

Orthotrichaceae Part 1. Macromitrioideae

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FAMILY ORTHOTRICHACEAE

Plants small to robust, tufted or forming mats. **Corticolous**, saxicolous or rarely terricolous. **Stems** erect or creeping, variously branched, in section with central strand lacking. **Leaves** erect-appressed or variously twisted when dry, spreading to squarrose when wet, variously ovate, oblong or lanceolate, occasionally undulate or rugose, unistratose, bistratose or rarely multistratose; apex variable, rarely fragile; margins generally entire but can be toothed; **costa** always present, single, percurrent to excurrent; **upper laminal cells** usually small, rounded hexagonal or rarely short rectangular, flat to bulging, incrassate, smooth, unipapillose to pluripapillose; **basal laminal cells** quadrate, rectangular or linear, incrassate, smooth, papillose or tuberculate, alar cells not differentiated.

Gemmae sometimes present. **Dioicous** or autoicous. **Perigonia** lateral or terminal, bud-like, leaves strongly differentiated, short, concave. **Perichaetia** terminal on erect branches, leaves differentiated, oblong lanceolate to linear lanceolate. **Seta** short to elongate, usually smooth, often twisted. **Capsules** immersed to exserted, erect, ovoid to cylindrical, smooth or ribbed, stomata superficial or immersed. **Operculum** usually conic rostrate. **Peristome** single, double, reduced or absent, exostome of 16 teeth, free or fused into 8 pairs or forming a continuous membrane, endostome often reduced, smooth or papillose.

Calyptra mitrate or cucullate, often relatively large, smooth or plicate, lobate or lacerate, naked or hairy. **Spores** spherical, usually papillose, isosporous or anisosporous.

1.	Plants in loose mats; primary stem prostrate with many erect to ascending branches; sporophytes usually produced on secondary branches	2
	Plants tufted or in cushions; primary stem erect, simple or sparsely branched; sporophytes produced on primary branches	6
2.	Basal cells of branch leaves elongate, usually linear-rectangular, upper laminal cells short and rounded	3
	Basal cells of branch leaves short and rounded, similar to but somewhat larger than upper laminal cells	5
3.	Branch leaves with a basal margin of elongate cells extending 1/4-1/5 lamina length, inner basal cells quadrate-rounded	Groutiella
	Branch leaves with basal marginal cells similar to inner cells, without a distinct margin	4

4.	Medial cells of branch leaves rounded, oriented irregularly or in vertical rows; calyptra often plicate and lacerated from base, smooth or hairy; peristome lacking, single or if double not well developed	Macromitrium subgenus Macromitrium
	Medial cells of branch leaves somewhat rhomboid, oriented in diagonal rows; calyptra not plicate; lobed at base, naked; peristome double, well developed	Schlotheimia
5.	Branch leaves with adventitious filaments from basal cells; seta rough with prorate cells; capsule urceolate	Macromitrium subgenus Cometium
	Branch leaves lacking adventitious filaments from basal cells; seta smooth; capsule cylindrical	Macrocoma
6.	Dry branch leaves upright appressed; capsule stomata superficial or immersed; peristome double or rarely single; calyptra mitrate, usually hairy	Orthotrichum
	Dry branch leaves somewhat twisted about stem or contorted; capsule stomata superficial; peristome absent, single or double; calyptra cucullate, rarely hairy	7
7.	Upper laminal cells papillose; peristome double or single, often rudimentary	Zygodon
	Upper laminal cells smooth; peristome double	Codonoblepharon

ORTHOTRICHACEAE PART 1 – SUBFAMILY MACROMITRIOIDEAE

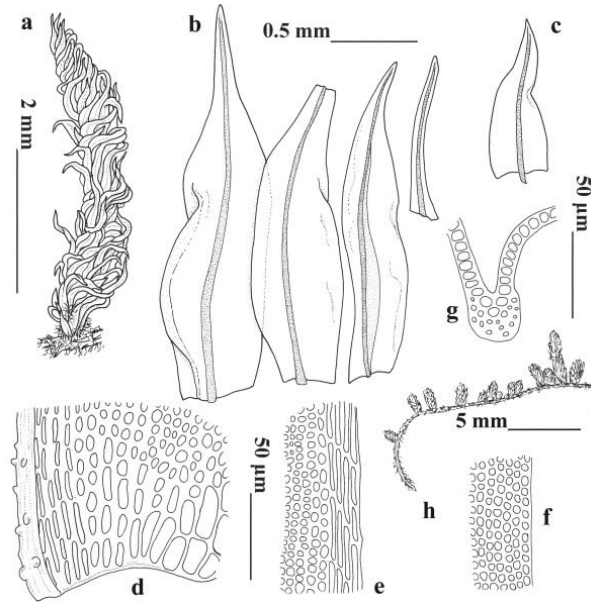
The Orthotrichaceae subfamily Macromitrioideae is characterised by the prostrate primary stems with numerous erect secondary branches terminated by sporophytes, the dimorphism of stem and branch leaves and the large mitrate calyptrae.

