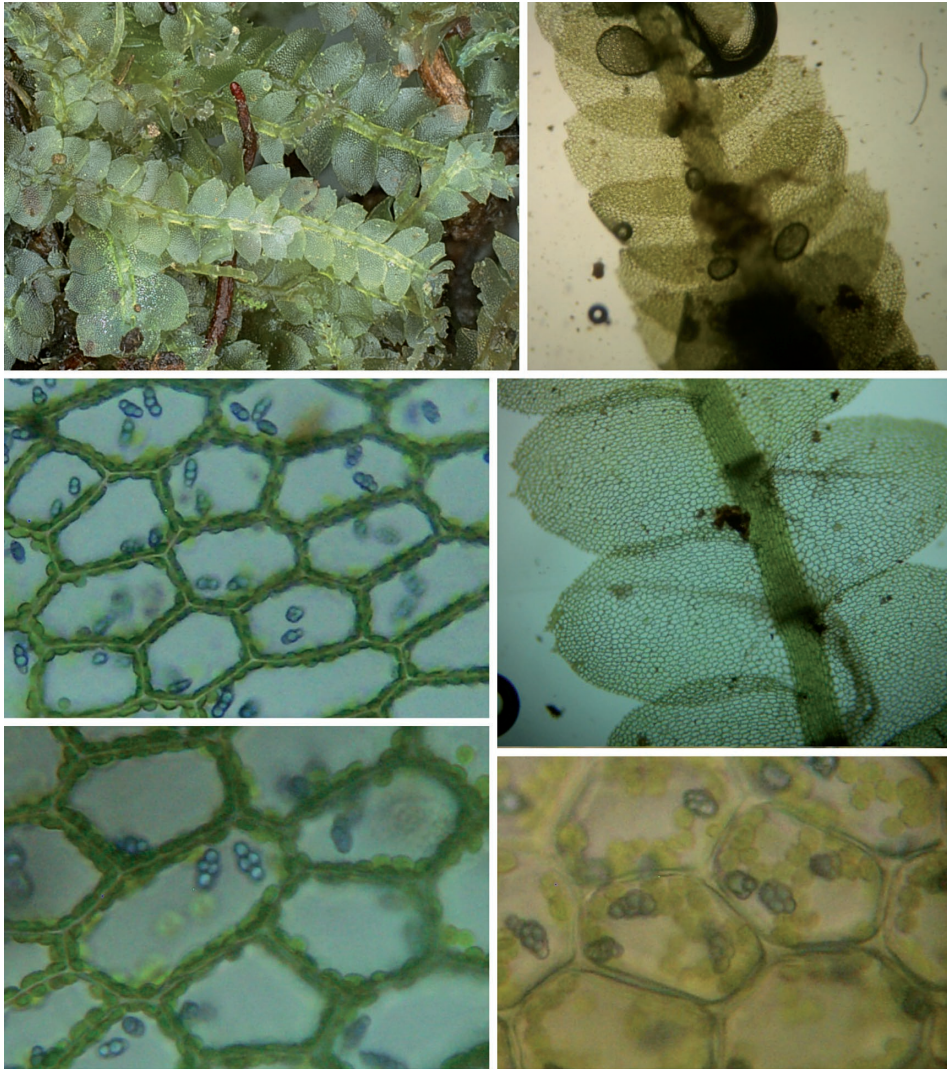


**Figs 57 and 58 (next page). *Blepharostoma trichophyllum* (L.) Dumort.**

Plants pale- to yellowish green, prostrate to ascending. Stems sparingly branched, 3-16 mm long. Leaves distant to approximate, divided to 0.9-0.95 of their length into (2-)3-4 uniseriate lobes 160-620  $\mu\text{m}$  long, each of 7-13 cells. Cells rectangular, equally thick-walled, 27-53  $\mu\text{m}$  long, oil bodies usually 4-8 per cell. Underleaves similar to lateral leaves, only slightly smaller, 3-4-lobed. Asexual reproduction by gemmae at apices of upper leaf lobes. **Habitat:** On ground and rotten wood from 2000 to 2500 m. **Distribution in Rwanda:** Nyungwe NP: Rwasekoko, Karamba, Uwinka. **Distribution in Africa:** Uganda, Kenya, Tanzania. Widespread species found throughout the Northern Hemisphere.





