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WESTERN MOUNT KENYA BRYOPHYTES - III

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INTRODUCTION

This is the third and final article in the current series on the bryophytes found on the western side of Mt. Kenya. An introduction of the environmental factors prevailing on the study site was given in part one of this series; figure numbering continues from the second paper in the series (Chuah-Petiot, 1994). The legend presents the scale for plant parts and the length of cells.

= BRYOPSIDA =

Leucodontaceae

Pterogonium gracile (Hedw.) Sm. (fig. 9)

MSC 241a, 202, 304b.

Altitude range: 2450–3150 m.

Plants epiphytic, robust, yellowish green. Stems procumbent to erect. Stem leaves larger but similar to branch leaves. Leaves ovate lanceolate tapering to long fine point; margin denticulate; nerve up to three quarters up leaf. Basal leaf cells shortly rectangular, upper leaf cells linear.

Legend: 1-plant habit (x 1); 2-part of plant (x 10); 3-part of shoot tip (x 4); 4-branch leaf (x 60); 5-stem leaf (x 35); 6-mid leaf cells (15 μ m); 7-marginal leaf cells (10 μ m).

Prionodontaceae

Prionodon ciliatus Besch. (fig. 9)

MSC 320b

Altitude range: 2375 m.

Plants robust, epiphytic, with prostrate and erect stems, irregularly branched. Small scale like leaves near base of main stem but abundantly leafy upwards. Leaves broad base to widely lanceolate, furrowed, serrate, margin coarsely toothed, teeth irregular as to size, some at right angles to margin, others more inclined forward or hooked. Leaf apex acute, usually toothed, nerve strong, brownish extending almost to apex. Marginal cells near apex rounded to elliptical, papillose; mid leaf cells long, lower marginal cells gradually shorter.

Legend: 8-part of shoot (x 6); 9-tooth (20 μ m); 10-plant habit (x 2/3); 11-mid leaf cells (15 μ m); 12-basal leaf cells (50 μ m); 13-leaf (x 13).

Pterobryaceae

Calypothecum hoehnelii (C. Mull.) Broth. (fig. 9)

MSC 320

Altitude: 2375 m.

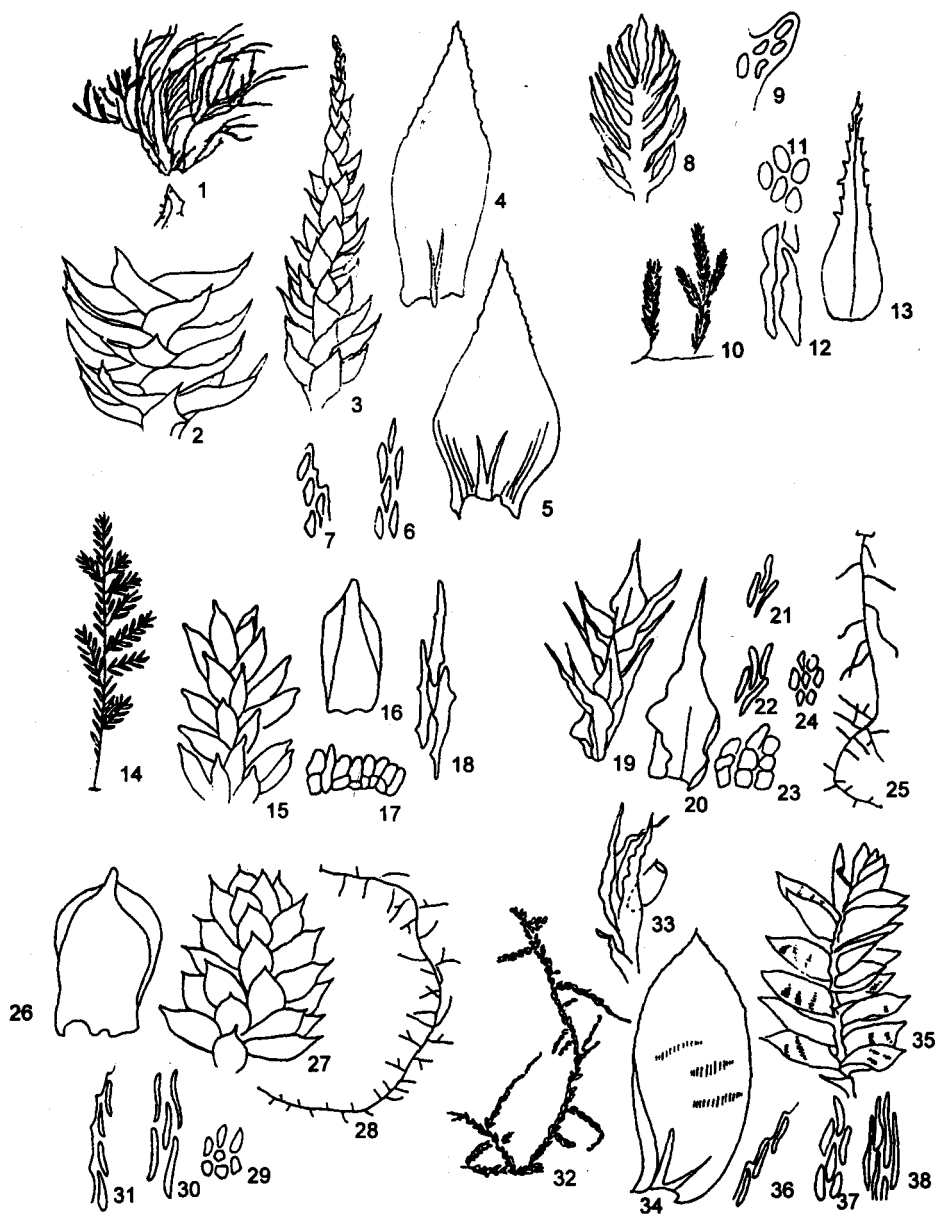


Figure 9. Legend see text. 1–7 *Pterogonium gracile*; 8–13 *Prionodon ciliatus*; 14–18 *Calypsothecum hoehneltii*; 19–25 *Papillaria africana*; 26–31 *Pilotrichella cuspidata*; 32–38 *Neckera platyantha*.

Plants robust, much branched. Primary stems creeping, secondary stems erect, irregularly to pinnately branched. Stems red, leaves imbricate, strongly concave, broadly ovate to oval, acute to abruptly acuminate. Nerveless. Upper leaf cells linear, pitted; basal alar cells shortly rectangular, brownish.

Legend: 14-plant habit (x 1); 15-part of lateral shoot (x 4); 16-leaf (x 7); 17-basal leaf cells (45 μm); 18-mid leaf cells (120 μm).

Meteoriaceae

Papillaria africana (C. Mull.) Jaeg. (fig. 9)

MSC 304d

Altitude: 2450 m.

Plant epiphyte, main stem long, secondary stems numerous, long and hanging, pinnated.

Leaves ovate acute, with wider lower portion rounded in to the base; apex subulate, margin entire, nerve single, not reaching apex. Cells elliptical, hexagonal, alar cells quadrate.

Legend: 19-part of plant (x 7); 20-leaf (x 35); 21-apical leaf cells (15 μm); 22-mid leaf cells (17.5 μm); 23-alar cells (12.5 μm); 24-cells below leaf apex (12 μm); 25-plant habit (x 1).

Pilotrichella cuspidata Broth. (fig. 9)

MSC 30-a, 303a, 317a, 320c.

Altitude range: 2375–2450 m.

Plants epiphytic, with short dendroid and long stems, more or less 2-pinnate, branchlets taper to a fine point. Leaves in regular rows, concave, ovate, nerveless, leaf margin lightly denticular in upper half. Basal alar leaf cells rhomboid, other cells elongate, vermicular.

Legend: 26-leaf (x 30); 27-part of shoot (x 7); 28-plant habit (x 1/2); 29-alar cells (10 μm); 30-mid leaf cells (55 μm); 31-marginal leaf cells (25 μm).

Neckeraceae

Neckera platantha (C. Muell.) Par. (fig. 9)

MSC 215, 501, 502

Altitude: 3000 m

Plants yellowish green, conspicuously flattened, pinnate or bipinnately branched. Epiphytic on *Arundinaria alpina*. Leaves complanate, sub-falcate, transversely undulate, tip apiculate, margin finely toothed near apex. Nerve double, short. Basal leaf cells elongate, mid leaf cells short, rhomboidal. Capsule immersed.

Legend: 32-plant habit (x 1); 33-capsule among perichaetial leaves (3 mm); 34-leaf (x 16); 35-part of shoot (x 8); 36-marginal leaf cells (25 μm); 37-upper leaf cells (20 μm); 38-mid leaf cells (40 μm).

Porothamnium stipitatum (Mitt.) Touw ex De Sloover. (fig. 10)

MSC 315c, 318b, 701, 707.

Altitude range: 2250–2650 m.

Plants rupicolous and epiphytic, green, robust, dendroid. Leaves distant on main stem, scale like leaves near base. Leaves concave, asymmetrical, oblong acuminate a clasping base, prominently serrate in upper two-thirds way up leaf. Mid leaf cells linear.

