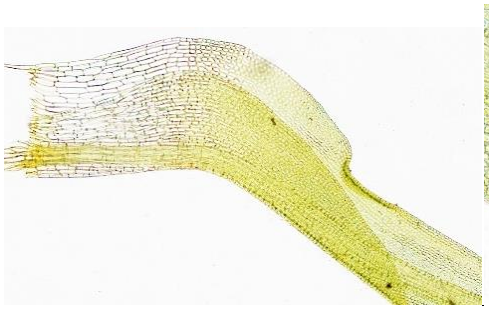
Symblepharis [a united fringe].

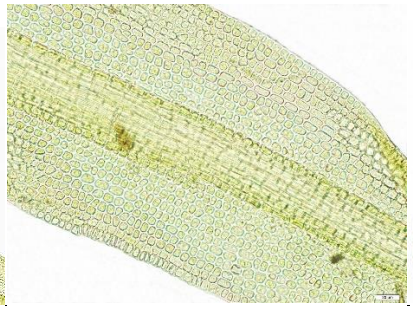
Symblepharis vaginata (Hooker) Wijk & Margadant [sheathed] [*Didymodon vaginatus* Hooker ex Harvey, *Symblepharis helicophylla* Montagne]. Acrocarpous, in dense, shining, yellowish tufts, the stems 1-3 cm long; leaves crisped and tortuose when dry, 6-7 mm long, the sheath broader at the shoulders than at the base, the margins plane, coarsely toothed distally, with 2-stratose patches; proximal cells elongate-rectangular to linear, thin-walled, clear; distal cells short-rectangular to subquadrate, thick-walled, 1-stratose; seta single or sometimes in clusters of 2-4; capsule cylindric, smooth to irregularly striate when dry, not strumose. ●Rotting logs and bark; mountains.





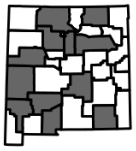






NM, Grant Co., Pinos Altos Range, Signal Peak, 2 Apr 2011, *Kleinman et al.* (SNM).

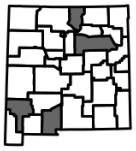
Rhytidium [wrinkled].



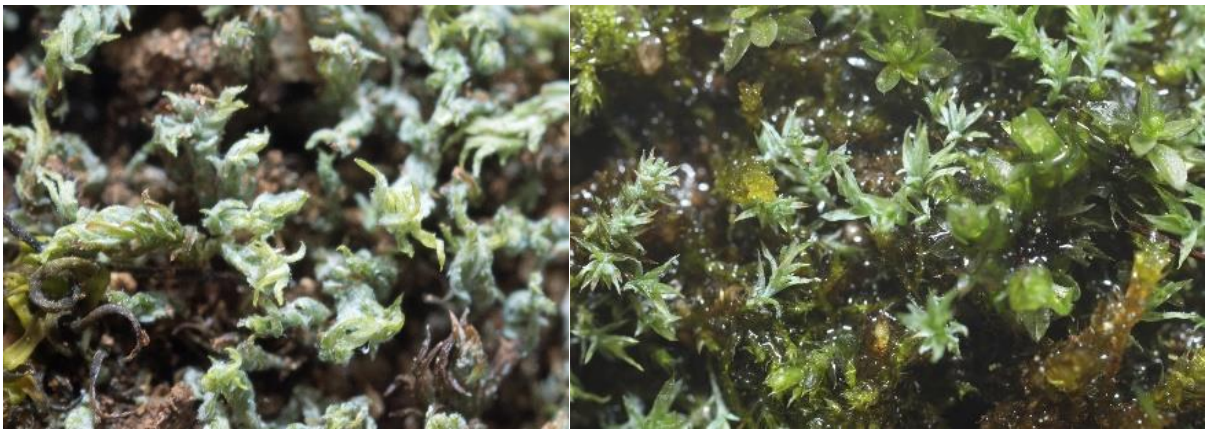
Rhytidium rugosum (Hedwig) Kindberg [abundantly wrinkled] [*Hypnum rugosum* Hedwig]. Pleurocarpous, in large, loose, golden mats, the stems to 10 cm long, lacking paraphyllia but with pseudoparaphyllia, the branches often hooked-tipped; leaves 2.8-4.5 mm long, falcate-secund, obscurely plicate, strongly rugose, the margins revolute, entire to serrulate distally; costa single or 2-fid, reaching ⅔ the leaf length, often with a terminal spine; alar cells quadrate, numerous; laminal cells narrowly oblong to linear, coarsely prorate at distal ends. ●On rock or thin soil over rock; mountains. ♦Distinctive by the large golden mats and strongly wrinkled leaves.

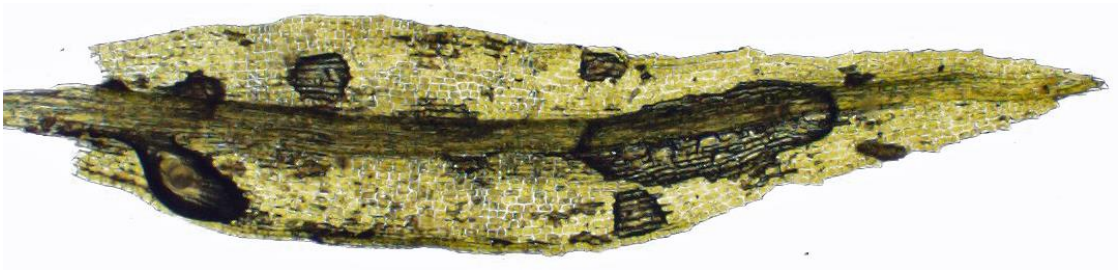
NM, Catron Co., Mogollon Mts, Willow Creek, 30 May 2011, *Kleinman & Blisard* (SNM).

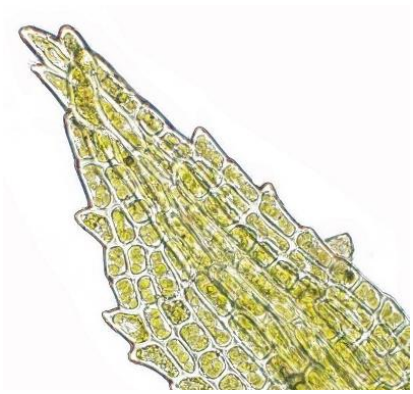
Saelania [for Anders Thiodolf Saelan (1834-1921), Finnish physician-botanist].

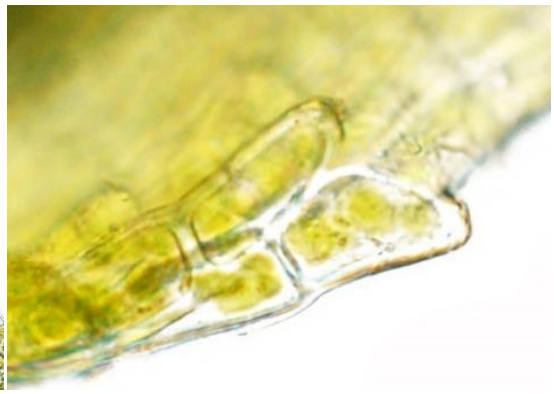


Saelania glaucescens (Hedwig) Brotherus [becoming glaucous] [*Didymodon trifarius* (Hedwig) Rohling, *Trichostomum glaucescens* Hedwig]. Acrocarpous, in bluish green tufts, the stems to 1.5 cm long, often shorter; leaves 1-3 mm long, somewhat flexuose of contorted when dry, scattered-2-stratose distally, with a cobwebby bluish coating, the margins plane, toothed distally; costa single, percurrent to short-excurrent, to ⅓ the leaf width at base; medial cells smooth, subquadrate to short-rectangular. ●Moist soil on steep banks, sheltered rock crevices; mountains and foothills. ♦Distinctive by the bluish leaves contorted when dry, covered with a cobwebby coating, and coarsely toothed.







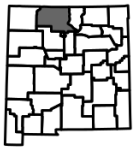


NM, San Miguel Co., Gallinas Canyon, 5 May 2019, *Kleinman & Blisard* (SNM).

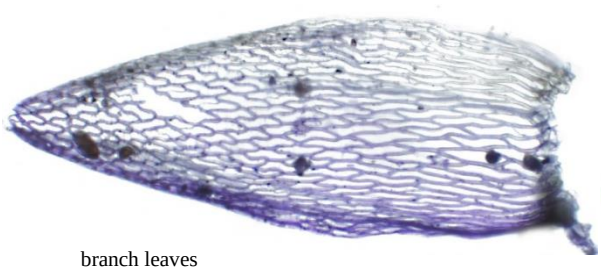
Sphagnum [an ancient Greek name for a kind of moss or lichen].

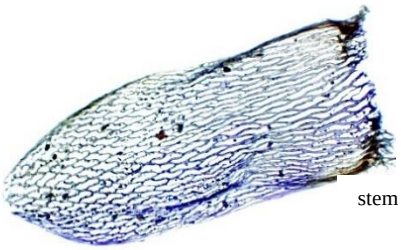
1 Stems green to reddish; stem leaves oblong-lanceolate, not fimbriate, the hyaline cells usually fibrillose in distal portion of leaf; plants somewhat reddish in the sun (greenish forms in shade), the clumps tight and congested .... ***S. capillifolium***

1 Stems pale green to straw-colored; stem leaves fan-shaped, fimbriate, the hyaline cells efibrillose; plants greenish, yellowish, to brownish in the sun, not reddish, the clumps a bit loose and scraggly .....***S. fimbriatum***



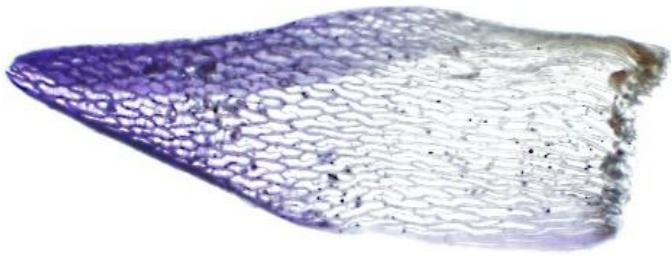
Sphagnum capillifolium (Ehrhart) Hedwig [with thread-like leaves] [*Sphagnum palustre* Linnaeus var. *capillifolium* Ehrhart]. Cladocarpous, in compact, greenish, yellowish, to reddish mounds, the stems with a central strand, lacking rhizoids, the branches in fascicles, the short apical branches forming a dense capitulum; leaves 1-stratose, dimorphic, the stem leaves hyaline, oblong-lanceolate, not fimbriate; hyaline cells usually fibrillose in distal portion of the leaf. ●Known only from fens in the Canjilon Lakes area of the Tusas Mountains.

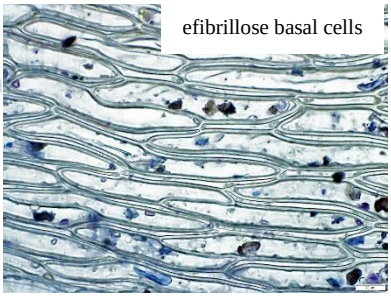




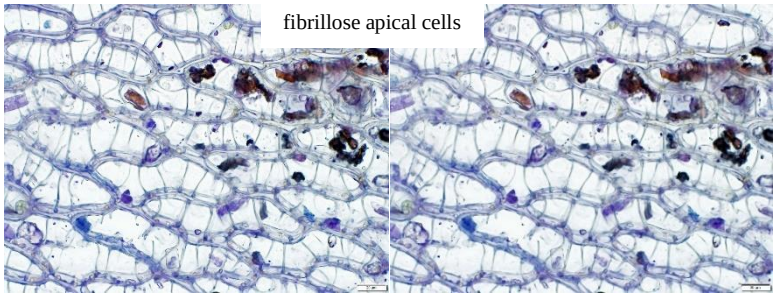
stem leaf

branch leaves





efibrillose basal cells

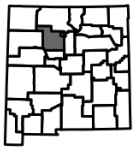


fibrillose apical cells

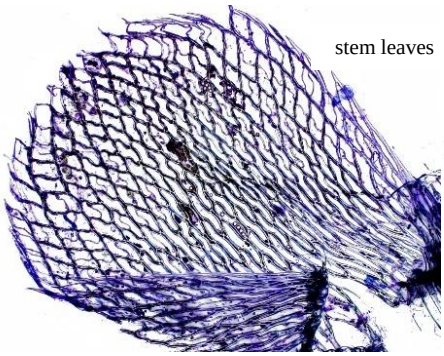
x-section stem leaf

NM, Rio Arriba Co., north of Canjilon Lakes, 16 Jun 2021, *Kleinman et al.* (SNM).

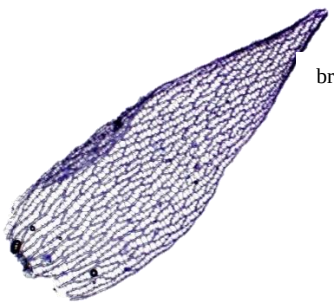
Sphagnum fimbriatum Wilson [finged]. Cladocarpous, in compact, greenish mounds, the stems with a central strand, lacking rhizoids, the branches in fascicles, the short apical branches forming a dense capitulum; leaves 1-stratose, dimorphic, the stem leaves hyaline, spatulate, 1-2 mm long, strongly fringed across the broad apex and often part way down the margins; hyaline cells lacking interior fibrils, often 1-2-septate. ●Known only from a heavy mineral fen in the Jemez Mountains.

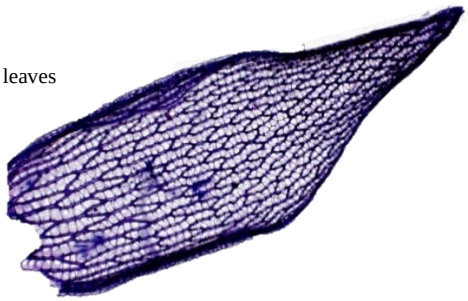


stem leaves



branch leaves





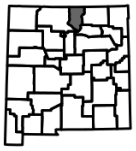
branch x-section

NM, Sandoval Co., Valles Caldera Nat. Pres., Alamo Canyon, 22 Jun 2019, *Kleinman et al.* (SNM).

Tayloria [for Thomas Taylor (1775-1848), British physician-botanist].

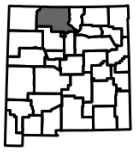
1 Exostome teeth 16, split into 32 filaments, which are rolled tightly inside the urn when moist, loosely rolled and reflexed when dry; leaf apex drawn out to an acuminate apex; leaf margins indistinctly bordered by yellowish cells; axillary club-shaped hairs present ..... ***T. acuminata***

1 Exostome teeth 16, not split into filaments, not rolled inside the urn when moist, reflexed when dry; leaf apex acute, not drawn out to an acuminate apex; leaf margins not bordered as above; axillary club-shaped hairs absent . ***T. serrata***

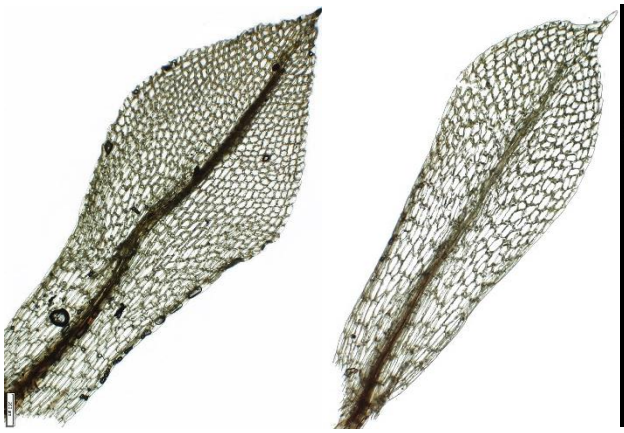


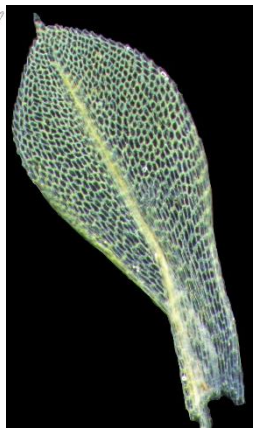
Tayloria acuminata Hornschuch [with a long tapering point]. Acrocarpous, in loose green tufts 5-10 mm high; leaves crowded at stem and branch apices, about 3 mm long, with axillary club-shaped hairs in the upper leaves, these 2-4 cells long, papillose, the basal cells reddish, the apices long-acuminate, the margins toothed distally; costa ending several cells before the apex; distal cells oblong-hexagonal, 1.5-2.5:1; seta yellow, red in age, 6-15 mm long; capsules with a prominent neck below the urn; specialized asexual reproduction by rhizoidal gemmae. ●On damp to wet humus, rotten wood, and soil rich in organic matter; northern mountains; known from few collections. ♦Distinctive by the acuminate leaves, club-shaped axillary hairs, and split exostome teeth.

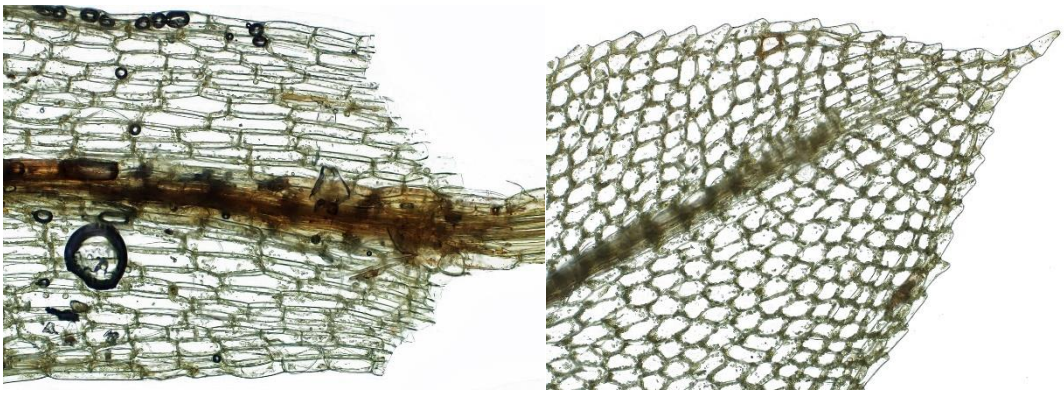
NM, Taos Co., Taos Ski Area lift, 24 Jul 2014, *Kleinman et al.* (SNM).



Tayloria serrata (Hedwig) Bruch & Schimper [toothed] [*Splachnum serratum* Hedwig]. Acrocarpous, in green tufts 5-30 mm high; leaves loosely arranged on the stems, 2-5 mm long, lacking axillary hairs, the margins toothed distally, the apices obtuse to somewhat acuminate; costa ending several cells before the apex; seta yellow to dark red or brown, 10-30 mm long; capsules with a prominent neck below the urn; specialized asexual reproduction by rhizoidal gemmae. ●Organic animal material and humus; known from a single collection. ♦Distinctive by the lack of axillary hairs, acute leaves, and exostome teeth not split into segments.



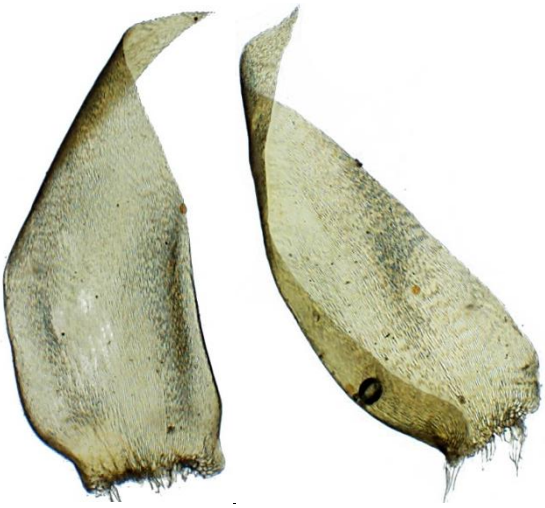


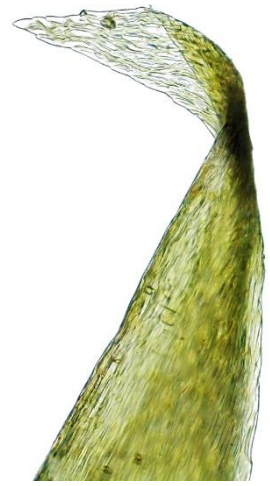


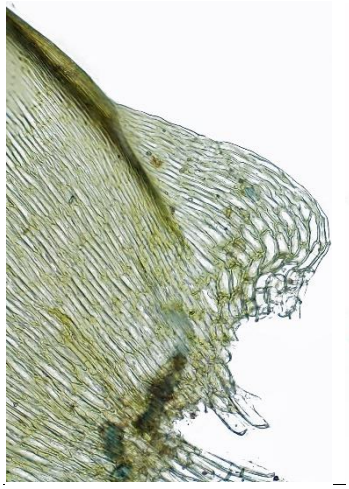
Canada, British Columbia, Kootenai Lake, 5 Aug 1960, *S. Flowers* (COLO).

Stereodon [a hard tooth].

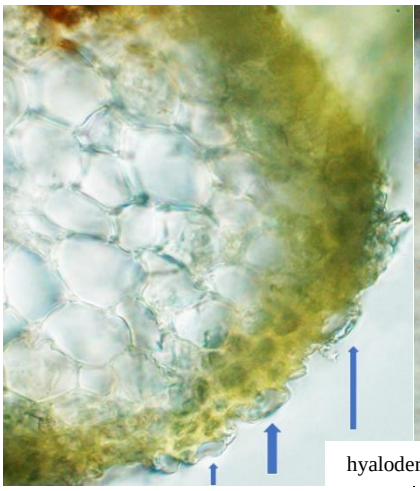
Stereodon pratensis (Koch ex Spruce) Loeske [of meadows] [*Breidleria pratensis* (Koch ex Spruce) Loeske, *Hypnum pratense* Koch ex Spruce]. Pleurocarpous, in pale green to somewhat golden mats, the stems to 2 cm long, flattened, sometimes unbranched, with a hyalodermis, central strand, and narrow pseudoparaphyllia, lacking paraphyllia; leaves straight to falcate, not or weakly secund, 0.5-2 mm long, the bases decurrent, the margins plane, entire; costa double, short; alar region not well-defined, the cells subquadrate, thin-walled, somewhat enlarged but not particularly balloon-inflated, with a gradual transition to the cells immediately above; median cells narrowly linear. ●Wet meadows, boggy ground, high elevations; not yet known from New Mexico, but reported for Colorado and perhaps to be found in the northern mountains. ♦So far, all New Mexico plants identified as *Stereodon pratensis* have belonged to either *Calliergonella lindbergii* or other hypnaceous species.



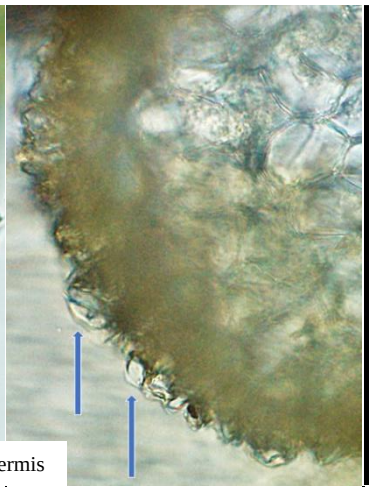




pseudoparaphyllium



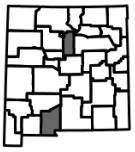
hyalodermis

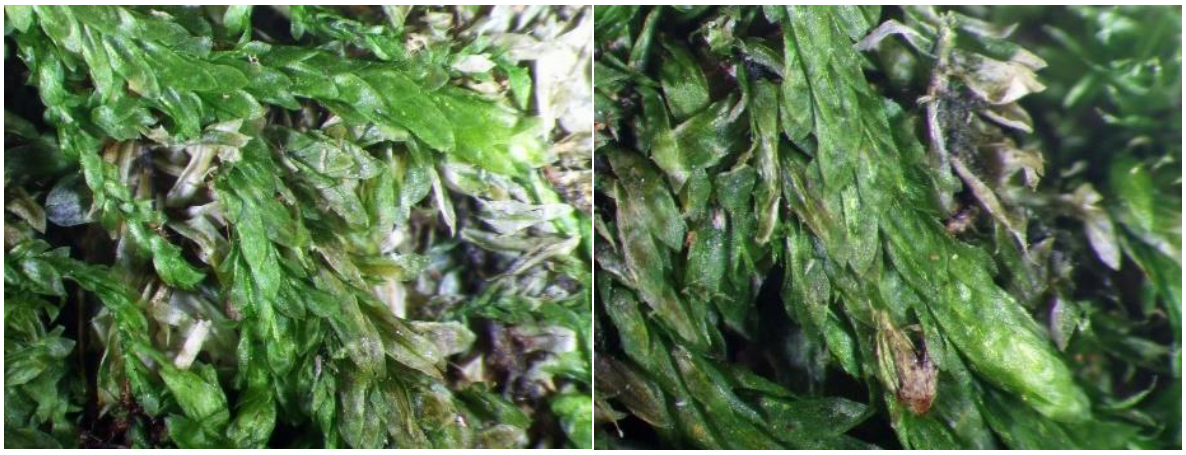


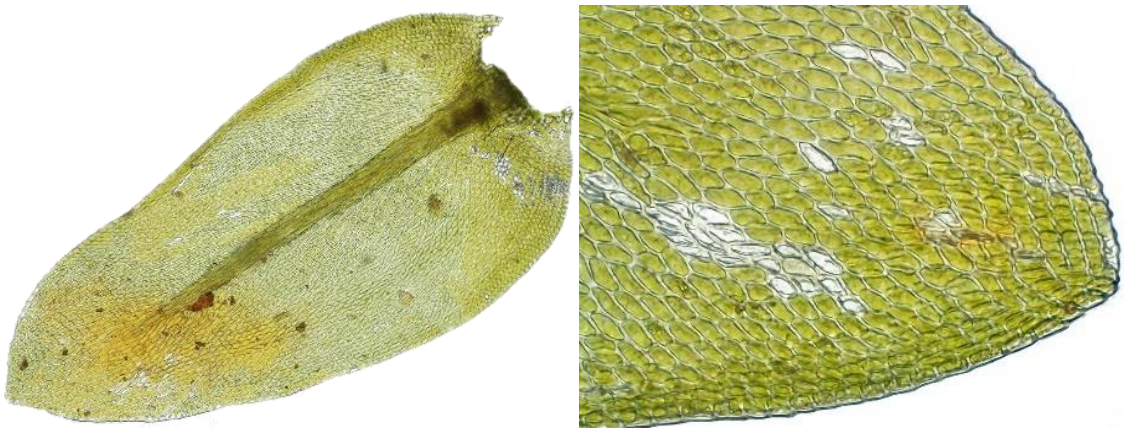
Canada, Alberta, north of Edmonton, 18 Sep 1980, *D.H. Vitt* (COLO).

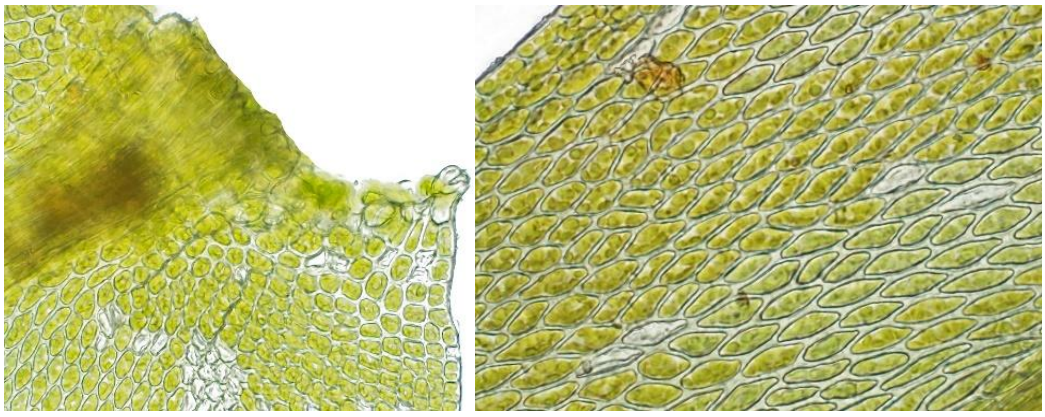
Stereophyllum [stiff-leaved].

Stereophyllum radiculosum (Hooker) Mitten [with abundant rhizoids] [*Hookeria radiculosa* Hooker, *Homalia wrightii* Sullivant, *Stereophyllum wrightii* (Sullivant) Renauld & Cardot]. Pleurocarpous, in yellow-green mats, the shoots complanate, little-branched; leaves 1-2.5 mm long, not plicate, the apices abruptly acute, the margins plane, entire to serrulate near the apex; costa ⅔-¾ the leaf length; medial and distal cells quadrate to rhomboidal, thick-walled, 1-papillose over the lumen or rarely smooth. ●On wood, exposed roots, stumps, occasionally rock; in the mountains; known only from two very old collections; perhaps now extirpated. ♦Distinctive by the complanate-foliate shoots, single costa, and faintly 1-papillose cells.







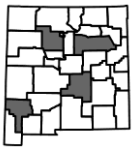


FL, Monroe Co., Pennekamp State Park, 10 Mar 2015, *K. Bisard* (SNM).

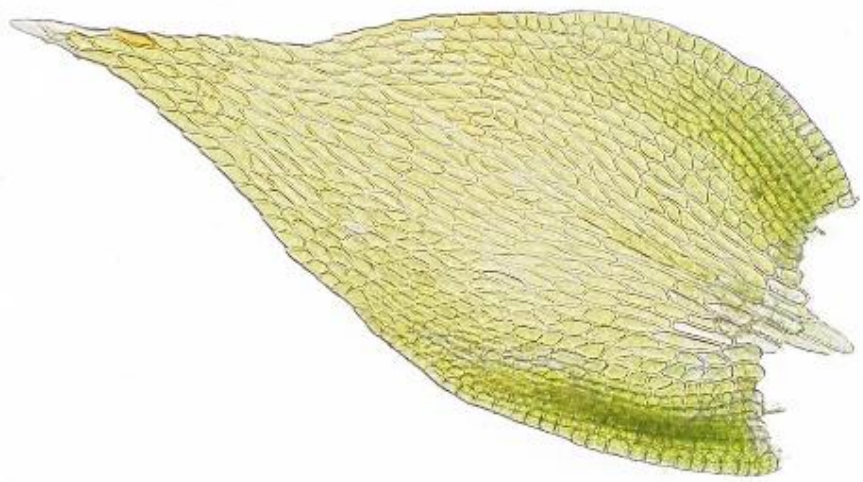
1 Shoots terete, the leaves pointing forward and surrounding the stem; leaf cells with micro-papillae (high magnification)..... **Leptopterigynandrum**

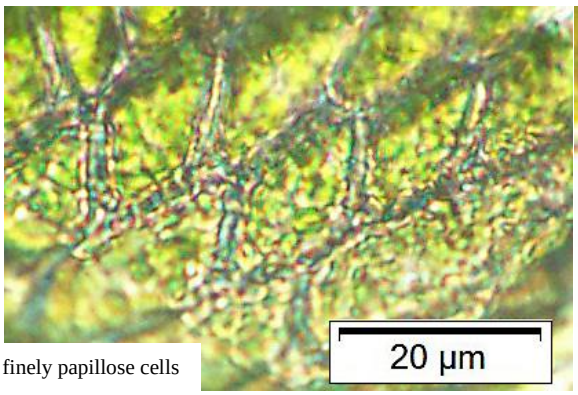
1 Shoots flattened, at least somewhat complanate, the leaves extending in flat sprays to both sides; leaf cells smooth.....**Taxiphyllum**

Leptopterigynandrum [a winged woman and man, alluding to the branches].

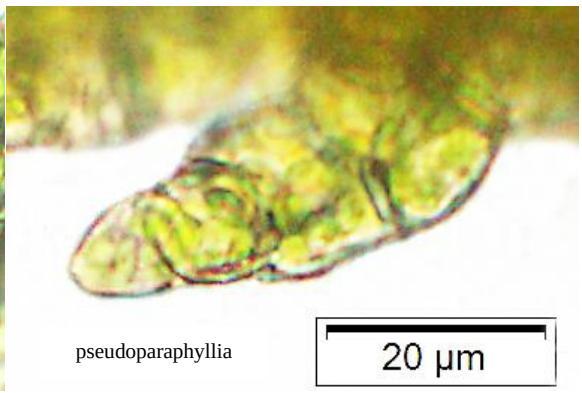


Leptopterigynandrum austroalpinum Müller [of southern mountains] [*Haplocladium austroalpinum* (Müller Hal.) Brotherus]. Pleurocarpous, in small, flat mats, the stems julaceous when dry, lacking paraphyllia but with foliose pseudoparaphyllia; leaves strongly appressed when dry, not catenulate, not plicate, to 2 mm long, the margins plane, entire to serrulate distally, lacking a hair-point; costa forked, to ½ leaf length; laminal cells 2-3:1, with numerous exceedingly fine papillae (oil immersion). ●On rock and soil in crevices. ♦Easily confused with *Pseudoleskeella tectorum*, and probably more common than records indicate.





finely papillose cells



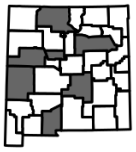
pseudoparaphyllia

NM, Lincoln Co., Three Rivers Trail at Fall Creek, 25 Feb 2015, *Kleinman et al.* (SNM).

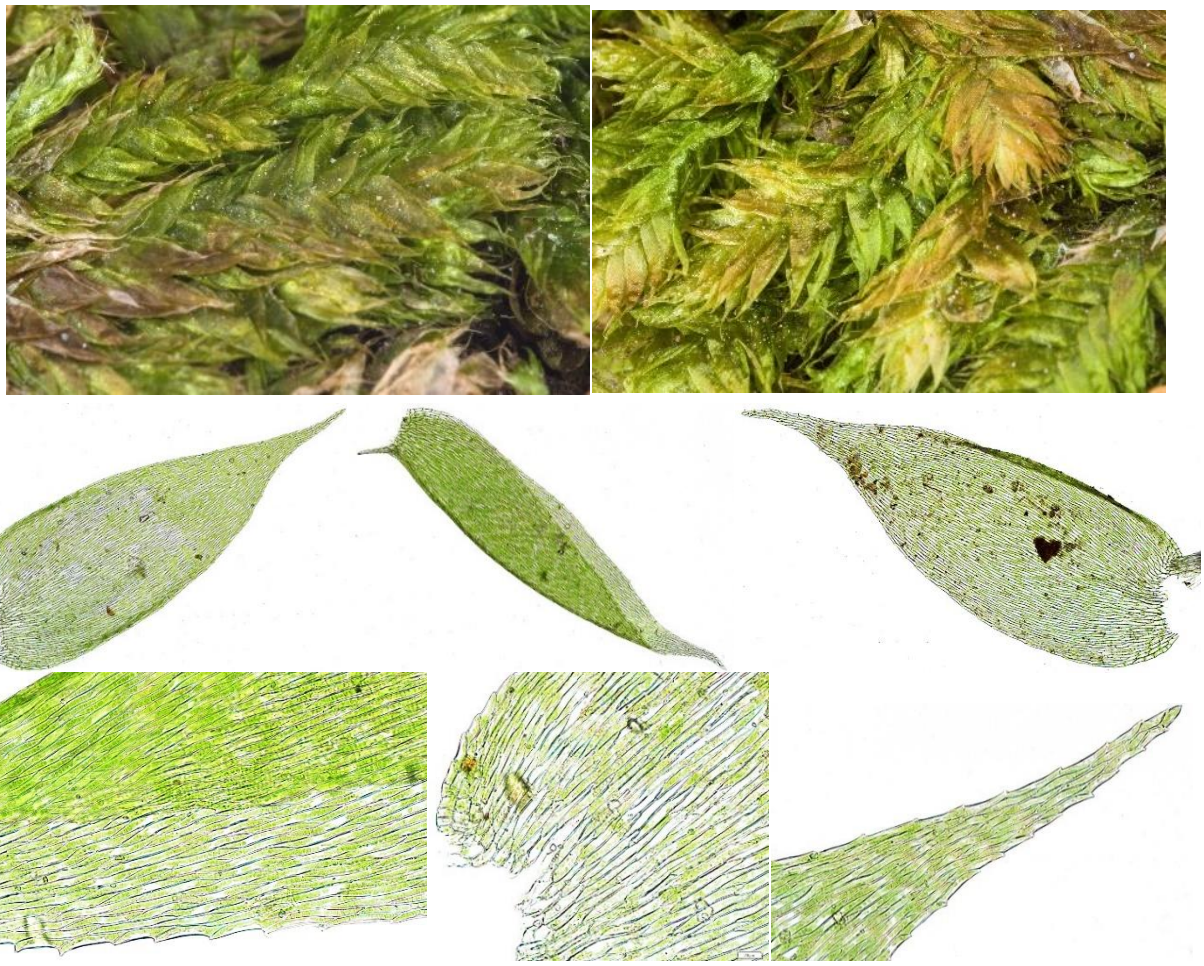
Taxiphyllum [leaf arrangement].

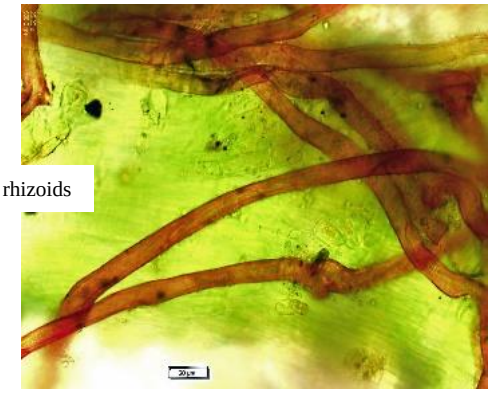
1 Leaves appressed-imbricate and conspicuously overlapping, never squarrose, the margins plane or rarely recurved basally .....***T. deplanatum***

1 Leaves rather remote, if overlapping then not appressed, commonly squarrose, the margins recurved to mid-leaf..... .....***T. taxirameum***

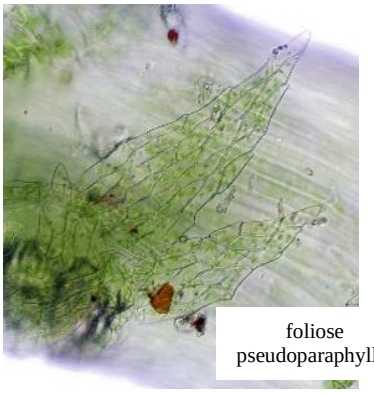


Taxiphyllum deplanatum (Bruch & Schimper ex Sullivant) Fleischer [flattened] [*Hypnum deplanatum* Bruch & Schimper ex Sullivant]. Pleurocarpous, in light green to yellowish mats, the stems to 4 cm long, complanate-foliate; leaves appressed-imbricate, 1-2 mm long, the margins plane or recurved only basally, serrulate; costa double and very short, sometimes obsolete; alar cells quadrate to short-rectangular; laminal cells smooth. ●On shaded soil and rock, among roots, rotten logs; mountains and El Malpais lava flow.





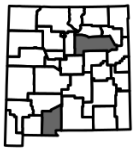
smooth rhizoids

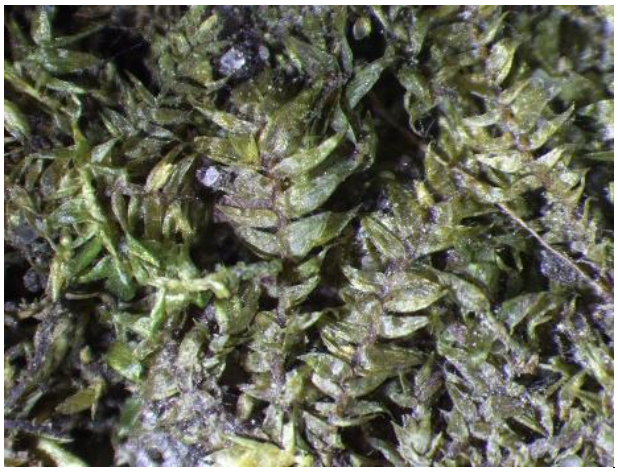


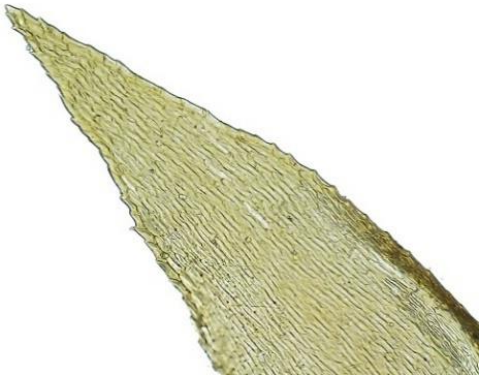
foliose pseudoparaphyllia

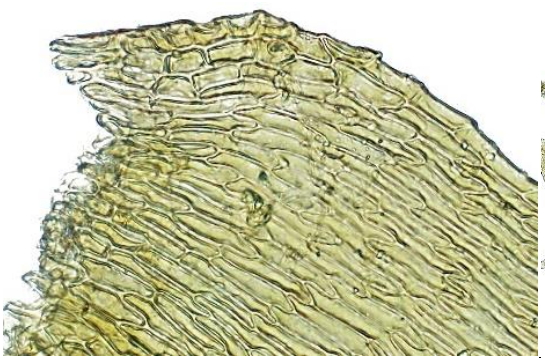
NM, Grant Co., Cliff Dwellings Nat. Mon., Cliff Dweller Canyon, 29 Oct 2011, *Kleinman & Blisard* (SNM).

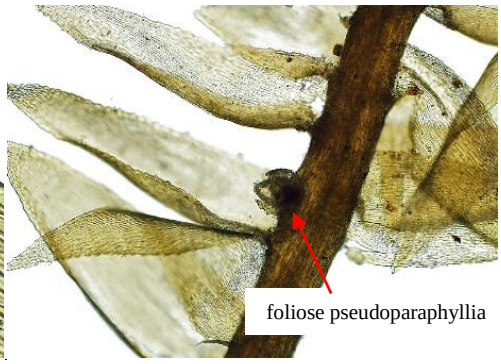
Taxiphyllum taxirameum (Mitten) Fleischer [pertaining to the leaf arrangement] [*Stereodon taxirameus* Mitten]. Pleurocarpous, in dark green to yellowish mats, the stems to 6 cm long, complanate-foliate; leaves wide-spreading to squarrose, usually distant, 1-2 mm long, the margins narrowly recurved almost to the apex, sometimes plane, serrulate throughout; costa double and short, sometimes obsolete; alar cells short- to long-rectangular; laminal cells smooth, prorulose at distal ends on abaxial surface. ●Shaded soil and rock; mountains and foothills; known from few collections.







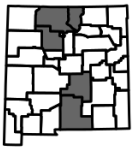


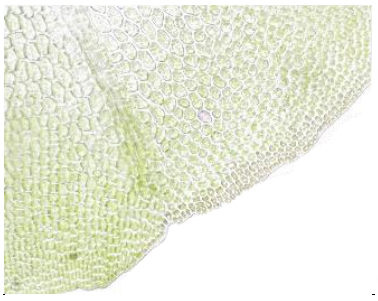


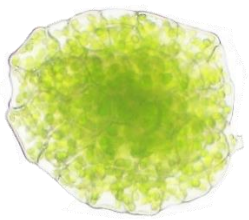
WI, Grant Co., Wyalusing State Park, Bluff Trail, 21 Apr 1991, *Norris & Dassler* (SNM).

Tetraphis [4-parted].

Tetraphis pellucida Hedwig [clear]. Acrocarpous, in scattered patches, the stems 1-1.5 cm long; leaves 1-3 mm long, keeled, plane, entire, pellucid when moist, the distal-most leaves forming a terminal rosette of rounded bracts on sterile stems; costa ending well before the apex; cells smooth, rounded-hexagonal to oblong proximally, thick-walled; gemmae stalked, borne in rosette splash cups; seta 6-17 mm long; capsule narrowly cylindric, brown or reddish brown, the peristome of 4 unsegmented teeth. ●Moist, decayed wood, stumps, and logs; shady sites in the mountains.







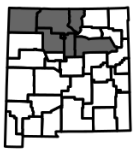
NM, Lincoln Co., Bonito Creek, 13 Jul 2015, *Kleinman et al.* (SNM).

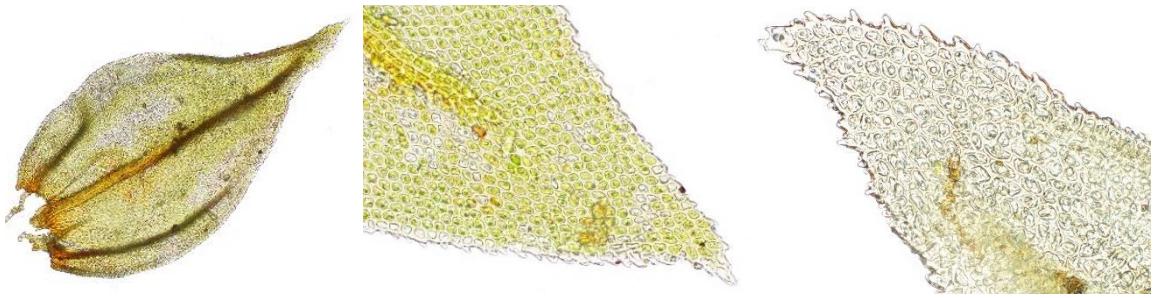
stalked gemma

1 Plants mostly 2- to 3-pinnate ..... **Thuidium**
1 Plants 1-pinnate
2 Laminal cells smooth; costa sinuose; paraphyllia absent; main stem and branches circinate-rolled when dry ..... **Herpetineuron**
2 Laminal cells 1-papillose; costa straight to curved; paraphyllia abundant; stems and branches not circinate-rolled when dry ..... **Abietinella**

Abietinella [resembling *Hypnum abietinum*].

Abietinella abietina (Hedwig) Fleischer [fir-like] [*Thuidium abietinum* (Hedwig) Schimper]. Pleurocarpous, in dense tufts or loose mats, yellowish green to brownish or sometimes darker, the stems ascending, to 12 cm long, regularly 1-pinnate, with abundant paraphyllia; leaves dimorphic; stem leaves 1-2 mm long, the margins recurved at least proximally, papillose-toothed; branch leaves 0.6-0.7 mm long, the margins plane; costa about ¾ leaf length; laminal cells 1-papillose on both surfaces. ●On dry rocks and sandy soil, in shady places in the mountains, often at the bases of rock faces.

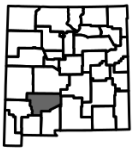


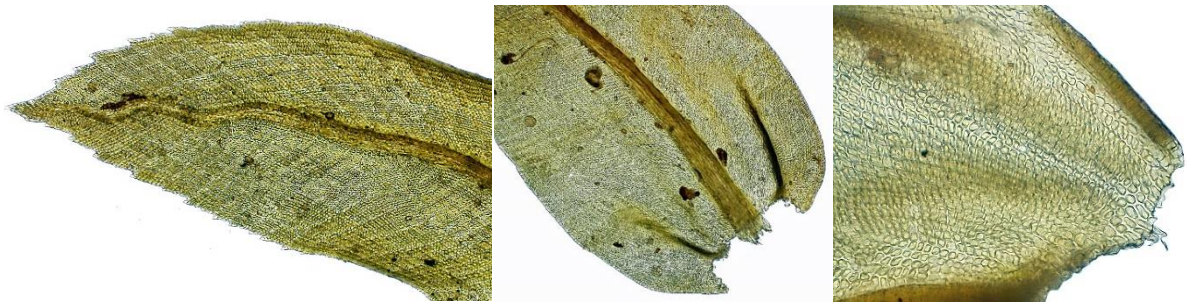


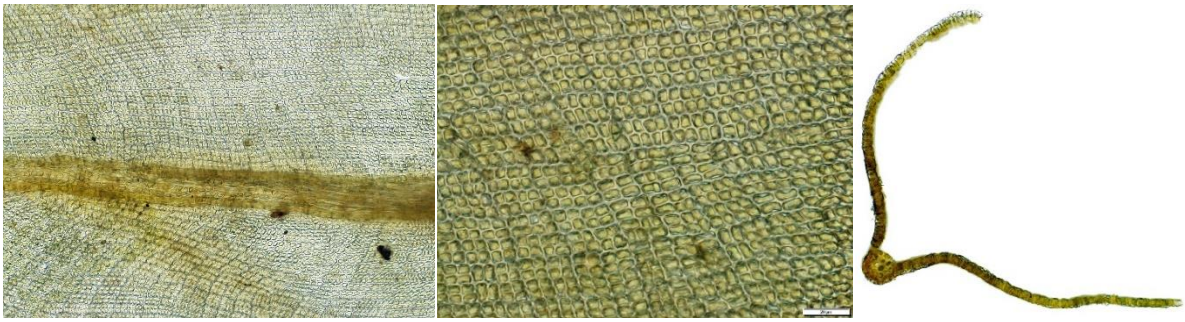
NM, Taos, near Sipapu Ski Area, 20 Jul 2014, *Kleinman et al.* (SNM).

Herpetineuron [a creeping nerve].

Herpetineuron toccoae (Sullivant & Lesquereus) Cardot [from Toccoa Falls, Georgia] [*Anomodon toccoae* Sullivant & Lesquereux]. Pleurocarpous, in straggly green to light brownish mats and shags, the stems with arcuate to circinate branches, often ending in flagellate strands, central strand well developed; leaves nearly tubular when dry, with a broad ovate base, the apex toothed; costa flexuose distally; medial cells rhombic to rectangular, smooth; capsules unknown in our region. ●On rock and tree bases, moist canyons; known from only two collections. ♦The coiled/circinate branches, smooth cells, and sinuous costa are diagnostic.





