Mosses of the San Francisco Bay Area
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This is a preliminary treatment of the mosses of the ten (and a fraction) counties listed below. I've been gradually adding records from notes and trips made to the herbarium and library for other purposes, but the specimen citations are not yet complete, even as regards my own collections. Literature reports for a county are given only where I have no specimens to cite; otherwise, the citation is given after the species, but not after the county.

Most collections list the herbarium where the specimen is deposited, but this information is not complete. Most of my collections are represented at CAS, MO, or DAV, but I haven't checked this specifically for many of the older ones; in the latter case, I give the herbarium as "atw" in lower case. Specimens listed as "tbd" have not yet been distributed, but will be deposited, usually at CAS or UC.

I have included all literature reports that cite mosses from specific areas in the Bay Area, with a few exceptions. References that are clearly secondary (i.e. species in Yurky 1995 for which he cites an earlier reference but not a specimen) are omitted. Most of the reports in Watson (1880) are repeated from Lesquereux (1868); only the new reports in Watson (1880) are given. Finally, Bradshaw (1926) contains a number of obvious misidentifications, and I have omitted all of his reports.

I include reports for ten counties (abbreviation in parentheses): Sonoma (Son), Marin (Mar), Napa, Solano (Sol), Contra Costa (CC), Alameda (Ala), San Francisco (SF), San Mateo (SM), Santa Clara (SCla), Santa Cruz (SCz), and a small part of the westernmost edge of Stanislas County (Stanis), where the Inner Coast Ranges cross the county border.

Higher-order relationships have always been poorly resolved in many groups of mosses. Many families and genera are poorly defined, and the relationships of many are uncertain. Unfortunately, DNA sequence data has provided surprisingly little resolution. This list mostly follows traditional concepts, though I have made a few changes in cases where alternate relationships seem clear and well supported. However, many taxa remain (especially in Dicranaceae and Hypnales) where relationships are still poorly supported, and the classification continues to be in flux.

Key to Bay Area genera of mosses:
In preparation.

ANDRAEALES

Andraeaceae

Andraea heinemannii Hampe & C. Müll. On granite. Norris and Shevock (2004).
Distribution: Mar (Norris and Shevock 2004) SM (Murray, pers. comm.)

POLYTRICHALES

Polytrichaceae

Key to genera of Polytrichaceae
1. Leaves strongly contorted when dry; midrib narrow, well defined, blade unistratose, lamellae confined to midrib. *Atrichum*
1. Leaves not at all contorted when dry; midrib poorly defined, leaf multistratose and bearing lamellae for much of its width. *Polytrichum*

Key to species of *Atrichum*

1. Walls of leaf cells thin; calyptra glabrous (but the tip often toothed or papillose). *A. selwynii* Aust.
1. Walls of leaf cells thick and collenchymatous; tip of calyptra hispid. *A. undulatum* (Hedw.) P. Beauv.

Atrichum selwynii Aust. Mineral soil of banks, in open shade, redwood forest or occasionally broadleaf forests. Ireland (1969a), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Note: The reports of an unidentified *Atrichum* sp. by Steere et al. (1954, San Mateo County) and Thompson and Ketchledge (1958, Santa Clara County), as well as the report of *A. angustatum* (Brid.) B.S.G. in Lesquereux (1868), were probably based on collections of *A. selwynii* (Ireland 1969a).
Distribution: Mar (Yurky 1995) CC (Norris and Shevock 2004) SM (*Whittemore 4369*, MO) SCla (*Whittemore 6657*, CAS) SCz (*Whittemore 4041*, MO)

Atrichum undulatum (Hedw.) P. Beauv. [*Catharinea undulata* (Hedw.) Weber & D. Mohr] Open stony soil, mixed broadleaf forest, 2500 feet. Lesquereux (1868), Koch (1950), Koch and Ikenberry (1954), Kellman (2003), Norris and Shevock (2004).
Note: The two *Atrichum* species were confused prior to Ireland (1969a), and some of the older reports of *A. undulatum* are surely based on collections of *A. selwynii*.
Distribution: Son (*Whittemore 6702*, CAS) Mar (Koch and Ikenberry 1954) CC (*Whittemore 6980*, CAS) Ala (Koch and Ikenberry 1954) SF (Lesquereux 1868) SCla (*Whittemore 6070*, tbd) SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Polytrichum*
1. Leaf margins entire, strongly and broadly involute.
    2. Hair points of leaves red. *P. juniperinum* Hedw.
    2. Hair points of leaves white. *P. piliferum* Hedw.
1. Leaf margins serrate, plane.
    3. Neck of capsule well differentiated, set off by a deep constriction; urn with four sharp angles; terminal cells of lamellae deeply notched in cross section. *P. commune* Hedw.
    3. Neck of capsule poorly differentiated, not set off by a constriction; urn terete or with four rounded angles; terminal cells of lamellae rounded in cross section.
        4. Urn terete; marginal cells of lamellae with cuticular papillae. *P. alpinum* Hedw.
        4. Urn 4-angled; marginal cells of lamellae with cuticular ridges. *P. lyallii* (Mitt.) Kindb.

Polytrichum alpinum Hedw. [*Pogonatum alpinum* (Hedw.) Roehl., *Polytrichastrum alpinum* (Hedw.) G. L. Smith] Dry soil. Koch (1950), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Ala (Koch 1950) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Polytrichum commune Hedw. Soil. Koch (1950).
Distribution: Son (Koch 1950)

Polytrichum juniperinum Hedw. On sandy soil of dry open banks and slopes, oak woodland and chaparral. Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6685*, CAS) Mar (Yurky 1995) CC (*Whittemore 6975*, tbd) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCla (*Baker 564*, MO) SCz (*Whittemore 4441*, MO)

Polytrichum lyallii (Mitt.) Kindb. [*Polytrichadelphus lyallii* Mitt., *Polytrichastrum lyallii* (Mitt.) G. L. Smith] Dry soil.
Note: I know of no reports specifically from the Bay Area, but the Koch reports need to be checked.
Distribution: "Sporadic in the Coast Ranges" (Koch 1950)

Polytrichum piliferum Hedw. Dry soil over rock. Lesquereux (1868), Yurky (1995), Shevock and Toren (2001), Kellman (2003).
Distribution: Mar (Yurky 1995) CC (Lesquereux 1868) SF (Shevock and Toren 2001) SCz (Kellman 2003)

ENCALYPTALES

Encalyptaceae

Key to species of *Encalypta*
1. Calyptra fringed; peristome present. *E. ciliata* Hedw.
1. Calyptra entire or erose; peristome absent. *E. vulgaris* Hedw.

Encalypta ciliata Hedw.
Distribution: The range statement in Koch (1950) is rather vague; Lesquereux (1868) reports this from Mendocino County, so it should be looked for in the Bay Area.
Encalypta vulgaris Hedw. On soil or in crevices in rock outcrops, open woodland or chaparral. Lesquereux (1868), Koch (1950), Steere et al. (1954), Horton (1983).
Distribution: CC (Lesquereux 1868, Koch 1950) Ala (Lesquereux 1868) SCla (*Whittemore 6620*, CAS)

ARCHIDIALES

Archidiaceae

Archidium crassicostatum D. R. Toren, Kellman & Shevock. Thin wet soil. Kellman (2003), Norris and Shevock (2004), Toren et al. (2016).
Note: Reports of *Archidium alternifolium* (Dicks. ex Hedw.) Schimp. by Kellman (2003) and Norris and Shevock (2004) are based on misidentified material of this specires.
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

HAPLOLEPIDEAE

Seligeriaceae

Blindia acuta (Hedw.) Bruch & Schimp. in B. S. G. Rocks in streams, redwood forest. Thompson and Ketchledge (1958), Kellman (2003).
Note: *Blindia acuta* was not mapped in the Bay Area by Bartlett and Vitt (1986).
Distribution: SCz (Thompson and Ketchledge 1958, Kellman 2003)

Ditrichaceae

Key to genera
1. Leaves broadly lanceolate, with a few broad, low, rounded teeth near apex; capsules horizontal, strongly longitudinally furrowed. *Ceratodon*
1. Leaves narrowly lanceolate or almost linear, entire or serrulate; capsules erect or nearly so, smooth or longitudinally furrowed.
    2. Capsules spherical, cleistocarpous. *Pleuridium*
    2. Capsules elongate, operculate. *Ditrichum*

Key to species of *Ceratodon*
1. Capsules inclined to horizontal, dark red or purplish; peristome dark purple, bases of teeth connected by strong persistent cross-walls. *C. purpureus* (Hedw.) Brid. ssp. *purpureus*
1. Capsules erect or suberect, yellow or yellow-orange; peristome pale, persistent cross-walls at bases of teeth weak, not connecting adjacent teeth. *C. stenocarpus* Bruch & Schimp. ex C. Müll.

Ceratodon purpureus (Hedw.) Brid. ssp. *purpureus* Sandy mineral soil in open (sometimes disturbed) areas, in mixed forest or chaparral. Steere et al. (1954), Burley and Pritchard (1990), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: Sterile material is very similar to *C. stenocarpus*, which was only recently recognized from the area; earlier collections should be re-checked.
Distribution: Son (Norris and Shevock 2004) Mar (Steere et al. 1954, Yurky 1995) CC (*Whittemore 6978*, tbd) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4461*, CAS) SCla (*Whittemore 4301*, MO) SCz (*Whittemore 3290*, MO) Stanis (*Whittemore 6613*, CAS)

Ceratodon stenocarpus Bruch & Schimp. ex C. Müll. On poor soil. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Ditrichum*

1. Leaf margins recurved. *D. ambiguum* Best
1. Leaf margins plane or incurved.
   2. Seta red; dioecious. *D. heteromallum* (Hedw.) Britt.
   2. Seta yellow; autoecious. *D. schimperi* (Lesq.) Kuntze

Ditrichum ambiguum Best Disturbed mineral soil and sandstone. Koch (1950), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) SF (Shevock and Toren 2001) SM (*Whittemore 4453A*, CAS) SCz (*Whittemore 4432*, CAS)

Ditrichum heteromallum (Hedw.) Britt.
Note: Known from Humboldt and San Benito Counties (Koch 1950), to be expected in the Bay Area.

Ditrichum schimperi (Lesq.) Kuntze On soil, evergreen forest. Koch (1950), Steere et al. (1954), Anderson and Bryan (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Koch 1950, Steere et al. 1954, Anderson and Bryan 1958, Yurky 1995, Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4399*, MO) SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Pleuridium*

1. Perichaetial leaf blade at least partly bistratose at shoulder. Paroecious, with solitary antheridia below perichaetium. *P. acuminatum* Lindb.
1. Perichaetial leaf blade unistratose at shoulder. Autoecious, with bud-like antheridial branches below perichaetium. *P. subulatum* (Hedw.) Rabenh.

Pleuridium acuminatum Lindb. [*P. bolanderi* C. Müll. ex Jaeg.] xxx. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004) SF (Shevock and Toren 2001) SCz (Kellman 2003, Norris and Shevock 2004)

Pleuridium subulatum (Hedw.) Rabenh. Sunny mineral soil, usually in chaparral. Lesquereux (1868), Koch and Ikenberry (1954), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: Most of these reports need to be checked, since *P. acuminatum* and *P. bolanderi* have often been considered synonyms of *P. subulatum*.
Distribution: Son (Steere et al. 1954) Mar (Lesquereux 1868, Koch 1950, Yurky 1995, Norris and Shevock 2004) Ala (Koch and Ikenberry 1954) SF (Shevock and Toren 2001) SM (*Whittemore 4460*, MO) SCla (*Whittemore 4299*, CAS) SCz (*Whittemore 3294*, atw)

Timmiellaceae

Key to species of *Timmiella*

1. Monoecious; peristome twisted at least one turn. *T. anomala* (Bruch. & Schimp.) Limpr.
1. Dioecious; peristome teeth straight. *T. crassinervis* (Hampe) L. Koch

Timmiella anomala (Bruch. & Schimp. in B.S.G.) Limpr. Dry soil over rock. Lesquereux (1868), Shevock and Toren (2001), Norris and Shevock (2004).
Note: Reports of this species need to be checked; it has often been confused with *T. crassinervis*.
Distribution: Mar (Lesquereux 1868) SF (Shevock and Toren 2001, Norris and Shevock 2004)

Timmiella crassinervis (Hampe) L. Koch [*T. vancouveriensis* Broth.] Dry mineral soil, many habitats. Lesquereux (1868), Koch and Ikenberry (1954), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: The report of *T. anomala* (B.S.G.) Limpr. by Lesquereux (1868) may be referrable here.
Distribution: Son (*Whittemore 6704*, CAS) Mar (Lesquereux 1868, Koch and Ikenberry 1954, Steere et al. 1954, Yurky 1995) CC (*Whittemore 6797*, CAS) Ala (*Whittemore 4243*, MO) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4374*, MO) SCla (*Whittemore 4302*, MO) SCz (*Whittemore 4444*, MO) Stanis (*Whittemore 6564*, CAS)

Dicranaceae

Key to genera

1. Alar cells well differentiated, usually inflated.
    2. Costa 0.3-0.7 of leaf width; leaves sometimes with hyaline hair points. *Campylopus*
    2. Costa narrower; leaves not ending in hair points. *Dicranum*
1. Alar cells not differentiated; leaves not ending in hair points.
    3. Leaves erect when dry; leaf apex very narrowly acuminate or subulate.
        4. Capsule operculate, exserted on a long seta. *Dicranella*
        4 Capsule indehiscent, emergent or scarcely exserted on a short seta. *Bruchia*
    3. Leaves contorted when dry; leaf apex acute or more broadly acuminate.
        5. Leaf apex obtuse or acute, cells ± mamillose. *Dichodontium*
        5. Leaf apex narrowly acuminate, cells plane, sometimes with cuticular papillae.
            6 Leaves entire. Capsule exserted far beyond tips of leaves. *Dicranoweisia*
            6. Leaves toothed, at least near apex. Capsule emergent from leaves. *Amphidium*

Amphidium californicum (Hampe ex C. Müll.) Broth. [*Zygodon californicus* Hampe ex C. Müll.] Shaded soil and rocks in mixed evergreen forest. Lesquereux (1868), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) Mar (Lesquereux 1868, Yurky 1995) SM (*Whittemore 4381*, atw) SCz (Kellman 2003)

Bruchia flexuosa (Schwaegr.) C. Müll. Moist soil in grassland. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Campylopus*

1. Leaves with a prominent hyaline hair point. *C. introflexus* (Hedw.) Brid.
1. Leaves with no hair point.
    2. Leaf base ovate or lance-ovate, margins toothed distally, usually for almost half the leaf length but sometimes less; costa usually with a few dorsal stereids. *C. pyriformis* (F.

Schultz.) Brid.
2. Leaf base oblong, margins entire or with a few weak teeth at the apex; costa without stereids. *C. subulatus* Schimp. in Rabenh.

Campylopus introflexus (Hedw.) Brid. Shaded soil near coast. O'Brien (1999), Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: Mar (O'Brien 1999, Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Bourell 7000*, CAS)

Campylopus pyriformis (F. Schultz.) Brid. Soil in a lawn. Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004)

Campylopus subulatus Schimp. in Rabenh. Soil and bases of trees. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Dichodontium pellucidum (Hedw.) Schimp. On rocks in streams where frequently submerged, redwood forest. Thompson and Ketchledge (1958), Kellman (2003).
Distribution: SM (*Whittemore 4142B*, MO) SCz (*Whittemore 4032*, atw)

Key to species of *Dicranella*

1. Capsule without stomata; seta yellow, sometimes becoming red-brown with age.
   2. Leaf base rather abruptly contracted to a very slender subula, costa excurrent. *D. heteromalla* (Hedw.) Schimp.
   2. Leaf base gradually tapering, apex not subulate, costa percurrent. *D. hilariana* (Mont.) Mitt.
1. Capsule with stomata; seta red.
   3. Costa poorly defined, ca 0.3 of leaf width; leaf blade bistratose distally, margin plane or recurved proximally; walls of exothecial cells slightly sinuose, uniformly thickened. *D. howei* Ren. & Card.
   3. Costa well defined, ca 0.2 of leaf width; leaf blade unistratose, margin recurved for most of leaf length; walls of exothecial cells straight, longitudinal walls much thicker than cross walls. *D. varia* (Hedw.) Schimp.

Dicranella heteromalla (Hedw.) Schimp. On soil and crevices in rock outcrops, in mesic forest. Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: Watson (1880) and Howe (1897) report this from Redwood City (San Mateo Co.); what is apparently the same collection was cited by Lesquereux (1868) as Big River City (probably Mendocino County). The habitat (bog in redwoods) is plausible for the latter but not the former.
Distribution: Mar (Yurky 1995, Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (*Whittemore 6782*, CAS)

Dicranella hilariana (Mont.) Mitt. xxx. Norris and Shevock (2004).
Distribution: SCz (Norris and Shevock 2004)

Dicranella howei Ren. & Card. Beaten soil beside paths, wet sandstone, or steep banks. Howe (1896), Crundwell and Nyholm (1977), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Koch 1315*, MO) Napa (Howe 1896) Mar (*Branscomb 22782*, MO) Ala (*Blasdale 21469*, MO) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 5267*, MO) SCla (*Whittemore 6749*, CAS) SCz (Kellman 2003, Norris and Shevock 2004)

Dicranella varia (Hedw.) Schimp. [*Anisothecium varium* (Hedw.) Mitt.] Disturbed soil. Lesquereux (1868), Koch and Ikenberry (1954), Steere et al. (1954), Yurky (1995).

Note: All of the reports except Shevock and Toren (2001) are surely based on specimens of *D. howei*, which was seldom separated from *D. varia* until recently. The report in Shevock and Toren (2001) is referrable to *D. howei* according to Norris and Shevock (2004).
Distribution: Mar (Koch and Ikenberry 1954, Yurky 1995) SCla (Steere et al. 1954)

Dicranoweisia cirrata (Hedw.) Lindb. ex Milde On decaying (often charred) wood or sometimes on bark (reported from rock by Shevock and Toren 2001), evergreen forests. Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4411*, MO) SCla (*Whittemore 6137A*, tbd) SCz (*Whittemore 1134*, DAV)

Key to species of *Dicranum*

1. Leaves straight, tips usually broken off; costa without stereids; capsule straight. *D. tauricum* Sapeh.
1. Leaves curved and secund, tips not fragile; costa with two stereid bands; capsule curved.
    2. Upper leaf cells rectangular, usually pitted; back of costa with 2--4 lamellae.
        3. xxx; inner perichaetial bracts abruptly acuminate. *D. scoparium* Hedw.
        3. xxx; inner perichaetial bracts gradually acuminate. *D. howellii* Ren. & Card.
    2. Upper leaf cells quadrate or short-rectangular, not pitted; costa without lamellae.
        4. Leaves distally keeled, blade undulate. *D. undulatum* Schrad. ex Brid.
        4. Leaves distally concave, blade not undulate.
            5. Lower leaf cells elongate; leaf usually smooth dorsally; costa relatively weak, in section with 2-3 stereids per bundle. *D. fuscescens* Turn.
            5. Subquadrate cells extending almost to leaf base; leaf papillose dorsally; costa relatively strong, in section with 4-5 stereids per bundle. *D. sulcatum* Kindb.

