

11. ENCALYPTACEAE Schimper

Robert E. Magill

Plants small to medium sized, tufted, gregarious. **Stems** short, irregularly branched, occasionally with tomentum on proximal stem or throughout; in transverse section rounded, central strand absent or weakly differentiated, cells small, thin-walled. **Leaves** somewhat crowded, spreading when wet, incurved and variously twisted or contorted when dry; costate; apex broadly acute to rounded, mucronate to hair-pointed; margins plane to weakly recurved or incurved on one or both sides, more or less entire to crenulate or serrulate; costa single, subpercurrent to long-excurrent, awn when present smooth, hyaline; laminal cells distally quadrate or rhombic, walls incrassate, generally papillose on both exposed surfaces with several large, branching or C-shaped papillae or distinctly mammillose; marginal cells sometimes longer proximally forming a very weak border; basal laminal cells long-rectangular, thin-walled, generally smooth, cross walls frequently distinctly colored. **Sexual condition** autoicous or dioicous. **Seta** generally elongate or short, smooth, brown to red or dark red to blackish red. **Capsule** mostly long-exserted, erect, cylindric, smooth or distinctly furrowed; gymnostomous or peristomate, cells at capsule mouth quadrate, thickened, reddish, exothelial cells long-rectangular, thin-walled, stomata at base of urn, phaneroporous; peristome single, double or absent, exostome teeth long, narrow, papillose or reduced to small, irregular projections, endostome segments reduced, narrow, frequently adhering to exostome or when peristome is single frequently well developed, lanceolate, basal membrane pronounced in some taxa; operculum mostly conic-rostrate, beak erect. **Calyptra** large, campanulate, completely covering capsule, smooth or papillose distally, frequently only on rostrum, base erose, lacerate or fringed, fringe small or well developed. **Spores** generally large, more or less round, but with distinct faces, papillose to warty, or ridged.

Genera 2, species ca. 34 (2 genera, 15 species in the flora): throughout the Northern Hemisphere with a few widespread species in montane habitats worldwide, North America, Mexico, Central America, South America, Europe, Asia (China, Japan), Africa, Indian Ocean Islands (Madagascar), Pacific Islands (New Zealand), Australia.

In the flora area the family Encalyptaceae is distinguished by a massive and persistent calyptra completely covering the capsule. Other characteristics such as habitat, spore ornamentation, and broad leaves with papillose or mammillose distal leaf cells help to define the group, but these characters are shared with other acrocarpous mosses. Reference should be made to the detailed treatment of D. G. Horton (1982, 1983) for the North American taxa.

SELECTED REFERENCES Horton, D. G. 1982. A revision of the Encalyptaceae (Musci), with particular reference to the North American taxa. Part 1. J. Hattori Bot. Lab. 53: 365–418. Horton, D. G. 1983. A revision of the Encalyptaceae (Musci), with particular reference to the North American taxa. Part 2. J. Hattori Bot. Lab. 54: 353–532.

- 1. Distal laminal cells bulging on both surfaces; distal leaf margins crenulate; dioicous 1. *Bryobrittonia*, p. 171
- 1. Distal laminal cells papillose on one or both surfaces; distal leaf margins entire; autoicous 2. *Encalypta*, p. 172

1. BRYOBRITTONIA R. S. Williams, Bull. New York Bot. Gard. 2: 115. 1901 • [Greek *bryon*, moss, and for Elizabeth G. Knight Britton, 1858–1934, American botanist]

Plants medium-sized, gregarious. **Stems** rarely branched; central strand absent or weakly differentiated. **Leaves** oblong, elliptic or narrowly obovate; apex broadly acute, mucronate; margins plane to weakly incurved, crenulate distally, entire proximally; costae subpercurrent, smooth; distal laminal cells more or less rhomboidal, bulging on both exposed surfaces, but stronger adaxially; basal cells long-rectangular; marginal cells sometimes longer proximally forming a very weak border. **Sexual condition** dioicous. **Seta** very long, smooth, reddish brown to black. **Capsule** long-exserted, erect, furrowed; peristomate, stomata numerous; peristome double, exostome teeth long, narrow; endostome with basal membrane, segments filiform, almost as long as teeth, papillose. **Operculum** long conic-rostrate. **Calyptra** generally smooth, erose or lacerate at base. **Spores** small, round.

Species 1: n North America, Europe, c Asia.

Found on open, calcareous soil across the northern reaches of the flora area, *Bryobrittonia* closely resembles *Encalypta* in its habitat preferences and growth form. Fruiting specimens produce the large, brownish calyptra diagnostic of the family, but, perhaps associated with dioicy, sporophytes are rare. *Bryobrittonia* can be separated from *Encalypta*, the only other genus in the family, by bulging distal laminal cells and crenulate distal leaf margins.