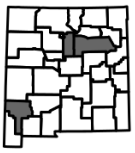


NM, Sierra Co., Black Range, along North Percha Creek, 8 Jul 1995, *R.D. Worthington* (COLO).

Thuidium [resembling *Thuja*].

1 Apices of stem leaves reflexed when dry, the acumen terminating in a uniseriate row of 2-8 hyaline cells; perichaetial leaves not ciliate or only rarely so ..... ***T. assimile***

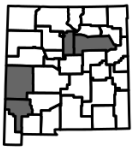
1 Apices of stem leaves not reflexed when dry, the acumen terminating in a single elongate cell; margins of perichaetial leaves sparsely ciliate ..... ***T. delicatulum***

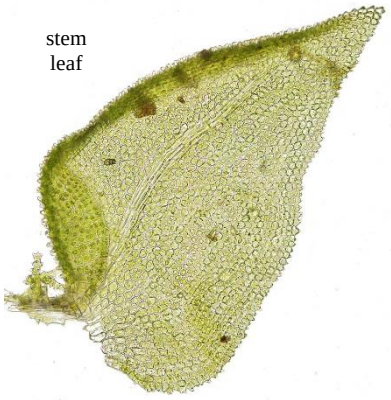


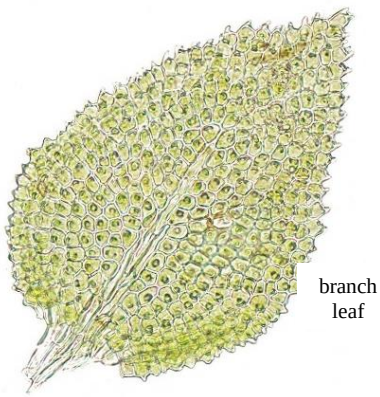
Thuidium assimile (Mittel) A. Jaeger [compared to *Thuidium delicatulum*] [*Leskea assimilis* Mitten, *Thuidium delicatulum* (Hedwig) Schimper var. *radicans* (Kindberg) Crum, Steere, & Anderson, *Thuidium philibertii* Limpricht, *Thuidium recognitum* (Hedwig) Lindberg var. *radicans* Kindberg]. Pleurocarpous, forming yellowish green mats, the stems arcuate, 2-3-pinnately branched, obscured by dense, simple to branched paraphyllia; stem leaves ± appressed with the apices reflexed when dry, plicate, tapering to a filiform apex, terminating in a uniseriate row of 2-8 hyaline cells, the margins sharply toothed from projecting cell ends; laminal cells 1-2:1, 1-papillose; branch leaves not terminating in a filiform hyaline tip; perichaetial leaves not ciliate. ●On moist rocks and cliff faces; in the mountains; known from few collections.

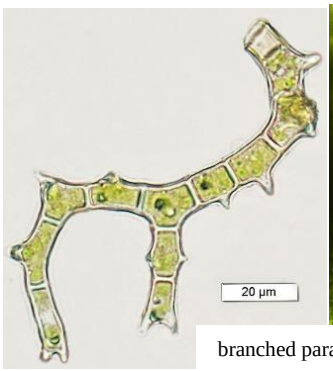
NM, San Miguel Co., Gallinas Canyon, 15 Jul 2021, *Kleinman et al.* (SNM).

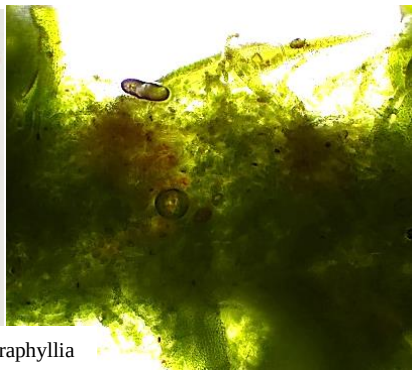
Thuidium delicatulum (Hedwig) Bruch & Schimper [pleasing, delicate] [*Hypnum delicatulum* Hedwig]. Pleurocarpous, forming green mats, the stems arcuate, 2-3-pinnately branched, obscured by simple to branched paraphyllia; stem leaves spreading to appressed, the apices seldom reflexed when dry, plicate, gradually or abruptly tapering to the apex of a single elongate, hyaline cell, the margins sharply toothed from projecting cell ends; laminal cells 1-2:1, 1-papillose; branch leaves similar but smaller; perichaetial leaves copiously ciliate. ●On moist rock and soil banks; in the mountains.









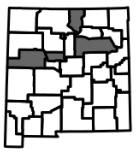


NM, Catron Co., Mogollon Mts, Willow Creek, 20 May 2011, *Kleinman & Blisard* (SNM).

Timmia [for Joachim Christian Timm (1734-1805), German botanist].

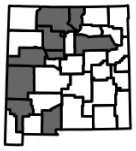
1 Leaf margins coarsely toothed only in the distal ⅓ or so; costa widening as it passes from basal sheathing portion of leaf into distal limb portion; limb abruptly and stiffly bent at about 45° from the sheath; moist leaves superficially resembling *Polytrichum* or *Polytrichastrum* in the field ..... ***T. austriaca***

1 Leaf margins coarsely toothed in the distal ½ or more; costa about the same width in basal and distal portions of leaf; limb curving gradually from the sheath and not stiffly bent at an angle; moist leaves superficially resembling *Atrichum* in the field ..... ***T. bavarica***



Timmia austriaca Hedwig [Austrian]. Acrocarpous, in dark green tufts or patches; leaves with a sheathing base and a spreading limb, the margins coarsely toothed in the distal ⅓ or so, the limb bent from the sheath at a sharp 45° angle; costa becoming wider as it passes from the sheath into the limb; distal cells irregularly quadrate, mammillose on the adaxial side, smooth on the abaxial side. ●On moist soil, rock crevices, under rock overhangs, tree roots, sometimes on exposed wet stream banks; mountains and foothills. ♦We find the oft-used distinction based on color of leaf sheath between this and *Timmia bavarica* to be confusing and untenable.

NM, Cibola Co., El Malpais Nat. Mon., AJ Tournaround Cave, 21 Jul 2016, *Kleinman et al.* (SNM).



Timmia bavarica Hessler [Bavarian] [*Timmia megapolitana* Hedwig var. *bavarica* (Hessler) Bridel]. Acrocarpous, in yellowish green tufts or patches; leaves with a sheathing base and a spreading limb, the margins coarsely toothed in the distal ½ or more, the limb curving gradually from the sheath and not sharply bent at an angle; costa about the same width in sheath and limb; distal cells irregularly quadrate, mammillose on the adaxial side, smooth on the abaxial side. ●On thin soil over rock, in rock crevices, under rock overhangs, on roots of trees; mountains and foothills. ♦We find the supposed distinction between this and *Timmia austriaca* based on leaf sheath color to be confusing and unusable.

NM, Grant Co., Rocky Canyon, along Northstar Road, 21 Nov 2012, *Kleinman et al.* (SNM).

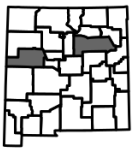
1 Plants leafy, with stems and leaves, the leaves one cell thick, without costa .....**Group A, Leafy Liverworts** (below)
1 Plants thallose or ribbon-like, lacking stems or leaves, the thallus with or without a midrib
2 Plants ribbon-like with distinct mid-rib and thin lamina, or with ruffled leaf-like lobes and purple rhizoids, or thalloid and translucent..... **Group B, Simple Thallose Liverworts** (p. 499)
2 Plants thalloid and opaque, multiple cells thick, with air pores, rhizoids, and/or scales present on ventral surface ..... **Group C, Complex Thallose Liverworts** (p. 504)

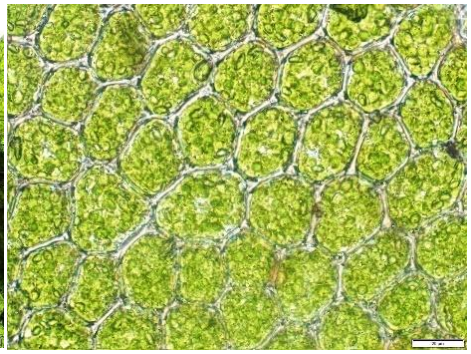
Group A: Plants leafy (leafy liverworts)

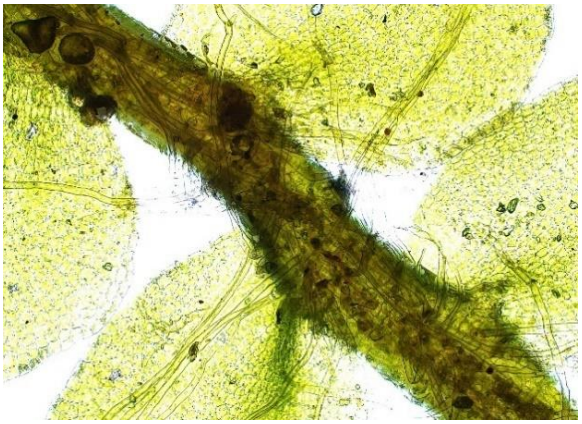
1 Leaves simple, not complicate-bilobed
2 Plants small, leaves divided nearly to base into thin fronds one cell thick..... BLEPHAROSTOMACEAE
2 Plants otherwise
3 Leaf insertion incubous, i.e., the upper (nearer the apex of the shoot) edge of the leaf overlaps the lower edge of the leaf above it..... LEPIDOZIACEAE
3 Leaf insertion succubous, i.e., the lower (farther from the apex of the shoot) edge of the leaf overlaps the upper edge of the leaf below it, or leaf insertion transverse
4 Leaves entire or sometimes 2-lobed
5 Underleaves bilobed with lateral teeth
6 Leaves deeply bilobed.....GEOCALYCACEAE
6 Leaves shallowly bilobed or entire .....LOPHOCOLEACEAE
5 Underleaves vestigial or inapparent
7 Leaf edges toothed, rhizoids scattered ..... PLAGIOCHILACEAE
7 Leaves entire, rhizoids dense
8 Mouth of perianth contracted, fringed with many-celled hairs.....ADELANTHACEAE
8 Mouth of perianth plaited, but not fringed
9 Leaves of well-developed sterile shoots circular or nearly so, widest at or near the middle..... SOLENOSTOMATACEAE
9 Leaves of well developed sterile shoots not circular, varying from rectangular to quadrate to ovate, distinctly longer than wide ..... JUNGERMANNIACEAE
4 Leaves 2-4-lobed
10 Plants very small (generally 1.5 mm wide or less)
11 Stem cortex with large clear cells (hyalodermis); leaves without oil bodies, ie small opaque intracellular storage bodies ..... CEPHALOZIACEAE
11 Stem cortex without hyalodermis; oil bodies present.....CEPHALOZIELLACEAE
10 Plants larger (generally larger than 1.5 mm wide)
12 Leaves with 3-4 lobes, underleaves present or absent.....ANASTROPHYLLACEAE
12 Leaves with 2 lobes, the underleaves generally obscure or absent
13 Leaves obliquely, almost horizontally inserted; underleaves present but obscured by rhizoids..... OBTUSIFOLIACEAE
13 Leaves transversely inserted
14 Uppermost leaves transversely inserted, crowded, forming a cabbage-like head; leaves 3-lobed, the lobes asymmetric (*Schistochilopsis*) ..... SCAPANIACEAE
14 Leaves do not form a cabbage-like cluster..... LOPHOZIACEAE
1 Leaves complicate-bilobed, i.e., one lobe lying over the other, forming a distinct keel
15 Dorsal lobe smaller, ventral lobe larger ..... SCAPANIACEAE
15 Dorsal lobe larger, ventral lobe smaller
16 Underleaves absent ..... RADULACEAE
16 Underleaves present
17 Underleaves entire; shoots pinnately branching ..... PORELLACEAE
17 Underleaves bilobed .....FRULLANIACEAE

Syzygiella [somewhat yoked].

Syzygiella autumnalis (A.P. de Candolle) Feldberg, Vana, Hentschel, & Heinrichs [of autumn] [*Jamesoniella autumnalis* (A.P. de Candolle) Stephani, *Jungermannia autumnalis* A.P. de Candolle]. Plants deep green, 2-3.5 mm wide, succubous, rarely branching, underleaves absent; leaves entire, unlobed, generally circular, oil bodies numerous; dioicous, bracts lancinate and common, perianth with ciliate mouth ●On rocks, logs, base of trees; known from few collections.





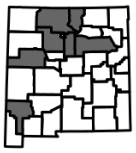


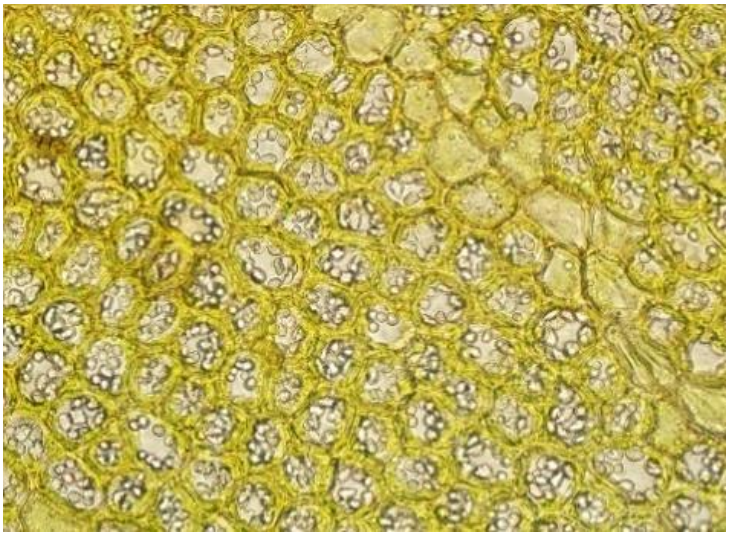
NM, Cibola Co., El Malpais Nat. Mon., 6 Feb 2017, *L. Baumann* (SNM).

1 Leaves mostly 2- or 4-lobed ..... **Barbilophozia**
1 Leaves mostly 3-lobed ..... **Neoorthocaulis**

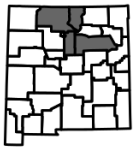
Barbilophozia [a bearded *Lophozia*].
1 Leaves without apiculi; underleaves 2-lobed with occasional cilia ..... ***B. barbata***
1 Leaves with apiculi; underleaves 2-lobed with prominent cilia
2 Usually with abundant red-orange gemmae ..... ***B. hatcheri***
2 Lacking gemmae ..... ***B. lycopodioides***

Barbilophozia barbata (Schmidel ex Schreber) Loeske [bearded] [*Jungermannia barbata* Schmidel ex Schreber]. Plants 2-4 mm wide, leaf insertion oblique; leaves broad, with 4 triangular lobes, gemmae rare; underleaves bilobed with acuminate lobes (no cilia); dioicous; perianth long exerted, cylindrical, contracted to a lancinate mouth. ●Often on rock outcrops.

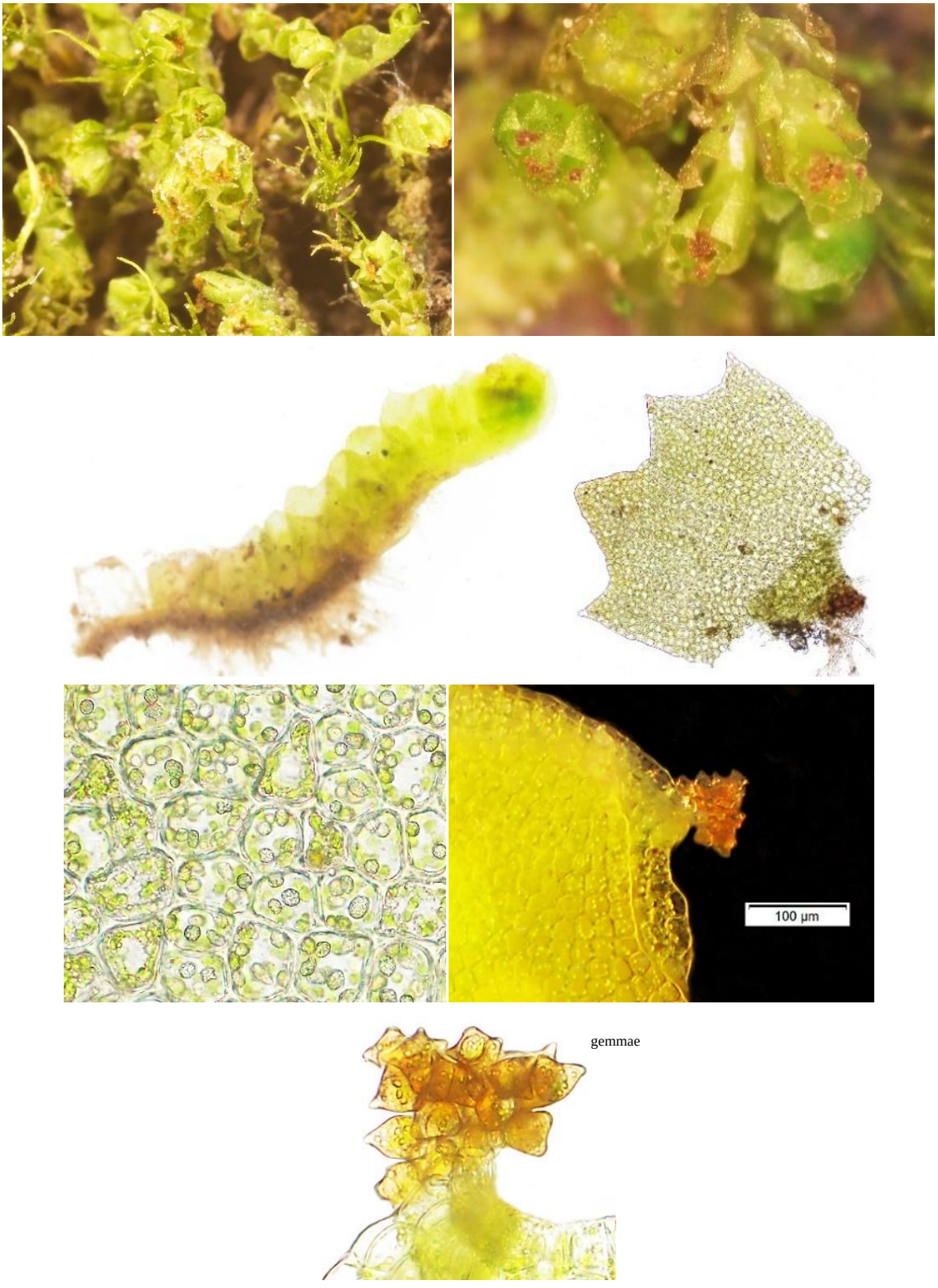




NM, Sierra Co., Black Range Trail, 6 Mar 2011, *Skinner et al.* (SNM).



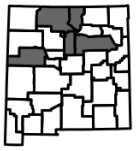
Barbilophozia hatcheri (A. Evans) Loeske [for John Bell Hatcher (1861-1904), American paleontologist] [*Jungermannia hatcheri* A. Evans]. Plants 1.5-2 mm wide, green to brownish, the leaf insertion succubous & oblique; leaves broad with 4 unequal lobes, with 1-3-celled apiculi at leaf tips, with long cilia at ventral bases; underleaves relatively large, irregular, ciliate; gemmae abundant on shoot tips, reddish-brown, angular; dioicous, perianth long-exerted and cylindrical, contracted to lancinate mouth. ●On rocks at high elevations.

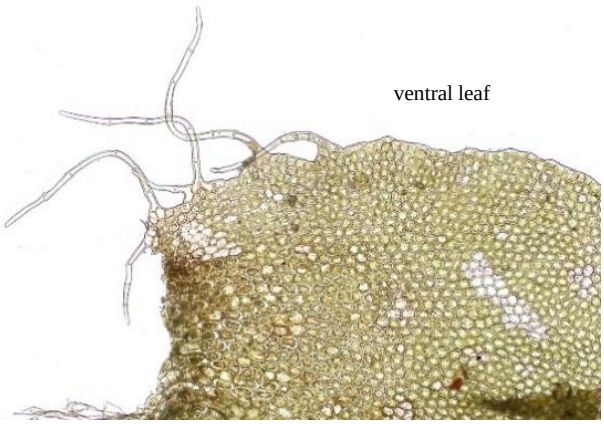


gemmae

NM, Taos, Taos Ski Valley, 24 Jul 2014, *Kleinman et al.* (SNM).

Barbilophozia lycopodioides (Wallroth) Loeske [resembling the genus *Lycopodium*] [*Jungermannia lycopodioides* Wallroth]. Plants large, 3.5-5 mm wide; leaves obliquely inserted, broad, 4-lobed with prominent 1-3-celled apiculi at the leaf tips; ventral leaf margins with 4-7 hair-like appendages; underleaves bilobed with numerous hair-like appendages; dioicous, with long-exerted cylindrical perianth. ●On rocks at high elevations.



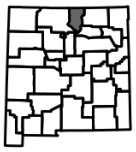


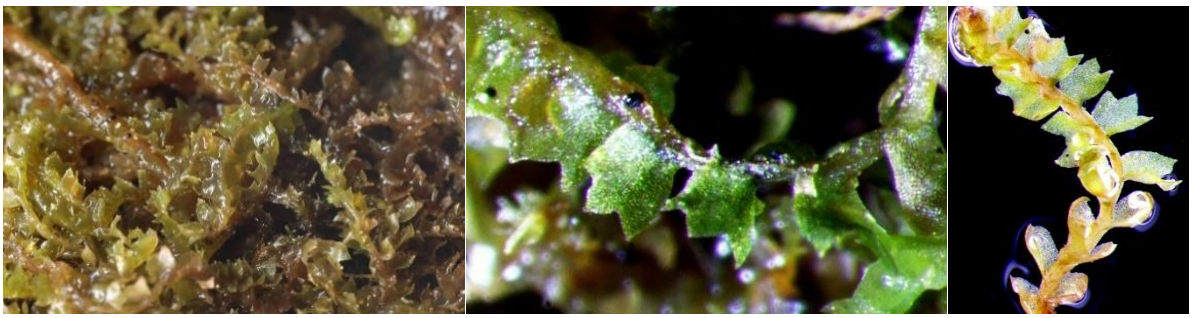
NM, Taos, Taos Ski Valley, 24 Jul 2014, *Kleinman et al.* (SNM).

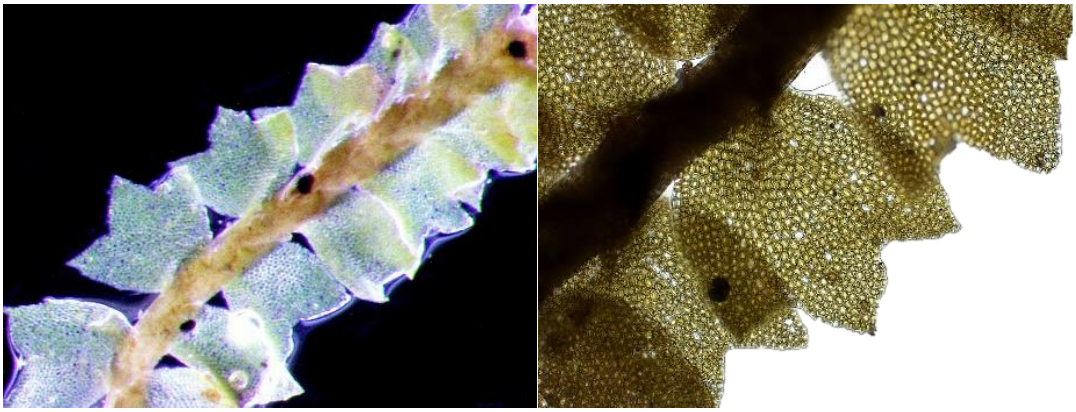
Neoorthocaulis [resembling *Orthocaulis*].

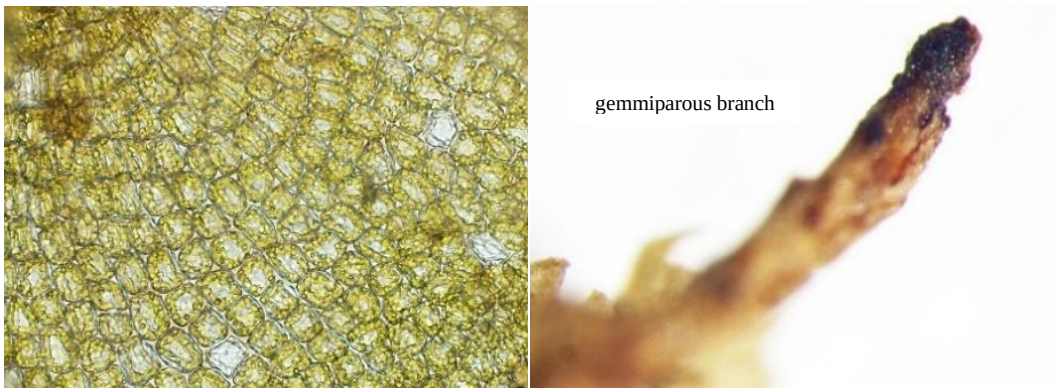
1 Underleaves not apparent.....***N. attenuatua***
1 Underleaves prominent.....***N. floerkii***

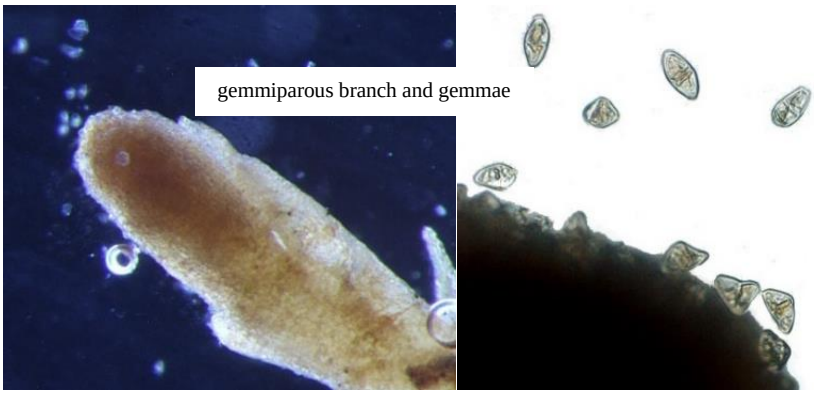
Neoorthocaulis attenuatus (Martius) L. Söderström [tapering] [*Barbilophozia attenuata* (Martius) Loeske, *Jungermannia quinquedentata* Hudson forma *attenuata* Martius]. Plants small, 0.7-1.5 mm wide, with succubous 3(2)-lobed leaves, the leaf bases lacking cilia; underleaves absent; numerous gemmiparous branches arise from apex of main shoots; gemmae green to reddish-brown, angular; dioicous; perianths terminal and long-exerted. ●Rocky outcrops at high elevations; known from a single collection.



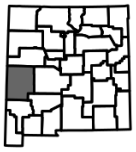




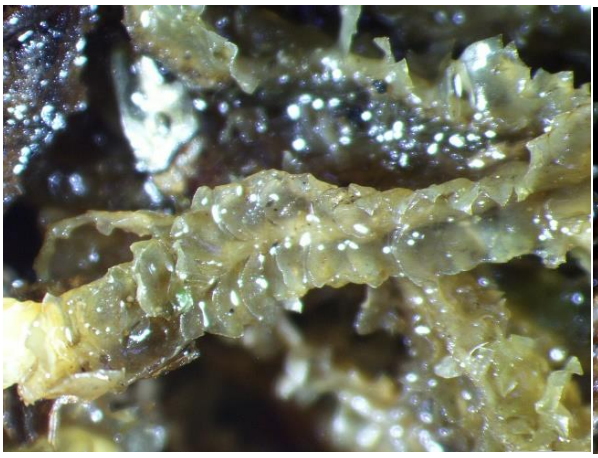


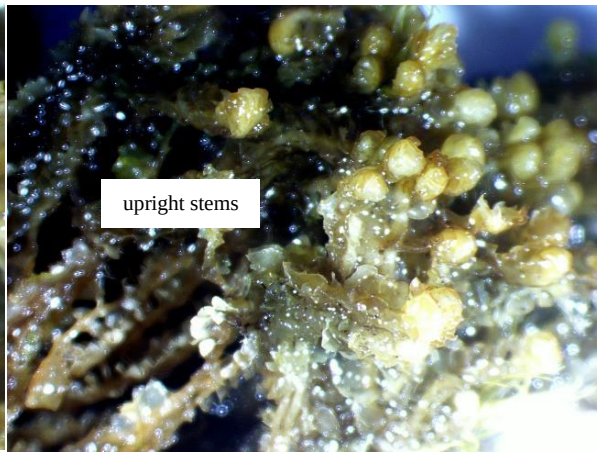


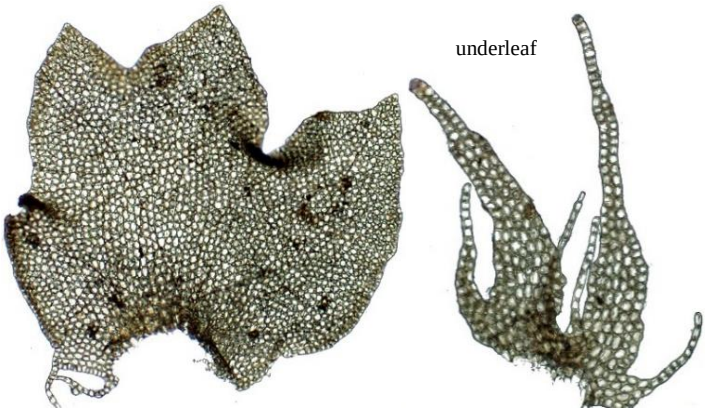
ME, Hancock Co., Tank Mt, Lake Salmon, 10 Jun 2013, *K. Blisard* (SNM).

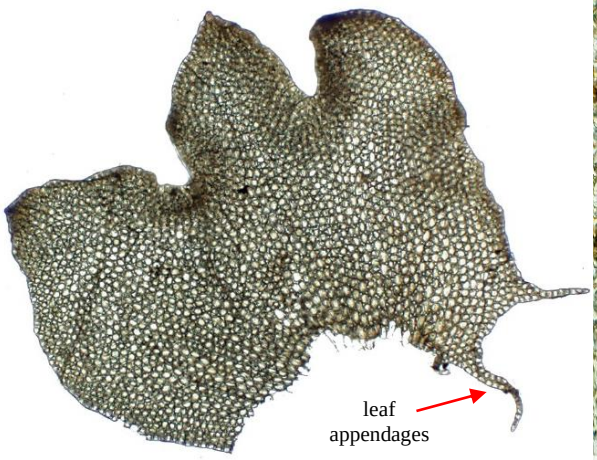


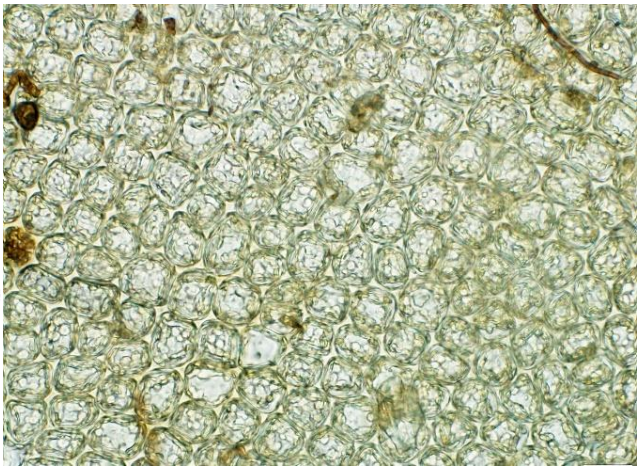
Neoorthocaulis floerkei (F. Weber & D. Mohr) L. Söderström, DeRoo, & Hedderson [for Heinrich Gustav Flörke (Floerke) (1764-1835), German clergyman-botanist] [*Barbilophozia floerkei* (F. Weber & D. Mohr) Loeske, *Jungermannia floerkei* F. Weber & D. Mohr]. Plants yellow to dark green, 1.8-3 mm wide, the leaf insertion essentially transverse; leaves 3-lobed; ventral leaf margins with several short appendages; underleaves distinct, bilobed, with thread-like appendages; dioicous; perianth long-exerted. ●Rocky cliffs and forest floor; known from a single collection.







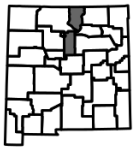


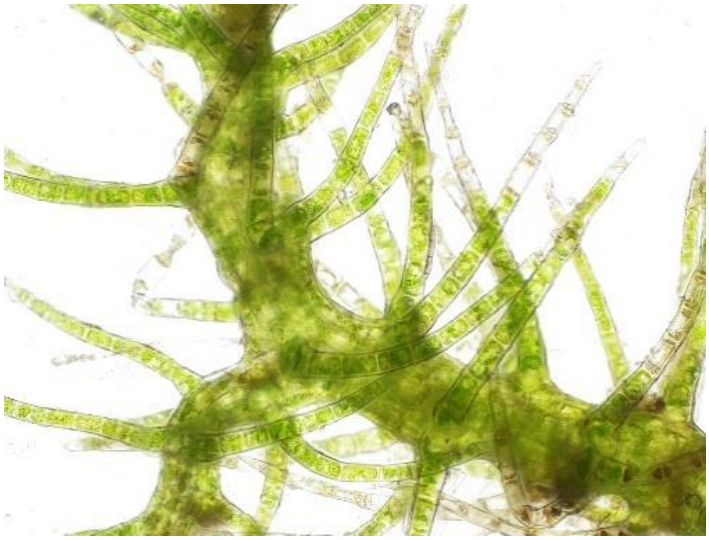


WA, Okanogan Co., Cutthroat Trail, 3 Aug 1981, *W. Hong* (COLO).

Blepharostoma [a fringed mouth].

Blepharostoma trichophyllum (Linnaeus) Dumortier [hair-leaved] [*Jungermannia trichophylla* Linnaeus]. Plants small, 0.7-0.8 mm wide, the leaf insertion transverse; leaves divided nearly to the base into thin, thread-like fronds one cell thick, the cells rectangular, often much longer than wide; underleaves with similar morphology, slightly smaller; pale green ovoid gemmae may be produced from leaf apices; monocious; perianth terminal on leading stem. ●Thin delicate mats on moist, shaded rocks, tree bases, or logs, often at high elevations; known from very few collections.



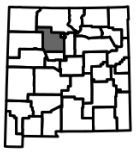


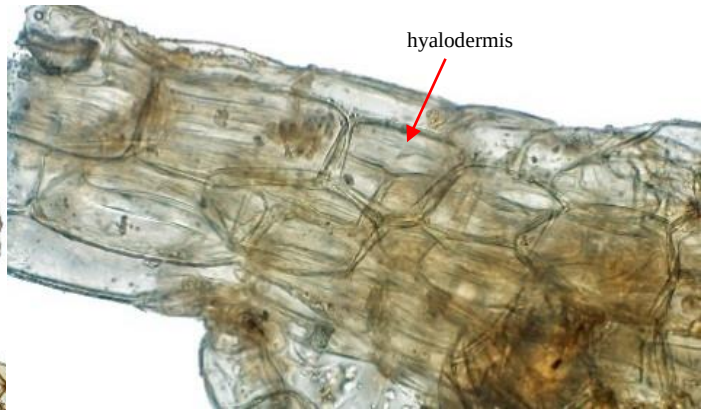
NM, Taos Co., Taos Ski Valley, 22 Jul 2014, *Kleinman et al.* (SNM).

1 Leaves entire; stems lacking a hyalodermis; oil bodies large and granular ..... **Odontoschisma**
1 Leaves 2-lobed; stems with hyalodermis (large pellucid cells on the outside of the stem); oil bodies absent
  2 Leaves orbicular, divided about ¼; gemmae common at the apices of short shoots ..... **Fuscocephaloziopsis**
  2 Leaves ovate, divided about ½ with two erect acute lobes; gemmae rare ..... **Cephalozia**

Cephalozia [a head bud].

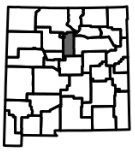
Cephalozia bicuspidata (Linnaeus) Dumortier [2-toothed] [*Jungermannia bicuspidata* Linnaeus]. Plants small, 0.6-1 mm wide, with transversely inserted, succubus leaves; stems with a hyalodermis (large, thin-walled outer cortical cells); leaves ovate, 10-16 cells wide, bilobed, each lobe acute, 6-9 cells wide at the base; underleaves lacking; cells lacking oil bodies; monoicous; antheridia in leaf axils on a separate branch; perianth long-exerted on a short ventral branch. ●On shady soil along streams and trails or on rocks; known from a single collection.



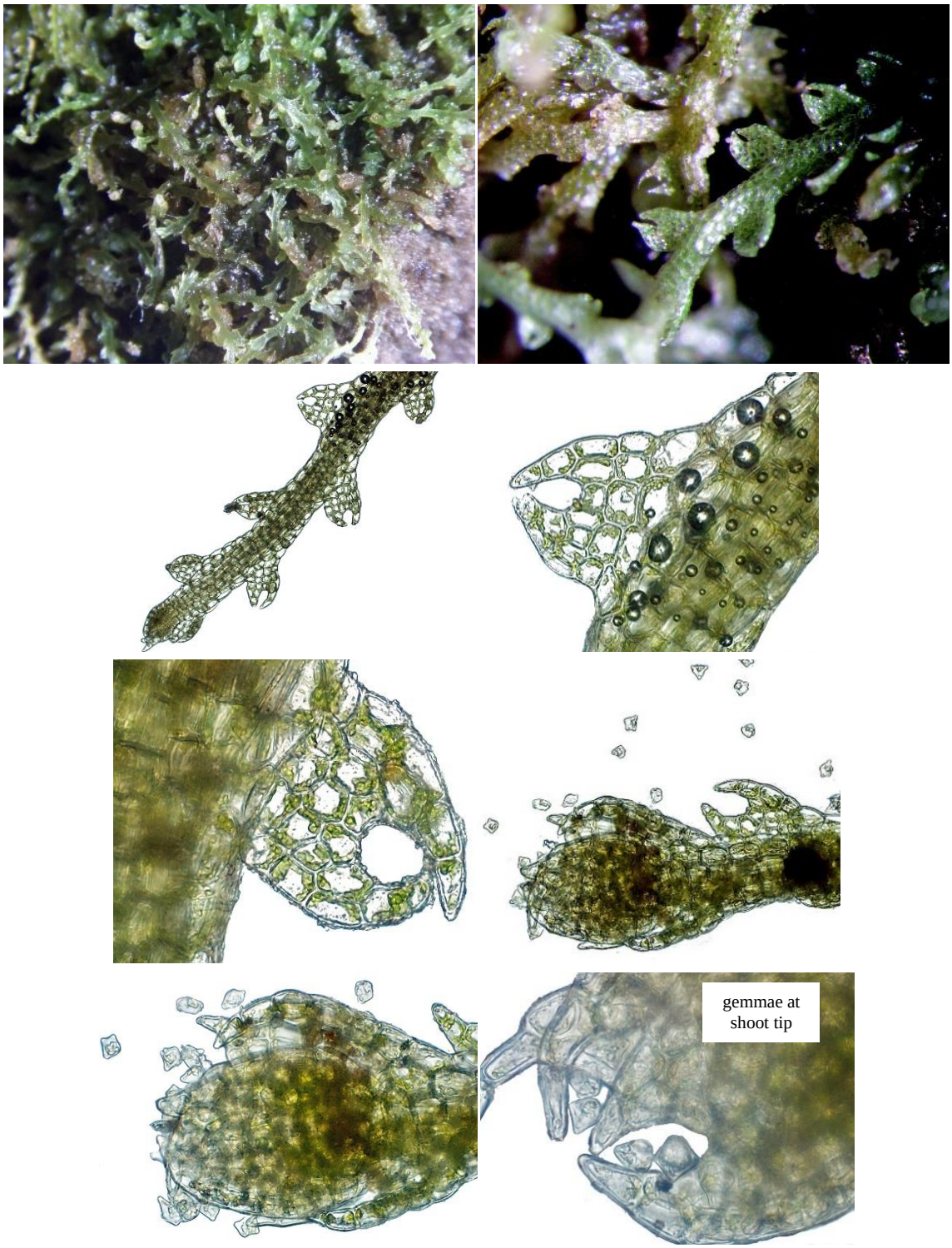


NM, Sandoval Co., Valles Caldera Nat. Pres., Alamo Canyon, 21 Jul 2009, *K. Romig* (SNM).

Fuscocephaloziopsis [resembling a dark *Cephalozia*].
1 Plants smaller (0.4-0.6 mm); stolons rare ..... ***F. lunulifolia***
1 Plants more robust (1-1.4 mm), fleshy; stolons common ..... ***F. pleniceps***

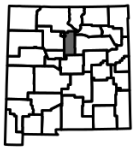


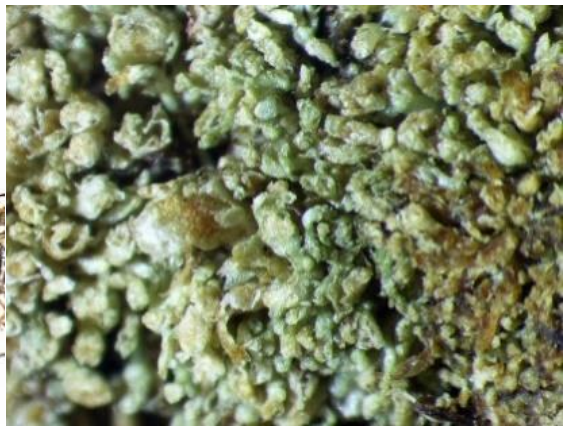
Fuscocephaloziopsis lunulifolia (Dumortier) Váňa & Söderström [with moon-like leaves] [*Cephalozia lunulifolia* (Dumortier) Dumortier, *Jungermannia lunulifolia* Dumortier]. Plants very small, 0.4-0.6 mm wide, in small patches; stems sparingly branched; hyalodermis present; leaves succubous with oblique to horizontal insertion; leaves circular in outline, bilobed, connivant, decurrent; underleaves absent; oil bodies absent; green gemmae frequently produced at shoot tips; dioicous; antheridia in leaf axils on a separate branch; perianth on a short ventral branch ●On a wide variety of substrates, soil, rock, logs; known from a single collection.

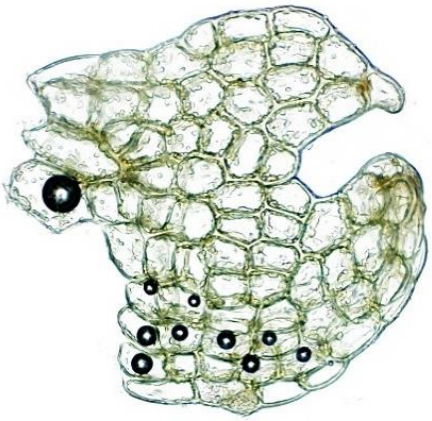


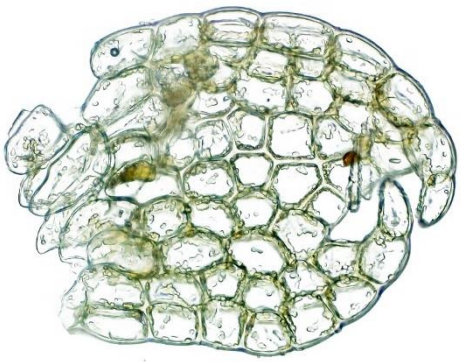
CA, Santa Cruz Co., Big Basin State Park, 29 Mar 2014, *Blisard* & *Kleinman* (SNM).

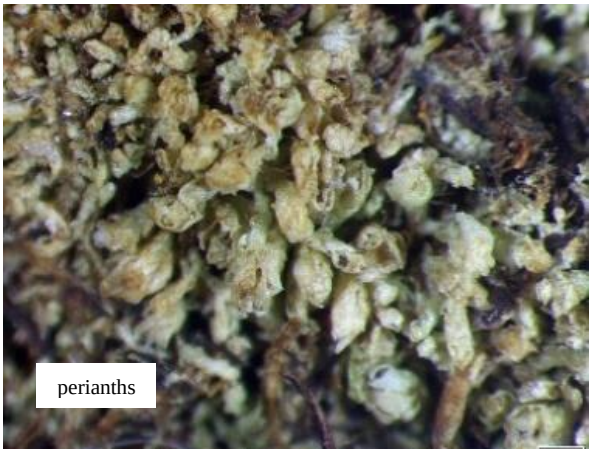
Fuscocephaloziopsis pleniceps (Austin) Váňa & Söderström [full-headed] [*Cephalozia pleniceps* (Austin) Lindberg, *Jungermannia pleniceps* Austin]. Plants very small, 0.3-0.5 mm wide; stem with hyalodermis; leaves succubous, obliquely to horizontally inserted, only slightly decurrent, bilobed with the divided part concave, the outline almost orbicular; hyalodermis present; underleaves absent; oil bodies absent; autoicous. ●On damp soil or shaded rocks or decaying logs; known from only two collections in 1920s.







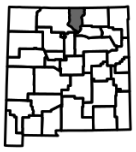




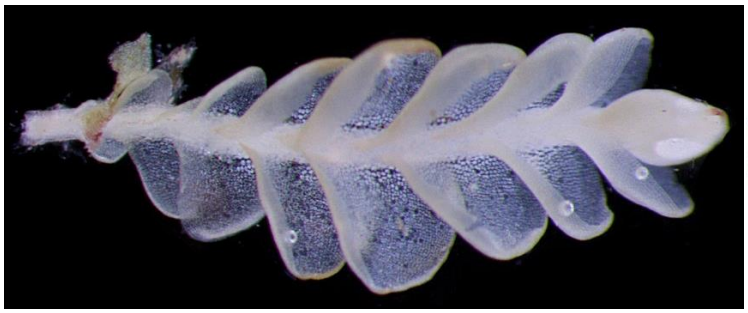
Canada, Manitoba, Churchill, 12 Jun 2019, *Blisard et al.* (SNM).

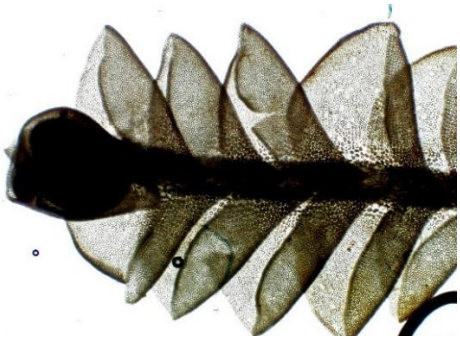
Odontoschisma [a split tooth].

1 Gemmae present on apices of small shoots; cell contours irregular ..... ***O. denudatum***
1 Gemmae rare; cell contours smooth ..... ***O. sphagni***

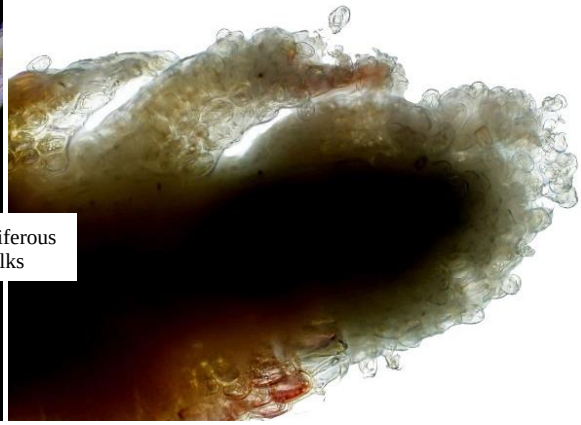


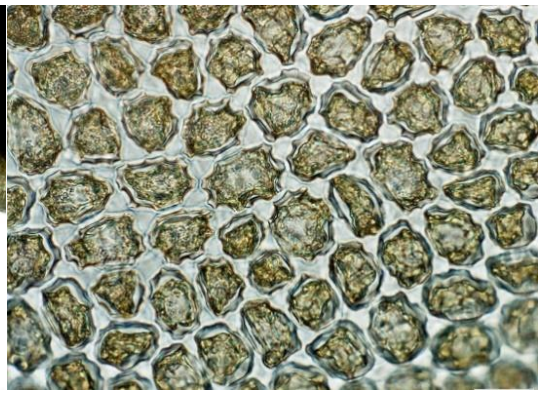
Odontoschisma denudatum (Martius) Dumortier [glabrous] [*Jungermannia scalaris* Schmidel ex Schreber var. *denundata* Martius]. Plants small, 1-1.5mm wide, with entire, succubous leaves that are essentially circular; stem without hyalodermis; cell contours irregular; underleaves absent; oil bodies large and granular; gemmae frequent on apices of small shoots, 1-2-celled; dioicous; antheridia on small compact branches; perianth on short ventral branch. ●On fallen logs and soil; known from a single collection.