GROUTIELLA Steere. Bryologist 53: 145, 1950.

Plants medium sized, forming dense mats, brownish green to dull green. **Primary stems** creeping with numerous short erect branches, densely tomentose. **Branch leaves** contorted when dry and irregularly twisted around the stem, spreading when wet, oblong-ligulate to oblong-lanceolate, smooth, rugose or undulate, unistratose or often bistratose at apex; apex obtuse, mucronate or acute to acuminate, or ending in a fragile, deciduous subula; margins plane to undulate, entire; *costa* single, ending below apex to shortly excurrent; **upper laminal cells** quadrate-rounded to suboval, smooth or mammillate-bulging, **basal laminal cells** with a distinct margin of elongated cells, inner cells oblong to short rectangular-rounded. *Stem leaves* differentiated in shape and size from branch leaves. **Sporophytes** and gametangia not observed in East African material.

Groutiella laxotorquata (Müll.Hal. ex Besch.) Wijk & Margad. Taxon 9: 51, 1960 (Fig. 1)

Plants medium sized, forming dense mats, brownish green to dull green. **Primary stems** creeping, tomentose, with numerous erect branches, up to 2.5 cm tall. **Branch leaves** contorted, typically twisted about stem when dry, spreading when wet, oblong-ligulate to oblong-lanceolate, 1.9–4.0 mm long, apex acute, often ending in a fragile subula which can be partially bistratose; margins plane to undulate, entire; *costa* single, ending just below or in apex; **upper laminal cells** quadrate-rounded to suboval, 8.4–14.0 μm , smooth, mammillate-bulging; **basal laminal cells** with a distinct margin 1/4–1/5 lamina length, forming 5–10 distinct rows, marginal cells short or long linear, smooth, inner basal laminal cells quadrate rounded, incrassate, bulging, often unipapillose, with an area of larger thin walled hyaline cells situated at basal corner of costa. **Stem leaves** smaller, lanceolate, 1.0–1.2 mm long. **Sporophytes** and gametangia not observed in East African material.



In Uganda known from Kabarole District, Masindi District and Bwindi NP. Elsewhere in Africa recorded from: Central African Republic, Cape Verde, Gabon, Ghana, Guinea, Ivory Coast, Mauritius, Madagascar, Nigeria, Sierra Leone, Tanzania, Togo, Zaire and Zambia (O'Shea 2006). *Groutiella laxotorquata* is currently considered restricted to Africa, however, it is a likely synonym of the widespread *Groutiella tomentosa* (Hornsch.) Wijk & Margad., which is known from America and Asia.

In Uganda, *G. laxotorquata* has been collected from 1040–1480 m a.s.l., growing as an epiphyte on trunks and branches of trees.

Figure 1. *Groutiella laxotorquata*: (a, h) habit (dry); (b) branch leaves and detached apex; (c) stem leaf; (d) basal lamina of branch leaf; (e) basal margin of branch leaf; (f) upper lamina of branch leaf; (g) cross-section mid-leaf of branch leaf. (a, c–g) Drawn from O'Shea U2672a (BM); (b, h) from O'Shea U2633a (BM).

MACROCOMA (Hornsch. ex Müll.Hal.) Grout. Bryologist 47: 4, 1944.

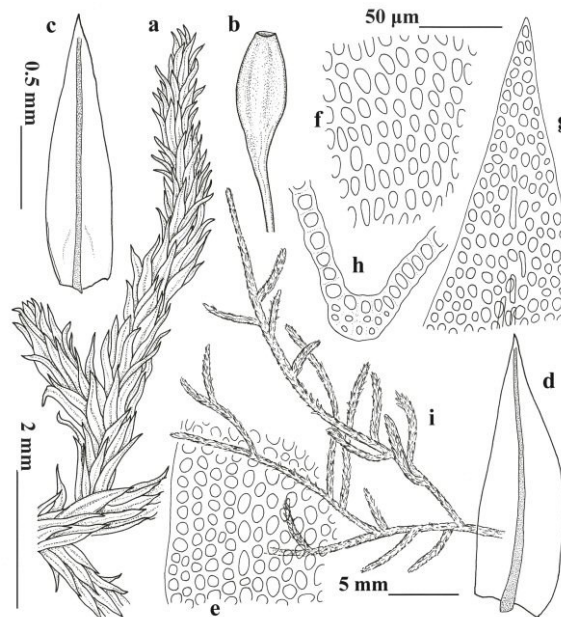
Plants slender, filiform, occasionally robust, forming mats, dark green to golden-brown. **Stems** creeping with widely spaced branches. **Branch leaves** closely appressed or occasionally slightly flexuose when dry, not contorted, erect-spreading to squarrose when wet, lanceolate to ovate-lanceolate, unistratose or

