Flore des Bryophytes du Quebec-Labrador Volume 1

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Key to Bryophytes Found in Quebec-Labrador

(1) Plants consisting of a narrowly divided and lobed thallus, bearing irregular lateral blades resembling leaves; purple rhizoids; sexual organs borne on the dorsal surface of the thallus **... Fossombronia**

(1) Thalloid plants **-- 2**

(1) Plants consisting of a stem and leaves **-- 3**

(2) Cylindrical sporophyte, more or less elongated, growing from the base and gradually opening by two valves at its distal end, persistent; seta absent; a single large chloroplast per cell **... Anthocerotaceae**

(2) Globular to ellipsoidal sporophyte generally opening by four valves, borne on a translucent, hyaline, or greenish seta; abundant chloroplasts **... thalloid liverworts**

(3) Leaves inserted with dorsoventral symmetry, the leaves being arranged in 2 rows on either side of the stem (excluding underleaves); midrib never present on the leaves (do not confuse midrib and vitta); laminal cells isodiametric; sporophyte ephemeral **-- leafy liverworts**

(3) Leaves inserted with radial symmetry, the leaves being spread out in 3 or 5 rows surrounding the stem; midrib present or absent, long or short, single or double, sometimes branched; laminal cells isodiametric or variously elongated; Persistent sporophyte [Note: the leaves may sometimes give the impression of being arranged in the same plane by changing their orientation, but insertion is in fact in 3 or 5 rows; however, in some genera, the leaves are exceptionally arranged on 2 rows, but then they have a vein or the laminar cells are elongated] **-- mosses (Volumes II and III)**

Artificial Keys to Liverworts Found in Quebec-Labrador

(1a) Plants consisting of a narrow, irregularly divided and lobed thallus, bearing irregular lateral blades resembling leaves; rhizoids purple; sexual organs borne on the dorsal surface of the thallus **... Fossombronia**

(1b) Plants consisting of a stem and leaves **... Leafy Liverworts**

(1c) Thalloid plants **-- 2**

(2) Thallus consisting of a spongy tissue (aerenchyma) on the dorsal side and a dense tissue (parenchyma) on the ventral side; plant often leathery and opaque **... Marchantiales**

(2) Thallus is a homogeneous internal tissue, translucent in most cases, not leathery (Aneura pinguis has a rather opaque and fleshy thallus but lacks aerenchyma) **... Metzgeriales**

Marchantiales Key to Families

(1) Pores absent or visible only at high magnification **-- 2**

(1) Pores visible to the naked eye, without magnification, each located in the center of a polygonal area on the dorsal surface of the thallus **-- 4**

(2) Plants forming complete or partial rosettes; capsules embedded in the thallus tissues **... Ricciaceae**

(2) Plants not forming regular rosettes; capsules produced on the underside of an umbrella-shaped container borne on an elongated pedicel **-- 3**

(3) Epidermal cells lining the pores with thick radial walls, giving the pore a radiating, star-like appearance **... Cleveaceae**

(3) Epidermal cells lining the pores that do not give the pores a radiating, star-like appearance (although they may have thick radial walls in one of the genera) **... Aytoniaceae**

(4) Pores located at the top of a mound of hyaline cells arranged in a single layer **... Conocephalum salebrosum**

(4) Pores with cross-shaped openings surrounded by a ring of overlapping cells, forming a short tube **... Marchantiaceae**

Metzgeriales Key to Genera

(1) Globular colonies of symbiotic blue-green algae forming diffuse, dark, circular patches within the thallus tissues (not to be confused with hornworts) **... Blasia pusilla**

(1) Symbiotic algal colonies absent **-- 2**
(2) Hairy thallus with ribbon-like margins, 1-2 mm wide; sexual organs produced on the ventral side of the thallus **... Metzgeria [2]**
(2) Hairless margins of the thallus; sexual organs produced on the dorsal side or margins of the thallus **-- 3**
(3) Thallus with numerous branches, sometimes bi- or tripinnate, thin and narrow, 0.2-2 mm wide **... Riccardia [4]**
(3) Sparsely branched thallus, 3.5-8 mm wide **-- 4**
(4) Sexual organs borne on short lateral branches **... Aneura [2]**
(4) Sexual organs produced on the dorsal part of the thallus **-- 5**
(5) Central bundle present in the center of the midrib, single, clearly visible, composed of thick-walled cells (to be observed in cross-section) **... Pallavicinia lyellii**
(5) Central bundle absent, or double and then often difficult to perceive **-- 6**
(6) Sexual organs protected by laciniate scales; female organs produced on the mid-dorsal part of the thallus **... Moerckia [?]**
(6) Male sexual organs embedded in small pustules arranged on the false midrib of the thallus; female organs protected by a foliaceous plate, produced near the distal end of the thallus **... Pellia [4]**

Leafy Liverworts

Proceed by elimination, from top to bottom
(1) Plants consisting of a narrow thallus bearing irregularly divided and lobed lateral blades resembling leaves; purple rhizoids; sexual organs borne on the dorsal surface of the thallus **... Fossombronia [2]**
(1) Leaves strongly concave, lobules at the proximal end and lobed at the distal end, lobes extending into long, narrow, acuminate cilia **... Nowellia curvifolia**
(1) Leaves distinctly bilobed-complicate (except Scapania obcordata) **-- Scapaniaceae**
(1) Isophyllous branches, the underleaves being of similar size and shape to the leaves (without necessarily being identical), the plant exhibiting radial symmetry with its leaves arranged in three rows **-- Key A**
(1) Lacinate (ciliate) leaves **-- Key B**
(1) Incubous leaves **-- Key C**
(1) Transverse leaves **-- Key D**
(1) Succubous leaves, lobed **-- Key E**
(1) Succubous leaves, unlobed **-- Key F**

Key A: Branches with Radial Symmetry

(1) 3-4-lobed leaves **... Tetralophozia setiformis [2]**
(1) Leaves bilobed for more than 1/2 their length, lobes acute; rhizoids arising on the leaves or at the base of the underleaves **... Anthelia [2]**
(1) Leaves shortly bilobed, lobes obtuse or subacute; rhizoids distributed on the ventral face of the stem **... Hygrobiella laxifolia**

Key B: Lacinate (Ciliate) Leaves

(1) Tiny, threadlike, thin plants, less than 0.8 mm wide; leaf blade apparently absent; leaves divided almost to the base into 2(3–4) narrow filaments, 1–2(4) cells wide at the base **-- 2**
(1) Robust plants, more than 1 mm wide; leaf blade present; leaves lobed to the center or more, lobes ciliate **-- 3**
(2) Leaves divided into filaments 2(3–4) cells wide at the base; underleaves smaller than the leaves and less divided; plants 0.3–0.5 mm wide **... Kurzia [2]**
(2) Leaves divided into filaments one cell wide at the base; underleaves similar to the leaves; plants 0.7–0.9 mm wide **... Blepharostoma trichophyllum [2]**
(3) Whitish-green plants; leaf blade reduced to narrow lobes bordered with abundant branched cilia **... Trichocolea tomentella**
(3) Green to tawny to reddish-brown plants; leaf blade evident; lobes rather broad bordered with simple cilia **... Ptilidium [2]**

Key C : Incubous Leaves
(1) Lobules absent on the ventral surface of leaves **-- 2**
(1) Lobules present on the ventral surface of leaves **-- 4**
(2) Leaves divided to the center into 3-4 lobes; underleaves similar in shape to the leaves but smaller **... Lepidozia reptans**
(2) Leaves entire or 2-3-dentate at the distal end; underleaves entire, bilobed, or irregularly toothed, not particularly similar in shape **-- 3**
(3) Flagella frequently produced on the ventral surface; leaves distinctly 2-3-dentate **... Bazzania [3]|Eocalypogeia schusterana**
(3) Ventral flagella absent; leaves entire or with 2(-3) small teeth at the apex **-- Calypogeiaceae**
(4) Underleaves absent **-- 5**
(4) Underleaves present **-- 6**
(5) Rhizoids arising on the stem; plants minute, pellucid, less than 0.8 mm wide; lobes and lobules closely attached to the stem; apex acute or nearly so **... Cololejeunea biddlecomiae**
(5) Rhizoids arising on the ventral face of the lobes; plants firm, opaque, 0.85–1.5 mm wide; lobes and lobules broadly attached to the stem; apex broadly rounded **... Radula [3]**
(6) Underleaves without lobes, sometimes obscurely notched **... Porella [2]**
(6) Underleaves distinctly bilobed **-- 7**
(7) Lobules closely attached to the stem and appearing free from it; plants rather opaque, dark green to reddish-brown **... Frullania [8]|Jubula pennsylvanica**
(7) Lobules broadly and distinctly attached to the stem; plants usually pale to yellowish-green **... Lejeunea cavifolia**

Key D: Transverse Leaves
(1) Tritomaria leaves predominantly 3-lobed **... Tritomaria [6]**
(1) Leaves uniformly bilobed **-- 2**
(2) Lobes acute or subacute, somewhat unequal; leaves slightly conduplicate, often producing reddish, purple, or vinaceous gemmae **... Anastrophyllum [7]**
(2) Lobes equal or nearly so; leaves not conduplicate **-- 3**
(3) Leaf cells with collenchymatous walls, prominent trigones **-- Gymomitriaceae**
(3) Leaf cells with equally thick walls, trigones absent **-- 4**
(4) Underleaves large and obvious, ovate-triangular, almost as long as the leaves **... Pleurocladula albescens [2]**
(4) Underleaves small or absent **-- 5**
(5) Stem with a hyalodermis composed of large, pellucid cells (observe mature specimens and several stem sections) **... Cephalozia [11]**
(5) Hyalodermis absent **-- 6**
(6) Leaves densely imbricate (margins difficult to discern), bilobed for 1/8 of their length or less **... Prasanthus suecicus**
(6) Leaves spaced apart, bilobed for at least half their length **-- 7**
(7) Outer stem cortex forms a ring of cells distinctly larger than the inner cortex cells; oil bodies absent from most cells **... Eremonotus myriocarpus**
(7) Stem cortex forms cells of more or less uniform size; oil bodies present **... Cephalozia [11]**

Key E : Leaves Succubous, Lobed
(1) 3-4 lobed leaves **-- Lophozia sensu lato**
(1) Bilobed leaves **-- 2**
(2) Underleaves present on plant stems, generally clearly visible but in some cases difficult to detect (observe the distal part of the stems) **-- 3**
(2) Underleaves on plant stems absent or reduced **-- 8**

(3) Rhizoids localized in a restricted area at the base of the underleaves **... Chiloscyphus [5]**
(3) Rhizoids distributed over the entire ventral surface of the stem **-- 4**
(4) Underleaves ovate, lingulate to ovate-lanceolate, without lobes ort cilia, sometimes narrowly conjoined on one side at the base of lateral leaves **-- 5**
(4) Underleaves with lobes, teeth, or cilia, always free from lateral leaves **-- 7**
(5) Cell walls equally thick; ventral stolons present **... Cladopodiella [2]**
(5) Cell walls thin, trigones protruding and conspicuous; stolons absent **-- 6**
(6) Ventral branches; stem narrow and firm; sexual organs on short ventral branches **... Harpanthus [3]**
(6) Lateral, sometimes terminal, branches; stem fleshy, soft, broad; intercalary androecia, terminal perianths on the main stem **... Nardia [3]**
(7) Underleaves divided to the base into 2 parallel, lanceolate segments; branches of ventral origin; perianths absent; fertile plants producing marsupia **... Geocalyx graveolens**
(7) Underleaves irregularly divided and ciliated; branches of lateral origin; fertile plants producing perianth **... Leiocolea [6]**
(8) Most branches, and at least the sexual branches, of ventral origin; cell walls not collenchymatous, equally thick **-- 9**
(8) Branches uniformly of lateral origin **-- 11**
(9) Stem with a hyalodermis composed of large, pellucid cells (observe mature specimens and several stem sections) **... Cephalozia [11]**
(9) Stem with an opaque hyalodermis composed of small cells **-- 10**
(10) Perianth triangular in cross-section in the distal half; medium-sized plants, more than 0.5 mm wide **... Cladopodiella [2]**
(10) Perianth with 4–5 longitudinal folds; small plants, 0.25–0.60 mm wide **... Cephaloziella [8]**
(11) Perianth smooth, swollen, deciduous, without a beak; plants usually blackish, appearing scorched; leaves bilobed, lobes obtuse or rounded at the apex (acute in the case of a rare variety); female bracts similar to the plant leaves **... Gymnocolea inflata [2]**
(11) Perianth pleated or smooth and with a beak, not distinctly swollen, not deciduous; plants not blackish, not appearing scorched; leaves variously lobed, lobes acute or obtuse; female bracts larger and often different in shape from the plant leaves **-- Lophozia sensu lato**