Dicranum fuscescens Turn. Tree trunks. Koch (1950), Peterson (1979), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: *Dicranum sulcatum* has usually been considered a synonym of *D. fuscescens*, and Peterson's (1979) resurrection of it has never been published, so some reports of *D. fuscescens* from the Bay Area may be based on specimens of *D. sulcatum*.
Distribution: Mar (Peterson 1979, Yurky 1995) SF (Shevock and Toren 2001) SM (Koch 1950, 1951) SCz (Kellman 2003, Norris and Shevock 2004)

Dicranum howellii Ren. & Card. Soil and leaf litter. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Dicranum scoparium Hedw. xxx. Koch (1950), Peterson (1979), Yurky (1995).
Distribution: Mar (Yurky 1995) Ala (Koch 1950)

Dicranum sulcatum Kindb. Damp decaying wood. Peterson (1979), Norris and Shevock (2004).
Distribution: Mar (Norris and Shevock 2004) SM (*Whittemore 1103A*, MO)

Dicranum tauricum Sapeh. [*D. strictum* Schleich. *nom. illegit.*, *Orthodicranum strictum* Culmann, *Orthodicranum tauricum* (Sapehin) Smirnova] On decaying wood in redwood forest. Koch (1950), Thompson and Ketchledge (1958), Peterson (1979), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995, Norris and Shevock 2004) SF (Shevock and Toren 2001) SM (*Whittemore 4454*, MO) SCz (*Whittemore 6780*, CAS)

Dicranum undulatum Schrad. ex Brid. xxx. Norris and Shevock (2004).
Distribution: Ala (Norris and Shevock 2004)

Fissidentaceae

Key to species of *Fissidens*

1. Leaves not bordered by elongate cells.
   2. Lamina multistratose. *F. grandifrons* Brid.
   2. Lamina unistratose.
      3. Aquatic; stem to 70 mm long; leaves entire. *F. fontanus* (B. Pyl.) Steud.
      3. Terrestrial; stem 1-20 mm long; leaves crenate or serrate.
         4. Leaves coarsely and irregularly serrate near apex; stem 10-20 mm long. *F. dubius* P. Beauv.
         4. Leaves evenly crenate; stem 1-8 mm long.
            5. Leaves lanceolate, acuminate; laminal cells irregular in shape; sterile stems at least twice as long as fertile stems. *F. taylori* C. Müll.
            5. Leaves oblong, apex obtuse or acute and apiculate; laminal cells regularly hexagonal; sterile stems not much larger than fertile stems.
               5'. Costa percurrent or excurrent; stem 4-8 mm long, usually with 20 or more leaves. *F. taxifolius* Hedw.
               5. Costa ending well below the apex; stem 1-3 mm long, with fewer than ten leaves. *F. pauperculus* Howe

1. Leaves bordered by elongate cells.
   6. Shoots 10-25 mm long; lamina often with bistratose streaks; seta 1-3 mm long. *F. ventricosus* Lesq.
   6. Shoots 1-8 mm long; lamina unistratose; seta 3-8 mm long.
      7. Leaves lanceolate, acuminate; laminal cells irregular in shape; sterile stems at least twice as long as fertile stems.
         8. Border of leaf strong, usually confluent with tip of costa. *F. curvatus* Hornsch.
         8. Border of leaf weak or absent, ending far below tip of costa. *F. taylori* C. Müll.
      7. Leaves lance-oblong, acute or rounded and apiculate; laminal cells regularly hexagonal; sterile stems not much larger than fertile stems.
         9. Leaf cells thick, in cross section about as wide as thick, surfaces not or scarcely bulging; cells of distal blade not in rows. *F. bryoides* Hedw.
         9. Leaf cells thin, in cross section twice as thick as wide, surfaces strongly bulging.
            10. Cells of distal blade not in rows. *F. minutulus* Sull.
            10. Cells of distal blade arranged in transverse and longitudinal rows.
               11. Leaves usually crisped and contorted when dry; dorsal lamina reaching leaf base, sometimes united with stem; costa reaching leaf apex or ending 1-3 cells below it. *F. crispus* Mont.
               11. Leaves plane with incurved tips when dry; dorsal lamina ending well above leaf base; costa always ending 2-5 cells below leaf apex. *F. sublimbatus* Grout

Fissidens bryoides Hedw. Wet soil and rocks. Yurky (1995), Kellman (2003).
Note: Yurky evidently considered *F. crispus* a synonym of this species; his record should be checked.
Distribution: Mar (Yurky 1995) SCz (Kellman 2003)

Fissidens bryoides Hedw. var. *viridulus* (Sw.) Broth. [*F. bryoides* var. *longifolius* (Brid.) Hampe, *F. viridulus* Sw.] Clayey soil in gardens. Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004)

Fissidens crispus Mont. [*F. limbatus* Sull.] On deeply shaded to rather open mineral soil, mostly canyonbottoms and lower slopes; common in many communities. Lesquereux (1868), Koch and Ikenberry (1954), Steere et al. (1954), Yurky (1995), Pursell (1997), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6689*, CAS) Marin (Koch and Ikenberry 1954) SF (Lesquereux 1868, Shevock and Toren 2001, Norris and Shevock 2004) CC (*Whittemore 6793*,

CAS) Ala (*Whittemore 4224*, MO) SM (*Whittemore 4287*, MO) SCla (*Whittemore 4258*, CAS) SCz (*Whittemore 4424*, MO) Stanis (*Whittemore 6575*, CAS)

Fissidens curvatus Hornsch. [*F. milobakeri* L. F. Koch] On sunny mineral soil, usually in disturbed places; live oak forest, sage scrub; now abundant but never collected prior to 1940, thus probably introduced from the tropics. Koch (1951), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004), Pursell (2006).
Distribution: Mar (Yurky 1995) Ala (*Whittemore 4255*, MO) CC (Pursell 2006) SF (Shevock and Toren 2001, Norris and Shevock 2004, Pursell 2006) SM (*Whittemore 4464*, MO) SCla (*Whittemore 5462*, CAS) SCz (Kellman 2003, Pursell 2006) Son (Pursell 2006) Stanis (*Whittemore 6576*, CAS)

Fissidens dubius P. Beauv. [*F. cristatus* Wils. ex Mitt.] xxx. Norris and Shevock (2004).
Distribution: SF (Norris and Shevock 2004)

Fissidens fontanus (B.-Pyl.) Steud. [*Octodiceras fontanum* (B.-Pyl.) Lindb.] Submerged. Koch (1950), Pursell (1987), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Napa (Koch 1950, Pursell 1987, Norris and Shevock 2004) Mar (Yurky 1995, Norris and Shevock 2004) SCz (Kellman 2003)

Fissidens grandifrons Brid. Wet rocks around streams and waterfalls. Howe (1896), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Howe 1896, Yurky 1995, Norris and Shevock 2004) SCz (Kellman 2003)

Fissidens minutulus Sull. Clayey soil in gardens. Shevock and Toren (2001), Norris and Shevock (2004).
Note: An uncertain report, the single specimen determined as "*Fissidens cf. minutulus*" by Pursell.
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004)

Fissidens pauperculus Howe Damp shaded soil in redwood forest. Koch (1950), Steere et al. (1954), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Koch 1950, Steere et al. 1954, Yurky 1995, Norris and Shevock 2004) SM (*Whittemore 4146B*, atw) SCz (Koch 1950, Kellman 2003, Norris and Shevock 2004)

Fissidens sublimbatus Grout Shaded clayey soil. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003)

Fissidens taxifolius Hedw. xxx. Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004)

Fissidens taylori C. Müll. Wet soil. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Fissidens ventricosus Lesq. [*F. rufulus* auct., not Br. & Schimp. in B. S. G.] On rocks in streams where frequently submerged, redwood forest. Thompson and Ketchledge (1958), Ireland and Schofield (1967), Kellman (2003), Norris and Shevock (2004).
Distribution: Ala (Norris and Shevock 2004) SM (*Whittemore 1108*, atw) SCz (Koch 1950, Thompson and Ketchledge 1958, Ireland and Schofield 1967, Kellman 2003, Norris and Shevock 2004)

Pottiaceae

Key to genera

1. Gametophyte, even at maturity, consisting mainly of protonema, the minute gametophores remain permanently attached to it. *Ephemerum*
1. Protonema short-lived, mature plants consisting only of leafy stems, without protonema.
    2. Leaf bistratose, tubular-incurved and very shiny when dry, cells mamillose adaxially but not papillose. *Timmiella* (Timmiellaceae)
    2. Leaf unistratose (at least in part), not tubular-incurved, not so shiny, cells smooth or papillose.
        3. Leaves linear to lanceolate, xxx as long as broad, costa usually with two stereid bands.

4. Leaf margins erect or incurved.
    5. Leaf margins strongly incurved for most of leaf length; blade linear-lanceolate from an oblong base. *Weissia*
    5. Leaf margins erect, or narrowly incurved near apex; blade ligulate or spatulate. *Trichostomum sweetii*
4. Leaf margins plane or recurved.
    6. Leaves clearly 3-ranked. *Triquetrella*
    6. Leaves not clearly ranked.
        7. Leaf margins plane.
            8. Leaf margins toothed below middle. *Eucladium*
            8. Leaf margins entire.
                9. Basal cells of leaf very thin-walled and ± inflated, much wider and thinner-walled than distal cells; marginal cells bistratose. *Didymodon australasiae*
                9. Basal cells of leaf firm-walled, usually not much wider and thinner-walled than distal cells; all cells unistratose. *Gymnostomum*
        7. Leaf margins recurved or revolute, at least below.
            10. Leaf margins spirally revolute (at least 1 1/2 turns) for their whole length. *Pseudocrossidium*
            10. Leaf margins recurved for some or all of their length.
                11. Leaf apex rounded or obtuse. *Barbula*
                11. Leaf apex acute or acuminate. *Didymodon*

3. Leaves broadly ovate to lingulate or spatulate, xxx as long as broad, costa almost always with only one stereid band.
    12. Inner surface of leaf covered with filaments.
        13. Leaf margins broadly infolded over filaments. *Aloina*
        13. Leaf margins erect or narrowly reflexed. *Crossidium*
    12. Leaf without filaments.
        14. Leaf margins thickened, lamina papillose but several rows of marginal cells smooth, enlarged and thick-walled but not elongate; plants of calcareous seeps. *Crumia*
        14. Leaf margin either not differentiated or not as above: either of strongly elongate cells or of thick-walled cells that are not enlarged and do not differe from laminal cells in papillosity; plants of dry habitats.
            15. Gametophores small or large, stems a few mm to several cm in length; costa often brown or reddish, at least in part; dorsal stereid band crescentic or semicircular in cross section, not covered by a differentiated epidermis. *Syntrichia*
            15. Gametophores small, stems only a few mm in length; costa green; dorsal stereid band elliptical or semicircular in cross section, often covered by a differentiated epidermis.
                16. Leaf with a strongly differentiated border of thick-walled, usually elongate cells.
                    17. Leaf apex sharply serrate; peristome none. *Hennediella*
                    17. Leaf apex obscurely serrulate or with one or two large teeth near apex; peristome well developed. *Tortula subulata* Hedw.
                16. Leaf not bordered.
                    18. Leaf cells smooth; leaf margins plane; stereids of costa very poorly differentiated or absent.
                        19. Gametophores xxx mm high, almost stemless; leaves deeply concave, almost as wide as long, very broadly ovate or elliptical. Capsules immersed, cleistocarpous. *Acaulon*

19. Gametophores xxx mm high, stem evident; leaves plane or keeled, much longer than wide, oblong or oblong-ovate. Capsules unknown (our species). *Leptophascum*

18. Leaf cells papillose.
    20. xxx; peristome teeth (if present) 32, filiform, straight or twisted. *Tortula*
    20. xxx; peristome teeth (if present) 16, lanceolate, straight. *Microbryum*

Key to cleistocarpus taxa:

1. Gametophyte, even at maturity, consisting mainly of protonema, with the minute gametophores remaining permanently attached to it. *Ephemerum*
1. Protonema short-lived, mature plants consisting only of leafy stems, without protonema.
    2. Leaves deeply concave, almost as wide as long, very broadly ovate or elliptical, margins plane, cells smooth. *Acaulon*
    2. Leaves not so concave, longer than wide, ovate, margins recurved, cells papillose. *Tortula acaulon* (L. ex With.) Zand.

Acaulon muticum (Hedw.) C. Müll. [*Sphaerangium muticum* (Hedw.) Schimp.] Grasslands and roadsides. Lesquereux (1868), Howe (1896), Koch (1950), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: This material is probably all referrable to var. *rufescens* (Jaeg.) Crum.
Distribution: Mar (Howe 1896, Koch 1950) Ala (Norris and Shevock 2004) SF (*Bolander, Sullivant & Lesquereux's Musci Boreali-Americani 32*, MO) SCz (Kellman 2003)

Key to species of *Aloina*

1. Leaf piliferous. *A. bifrons* (DeNot.) Delgadillo
1. Leaf muticous.
    2. Marginal cells of leaf base undifferentiated, firm- or thick-walled, green, mostly quadrate. *A. aloides* (J. Koch ex Schultz) Kindb. var. *ambigua* (Bruch & Schimp. in B.S.G.) Craig in Grout
    2. Marginal cells of leaf base well-differentiated, thin-walled, hyaline, often elongate. *A. rigida* (Hedw.) Limpr.

Aloina aloides (J. Koch ex Schultz) Kindb. var. *ambigua* (Bruch & Schimp. in B.S.G.) Craig in Grout [*Aloina ambigua* (Bruch & Schimp. in B.S.G.) Limpr.] On disturbed soil. Steere et al. (1954), Delgadillo (1975), Kellman (2003), Norris and Shevock (2004).
Note: The spelling "*ambiguua*" in Steere et al. (1954) is incorrect.
Distribution: CC (Norris and Shevock 2004) SCla (Steere et al. 1954) SCz (Kellman 2003)

Aloina bifrons (DeNot.) Delgadillo Sandy soil. Delgadillo (1975).
Distribution: Mapped for the Bay Area (Delgadillo, 1975)

Aloina rigida (Hedw.) Limpr. Sandstone outcrop in chaparral. Koch (1950), Kellman (2003), Norris and Shevock (2004).
Note: Delgadillo (1975) does not include California in the range of this species.
Distribution: Napa (Koch 1950) SCla (Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004).

Key to species of *Barbula*

1. Leaf margin plane or recurved only near leaf base, costa excurrent as a small apiculus or not at all; seta yellowish. *B. convoluta* Hedw.
1. Leaf margin recurved almost to leaf apex, costa excurrent as a stout mucro; seta dark red or purple. *B. unguiculata* Hedw.

Barbula convoluta Hedw. On disturbed soil. Lesquereux (1868), Koch (1950), Steere et al. (1954), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Ala (Lesquereux 1868) SF (Lesquereux 1868, Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4056*, MO) SCz (Kellman 2003)

Barbula unguiculata Hedw. On disturbed soil. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003)

Key to species of *Crossidium*

1. Terminal cells of filaments globose or nearly so, their papillae hollow. Upper leaf cells usually bulging and papillose, sometimes smooth. Perichaetial leaves often differentiated, spatulate. *C. aberrans* Holz. & Bartr.
1. Terminal cells of filaments globose to cylindrical, their papillae solid. Upper leaf cells smooth. Perichaetial leaves never differentiated. *C. squamiferum* (Viv.) Jur.

Crossidium aberrans Holz. & Bartr. On sandstone. Kellman (2003).
Distribution: SCz (Kellman 2003)

Crossidium squamiferum (Viv.) Jur. On sandstone. Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004) SCz (Kellman 2003)

Crumia latifolia (Kindb. ex Mac.) Schof. [*Merceya latifolia* Kindb. in Mac.] Shady calcareous seeps. Thompson and Ketchledge (1958), Schofield (1966), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: La Honda, listed as Santa Clara County by Schofield (1966), is actually in San Mateo County, and is so cited below.
Distribution: Mar (Schofield 1966, Yurky 1995) CC (Schofield 1966) SF (Shevock and Toren 2001) SM (Thompson and Ketchledge 1958, Schofield 1966) SCla (*Whittemore 5110*, CAS) SCz (Kellman 2003)

Key to species of *Didymodon*

1. Cells on inner surface of costa elongate.
    2. Leaves ovate to long-elliptic, often obtuse. *D. tophaceus* (Brid.) Lisa
    2. Leaves lanceolate, always acute. *D. fallax* (Hedw.) Zand.
1. Cells on inner surface of costa quadrate (except in basal 0.2-0.3 of leaf).
    2'. Costa laterally spurred; leaves ovate, rounded-obtuse. *D. revolutus* (Card.) Williams
    2'. Costa not spurred; leaves triangular-ovate to long-lanceolate, narrowly obtuse to acuminate.
        3. Costa with a broad, shallow adaxial channel, or leaf merely concave; leaf apex seldom apiculate by a smooth, conical cell; leaf margin plane or recurved.
            4. Basal cells (at least in middle of leaf base) with thin walls; plants deep green or black when dry; costa 2-6 cells wide at midleaf.
                5. Leaves short-lanceolate, cells on ventral surface of costa quadrate; marginal cells at leaf base not or scarcely differentiated from interior cells; hyalodermis of stem absent or poorly developed. *D. australasiae* (Hook. & Grev.) Zand.
                5. Leaves long-lanceolate, cells on ventral surface of costa usualluy elongate; 2-4 rows of marginal cells at leaf base narrowly rectangular, clearly differentiated from interior cells; stem with a well marked hyalodermis. *D. umbrosus* (C. Müll.) Zand.
            4. Basal cells with thick, or at least firm, walls.
                5'. Leaf margins finely crenulate by projecting cells; costa 6-10 cells wide at midleaf; plants red-brown when dry. *D. norrisii* Zand.
                5'. Leaf margins entire; costa 2-4 cells wide at midleaf; plants green or blackish

green when dry.
5'. Margins unistratose or with bistratose patches. *D. acutus* (Brid.) Saito
5'. Upper leaf margins uniformly bistratose. *D. rigidulus* Hedw.

3. Costa with a deep, narrow adaxial channel, at least distally; leaf apex usually apiculate by a smooth, conical cell; leaf margins always recurved, at least proximally; costa 5-6 cells wide at midleaf [*D. nicholsonii* with the costa broadly channeled, the apex often rounded].
6. Leaves broadly triangular or ovate, obtuse or broadly acute; margins revolute nearly to apex. *D. brachyphyllus* (Sull. in Whipple & Ives) Zand.
6. Leaves lanceolate, acuminate; margins various.
7. Margins uniformly bistratose distally; apex broadly acute. *D. nicholsonii* Culm.
7. Margins unistratose or bistratose in patches; apex slenderly acuminate. *D. vinealis* (Brid.) Zand.
8. Leaves contorted when dry; margins often recurved only in proximal half. *D. vinealis* var. *flaccidus* (Bruch & Schimp. in Schimp.) Zand.
8. Leaves straight or curved when dry; margins recurved to above midleaf.
9. Peristome none or rudimentary; cells of operculum in longitudinal rows; cells 10-13 μm wide; usually with basal cells all quadrate. *D. vinealis* var. *rubiginosus* (Mitt.) Zand.
9. Peristome well developed; cells of operculum in helical rows; cells 7-10 μm wide; usually at least some basal cells more than twice as long as wide. *D. vinealis* (Brid.) Zand. var. *vinealis*

Didymodon acutus (Brid.) Saito [*Barbula acuta* (Brid.) Brid., *D. rigidulus* var. *gracilis* (Schleich. ex Hook. & Grev.) Zand.] xxx. Koch (1950).
Note: The specimens need to be rechecked; Koch questioned the determination, and Zander (1981) reported *D. rigidulus* var. *icmadophila* (Schimp. ex C. Muell.) Zand. but not var. *gracilis* for California.
Distribution: SCla (Koch 1950)

Didymodon australasiae (Hook. & Grev.) Zand. [*Trichostomopsis australasiae* (Hook. & Grev.) Robins., *T. brevifolia* Bartr., *T. fayae* Grout] Dry mineral soil of trailbank; also concrete in cities. Shevock and Toren (2001), Norris and Shevock (2004), Jiménez et al. (2005).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) Stanis (*Whittemore 6612*, CAS)

Didymodon brachyphyllus (Sull. in Whipple & Ives) Zand. [*Barbula brachyphylla* Sull. in Whipple & Ives, *B. purpurea* C. Muell., *D. vinealis* var. *brachyphyllus* (Sull. in Whipple & Ives) Zand.] Soil and rock. Watson (1880) Koch (1950), Steere et al. (1954), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Sol (Watson 1880, Koch 1950, Zander & Ochyra 2001) Mar (Yurky 1995, Norris and Shevock 2004) CC (Norris and Shevock 2004) Ala (Watson 1880) SCla (Steere et al. 1954) SCz (Zander & Ochyra 2001, Kellman 2003)

Didymodon fallax (Hedw.) Zand. xxx. Norris and Shevock (2004).
Distribution: Ala (Norris and Shevock 2004) SCla (Norris and Shevock 2004)

Didymodon nicholsonii Culm. [*D. vinealis* var. *nicholsonii* (Culm.) Zand.] Shaded rocks in beds of fast-moving streams, where innundated at high water; also reported from urban brick walls by Shevock and Toren (2001). Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) Ala (*Whittemore 5452*, CAS) SF (Shevock and Toren 2001) SCla (*Whittemore 6621*, CAS) SCz (Kellman 2003, Norris and Shevock 2004)

Didymodon norrisii Zand. Seasonally wet rock, full sun. Kellman (2003), Norris and Shevock (2004).

Distribution: CC (Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Didymodon revolutus (Card.) Williams [*Husnotiella revoluta* Card.] Sunny rocks in an intermittent creek. Koch (1950), Koch and Ikenberry (1954), Norris and Shevock (2004).
Distribution: Son (Koch 1950, Norris and Shevock 2004) Sol (Koch and Ikenberry 1954) CC (Norris and Shevock 2004) SCla (*Whittemore 6135*, tbd)

Didymodon rigidulus Hedw. Rock, concrete, asphalt. Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: The older determinations need to be checked, since *Didymodon rigidulus* has been confused with *D. vinealis* in the past. Koch (1950) noted that in California material he referred to *D. rigidulus* always lacks propagula, and Zander (1981) did not report *D. rigidulus* s. str. from California.
Distribution: Mar (Yurky 1995, Norris and Shevock 2004) Ala (Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003)

Didymodon tophaceus (Brid.) Lisa [*Desmatodon hendersonii* (Ren. & Card.) Williams] On wet rock or soil, in seepy places (usually or always calcareous) and around waterfalls. Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 801*, atw) Napa (Norris and Shevock 2004) Mar (Yurky 1995) SF (Shevock and Toren 2001) SM (*Whittemore 4055*, MO) SCla (Steere et al. 1954, Norris and Shevock 2004) SCz (Kellman 2003) Stanis (*Whittemore 6606*, CAS)

Didymodon umbrosus (C. Müll.) Zand. [*D. australasiae* var. *umbrosus* (C. Müll.) Zand., *Trichostomtopsis umbrosus* (C. Müll.) H. Robins.] Compacted soil over concrete and asphalt. Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004)

Didymodon vinealis (Brid.) Zand. var. *vinealis* [*Barbula artocarpa* Lesq., *B. semitorta* Sulliv., *B. vinealis* Brid., *B. virescens* Lesq.] On mineral soil or rock, sun or open shade, many communities. Lesquereux (1868), Watson (1880), Koch and Ikenberry (1954), Steere et al. (1954), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003).
Note: The report of *Barbula fallax* Hedw. in Lesquereux (1868) is probably misidentified *D. vinealis* (Koch 1950).
Distribution: Mar (Yurky 1995) Sol (Watson 1880) CC (*Whittemore 6808*, CAS) Ala (*Whittemore 4225*, MO) SF (Shevock and Toren 2001) SM (*Whittemore 4412*, MO) SCla (*Whittemore 5307*, MO) SCz (*Whittemore 4426*, MO)

Didymodon vinealis var. *flaccidus* (Bruch & Schimp. in Schimp.) Zand. [*Barbula cylindrica* (MacKay) Schimp. in Ruthe, *B. flexifolia* Hampe, *B. subfallax* C. Muell., *D. insulanus* (DeNot.) M. Hill] On mineral soil or rock, shaded evergreen or semievergreen forests. Lesquereux (1868), Vaarama (1953), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6674*, CAS) Mar (Yurky 1995) CC (*Whittemore 6798*, CAS) Ala (*Whittemore 5428B*, CAS) SF (Lesquereux 1868, Shevock and Toren 2001) SM (*Whittemore 4292*, CAS) SCla (*Whittemore 5107*, CAS) SCz (*Whittemore 4035*, MO) Stanis (*Whittemore 6563*, CAS)

Didymodon vinealis var. *rubiginosus* (Mitt.) Zand. [*Barbula rubiginosa* Mitt., *D. occidentalis* Zand.] xxx. Norris and Shevock (2004).
Note: There are several older names at the species level which have not been transferred to *Didymodon*. According to Zander (1998), none of the gametophytic characters is sufficient to distinguish *D. occidentalis* from *D. vinealis*, and they can be distinguished only when capsules are present.
Distribution: Son (*Whittemore 674*, atw) CC (Norris and Shevock 2004) SM (*Whittemore 4286*, atw) SCla (*Whittemore 4207*, MO)

Ephemerum serratum (Hedw.) Hampe [*E. minutissimum* Lindb.] Bare patches of soil in fields.