bistratose; apex narrowly obtuse, acute to acuminate; margins plane, often recurved below, entire to crenulate; **costa** single, prominent, ending below apex; **upper laminal cells** rounded, quadrate, flat or bulging; **basal laminal cells** homogeneous, rounded, short rectangular to elliptic, bulging, often with tuberculae. **Stem leaves** similar to branch leaves or differentiated. **Autoicous**. **Perigonia** terminal or lateral, leaves broadly ovate apiculate. **Perichaetia** terminal on short branches, perichaetial leaves longer than branch leaves. **Seta** elongate, smooth, < 10 mm long, ochrea present. **Capsule** erect, urn cylindrical, lightly 8-ribbed or smooth; stomata superficial, at urn base. **Operculum** conic rostrate. **Peristome** double, single or absent, exostome of 16 teeth, usually reduced, endostome of 16 segments, usually forming a low membrane. **Calyptra** large, mitrate, smooth or weakly plicate, naked to densely hairy. **Spores** papillose, isosporous.

1.	Branch leaves loosely arranged when dry; peristome consisting of a single well developed exostome of 16 teeth [a rare plant in Africa]	M. orthotrichoides
	Branch leaves appressed or loosely arranged when dry; peristome reduced to a low, double membrane	2
2.	Plants generally small in size; branch leaves erect and closely appressed in dry state, branch leaves usually < 1.3 mm, rarely at altitudes above 3000 m a.s.l.	M. tenuis subsp. tenuis
	Plants fairly robust; branch leaves loosely arranged with reflexed apices in dry state, branch leaves often > 1.2 mm, at altitudes above 2500 m a.s.l.	M. abyssinica

Macrocoma abyssinica (Müll.Hal.) Vitt. Bryologist 83: 419, 1980 [1981] (Fig. 2)

Plants medium sized to fairly robust, green to golden brown, forming loose mats. **Stems** creeping, with numerous irregular branches, up to 4 cm tall. **Branch leaves** in dry state loosely appressed, slightly twisted with apices spreading to reflexed, spreading when moist, lanceolate, 0.9–1.9 mm, unistratose; apex acuminate to acute, sharply pointed; **costa** ending below apex; **upper laminal cells** smooth, 8.4–19.6 μm , incrassate; **basal laminal cells** elliptic to rounded, bulging, often unipapillose. **Stem leaves** similar or somewhat ovate lanceolate, 0.7–1.9 mm. **Autoicous**. **Perigonia** terminal on branches. **Perichaetial** leaves 1.9–3.9 mm long. **Seta** up to 10 mm long. **Capsule** elliptic or oblong cylindrical, 1.5–2.0 mm long, smooth to lightly ribbed.



Peristome a low double membrane. **Calyptra** large, mitrate, densely hairy. **Spores** papillose, isosporous.

In Uganda, *Macrocoma abyssinica* is locally common in the Ruwenzori Mts, Mt Elgon and Mt. Sabino. It is restricted to Africa where it has also been recorded from Cameroon, Eritrea, Ethiopia, Kenya, Malawi, Rwanda, Socotra, Tanzania and Zaire (O'Shea 2006).

Macrocoma abyssinica is found at high altitudes and has been recorded from 2500–4100 m a.s.l. in Uganda. It occurs as an epiphyte or occasionally on rocks and is locally common in *Erica* forests.

Figure 2. *Macrocoma abyssinica*: (a, i) habit (dry); (b) capsule; (c) branch leaf; (d) stem leaf; (e) upper laminal cells; (f) basal laminal cells; (g) branch leaf apex; (h) cross-section mid-leaf of branch leaf. (a–i) Drawn from Miehe U58-10901-10 (BM).

Macrocoma orthotrichoides (Raddi) Wijk & Margad. Taxon 11: 221, 1962. (Fig.3)

Plants slender to medium sized, forming loose mats, yellow-green to dark green. **Stems** creeping, with numerous irregular branches, up to 3 cm tall. **Branch leaves** in dry state appressed to somewhat loosely arranged on branches, spreading when moist, broadly lanceolate, 1.1–1.3 mm, unistratose; apex acute; **costa** ending below apex; **upper laminal cells** 10–14 μ m, flat to slightly bulging, uniform in size from costa to margin; **basal laminal cells** elliptic to rounded, smooth. **Stem leaves** similar, 1.1–1.2 mm. **Autoicous**.