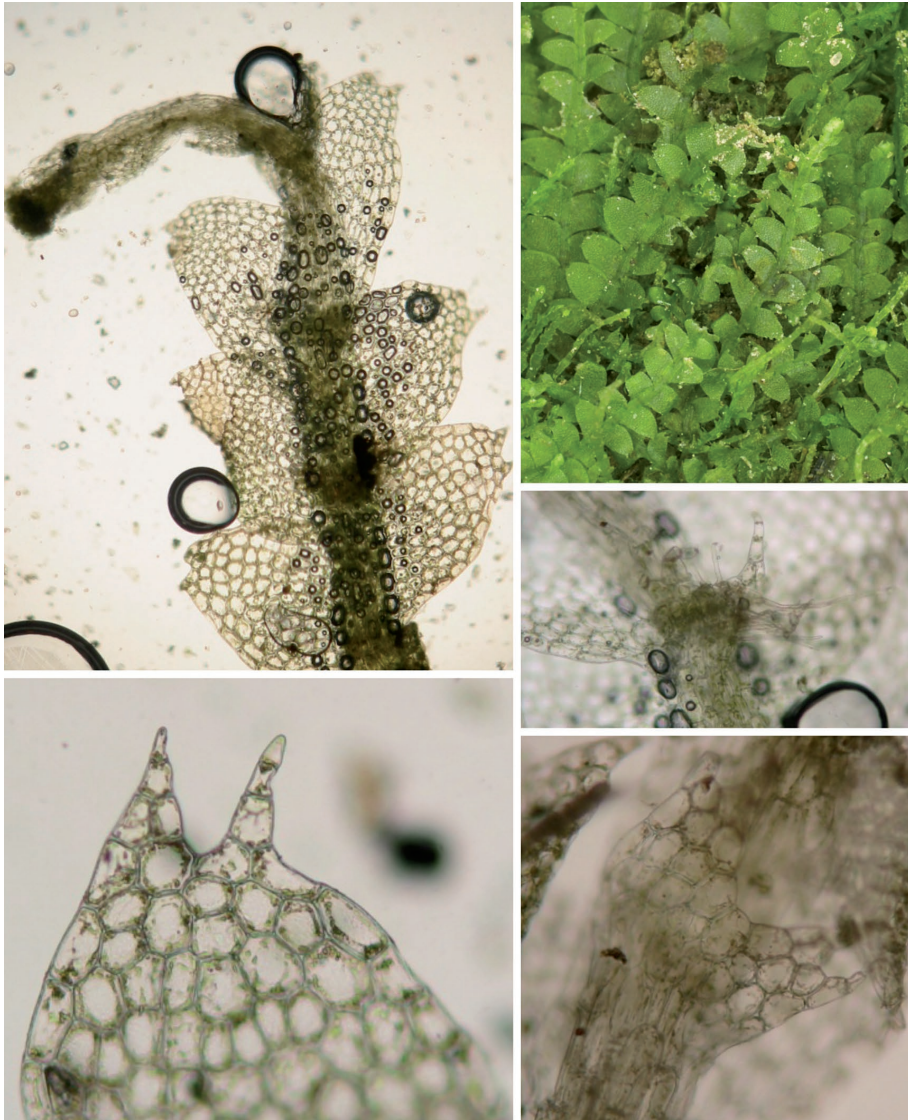


**Figs 59 and 60 (next page).** *Calypogeia afrocaerulea* E.W.Jones

Plants usually terrestrial, up to 2.5-3 mm wide, bluish when fresh. Leaves imbricate, alternate, ovate to broadly oblong-ovate, 1-1.5 x 1-1.3 mm, apex rounded, shortly bifid, the sinus 40-90  $\mu$ m deep. Oil bodies compound (*Calypogeia*-type), blue, 2-8 per cell. Underleaves 1.5-2 x as wide as the stem, 0.35-0.45 mm wide, rounded, distinctly bilobed, sinus acute or obtuse, margin with few teeth. Autoicous. **Habitat:** Soil, along paths and roadcuts in montane forest, 2000-2500 m. **Distribution in Rwanda:** Nyungwe NP: Rwasekoko, Pindura, Gisakura. **Distribution in Africa:** São Tomé, Bioko, Cameroon, DR Congo, Burundi, Kenya, Tanzania. Also Réunion, Seychelles. **Note:** An easily distinguishable species in fresh state by the bright blue coloured oil bodies.







**Fig. 61.** *Calypogeia arguta* Nees & Mont.

Plants usually terrestrial, shoots up to 20 mm long, up to 1-2.5 mm wide, gemmiferous shoots ascending. Leaves distant, alternate, obliquely ovate, 0.7-1.2 x 0.4-1 mm, apex bilobed with divergent lobes, the sinus wide, up to 0.2 mm deep, lobes ending in 1-2 uniseriate cells. Underleaves not much wider than the stem, distinctly bilobed to within 1-2 cells of rhizoid area, sinus acute or obtuse, margin with subulate teeth. Dioicous.

