ARTIFICIAL KEY TO THE MORE COMMON GENERA AND SOME SPECIES OF CALIFORNIA MOSESSES, ESPECIALLY IN THE SAN FRANCISCO BAY AREA. By William C. Steere.

Peat mosses of very characteristic appearance; branches in bunches; leaves composed of very large empty colorless cells surrounded by a network of narrow green cells; plants of peat bogs and wet places ........................................ Sphagnum

Branches arising individually, not in fascicles; leaves composed of uniform cells, never as in Sphagnum.

Leaves in only 2 opposite rows on the stem (some mosses have flattened stems or branches, but with more than 2 rows of leaves).

Leaves equitant, that is, with a pocket on the upper side that straddles the stem and usually the leaf next above.

Aquatic plants, floating in water ................................ Octodiceras fontanum

Not aquatic, although occasionally on wet soil or rocks .................................. Fissidens

Leaves not equitant, on stolon-like branches of plants whose leaves are normally 2-rowed.

Leaves in more than 2 rows, usually 3-8 rows, arranged spirally on the stem.

Sporophytes terminal on stem or branches; plants growing in cushions or tufts, the stems erect or nearly so, simple or forking, never pinnate; leaf cells usually short, rarely much elongated (Acrocarpous Mosses).

Leaves with thin parallel longitudinal plates of tissue (lamellae) projecting from upper surface of leaf. ........................................ Key A

Leaves without lamellae on upper surface.

Plants small and inconspicuous, some apt to be overlooked when without capsules; seta shorter than capsule, which is completely immersed in the uppermost leaves.

Capsules opening irregularly, without a differentiated lid. Key B

Capsules opening by means of a differentiated lid or operculum, which falls off when the spores are mature .......................................... Key C

Plants larger, conspicuous even without capsules, which are raised above the plants on an elongated seta.

Leaf cells papillose on back of leaf ........................................ Key D

Leaf cells smooth, not papillate ........................................ Key E

Sporophytes lateral on stem or branches; plants forming mats or carpets, the stems usually creeping and elongated, with erect, spreading, or hanging branches, often regularly or irregularly pinnately branching; leaf cells usually much elongated, rarely short (Pleurocarpous Mosses).

Leaves lacking a costa, or the costa short and double ................................ Key F

Leaves with a distinct costa, reaching at least to the middle of the leaf. ................................. Key G
Key A. Acrocarpous mosses with lamellae on upper surface of leaf.

Leaves plainly crisped when dry; with thickened border; lamellae on costa only; calyptra not hairy.

- Atrichum undulatum

Leaves pressed to stem when dry but not crisped; border not thickened; lamellae covering most of upper leaf surface; calyptra hairy.

- Pogonatum alpinum

Capsule cylindric, not angled in cross-section.

- Polytrichum

Capsule angled, square in section.

Key B. Minute mosses with immersed and cleistocarpous capsules.

Leaf cells papillose.

- Phascum cuspidatum

Leaf cells smooth, not papillose.

Leaves linear-lanceolate; capsule ovoid.

- Pleuridium

Leaves lanceolate to ovate, or broader; capsules globose.

Plants bud-like, the capsule completely enveloped by the leaves.

- Aciculum muticum

Plants not bud-like, capsule exposed, not completely covered by the leaves.

Stems lacking; leafy plants scattered over a conspicuous mat of protonema; leaves without costa.

- Ephemerum serratum

Stems present; protonema not conspicuous if present at all; leaves costate.

- Physcomitrella patens

Key C. Small mosses with immersed capsules.

Plants aquatic, long slender and floating; leaves distichous.

- Octodiceras fontanum

Plants not aquatic, although occasionally in wet habitats; leaves not distichous.

- Orthotrichum

Calyptra pleated, covered with conspicuous straight hairs.

- Hedwigia ciliata

Calyptra smooth, without hairs.

Leaves without costa.

- Amphiadum californicum

Leaves with distinct costa.

Capsules regularly and evenly 8-ribbed; peristome lacking.

- Grimmia
Key D. Acrocarpous mosses with papillose leaf cells.