Perigonia terminal on branches. **Perichaetial** leaves longer than branch leaves, 2.0–2.1 mm long. **Seta** 5–10 mm long. **Capsule** elliptic or oblong cylindrical, < 2 mm long, smooth. **Peristome**

single, exostome of 16 well developed teeth, endostome absent. **Calyptra** large, mitrate, sparsely hairy. **Spores** papillose, isosporous.

Macrocoma orthotrichoides has been reported only once from Africa, when it was collected from Uganda, Kabarole District, at 1320 m a.s.l., growing as an epiphyte on twigs fallen from the forest canopy. This species mostly has a neotropical distribution with disjunct populations in Uganda (Wilbraham 2007) and northern India (Parihar 1975).

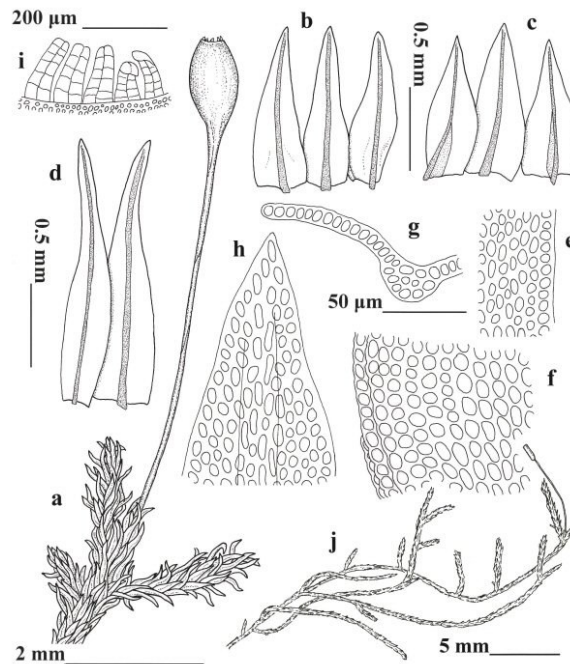


Figure 3. *Macrocoma orthotrichoides*: (a, j) habit (dry); (b) branch leaves; (c) stem leaves; (d) perichaetial leaf; (e) upper laminal cells; (f) basal laminal cells; (g) cross-section mid-leaf of branch leaf. (h) branch leaf apex; (i) portion of peristome. (a–j) Drawn from *Porley U473j* (BM).

Macrocoma tenuis* subsp. *tenuis (Hook. & Grev.) Vitt. *Rev. Bryol. Lichénol.* 39: 217, 1973 (Fig. 4)

Plants slender, forming loose mats, yellow-green to dark green.

Stems creeping, irregularly branched, with numerous branches up to 2.5 cm tall.

Branch leaves spirally arranged, erect-appressed when dry, erect spreading to widely spreading when wet, narrowly lanceolate, 0.9–1.4 mm, unistratose, keeled below; apex bluntly acute; margins plane above, often recurved below; *costa* ending below apex; **upper laminal cells** rounded-quadrangle, incrassate, smooth, flat, 8.5–19.5 μm ; **basal laminal cells** elliptic to rounded, bulging, often with tuberculae.

Stem leaves often reflexed, usually slightly larger than branch leaves, ovate-lanceolate to lanceolate, 0.9–1.5 mm.

Autoicous. Perigonia terminal on branches. **Perichaetial leaves** broadly lanceolate, 1.3–2.3 mm long, acute, longer than branch leaves. **Seta** 4–10 mm long. **Capsule** elliptic or oblong cylindrical, < 2 mm long, smooth to lightly ribbed. **Peristome** reduced to a low double membrane. **Calyptra** large, mitrate, plicate, hairy. **Spores** papillose, isosporous.

Frequently collected in Uganda and widespread elsewhere in sub-Saharan Africa. Also known from Papua New Guinea, Eastern Australia and New Zealand (Vitt, Koponen & Norris 1995).

In Uganda this species has been recorded from 900–3000(–3520) m a.s.l. as an epiphyte on a range of different tree and shrub species, or more rarely growing on rocks.