Legend: 1-part of shoot (x 8); 2-plant habit (x 1/2); 3-leaf (x 16); 4-apical leaf cells (27 μm); 5-mid leaf cells (55 μm); 6-marginal leaf cells (25 μm).

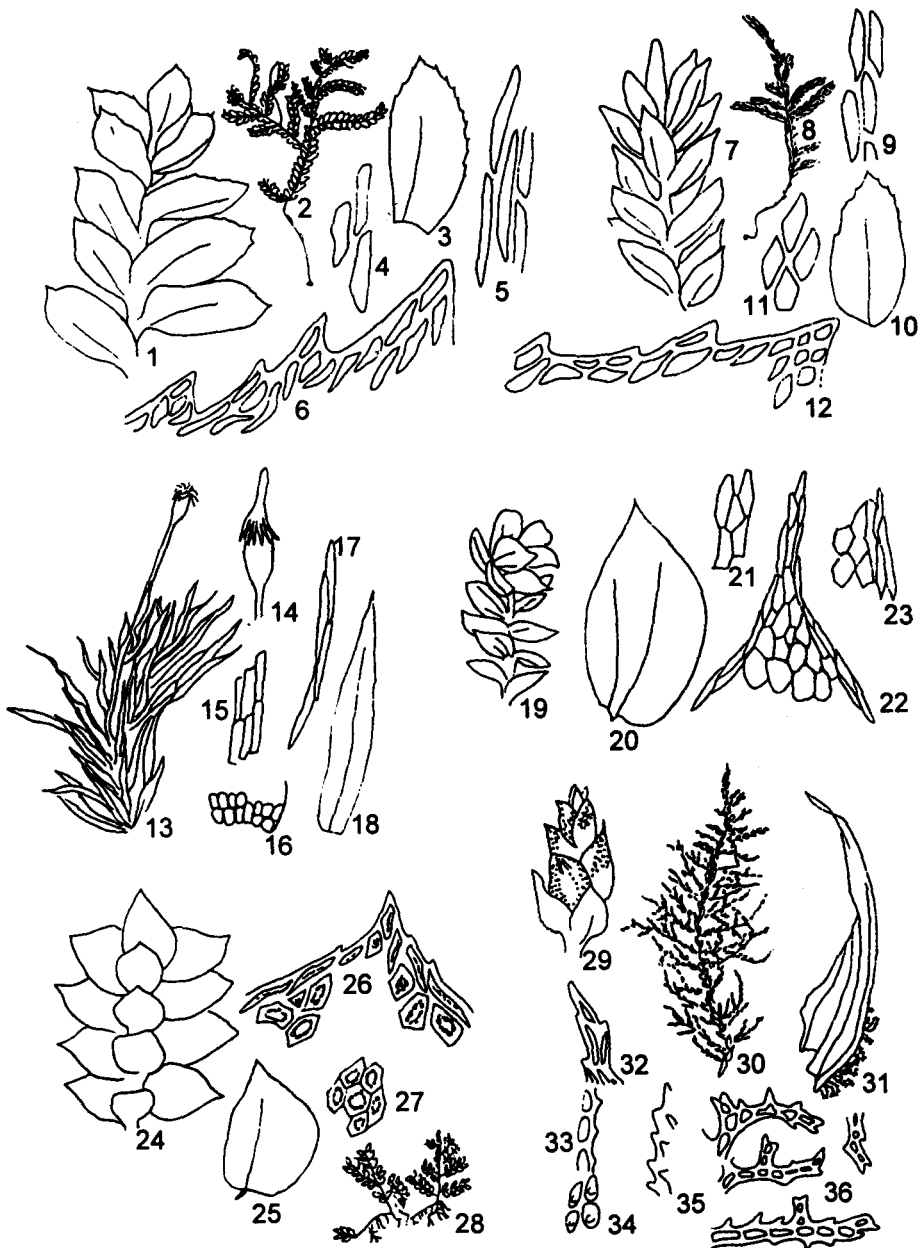


Figure 10. Legend see text. 1–6 *Porothamnium stipitatum*; 7–12 *Porotrichum molliculum*; 13–18 *Daltonia mildbraedii*; 19–23 *Cyclodictyon laetevirens*; 24–28 *Hypopterygium mildbraedii*; 29–36 *Thuidium matarumense*

***Porotrichum molliculum* Broth. (fig. 10)**

MSC 318b

Altitude: 2400 m.

Plants erect, robust, bipinnate, more or less dendroid, small leaved at base. Leaves concave, asymmetrical, oval; margin serrated. Nerve ending more than halfway up leaf. Stem leaves larger than branch leaves, otherwise similar.

Legend: 7-part of shoot (x 5); 8-plant habit (x 1); 9-mid leaf cells (25 μ m); 10-leaf (x 10); 11-apical leaf cells (10 μ m); 12-marginal leaf cells (10 μ m).

Daltoniaceae***Daltonia mildbraedii* Broth. (fig. 10)**

P 9235/K

Altitude: 3000 m.

Plant epiphytic on bamboo. Stems short, 1–2 cm long. Leaves elongate lanceolate, nerve ending below apex. Basal alar cells brown, rhomboidal, marginal cells elongate narrow 10–12 rows; mid leaf cells rectangular. Capsule subglobular, hairy calyptra, peristome teeth pale green; seta reddish brown.

Legend: 13-plant with sporophyte (x 5); 14-capsule with hairy calyptra (1 mm); 15-mid leaf cells (40 μ m); 16-basal alar leaf cells (10 μ m); 17-marginal leaf cells (10 μ m); 18-leaf (x 10).

Hookeriaceae***Cyclodictyon laetevirens* (Hook. & Tayl.) Mitt. (fig. 10)**

BR 91/130f

Altitude: 3050 m.

Plants light green, soft, slender. Stems creeping to 1.5 cm long. Leaves asymmetrical, oval, apex apiculate, margin entire, bordered. Nerve double, unequal length. Leaf cells hexagonal generally, more elongate towards base, narrow, linear at margin forming border.

Legend: 19-part of shoot (x 5); 20-leaf (x 15); 21-mid leaf cells (25 μ m); 22-apical leaf cells (70 μ m); 23-marginal leaf cells (70 μ m).

Hookeriaceae***Hypopterygium mildbraedii* Broth. (fig. 10)**

MSC 319e

Altitude: 2400 m.

Plants light green, epiphytic. Primary stems prostrate, secondary stems erect. Leaves dimorphic, in 3 ranks, lateral leaves larger. third rank smaller. Leaves ovate, apiculate, asymmetrical, margins bordered, margin near apex weakly serrate. Nerve ending before apex.

Legend: 24-part of plant (x 7); 25-leaf (x 9); 26-apical leaf cells (110 μ m); 27-mid leaf cells (50 μ m); 28-plant habit (x 1/4).