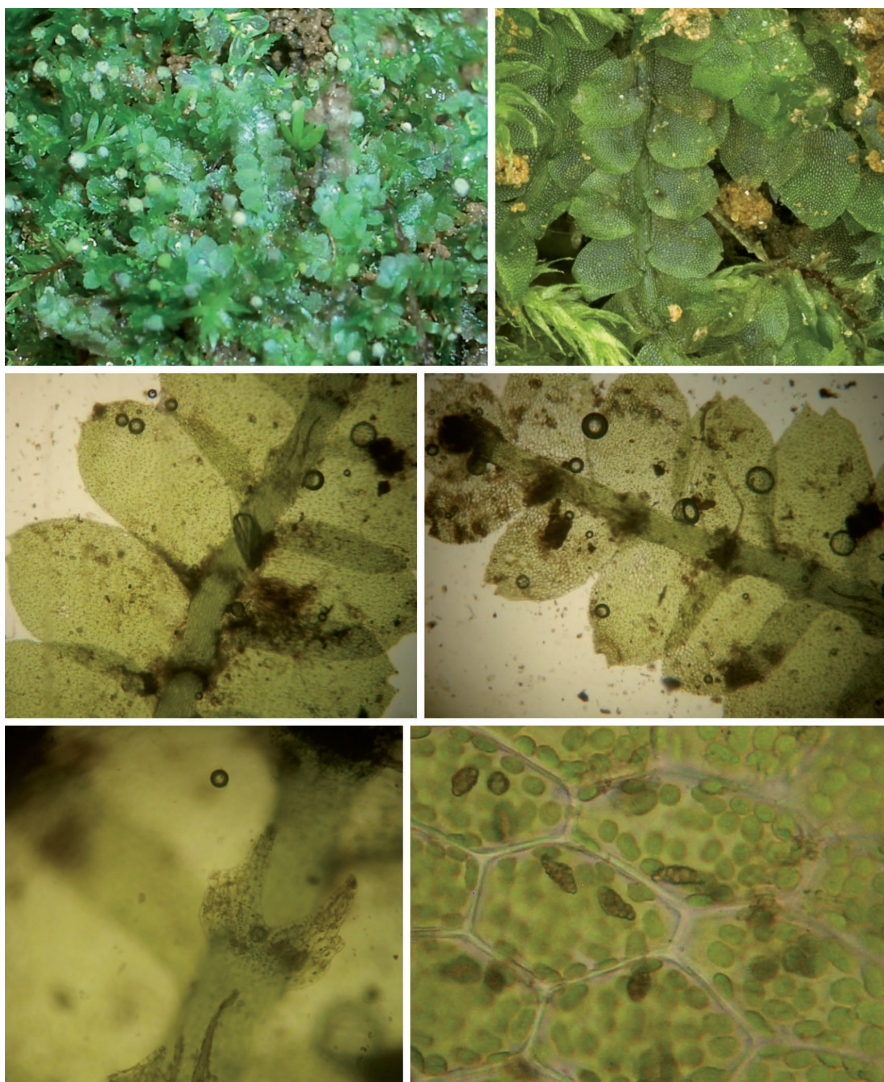
**Habitat:** Soil, along paths and roadcuts in montane forest, 2000 m. **Distribution in Rwanda: Nyungwe NP:** Uwinka. **Distribution in Africa:** DR Congo, Burundi, Tanzania, Malawi, Swaziland, South Africa. Also in Europe, Azores, Madeira, Canary Islands, Asia, Madagascar, Mauritius, Réunion.



**Fig. 62. *Calypogeia bidentula* (Web.) Nees**

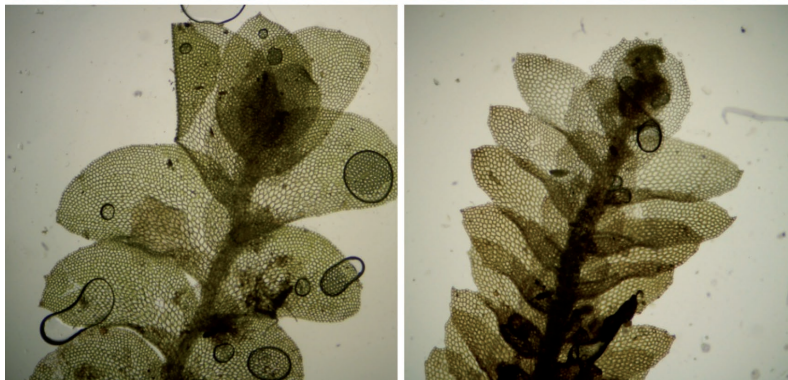
Plants usually terrestrial, up 3 mm long. Leaves imbricate, alternate, ovate to broadly oblong-ovate, 1 x 0.9-1.2 mm, triangular, apex rounded, rather narrow, shortly bifid to emarginate, teeth obtuse. Oil bodies colourless. Underleaves 2-3 x as wide as the stem, 0.3-0.7 mm wide, rounded, arcuate, always decurrent, insertion strongly distinctly bilobed to 0.5 of their length, lobes triangular, sinus acute or obtuse, V-shaped, outer margin with a broad marginal tooth. **Habitat:** On soil or occasionally epiphyllous in montane forest, 2500 m. **Distribution in Rwanda:** Nyungwe NP: Uwinka. **Distribution in Africa:** Zimbabwe, Lesotho, South Africa. Also Madagascar, Mauritius, Réunion.