1. *Bryobrittonia longipes* (Mitten) D. G. Horton, Brittonia 30: 19. 1978 [F]



Encalypta longipes Mitten, J. Linn. Soc., Bot. 8: 29. 1864;
Bryobrittonia pellucida R. S. Williams

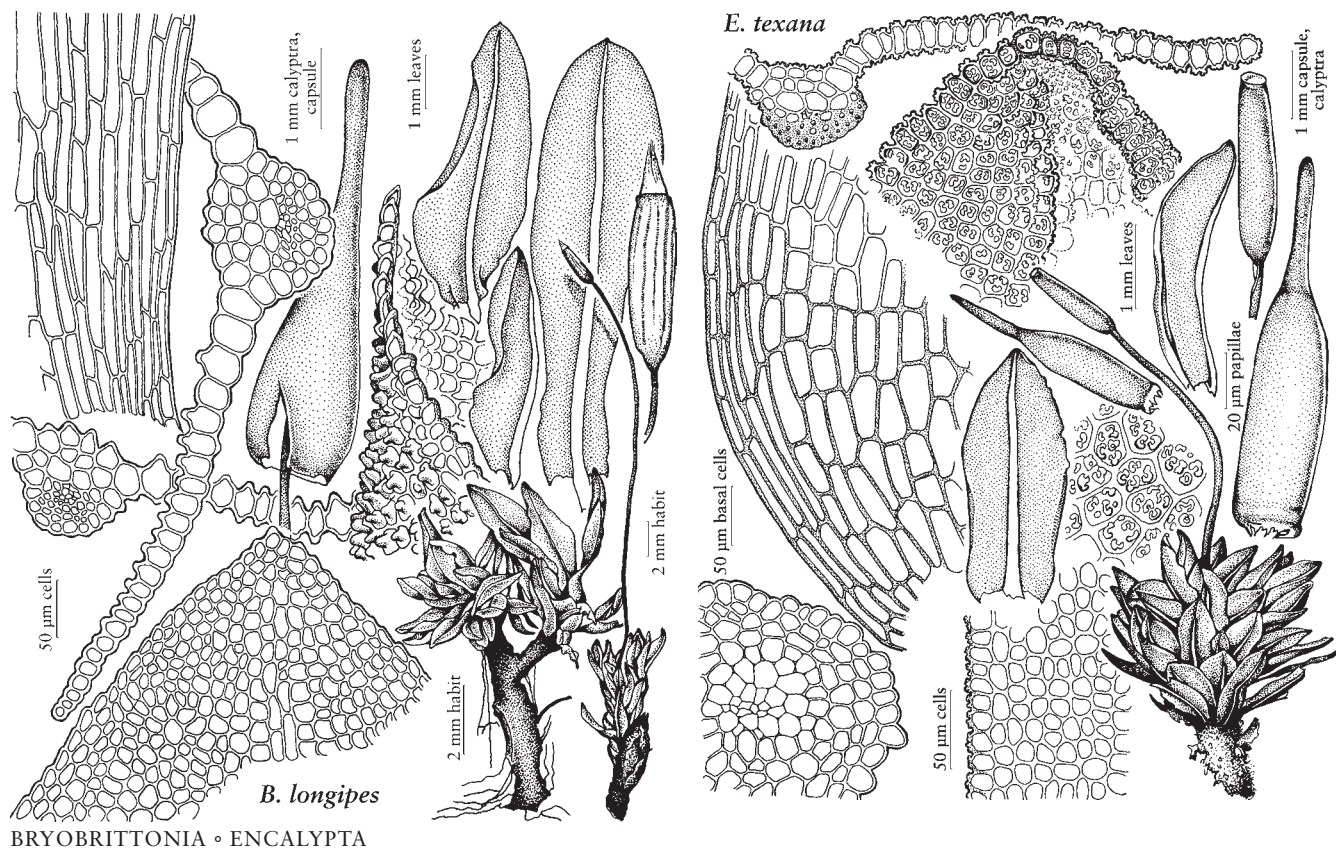
Stems erect, 25 mm. **Leaves** 3–6.5 mm; laminal cells 10–25 µm, walls thin; basal cells long-rectangular, 140 µm, walls weakly thickened, smooth; basal marginal cells

weakly differentiated, longer than laminal cells. **Seta** 20–40 mm. **Capsule** ovoid-cylindric, 2–3 mm, ribbed, exothecial cells long-rectangular, walls weakly thickened;

peristome teeth linear, 1 mm, papillose, erect when wet, somewhat recurved or twisted when dry; endostome almost as long as teeth. **Operculum** 2 mm. **Calyptra** campanulate, 4–8 mm, smooth. **Spores** 12–20 µm, papillose, brownish green.

Calcareous soils along stream and river banks in Arctic and montane habitats; Greenland; Alta., B.C., N.W.T., Nunavut, Yukon; Alaska; Europe (n Russia); c Asia.

Bryobrittonia longipes is similar to the larger, peristomate species of *Encalypta* (for example, *E. procera*) but differs in being dioicous and having laminal cells mammillose, distal leaf margins serrulate, and very long seta.



2. ENCALYPTA Hedwig, Sp. Musc. Frond., 60. 1801 • [Greek *en*, in, and *kalyptos*, cover or veil or lid, alluding to the calyptra]

Plants small to medium sized, frequently gregarious. **Stems** irregularly branched, occasionally tomentose; central strand absent or weakly differentiated. **Leaves** oblong, elliptic, narrowly spatulate or occasionally lanceolate; apex broadly acute to rounded, mucronate to hair-pointed, occasionally cucullate; margins plane to weakly recurved on one or both sides, entire; costa single, subpercurrent to long-excurrent, awn smooth, hyaline; distal laminal cells more or less quadrate, papillose on one or both exposed surfaces with several large, branching or C-shaped papillae; marginal cells sometimes longer proximally, forming a very weak border; basal cells long-rectangular, thin-walled, generally smooth, cross walls frequently distinctly colored. **Sexual condition** autoicous. **Seta** elongate, smooth, brown to red or dark red. **Capsule** generally long-exserted or just emergent, erect to inclined, cylindric, smooth or distinctly furrowed; gymnostomous or peristomate, stomata few; peristome single, double or absent, exostome frequently reduced to small, irregular projections or teeth long, narrow, papillose; operculum usually conic-rostrate. **Calyptra** smooth or papillose distally or frequently only on rostrum, entire, fringed or lacerate below, fringe small or well developed. **Spores** generally large, ornamentation papillose to warty, or ridged.

