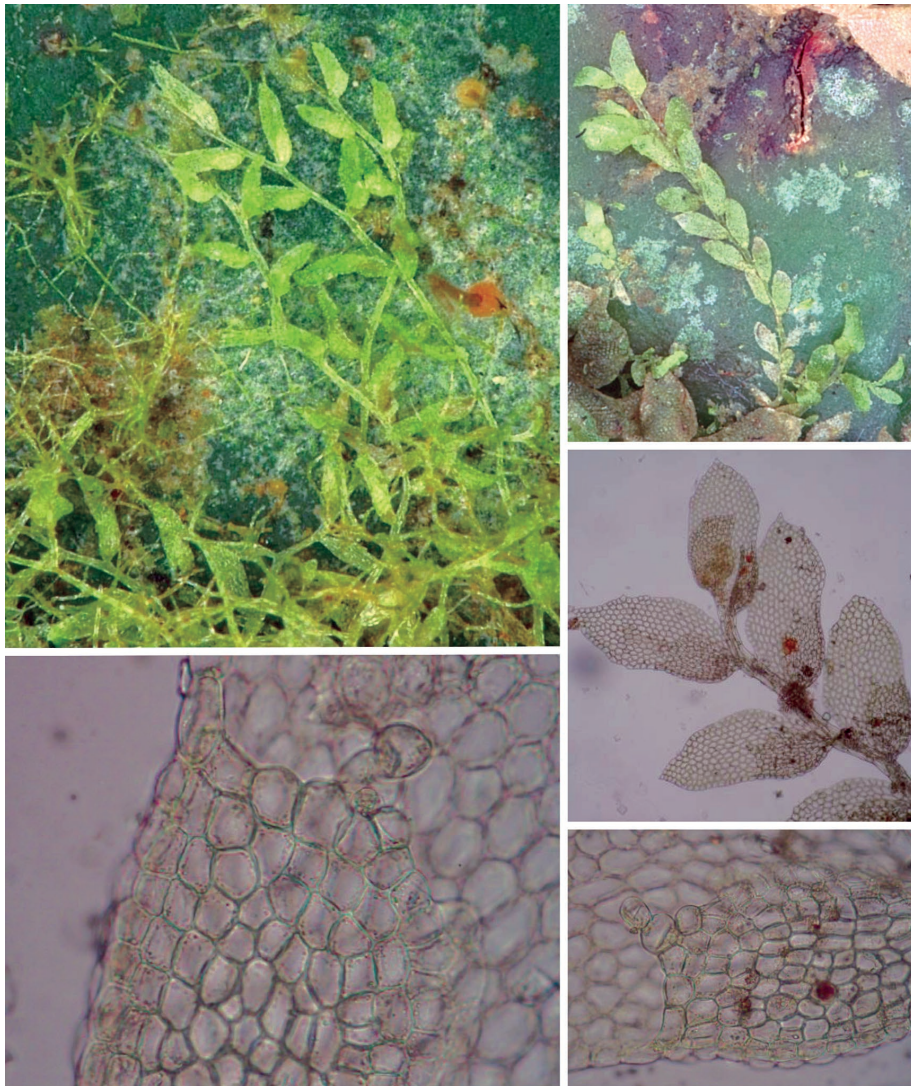


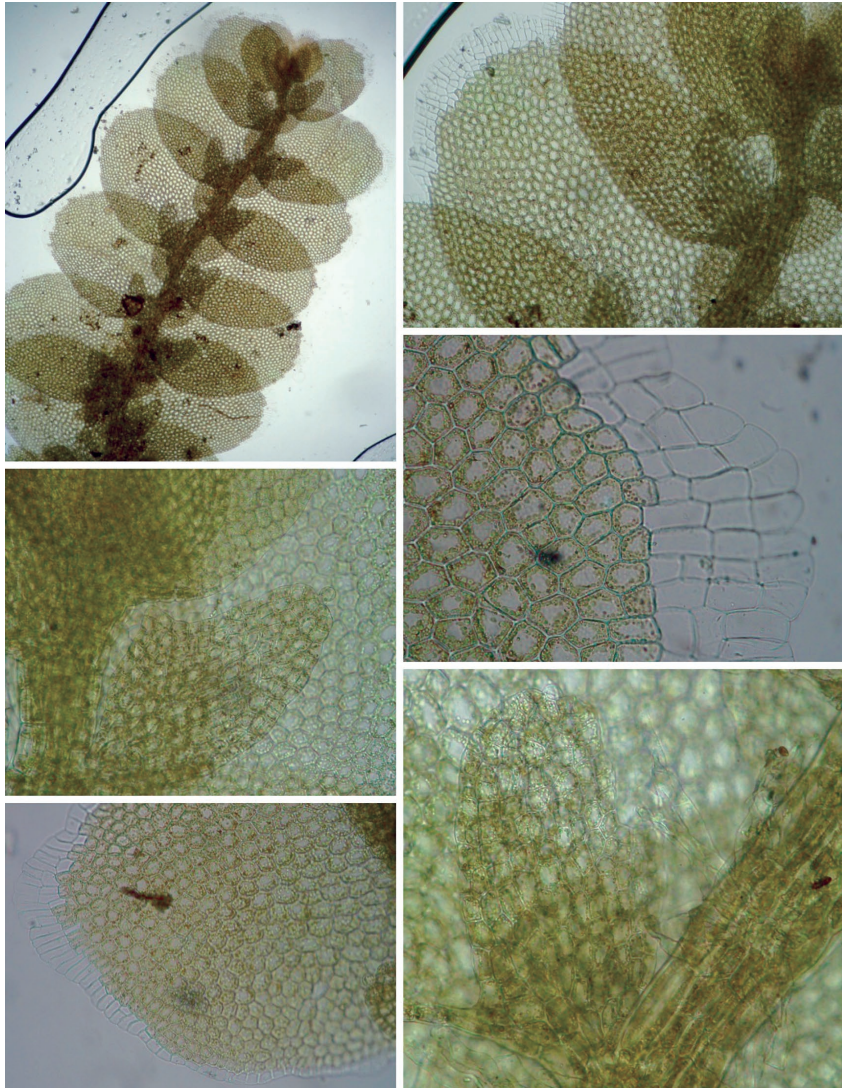
**Fig. 118. *Cololejeunea heterolobula* Tixier**

Plants small, epiphyllous, densely appressed to substrate, up to 0.8 mm wide. Stems up to 1 cm long, branched. Lobes ovate, apex rounded, 0.5 mm long and 0.3 mm wide, pseudovitta short, at base of lobe. Lobules saccate, inflated, keel straight, 0.2 mm long and 0.15 mm wide, with 2 teeth, apical tooth unicellular, hardly visible, median tooth 2-cellular, reduced lobules sometimes present. Asexual reproduction with up to 20-celled. Monoicous. Perianths ovoid, apex rounded, with ventral keels and short rostrum, 0.35 mm long and 0.2 mm wide. **Habitat:** Montane forest, epiphyllous, 2000 m. **Distribution in Rwanda: Nyungwe NP:** Kamiranzovu. **Distribution in Africa:** DR Congo.