Thuidiaceae***Thuidium matarumense* Besch. (fig. 10)**

MSC 217

Altitude: 3000 m

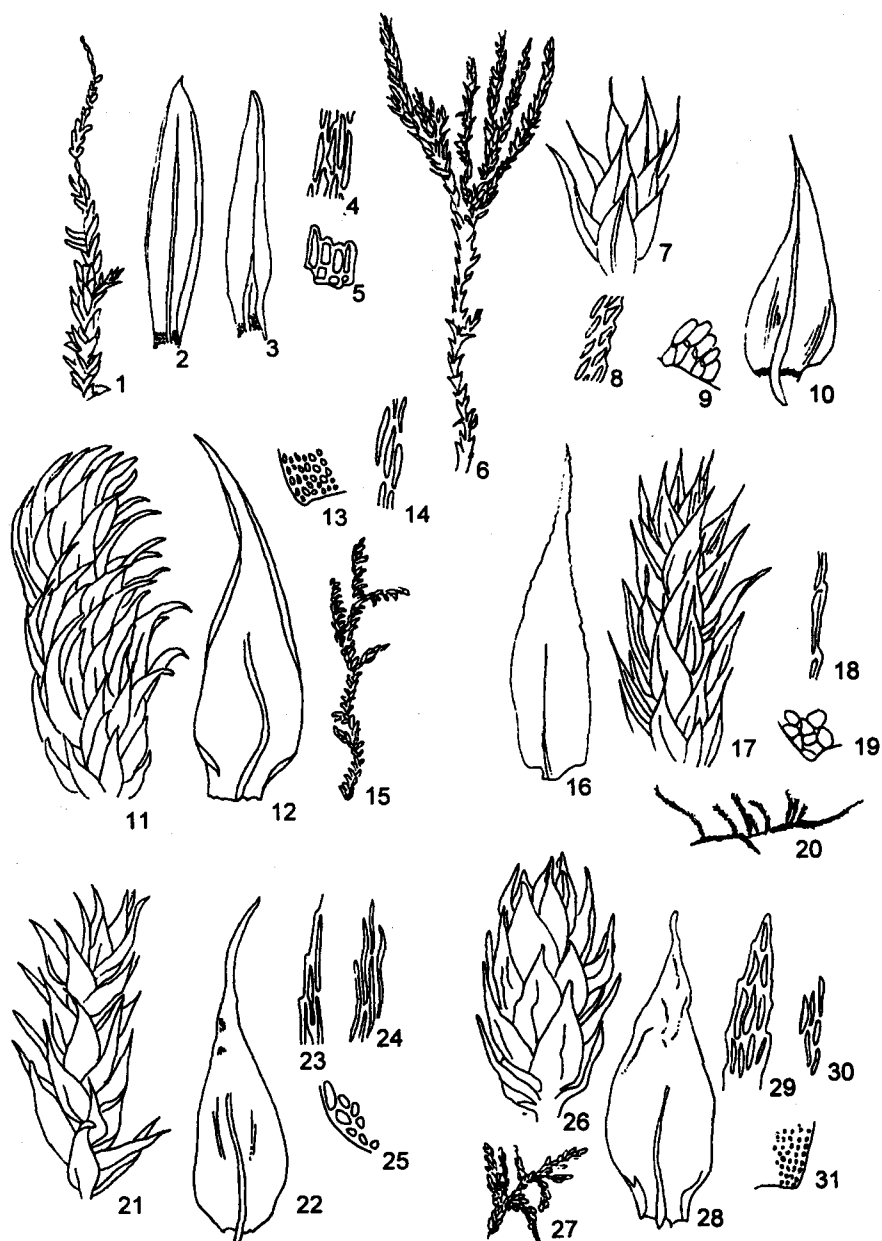


Figure 11. Legend see text. 1–5 *Calliergon sarmentosum*; 6–10 *Cratoneuron filicinum*; 11–15 *Brachythecium plumosum*; 16–20 *Brachythecium* sp. 1; 21–25 *Brachythecium* sp. 2; 26–31 *Brachythecium* sp. 3

Plants rupicolous, yellowish green to brown; branches bipinnate to tripinnate. Stem with abundant paraphyllia. Stem leaves broadly triangular ovate, longitudinally plicate when wet, apex straight to flexuose, gradually narrowed into a filiform leaf tip; margin recurved above leaf base. Cells brownish, short rectangular, papillose; nerve prominent leaves, ovate with acute apex; margin coarsely serrulate by projecting cells.

Legend: 29-part of shoot (x 8); 30-plant habit (x 1); 31-leaf with paraphyllia (x 80); 32-apical leaf cells (15 µm); 33-marginal leaf cells (12 µm); 34-papillose mid leaf cells (15 µm); 35-papillose back of young leaf (10 µm); 36-paraphyllia (120 µm).

Amblystegiaceae

Calliargon sarmentosum (Wahl.) Kindb. (fig. 11)

MSC 173, 180, 140.

Altitude range: 3650–4490 m.

Plants terricolous, brownish green, forming tufts. Stems to 8 cm long, much branched.

Leaves reddish, concave, lanceolate, apex rounded or with short apiculus, nerve to three-quarters or more up leaf. Basal alar cells rectangular, hyaline; cells above linear rhomboidal.

Legend: 1-plant (x 2); 2, 3-leaves (x 20); 4-mid leaf cells (55 µm); 5-basal alar cells (25 µm).

Amblystegiaceae

Cratoneuron filicinum (Hedw.) Broth. (fig. 11)

MSC 95

Altitude: 4350 m

Plants terricolous, robust, irregularly branched. Stem erect to 5 cm. long. Stem leaves concave, broad base to acuminate apex, nerve stout. Basal leaf cells rounded, elsewhere oblong rhomboidal.

Legend: 6-plant habit (x 2½); 7-part of plant (x 10); 8-marginal leaf cells (20 µm); 9-basal leaf cells (25 µm); 10-leaf (x 35).

Brachytheciaceae

Brachythecium plumosum (Hedw.) B & S. (fig. 11)

MSC 230c, 174a, 187b

Altitude range: 3000–4200 m

Plants terricolous, rupicolous and epiphytic, robust, golden brown, branched. Leaves near tip turned to one side, concave, ovate lanceolate, base asymmetrical, margin recurved near base, denticulate; nerve to above 1/2 way up leaf. Basal leaf cells shortly rectangular, mid leaf cells linear.

Legend: 11-part of plant (x 10); 12-leaf (x 25); 13-basal leaf cells (12.5 µm); 14-mid leaf cells (35 µm); 15-plant habit (x 1).

Brachythecium sp. 1 (fig. 11)

MSC 117b

Altitude: 4300 m

Plants green above, brown below. Leaves narrowly ovate lanceolate, plicate; margin entire or finely toothed; nerve 1/2 way up leaf. Basal leaf cells short, roundish; elsewhere elongate.

Legend: 16-leaf (x 25); 17-part of plant (x 10); 18-marginal leaf cells (70 µm); 19-basal leaf cells (25 µm); 20-plant habit (x 1).

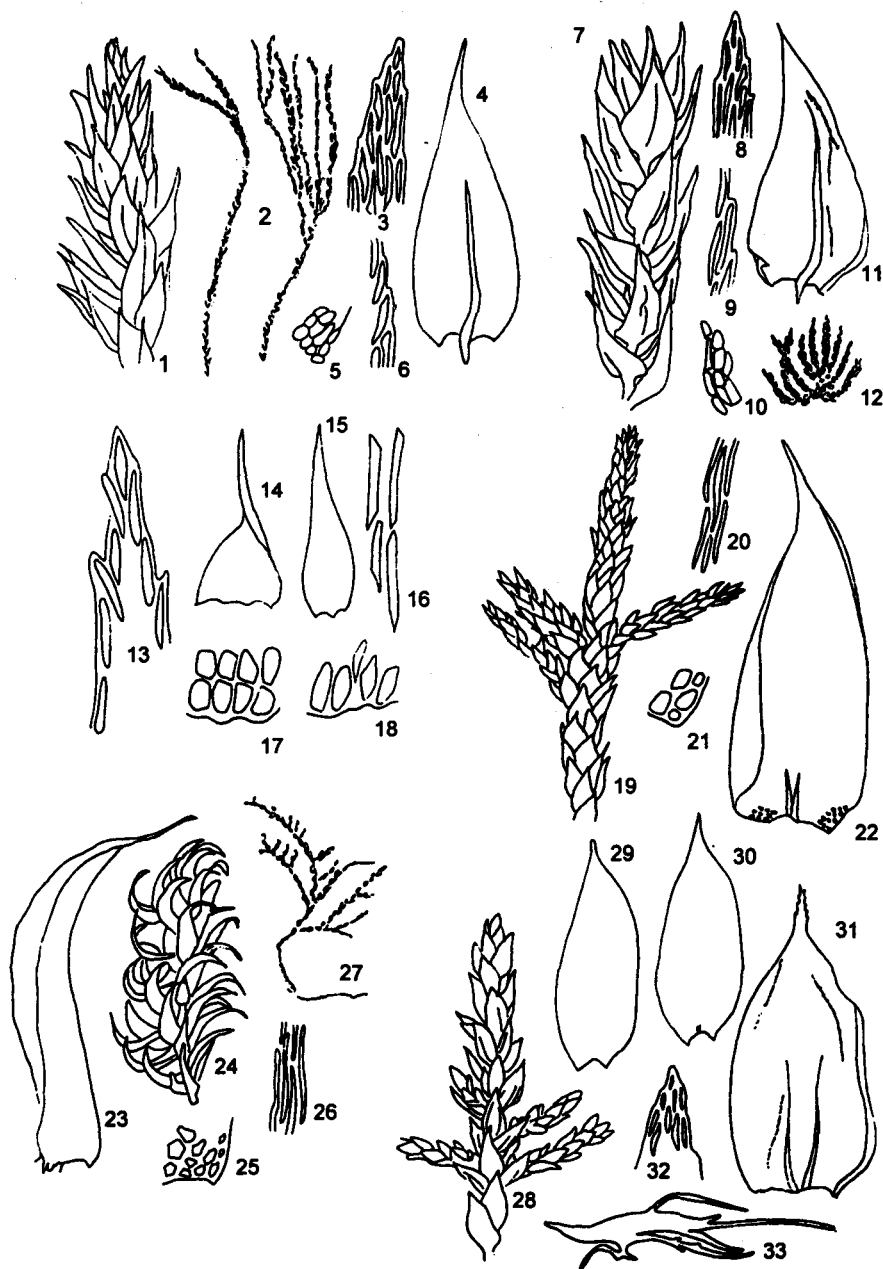


Figure 12. Legend see text. 1-6 *Brachythecium* sp. 4; 7-12 *Brachythecium* sp. 5; 13-18 *Wijkia trichocolea*; 19-22 *Hypnum cupressiforme*; 23-27 *Hypnum cupressiforme* var. *ericetorum*; 28-33 *Hylocomium splendens*

Brachythecium sp. 2 (fig. 11)

MSC 123c

Altitude: 4400 m

Plants small, slender, pale green, branched. Leaves ovate lanceolate, tapering to a long fine point; margin finely toothed; nerve 1/2 way up leaf. Basal leaf cells short rectangular round, elsewhere elongate.

Legend: 21-part of shoot (x 10); 22-leaf; 23-marginal leaf cells (40 µm); 24-mid leaf cells (60 µm); 25-basal leaf cells (15 µm).