**Fig. 63. *Calypogeia fissa* (L.) Raddi**

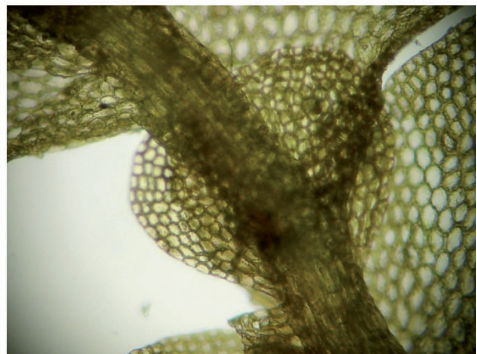
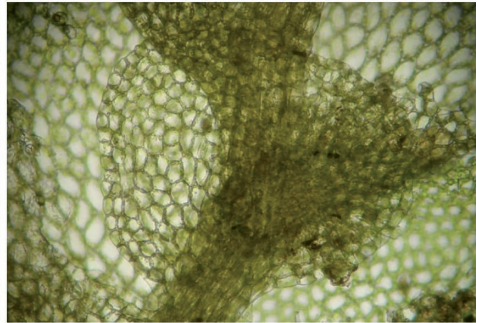
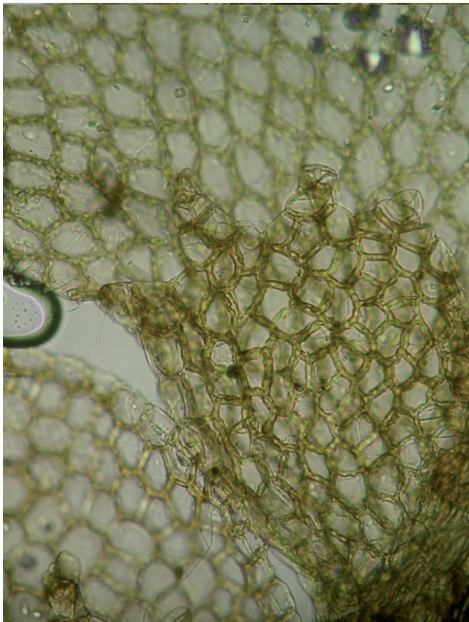
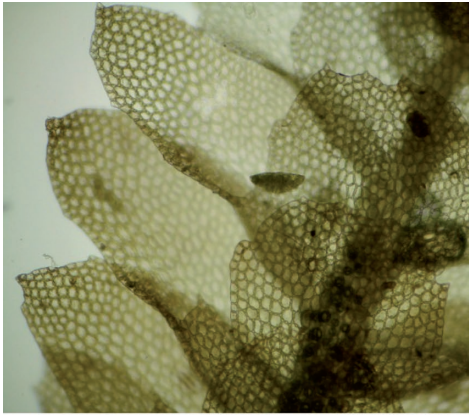
Plants usually terrestrial, up to 1-4 mm wide. Leaves imbricate, alternate, ovate to broadly oblong-ovate, 1-1.8 x 0.9-1.4 mm, triangular, apex rounded, rather narrow, shortly bifid, the sinus sharp and narrow. Oil bodies colourless. Underleaves 1.5-2 x as wide as the stem, 0.3-0.7 mm wide, rounded, distinctly bilobed to 0.5 or more of their length, sinus wide, V-shaped, outer margin with one tooth. **Habitat:** On ground or on roadcuts, rarely as epiphyte, 2200-2500 m. **Distribution in Rwanda:** Nyungwe NP: Rwasenkokoko, Uwinka. **Distribution in Africa:** Sierra Leone, Annobon, São Tomé, Bioko, Cameroon, DR Congo, Angola, Zimbabwe, Swaziland, South Africa. Also widespread in the Northern Hemisphere, Comoros, Réunion. **Note:** In fresh state easily to distinguish from *Calypogeia afrocaerulea* by the colourless oil bodies.



**Figs 64 and 65 (next page).** *Caudalejeunea lewallei* Vanden Berghen

Plants epiphyllous. Stems 1-3 cm long, sterile branches appressed to substrate, propaguliferous branches and branches with gametangia erect. Lobes ovate, with obtuse or rounded apex, (0.5-)0.6-0.8(-0.9) mm x (0.9-)1-1.3(-1.5) mm, margin entire or near apex irregularly dentate. Lobules fusiform, (0.10-)0.13-0.18(-0.25) x (0.27-)0.3-0.4(-0.48) mm, inflated, with acute apical tooth, often 2 cells wide at base and ending with a row of 2 cells, free margin of lobule often involute, with a 1-2 celled tooth and often a second obtuse tooth. Underleaves of appressed branches distant to imbricate, 3-6 x as wide as the stem, in erect branches densely imbricate, 5-8 x as wide as the stem, suborbicular or emarginate. Asexual reproduction with disciform propagules. Dioicous. Perianths obovate-obcordate, 1-1.2 x 1.35-1.5 mm, compressed and trigonal, with acute ventral keel to base, lateral keels in upper half with irregularly lacinate wing, beak cylindrical. **Habitat:** Montane forest, epiphyllous, 2000-2100 m. **Distribution in Rwanda:** Nyungwe NP: Gisakura. **Distribution in Africa:** DR Congo, Burundi, Ethiopia, Tanzania, Malawi, Zimbabwe. Also Madagascar.







**Figs 66 and 67 (next page).** *Caudalejeunea yangambiensis* (Vanden Berghen)  
E.W.Jones

Plants epiphytic, sterile shoots prostrate, freely branching, the branches prostrate (sterile), or ascending-erect (gemmaiferous or fertile). Leaves of sterile shoots imbricate.