Species 34 (14 in the flora): North America, Mexico, West Indies, Central America, South America, Europe, Asia, Africa, Indian Ocean Islands (Madagascar), Pacific Islands (New Zealand), Australia.

The large, straw-colored calyptrae of *Encalypta* are generally present in mature colonies, growing on shallow soil over rock in exposed or moderately sheltered recesses. *Encalypta* can be separated from the only other genus in the family, *Bryobrittonia*, by papillose distal leaf cells and more or less entire leaf margins.

1. Vegetative leaves without long awn; apex muticous, mucronate, or apiculate.
 2. Stems covered with dense mass of rhizoidal gemmae 1. *Encalypta procera*
 2. Stems without rhizoidal gemmae.
 3. Costa short-excurrent or percurrent; peristome present.
 4. Leaves oblong to elliptical, 4–6 mm; regularly apiculate; peristome single 6. *Encalypta ciliata*
 4. Leaves ligulate to lingulate or narrowly lanceolate, 3–5 mm; costa ending before apex or short-excurrent; peristome double 7. *Encalypta affinis*
 3. Costa ending before apex on most leaves; peristome absent.
 5. Leaves broadly oblong to elliptical, 3–4 mm; calyptra fringed or not.
 6. Calyptra base not fringed; costa generally smooth distally adaxially; capsule weakly striate; spores warty, 22–35 μm 2. *Encalypta vulgaris*
 6. Calyptra irregularly fringed at base; costa papillose distally adaxially; capsule smooth to slightly wrinkled; spores finely pitted, 30–35 μm 3. *Encalypta texana*
 5. Leaves elliptical to ligulate or lingulate, 1–3 mm; calyptra lacerate.
 7. Leaves broadly elliptical to ligulate, 1–2 mm; margins plane to weakly recurved along one margin; spores papillose, 25–28 μm 4. *Encalypta mutica*
 7. Leaves broadly oblong to lingulate, 2–3 mm; margins plane; spores ridged, 35–40 μm 5. *Encalypta flowersiana*
1. Some or all vegetative leaves with distinct awns; apex broad to obtuse or acute.
 8. Leaves apiculate to short-awned.
 9. Peristome well developed; leaf apex broad to obtuse.
 10. Capsules distinctly ribbed; spores warty, 35–37 μm ; leaves oblong to lingulate, 1.5–2.5 mm 8. *Encalypta vittiana* (in part)
 10. Capsules \pm smooth, not ribbed; spores granulate, 60–80 μm ; leaves narrowly spathulate to lingulate, 1.3–2.5 mm 9. *Encalypta longicollis* (in part)
 9. Peristome weak or absent; leaf apex acute.
 11. Leaves lanceolate; peristome absent 10. *Encalypta alpina*
 11. Leaves narrowly oblong; peristome present, weak 11. *Encalypta rhaptocarpa* (in part)
 8. Leaves short- to long-awned
 12. Peristome absent.
 13. Leaves oblong, 1.7–3 mm; seta elongate 12. *Encalypta spathulata*
 13. Leaves broadly oblong to oval-spathulate, 2–4 mm; seta short 13. *Encalypta brevipes*
 12. Peristome present.
 14. Capsules strongly ribbed.
 15. Calyptra base fringed; leaves lingulate, apiculate to very short-awned 8. *Encalypta vittiana* (in part)
 15. Calyptra base erose; leaves oblong-lanceolate, generally with a distinct awn 11. *Encalypta rhaptocarpa* (in part)
 14. Capsules not noticeably ribbed.
 16. Leaves ligulate to narrowly spathulate, 1.5–3.5 mm; capsules short-cylindric; spores granulate 9. *Encalypta longicollis* (in part)
 16. Leaves broad oblong to oblong spathulate, 2–6 mm; capsules cylindric; spores warty or ridged 14. *Encalypta brevicollis*

1. *Encalypta procera* Bruch, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 1: 283. 1832



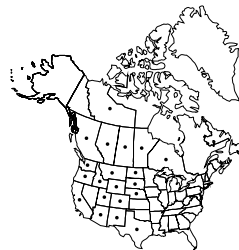
Stems 40–80 mm; central strand small. **Leaves** broadly ovate to elliptic, lingulate or narrowly spatulate, 2.5–5 mm; apices broadly acute to obtuse, sometimes cucullate, mucronate or occasionally short hair-pointed; one or both margins recurved from base to distal portion of leaf;

costa ending before apex, percurrent or occasionally short-excurrent in distal leaves, abaxial surface smooth distally; laminal cells 12–18 μm ; basal cells 30–90 μm , smooth; basal marginal cells not distinctly differentiated. **Specialized asexual reproduction** by rhizoidal gemmae, in tufts on stems, filamentous, branching, brown, smooth. **Seta** 12–20 mm, reddish brown. **Capsule** 2–4 mm, spirally ribbed, brown to brownish yellow, exothelial cells linear, walls thickened along ridges; peristome double, teeth 16, reddish yellow, linear, 1 mm, papillose, endostome teeth linear from high basal membrane, adhering to exostome, papillose; operculum 1.5–2 mm. **Calyptra** 4–8 mm, lacerate at base, papillose. **Spores** 14–24 μm , granulate, brownish green.