Brachythecium sp. 3 (fig. 11)

MSC 104b

Altitude: 3950 m

Plants golden brown, branched. Leaves ovate lanceolate tapering to a fine narrow apex, margin entire, finely denticulate near apex; nerve up to mid leaf. Basal leaf cells small, round, elsewhere elongate.

Legend: 26-part of shoot (x 15); 27-plant habit (x 2); 28-leaf (x 15); 29-apical leaf cells (50 µm); 30-mid leaf cells (40 µm); 31-basal leaf cells (15 µm).

Brachythecium sp. 4 (fig. 12)

MSC 179b

Altitude: 4200 m

Plants in compact tufts, yellowish green above, light brown to brown below. Stems to 8.5 cm long, branched. Leaves ovate lanceolate, nerve single, to more than 1/2 way up leaf. Basal leaf cells round oblong, elsewhere linear.

Legend: 1-part of shoot (x 8); 2-plant habit (x 1/2); 3-apical leaf cells (90 µm); 4-leaf (x 20); 5-basal leaf cells (25 µm); 6-marginal leaf cells (60 µm).

Brachythecium sp. 5 (fig. 12)

MSC 179a

Altitude: 4200 m

Plants yellowish green, forms compact tufts. Stems to 3 cm long, branching near base. Leaves ovate lanceolate, nerve single to 3/4 way up leaf. Basal leaf cells short rectangular, elsewhere linear.

Legend: 7-part of shoot (x 10); 8-apical leaf cells (60 µm); 9-marginal leaf cells (70 µm); 10-basal leaf cells (40 µm); 11-leaf (x 15); 12-plant habit (x 1/2).

Sematophyllaceae*Wijkia trichocolea* (C. Mull.) Crum. (fig. 12)

MSC 307d

Altitude: 2400 m.

Plant terricolous, prostrate, laxly matted, usually brown. Stem bipinnate. Stem leaves oval acuminate, nerveless, margin entire, alar cells shortly rectangular, brown. Branch leaves lanceolate, margin finely denticulate, alar cells rectangular to oblong, light brown.

Legend: 13-apical leaf cells (35 µm); 14-stem leaf (x 20); 15-branch leaf (x 15); 16-mid leaf cells (50 µm); 17-alar cells of stem leaf (35 µm); 18-alar cells of branch leaf (35 µm).

Hypnaceae*Hypnum cupressiforme* Hedw. (fig. 12)

MSC 52, 14, 66b, 74, 155b, 231a, 12a, 198, 194, 267, 46a, 44b, 269a, 235b, 20a

Altitude range: 2900–4490 m

Plants terricolous and epiphytic, robust, golden brown to light green, pinnately branched. Stem leaves ovate lanceolate, concave, leaf tip turned to one side, margin entire, nerve short, double. Branch leaves similar to stem leaves but smaller. Basal (alar) cells short, rectangular, brown, elsewhere vermicular.

Legend: 19-part of shoot (x 4); 20-mid leaf cells (70 μm); 21-basal (alar) leaf cells (15 μm); 22-leaf (x 30).

Hypnum cupressiforme var. *ericetorum* B & S (fig. 12)

MSC 214a

Altitude: 4490 m

Plants terricolous, robust, branched. Leaves ovate lanceolate, concave, strongly curved giving a hooked effect to the tips; margin entire; nerveless. Basal (alar) cells short, rectangular, brown, elsewhere vermicular.

Legend: 23-leaf (x 35); 24-part of shoot (x 6); 25-basal (alar) leaf cells (15 μm); 26-mid leaf cells (60 μm); 27-plant habit (x 1).

Hylocomiaceae

Hylocomium splendens (Hedw.) B & S (fig. 12)

MSC 266, 241b, 104a, 231b, 148a, 105b, 187a

Altitude range: 3000–4000 m

Plants terricolous, green to yellowish green, forming mats, branching bipinnate. Stems creeping, bright red, abundant paraphyllia on stem. Stem leaves concave, broadly ovate but abruptly narrowed to short tip; margin denticulate; nerve double. Branch leaves similar to stem leaves but smaller. Basal leaf cells brown, opaque, incrassate, rectangular, elsewhere linear.

Legend: 28-part of shoot (x 8); 29, 30-branch leaves (x 30); 31-stem leaf (x 40); 32-apical leaf cells (25 μm); 33-paraphyllia (0.5 mm).

= HEPATICOPSIDA =

Herbertaceae

Herbertus dicranus (Tayl.) Steph. (fig. 13)

MSC 155a, 227, 226, 233, 516

Altitude range: 3000–3600 m.

Plants rupicolous, reddish brown, ascending, branched, anisophyllous. Leaves bilobed, lobe lanceolate, acuminate; medium cells elongated with pitted walls, forming a vitta extending into lobes, other cells more or less isodiametric, trigones prominent.

Legend: 1-plant (x 2½); 2, 3-lateral leaf lobes (x 25); 4, 5-underleaves (x 50); 6-mid leaf lobe cells (24 μm).

Blepharostomaceae

Blepharostoma trichophyllum (L.) Dumort. (fig. 13)

MSC 603

Altitude: 4200 m.

Plants terricolous, slender, pale green forming small patches or growing among other bryophytes. Stem to 1 cm long, procumbent to ascending, branching irregular. Leaves distant, transversely inserted, divided almost to base into three uniseriate filaments,

each of 7-10 cells. Underleaves usually three lobed, lobes similar to leaf filaments. Inflorescence terminal, perianth subcylindrical, contracted to ciliated mouth.

Legend: 7-part of shoot (x 80); 8-part of plant (x 120); 9-leaf lobe (x 150); 10-perianth mouth (x 250); 11-capsule within perianth (x 250).

Isotachidaceae

Isotachis aubertii (Schw.) Mitt. (fig. 13)

MSC 603, 509

Altitude range: 3000–4200 m.

Plants very small size, pale green. Leaves ovate, bilobed, sinus obtuse. Underleaves ovate, margin dentate.

Legend: 12-part of shoot (x 70); 13-leaf (x 25); 14, 15-underleaves (x 30); 16-mid leaf cells (50 µm).

Lepidoziaceae

Lepidozia stuhlmanii Steph. (fig. 13)

Br 101a, 23

Altitude: 3530 m.

Plants small to medium size, dull or pale green to cream. Stems prostrate to ascending.

Stems 1 to 2-pinnate. Leaves distant to imbricate, incubous, asymmetrical, obliquely inserted, 2-5 lobed to 1/4-3/4. Underleaves smaller than leaves. Inflorescences on short, ventral branches. Male bracts smaller than or of similar size to leaves, concave, 2-3 lobed. Female bracts much larger than leaves, entire or toothed at apex.

Legend: 17-plant (x 15); 18-part of plant (x 20); 19-mid leaf lobe cells (40 µm).

Calypogeiaceae

Calypogeia afrocaerulea E.W. Jones (fig. 13)

Br 91/100b

Altitude: 3530 m.

Plants terricolous, small, pale green to greyish green to bluish. Stems prostrate to ascending, sparsely branched. Leaves incubous, distant to imbricate, spreading horizontally, ovate to broadly ovate or triangular. Apex rounded to acute, obliquely inserted. Cells large, thin walled, with or without small trigones. Oil bodies compound, blue. Underleaves wider than stem, rounded, bilobed.

Legend: 20-part of shoot (x 30); 21-leaf lobe (x 50); 22-underleaf (x 100); 23-mid leaf lobe cells (40 µm).

Lophoziaceae

Chandonanthus hirtellus (Weber) Mitt. (fig. 13)

MSC 3, 228

Altitude range: 3000-3100 m.

Plants epiphytic, yellowish brown, forming dense mats. Stems 10-15 cm long. Leaves imbricate, deeply lobed, margins ciliate. Trigones present. Underleaves deeply lobed, similar to leaves. Capsule terminal, elongate, to globose, dehiscence by four longitudinal slits.

Legend: 24-plant with sporophyte (x 1); 25-exposed capsule (x 65); 26, 27-exposed capsules (x 40); 28-part of shoot with sporophyte (x 7); 29-underleaf (x 30); 30, 31-leaves (x 30).