**Fig. 119. *Cololejeunea hildebrandii* (Aust.) Steph.**

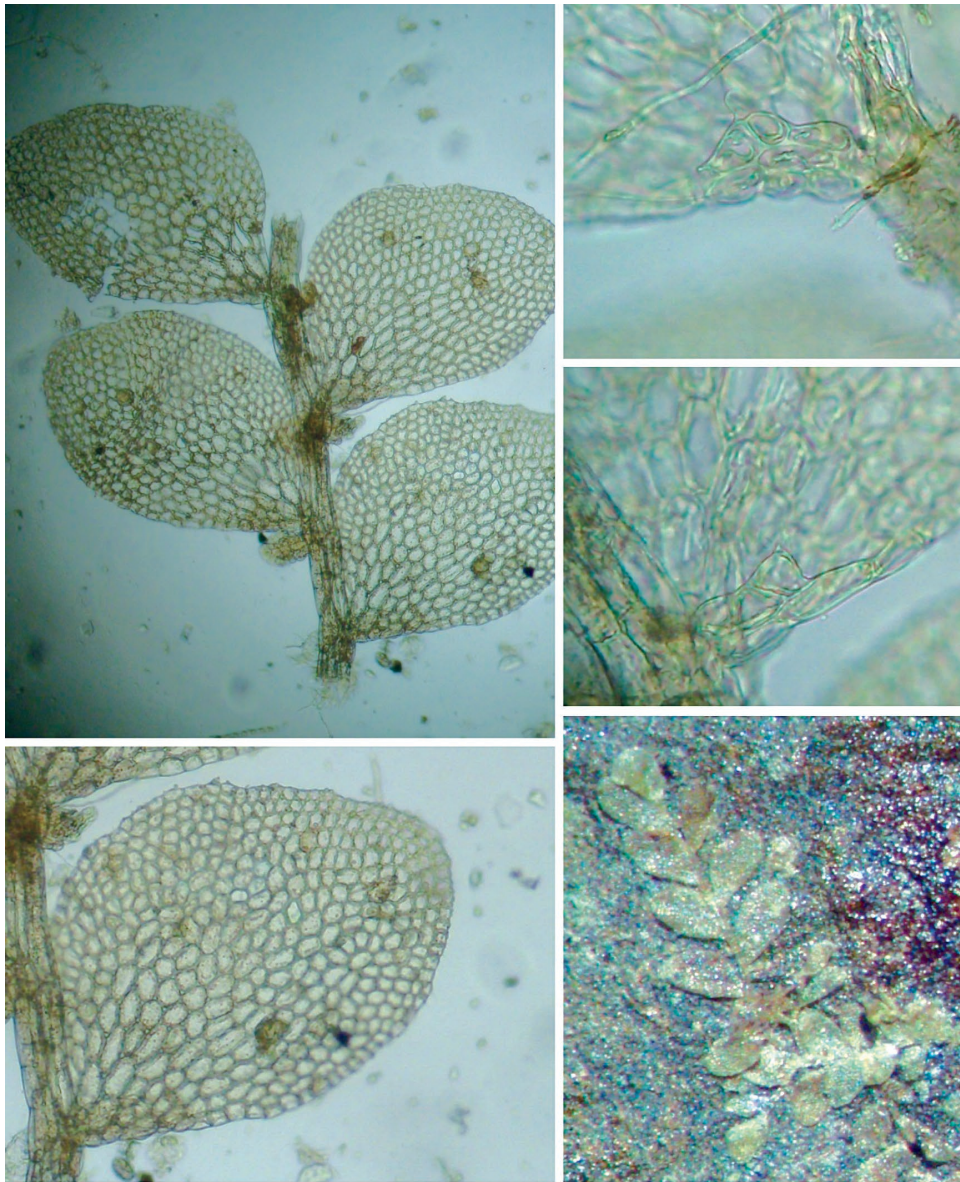
Synonym: *Cololejeunea filicaulis* Steph. Plants small. Leaves distant. Lobes narrowly ovate or oblong, 0.3-0.6 x 0.12-0.2 mm, base cuneate, apex tapering to rounded or subacute point, margins entire to crenulate. Lobule about 0.3-0.5 the length of the lobe, sometimes reduced to few cells, inflated, apex flat, truncate, apical tooth of 2-3 cells, inserted in the middle of apex, hyaline papilla at base of apical tooth. Asexual reproduction by gemmae mainly from marginal cells. Autoicous. Perianths 0.5-0.7 x 0.3-0.4 mm, obconical, smooth or slightly mammillose. **Habitat:** Montane forest, epiphyllous, 1900-2500 m. **Distribution in Rwanda:** Nyungwe NP: Rwasenkoko, Karamba, Kamiranzovu, Uwinka. **Distribution in Africa:** Cameroon, DR Congo, Ethiopia, Kenya, Tanzania. Also Comoros, Madagascar, Réunion.



**Fig. 120. *Cololejeunea latilobula*** (Herzog) Tixier

Synonym: *Cololejeunea himalayensis* (Pandé & Misra) R.M.Schust. Plants medium-sized, shoots up to 1-1.6 mm wide. Lobe ovate, broadly rounded at dorsal base, 0.7-1 x 0.6-1 mm, apex broadly rounded, hyaline margin entire, 2-3 cells wide at apex of lobe, merging into a single row along the dorsal margin extending nearly to stem, on ventral margin often abruptly ending. Chlorophyllose cells without papillose cuticle. Lobule narrow, ovate to ovate lanceolate or ovate-triangular, 8-15 cells wide at middle, apex obtuse, hyaline papilla in a notch near apex. Gemmae on lobes. Autoicous. Perianth pyriform, compressed.

**Habitat:** Montane forest, epiphyllous, 1700 m. **Distribution in Rwanda:** Nyungwe NP: Cyamudongo Forest. **Distribution in Africa:** Nigeria, Cameroon, Rio Muni, DR Congo, Burundi, Uganda, Tanzania, Malawi, Zambia. Also Comoros, Seychelles extending to Asia (Himalaya, Japan).