Key F : Leaves Succubous, Unlobed
(1) Dorsal margins of leaves broadly incurved along their entire length; leaves nearly orbicular, with a characteristic central longitudinal fold **... Plagiochila porelloides [2]**
(1) Margins flat or variously reflexed or recurved but not distinctly incurved; central longitudinal fold absent **-- 2**
(2) Leafless stolons of ventral origin present; underleaves minute, difficult to observe, bearing slime papillae **... Odontoschisma [3[**
(2) Leafless stolons of ventral origin absent (but stolon-like branches sometimes present in the leaf axils); underleaves, if present, not bearing numerous slime papillae **-- 3**
(3) Central leaf cells 45–50 µm or more in diameter; trigones protruding and large; gemmae at the leaf tips of normal size; underleaves clearly visible, lanceolate **... Mylia taylorii|Leiomylia anomala**
(3) Central leaf cells 36 µm wide or less; trigones absent or small, never protruding; gemmae absent from leaves, in Jungermannia sometimes present at the margins of small, reduced leaves **-- 4**
(4) Rhizoids limited to a restricted area at the base of the underleaves; underleaves large, clearly visible, lanceolate or bifid **... Chiloscyphus [5]**
(4) Rhizoids distributed over the entire ventral surface of the stem; underleaves small or consisting of a few minute cilia **-- 5**
(5) Underleaves present, small, lanceolate; perigynium well developed, forming an angle with the stem; orbicular leaves **... Nardia [3]**
(5) Underleaves usually absent from vegetative stems or divided into several cilia; perigynium absent or continuous with the stem **-- 6**

(6) Base of female bracts and margin of the perianth opening with teeth or cilia; large bracteoles present **... Syzygiella autumnalis**
(6) Base of female bracts and margin of the perianth opening entire; bracteoles absent **... Jungermannia [13]**

FAMILY KEYS to genus and select species

Aneuraceae Key

(1) Simple thalli, sometimes slightly branched, 3–8 mm wide; branches few, short and irregular; oil bodies numerous, hyaline and small **... Aneura [?]**
(1) Thalli with numerous branches, sometimes bi- or tripinnate, thin and narrow, 0.2–2 mm wide; oil bodies 1–3 (5) per cell, brown and large, or absent **... Riccardia [?]**

Aytoniaceae Key

(1) Pores surrounded by 4–5(6) rows of distinct cells; cells surrounding the pores having radial walls distinctly thicker than tangential walls; ventral scales with filiform appendages; female cap, when viewed from above, having a star-shaped silhouette; capsules with irregular dehiscence **... Reboulia**
- **A -** Plants paroicous **... Reboulia hemisphaerica subsp. hemisphaerica**
- **A -** Plants autoicous **... Reboulia hemisphaerica (L.) Raddi subsp. australis R.M. Schuster**

(1) Pores surrounded by 1–3 rows of distinct cells or by irregular cells, not particularly different; cells surrounding the pores showing no difference between radial and tangential walls; ventral scales with lanceolate appendages; female cap, viewed from above, having a circular silhouette (lobes prominent under the cap); capsule with dehiscence along a clearly defined line **-- 2**
(2) Cap pedicel bearing whitish scales, particularly at the base or apex under the cap. Capsule surrounded by a perichaetium not particularly visible **... Mannia [3]**
(2) Cap pedicel not bearing whitish scales; capsule surrounded by an exsert pseudoperianth, initially conical then divided into several scales **... Asterella [2]**

Calypogeiaceae Key

(1) Plants strongly chlorophyllose and opaque; rhizoids partly dispersed on the stem; marsupium stipitate, obovoid, bearing few or no rhizoids **... Eocalypogeia schusterana**
(1) Plants translucent and delicate, with few chlorophyllose; rhizoids strictly bordered, with a zone below the insertion of the underleaves; marsupium sessile, cylindrical, and with a tomentum of rhizoids **... Calypogeia [6]**

Cephaloziaceae Key

(1) Hyalodermis absent; oil bodies present **-- 2**
(1) Hyalodermis present; oil bodies absent **-- 3**
(2) Leaves bilobed for 1/5–2/5 of their length **... Cladopodiella [2]**
(2) Leaves entire **... Odontoschisma [3]**
(3) Underleaves isophyllous or nearly so, distinctly bilobed **... Hygrobiella laxifolia**
(3) Underleaves absent or small and inconspicuous, difficult to identify, or else reaching at most 3/5 the size of the leaves and not lobed **-- 4**
(4) Underleaves present, reaching at most 3/5 the size of the leaves, not lobed **... Pleurocladula**
- **A -** Leaves 1.1–1.3 X as wide as long, bilobed for 1/4–1/3 of their length; underleaves ovate-lanceolate to ovate **... Pleurocladula albescens var. albescens**
- **A -** Leaves 0.95–1.1 X as wide as long, bilobed for 1/3–1/2 of their length; underleaves lanceolate **... Pleurocladula albescens var. islandica**

(4) Underleaves absent or small and inconspicuous, difficult to identify **-- 5**
(5) Leaf blade erect, strongly attached at the proximal end, ventral margin incurved and folded, forming a lobule **... Nowellia curvifolia**
(5) Leaf blade sometimes strongly concave but not folded to form a lobule **... Cephalozia [10]**

Cleveaceae Key
(1) Ventral scales projecting beyond the thallus margins; reddish secondary coloration present, at least at the thallus margin; oil bodies absent from ventral scales; areoles not swollen; dioicous; dorsal gynoecium **... Clevea [?]**
(1) Ventral scales not projecting beyond the thallus margins; reddish secondary coloration absent; oil bodies present on ventral scales; swollen areoles; parietal wall, sometimes autoicous; gynoecium terminated, at the tip of a lobe or in the fork of a dichotomy **... Sauteria [?]**

Geocalycaceae Key
(1) Plants opaque, greenish-yellow; leaves with nearly parallel margins, a sinus, and acute lobes; underleaves deeply divided into two narrow lobes; subterranean marsupium present; autoicous **... Geocalyx graveolans**
(1) Plants pellucid; leaves ovate to ovate-rounded, sinuses crescent-shaped or semicircular and lobes acute to obtuse; underleaves oblong or bilobed only at the apex; gynoecium erect and clavate; dioicous **... Harpanthus [3]**

Gymnomitriaceae Key
(1) Laminal cells with more or less equally thick walls, trigones absent, sometimes small, inconspicuous trigones are present in some leaf areas; oil bodies absent from most cells, but some cells disperse with 1–3 oil bodies **-- 2**
(1) Laminal cells with more or less thin walls, trigones present, generally prominent; oil bodies (1)2–3(5) per cell **-- 3**
(2) Leaves spaced apart, bilobed for half their length; plants reddish-brown to olive-brown or greenish-olive **... Eremonotus myriocarpus**
(2) Leaves densely imbricate, margins difficult to discern, bilobed for 1/8 of their length or less; plants whitish-green, silver-green, or grayish-green **... Prasanthus suecicus**
(3) Leaf margins revolute **-- 4**
(3) Leaf margins flat, not revolute **-- 5**
(4) Margins of most, if not all, leaves strongly and broadly revolute, even in the sinus; leaves sheathing in **... Apomarsupella revoluta**
(4) Margins of leaves (at least some) narrowly and partially revolute at the proximal part; leaves little or not sheathing **... Marsupella emarginata**
(5) Margins of leaves not discolored or particularly eroded (margins sometimes discolored in Marsupella arctica, which should not be confused with it; see description of this taxon); leaves generally more or less spaced, variously spreading, exposing, at least partially, the stem; twigs not scaly (except in Marsupella condensata) **... Marsupella [12]**
(5) Margins of leaves hyaline, eroded (at least in the older leaves); leaves erect-appressed, densely imbricate, obscuring the stem; twigs distinctly and strongly scaly **-- 6**
(6) Dioicous; perigynium absent or indistinct, gynoecium inserted in the stem axis; underleaves absent; intramarginal laminal cells with (1)2–3(5) oil bodies; stems 5–30 mm long, generally erect, branches cylindrical, club-shaped, or dorsoventrally compressed; rhizoids, when present, restricted to the proximal part of the stem; stolons arising from older parts of the stem **... Gymnomitrion [4]**
(6) Paroicous; perigynium present, forming a marsupium bearing rhizoids and oriented perpendicular to the stem axis; oil bodies generally absent but rarely present in some cells of young leaves. stems 2–5 mm long, horizontal, creeping and buried, distal end erect, branches laterally compressed; rhizoids abundant along the entire length of the stem; stolons arising on all parts of the stem, including branches produced during the current year **... Prasanthus suecicus**

Jungermanniaceae Key
(1) Median laminal cells 45–50 µm or more wide; trigones prominent; gemmae at the tips of normal-sized leaves; underleaves prominent, lanceolate **-- 2**

(1) Median laminal cells 36 µm or less wide; trigones absent or small, never prominent; gemmae absent from leaves (in Jungermannia, sometimes present at the margins of small, reduced leaves); underleaves absent or small and inconspicuous **-- 3**
(2) Leaf cuticle smooth; gemmiparous leaves ovate-lanceolate and often acute; oil bodies with prominent segments **... Leiomylia anomala**
(2) Leaf cuticle dissected, appearing fractured and cut into polygonal plates; leaves all orbicular, sometimes rectangular-rounded; granular oil bodies **... Mylia taylorii**
(3) Underleaves present, small, lanceolate; perigynium well developed, forming an angle with the stem; leaves perfectly orbicular ... Nardia
(3) Underleaves usually absent from vegetative stems or divided into several cilia; perigynium absent or continuous with the stem; leaves not perfectly orbicular **-- 4**
(4) Base of female bracts and margin of the perianth opening bearing teeth or cilia; large bracteoles present **... Syzygiella autumnalis**
(4) Base of female bracts entire, margin of the perianth opening entire; bracteoles absent **... Jungermannia [13]**

Lejeuneaceae Key
(1) Underleaves absent **... Cololejeunea biddlecomiae**
(1) Underleaves present **... Lejeunea cavifolia**

Lepidoziaceae Key
(1) Pseudo dichotomous branching; leaves 2–3 toothed at the distal end, sinuses shallow **... Bazzania [3]**
(1) Pinnate branching, lateral branches diverging at an angle of about 90°; leaves (2)3–4 lobed for at least 1/3 of their length **-- 2**
(2) Leaves inserted transversely or somewhat succubus, divided for 2/3–7/8 of their length into thread-like segments 2(-4) cells wide at the base **... Kurzia [2]**
(2) Leaves incubate, 3–4 lobed for 1/3–1/2 of their length, lobes triangular, 5–8 cells wide at the proximal end **... Lepidozia reptans**

Lophoziaceae Key
(1) Leaves divided for 1/2–3/4 of their length; twigs isophyllous, the underleaves of similar size to the primary leaves; perianth pleated along its entire length; gemmae absent **... Tetralophozia setiformis**
(1) Leaves divided for 1/8–1/2 of their length; twigs anisophyllous, the underleaves, if present, distinctly smaller than the principal leaves; perianth pleated at the distal end or smooth; gemmae often present **-- 2**
(2) Leaves inserted obliquely on the dorsal side of the stem, the line of insertion pointing towards the proximal part of the branch **-- 3**
(2) Leaves inserted transversely on the dorsal side of the stem, the line of insertion perpendicular to it or pointing towards the distal part of the branch **-- 4**
(3) Perianth smooth, swollen, deciduous, beak absent; plants usually blackish, appearing scorched; bilobed leaves, lobes obtuse or rounded at the tip (acute in the case of a rare variety); female bracts similar to vegetative leaves **... Gymnocolea**
    A - Leaves suborbicular to broadly ovate, lobes rounded or obtuse; perianths common, deciduous **... Gymnocolea inflata subsp. inflata**
    A - Leaves subsquare to ovate-rectangular, lobes subacute and acute; perianths rare, not deciduous **... Gymnocolea inflata subsp. acutiloba**
(3) Perianth pleated or smooth with a beak, not distinctly swollen, not deciduous; plants not having a blackish appearance; leaves variously lobed, lobes acute or obtuse; female bracts larger and often different in shape from the vegetative leaves **-- Lophozia sensu lato**
(4) Leaves predominantly three-lobed **... Tritomaria s. lat**
(4) Leaves bilobed **-- 5**
(5) Underleaves absent **... Anastrophyllum s. lat.**
(5) Underleaves present **... Barbilophozia kunzeana**

Marchantiaceae Key

(1) Thallus often bearing cup-shaped receptacles in the upper part containing discoid gemmae; ventral part of the thallus with 3 rows of scales on either side of the central rhizoid zone; female cap digitate; dichotomous branching **... Marchantia**

A - Dorsal surface of the thallus marked in the midsection with a continuous, clearly defined, longitudinal black line; margins of the median scale appendages entire or nearly so; pores of the dorsal epidermis averaging 39 µm wide; thallus rather erect **... Marchantia polymorpha subsp. polymorpha**

A - Dorsal surface of the thallus without a median black line, a more or less well-defined and sometimes interrupted black band present; margins of the median scale appendages dentate; pores of the dorsal epidermis averaging 55–60 µm wide; thallus prostrate **-- B**