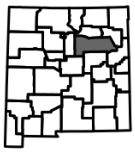
gemmiferous stalks

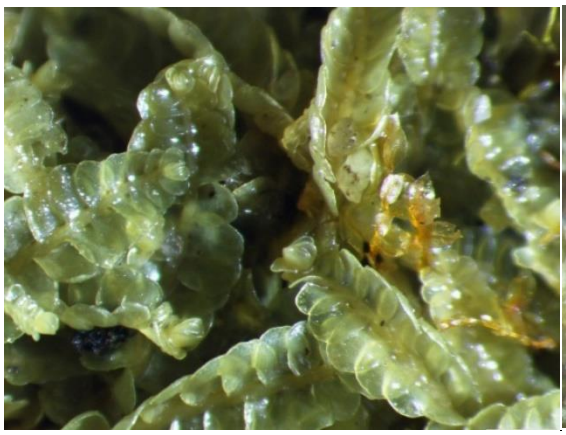


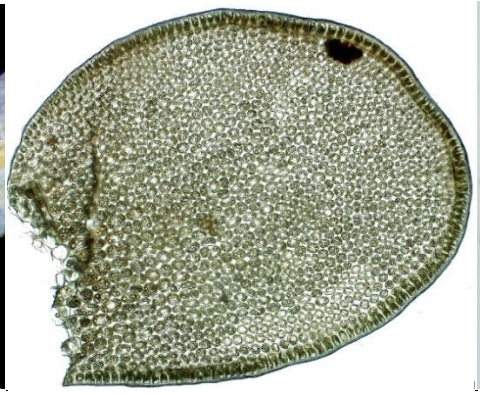


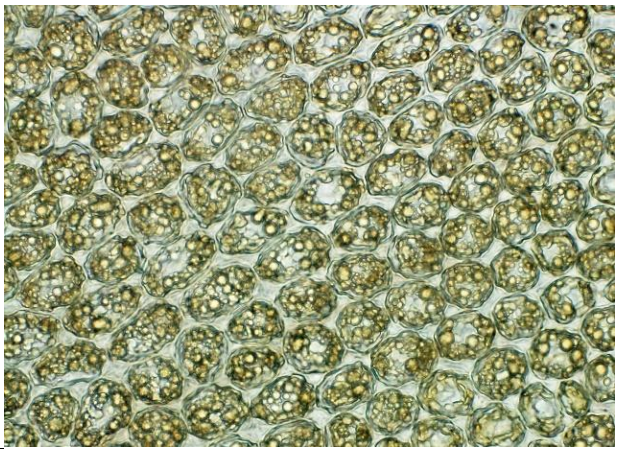
ME, Washington Co., Great Wass Island, 12 Jun 2013, *K. Blisard* (SNM).

Odontoschisma sphagni (Dickson) Dumortier [of *Sphagnum*] [*Jungermannia prostrata* Swartz, *Odontoschisma prostratum* (Swartz) Trevisan]. Plants 1.5-2 mm wide, with entire, succubous leaves that are essentially circular; cell walls thick with smooth contours; leaf border prominent; oil bodies large and granular; gemmae rare; underleaves absent; dioicous; antheridia on small compact branches; perianth on short ventral branch. ●On fallen logs and soil; known from a single collection.









AL, Franklin Co., Dismals Canyon, 26 Sep 1992, *W.R. Norris* (SNM).

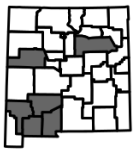
Cephaloziella [resembling *Cephalozia*].

1 Underleaves present..... ***C. divaricata***

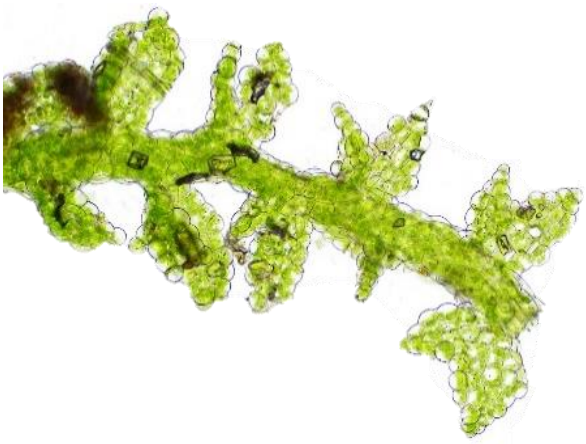
1 Underleaves absent, or scarce

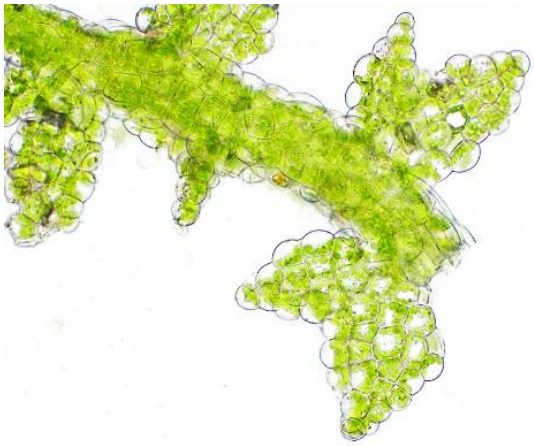
2 Plants green, leaf lobes 6-12 cells wide at base.....***C. hampeana***

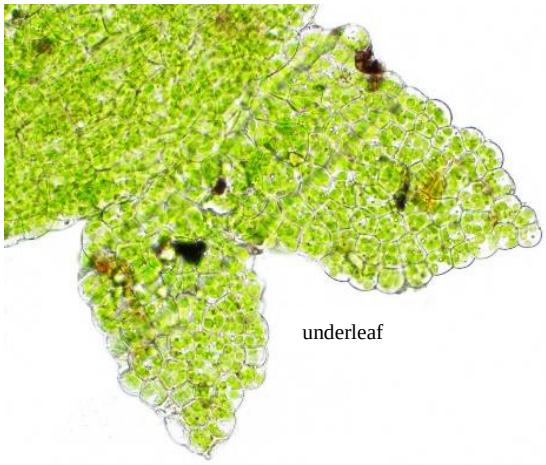
2 Plants with reddish-brown pigmentation, leaf lobes 3-5 cells wide at base .....***C. rubella***



Cephaloziella divaricata (Smith) Schiffner [spreading] [*Jungermannia divaricata* Smith]. Plants very tiny, 0.16-0.5 mm wide, with succubous, bilobed leaves; leaves transversely inserted; leaf lobes triangular with acute apices, 6-9 cells wide at the base, may have small basal teeth; cell walls at base may develop reddish-brown pigmentation in cell walls; oil bodies present; underleaves prominent on non-gemmiparous shoots; gemmae developed at apices of gemmiparous shoots; dioicous; androecium apical; perianth at apex of long, leafy shoot, may develop reddish-purple coloration. ●On shaded soil or rocky outcrops.

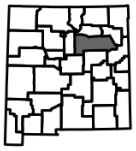






underleaf

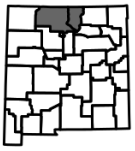
NM, Grant Co., Pinos Altos Range, Little Cherry Creek Ranch Road, 13 Feb 2021, *Kleinman* & *Blisard* (SNM).



Cephaloziella hampeana (Nees) Schiffner ex Loeske [for Georg Ernst Ludwig Hampe (1795-1880), German bryologist] [*Jungermannia hampeana* Nees]. Plants small, 0.2-0.4 mm wide; leaves transversely inserted, bilobed, patent (nearly perpendicular to the stem), usually distant, the lobes entire, acuminate, 6-9 cells wide at the base; leaf cells thin walled, oil bodies present; underleaves lacking; autoicous; perianths at apex of main shoot, exserted. ●On peaty logs or soil, or sandy soil; known from a single collection.

CO, Boulder Co., Hazelwood Bog, 17 Sep 1972, *Weber & Hong* (COLO).

Cephaloziella rubella (Nees) Schiffner [reddish] [*Jungermannia rubella* Nees]. Shoots small, 0.25-0.4 mm wide, usually with intense reddish or brownish secondary pigmentation; leaves usually distant, transversely inserted, bilobed with entire, triangular lobes, 6-9 cells wide at the base; underleaves very small or lacking; gemmae green or brown, ellipsoidal, frequent; autoicous, with reproductive parts on long, leafy shoots. ●On open sandy or clayey soil; known from only two collections. ♦This can be quite variable in morphology.



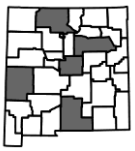
MN, Cook Co., Suzie Islands, Sailboat Island, 8 Sep 1947, *R.M. Schuster* (COLO).

Frullania [for Leonardo Frullani (1756-1824), Italian functionary].

Key and species concepts contributed by John J. Atwood.

Note: This must be considered a tentative treatment of *Frullania* in New Mexico; the relationships are all under current re-evaluation and subject to modification in the future. Because of this, descriptions and distribution maps should be considered only provisional.

1 Plants with caducous leaves..... ***F. caucasica* / *parvistipula* complex**
1 Plants without caducous leaves
  2 Plants dioicous or sterile and sexuality undeterminable
    3 Leaves squarrose when moist; gynoecia when present terminal on short lateral branches..... ***F. ericoides***
    3 Leaves imbricate to spreading when moist; gynoecia when present terminal on stem or main branch
      4 Lobules helmet-shaped; styli subulate to lanceolate triangular..... ***F. wrightii***
      4 Lobules mostly explanate or cap-shaped when inflated; styli filiform..... ***F. riparia***
  2 Plants monoicous
    5 Lobules consistently inflated
      6 Underleaves wider than stem with toothed margins; perianth 4-5-keeled ..... ***F. wrightii***
      6 Underleaves about the width of the stem with entire margins; perianth 8-12-keeled ..... ***F. mexicana* / *pluricarinata* complex**
    5 Lobules consistently explanate
      7 Underleaves ovate, bifid to ⅓ with triangular lobes, the margins toothed .... ***F. cleistostoma* / *saxicola* complex**
      7 Underleaves oblong, bifid to near the middle with attenuate-acute lobes, the margins entire .... ***F. neomexicana***

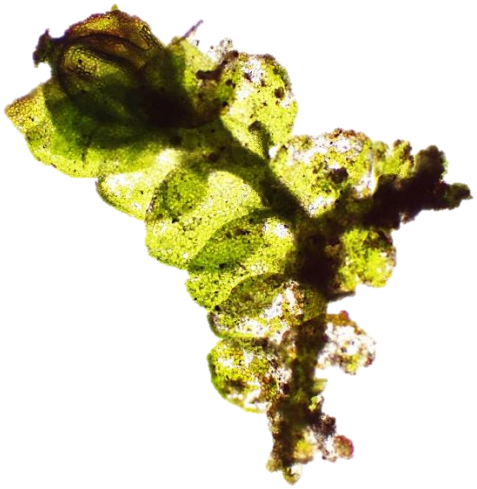


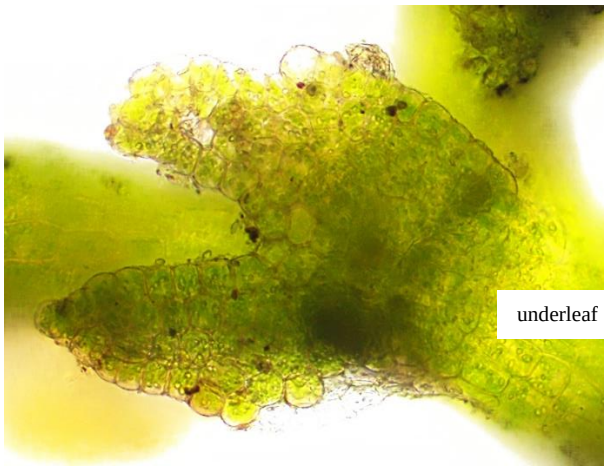
Frullania caucasica / parvistipula complex : Including *Frullania brittoniae* of NM reports, *Frullania caucasica* Stephani, *Frullania eboracensis* of NM reports, and *Frullania parvistipula* Stephani. Plants green to yellowish brown, complicate-bilobed; leaves caducous, hence many stems with the leaves broken off or missing, the lobe may be larger than the lobule (in *parvistipula*) or similar in size (in *caucasica*); lateral leaves contiguous to imbricate; ventral leaves distant to approximate; lobules galeate, compressed at the mouth; underleaves 2-3 times the width of the stem, bifid to about ⅓ their length; styli lanceolate, 5-8 cells long, 2-3 cells wide at base; gynoecia terminal on main stem or branch. ●Shaded boulders and rock outcrops.

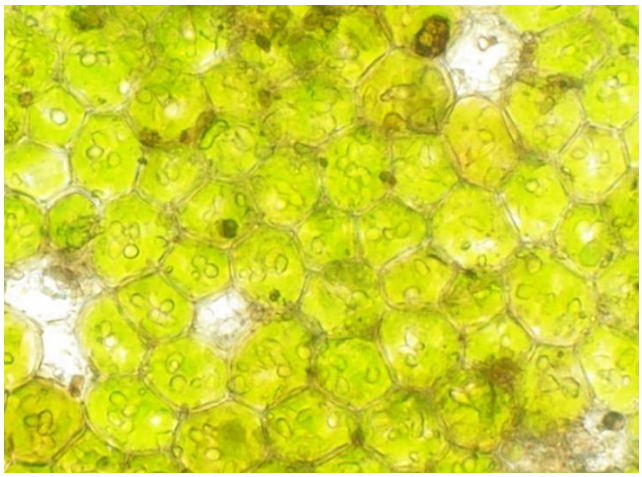
underleaf

NM, San Miguel Co., Pecos Wilderness, Porvenir Canyon, along Beaver Creek, 3 May 2019, *J.C. Brinda* (MO); NM, Lincoln Co., Eagle Creek, 11 May 1996, *R.D. Worthington* (SNM).

Frullania cleistostoma / saxicola complex : Including *Frullania cleistostoma* Schiffner & Wollny, *Frullania inflata* of NM reports, and *Frullania saxicola* Austin. Plants complicate-bilobed, medium sized (0.8-1.3 mm), dark green to brownish-green; lobe orbicular; lobule explanate and less than half the size of the lobe; underleaves bilobed, bifid to ½ their length, slightly larger than the stem, the margins entire; leaf cells with smooth cell walls; oil bodies 3-5 per cell; monoicous; perianths on short or long branches. ●On bark or rocks.

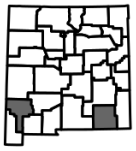


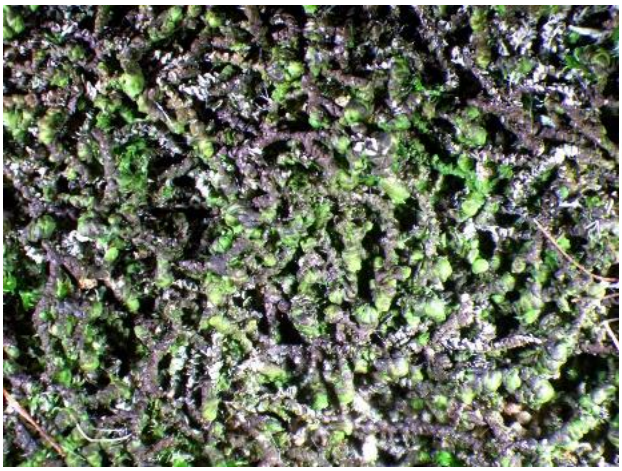


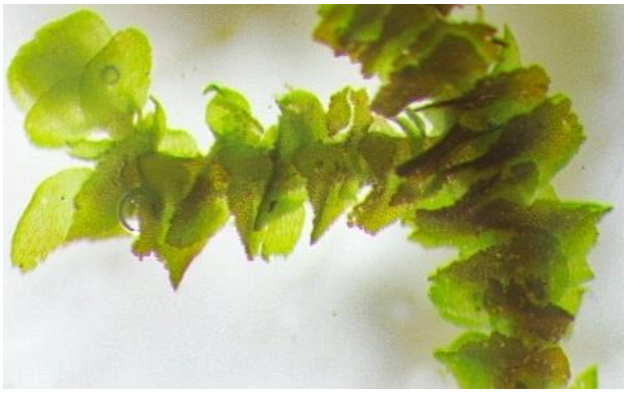


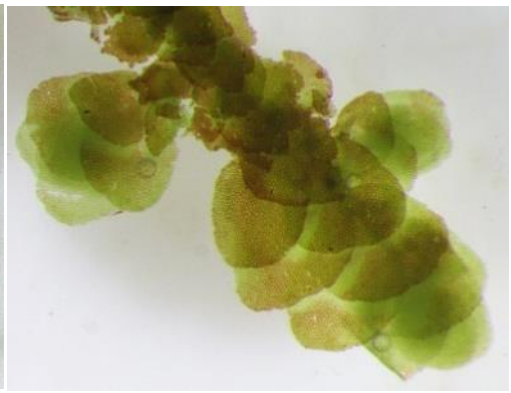
NM, Grant Co., Gila Cliff Dwellings Nat. Mon., North Canyon, 26 Jun 2012, *Blisard & Kleinman* (SNM).

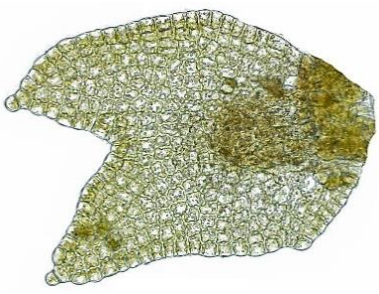
Frullania ericoides (Nees) Montagne [resembling *Erica*] [*Jungermannia ericoides* Nees]. Plants complicate-bilobed, large (for a *Frullania*),1-1.8 mm wide; leaves circular to reniform, close to the stem when dry, squarrose when wet, very crowded; lobules galeate, less than ½ the size of the lobe; underleaves distant, about 2.5-3 times the stem width; cell walls wavy; dioicous; perianths with scattered tubercles on their surfaces. ●On trunks, branches, logs, rocks, boulders, soil; known from only two collections.

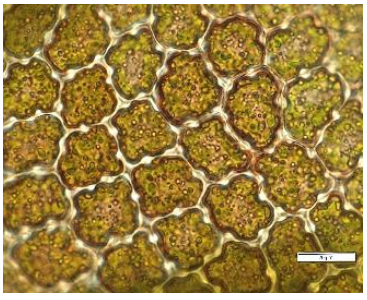








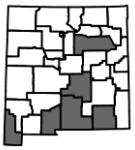


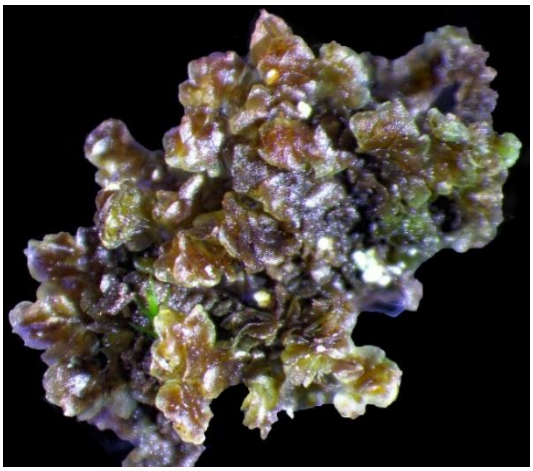


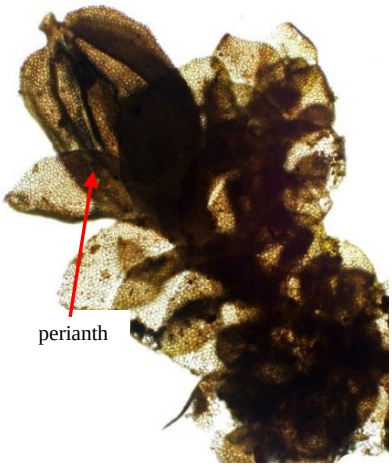
lobule underleaf

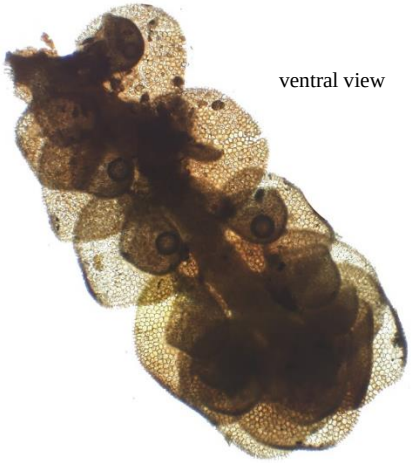
TX, Aransas Co., Aransas Nat. Wildlife Ref., 11 Mar 2012, *Blisard et al.* (SNM).

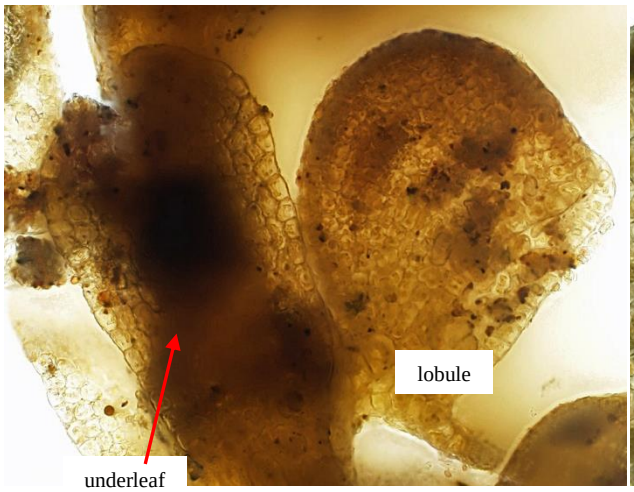
Frullania mexicana / pluricarinata complex : Including *Frullania mexicana* Lindenberg and *Frullania pluricarinata* Gottsche. Plants green to purplish or reddish/brown, 0.8 to 1.2 mm wide, complicate/bilobed; dorsal lobes broadly ovate with cordate bases; lobule triangular in the proximal portion; marginal cells differentiated; underleaves obovate, 1-3 times the width of the stem, shallowly bifid, with entire margins; cell walls wavy; oil bodies 3-5 per cell; autoicous; perianth 8-12-keeled. ●Essentially only on bark. ♦Distinctive by the inflated lobules and the prominently many-keeled perianth.

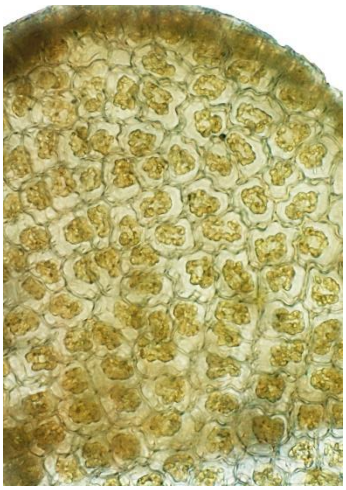






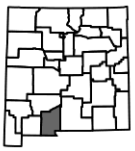


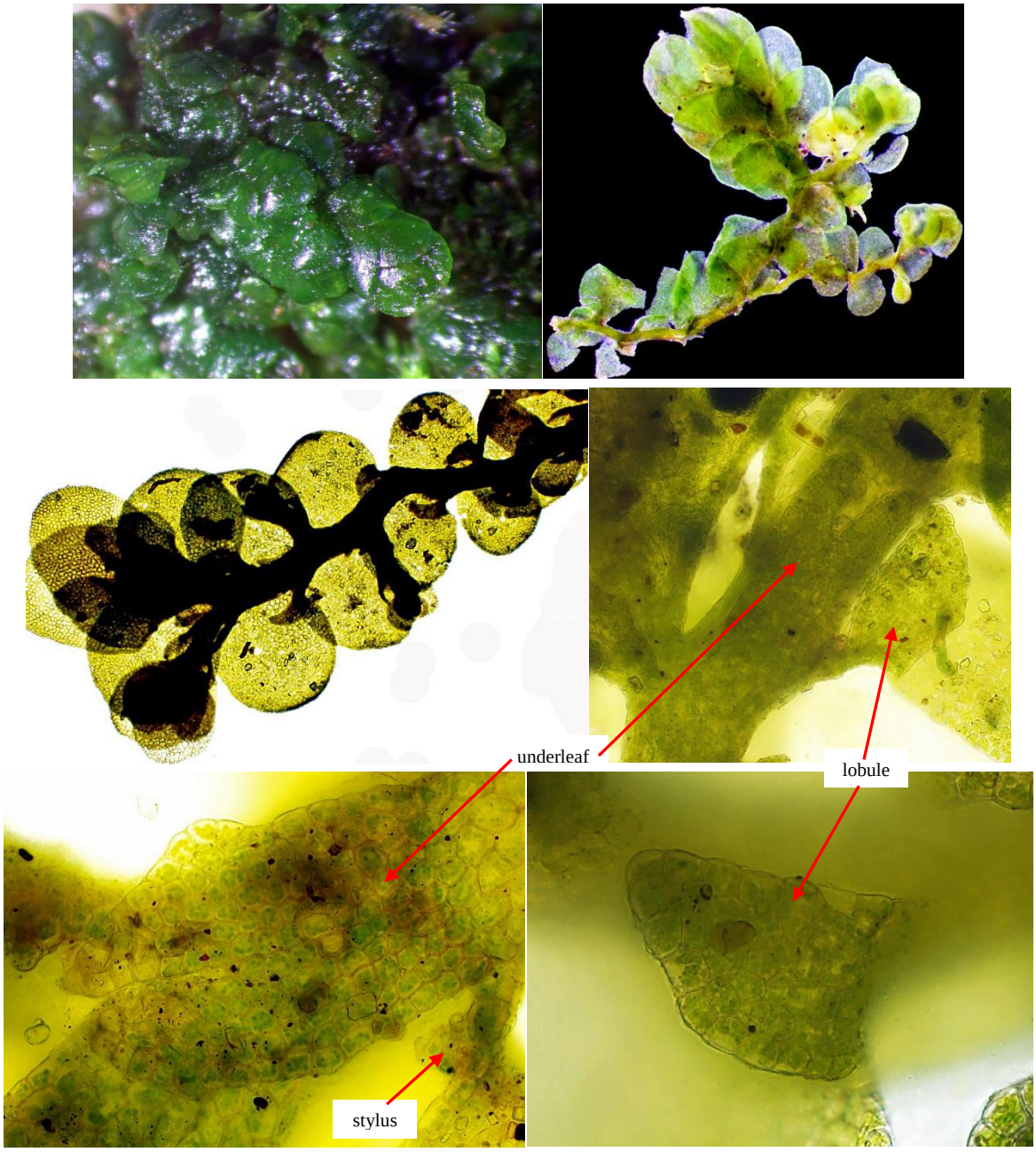




NM, Hidalgo Co., Animas Mt, Victorio Peak, 8 Apr 2019, *J.C. Brinda* (MO).

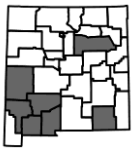
Frullania neomexicana Atwood, Vilnet, & Mamontov [of New Mexico]. Plants complicate-bilobed, small, 0.6-0.8 mm wide, irregularly pinnately branched; dorsal leaf lobe flat, ovate with rounded apex and entire margins; lobules small, less than ½ the lobe, explanate, with rounded apex; underleaves distant, oblong, less than twice the width of the stem, bifid to one-half its length, the margins entire; autoicous; perianth exerted about half its length, the beak distinct with dilated mouth. ●On rock; known from a single collection.

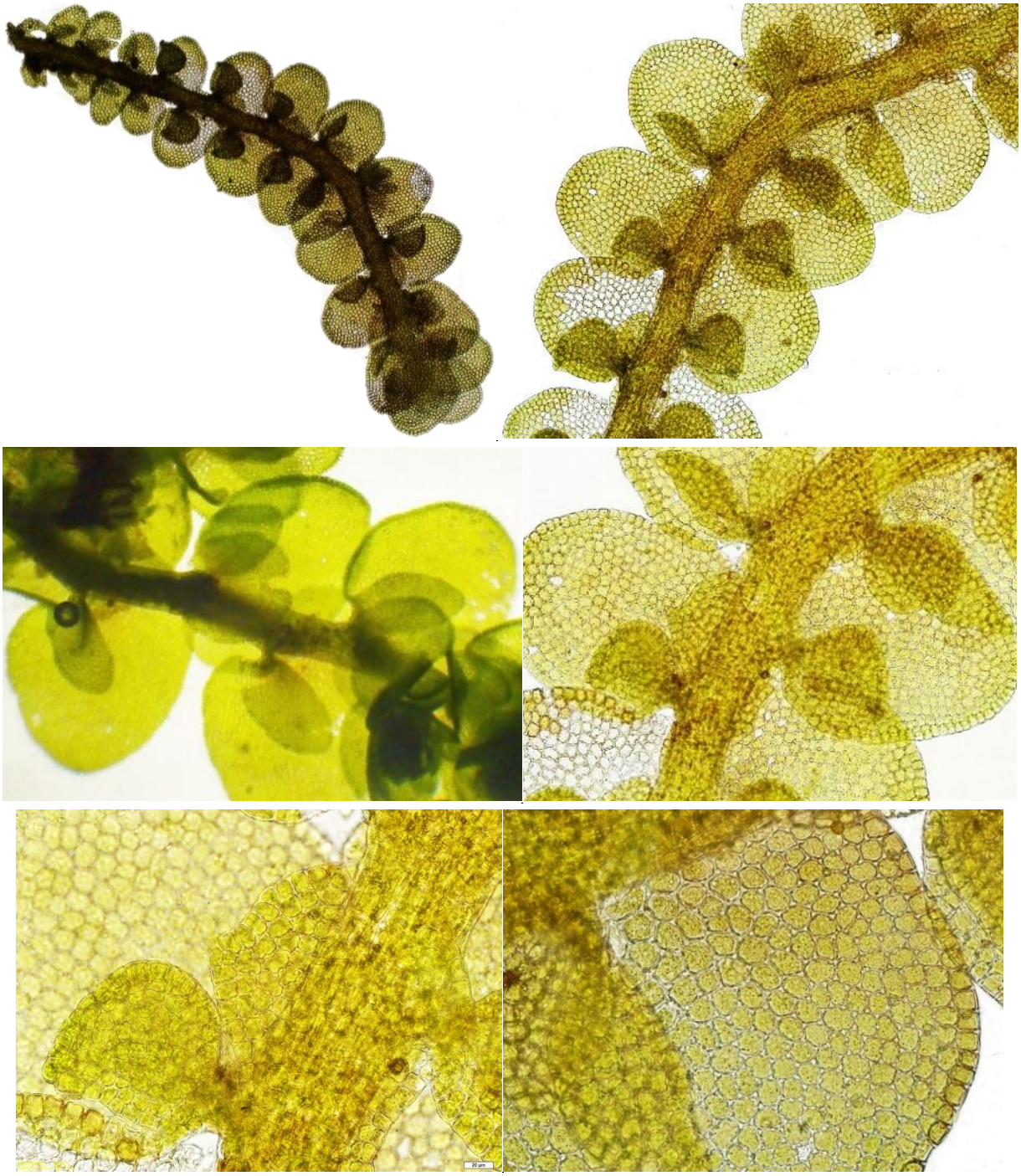




AZ, Greenlee Co., Blue Ridge Primitive Area, Lamphier Canyon, 3 Aug 2019, *J.C. Brinda* (MO).

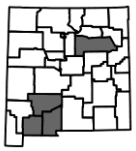
Frullania riparia Hampe & Lehmann [of streambanks]. Plants green, rather large, 1.5-2 mm wide, complicate-bilobed, the lobe circular; lobule explanate or inflated, less than ½ the size of the lobe; cell walls slightly wavy; underleaves 3-4 times the width of the stem; styli filiform; dioicous. ●Limestone rock.

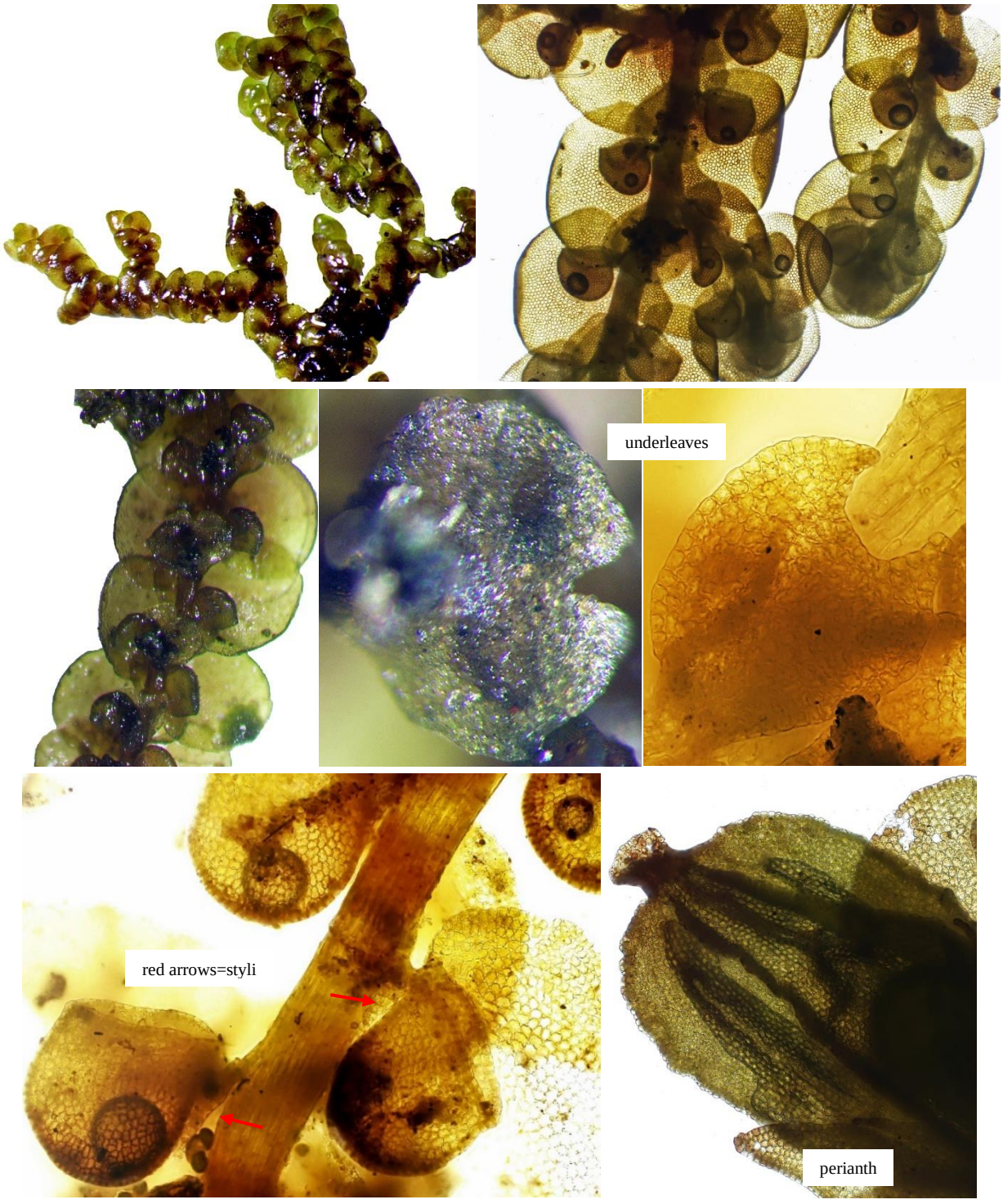




NM, Catron Co., Mogollon Mts, Catwalk, 4 Oct 2011, *Kleinman & Blisard* (SNM).

Frullania wrightii Austin [for Charles Wright (1811-1885), outstanding American botanical collector]. Plants light green to yellow-brown, 0.9-1 mm wide, complicate/bilobed; lateral leaves dist ant to contiguous, loosely imbricate when dry, squarrose when moist; lobules helmet-shaped; styli subulate to lanceolate-triangular, 2-4 cells wide at the base; underleaves wider than stem, bilobed to ½ their length, with toothed margins; autoicous; gynoecia terminal on the stem or main branch; perianth 4-5 keeled. ●On rocks.

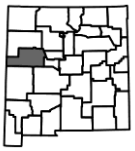


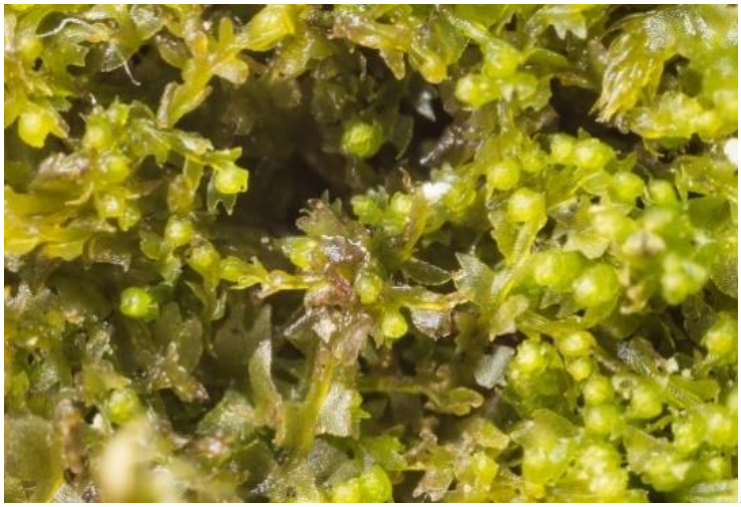


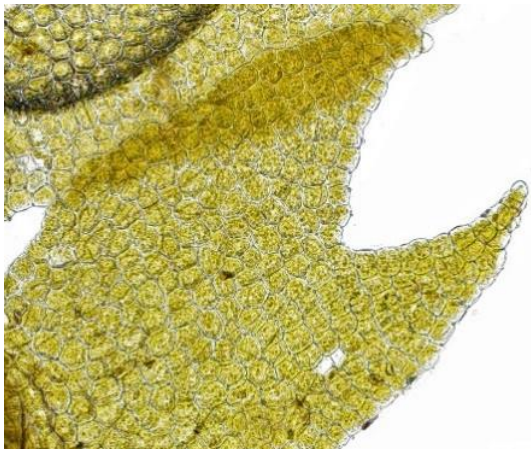
NM, Grant Co., Gila Nat. For., Meadow Creek, 5 Aug 2019, *Brinda & Kleinman* (MO).

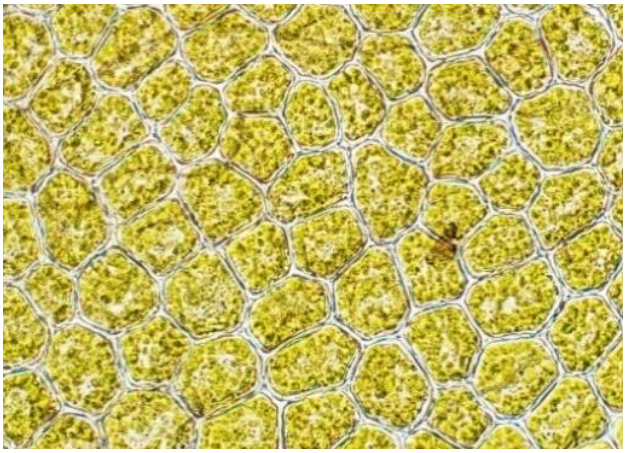
Geocalyx [a buried calyx].

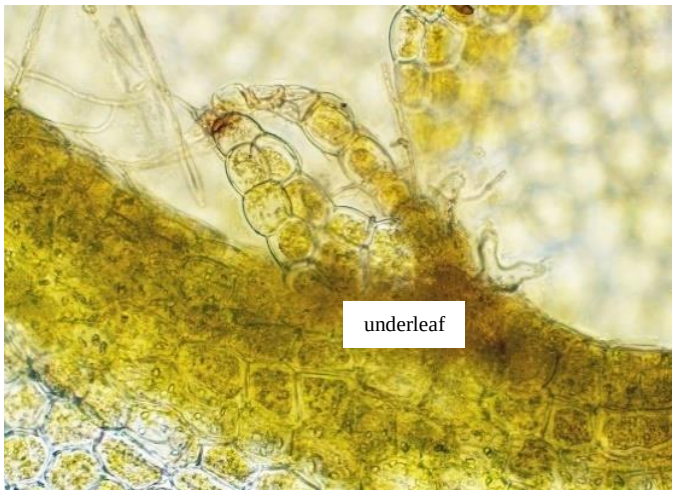
Geocalyx graveolens (Schrader) Nees [ill-smelling] [*Jungermannia graveolens* Schrader]. Plants rather small, 1-1.5 mm wide; leaves succubous, longitudinally inserted. bilobed with roughly parallel sides; leaf cells thin-walled; oil bodies brownish, 6-10 per cell, nearly filling the lumen; underleaves elongate, bilobed; gemmae absent; monoicous; reproductive parts on branches arising from leaf axils; perianths absent. ●Found on decaying logs; known from a single collection.









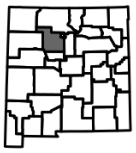


NM, Cibola Co., El Malpais Nat. Mon., Knob Fire Scar, 13 Dec 2018, *Kleinman et al.* (SNM).

1 Leaves bilobed ..... **Gymnocolea**
1 Leaves unlobed
2 Gynoecial bracts nearly always present, laciniate .....go to ADELANTHACEAE
2 Gynoecial bracts present or absent, not laciniate
3 Leaves obovate, the apex rounded or truncate to emarginate .....**Liochlaena**
3 Leaves ovate to elliptical, cordate, or almost circular, the apex rounded .....**Jungermannia**

Gymnocolea [a naked sheath].

Gymnocolea inflata (Hudson) Dumortier [swollen] [*Jungermannia inflata* Hudson]. Plants small, 0.7-0.9 mm wide, with transverse, succubous leaves; leaves ovate, bilobed, with rounded lobes; underleaves absent; dioicous, with large terminal perianth; gemmae absent. ●Usually found in wet places on rock outcrops; little known from few collections.



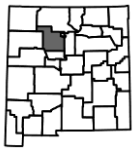
inflated perianth

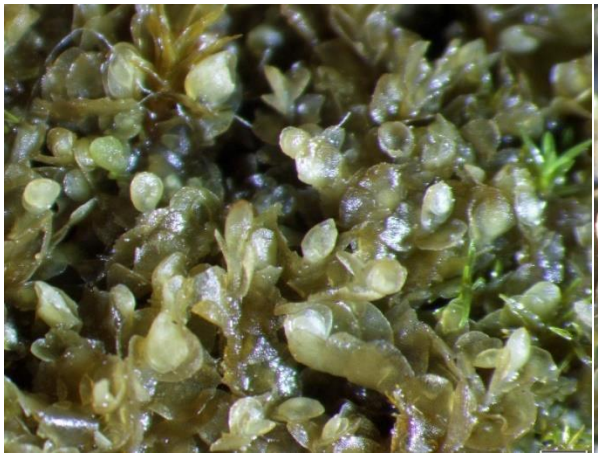
NM, Sandoval Co., Valles Caldera Nat. Pres., 31 Jul 2009, *K. Romig* (SNM).

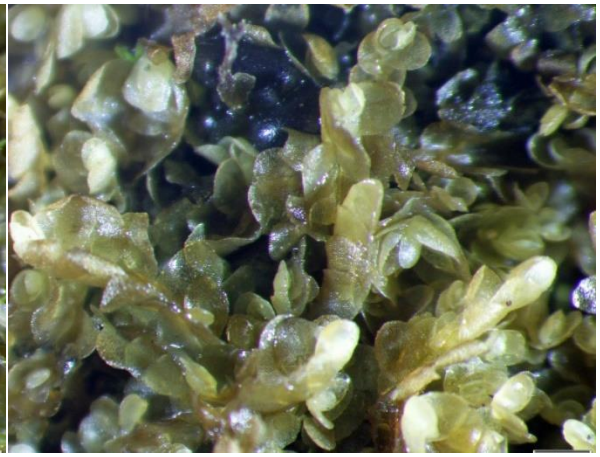
Jungermannia [for Ludwig Jungermann (1572-1653), German botanist].

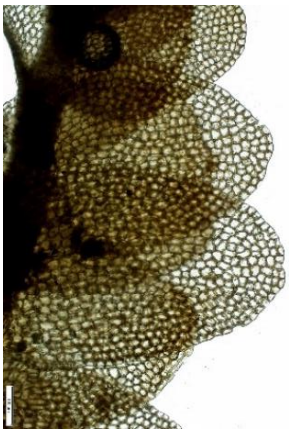
1 Leaves usually oblong with parallel edges (*L. lanceolata*).....go to **Liochlaena**
1 Leaves various shapes, but not oblong with parallel edges
  2 Rhizoids developing from both stem tissue and (at least some) leaf bases ..... go to SOLENOSTOMATACEAE
  2 Rhizoids developing only from stem tissue
    3 Plants large (3-6 mm), median leaf cells large with brown/black cell walls, rhizoids few, hyaline ..***J. eucordifolia***
    3 Plants smaller (0.5-4 mm), rhizoids numerous
      4 Typical plants with broadly ovate leaves; oil bodies 2-3 per cell; dioicous.....***J. atrovirens***
      4 Typical plants with elliptical to ovate leaves; oil bodies 4-5 per cell; paroicous .....***J. pumila***

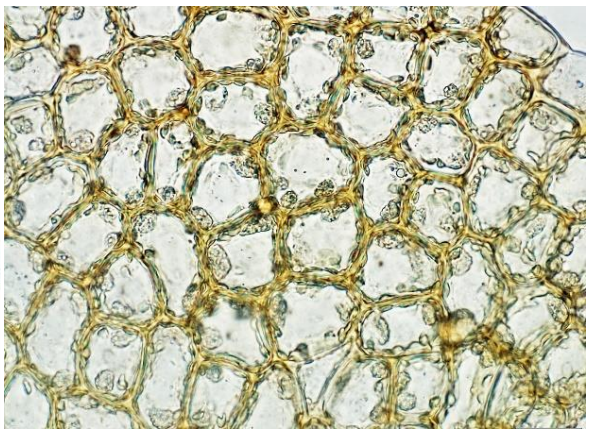
Jungermannia atrovirens Dumortier [dark green]. Plants variable, 0.5-4.5 mm wide, with broadly ovate leaves, broadly rounded at the apex; cell walls moderately thick with noticeable trigones;; leaves with no obvious margin; rhizoids arise from stem surface; oil bodies 2-3 per cell; dioicous. ●Shaded or moist areas; known from a single collection. ♦Perhaps better treated as a subspecies of *Liochlaena lanceolata* Nees, *q.v.*



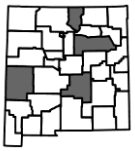




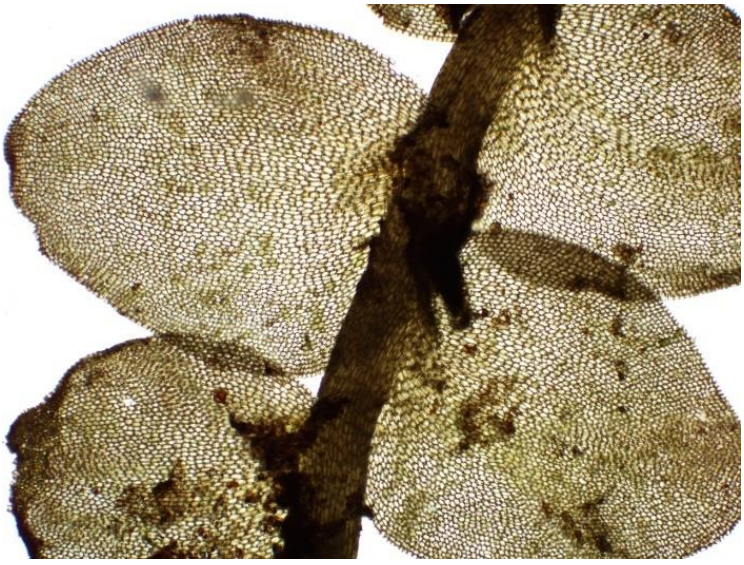


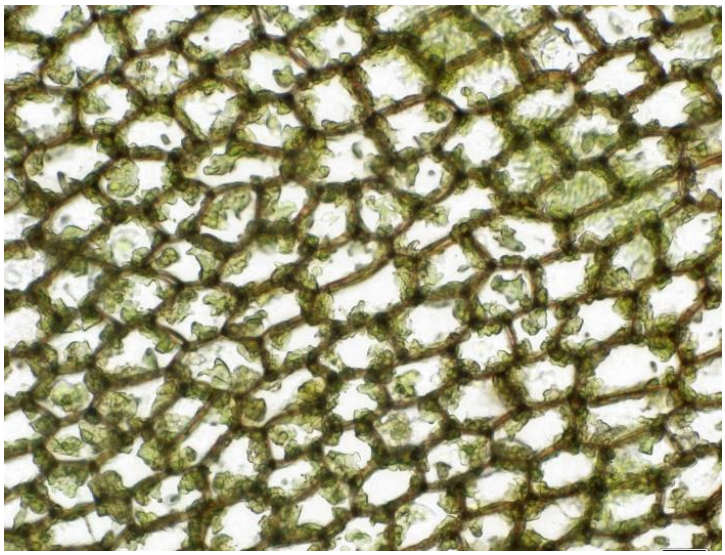


Russia, Khosta Distr., Caucusus Occidentalis, 16 Jun 1979, (COLO).

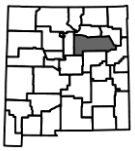


Jungermannia eucordifolia Schljakov [the true *cordifolia*] [*Jungermannia cordifolia* Hooker, *Jungermannia exsertifolia* of NM reports, *Jungermannia exsertifolia* Stephani subsp. *cordifolia* (Dumortier) Váňa]. Large plants, 3-6 mm wide, gray to dark green in color; living plants aromatic; leaves ovoid/triangular with blunt apices, the bases loosely sheathing the stem; cell walls thin, brownish-black; oil bodies 2-4 per cell, botryoidal; underleaves and gemmae lacking; dioicous, male and female plants often segregated; androecium apical; perianth long exerted with sheathing bracts. ●Widely distributed, found in moist areas.