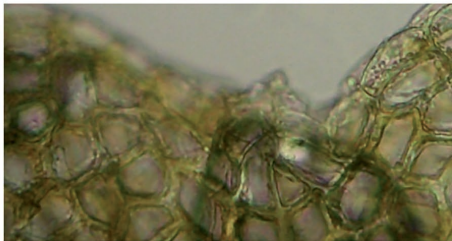
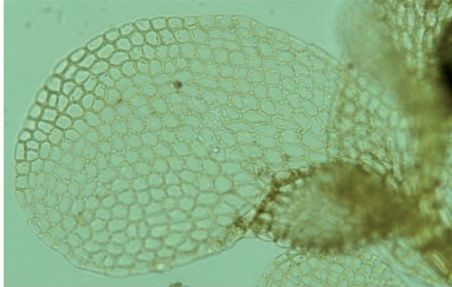
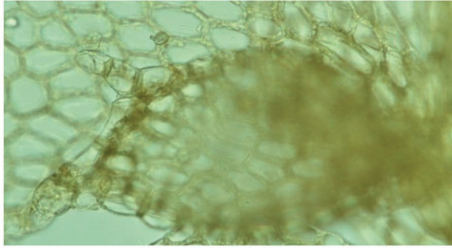
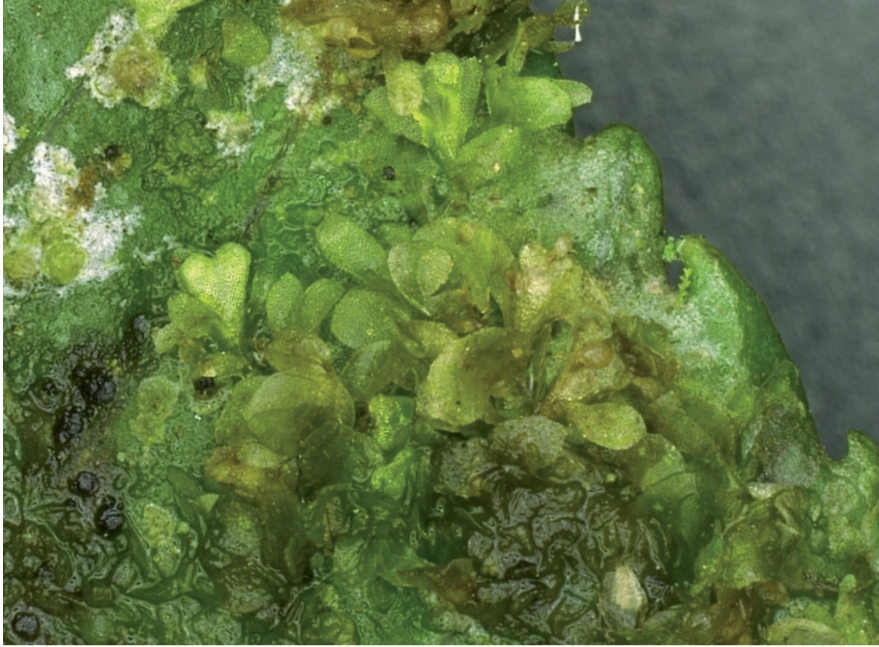
**Fig. 121. *Cololejeunea lobulilineata* Tixier**

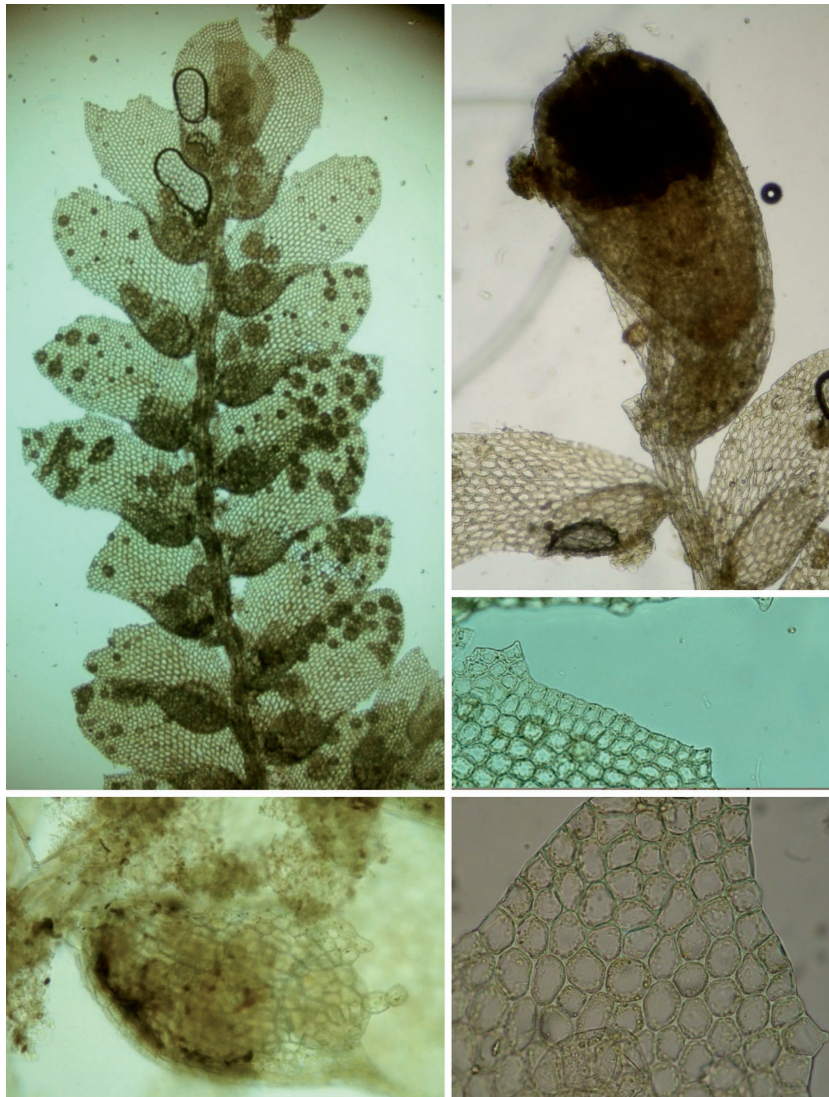
Plants small, up to 0.7 mm wide. Stems up to 0.5 cm long. Lobes rounded-ovate, apex rounded, 0.4 mm long and 0.35 mm wide, pseudovitta short, at base of lobe. Lobules reduced to an rectangular band of 5 cells length and 2 cells width, with apical tooth hardly visible. Asexual reproduction with up to 16-20-celled gemmae. Monoicous. Perianths ovoid, apex rounded, with ventral keels and short rostrum, 0.3 mm long and 0.2 mm wide. **Habitat:** Submontane rain forest, epiphyllous, 1950 m. **Distribution in Rwanda:** Nyungwe NP: Gisakura. **Distribution in Africa:** DR Congo.