B - Dorsal surface of the thallus marked in the midsection with a more or less well-defined and discontinuous longitudinal black zone, with pores more or less densely packed; perianth short, barely reaching 1/3 of the distance between the center of the cap and the tip of the lobes; dark green thallus **... Marchantia polymorpha subsp. ruderalis**

B - Longitudinal black line absent in the midsection but sometimes present between the thallus bifurcations; long perianth, reaching half the distance between the center of the cap and the tips of the lobes; yellow-green thallus **... Marchantia polymorpha subsp. montivagans**

(1) Gemmule receptacles absent; ventral part of the thallus with a conspicuous row of colored (purple-black) scales on either side of the central rhizoid zone; female cap entire; apical and ventral branches present **... Preissia**

A - Male receptacle with a broad, thin, papery, opalescent margin, distinctly arched upwards; thallus up to 1–1.5 cm wide; 2–4 sporophytes per cap; spores 50–70 µm; monoicous **... Preissia quadrata subsp. hyperborea**

A - Male receptacle with a flat, but not broad, papery, opalescent margin, arched upwards; thallus generally less than 1 cm wide; 8–10 sporophytes per cap; spores 65–80 µm; dioicous **... Preissia quadrata subsp. quadrata**

Palaviniaceae Key

(1) Single, central bundle (observed in cross-section), formed by cells with clearly differentiated and thick walls **... Pallavicinia lyellii**

(1) Double, lateral bundles, difficult to perceive, cell forms with subtly differentiated walls **... Moerckia [?]**

Ricciaceae Key

(1) Pores absent or simple, not surrounded by distinct cells; oil bodies absent; ventral scales inconspicuous, arranged in 1 or 2 rows, with entire margins **... Riccia [9]**

(1) Pores present, surrounded by a concentric circle of distinct cells; oil bodies present in the epidermis and ventral scales; ventral scales numerous, long, colored, conspicuous, inconspicuous and few in number in stranded individuals, with coarsely toothed margins **... Ricciocarpos natans**

Scapaniaceae Key

(1) Gemmae angular, polyhedral, etiolated; leaf lobes elongated, long-lingulate **... Diplophyllum [4]**

(1) Gemmae smooth, ovoid or ellipsoidal; leaf lobes rounded, broadly ovate, sometimes broadly lingulate **... Scapania [27]**

Trichocoleacea Key

(1) Robust plants; leaves succubus, 4-5-lobed over 0.5–0.9 mm in length, lobes narrowly triangular, ciliate, and 3–4 cells wide at the base **... Trichocolea tomentella**

(1) Tiny, thread-like, slender plants, 0.7–0.9 mm wide; Transverse or subtransverse leaves, divided almost to the base into 2–3(4) narrow filaments, a single cell wide at the base **... Blepharostoma**

A - Spores 8–10(13) µm; leaf lobes long-acuminate, with cells (2)3–4(6) X as long as wide; oil bodies 4–8 per cell; gemmae frequent; perianth cells 13–18 µm wide; cells underlying the perianth opening 4–5 X as long as wide **... Blepharostoma trichophyllum var. trichophyllum**

A - Spores (10)12–14(16) µm; leaf lobes short and rigid, with cells 1–1.8 X as long as wide; oil bodies 2–5 per cell; gemmae absent; Perianth cells 19-25 µm wide; cells underlying the perianth opening 0.8–4 X as long as wide **... Blepharostoma trichophyllum var. brevirete**

GENUS KEYS TO SPECIES

Anthelia Key to presumed species
(1) Dioicous; perianth emerging to half its length; rhizoids rare, mostly; present on the flagella; spores 12–16 µm **... Anthelia julacea**
(2) Paroicous; perianth submerged or barely emerging; rhizoids usually; present on all branches and on the main stem; spores 16–21 µm **... Anthelia juratzkana**

Anthocerotae Key
(1) Sporophyte over 1 cm long at maturity, erect; valves becoming spiral at the distal end after dehiscence **-- 2**
(1) Sporophyte less than 0.8 cm long at maturity, oriented obliquely to the thallus surface; valves at the distal end not spiral after dehiscence **-- 4**
(2) Dark brown spores; lacunae present **... Anthoceros agrestis**
(2) Yellow spores; lacunae absent **-- 3**
(3) Monoicous **... Phaeoceros carolinianus**
(3) Dioicous **... Phaeoceros laevis**
(4) Yellow spores **... Notothylas orbicularis**
(4) Dark brown spores **... Anthoceros macounii**

Anastrophyllum Key
(1) Broader leaves have a proximal portion; dorsal leaf insertion line arched and decurrent along the midline; proximal laminal cells more or less elongated **-- 2**
(1) Leaves oblong-ovate rounded-square, not broadened at the base; dorsal insertion line not decurrent; proximal laminal cells not elongated **-- 5**
(2) Leaves much wider than long, unequally bilobed, dorsal lobe smaller and weakly decurrent; lobes obtuse or rounded; female bracts divided into 3–5 toothed lobes **... Anastrophyllum saxicola**
(2) Leaves as long as or longer than wide, more or less equally bilobed; lobes acute; female bracts bilobed **-- 3**
(3) Plants not more than 1 mm wide; stem diameter 7–9 cells wide; Dorsal line of leaf insertion almost transverse, shortly decurrent, extending little across the stem surface; heterozygous sexuality **... Anastrophyllum sphenoloboides**
(3) Plants 1–6 mm wide; stem diameter 10–15 cells wide; leaves distinctly decurrent; dioecious **-- 4**
(4) Most leaves as long as wide, bilobed for 1/3–1/2 of their length, lobes slightly squarrose; proximal laminal cells 1.5–2 X longer than wide; gemmae present **... Anastrophyllum michauxii**
(4) Most leaves longer than wide, bilobed for 1/4–1/3 of their length, conduplicate-concave, secondary; lobes not squarrose; proximal laminal cells 2–4 X longer than wide; gemmae generally absent **... Anastrophyllum assimilate**
(5) Plants with erect gemmiferous branches, very different from vegetative branches; stem diameter 5–7 cells wide; gemmae angular, more or less regularly cubical, vinaceous, unicellular; plants thread-like, majority of branches 0.2 mm wide **... Anastrophyllum hellerianum**
(5) Gemmae produced at the margin of leaves that are little or not altered, or progressively attenuated, or gemmae absent; stem diameter 9–15 cells wide; gemmae polyhedral, composed of (1)2(4) cells; branches 0.5–1.5 mm wide **-- 6**
(6) Leaves strongly concave, hemispherical, bilobed for 1/5–1/3 of their length (sometimes 3- or 4-lobed); large trigones present; Marginal lobe cells 20–27 µm; oil bodies 4–8(10) per cell; underleaves sporadically present **... Anastrophyllum cavifolium**

(6) Leaves conical, concave, bilobed for 1/4–1/2 of their length, never 3- or 4-lobed; trigones small or absent (except at the proximal end); marginal lobe cells 12–18 µm; oil bodies 3–4(7) per cell; underleaves absent **... Anastrophyllum minutum**

Aneura Key
(1) Thin, translucent, herbaceous thallus, with a midrib abruptly branching on either side into a unicellular margin **... Aneura maxima**
(1) Turgid, opaque, and brittle thallus when fresh, lacking a midrib, multicellular throughout its entire width or nearly so **... Aneura pinguis**

Asterella Key
(1) Spore diameter less than 70 µm; species from northern regions **... Asterella gracilis**
(1) Spore diameter greater than 70 µm; species from southern regions **... Asterella tenella**

Barbilophozia Key
(1) Main leaves predominantly and regularly 4-lobed **-- 2**
(1) Leaves (2-)3-lobed **-- 5**
(2) Leaf lobes longer than wide, with distinctly reflexed margins; deep sinus at least half the leaf length **... Barbilophozia quadriloba**
(2) Leaf lobes wider than long, margins not reflexed; deep sinus at most half the leaf length, often less **-- 3**
(3) Marginal cilia absent; underleaves absent or barely developed; leaf lobes not apiculate or mucronate **... Barbilophozia barbata**
(3) Marginal cilia present on the proximal part of the ventral margin, elongated cell forms; underleaves present; leaf lobes apiculate or mucronate **-- 4**
(4) Dorsal margin of leaves reaching at most the midline of the stem; reddish gemmae present; branchlets less than 3 mm wide; leaves less than 2 mm wide **... Barbilophozia hatcheri**
(4) Dorsal margin of leaves crossing the midline of the stem; gemmae absent; branchlets more than 3 mm wide; leaves more than 2 mm wide **... Barbilophozia lycopodioides**
(5) Large, 2-lobed underleaves with ciliate margins; cilia present (sometimes sparse) on the ventral margin of the leaves **-- 6**
(5) Underleaves absent, or if present, small, lanceolate, and not ciliate on the margin; cilia absent from the ventral margin of the leaves **-- 7**
(6) Main leaves mostly 2-lobed, lobes rounded; erect underleaves **... Barbilophozia kunzeana**
(6) Main leaves 3-lobed, lobes acute; appressed underleaves **... Barbilophozia floerkei**
(7) Trigones small, slightly or prominently; leaf marginal cells 13–17 µm long; flagelliform branches often present at the distal end of the stem, with reduced, scaly, and appressed leaves bearing gemmae; common forest species **... Barbilophozia attenuata**
(7) Trigones large and prominent; leaf marginal cells 18–24 µm long; gemmae, if present, borne on the margin of normal leaves (sometimes on the margin of slightly reduced and close-set leaves), but flagelliform branches occasionally present; alpine or arctic-alpine species **-- 8**
(8) Trigones prominent but not confluent; leaves scarcely concave, 1.3–1.5 X as wide as long; underleaves present on the gemmiferous stems, small and lanceolate; lobes broad; sinuses reaching 1/3 the length of the leaf **... Barbilophozia atlantica**
(8) Trigones confluent; leaves strongly concave, as wide as long; underleaves absent; lobes lanceolate; sinuses reaching less than 1/3–1/2 the length of the leaf **... Barbilophozia binsteadii**

Bazzania Key
(1) Plants 3–6 mm wide **... Bazzania trilobata**
(1) Plants less than 2.2 mm wide **-- 2**
(2) Marginal cells of the distal leaf are elongated tangentially to the margin; oil body is cluster-like; underleaves are bidentate or bilobed; basophilous; rare **... Eocalypogeia schusterana**

(2) Marginal cells of the distal leaf are isodiametric; oil bodies homogeneous, segmented with age; underleaves with 3-4 lobes or teeth at the distal end; widespread plant, generally in acidic environments **-- 3**
(3) Leaf apex inflexed, especially when dry, with 2–3 well-defined, symmetrical teeth; leaves persistent, somewhat falcate; plants are brownish or dark green; underleaves distinctly tooth-lobed at the distal end, margins sinuous; oil bodies 2–4(6) per cell **... Bazzania tricrenata**
(3) Leaf apex flat, variable in shape, acute or shortly bidentate, never regularly tridentate; leaves often deciduous, somewhat asymmetrical but not falcate; plant light green or yellowish-green, no brownish tint; underleaves sinuous to obscurely angular-toothed at the distal end, lobes obscurely defined; rounded, margins generally straight or rounded; oil bodies 5–15 per cell **... Bazzania denudata**

Calypogeia Key
(1) Underleaves rounded, entire or emarginate for 25% or less of their length; 6–12 cells present between the base of the sinus and the rhizoid zone below the insertion; marginal cells at the leaf tips often elongated, rectangular, and longer than the laminal cells; oil bodies absent (or disappearing entirely) in the underleaf cells **-- 2**
(1) Underleaves deeply notched; 2–6 cells present between the base of the sinus and the rhizoid zone below the insertion; marginal cells at the leaf tips similar in size to the laminal cells; oil bodies present in the underleaf cells **-- 3**
(2) Distal leaf tip slightly emarginate or truncate; rectangular cells forming a continuous band at the leaf margin; underleaves 1.1–1.2 X as wide as long, with a short, acute sinus at the tip, drooping at the base; oil bodies present in the cells of the leaf margin but absent from the central cells **... Calypogeia neesiana**
(2) Distal tip of leaves rounded; rectangular cells forming an irregular, interrupted band at the leaf margin; underleaves 1.2–1.6 X as wide as long, sinus absent or otherwise wide and shallow, not decurrent; oil bodies present in all leaf cells **... Calypogeia integristipula**
(3) Adult plant rarely reaching a width of 2 mm and a length of 10 mm; trigones often present; oil bodies formed of 2–5 segments; median laminal cells 25–25 X 30–40 µm **-- 4**
(3) Adult plant reaching a width greater than 2 mm and a length greater than 20 mm; trigones absent or small and variable; oil bodies composed of 4–35 globules; median laminar cells (32)36–45 X 45–75(48) µm **-- 5**
(4) Underleaves twice as wide as long, imbricate, twice as wide as the stem; leaves spreading, apex broadly rounded to narrowly truncate or emarginate; on decaying wood **... Calypogeia suecica**
(4) Underleaves less than twice as wide as long, distant, scarcely wider than the stem; leaves appressed, apex more or less acute, or narrowly rounded or bident; epiphyte on Sphagnum **... Calypogeia sphagnicola**
(5) Leaves longer than wide, narrowly ovate, apex acute or obtuse; underleaf lobes divided by a sinus reaching at least half their length, 1–2(3) cells present between the base of the sinus and the rhizoid zone below the insertion; underleaf lobes acute or narrowly rounded and margins lobed or angular **... Calypogeia fissa subsp. neogaea**
(5) Leaves as wide as long or wider, apex narrowly or broadly rounded; underleaf lobes divided by a sinus reaching less than half their length, 3–6 cells present between the base of the sinus and the rhizoid zone below the insertion; underleaf lobes broadly rounded and margins entire **... Calypogeia muelleriana**

Cephalozia Key
Species of the genus Cephalozia are sometimes difficult to identify. Avoid relying on certain characteristics that are likely unreliable: stem cell length, the presence or absence of flagella (often broken during harvesting or handling), the number of stem cells observed in cross-section, lobe orientation, and the gradation in laminar cell size from one end of the leaf to the other. Cell size is measured at the center of the leaf, at the base of the lobes. The number of cells across the width of the leaf is counted in the undivided portion just below the lobes. The number of cells across the width of the lobes is the number at their base. It can be risky to attempt identification of sterile specimens from wet environments or submerged sites.