Lesquereux (1868), Koch (1950), Crum (1957), Bryan and Anderson (1957), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Bryan and Anderson 1957) SF (Lesquereux 1868, Koch 1950, Bryan and Anderson 1957, Shevock and Toren 2001, Norris and Shevock 2004) SCla (Crum 1957, Bryan and Anderson 1957) SCz (Crum 1957, Bryan and Anderson 1957, Kellman 2003, Norris and Shevock 2004)

Eucladium verticillatum (With.) Bruch & Schimp. in B.S.G. On soil or rock, in seeps or near streams, calcareous areas. Howe (1897), Thompson and Ketchledge (1958), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) CC (Howe 1897) SCla (*Whittemore 5115*, CAS) SCz (*Whittemore 3495*, atw)

Gymnostomum aeruginosum Sm. [*G. calcareum* Nees, Hornsch. & Sturm] Shaded soil or limestone. Lesquereux (1868), Thompson and Ketchledge (1958), Zander (1977), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: Zander (1977) reports this species from Santa Clara County, but the locality (Fall Creek) is in Santa Cruz County (see note under *Orthotrichum cupulatum*).
Distribution: Son (Norris and Shevock 2004) SF (Shevock and Toren 2001) SM (Thompson and Ketchledge 1958) SCla (*Whittemore 5100*, CAS) SCz (Zander 1977, Kellman 2003)

Key to species of *Hennediella*
1. Elongate cells of leaf border multistratose, extending almost to apex. *H. stanfordensis* (Steere) Blockeel
1. Elongate cells of leaf border unistratose, ending well below apex. *H. heimii* (Hedw.) Zand.

Hennediella heimii (Hedw.) Zand. [*Pottia heimii* (Hedw.) Hampe] Exposed soil. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Hennediella stanfordensis (Steere) Blockeel [*Tortula stanfordensis* Steere] Mineral soil, often in disturbed places, grassland or woodland. Koch and Ikenberry (1954). Steere (1951), Crum (1957), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) Ala (*Whittemore 4249*, MO) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 3394A*, CAS) SCla (Steere 1951) SCz (Kellman 2003, Norris and Shevock 2004)

Leptophascum leptophyllum (C. Müll.) Guerra & Cano [*Chenia leptophylla* (C. Müll.) Zand., *Tortula rhizophylla* (Sak.) Iwats. & Saito, *Tortula vectensis* Warb. & Crundw.] On exposed soil. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Microbryum*
1. Costa excurrent as an awn 250-750 μm long; capsule cleistocarpus. See *Tortula protobryoides*
1. Costa percurrent or short-excurrent; capsule with a functional operculum and annulus.
    2. Spores coarsely tuberculate. *M. starckeanum* (Hedw.) Zand.
        3. Peristome well developed; costa excurrent as a strong mucro or short awn. *M. starckeanum* var. *starckeanum*
        3. Peristome absent or rudimentary; costa barely excurrent as a short mucro. *M. starckeanum* var. *brachyodus* (B. S. G.) Zand.

2. Spores echinate. *M. davallianum* (Sm. in Drake) Zand.
    4. Capsule turbinate, widest at mouth, usually with 1 row of unthickened cells below mouth; peristome absent. *M. davallianum* var. *davallianum*
    4. Capsule ellipsoid to obovoid, widest below mouth, usually with 1-3 rows of unthickened cells below mouth.
        5. Peristome absent or rudimentary. *M. davallianum* var. *conicum* (Schleich. ex Schwaegr.) Zand.
        5. Peristome well developed. *M. davallianum* var. *commutatum* (Limpr.) Zand.

Microbryum davallianum (Sm. in Drake) Zand [*Pottia davalliana* (Sm. in Drake) C. Jens.] On disturbed soil or rock, grassland or open woodland. Steere et al. (1954), Kellman (2003), Norris and Shevock (2004).
Distribution: Ala (*Whittemore 5454*, CAS) SCla (*Whittemore 6153*, tbd) SCz (Kellman 2003, Norris and Shevock 2004)

Microbryum davallianum var. *commutatum* (Limpr.) Zand. [*Pottia davalliana* ssp. *commutata* (Limpr.) Podpéra]

Microbryum davallianum var. *conicum* (Schleich. ex Schwaegr.) Zand. [*Pottia davalliana* var. *conica* (Schleich. ex Schwaegr.) Podpéra]

Microbryum starckeanum (Hedw.) Zand. var. *starckeanum* [*Pottia starckeana* (Hedw.) C. Müll. var. *starckeana*; *Pottia arizonica* Wareh. var. *arizonica*] Dry mineral soil, open places in woodland and shrubland. Lesquereux (1868), Howe (1896), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: The epithet is sometimes spelled "*starkeana*"; the spelling "*starckeana*" is the original.
Distribution: SF (Lesquereux 1868, Shevock and Toren 2001) SM (*Whittemore 5345*, CAS) Ala (*Whittemore 4254A*, CAS) SCz (Kellman 2003) Stanis (*Whittemore 6559*, CAS)

Microbryum starckeanum (Hedw.) Zand. var. *brachyodus* (B. S. G.) Zand. [*Pottia starckeana* (Hedw.) C. Müll. var. *brachyodus* (B. S. G.) C. Muell.; *Pottia arizonica* var. *mucronulata* Wareh.] On soil in a garden. Crum (1957).
Distribution: SCla (Crum 1957)

Pseudocrossidium obtusatulum (Lindb.) Crum & Anderson [*P. revolutum* (Brid. in Schrad.) Zand. var. *obtusatulum* (Lindb.) Tan, Zand. & T. Tayl.] Stony mineral soil in disturbed areas. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4216*, CAS) SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Syntrichia*

1. Leaf margins incurved or involute; leaf-bourne gemmae usually present; leaf apex acute and piliferous. *S. papillosa* (Wils. in Spruce) Jur.
1. Leaf margins plane or recurved; leaf-bourne gemmae absent (except in *S. latifolia*, with broadly rounded muticous leaves; see also comments under *S. laevipila*).
    2. Several rows of cells near leaf margin thick-walled, often yellow or red; leaves muticous. [see also *Crumia latifolia* (Kindb. ex Mac.) Schof., plants of calcareous seeps with lamina papillose but several rows of marginal cells smooth, enlarged and thick-walled]
        3. Leaf cells smooth or nearly so. *S. amplexa* (Lesq.) Zand.
        3. Leaf cells densely papillose. *S. bolanderi* (Lesq. & James) Zand.
    2. Not as above: leaf either unbordered, or piliferous (usually both).
        4. Distal leaves modified as propagula. *S. pagorum* (Milde) Amann
        4. Distal leaves not modified.
            5. Leaves spatulate, upper part much broader than base, muticous or the uppermost with very short hair points; gemmae usually produced on leaves. *S. latifolia* (Bruch ex Hartm.) Hueb.

5. Leaves ligulate, upper part not much broader than base, all with long hair points; gemmae very rarely produced on leaves.
    6. Leaf margins plane throughout. *S. bartramii* (Steere in Grout) Zand.
    6. Leaf margins recurved, at least near midleaf.
        7. Central strand of stem absent; costa without hydroids; basal leaf cells 11-23 μm wide.
            8. Outer surfaces of leaf cells plane or nearly so, each with several O- or C-shaped papillae. *S. ruralis* (Hedw.) Web. & Mohr
            8. Each outer surface of each leaf cell bulging outward as an attenuate-conical protrusion almost as high as the thickness of the cell, crowned with a single (2-)4-6-branched papilla. *S. papillosissima* (Copp.) Loeske
        7. Central strand of stem present; costa with hydroids; basal leaf cells 16-30(-40) μm wide.
            9. Leaf margins recurved only near midleaf (at least on one side of leaf); spines of hair point often low; cells 9.5--21 μm; many leaves truncate or emarginate; usually on bark, sometimes rock. *S. laevipila* Brid.
                10. xxx. var. *laevipila*
                10. xxx. var. *meridionalis* (Schimp.) Jur.
            9. Leaf margins recurved in lower 1/2 or more of leaf; spines of hair point usually high; usually on soil or rock, sometimes bases of trees.
                11. Margins revolute 3/4 or more of leaf length; cells 13-23 μm; most leaf apices truncate or emarginate; usually autoecious. *S. obtusissima* (C. Müll.) Zand.
                11. Margins revolute 1/2 -3/4 of leaf length; cells 8-17 μm; leaf apices acute or sometimes truncate; dioecious or synoecious.
                    12. Dioecious; cells 8-10 μm. *S. intermedia* Brid.
                    12. Usually synoecious; cells 9.5-17 μm. *S. princeps* (De Not.) Mitt.

Syntrichia amplexa (Lesq.) Zand. [*Tortula amplexa* (Lesq.) Steere] On soil. Koch and Ikenberry (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) Mar (Koch and Ikenberry 1954, Yurky 1995, Norris and Shevock 2004) Ala (Koch and Ikenberry 1954) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Syntrichia bartramii (Steere in Grout) Zand. [*Tortula bartramii* Steere in Grout] On soil. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Syntrichia bolanderi (Lesq. & James) Zand. [*Barbula bolanderi* Lesq., *Tortula bolanderi* (Lesq.) Howe] Bare mineral soil, usually on banks, live oak forest. Lesquereux (1868), Howe (1896), Koch and Ikenberry (1954), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) Mar (Howe 1896, Yurky 1995), Ala (*Whittemore 4226*, MO) SF (Shevock and Toren 2001) SM (*Whittemore 4285*, CAS) SCla (*Whittemore 4321*, CAS) SCz (Kellman 2003, Norris and Shevock 2004) Stanis (*Whittemore 6565*, CAS)

Syntrichia intermedia Brid. [*Tortula intermedia* (Brid.) Berk., *Tortula montana* Lindb.] xxx. Howe (1897), Koch and Ikenberry (1954).
Note: These specimens are probably all misidentified; *S. intermedia* probably does not occur in North America.
Distribution: Ala (Howe 1897, Koch and Ikenberry 1954)

Syntrichia laevipila Brid. [*Tortula laevipila* (Brid.) Schwaegr.] Trunks of broadleaved trees or

rock, deciduous or live oak forest. Vaarama (1953), Koch and Ikenberry (1954), Steere et al. (1954), Thompson and Ketchledge (1958), Kellman (2003), Norris and Shevock (2004).
Note: European material is said to have smooth hair points and a border of smooth, thick-walled cells 0-4 cells wide, but in Bay Area material the hair points are always distinctly spinulose, and the marginal cells are not or scarcely differentiated. A race with leaf-bourne gemmae is common in Davis, Yolo Co., but it has not yet been found in the Bay Area. Kellman (2003) and Norris and Shevock (2004) report *Syntrichia laevipila* var. *meridionalis* (Schimp.) Jur. (=*Tortula laevipila* var. *meridionalis* (Schimp.) Wijk & Marg.) from Santa Cruz Co. This name has been variously used for non-gemmiparous plants with strongly bordered leaves (Barkman 1963) and plants with terminal gemmae similar to those of *S. pagorum* (Lawton 1971).
Distribution: Son (*Whittemore 6670*, CAS) CC (*Whittemore 6806*, CAS) Ala (*Whittemore 4238*, MO) SM (*Whittemore 5229*, MO) SCla (*Whittemore 5301*, MO) SCz (Kellman 2003) Stanis (*Whittemore 6568*, CAS)

Syntrichia latifolia (Bruch ex Hartm.) Hueb. [*Tortula latifolia* Bruch ex Hartm.] Near streams, on bark or rotting wood, occasionally thin soil over rock. Lesquereux (1868), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Lesquereux 1868) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Syntrichia obtusissima (C. Müll.) Zand. [*Tortula obtusissima* (C. Müll.) Mitt.] On rock faces in open shade, open oak woodland.
Distribution: CC (*Whittemore 6961*, tbd) Ala (*Whittemore 5431*, CAS) SCla (*Whittemore 5300*, tbd) Stanis (*Whittemore 6592*, CAS)

Syntrichia pagorum (Milde) Amann [*Tortula pagorum* (Milde) De Not.] Bark of deciduous trees. Koch (1950), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) Ala (Koch 1950, Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Syntrichia papillosa (Wils. in Spruce) Jur. [*Tortula papillosa* Wils. in Spruce] Bark, occasionally concrete. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Ala (Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Syntrichia papillosissima (Copp.) Loeske [*Tortula papillosissima* (Copp.) Broth., *Syntrichia ruralis* var. *hirsuta* (Vent.) Podp.] Sandstone outcrop, open roadbank in oak woodland, inner coast ranges.
Distribution: SCla (*Whittemore 6609*, CAS)

Syntrichia princeps (De Not.) Mitt. [*Tortula princeps* De Not.] Dry rock, bases of trees, sometimes soil or concrete, many communities. Steere et al. (1954), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: Mishler says that *S. princeps* always has the distal part of the costa serrate by projecting cell ends, but this isn't true of all California specimens (see *Janeway 5598*, MO, CHSC).
Distribution: Son (*Whittemore 6676*, CAS) Mar (Yurky 1995) Ala (*Whittemore 5293*, MO) SF (Shevock and Toren 2001) SM (*Whittemore 4406*, MO) SCla (*Whittemore 4256*, CAS) SCz (*Whittemore 4418*, CAS) Stanis (*Whittemore 6570*, CAS)

Syntrichia ruralis (Hedw.) Web. & Mohr [*Tortula ruralis* (Hedw.) Gaertn et al.] Yurky (1995), Shevock and Toren (2001), Norris and Shevock (2004).
Note: Older records need to be checked; *S. ruralis* and *S. princeps* have often been confused.
Distribution: "Throughout California" (Koch 1950) Mar (Yurky 1995) SF (Shevock and Toren 2001) SM (Norris and Shevock 2004)

Key to species of *Tortula*

1. Leaves strongly bordered with elongate cells. *Tortula subulata* Hedw.

1. Leaves not bordered.
    2. Leaves muticous, or the costa excurrent as a short, green or yellowish point.
        3. Costa broadened distally; dry leaves spirally twisted; capsule ellipsoid. *T. atrovirens* (Sm.) Lindb.
        3. Costa not broadened distally; dry leaves incurved or contorted.
            4. Leaf apices obtuse, rounded or apiculate; capsule cylindrical, long-exserted, opening by loss of a well-differentiated operculum. *T. obtusifolia* (Schwawegr.) Math.
            4. Leaf apices obtuse, acute, or acuminate, costa exserted as a short yellowish awn; capsule spherical or ellipsoidal, immersed or short-exserted.
                5. Capsule immersed, spherical or short-ellipsoidal, with no sign of an operculum. *T. acaulon* (L. ex With.) Zand.
                5. Capsule short-exserted, ellipsoidal, generally with a visible operculum.
                    6. Operculum non-functional, spores liberated by decay of the capsule wall; costa excurrent as a green awn 250-750 μm long. *T. protobryoides* Zand.
                    6. Operculum functional, falling to liberate spores; costa percurrent or short-excurrent. see *Microbryum*
    2. Leaves each tipped with a long, hyaline hair point.
        7. Ventral cells of costa enlarged (larger in section than the guide cells), forming a large ventral pad, costa projecting at least as strongly on the ventral side of the leaf as on the dorsal side; leaf less than 2 mm long.
            8. Cells of costal pad ± rectangular; cells of upper lamina 14-16 μm wide; peristome teeth 16, not or weakly twisted. *T. guepinii* (Bruch & Schimp. in B.S.G.) Broth.
            8. Cells of costal pad radially elongate; cells of upper lamina 9-12 μm wide; peristome teeth 32, strongly twisted. *T. brevissima* Schiffn.
        7. Ventral cells of costa not enlarged, no larger in section than the guide cells, not forming a large ventral pad, costa projecting at least as strongly on the dorsal side of the leaf as on the ventral side; leaf 2-3 mm long.
            9. Peristome teeth short, straight, basal membrane very low; hair point of leaf often short, often toothed. *T. plinthobia* (Sull. & Lesq.) Broth.
            9. Peristome teeth long, twisted; hair point of leaf long, straight.
                10. Peristome with a well-developed basal membrane; capsule long-cylindric. *T. brevipes* (Lesq.) Broth.
                10. Peristome without a basal membrane; capsule ellipsoid or short-cylindric. *T. muralis* Hedw.

Tortula acaulon (L. ex With.) Zand. [*Phascum cuspidatum* Hedw., *P. acaulon* L. ex With.] Dry mineral soil in grassland, chaparral and open oak woodland. Howe (1897), Koch (1950), Steere et al. (1954), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Steere et al. 1954) SF (Lesquereux 1868) CC (Norris and Shevock 2004) Ala (*Whittemore 4247*, MO) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 3395*, MO) SCla (*Whittemore 4197*, CAS) SCz (Kellman 2003)

Tortula atrovirens (Sm.) Lindb. [*Desmatodon convolutus* (Brid.) Grout, *Desmatodon californicus* Lesq.] Dry soil of trailbank, open shade, in deciduous scrub. Lesquereux (1868), Koch (1950), Yurky (1995), Shevock and Toren (2001), Kellman (2003).
Distribution: Mar (Yurky 1995) SF (Lesquereux 1868, Shevock and Toren 2001) Ala (Koch 1950) SCla (*Whittemore 6526*, CAS) SCz (Kellman 2003)

Tortula brevipes (Lesq.) Broth. Dry soil or rock in grassland or open woodland. Lesquereux (1868), Steere (1940), Shevock and Toren (2001), Norris and Shevock (2004).
Note: The report of *T. cuneifolia* Roth from Alameda County by Lesquereux (1868) probably belongs here (Steere 1940); Lesquereux's report of *T. vahliana* (Schultz) Dumort. from Contra Costa County may belong here, but Steere doesn't report seeing the Bolander specimen it was based on.

Distribution: SF (Steere 1940, Shevock and Toren 2001) Ala (*Whittemore 5439*, CAS) SCla (*Whittemore 5326*, CAS) SCz (Kellman *in litt*.) Stanis (*Whittemore 6567*, CAS)

Tortula brevissima Schiffn. Dry soil or rock. Kellman (2012).
Distribution: SCz (Kellman 2012)

Tortula guepinii (Bruch & Schimp. in B.S.G.) Broth. [*Desmatodon guepinii* Bruch & Schimp. in B.S.G.] Dry mineral soil in broken sun beneath shrubs. Lesquereux (1868), Koch (1950), Norris and Shevock (2004).
Distribution: CC (*Whittemore 6807*, CAS) Ala (Lesquereux 1868, Koch 1950, Norris and Shevock 2004) SM (*Whittemore 5346*, CAS) SCla (*Whittemore 6761*, CAS) Stanis (*Whittemore 6560*, CAS)

Tortula muralis Hedw. On soil, masonry or concrete, mixed evergreen forest or grassland. Howe (1896), Koch (1950), Vaarama (1953), Koch and Ikenberry (1954), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: The report of *T. marginata* Br. & Schimp. by Lesquereux (1868) belongs here (Koch 1950)
Distribution: Mar (Yurky 1995) CC (Koch and Ikenberry 1954) Ala (*Whittemore 3351*, atw) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 3400*, atw) SCla (*Whittemore 4205*, MO) SCz (Kellman 2003)

Tortula obtusifolia (Schwawegr.) Math. [*Desmatodon obtusifolius* (Schwawegr.) Schimp.] Disturbed soil. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004) SF (Shevock and Toren (2001) SM (*Whittemore 3396*, DAV) SCz (Kellman 2003)

Tortula plinthobia (Sull. & Lesq.) Broth. [*Desmatodon plinthobius* Sull. & Lesq.] Bark. Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren (2001, Norris and Shevock 2004)

Tortula protobryoides Zand. [*Phascum bryoides* Dicks., *Pottia bryoides* (Dicks.) Mitt., *Mildeella bryoides* (Dicks.) Limpr.] xxx. Lesquereux (1868), Howe (1897), Norris and Shevock (2004).
Note: Zander (1993) does not give his reasons for basing a nomen novum on *Pottia bryoides*; other books list several names for this taxon older than his *Tortula protobryoides*.
Distribution: Ala (Lesquereux 1868, Howe 1897, Norris and Shevock 2004)

Tortula subulata Hedw. Mineral soil, often in disturbed places, in woodland. Kellman (2003), Norris and Shevock (2004).
Notes: Manuals state that the leaves of *T. subulata* are often entire, but Bay Area specimens seen are always toothed, with many leaves having one or two large teeth as well as obscure marginal serrulations near the apex. Our material all seems to be referrable to var. *subulata*.
Distribution: SM (*Whittemore 3393*, DAV) SCla (*Whittemore 6664*, CAS) SCz (Kellman 2003, Norris and Shevock 2004) Stanis (*Whittemore 6581*, tbd)

Trichostomum sweetii (Bartr.) Stark [*Weissia sweetii* Bartr., *W. perligulata* Flowers] xxx. Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004)

Triquetrella californica (Lesq.) Grout [*Anomodon californicum* Lesq.] Sandy soil and rocks in open woodland. Lesquereux (1868), Koch (1950), Stark (1980), Yurky (1995), Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6712*, MO) Mar (Koch 1950, Stark 1980, Norris and Shevock 2004) CC (Lesquereux 1868, Koch 1950, Stark 1980, Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004)

Key to species of *Weissia*
1. Capsule operculate. *W. controversa* Hedw.
1. Capsule cleistocarpous. *W. inoperculata* (Crum) Crum et al.

Weissia controversa Hedw. [*W. viridula* Hedw.] Dry open soil, in chaparral, live oak forest, and grassland. Lesquereux (1868), Koch and Ikenberry (1954), Steere et al. (1954), Stoneburner (1985), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6699*, CAS) Mar (Steere et al. 1954, Yurky 1995, Norris and Shevock 2004) SF (Lesquereux 1868) Ala (*Whittemore 4252A*, CAS) SF (Shevock and Toren 2001) SM (*Whittemore 4064*, MO) SCla (*Whittemore 4332*, CAS) SCz (Kellman 2003)

Weissia inoperculata (Crum) Crum et al. [*Hymenostomum inoperculatum* Crum] On soil in garden. Crum (1957), Stoneburner (1985), Norris and Shevock (2004).
Distribution: SCla (Crum 1957, Stoneburner 1985, Norris and Shevock 2004)

Scouleriaceae

Scouleria aquatica Hook. in Drumm. On rock on fast-moving streams. Churchill (1985), Yurky (1995), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995, Norris and Shevock 2004)

Grimmiaceae

Key to genera

1. Capsule immersed; operculum permanently attached to the columella.
    2. Columella and operculum persistent; proximal part of costa bearing rhizoids. see *Scouleria* (Scouleriaceae)
    2. Columella and operculum deciduous together; costa without rhizoids. *Schistidium*
1. Capsule sometimes immersed, usually exserted; operculum not remaining attached to the columella.
    3. Peristome teeth lanceolate, or peristome absent.
        4. Calyptra large, covering most of the capsule. *Coscinodon*
        4. Calyptra small, covering little more than the operculum. *Grimmia*
    3. Peristome teeth linear or filiform.
        5. Leaves strongly contorted when dry, margins strongly toothed (our species). *Ptychomitrium*
        5. Leaves erect when dry, margins entire. *Racomitrium*

Key to genera and species of Grimmiaceae and Scouleriaceae

1. Capsule immersed or emergent.
    2. Aquatic; proximal part of costa bearing rhizoids; columella and operculum persistent on capsule. *Scouleria*
    2. Terrestrial; costa without rhizoids; operculum deciduous.
        3. Columella shed with operculum; peristome well developed. *Schistidium apocarpum* (Hedw.) Bruch & Schimp. in B. S. G.
        3. Columella retained in capsule; peristome present or absent.
            4. Capsule symmetrical; seta straight; costa prominent.
                5. Stems forming cushions; peristome rudimentary. *G. mariniana* Sayre
                5. Stems scattered; peristome well developed. *G. vaginulata* Kellman
            4. Capsule asymmetrical; seta curved.
                4'. Peristome none; costa prominent, leaves keeled. *G. anodon* Bruch & Schimp. in B.S.G.
                4. Peristome present; costa flat, leaves plane or concave, not keeled. *G. poecilostoma* Card. & Sebille
1. Capsule exserted (occasionally merely strongly emergent).
    5'. Distal leaf margins coarsely serrate; hair point absent. *Ptychomitrium gardneri* Lesq.
    5'. Leaf margins entire (sometimes with a hyaline hair point that is serrulate).