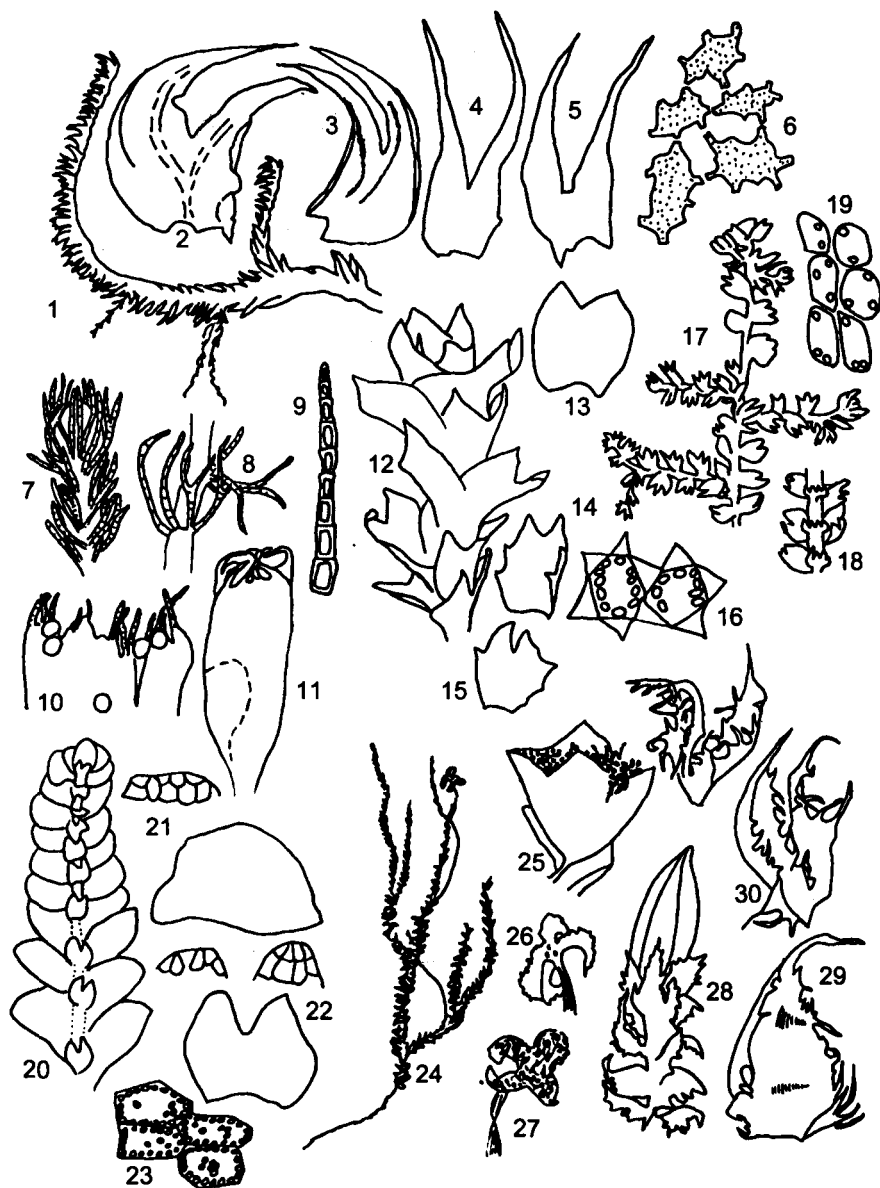


Figure 13. Legend see text. 1–6 *Herbertus dicranus*; 7–11 *Blepharostoma trichophyllum*; 12–16 *Isotachis aubertii*; 17–19 *Lepidozia stuhlmanii*; 20–23 *Calypogeia afrocaerulea*; 24–31 *Chandonanthus hirtellus*.

Tetralophozia cavallii (Gola) Vana. (fig. 14)

Br 91/112b

Altitude: 3430 m.

Plants small, brown, growing in tufts on rock surfaces. Stems to 2 cm long. Leaves imbricate, deeply lobed, ciliate towards leaf base. Trigones present. Underleaves deeply lobed, similar to leaves.

Legend: 1-part of shoot (x 20); 2-underleaf (x 30); 3, 4-leaves (x 30); 5-mid leaf cells (10 µm).

Lophozia decolorans (Limpr.) Steph. (fig. 14)

MSC 213c

Altitude: 4490 m.

Plants very small, brown, grow intermingled with *Racomitrium* sp. Stems to 4 mm long. Leaves concave, bilobed to about 1/3 its length, lobes rectangular, hyaline; underleaves absent.

Legend: 6-part of shoot (x 190); 7-leaf (x 200); 8-mid leaf cells (20 µm); 9-gemmae (15 µm), 10-part of fertile shoot (x 140).

Anastrophyllum auritum Steph. (fig. 14)

MSC 530

Altitude: 3500 m.

Plants rupicolous, small, brownish black growing on rock surfaces. Stems erect to ascending, up to 3 cm long, branched. Leaves reddish brown, concave, asymmetrical, somewhat distant, bilobed to about 1/3, sinus acute. Cells hexagonal to elongated. Trigones present. Underleaves absent.

Legend: 11-leaf lobe (x 55); 12-leaf lobe tip cells (15 µm); 13-plant (x 30); 14-fertile shoot (x 30).

Scapaniaceae*Diplophyllum africanum* S. Arn. (fig. 14)

MSC 525

Altitude: 3500 m.

Plants pale green, delicate, small; growing in tufts. Leaves bilobed, imbricate, margin entire. Lobule length about 2/3 that of lobe. Leaf lobe without vitta. Underleaves absent.

Legend: 15-part of shoot (x 35); 16-leaf (x 50); 17-mid leaf lobe cells (15 µm).

Scapania hedbergii S. Arn. (fig. 14)

MSC 604, 601, 599, 588, 532

Altitude range: 4200-4400 m.

Plants terricolous, small, green to brown, prostrate to erect, growing on alluvial soil.

Shoots arising from creeping rhizomatous stems. Stems to 2 cm long. Leaves bilobed, conduplicate, dorsal lobe more or less undulate, appressed to ventral lobe; margin denticulate, wavy. Cells with trigones. Underleaves absent.

Legend: 18-part of shoot (x 60); 19-marginal leaf lobe cells (30 µm); 20-leaf (x 150).

Lophocoleaceae*Lophocolea cuspidata* (Nees.) Limpr. (fig. 14)

MSC 315d

Altitude: 2400 m.

Plants epiphytic, small. Leaves 1-2 mm long, asymmetrical, bilobed, sinus broad and lunate; lobes long and finely apiculate, the apiculi parallel or diverging, ending in 2-4

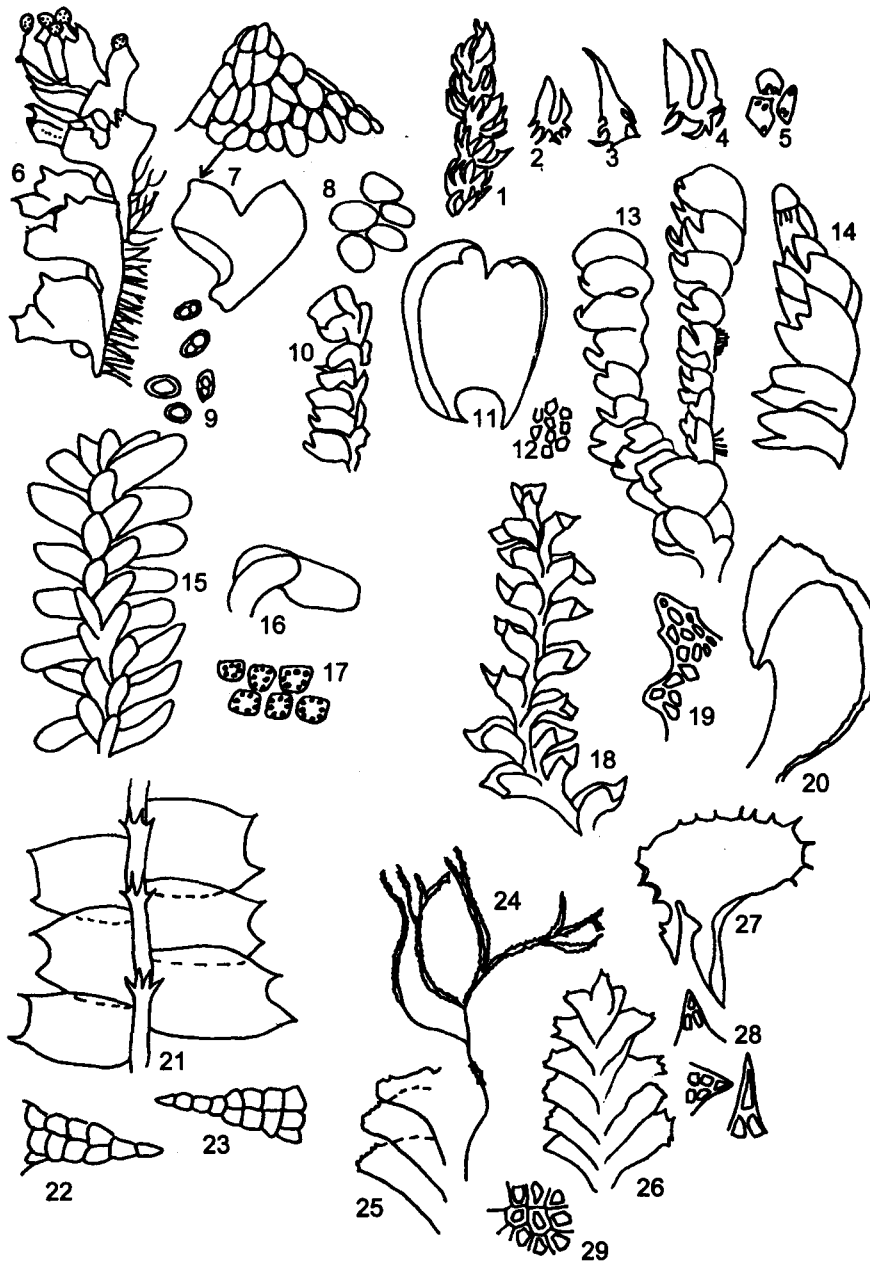


Figure 14. Legend see text. 1–5 *Tetralophozia cavallii*; 6–10 *Lophozia decolorans*; 11–14 *Anastrophylum auritum*; 15–17 *Diplophyllum africanum*; 18–20 *Scapania hedbergii*; 21–23 *Lophocolea cuspidata*; 24–29 *Plagiochila squamulosa* var. *squamulosa*

or more uniseriate cells. Cells thin walled. Trigones absent. Underleaves deeply bilobed narrowly triangular, laciniae each with a subsidiary tooth near base of outer margin.