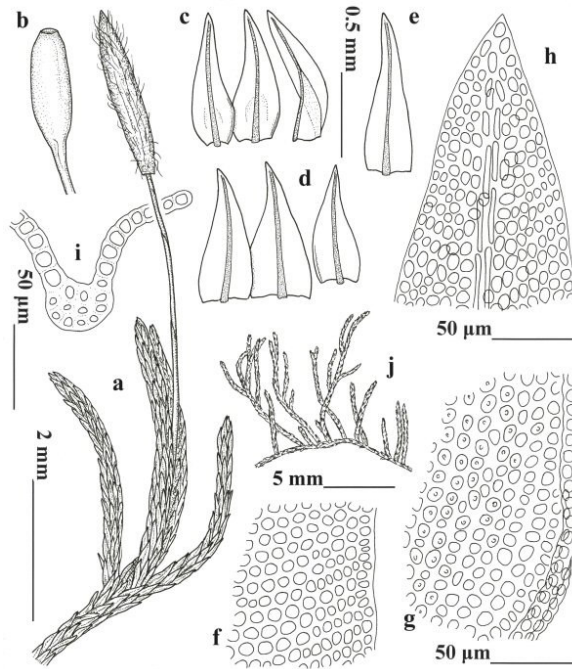


Figure 4. *Macrocoma tenuis* subsp. *tenuis*: (a, j) habit (dry); (b) capsule; (c) branch leaves; (d) stem leaves; (e) perichaetial leaf; (f) upper laminal cells; (g) basal laminal cells; (h) branch leaf apex; (i) cross-section mid-leaf of branch leaf. (a–b, j) Drawn from *Porley U473g* (BM); (c–i) from *Wigginton U8019a* (BM).

MACROMITRIUM Brid. Musc. Rec. Suppl. 4: 132, 1819 [1818].

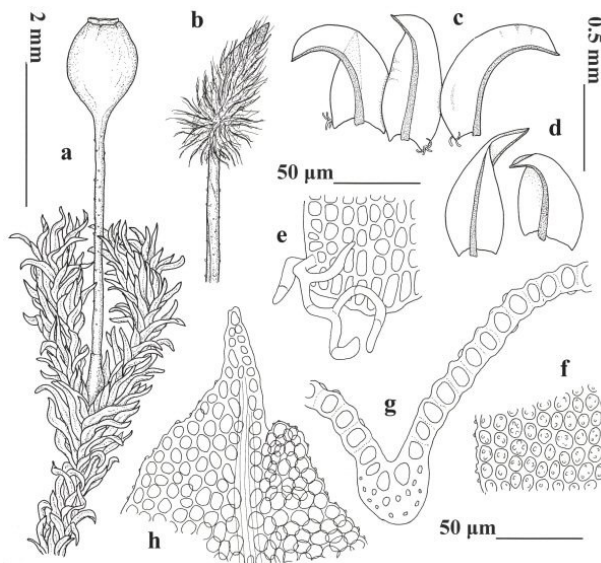
Plants slender to robust, forming loose to dense mats, dark green to reddish-brown or golden. **Stems** short to long, creeping, tomentose, with numerous secondary branches. **Branch leaves** five-ranked or spirally arranged, variously contorted when dry, spreading when wet, ovate lanceolate, linear-lanceolate to oblong-lanceolate, unistratose or bistratose; apex obtuse or acute; margins plane to recurved below, smooth to crenulate or denticulate above; **costa** single, usually strong, ending below apex to shortly excurrent; **upper laminal cells** oval or rounded-subquadrate, flat to bulging, incrassate, smooth or papillose; **basal laminal cells** homogenous, elongate and narrow, rarely short and quadrate, tuberculate or papillose, rarely smooth. **Stem leaves** similar to branch leaves or differentiated. **Dioicous**, often producing dwarf male plants. **Perichaetial leaves** differentiated. **Seta** elongate, roughened or more frequently smooth. **Capsule** ovoid to cylindrical, smooth or ribbed. **Operculum** short- to long-rostrate. **Peristome** often rudimentary, absent, single or double. **Calyptra** large, mitrate, base often lacerate, plicate, naked to densely hairy. **Spores** papillose, anisosporous.

1.	Plants usually robust; branch leaves narrow lanceolate, basal cells of branch leaves narrowly elongate; calyptrae naked	M. sulcatum
1.	Plants slender; branch leaves ovate lanceolate, basal cells of branch leaves quadrate or rectangular; calyptrae hairy	M. orthostichum

Macromitrium orthostichum Nees ex Schwägr. Spec. Musc. Suppl. 4: 136, 1842 (Fig 5)

(*Macromitrium scleropodium* Besch., fide Wilbraham 2007)

Plants slender, olive green to yellow brown. **Stems** creeping with numerous erect branches up to 2 cm tall. **Branch leaves** in five ranks, flexuose and contorted when dry, spreading to squarrose when wet, ovate lanceolate, 0.9–1.7 mm long, unistratose, apex broadly acute, margins plane above, often recurved below, crenulate, **costa** ending just below apex or slightly excurrent; **upper laminal cells** irregularly rounded, 14.0–17.4 μm , pluripapillose or rarely smooth; **basal laminal cells** short, rounded-quadrate, 19.5–28.0 μm , tuberculate, often with marginal cells at leaf base generating adventitious rhizoids. **Stem leaves** similar to branch leaves. **Dioicous**, producing dwarf male plants. **Perichaetia** terminal, inner leaves narrow, similar to vegetative leaves, outer leaves very small, triangular. **Seta** stout, 3–6 mm, rough with prorate cells. **Capsule** ovoid, relatively large, < 1.5 mm. **Peristome**



consisting of a double membrane, papillose. **Calyptra** large, mitrate, densely hairy. **Spores** papillose, anisoporous.