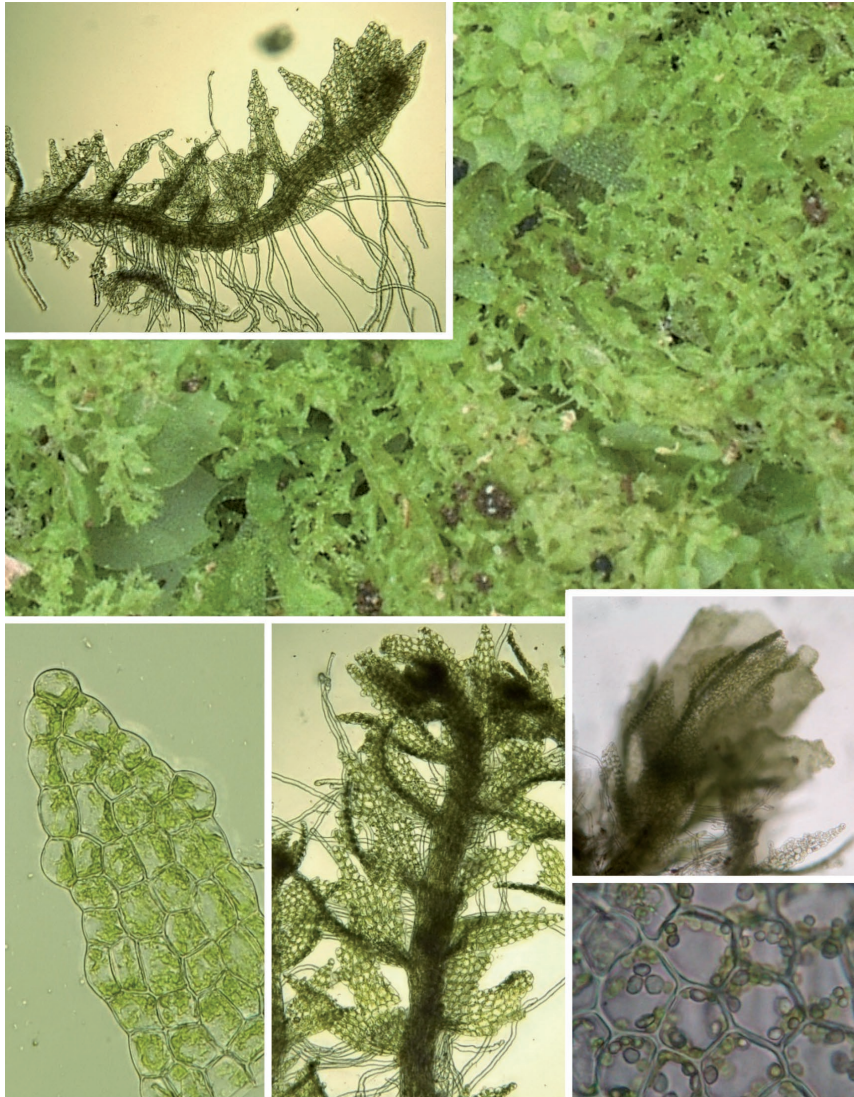
Lobes 0.9-1.3 x 0.7-0.9 mm, spreading, concave, elliptical, entire, rounded at apex.

Lobules fusiform, inflated, the free margin incurved, apical tooth with 1-3 cells, Leaves of ascending gemmaiferous shoots very different in form, strongly imbricate, conduplicate.

Lobules small,  $\pm$  rectangular, not visible in situ. Underleaves imbricate, about 4-6 x as wide as the stem, 1.2 x 1.5 mm, suborbicular to elliptic, truncate or emarginate at apex, margins broadly reflexed. Asexual reproduction by propagules on upper leaves of erect stems. Probably dioicous. Perianths broadly ovate, obovate or pyriform, about 1 x 0.75-0.9 mm, with 3-4 sharp ventral keels and 2 lateral keels. **Habitat:** Epiphyte on exotic trees, 1700 m. **Distribution in Rwanda:** Central Rwanda: Butare. **Distribution in Africa:** Ghana, Cameroon, Congo-Brazzaville, DR Congo, Uganda.