Legend: 21-part of plant (x 70); 22, 23-cells of apiculi (25 μ m).

Plagiochilaceae

Plagiochila squamulosa Mitt. var. *squamulosa* (fig. 14)

MSC 304c

Altitude: 2450 m.

Plants epiphytic, robust, forming pendant pinnate shoots. Older parts of stem devoid of leaves. Stem up to 12 cm long. Leaves triangular, margin dentate, teeth spiniform.

Trigones small. Underleaves absent. Numerous paraphyllia present on stem.

Legend: 24-plant habit (x 1); 25, 26-part of shoot (x 15); 27-leaf (x 20); 28-teeth on leaf margin (whole tooth = 53 μ m); 29-mid leaf cells (30 μ m).

Plagiochila ericicola Steph. (fig. 15)

Ag 1021

Altitude: 3000 m.

Plants brownish. Stem up to 8 cm long, branched. Leaves triangular, margin dentate.

Trigones small. Underleaves absent.

Legend: 1-plant (x 4); 2-part of plant (x 30); 3-plant habit (x 5); 4-teeth on leaf margin (whole tooth = 40 μ m); 5, 6-leaves (x 50).

Plagiochila pectinata (Willd.) Ldbg. (fig. 15)

MSC 315e

Altitude: 2400 m.

Plants green when fresh. Stems to 3 cm long, much branched. Leaves distant, narrowly triangular ovate about one and a half times as long as wide; base cuneate; antical margin entire with tooth at apex. Postical margin slightly arched to straight, the distal half to two-thirds with triangular teeth. Trigones prominent and large.

Legend: 7-part of shoot (x 15); 8-tooth from leaf lobe (whole tooth = 70 μ m); 9-leaf lobe (x 35).

Plagiochila barteri Mitt. (fig. 15)

MSC 225

Altitude: 3400 m.

Plants robust, up to 8 cm long, 6mm broad, little branched. Leaves imbricate, triangular, margin dentate around apex. Trigones small. Underleaves absent.

Legend: 10-succubous leaf arrangement (x 6); 11-part of shoot (x 5); 12-teeth on leaf margin (whole tooth = 35 μ m); 13-leaf lobe (x 15).

Cephaloziaceae

Cephaloziella sp. (fig. 15)

Br 91/19

Altitude: 3500 m.

Plants small, pale green. Leaves bilobed to about 1/2 or more, sinus acute. Leaf margin entire. Trigones absent.

Legend: 14, 15-leaves (50 μ m); 16-plant (x 100).

Radulaceae

Radula recurvifolia Steph. (fig. 15)

MSC 318d

Altitude: 2400 m.

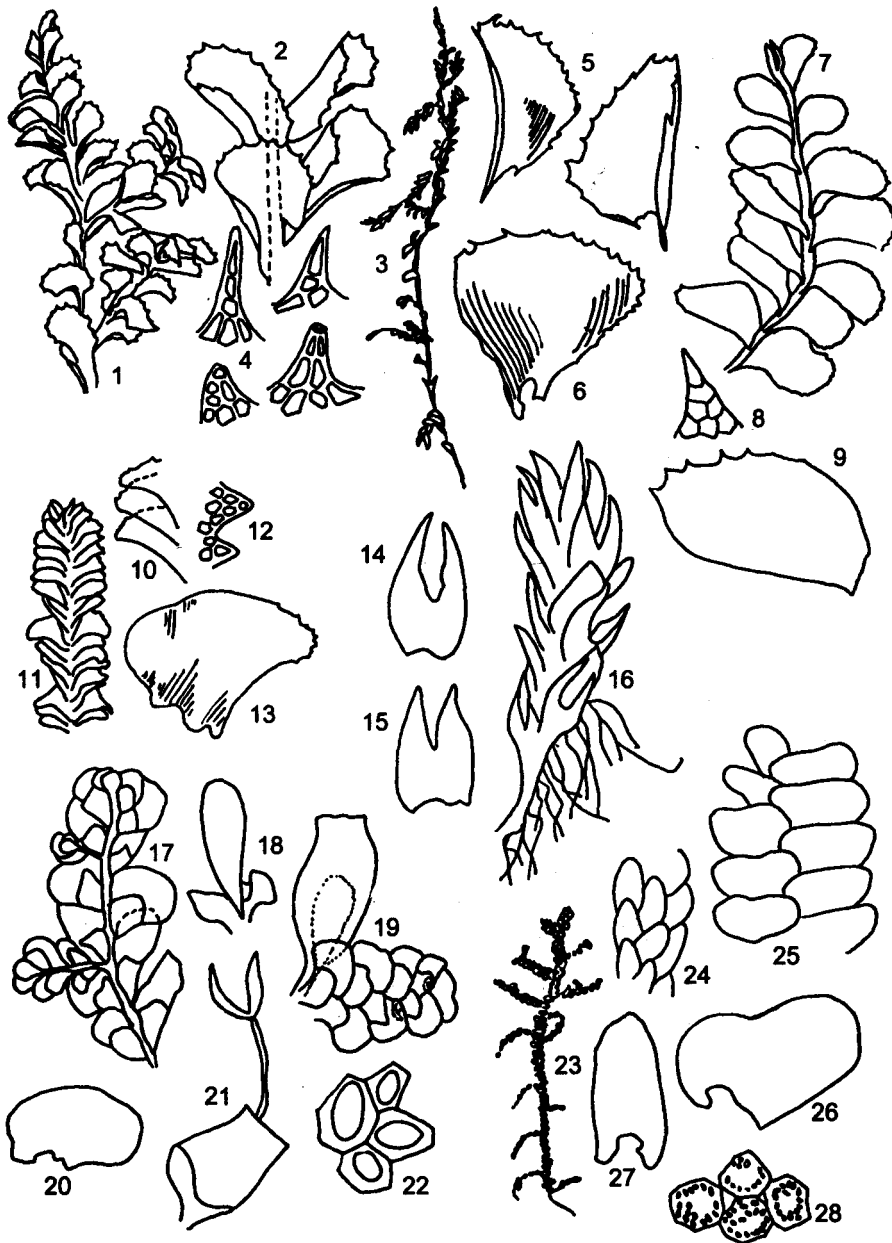


Figure 15. Legend see text. 1–6 *Plagiochila ericicola*; 7–9 *Plagiochila pectinata*; 10–13 *Plagiochila barteri*; 14–16 *Cephaloziella* sp.; 17–22 *Radula recurvifolia*; 23–28 *Porella abyssinica*

Plants epiphytic, prostrate, greenish to brownish black, branching pinnate. Leaves spreading more or less horizontally, bilobed almost to base, dorsal lobes incubous, imbricate, orbicular to ovate, crossing stem on dorsal side, ventral lobe smaller than dorsal lobe, leaf margin entire. Cells hexagonal, oil bodies very large rendering cells opaque. Male inflorescence spike-like with saccate male organs. Female inflorescence terminal, bracts asymmetrically bilobed. Perianth smooth, narrowed to wide mouth.

Legend: 17-part of plant (x 15); 18-young sporophyte with bracts at base (x 20); 19-part of plant showing two male organs towards plant apex and mature capsule within perianth (x 20); 20-leaf lobe (x 15); 21-perianth with exposed capsule (x 20); 22-cells with single large oil bodies (190 μ m).

Porellaceae

Porella abyssinica (Nees) Trev. var. *hoehnelii* (Steph.) Pócs (fig. 15)

MSC 20b, 230b, 237, 303b, 319b

Altitude range: 2750-3000 m.

Plants terricolous, rupicolous and epiphytic, robust, brownish green, branching bipinnate from rhizomatous base. Leaves bilobed, conduplicate, dorsal lobe large, oblong-oval, ventral lobe smaller, almost parallel to stem, oblong-oval, often equal to size of underleaves. Leaf margins entire. Cells hexagonal. Underleaves oblong-oval, 1.5 times as wide as stem; apex rounded.

Legend: 23-plant habit (x 1); 24-ventral surface of plant showing the vertical position of underleaves (u) and bilobed leaves (lf) (x 5); 25-dorsal surface of plant part (x 5); 26-leaf lobe (x 15); 27-underleaf (x 15); 28-mid leaf cells (25 μ m).

Frullaniaceae

Frullania arecae (Spreng.) Gott. (fig. 16)

MSC 503

Altitude: 3000 m.

Plants robust, greenish brown epiphyte. Stems to 3 cm long, branching irregular. Dorsal leaf lobe broadly ovate, concave. Ventral lobe helmet-shaped. Leaf cells irregularly polygonal, trigones prominent. Underleaves suborbicular bilobed to about 1/10 down underleaf, rounded sinus. Female inflorescence terminal. Perianth narrowed to beak-like mouth. Capsule spherique.