Macromitrium orthostichum is the sole representative of the sub-genus *Cometium* in Africa. This group has many features that are atypical for *Macromitrium*, such as the slender habit and branch leaves with short basal cells (Wilbraham 2007).

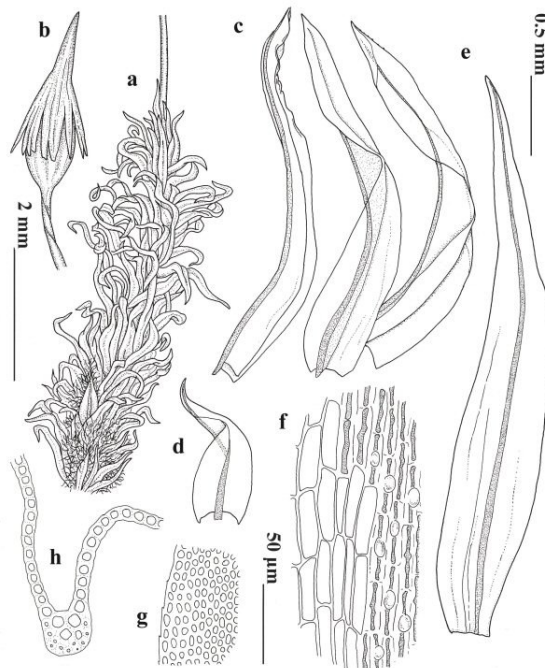
Macromitrium orthostichum is rather uncommon in Uganda where it has been recorded from Kabarole and Karwungu Districts. Elsewhere in Africa it is known from Cameroon, Gabon, Madagascar, Réunion, Rio Muni and Zaire (Wilbraham 2007). It also occurs in tropical Asia (Vitt *et al.* 1995). *Macromitrium orthostichum* is found as an epiphyte in forests and has been recorded from altitudes of 1200–1532 m a.s.l. in Uganda.

Figure 5. *Macromitrium orthostichum*: (a) habit (dry); (b) capsule with calyptra; (c) branch leaves; (d) stem leaves; (e) basal lamina with adventitious rhizoids; (f) upper laminal cells; (g) cross-section mid-leaf of branch leaf; (h) branch leaf apex. (a–b) Drawn from Nees *s.n.*, lectotype of *M. orthostichum* (G); (c–g) from *Mugizi 1109/25* (BM).

Macromitrium sulcatum (Hook.) Brid. Bryol. Univ. 1:319, 1826 (Fig 6)

(*Macromitrium levatum* Mitt. - *fide* Tixier 1989)

Plants medium sized to robust, green, yellowish-green to brownish-green. **Stems** creeping with numerous bushy branches up to 4 cm tall, tomentose. **Branch leaves** variously contorted and twisted when dry, erect spreading when wet, narrow lanceolate to oblong lanceolate, keeled, 2.2–4.7 mm long, unistratose, apex acute to acuminate, margins plane or occasionally undulate when lamina is broader, often denticulate above; **costa** ending below apex to slightly excurrent; **upper laminal cells** rounded irregular, incrassate, flat to bulging, arranged in longitudinal rows, 8.5–14.0 μm ; **basal laminal cells** elongate, strongly incrassate, tuberculate, rarely smooth, with a distinct area of thin-walled hyaline cells situated at basal corner of costa. **Stem leaves** smaller than branch leaves, ovate lanceolate, 0.8–1.4 mm. **Dioicous**, producing dwarf male plants. **Perichaetia** terminal, leaves shortly oblong-ovate to oblong-lanceolate, usually longer than branch leaves, 3.5–4.7 mm. **Seta** 6–15 mm long, smooth. **Capsule** ovate, ribbed, narrowed at mouth, < 2 mm. **Peristome** double, exostome teeth fused forming a low membrane, endostome also a low membrane. **Calyptra** mitrate, deeply lacerate, naked. **Spores** papillose, anisoporous.



Macromitrium sulcatum is frequently collected from Uganda and is the most common member of the genus in sub-Saharan Africa. It also occurs in Asia, extending from India as far east as Borneo (Eddy 1996).