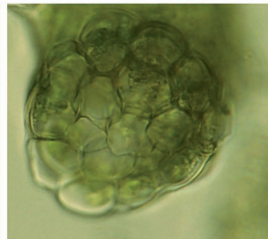
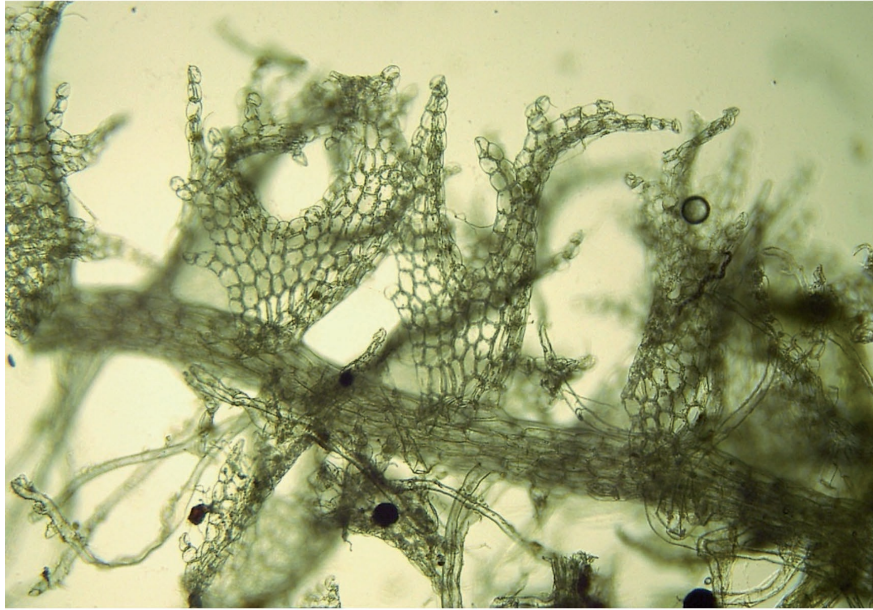




**Figs 68 and 69 (next page). *Cephalojonesia incuba* Grolle & Vanden Berghen ssp. *incuba***

Plants epiphytic and on rotten wood, pale green. Stems irregularly branched, 70-90(-120)  $\mu\text{m}$  in diameter, 5-6 cells thick in section, cells thin-walled. Leaves cuneate with narrow base, bilobed to 1/3-3/5, sometimes 3-lobed, margin crenulate to irregularly dentate, 300-350  $\times$  350-480  $\mu\text{m}$ , incubous. Cells thin-walled, without trigones, 15-22  $\times$  18-23  $\mu\text{m}$ . Underleaves distant, setaceous, 2-3 cells wide, 24-45  $\times$  75-160  $\mu\text{m}$ . Autoicous. Perianths subcylindrical, with mouth wide, truncate. **Habitat:** On rotten wood in montane forest, 1900 m. **Distribution in Rwanda:** Nyungwe NP: Cyamudongo Forest. **Distribution in Africa:** Nigeria (Jos), DR Congo (Katanga), Kenya (Nandi). **Note:** *Cephalojonesia incuba* ssp. *mexicana* Burghardt, Gradst. & Váňa is known from Mexico.