**Figs 122 and 123 (next page). *Cololejeunea magna* (Tixier) Infante & Heras**

Synonyms: *Cololejeunea harrisii* var. *magna* Tixier; *C. harrisii* sensu Vanden Berghen. Plants medium-sized, forming dense mats, shoots (0.9-)1-1.3(-1.6) mm wide. Lobe entire, asymmetrically ovate-reniform, apex rounded, (0.37-)0.4-0.6 x (0.48-)0.6-0.9 mm. Lobule variable, if well developed rather long, 0.14-0.22 x 0.2-0.35 mm, ovate, inflated, apical tooth with 1-2 cells, hyaline papilla at apex of apical tooth, free margin of lobule usually with obtuse tooth, lobule sometimes reduced to a rectangular-ovate row, 0.09-0.12 x 0.14-0.25 mm, distally prolonged into long apical tooth of 2-3 cells width at base, hyaline papilla at apex. Perianth exserted, heart-shaped, compressed, laterally with 2 rounded auricles, 0.7-0.9 x 0.7-1 mm, beak conical, lacking protruding cells. **Habitat:** Montane forest, epiphyllous on *Marattia fraxinea*, 1700-2300 m. **Distribution in Rwanda:** **Nyungwe NP:** Karamba, Kamiranzovu, Uwinka, Rwankuba, km 22 Pindura-Bweyeeye, Gisakura.

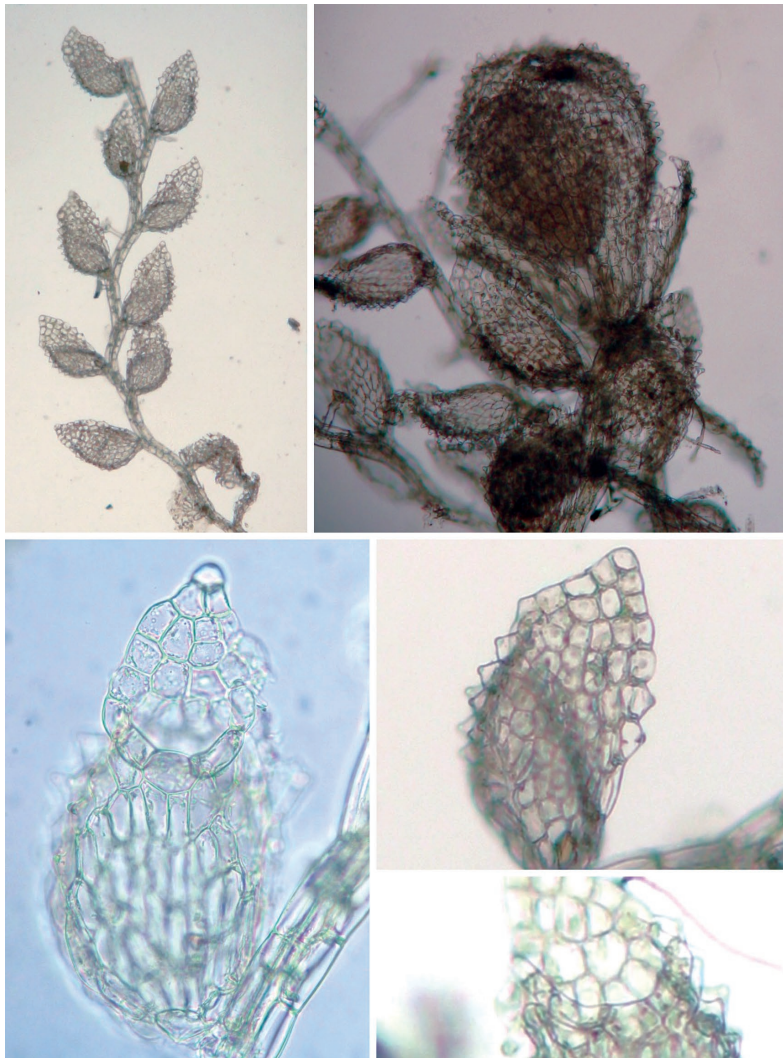




**Fig. 124. *Cololejeunea malanjae* Steph.**

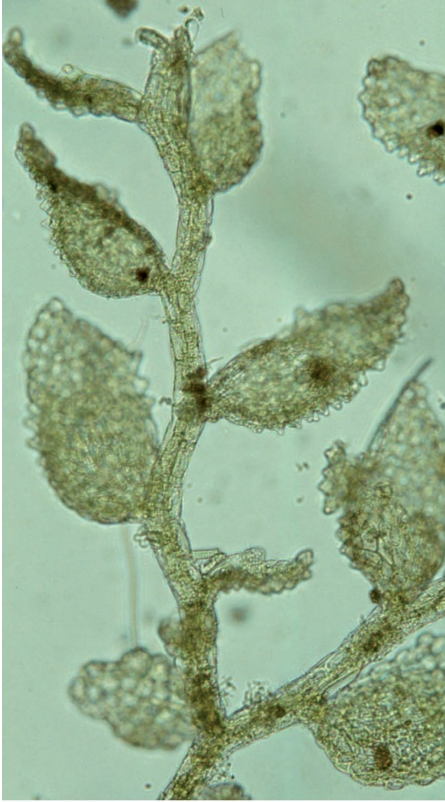
Synonym: *Cololejeunea grossidens* (Steph.) Steph. ex E.W.Jones. Plants small. Leaves distant. Lobes narrowly ovate or oblong, 0.3-0.6 x 0.12-0.2 mm, base cuneate, apex tapering to rounded or subacute point, margins dentate. Lobule about 0.3-0.5 the length of the lobe, sometimes reduced to few cells, inflated, apex flat, truncate, apical tooth of 2-3 cells, inserted in the middle of apex, hyaline papilla at base of apical tooth. Asexual reproduction by gemmae mainly from marginal cells. Autoicous. Perianths 0.5-0.7 x 0.3-0.4 mm, obconical, smooth or slightly mammillose. **Habitat:** Montane forest, epiphyllous, 1900-2500 m. **Distribution in Rwanda:** Nyungwe NP: Rwasekoko, Karamba, Kamiranzovu, Uwinka. **Distribution in Africa:** DR Congo, Burundi, Uganda, Kenya, Tanzania, Zimbabwe, Malawi.