(1) Dorsal surface of the branch axis without a free band in the center, the dorsal leaf insertion line reaching the cells of the central axis **-- 2**

(1) Dorsal surface of the mature branch axis with a broad band of 2 cells in the center of the dorsal surface left free by the leaf insertion line **-- 3**
(2) Laminal cells (24)25–38(50) µm wide; plants 0.6–1 mm wide; gemmae rare **... Cephalozia bicuspidata**
(2) Laminal cells (18)20–24(27) µm wide; plants 0.3–0.4 mm wide; gemmae frequent **... Cephalozia ambigua**
(3) Leaves inserted transversely and almost vertically **... Cephalozia leucantha**

A - Leaf lobes narrowly triangular, 4(5) cells wide at the base; leaves 1.1–1.3 X as long as wide, 7–8(9) cells wide; female bract margin entire or nearly so; perianth aperture with teeth composed of 1(2) cells **... Cephalozia leucantha**

A - Leaf lobes lanceolate, 2(3) cells wide at the base; leaves 1.4–1.5 X as long as wide, 5–7(8) cells wide; female bract margin toothed; perianth aperture with teeth composed of 1–3 cells **... Cephalozia macounii**

(3) Leaves inserted obliquely or longitudinally, generally horizontal **-- 4**
(4) Laminal cells 15–20 µm wide; cells on the dorsal side of the stem 16–28 µm wide; leaves inserted obliquely but the tip of the dorsal insertion line more or less transverse **... Cephalozia catenulata**
(4) Laminal cells 20–35(50) µm wide; cells on the dorsal side of the stem 24–38 µm wide; leaves inserted longitudinally (sometimes more or less transversely in C. pleniceps) **-- 5**
(5) Apical cells of leaf lobes with walls of regular thickness **... Cephalozia pleniceps**
(5) Apical cells of lobes with a cell wall thicker at the distal end than at the margins **-- 6**
(6) Laminal cells 28–50 µm wide; glossy plants **... Cephalozia connivens**
(6) Laminal cells 20–38 µm wide; plants slightly or not glossy **-- 7**
(7) Leaves 12–16(20) cells wide, slightly competing **-- 8**
(7) Leaves 8–12(15) cells wide, shortly or long decurrent **-- 9**
(8) Laminal cells 15–25 X 15–20 µm with walls of varying thickness; Short androecium, with 3–5 pairs of bracts **... Cephalozia catenulata**
(8) Laminal cells 25–35(40) X 20–30 µm, with thin walls; androecium often long, with 14–20 pairs of bracts **... Cephalozia macrostachya**
(9) Leaf lobe apex with 2–3 uniseriate cells; female bracts 4(-6) toothed; perianth opening laciniate; autoicous; cell walls of the inner stem tissue (medulla) with yellowish secondary pigmentation **... Cephalozia loitlesbergeri**
(9) Leaf apex with 1(2) uniseriate cells; female bracts bidentate; perianth opening crenate to crenelate-denticulate; dioicous; Cell walls of the internal stem tissue (medulla) not showing secondary yellowish pigmentation **... Cephalozia lunulifolia**

Cephaloziella Key
(1) Leaves divided for 4/5 of their length into two lanceolate lobes, 2–4 cells wide at the base; vegetative leaves, at least some, with 1–2 spinose teeth at the margin (if the margin is dentate or serrulate, see C. divaricata) **-- 2**
(1) Leaves divided for 1/2–2/3 of their length into two triangular or broadly lanceolate lobes, (3)4–10 cells wide at the base; vegetative leaves entire, sometimes with a small isolated tooth on the proximal ventral part **-- 3**
(2) Laminal cell walls distinctly thick; laminal cells 10–15 µm wide; male bract lobes straight; female bract lobes squarrose, 4-8 cells wide at the base **... Cephaloziella spinigera**
(2) Laminal cell walls thin, sometimes slightly thickened on specimens growing in full light; laminal cells 12–20 µm wide; male bract lobes strongly incurved; female bract lobes rarely recurved, 9–15 cells wide at the base **... Cephaloziella elachista**
(3) In dorsal view, leaf lobes erect and inclined with the proximal part of the leaf spreading; dioicous, inflorescences rarely present; underleaves present and evident, variable in shape and size, often bilobed, present on mature, non-gemmiparous plant stems **... Cephaloziella divaricata**
(3) Leaf lobes in the same plane as the proximal part of the leaf; monoicous, generally abundantly fertile; underleaves small or minute, lanceolate, present on mature, non-gemmiparous vegetative stems, or absent **-- 4**
(4) Laminal cells (10)12–18 µm wide; marginal cells of the perianth aperture (4)5–7 X as long as wide **-- 5**
(4) Laminal cells (6)8–12(15) µm wide; marginal cells of the perianth aperture 2–4 X as long as wide **-- 6**

(5) Leaf apex acute, terminating in 1–2 elongated, overlapping cells characteristically recurved into a hook; female bracts serrulate, lobes terminating in 2–3(4) elongated, overlapping cells, often recurved into a hook; laminal cells (measurements at the base of the lobes) 10–14(15) µm wide ... Cephaloziella uncinata
(5) Leaf apex not recurved hook-shaped; female bracts toothed, lobe apex not recurved hook-shaped; laminal cells (12)13–18 µm wide **... Cephaloziella grimsulana**
(6) Plants mostly parotic, some self-flowering inflorescences occasionally present; laminal cell walls generally thick; secondary staining red **-- Cephaloziella rubella sensu lato**
(6) Plants mostly self-flowering, some self-flowering inflorescences occasionally present; laminal cell walls thin; secondary staining brown **-- 7**
(7) Underleaves present on mature, non-gemmiparous plant stems; spores 9–12 µm; leaves erect or nearly so, slightly concave; reddish-purple gemmae; broad lobes with 6-12(14) cells at the base **... Cephaloziella varians**
(7) Underleaves absent from mature, non-gemmiparous plant stems; spores 7–9 µm; leaves spreading or squarrose; gemmae pale green or slightly brownish; broad lobes with 6–9 cells at the base **... Cephaloziella hampeana**

Chiloscyphus Key
(1) Leaves of plant stems entire or scarcely emarginate **-- 2**
(1) Leaves of plant stems bilobed **-- 3**
(2) Perianth lobes scarcely or not divided, not toothed or with small teeth; leaf apex usually broad and rounded or sometimes slightly emarginate; oil bodies (1)2–4 per cell, rarely more **... Chiloscyphus polyanthos**
> **A -** Leaves distant or close together, flat, more or less rectangular; median laminal cells 20–25 X 25–30 µm; rhizoids sparse; plants blackish, submerged **... Chiloscyphus polyanthos var. rivularis**
> **A -** Leaves close together or overlapping, convex, more or less oval; median laminal cells 24–30 X 30–35 µm; rhizoids in small tufts; dull green, terrestrial plants **... Chiloscyphus polyanthos var. polyanthos**

(2) Perianth lobes distinctly divided, toothed or spinose-toothed; leaf apex slightly attenuate, more often truncate or emarginate than rounded (sometimes slightly bilobed); oil bodies 2–5(6) per cell, sometimes much more **... Chiloscyphus pallescens**
> **A -** Shoots rarely wider than 3–3.5 mm and 2–5 cm long; plants pale, translucent, whitish to greenish-white; leaves close together, rectangular or oblong-square to rounded-square; plants growing on the ground in marshy areas along watercourses **... Chiloscyphus pallescens var. pallescens**
> **A -** Shoots 3.5 mm wide and 5–12 cm long; plants dull green to olive green, relatively opaque; leaves distant, nearly circular; plants growing submerged in pools or slow-moving streams **... Chiloscyphus pallescens var. fragilis**

(3) Leaves distinctly bilobed, lobe apex distinctly acute or ciliate **... Chiloscyphus coadunatus var. rivularis**
(3) Leaves truncate, emarginate, or slightly bilobed; if bilobed, the lobes are obtuse and the sinus shallow **-- 4**
(4) Lobed leaves; abundant gemmae, almost always present in globose masses at the leaf margins; leaf margins eroded and deformed by the abundant production of gemmae; plants 0.5–0.8 mm wide; perianth rare **... Chiloscyphus minor**
(4) Leaves variable on the same stem: entire or emarginate at the distal part of the stem, bilobed in the middle; gemmae usually absent, if present not forming globose masses; leaf margins undeformed; plants 1–1.6 mm wide; perianth frequent **... Chiloscyphus profundus**

Cladopodiella Key
(1) Stem 0.5–0.7 mm wide, 3–8 mm long; leaves imbricate, concave, bilobed for at most 1/5 of their length; lobes more or less acute or obtuse, rarely rounded; gemmae often present; secondary coloration reddish; growing on mineral substrates **... Cladopodiella francisci**
(1) Stem 0.7–1.2 mm wide, 3–5(–20) cm long; leaves distant, flat or convex, bilobed for 1/5–2/5 of their length; lobes obtuse or rounded; gemmae absent; secondary coloration brownish; growing on organic or floating substrates **... Cladopodiella fluitans**

Diplophyllum Key
(1) Vitta clearly defined, reaching at least half the lobe; cuticle smooth **... Diplophyllum albicans**

(1) Vitta absent or small and poorly defined; cuticle papillate **-- 2**
(2) Ventral lobe apex distinctly apiculate **... Diplophyllum apiculatum**
(2) Ventral lobe apex broadly rounded **-- 3**
(3) Monoicous, perianths always present; median laminal cells of the ventral lobe 2–4 X as long as wide; gemmae rare, unicellular, sometimes bicellular, reddish-brown at maturity **... Diplophyllum obtusatum**
(3) Dioicous, perianths rare; median laminal cells of the ventral lobe 1.5–2 X as long as wide; gemmae rare, bicellular, greenish at maturity **... Diplophyllum taxifolium**

> **A -** Cuticle of the mid-lobe portion with numerous, large, confluent papillae **... Diplophyllum taxifolium var. macrostricta**
> **A -** Cuticle with abundant, medium-sized papillae **... Diplophyllum taxifolium var. taxifolium**

Fossombronia Key
(1) Reticulated outer surface of the spore, with ridges forming a lattice of areoles; oil bodies 6–40 per median cell **... Fossombronia foveolata**
(1) Spore surface with parallel ridges, some occasionally joining at the center of the surface and forming exceptional areoles; oil bodies 60–85 per median cell **... Fossombronia wondraczekii**

Frullania Key
(1) Leaf lobes distinctly apiculate **... [Jubula pennsylvanica]**
(1) Leaf lobes obtuse or rounded **-- 2**
(2) Ocelli present on leaves **-- 3**
(2) Ocelli absent **-- 4**
(3) Autoicous; longitudinal axis of lobules converging with the axis of the main stem; style narrow, sometimes lanceolate, 2–4(6) cells long, 2 cells wide at the base; underleaves longer than wide; stem 0.6–0.9 mm wide **... Frullania selwyniana**
(3) Dioicous; longitudinal axis of lobules diverging from the axis of the main stem; style broad, semicircular, often appendiculate; underleaves as wide as or wider than long; stem 0.8–1.3 mm wide **... Frullania asagrayana**
(4) Flagelliform branches always present, erect and deciduous **... Frullania bolanderi**
(4) Flagelliform branches absent **-- 5**
(5) Laminal cell walls not nodular, of approximately regular thickness; autoicous; dorsal leaf lobe truncate at the base **-- 6**
(5) Laminal cell walls nodular; dioicous ; dorsal lobe auricle or cordate **-- 7**
(6) Large lobules, covering 3/4 of the surface of the underlying dorsal lobe; plants copper-red or reddish-brown; branches 0.5–0.75 mm wide **... Frullania oakesiana**
(6) Lobules covering less than 1/2 of the surface of the underlying dorsal lobe; plants olive-green, dark green, sometimes marked with brown; branches up to 1 mm wide **... Frullania inflata var. communis**
(7) Underleaves reaching up to 275 µm in length and 250 µm in width, 1–1.7 X as wide as the stem **... Frullania eboracensis**
(7) Underleaves over 300 µm long, over 300 µm wide, 1.8–4 X as wide as the stem **-- 8**
(8) Saxicolous plants; underleaves 3–4 X as wide as the stem; leaves spaced apart **... Frullania riparia**
(8) Corticolous plants; underleaves 1.8–3.2 X as wide as the stem; leaves imbricate **... [Frullania brittoniae]**