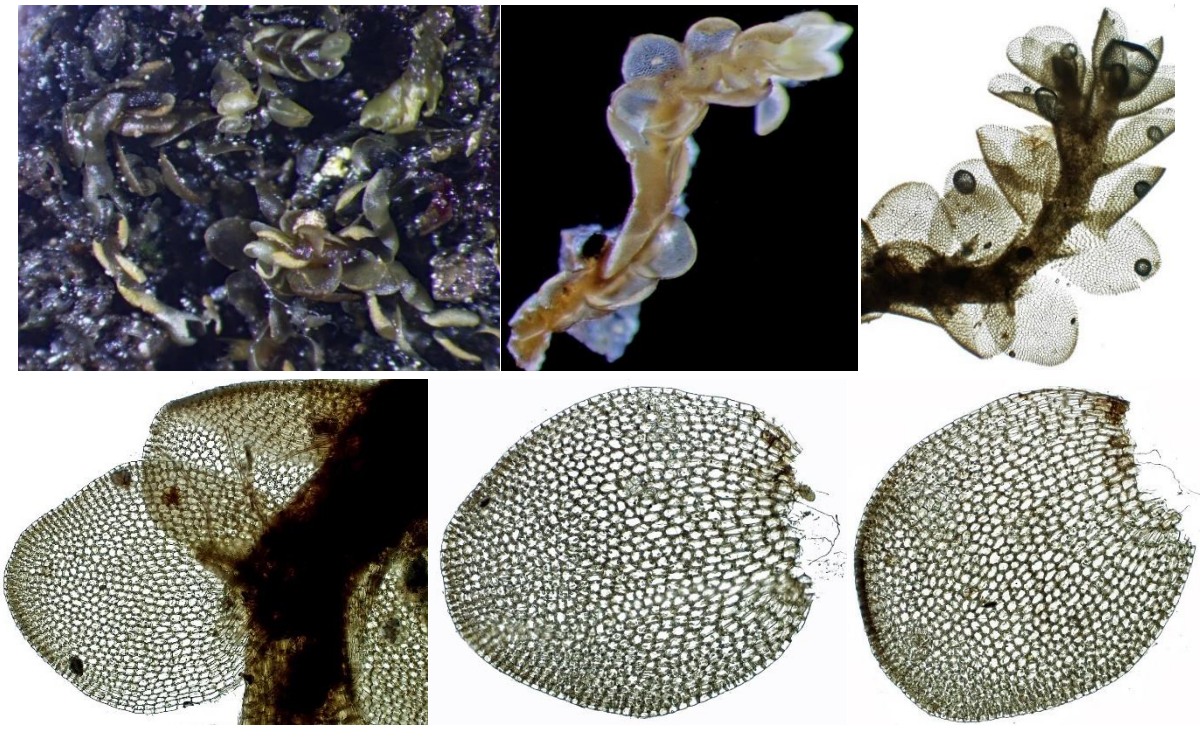




NM, Catron Co., Mogollon Mts, Willow Creek, 27 May 2006, *K. Allred* (SNM).



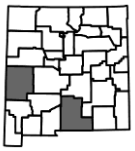
Jungermannia pumila Withering [dwarf]. Plants dark to olive green; 0.5-3 mm wide; sparingly branched; leaves obliquely inserted near stem base, nearly transversely inserted above; leaves elliptical/ovoid, with blunt apices; cells thin-walled with indistinct trigones; oil bodies granular, 4-5 per cell; rhizoids colorless; underleaves and gemmae lacking; paroicous; androecium directly below gynoecium; perianth usually present. ●Often on shaded rocks near streams, often submerged; known from a single collection.

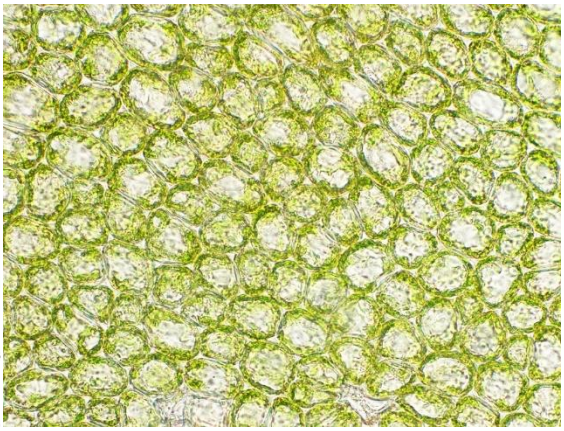


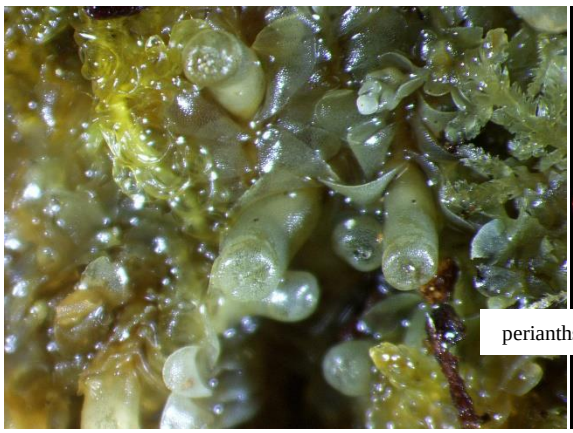
CA, Alpine Co., Hope Valley Resort, 24 Aug 1988, *A.T. Whittemore* (COLO).

Liochlaena [a smooth cloak].

Liochlaena lanceolata Nees [spear-shaped] [*Jungermannia leiantha* Grolle]. Plants medium sized, 2-3 mm wide, pale green to brownish; leaves oblong with parallel edges, the apices rounded; leaf cell walls thin with distinct trigones; oil bodies granular, 7-11 per cell; underleaves lacking; gemmae elliptical to spherical, found at apices of attenuate shoots; dioicous or paroicous; perianths sheathed by female bracts. ●On damp soil along streams or moist decaying logs; known from only two collections.

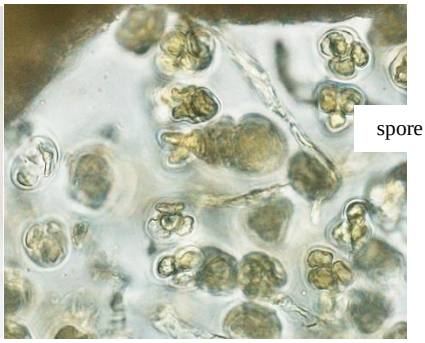






perianths

sporangium & perianth

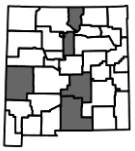


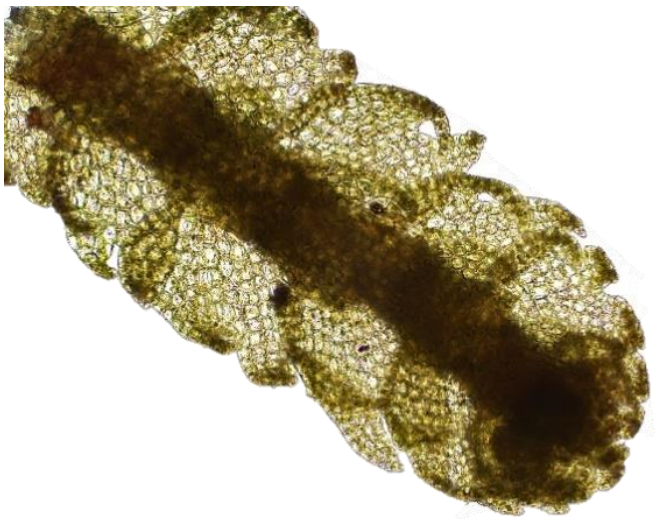
spore tetrads

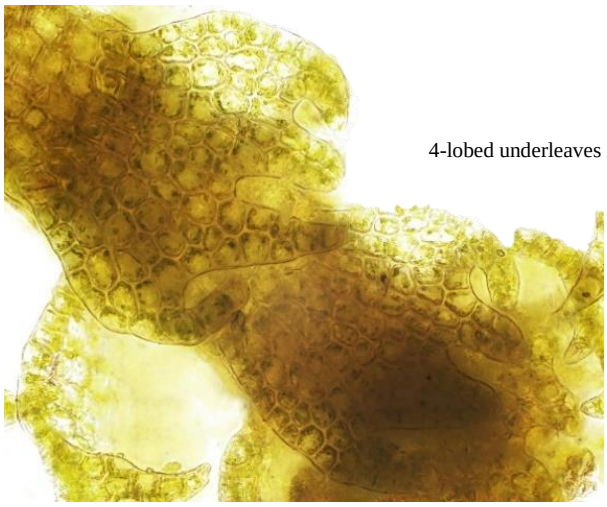
NM, Catron Co., Mogollon Mts, Bead Spring, 14 May 2012, *Kleinman & Blisard* (SNM).

Lepidozia [a scaly bud].

Lepidozia reptans (Linnaeus) Dumortier [crawling] [*Jungermannia reptans* Linnaeus]. Plants small, 0.4-0.7 mm wide, green, with frequent branching; leaves incubously inserted, 4-lobed, the lobes incurved and giving the appearance of a small hand; underleaves also 4-lobed and a bit smaller; gemmae absent; monoicous; antheridia and perianth on a short ventral branch arising from an underleaf. ●Higher elevations, on logs.





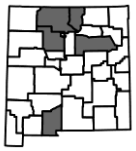


4-lobed underleaves

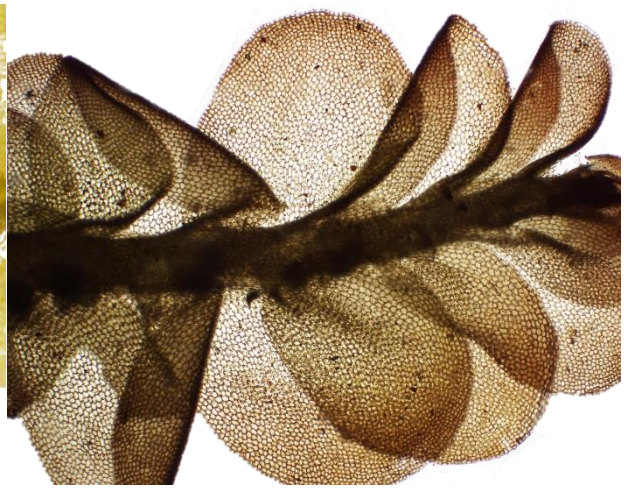
NM, Catron Co., Mogollon Mts, Bead Spring, 15 May 2012, *Blisard & Kleinman* (SNM).

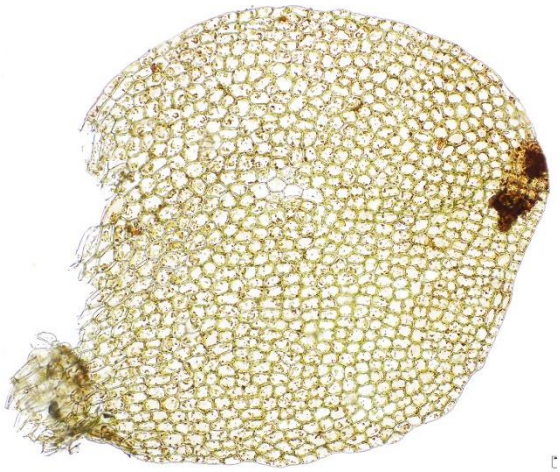
1 Leaves bilobed, with abundant gemmae ..... **Lophocolea**
1 Leaves mostly entire or occasionally bilobed ..... **Chiloscyphus**

Chiloscyphus [a bent lip].
1 Plants yellowish- or whitish-green; cells measure 35-60 µm, with 4-8 oil bodies per cell ..... ***C. pallescens***
1 Plants dull- to dark-green; cells measure 18-35µm, with 2-4 oil bodies per cell ..... ***C. polyanthos***

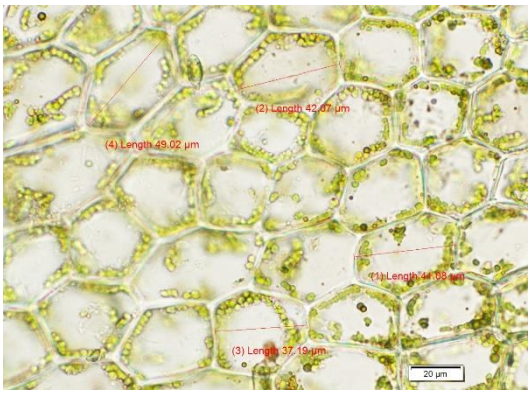


Chiloscyphus pallescens (Ehrhart ex Hoffmann) Dumortier [becoming pale] [*Jungermannia pallescens* (Ehrhart ex Hoffmann]. Plants pale green, large, 2.5-3.5 mm wide; leaves succubous, longitudinally inserted; leaves rectangular, unlobed, entire; leaf cells 35-60 microns; oil bodies 4-8 per cell; underleaves about same width as stem, but elongate, deeply bilobed, with ciliate teeth on both lateral margins; rhizoids restricted to small area at base of underleaves; monoicous; perianth on short ventral branch. ●On shaded soil, rocks, and logs in damp/wet areas.

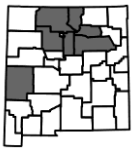




underleaf



NM, Taos Co., Taos Ski Valley, 23 Jul 2014, *Blisard et al.* (SNM).

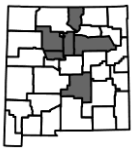


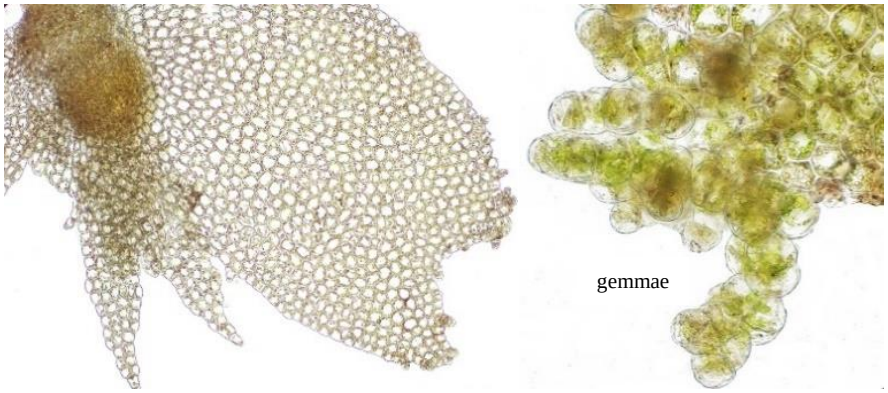
Chiloscyphus polyanthos (Linnaeus) Corda [many-flowered] [*Chiloscyphus rivularis* (Schrader) Hazslinszky, *Chiloscyphus polyanthos* (Linnaeus) Corda var. *rivularis* (Schrader) Lindenberg & Arnell, *Jungermannia polyanthos* Linnaeus, *Jungermannia pallescens* (Ehrhart ex Hoffmann) var. *rivularis* Schrader]. Plants dark green, large, 2.5-3.5 mm wide; leaves succubous, longitudinally inserted, rectangular, unlobed, entire; leaf cells 18-35 µm; monoicous; perianth on short ventral branch. ●On soil in damp or wet areas. ♦Deep green to nearly blackish plants with small cells 19-24 µm wide and growing submerged on rocks have been called var. ***rivularis***.

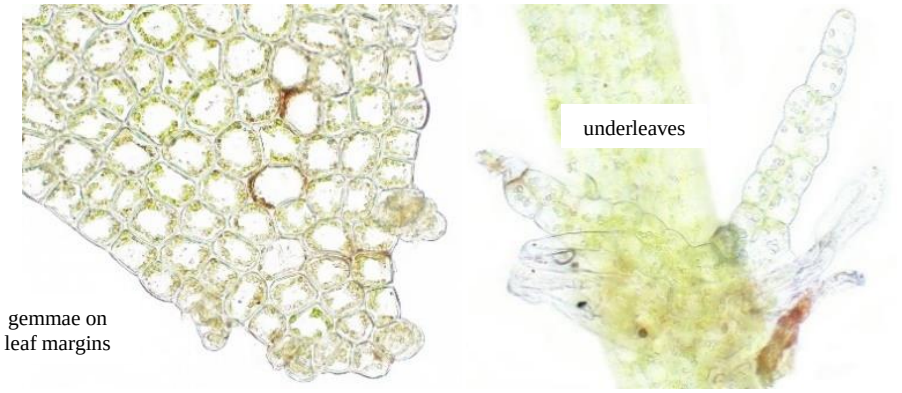
NM, Catron Co., Mogollon Mts, Bead Spring, 10 Jun 2010, *Kleinman & Blisard* (SNM).

Lophocolea [a crested sheath].

Lophocolea minor Nees [smaller]. Plants pale yellow-green, small, 0.5-1.5 mm wide; leaves succubus, horizontally inserted, rectangular, shallowly bilobed, the margins erose due to gemmae; gemmae very numerous on leaf margins, also underleaves and perianths, forming small clusters of globoid cells; leaf cells 20-25 μm; oil bodies 3-8 per cell; underleaves about same width as stem, but elongate, deeply bilobed, with ciliate teeth on both lateral margins; rhizoids restricted to small area at base of underleaves; dioicous. ●Widespread on soil and logs in damp or wet areas.







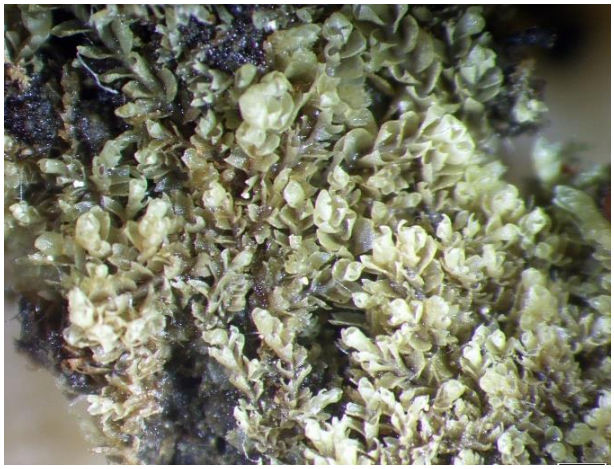
NM, Sandoval Co., Valles Caldera Nat. Pres., *K. Romig* (SNM).

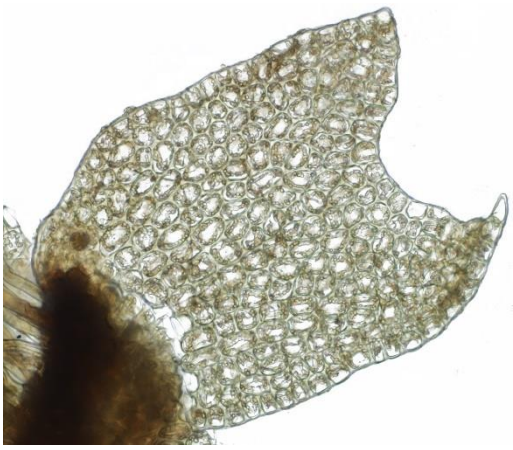
Note: Species in italics but not bolded are not yet known from New Mexico, but are included here for comparison.

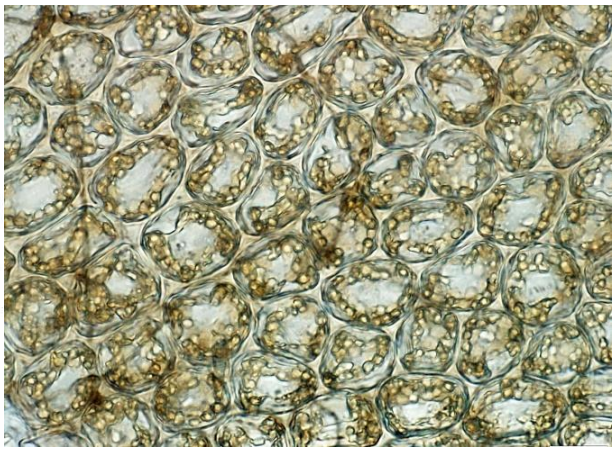
1 Leaves mostly 2-lobed
  2 Plants very small, less than 1 mm wide; underleaves and gemmae absent; trigones absent ..... **Leiocolea**
  2 Plants larger, mostly wider than 1 mm; underleaves or gemmae present; trigones small but present.....**Lophozia**
1 Leaves mostly 3-4 lobed
  3 Leaves mostly 3-lobed, lobes unequal .....*Tritomaria*
  3 Leaves generally 3-4 lobed, lobes equal (*Barbilophozia*) .....go to ANASTROPHYLLACEAE

Leiocolea [a smooth sheath].

Leiocolea badensis (Gottsche ex Rabenhorst) Jorgensen [from Baden, Germany] [*Jungermannia badensis* Gottsche ex Rabenhorst, *Mesoptychia badensis* (Gottsche ex Rabenhorst) L. Söderström & Váňa]. Plants yellow-green, 0.5-0.9 mm wide; stem translucent with thin-walled cortical cells; leaves ovate, oblong, obliquely inserted, short-decurrent, bilobed but barely divided; oil-bodies 2-5 per cell; underleaves and gemmae absent; dioicous; male plants small with apiculate leaf lobes and spicate androecia with several pair of bracts; female plants larger with obtuse leaf lobes, the bracts similar in morphology; perianth long-exserted. ●On moist shaded areas or rock crevices; known from a single collection.





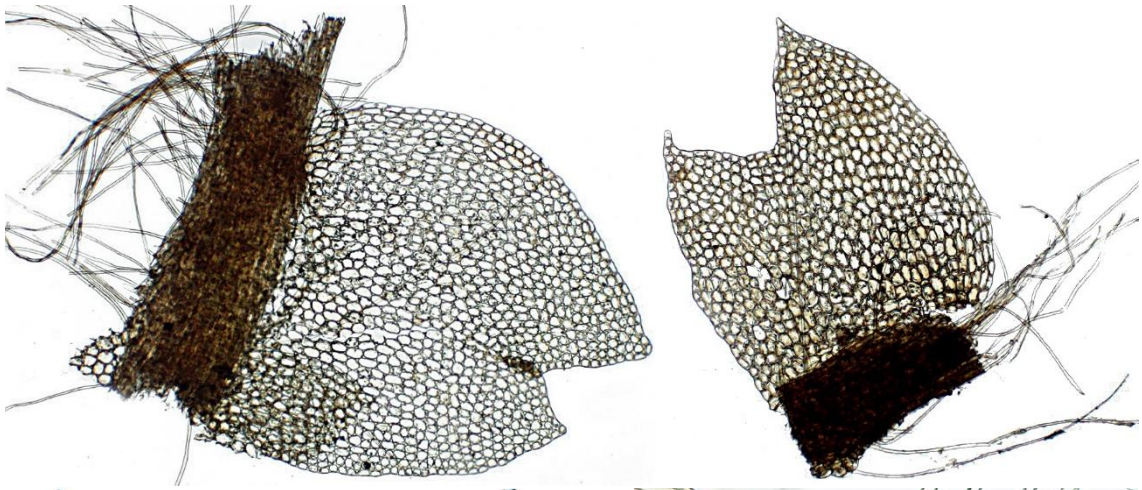


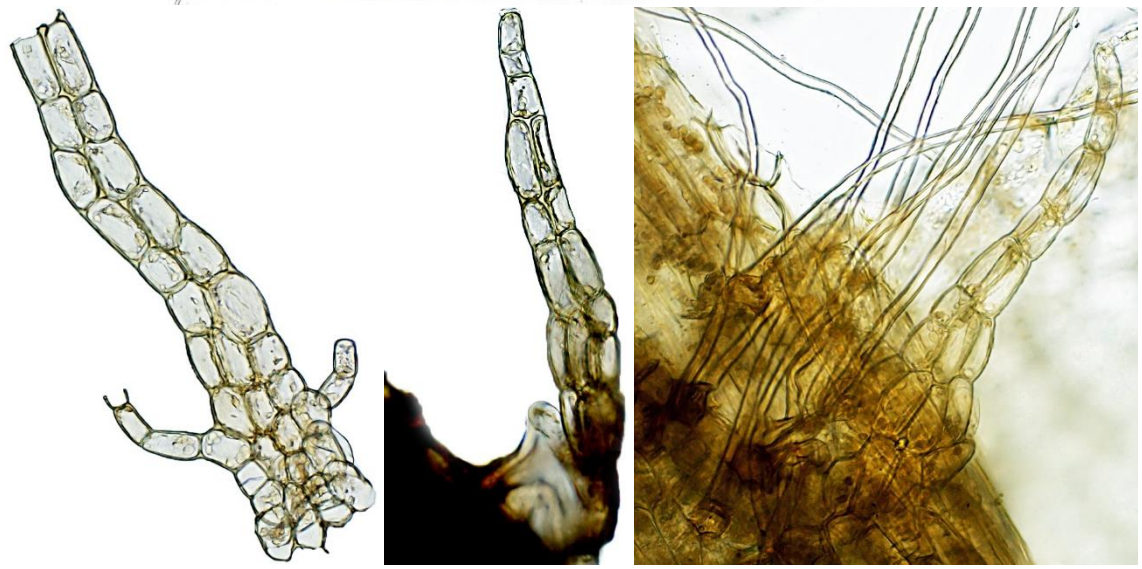
CO, San Juan Co., Weminuche Wilderness, along Trinity Creek, 30 Jun 1985, *D.W. Jamieson* (COLO).

Lophozia [a crested bud].

1 Underleaves generally present; gemmae absent or rare
  2 Underleaves small and lanceolate; lobes acute often with small apiculi ..... ***L. collaris***
  2 Underleaves sometimes large, consisting of long narrow lobes; lobes with obtuse apex ..... go to OBTUSIFOLIACEAE
1 Underleaves generally absent; gemmae generally present and abundant
  3 Uppermost leaves transversely inserted, crowded, forming a cabbage-like head; leaves 3-lobed, the lobes asymmetric (*Schistochilopsis*) ..... go to SCAPANIACEAE
  3 Leaves do not form a cabbage-like cluster
    4 Bases of rhizoids and leaves reddish-tinged; cells collenchymatous with bulging trigones; lobes incurved..... ***L. ventricosa***
    4 Leaves and rhizoids not reddish-tinged, cells not collenchymatous
      5 Plants very small (less than 1 mm wide); leaf cells relatively large (compared to size of plant); cell walls very thin, trigones essentially absent (*L. badensis*) ..... go to **Leiocolea**
      5 Plants larger (greater than 1mm wide); cell walls not thin
        6 Leaves concave, commonly about as long as wide ..... ***L. wenzelii***
        6 Leaves not concave, but ± folded lengthwise, commonly longer than wide ..... ***L. ventricosa***

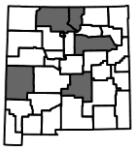
Lophozia collaris (Martius) Dumortier [collared] [*Jungermannia collaris* Nees, *Mesoptychia collaris* (Nees) L. Söderström & Váňa]. Plants often brownish, 1-2.8 mm wide; leaves ovoid, flat, divided 0.25-0.33 of length; underleaves lanceolate and often dentate; oil bodies grayish; gemmae lacking; dioicous; male plants with spicate androecia, the bracts similar to leaves; female bracts bilobed, also similar to leaves; perianth long exserted. ●On soil and rocks near creek banks; known from a single collection.



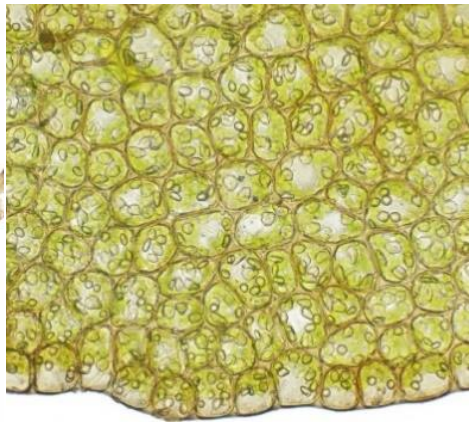


underleaves

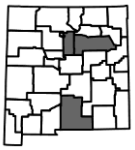
Canada, British Columbia, Moresby Island, 25 Aug 1961, *W.B. Schofield* (DUKE).



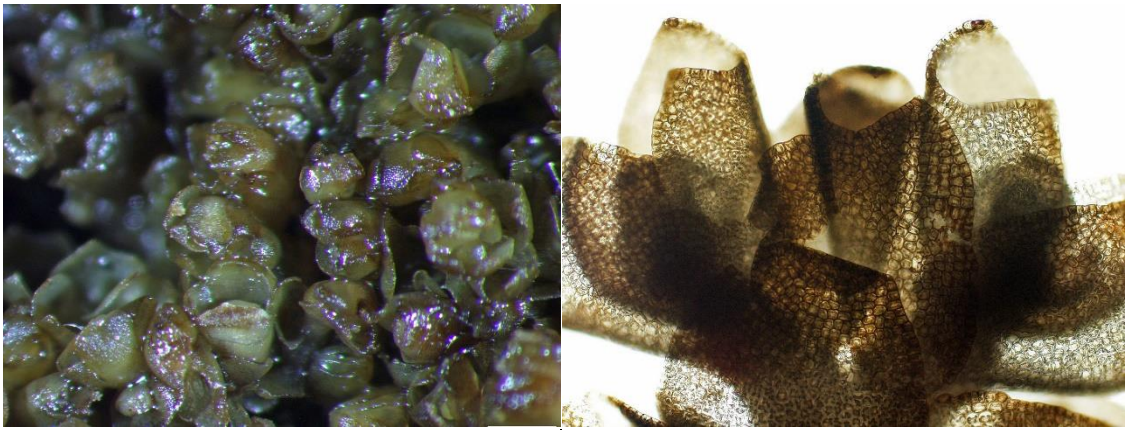
Lophozia ventricosa (Dickson) Dumortier [belly-like, swollen] [*Jungermannia porphyroleuca* Nees, *Jungermannia ventricosa* Dickson]. Plants yellow-green to green, small, 1-2 mm wide; leaves about as wide as long, bilobed with shallow sinus; leaf cells with thin walls and small but triangular trigones; oil bodies numerous, granular, some with central clear area; gemmae numerous, 1-2-celled, forming aggregates on leaf margins or at shoot tips; dioicous. ●On soil or decaying logs.

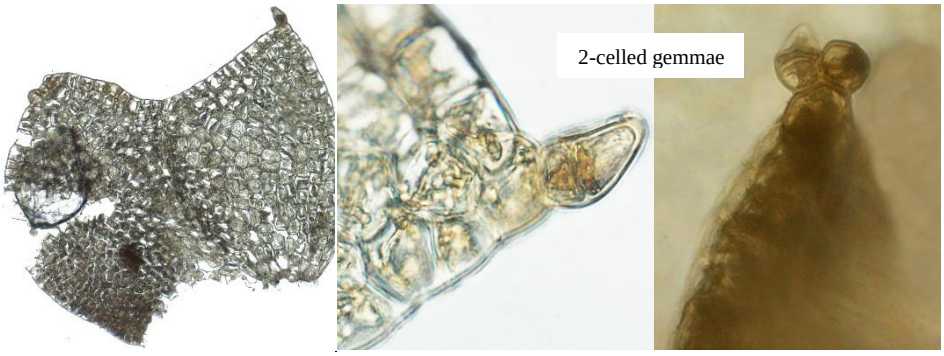


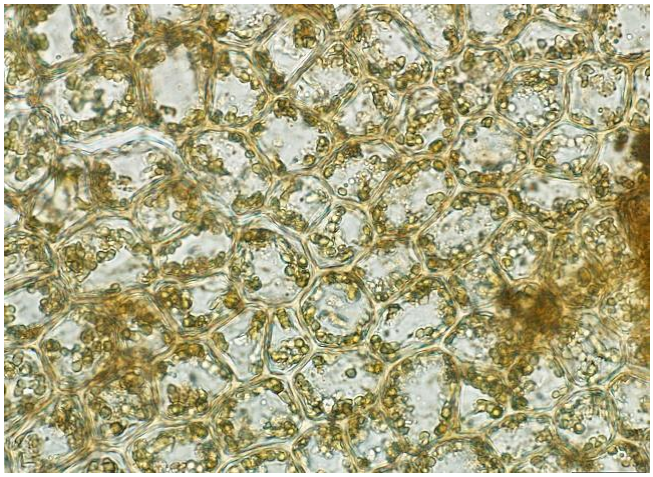
NM, Catron Co., Mogollon Mts, Bead Spring, 15 May 2012, *Kleinman & Blisard* (SNM).



Lophozia wenzelii (Nees) Stephani [for Wenzel von Kroyanke, German apothecary and amateur bryologist] [*Jungermannia wenzelii* Nees, *Lophozia confertifolia* Schiffner]. Plants light green to yellow-green, small, 1.2-2 mm wide; leaves broad and with incurved margins, concave (saucer-shaped), bilobed with shallow, lunate sinus; leaf cells thin-walled with small trigones; oil bodies 4-10 per cell; gemmae light green and polyhedral; dioicous. ●Wet habitats, along streams; known from only three collections. ♦We include *Lophozia confertifolia* Schiffner here; some bryologists place that name under *Lophozia murmanica* Kaalaas.



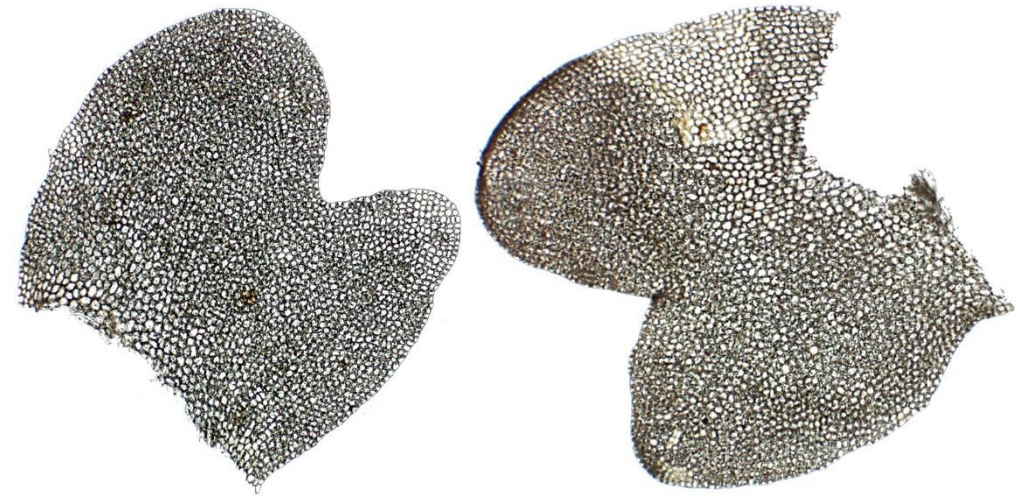




CO, Boulder Co., Niwot Ridge, 10 Aug 1972, *Weber & Nelson* (COLO).

Obtusifolium [a blunt leaf].

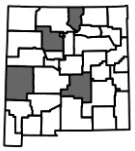
Obtusifolium obtusum (Lindberg) S.W. Arnell [blunt] [*Jungermannia obtusa* Lindberg, *Lophozia obtusa* (Lindberg) A. Evans]. Plants medium-sized, 1.5-2.5 mm wide, 2-5 cm long, green to yellowish-green; stems fleshy; leaves markedly obliquely, almost horizontally, inserted, bilobed with rounded lobes, obtuse at apex, the margins entire; sterile stems may develop large laciniate underleaves; rhizoids often reddish at base; cells small, thin-walled, with minute oil bodies; gemmae rare; dioicous, sporophytes rare. ●Moist soil; known from a single collection.

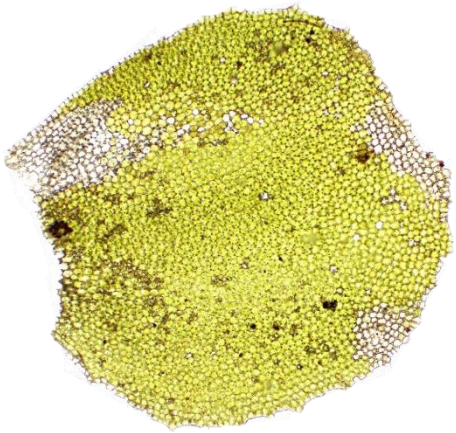


Switzerland, Canton of Graubunden, nw-facing slope of Guggerbachtal, 25 Jul 2005, *Blanka Shaw* (DUKE).

Plagiochila [a slanting mouth].

Plagiochila porelloides (Torrey ex Nees) Lindenberg [resembling *Porella*] [*Jungermannia porelloides* Torrey ex Nees, *Plagiochila asplenioides* (Linnaeus) Dumortier subsp. *porelloides* (Torrey ex Nees) Lindenberg ex Kaalaas]. Plants large, 1.7-5 mm wide, the lower segments sometimes embedded in sand or silt; leaves round to ovate, decurrent, succubously inserted, the margins lined by short teeth; underleaves essentially absent; gemmae absent; dioicous, perianth long and situated at the apex of a shoot. ●On rocks along streams and other wet habitats.





NM, Catron Co., Mogollon Mts, Bead Spring, 15 May 2012, *Blisard & Kleinman* (SNM).

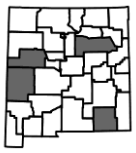
Porella [a small pore].

1 Underleaves narrow, about the same width as the stem, not decurrent, the lobule very small; plants found on wet rocks subject to inundation..... ***P. pinnata***

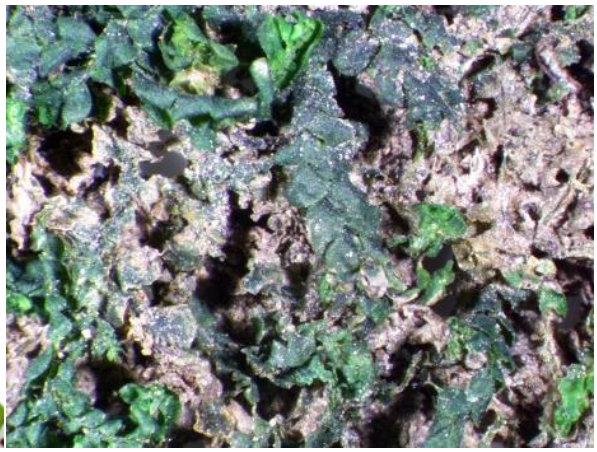
1 Underleaves wider than stem, with arched line of insertion, decurrent, the lobules and underleaves similar or dissimilar

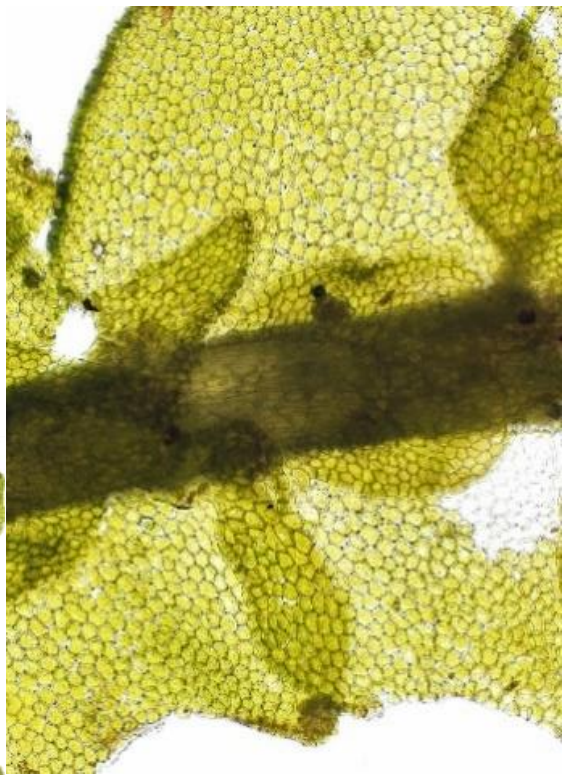
2 Lobule and underleaves similar in size; plants very common.....***P. platyphylla***

2 Lobule dissimilar in size, very small with acute apex; plants not so common.....***P. cordaeana***



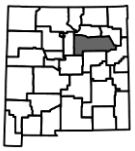
Porella cordaeana (Huebener) Moore [for August Carl Joseph Corda (1809-1849), Czech botanist] [*Jungermannia cordaeana* Huebener]. Plants very large, 2.5-4 mm wide, up to 10 cm long, variable; dark green (humid) to olive brown (drier) depending on environment; positive reaction to IKI, turning blue/black; leaves complicate-bilobed; lobe broadly ovate; lobule very much smaller than lobe, lanceolate; underleaves ovate, slightly (1.5x) wider than stem, long-decurrent, the apex with recurved margin; oil bodes small and numerous; dioicous, often fertile. ●Occurs in both dry and moist environments, on rocks and tree trunks.

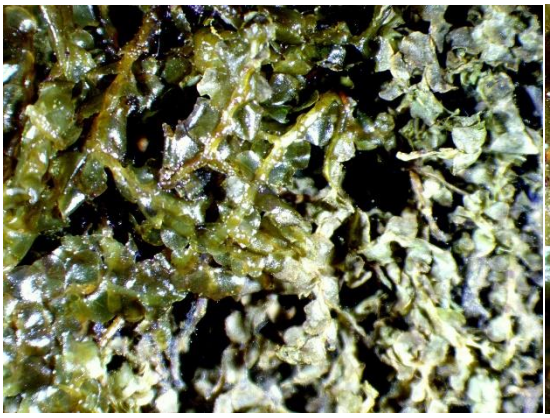


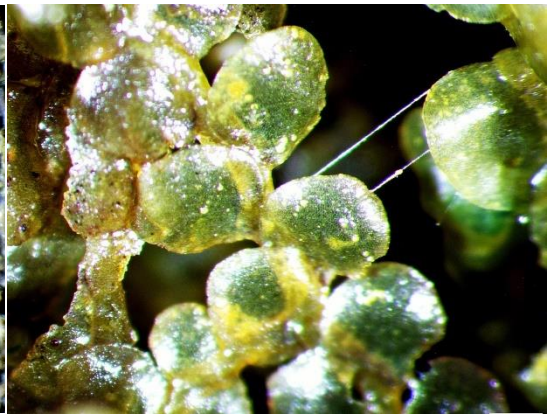


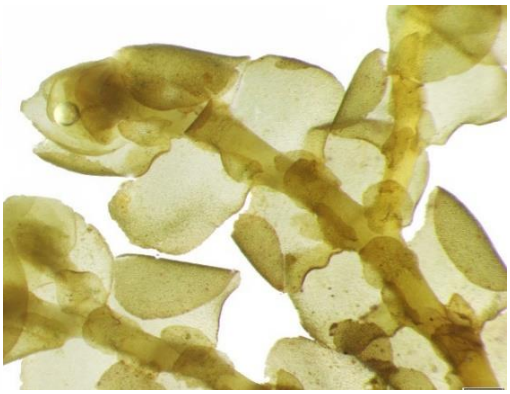
NM, Cibola Co., El Malpais Nat. Mon., Skylight Cave, 5 Nov 2016, *Blisard & Kleinman* (SNM).

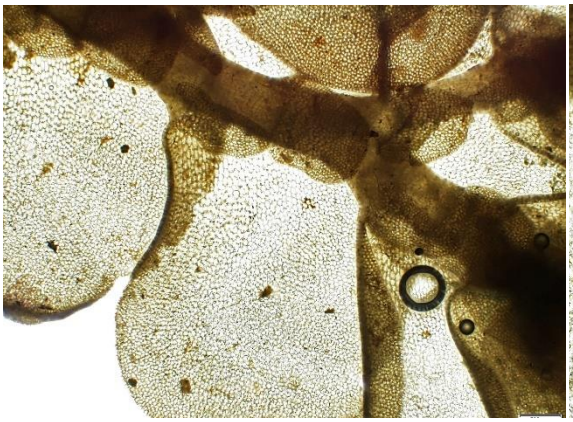
Porella pinnata Linnaeus [feather-like] Plants very large, 3-5 mm wide, up to 10 cm long, green to dark green; stems brown to black; leaves complicate-bilobed with ovate to rectangular lobes; lobule very much smaller and lingulate; underleaves ovoid, just slightly wider than stem and decurrent; dioicous, the male branches short and lateral, the perianth also on a short lateral branch. ●In water or inundated areas, sometimes caked with mud. ♦Known from a single report.

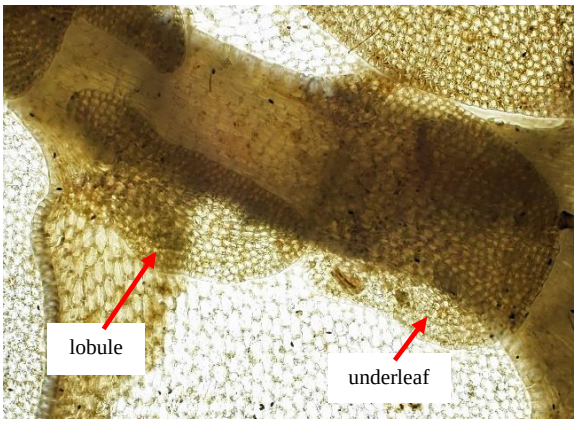




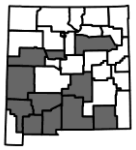




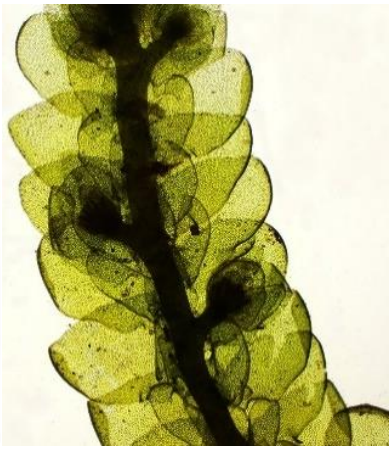


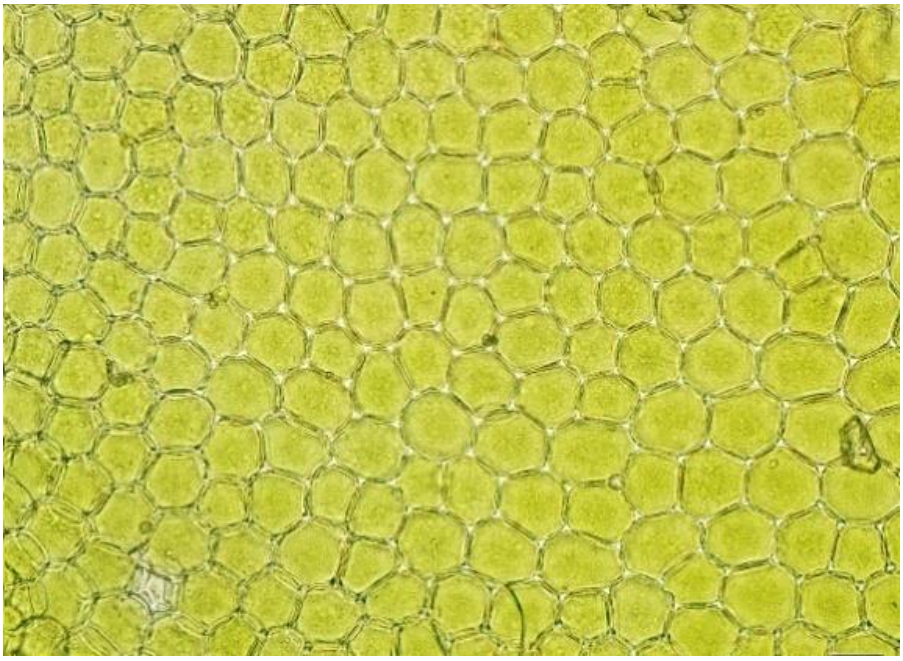


MO, Montgomery Co., Ozark Mts, Big Spring, Sep 1990, *W.R. Norris* (SNM).



Porella platyphylla (Linnaeus) Pfeiffer [flat-leaved] [*Jungermannia platyphylla* Linnaeus, *Porella platyphylloidea* (Schweinitz) Lindberg]. Plants large, 2-3.5 mm wide, medium to dark green; leaves complicate-bilobed with broadly ovate lobes and lobules, both overlapping the stem; lobule short-keel and decurrent; underleaves ovate, similar to lobule in size and shape, with curved line of insertion; oil bodies small and numerous; dioicous, often fertile. ●Common, found on bark or rock outcrops in moist areas. ♦*Porella platyphylloidea* (Schweinitz) Lindberg appears to be an example of so-called "cryptic" species, in that it cannot be distinguished by morphologic characteristics but requires molecular studies; it is included within *P. platyphylla* herein.





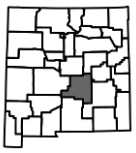
NM, Grant Co., Black Range, Skeleton Canyon, 3 Mar 2021, *Kleinman & Blisard* (SNM).

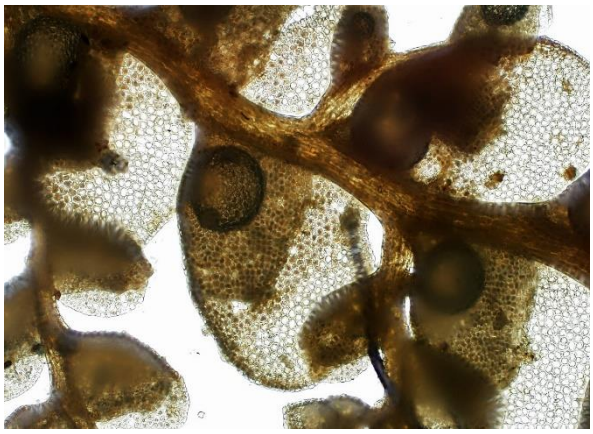
Radula [a scraper].