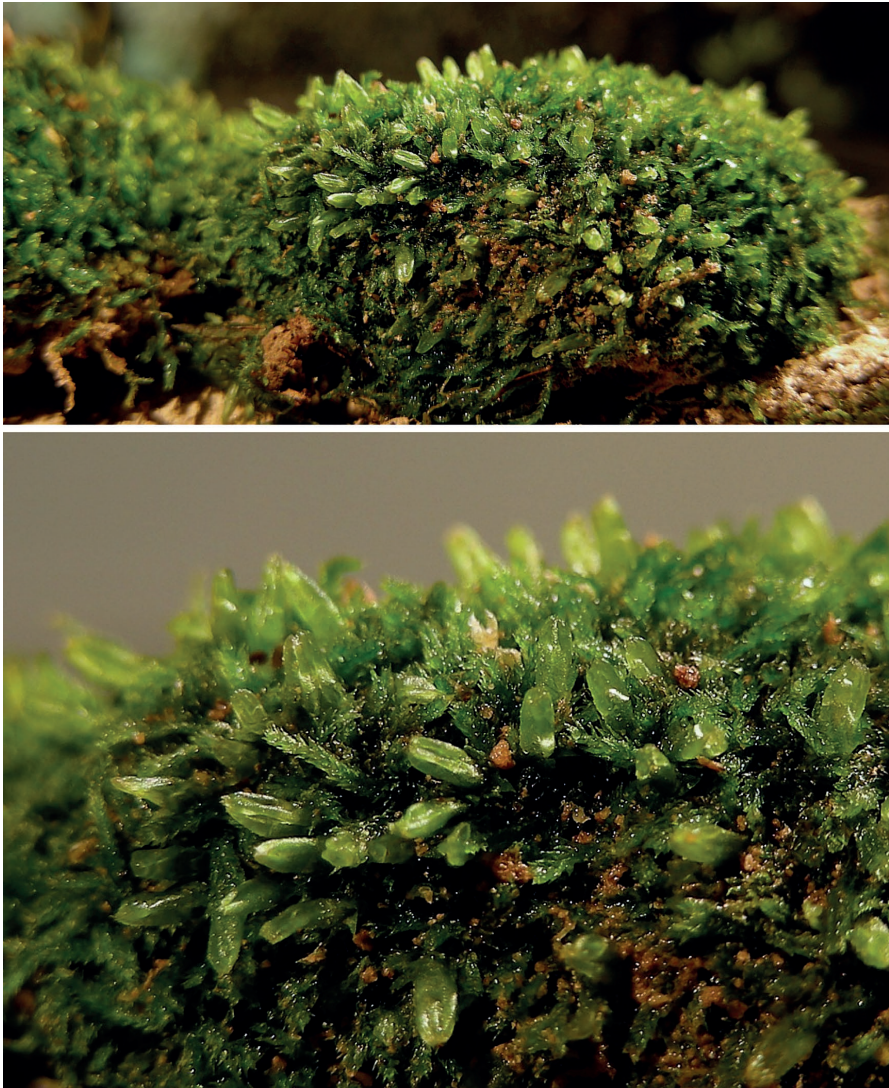


**Figs 70 and 71 (next page). *Cephalozia africana* Váňa**

Plants medium-sized, pale green to brownish. Shoots procumbent to ascending, 1-1.6(-2) mm long. Leaves distant to contiguous, obliquely inserted, almost horizontally spreading, orbicular to ovate-quadrangle, 0.5-0.6(-0.8) × 0.5-0.6 mm, bilobed to 0.3-0.4 of their length, slightly decurrent dorsally, lobes straight, not connivent, broad, triangular, terminated by 1-2 cells. Median leaf cells 40-45 µm in diameter. Autoicous. Perianth inflated, trigonous above, mouth ciliate-dentate. **Habitat:** On soil in swamps, 2300-2500 m. **Distribution in Rwanda:** Nyungwe NP: Rugera. **Distribution in Africa:** DR Congo (Kahuzi-Biega).







**Fig. 72. *Cephalozia bicuspidata* (L.) Dumort.**

Synonym: *Cephalozia vulcanicola* Steph. Plants slender, pale to dark green or brownish.

Shoots procumbent to ascending, 2-2.5 mm long. Lower leaves distant, upper leaves approximate to subimbricate, broadly ovate to ovate-quadrangle, concave, transversally inserted, 0.2-0.6 × 0.16-0.44 mm, bilobed to 1/2-2/3, lobes acute to acuminate, ending in 1-3(-4) uniseriate cells, lobes inflexed. Small underleaves sometimes present on fertile stems. Autoicous. Perianth fusiform, trigonous above, mouth ciliate-dentate. **Habitat:** On soil and dead wood, 2500-3600 m. **Distribution in Rwanda: Volcano NP:** Karisimbi.

**Nyungwe NP:** Rwasekoko. **Distribution in Africa:** DR Congo, Uganda, Kenya, Tanzania, Malawi, South Africa. Also in Europe, Turkey, Caucasus, Siberia, N Africa, Azores, Madeira, Tenerife, N America, Greenland, Mexico.





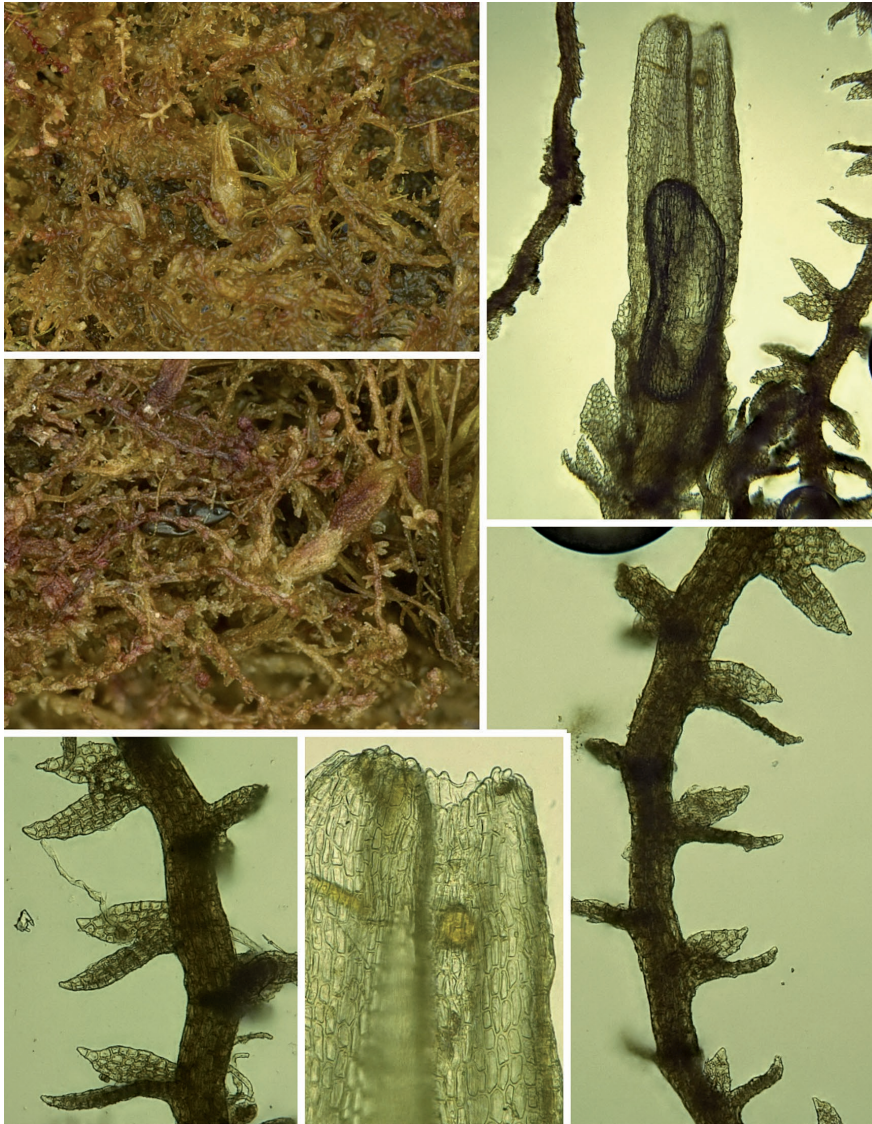
**Fig. 73. *Cephalozia connivens*** (Dicks.) Lindb. **ssp. *fissa*** (Steph.) Váňa  
 Synonym: *Cephalozia crassicaulis* Steph. Plants slender, pale green. Shoots procumbent, 2-2.5 mm long. Leaves approximate, broadly ovate to ovate-quadrangle, concave, transversally inserted, 0.4-0.5 × 0.3-0.4 mm, bilobed to 1/2-2/3, lobes acute to acuminate, ending in 2-3 uniseriate cells, 3-5 cells wide at base. Autoicous. Perianth fusiform, trigonous above, mouth ciliate-dentate. **Habitat:** On soil or rotting wood, 1900 m. **Distribution in Rwanda:** Nyungwe NP: Cyamudongo. **Distribution in Africa:** Ghana, Togo, Nigeria, Cameroon, Bioko, São Tomé, Príncipe, Rio Muni, Gabon, DR Congo, Uganda, Tanzania, Zambia, Zimbabwe, Malawi, South Africa. Also Madagascar, Réunion.