Gymnomitrion Key
(1) Cuticle more or less densely papillose or warty **-- 2**
(1) Cuticle smooth **-- 3**
(2) Leaf lobes semicircular, obtuse; lobe margins regularly crenate; sinus firm at the base; plants whitish **... Gymnomitrion obtusum**
(2) Leaf lobes acute; lobe margins smooth or irregularly crenate; sinus broad, acute or rectangular, open; plants yellow to yellowish-brown **... Gymnomitrion concinnatum**

(3) Leaf lobes rounded, not apiculate; shoots distinctly dilated at the distal end, club-shaped; plants silvery-grey to greyish-green **... Gymnomitrion corallioides**
(3) Leaf lobes apiculate; shoots cylindrical, thread-like, oval in cross-section; plants brownish-green to reddish-brown **... Gymnomitrion apiculatum**

Harpanthus Key
(1) Stem 2–3 mm wide and up to a length of 20–30 mm; leaves retuse or emarginate for 1/10 of their length, lobes obtuse or more or less acute; trigones very inconspicuous or absent; underleaves free from the leaves **... Harpanthus flotovianus**
(1) Stem 1 mm wide and up to a length of 15 mm; leaves bilobed for 1/3 of their length, lobes acute; trigones well developed; underleaves usually joined by one side to a lateral leaf **-- 2**
(2) Gemmae borne at the tips of gemmiparous branches bearing reduced leaves and terminating the main stem **... Harpanthus drummondii**
(2) Gemmae borne on short ventral-intercalary branches **... Harpanthus scutatus**

Jungermannia Key A
(1) Perianth cylindrical, smooth, unpleated, long-emergent, distal end truncate and with a small beak in the center of a depression; leaves oblong with mostly parallel ribs **... Jungermannia leiantha**
(1) Perianth pleated at the distal end, gradually tapering towards the opening; leaves distinct **-- 2**
(2) Mature bracts and leaves of the main branches with a well-defined band, visible at low magnification, of differentiated, swollen, square-rectangular, thick-walled marginal cells **-- 3**
(2) Mature bracts and leaves of the main branches without a clear band of distinct marginal cells **-- 4**
(3) Marginal cells of mature leaves 1.1–1.5(2) X the size of intramarginal cells; rhizoids tinged with red or purplish-red; perianth plunging or slightly emergent; distinct trigones **... Jungermannia crenuliformis**
(3) Marginal cells of mature leaves 1.5–3 X the size of intramarginal cells; rhizoids not tinged with red or purplish-red; perianth distinctly emergent; trigones generally absent or small and poorly defined **... Jungermannia gracillima**
(4) Asexual reproduction present, gemmae masses produced at the tips of stems and surrounded by a pair of concave leaves; oil bodies 1–2 per cell **... Jungermannia caespiticia**
(4) Asexual reproduction absent; oil bodies 2-4 or more per cell **-- 5**
(5) Dioicous **-- 6**
(5) Paroicous **-- 9**
(6) Rhizoids red to purplish-red; perianth exserted after fertilization, borne on a tall, well-developed perigynium with two pairs of bracts; male bracts kidney-shaped, distinctly asymmetrical at the proximal end; stem tinged red or purplish-red on the ventral surface **... Jungermannia hyalina**
(6) Rhizoids hyaline or brownish; perigynium absent or short; male bracts suborbicular or ovate, almost symmetrical at the base; no secondary red coloration of the stem **-- 7**
(7) Perianth abruptly erect, tree-like, pleated, with thin, angular keels; cuticle of the stem cells more or less striated **... Jungermannia gracillima**
(7) Perianth gradually tapering towards the apex, not forming a clearly defined beak, pleated but with pleats that are neither thin nor angular; cuticle of the stem cells smooth **-- 8**
(8) Plants green to blackish-green, 2–12 cm long; rhizoids sparse; leaves cordate, semi-amplexicaul; perianth aperture crenate, supported by elongated cells **... Jungermannia exsertifolia subsp. cordifolia**
(8) Plants green to yellowish-green, 0.3–4 cm long; rhizoids abundant; leaves ovate to cordate, not semi-amplexicaul; perianth aperture dentate, supported by isodiametric cells **... Jungermannia atrovirens**
(9) Perinatal cells elongated **-- 10**
(9) Perianth cells slightly or not elongated, except for those in the first row subtending the aperture **-- 11**
(10) Branches 1.5–2.5 mm wide, 2–5 cm long; plant erect, rhizoids purplish-red; perianth emerging from spreading to squarrose bracts **... Jungermannia obovata**
(10) Branches 0.4–1.5 mm wide, 0.5–2.0 mm long; plant prostrate; rhizoids hyaline or brownish; perianth immersed in erect, sheathing bracts (except at the distal end) **... Jungermannia subelliptica**

(11) Perianth gradually tapering to a rounded shape **-- 12**
(11) Perianth abruptly contracts to form a beak **-- 13**
(12) Perianth ellipsoidal to fusiform, gradually drawn towards the apex, with a toothed-crenate aperture; laminal cells (16)18–25 µm wide; leaves ovate to elliptic, wider in the mid-portion **... Jungermannia pumila**
(12) Perianth ellipsoidal to obovoid or clavate, abruptly drawn towards the apex, with a crenate aperture; laminal cells 16–19 µm wide; leaves cordate, subcordate, or nearly orbicular, wider in the proximal part **... Jungermannia polaris**
(13) Rhizoids arising on the stem and having the laminal cells on the dorsal side, abundant, intertwined, and forming a bundle close to the stem; Vegetative leaves distinctly wider than long; short perigynium present; red secondary coloration **... Jungermannia confertissima**
(13) Rhizoids arising on the stem and basal laminal cells, not forming a bundle close to the stem; vegetative leaves rounded, about as wide as long; perigynium absent; brown secondary coloration **... Jungermannia sphaerocarpa**

Jungermannia Supplemental Key B
(1a) Perianth cylindrical, smooth, unpleated, long-emergent, distal end truncate and with a small beak; leaves oblong with rather parallel ribs **... Jungermannia leiantha**
(1b) Mature bracts and leaves of the main branches with a well-defined band, visible at low magnification, composed of differentiated, swollen, square-rectangular, thick-walled marginal cells **-- Key A, couplet [3]**
(1c) Asexual reproduction present, gemmae masses at the tips of the stems and surrounded by a pair of concave leaves; oil bodies 1(2) per cell **... Jungermannia caespiticia**
(1d) Perianth embedded in the bracts, emerging less than 1/3 of its length, unistratified; perigynium at least 6 X the length of the perianth, sometimes more; perianth cells elongated **-- Key C**
(1e) Perianth emerging, bistratified in the proximal part; perigynium absent or less than 1/4 of the perianth length; perianth cells slightly or not elongated, except those of the first row subtending the aperture **-- 2**
(2) Perianth forming a small beak, 4–5 folds; low perigynium often present; cells subtending the perianth aperture elongated **... Jungermannia sphaerocarpa**
(2) Perianth gradually attenuated distally, not forming a beak, 2–3 folds; perigynium absent; cells subtending the perianth aperture more or less isodiametric **-- Key D**
Jungermannia Supplemental Key C
(1) Cuticle of smooth leaves; cells of the perianth aperture margin free at their distal end **... Jungermannia hyalina**
(1) Striated-warty cuticle; perianth aperture margin crenulated, 2–3 lobed **-- Key A, couplet [10]**
Jungermannia Supplemental Key D
(1) Leaves broadly triangular, cordate, somewhat clasping the stem; plants 2–12 cm long **... Jungermannia exsertifolia subsp. cordifolia**
(1) Leaves elliptic to oblong-lanceolate; plants 0.2–3 cm long **-- 2**
(2) Cuticle smooth **... Jungermannia atrovirens**
(2) Cuticle striolate, sometimes weakly (occasionally smooth in Jungermannia polaris) **-- Key A, couplet [12]**

Kurzia Key
(1) Female bracts divided over 1/3–1/2 of their length into (2)3–4 lobes with abundant uniseriate cilia, 6–9 cells long; apical cells of male bracts rounded, 16–24 µm wide at the proximal end **... Kurzia pauciflora**
(1) Female bracts divided over 1/8–1/3 of their length into 2 short-toothed or shortly ciliate lobes (cilia 1–3 cells long); apical cells of male bracts acute, 8–16 µm wide at the proximal end **... [Kurzia sylvatica]**

Leiocolea Key to fertile specimens
(1) Paroicous, underleaves present; gemmae absent **-- 2**
(1) Dioicous ; underleaves present or absent; gemmae present or absent **-- 3**

(2) Underleaves large, evident, 2-3(5)-lobed and often with long marginal teeth; plants 3–4 mm wide, 4–8 cm long; leaves convex, wider than long; leaves distinctly decurrent on the ventral face of the stem **... Leiocolea rutheana**
(2) Underleaves small, subulate to lanceolate, often ciliate; plants (1.5)2–3 mm wide, 2–4 cm long; leaves concave, ovate; leaves slightly or not decurrent on the ventral face of the stem **... Leiocolea gillmanii**
(3) Underleaves absent or reduced to a slime papilla; plants less than 1(-1.5) mm wide **... Leiocolea badensis**
(3) Underleaves present; plants more than 1.5 mm wide **-- 4**
(4) Acute sinus; brownish gemmae produced at the margin of reduced, appressed leaves borne on attenuated, erect branches **... Leiocolea heterocolpos**
(4) Lunuliform sinus; gemmae absent **... Leiocolea bantriensis**
A - Middle laminal cells 35–40µm wide **... Leiocolea bantriensis**
A - Middle laminal cells 25–30µm wide **... Leiocolea collaris**

Leiocolea Key to sterile specimens
(1) Plants 0.3–1.5 mm wide; underleaves absent **... Leiocolea badensis**
(1) Plants more than 1.5 mm wide; underleaves present **-- 2**
(2) Gemmae produced at the margin of reduced, appressed leaves borne on attenuate, erect branches **... Leiocolea heterocolpos**
(2) Gemmae absent **-- 3**
(3) Large, conspicuous underleaves, 2-3(-5) lobed and often with long marginal teeth; plants 3–4 mm wide, 4–8 cm long **... Leiocolea rutheana**
(3) Small underleaves, subulate with lanceolate lobes, often ciliate at the base; plants (1.5)2–3(4) mm wide, 2–4(5) cm long **... Leiocolea gillmanii | Leiocolea bantriensis**

Lophozia sensu lato Key
(1) Leaves 2–4(5) lobed **-- 2**
(1) Leaves regularly 2-lobed, occasionally 3-lobed **-- Key A**
(2) Leaves regularly 3- or 4-lobed, different leaves and sometimes present **... Barbilophozia**
(2) Leaves variously and irregularly 2–4(5)-lobed but not regularly 3- or 4-lobed **-- 3**
(3) Underleaves present, sometimes sporadic (observe several stems) **-- 4**
(3) Underleaves absent or very reduced **-- 5**
(4) Branchlets 1.0–1.8 mm wide; leaves with variable number of lobes but predominantly 3-lobed leaves **... Barbilophozia atlantica**
(4) Branchlets 0.7–0.9 mm wide; leaves with variable number of lobes but predominantly 2-lobed **... Lophozia debiliformis**
(5) Laminal cells with mostly thick walls, trigones absent; reddish gemmae frequent and abundant; oil bodies 6–12; leaves 2(-3)-lobed; plants often found on the ground in disturbed environments **... Lophozia bicrenata**
(5) Laminal cells with thin walls, trigones present; gemmae generally greenish, rare or abundant, leaves 2–3(5)-lobed **-- 6**
(6) Polymorphic leaves, 2–3(5)-lobed; homogeneous medulla; plants 1–2.5 mm wide; oil bodies 20–50 per cell; stem with 10–12 cells when viewed in cross-section **... Schistochilopsis**
(6) Leaves bilobed but often trilobed; medulla showing a dorsoventral difference; plants 2.3–3.0(4.0) mm wide; oil bodies 9–16 per cell; stem showing 16–22 cells when viewed in section **... Lophozia ventricosa var. longiflora**
Lophozia sensu lato Key A
(1) Fertile specimens, sexual organs present **-- 2**
(1) Sterile specimens, sexual organs absent **-- 4**
(2) Perianth smooth, abruptly contracted into a short beak **... Leiocolea**
(2) Perianth folded over at least 1/4 of the distal part, without a beak **-- 3**
(3) Underleaves present, evident, erect, deeply bilobed **... Barbilophozia kunzeana**