Legend: 1-plant (x 15); 2-underleaves (x 35); 3-underleaves (x 30); 4-ventral surface underleaves removed (x 30); 5-mid leaf cells (24 μ m); 6-ventral surface showing position of underleaf (x 30).

Frullania shimperi Nees var. *shimperi* (fig. 16)

MSC 587, 512

Altitude range: 3000-3300 m.

Plants epiphytic, copper brown to black. Leaves bilobed, dorsal lobe oval, concave, entire, incurved at summit; ventral lobe saccate, two times taller than wide. Cells polygonal-rounded, trigones present. Underleaves bilobed.

Legend: 7-plant habit (x 2); 8-part of shoot (x 40); 9-part of shoot (x 35); 10-ventral surface of shoot (x 40); 11-leaf lobe with lobule (x 50); 12-leaf lobe (x 50); 13-mid leaf cells (15 μ m).

Lejeuneaceae

Lejeunea flava (Sw.) Nees (fig. 16)

Br 91/89, 91/123a

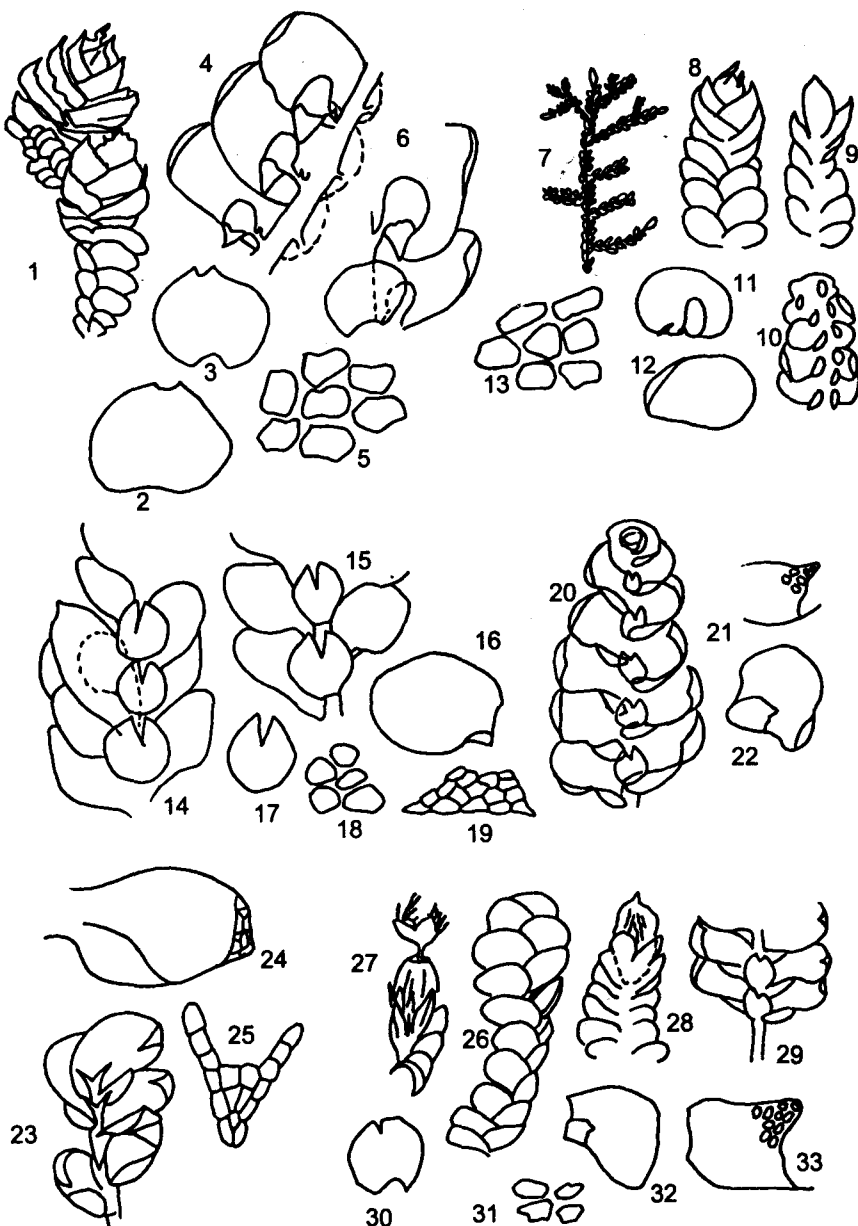


Figure 16. Legend see text. 1–6 *Frullania arecae*; 7–13 *Frullania shimperi*; 14–19 *Lejeunea flava*; 20–22 *Cheilolejeunea cordistipula*; 23–25 *Drepanolejeunea friesii*; 26–33 *Cheilolejeunea pluriplicata*.

Altitude range: 3000-3060 m.

Plants yellowish green, small, epiphytic on *Arundinaria alpina*. Leaf lobe ovate, apex rounded, lobule reduced to a small fold. Underleaves small, two times width of stem, bilobed to middle. Leaf and underleaf margin entire.

Legend: 14-ventral surface of fertile shoot (x 80); 15-ventral surface of sterile shoot (x 80); 16-leaf lobe (0.7 mm); 17-underleaf (400 µm); 18-mid leaf cells (40 µm); 19-leaf lobule (30 µm).

Cheilolejeunea cordistipula (Steph.) Grolle ex E.W. Jones (fig. 16)

Br 91/91e

Altitude: 3350 m.

Plants pale green, minute, epiphytic on *Phillipia* sp.. Leaves ovate, concave, lobule prominent reaching halfway to apex of lobe. Underleaves orbicular, bilobed to 1/4 their length, sinus narrow, acute.

Legend: 20-part of shoot (x 100); 21-leaf lobule (single cell = 20 µm); 22-leaf lobe and lobule (x 100).

Drepanolejeunea friesii Vanden Berghen (fig. 16)

Br 123c

Altitude: 3000 m.

Plants yellowish green, minute, epiphytic on *Arundinaria alpina*. Leaf lobe oval, concave, narrowed to acuminate apex, margin entire. Lobule lanceolate. Underleaves V-shaped.

Legend: 23-part of shoot (x 90); 24-leaf (x 180); 25-underleaf (single cell = 15 µm).

Cheilolejeunea pluriplicata (Pears.) Schust. (fig. 16)

Br 91/91a, 91/91c, 91/123b

Altitude range: 3000-3350 m.

Plants yellowish green, minute, epiphytic on *Phillipia* sp. and *Arundinaria alpina*. Leaf lobe concave, margin entire; lobule small, cells irregularly polygonal. Underleaves orbicular, bilobed to less than 1/4 their length, sinus acute. Perianth cylindrical, plicate, reduced to a beak.

Legend: 26-part of shoot (x 60); 27, 28-fertile shoots (x 60); 29-ventral surface of shoot (x 80); 30-underleaf (x 100); 31-mid leaf cells (20 µm); 32-leaf lobe and lobule (x 110); 33-lobule (single cell = 20 µm).

Dilaenaceae

Jensenia spinosa (Lindenb. & Bott.) Grolle (fig. 17)

MSC 5

Altitude: 3000 m.

Thallus terricolous, olivaceous green, dendroid up to 4.5 cm long, in the lower portion reduced to stem-like midrib, in upper part winged and bifurcate, margin dentate, teeth three to four cells long.

Legend: 1-fertile thallus (x 15); 2-vegetative thalli (x 10); 3-archegonia (x 20); 4-antheridia (x 30); 5-tooth (whole tooth = 135 µm).

Calycularia crispula Mitt. (fig. 17)

MSC 511

Altitude: 3000 m.

Thallus 1.5cm broad, 2.5 cm long, dichotomously branched, margins strongly undulate, midrib prominent. Abundant rhizoids on ventral surface, scales difficult to locate.

Legend: 9-thallus (x 3); 10-dorsal surface cells (45 µm).