6'. Calyptra large, covering most of the capsule, plicate; peristome teeth cribrose. *G. calyptrata* Hook. in Drumm.
6'. Calyptra small, not plicate; peristome teeth solid or with a few perforations.
7. Seta curved when moist; capsule ± sulcate.
8. Leaves spirally twisted when dry. *G. torquata* Hornsch. in Grev.
8. Leaves straight or nearly so when dry.
9. Plants forming well-defined cushions; leaves oblong, acute. *G. pulvinata* (Hedw.) Smith
9. Plants forming turfs; leaves lanceolate, acuminate.
10. Adaxial surface of costa 2 cells wide in cross section; leaves longitudinally twisted and sharply folded along costa to apex when dry, usually straight or weakly recurved when moist; capsule ellipsoidal, almost cylindrical, strongly ribbed; gemmae (when present) sessile, scattered over lamina. *G. trichophylla* Grev.
10. Adaxial surface of costa 4 or more cells wide in cross section; leaves typically plane when dry, often strongly recurved when moist; capsule ovoid, less strongly ribbed xxx; gemmae (when present) stalked, confined to leaf base.
11. Adaxial surface of costa ca 4 cells wide in cross section; hyaline base of hair point terete. *G. lisae* De Not.
11. Adaxial surface of costa ca 8 cells wide in cross section; hyaline base of hair point flat. *G. leibergii* Paris
7. Seta straight; capsule smooth.
12. Leaves unistratose. *Racomitrium*
12. Leaves bistratose.
13. Costa flat, leaves plane or concave, not keeled; cross walls of alar cells not or somewhat thicker than longitudinal walls.
14. Leaf apex ± cucullate, narrowly rounded, green, without a hair point. *G. unicolor* Hook. in Grev.
14. Leaf apex plane, ending in a hyaline hair point which is decurrent on the lamina.
15. Alar cells wider than long; leaves ovate, obtuse or acute; walls of basal cells not nodulose. *G. laevigata* (Brid.) Brid.
15. Alar cells about as wide as long; leaves lanceolate, acuminate; walls of basal cells nodulose. *G. ovalis* (Hedw.) Lindb.
13. Costa prominent, leaves keeled; cross walls of alar cells much thicker than longitudinal walls.
16. One or both leaf margins recurved. *G. longirostris* Hook.
16. Leaf margins plane or incurved.
17. Leaf cells bulging on both surfaces; lamina ± plicate near midleaf. *G. caespiticia* (Brid.) Jur.
17. Leaf cells plane on both surfaces, leaf not plicate.
18. Operculum long-rostrate; seta 2--4 mm long; peristome teeth 50--90 μm wide at mouth, irregularly spliting distally and ± cribrose; leaf cells next to base of costa mostly long-rectangular, to 4.5:1; dioecious. *G. montana* Bruch & Schimp. in B.S.G.
18. Operculum obtuse to short-mammillate; seta to 2 mm long; peristome teeth 40--50 μm wide at mouth, entire or slightly cribrose at apex; leaf cells next to base of costa isodiametric to shortly rectangular, to 2:1; autoecious. *G. ungeri* Jur.

Key to sterile specimens of Grimmiaceae

1. Leaves spirally twisted when dry.
    2. Leaf margins entire. *G. torquata* Hornsch. in Grev.
    2. Leaf margins coarsely serrate. *Ptychomitrium gardneri* Lesq.
1. Leaves straight and imbricate when dry.
    3. Aquatic; proximal part of costa bearing rhizoids. *Scouleria*
    3. Terrestrial; rhizoids confined to stem.
        4. Leaf blade bistratose throughout (except differentiated basal cells).
            5. Costa flat, leaves plane or concave, not keeled; cross walls of alar cells not much thicker than longitudinal walls [check; this doesn't hold too well; the alar cells are short].
                6. Leaf apex ± cucullate, narrowly rounded, green, without a hair point. *G. unicolor* Hook. in Grev.
                6. Leaf apex plane, ending in a hyaline hair point which is flat basally and often decurrent on the lamina.
                    6'. Leaves ovate, obtuse or acute; alar cells wider than long; walls of basal cells not nodulose. *G. laevigata* (Brid.) Brid.
                    6'. Leaves lanceolate, acuminate; alar cells about as wide as long.
                        6". Basal leaf cells strongly elongate (4-8:1 near costa), with nodulose walls; capsule exserted. *G. ovalis* (Hedw.) Lindb.
                        6". Basal leaf cells short or less elongate (1-4:1 near costa), with straight walls; capsule immersed. *G. poecilostoma* Card. & Sebille
            5. Costa prominent, leaves keeled; cross walls of alar cells much thicker than longitudinal walls.
                7. Leaves narrowly lanceolate; capsule immersed. *G. mariniana* Sayre
                7. Leaves broadly lanceolate or lance-ovate; capsule exserted.
                    8. One or both leaf margins recurved. *G. longirostris* Hook.
                    8. Leaf margins plane or incurved.
                        8'. Leaf cells bulging on both surfaces; lamina ± plicate near midleaf. *G. caespiticia* (Brid.) Jur.
                        8'. Leaf cells plane on both surfaces, leaf not plicate.
                            9. Operculum long-rostrate; seta 2--4 mm long; peristome teeth 50--90 μm wide at mouth, irregularly spliting distally and ± cribrose; leaf cells next to base of costa mostly long-rectangular, to 4.5:1; dioecious. *G. montana* Bruch & Schimp. in B.S.G.
                            9. Operculum obtuse to short-mammillate; seta to 2 mm long; peristome teeth 40--50 μm wide at mouth, entire or slightly cribrose at apex; leaf cells next to base of costa isodiametric to shortly rectangular, to 2:1; autoecious. *G. ungeri* Jur.
        4. Leaf blade unistratose, or with bistratose streaks or margins.
            10. All leaf cells with strongly sinuose walls; cells smooth or papillose. *Racomitrium* spp.
            10. Some or all leaf cells with straight walls; sinuose walls, if present at all, less strongly sinuose; cells smooth.
                11. Leaf with both margins recurved for most of their length; cells of lamina neither nodose nor papillose. *Schistidium apocarpum* (Hedw.) Bruch & Schimp. in B. S. G.
                11. One or both leaf margins plane or recurved only near the middle.
                    12. Leaves oblong, acute; margins equally, weakly recurved below middle. *G. pulvinata* (Hedw.) Smith
                    12. Leaves ovate or lanceolate, acuminate, margins either plane or one more strongly revolute than the other.
                        13. Leaves 1.0--1.7 mm long, margins plane. *G. anodon* Bruch & Schimp.

in B.S.G.

13. Leaves 1.5--4 mm long, margins recurved (except sometimes in *Coscinodon calyptratus*).
    14. Walls of leaf cells never sinuose.
        15. xxx; capsule exserted, calyptra covering the whole capsule. *Coscinodon calyptratus* (Hook. in Drumm.) Kindb.
        15. xxx; capsule immersed, calyptra smaller. *Schistidium confertum* (Funck) Bruch & Schimp. in B. S. G.
    14. Walls of leaf cells sinuose, at least in part.
        16. Adaxial surface of costa 2 cells wide in cross section; leaves longitudinally twisted and sharply folded along costa to apex when dry, usually straight or weakly recurved when moist; gemmae (when present) sessile, scattered over lamina. *G. trichophylla* Grev.
        16. Adaxial surface of costa 4 or more cells wide in cross section; leaves typically plane when dry, often strongly recurved when moist; gemmae (when present) stalked, confined to leaf base.
            17. Hyaline base of hair point terete; adaxial surface of costa usually 4-6 cells wide in cross section. *G. lisae* De Not.
            17. Hyaline base of hair point flat; adaxial surface of costa ca 8 cells wide in cross section. *G. leibergii* Paris

Coscinodon calyptratus (Hook. in Drumm.) Kindb. [*Grimmia calyptrata* Hook. in Drumm.] xxx. Koch (1950), Yurky (1995).
Note: This species is usually considered endemic to the Great Basin.
Distribution: Mar (Koch 1950)

Grimmia alpestris (Web. & Mohr) Schleich. xxx. Lesquereux (1868).
Note: Later authors report this species only from the Sierra Nevada in California.
Distribution: CC (Watson 1880)

Grimmia anodon Bruch & Schimp. in B.S.G. xxx. Koch (1950).
Note: Ireland and Miller (1982) don't map this species in the Bay Area.
Distribution: Napa (Koch 1950)

Grimmia caespiticia (Brid.) Jur. [*G. mannieae* C. Muell., *G. alpestris* var. *mannieae* (C. Muell.) Jones] Habitat not given; presumably on siliceous rock. Muñoz (1998), Muñoz and Pando (2000), Norris and Shevock (2004).
Note: Lawton (1971) notes that the type material of *G. mannieae* she saw at NY is too fragmentary to be identified. According to Muñoz (pers. comm.), material at PC is more ample, and characteristic of *G. caespiticia*.
Distribution: Napa (Muñoz 1998, Norris and Shevock 2004)

Grimmia laevigata (Brid.) Brid. Dry sunny rock outcrops, low elevations. Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6682*, CAS) Mar (Yurky 1995) Ala (*Whittemore 5421*, CAS) SF (Shevock and Toren 2001) SM (*Whittemore 1341*, atw) SCla (*Whittemore 6117*, tbd) SCz (Kellman 2003) Stanis (*Whittemore 6585*, CAS)

Grimmia leibergii Paris Dry sunny rock outcrops. Muñoz (1999), Norris and Shevock (2004).
Distribution: Ala (Norris and Shevock 2004) SCla (*Whittemore 6750*, CAS) Stanis (*Whittemore 6584*, CAS)

Grimmia lisae De Not. [*G. californica* Sulliv. in part, *G. trichophylla* Grev. var. *meridionalis* auct., not Schimp.] Bare surfaces of large boulders and rock outcrops, in sun or open shade, many communities. Muñoz and Pando (2000), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).

Note: The syntype of *G. californica* from Oakland is *G. lisae*; the other syntype (presumably from Sonora) is *G. trichophylla*. Lesquereux (1868) also reports *G. californica* from Marin County.

Distribution: Son (*Whittemore 6678*, CAS) Mar (*Koch 2265*, xxx) CC (*Whittemore 6960*, tbd) Ala (*Whittemore 5428A*, MO) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 5272*, tbd) SCla (*Whittemore 5112*, tbd) SCz (*Duell 2174/2*, NY)

Grimmia longirostris Hook. xxx. Norris and Shevock (2004).

Distribution: CC (Norris and Shevock 2004) Mar (Norris and Shevock 2004)

Grimmia mariniana Sayre Exposed rocks. Sayre (1955), Crum (1957), Yurky (1995), Muñoz and Pando (2000), Norris and Shevock (2004).

Distribution: Napa (Sayre 1955, Norris and Shevock 2004) Mar (Sayre 1955, Crum 1957, Yurky 1995, Norris and Shevock 2004) CC (Norris and Shevock 2004)

Grimmia montana Bruch & Schimp. in B.S.G. Dry rock outctrops in mixed forest. Lesquereux (1868), Koch (1950), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).

Distribution: Mar (Koch 1950, Yurky 1995) CC (Lesquereux 1868, Koch 1950) SF (Shevock and Toren 2001) SCla (*Whittemore 4277*, CAS) SCz (Kellman 2003, Norris and Shevock 2004)

Grimmia ovalis (Hedw.) Lindb. Sunny sandstone. Kellman (2003), Norris and Shevock (2004).

Distribution: SM (Kellman *in litt*.) SCz (Kellman 2003, Norris and Shevock 2004)

Grimmia poecilostoma Card. & Sebille xxx. Norris and Shevock (2004).

Distribution: *Grimmia tergestina* Tomm. ex Bruch & Schimp., known from Lake County, is indistinguishable from *G. poecilostoma* when sterile, but has symmetrical capsules on straight setae.

Distribution: CC (Norris and Shevock 2004) SCz (Norris and Shevock 2004)

Grimmia pulvinata (Hedw.) Smith Dry rock, sometimes masonry or stony asphalt, broadleaf or mixed woodland. Koch and Ikenberry (1954), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).

Distribution: Mar (Yurky 1995) CC (Koch and Ikenberry 1954, Steere et al. 1954) Ala (*Whittemore 6726*, CAS) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 3382*, atw) SCla (*Whittemore 5114*, CAS) SCz (Kellman 2003)

Grimmia torquata Hornsch. in Grev. xxx. Koch (1950), Yurky (1995), Norris and Shevock (2004).

Distribution: Mar (Koch 1950, Yurky 1995, Norris and Shevock 2004)

Grimmia trichophylla Grev. On dry rock. Koch (1954), Steere et al. (1954), Yurky (1995), Muñoz and Pando (2000), Shevock and Toren (2001), Kellman (2003).

Note: *Grimmia trichophylla* was long confused with *G. lisae* and *G. leibergii*, and older reports need to be rechecked.

Distribution: Son (xxx *Whittemore 673*, atw) Mar (Koch 1954, Yurky 1995, Muñoz and Pando (200) Napa (Koch 1954) Sol (Koch 1954) CC (Koch 1954, Steere et al. 1954) SF (Shevock and Toren 2001) SM (*Whittemore 4186*, MO) SCla (*Whittemore 4261*, MO) SCz (*Whittemore 3289*, MO), Stanis (*Whittemore 6590A*, CAS)

Grimmia ungeri Jur. On dry rock at medium elevations. Muñoz and Pando (2000), Kellman (2003), Norris and Shevock (2004).

Distribution: Son (*MacFadden 11410*? MO) CC (Muñoz and Pando 2000) Mar (*Howell H184*, MO) SCz (Kellman 2003, Norris and Shevock 2004)

Grimmia unicolor Hook. in Grev. On dry rock among shrubs, 150 m.

Distribution: Ala (*Whittemore 5424*, CAS)

G. vaginulata Kellman Vertical or underhanging sides of sandstone boulders. Kellman (2011).

Distribution: SCz (Kellman 2011)

Ptychomitrium gardneri Lesq. On rock outcrops in open woodland. Howe (1896), Koch (1950),

Yurky (1995).
Distribution: Son (*Whittemore 6693*, CAS) Mar (Yurky 1995) Ala (Howe 1896, Koch 1950)

Key to species of *Racomitrium*

1. Leaf apex broad, rounded, green and muticous. *R. aciculare* (Hedw.) Brid.
1. Leaf apex acuminate, usually ending in a hyaline hair point.
    2. Leaf cells smooth or weakly and indistinctly papillose; seta twisted to right; spores 12-18 μm.
        3. Leaf cells smooth; seta 4-8 mm long, capsule 1-3 mm long, peristome teeth 0.2-0.5 mm long. *R. heterostichum* (Hedw.) Brid.
        3. Leaf cells weakly and indistinctly papillose; seta 10-15 mm long, capsule 3-5 mm long, peristome teeth 1.5-1.7 mm long. *R. varium* (Mitt.) Jaeg.
    2. Cells of leaf (including costa and hair point) strongly papillose; seta twisted to left; spores 8-10 μm.
        4. Leaves narrowly ovate, distally scarcely keeled and mostly lying flat on slide. *R. canescens* (Hedw.) Brid.
        4. Leaves lanceolate, distally keeled and mostly lying folded on slide.
            5. Marginal cells immediately distal to alar cells thin-walled, usually elongate; hair points weakly toothed, usually not decurrent, erect and flexuose when dry. *R. ericoides* (Hedw.) Brid.
            5. Marginal cells immediately distal to alar cells thck-walled, usually short; hair points often strongly toothed, usually decurrent, recurved and straight when dry. *R. elongatum* Frisvoll

Racomitrium aciculare (Hedw.) Brid. [*Codriophorus acicularis* (Hedwig) P. Beauvois] Seasonally flooded rocks. Kellman (2003).
Distribution: SCz (Kellman 2003)

Racomitrium canescens (Hedw.) Brid. [*Niphotrichum canescens* (Hedwig) Bednarek-Ochyra & Ochyra] xxx. Lesquereux (1868), Koch (1950), Yurky (1995).
Note: Most authors have included *R. elongatum* and *R. ericoides* in their concept of *R. canescens*, and all of these reports need to be rechecked.
Distribution: Mar (Lesquereux 1868, Yurky 1995) Ala (Koch 1950) SCz (Koch 1950)

Racomitrium elongatum Frisvoll [*Niphotrichum elongatum* (Frisvoll) Bednarek-Ochyra & Ochyra] Sunny acid rocks in meadows and savannas. Frisvoll (1983), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6681*, CAS) SCz (Kellman 2003, Norris and Shevock 2004)

Racomitrium ericoides (Hedw.) Brid. [*Niphotrichum ericoides* (Bridel) Bednarek-Ochyra & Ochyra] xxx. Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004)

Racomitrium heterostichum (Hedw.) Brid. [*Bucklandiella heterosticha* (Hedwig) Bednarek-Ochyra & Ochyra, *R. obesum* Frisvoll, *R. occidentale* (Ren. & Card.) Ren. & Card.] Dry rocks. Frisvoll (1988), Yurky (1995), Kellman (2003). Norris and Shevock (2004).
Note: The taxonomy of this group is in need of revision. For the moment, I have retained a broad definition of *R. heterostichum*. Frisvoll (1988) reports the segregate *R. obesum* from "Little Butano Creek, Santa Clara County;" Little Butano Creek is actually in San Mateo County (see also *Mielichhoferia mielichhoferiana*).
Distribution: (Koch 1950) Mar (Yurky 1995 and Norris and Shevock 2004, as *R. occidentale*) SM (Frisvoll 1988, as *R. obesum*) SCz (Kellman 2003, Norris and Shevock 2004)

Racomitrium microcarpum (Hedw.) Brid. [*Bucklandiella microcarpa* (Hedwig) Bednarek-Ochyra & Ochyra] Sunny sandstone. Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6681*, CAS) SCz (Kellman 2003, Norris and Shevock 2004)

Racomitrium varium (Mitt.) Jaeg. [*Codriophorus varius* (Mitten) Bednarek-Ochyra & Ochyra]

Dry rock. Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Schistidium*
1. Leaf margins recurved for most of their length; exothecial cells quadrate or transversely rectangular; spores 11-15(-19) μm across. *S. apocarpum* (Hedw.) Bruch & Schimp. in B. S. G.
1. Leaf margins recurved for about half of their length; many exothecial cells rectangular; spores 8-10 μm across. *S. confertum* (Funck) Bruch & Schimp. in B. S. G.

Schistidium apocarpum (Hedw.) Bruch & Schimp. in B. S. G. [*Grimmia apocarpa* Hedw.] xxx. Koch (1950), Steere et al. (1954).
Note: These reports may also be *S. confertum*, which was not recognized by Koch and Steere.
Distribution: SCla (Koch 1950, Steere et al. 1954)
Schistidium confertum (Funck) Bruch & Schimp. in B. S. G. [*Grimmia conferta* Funck] On rocks in the Diablo and Hamilton Ranges. Lesquereux (1868), Norris and Shevock (2004).
Distribution: CC (Lesquereux 1868, Norris and Shevock 2004) SCla (*Whittemore 6946*, tbd)

FUNARIALES

Ephemeraceae

See Pottiaceae.

Funariaceae

Key to genera
1. Capsule immersed in leaves, rupturing irregularly. *Physcomitrella*
1. Capsule exserted, operculate.
   2. Capsule asymmetrical, ± inclined. *Funaria*
   2. Capsule erect and symmetrical.
      3. Peristome present; capsule narrowly pyriform or almost cylindrical. *Entosthodon*
      3. Peristome absent; capsule broadly pyriform or urceolate. *Physcomitrium*

Key to species of *Entosthodon*
1. Peristome double. *E. californicus* (Sull. & Lesq.) Crum & Anders.
1. Peristome single, endostome none or rudimentary.
   2. Leaves acute or minutely apiculate; peristome teeth finely papillose or faintly papillose-striate. *E. kochii* Crum & Anderson
   2. Leaves acuminate; peristome teeth strongly striate or papillose.
      3. Leaves bordered below by narrow cells; spores 20-24 μm. *E. attenuatus* (Dicks.) Bryhn
      3. Leaves not bordered; spores ca 30 μm. *E. bolanderi* Lesq.

Entosthodon attenuatus (Dicks.) Bryhn xxx. Koch (1950), Crum and Anderson (1955), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Koch 1950, Crum and Anderson 1955, Yurky 1995, Norris and Shevock 2004) SM (Crum and Anderson 1955, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)
Entosthodon bolanderi Lesq. Clayey soil banks. Lesquereux (1868), Koch (1950), Shevock and Toren (2001).
Distribution: CC (Koch 1950)
Entosthodon californicus (Sull. & Lesq.) Crum & Anders. [*Funaria californica* Sull. & Lesq.] xxx. Koch (1950), Vaarama (1953).

Distribution: Son (Koch 1950) SCla (Vaarama 1953) Stanis (*Whittemore 6615*, CAS)

Entosthodon kochii Crum & Anderson xxx. Norris and Shevock (2004).
Distribution: Marin (Norris and Shevock 2004)

Key to species of *Funaria*
1. Urn of dry capsule furrowed; annulus present; leaves acute. *F. hygrometrica* Hedw.
1. Urn of dry capsule smooth; annulus none; leaves acuminate. *F. muhlenbergii* Turn.