Papillae at ends of cells, caused by projection of cell angles.
Leaves lanceolate or broader; capsules inclined, curved, sub-sphaerical when moist; peristome double; plants of wet habitats ........................................ Philonitis

Leaves linear to linear-lanceolate; capsules erect or nearly so, ovoid; peristome single; plants of dry habitats.
Capsules furrowed when dry; plants in dense tufts ........................................ Bartramia stricta
Capsules not furrowed when dry; plants in loose tufts ........................................ Anacolus menziesii

Papillae more or less central, over the cell cavity.
Plants with erect, leafless shoots (pseudopodia) bearing terminal clusters of gemmae. ........................................ Aulacornium

Plants without gemmiferous branches.
Leaves without costae.
Seta very short; capsules enclosed by leaves ........................................ Hedwigia ciliata
Capsule exerted on long seta ........................................ Pseudobraunia californica

Leaves with well developed single costae.
Plants growing typically on dry, exposed trunks of trees, well above the ground level.
Leaves spatulate; costa sometime excurrent into an awn; gemmæ usually present on upper surface of costa, leaf blade, or on apex of stem ........................................ Tortula
Leaves lanceolate to ovate, never spatulate, never awned.
Gemmæ abundant in leaf axils; calyptra not hairy ........................................ Zygodon viridissimus
Gemmæ rarely present, then on leaf surface; calyptra covered with conspicuous straight hairs ........................................ Orthotrichum

Plants growing on rock or soil, not on the trunks of trees, except at the very base.
Calyptra very large, neither plicate nor hairy, covering completely the whole long cylindric capsule. ........................................ Encalypta

Calyptra not covering the whole capsule; if appearing to do so, then plicate and hairy.
Plants black or brown, except at the growing tips, forming dense cushions or tufts on rather dry exposed rock; firmly attached to the rock by means of rhizoids; leaf cells with very thick walls.
Calyptra pleated; with conspicuous straight hairs ........................................ Orthotrichum
Calyptra not pleated; without hairs.
Capsule opening by 4-8 vertical slits; without operculum ........................................ Andreaea
Capsule opening normally through the fall of an operculum.
Leaf cells sinuose-thickened throughout the leaf ........................................ Rhacomitrium
Leaf cells sometimes sinuose-thickened at the base, but not throughout the leaf ........................................ Grimmia

Plants usually some shade of green, growing in moister habitats than preceding; if on rock, then easily detached; leaf cells not greatly incrassate.
Alar cells distinctly enlarged or inflated, usually colored.
Capsule erect and symmetrical ........................................ Orthodicranum strictum
Capsule inclined, curved, usually strumose ........................................ Dicranum
Alar cells not distinctly modified in size or color.

(on next page; the rest of this key, D, goes to the left hand margin)
Key D. Acrocarpous mosses with papillose leaf cells (continued).

Calypttra peated, with conspicuous straight hairs; leaves usually little changed in drying.  
Orthotrichum

Calypttra smooth, without hairs, or lacking; leaves usually twisted or crisped upon drying.
Capsules regularly and evenly 8-ribbed; peristome lacking.  
Amphidium californicum
Capsules not ribbed; peristome usually present.
Leaves narrowly lanceolate to oblong, rarely broader above than below; papillae not circular or c-shaped.
Leaf margins strongly involute.  
Weissia
Leaf margins plane or revolute.
Leaves of 2 layers of cells nearly throughout.  
Timmiella crassinervis
Leaves only 1 layer of cells thick, except sometimes at the margins.

Plants very small and crowded, on moist or wet limestone, often encrusted with a limy deposit.

Leaves entire; peristome lacking.  
Tymnostomum calcareum
Leaves serrulate near base.  
Bacillaria verticillata
Plants on soil.  
Barbula

Leaf margins revolute.
Leaves in 3 rows, covered with high, sharp papillae; plants excessively rare.
Triquetrella californica
Leaves distinctly in more than 3 rows; papillae of moderate size to nearly lacking.
Peristome teeth 16, short, straight, each tooth regularly or irregularly divided into 2 forks.  
Didymodon
Peristome teeth 16, long, strongly twisted at least 1 turn, divided to base into 32 hair-like filaments.  
Barbula

Leaves broadly ovate or oblong, lingulate or spatulate, always broader above than at the base; papillae usually circular or c-shaped.
Upper surface of costa, near apex, covered with green filaments.