Calcareous soil and rock, crevices and ledges; Greenland; Alta., B.C., Man., N.B., Nfld. and Labr., N.W.T., N.S., Nunavut, Ont., P.E.I., Que., Sask., Yukon; Alaska, Ark, Colo., Conn., Idaho, Ill., Ind., Iowa, Ky., Maine, Mass., Mich., Minn., Mo., Mont., N.H., N.J., N.Y., N.C., N.Dak., Ohio, Pa., S.Dak., Tenn., Utah, Vt., Va., Wash., W.Va., Wis., Wyo.; n Europe; Asia (Japan, Russia).

The copious filamentous brood bodies, covering the stem in sterile plants or only on the lower stem of fertile plants, will quickly identify *Encalypta procera* in North America, which includes specimens identified as the Old World species *E. streptocarpa* Hedwig, now excluded. The capsules of *E. procera* are spirally ribbed with a long, double peristome. Vegetative leaves are generally mucronate and somewhat cucullate, but some plants have leaves with short awns at the apex associated with the generally awned perichaetial leaves.

2. *Encalypta vulgaris* Hedwig, Sp. Musc. Frond., 60. 1801



Encalypta vulgaris var. *apiculata* Wahlenberg; *E. vulgaris* var. *mutica* Bridel

Stems 5–20 mm, central strand small. **Leaves** broadly oblong to lingulate, 3–4 mm; apices broadly acute to obtuse, sometimes weakly cucullate or mucinous; margins plane or weakly incurved; costa

subpercurrent or percurrent, papillose; laminal cells 8–14 μm ; basal cells smooth. **Specialized asexual reproduction** absent. **Seta** 4–8 mm, yellowish red. **Capsule** exserted, erect, cylindric, 2–3.5 mm, weakly straight-furrowed, yellowish brown, exothelial cells rectangular, walls weakly thickened; peristome absent or just a short hyaline membrane present; operculum 1.5 mm. **Calyptra** 4–5 mm, base not fringed, body smooth or papillose above or throughout. **Spores** 22–35 μm , warty, light brown.

Shallow calcareous soil over rock; Alta., B.C., Man., N.W.T., Ont., Sask.; Ariz., Calif., Colo., Idaho, Mont., Nebr., N.Mex., N.Dak., Oreg., S.Dak., Tex., Utah, Wash., Wyo.; Mexico (Baja California); Central America; South America; Europe; Asia; Africa; Pacific Islands (New Zealand); Australia.

Encalypta vulgaris has at times been lumped with *E. rhaptocarpa*, and some “intermediate” specimens are difficult to place. The absence of a peristome, weakly furrowed capsule, and absence of an awn on vegetative leaves should be sufficient to identify most specimens. Furthermore, *E. vulgaris* is most frequently found in the western United States and western Mexico, while *E. rhaptocarpa* is more common throughout the north in Canada and Alaska.

3. *Encalypta texana* Magill, Bryologist 109: 399, figs. 1–11. 2006 [E] [F]



Stems 5–10 mm, central strand small. **Leaves** broadly oblong to elliptic, 3–4 mm; apices broadly acute, mucronate; margins plane to erect or incurved distally or weakly recurved proximally; costa percurrent to subpercurrent, narrow, papillose distally on adaxial surface; laminal cells 15–25 μm ; basal cells 25–75 μm , walls thickened, smooth; basal marginal cells weakly differentiated, longer than

laminal cells, in 3–5 rows. **Specialized asexual reproduction** absent. **Seta** 4–6 mm, yellow-brown. **Capsule** cylindric, 1.8–2 mm, smooth to weakly wrinkled when dry, gymnostomous, yellowish brown; exothecial cells quadrate, walls thickened; peristome absent; operculum 0.5 mm. **Calyptra** 3–4 mm, irregularly fringed at base, weakly papillose to essentially smooth. **Spores** 30–35 μm , finely pitted, reddish brown.

Igneous soil in rock crevices; Tex.

Encalypta texana was previously identified as a North American specimen of *E. sibirica* (Weinmann) Warnstorf. Several distinct characters and important habitat and distributional factors, however, set it apart from that Asian species: costa ending just before the apex, capsule length, calyptra ornamentation, spore ornamentation, and differences in gametophyte and calyptra color. *Encalypta texana* could be confused with another species with gymnostomous capsules and costae ending before the leaf apex, *E. flowersiana*, which is also present in the mountains of western Texas. *Encalypta flowersiana* is smaller, with leaf margins plane, capsule furrowed, and spores have distinct ridges, while *E. texana* has laminal margins incurved to plane distally and recurved proximally, capsule smooth to weakly wrinkled, and spores finely pitted.

4. *Encalypta mutica* I. Hagen, Tromsø Mus. Aarsh. 21: 91. 1899



Stems 5–8 mm, central strand weakly differentiated, small. **Leaves** elliptic to ligulate or lingulate, 1–2 mm; apices mucous, obtuse; margins plane to weakly recurved along one margin; costa subpercurrent, narrow, papillose distally; laminal cells 10–15 μm ; basal cells

rectangular, 25–75 μm , smooth; basal marginal cells not differentiated. **Specialized asexual reproduction** absent. **Seta** 4–8 mm, brownish red to black. **Capsule** short-cylindric, 1–2.5 mm, smooth to weakly striate, yellowish brown, exothecial cells rectangular, walls weakly thickened; peristome absent; operculum 0.5 mm. **Calyptra** 2–4 mm, smooth, lacerate at base. **Spores** 22–28 μm , papillose, dark brown.