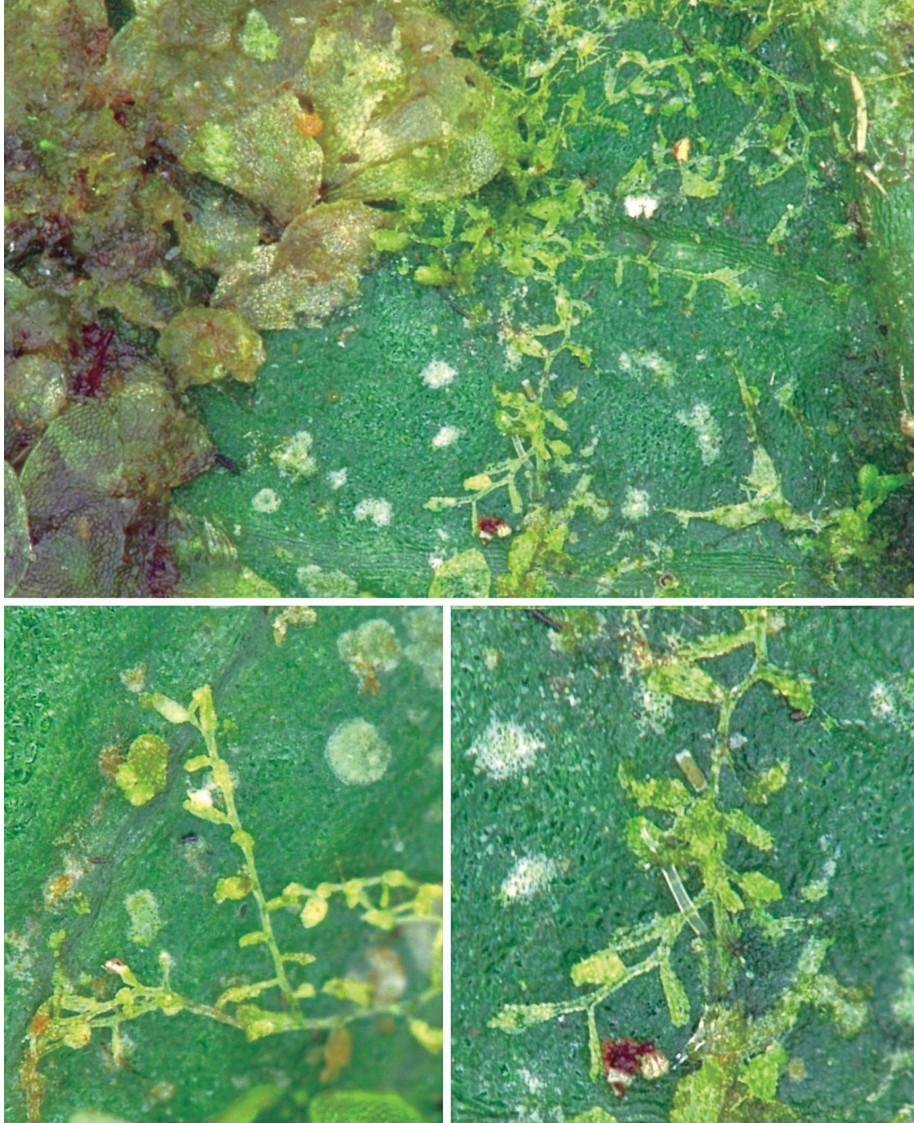




**Figs 125 and 126 (next page). *Cololejeunea microscopica* (Taylor) A.Evans var. *africana* (Pócs) Pócs & Bernecker**

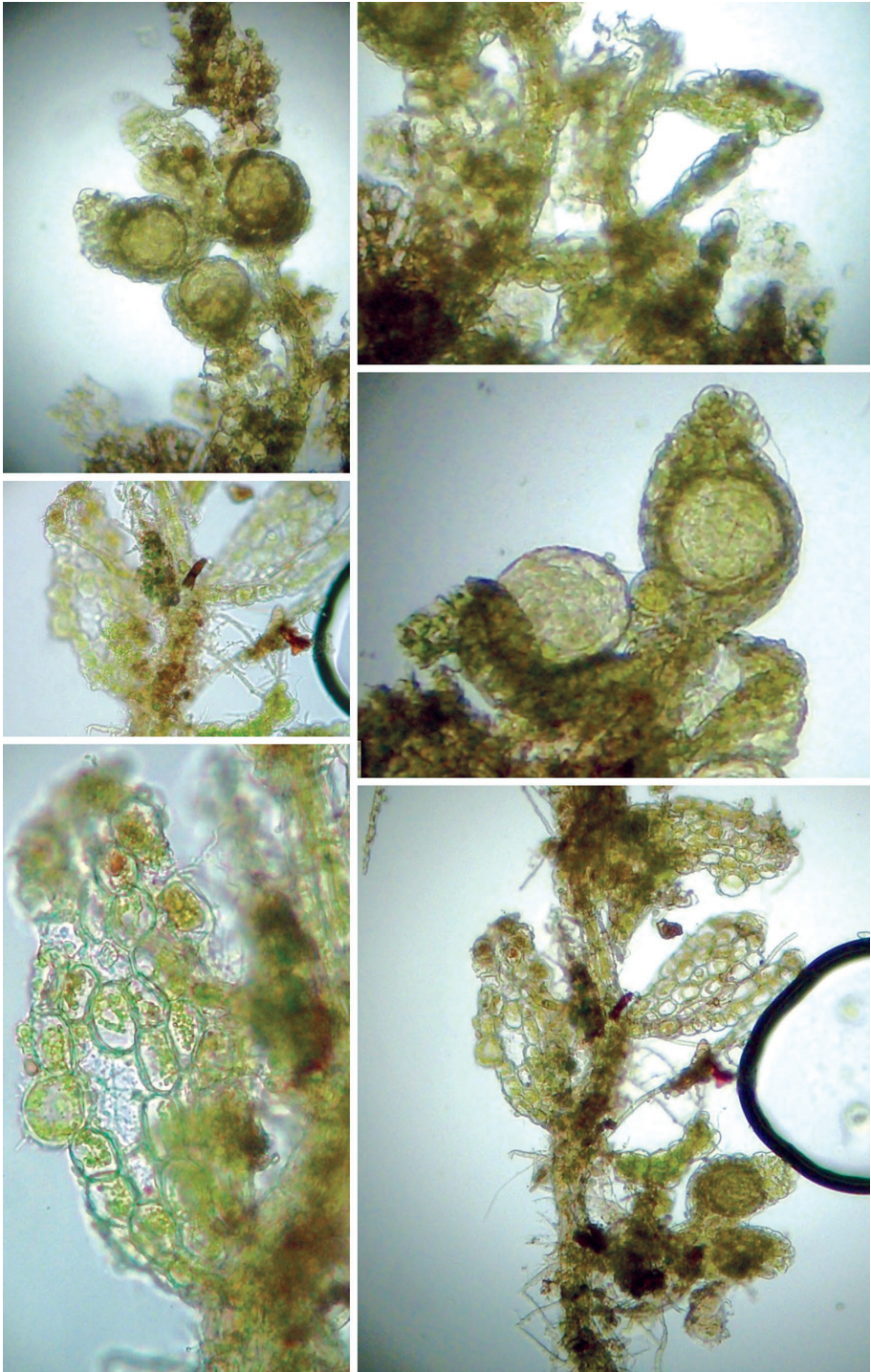
Synonyms: *Aphanolejeunea exigua* A. Evans var. *africana* Pócs; *A. microscopica* var. *exigua* (A.Evans) A.Lücking & Pócs. Plants minute, 0.18-0.35 mm wide, epiphytic or epiphyllous. Lobes of lobulate leaves 0.14-0.24 x 0.09-0.13 mm, ovate to ovate-lanceolate, surface smooth, marginal cells of keel and lobe strongly conical, elobulate leaves few. Lobules inflated, as wide as lobe, and 0.65-0.75 the length of the lobe, with 1 apical tooth, 2-celled and strongly curved. Asexual reproduction by disciform gemmae on marginal cells of the lobe. Autoicous. Perianths inflated, broadly pyriform, about 0.25 x 0.25 mm, obscurely 5-keeled. **Habitat:** Ramicolous on ericaceous shrubs, at base of trees or epiphyllous, 2000-2500 m. **Distribution in Rwanda:** Nyungwe NP: Rwasekoko, Uwinka. **Distribution in Africa:** Ivory Coast, DR Congo, Kenya, Tanzania.