In Uganda, *M. sulcatum* has been recorded from 975–2700 m a.s.l., as an epiphyte on a range of different tree and shrub species, or more rarely growing on rocks.

Figure 6. *Macromitrium sulcatum*: (a) habit (dry); (b) capsule with calyptra; (c) branch leaves; (d) stem leaf; (e) perichaetial leaf; (f) basal laminal cells; (g) upper laminal cells; (h) cross-section mid-leaf of branch leaf. (a–h) Drawn from O'Shea U5447a (BM).

SCHLOTHEIMIA Brid. Musc. Rec. Suppl. 2: 16, 1812.

Plants medium sized, forming mats. **Stems** creeping with erect bushy branches, often tomentose. **Branch leaves** appressed and often spirally coiled around the stem when dry, erect-spreading when wet, ovate-oblong, ligulate, or oblong-acuminate, unistratose, often rugose; apex rounded-obtuse, acute, cuspidate or mucronate; margins plane or recurved below, entire; **costa** strong, often channelled, ending below apex to shortly excurrent; **upper laminal cells** rounded, incrassate, smooth, median cells often rhomboidal; **basal laminal cells** homogenous, narrowly rectangular, incrassate, pitted. **Stem leaves** usually smaller than branch leaves, ovate-lanceolate, costa percurrent, shortly excurrent or aristate. **Dioicous**, often producing dwarf male plants. **Perichaetial leaves** oblong-lanceolate to lanceolate. **Seta** short to elongate, smooth. **Capsule** exserted, erect, ovoid to ovoid-cylindrical. **Operculum** short- to long-rostrate. **Peristome** well developed, double, exostome of 16 teeth, reflexed when dry, papillose, endostome segments alternating with exostome teeth, shorter than exostome. **Calyptra** large, mitrate, naked, lobed below. **Spores** papillose, anisosporous.

1.	Branch leaf apex broad, rounded-obtuse, mucronate; stem leaf costa shortly excurrent	S. ferruginea
1.	Branch leaf apex gradually narrowed to cuspidate point; stem leaf costa ending below apex	S. percuspidata

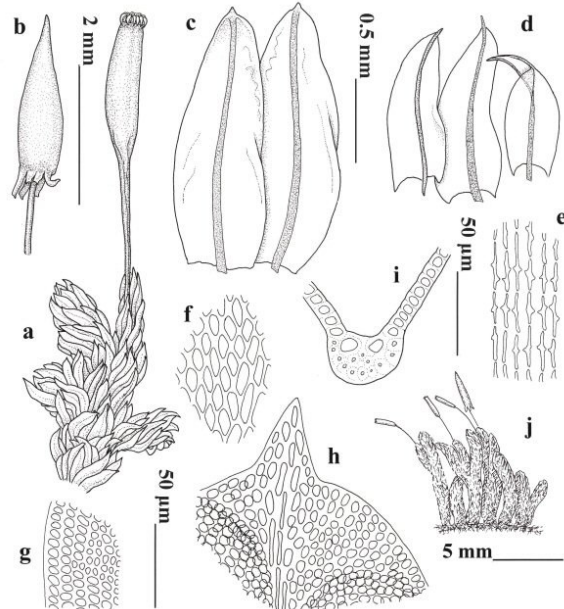
Schlotheimia ferruginea (Bruch ex Hook. & Grev.) Brid. Bryol. Univ. 1: 743, 1826 (Fig 7)

(*Schlotheimia rigescens* Broth. -fide Wilbraham 2008)

Plants medium sized, forming mats, greenish brown to rusty brown. **Stems** creeping with frequent secondary branches up to 2.5 cm long, tomentose. **Branch leaves** appressed and twisted around stem when dry, erect spreading when moist; broadly oblong-ovate to oblong-ligulate, 1.1–2.2 mm, unistratose, often

rugose above; margins entire; apex rounded-obtuse, mucronate; **costa** stout, ending in or below mucronate apex; **upper laminal cells** rounded, 7.2–10.8 μm ,

incrassate, flat, smooth, medial cells rhomboidal; **basal laminal cells** narrow rectangular, incrassate, pitted. **Stem leaves** ovate lanceolate, 0.6–1.4 mm, apex rounded-acute, costa usually shortly excurrent, occasionally ending in apex. **Dioicous**, producing dwarf male plants. **Perichaetial leaves** broadly oblong to oblong-lanceolate, 2.1–3.2 mm long. **Seta** 2–7 mm long. **Capsule** cylindrical, < 2 mm, smooth to weakly ribbed. **Peristome** double, exostome teeth 16, ca. 400–450 μm , endostome segments 16–32. **Calyptra** large, mitrate, < 3 mm, smooth, basally lobed. **Spores** papillose, anisoporous.