Disturbed, exposed soil or soil over rocks; Alta., B.C., N.W.T., Yukon; Alaska; nw Europe.

Encalypta mutica is a tiny species found on soil in naturally disturbed areas. It might be confused with *E. flowersiana* as both taxa are absent leaf awn and peristome, but *E. mutica* has much shorter leaves, smaller spores with granulate ornamentation, and an almost smooth capsule.

5. *Encalypta flowersiana* D. G. Horton, Bryologist 82: 374. 1979 [F]



Stems 6–11 mm, central strand small, cells very thin-walled. **Leaves** broadly oblong to lingulate, 1.5–3 mm; apex mucous, obtuse to rounded; margins plane; costa ending below apex; laminal cells 10–16 μm ; basal cells 30–50 μm , smooth; basal marginal cells differentiated

proximally, in 3–5 rows, longer than laminal cells. **Specialized asexual reproduction** absent. **Seta** 3–5 mm, reddish brown. **Capsule** short-cylindric, 1.5–3 mm, striate to weakly ribbed, yellowish brown; exothecial cells long-rectangular to linear; peristome absent; operculum 0.5–0.7 mm long. **Calyptra** 2.5–4 mm, lacerate at base, papillose on rostrum. **Spores** 35–40 μm , with vermiculate ridges, brown.

Calcareous soil over rock, deciduous woodlands; Tex.; West Indies (Haiti); Central America (Guatemala).

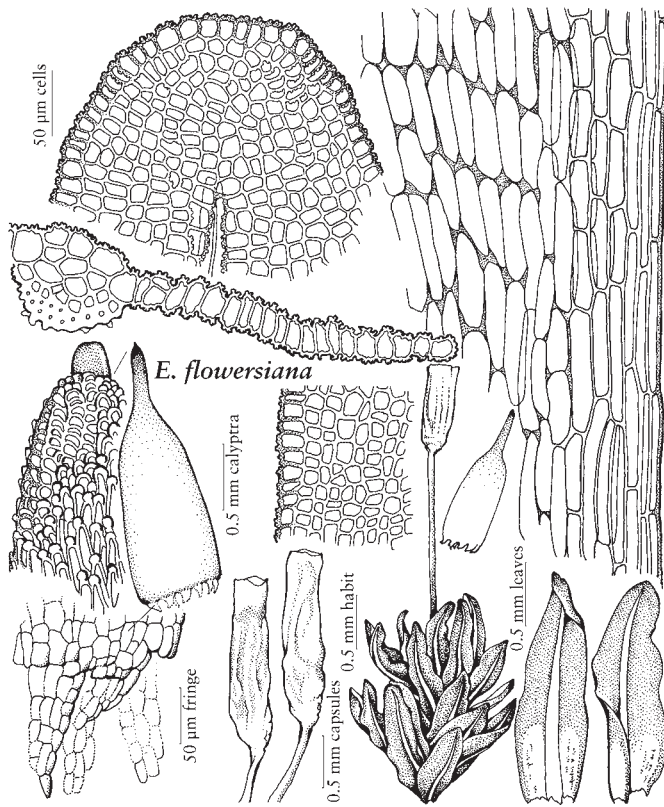
Encalypta flowersiana is recognized by its small size, narrow leaves, subpercurrent costa, and distinctly ridged spores. The species is similar to *E. mutica* and *E. texana* in the absence of a peristome and leaf awn. The most useful difference is spore ornamentation (see the discussions with those species). Currently, *E. flowersiana* is known in the flora area only from the Chisos Mountains of western Texas, but its small size and the rugged terrain of its habitat may mask a broader distribution in the mountains of the southwestern United States and northern Mexico.

6. *Encalypta ciliata* Hedwig, Sp. Musc. Frond., 61. 1801
Encalypta ciliata var. *microstoma* Schimper

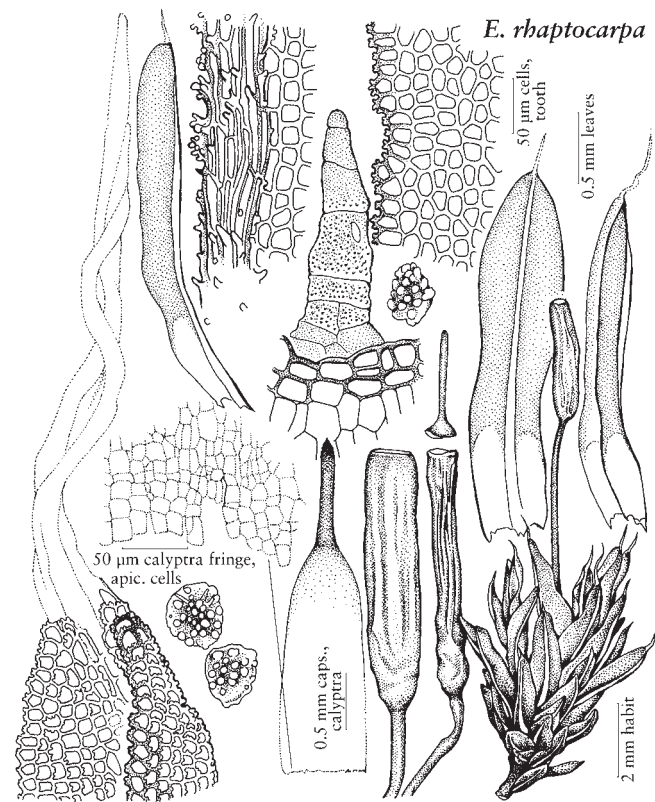


Stems to 20 mm, central strand absent. **Leaves** oblong to elliptic, 4–6 mm, apices broadly acute to rounded, mucronate to cuspidate, margins recurved below mid-leaf; costa excurrent or subpercurrent, narrow; laminal cells 10–20 μm ;