(3) Underleaves absent or occasional; if present, simple and lanceolate or subulate but not regularly bilobed **... Lophozia s. str.**
(4) Underleaves present **-- Key B**
(4) Underleaves absent or greatly reduced **-- Key C**

Lophozia sensu lato Key B

(1) Obvious underleaves, erect, deeply bilobed **... Barbilophozia kunzeana**
(1) Simple, lanceolate or subulate underleaves, sometimes branched into several lobes but not regularly bilobed **-- 2**
(2) Gemmae present **-- 3**
(2) Gemmae absent **-- 5**
(3) Gemmae green or yellowish **... Lophozia obtusa**
(3) Gemmae brownish or reddish **-- 4**
(4) Gemmae produced at the margin of reduced, uppermost leaves on erect, upright branches; trigones, large, and with prominent walls **... Leiocolea heterocolpos**
(4) Gemmae produced at the margin of normal leaves; trigones small **... Lophozia debiliformis**
(5) Underleaves large, conspicuous, 2–3(-5)-lobed and often showing long marginal teeth **... Leiocolea rutheana**
(5) Underleaves small, narrow, lanceolate **-- 6**
(6) Leaf lobes obtuse or rounded; gibbous sinuses **... Lophozia obtusa**
(6) Leaf lobes acute to obtuse , non-gibbous sinuses **... Leiocolea bantriensis | Leiocolea gillmanii**

Lophozia sensu lato Key C

(1) Laminal cells with predominantly thick walls and homogeneous medium (2 or 3 rows of medullary cells have the ventral portion which may become mycorrhizal with age); leaves 2(-3)-lobed **... Lophozia bicrenata**
(1) Laminal cells with predominantly thin walls, if thick then the pith shows dorsoventral differentiation; leaves regularly bilobed **-- 2**
(2) Homogeneous medulla; gemmae never present; plants tiny, threadlike, delicate, and transparent, basophilous **... Leiocolea badensis**
(2) Medulla showing dorsiventral differentiation; gemmae usually present **-- 3**
(3) Mature gemmae reddish, brownish, purplish-red, or violet **-- 4**
(3) Mature gemmae green to yellowish-green **-- 7**
(4) Plants erect or ascending; leaves inserted transversely or nearly so; lobes horn-like **... Lophozia longidens**
(4) Prostrate or creeping plants, sometimes erect at the apex; leaves inserted more or less obliquely; lobes triangular or broadly triangular **-- 5**
(5) Laminal cells 20–25 µm long **... Lophozia sudetica**
(5) Laminal cells 30–35 µm long **-- 6**
(6) Oil bodies(11–)15–24(–28) per cell; gemmae red or carmine **... Lophozia excisa**
(6) Oil bodies less than 13 per cell; gemmae reddish-purple or vinaceous **... Lophozia polaris**
(7) Erect or nearly erect plants **... Lophozia ascendens**
(7) Plants prostrate **-- 8**
(8) Concave leaves; sinuses crescent-shaped, less than 1/5 the leaf length deep **-- 9**
(8) Flat leaves, sometimes barely concave; sinuses obtuse to rectangular, bilobed for 1/5–1/2 the leaf length **-- 10**
(9) Oil bodies 2–12 per cell, multi-spherical, appearing granular; leaves inserted almost transversely with the concavity facing distal to the stem; marshy habitats **... Lophozia wenzelii**
(9) Oil bodies 15–25 per cell, appearing biconcentric due to the presence of a strongly refracting central globule and having smooth outer walls; leaf insertion line and concavity oriented obliquely; on exposed rocks **... Lophozia schusterana**
(10) Leaves wider than long, 0.75–1.0 X as long as wide **... Lophozia ventricosa**
(10) Leaves longer than wide, 1.1–1.4 X as long as wide **-- 11**

(11) Oil bodies 15–25 per cell, appearing biconcentric due to the presence of a strongly refracting central globule and with smooth outer walls; trigones mostly concave, sometimes slightly prominent; gemmae abundant; leaves not canalicular; perianth aperture with compound teeth of 1–2 cells **... Lophozia silvicola**
(11) Oil bodies 5–10 per cell, not biconcentric; trigones strongly prominent, sometimes confluent; gemmae sparse; leaves canalicular; perianth opening with cilia formed of 3-4(5) superimposed cells **... Lophozia guttulata**

Lophozia Key to fertile specimens
(1) Underleaves present, sometimes sporadic, small, and not always obvious (observe the stem near branches and at the apex) **-- 2**
(1) Underleaves absent **-- 3**
(2) Gemmae green or yellowish **... Lophozia obtusa**
(2) Gemmae brownish or reddish **... Lophozia debiliformis**

A - Transverse section of the ventral side of the stem without a few patches of reduced cell size; brownish secondary staining; perianth opening margin with teeth 1–2 cells long; oil bodies 3–6(10) **... Lophozia debiliformis**

A - Transverse section of the ventral side of the stem with a few patches of reduced cell size; reddish secondary staining; perianth opening margin with teeth 1–4 cells long; oil bodies 7–14(16) **... Lophozia heteromorpha**

(3) Laminal cell walls thick, uniform, trigones absent, cell lumen often guttulate **... Lophozia bicrenata**
(3) Cell walls more or less thin, trigones present **-- 4**
(4) Paroicous **... Lophozia excisa**
(4) Dioicous **-- 5**
(5) Perianth aperture lined with teeth 6–8 cells long **-- 6**
(5) Perianth aperture crenate or lined with teeth 1–4(5) cells long **-- 7**
(6) Gemmae yellowish-green to yellowish; oil body surface smooth; plants 0.8–1.3 mm wide **... Lophozia ascendens**
(6) Gemmae orange-brown to reddish-brown; oil body surface granular; plants 1.2–1.8 mm wide **... Lophozia longidens**
(7) Mature gemmae reddish, brownish, purplish-red, or violet **-- 8**
(7) Mature gemmae green to yellowish-green **-- 9**
(8) Median laminal cells 20–25 µm long; perianth opening with teeth 1–2 cells long **... Lophozia sudetica**
(8) Median laminal cells 30–35 µm long; perianth opening with teeth 3–5 cells long, overlapping **... Lophozia polaris**
(9) Leaves concave; sinus crescent-shaped, less than 1/5 the leaf length depth **-- 10**
(9) Leaves flat, sometimes barely concave; sinus obtuse to rectangular, bilobed over 1/5–1/12 the leaf length **-- 11**
(10) Oil bodies 2–12 per cell, formed of several spherules, appearing granular; leaves inserted almost transversely with the concavity facing distal to the stem; marshy habitats **... Lophozia wenzelii**
(10) Oil bodies 15–25 per cell, appearing biconcentric due to the presence of a strongly refracting central globule and having smooth outer walls; insertion line and leaf concavity oriented obliquely; on exposed rocks **... Lophozia schusterana**
(11) Leaves wider than long, 0.75–1.0(1.2) X as long as wide **... Lophozia ventricosa**

A - Plants 0.8–2.2 mm wide; leaves regularly bilobed; perianth 0.75 X 2–3 mm **... Lophozia ventricosa var. ventricosa**

A - Plants 2.5–3(4) mm wide; leaves often trilobed; perianth 1–2 X 3–4(5) mm **... Lophozia ventricosa var. longiflora**

(11) Leaves longer than wide, 1.1–1.4 X as long as wide **-- 12**
(12) Oil bodies 15–25 per cell, appearing biconcentric due to the presence of a strongly refracting central globule and having smooth outer walls; trigones mostly concave, sometimes slightly prominent; gemmae abundant; leaves not canaliculate; perianth opening with compound teeth of 1–2 cells **... Lophozia silvicola**

(12) Oil bodies 5–10 per cell, not biconcentric; trigones strongly prominent, sometimes confluent; gemmae sparse; leaves canaliculate; perianth opening bearing cilia formed of 3–4(5) superimposed cells **... Lophozia guttulata**

Mannia Key

(1) Thallus segments bearing the female cap present at the distal end of the scales (of ventral origin) discolored and whitish, divided into 2-3 acuminate lobes and projecting at the end of the segment to form an apical tuft; thallus usually simple and linear, with lateroventral branching **... Mannia fragrans**

(1) Thallus segments not exhibiting a tuft of whitish scales; frequent dichotomous branching **-- 2**

(2) Pedicel apex bare; upper surface of the thallus becoming lacunose with age; green thallus on both surfaces and margins, except for the ventral scales which are purplish-red or violet **... [Mannia triandra]**

(2) Pedicel apex with a distinct tuft of whitish scales; thallus surface firm and leathery, not becoming particularly porous with age; thallus usually marked with purplish-red at least on the ventral surface and margins **... Mannia pilosa**

Marsupella Key

(1) Leaves scarcely wider than the stem **-- 2**

(1) Leaves distinctly wider than the stem **-- 3**

(2) Stem leaf sinuses rounded or crescent-shaped; leaves rather imbricate and branchlets julaceous **... Marsupella condensata**

(2) Stem leaf sinuses acute or rectangular; leaves rather distant, sometimes close together; branchlets threadlike **... Marsupella boeckii**

(3) Stem leaf margins flat **-- 4**

(3) Stem leaf margins (at least some) narrowly and partially revolute at the proximal end **... Marsupella emarginata**

A - Leaves bilobed, 0.1–0.12 in length; plants aquatic, 5–8 cm long **... Marsupella emarginata var. aquatica**

A - Leaves bilobed, 0.2–0.25 in length; plants terrestrial, 1–5 cm long **... Marsupella emarginata var. emarginata**

(4) Leaves scarcely lobed, strongly concave, hemispherical, unable to be flattened without being damaged **... Marsupella arctica**

(4) Leaves channeled or sometimes concave but not hemispherical **-- 5**

(5) Erect-appressed, imbricate leaves **... Marsupella brevissima**

(5) Erect to spreading leaves **-- 6**

(6) Deep sinus 1/5–1/4(1/3) of the leaf length; stem reaching a length of (1)4–6 mm **... Marsupella sprucei**

(1) Marginal cells of lobes (7)9–12(13) µm; middle cells 10–17 X 12–20 pm; obtuse lobes; spores 7–9 µm **... Marsupella sprucei var. ustulata (Spruce) Damsholt (syn.: Marsupella ustulata Spruce**

(1) Marginal cells of lobes 11–19 pm; middle cells 15–17 X 18–28 pm; acute lobes; spores 10–13 µm **... Marsupella sprucei var sprucei**

(6) Deep sinus 1/3–1/2(2/3) of the leaf length; stem longer than 8–10 mm (up to 50–80 mm in Marsupella sphacelata) **-- 7**

(7) Paroicous; cauline leaf lobes rather acute; laminal cells 10–20(25) µm **... Marsupella sparsifolia**

(7) Dioicous; leaf lobes broadly rounded or obtuse; laminal cells 20–30 µm **... Marsupella sphacelata**

Nardia Key

(1) Leaves entire, rounded or kidney-shaped; perigynium arranged along the stem axis; oil bodies homogeneous, glossy; dioicous **... Nardia scalaris**

(1) Leaves emarginate or bilobed, at least on the distal part of fertile stems, below the inflorescence; perigynium subtending the perianth arranged on a marsupium; oil bodies composed of numerous spherules; paroicous **-- 2**

(2) Leaves all bilobed; sinus angular, deep 1/5–1/2 of the leaf length **... Nardia insecta**

(2) Leaves of plant stems entire, leaves below the inflorescence emarginate or slightly bilobed for less than 1/5 of the leaf length **... Nardia geoscyphus**

Metzgeria Key
(1) Thallus margins recurved when wet; marginal hairs in pairs, at least in some places; propagules absent; autoicous **... Metzgeria conjugata**
(1) Thallus margins flat when wet; marginal hairs simple, sometimes inconspicuous; propagules abundant; dioicous **... Metzgeria furcata**

Odontoschisma Key
(1) Cuticle more or less distinctly papillose; gemmae with thick cell walls, produced on small leaves borne on elongated, erect, attenuate stems **... Odontoschisma denudatum**
(1) Cuticle smooth; gemmae with thin cell walls, produced on undifferentiated, tree-like stems **-- 2**
(2) Plants pure green, even when growing in full light; leaves strongly concave and hemispherical, imbricate, giving the shoot a cylindrical appearance; laminal cells with uncolored walls; plants 0.8–1.1 mm wide; trigones confluent **... Odontoschisma macounii**
(2) Plants often tinged with reddish or brownish; leaves weakly concave, not particularly imbricate and not giving the shoot a cylindrical appearance; laminal cells with colored walls; plants 1–1.6 mm wide; trigones rarely confluent **... Odontoschisma elongatum**