Leaf margins strongly incurved, apex blunt.  
Aloina rigida
Leaf margins plane or revolute, leaf apex hair-pointed.  
Crossidium

Upper surface of costs without filaments (sometimes with gemmae).
Plants very small, almost microscopic, bud-like; capsules cleistocarpous, enveloped by the leaves.  
Phacium cuspidatum
Plants of normal size; capsules operculate, with elongated seta.
Leaves distinctly bordered with cells that are longer, thicker-walled, or of different size or color.
Leaf margins bordered with elongated cells.  
Tortula
Leaf margins bordered by 2-7 rows of thicker-walled, orange-colored cells.
Plants growing on wet limestone at or below water level.  
Merseya latifolia
Plants growing on moist soil or rock.  
Tortula

Leaves not at all bordered with modified cells.
Key D. Acrocarpous mosses with papillosc leaf cells (continued).

Peristome lacking or consisting only of low membrane . . . . . . . . . Pottia
Peristome well-developed, of 16 divided or undivided teeth.
  Peristome teeth conspicuously twisted at least 1 turn . . . . . . . . Tortula
  Peristome teeth not or only very slightly twisted.
    Peristome teeth long, split nearly to the base into 2-3 slender divisions. Desmatodon
  Peristome teeth very short, often irregular, undivided . . . . . . . . Pottia
Key E. Acrocarpous mosses with smooth leaf cells.

Plants small and inconspicuous, hardly noticeable to the naked eye; capsules completely or partly enveloped by the uppermost leaves.
Leaves linear-lanceolate, capsules ovoid ................. Pleuridium
Leaves lanceolate to ovate or broader, capsules globose.
Plants bud-like, the capsules completely hidden in the leaves .......... Acantho muicium
Capsules exposed, not hidden by the leaves.
Stem lacking; leafy plants scattered over a mat of protonema; leaves without a costa.
Stem present; protonema not conspicuous if present; leaves with distinct costa.

Plants larger, conspicuous even without capsules, which are extended above the plants.
Some stems with terminal leafy cups filled with oval gemmae; peristome teeth 4 .... Tetrabhis pellucida
Gemma-filled leafy cups lacking; peristome teeth always more than 4; usually 16.
Alar cells plainly inflated, often colored.
Capsule erect and symmetric ................................ Orthodicranum strictum
Capsule nodding, curved, strumose .......................... Dicranum
Alar cells neither inflated nor colored.

Plants black or brown except at growing tips, in dense tufts or cushions firmly attached to rather dry exposed rocks; walls of leaf cells usually greatly thickened.
Leaves sharply serrate toward the apex ................... Ptychomitrium gardneri
Leaves entire; rarely slightly serrulate.
Leaf cells sinuose-thickened throughout the leaf .......... Rhacomitrium
Leaf cells not sinuose-thickened throughout.
Calyptra pleated, covered with straight hairs, usually persistent . Orthotrichum
Calyptra smooth, without hairs, not persistent ........... Grimmi
Plants not usually black or brown, but some shade of green; on soil or tree trunks, if on rock then easily detached.
Leaves distinctly (sometimes rather obscurely) bordered with longer, narrower cells.
Leaf cells nearly as broad as long, or broader than long.
Margins of leaf serrate with spine-like teeth clearly set off from surrounding cells, sometimes in pairs.
Plants dendroid with numerous short terminal branches .... Leucopleis menziesii
Plant not at all dendroid; stems simple or little branched.
Leaves with lamellae on upper surface of costa; spine-like teeth present on lower surface of leaf; capsules erect ............... Atrichum undulatum
Leaves without lamellae; without spines on leaf surface; capsules inclined to hanging.
Mnium
Margins of leaf entire or serrate, but the teeth never spine-like or paired.
Key E. Acrocarpous mosses with smooth leaf cells (continued).