basal cells rectangular, 50–120 μm , smooth; basal marginal cells weakly differentiated below, in 4–8 rows, elongate, smooth. **Specialized asexual reproduction** absent. **Seta** 4–14 mm, yellow to yellowish brown. **Capsule** cylindric, 2–3 mm, smooth, constricted below mouth, yellowish brown, exothecial cells rectangular, 50–120 μm ; peristome single, yellowish red to hyaline, 16 teeth, lanceolate, to 0.3 mm high, papillose, erect; operculum 1–1.5 mm. **Calyptra** 3–7 mm, fringed at base, smooth or rarely papillose at apex. **Spores** 30–40 μm , plicae and pitted, brownish yellow.



ENCALYPTA



Crevices of acid or neutral rock or soils in sheltered or exposed situations; Greenland; Alta., B.C., N.B., Nfld. and Labr. (Labr.), N.S., Ont., Que., Yukon; Alaska, Ariz., Calif., Colo., Ill., Maine, Mich., Minn., Mont., Nebr., N.H., N.Mex., N.Y., N.Dak., Oreg., Pa., S.Dak., Utah, Vt., Wash., Wis., Wyo.; Mexico; West Indies; South America; Europe; Asia; Africa.

Encalypta ciliata is among the most variable species of the genus in leaf shape, apex development, and costae length. A combination of excurrent costa, smooth capsule wall, and single peristome will serve to identify it.

7. *Encalypta affinis* R. Hedwig in F. Weber and D. M. H. Mohr, Beitr. Naturk. 1: 121. 1805



Encalypta affinis subsp. *macounii* (Austin) D. G. Horton; *E. affinis* var. *macounii* (Austin) H. A. Crum & L. E. Anderson; *E. apophysata* Nees & Hornschuch; *E. macounii* Austin

Stems 10–25 mm, central strand absent. **Leaves** ligulate to lingulate or narrowly lanceolate, 3.5–5.5 mm, apices broadly acute to rounded, mucronate to apiculate, margins irregularly recurved or sometimes plane; costa excurrent to percurrent or subpercurrent; laminal cells 9–14 µm; basal

cells rectangular, 40–110 µm, papillose more or less in rows across leaf above; basal marginal cells not differentiated, papillose. **Specialized asexual reproduction** absent. **Seta** 6–19 mm, dark red. **Capsule** cylindrical, 3–4 mm, smooth, yellowish brown, exothecial cell walls rectangular, thickened; peristome double, yellowish brown, 16 teeth, linear-lanceolate, 0.5 mm, papillose, erect, endostome without basal membrane, fused to teeth, papillose, almost as long as teeth; operculum 2 mm. **Calyptra** 5–7 mm, lacerate at base, papillose from apex to mid body. **Spores** 20–26 µm, warty-papillose yellowish brown.

Exposed soil and rock, protected mountain or alpine habitats; Greenland; Alta., B.C., N.W.T., Yukon; Alaska, Mont., Wash.; Europe; sw, c Asia (Himalayan Nepal, Kazakstan, Russia).

Encalypta affinis is the only species of the genus in the flora area with papillae on the basal leaf cells. Specimens with short, excurrent costae and cuspidate leaf apices have been referred to var. *affinis* while the other extreme, costae ending below apex and leaves muticous, to var. *macounii*. This species could be confused with *E. ciliata*, also with a double peristome but with pitted instead of heavily papillose spores. *Encalypta procera* has a longer double peristome, granulate spores, and propagula on the stem tomentum.

8. *Encalypta vittiana* D. G. Horton, Bryologist 82: 369, figs. 1–10. 1979 [E]



Stems 2–10 mm, central strand present, weakly differentiated, cells small. **Leaves** oblong to lingulate or narrowly spatulate, 1.5–2.5 mm, apices obtuse, apiculate, margins plane; costa excurrent, smooth, narrow, shorter than lamina; laminal cells 12–20 μm ; basal cells rectangular,

20–60 μm , smooth; basal marginal cells weakly differentiated, longer than laminal cells, in 3–5 rows. **Specialized asexual reproduction** absent. **Seta** 4–7 mm, smooth, reddish. **Capsule** emergent, inclined, cylindrical, 1.5–2.5 mm, strongly ribbed, brownish yellow to red, exothecial cells linear, walls thickened; peristome double, rudiments of exostome present as short nubs, teeth dark red, lanceolate, 0.25 mm, papillose, incurved when wet, erect when dry; operculum 1 mm. **Calyptra** 2.5–5 mm, fringed at base, smooth. **Spores** 35–37 μm , warty, brown.

Protected sites on calcareous soils or rock in mesic tundra; N.W.T., Yukon; Alaska.