Pellia Key
(1) Plants producing abundant, small, and fragile dichotomous branches at the distal end typically in Fall **... Pellia endiviifolia**
(1) Plants capable of branching once or twice but not producing abundant, small, and fragile dichotomous branches at the distal end **-- 2**
(2) Slime papillae borne on hairs of variable length, composed of 2–5 cylindrical cells, 3–8 X as long as wide; involucre regularly cylindrical and vertical, after fertilization elongated, incised, and fimbriate at the opening **... Pellia megaspora**
(2) Slime papillae borne on a single, short cell, 1.5–3 X as long as wide; involucre shaped like a flap or an irregular, horizontal cylinder, not fimbriae at the opening **-- 3**
(3) Monoicous species; involucre shaped like a flap **... Pellia epiphylla**
(3) Dioicous species; involucre completely surrounding the gynoecium, low in its distal part, high in its proximal part, forming an irregular, horizontal cylinder **... Pellia neesiana**

Plagiochila Key
(1) Plants 2–6 cm long, not strongly compressed laterally; leaves erect-spreading to spreading, not pressed; margins denticulate or entire, incurved; perianth common **... Plagiochila porelloides var. porelloides**
(1) Plants 1–3 cm long, strongly compressed laterally; leaves tall; margins entire or nearly so, slightly or not incurved; perianth absent **... Plagiochila porelloides var. subarctica**

Porella Key
(1) Aquatic or semi-aquatic plants, blackish-green; underleaves and flat lobules, narrowly lingulate, small, narrower than the stem, not decurrent or scarcely so **... Porella pinnata**
(1) Never aquatic plants, green or yellowish-green; underleaves and lobules with reflexed margins, broadly lingulate to ovate, as wide as or wider than the stem, long-decurrent **... Porella platyphylla**

Ptilidium Key
(1) Base of the main lobe of stem leaves 15–25 cells wide; cilia on the dorsal margin of the leaves shorter than or equal to the width of the base of the ventral lobe; dorsal sinus about 1/2 the length of the leaf **... Ptilidium ciliare**
(1) Base of the main lobe of stem leaves 5–12 cells wide; cilia on the dorsal margin of the leaves longer than the width of the base of the ventral lobe; dorsal sinus about 3/4 the length of the leaf **... Ptilidium pulcherrimum**

Radula Key

(1) Leaf lobes often deciduous **... [Radula obconica]**
(1) Leaf lobes not tending to be deciduous **-- 2**
(2) Coppery or brown plants, gemmae absent **... [Radula tenax]**
(2) Yellowish-green plants; gemmae frequent and abundant **... Radula complanata**

Riccardia Key
(1) Dioicous; palmate thalli; main axis apprised on the substrate, ultimate branches no more than 0.4 mm wide, erect **... Riccardia palmata**
(1) Monoicous; pinnate, subpinnate, or subpalmate thalli, apprised or sub-erect; ultimate branches more than 0.5 mm wide, supporting or sub-erect **-- 2**
(2) Oil bodies present in most epidermal cells, in the center and at the margin **... Riccardia chamedryfolia**
(2) Oil bodies absent from most epidermal cells, especially at the margin (they may be present in hypodermal cells) **-- 3**
(3) Oil bodies present in the hypodermis, absent from epidermal cells; branch margins translucent, unistratified over a width of 2–3 cells; thallus regularly bi-tripinnate **... Riccardia multifida**
(3) Oil bodies absent or rare; branch margins opaque, unistratified over a width of one or sometimes two cells; thallus irregularly pinnate, sometimes subpalmate **... Riccardia latifrons**

Riccia Key
(1) Dorsal surface of the thallus formed of a compact tissue composed of vertical columns of cells, their tightly packed ends creating a smooth, uniform surface; spores free on the dorsal surface **-- 2**
(1) Dorsal surface of the thallus formed of a loose, spongy aerenchyma composed of air cavities, producing an areolate upper surface; spores free on the dorsal or ventral surface **-- 5**
(2) Narrow dorsal groove with an acute base, less than 1/4 the width of the thallus lobes, gradually widening towards the proximal part; acute thallus margins **... [Riccia sorocarpa]**
(2) Dorsal groove occupying 1/4–1/2 of the width of the thallus lobes (except at the distal end, where the ribs are connivent but widen rapidly), becoming shallow, flat-bottomed, and disappearing quickly; rounded thallus margins **-- 3**
(3) Cilia absent at the thallus margins, sometimes present, but then sparse and inconspicuous **... Riccia bifurca**
(3) Short cilia present at the thallus margins **-- 4**
(4) Cilia of the thallus margins inconspicuous and sparse, 0.15(0.2) mm long; dorsal groove reaching 0.2–0.35 of the lobe width; main lobes 0.5–1.5 mm wide, twice as wide as thick **... [Riccia hirta]**
(4) Cilia of the margins evident, frequent, and numerous, 0.1–0.4 mm long; dorsal groove reaching 0.3–0.4 mm in lobe width; main lobes 1–2.5 mm wide, 3–4 X as wide as thick **... [Riccia beyrichiana]**
(5) Dorsal surface of the thallus becoming spongy in older parts due to disorganization of the epidermis exposing the underlying lacunar spaces; sporophytes often present **-- 6**
(5) Dorsal surface of the thallus not spongy with age; sporophytes unknown **-- 8**
(6) Distal tip of the thallus lobes 1.5–2.5 mm wide; sporophytes embedded in the tissues, not very prominent; spores (60)65–85(100) µm, released on the dorsal surface **... Riccia cavernosa**
(6) Distal tip of lobes less than 1.5 mm wide **-- 7**
(7) Prominent, dehiscent sporophyte on the dorsal surface of the thallus; spores 40–65 µm bearing ridges that do not form regular areolations; lobes 1.5–3:1; dioicous, male thalli smaller than female thalli **... Riccia frostii**
(7) Prominent, dehiscent sporophyte on the ventral surface of the thallus; spores 50–78 µm bearing ridges that form regular areolations; lobes 2–4:1; monoicous **... Riccia huebeneriana subsp. sullivantii**
(8) Thallus lobes linear, less than 0.8 mm wide, 3–6:1; dichotomy at 40–55° **... Riccia fluitans**
(8) Lingulate thallus lobes, 2 mm wide, 5–8:1; 90° dichotomy **... Riccia rhenana** (terrestrial form)

Scapania Keys
S. undulata compared to S. nemorea

> **A -** Oil bodies small, inconspicuous; two-celled gemmae; transversely inserted dorsal lobe; trigones never prominent **... Scapania undulata**

A - Oil bodies large, filling the cell cavity; one-celled gemmae; distinctly decurrent dorsal lobe; emergent trigones often present **... Scapania nemorea**

Scapania Keys

(1) Taxa found in the southern regions of Quebec, mostly south of the 50° north parallel, excluding boreal and arctic zones, as well as arctic-alpine sites -- Key 1

(1) Taxa found anywhere in Quebec-Labrador, including boreal, arctic, and alpine regions -- Key 2

Key 1: Taxa, not strictly arctic-alpine, of southern Quebec

(1) Cells in the non-gemmiparous region of the leaf generally containing a single large oil body, which often persists for a long time (at least ten years) in dead, dry specimens; dorsal lobe 1/5–1/2 the size of the ventral lobe **... Scapania gymnostomophila**

(1) Oil bodies 2–12 per cell **-- 2**

(2) Leaves distinctly decurrent ventrally, the decurrent portion several cells wide, gradually attenuate **-- 3**

(2) Leaves not distinctly decurrent ventrally; sometimes a short decurrence is present but does not extend beyond the leaf insertion line, or, occasionally, a thin decurrence line one cell wide is present **-- 7**

(3) Plants 1–2(2.5) mm wide, 5–12(25) mm long; ventral lobe width-to-length ratio 0.5:1–0.75(0.85):1 **-- 4**

(3) Plants 2–5 mm wide, 20–150 mm long; ventral lobe width-to-length ratio (0.75)0.8:1–1.2:1 **-- 5**

(4) Lobes of non-gemmiparous leaves rounded, entire; margins of non-gemmiferous leaves with a border of thick-walled cells **... Scapania cuspiduligera**

(4) Lobes of non-gemmiferous leaves pointed, coarsely toothed; margins of non-gemmiferous leaves without a border of thick-walled cells **... Scapania umbrosa**

(5) Insertion line of the dorsal lobe distinctly arched **... Scapania nemorea**

(5) Insertion line of the dorsal lobe not arched or scarcely so, lobe inserted transversely **-- 6**

(6) Dorsal lobe 1/3–2/3 the size of the ventral lobe; keel 1/4–2/5 the length of the ventral lobe **... Scapania undulata**

(6) Dorsal lobe 2/3–4/5 the size of the ventral lobe; keel 1/2–3/5 the length of the ventral lobe **... Scapania subalpina**

(7) Leaves approximately equally bilobed; dorsal lobe 3/5–7/8 the size of the ventral lobe **... Scapania hyperborea**

(7) Leaves also bilobed, dorsal lobe 1/5–3/5 the size of the dorsal lobe **-- 8**

(8) Ventral lobe broad, length/width ratio 0.85–1.25; plants 2.1–5.0 mm wide **-- 9**

(8) Ventral lobe narrow, length/width ratio 0.5–0.9; plants 0.5–2.2 (2.5) mm wide **-- 10**

(9) Dorsal lobe cordate-suborbicular; apex of the dorsal lobe pointing towards the stem apex, forming an angle of 0–25° with it; keel less than 1/4 the length of the ventral lobe **... Scapania paludicola**

A - Mature gemmae turning more or less dark brown, even on plants subjected to diffuse lighting **... Scapania paludicola var. paludicola**

A - Mature gemmae remaining green, even under direct lighting **... Scapania paludicola var. viridigemma R.M. Schust.**

(9) Dorsal lobe kidney-shaped to oblong or suborbicular; apex of the dorsal lobe forming an angle of 20–45° with the stem orientation; Carina more than 1/5 of the length of the ventral lobe **... Scapania irrigua**

A - Leaf lobes pointed, usually ending in a tooth composed of 2 to 3 cells; leaf margins often denticulate near the apex; gemmae fusiform; red coloration absent **... Scapania irrigua subsp. irrigua**

A - Leaf lobes rounded; leaf margins entire; gemmae ovoid; red coloration sometimes present on leaves of the distal stem, at least on the proximal leaf **... Scapania irrigua subsp. rufescens**

(10) Margins of non-gemmiparous leaves with a thick-walled cell border, border formed by (1)2–4 rows of cells **-- 11**

(10) Margins without a distinct cell border, cells all collenchymatous, thin-walled **-- 14**

(11) Gemmae unicellular or bicellular, dark brown or reddish-brown at maturity; proximal ventral part of leaves never marked with reddish; acute part of the keel not reaching the base of the leaf **-- 12**

(11) Gemmae bicellular, greenish at maturity; proximal ventral part of leaves mottled with reddish; leaves narrowly keeled to the base **-- 13**

(12) Mature gemmae predominantly bicellular; 5–9 oil bodies in the median cells of leaves **... Scapania glaucocephala**
(12) Mature unicellular gemmae; 2–5 oil bodies in the median cells of leaves **... Scapania carinthiaca**
(13) Ventral lobe apex rather rounded; ventral lobe width-to-length ratio 0.6:1–0.85:1; perianth aperture margins dentate; keel 1/2-2/3 of the ventral lobe length; dorsal lobe oriented obliquely to the stem **... Scapania curta**
(13) Ventral lobe apex pointed; ventral lobe width-to-length ratio 0.45:1–0.65:1; perianth aperture margins entire; keel 1/5–2/5 of the ventral lobe length; dorsal lobe oriented parallel to the stem **... Scapania scandica**
(14) Unicellular, brownish gemmae **... Scapania apiculata**
(14) Predominantly two-celled gemmae, green, reddish, vinaceous or brown **... Scapania mucronata**

Key 2: Taxa from the whole of Quebec-Labrador

(1) Leaf keel absent or barely sketched, leaves simply concave **... Scapania obcordata**
(1) Sharp keel present **-- 2**
(2) Cells in the non-gemmiparous region of the leaf generally containing a single large oil body, this often persisting for a long time in dead and dried specimens; dorsal lobe 1/5–1/2 the size of the ventral lobe **... Scapania gymnostomophila**
(2) Oil bodies 2–12 per cell **-- 3**
(3) Leaves distinctly decurrent ventrally, the decurrent portion several cells wide, gradually attenuate **-- Group A**
(3) Leaves not distinctly decurrent ventrally, sometimes a short decurrence is present but does not extend beyond the leaf insertion line, or, occasionally, a thin decurrence line one cell wide is present **-- Group B**