**Capsules erect, symmetric.**
- Capsules broad and short; peristome completely lacking — *Physcomitrium*
- Capsules elongated; peristome present.
  - Peristome single — *Entosthodon attenuatus*
  - Peristome double — *Funaria californica*

**Capsules inclined to hanging, often asymmetric.**
- Leaves nearly round; border very conspicuous, more than 1 layer of cells thick, without any teeth — *Hnium glabrescens*
- Leaves ovate; border sometimes obscure, not thickened, usually more or less toothed — *Funaria*

**Leaf cells always distinctly longer than broad.**
- Leaf cells about twice as long as wide; leaves sometimes hair-pointed; margins entire — *Bryum*
- Leaf cells much longer than wide, usually more than 4 times as long as wide; leaves never hair-pointed, usually somewhat toothed.
  - Leaves on upper side of sterile stems smaller than those on lower side, plants very pale with pinkish tinge — *Epipterygium tozeri*
  - Leaves not dimorphic; plants green — *Pohlia*

**Leaves not at all bordered.**
- Upper leaf cells hardly longer than wide.
  - Capsules erect and symmetric.
    - Cells very large, visible with a hand-lens, costa ending about the middle of the leaf; margin not thickened — *Entosthodon*
    - Cells small, not visible with a hand-lens; costa ending in leaf Apex; margin of leaf two layers of cells thick — *Dicranoweisia cirrata*
  - Capsules inclined, curved, asymmetric.
    - Cells very large, visible with a hand-lens, seta much curved; capsules pear-shaped, not strumose; peristome teeth not split — *Funaria*
    - Cells small, not visible with a hand-lens; seta straight; capsules horizontal, cylindrical, strumose; peristome teeth split — *Ceratodon purpureus*

**Upper leaf cells distinctly longer than wide.**
- Leaves very narrow, linear-lanceolate, with long acuminate or subulate apex.
  - Plants forming silky cushions on charred redwood stumps — *Orthodontium gracile*
  - Plants not restricted to charred redwood, usually on soil.
    - Capsules erect, cylindric; peristome of 32 threadlike filaments — *Ditrichum*
    - Capsules inclined to hanging; peristome of 16 teeth — *Leptobryum pyriforme*
    - Capsules not pear-shaped, short and curved; peristome single, the teeth split at the apex; operculum long-beaked — *Dicranella varia*
Key E. Acrocarpous mosses with smooth leaf cells (continued).

Leaves lanceolate to ovate.
Upper leaf cells about twice as long as wide; leaf margins entire.

Bryum
Upper leaf cells distinctly longer than wide, usually 4 or more times as long as wide.
Plants of very wet places; dull whitish; capsules as long when dry.

Mniobryum wahlenbergii
Plants of moist habitats; sometimes shining but not dull whitish; capsules distinctly longer than wide when dry . . . . . . . . . Pohlia
Key F. Pleurocarpous mosses with ectostate leaves.

Plants aquatic, stream ing out with the current .............................................. Fontinalis
Plants not floating in running water.

Leafy stems distinctly flattened (complanate).

Leaves wavy or undulate; plants growing on trunks of living trees .................. Neckera douglasii
Leaves not undulate, not growing on living trees.

Plants very large, pale green to whitish, not glossy; leaves obtuse, about 4 mm long. Hookeria lucens
Plants bright glossy green; leaves acute or acuminate, rarely reaching 3 mm long.

Leaves strongly decurrent at base ................................................................. Plagiothecium denticulatum
Leaves not at all decurrent.

Upper leaf cells very long and narrow ....................................................... Isopterygium elegans
Upper leaf cells hexagonal, little longer than wide (found in a conservatory, perhaps not a native plant).

Plants very large, pale green to whitish, not glossy; leaves obtuse, about 4 mm long. Hookeria lucens
Hookeria lucens

Leafy stems not complanate, more or less round in section.

Leaves fringed in upper half with long ciliate teeth ..................................... Fabronia pusilla
Leaves toothed or entire, but not fringed with long ciliate teeth.

Leaf cells papillose on back of leaf.

Upper leaf cells elongated, 3-5 times as long as wide .................................. Pterigynandrum filiforme
Upper leaf cells short, as broad as long to twice as long as wide.

Stems covered with paraphyllia ................................................................. Alsia californica
Stems lacking paraphyllia.

Leaves sharply serrate above, never with white points; with numerous branches;
peristome present ............................................................... Pterogonium gracile
Leaves entire above, some with white points; branching not dendroid; peristome lacking.
Capsules on very short seta, enveloped in the leaves, papillae of leaf cells branched.