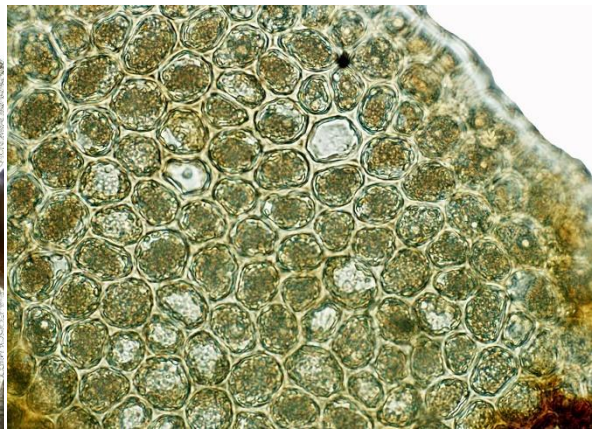
1 Dorsal lobe inner margin adnate to stem, apical region does not overlap stem, gemmae absent, rhizoids scarce, single oil body nearly filling the cell lumen ..... ***R. bolanderi***

1 Dorsal lobe inner margin not adnate to stem, apical region overlaps stem, gemmae often present on leaf margins rhizoids abundant, single oil body filling about half the cell lumen .....***R. complanata***

Radula bolanderi Gottsche [for Henry Nicholson Bolander (1831-1897), California plant collector]. Plants 1.5-2 mm wide, green, complicate-bilobed ; dorsal lobe rounded; lobule squarish, ¼ to ⅓ the lobe area, the free portion adnate to the stem; gemmae absent; cells contain a single oil body which fills almost the entire cytoplasm; underleaves absent; dioicious; ●Endemic to western North America, on trunks and branches of angiosperms; known from a single collection.

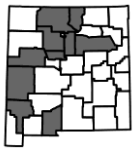


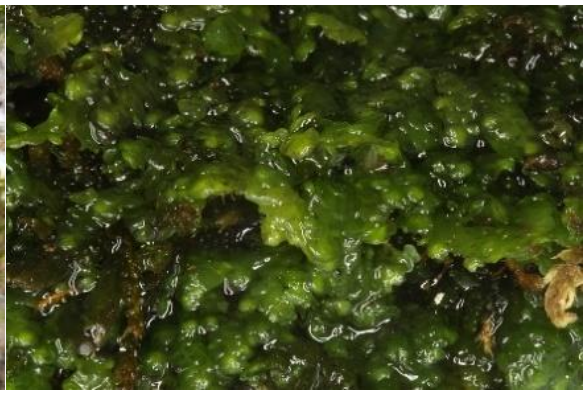


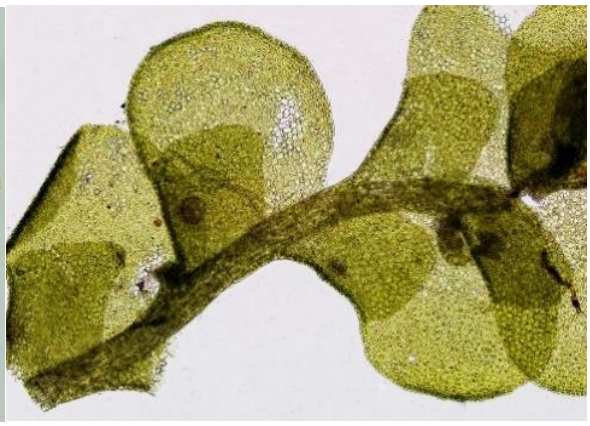


CA, San Mateo Co., Huddart State Park, *B. Thiers* (NY 00239723).

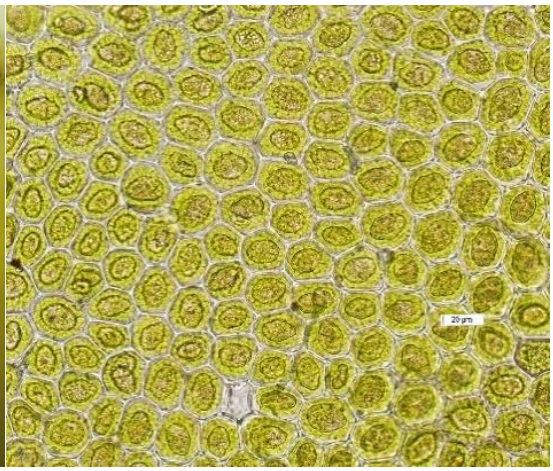
Radula complanata (Linnaeus) Dumortier [flattened on the ground] [*Jungermannia complanata* Linnaeus]. Plants 1.5-2 mm wide, green, complicate-bilobed; dorsal lobe rounded, the lobule squarish, ¼ to ⅓ the lobe area, the free portion of the lobule not adnate to stem; leaf margin often lined by gemmae; cells with a single oil body filling approximately half the cytoplasm; monoicous, the plants often with both gemmae and perianths. ●Widespread, on tree bark and rocks.

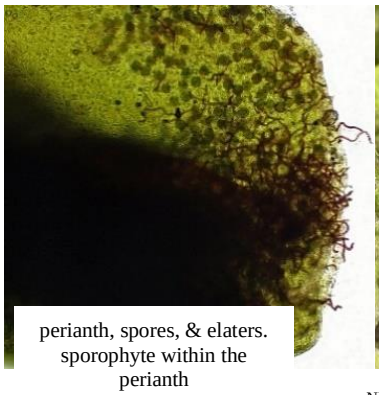






gemmae on leaf margin





perianth, spores, & elaters. sporophyte within the perianth

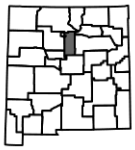
perianths

NM, Catron Co., Bursum Road, 17 May 2010, *Kleinman & Blisard* (SNM).

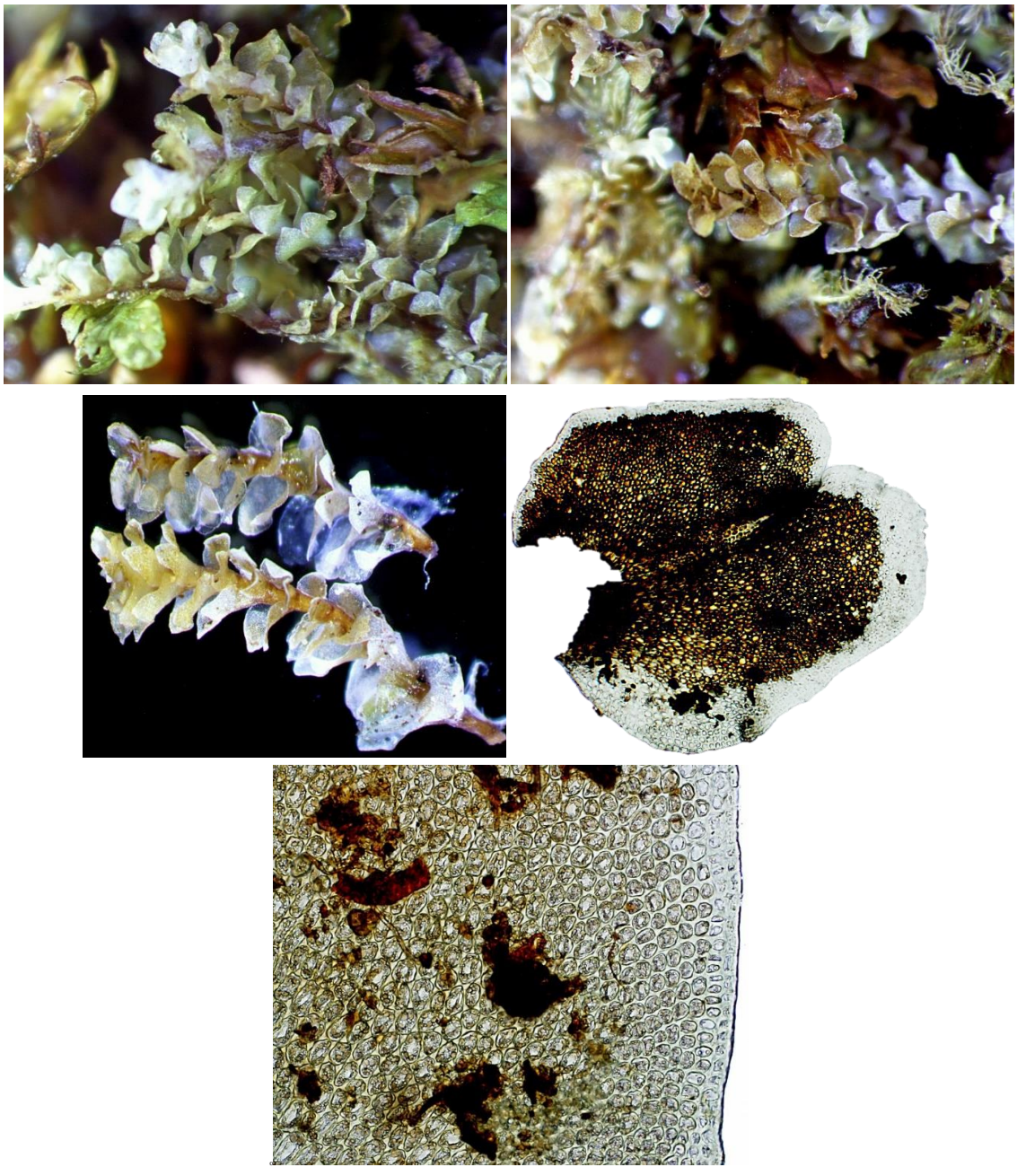
1 Leaves simple, the outer margins mostly 3-lobed, not complicate-bilobed ..... **Schistochilopsis**
1 Leaves complicate-bilobed, i.e., one lobe lying over the other, forming a distinct keel ..... **Scapania**

Scapania [a spade].

1 Ventral lobe decurrent to stem
  2 Dorsal and ventral lobes unequal (dorsal lobe less than ⅔ the size of the ventral lobe) ..... ***S. undulata***
  2 Dorsal and ventral lobes subequal (dorsal lobe ¾ or more the size of the ventral lobe)
    3 Plants small (1-2.5 mm wide) ..... ***S. cuspiduligera***
    3 Plants large (2-4 mm wide) ..... ***S. subalpina***
1 Ventral lobe not decurrent to stem
  4 Leaves with distinct border of 1-3 rows of cells with thick cell walls ..... ***S. curta***
  4 Leaves without border; laminal cells generally collenchymatous (have bulging trigones)
    5 Plants large (2-4 mm wide) ..... ***S. irrigua***
    5 Plants very small to small (0.6-2.5 mm wide) ..... ***S. mucronata***

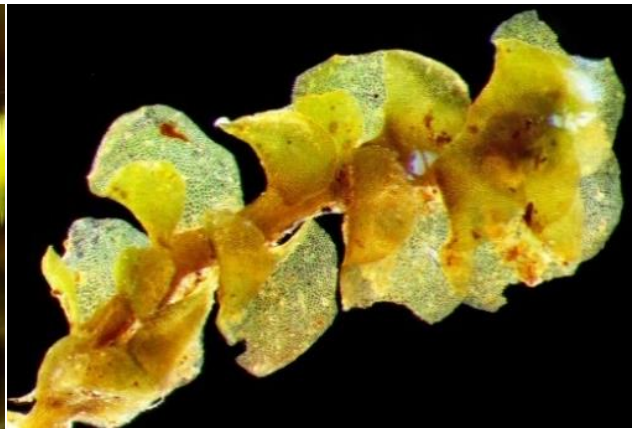


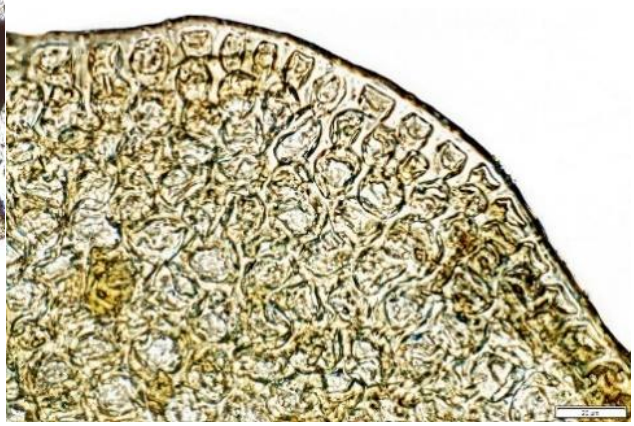
Scapania curta (Martius) Dumortier [short] [*Jungermannia curta* Martius]. Plants polymorphic, 1.3-2.5 mm wide, the ventral surface often red-purple; ventral lobe apices mostly rounded; large dorsal lobe 0.65 the area of the ventral lobe; leaf margins with 1-4 thick-walled cells; oil bodies 2-4 per cell; dioicous; often with 2-celled ellipsoidal yellow-green gemmae. ●Occurs on soil and wood along streams; known from a single collection.

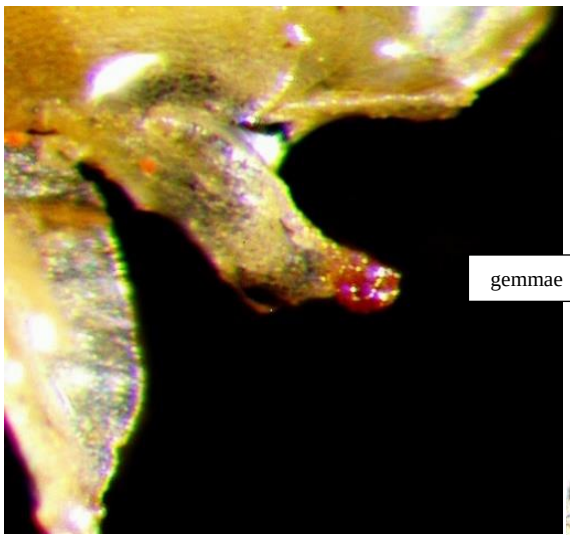


Canada, Quebec, Mingan Archipelago Nat. Park Reserve, 12 Jun 1989, *Schofield et al.* (DUKE).

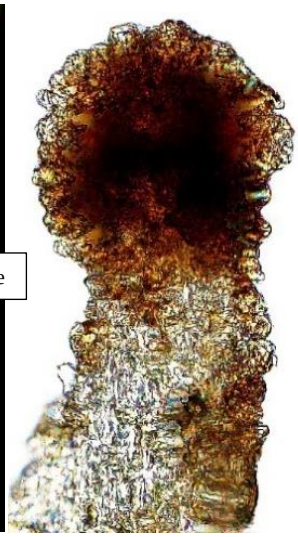
Scapania cuspiduligera (Nees) Muell. Frib. [with little points] [*Jungermannia cuspiduligera* Nees]. Plants small, 1-2.5 mm wide, whitish to light blue-green; leaves complicate-bilobed with dorsal lobe 0.75 (or more) times the ventral lobe (sub-equal); ventral lobe long-decurrent; marginal cells thick-walled without oil bodies, forming a hyaline margin, otherwise oil bodies 1-3 per cell; gemmae brownish, ovoid, in clusters of apices of upper leaves; dioicous; androecium apical; perianth oblong, compressed, often appearing parallel sided. ●On moist rocks, especially sandy gravel.





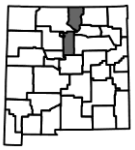


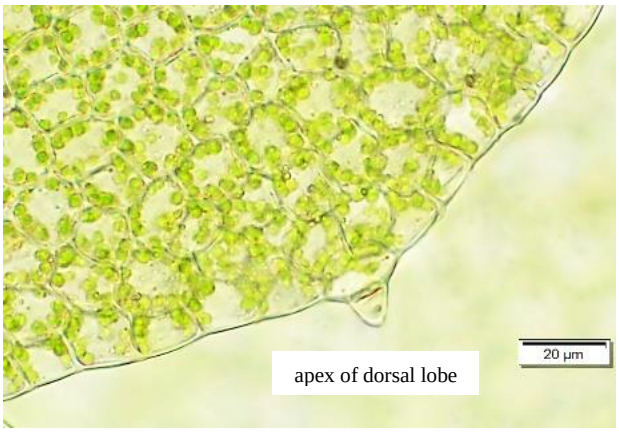
gemmae

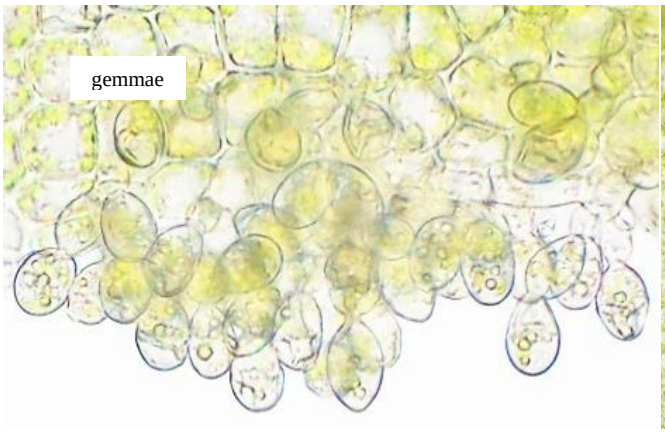


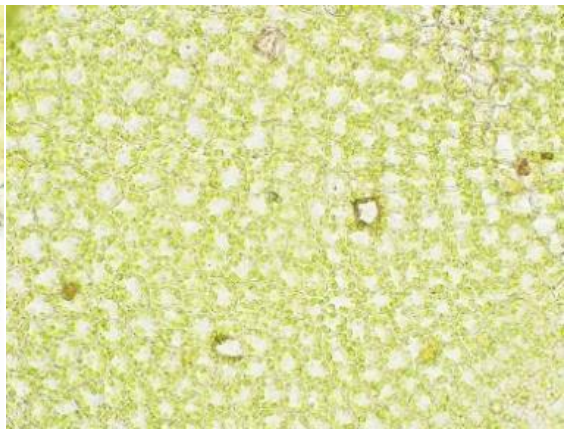
NM, Taos Co., Williams Lake, 7 Aug 2015, *Kleinman & Blisard* (SNM).

Scapania irrigua (Nees) Nees [soaked] [*Jungermannia irrigua* Nees]. Plants large, 2-4 mm wide, pale yellow-green to brown; complicate-bilobed; dorsal lobe 0.5-0.6 the size of the ventral lobe; dorsal lobe has apiculate apex (1-2 celled tooth); leaf laminal cells generally collenchymatous with bulging trigones; oil bodies 3-5 per cell, small, occupying small percentage of cytoplasm; gemmae 2-celled, pale green; dioicous. ●Generally found near standing water but rarely submerged; known from few collections.



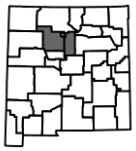


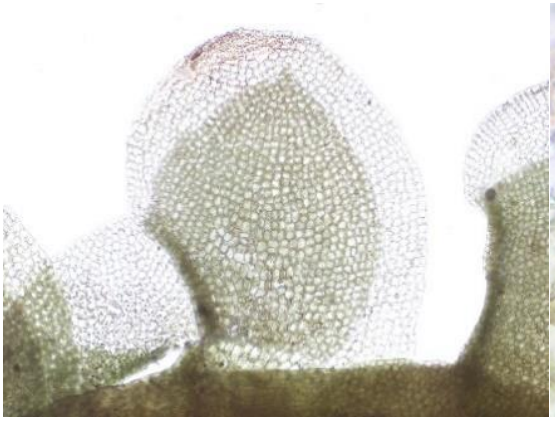


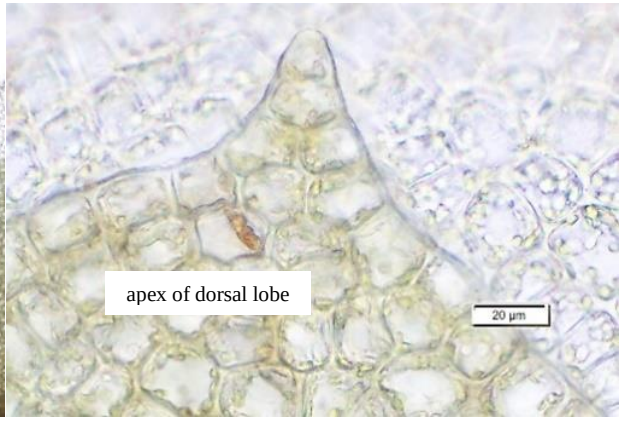


NM, Taos Co., Williams Lake, 23 Aug 2014, *Romig et al.* (SNM).

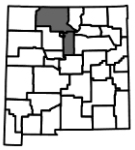
Scapania mucronata Buch [sharp-pointed]. Leaves complicate-bilobed, with keel half the length of the lobe; ventral lobe oblong, the apex triangular and ending in a mucro (single-celled tooth); dorsal lobe ½ the ventral lobe, not extending across the stem; oil bodies granular; gemmae when present green, on tips of leaves, but seldom present; dioicous, but plants usually non-reproductive. ●On soil in rock crevices; known from two collections.



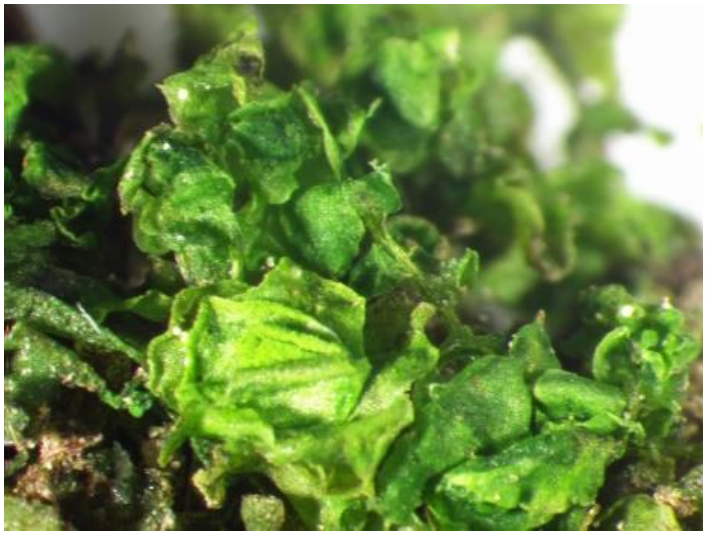


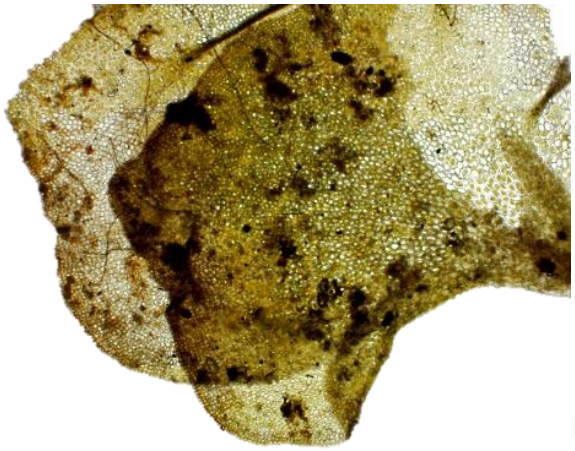


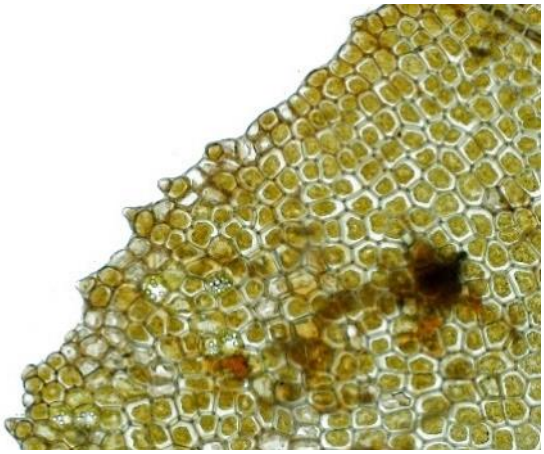
NM, Sandoval Co., Valles Caldera Nat. Pres., Redondo Creek, 15 Jul 2010, *K. Romig* (SNM).

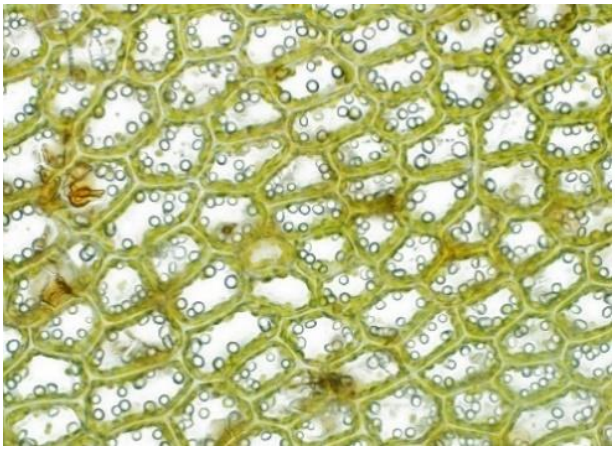


Scapania subalpina (Nees) Dumortier [nearly alpine] [*Jungermannia subalpina* Nees ex Lindenberg]. Plants 2-4 mm wide, pale green, often with reddish-brown/black secondary pigmentation; leaves complicate-bilobed, dorsal lobe 0.65-0.8 times the ventral lobe; leaves transversely inserted; ventral lobe long-decurrent; marginal cells of leaves thick-walled, forming a 1-3-cell wide border, the margin entire or denticulate; oil bodies 4-5 per cell; gemmae ovoid, 2-celled, green with some reddish pigmentation; dioicous; androecium at apex of main shoot; perianth ellipsoidal, long-exserted. ●On continuously wet sandy soil or stones; sometimes submerged; known from few collections at two sites.



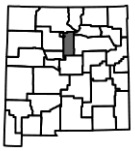






NM, Rio Arriba Co., Canjilon Creek, 16 Jun 2021, *Blisard et al.* (SNM).

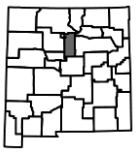
Scapania undulata (Linnaeus) Dumortier [wavy] [*Jungermannia undulata* Linnaeus]. Plants large, 2-4.5 mm wide; leaves entire or slightly toothed; dorsal lobe ovate, large, extending across the stem and overlapping adjacent leaves; ventral lobe obovate and decurrent; laminal leaf cells thin-walled, the marginal cells smaller with thick walls; oil bodies relatively small, 2-4 per cell; gemmae green. ●Wet places such as rocks in streams or seepages.

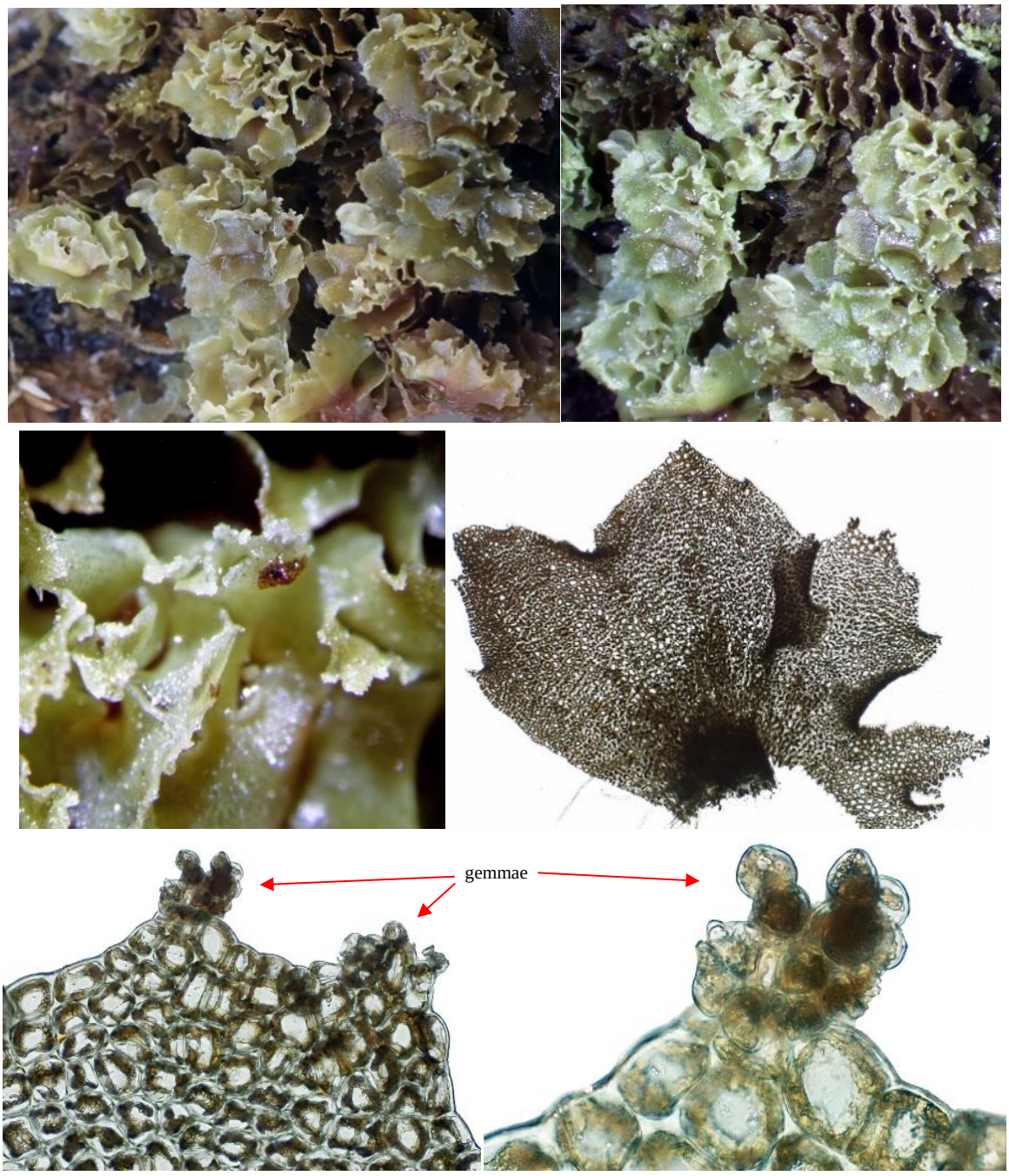


CO, Gilpin Co., 20 Jul 2022, *M. Ewing* (SNM).

Schistochilopsis [resembling *Schistochila*].

Schistochilopsis incisa (Schrader) Konstantinova [cut, fringed] [*Jungermannia incisa* Schrader, *Lophozia incisa* (Schrader) Dumortier]. Plants small, 1-2 mm wide; uppermost leaves transversely inserted, crowded, forming a cabbage-like head; leaves mostly 3-lobed (sometimes 2-5-lobed), the lobes asymmetric; leaf cells with 20-50 oil bodies; polyhedral gemmae common; underleaves absent; dioicous; perianth plicate. ●On shaded decaying logs or moist soil; known from a single collection.

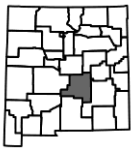




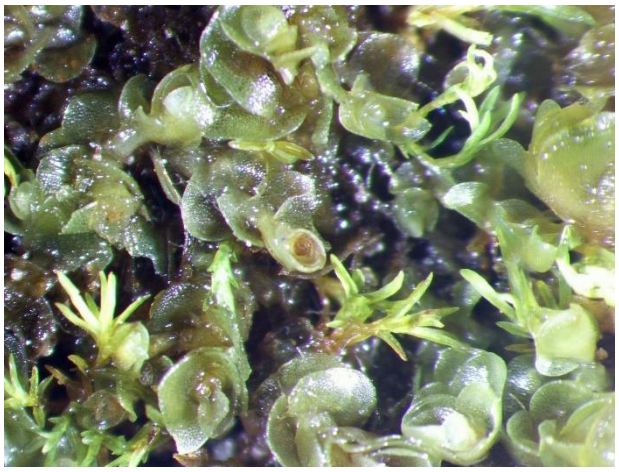
ME, Washington Co., Great Wass Island, 12 Jun 2013, *K. Blisard* (SNM).

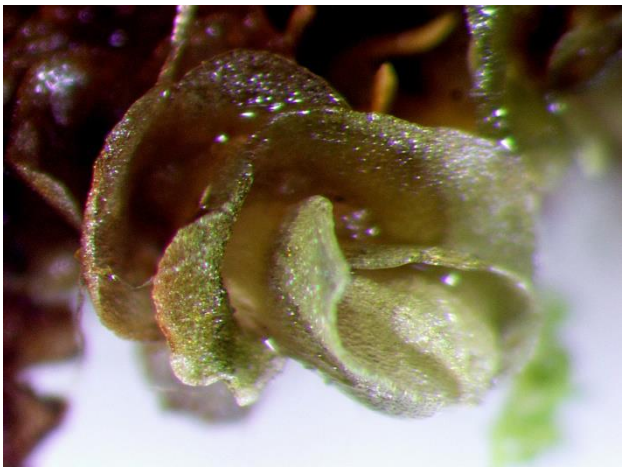
Solenostoma [a channel-mouth].

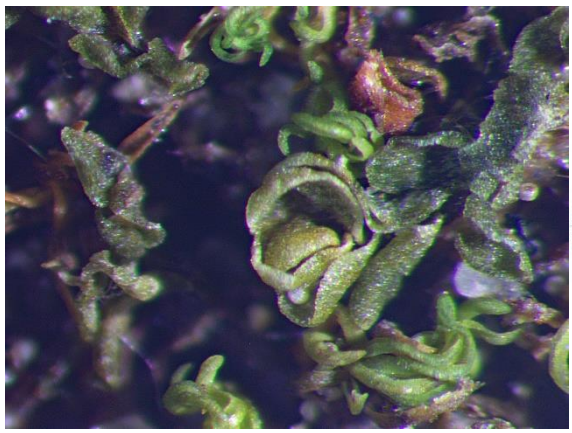
1 Leaves long decurrent on stem surface; leaf shape semi-circular with widest part the base of the leaf .....***S. hyalinum***
1 Leaves not or short decurrent on stem surface; leaf shape circular or reniform, with widest part of leaf near middle
  2 Leaves reniform, mostly wider than long; rhizoids in obvious clusters .....***S. confertissimum***
  2 Leaves circular, mostly as long as wide; rhizoids scarcely in clusters
    3 Plants paroicous; rhizoids mostly/many perpendicular to the stem .....***S. sphaerocarpum***
    3 Plants dioicous; rhizoids mostly appressed and decurrent down the stem.....*S. rubrum*

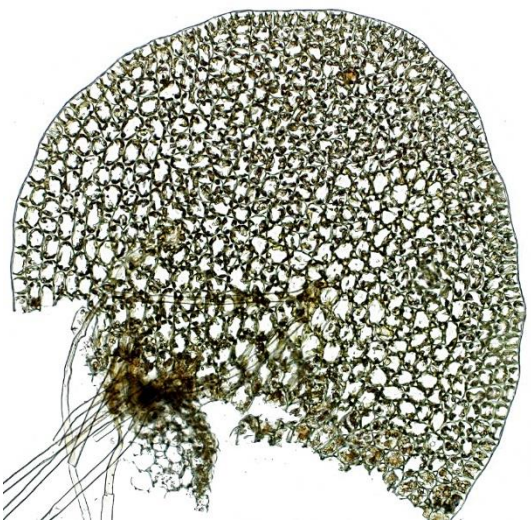


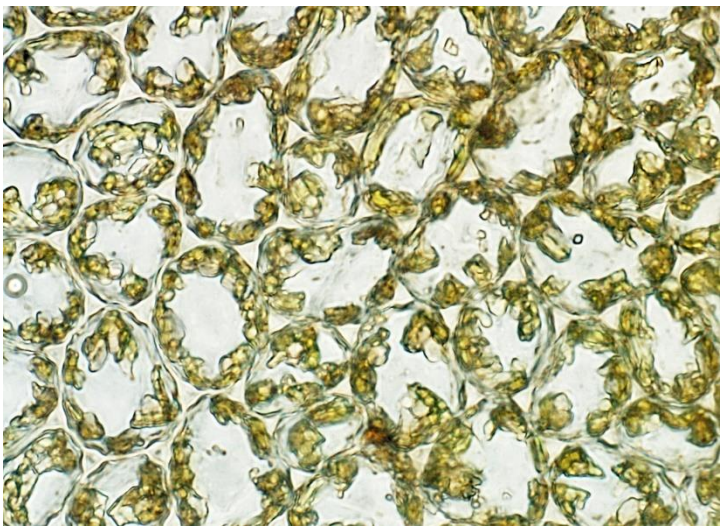
Solenostoma confertissimum (Nees) Schljakov [very crowded] [*Jungermannia confertissima* Nees]. Plants yellow-green to green to brownish-green, 1-2 mm wide; leaves reniform or occasionally round; oil bodies 4-11 per cell, granular; underleaves and gemmae absent; rhizoids long and numerous, arising from stem and leaves, forming a distinct strand-like bundle along the ventral side of the stem; paroicous; male and female bracts reniform; perianth partially exserted. ●On moist soil, in crevices of rock walls and ledges; known from a single collection. ♦Distinguished by bundles of rhizoids on ventral surface of stem.



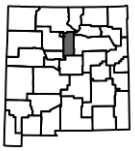




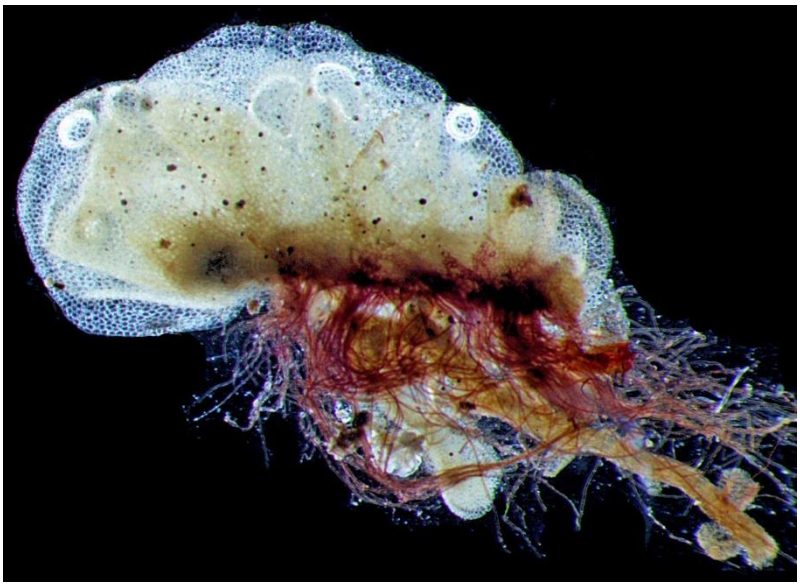


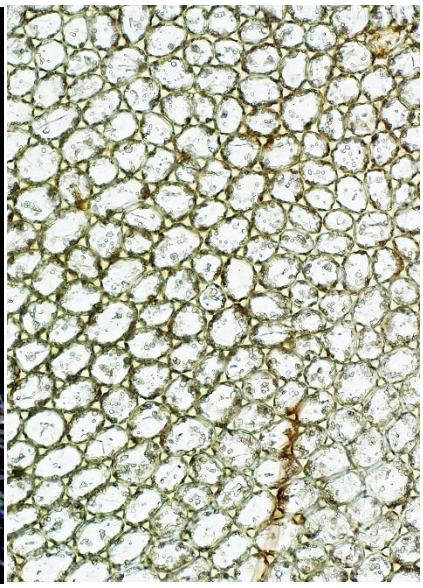


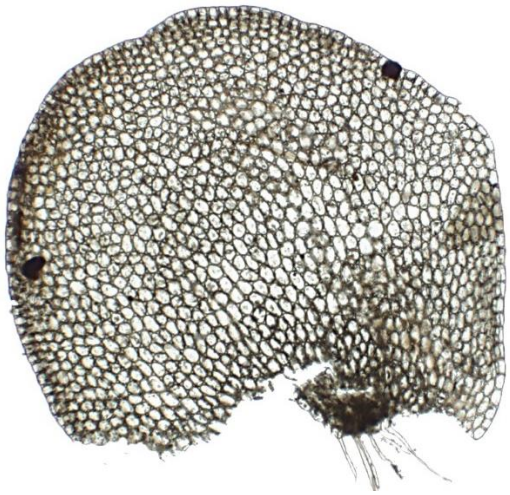
MI, Alger Co., Tannery Falls, 6 Aug 1967, *N. Miller* (NY 02136063).



Solenostoma hyalinum (Lyell) Mitten [translucent] [*Jungermannia hyalina* Lyell, *Plectocolea hyalina* (Lyell) Mitten]. Plants small, 1.5-2 mm wide, yellowish-green to deep green; leaves entire, succubus, leaf shape semi-circular with widest part near base, decurrent; leaf cells thin-walled with small trigones; oil bodies large and granular, usually 2-5 per cell; underleaves and gemmae absent; rhizoids long and reddish, in clusters arising from both stem and leaf bases; dioicous; perianth fused to the bracts for half its length. ●On soil-covered rocks along streams; known from a single collection.

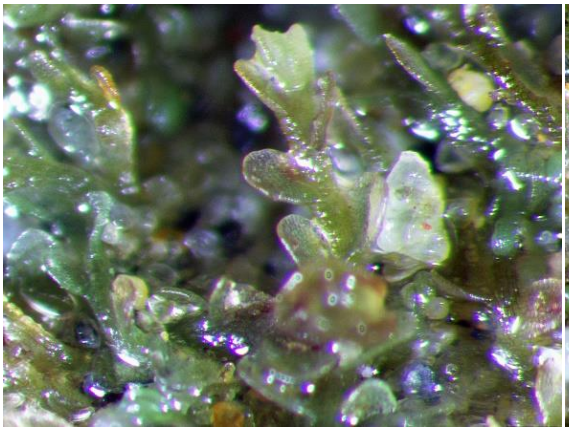


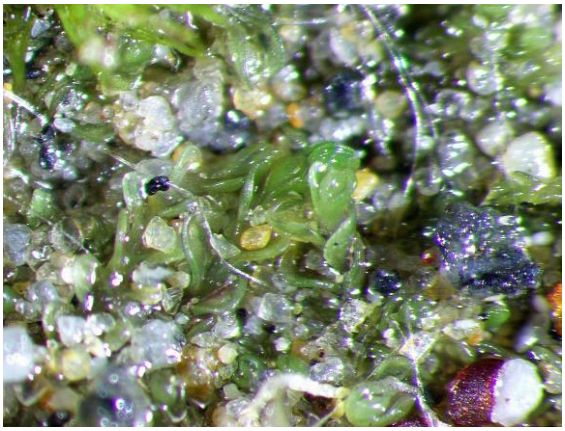


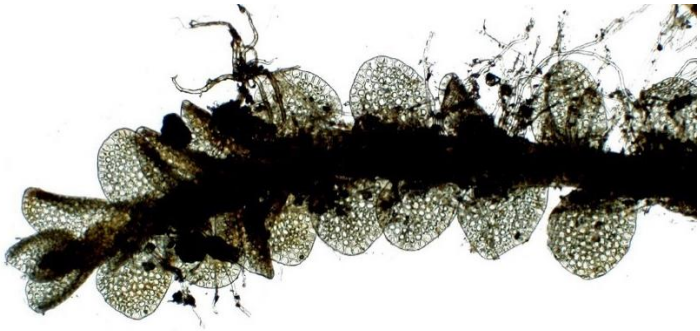


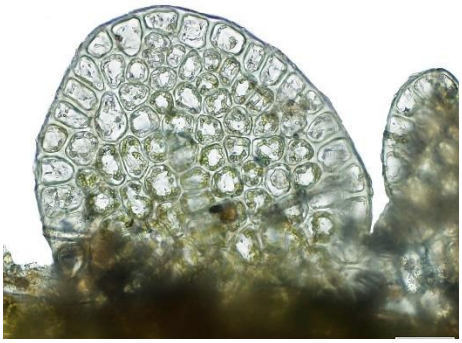
MI, Alger Co., Pictured Rocks, 22 Jun 1957, *R.M. Schuster* (DUKE).

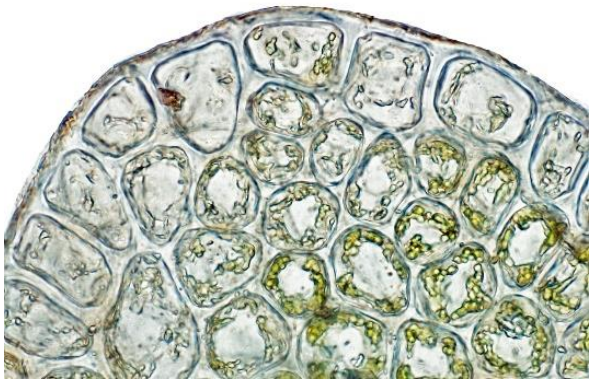
Solenostoma rubrum (Gottsche ex Underwood) R.M. Schuster [red] [*Jungermannia rubra* Gottsche ex Underwood]. Plants green when actively growing in moist habitats, turning reddish when dry and exposed; leaves bordered by thick-walled cells that are larger than the median leaf cells; rhizoids hyaline; dioicous; perianths red-purple. ●On soil, shaded banks; not yet known from the state, but to be looked for in the northern counties.

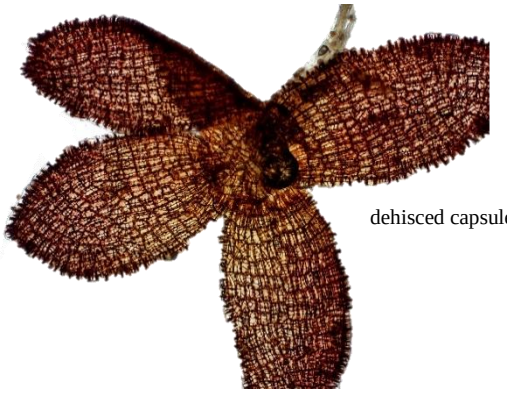










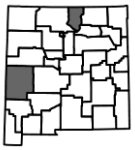


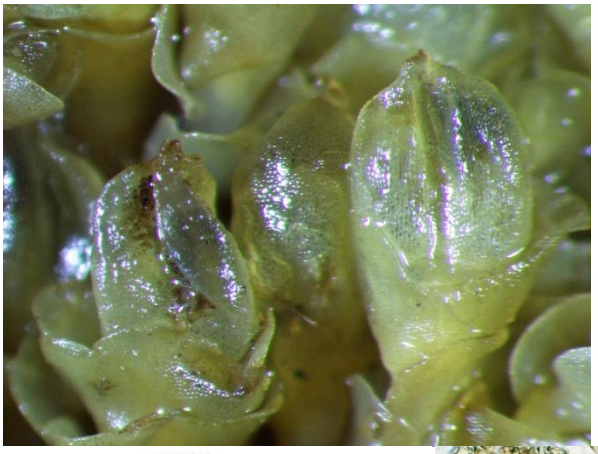
dehisced capsule

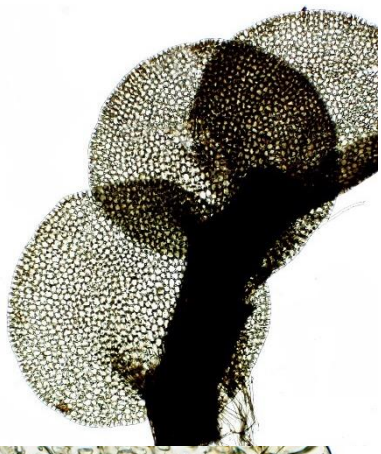
sporophytes

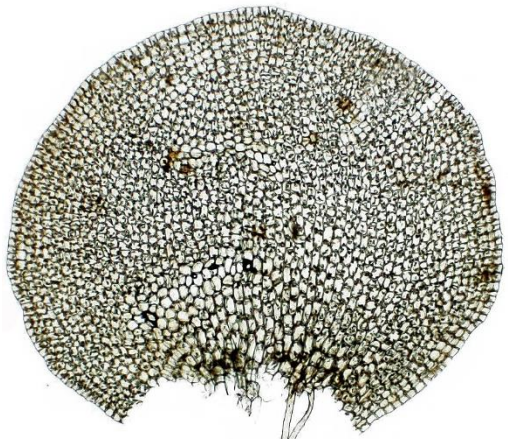
CA, Sonoma Co., near Occidental, 18 Mar 2016, *K. Blisard* (SNM).

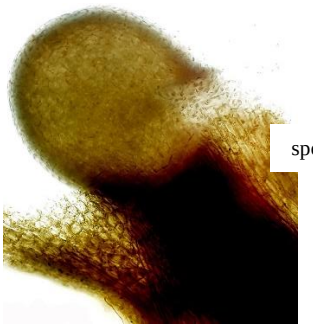
Solenostoma sphaerocarpum (Hooker) Stephani [with globe-shaped fruits] [*Jungermannia spaerocarpa* Hooker]. Plants olive-green, 1-3 mm wide, quite variable; leaves transversely inserted, nearly circular; oil bodies 4-9 per cell, granular; underleaves and gemmae absent; rhizoids frequent, not in clusters, many oriented perpendicular to the stem, some rhizoids arise from leaf bases; paroicous, both sets of bracts round to reniform; perianth partially exserted. ●On moist, sandy soils over rocks near streams; known from few collections.











sporophyte & spores

Poland, Klodzko Valley, Table Mts, 20 Sep 1954, *J. Szweykowski* (CINC).