Encalypta vittiana is similar to *E. rhaptocarpa* but is distinct in having dark red furrows on the capsule and a fringed calyptra. *Encalypta rhaptocarpa* has brown to brown-red capsules and erose calyptra bases. The two species overlap in their ranges.

9. *Encalypta longicollis* Bruch, Abh. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. 1: 282. 1832



Stems 10–20 mm, central strand weakly differentiated. **Leaves** narrowly spatulate to lingulate, 1.5–3.5 mm; apices broadly acute, mucronate, apiculate or hair-pointed; margins more or less plane; costa excurrent or sometimes percurrent; laminal cells 10–16 μm ; basal cells

rectangular, 30–70 μm , walls thin, smooth; basal marginal cells not differentiated. **Specialized asexual reproduction** absent. **Seta** 5–12 mm, brownish red. **Capsule** exserted, short-cylindrical, 1–2 mm, smooth, with neck differentiated from urn, constricted and twisted when dry, yellowish brown; exothecial cells rectangular to linear; peristome double, reddish, teeth linear, 0.5 mm, papillose, erect when wet, erect to weakly recurved when dry, endostome fused to exostome, smooth, as long as teeth, basal membrane absent; operculum 1–1.5 mm. **Calyptra**, 3–6 mm, lacerate at base, smooth. **Spores** 60–80 μm , granulate, brown.

Somewhat restricted to mesic habitats with calcareous soils; Alta., B.C., Nfld. and Labr. (Nfld.), N.W.T., Yukon; Alaska; Europe; Asia.

The large spores, capsule smooth above neck, and distinctly red peristome will separate *Encalypta longicollis* from similar species. The peristome appears single, but closer inspection shows endostome segments fused to the teeth. The spores are strongly granulate and much larger than those of other species in the genus. These characters will help also to place mucous-leaved forms of this species that resemble *E. brevicollis* or *E. affinis*.

10. *Encalypta alpina* Smith in J. E. Smith et al., Engl. Bot. 20: 1419. 1805 [E]



Stems 20–50 mm, central strand weak, small when present, cells very thin-walled. **Leaves** oblong-ovate to lanceolate, 2–4 mm; apices acute to acuminate, mucronate to apiculate; margins plane; costa percurrent to excurrent, narrow, papillose; laminal cells 8–16 μm ; basal cells long-

rectangular, smooth; basal marginal cells weakly differentiated, longer than laminal cells forming border in leaf base. **Specialized asexual reproduction** absent. **Seta** 6–12 mm, brownish red to black. **Capsule** cylindrical, 1–3 mm, ribbed, gymnostomous, brown; exothecial cells rectangular, walls thickened; peristome absent; operculum 1.5 mm. **Calyptra** 3–6 mm, lacerate at base, smooth. **Spores** 30–36 μm , irregular granulate, brown.

Mesic sites, soil and rock around waterfalls and seeps in mountain and alpine habitats; Greenland; Alta., B.C., Man., Nfld. and Labr. (Labr.), N.W.T., Nunavut, Que., Yukon; Alaska, Ariz., Colo., Mont., Wash.

Encalypta alpina is most distinct in its lanceolate leaves, apiculate leaf apices, and lacerate base on the calyptrae. It might be confused with *E. rhaptocarpa*, but that species has a longer awn, ribbed capsule, and peristome.

11. *Encalypta rhaptocarpa* Schwägrichen, Sp. Musc. Frond. Suppl. 1(1): 56. 1811 [F]



Encalypta intermedia Juratzka;
E. rhabdocarpa Schwägrichen;
E. rhaptocarpa var. *microstoma* Limpricht; *E. rhaptocarpa* var. *subspathulata* (Müller Hal. & Kindberg) Flowers; *E. vulgaris* var. *rhaptocarpa* (Schwägrichen)
E. Lawton

Stems 10–30 mm, central strand absent. **Leaves** oblong-lanceolate, 2.5–3.5 mm, apices acute to short-acuminate, mucronate to hair-pointed; margins plane; costa percurrent to long-excurrent, smooth distally; laminal cells quadrate to subhexagonal,

12–20 μm ; basal cells rectangular, 20–70 μm , smooth; basal marginal cells not differentiated. **Specialized asexual reproduction** absent. **Seta** 8–10 mm, reddish brown. **Capsule** cylindrical, 2.5–3 mm, ribbed, brown to brownish red, ribs dark red; peristome single, reddish brown, teeth lanceolate 0.5 mm high, papillose, occasionally with a preperistome ring of very short and stubby projections, papillose, erect and brittle; operculum 0.5 mm. **Calyptra** 3–4 mm, entire to erose at base, smooth to papillose proximally, papillose on rostrum. **Spores** 35–40 μm , warty, brown.

Soil or soil over rock; Greenland; Alta., B.C., Man., N.B., Nfld. and Labr. (Labr.), N.W.T., Nunavut, Ont., Que., Sask., Yukon; Alaska, Ariz., Calif., Colo., Idaho, Mich., Mont., Nebr., Oreg., S.Dak., Wash., Wyo.; Mexico (Nuevo León and Zacatecas); Europe; c, e Asia (China, Japan, Kazakstan, Mongolia).