Group A

(1) Leaf cell cuticle coarsely papillose, papillae hemispherical **-- 2**
(1) Leaf cell cuticle smooth or slightly papillose **-- 3**
(2) Margins entire but with a few acute, unicellular teeth at the lobe apex **... Scapania simmonsii**
(2) Margins strongly dentate to dentate-spinous, teeth acute, long, and recurved, composed of 2–3 narrow cells at the distal part of the leaf and 5–10 cells at the proximal part **... Scapania spitzbergensis**
(3) Plants 1–2(2.5) mm wide, 5–12(25) mm long **-- 4**
(3) Plants 2–5 mm wide, 20–150 mm long **-- 5**
(4) Non-gemmiferous leaf lobe rounded, entire; non-gemmiferous leaf margins with a border of thick-walled cells; leaf axis forming an angle of 45–60° with the stem axis; basiphilous plant **... Scapania cuspiduligera**
(4) Leaf lobe pointed, coarsely toothed; marginal leaf cells undifferentiated; leaf axis forming an angle of 0–40° with the stem axis; basifuge plant **... Scapania umbrosa**
(5) Dorsal lobe insertion line distinctly arched **-- 6**
(5) Dorsal lobe insertion line not arched or scarcely so, lobe inserted transversely **-- 9**
(6) Keel strongly and regularly arched, semicircular, reaching less than 1/4 the length of the ventral lobe; gemmae (if produced) bicellular **-- 7**
(6) Keel more or less arched, sometimes recurved, (if strongly curved, then the keel is variable from leaf to leaf) reaching 1/5–1/2 of the length of the ventral lobe; gemmae unicellular (some rarely bicellular) **-- 8**
(7) Keel entire; leaf margins entire to slightly toothed, proximal part entire; gemmae unknown **... Scapania paludosa**
(7) Keel toothed-spinose; leaf margins toothed-spinose, proximal part ciliate; gemmae present **... Scapania spitzbergensis**
(8) Leaf margins toothed-spinose; oil bodies 2–4, large, filling the cell; gemmae cinnamon-brown **... Scapania nemorea**
(8) Leaf margins entire or with small, blunt teeth; oil bodies 2–5 per cell, small and inconspicuous; gemmae green to reddish **... Scapania uliginosa**
(9) Non-gemmiparous leaf margins with a thick-walled cell border, border formed by one or more rows of cells **-- 10**
(9) Margins without a distinct cell border **-- 11**
(10) Dorsal lobe 1/3–2/3 the size of ventral lobe; keel 1/4–2/5 length of ventral lobe **... Scapania undulata**

(10) Dorsal lobe 3/5–4/5 the size of ventral lobe; keel 1/2–3/5 length of ventral lobe **... Scapania subalpina**
(11) Bicellular gemmae; small trigones; single-celled leaf margin teeth **... Scapania serrulata**
(11) Unicellular gemmae; large, prominent trigones; leaf margin teeth formed of (1)2(3) cells **... Scapania crassiretis**

Group B

(1) Leaves approximately equally bilobed; dorsal lobe 3/5–7/8 the size of the ventral lobe **-- 2**
(1) Leaves unequally bilobed, dorsal lobe 1/5–4/5 the size of the ventral lobe **-- 3**
(2) Dioicous; oil bodies (2)4–9 per cell; keel unstratified or bistratified; gemmae exhibiting red, pink, or reddish-brown hues upon ripening **... Scapania hyperborea**
(2) Monoicous; oil bodies 2–3 per cell; thick keel of 3–4 cell layers; gemmae green upon ripening, sometimes brownish **... Scapania kaurinii**
(3) Ventral lobe broad, width:length 0.9:1–1.3:1; plants 2.1–5.0 mm wide **-- 4**
(3) Narrow ventral lobe, width:length 0.5:1–0.8(0.9):l; plants 0.5–2.2(2.5) mm wide **-- Group C**
(4) Cordate-suborbicular dorsal lobe; leaf tips pointing towards the stem apex, forming an angle of 0–25° with it; keel less than 1/4 the length of the ventral lobe ... Scapania paludicola

A - Mature gemmae turning more or less dark brown, even on plants subjected to diffuse lighting **... Scapania paludicola var. paludicola**

A - Mature gemmae remaining green, even under direct lighting **... Scapania paludicola var. viridigemma** R.M. Schust.

(4) Kidney-shaped to oblong or suborbicular dorsal lobe; leaf apexes pointing at a direction of 20–45°(60°) to the stem orientation; keel more than 1/4 the length of the ventral lobe **-- 5**
(5) Mature gemmae green **... Scapania irrigua**

A - Leaf lobes pointed, usually ending in a tooth composed of 2 to 3 cells; leaf margins often denticulate near the apex; gemmae fusiform; red coloration absent **... Scapania irrigua subsp. irrigua**

A - Leaf lobes rounded; leaf margins entire; gemmae ovoid; red coloration sometimes present on leaves of the distal stem, at least on the proximal leaf **... Scapania irrigua subsp. rufescens**

(5) Mature gemmae reddish or brownish **-- 6**
(6) Brown gemmae, mostly unicellular or sometimes several bicellular ones present; large, persistent oil bodies **... Scapania brevicaulis**

A - Gemmae predominantly unicellular; ventral lobe 2/5–3/5 of the ventral lobe surface **... Scapania brevicaulis var. brevicaulis**

A - Gemmae bicellular, present in large numbers; ventral lobe 1/2–3/4 of the ventral lobe surface **... Scapania brevicaulis var. dubia** R.M. Schust.

(6) Reddish gemmae, mostly bicellular, some 3-4-cellular or unicellular; small oil bodies, disappearing rapidly after plant death **... Scapania hyperborea**

Group C

(1) Margins of non-gemmiparous leaves with a distinct border of thick-walled cells, border formed by (1)2–4 rows of cells **-- 2**
(1) Margins of lobes without a distinct cell border, cells all collenchymatous, thin-walled, sometimes a row of thin-walled cells is present, particularly in the proximal part of the leaf **-- 5**
(2) Gemmae unicellular or bicellular, dark brown or reddish-brown at maturity; proximal ventral part of leaves never reddish; acute part of the keel not reaching the base of the leaf **-- 3**
(2) Gemmae bicellular, greenish at maturity; proximal ventral part of leaves mottled reddish; leaves narrowly keeled to the base **-- 4**
(3) Mature gemmae predominantly bicellular; oil bodies 5–9 **... Scapania glaucocephala**
(3) Mature unicellular gemmae; oil bodies 2–5 **... Scapania carinthiaca**
(4) Ventral lobe apex rounded; ventral lobe width-to-length ratio 0.6:1–0.85:1; perianth aperture margins dentate; keel 1/2–2/3 of the ventral lobe length; dorsal lobe oriented obliquely to the stem **... Scapania carta**
(4) Ventral lobe apex pointed; ventral lobe width-to-length ratio 0.45:1– 0.65:1; perianth aperture margins entire; keel 1/5–2/5 of the ventral lobe length; dorsal lobe oriented parallel to the stem **... Scapania scandica**
(5) Unicellular gemmae, produced on flagelliform gemmiparous shoots **... Scapania apiculata**
(5) Gemmae predominantly bicellular, produced on leaves borne on shoots not particularly different **-- 6**

(6) Mature gemmae dark brown; oil bodies persisting after plant death, yellowish-brown, opaque, 2–5 per cell, large and filling the cell **... Scapania ligulifolia**
(6) Mature gemmae greenish, sometimes with reddish hues, sometimes brownish-yellow but never dark brown; oil bodies disappearing rapidly after plant death, grayish or uncolored, 2–8 per midline cell, not filling the cell **-- 7**
(7) Dorsal lobe area 1/3–1/2 of the ventral lobe area; keel length 1/2 of the ventral lobe length; margins of female bracts and entire leaves **... Scapania mucronata**
(7) Dorsal lobe surface area 1/3–1/2 of the ventral lobe surface area; keel length 2/3–3/4 of the ventral lobe length; margins of female bracts and sometimes leaves occasionally bearing small unicellular teeth **... Scapania praetervisa**

Schistochilopsis Key
(1) Gemmae ovoid to ellipsoidal; stem less than 0.4 mm wide **-- 2**
(1) Gemmae angular to stellate; stem more than 0.5 mm wide **-- 3**
(2) Ventral part of branchlets reddish-purple; leaves green; oil bodies homogeneous or composed of 2–3 globules; perianth aperture with teeth 1–2 overlapping cells long **... Schistochilopsis laxa**
(2) Ventral part of branchlets green; leaves green but often reddish at the apex; oil bodies composed of numerous small globules; perianth aperture with teeth 2–10 overlapping cells long **... Schistochilopsis capitata**
(3) Ventral part of stem reddish-purple to blackish; midline laminal cells 35–65 X 50–75(80) µm; several 2-3-lobed leaves; margins of entire lobes, sometimes with 1 or 2 small blunt teeth **... Schistochilopsis grandiretis**
(3) Ventral part of the greenish stem; median laminar cells 30–35 X 35–40 µm; several (2)3–5-lobed leaves; lobe margins with a few large spinous teeth ... Schistochilopsis incisa

> **A -** Leaves 1–1.5 X as wide as long, 1–2 cells thick at the proximal end; lobe apex with a cell 2–3.5 X as long as wide; marginal teeth often present on leaves; gemmae up to 25 µm at their longest dimension **... Schistochilopsis incisa var. incisa**
> **A -** Leaves 1.5–2.5 X as wide as long, (2)3–4(5) cells thick at the proximal end; lobe apex with a cell 1–1.5(2) X as long as wide; marginal teeth absent from leaves; gemmae up to 40 µm at their longest dimension **... Schistochilopsis incisa var. opacifolia**

Tetralophozia Key
(1) Branchlets (0.5)0.7–1.1 mm wide; leaves (2-)3-4 lobed; Margins of lobes recurved, toothed at the proximal part **... Tetralophozia setiformis f. setiformis**
(1) Branches broad 0.3–0.5 mm; leaves 2(-3)-lobed; margins flat and generally entire, sometimes with a tooth **... Tetralophozia setiformis f. nemoides**

Tritomaria Key
(1) Leaves symmetrical or nearly so, lobes equal or more or less equal, the ventral margin slightly longer than or equal in length to the dorsal margin **-- 2**
(1) Leaves asymmetrical, equally 3-lobed, ventral margin distinctly longer than the dorsal margin **-- 4**
(2) Lobes acute; leaf insertion line, on the dorsal surface of the stem, oriented transversely; proximal leaf cells not elongated **-- 3**
(2) Lobes rounded; leaf insertion line, on the dorsal surface of the stem, arched towards the distal end of the stem; proximal leaf cells strongly elongated ... Tritomaria polita

> **A -** Leaves as long as or longer than wide, regularly three-lobed; sinuses of lobes angular; gemmae few, brown or reddish, angular; female bracts oblong or obcuneiform, longer than wide, 3-lobed, lobes deep; mid-cells containing 2–7 oil bodies **... Tritomaria polita subsp. polita**
> **A -** Leaves wider than long, mostly 3-lobed but variable in shape and often with 2 or 4 lobes; sinuses of lobes curved; gemmae frequent, yellowish-brown or golden, ellipsoid and smooth; female bracts more or less kidney-shaped, wider than long, 3-4-lobed, lobes shallow; mid-cells containing (5)8–12 oil bodies **... Tritomaria polita subsp. polymorpha**

(3) Leaves about as wide as long or slightly longer than wide; lobes never cuspidate; trigones small or slightly prominent; Perianth opening with teeth 4–5 cells long ... Tritomaria scitula

(3) Leaves wider than long; lobes mucronate or cuspidate; trigones strongly prominent; perianth opening with teeth 1–2 cells long **... Tritomaria heterophylla**
(4) Gemmae reddish, always abundant; plants 1.2–2 mm wide; leaves as wide as or narrower than long **-- 5)**;
(4) Gemmae yellowish-brown, sparse, usually absent; plants (1.5)2–3(4) mm wide; leaves wider than long, wavy when wet, crisped when dry **... Tritomaria quinquedentata**

A - Perianth aperture long-toothed, teeth formed of 2–5 overlapping cells; cross-section of the perianth base showing 1–3 cell layers; distal part of the perianth pleated; oil bodies 2–10 per cell; median laminar cells 18–24 µm X 21–28 µm; opaque, dark plant **... Tritomaria quinquedentata (Huds.) H.Buch subsp. quinquedentata**

A - Perianth aperture sparsely toothed, teeth formed of 1–2 overlapping cells; cross-section of the perianth base showing 2–4 cell layers; distal part of the perianth sparsely pleated; oil bodies 5–15 per cell; median cells 24–26 µm X 32–45 µm; pellucid plant **... Tritomaria quinquedentata subsp. turgida (Lindb.) Perss.**

(5) Gemmae elliptical, smooth; leaf cell walls thick, trigones absent or small **... Tritomaria exsecta**
(5) Gemmae angular; thin leaf cell walls, trigones present **... Tritomaria exsectiformis**