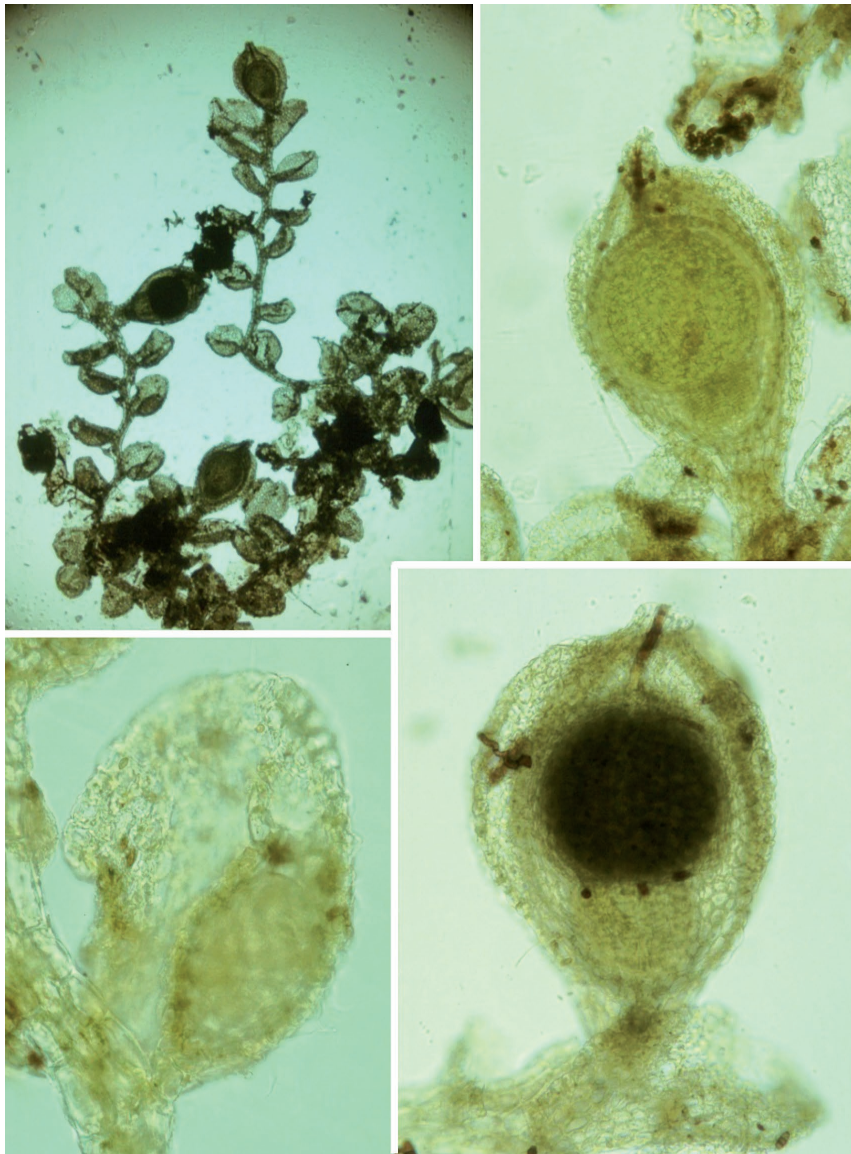




**Figs 127 and 128 (next page). *Cololejeunea minuscula* Pócs**

Synonym: *Aphanolejeunea minuta* R.M.Schust. Plants extremely minute, resembling a terrestrial alga, 2-5 mm long and 0.13-0.19 mm wide, with remote linear-lingulate to lanceolate elobulate leaves, epiphyllous. Lobes of lobulate leaves 85-130 x 26-40  $\mu$ m, ovate to ovate-lanceolate, surface smooth, marginal cells of keel and lobe strongly conical, elobulate leaves with lobule reduced to single cell. Lobules usually only on bracts, inflated, as wide as lobe, and 0.5-0.6 the length of the lobe, with a 1-celled apical tooth. Asexual reproduction by disciform gemmae on marginal cells of the lobe. Dioicous. **Habitat:** Montane forest, usually epiphyllous, 2250-2300 m. **Distribution in Rwanda:** Nyungwe NP: Gisakura. Also USA (Florida).