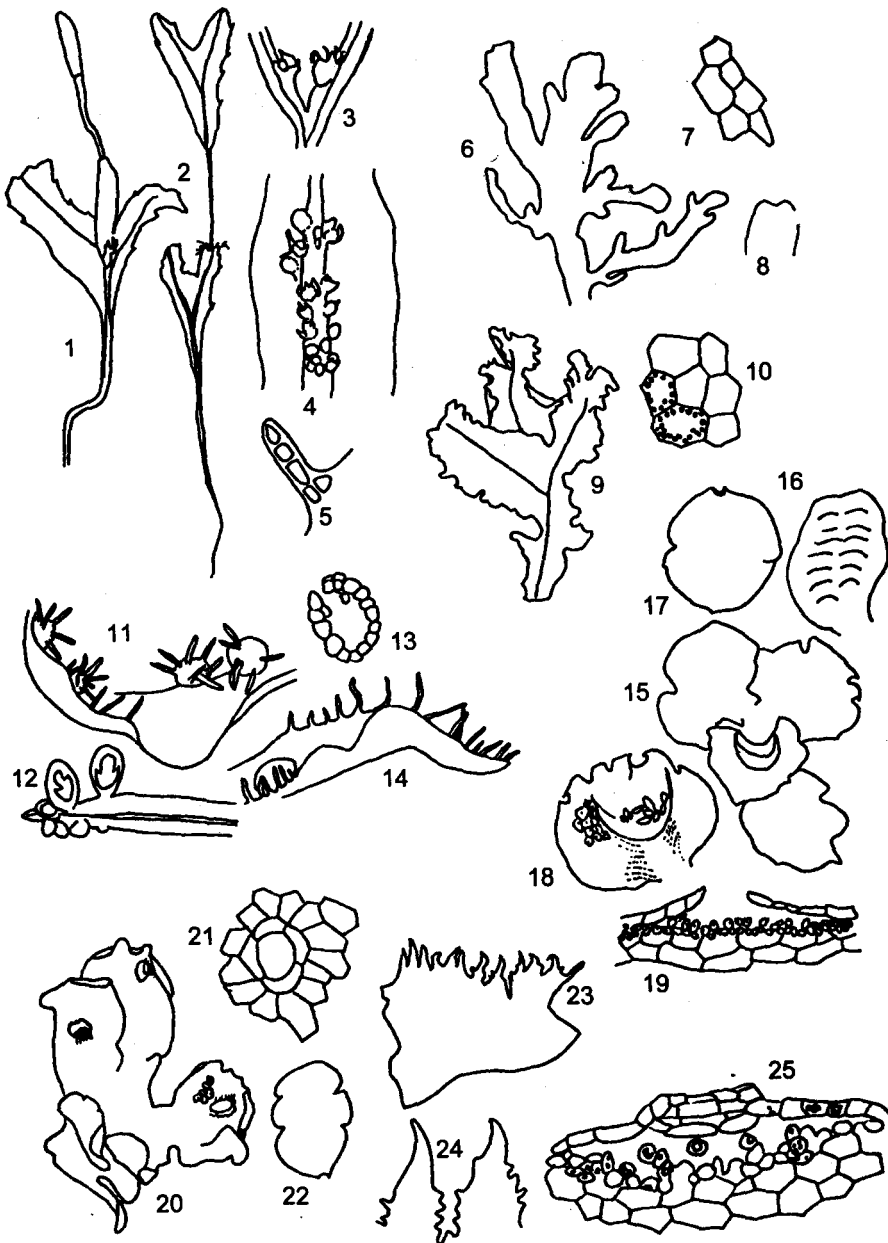


Figure 17. Legend see text. 1–5 *Jensenia spinosa*; 6–8 *Riccardia fastigiata*; 9–10 *Calycularia crispula*; 11–14 *Metzgeria convexa*; 15–19 *Lunularia cruciata*; 20–25 *Marchantia polymorpha*

Aneuraceae

Riccardia fastigiata (L. & L.) S. Arn. (fig. 17)

MSC 123b

Altitude: 4400 m.

Thallus light green. Main axis give off branches at about 45 degrees. Apices have a shallow incision at growing points. Cells thin walled.

Legend: 6-thallus (x 25); 7-dorsal surface cells (20 µm); 8-thallus apex (x 30).

Metzgeriaceae

Metzgeria convexa Vanden Berghen (fig. 17)

MSC 524, 538

Altitude range: 3400–4300 m.

Thallus yellowish green, 0.5–1.5 cm long, irregular dichotomous branching. Dorsal surface convex, midrib prominent, marginal hairs abundant. Surface cells hexagonal.

Legend: 11-thallus with propagules (x 25); 12-thallus with antheridia (x 30); 13-propagule (x 45); 14-thallus with archegonium (x 25).

Lunulariaceae

Lunularia cruciata (L.) Dum. (fig. 17)

MSC 220b, 329.

Altitude range: 2350–3000 m.

Thallus green, 1.8 cm broad, branching irregular. Dorsal surface-lunate cups containing discoid gemmae; ventral surface-lunate scales, smooth, tuberculate hyaline rhizoids.

Legend: 15-thallus-dorsal surface (x 6); 16-thallus-ventral surface showing scales; 17-discoid gemma (x 120); 18-thallus with lunate cup containing discoid gemmae (x 6, individual cells = 240 µm); 19-longitudinal section. of air chamber (cell of lower surface = 250 µm).

Marchantiaceae

Marchantia polymorpha L. (fig. 17)

MSC 118a

Altitude: 4200 m.

Thallus terricolous, dark green, 1.9cm broad, branching dichotomous. Hexagonal areolae on dorsal surface, pores with four guard cells. Gemma cups with toothed margins, contains shallowly bilobed discoid gemmae. Ventral surface-scales reddish, hyaline; rhizoids smooth, tuberculate.

Legend: 20-thallus-dorsal surface (x 3); 21-air pore (individual cell = 45 µm); 22-discoid gemma (x 125); 23, 24-margins of gemma cup (margin tooth = 250 µm); 25-longitudinal section of air chamber (individual cell of upper surface = 40 µm).

Dumortiera hirsuta (Sw.) Nees. (fig. 18)

MSC 315a

Altitude: 2400 m.

Thallus terricolous, dark green. Thallus without pores, air chambers or ventral scales. Thallus margin undulate, wings more or less translucent; midrib present. Rhizoids abundant on ventral surface.

Legend: 1- thallus seen from ventral side (x 2); 2-thallus with receptacles seen from dorsal side (x 1½).

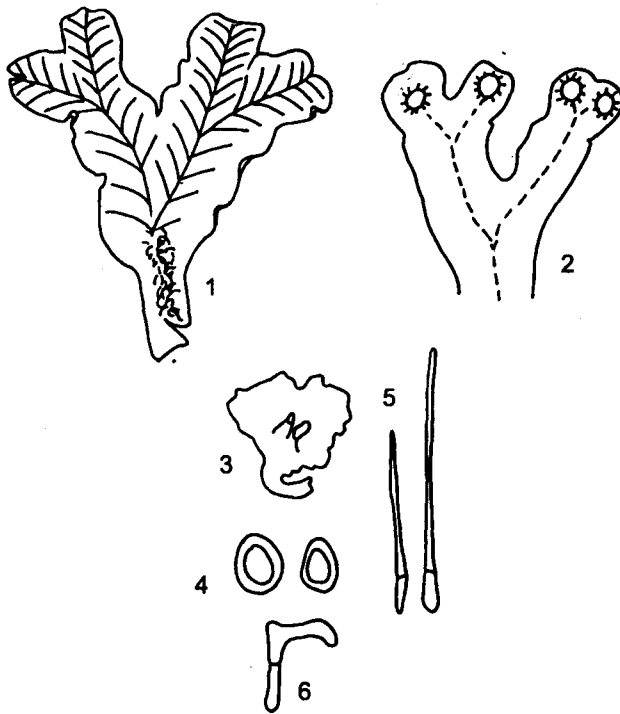


Figure 18. Legend see text. 1–2 *Dumortiera hirsuta*; 3–6 *Phaeoceros laevis*

Anthocerotaceae*Phaeoceros laevis* Prosk. (fig. 18)

MSC 321

Altitude: 2375 m.

Thalli dull green, lobed, margins undulate. Sporophytes common.

Legend: 3-thallus with young sporophytes (x 5); 4-spores (35 μ m); 5-sporophytes (x 6); 6-pseudoelater (cell = 30 μ m).**GLOSSARY**

- antical = upper or dorsal side or margin relative to substrate
 apiculate = possessing projection at apex
 ciliate = possessing hair-like uniseriate structures
 complanate = more or less flattened in one plane
 concave = saucer-shaped when viewed from dorsal side
 conduplicate = of bilobed leaves with the two lobes folded together face to face
 cuneate = wedge-shaped
 dendroid = tree-like in habit
 denticulate = finely toothed
 elliptical = with convex sides
 entire = smooth, not toothed
 falcate = curved like a sickle
 filiform = thread-like
 globose = more or less spherical in shape
 habit = appearance of a plant
 hair-point = hair-like leaf tip formed by long excurrent nerve
 imbricate = overlapping
 incrassate = thick-walled
 incubous = forward margin of one leaf overlies rear margin of leaf in front
 lobule = term applied to small ventral lobe of leaf in Lejeuneaceae and Radulaceae
 lunate = shaped like a crescent moon
 oblong = rectangular with rounded corners
 paraphyllia = small, variously divided structures on stem between the leaves
 perianth = protective tubular structure formed from the fusion of two leaves following fertilisation of an archegonium
 perichaetial = used of the leaves or bracts immediately enclosing the archegonia
 pinnate = with spreading branches produced more or less regularly on either side of stem
 plicate = possessing longitudinal folds
 postical = lower or ventral side relative to substrate
 procumbent = prostrate
 pseudoelater = irregular-shaped sterile cells
 quadrate = with four sides of more or less equal length
 recurved = curved down and backwards
 rhomboidal = more or less diamond-shaped
 serrate = regularly toothed
 sinus = indentation between two lobes of a leaf
 subulate = possessing needle-like point
 trigones = thickening at cell angle

tuft = growth form of erect shoots
 underleaves = third row of leaves on the ventral side of the stem
 undulate = wavy
 uniseriate = with cells in a single row
 vitta = band of elongated cells in a leaf

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