Encalypta rhamnoides is widely distributed in the northern part of the flora area. It is somewhat similar to *E. alpina*, but differs in leaf shape and has a much longer excurrent costa, a peristome, and an entire or erose base on the calyptrae. *Encalypta rhamnoides* could be confused also with *E. vittiana* by the strongly ribbed and red color on the capsule, however *E. vittiana* has a shorter awn and fringed calyptrae. The peristome of *E. rhamnoides* generally presents as single row of reddish, broadly lanceolate teeth. Careful examination of some specimens reveals a preperistome of very short, stubby projections ringing the outside of the main teeth.

12. *Encalypta spathulata* Müller Hal., Syn. Musc.
Frond. 1: 519. 1849



Stems to 10 mm, central strand weakly differentiated, cells very thin-walled. **Leaves** oblong to lingulate or ligulate, 1.5–3 mm, apices obtuse to broadly acute, hair-pointed, margins plane, weakly bordered; costa excurrent, awns shorter than leaf lamina, smooth, narrow; laminal cells 12–

18 μm ; basal cells rectangular, 30–70 μm , smooth; basal marginal cells weakly differentiated, in 12–18 rows, longer than laminal cells. **Specialized asexual reproduction** absent. **Seta** 3–8 mm, dark red. **Capsule** short-cylindrical, 1–2 mm, weakly striate to ribbed, gymnostomous, yellowish brown, exothelial cells rectangular to linear, walls thickened; peristome absent; operculum 0.5 mm. **Calyptra** 2–4 mm, lacerate at base, smooth. **Spores** 26–35 μm , warty, brown.

Forming extensive mats on calcareous soils of disturbed sites; Alta., B.C.; Idaho, Mont., Wyo.; Europe; c Asia.

Encalypta spathulata is very similar to *E. rhamnoides* but differs in the fringed calyptra base and weakly striate,

peristomate capsule. The gymnostomous capsules and long awn will separate *E. spathulata* from other species of the genus.

13. *Encalypta brevipes* Schljakov, Bot. Mater. Otd.

Sporov. Rast. Bot. Inst. Komarova Akad. Nauk S.S.S.R.
7: 227. 1951



Stems 10–14 m, central strand absent. **Leaves** broadly oblong to elliptic or spatulate, 2–4 mm, apices rounded, apiculate to hair-pointed; margins plane; costa excurrent, awns shorter than leaf lamina, hyaline, smooth, stout; laminal cells 10–22 μm ; basal cells rectangular, 60–90 μm , walls

thickened, adaxial and abaxial surfaces smooth; basal marginal cells distinctly differentiated in 10–20 rows. **Specialized asexual reproduction** absent. **Seta** 1–3 mm, red to yellowish red, smooth. **Capsule** exserted or sometimes just emergent, erect, cylindrical, 1–3 mm, smooth, reddish yellow with distinctive red rim, gymnostomous; exothelial cells rectangular, to 85 μm , walls thickened; peristome absent; operculum 0.5–0.8 mm. **Calyptra** 2–5 mm, fringed at base, smooth to weakly papillose. **Spores** 30–50 μm , warty, brown.

Scattered, on basic soils intermixed with other species in the northwestern area of the flora; Alta., B.C., Yukon; Alaska, Wash.; Europe; c, n Asia; Atlantic Islands (Iceland).

When sporophytes are present in *Encalypta brevipes*, the very short setae extending the capsules above the leaf awns are distinctive. The rather broadly elliptic leaves, awn, and gymnostomous capsules also help to distinguish it. This species is frequently reported growing among other species of the genus, but is consistently smaller than those associates.

14. *Encalypta brevicollis* (Bruch & Schimper)

Åongström, Nova Acta Regiae Soc. Sci. Upsal. 12: 362.
1844



Encalypta longicollis Bruch var.
brevicollis Bruch & Schimper, Bryol.
Europ. 3: 28. 1838; *E. brevicollis*
subsp. *crumiana* D. G. Horton

Stems 20–25 mm, central strand absent. **Leaves** oblong to narrowly spatulate, 2–6 mm, apices obtuse or broadly acute, hair-pointed, awn short; margins plane; costa excurrent, awns shorter than leaf lamina; laminal cells 15–20 μm ; basal cells rectangular, 20–90 μm , smooth; basal marginal cells differentiated, longer than laminal cells, in 8–12 rows. **Specialized asexual**

reproduction absent. Seta 5–16 mm. Capsule exerted, long-cylindric, 1.5–3.5 mm, smooth; exothecial cells rectangular, walls thickened; peristome diplolepidous, not well developed, teeth irregular, narrowly lanceolate, 0.5 mm, papillose or rarely smooth, erect when wet or dry; endostome segments attached to exostome teeth, papillose, as long as teeth; operculum 2 mm. Calyptra 4–8 mm, lacerate at base, papillose distally. Spores 30–40 µm, warty, brown.

Soil in open montane and alpine habitats; Greenland; Alta., B.C., Man., N.W.T., Nunavut, Ont., Que., Sask., Yukon; Alaska, Oreg., Wash.; n Europe; c, n Asia.

The long awn on narrowly spatulate leaves and whitish peristome distinguish *Encalypta brevicollis*.

There is some similarity to *E. affinis* or *E. ciliata*, but neither of these species displays an awn as long and prominent as that of *E. brevicollis*, or has the whitish peristome. Subspecies *crumiana* has been recognized primarily based on poorly developed, smooth peristome teeth, granulate ornamentation on top of ridged or warty spores, and a more gradual change from the calyptra body to the rostrum.

Excluded Species:

Encalypta microstoma Balsamo & De Notaris

No specimens were seen; see D. G. Horton (1983).