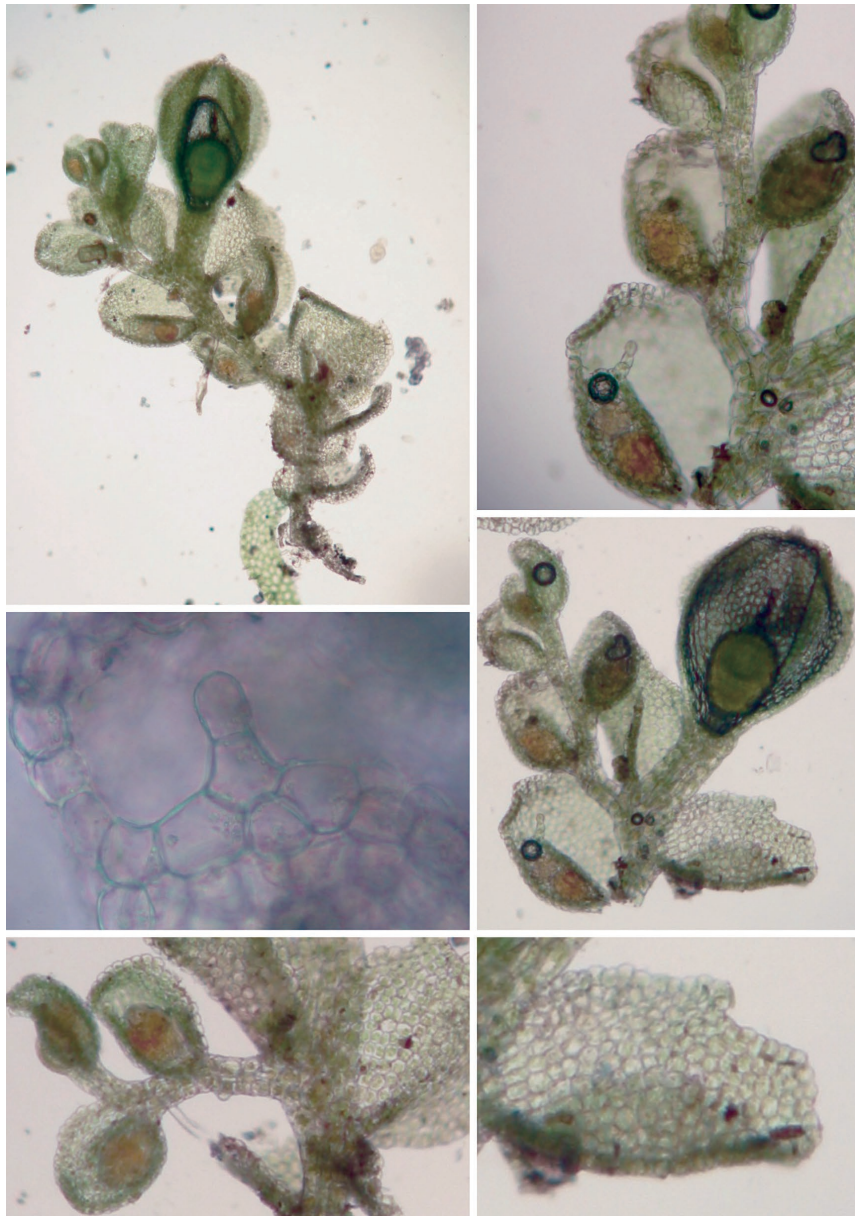




**Fig. 129. *Cololejeunea minutissima* (Sm.) Schiffn. ssp. *minutissima***

Plants very small, shoots 0.25-0.6 mm wide. Leaves distant to contiguous, complicate. Lobe 0.2-0.38 x 0.17-0.25 mm, strongly convex, apex rounded. Lobule inflated, 0.8-0.95 of lobe length, apical tooth prominent, long or short, with hyaline papilla at base. Autoicous.

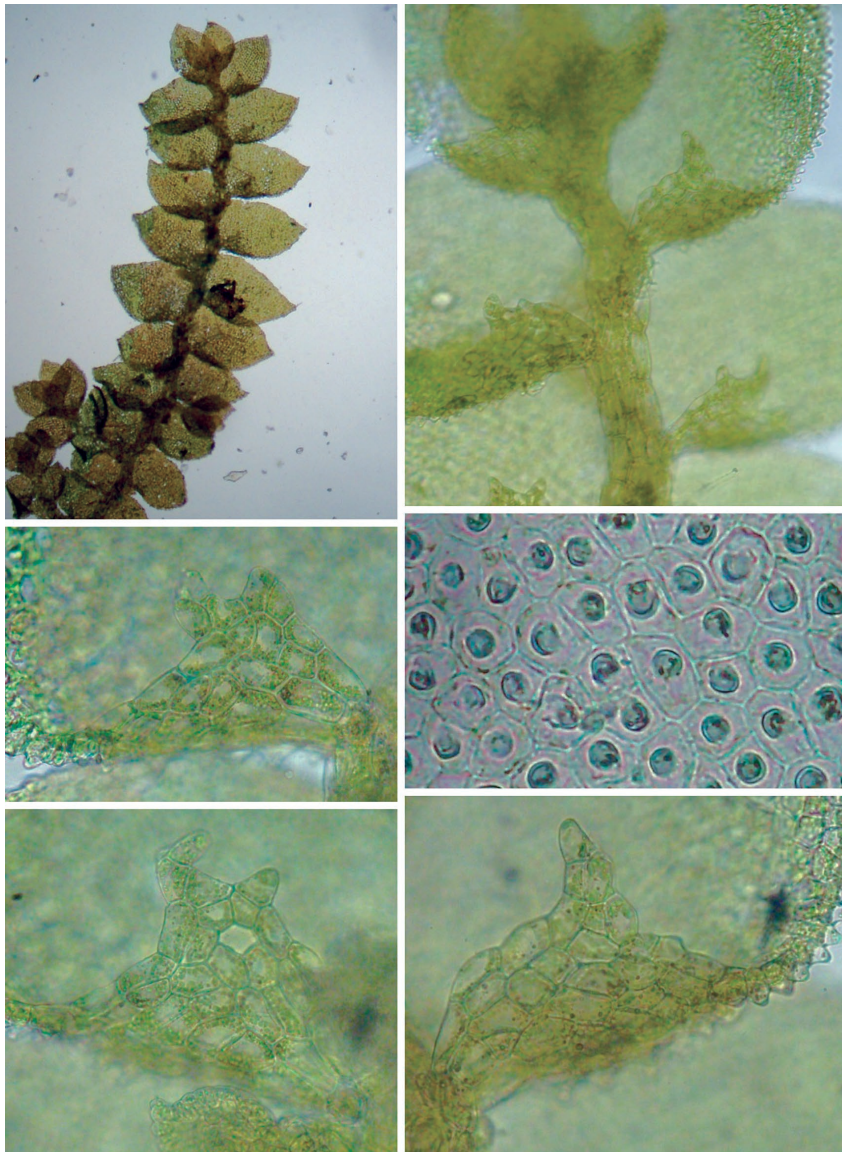
Female bracts with well developed lobule. Perianth exserted, pyriform, 0.3 x 0.27 mm. **Habitat:** Epiphyte on small twigs in montane rainforest and ericaceous shrub, 2500-2900 m. **Distribution in Rwanda:** Nyungwe NP: Rwasenkoko. **Distribution in Africa:** Ivory Coast, DR Congo, Uganda, Kenya, Tanzania, Malawi, Zimbabwe, South Africa. Also Western Europe, North America, Cape Verde, Madagascar, Réunion, Rodriguez.