**Fig. 74. *Cephaloziella kiaerii*** (Austin) S.W.Arnell

Plants minute, usually green to reddish, about 0.4 mm wide. Stems procumbent, 80-100  $\mu$ m in diameter. Leaves obliquely-subtransversally inserted and oriented, distant, 0.1-0.2 mm long, not reaching the mid-line of the stem, ovate, leaf margins entire, with projecting verrucae, bilobed to half of their length, lobes widely pointed, ending in 1-2 short cells, 7-9 cells wide at base. Cells in mid-leaf 8-10 x 8-15  $\mu$ m, walls thick, trigones absent, cuticle rough, oil bodies *Jungermannia*-type, small, 1-7 per cell. Underleaves lacking. Asexual reproduction by 2-celled gemmae on leaf lobe tips. Autoicous. Perianths 1-1.4 x 0.4 mm, deeply 4-5-plicate, the mouth with hyaline, thick-walled cells, 35-40 x 6-8  $\mu$ m. **Habitat:** Peaty soil, 2500 m. **Distribution in Rwanda:** Nyungwe NP: Rwasenkokoko. **Distribution in Africa:** Bioko, Cameroon, DR Congo, Kenya, Tanzania, Malawi, Mozambique, Lesotho, South Africa. Also Madagascar, Réunion, Seychelles.





**Fig. 75. *Cephaloziella vaginans* Steph.**

Plants minute, about 0.4 mm wide. Stems procumbent. Leaves obliquely to subtransversally inserted and oriented, distant, 0.1-0.2 mm long, not reaching the mid-line of the stem, ovate, leaf margins entire, with projecting verrucae, bilobed to half of their length, the lobes widely pointed, ending in 1-2 short cells, 7-9 cells wide at base. Asexual reproduction by 2-celled gemmae on leaf lobe tips. Autoicous. Perianths 1-1.4 x 0.4 mm, deeply 4-5-plicate, the mouth with hyaline, thick-walled cells. **Habitat:** Mossy rocks in montane forest, 2000 m. **Distribution in Rwanda:** Nyungwe NP: Karamba. **Distribution in Africa:** Sierra Leone, Cameroon, DR Congo, Uganda, Tanzania, Malawi, Lesotho. Also Réunion.



**Figs 76 and 77 (next page). *Ceratolejeunea diversicornua* (Steph.) Steph.** Plants small to medium-sized. Leaves wide-spreading, 0.7-0.85 x 0.45-0.55 mm, ovate, the ventral margin straight, broadly rounded at apex, margins finely serrulate, with papilliform projecting cells, otherwise entire or with few teeth distally. Lobules inflated, 1/6 of lobe length, sometimes reduced, ovate to globose, with apical tooth 1-celled, the cell obtuse. Cells in mid-leaf 16-22 x 20-25  $\mu$ m, ocelli 1-5 near the base of the lobe, solitary or in 2 groups. Underleaves bilobed, small, distant, ovate or round, 2-3 x as wide as the stem. Autoicous. Female bracts with obtuse dentate lobes and acute dentate lobules. Perianths with 4 keels extended above into 4 obtuse, horn-like and inflated projections, 0.1-0.7 mm long. **Habitat:** Epiphytic or epiphyllous in montane forest, 1900 m. **Distribution in Rwanda:** Karamba. **Distribution in Africa:** Ghana, Cameroon, DR Congo.