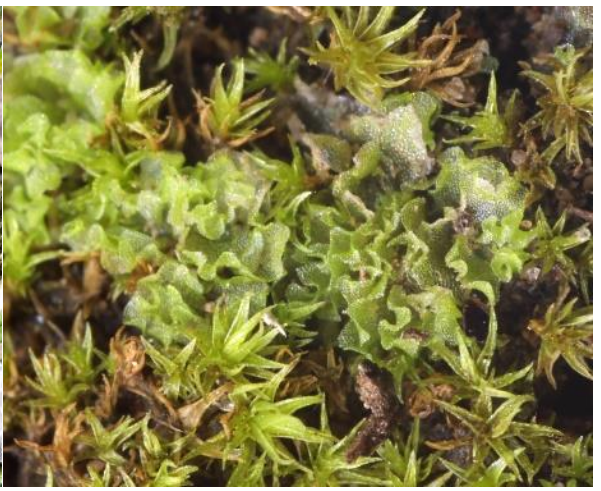
Group B: Plants ribbon-like or thallose and translucent (simple thallose liverworts)

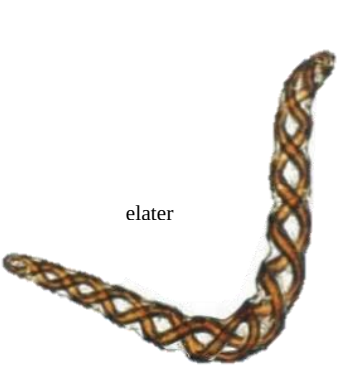
1 Plants with ruffled thalli that appear leaf-like, with purple rhizoids.....FOSSOMBRONIACEAE
1 Plants thalloid or ribbon-like, but not leafy
2 Plants linear, ribbon-like, with distinct mid-rib; hair-like rhizoids on margin of thallus .....METZGERIACEAE
2 Plants thalloid, the mid-rib lacking or indistinct, with distinct lobing ..... PELLIACEAE

Simple Thallose Liverworts – Family FOSSOMBRONIACEAE

Fossombronia [for Vittorio Fossombroni (1754-1844), Italian mathematician].

Fossombronia pusilla (Linnaeus) Nees [very small] [*Jungermannia pusilla* Linnaeus]. Thallus generally a single cell thick and intricately folded, looking like a cabbage head or ruffles on a dress shirt; purple rhizoids characteristic; spores are necessary to define species, based on microscopic spore ornamentation. ●Damp, shaded places, including soil of hillsides and sometimes on trails, or rocky outcrops; known from two recent collections.





elater

spore

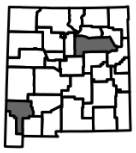
NM, Grant Co., Pinos Altos Range, McMillen Campground, 4 Sep 2018, *Blisard & Kleinman* (SNM).

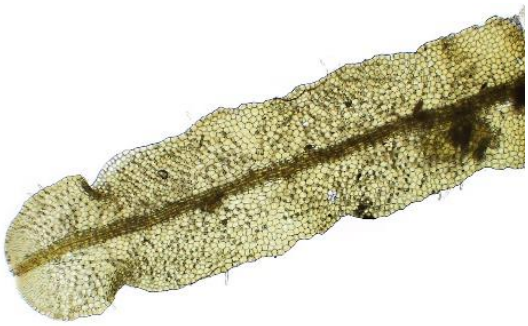
Metzgeria [for Johann Baptist Metzger (1771-1844), German engraver].

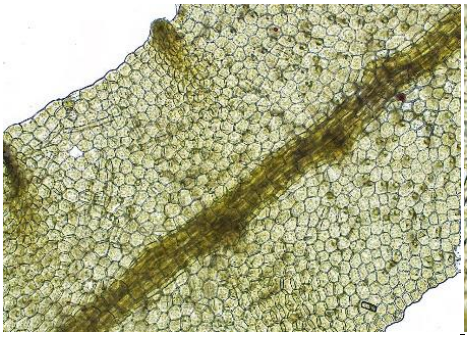
1 Small green to yellow-green thalli, with hairs singly or in pairs, along margin or on ventral midrib, monoicous, often fertile, with sex organs arising from ventral surface ..... **M. conjugata**

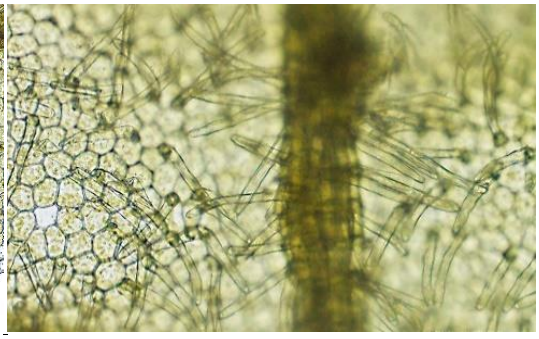
1 Small grayish-green thalli with numerous small hairs on both dorsal and ventral surfaces..... **M. pubescens**

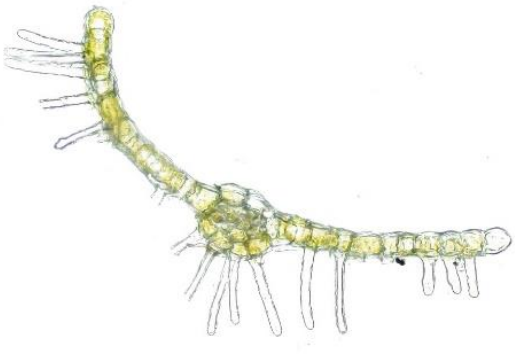
Metzgeria conjugata Lindberg [united]. Thalli linear, long and narrow, to 2 cm long, 0.1-0.2 cm wide, green to yellow-green; midrib prominent, convex on both surfaces, the remainder of the thallus a single cell thick; hairs single or in pairs, present on thallus margins and ventral surface of midrib; monoicous; sex organs arise on ventral midrib, often fertile; gemmae absent. ●On bark, shaded rock outcrops.





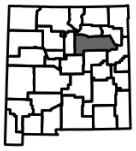


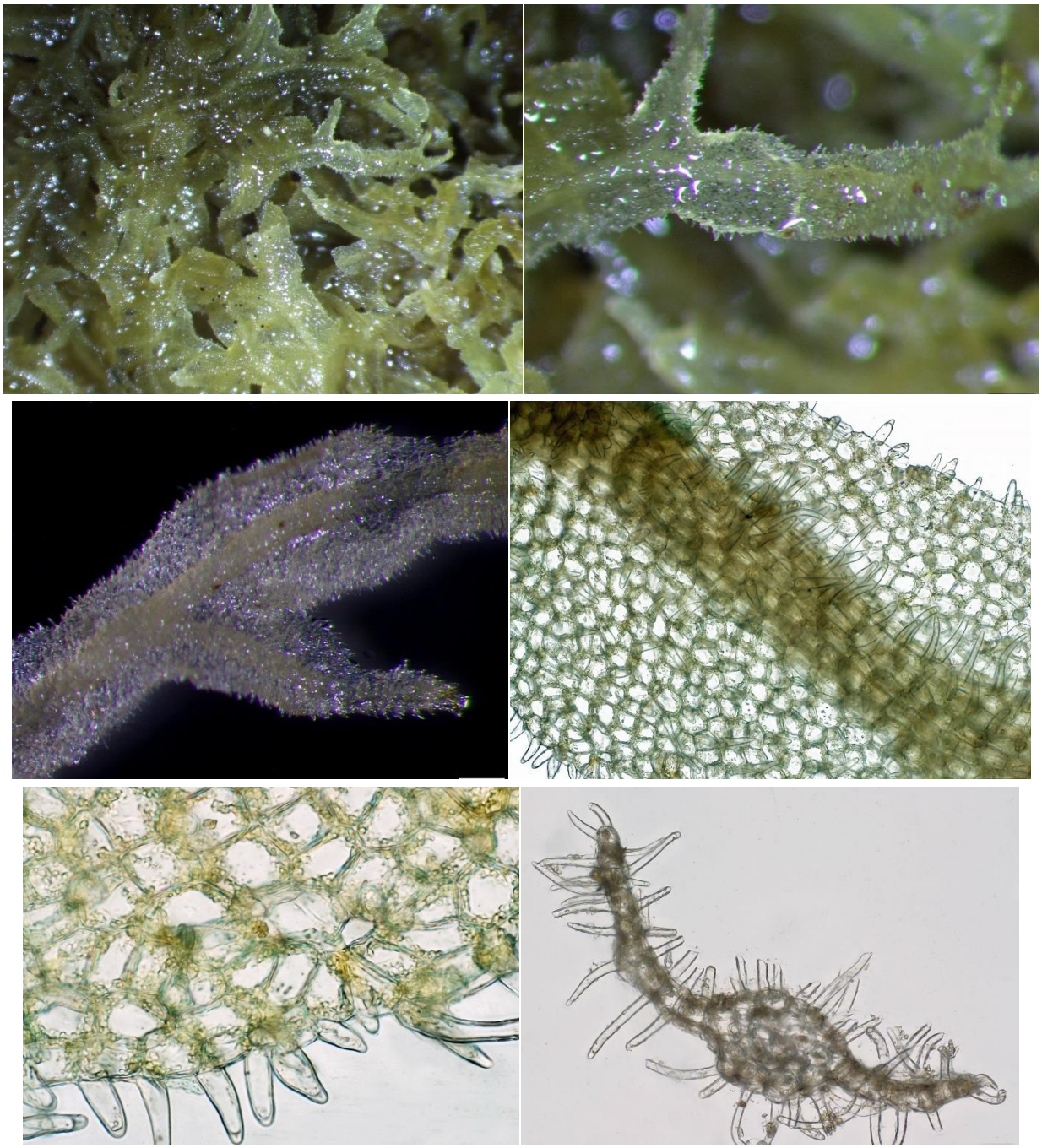




NM, San Miguel Co., Porvenir Canyon, 13 Aug 2018, *Kleinman & Blisard* (SNM).

Metzgeria pubescens (Shrank) Raddi [downy hairy] [*Apometzgeria pubescens* (Shrank) Kuwahara, *Jungermannia pubescens* Shrank]. Thalli linear, long and narrow, to 3 cm long, 0.1-0.2 cm wide, grayish-green; midrib prominent, convex on both surfaces, the remainder of the thallus a single cell thick; hairs single or in pairs, on thallus margin and on both dorsal and ventral surfaces of midrib; dioicous; often sterile, gemmae absent. ●Most commonly rocks, occasionally trees; known from a single collection.



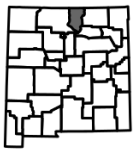


OR, Clatsop Co., Saddle Mt, 17 Apr 1978, *Schofield & Tan* (COLO).

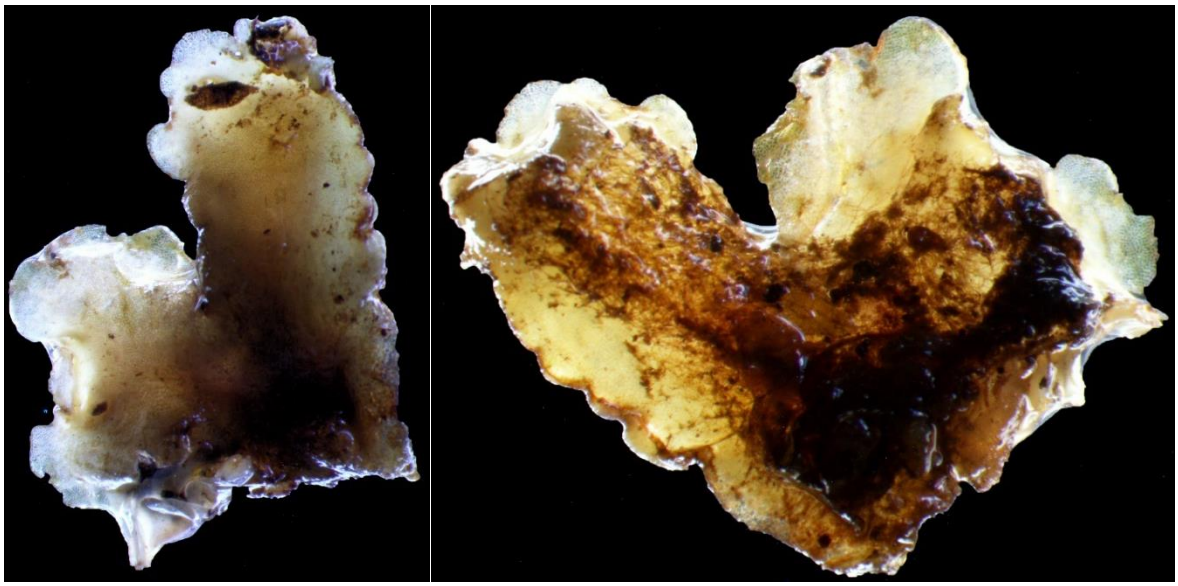
1 Thalli with longer slime hairs (4-8 cells) on the apical ventral surface; thallus without thickening bands near mid-rib ..... **Apopellia**

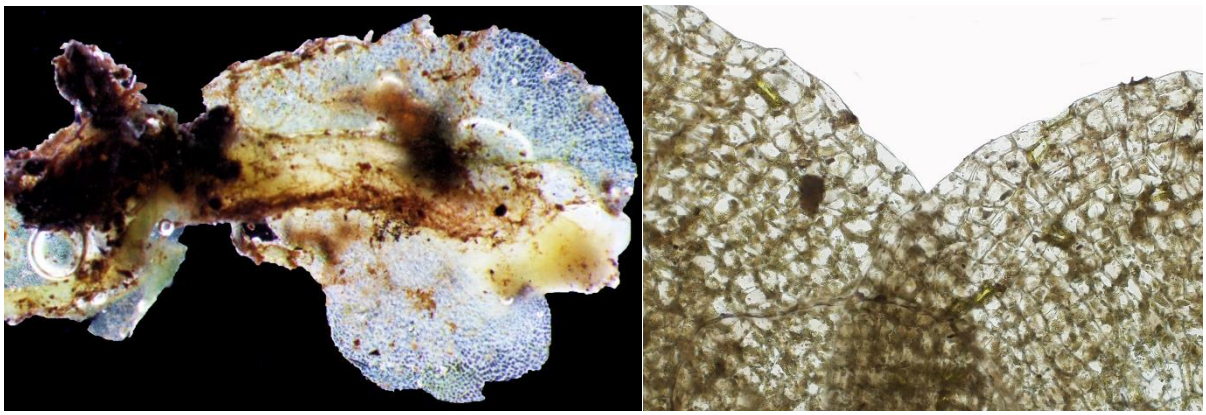
1 Thalli with short slime papillae (2 cells) on the ventral surface near apex; thallus cross-sections show thickening bands near the mid-rib ..... **Pellia**

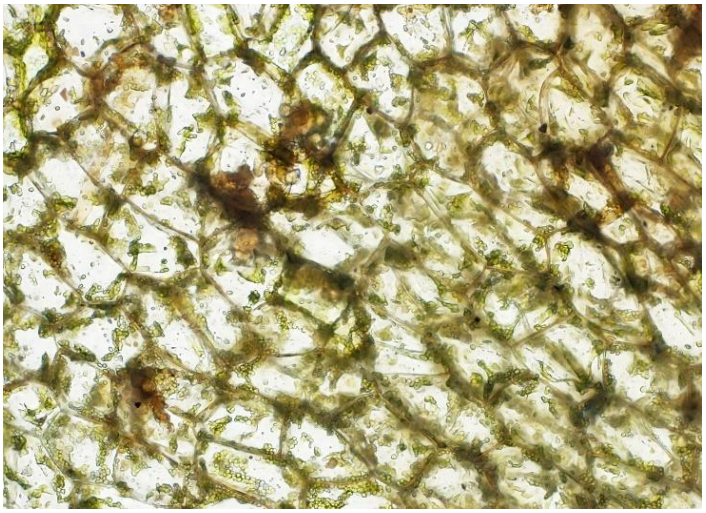
Apopellia [not *Pellia*].



Apopellia endiviifolia (Dickson) Nebel & Quandt [resembling endive leaves] [*Jungermannia endiviifolia* Dickson, *Pellia endiviifolia* (Dickson) Dumortier]. Thalli rather large, 4-5 cm long, 0.5-0.7 cm wide, thin, translucent, with thicker middle region, the cross-section devoid of thickening bands near the midrib; ventral thallus apex with longer slime hairs 4-8 cells long; dioicous; female thalli typically larger than male; pseudoperianths erect and tubular with ciliate mouths. ●Shaded creek banks and drainages in meadows and forests; known from a single collection.



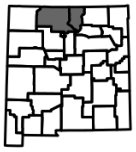


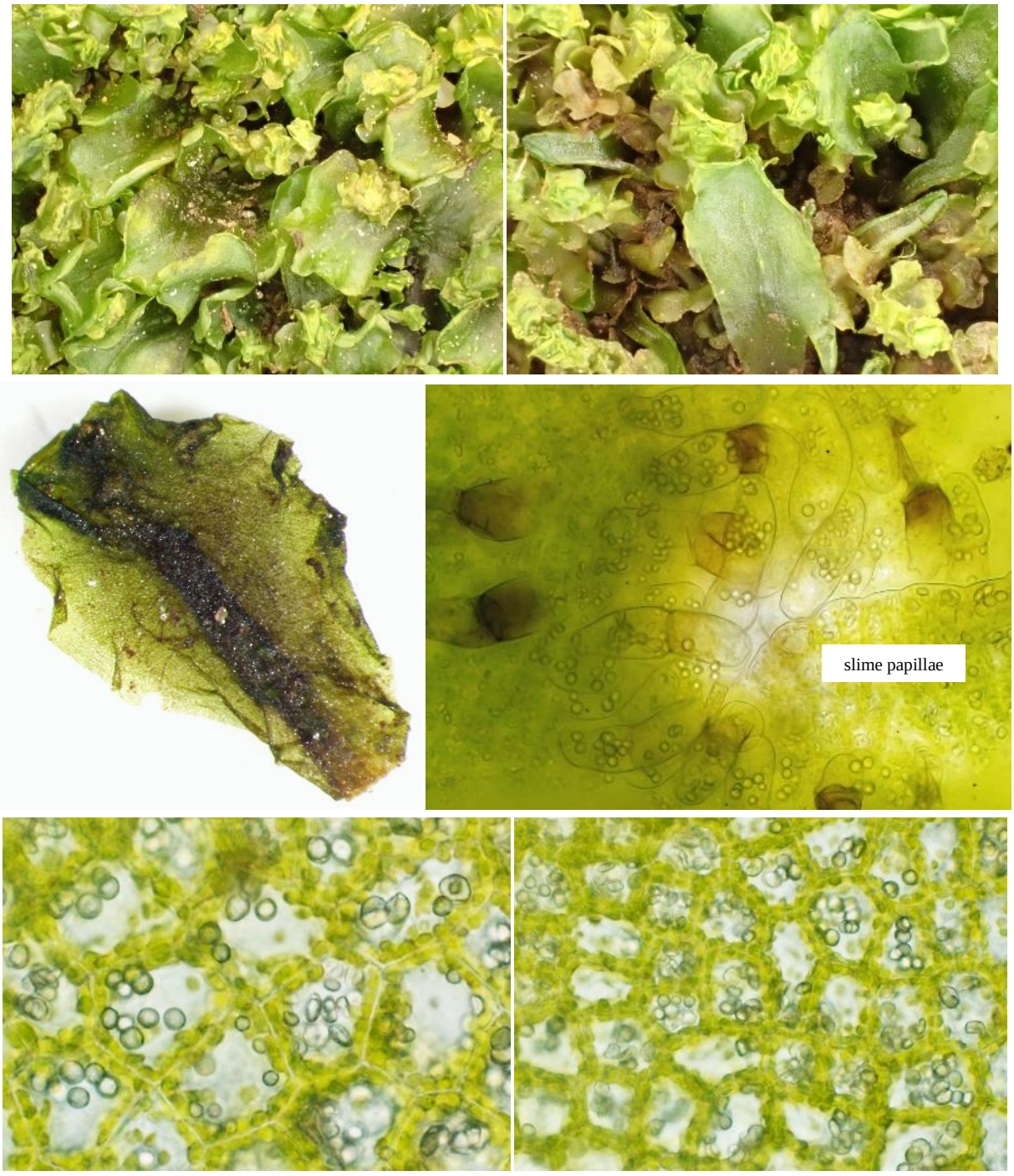


Colorado, Boulder Co., 8 Jun 1976, *F.J. Hermann* (NY 00260944).

Pellia [for Giovanni Pietro Leopoldo Vincenzo Giuseppe Luigi Pelli Fabbroni (1783-1864), Italian functionary].

Pellia epiphylla (Linnaeus) Corda [from the leaf] [*Jungermannia epiphylla* Linnaeus]. Thalli rather large, 3-5 cm long, 0.8-1.2 cm wide, firm, translucent; midrib broad and high with many of the cells having ring-like or band-like internal thickenings; ventral apex with short (2 cell) slime papillae; rhizoids abundant and brownish; monoicous; antheridia along dorsal midrib; perichaetium flaplike, forming a pocket from which the sporophyte emerges. ●On soil near streambanks and other wet sites; known from few collections.





NM, Rio Arriba Co., Canjilon Creek, 16 Jun 2021, *Kleinman et al.* (SNM).

Group C: Plants thallose and opaque (complex thallose liverworts)

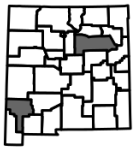
1 Plant thalli ribbon-like, often forming rosettes
  2 Thalli forming rosettes, with spongy surface and medial indentations ..... RICCIACEAE
  2 Thalli scattered or aggregated into partial rosettes; lateral ventral scales prominent ..... OXYMITRACEAE
1 Plants with fleshy thalli, with or without observable air pores
  3 Thalli large (2-4 cm long, 5-10 mm wide, or more)
    4 Thalli very large with distinctly areolate surface due to prominent white air pores, carpocephalum cone shaped ..... CONOCEPHALACEAE
    4 Thalli large, air pores less prominent but still conspicuous, often with round gemmae cups, carpocephalum umbrella-like (*M. polymorpha*) ..... MARCHANTIACEAE
  3 Thalli smaller (1-2 cm long, 2-5 mm wide)
    5 Thalli rolled up into tubes when dry; ventral scales usually purple ..... AYTONIACEAE
    5 Thalli not rolled up when dry; ventral scales purple or not
      6 Ventral scales hyaline and curled around thallus apex; carpocephalum dorsal ..... CLEVEACEAE
      6 Ventral scales purple, not curled around the thallus apex
        7 Carpocephalum 4-lobed (*M. quadrata*) ..... MARCHANTIACEAE
        7 Sporangium covered by black involucre at dorsal thallus apex ..... TARGIONIACEAE

Family AYTONIACEAE

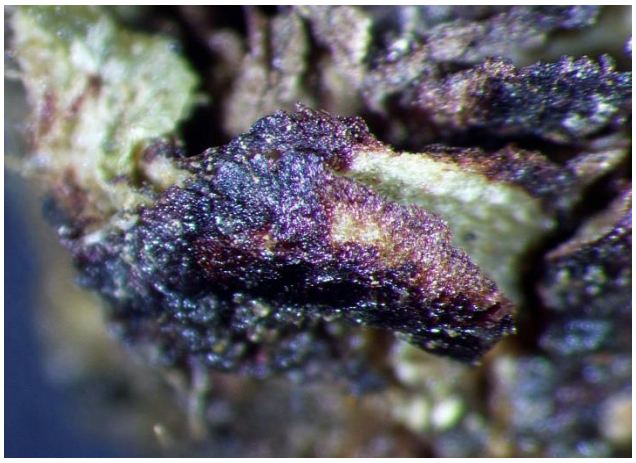
1 When dry, thalli do not curl up and thus appear brownish; sporangium arises from dorsal midline not at apical notch ..... **Plagiochasma**
1 When dry, thalli curl up into blackish tubes; sporangium arises from apical notch
  2 Carpocephalum with white or purple pseudoperianth below cap, comprised of thin white linear segments .... **Asterella**
  2 Carpocephalum without such pseudoperianth
    3 Carpocephalum noticeably lobed; ventral scales with narrow purple appendages; base and apex of carpocephalum with white filiform scales ..... **Reboulia**
    3 Carpocephalum not or barely lobed; ventral scales with hyaline appendages ..... **Mannia**

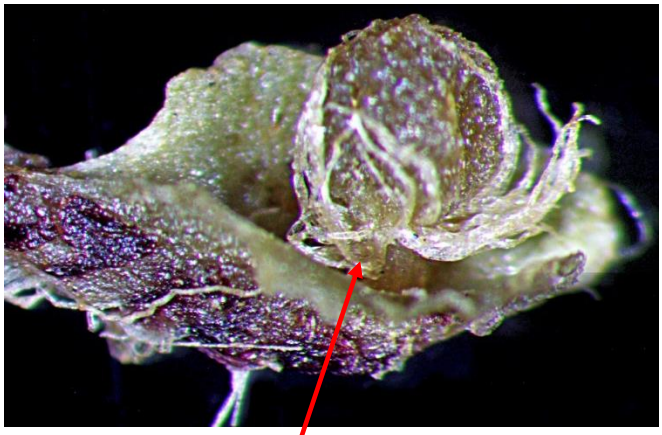
Asterella [star-like].

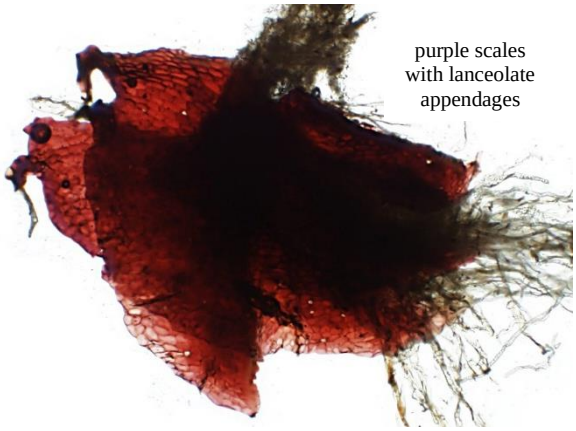
1 Thalli large (1-3 cm long, 0.6-1 cm wide); ventral scales red-brown to purple; spores purple ..... ***A. lindenbergiana***
1 Thalli smaller (0.5-1 cm long, 0.2-0.3 cm wide); ventral scales purplish-black; spores brown-black ..... ***A. palmeri***



Asterella lindenbergiana (Corda ex Nees) Lindberg ex Arnell [for Johann Bernhard Wilhelm Lindenberg (1781-1851), German bryologist] [*Fimbraria lindenbergiana* Corda ex Nees]. Thalli yellowish-green to red, rather large, 1-3 cm long, 0.6-1 cm wide, may be somewhat incurved when dry; fresh plants may smell of rotting fish; ventral scales red-brown to purple, with 1-2 red-brown triangular appendages; plants paroicous; carpocephalum conical, green, arising at the apical notch, with red-purple pseudoperianths hanging obliquely down; stalk with scanty hyaline scales at base and apex; antheridia form a small disc just behind the stalk; spores are purple. ●On mossy soil; known from few collections.

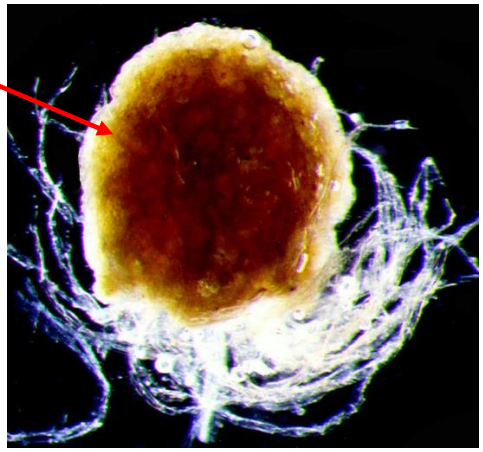






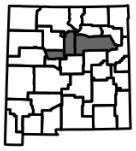
purple scales with lanceolate appendages

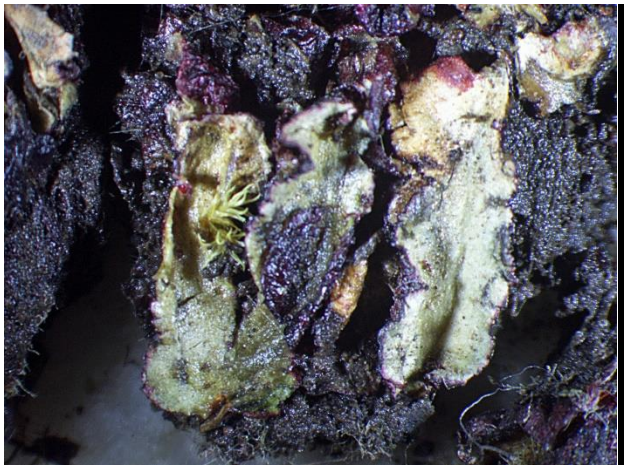
developing sporophyte

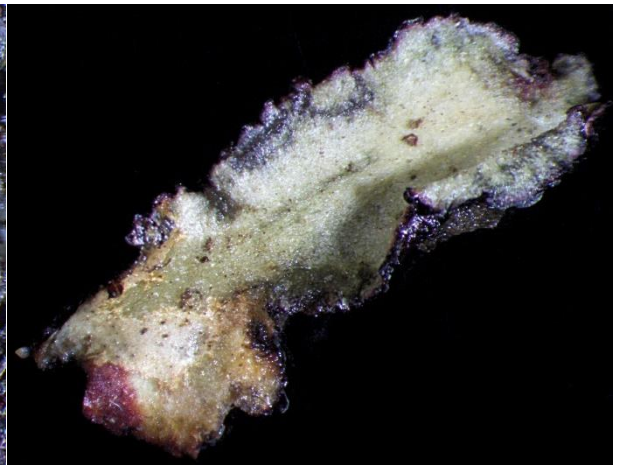


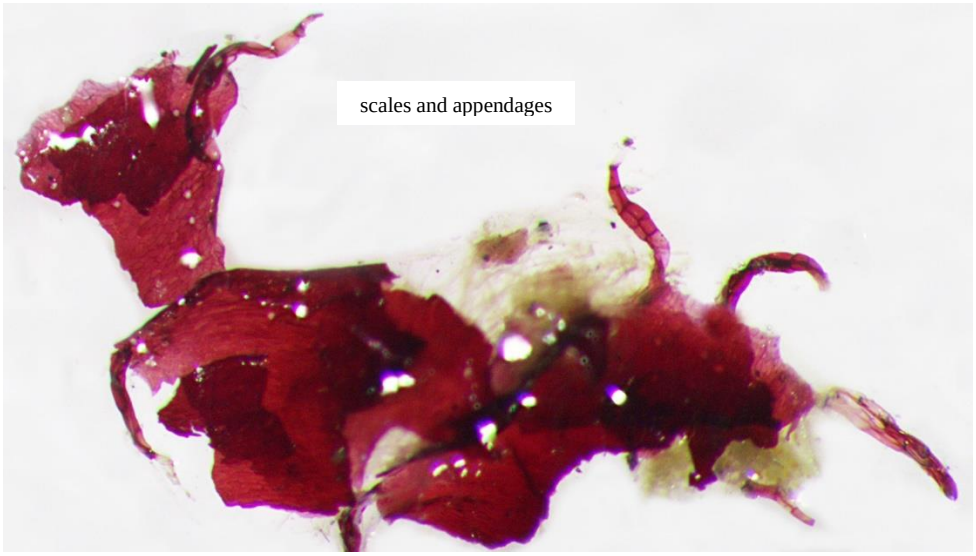
CA, San Mateo Co., Jasper Ridge, 1 Jan 1943, *M. Doty* (NY 00575633).

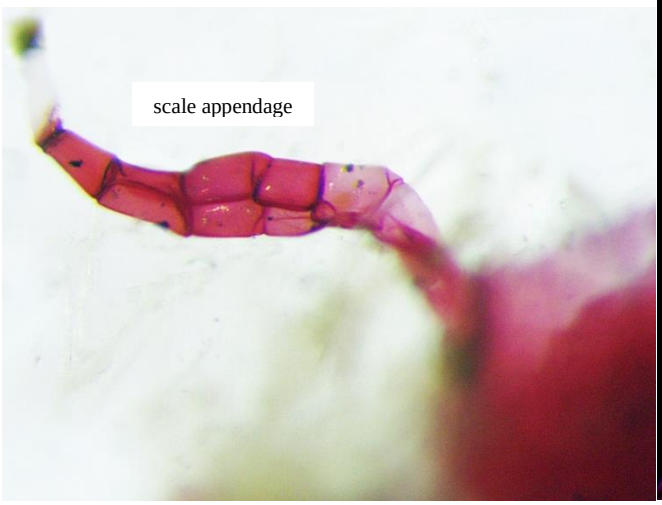
Asterella palmeri (Austin) Underwood [for Edward Palmer (1829-1911), British botanist] [*Fimbraria palmeri* Austin]. Plants small, the thalli 0.5-1 cm long, 0.2-0.3 cm wide, dichotomously branched; dry plants are strongly incurved forming blackish tubes; ventral scales purple-black with 1-2 appendages; archigoniophore lacks basal and apical scales; antheridia form small irregular patch just posterior to archegoniophore; carpocephalum nearly conical, with thin white pseudoperianths directed nearly straight down; spores dark brown and opaque. ●Relatively dry soil banks.







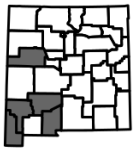




NM, Bernalillo Co., Ellis Ranch, *Bro. G. Arsène* (NY 00267164); CA, Los Angeles Co., Altadena, 2 Mar 1911, *C.C. Kingman* (NY 00267163).

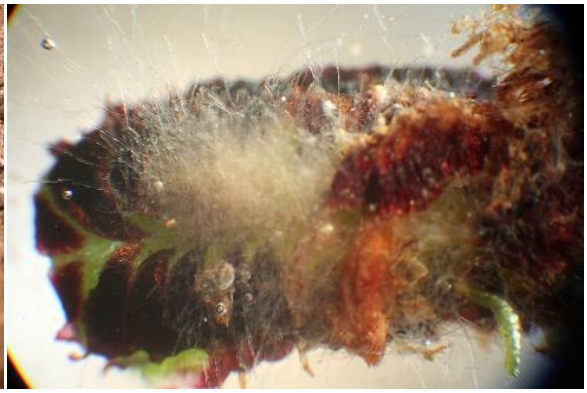
Mannia [for Wenzeslaus (Wenzel) Blasius Mann (1799-1839), Bohemian physician-botanist].

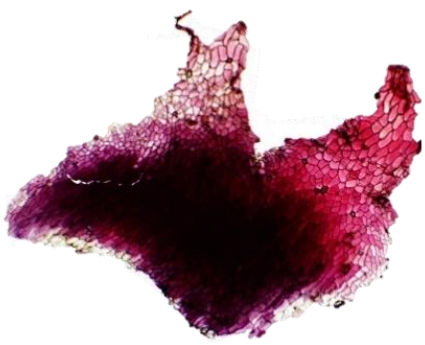
1 Thalli scarcely branched, not expanded distally; androecia diffuse near terminal end of leading segment
  2 Thalli with clusters of white scales at the apices; ventral scales with 2-3 hyaline appendages.....***M. fragrans***
  2 Thalli without clusters of white scales at the apices; ventral scales with 1-2 purplish acuminate appendages.....
  .....***M. californica***
1 Thalli freely branching, often expanded distally, androecia in the form of circular discs
  3 Androecial discs irregularly scattered; carpocephalum stalk with beard of purplish filaments; known only from Carlsbad Caverns Nat. Park..... ***M. paradoxa***
  3 Androecial discs on ventral branches
    4 Aerenchyma compact, the air spaces somewhat subdivided; ventral scales without oil bodies .....***M. sibirica***
    4 Aerenchyma loose, the air spaces scarcely subdivided; ventral scales with or without oil bodies
      5 Ventral scales without oil bodies .....***M. pilosa***
      5 Ventral scales contain oil bodies.....***M. gracilis***



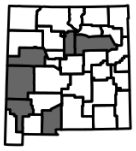
Mannia californica (Gottsche ex Underwood) L.C. Wheeler [of California] [*Grimaldia californica* Gottsche]. Plants sparingly branched, bright green when moist; thalli small, 1-2 cm long, 0.2-0.4 cm wide, with 2 rows of deep purple ventral scales that extend to the lateral margins, rolling into dark purple or blacking tubes when dry with only the scales visible; ventral scales with 2 triangular/acuminate appendages, which may extend upward into the apical notch; air pores lined by 2-3 rings of concentric cells; monoicous; antheridia clustered in small medial patches; archegoniophores on short lateral branches; carpocephala hemispheric, becoming 2-4-lobed, sometimes persisting; spores 55-75 µm. ●On limestone or non-acidic outcrops or cliffs, sometimes forming large colonies.



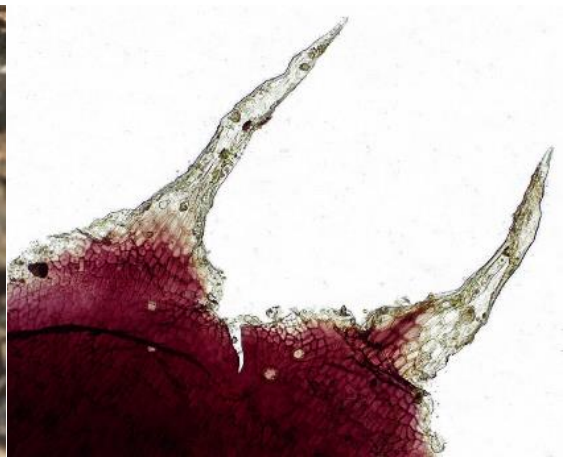


NM, Grant Co., Burro Mts, CF Canyon, 6 Jan 2010, *Kleinman & Blisard* (SNM).

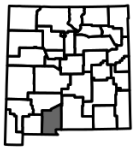


Mannia fragrans (Balbis) Frye & L. Clark [fragrant] [*Asterella saccata* of NM reports, *Mannia barbifrons* Shimizu & S. Hattori, *Marchantia fragrans* Balbis]. Plants sometimes aromatic; thalli sparingly branched, 0.6-2 cm long, bright green with purplish lateral margins when moist, rolling up into dark purple/black tubes when dry, with only the scale visible; aerenchyma compact; upper thallus surface distinctly punctate because of elevated air pores; apical notch with a "beard" of white scale appendages; ventral surface with 2 rows of deep purple scales, each with have 2-3 hyaline appendages; polyoicous; antheridia clustered in sessile semicircular discs at apex of thallus; carpocephalum hemispherical, becoming 2-4-lobed, with clusters of white scales at the base and apex; spores 60-82 µm, yellow-brown. ●Wide-spread in the state, often at edges of open forest.

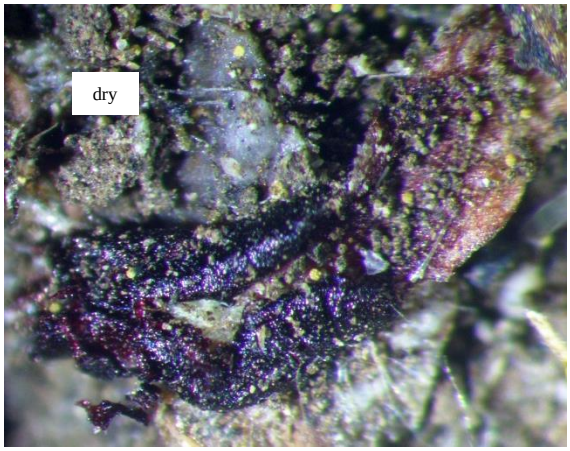


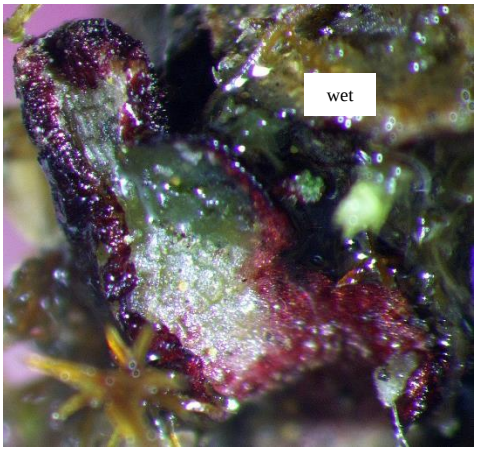



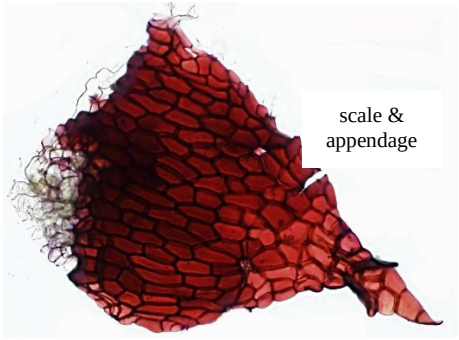
NM, Grant Co., Pinos Altos Range, 15 Dec 2019, *Blisard & Kleinman* (SNM).



Mannia gracilis (F. Weber) D.B. Schill & D.G. Long [slender] [*Marchantia gracilis* F. Weber]. Plants sometimes fragrant when moist; thalli small (0.5-1.5 cm long, 0.1-0.2 cm wide), green and freely branching, the aerenchyma loose, when dry, rolling up into dark purple/black tubes; ventral scales dark purple, with a single lanceolate appendage, with small oil bodies, the margins of scales and appendages often colorless; paroecious; antheridia ill-defined; carpocephalum hemispherical, with white/colorless pseudoperianth that separates into long white, linear segments; stalk very long, without filaments; spores 50-65 µm, yellow. ●On thin soil over rock; known from a single report.

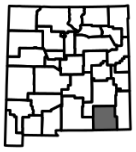


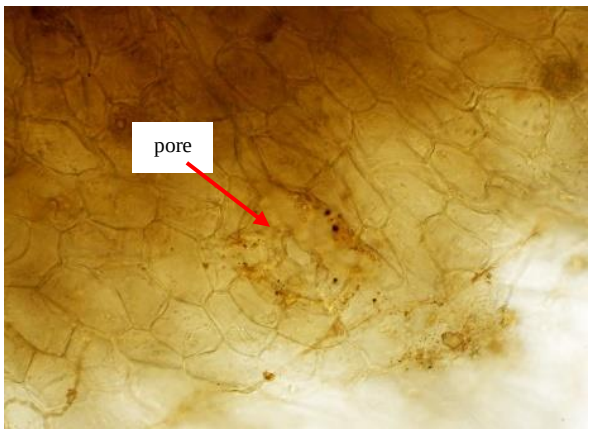




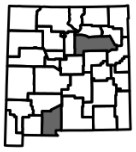
AZ, Maricopa Co., near Burnett Corral, 30 Mar 1993, *L.B. Anderson* (DUKE).

Mannia paradoxa R.M. Schuster [strange]. Plants bluish-green and small (0.2-0.4 cm wide), frequently branching, strikingly xeromorphic; surface of the thalli with small conspicuous pores, the sides dark purple, curling up into tight, dark tubes when dry; ventral scales dark purple, with filiform appendages; paroecious; antheridia irregularly scattered on main thalli; carpocephala apical and poorly developed, the stalk surrounded by purple filaments. ●Known only from Carlsbad Caverns National Park.



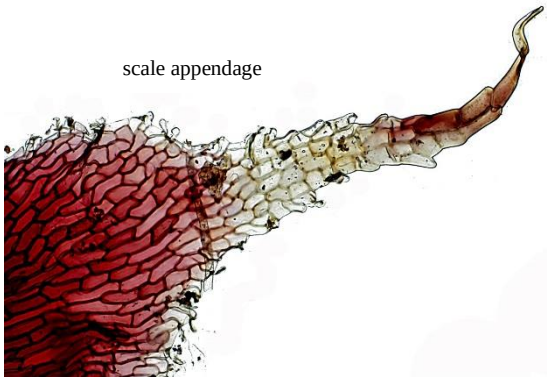


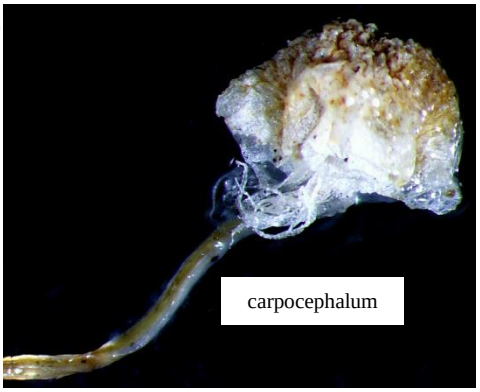
NM, Eddy Co., Carlsbad Caverns Nat. Park, Rattlesnake Canyon, 20 Jan 1982, *R.M. Schuster* (F).

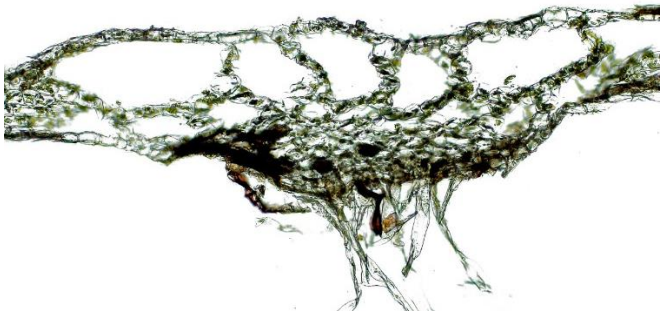


Mannia pilosa (Hornemann) Frye & L. Clark [hairy] [*Marchantia pilosa* Hornemann]. Moist plants green with reddish-brown thallus margin, rolling up into dark purple/black tubes when dry, small (1-2 cm long and 0.2-0.3 cm wide), freely branching; dorsal surface nearly smooth, the aerenchyma loose, undivided, occupying about 60% the thickness of the thallus; ventral scales deep purple, without oil bodies, with 1-2 lanceolate appendages; autoicous; antheridial discs on ventral branches; carpocephalum spherical, with scattered whitish scales at base and apex, the stalk elongate and red-purple; spores 70-90 μm, yellow to brown. ●On shaded soil banks; known from two collections.

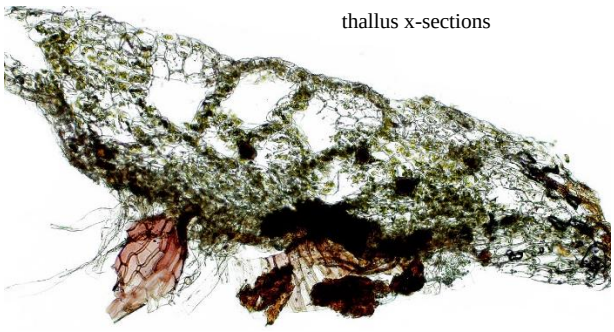
scale appendage



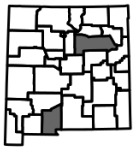




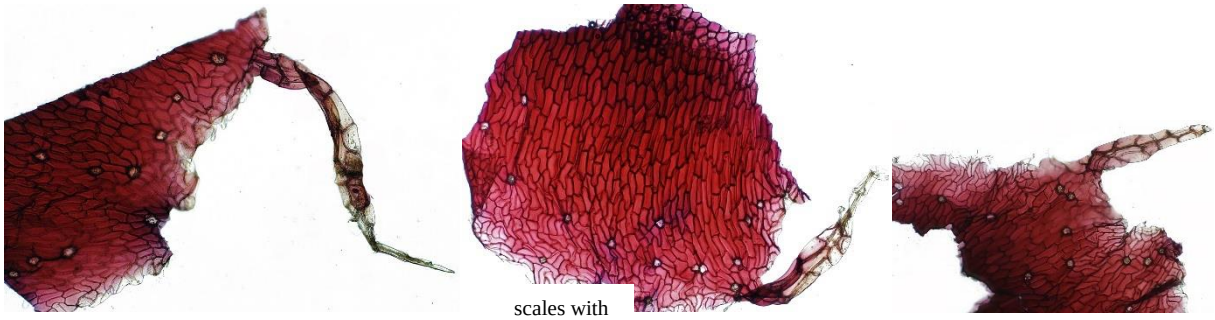
thallus x-sections



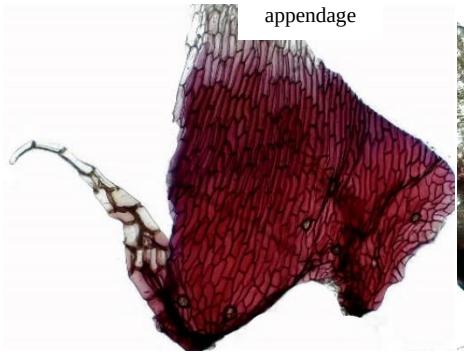
AK, Kantishna, along Eldorado Creek, 30 Jul 1963, *J. Michener* (COLO).

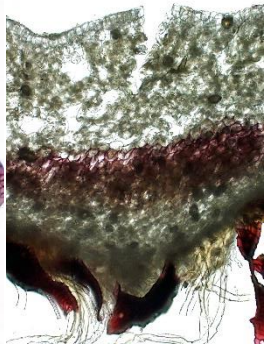


Mannia sibirica (Müller Frib.) Frye & L. Clark [of Siberia] [*Grimaldia pilosa* (Hornemann) Lindberg var. *sibirica* Müller Frib.]. Moist plants dark green with reddish-brown thallus margins, rolling up into dark purple/black tubes when dry, small (1-1.5 cm long, 0.15-0.2 cm wide), freely branching; dorsal surface nearly flat, leathery, the aerenchyma spongy, compact, occupying about ½ the thickness of the thallus; ventral scales large, ovate-crescentic, deep purplish-red with metallic luster, containing scattered oil bodies, with 1-2 hyaline, lanceolate appendages; autoicous; antheridial discs terminal on short ventral branches; carpocephalum spherical, on a red-purple stalk; spores 55-65 µm, yellow to brown. ●On rock, sandstone, igneous substrates; known from few collections. ♦Very similar to *Mannia pilosa*.