Frequently collected in Uganda and widespread across sub-Saharan Africa: Angola, Kenya, Malawi, Rwanda, South Africa, Tanzania, Togo, Zaire, Zambia and Zimbabwe (Wilbraham 2008). Elsewhere known from tropical Asia under the synonym *Schlotheimia grevilleana* Mitt. (Koponen & Enroth 1992).

In Uganda, *S. ferruginea* occurs at 1040–1540 m a.s.l., as an epiphyte on trees or occasionally growing on rocks.

Figure 7. *Schlotheimia ferruginea*. (a, j) habit (dry); (b) capsule with calyptra; (c) branch leaves; (d) stem leaves; (e) basal laminal cells; (f) medial laminal cells; (g) upper laminal cells; (h) branch leaf apex; (i) cross-section mid-leaf of branch leaf. (a–j) Drawn from O'Shea U2882a (BM).

Schlotheimia percuspidata Müll.Hal. Hedwigia 38: 117, 1899 (Fig 8)

Plants medium sized, forming mats, greenish brown to rusty brown. **Stems** creeping, with frequent secondary branches up to 3 cm tall, tomentose. **Branch leaves** appressed and twisted to spirally twisted around stem when dry, erect spreading when moist, oblong lanceolate, attenuate, 1.4–2.7 mm; unistratose, occasionally rugose above, apex acute to cuspidate, occasionally fragile; **costa** ending below apex or extending into cuspidate point; **upper laminal cells** rounded, 7.0–12.0 μm , incrassate, flat, smooth, medial cells rhomboidal; **basal laminal cells** narrow rectangular, incrassate, pitted. **Stem leaves** ovate to ovate-lanceolate, 0.8–2.2 mm, apex acute to acuminate, costa ending below apex or extending into tapering point. **Dioicous**, producing dwarf male plants. **Perichaetial leaves** broadly oblong to oblong-lanceolate, 1.9–3.2 mm. **Seta** 1.5–7.0 mm long. **Capsule** cylindrical, < 3 mm long, smooth to weakly ribbed. **Peristome** double, exostome teeth 16, approx. 330–440 μm , endostome

segments 16–32. **Calyptra** large, mitrate, < 3 mm, smooth, basally lobed. **Spores** papillose, anisosporous.

Schlotheimia percuspidata has been frequently collected in Uganda. It is restricted to sub-Saharan Africa where it is also known from Kenya, Malawi, South Africa, Tanzania and Zimbabwe (Wilbraham 2008).

In Uganda, *S. percuspidata* has been recorded from altitudes of 1060–1522 m a.s.l., growing as an epiphyte on trees or occasionally on rocks.

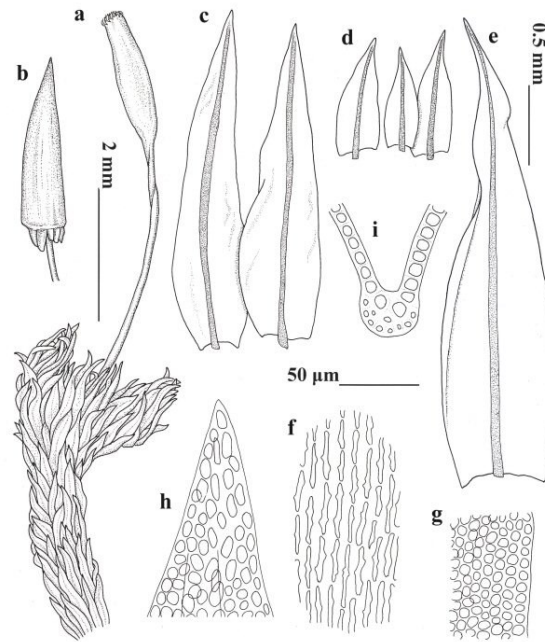


Figure 8. *Schlotheimia percuspidata*. (a) habit (dry); (b) capsule with calyptra; (c) branch leaves; (d) stem leaves; (e) perichaetial leaf; (f) basal laminal cells; (g) upper laminal cells; (h) branch leaf apex; (i) cross-section mid-leaf of branch leaf. (a–i) Drawn from O’Shea U2802a (BM).

EXCLUDED SPECIES

Macromitrium fragile G.Negri, *hom. illeg.* Ann. Bot. 7: 166, 1908

None of the Ugandan specimens of *Macromitrium* examined for this study match the protologue description of *M. fragile* and it is likely that this name is synonymous within the genus *Zygodon*. However, no taxonomic changes can be made until the type material (FI) is examined.

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