Funaria hygrometrica Hedw. Exposed soil, disturbed areas in various habitats; reported from retaining walls by Shevock and Toren (2001). Koch (1950), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Steere et al. 1954) Sol (Norris and Shevock 2004) Mar (Koch 1950, Yurky 1995) Ala (*Whittemore 5456*, MO) SF (Shevock and Toren 2001) SM (*Whittemore 4219*, atw) SCla (*Whittemore 4303*, CAS) SCz (*Whittemore 3493*, atw) Stanis (*Whittemore 6578*, CAS)

Funaria muhlenbergii Turn. [*Entosthodon muehlenbergii* (Turn.) A. J. Fife, *F. calcarea* Wahlenb.] Soil banks, open live oak forest. Lesquereux (1868), Howe (1896), Steere et al. (1954), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: *Funaria convexa* Spruce, with a distribution centered in the Old World Mediterranean, has been reported from Lake Co. by Toren (2009), and should be watched for in our area. The report of *Funaria americana* Lindb. ex Sull. [*Entosthodon americanus* (Lindb. ex Sull.) A. J. Fife] from Marin County by Yurky (1995) is evidently an error for *F. muhlenbergii*; Crundwell and Nyholm (1974) do *not* refer Pacific Coast specimens to *F. americana*, which is endemic to the eastern half of the continent (Smith 1980).
Distribution: CC (Lesquereux 1868) Ala (*Whittemore 4213*, atw) SF (Lesquereux 1868, Shevock and Toren 2001) SM (*Whittemore 4283*, CAS) SCla (*Whittemore 5467*, CAS) SCz (Kellman 2003, Norris and Shevock 2004)

Physcomitrella readeri (C. Müll.) Scott & Stone [*P. californica* Crum & Anders.] On mud at edges of lakes and ponds. Crum and Anderson (1955), Norris and Shevock (2004).
Note: The reports of *P. patens* (Hedw.) Bruch & Schimp. in B.S.G. from the Bay Area by Koch (1950) are referrable to this species. The report of *P. patens* by Norris and Shevock (2004) is apparently an error.
Distribution: Sol (Crum and Anderson 1955, Norris and Shevock 2004) Ala (Crum and Anderson 1955, Norris and Shevock 2004)

Key to species of *Physcomitrium*
1. Capsule flaring at the mouth; leaves usually toothed. *P. pyriforme* (Hedw.) Hampe
1. Capsule contracted at the mouth; leaves usually entire. *P. californicum* E. Britt.

Physcomitrium californicum E. Britt. xxx. Norris and Shevock (2004).
Note: Doubtfully distinct from *P. pyriforme*.
Distribution: Mar (Norris and Shevock 2004)

Physcomitrium pyriforme (Hedw.) Hampe [*P. megalocarpum* Kindb.] Sunny mineral soil, disturbed areas, open grassy scrub. Lesquereux (1868), Yurky (1995), Norris and Shevock (2004).
Distribution: Mar (Lesquereux 1868, Yurky 1995, Norris and Shevock 2004) SM (*Whittemore 5407*, CAS)

BRYALES

Bryaceae and Mniaceae

Note: These plants have generally been treated in two families, Bryaceae and Mniaceae. Chloroplast DNA sequence data suggests that the families as traditionally defined are not natural, but the clades found in the chloroplast DNA cladogram are scarcely separable morphologically, so I am keying them here as one natural unit.

Key to genera

1. Plants dendroid, with a branched "crown" terminating an erect unbranched stipe. *Leucolepis*
1. Plants not or scarcely branched.
    2. Leaves narrowly lanceolate to linear or setaceous (lateral leaves of *Epipterygium* are ovate); cells more than 4 times as long as wide.
        3. Shoots complanate; leaves strongly dimorphic, those on sides of stem much larger than those on top of stem. *Epipterygium*
        3. Shoots not complanate; leaves monomorphic, similar in size on all sides of stem.
            4. Leaves setaceous. *Leptobryum*
            4. Leaves linear to ovate or obovate.
                5. Leaves somewhat contorted when dry, linear; capsule erect. *Orthodontium*
                5. Leaves plane and straight when dry, narrowly to rather broadly lanceolate.
                    6. Leaves rather broadly lanceolate; capsule erect. *Mielichhoferia*
                    6. Leaves lanceolate to narrowly lanceolate; capsule inclined. *Pohlia*
    2. Leaves lance-ovate to ovate or obovate; cells often less than 4 times as long as wide; stems sometimes complanate but nor with dorsiventral leaf differentiation.
        7. Teeth paired on leaf margin. *Mnium*
        7. Teeth single or leaf margin entire.
            8. Capsule pyriform, with a well-differentiated neck that is narrower than the urn. Leaves 0.5-4 mm long, border of elongate cells absent to moderately strong. *Bryum*
            8. Capsule cylindrical, neck short and poorly differentiated. Leaves 3-10 mm long, border of elongate cells very strong.
                9. Leaves entire, plane when dry; stems erect and radially symmetrical. *Rhizomnium*
                9. Leaves toothed, strongly contorted when dry; stems erect and radially symmetrical or arching and ± complanate. *Plagiomnium*

Key to species of *Bryum*

1. Leaf rounded, obtuse, or broadly acute.
    2. Shoots slender and julaceous; leaves ca 1 mm long; cells long and narrow as in *Pohlia*. *B. julaceum* Schrad. ex Gaertn. et al.
    2. Shoots thicker, not julaceous; leaves ca 2 mm long; cells broader, ca 3-6 times as long as wide, typical for *Bryum*.
        3. Axillary bulbils often present; leaf green, its apex always acute. *B. gemmiparum* De Not.
        3. Axillary bulbils absent; leaf usually ± reddish, its apex acute, obtuse or rounded.
            4. Leaves green or only the base and costa red; tiny julaceous plants with the leaves usually 0.2-1.0 mm long. *B. calobryoides* Spence
            4. Leaves red throughout, or at least the lower half red; usually larger, if julaceous then leaves ca 2 mm long.
                5. xxx. *B. miniatum* Lesq.
                5. xxx. *B. muehlenbeckii* Bruch & Schimp. in B. S. G.
1. Leaf [typically] acuminate, [rarely narrowly acute or apiculate?].
    6. Distal half or more of leaf hyaline, plant white. *B. argenteum* Hedw.
    6. Leaf green or reddish throughout, plant green, yellow-green or red.
        7. Cilia rudimentary or absent. *B. uliginosum* (Brid.) Bruch & Schimp. in B.S.G.
        7. Cilia well developed.
            8. Exostome teeth pale yellow.

9. Cells of leaf margin very narrow, forming an abruptly, strongly differentiated border. *B. pallens* Swartz
9. Cells of leaf margin not asw narrow, border grading into midleaf cells. *B. turbinatum* (Hedw.) Turn.

8. Exostome teeth brown.
10. Many or all interior cells in distal part of leaf less than 3 times as long as wide.
11. Leaf cells thick-walled and pitted; border none; apex recurved. *B. canariense* Brid.
11. Leaf cells not pitted (except in *B. pseudotriquetrum*, with strongly bordered leaves); apex straight.
12. Leaf cells thick-walled; margins tightly recurved almost to apex; costa percurrent or excurrent. *B. pseudotriquetrum* (Hedw.) Gaertn. et al.
12. Leaf cells thin walled (except sometimes in *B. gemmascens*); margins plane or weakly recurved proximally; costa variable in length.
13. Leaf margin plane (rarely weakly reflexed in proximal half of leaf), marginal cells narrow but not forming a distinct border. *B. gemmascens* Kindb.
13. Leaf margin recurved, with a distinct border of elongate cells.
14. Axillary gemmae sometimes present; dry leaves twisted along their own axes.
15. xxx. *B. flaccidum* Brid.
15. xxx. *B. laevifilum* Syed
14. Axillary gemmae none; dry leaves straight or twisted around the stem.
16. Rhizoidal tubers red, leaves not strongly twisted when dry; autoecious, synoecious, or sometimes dioecious. *B. torquescens* Bruch
16. Rhizoidal tubers brown or red-brown, leaves strongly twisted when dry; dioecious. *B. capillare* Hedw.

10. Most or all interior cells in distal part of leaf more than 3 times as long as wide.
17. Synoecious. *B. lisae* DeNot. var. *cuspidatum* (Bruch & Schimp. in B.S.G.) Marg.
17. Dioecious.
18. Axillary bulbils generally present; rhizoidal gemmae none. [see note at the end of the *Bryum* treatment]
19. Leaf primordia 0.4-0.6 length of bulbil; bulbils always large, 1(-2) per axil. *B. dichotomum* Hedw. (=*B. bicolor* Dicks.)
19. Leaf primordia less than 0.5 length of bulbil; bulbils always large, (2-)5 or more per axil (but developing bulbils low on stem may be large and solitary).
20. Bulbils ovoid or globose, leaf primordia rudimentary or absent. *B. gemmilucens* Wilcz. & Dem.
20. Bulbils conical, leaf primordia well developed.
21. Young bulbils 200-450 μm long, leaf primordia broadly triangular, acute or obtuse. *B. barnesii* Wood in Schimp.
21. Young bulbils 150-250 μm long, leaf primordia narrowly triangular, narrowly acute. *B. gemmiferum* Wilcz. & Dem.
18. Rhizoidal tubers present (sometimes on axillary rhizoids); axillary bulbils none.
22. Rhizoids red or purple. *B. violaceum* Crundw. & Nyh.
22. Rhizoids yellow or brown.
23. Tubers 40-80 μm; leaf cells usually 5-6 times as long as wide.

B. valparaisense Thér.

23. Tubers mostly 120-260 μm long; leaf cells usually 3-4 times as long as wide.
    24. Leaves bordered; tubers red.
        25. Tubers 180-260 μm, formed close to stem, their cells 25-40(-50) μm. *B. rubens* Mitt.
        25. Tubers 160-300 μm, usually on long rhizoids, their cells 40-70 μm. *B. bornholmensis* Winkelm. & Ruthe
    24. Leaves not bordered; tubers yellow.
        26. Basal leaf cells quadrate; tubers concolorous with rhizoids. *B. radiculosum* Brid.
        26. Basal leaf cells rectangular; tubers not concolorous with rhizoids.
            27. Tubers yellowish, 120-180(-220) μm. *B. tenuisetum* Limpr.
            27. Tubers red, 190-260 μm. *B. subapiculatum* Hampe

Bryum argenteum Hedw. Exposed soil, open areas in many habitats; also reported from sandstone, concrete and bases of trees. Lesquereux (1868), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Steere et al. 1954) Mar (Yurky 1995) CC (*Whittemore 6809*, CAS) Ala (Norris and Shevock 2004) SF (Lesquereux 1868, Shevock and Toren 2001) SM (*Whittemore 4218*, CAS) SCla (*Whittemore 5328*, CAS) SCz (Kellman 2003)

Bryum barnesii Wood in Schimp. Disturbed soil and concrete. Vanderpoorten and Zartman (2002), Kellman (2003), Norris and Shevock (2004).
Note: The map in Vanderpoorten and Zartman (2002) lists no specific localities, but shows dots all around the Bay Area.
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Bryum cf. bornholmensis Winkelm. & Ruthe? xxx.
Distribution: SCla (*Whittemore 4209*, atw)

Bryum calobryoides Spence On sandstone. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Bryum canariense Brid. [*B. hendersoni* Ren. & Card.] Soil or rock, occasionally spreading onto tree bases, usually in open shade, oak woodland or grassland. Lesquereux (1868), Howe (1896), Koch (1950), Koch and Ikenberry (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Howe 1896, Yurky 1995) CC (Lesquereux 1868) Ala (*Whittemore 1393A*, atw) SF (Shevock and Toren 2001) SM (*Whittemore 5257*, CAS) SCla (*Whittemore 1370*, atw) SCz (Kellman 2003)

Bryum capillare Hedw. On soil, rock,, rarely concrete or decaying wood, open oak woodland. Watson (1880), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: Lesquereux (1868) reports *B. obconicum* Hornsch. ex B.S.G., which was considered a synonym of *B. capillare* by Andrews and a synonym of *B. pallescens* Schleich. ex Schwaegr. by Smith (1978).
Distribution: Son (*Whittemore 677*, atw) Ala (*Whittemore 6546*, tbd) Mar (Yurky 1995) CC (Watson 1880) SF Shevock and Toren 2001) SM (*Whittemore 5273*, CAS) SCla (*Whittemore 5322*, CAS) SCz (*Whittemore 1136*, atw)

Bryum dichotomum Hedw. [*B. bicolor* Dicks., *B. californicum* Sull.] Disturbed soil. Lesquereux (1868), Koch (1950), Koch and Ikenberry (1954), Yurky (1995), Shevock and Toren (2001), Vanderpoorten and Zartman (2002), Kellman (2003), Norris and Shevock (2004).
Distribution: Sol (Lesquereux 1868) Mar (Yurky 1995) CC (Koch and Ikenberry 1954) SF

(Lesquereux 1868, Shevock and Toren 2001) Ala (*Whittemore 1393B*, atw) SCla (*Whittemore 4213*, atw; s. lat.) SCz (Kellman 2003)

Bryum flaccidum Brid. On shaded logs and rocks, live oak woodland.
Note: The determination of the Bay Area material is provisional; all material I have seen lacks both filamentous axillary gemmae and rhizoid tubers. Kellman (2003) reports *B. laevifilum* Syed, doubtfully distinct from this species, from Santa Cruz County.
Distribution: SM (*Whittemore 2991*, CAS, DAV, MO) SCla (*Whittemore 6079*, tbd)

Bryum gemmascens Kindb. [*B. sanguilentum* Ren. & Card. nom. nud.] On decaying wood, trunks of trees, and rocks (also reported from soil) in open broadleaf woodland. Howe (1896), Syed (1973), Shevock and Toren (2001), Norris and Shevock (2004).
Note: Some of this material may represent an undescribed species (*Bryum* sp. B of Kellman 2003).
Distribution: Son (Syed 1973) Mar (Howe 1896, Syed 1973) Ala (*Whittemore 5442*, CAS) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 1402*, atw) SCla (*Whittemore 4322*, CAS) SCz (*Whittemore 6786*, CAS) Stanis (*Whittemore 6603*, CAS)

Bryum gemmiferum Wilcz. & Dem. Disturbed soil. Vanderpoorten and Zartman (2002), Kellman (2003), Norris and Shevock (2004).
Distribution: SM (Norris and Shevock 2004) SCz (Kellman 2003)

Bryum gemmilucens Wilcz. & Dem. Beaten soil in disturbed areas. Shevock and Toren (2001), Vanderpoorten and Zartman (2002), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) Ala (*Whittemore 6716*, CAS) Mar (Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 3335*, atw) SCz (Kellman 2003)

Bryum gemmiparum De Not. Seasonally wet rocks. Kellman (2003)
Distribution: SCz (*Kellman 611*, CAS)

Bryum julaceum Schrad. ex Gaertn. et al. [*Anomobryum julaceum* (Schrad. ex Gaertn. et al.) Schimp.] xxx check authors. Moist sandstone. Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) CC (Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Bryum laevifilum Syed xxx. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Bryum lisae DeNot. var. *cuspidatum* (Bruch & Schimp. in B.S.G.) Marg. Sunny disturbed soil, retaining walls and bricks. Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCla (*Whittemore 4305*, atw) SCz (Kellman 2003)

Bryum miniatum Lesq. [*B. atwateriae* C. Muell.] Wet rocks. Howe (1896), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Howe 1896) Napa (Norris and Shevock 2004) Mar (Yurky 1995) SCz (Kellman 2003, Norris and Shevock 2004)

Bryum muehlenbeckii Bruch & Schimp. in B. S. G. Seasonally wet soil, open shade in live oak forest.
Distribution: SCla (*Whittemore 6086*, tbd) SCz (Kellman *in litt*.) Stanis (*Whittemore 6605*, CAS)

Bryum pallens Swartz xxx. Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004)

Bryum pseudotriquetrum (Hedw.) Gaertn. et al. [*B. crassirameum* Ren. & Card.] Soil and seasonally wet rock. Howe (1896), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Ala (Norris and Shevock 2004) Mar (Howe 1896, Steere et al. 1954, Yurky 1995) SF (Shevock and Toren 2001) SM (*Whittemore 3344*, atw) SCz (Kellman *in litt*.)

Bryum radiculosum Brid. Dry soil in disturbed areas. Norris and Shevock (2004).

Distribution: SM (*Whittemore 4415*, atw)

Bryum rubens Mitt. On soil, gardens [and roadsides?]. Crundwell & Nyholm (1964), Yurky (1995), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995, Norris and Shevock 2004) SCla (Crundwell & Nyholm 1964)

Bryum subapiculatum Hampe [*B. microerythrocarpum* C. Müll. & Kindb. in Macoun] Disturbed soil. Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Rae 95-008*, MO) SCz (*Kellman 616*, CAS)

Bryum tenuisetum Limpr. xxx. Crundwell & Nyholm (1964), Norris and Shevock (2004).
Distribution: Sol (Norris and Shevock 2004) Mar (Crundwell & Nyholm 1964)

Bryum torquescens Bruch Dry stony soil, often in disturbed areas. Lesquereux (1868), Howe (1896), Syed (1973), Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: Son (Syed 1973) Napa (Syed 1973) Mar (Howe 1896, Syed 1973) Ala (Lesquereux 1868) SF (Syed 1973, Shevock and Toren 2001, Norris and Shevock 2004) SCla (*Whittemore 6624*, CAS)

Bryum turbinatum (Hedw.) Turn. xxx. Yurky (1995).
Distribution: Mar (Yurky 1995)

Bryum uliginosum (Brid.) Bruch & Schimp. in B.S.G. xxx. Watson (1880), Koch (1950).
Note: The species is primarily high-montane in California, and Koch and Ikenberry (1954) suggest that these specimens may be misidentified.
Distribution: CC (Watson 1880, Koch 1950) SM (Koch 1950)

Bryum valparaisense Thér. [*Bryum pyriferum* Crundw. & H. Whiteh.] Rock wall. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Bryum violaceum Crundw. & Nyh. Disturbed soil. Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004) Mar (Yurky 1995) SCz (Kellman 2003, Norris and Shevock 2004)

Note: I have not incorporated data from Spence and Kellman (2015) into the treatment above. This publication reports three additional species from the area:

Gemmabryum brassicoides J. R. Spence & K. M. Kellman Summer-dry rocks. CC SCz Solano

Gemmabryum vinosum J. R. Spence & K. M. Kellman Forming turfs on rock, seldom soil. CC SCla (Whittemore & Briggs 6619, CAS, MO) **Note:** S&K report from San Mateo Co., but the locality cited (LosAltos Hills) is in Santa Clara Co.

Bryum californicum Sullivant = *Gemmabryum californicum* (Sullivant) J. R. Spence & K. M. Kellman Forming turfs on rock or thin soil over rock. SCz

Epipterygium tozeri (Grev.) Lindb. [*Bryum tozeri* Grev.] On mineral soil or sometimes rock or wood, deeply shaded humid sites (usually bases of banks) in evergreen forests. Lesquereux (1868), Koch and Ikenberry (1954), Steere et al. (1954), Shaw (1984), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) Mar (Koch and Ikenberry 1954, Shaw 1984, Yurky 1995) CC (*Whittemore 6792*, CAS) Ala (*Whittemore 6545*, CAS) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4375*, MO) SCla (*Whittemore 5319*, CAS) SCz (*Whittemore 4427*, MO)

Leptobryum pyriforme (Hedw.) Wils. Soil in seeps. Koch (1954), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Koch 1954, Shevock and Toren 2001, Norris and Shevock 2004) SCz (*Whittemore 3492*, atw)

Leucolepis acanthoneuron (Schwaegr.) Lindb. [*L. menziesii* (Hook.) Steere in L. F. Koch] Very thoroughly rotted wood, rarely rock, shady floor of redwood forest. Howe (1897), Koch (1950), Koch and Ikenberry (1954), Steere et al. (1954), Thompson and Ketchledge (1958), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Howe 1897) Mar (Howe 1897, Koch and Ikenberry 1954, Yurky 1995) SM (*Whittemore 4111*, atw) SCla (Koch 1950) SCz (*Whittemore 4038*, atw)

Key to species of *Mielichhoferia*:
1. Leaves ovate to ovate-lanceolate, apex acute to obtuse, cells at midleaf 10--20 μm wide. *M. elongata*
1. Leaves lanceolate, apex acuminate, cells at midleaf ca 10 μm wide. *M. mielichhoferiana*

Mielichhoferia elongata (Hoppe & Hornsch.) Hornsch. Vertical soil or rock banks. Shaw and Schneider (1995), Kellman (2003), Norris and Shevock (2004).
Note: Thompson and Ketchledge (1958) report a putative undescribed species of *Mielichhoferia* from Alum Rock Park, Santa Clara County. Since this is one of the sites Shaw and Schneider cite for *M. elongata*, the report is likely referrable to this species.
Distribution: Mar (Norris and Shevock 2004) SCla (Shaw and Schneider 1995) SCz (Shaw and Schneider 1995, Kellman 2003, Norris and Shevock 2004)

Mielichhoferia mielichhoferiana (Funck in Hook.) Loeske Slaty cliff above creek. Crum (1957), Shaw and Crum (1984).
Note: Crum (1957) cites this species, "On a tree trunk, Little Butano Creek, Santa Clara County." However, Little Butano Creek is in San Mateo County, and Schofield (1959), the original collector, later corrected the habitat description. Shaw and Schneider (1995) evidently refer all Californiia populations to *M. elongata*, but the illustrations in Crum (1957) match Smith's illustrations of *M. mielichhoferiana*, not *M. elongata*.
Distribution: SM (Crum 1957)

Mnium marginatum (Dicks. exWith.) P. Beauv. Wet rock, redwood forest. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Orthodontium*
1. Paroecious; central strand of stem absent; leaves filiform; capsules smooth or lightly wrinkled when dry. *O. gracile* (Wils. in Smith & Sowerby) Schwaegr. ex B.S.G.
1. Autoecious; central strand of stem present; leaves lanceolate; capsules furrowed when dry. *O. pellucens* (Hook.) Bruch & Schimp. in C. Muell.

Note: This genus may not belong in Bryaceae, where it was traditionally placed. It is sometimes now placed in a separate family Orthodontiaceae, together with some exotic genera.

Orthodontium gracile (Wils. in Smith & Sowerby) Schwaegr. ex B.S.G. [*Stableria gracilis* (Wils. in Smith & Sowerby) Lindb.] Charred wood of decorticated stumps, redwood forest. Howe (1897), Koch (1950), Meijer (1951), Steere et al. (1954), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Howe 1897, Meijer 1951) Mar (Yurky 1995, Norris and Shevock 2004) SM (*Whittemore 4016*, atw) SCz (Koch 1950, Kellman 2003)

Orthodontium pellucens (Hook.) Bruch & Schimp. in C. Muell. Reported from Mendocino and Monterey Counties by Norris and Shevock (2004), and to be expected in the Bay Area.