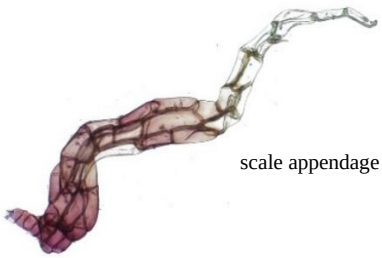


scales with appendage





thallus x-section



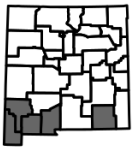
scale appendage

CO, Baca Co., Carrizo Creek drainage, 24 May 1993, *Weber & Wittmann* (COLO).

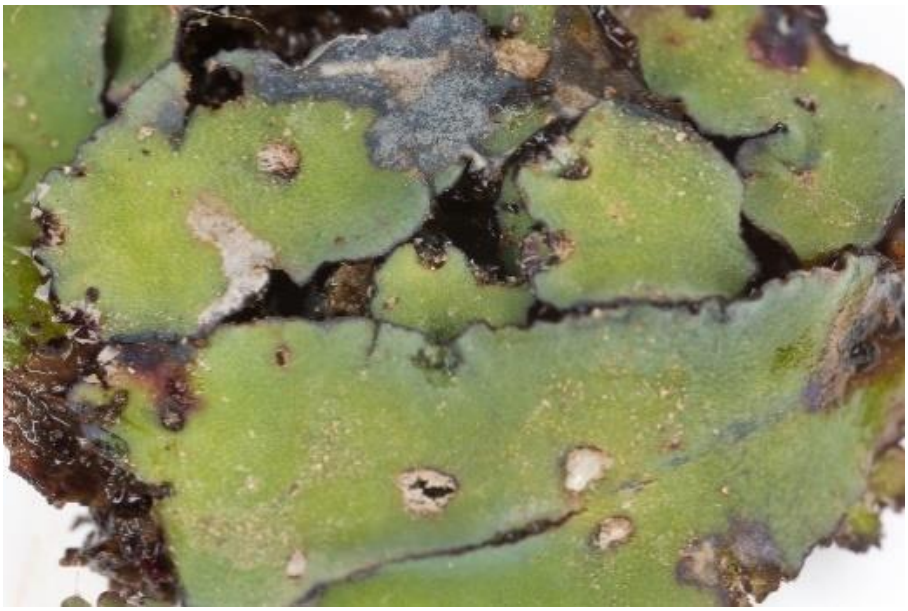
Plagiochasma [oblique cleft].

1 Thalli glaucous (dull) gray-green; scales with triangular appendages; pores surrounded by single row of cells ..... ***P. rupestre***

1 Thalli bright green, shiny; scales with cordate appendages; pores surrounded by 2-3 concentric rows of cells ..... ***P. wrightii***



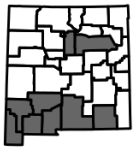
Plagiochasma rupestre (J.R. & G. Forster) Stephani [rock-dwelling] [*Aytonia rupestris* J.R. & G. Forster]. Plants grayish-green and glaucous when moist, brownish and not curling when dry, 1-2 cm long, the thalli 0.4-0.5 cm wide, sometimes freely branching; pores surrounded by a single row of cells; ventral scales purple and with ovate/triangular appendages. monoicous; sporangium arising from the dorsal midline (not the apical notch); carpocephalum slightly concave at apex, with 2-3 spherical lobes; spores 70-90 µm, yellowish-brown. ●Generally arid environments.

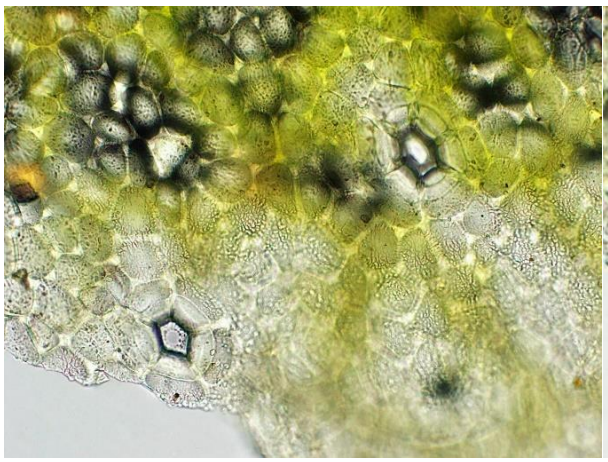


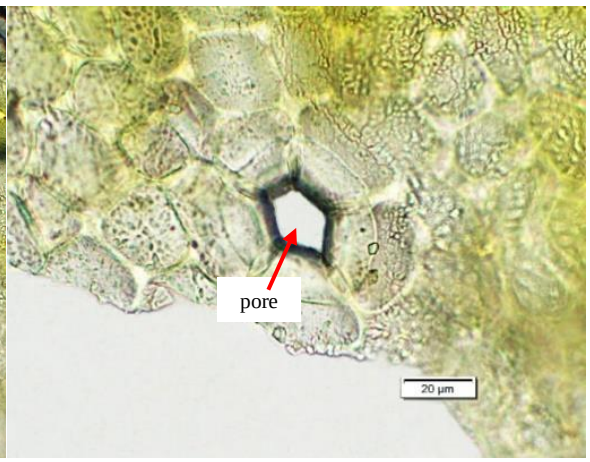
triangular scale appendage

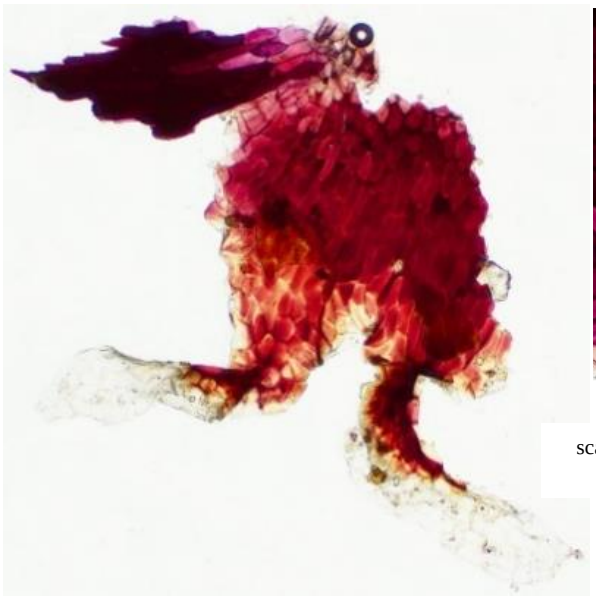
NM, Hidalgo, Clanton Canyon, 26 Feb 2013, *Kleinman et al.* (SNM).

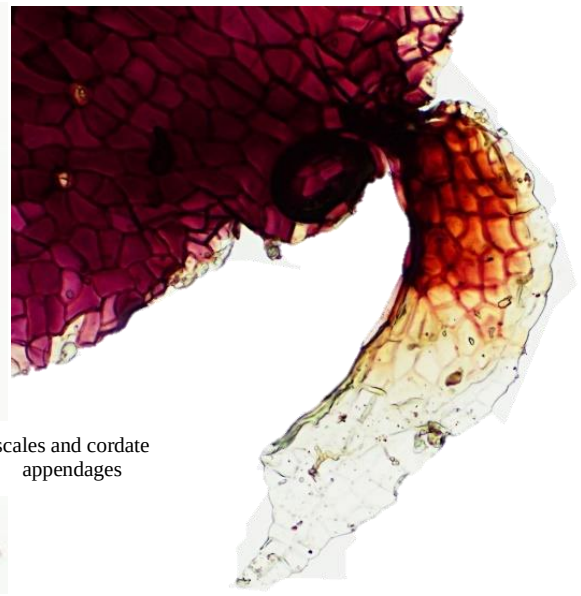
Plagiochasma wrightii Sullivant [for Charles Wright (1811-1885), outstanding American botanical collector]. Plants bright green and shiny when moist, brownish and generally not curling when dry, infrequently branching, the thalli 1-2 cm long, 0.3-0.4 mm wide; pores surrounded by 2-3 concentric rows of cells; ventral scales reddish-purple with 1-2 cordate appendages; monoicous; sporangium arising from the dorsal midline (not the apical notch); carpocephalum deeply 2-3 lobed; spores 85-110 µm, translucent, yellowish-brown. ●Generally arid environments.





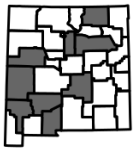




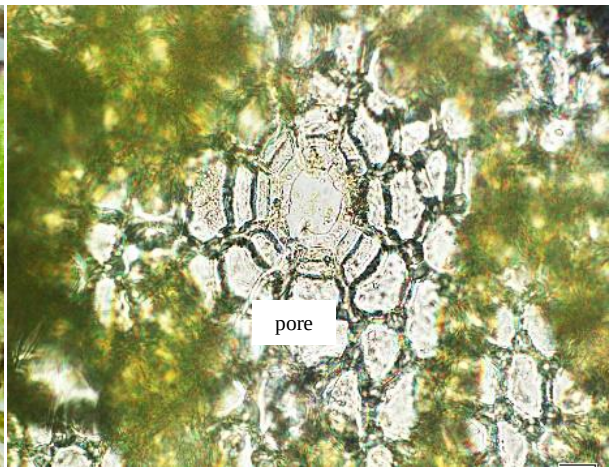


NM, Grant Co., Burro Mts, CF Canyon, 23 Feb 2012, *Blisard & Kleinman* (SNM).

Reboulia [for Eugene de Reboul (1781-1851), Italian botanist].



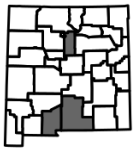
Reboulia hemisphaerica (Linnaeus) Raddi [somewhat spherical] [*Marchantia hemisphaerica* Linnaeus]. Plants large, the thalli 2-4 cm long, 0.4-0.9 cm wide, generally not rolling up when dry, the surface somewhat dull and leathery with purple margins; pores on dorsal surface lined by 4-6 concentric rings of cells; ventral scales purple, with 2-3 filiform appendages; monoicous; antheridia in sessile receptacles bordered by small purplish scales; archegoniophores with white apical and basal filiform scales; carpocephalum hemispheric with 4-6 lobes; spores 65-80 µm, yellow-brown. ●Common and widespread.



NM, Catron Co., Mogollon Mts, Willow Creek, 20 May 2011, *Kleinman* & *Blisard* (SNM).

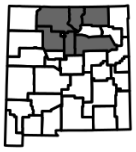
Clevea [for Per Theodor Cleve (1840-1905), Swedish biologist].

Clevea nana (Lindenberg) Crandall-Stotler & D.G. Long [dwarf] [*Athalamia hyalina* (Sommerfelt) S. Hattori, *Clevea hyalina* (Sommerfelt) Lindberg, *Marchantia hyalina* Sommerfelt]. Thalli dull gray-green, 0.5-1.5 cm long, 0.25-0.55 cm wide, the dorsal surface showing distinct areolation; ventral scales with hyaline or purplish appendages that often form conspicuous apical clusters, the scales projecting beyond the margin of the thallus; dioicous; antheridia in an elongated band on the dorsal midrib region of male plants; gyneoecia arise from pit-like depressions originating behind the thallus apex, these are ringed by a cluster of whitish scales; carpocephalum with 4 almost horizontal lobes with whitish scales; stalks lacking scales at the base; spores 45-55 µm, reddish-brown to orangish-brown. ●Damp soil around granite rocks, margins of drainages, limestone and other rock outcrops, steep hillsides.

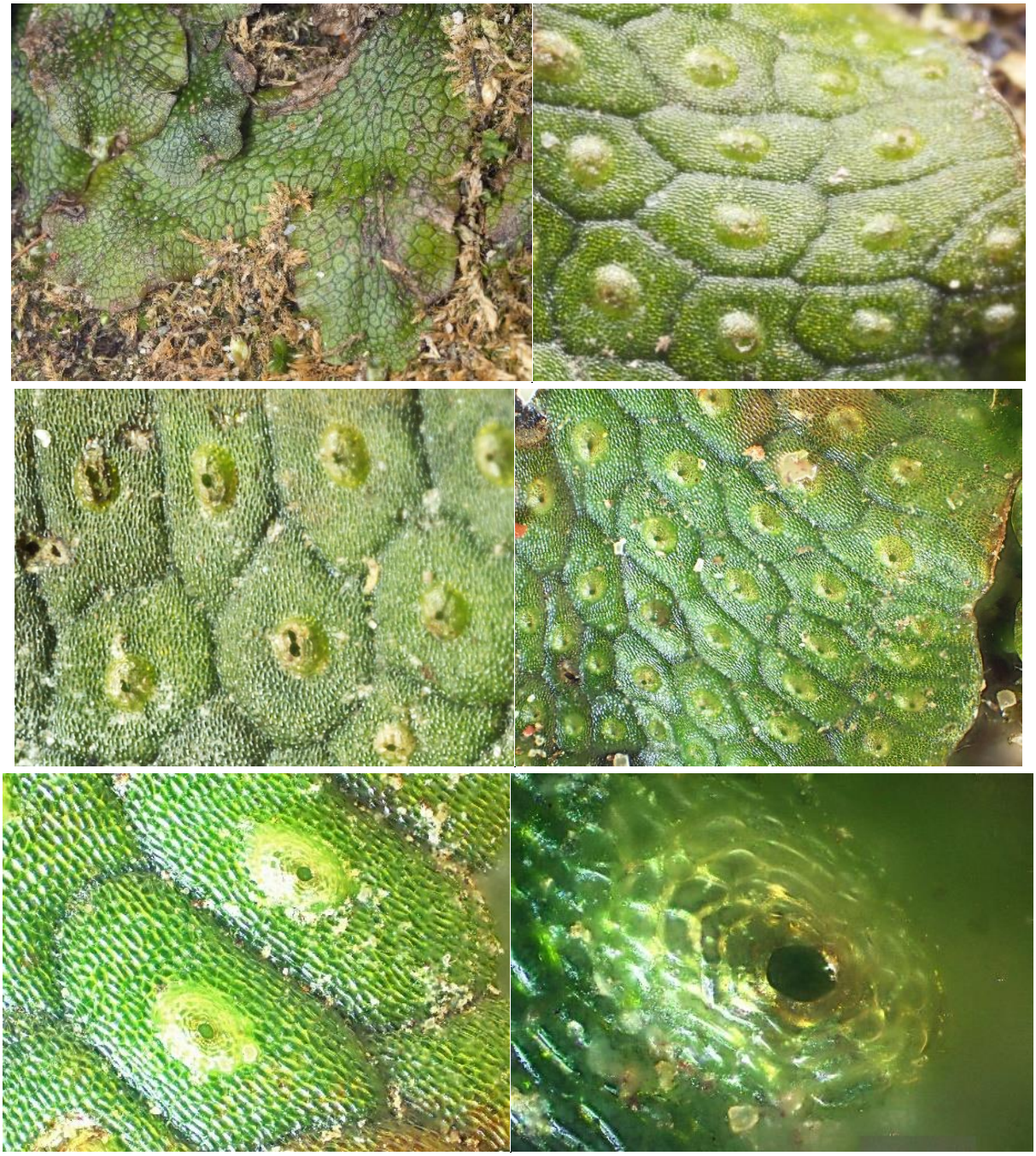


UT, Duchesne Co., Uintah Mts, Ottoson Basin, 5 Sep 1963, *S. Flowers* (COLO).

Conocephalum [a cone-head].

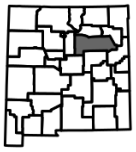


Conocephalum salebrosum Szweykowski, Odrzykoski, & Buczkowska [rough] [*Conocephalum conicum* of NM reports]. Thallus very large, 10 cm or more long, 1-1.5cm wide, with distinctly areolate surface due to prominent air pores; ventral scales small and green; dioicous; male plants with wart-like antheridia on the dorsal thallus near the margin; female plants with the stalk arising from the apical notch, no hairs or scales are present; carpocephalum conical with capsules protruding from the underside; spores 80-100 µm, green. ●Moist ground in northern forests. ♦Distinguished by the distinctive hexagonal areolation with raised pores, giving the thallus a reptilian appearance. Previously confused with *Conocephalum conicum* Linnaeus of Europe, which is separable by morphologic and molecular criteria.



NM, Taos Co., Lower Hondo Campground, 19 May 2015, *Kleinman et al.* (SNM).

Dumortiera [for Barthélemy Charles Joseph Dumortier (1797-1878), distinguished Belgian botanist].



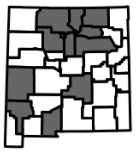
Dumortiera hirsuta (Swartz) Nees [hairy] [*Marchantia hirsuta* Swartz]. Thalli very large, up to 20 cm long, 1-2 cm wide, dark green to yellow green, without observable pores, the margins with short, hair-like scales; ventral scales lacking; monoicous; androecia on the surface of a round, elevated pad with white scales around its edges; carpocephalum thick, lobed, arising from the apical notch, with white, hair-like scales on the surface; capsules arising on the undersurface, splitting open to release the spores; spores small, 20-34 µm. ●Known only from a few collections.

SC, Oconee Co., 17 Aug 1952, *R.M. Schuster* (NY 00268297).

Marchantia [for Nicolas Marchant (?-1678), French botanist].

1 Large thalli with distinct pores and colorless scales, round gemmae cups, and carpocephalum umbrella-like with ray-like arms ..... ***M. polymorpha***

1 Large thalli with purple ventral scales; carpocephalum 4-lobed ..... ***M. quadrata***

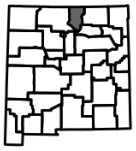


Marchantia polymorpha Linnaeus [with many shapes] [*Marchantia polymorpha* Linnaeus subsp. *montivagans* Bischler & Boisselier-Dubayle]. Thalli large, dark green, up to 10 cm long, 1-2 cm wide, with faintly areolate surface, with one or more dark lines on the dorsal surface, or these lacking; air pores of 4 curved cells surrounding the pore, with 4 smaller cells within the pore, resulting in a cross-like opening; thallus margins entire; ventral scales small, green, with an indistinct appendage; dioicous; male plants with a discoid gametophore elevated on a long stalk, the antheridia embedded in the upper surface; female plants with the gametophore arising from the apical notch and also on a long stalk; carpocephalum umbrella-like with elongate arms; archegonia on the underside; sporophytes uncommon; spores small, 10-14 µm, yellowish; asexual reproduction common from gemmae cups on the dorsal surface of the thallus, producing flat round green gemmae. ●Widespread and common. ♦Plants lacking dark lines on the dorsal surface of the thallus have been called subsp. *montivagans*.

dry sporangiophore

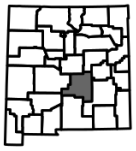
NM, Catron Co., Mogollon Mts, Bursom Road, Redstone Trailhead, 1 Aug 2009, *Kleinman et al.* (SNM).

Marchantia quadrata Scopoli [in fours] [*Preissia quadrata* (Scopoli) Nees]. Thalli dull gray-green, 0.5-3 cm long, 0.1-1.5 cm wide, with reddish-brown lateral margins; ventral scales are purplish-black with a single subulate appendage; dioicous; carpocephalum 4-lobed with quadrate low ridges on the upper surface; spores 55-80 µm, brown, angular. ●Shaded or moist soil, aspen-fir forest in the northern mountains; known from only two collections.



NM, Taos Co., Beaver Lake, 3 Aug 1965, *J.R. Crutchfield* (COLO).

Oxymitra [a sharp cap].

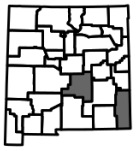


Oxymitra incrassata (Brotero) Sérgio & Sim-Sim [thickened] [*Oxymitra androgyna* M. Howe, *Oxymitra paleacea* Bischoff]. Thalli scattered or aggregated into partial rosettes, grayish-green, the median sulci deep, the pores conspicuous; lateral ventral scales prominent, projecting beyond the thallus margin, hyaline or reddish-brown, with hyaline tips; dioicous; antheridia usually mixed with archegonia at the bottom of the medial sulcus; sporophytes sessile, beaked, within median sulcus, disintegrating to release black, shiny spores, 100-175 µm. ●Known from a single report, on wet soil at edge of a mountain stream. ♦The edges of the thalli are lined with acuminate, whitish scales reminiscent of a Venus fly trap.

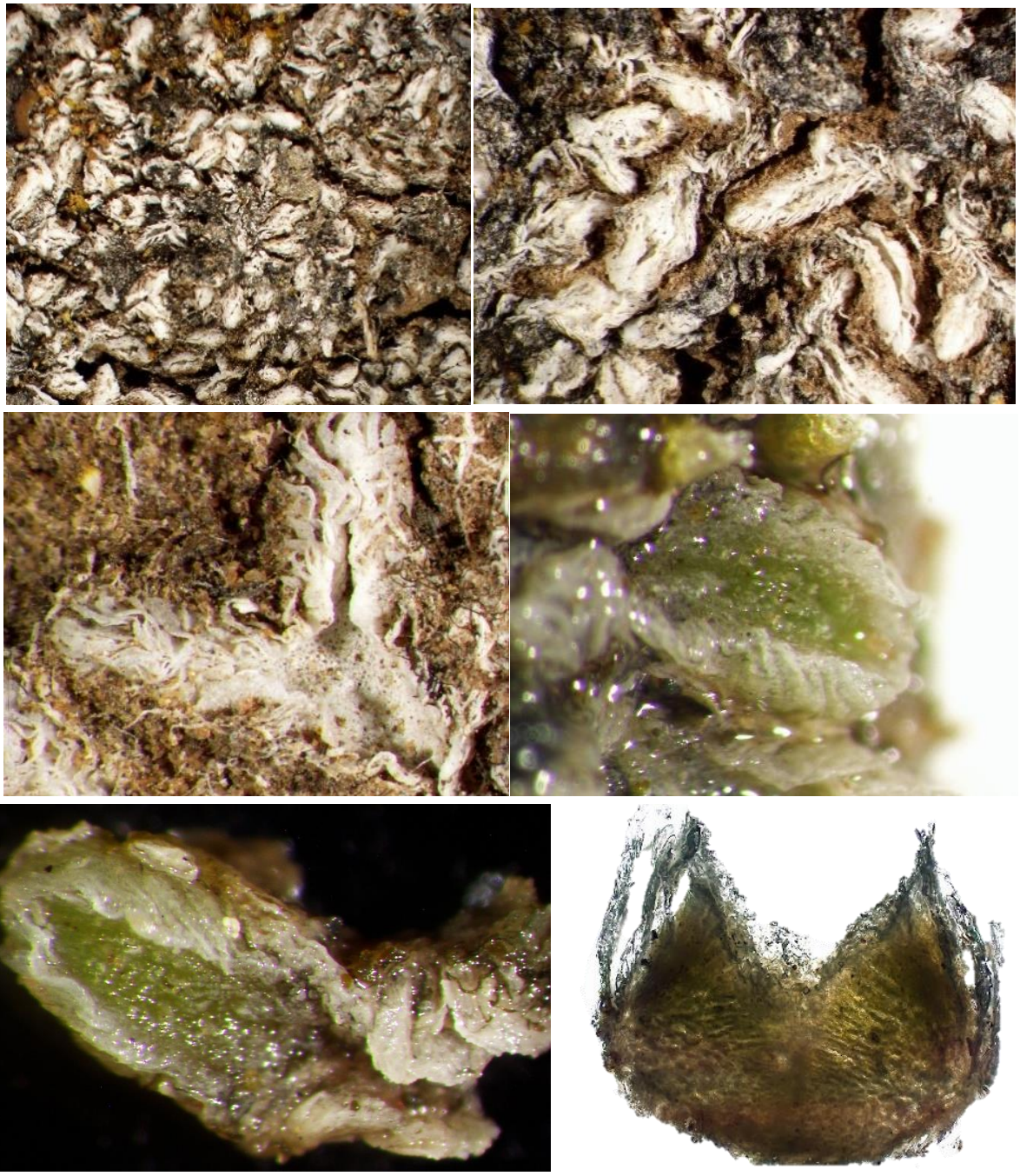
TX, Burnet Co., west of Burnet, 18 Feb 1951, *E. Whitehouse* (COLO).

Riccia [for Pietro Francesco Ricci (Ricco) (1690-1751), Italian botanist]. Note: Species in italics but not bolded are not yet known from New Mexico, but are included in the key for comparison.

1 Plants generally grow in a specialized (i.e., xeric, alluvial, aqueous, see below) environment
  2 Plants generally in an aqueous environment
    3 Plants grow in an alluvial environment
      4 Plants annual, growing in rosettes, thallus segments nearly parallel, male plants have red (magenta or purple) pigments in their walls..... ***R. frostii***
      4 Plants annual, short-lived, very thin and flat, nearly translucent ..... ***R. membranacea***
    3 Plants grow in a seasonally moist environment, and may be very difficult or impossible to find when they are dry ..... ***R. atromarginata***
  2 Plants generally in a xeric environment
    5 Thallus margins densely ciliate ..... *R. ciliata*
    5 Thallus margins not densely ciliate
      6 Thalli of dry plants roll up into vermiform tubes, margins colored
        7 Plants bluish-green, thalli with granular surface, margins chestnut ..... *R. dorsiverrucosa*
        7 Plants tiny, deep green, with black/purple margins ..... *R. nigrella*
      6 Thalli of dry plants do not roll up, margins whitish
        8 Ventral scales extend beyond thallus margin, forming whitish border..... ***R. lamellosa***
        8 Ventral scales extend beyond thallus margin, encrusted with calcium, chalk white when dry . ***R. albolimbata***
1 Plants grow in diverse environments
  9 Thalli with short cilia
    10 Plants perennial, thalli large and pale green, with crowded short hyaline cilia on margins ..... *R. beyrichiana*
    10 Thalli grayish or blue-gray, with sparse apical cilia ..... *R. hirta*
  9 Thalli with no short cilia
    11 Thalli glaucous green, with short median furrow ..... *R. glauca*
    11 Thalli not glaucous green with median furrow
      12 Thalli bright green with hyaline margins, surface epidermis often sloughed leaving a granular surface..... ..... ***R. sorocarpa***
      12 Gray-green thalli showing marked contrast with pink/yellow/orange margins..... ***R. campbelliana***

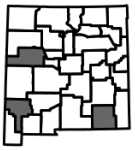


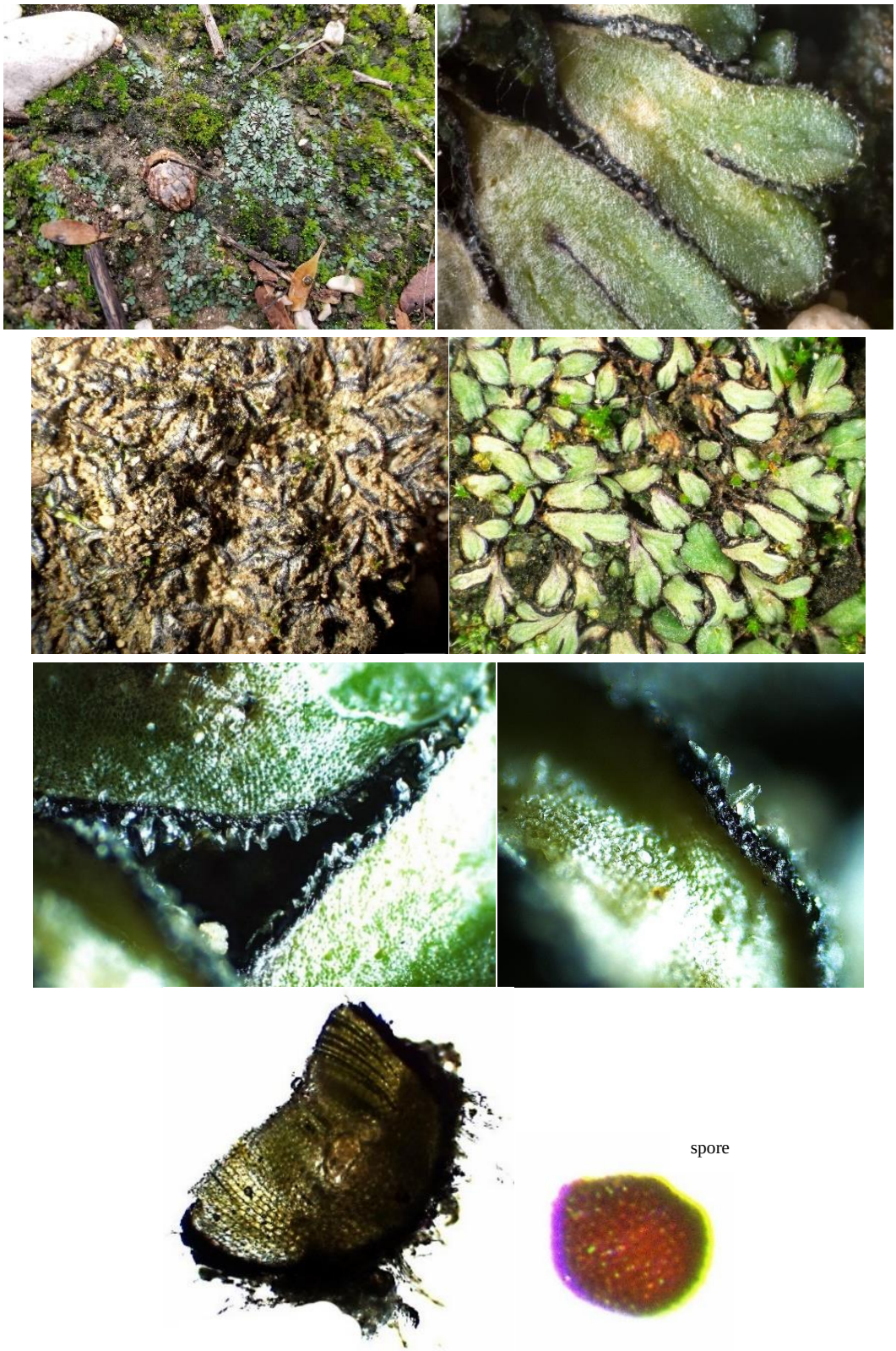
Riccia albolimbata S.W. Arnell [white-bordered]. Thalli perennial, occurring as isolated hemirosettes, 1.5-2 cm across, but may be smaller and poorly developed, chalk-white when dry due to calcium encrustation, when wet for some time, the calcium comes off and the surface of the thallus becomes gray-green, with a deep central groove in the distal portions, these depressions are inconspicuous more proximally; distal cross-sections are semicircular, with steep vertical sides; ventral scales large and colorless, projecting beyond the thallus margin, especially on dry plants, becoming encrusted with calcium; monoicous; capsules seem to discharge spores with the decay of the thallus; spores brown, 80-100 µm. ●On soil of xeric environments; known from few collections. ♦*Riccia albolimbata* may be difficult to distinguish from *Riccia lamellosa*, and these species have likely been confused in the literature.



NM, Lincoln Co., Sacramento Mts, 19 May 2006, *R.D. Worthington 34182* (SNM).

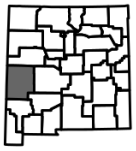
Riccia atromarginata Levier [dark-bordered]. Thalli small, 0.8-1.3 mm wide, forming gregarious patches or partial rosettes, deep bluish-green with dark purple lateral margins, with numerous short, straight, hyaline hairs (cilia) investing the lateral margins; ventral scales generally deep purple; distal portions of the thalli display a shallow but well-defined groove; monoicous; distal cross sections almost semi-circular; capsules are embedded in the thallus; spores variable, 75-110 µm, dark brown. ●On sandy or rocky ground, in the open. ♦Drought-tolerant, very inconspicuous (essentially invisible) when dry, but becoming evident with seasonal flooding.



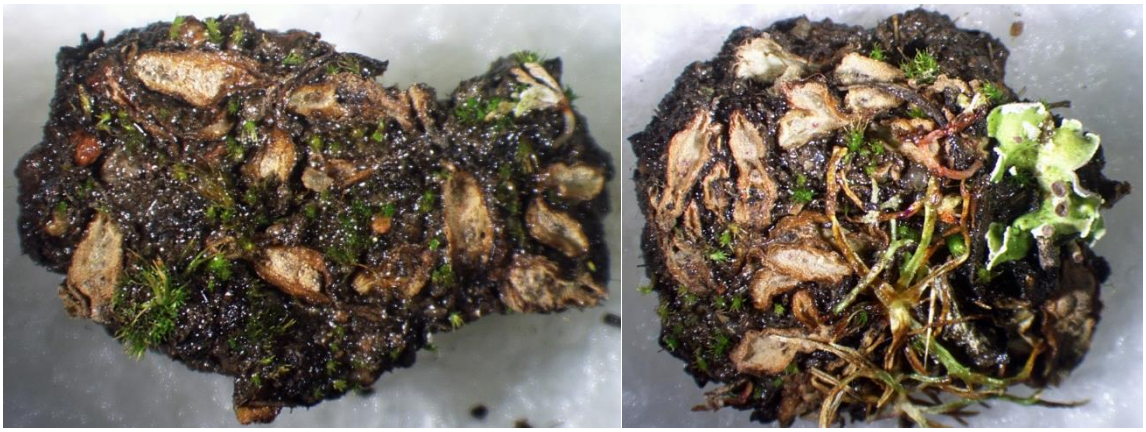


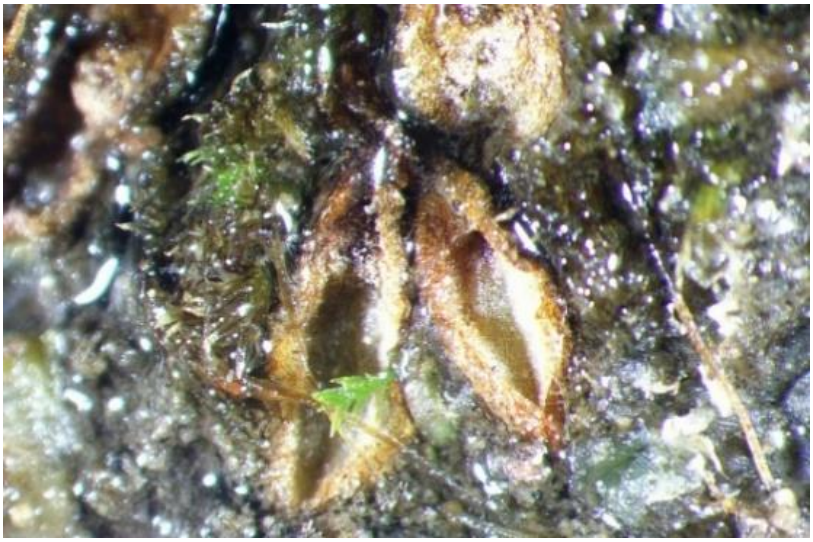
spore

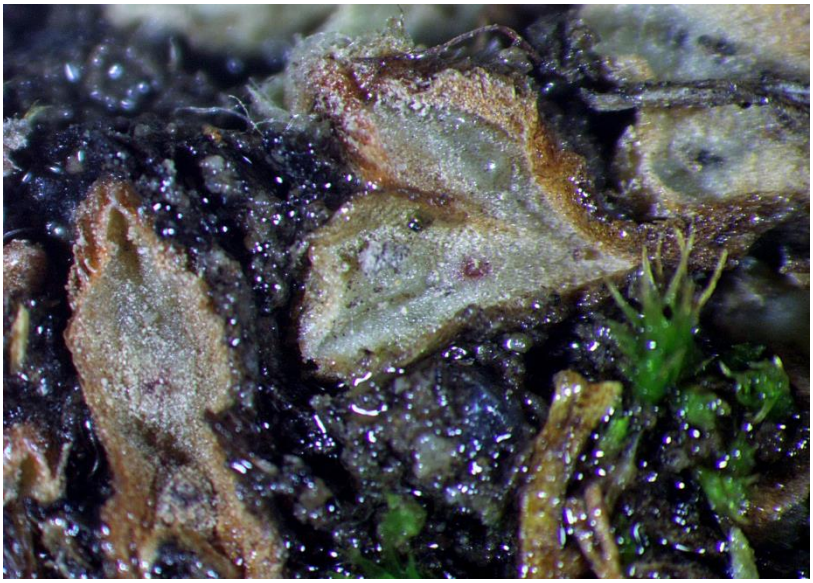
NM, Grant Co., Nun Overlook, 21 Jul 2021, *Blisard et al.* (SNM).



Riccia campbelliana M. Howe [for Douglas Houghton Campbell (1859-1953), American botanist]. Thalli branching, forming hemirosettes, the dorsal surface light green to gray-green or sometimes pink to yellowish or brown, reticulate, 1.3-2 mm wide, with a deep median groove which becomes shallower more proximally, the margins pink to yellow to orange brown; ventral scales hyaline or pale brown, barely exceeding the margin when moist, but becoming more obvious when dry; monoicous; antheridial ostioles prominent; sporophytes rather protuberant dorsally; spores 90-110 µm, yellow-brown. ●Known from a single collection.

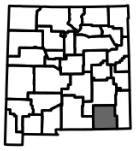




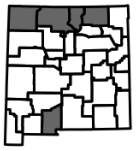


CA, San Luis Obispo Co., south of Los Ojos, 11 Apr 2005, *W.T. Doyle* (COLO).

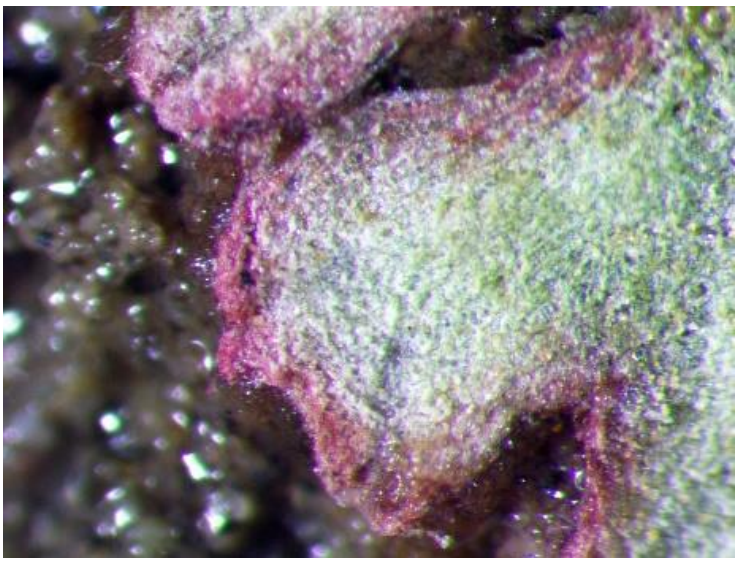
Riccia crystallina Linnaeus [glass-like]. Thalli usually bluish- to grayish-green, 1.5-2.5 mm wide, generally in 2 hemirosettes, the surface often appearing to glisten (crystalline), lacking a dorsal groove; dorsal epidermis remaining intact in younger plants, sometimes deteriorating in older plants; capsules embedded in thallus tissue; spores 63-89 µm, yellow-brown. ●In mud at bottom of cliff; known from a single collection.



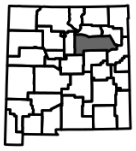
CA, Modoc Co., 16 Oct 1976, *D.H. Norris* (COLO).



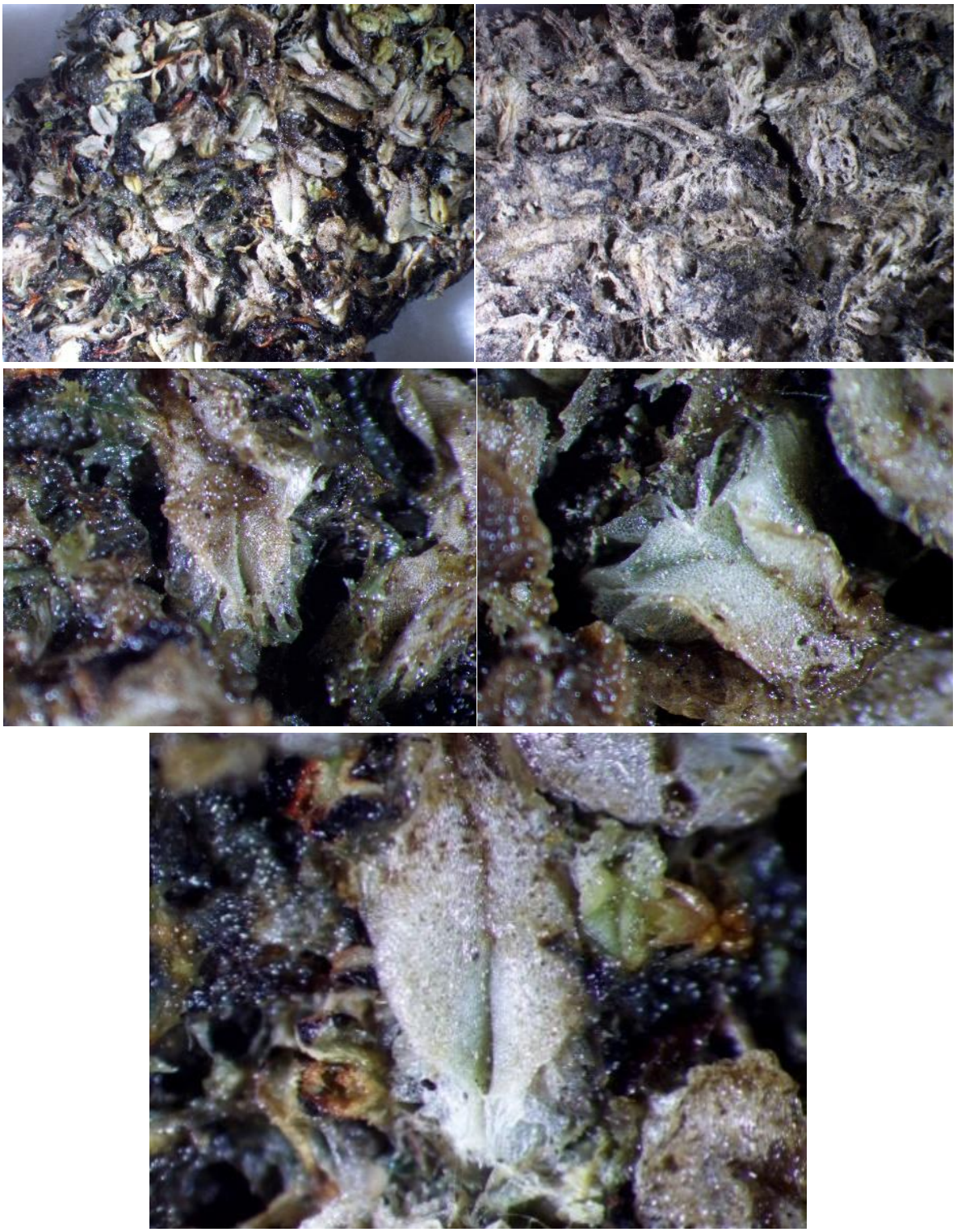
Riccia frostii Austin [for Charles Christopher Frost (1805-1880), American amateur botanist]. Plants typically short-lived, the young thalli compact, becoming spongy with age and when dry; ventral scales inapparent or lacking; dioicous; plants strongly dimorphic; male plants forming small reddish-purple rosettes 0.7-2 cm diameter, thalli 1-1.5 mm wide, with reddish antheridia; female plants dull grayish-green, sometimes reddish-tinged with age, the rosettes 0.7-1.5 cm diameter, thalli 0.5-1.5 mm wide; capsules numerous, erupting though thallus surface in maturity; spores 45-55 μm. ●Commonly found on soil in areas subject to flooding.



NM, Rio Arriba Co., San Juan River, 11 Jul 1960, *S. Flowers* (COLO).

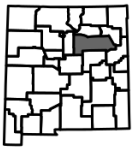


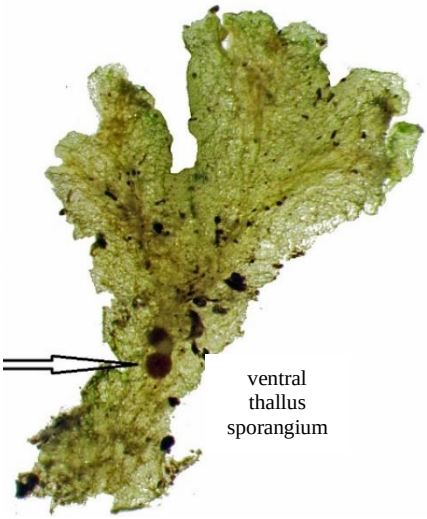
Riccia lamellosa Raddi [with abundant lamellae] [*Riccia austinii* Stephani]. Thalli light green to grayish green, not becoming chalk white, relatively large, 2.5-3.5 mm wide, with a sharp dorsal groove near the apex, generally gregarious, but not usually forming complete rosettes; ventral scales very large, ovate, hyaline, extending beyond the thallus margin to form a white border, dorsal groove deep distally, becoming more shallow towards the center; monoicous; antheridial ostioles barely elevated; capsules deeply embedded in the ventral thallous tissue and sometimes inconspicuous; spores variable, 90-120 µm, dark brown. ●In xeric habitats, can tolerate intense summer heat; known from a single collection.

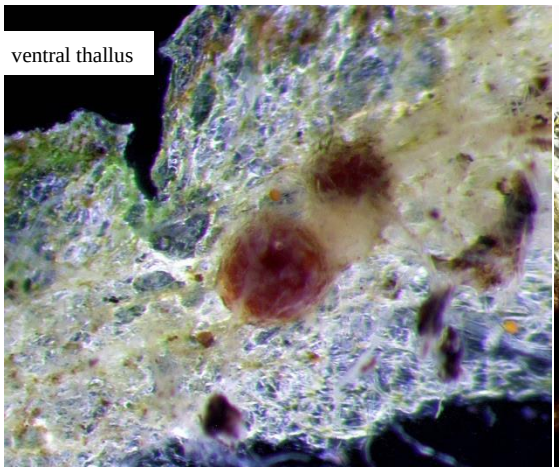


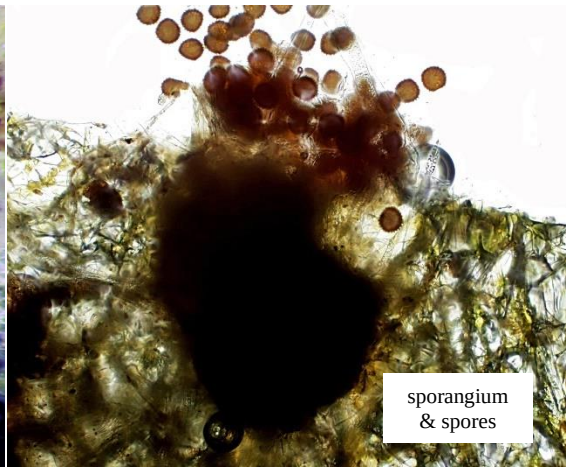
CA, San Diego Co., Eastgate Mall Road, Apr 1995, *W.T. Doyle* (COLO).

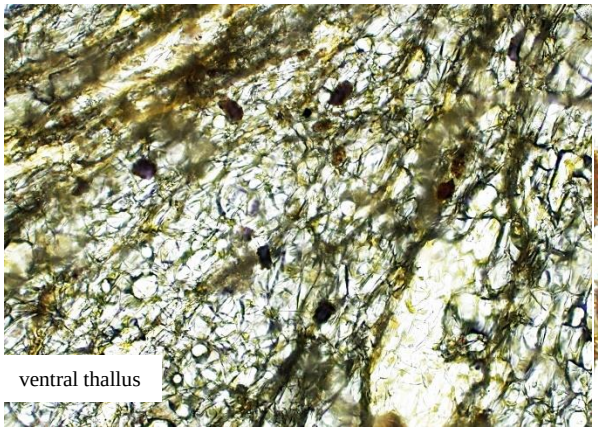
Riccia membranacea Gottsche & Lindenberg [skin-like]. Plants delicate, yellow-green to green, forming complete or incomplete rosettes, generally short-lived; thalli broad, 2-3 mm wide and very thin, except where the sporangia are, the apical regions often scalloped or indented; monoicous; antheridia within the median part of the thallus; sporangia scattered in the thallus and bulging ventrally; spores 48-58 µm, reddish-orange. ●Almost exclusively found in wet environments, along rivers or near swamps; known from a single collection.