Capsules exserted on long seta; papillae simple ........................................... Pseudobraunia californica
Capsules exserted on long seta; papillae simple ........................................... Pseudobraunia californica
Leaf cells smooth, not papillose.

Upper leaf cells hexagonal, not much longer than wide; plants of conservatories, perhaps not native ............................................................... Vesicularia amphibia
Upper leaf cells very long and narrow; plants obviously native.

Leaves falcate-secund, conspicuously hooded at apex .................................. Hypnum
Leaves not falcate-secund, but widely spreading to squarrose ........................ Campylium
Key G. Pleurocarpous mosses with costate leaves.

Stems covered with green paraphyllia.
Leafy stems and branches distinctly complanate-flattened; leaves undulate. Neckeradelphus menziesii
Leafy branches not flattened; leaves not undulate.

Leaf cells papillose; stems regularly branched in a tree-like manner; seta very short.
Dendroalsia abietina
Leaf cells smooth, not papillose on back of leaf; plants irregularly branched; seta elongated but sheathed.
Alsia californica

Stems without paraphyllia.

Leaves papillose on back.
Papillae formed by projections of cell angles; leaves overlapping, not crisped when dry; seta smooth.
Pterigynandrum filiforme
Costa short or nearly lacking.
Pseudisothecium stoloniferum
Costa reaching beyond the middle of the leaf, ending in a spine on the back.

Papillae central over cell cavity; leaves spreading, crisped or twisted when dry.
Claopodium
Leaves smooth, not papillose on back.
Leaf margins fringed with long ciliate teeth.
Fabronia pusilla
Leaf margins toothed or entire, but not fringed.
Upper leaf cells short and relatively broad, usually rhomboidal, 2-5 times as long as wide.

Leaf stems or branches distinctly flattened.
Plants very glossy; leaves about 3 mm long; capsule inclined.
Porothamnium bigelovii
Plants not glossy; leaves not exceeding 2 mm; capsule erect or nearly so.
Bestia

Stems or branches not complanate, more or less round.
Leaves with large, sharp teeth at apex; leaves closely appressed when dry; the branches curved and julaceous.

Leaf margins revolute (rolled back); leaf cells very thick-walled; supplementary costae often present; some of the apical teeth recurved.
Antitrichia
Leaf margins reflexed but not rolled back; leaf cells thin-walled; supplementary costae lacking; apical teeth not recurved.
Bestia

Leaves entire or finely and regularly serrate, without a few conspicuous sharp apical teeth; leaves spreading; branches not julaceous.
Leaves regularly and evenly serrate; plants pinnately branched, often beautifully and regularly so; seta rough, operculum beaked; costa ending in a spine.
Eurhynchium
Leaves entire or nearly so, sometimes with inconspicuous teeth; plants not pinnately branched; seta smooth; operculum not beaked; costa not ending in a spine.
Amblystegium

Upper leaf cells very long and narrow, 5-20 times as long as wide.
Key G. Pleurocarpous mosses with costate leaves (continued).

Leaves conspicuously and regularly plicate.
Leaves narrowly lanceolate, gradually long acuminate.
Capsules erect and symmetrical or nearly so
Capsules inclined, more or less curved
Leaves ovate, usually abruptly acuminate

Leaves not or only slightly plicate.
Seta always smooth; leaves entire; costa not ending in a spine.
Leaves very widely spreading to squarrose; costa rather short
Leaves spreading to appressed; costa long
Seta conspicuously papillose; leaves serrate; costa ending in a spine
Plants very regularly pinnately branched; operculum long beaked
Plants not regularly pinnately branched; operculum not long beaked.

Leaves closely overlapping, branch leaves very concave, occasionally blunt; the branches julaceous
Leaves not closely overlapping, never blunt, usually spreading; the branches not julaceous.
Leaves with conspicuous groups of small, thick-walled, rounded alar cells;
somewhat papillose on back by projecting cell angles; seta smooth.
Pseudisothecium stoloniferum

Alar cells tending to be larger rather than smaller, not thick-walled; leaves not papillose on back; seta rough

(Homalotheccium nuttallii
Camptothecium
Brachythecium
Camphycium riparium
Leptodictyum riparium
Eurhynchium
Scleropodium
Pseudisothecium stoloniferum
Brachythecium

(Rewritten in the form of an indented key by
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