Key to species of *Plagiomnium*
1. Leaves strongly decurrent (decurrencies 2-4 mm); walls of leaf cells ± pitted; dioicous. *P. insigne* (Mitt.) Koponen

1. Leaves not or weakly decurrent (decurrencies 0-0.5 mm); walls of leaf cells not pitted; synoicous. *P. venustum* (Mitt.) Koponen

Plagiomnium insigne (Mitt.) Koponen [*Mnium insigne* Mitt.] On soil, in redwood forest or riparian deciduous forest near the coast. Koch (1950), Koch and Ikenberry (1954), Koponen (1971), Yurky (1995), Kellman (2003).
Note: Kellman (2003) reported a specimen from Santa Cruz Co., too depauperate to name, which he compared with *P. cuspidatum*.
Distribution: Mar (Koch and Ikenberry 1954, Koponen 1971, Yurky 1995) Ala (Koponen 1971) SM (Koch 1951, Koponen 1971) SCz (Kellman 2003)

Plagiomnium venustum (Mitt.) Koponen [*Mnium venustum* Mitt.] Shaded rocks in redwood forest. Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004) SCz (Kellman 2003)

Key to species of *Pohlia*

1. Axils of distal leaves bearing clusters of 5-many gemmae.
    2. Gemmae spherical or ovoid, less than twice as long as wide, leaf primordia 1-2-celled, confined to tip of gemma. *P. camptotrachela* (Ren. & Card.) Broth. in Engl. & Prantl
    2. Gemmae elongate, leaf primordia multicellular, along ca half the length of the gemma. *P. andalusica* (Hohn.) Broth.
1. Gemmae none.
    2. Annulus absent; exothecial cells ± isodiametrical.
        3. Leaves dull, whitish; leaf cells 12-20(-30) µm wide; leaves erect-spreading; perigonial bracts short-acuminate, 2-3 mm long. *P. wahlenbergii* (Web. & Mohr) Andr.
        3. Leaves shiny, deep green; leaf cells less than 10 µm wide; leaves wide-spreading; perigonial bracts long-acuminate, xxx -6 mm long. *P. longibracteata* Broth. in Röll
    2. Annulus present; exothecial cells longer than wide.
        4. Leaves dull; leaf cells thick-walled. *P. nutans* (Hedw.) Lindb.
        4. Leaves shiny; leaf cells thin-walled.
            5. Capsules almost cylindrical, 4-6 mm long; exothecial cells long-rectangular, 40-80 µm long, walls straight. *P. cruda* (Hedw.) Lindb.
            5. Capsules broadly pyriform, 1.5-2.5 mm long; exothecial cells short-rectangular, 25-55 µm long, walls strongly sinuose. *P. pacifica* Shaw

Key to sterile specimens:

1. Axils of distal leaves bearing clusters of 5-many ellipsoidal or spherical gemmae.
    2. Leaf primordia on tip of gemmae small, rudimentary. *P. camptotrachela* (Ren. & Card.) Broth. in Engl. & Prantl
    2. Leaf primordia on tip of gemmae triangular, almost as long as body of gemma. *P. andalusica* (Hohn.) Broth.
1. Gemmae none.
    3. Leaf cells 12-20(-30) µm wide. *P. wahlenbergii* (Web. & Mohr) Andr.
    3. Leaf cells 6-9 (-12??) µm wide.
        4. Leaves dull, leaf cells thick-walled. *P. nutans* (Hedw.) Lindb.
        4. Leaves shiny, leaf cells thin-walled.
            5. Leaves 2-3.5 mm long; stomates immersed; annulus none. *P. longibracteata* Broth. in Röll
            5. Leaves 1-2 mm long; stomates superficial; annulus present.
                6. Capsules broadly pyriform, 1.5-2.5 mm long. *P. pacifica* Shaw
                6. Capsules almost cylindrical, 4-6 mm long. *P. cruda* (Hedw.) Lindb.

Pohlia andalusica (Hohn.) Broth. xxx. Norris and Shevock (2004).

Distribution: SCz (Norris and Shevock 2004)

Pohlia camptotrachela (Ren. & Card.) Broth. in Engl. & Prantl Sandy or gravelly soil, roadbanks. Shaw (1981, 1982).
Distribution: Mapped in the East Bay by Shaw (1981, 1982).

Pohlia cruda (Hedw.) Lindb. xxx. Yurky (1995).
Distribution: Mar (Yurky 1995)

Pohlia longibracteata Broth. in Röll Damp soil or rock banks in redwood forest, occasionally damp canyon bottoms in other evergreen forests. Koch (1950), Steere et al. (1954), Thompson and Ketchledge (1958), Shaw (1982), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995, Norris and Shevock 2004) SM (*Whittemore 4127*, atw) SCla (Shaw 1982) SCz (*Whittemore 3314*, atw)

Pohlia nutans (Hedw.) Lindb. On rock and soil. Shaw (1982), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) Ala (Norris and Shevock 2004) SF (Shevock and Toren 2001) SCz (Kellman 2003)

Pohlia pacifica Shaw Wet soil, especially in disturbed areas. Shaw (1982), Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Shaw 1982, Kellman 2003, Norris and Shevock 2004)

Pohlia wahlenbergii (Web. & Mohr) Andr. [*Mniobryum wahlenbergii* (Web. & Mohr) Jenn., *Bryum albicans* Wahl. *nom. nud.*] Wet soil or rock in or beside streams, many communities. Shaw (1982), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SCla (*Whittemore 6112*, tbd) SCz (*Whittemore 3491*, CAS)

Rhizomnium glabrescens (Kindb.) Koponen [*Mnium glabrescens* Kindb.] Wet logs and soil, redwood forest. Koch (1950), Thompson and Ketchledge (1958), Koponen (1973), Kellman (2003), Norris and Shevock (2004).
Distribution: Ala (Koch 1950, Koponen 1973) SM (*Whittemore 4017*, MO) SCz (Thompson and Ketchledge 1958, Koponen 1973, Kellman 2003)

Aulacomniaceae

Key to species of *Aulacomnium*

1. Basal cells of leaf not inflated; gemma-clusters well defined, stalk naked; plants 0.5-4 cm tall, on rotten wood or sometimes soil, not in marshes. *A. androgynum* (Hedw.) Schwaegr.
1. Basal cells of leaf inflated; gemmae often scattered on stalk below gemma-cluster; plants 1-11 cm tall, on wet soil in marshy areas. *A. palustre* (Hedw.) Schwaegr.

Aulacomnium androgynum (Hedw.) Schwaegr. Charred surfaces of logs and stumps or rarely shaded soil or rock, usually in redwood forest. Steere et al. (1954), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) SF (Shevock and Toren 2001) SM (*Whittemore 1101*, atw) SM (*Whittemore 6659*, CAS) SCla (Norris and Shevock 2004) SCz (Steere et al. 1954, Thompson and Ketchledge 1958, Kellman 2003)

Aulacomnium palustre (Hedw.) Schwaegr. Marshes and swamps. Koch (1950), Kellman (2003).
Distribution: Son (*Rubitzoff 21980*, MO) SCz (Kellman 2003)

Bartramiaceae

Key to genera

1. Leaves lanceolate to ovate; wet habitats. *Philonotis*
1. Leaves narrowly lanceolate to linear; dry habitats.
   2. Stems short, forming compact cushions; cells long and narrow, strongly papillose; capsules

longitudinally grooved when dry. *Bartramia*
2. Stems long, decumbent, forming straggly mats; cells shorter, smooth or scarcely papillose; capsules smooth or wrinkled. *Anacolia*

Anacolia menziesii (Turn.) Paris Dry rock in open shade, live oak forest and mixed forests. Flowers (1952), Steere et al. (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Note: According to Kellman (*in litt*.), all his material with capsules is referrable to var. *baueri* Hampe.
Distribution: Son (*Whittemore 6701*, CAS) Mar (Flowers 1952, Yurky 1995) Sol (Flowers 1952) CC (*Whittemore 6981*, tbd) Ala (*Whittemore 5430*, CAS) SF (Shevock and Toren 2001) SM (*Whittemore 5274*, CAS) SCla (*Whittemore 4330*, CAS)

Bartramia stricta Brid. Dry soil in live oak forest. Lesquereux (1868), Howe (1897), Koch (1950), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6696*, CAS) Mar (Yurky 1995) CC (Howe 1897) Ala (*Whittemore 3354*, atw) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 5347*, xxx) SCz (Kellman 2003)

Key to species of *Philonotis*
1. Distal leaf cells 2--3 times as long as wide; marginal teeth involving the upper ends of the marginal cells only; cells papillose at upper and sometimes also lower end. *P. capillaris* Lindb. in Hartm.
1. Distal leaf cells 4--10 times as long as wide.
2. Cells papillose at upper ends only; marginal teeth involving the upper ends of the marginal cells only. *P. muhlenbergii* (Schwaegr.) Brid.
2. Cells papillose at lower end or both ends; at least some marginal cells projecting as teeth at both ends. *P. fontana* (Hedw.) Brid.
3. xxx. *P. fontana* var. *fontana*
3. xxx. *P. fontana* var. *americana* (Dism.) Flowers ex Crum

Philonotis capillaris Lindb. in Hartm. Soil, sandstone and shale of banks in seeps and intermittent streamlets. Howe (1896), Koch (1950), Zales (1973), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Zales 1973, Norris and Shevock 2004) Mar (Koch 1950, xxx 1951, Yurky 1995, Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 6537*, CAS) SCla (*Whittemore 6954*, tbd) SCz (Koch 1950 xxx 1951, Zales 1973, Kellman 2003, Norris and Shevock 2004)
Philonotis fontana (Hedw.) Brid. var. *fontana* Soil over wet rock. Zales (1973), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Zales 1973, Yurky 1995, Norris and Shevock 2004) Napa (Zales 1973) SCz (Kellman 2003, Norris and Shevock 2004)
Philonotis fontana (Hedw.) Brid. var. *americana* (Dism.) Flowers ex Crum xxx. Zales (1973).
Distribution: SCz (Zales 1973)
Philonotis muhlenbergii (Schwaegr.) Brid. xxx. Yurky (1995), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995, Norris and Shevock 2004)

ORTHOTRICHALES

Orthotrichaceae

Key to genera

1. Calyptra mitrate, ± plicate and usually hairy.
   2. xxx. *Orthotrichum*
   2. xxx. *Ulota*
1. Calyptra cucullate, smooth and glabrous.
   3. Leaves strongly contorted when dry; capsule emergent. see *Amphidium* (Dicranaceae)
   3. Leaves not or weakly contorted when dry; capsule long-exserted. *Zygodon*

Key to species of *Orthotrichum* and *Ulota*

1. Leaf ending in a hyaline hair point. *O. diaphanum* Brid.
1. Leaf muticous.
   2. Dry leaves crisped; endostome segments as long as exostome teeth.
      3. Leaf margins plane or recurved proximally.
         4. Upper leaves usually tipped with prominent clusters of gemmae; dioecious, rarely fruiting. *Ulota phyllantha* Brid.
         4. Leaves without gemmae; autoecious, usually fruiting. *O. persimile* F. Lara, R. Medina B. & Garilleti
      3. Leaf margins recurved almost to apex; rhizoids smooth.
         5. Calyptra glabrous; endostome of 16 segments; inner surface of exostome longitudinally striate. *O. columbicum* Mitt.
         5. Calyptra hairy; endostome of 8 segments; inner surface of exostome smooth or nearly so. *O. consimile* Mitt.
   2. Dry leaves straight; endostome segments shorter than exostome teeth (except in *O. underwoodii*).
      6. Stomata immersed; basal cells rectangular, with thin walls.
         7. Leaves strongly dimorphic: leaves of sterile stems obtuse, less than 1.5 mm long, leaves of fertile stems acuminate, to 2.5 mm long. *O. shevockii* Lewinsky-Haapasaari & D. H. Norris
         7. Leaves monomorphic.
            8. Leaf apex obtuse, dentate; aquatic. *O. rivulare* Turn.
            8. Leaf apex acute or narrowly obtuse, entire or nearly so; terrestrial.
               9. Endostome none or rudimentary; leaves 2.5-4 mm long; on rocks. *O. cupulatum* Brid.
               9. Endostome well developed; leaves 1-3.5 mm long; on bark.
                  10. Base of capsule truncate, with seta attachment recessed; exostome teeth separate, 16; leaves 2-3.5 mm long, one margin recurved for 0.5-0.7 of leaf length, the other margin plane or weakly recurved near base. *O. underwoodii* Garilleti, Lara and Mazimpaka
                  10. Base of capsule long-tapered; exostome teeth joined in 8 pairs; leaves 1-3 mm long, both margins recurved or revolute for most of their length.
                     11. Capsules exserted, leaf apices blunt or acute. *O. coulteri* Mitt.
                     11. Capsules immersed, leaf apices various.
                        12. At least some leaves with channelled apices. *O. norrisii* F. Lara, R. Medina & Garilleti
                        12. Leaves without channelled apices.
                           13. Leaf apices obtuse or rounded and frequently cucullate. *O. cucullatum* F. Lara, R. Medina & Garilleti
                           13. Leaf apices acute to acuminate, never rounded and cucullate. *O. franciscanum* F. Lara, R. Medina & Garilleti
      6. Stomata superficial; basal cells elongate, with thick ± nodose walls.
         11. Leaves bistratose, margins plane. *O. bolanderi* Sull.
         11. Leaves unistratose, margins revolute at least near middle (sometimes plane in *O. lyellii*).

12. Leaf margins plane or revolute only in widest part of leaf; dioecious; brood bodies sometimes formed on leaves; usually on bark.
    13. Leaves long-acuminate, margins plane or revolute only in widest part of leaf. *O. lyellii* Hook. & Tayl.
    13. Leaves obtuse or rounded, margins plane or incurved. *O. obtusifolium* Brid.
12. Leaf margins revolute almost to the apex; monoecious; brood bodies never formed.
    14. Segments rudimentary or absent; exostome teeth erect or spreading (reflexed with age); on rock. *O. rupestre* Schleich. ex Schwaegr.
    14. Segments almost as long as teeth; teeth reflexed; on bark.
        15. Capsules immersed or emergent. *O. affine* Brid.
        15. Capsules exserted. *O. speciosum* Nees in Sturm

Orthotrichum affine Brid. [*Lewinskya affinis* (Brid.) F. Lara, Garilleti & Goffinet] xxx. Yurky (1995).
Note: According to Vitt (1973), this is a montane species, not found in the Bay Area.
Distribution: Mar (Yurky 1995)

Orthotrichum bolanderi Sull. [*Lewinskya bolanderi* (Sull.) F. Lara, Garilleti & Goffinet] Vertical rock faces, mixed forest. Koch (1950), Koch and Ikenberry (1954), Steere et al. (1954), Thompson and Ketchledge (1958), Vitt (1973), Yurky (1995), Norris and Shevock (2004).
Distribution: Son (Vitt 1973, Norris and Shevock 2004) Mar (Yurky 1995) Sol (Koch and Ikenberry 1954) CC (Steere et al. 1954) Ala (Koch 1950) SM (Vitt 1973, Steere et al. 1954) SCla (*Whittemore 4279*, CAS, MO)

Orthotrichum coulteri Mitt. Bark of trees. Medina et al. (2013).
Distribution: Son (Medina et al. 2013) Mar (Medina et al. 2013) CC (Medina et al. 2013) Ala (Medina et al. 2013) SF (Medina et al. 2013) SM (Medina et al. 2013) SCla (Medina et al. 2013) SCz (Medina et al. 2013)

Orthotrichum columbicum Mitt. Upper side of limbs of *Acer*, redwood forest; also exotic trees in cities. Medina et al. (2012).
Distribution: CC (Medina et al. 2012)

Orthotrichum consimile Mitt. On upper side of limbs of trees, in native forests and in cities. Reported from the area by Howe (1896), Koch (1950), Vitt (1973), Yurky (1995), Shevock and Toren (2001), Norris and Shevock (2004). Reports are from several counties: Son (*Whittemore 802*, atw) Mar (Howe 1896, Vitt 1973, Koch 1950, Yurky 1995, Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) "Santa Cruz Mts." (Koch 1950)
Note: Medina et al. (2012) split this into several species. They cite two of the segregates, *O. columbicum* and *O. persimile*, from the Bay Area, but *O. consimile* itself is cited only from farther north. However, they do not investigate its range in detail, so *O. consimile* should be looked for here.

Orthotrichum cucullatum F. Lara, R. Medina & Garilleti. Bark of trees. Medina et al. (2013).
Distribution: CC (Medina et al. 2013) Ala (Medina et al. 2013) SF (Medina et al. 2013) SM (Medina et al. 2013) SCz (Medina et al. 2013)

Orthotrichum cupulatum Brid. Marble boulders. Vitt (1973), Kellman (2003), Norris and Shevock (2004).
Note: Vitt (1973) lists *O. cupulatum* from Santa Clara County, but the site he lists ("Fall Creek, near Felton") is in Santa Cruz County.
Distribution: SCz (Vitt 1973, Kellman 2003, Norris and Shevock 2004)

Orthotrichum diaphanum Brid. Trunks of trees and concrete. Vitt (1973), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Ala (*Whittemore 3346B*, atw) SF (Shevock and Toren 2001, Norris and

Shevock 2004) SCla (Vitt 1973) SCz (Kellman 2003, Norris and Shevock 2004)

Orthotrichum franciscanum F. Lara, R. Medina & Garilleti Bark of trees. Medina et al. (2013).
Distribution: Napa (Medina et al. 2013) CC (Medina et al. 2013) Ala (Medina et al. 2013) SF (Medina et al. 2013) SCla (Medina et al. 2013).

Orthotrichum lyellii Hook. & Tayl. [*Orthotrichum lyellii* var. *papillosum* (Hampe) Lesq. & James, *O. lyellii* var. *pringlei* (C. Müll.) Mac. & Kindb., *O. papillosum* Hampe; *Pulvigera lyellii* (Hook. & Taylor) Plásek, Sawicki & Ochyra, *Pulvigera papillosa* (Hampe) F. Lara, Draper & Garilleti, *Pulvigera pringlei* (Müll. Hal.) F. Lara, Draper & Garilleti] Trunks and branches of trees and shrubs, rarely rock, many habitats. Steere et al. (1954), Thompson and Ketchledge (1958), Vitt (1973), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Kellman (2003), Norris and Shevock (2004).
Note: There are well-marked differences between the gemmiparous form (*O. lyellii s. str.*) and the large plants of more humid habitats, which never have gemmae (sometimes separated as *O. papillosum*). Most Bay Area material would be referable to *O. papillosum*. More recently, Lara et al. (2020), treating these plants in the small segregate genus *Pulvigera*, have treated *O. papillosum* as two species, *P. papillosa* and *P. pringlei*, distinguished by very minor differences in the sporophytes. I have not re-evaluated this material recently.
Distribution: Son (*Whittemore 6673*, CAS) Mar (Yurky 1995) CC (*Whittemore 6788*, CAS) SF (Shevock and Toren 2001) SM (*Whittemore 6919*, tbd) SCla (*Whittemore 4267*, CAS) Stanis (*Whittemore 6569*, CAS) SCz (*Whittemore 6770*, CAS)

Orthotrichum norrisii F. Lara, R. Medina & Garilleti. Bark of trees. Medina et al. (2008).
Note: This species is very close to *Orthotrichum tenellum* Bruch ex Brid., and might best be considered a synonym of it.
Distribution: SCla (Medina et al. 2008)

Orthotrichum obtusifolium Brid. [*Nyholmiella obtusifolia* (Brid.) Holmen & E. Warncke] On bark. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Orthotrichum persimile F. Lara, R. Medina B. & Garilleti Upper side of limbs of *Acer*, redwood forest; also exotic trees in cities. Medina et al. (2012).
Distribution: Mar (Medina et al. 2012) SCz (Medina et al. 2012)

Orthotrichum rivulare Turn. Rocks along streams. Koch (1950), Steere et al. (1954), Thompson and Ketchledge (1958), Vitt (1973), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001) SCla (Koch 1950, Steere et al. 1954, Thompson and Ketchledge 1958) SCz (Kellman 2003, Norris and Shevock 2004)

Orthotrichum rupestre Schleich. ex Schwaegr. [*O. texanum* Sull., *Lewinskya rupestris* (Schleich. ex Schwaegr.) F. Lara, Garilleti & Goffinet] Dry rock outcrops, mixed evergreen forest. Koch (1950), Vitt (1973), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) Napa (Koch 1950) Ala (Koch 1950) SM (*Whittemore 3370*, atw) SCla (*Whittemore 4276*, CAS) SCz (Kellman 2003)

Orthotrichum shevockii Lewinsky-Haapasaari & D. H. Norris, [*Orthotrichum kellmanii* Norris, Shevock & Goffinet] Sandstone outcrops. Norris et al. (2004), Vigalondo et al. (2019).
Distribution: SM (Norris et al. 2004) SCz (Norris et al. 2004)

Orthotrichum speciosum Nees in Sturm [*Lewinskya speciosa* (Nees in Sturm) F. Lara, Garilleti & Goffinet] xxx. Norris and Shevock (2004).
Distribution: Mar (Norris and Shevock 2004)

Orthotrichum underwoodii Garilleti, Lara and Mazimpaka On trees. Garilleti et al. (2001), Kellman (2003), Norris and Shevock (2004).
Note: Garilleti et al. (2001) place the type and paratype in Santa Clara Co. in one place, Santa Cruz Co. in another; Kellman (2003) points out that they are from Santa Clara Co.
Distribution: SCla (Garilleti et al. 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Ulota phyllantha Brid. xxx. Norris and Shevock (2004).
Distribution: Mar (Norris and Shevock 2004)

Key to species of *Zygodon*
1. Leaves smooth, acute, strongly twisted when dry. *Z. menziesii* (Schwaegr.) Arnott
1. Leaves papillose, sharply apiculate, erect or weakly contorted when dry.
   2. Gemmae without longitudinal cell walls; stem often felted with tangled rhizoids; leaves green to yellow-green. *Z. rupestris* (Hartm. f.) Norrl.
   2. Gemmae with some longitudinal cell walls; stem seldom felted with tangled rhizoids; leaves green to dark green. *Z. viridissimus* (Dicks.) Brid.