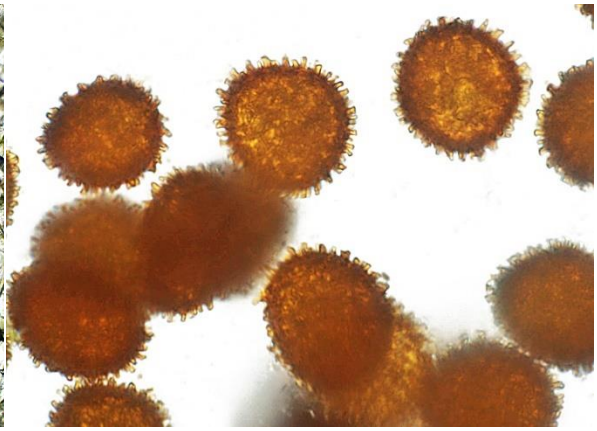






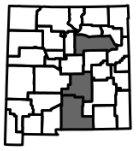


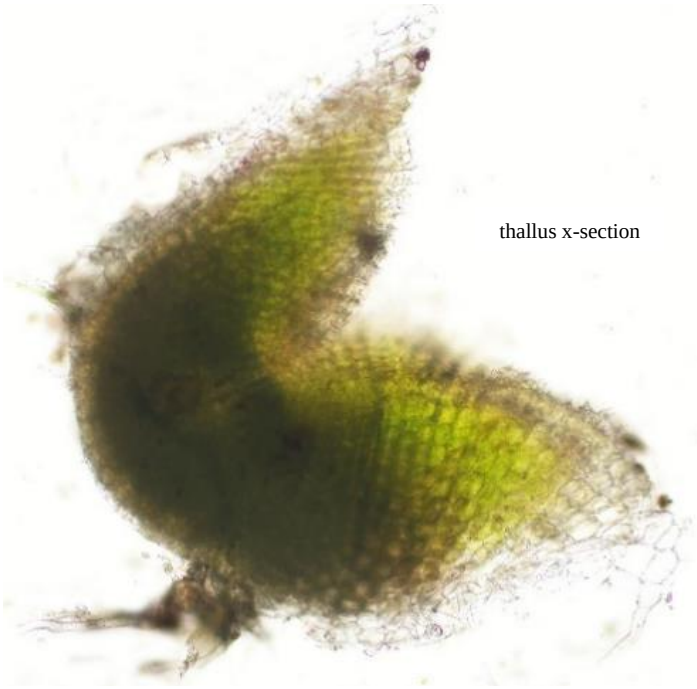




NC, Columbus Co., e
of Whiteville, 23 Oct 1953, *Schuster et al.* (DUKE).

Riccia sorocarpa Bischoff [with clumped fruits]. Plants forming rosettes or hemirosettes, usually less than 1.5 cm in diameter; thalli 0.75-1.5 mm wide, clear green to greenish-gray, the margins hyaline and colorless, with a deep median groove which widens and becomes more shallow centrally, the dorsal surface pale; ventral scales hyaline, rarely projecting beyond the margin; monoicous; capsules numerous, included within the thallus, emerging from the dorsal surface as they mature; spores 75-98 µm, dark brown. ●On moist ground in the mountains.



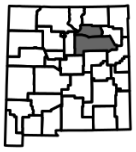


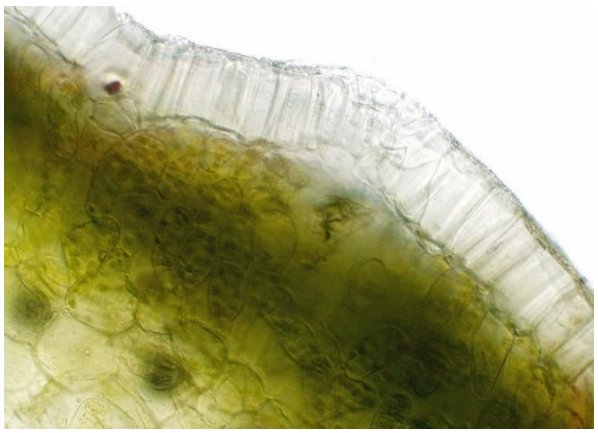
thallus x-section

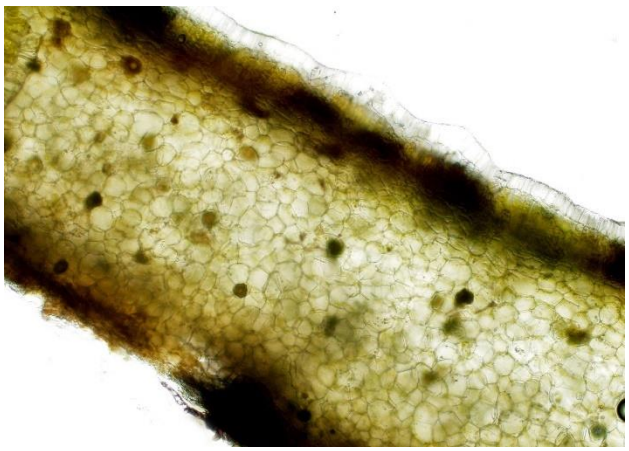
NM, Lincoln Co., Lookout Peak, 13 Sep 2014, *Blisard et al.* (SNM).

Targionia [for Cipriano Antonio Targioni (1672-1748), Italian physician].

Targionia hypophylla Linnaeus [under the leaf]. Thallus green to gray-green, 1-2 cm long, 0.2-0.5 mm wide, the ventral surface with black-purple scales with a single appendage; fertile plants with sporophytes contained within large, bivalved, black-purple involucres; involucres at the apices of the main branches; antheridia in receptacles on short branches; spores 45-85 µm, yellow-brown with a frothy appearance. ●On soil of mixed-conifer forests; known from few collections.







NM, San Miguel Co., Porvenir Canyon, 6 May 2019, *Kleinman* & *Blisard* (SNM).

REFERENCE MATERIAL

DISTINGUISHING FEATURES OF MOSSES

Note: At least some (but not necessarily all) species of the following genera have the feature indicated.

Leaves when dry curly, coiled, or crisped.
Amphidium, Atrichum, Brideliella, Ceratodon, Dichodontium, Dicranoweisia, Dicranum, Fissidens, Hymenoloma, Mnium, Plagiomnium, Pyramidula, Rhabdoweisia, Syntrichia, Symblepharis, Tortella, Tortula, Trichostomum, Weissia.

Leaves strongly and often coarsely toothed.
Anacolia, Aulacomnium, Climacium, Cynodontium, Dichodontium, Herpetineuron, Leptodontium, Oncophorus, Pleurochaete, Polytrichastrum, Polytrichum, Ptychomitrium, Rhexophyllum, Saelania, Symblepharis, Timmia, Timmiella,

Plants or leaves whitish.
Bryum, Brachythecium, Pohlia, Saelania.

Leaves with obvious awns or hair-points.
Claopodium, Coscinodon, Crossidium, Drepanocladus, Encalypta, Funaria, Gemmabryum, Grimmia, Jaffueliobryum, Leptostomopsis, Niphotrichum, Orthotrichum, Polytrichum, Pseudocrossidium, Pterygoneurum, Ptychostomum, Pyramidula, Rosulabryum, Schistidium, Syntrichia, Tortula.

Leaves falcate or sickle shaped.
Arctoa, Brachytheciastrum, Brachythecium, Bucklandiella, Calliergonella, Cratoneuron, Dicranella, Dicranum, Drepanocladus, Flexitrichum, Hygroamblystegium, Hygrohypnum, Hypnum, Jochenia, Leptodictyum, Palustriella, Paraleucobryum, Rhytidium, Roaldia, Sanionia, Sarmentypnum, Scorpidium, Warnstorfia.

Leaves wrinkled-undulate.
Anomodon, Atrichum, Neckera, Rhytidium, Tortella.

Shoots flattened or complanate-foliate.
Anomodon, Bryoxiphium, Distichium, Fissidens, Isopterygium, Neckera, Plagiomnium, Plagiothecium, Rhynchostegium, Stereophyllum, Taxiphyllum.

Shoots 2- to 3-times pinnate.
Hylocomium, Thuidium.

Plants with visible gemmae, bulbils, or brood branchlets.
Aulacomnium, Brothera, Conardia, Dichodontium, Dicranoweisia, Dicranum Didymodon, Encalypta, Gemmabryum, Gertrudiella, Grimmia, Hydrogonium, Husnotiella, Leptodontium, Nyholmiella, Plagiothecium, Platydictya, Platygyrium, Pohlia, Pseudoleskeella, Ptychostomum, Rosulabryum, Syntrichia, Tetraphis, Zygodon.

DISTINGUISHING FEATURES OF LIVERWORTS

Note: At least some (but not necessarily all) species of the following genera have the feature indicated.

COMPLEX THALLOUS LIVERWORTS

Dorsal thalli displaying areolation with prominent air pores.
Conocephalum, Marchantia.

Thalli when dry, curl up into blackish tubes.
Asterella, Mannia, Reboulia.

Ventral thalli covered in purple scales with diagnostic appendages.
Asterella, Mannia, Plagiochasma, Reboulia.

Thalli with apical clusters of elongate hyaline scales.
Clevea, Oxymitra.

Thallus margins with short white hair-like scales.
Dumortiera.

Gemmae cups on dorsal surface of thallus.
Marchantia.

Thalli often arranged in rosettes or hemirosettes.
Riccia.

Black involucre containing spores at apices of thalli.
Targionia.

SIMPLE THALLOUS LIVERWORTS

Thalli single cell thick.
Apopellia, Blasia, Fossombronia, Metzgeria, Pellia.

LEAFY LIVERWORTS

Leaves complicate-bilobed.
Frullania, Porella, Radula, Scapania.

Plants tiny.
Cephalozia, Cephaloziella, Fuscocephaloziopsis.

Leaf insertion incubous.
Frullania, Lepidozia, Porella.

Leaf insertion succubous or transverse.
Cephalozia, Chiloscyphus, Fuscocephaloziopsis, Geocalyx, Gymnocolea, Leiocolea, Liochlaena, Lophocolea, Obtusifolium, Odontoschisma, Plagiochila, Solenostoma, Syzygiella.

Leaf lobe entire.
Chiloscyphus, Jungermannia, Liochlaena, Odontoschisma, Porella, Solenostoma, Syzygiella.

Leaf lobes bilobed.
Cephalozia, Cephaloziella, Fuscocephaloziopsis, Geocalyx, Gymnocolea, Leiocolea, Lophocolea, Lophozia, Obtusifolium.

Leaf lobes with three or four lobes.
Barbilophozia, Lepidozia, Neoorthocaulis, Schistochilopsis.

Leaves divided into thread-like fronds.
Blepharostoma.

Underleaves present.

Barbilophozia, Cephaloziella, Chiloscyphus, Frullania, Leiocolea, Lepidozia, Lophocolea, Lophozia, Neoorthocaulis, Obtusifolium, Porella, Radula.

Underleaves absent.

Cephalozia, Geocalyx, Gymnocolea, Jungermannia, Liochlaena, Neoorthocaulis, Odontoschisma, Plagiochila, Syzygiella.

Gemmae often present.

Barbilophozia, Liochlaena, Lophocolea, Odontoschisma, Schistochilopsis.

Leaf margins toothed.

Plagiochila.

BRYOPHYTES OF COMMON NEW MEXICO HABITATS

Note: At least some species of the following genera commonly occur in the habitat indicated.

Bogs, fens, marshlands, and swamp-like ground.

Aulacomnium, Calliergonella, Campylium, Climacium, Drepanocladus, Palustriella, Polytrichum, Pseudocampylium, Rhizomnium, Sanionia, Sarmentypnum, Scorpidium, Sphagnum, Straminergon, Tomentypnum, Warnstorfia.

In streams, creeks, lakes, ponds and similar aquatic habitats, often fully or partly submerged.

Fissidens, Fontinalis, Hygrohypnella, Hygrohypnum, Leptodictyum, Palustriella, Platyhypnum, Scleropodium.

Stream banks, along springs.

Atrichum, Bartramia, Brachythecium, Bryoerythrophyllum, Calliergonella, Campylium, Climacium, Cratoneuron, Crumia, Dichodontium, Dicranella, Distichium, Drepanocladus, Entosthodon, Eurhynchiastrum, Fissidens, Gemmabryum, Hygroamblystegium, Hygrohypnella, Hygrohypnum, Hymenostylium, Imbribryum, Leptodictyum, Oncophorus, Palustriella, Philonotis, Plagiobryoides, Pohlia, Polytrichum, Ptychostomum, Sanionia, Sciuro-hypnum.

Decaying logs, fallen trees, stumps.

Amblystegium, Aulacomnium, Brachythecium, Brideliella, Brothera, Campylopodiella, Dicranoweisia, Dicranum, Distichium, Hymenoloma, Jochenia, Lindbergia, Mnium, Oncophorus, Plagiomnium, Plagiothecium, Ptychostomum, Rhynchostegium, Rhodobryum, Roaldia, Rosulabryum, Symblepharis, Tetraphis

Bark of trees and shrubs.

Anomodon, Conardia, Fabronia, Haplohymenium, Homomallium, Leskea, Lewinskya, Lindbergia, Nyholmiella, Orthotrichum, Pylaisia, Rhynchostegium, Roaldia, Rosulabryum, Symblepharis, Syntrichia.

Boulders, large rocks, cliffs, ledges.

Amblystegium, Andreaea, Barbula, Brachythecium, Braunia, Buckia, Bucklandiella, Ceratodon, Claopodium, Coscinodon, Dicranum, Didymodon, Entodon, Fissidens, Grimmia, Hedwigia, Homomallium, Husnotiella, Hymenoloma, Lescuraea, Lewinskya, Molendoa, Orthotrichum, Neckera, Paraleucobryum, Plagiothecium, Platygyrium, Pseudocrossidium, Pseudoleskeella, Ptychomitrium, Rhytidium, Roaldia, Schistidium, Syntrichia, Tortella, Tortula, Zygodon.

Moist forest soil, humus, often shaded.

Brachythecium, Campylium, Climacium, Conardia, Dicranum, Entodon, Hylocomium, Meiotrichum, Mnium, Oxyrrhynchium, Plagiomnium, Plagiothecium, Pohlia, Polytrichastrum, Polytrichum, Ptychostomum, Rhodobryum, Rhizomnium, Rhynchostegium, Rhytidium, Roaldia.

Dry open soil, often desert areas.

Acaulon, Aloina, Anacolia, Brachytheciastrum, Bryum, Ceratodon, Chenia, Crossidium, Fissidens, Gemmabryum, Gertrudiella, Pseudocrossidium, Pterygoneurum, Syntrichia, Tortula, Weissia.

Disturbed ground, commonly in urban settings.

Barbula, Gemmabryum, Leptobryum, Streblotrichum, Weissia.

Mosses

1. *Anacolia menziesii*
2. *Arctoa starkei*
3. *Atrichum tenellum*
4. *Bartramia aprica*
5. *Bartramia brevifolia*
6. *Bartramia ithyphylla*
7. *Brachymenium klotzschii*
8. *Brachymenium mexicanum*
9. *Brideliella wahlenbergii*
10. *Brothera leana*
11. *Bucklandiella subsecunda*
12. *Bucklandiella sudetica*
13. *Chenia leptophylla*
14. *Crossidium seriatum*
15. *Crossidium squamiferum*
16. *Cynodontium tenellum*
17. *Dichodontium pellucidum*
18. *Dicranella varia*
19. *Dicranum fuscescens*
20. *Didymodon cordatus*
21. *Didymodon tectorum*
22. *Distichium inclinatum*
23. *Drepanocladus polygamus*
24. *Entodon beyrichii*
25. *Entodon sullivantii*
26. *Entosthodon attenuatus*
27. *Entosthodon rubiginosus*
28. *Entosthodon rubrisetus*
29. *Entosthodon sonorae*
30. *Fabronia pusilla*
31. *Fissidens dubius*
32. *Flexitrichum flexicaule*
33. *Flexitrichum gracile*
34. *Geheebia fallax*
35. *Geheebia ferruginea*
36. *Gertrudiella nevadensis*
37. *Grimmia elatior*
38. *Grimmia plagiopodia*
39. *Grimmia sessitana*
40. *Grimmia texicana*
41. *Grimmia trichophylla*
42. *Helodium blandowii*
43. *Herpetineuron toccoae*
44. *Homomallium incurvatum*
45. *Hydrogonium bolleanum*
46. *Hydrogonium orientale*
47. *Hygrohypnella bestii*
48. *Hymenoloma crispulum*
49. *Isopterygiella pulchella*
50. *Isopterygium tenerum*
51. *Lescuraea patens*
52. *Lescuraea saxicola*
53. *Leskea polycarpa*
54. *Lewinskya laevigata*
55. *Microbryum davallianum*
56. *Microbryum starckeanum*
57. *Oncophorus integerrimus*
58. *Ozobryum ogalalense*
59. *Paraleucobryum longifolium*
60. *Pohlia tundrae*
61. *Polytrichastrum alpinum septentrionale*
62. *Ptychomitrium serratum*
63. *Pyramidula tetragona*
64. *Sarmentypnum exannulatum*
65. *Schistidium teretinerve*
66. *Stegonia latifolia*
67. *Syntrichia chisosa*
68. *Taxiphyllum taxirameum*
69. *Tayloria acuminata*
70. *Tayloria serrata*
71. *Thuidium assimile*
72. *Timmiella anomala*
73. *Tortella densa*
74. *Tortella fragilis*
75. *Tortula brevipes*
76. *Tortula cernua*
77. *Tortula guepinii*
78. *Tortula hoppeana*
79. *Tortula nevadensis*
80. *Trichostomopsis umbrosa*
81. *Trichostomum brachydontium*
82. *Trichostomum crispulum*
83. *Trichostomum planifolium*
84. *Weissia phascopsis*
85. *Zygodon campylophyllus*
86. *Zygodon rupestris*

Liverworts

1. *Apopellia endiviifolia*
2. *Asterella lindenbergiana*
3. *Blepherostoma trichophyllum*
4. *Cephalozia bicuspidata*
5. *Cephaloziella hampeana*
6. *Cephaloziella rubella*
7. *Fossombronia pusilla*
8. *Frullania ericoides*
9. *Frullania neomexicana*
10. *Fuscocephaloziopsis lunulifolia*
11. *Fuscocephaloziopsis pleniceps*
12. *Geocalyx graveolens*
13. *Gymnocolea inflata*
14. *Jungermannia atrovirens*
15. *Jungermannia pumila*
16. *Leiocolea badensis*
17. *Liochlaena lanceolata*
18. *Lophozia collaris*
19. *Lophozia wenzelii*
20. *Mannia gracilis*
21. *Mannia pilosa*
22. *Mannia sibirica*
23. *Marchantia quadrata*
24. *Metzgeria pubescens*
25. *Neoorthocaulis attenuatus*
26. *Neoorthocaulis floerkei*
27. *Obtusifolium obtusum*
28. *Odontoschisma denudatum*
29. *Odontoschisma sphagni*
30. *Oxymitra incrassata*
31. *Pellia epiphylla*
32. *Porella pinnata*
33. *Riccia albolimbata*
34. *Riccia campbelliana*
35. *Riccia crystallina*
36. *Riccia lamellosa*
37. *Riccia membranacea*
38. *Scapania apiculata*
39. *Scapania curta*
40. *Scapania irrigua*
41. *Scapania mucronata*
42. *Scapania subalpine*
43. *Schistochilopsis incisa*
44. *Solenostoma confertissima*
45. *Solenostoma hyalinum*
46. *Solenostoma rubrum*
47. *Solenostoma sphaerocarpum*
48. *Syzygiella autumnalis*
49. *Targionia hypophylla*

GLOSSARY OF BRYOPHYTE TERMS

Adapted from Flowers (1973); the online Flora of Australia Glossary–Mosses; Weber & Wittmann (2007).

A

abaxial: of the side or surface of an organ facing away from the axis.
acaulescent: lacking a stem.
acicular: needle-shaped or long and slenderly pointed.
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.
acumen: a slender, tapering point.
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°.
adaxial: of the side or surface of an organ, facing towards the axis.
alar cells: specialized cells at the basal angles of a leaf, often distinctive in their size, shape, color or ornamentation.
amphigastria: the underleaves in leafy liverworts, often differing in shape and size from the lateral leaves.
amplexicaul: clasping a stem.
anastomose: the union between lines or ridges in spores of liverworts.
annual: a plant that completes its life history within a single growing season or year.
annular: shaped like a ring; leaves or branches arranged in a circle, e.g. *Philonotis*.
annulus: a ring of 1-3 or more rows of cells with differentially thickened walls between the lid and the urn of capsules. As the capsule matures the ring develops tension and dries out, causing the capsule to tear away from the adjacent cells. This brings about the separation of the lid from the urn.
antheridiophore: a specialized branch that bears the archegonia in liverworts.
antheridium (pl. **antheridia**)**:** the male gametangium; a multicellular stalked, structure with a jacket of sterile cells and producing large numbers of antherozoids (male gametes); globose to broadly cylindrical in shape.
anticlinal: oriented perpendicular (rather than parallel) to the surface.
apical cell: a single cell at the apex of a shoot, leaf or other organ that divides repeatedly to produce new leaves, stems or other organs.
apiculus: a short, abrupt point; adj. **apiculate**.
apophysis: a swelling of the seta at the base of the capsule, with many stomata, and functioning as chief assimilative part of the sporophyte.
appendiculate: having short, thin transverse projections, e.g. on the endostomial cilia of the peristome (see **trabeculae**).
appressed: closely applied, as for leaves lying closely or flat against the stem.
archegoniophore: specialized structure found in some of the Marchantioid large thalloid liverworts; the sporophytes are formed on the underside of the long-stalked umbrella spokes
archegonium (pl. **archegonia**)**:** the female gametangium; a multicellular, flask-shaped structure consisting of a stalk, a swollen base (venter) containing the egg and a neck through which the antherozoid swims to fertilize the egg.
arcuate: strongly curved in an arc.
areola (pl. **areolae**)**:** in liverworts, on the upper surface of the thallus, the areolae are the visible evidence of the underlying air-chambers in the complex thalli of the Marchantiales; there is also a central pore in the middle of the areola.
areolate: with small angular areas forming a network.
areolation: the network formed by cell walls, especially in leaves.
arista: the hard awn or bristle at the tip of a leaf, usually formed by an excurrent costa.
aristate: ending in a slender, stiff, bristle-like point.
arthrodontous: of a peristome, consisting of triangular or linear teeth/segments with differentially thickened walls; the teeth/segments are formed of part cells, in contrast to a peristome in which they are formed of whole cells.
articulate: jointed; in mosses applied to the peristome teeth which have -+- strong transverse thickening, suggestive of joints.
ascending: sloping or curved upwards.
attenuate: tapering gradually.
auricle: a small bulge or ear-like lobe at the basal margin of a leaf.
auriculate: having auricles.
autoicous: having the antheridia and archegonia in separate buds on the same stem.
awn: an arista, 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

basal membrane: a membrane at the base of the endostome, often bearing segments and cilia.
beaked: having a slender point on the operculum or lid; rostrate.
bifurcate: forked into ± equal parts.

bistratose: consisting of two cell layers, e.g. a leaf lamina two cells thick.
blade; the leaf.
border: a margin that is differentiated in shape, size, color or thickness.
bract: one of the specialized leaves surrounding and protecting archegonia and/or antheridia.
bryophyte: a non-vascular, green plant with a gametophyte generation that is free-living and a separate comparatively ephemeral sporophyte generation; a collective name for mosses, liverworts, and hornworts.
buds: small propagative bodies having incipient stem and leaves borne on the protonemata of all mosses, and sometimes in the axils of the leaves of certain species.
bulbiform: bulb-shaped.
bulbil: a small deciduous, bulb-shaped, axillary, vegetative propagule; often with rudimentary leaves.

C
caducous: falling readily or early.
caespitose: tufted, growing in dense cushions or turfs.
calcicolous: a plant that grows best in habitats or on substrata with high levels of calcium.
calcifugous: a plant that cannot tolerate habitats or substrata with high levels of calcium.
calliculate: applied to leaves that are channeled from base to apex and rounded at the back.
calyptra (pl. **calyptrae**)**:** a thin hood covering the lid of the capsule; derived largely from the archegonial venter.
campanulate: bell-shaped.
capillary: hair-like, filamentous.
capitulum (pl. **capitula**)**:** a head-like mass of crowded branches at the apex of the stem, e.g. in *Sphagnum*.
capsule: the terminal, spore-producing part of a moss sporophyte.
carinate: folded along the middle, like the keel of a boat; V-shaped in cross-section.
carpocephalum: in liverworts, the specialized receptacle that surmounts the perpendicular stalk; it bears the sporangia.
catenulate: resembling the links of a chain
caulonema: a secondary, bud-generating part of the filamentous moss **protonema**, typically reddish brown with few chloroplasts and consisting of long cells with oblique end walls.
central strand: a group of small cells in the center of stems or setae.
cernuous: nodding or drooping.
channeled: of a leaf, hollowed out like a gutter and semicircular in cross-section.
chloronema: the filamentous part of the protonema that contains chloroplasts.
chlorophyllose: of cells containing chloroplasts.
cilia (sing. **cilium**)**:** a delicate, hair-like or thread-like structure, usually one cell thick and unbranched; in peristomes, a structure that occurs singly or in groups alternating with the segments of the inner endostome; hair-like appendages fringing leaves or calyptrae. adj. **ciliate**.
circinate: applied to leaves curved to one side in a semicircle or nearly a circle.
cladocarpous: having perichaetia terminal on lateral branches with juvenile leaf development similar to that on vegetative branches.
clavate: club-shaped.
cleistocarpous: of a capsule, lacking an operculum and, therefore, opening irregularly.
clone: population of genetically identical plants produced vegetatively from a single propagule or spore.
cochleariform: round and deeply concave, like the bowl of a spoon.
collenchymatous: cells with walls that are thickened at the corners.
columella: the sterile, central tissues of a moss capsule, around which the spores develop.
comal leaves: a cluster of leaves at the apices of stems and branches.
commissure: the margin of a hyaline cell which adjoins that of a chlorophyllose cell in the leaves of *Sphagnum* species.
comose: of stem tips with a cluster of leaves at the apices.
complanate: a leafy shoot that is more-or-less flattened into one plane.
complicate: folded lengthwise.
complicate-bilobed: having two unequal leaf lobes with the smaller folded against the larger.
concolorous: having the same color.
conduplicate: folded lengthwise along the middle.
conspecific: belonging to the same species.
constricted: narrowed.
contracted: narrowed or shortened.
convolute: of leaves rolled one within the other.
cordate: heart-shaped.
coriaceous: leathery in texture.
cortex: the outermost layer or layers of cells in a stem, often differentiated from the central cylinder.
corticolous: growing on bark.
costa (pl. **costae**)**:** the thickened midrib or nerve of a leaf.

costate: having a costa.
crenate: having rounded teeth.
crenulate: having minute, rounded teeth formed from bulging cell walls.
cribrose: perforated with holes or thin spots.
crisped (or **crispate**)**:** strongly curled, twisted and contorted.
cristate: having a crest-like ridge.
cucullate: hooded or in the shape of a hood; of leaves that are concave at the tips; of calyptrae that are conical and split on one side.
cuneate: wedge-shaped, as in some peristome teeth.
cuspidate: ending in a stout, rigid point, like a tooth.
cuticle: a non-cellular coating on the outer surface of cells in contact with the environment, often variously roughened or ornamented.
cylinder: the central strand in stem.

D
deciduous: falling off, lost at maturity, e.g. the operculum.
decumbent: tips ascending from a prostrate base.
decurrent: applied to the margins of leaves that extend down the stem, as ridges or narrow wings, below the insertion of the leaf.
decurved: curved downward.
deflexed: bent downward.
dehiscent: splitting open (as opposed to **indehiscent**).
deltoid: shaped like an equilateral triangle.
dendroid: tree-like in habit, branching from a main stem.
dentate: with teeth directed outward.
denticulate: finely toothed.
depauperate: stunted or poorly developed.
depressed: flattened from above.
descending: directed gradually downward.
diaspore: an agent of dispersal; any structure that becomes detached from the parent plant and gives rise to a new individual.
dichotomous: with two equal forks or branches.
differentiation: the morphological and physiological changes that occur between initiation and maturation of a cell, tissue or organ.
dimorphic: of two distinct forms.
dioicous: with archegonia and antheridia borne on separate plants.
diploid: a cell, individual or generation with two sets of chromosomes (*2n*); the typical chromosome level of the sporophyte generation.
diplolepidous: a form of arthrodontous peristome having two concentric rings of teeth, with the outer ring (**exostome**) derived from thickening of the contiguous walls of the outer and primary peristomial layers and the inner ring (**endostome**) derived from the thickening of the contiguous walls of the primary and inner peristomial layers. The exostome is generally more heavily thickened than the endostome. One or both rings may be absent or reduced.
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*.
divergent: spreading in opposite directions.
dorsal: abaxial, the back of the leaf away from the stem, the underside.
dorsal lamina: part of the leaf blade opposite the sheathing base, at the back of the costa and below the apical lamina in *Fissidens*.
dorsiventral: flattened with distinct upper and lower surfaces.
dwarf male: a minute male gametophyte borne on the female plant.

E
echinate: bearing spiny projections.
ecostate: lacking a costa.
ectohydric: having water transport essentially external by surface flow, including capillary motion between leaves or through surface papillae.
efibrillose: without fibrils.
elater: in liverworts, elongate sterile cells, usually hygroscopic, mixed among the spores.
ellipsoidal: a solid with an elliptical profile.
elliptical: having the shape of an ellipse, oblong but convex at the sides and ends.
emarginate: broad at the apex with a shallow notch, deeper than **retuse**.

embryo: the developing sporophyte phase normally generated from a zygote; in mosses it usually consists of a foot, seta and capsule.
emergent: partly exposed, as a capsule only partly protruding from among the perichaetial leaves.
endemic: restricted to one country or one floristic region.
endohydric: having water transport essentially internal.
endostome: the inner ring of a diplolepidous peristome, formed from contiguous periclinal wall-pairs of the primary and and inner peristomial layers; typically a weak membranous structure consisting of a basal membrane bearing **segments** and **cilia**; homologous with the single peristome of haplolepidous mosses.
endothecium: in most mosses, the inner embryonic tissue of a capsule which gives rise to all tissues interior to the outer spore sac. In *Sphagnum* it also produces the columella.
entire: with a smooth outline, not toothed or lobed.
ephemeral: short-lived.
epidermis: the outer layer of cells at the surface of an organ.
epiphragm: a circular membrane, positioned horizontally over the capsule mouth of some mosses, attached to the tips of the peristome teeth and partially closing the mouth of an inoperculate capsule, e.g. *Funaria* , *Polytrichum*.
epiphyllous: growing on the living leaves of another plant.
epiphyte: growing on another plant.
equidistant: regularly separated or spaced.
erect: upright, almost parallel to main axis (such as leaves to a stem), but not appressed.
erect-patent: spreading at an angle of less than 45°.
erose: ragged or irregularly notched on the margins as if tom or gnawed.
exannulate: lacking an annulus.
excavate: hollowed out.
excurrent: of a costa, extending beyond the leaf apex.
exine: the outermost wall layer of the spore.
exostome: the outer circle of the diplolepidous peristome, consisting of teeth formed from contiguous periclinal wall-pairs of the outer and primary peristomial layers; absent or rudimentary in the haplolepidous peristome.
exothecium: the epidermis or superficial layer of cells (**exothecial** cells) of the capsule wall.
explanate: flattened, spread out.
exserted: exposed, as in a capsule protruding beyond the perichaetial leaves.

F
falcate: curved like a sickle.
falcate-secund: strongly curved and turned to one side.
fascicle: a group, bunch, or tuft, as a fascicle of branches or leaves, adj. **fasciculate**.
fastigiate: with branches erect and of similar length.
fenestrate: pierced with broad openings resembling windows.
ferruginous: rusty red color; iron rust.
fibril: a fine, fibre-like wall thickening. adj. **fibrillose**.
filamentous: thread-like.
filiform: very slender and elongate, thread-like.
fimbriate: fringed, generally eroded with radiating cell walls of partly eroded marginal cells.
flabellate: shaped like a fan.
flaccid: soft and limp.
flagelliform: whip-like; a branch with a gradual attenuation from ordinary leaves at the branch base to vestigial-branched tip.
flexuose: wavy or twisted.
foliose: leafy or leaflike; covered with leaves.
foot: the basal organ of attachment and absorption for the bryophyte sporophyte, embedded in the gametophyte.
fringed: with a short-ciliate margin or edge.
frond: the branched or leafy part of an erect stem, including branches of a dendroid moss. adj. **frondose**.
fruit: archaic term for the capsule or sporophyte.
fugacious: quickly or readily falling or vanishing.
funiculate: rope-like.
fuscous: dull brown.
fusiform: narrow and tapering at each end, spindle-shaped.

G
galeate: helmet-shaped.
gametangium (pl. **gametangia**)**:** an **antheridium** or **archegonium**; a structure forming gametes.
gamete: a haploid reproductive cell (sperm, egg).
gametoecium: a gametangium together with its surrounding bracts (see **androecium**, **gynoecium**).
gametophore: loosely used for the leafy moss gametophyte plant developed from a protonema.

gametophyte: the haploid, sexual generation; in bryophytes the free-living, dominant generation.
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.
gemmiferous: bearing gemmae.
gemmiform: gemma-like, bud-like.
geniculate: bent abruptly, as at the knee.
gibbous: swollen or bulging at one side.
glabrous: lacking papillae or hairs.
glaucous: bluish green in color or with a greyish or whitish bloom.
granulose: minutely grainy, roughened with minute blunt projections.
gregarious: growing close together in loose tufts or mats.
guard cells: specialized photosynthetic cells bordering the stoma on the capsule wall.
guide cells: large, rather thin-walled cells in the center of the costa, usually best seen in transverse section.
gymnostomous: without a peristome, so that the mouth of the urn is naked.

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.
haploid: a cell, structure or organism having a haploid set of chromosomes (*n*); e.g. the normal chromosome number of the gametophyte generation.
haplolepidous: a form of arthrodontous peristome having only one circle of teeth derived from thickening of the contiguous walls of the primary and inner peristomial layers.
heteroicous: having several forms of gametoecia on the same plant; also called polygamous, polyoicous.
heterolepidous: a form of arthrodontous peristome thought by some to be intermediate between **haplolepidous** and **diplolepidous**, e.g. in *Encalypta*.
heteromallous: pointing in various directions.
heteromorphic: having two or more different shapes or phases.
hoary: greyish or whitish, appearing frosted from numerous massed hair-points.
homomallous: pointing in the same direction.
hyaline: colorless and transparent; commonly used with reference to cells that lack chloroplasts.
hyalocyst: a large, hyaline, water-storage cell in Sphagnopsida.
hyalodermis: in *Sphagnum*, a cortex of large, empty, colorless cells. adj. **hyalodermal**.
hydroid: a water-conducting cell in the central strand and/or costa of some mosses,
hygroscopic: rapidly absorbing water, thus changing form or position.

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.
incrassate: thickened, or with thick walls.
incubous: a special distichous insertion in leafy liverworts, where the leaf-insertion scars are oblique to the long axis of the stem; in the incubous arrangement the forward border of a leaf overlaps the rearward border of the next leaf up the stem, as if you were looking down the shingles of a roof; see also **succubous**.
incumbent: lying against or leaning on something.
incurved: curved upward and inward, the opposite of **recurved**; applied to leaf margins and tips.
indehiscent: of capsules lacking a distinct opening mechanism; spores shed by irregular rupture or breakdown of capsule wall.
inflated: swollen, puffed up.
inflexed: bent upward (adaxially) and inward, the opposite of **reflexed**; applied to leaves, leaf margins, and peristome teeth.
innovation: a new shoot; in acrocarpous mosses a subfloral branch formed after differentiation of the sex organs, usually from the gynoecium base.
inoperculate: lacking an operculum.
insertion: a line or point of attachment of a leaf, branch, or peristome etc.
intine: the innermost wall of the spore.
intramarginal: submarginal; structures close to or associated with but not strictly on the margin.
intricate: tangled, interwoven.
involute: strongly rolled upward (adaxially) and tightly inward, opposite of **revolute**; applied to leaf margins.
isodiametric: about as long as broad and having roughly the same dimensions in all directions; applied to square, rounded or hexagonal cells.
isomorphic: ± uniform in size.
isophyllous: having similar stem and branch leaves.

J

julaceous: smoothly cylindrical; applied to rounded shoots with crowded, imbricate leaves.
juxtacostal: the part of a leaf lamina adjacent to the costa.

L

lacerate: deeply and irregularly cut or torn.
laciniate: dissected into fine, deep, often irregular divisions; fringed with cilia.
lamella (pl. **lamellae**)**:** a longitudinal ridge, sheet, or plate on the leaf blade of some mosses (e.g. Polytrichaceae); adj. **lamellate**; also the plates of the secondary wall deposition occurring between trabeculae on the dorsal and ventral surfaces of an arthrodontous peristome.
lamina (pl. **laminae**)**:** the blade of a leaf excluding the costa and leaf margin or border.
laminal cell: any cell of the lamina.
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.
lenticular: shaped like a double-convex lens.
leptoid: a conducting cell similar in form and function to a sieve tube in vascular plants; found in the central strand and setae of Polytrichales and in the setae of many mosses.
leptome: a tissue, similar to the phloem of vascular plants, consisting of leptoids and parenchymatous cells.
leucocyst: a large, empty hyaline cell (= **hyalocyst**).
lid: operculum.
ligulate: strap-shaped, with parallel sides and an abruptly tapered apex.
limb: the upper part of the leaf, the lower part being the **base**.
limbidium: a leaf border or differentiated margin, as in *Fissidens*.
linear: very narrow and elongate, with the sides nearly parallel; narrower than **ligulate**.
lingulate: tongue-shaped; broad with the sides ±parallel.
lumen (pl. **lumina**)**:** the cavity of a cell.

M

macronema (pl. **macronemata**)**:** a large, branched rhizoid produced around branch primordia and at the base of buds.
mammilla (pl. **mammillae**)**:** a bulge on the surface of cell with a nipple-like tip. adj. **mammillose**.
marsupium: a swollen sac or bulb that grows down into the substrate, protecting the developing sporophyte of some leafy liverworts.
mat: a densely interwoven, horizontal growth form.
median: central, in the middle;
median leaf cells are those in the upper middle of the leaf or, in leaves with a costa, those located between the margin and costa about two-thirds of the way up the leaf.
medulla: the inner tissue of a stem, surrounded by the outer cortical layer.
meristem: a permanent or temporary zone of actively dividing undifferentiated cells which by, mitotic division, give rise to tissues and organs.
mitrate, mitriform: as applied to the calyptra, cleft at two or more points around the base.
monoicous: bisexual, having antheridia and archegonia on the same plant; includes **autoicous**, **synoicous** and **paroicous**.
monopodial: with the main stem having unlimited growth, and giving rise to numerous, secondary, lateral shoots or stems.
mucro: a short, abrupt point at the apex of a leaf (adj. **mucronate**), as in a leaf with a short-excurrent costa; **apiculate** is somewhat longer.
muticous: blunt or rounded at the apex, without a point.

N

naked: lacking covering structures or ornamentation.
naviculate: of the distal portion of the leaf, boat-shaped, both somewhat cuculate and keeled.
neck: the sterile basal part of moss capsule; also the cylindrical upper part of an archegonium.
nematodontous: of a peristome, consisting of whole dead cells with ± evenly thickened walls.
nodes: thickened joints or knots.
nodose: knotted, with small knob-like thickenings; e.g. endostomial cilia in Bryaceae. dim. **nodulose**.
nutant: nodding or drooping.

O

ob-: a prefix indicating inversion, as in **obovate**.
oblanceolate: reverse-lanceolate, with the narrow end lowermost.
oblate: wider than long, flattened from above.
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.
ochraceous: brownish yellow.
ocrea: a short, thin, collar-like sheath around the base of the seta in Orthotrichum.
oil bodies: oil-containing inclusions in the cells of livereworts; they tend to be ephemeral so are best observed in fresh specimens.
operculum (pl. **opercula**)**:** the lid covering the mouth of most moss capsules, becoming detached at maturity; usually separated from the mouth by an annulus. adj. **operculate**.
orbicular: nearly round or circular.
oval: confusingly used for shapes broadest in the middle and rounded at each end, or for shapes ovate-like, broadest toward the base.
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
palmate: having radiating branches originating from a single point.
panduriform: shaped like the body of a violin.
papilla (pl. **papillae**)**:** a minute, solid protuberance from the surface of a cell (especially of leaves and spores) of various forms, commonly domed or spinous, simple or branched. adj. **papillate, papillose**.
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**.
paraphyses (sing. **paraphysis**)**:** sterile hairs composed of uniseriate cells, colored or hyaline, associated with antheridia and sometimes archegonia.
parenchyma: tissue of undifferentiated cells, usually isodiametric and thin-walled, usually not overlapping; adj. **parenchymatous**.
paroicous: with antheridia and archegonia in the same gametoecium but not mixed, the antheridia immediately below the perichaetium in the axils of leaves.
patent: open, spreading, diverging at angles of 30-60°.
pellucid: clear, transparent or translucent.
pendant, pendent: drooping or hanging down.
percurrent: of a costa, extending up to but ceasing at the apex of a leaf.
perfect: a complete peristome; applied to diplolepidous peristomes with an endostome having both segments and cilia.
perichaetial leaf: a modified leaf surrounding the archegonia.
perichaetium: the perichaetial leaves surrounding the archegonia.
periclinal: oriented parallel (rather than perpendicular) to the surface.
perigonial leaf: a modified leaf associated with and surrounding the antheridia.
perigonium: the perigonial leaves surrounding the antheridia.
peristome: a circular structure generally divided into 4, 8, 16 or 32 teeth arranged in single or double (rarely multiple) rows around the mouth of the capsule and visible after dehiscence of the operculum.
persistent: not falling off.
phyllodioicous: with dwarf male plants growing on the leaves or tomentum of much larger female plants.
piliferous: with a long, hyaline hair point.
pinnate: with spreading branches on either side of a stem, rather like a feather.
pitted: of cell walls, having small depressions or pores.
placenta: the interface between the gametophyte and sporophyte, usually containing numerous transfer cells. adj. **placental**.
plane: flat, not curved or wavy.
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 mats rather than tufts.
plica (pl. **plicae**)**:** a lengthwise fold or pleat. adj. **plicate**.
plumose: closely and regularly pinnate and feathery in appearance.
polymorphic: having more than one form, variable.
polyploid: a plant or tissue with more than 2 complete sets of chromosomes.
polysety: having more than one sporophyte produced from a single gametoecium, each from a separate archegonium with its own calyptra. adj. **polysetose**.
pore: a pit or opening in a cell wall. adj. **porose**.
procumbent: prostrate, spreading.
prolate: longer than wide.
propagula, propagule: deciduous brood bodies of various forms; a reduced bud, branch, or leaf functioning in vegetative reproduction.
prora (adj. **prorate**, dim. **prorulate**)**:** a mammillose or papillose projection formed by protrusion of the end of a cell.
prostrate: lying flat on ground.
protandrous: maturation of the antheridia prior to the archegonia.

protogynous: maturation of the archegonia prior to the antheridia.
protonema (pl. **protonemata**)**:** a filamentous, globose, or thallose structure resulting from spore germination and including all stages up to production of one or more gametophores.
protuberant: projecting.
proximal: the part nearest to the base or place of origin.
pseudautoicous: having dwarf male plants epiphytic on the female.
pseudopapillose: of leaf cells having longitudinal, cuticular ridges or striae (pseudopapillae), making the cells appear papillose in cross-section; can usually be discerned in face view at high magnification as dark, shadowy, longitudinal lines; see *Bucklandiella sudetica* and *Hymenoloma*.
pseudoparaphyllium (pl. **pseudoparaphyllia**)**:** structures resembling paraphyllia but restricted to the bases of branches and branch buds in some pleurocarpous mosses.
pseudopodium: an elongation of the stem of the gametophore, e.g. below the sporophyte in *Sphagnum* and *Andreaea*, to give a false seta; also an extension of the stem tip bearing clusters of gemmae.
pulvinate: cushion-like.
punctate: minutely dotted.
pyriform: pear-shaped.

Q
quadrate: usually of cells, square or nearly so.

R
rachis: the axis of a pinnate or umbellate frond.
radiculose: covered with rhizoids.
ramification: branching.
ramose: richly branched.
recurved: curved down (abaxially) and inward, the opposite of **incurved**; in leaves referring to margins, 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 margins or leaves of a stem.
reniform: kidney-shaped.
reticulate: forming a network.
retuse: having a slight indentation or notch in a broad, rounded apex.
revoluble: pertaining to the annulus of a moss capsule, in which the annulus coils away from the operculum.
revolute: of leaf margins, rolled downward (abaxially) and backward.
rhizoids: filamentous, branched outgrowths from the stems serving to attach the moss to the substratum; sometimes called radicles.
rhizome: a slender, horizontal, subterranean stem giving rise to erect secondary stems.
rhombic: diamond-shaped.
rhomboidal: longer and narrower than rhombic, oblong–hexagonal.
rosette: of the comal or perichaetial leaves spreading in rose-like fashion.
rostellate: with a short beak.
rostrate: with an apical beak that is narrowed to a slender tip or point.
rosulate: resembling a rosette, with leaves enlarged and crowded at the tips of stems.
rugose (dim. **rugulose**)**:** with irregular, roughly transverse wrinkles or undulations.

S
saxicolous: growing on rock.
scabrous: rough.
secund: bent or turned to one side.
segment: of a peristome, a single, tooth-like component of the endostome.
seriate: in rows (uni-, bi-, tri- or multiseriate); applied either to adjacent rows of leaf cells, or to ranks of leaves on a stem.
serrate: regularly toothed like a saw; leaves with marginal teeth pointing forward.
serrulate: finely or minutely serrate.
sessile: without a stalk, as a sporophyte with a greatly reduced seta.
seta (pl. **setae**)**:** the elongated stalk of the sporophyte between the capsule and the foot.
setaceous: bristle-like.
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.
sigmoid: S-shaped.
sinuose, sinuous: having a wavy wall or margin.
sinus: a gap between two lobes of a leaf.
spathulate: having the shape of a spatula, narrow below and gradually broadening above.

spermatozoid: a male gamete; bearing two flagella.
spiculose: sharply and minutely toothed or papillose.
spinose: having sharply pointed teeth.
spinulose: with minutely sharply pointed teeth.
splash-cup: a cup-shaped androecium in which the dispersal of antherozoids is aided by the action of falling raindrops.
spore sac: a spore-containing cavity in a moss capsule.
spore: a minute, usually spherical, haploid cell produced in the capsule as a result of meiosis; its germination gives rise to the protonema.
sporophyte: the spore-bearing generation; 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°.
squarrose: spreading at right angles.
squarrose-recurved: spreading at right angles, with the tips curved downwards.
stegocarpous: a capsule with a differentiated, dehiscent operculum.
stereid: a slender, elongate cell with very thick walls present in groups (**stereid bands**) in the costa and stem of many mosses.
stipe: the erect, unbranched basal part of a stem in a dendroid or frondose moss.
stolon: a slender, elongate branch with leaves that are often smaller and have a different shape to those of the main stem. adj. **stoloniferous**.
stoma (pl. **stomata**)**:** a pore involved in gas exchange, surround by two guard cells; in mosses restricted to the neck of the capsule.
stratose: in layers; denoting the thickness of leaves, i.e. uni-, bi-, or multistratose.
stria (pl. **striae**)**:** a fine line, streak, furrow, or ridge. adj. **striate**.
strict: straight and rigid, stiff.
striolate: very finely striate.
struma: a cushion-like swelling at one side of the base of a capsule; adj. **strumose**.
stylus (pl. **styli**)**:** a uniseriate or lanceolate flap found between a lobule and the stem in some liverworts (*Frullania*).
substratum: the surface on which a moss grows, e.g. soil, bark, or rock.
subula: a long, slender, needle-like point; adj. **subulate**.
succubous: a distichous insertion in leafy liverworts, where the leaf-insertion scars are oblique to the long axis of the stem; in the succubous arrangement the rearward border of a leaf overlaps the forward border of the next leaf down the stem, as if you were looking up the shingles of a roof; see **incubous**.
sulcate: deeply furrowed with longitudinal folds or ridges.
superficial: of stomata, having the guard cells in the same plane as the adjacent exothecial cells.
sympodial: having a main stem of determinate growth, and further growth by innovations or lateral branches.
synoicous: having antheridia and archegonia mixed in the same cluster or bud.
systylous: of a capsule, when the operculum remains attached to the tip of the columella after the capsule has opened.

T

terete: smoothly cylindrical, round in cross-section.
thalloid: the plant body not differentiated into stems and leaves, but ribbon-like.
theca (pl. **thecae**)**:** the spore-bearing part of a moss-capsule.
tomentum: a felt-like or woolly covering composed of abundant hairs or rhizoids; adj. **tomentose**.
trabecula (pl. **trabeculae**)**:** projecting cross-bars formed from the horizontal walls on either face of arthrodontous exostome teeth; also strands of cells bridging spaces within some capsules. adj. **trabeculate**.
truncate: cut off abruptly or squarely at the apex.
tuber: a gemma borne on rhizoids, usually underground.
tubulose: applied to leaves having the margins incurved and nearly touching.
tuft: a growth form with stems erect but radiating at the edges and forming small cushions.
tumid: swollen or inflated.
turbinate: top-shaped.
turgid: swollen or plump.

U

umbellate: having all of its branches spreading from the apex, umbrella-like.
uncinate: hooked; with the tip bent to form a hook.
underleaves: in livrworts, the reduced (often vestigial) lower row of leaves, often hidden among rhizoids.
undulate: wavy.
unistratose, **1-stratose:** having cells in 1 layer.
urceolate: urn-shaped; used with reference to capsules that are constricted below a wide mouth, then abruptly narrowed to the seta.
urn: the spore-bearing part of the capsule.

V

vaginant blade: one of two clasping leaf laminae in *Fissidens* species; the adaxial part of the leaf that sheathes the stem and encloses the base of the leaf above it.
venter: the swollen basal part of an archegonium, containing the egg.
ventral: the upper, adaxial side of the leaf facing the stem.
ventricose: swollen on one side.
vermicular: worm-like; long, narrow, and curving.
verrucose: beset with wart-like papillae or protuberances.
verticillate: whorled, with three or more branches arising from the same point.

W

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

X

xerophyte: a plant that is adapted for survival in arid places. adj. **xerophytic**.

Z

zygote: the product of the fusion of male and female gametes; the fertilized ovum before it undergoes mitosis or meiosis.

C

G

H