Zygodon menziesii (Schwaegr.) Arnott Trunks of trees in an urban park. Crum (1957), Thompson and Ketchledge (1958), Shevock and Toren (2001), Norris and Shevock (2004).
Note: This species, native to the southern hemisphere, is surely introduced.
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004)

Zygodon rupestris (Hartm. f.) Norrl. On bark , redwood forest; also, exotic trees in an urban park. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Zygodon viridissimus (Dicks.) Brid. Bark and logs, redwood forest. Crum (1957), Thompson and Ketchledge (1958).
Note: *Zygodon rupestris* has sometimes been treated as a synonym of this species; these old reports may be based on material of *Z. rupestris*.
Distribution: SCz (Crum 1957, Thompson and Ketchledge 1958)

Hedwigiaceae

Key to genera
1. Capsule immersed; hair point of leaf broad at base, dry plants very hoary; adaxial leaf papillae 2-4 per cell and simple, or 1 per cell and multifid. *Hedwigia*
1. Capsule exserted; hair point of leaf slender to base, dry plants scarcely hoary; adaxial leaf papillae 1-2 per cell, simple or forked. *Pseudobraunia*

Key to species of *Hedwigia*
1. Abaxial surface of distal leaf with (1-)2-4 small, simple papillae per cell; perichaetial leaves ciliate. *H. ciliata* (Hedw.) P. Beauv.
1. Abaxial surface of distal leaf with 1(-2) large, branched papillae per cell.
   2. Perichaetial leaves entire; hyaline leaf apex erect when dry. *H. detonsa* (M. A. Howe) Buck & Norris
   2. Perichaetial leaves ciliate; hyaline leaf apex usually spreading or recurved when dry. *H. stellata* Hedenäs

Hedwigia ciliata (Hedw.) P. Beauv. [*H. albicans* (Web.) Lindb. basionym prehedwigian] Exposed rock. Howe (1897), Steere et al. (1954), Yurky (1995).
Note: Some of these reports may be referrable to other species of *Hedwigia*.
Distribution: Mar (Howe 1897, Yurky 1995) CC (Howe 1897) Ala (Howe 1897) SCla (Steere et al. 1954)

Hedwigia detonsa (M. A. Howe) Buck & Norris [*H. albicans* var. *detonsa* M. A. Howe] Dry rock outcrops, mixed forest. Howe (1897), Buck and Norris (1996), Norris and Shevock (2004).
Distribution: Son (Buck and Norris 1996) Mar (Buck and Norris 1996) Napa (Buck and Norris 1996) Sol (Buck and Norris 1996) CC (Buck and Norris 1996) Ala (*Whittemore 5449*,

CAS) SCla (*Whittemore 4273*, CAS) Stanis (*Whittemore 6597*, CAS)

Hedwigia stellata Hedenäs Dry rock. Buck and Norris (1996, Norris and Shevock 2004), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Buck and Norris 1996) CC (Buck and Norris 1996, Norris and Shevock 2004) Ala (Buck and Norris 1996) SCz (Kellman 2003, Norris and Shevock 2004)

Pseudobraunia californica (Lesq.) Broth. [*Braunia californica* Lesq., *Hedwigia californica* (Lesq.) Kindb.] Dry rock, mixed evergreen forest. Howe (1897), Steere et al. (1954), Thompson and Ketchledge (1958), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6687*, CAS) Mar (Howe 1897, Yurky 1995) CC (Lesquereux 1868) Ala (*Whittemore 5450*, CAS) SM (*Whittemore 5270*, CAS) SCla (*Whittemore 6121*, tbd) SCz (Kellman 2003) Stanis (*Whittemore 6598*, CAS)

HYPNALES

Fontinalaceae

Key to species of *Fontinalis*

1. Perichaetial leaves broadly obtuse or rounded; shoot apices ± loosely foliate. *F. antipyretica* Hedw.
1. Perichaetial leaves apiculate or short-acuminate; leaves of shoot apices tightly imbricate. *F. neomexicana* Sull. & Lesq.

Fontinalis antipyretica Hedw. var. *antipyretica* Rock and dead branches in streams where ± permanently submerged. Welch (1960), Norris and Shevock (2004).
Distribution: Mar (Welch 1960, Norris and Shevock 2004) CC (Welch 1960) SM (*Whittemore B294*, atw)

Fontinalis neomexicana Sull. & Lesq. On rocks in fast-moving streams. Koch (1950), Welch (1960), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Napa (Welch 1960) SF (Welch 1960, Shevock and Toren 2001) SCz (Koch 1950, Welch 1960, Kellman 2003, Norris and Shevock 2004)

Leucodontaceae

Key to genera

1. Stems densely paraphyllose.
    2. Plant sparsely and irregularly pinnate, without a differentiated stipe; costa ending at midleaf or below; leaf cells smooth. see *Neckera californica* Hook. & Arn. (Neckeraceae)
    2. Plant densely regularly pinnate above an unbranched stipe; costa reaching almost to leaf apex; leaf cells strongly papillose. *Dendroalsia*
1. Stems without paraphyllia.
    3. Costa single and long, or triple, with the middle costa long and the lateral ones short. *Antitrichia*
    3. Costa double, short. *Pterogonium*

Key to species of *Antitrichia*

1. Shoots julaceous; supplementary costae usually absent or poorly developed; walls of leaf cells not or weakly pitted. *A. californica* Sull. in Lesq.
1. Shoots not julaceous; supplementary costae well developed; walls of leaf cells strongly pitted. *A. curtipendula* (Hedw.) Brid.

Antitrichia californica Sull. in Lesq. Seasonally dry bark of broadleaf trees and rock outcrops in forest. Lesquereux (1868), Anonymous (1924), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003).

Distribution: Son (*Whittemore 6671*, CAS) Mar (Yurky 1995) CC (*Whittemore 6790*, CAS) Ala (*Whittemore 4235*, CAS) SF (Shevock and Toren 2001) SM (*Whittemore 4387,* atw) SCla (*Whittemore 4264*, CAS) SCz (*Whittemore 6775*, CAS) Stanis (*Whittemore 6580*, tbd)

Antitrichia curtipendula (Hedw.) Brid. [*Antitrichia gigantea* (Ren. & Card.) Kindb.] Bark of *Cupressus* on foggy ridgetop. Lesquereux (1868), Koch (1950), Thompson and Ketchledge (1958), Norris and Shevock (2004).
Distribution: CC (Lesquereux 1868) SM (*Whittemore B195*, atw) SCla (Thompson and Ketchledge 1958)

Dendroalsia abietina (Hook.) Britt. Seasonally dry bark of broadleaf trees in forest. Anonymous (1924), Koch and Ikenberry (1954), Thompson and Ketchledge (1958), Manuel (1974), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6692*, CAS) Mar (Koch and Ikenberry 1954, Manuel 1974, Yurky 1995) Napa (Manuel 1974) CC (*Whittemore 6802*, CAS) Ala (*Whittemore 4236*, CAS) SF (Manuel 1974) SM (*Whittemore 4389*, atw) SCla (*Whittemore 4265*, CAS) SCz (*Whittemore 6772*, CAS)

Pterogonium gracile (Hedw.) Smith Seasonally dry bark and rock in open forest and shrubland. Lesquereux (1868), Koch and Ikenberry (1954), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003).
Distribution: Son (*Whittemore 6690*, CAS) Mar (Koch and Ikenberry 1954, Yurky 1995) CC (*Whittemore 6969*, tbd) Ala (*Whittemore 4234*, CAS) SF (Shevock and Toren 2001) SM (*Whittemore 4391*, atw) SCla (*Whittemore 4275*, CAS) SCz (*Whittemore 3303*, atw) Stanis (*Whittemore 6599*, CAS)

Neckeraceae

Key to genera

1. Leaves not plane, either concave or transversely wrinkled. Paraphyllia present or absent. Seta short, not geotropic (i.e. growing straight out from perigonium, usually horizontal or descending). *Neckera*
1. Leaves plane. Paraphyllia absent. Seta long, negatively geotropic (i.e. growing straight up, regardless of the orientation of the plant).
    2. Leaves to 3 mm long, margins coarsely serrate; shoots very strongly complanate. *Porotrichum*
    2. Leaves to 1 mm long, margins finely serrulate; shoots weakly complanate. *Bryolawtonia*

Bryolawtonia vancouveriensis (Kindb. in Mac.) Norris & Enroth [*Bestia holzingeri* (Ren. & Card.) Broth. in Engl. & Prantl, *B. occidentalis* (Sull. & Lesq.) Grout *nom. illegit.*, *Porotrichum vancouveriensis* (Kindb. in Mac.) Crum, *Thamnium holzingeri* Ren. & Card.] Shaded bark and xxx in redwood forest. Howe (1896), Koch (1950), Koch and Ikenberry (1954), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Ala (Norris and Shevock 2004) Mar (Howe 1896, Koch and Ikenberry 1954, Yurky 1995, Norris and Shevock 2004) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 6727*, CAS) SCz (*Whittemore 3477*, CAS)

Key to species of *Neckera*

1. Shoots not or weakly complanate, leaves concave, never transversely wrinkled. Paraphyllia abundant; costa ending at midleaf or below. *N. californica* Hook. & Arn.
1. Shoots strongly complanate, leaves transversely wrinkled.
    2. Paraphyllia none; costa short and double. *N. douglasii* Hook.
    2. Paraphyllia abundant; costa single, long. *N. menziesii* Hook in Drumm.

Neckera californica Hook. & Arn. [*Alsia californica* (Hook. & Arn.) Sull.] Seasonally dry bark of broadleaf trees in coniferous or mixed forest. Koch (1954), Koch and Ikenberry (1954), Thompson and Ketchledge (1958), Manuel (1974), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 803*, atw) Mar (Koch 1954, Koch and Ikenberry 1954, Manuel 1974, Yurky 1995) CC (*Whittemore 6801*, CAS) Ala (*Whittemore 6555*, CAS) SF (Koch 1954, Manuel 1974, Shevock and Toren 2001) SM (*Whittemore 4390*, atw) SCla (*Whittemore 4309*, CAS) SCz (*Whittemore 4420*, CAS)

Neckera douglasii Hook. Bark of broadleaved trees, redwood forest. Lesquereux (1868), Koch (1950), Koch and Ikenberry (1954), Thompson and Ketchledge (1958), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Lesquereux 1868, Koch and Ikenberry 1954, Yurky 1995, Norris and Shevock 2004) SM (*Whittemore 4114*, MO) SCla (Thompson and Ketchledge 1958) SCz (Thompson and Ketchledge 1958, Kellman 2003, Norris and Shevock 2004)

Neckera menziesii Hook in Drumm. Shaded limestone outcrops. [*Neckeradelphus menziesii* (Hook.) Steere, *Metaneckera menziesii* (Hook.) Steere] Koch (1950), Koch and Ikenberry (1954), Thompson and Ketchledge (1958), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Koch and Ikenberry 1954, Yurky 1995) SCla (*Whittemore 6923*, tbd) SCz (Thompson and Ketchledge 1958, Kellman 2003, Norris and Shevock 2004)

Porotrichum bigelovii (Sull.) Kindb. [*Porothamnium bigelovii* (Sull.) Fleisch. ex Broth. in E. & P.] Damp shaded soil, roots and stones along streams, redwood forest. Koch (1950), Koch and Ikenberry (1954), Steere et al. (1954), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003).
Distribution: Mar (Koch 1950, Koch and Ikenberry 1954, Yurky 1995) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4383*, atw) SCla (Thompson and Ketchledge 1958) SCz (*Whittemore 3316*, atw)

Hookeriaceae

Hookeria lucens (Hedw.) Smith Koch (1950).
Note: This report is probably erroneous. Lesquereux (1868) reports a Bolander collection of the eastern *H. acutifolia* Hook. without locality, and Watson (1880) gives the locality as Mt. Diablo; Koch (1950) says this "was probably based on one of Bolander's collections of *H. lucens*." *Hookeria lucens* grows in wet coastal forests from Mendocino County northward; its presence in the Bay Area has never been confirmed, and Mt. Diablo would be a very unlikely station for this very hygric species.
Distribution: CC (Koch 1950)

Lembophyllaceae

Key to genera
1. Alar cells not abruptly differentiated from adjacent cells; leaf cells 1-3(-4.5) times as long as wide. *Bestia*
1. Alar cells sharply differentiated from the longer, thinner-walled cells above them; some leaf cells (at least those near the costa in distal part of leaf) at least four times as long as wide. *Isothecium*

Bestia longipes (Sull. & Lesq.) Broth. [*Alsia longipes* Sull. & Lesq.] On shaded bark and rocks in canyons, live oak forest. Lesquereux (1868), Koch (1950), Yurky (1995), Kellman (2003), Norris and Shevock (2004), Shevock et al. (2009).
Distribution: Son (Shevock et al. 2009), Mar (Yurky 1995, Shevock et al. 2009), Napa (Shevock et al. 2009), CC (*Whittemore 6972*, tbd) Ala (*Whittemore 5295*, CAS) SM

(*Whittemore 3114*, CAS) SCla (*Whittemore 5323*, CAS) SCz (Kellman 2003, Norris and Shevock 2004, Shevock et al. 2009)

Key to species of *Isothecium*
1. Alar region 0.25-0.3 of leaf length; stems always julaceous; leaves always widest near middle. *I. cristatum* (Hampe) H. Rob.
1. Alar region 0.1-0.2 of leaf length; stems julaceous or not; leaves usually widest near base. *I. myosuroides* Brid.

Isothecium cristatum (Hampe) H. Rob. [*Bestia breweriana* (Lesq.) Grout, *B. cristata* (Hampe) L. F. Koch, *Isothecium brewerianum* (Lesq.) Macoun & Kindb., *Hypnum aggregatum* Mitt., *H. brewerianum* Lesq., *Isothecium cristatum* var. *lutescens* (Lesq. & James) Crum et al., *Isothecium howei* Kindb.] Shaded rocks and rotting logs, reported from soil, evergreen forest. Lesquereux (1868), Howe (1896, 1897), Koch and Ikenberry (1954), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Howe 1897, Norris and Shevock 2004) Mar (Howe 1896, 1897, Koch 1950, Koch and Ikenberry 1954, Yurky 1995, Norris and Shevock 2004) Ala (Lesquereux 1868, Koch and Ikenberry 1954) SF (Lesquereux 1868, Howe 1897, Koch 1950, Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 3389*, MO) SCz (Kellman 2003, Norris and Shevock 2004)

Isothecium myosuroides Brid. [*Hypnum myosuroides* L. basionym prehedwigian, *I. obtusatulum* Kindb., *Isothecium spiculiferum* (Mitt.) Ren. & Card., *Pseudisothecium stoloniferum* (Brid.) Grout] On soil, rock, tree trunks or rotting logs, open shade or broken sun, evergreen forests, rarely deciduous riparian woodlands near the coast. Lesquereux (1868), Anonymous (1924), Koch and Ikenberry (1954), Yurky (1995), Allen and Whittemore (1996), Kellman (2003), Norris and Shevock (2004).
Note: This probably should be broken up into two or more species. Just sorting the specimens by growth form, however, doesn't seem to result in a natural subdivision.
Distribution: Son (*Whittemore 6707*, MO) Mar (Koch and Ikenberry 1954, Yurky 1995) CC (*Whittemore 6791*, CAS) SF (Shevock and Toren 2001) SM (*Whittemore 3328*, MO) SCla (*Whittemore 6651*, CAS) SCz (*Whittemore 3479*, MO)

Fabroniaceae

Key to species of *Fabronia*
1. Marginal teeth of leaves always unicellular. *F. ciliaris* (Brid.) Brid.
1. The largest marginal teeth of leaves multicellular. *F. pusilla* Raddi

Fabronia ciliaris (Brid.) Brid. Norris and Shevock (2004) report this from Lake and Monterey Counties, so it should be expected in the Bay Area.

Fabronia pusilla Raddi Underside of leaning trunks or limbs of oaks, or below overhangs on rock faces, live oak or mixed forest. Lesquereux (1868), Howe (1896), Thompson and Ketchledge (1958), Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004) Ala (*Whittemore 5440*, CAS) SM (*Whittemore 3476*, CAS) SCla (*Whittemore 6065*, tbd) SCz (Kellman 2003)

Leskeaceae

Key to genera
1. Costa single, extending most of leaf length. *Claopodium*
1. Costa short and double.
   2. Branching irregular; stems without paraphyllia; costae less than 1/4 of leaf length. *Pterigynandrum*

2. Branching regularly pinnate; stems with scattered paraphyllia; costae usually 1/3 - 1/2 of leaf length. *Heterocladium*

Key to species of *Claopodium*

1. Leaves not piliferous. Stem 2-4 cm long; stem leaves 0.5-1 mm long. *C. whippleanum* (Sull. in Whipple & Ives) Ren. & Card.
1. Leaves piliferous. Stem 3-8 cm long; stem leaves 1-2 mm long.
   2. Cells with 2-5 papillae on each surface. *C. bolanderi* Best
   2. Cells with 1 papilla on each surface. *C. crispifolium* (Hook.) Ren. & Card.

Claopodium bolanderi Best xxx. Koch (1950), Yurky (1995), Norris and Shevock (2004).
Distribution: Mar (Koch 1950, Yurky 1995, Norris and Shevock 2004)

Claopodium crispifolium (Hook.) Ren. & Card. [*Hypnum crispifolium* Hook.] xxx. Lesquereux (1868), Watson (1880), Koch (1950), Noguchi (1964), Yurky (1995), Norris and Shevock (2004).
Note: Noguchi (1964) lists "San Francisco: Pilarcitos Canyon below Lake Pilarcitos;" this locality is in San Mateo County, not San Francisco.
Distribution: Mar (Watson 1880, Yurky 1995, Norris and Shevock 2004) Ala (Lesquereux 1868) SM (Koch 1950, 1951, Noguchi 1964, Norris and Shevock 2004)

Claopodium whippleanum (Sull.) Ren. & Card. [*Hypnum leuconeurum* Sull. & Lesq., *Claopodium leuconeurum* (Sull. & Lesq.) Renauld & Cardot] Soil of banks and slopes, or occasionally rocks, evergreen or mixed forests. Lesquereux (1868), Koch and Ikenberry (1954), Steere et al. (1954), Thompson and Ketchledge (1958), Noguchi (1964), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6688*, CAS) Mar (Koch and Ikenberry 1954, Noguchi 1964, Yurky 1995) CC (*Whittemore 6794*, CAS) Ala (Lesquereux 1868) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4372*, atw) SCla (*Whittemore 4312*, CAS) SCz (*Whittemore 3487*, CAS)

Heterocladium dimorphum (Brid.) Schimp. in B.S.G. Tree trunks. Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004)

Pterigynandrum filiforme Hedw. xxx. Koch (1950).
Distribution: SF (Koch 1950)

Amblystegiaceae

Key to genera

1. Leaves broadly elliptical or almost circular, obtuse or rounded-obtuse; costa double on at least some leaves.
   2. Costa completely absent. *Calliergonella*
   2. Costa double, at least in some leaves. *Hygrohypnum*
1. Leaves lanceolate, acute or acuminate; costa always single.
   2. Leaves straight.
      3. Costa present, at least half the leaf length. *Amblystegium*
      3. Costa absent. *Platydictya*
   2. Leaves strongly falcate-secund, at least near tips of stems.
      3. Leaves completely entire; rhizoid-initial cells absent from leaf. *Drepanocladus*
      3. Leaves finely serrate or serrulate, at least near the apex; rhizoid-initial cells present in leaf. *Warnstorfia*

Key to species of *Amblystegium*

1. Costa very strong, excurrent. *A. tenax* (Hedw.) C. Jens.
1. Costa weaker, ending below apex.
    2. Leaves entire, 2-6 mm long. *A. riparium* (Hedw.) Schimp. in B.S.G.
    2. Leaves serrulate, 0.7-1.2 mm long.
        3. Leaves patent. *A. serpens* (Hedw.) Schimp. in B.S.G.
        3. Leaves spreading. *A. juratzkanum* Schimp.

Amblystegium juratzkanum Schimp. Moist soil, stones, wood, pool in garden. Steere et al. (1954), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Steere et al. 1954, Shevock and Toren 2001) SCla (Norris and Shevock 2004) SCz (Kellman 2003)

Amblystegium riparium (Hedw.) Schimp. in B.S.G. [*Leptodictyum riparium* (Hedw.) Warnst.] Submerged in shady pools of running streams. Lesquereux (1868), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995) Ala (Lesquereux 1868) SF (Shevock and Toren 2001, Norris and Shevock 2004) SCla (*Whittemore 6942*, tbd) SCz (Kellman 2003)

Amblystegium serpens (Hedw.) Schimp. in B.S.G. Lawns, tree bases, soil, and concrete retaining walls. Vaarama (1953), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) Ala (Vaarama 1953) SCz (Kellman 2003)

Amblystegium tenax (Hedw.) C. Jens. [*A. irriguum* (Hook. & Wils.) Schimp. in B.S.G., *Hygroamblystegium irriguum* (Hook. & Wils.) Loeske, *H. tenax* (Hedw.) Jenn.] Submerged rocks in a garden.
Distribution: SF (Steere et al. 1954, Shevock and Toren 2001).

Amblystegium varium (Hedw.) Lindb. [*Orthotheciella varia* (Hedw.) Ochyra] Sandstone in river. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Calliergonella cuspidata (Hedw.) Loeske Lawns, grassy areas, banks of creeks. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SCz (Kellman 2003, Norris and Shevock 2004)

Drepanocladus aduncus (Hedw.) Warnst. Ponds, streams, swamps and wet lawns. Lesquereux (1868), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Lesquereux 1868, Norris and Shevock 2004) SCla (*Whittemore 6944*, tbd) SCz (Kellman 2003)

Hygrohypnum bestii (Ren. & Bryhn. in Ren.) Broth. xxx. Jamieson (1976), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Jamieson 1976, Yurky 1995) SCz (Kellman 2003, Norris and Shevock 2004)

Platydictya jungermannioides (Brid.) Crum Moist soil and rotting wood. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Warnstorfia exannulata (B. S. G.) Loeske [*Drepanocladus exannulatus* (B. S. G.) Warnst.] Probably an erroneous report. Wynne (1944).
Distribution: Wynne (1944) maps a locality in the northern Bay Area (in or near Sonoma County). This is surely a mis-mapping of the Mendocino County specimens cited by Wynne

(1942); the 1944 map has no dots in Mendocino County.

Brachytheciaceae

Key to genera

1. Alar cells small, quadrate, thick-walled.
    2. Stem leaves strongly decurrent, with thick-walled alar cells; branch leaves nondecurrent, without differentiated alar cells. *Scleropodium californicum*
    2. Leaves never strongly decurrent; stem and branch leaves both with small, quadrate, thick-walled alar cells. see **Lembophyllaceae**
1. Alar cells thin-walled, variously shaped.
    4. Leaves broadly ovate to elliptical, broadly acute, obtuse, or apiculate.
        5. Leaves weakly serrate, concave. *Scleropodium*
        5. Leaves strongly serrate, never concave. *Rhynchostegium*
    4. Leaves narrowly ovate to lanceolate or triangular, narrowly acute or acuminate.
        6. Leaves narrowly triangular, very strongly plicate; dry plants golden. *Homalothecium*
        6. Leaves ovate or lanceolate, smooth or less strongly plicate; dry plants green or yellowish.
            7. Stem and branch leaves differing in shape; costa spurred. *Eurhynchium*
            7. Stem and branch leaves similar in shape; costa not spurred? *Brachythecium*

Key to species of *Brachythecium*

1. Stem leaves moderately to strongly plicate, deeply concave at base, 1.5-3 mm; alar cells large, lax, often inflated; in wet habitats.
    2. Stem leaves lanceolate to lance-ovate, moderately concave; seta smooth. *B. salebrosum* (Web. & Mohr) Schimp. in B.S.G.
    2. Stem leaves lance-ovate to triangular, 2-2.5 mm long, deeply concave at base; seta very rough.
        3. Leaves long-acuminate, patent, shoots distally tapered. *B. asperrimum* (Mitt.) Sull.
        3. Leaves short-acuminate, patent or spreading, shoots not tapered. *B. frigidum* (C. Müll.) Besch.
1. Stem leaves not to very weakly plicate, plane to moderately concave, 0.7-3 mm; alar cells oblong or quadrate, never lax or inflated; in seasonally dry habitats.
    4. Leaves strongly toothed, asymmetrical (either falcate or with the blade much wider on one side of the midrib), often well under 1 mm long.
        5. Leaf cells 30-45 μm; dioecious. *B. bolanderi* (Lesq.) Jaeg. & Sauerb.
        5. Leaf cells 45-90 μm; autoecious. *B. velutinum* (Hedw.) Schimp. in B.S.G.
    4. Leaves entire or denticulate, straight, 1.5-3 mm long.
        6. Costa extending to apex or nearly so. *Brachythecium starkei* (Brid.) B.S.G. var. *pacificum* Lawt.
        6. Costa ending well below apex, usually less than 0.8 of leaf length.
            7. Alar cells oblong, poorly differentiated; leaves not strongly dimorphic, always denticulate; seta rough. *B. rutabulum* (Hedw.) Schimp. in B.S.G.
            7. Alar cells well differentiated, quadrate. xxx add *Brachythecium holzingeri* (Grout) Grout
                8. Alar cells clear, 12-16 μm wide; leaves not strongly dimorphic, entire or denticulate; seta smooth. *B. albicans* (Hedw.) Schimp. in B.S.G.
                8. Alar cells of stem leaves usually dense, 8-9 μm wide; leaves strongly dimorphic (stem leaves triangular, tapering from near the base, slenderly acuminate; branch leaves ovate-triangular, more broadly acuminate), always denticulate; seta rough. *Scleropodium californicum* (Lesq.) Kindb.

Brachythecium albicans (Hedw.) Schimp. in B.S.G. On soil, often beneath herbs, shaded banks, live oak forest, gardens. Yurky (1995), Kellman (2003), Norris and Shevock (2004).

Distribution: Mar (Yurky 1995) SM (*Whittemore 2961*, DAV, MO) SCla (*Whittemore 6044*, tbd) SCz (Kellman 2003)

Brachythecium asperrimum (Mitt.) Sull. On tree trunks, bases of trees and banks in open shade, usually near streams, also reported from wet lawns and urban grassy areas. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 2950A*, atw) SCla (*Whittemore 6052*, tbd) SCz (Kellman 2003, Norris and Shevock 2004)

Brachythecium bolanderi (Lesq.) Jaeg. & Sauerb. Soil, leaf litter, and rock. Lesquereux (1868), Howe (1896), Koch and Ikenberry (1954), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) Marin (Howe 1896) Ala (Lesquereux 1868) SM (*Whittemore 1392*, atw) SCla (*Whittemore 4259*, CAS) SCz (Kellman 2003, Norris and Shevock 2004)

Brachythecium frigidum (C. Müll.) Besch. [*B. lamprochryseum* C. Muell. & Kindb. in Mac. & Kindb., *B. washingtonianum* Eaton ex Grout] Bases of streambanks and on rocks in streams, where seasonally innundated. Crum (1957), Kellman (2003).
Distribution: SM (Crum 1957), SCla (*Whittemore 6136*, tbd) SCz (*Whittemore 3319*, DAV, MO)

Brachythecium holzingeri (Grout) Grout xxx. Norris and Shevock (2004).
Distribution: SCz (Norris and Shevock 2004)

Brachythecium rutabulum (Hedw.) Schimp. in B.S.G. Lawns and urban grassy areas. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Norris and Shevock 2004) SF (Shevock and Toren 2001) SCz (Kellman 2003, Norris and Shevock 2004)

Brachythecium salebrosum (Web. & Mohr) Schimp. in B.S.G. Seepy soil and rock. Shevock and Toren (2001).
Distribution: SF (Shevock and Toren 2001)

Brachythecium starkei (Brid.) B.S.G. var. *pacificum* Lawt. Submerged in small waterfall. Kellman (2003), Norris and Shevock (2004).
Distribution: SCz (Kellman 2003, Norris and Shevock 2004)

Brachythecium velutinum (Hedw.) Schimp. in B.S.G. Rock, soil and rotting wood. Yurky (1995), Kellman (2003).
Distribution: Mar (Yurky 1995) SCz (Kellman 2003)

Key to species of *Eurhynchium*

1. Leaf apex blunt or rounded, with a well-defined patch of short cells.
    2. Seta smooth; branching regularly pinnate; leaves evenly arranged around the stem; stem and branch leaves very strongly differentiated, stem leaves often triangular-ovate and tapering from near the base, branch leaves very variable, acute, obtuse, or rounded; plant appearing autoecious, but actually with epiphytic dwarf males. *E. pulchellum* (Hedw.) Jenn.
    2. Seta rough; branching irregularly pinnate; leaves usually loosely complanate; stem and branch leaves smaller than stem leaves but not very different in shape, ovate and commonly widest about 0.3 above the base, acute or acuminate; dioecious, male plants free-living, as large as females. *E. hians* (Hedw.) Sande Lac.
1. Leaf apex slenderly acuminate, apical cells not differentiated.
    2. Once pinnate, stem not or scarcely branched; branch leaves 1.0--2.0 mm long. *E. oreganum* (Sull.) Jaeg. & Sauerb.
    2. 1-2-pinnate, stem usually branching; branch leaves 0.6--1.0(--1.1) mm long. *E. praelongum* (Hedw.) Schimp. in B.S.G.

Eurhynchium hians (Hedw.) Sande Lac. Damp soil with leaf litter. Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001)

Eurhynchium oreganum (Sull.) Jaeg. & Sauerb. [*Kindbergia oreganum* (Sull.) Ochyra] Leaf litter on forest floor, redwood forest. Koch (1950), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) Mar (Yurky 1995) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM! (Koch 1950) SCz (Thompson and Ketchledge 1958, Kellman 2003, Norris and Shevock 2004)

Eurhynchium praelongum (Hedw.) Schimp. in B.S.G. [*E. stokesii* (Smith) Schimp. in B. S. G., *Kindbergia praelonga* (Hedw.) Ochyra] Damp soil, rock, or wood, usually near streams, sometimes regularly submerged, evergreen forest or deciduous riparian woodland. Koch and Ikenberry (1954), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Koch and Ikenberry 1954, Yurky 1995) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4396B*, atw) SCla (*Whittemore 6111*, tbd) SCz (*Whittemore 3312*, MO)

Eurhynchium pulchellum (Hedw.) Jenn. xxx. Yurky (1995).
Distribution: Mar (Yurky 1995)

Key to species of *Homalothecium*

1. Basal margins of stem leaves usually strongly dentate with remote, sharp, spreading or recurved teeth; branching densely regularly pinnate, stem normally tightly attached to substrate almost to its tip. *H. nuttallii* (Wils.) Jaeg.
1. Basal margins of stem leaves not or weakly dentate; branching various, stem usually attached to substrate only near its base or not at all.
    2. Alar region of stem leaves large (ca 10 cells on margin) at least on one side of leaf, cells clear, quadrate; plants densely regularly pinnate, sometimes loose and ± ascending. *H. aureum* (Spruce) Robins.
    2. Alar region of stem leaves smaller (5-6 cells on margin), usually extending higher within margin, cells ± obscure, quadrate to rounded or irregular; branching xxx.
        3. Capsule erect and straight, cilia none or rudimentary. *H. nevadense* (Lesq.) Ren. & Card.
        3. Capsule inclined and asymmetrical, cilia well developed.
            4. Stem leaves 1.5--2 mm; branch leaves 1--1.3 mm; stem leaves with 4-6 rows of short broad cells extending completely across leaf base; branching irregular. *H. arenarium* (Lesq.) Lawt.
            4. Stem leaves 3--4 mm; branch leaves 2.5--3 mm; stem leaves with basal cells not differentiated; branching xxx.
                5. xxx. *H. fulgescens* (Mitt. ex C. Müll.) Lawt.
                5. xxx. *H. aeneum* (Mitt.) Lawt.

Homalothecium aeneum (Mitt.) Lawt. On soil in grassland. Norris and Shevock (2004).
Distribution: Ala (Norris and Shevock 2004)

Homalothecium arenarium (Lesq.) Lawt. [*Camptothecium alsioides* Kindb., *C. arenarium* (Lesq.) Ren. & Card.] On sunny mineral soil or rock in dry shrubland. Lesquereux (1868), Howe (1896), Koch (1950), Lawton (1965), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (Norris and Shevock 2004) Mar (Koch 1950, Lawton 1965, Yurky 1995) Ala (*Whittemore 3355*, DAV) SF (Lesquereux 1868, Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 3280*, atw) SCla (*Whittemore 5471*, CAS) SCz (*Whittemore 1133A*, atw)

Homalothecium aureum (Spruce) Robins. [*Camptothecium amesiae* Ren. & Card., *C. pinnatifidum* (Sull.) Sull., *H. pinnatifidum* (Sull.) Lawt.] Forming loose masses on soil or rock in full or partial sun, dry shrubland or open oak or mixed woodland. Howe (1896, 1897), Koch

(1950), Thompson and Ketchledge (1958), Lawton (1965), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Note: Lawton (1965) lists *H. pinnatifidum* from "Alameda Co., Mt. Diablo," but Mt. Diablo is in Contra Costa County.
Distribution: Son (*Whittemore 6677*, CAS) CC (*Howe, N. Amer. Musci Pleuro. 28*, MO) Mar (Yurky 1995) SF (Lawton 1965) SM (*Whittemore 5268*, CAS) Ala (*Whittemore 5432*, MO) SCla (*Whittemore 4329*, CAS) SCz (Kellman 2003, Norris and Shevock 2004) Stanis (*Whittemore 6579*, tbd)

Homalothecium fulgescens (Mitt. ex C. Müll.) Lawt. xxx. Yurky (1995).
Distribution: Mar (Yurky 1995)

Homalothecium nevadense (Lesq.) Ren. & Card. Rock outcrops in dry woodland. Yurky (1995), Norris and Shevock (2004).
Distribution: Ala (Norris and Shevock 2004) Mar (Yurky 1995) SCla (*Whittemore 6119*, tbd)

Homalothecium nuttallii (Wils.) Jaeg. On bark of broadleaf trees, seldom on rock, concrete or brickwork, in sun or open shade, broadleaf or mixed deciduous or evergreen forests and woodlands. Koch and Ikenberry (1954), Thompson and Ketchledge (1958), Lawton (1965), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: Son (*Whittemore 6672*, CAS) Mar (Lawton 1965, Yurky 1995) CC (*Whittemore 6789*, CAS) Ala (*Whittemore 3348*, atw) SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4388*, atw) SCla (*Whittemore 4268*, CAS) SCz (*Whittemore 4425*, CAS)

Rhynchostegium riparioides (Hedw.) Card. in Tourr. [*R. rusciforme* (Neck.) Br. & Schimp. in B.S.G., basionym prehedwigian] Submerged rocks in creeks. Lesquereux (1868), Kellman (2003), Norris and Shevock (2004).
Distribution: CC (Lesquereux 1868) SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Scleropodium*

1. Leaves dimorphic: stem leaves triangular, tapering from near the base, slenderly acuminate; branch leaves ovate-triangular, more broadly acuminate. *S. californicum* (Lesq.) Kindb.
1. Leaves monomorphic, ovate or elliptical, widest well above the base, acute, obtuse or apiculate.
    2. Leaves deeply concave, folds surrounding concave center of leaf base always deep; leaf base with 1-2(-3) rows of quadrate cells.
        3. Leaves rounded to obtuse or sometimes with a small straight apiculus; costa not projecting; aquatic. *S. obtusifolium* (Jaeg.) Kindb. in Mac. & Kindb.
        3. Leaves (at least on some branches) ending in a recurved apiculus; tip of costa projecting as a spine; terrestrial. *S. tourretii* (Brid.) L. F. Koch
    2. Leaves much less concave, folds surrounding concave center of leaf base always shallower, often obscure; leaf base with 2-6 rows of quadrate cells. [This lead doesn't work well; many leaves have 2 rows of quadrate basal cells. Unworkable characters: Size of the alar region is variable, at least in *S. julaceum*; leaf size is much more variable than Lawton indicates]
        4. Capsule curved and ± asymmetrical; leaves triangular, apices obtuse or broadly acute, usually tightly imbricate when dry. *S. julaceum* Lawt.
        4. Capsule straight, ± symmetrical; leaves ovate to lance-ovate, apices acuminate, often loosely imbricate or even loosely spreading when dry. *S. cespitans* (C. Müll.) L. F. Koch

Scleropodium californicum (Lesq.) Kindb. On soil and leaf litter, occasionally rock, often beneath herbs or low shrubs, slopes and banks in live oak and mixed semievergreen or evergreen forests and occasionally chaparral. Lesquereux (1868), Howe (1896), Koch (1950), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and

Shevock (2004), Carter (2014).
Distribution: Son (*Rae 95-003*, MO) Mar (Yurky 1995, Norris and Shevock 2004) CC (*Whittemore 6800*, CAS) Ala (*Whittemore 2996*, CAS, MO) SF (Lesquereux 1868, Howe 1896, Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 3342*, atw) SCla (*Whittemore 5459*, CAS) SCz (Kellman 2003, Norris and Shevock 2004)

Scleropodium cespitans (C. Müll.) L. F. Koch [*Scleropodium cespitosum* (Wils.) Br. & Schimp. in B.S.G., basionym illegitimate] Trunks and bases of broadleaved trees or on rotten wood, in riparian forest. Lesquereux (1868), Koch and Ikenberry (1954), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004), Carter (2014).
Distribution: Son (Norris and Shevock 2004) Mar (Yurky 1995) Ala (*Whittemore 6554*, CAS) SF (Shevock and Toren 2001) SM (*Whittemore 2456*, atw) SCla (*Whittemore 6140*, tbd) SCz (*Whittemore 2995*, DAV)

Scleropodium julaceum Lawt. On soil or bark, often near intermittent streambeds, live oak forest or oak savanna. Lawton (1967), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004), Carter (2014).
Distribution: CC (*Whittemore 6799*, CAS) Ala (*Whittemore 3353*, CAS, MO) SF (Shevock and Toren 2001) SM (*Whittemore 3397A*, atw) SCla (*Whittemore 6061*, tbd) SCz (Kellman 2003, Norris and Shevock 2004) Stanis (*Whittemore 6574*, CAS)

Scleropodium obtusifolium (Jaeg.) Kindb. in Mac. & Kindb. On submerged rocks in streams, mixed evergreen forest or deciduous riparian forest. Howe (1896), Thompson and Ketchledge (1958), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Carter (2014).
Distribution: Mar (Yurky 1995) SF (Shevock and Toren 2001) SM (*Whittemore 4380*, atw) SCla (*Whittemore 6133*, tbd) SCz (Kellman 2003).
Note: This species has been split into two by Carter (2012, 2014), recognizing *S. obtusifolium* has larger leaves (typically >1.2 mm wide) and a weaker costa lacking a terminal spine, while *S. occidentale* has narrower leaves with a stronger, spine-tipped costa. Carter (2012) cites specimens of *Scleropodium occidentale* B. E. Carter from CC and SCz, but the map in Carter (2014) includes only SCz. I have not yet reviewed my specimens using his characters.

Scleropodium tourretii (Brid.) L. F. Koch [*S. colpophyllum* (Sull.) Grout, *S. illecebrum* (L.) Br. & Schimp. in B. S. G., nom. illegit.] On soil, less often rock, roots, and bases of trees, on shaded banks, slopes and intermittent streamcourses in evergreen or mixed forests. Watson (1880), Howe (1897), Yurky (1995), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004), Carter (2014).
Distribution: Son (*Whittemore 6711*, CAS) Mar (Howe 1897, Yurky 1995) CC (*Whittemore 6796*, CAS) Ala (*Whittemore 4242*, CAS) SF (Watson 1880, Shevock and Toren 2001) SM (*Whittemore 4386*, atw) SCla (*Whittemore 4314*, CAS) SCz (*Whittemore 4438*, CAS)

Sematophyllaceae

Sematophyllum adnatum (Michx.) E. G. Britt. Rotten logs. Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004)

Hypnaceae

Key to genera
1. Leaf cells short and lax; ventral leaves smaller than dorsal and lateral leaves. *Vesicularia*
1. Leaf cells narrower, at least distal cells linear or nearly so; ventral leaves not differentiated.
    2. Leaves strongly falcate-secund. *Hypnum*
    2. Leaves complanate but not falcate-secund.
        3. Alar region of leaf toothed. *Dacryophyllum*
        3. Alar region of leaf entire.
            4. Leaves decurrent. *Plagiothecium*

4. Leaves not decurrent. *Pseudotaxiphyllum*

Dacryophyllum falcifolium Ireland Shaded limestone. Ireland (2004), Norris and Shevock (2004).
Distribution: SCz (Ireland 2004, Norris and Shevock 2004)

Key to species of *Hypnum*
1. Stem with a hyalodermis. *H. subimponens* Lesq.
1. Stem without a hyalodermis; cortical cells all small and thick-walled.
   2. Alar region with few quadrate cells (1-3 on margin) above inflated cells. *H. circinale* Hook.
   2. Alar region with many quadrate cells (6-10 on margin) above inflated cells. *H. cupressiforme* Hedw.

Hypnum circinale Hook. On logs and bark. Koch (1950), Koch and Ikenberry (1954), Thompson and Ketchledge (1958), Ando (1976), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Koch and Ikenberry 1954, Yurky 1995, Norris and Shevock 2004) SM (*Whittemore 1100*, atw) SCz (Koch 1950, Thompson and Ketchledge 1958, Kellman 2003, Norris and Shevock 2004)
Hypnum cupressiforme Hedw. xxx. Koch (1950), Yurky (1995).
Distribution: Mar (Koch 1950)
Hypnum subimponens Lesq. Wet rocks. Lesquereux (1868), Koch (1950), Yurky (1995), Kellman (2003), Norris and Shevock (2004).
Distribution: Mar (Yurky 1995, Norris and Shevock 2004) Ala (Lesquereux 1868) SM (*Whittemore 4134*, atw) SCz (Kellman 2003, Norris and Shevock 2004)

Key to species of *Plagiothecium*
1. Leaf cells 10-13 μm wide, long-rhomboidal; capsules strongly inclined to horizontal, curved, when dry contracted below mouth and usually ± wrinkled-plicate. *P. denticulatum* (Hedw.) Schimp. in B.S.G.
1. Leaf cells 5-7 μm wide, linear-flexuose; capsules suberect, straight, smooth and not contracted below mouth when dry. *P. laetum* B. S. G.

Plagiothecium denticulatum (Hedw.) Schimp. in B.S.G. Howe (1896), Koch (1950), Yurky (1995), Norris and Shevock (2004).
Note: Prior to Ireland (1969b) *Plagiothecium laetum* was confused with *P. denticulatum*; these reports may be based on misidentified *P. laetum*.
Distribution: Mar (Howe 1896, Koch 1950) SM (Norris and Shevock 2004)
Plagiothecium laetum B. S. G. Damp shaded wood of decorticated logs, redwood forest. Ireland (1969b), Shevock and Toren (2001), Kellman (2003), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004) SM (*Whittemore 4149*, atw) SCz (Ireland 1969b, Kellman 2003, Norris and Shevock 2004)

Pseudotaxiphyllum elegans (Brid.) Iwats. [*Isopterygium elegans* (Brid.) Lindb.] Moist soil banks, redwood forest. Koch (1950), Ireland (1969b), Yurky (1995), Shevock and Toren (2001), Kellman (2003).
Distribution: Mar (Koch 1950, Ireland 1969b, Yurky 1995) SF (Shevock and Toren 2001) SCz (Kellman 2003)

Vesicularia vesicularis (Schwaegr.) Broth. [*V. amphibola* (Spruce) Broth. in Engl. & Prantl] Wet areas of lawns. Koch (1950), Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: SF (Koch 1950, Shevock and Toren 2001, Norris and Shevock 2004)

Rhytidiaceae

Key to genera
1. Stem without paraphyllia. *Rhytidiadelphus*
1. Stem densely felted with paraphyllia. *Rhytidiopsis*

Key to species of *Rhytidiadelphus*
1. Leaves plicate, falcate-secund, spreading or weakly squarrose; shoots horizontal and mat-forming; stem leaves 3.5-4 mm long. *R. loreus* (Hedw.) Warnst.
1. Leaves not plicate, strongly squarrose and spreading on all sides of shoot; shoots usually strongly ascending, stem leaves 2.5-3.2 mm long. *R. squarrosus* (Hedw.) Warnst.

Rhytidiadelphus loreus (Hedw.) Warnst. xxx. Norris and Shevock (2004).
Distribution: SM (Norris and Shevock 2004)

Rhytidiadelphus squarrosus (Hedw.) Warnst. Lawns. Shevock and Toren (2001), Norris and Shevock (2004).
Distribution: SF (Shevock and Toren 2001, Norris and Shevock 2004)

Rhytidiopsis robusta (Hook.) Broth. xxx. Norris and Shevock (2004).
Distribution: SM (Norris and Shevock 2004)

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