**Fig. 130. *Cololejeunea minutissima* ssp. *utriculifera*** Vanden Berghen

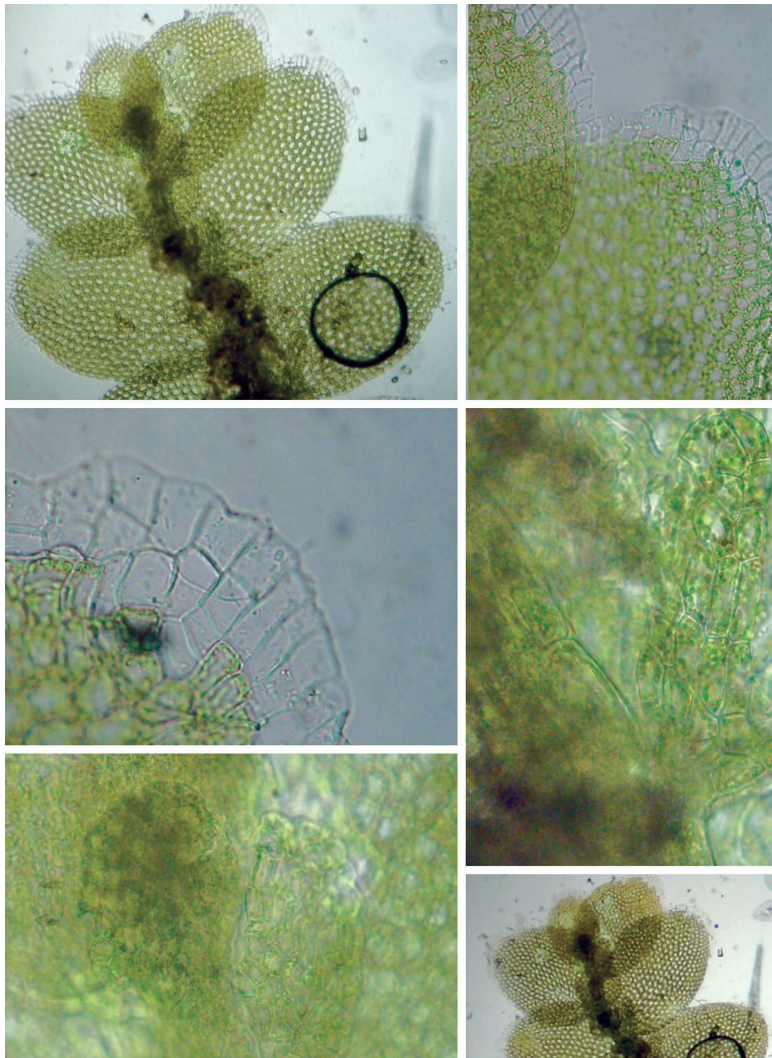
Similar to *Cololejeunea minutissima* ssp. *minutissima*, but differs in the utriculiferous leaves where the leaf is transformed into a globose utricule with the lobule as large as the lobe, and the stipitate perianth. **Habitat:** Epiphyte on small twigs in montane rainforest and ericaceous shrub, 2000-2400 m. **Distribution in Rwanda:** Gishwati Forest: Gikungu.

**Nyungwe NP:** Rwasenkoko. **Distribution in Africa:** Burundi, Tanzania.



**Fig. 131. *Cololejeunea mocambiquensis* S.W.Arnell**

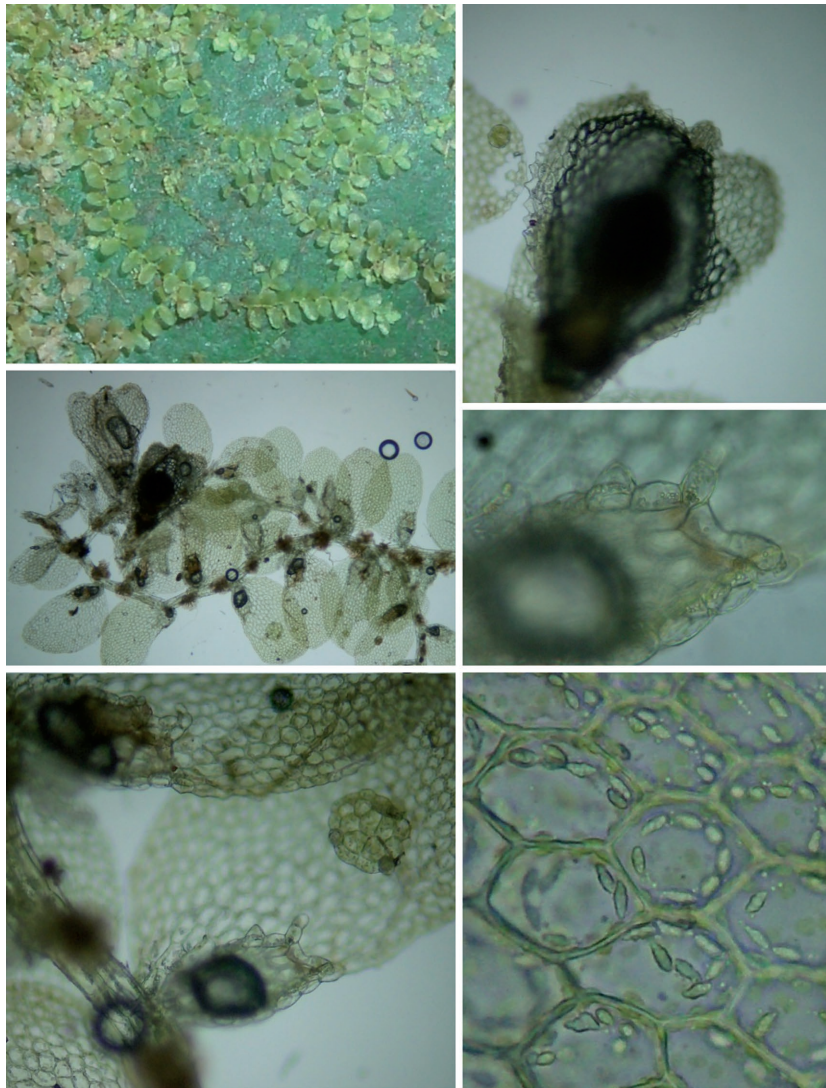
Plants small, shoots 0.3-0.5 mm wide and 2 mm long. Lobe subquadrate, acute at apex, dorsal base truncate, densely denticulate at margin by acute papillose cells, 0.15-0.18 x 0.21-0.25 mm, dorsal cells with straight conical papilla. Lobule irregularly dentate, half the size of the lobe. Cells about 10  $\mu$ m in diameter, trigones lacking. Dioicous. Male bracts similar to vegetative leaves. **Habitat:** Montane forest, epiphyllous, 1700 m. **Distribution in Rwanda: Nyungwe NP:** Cyamudongo Forest. **Distribution in Africa:** Uganda, Kenya, Tanzania, Malawi, Mozambique, South Africa. Also Madagascar.



**Fig. 132. *Cololejeunea nigerica* (E.W.Jones) R.M.Schust.**

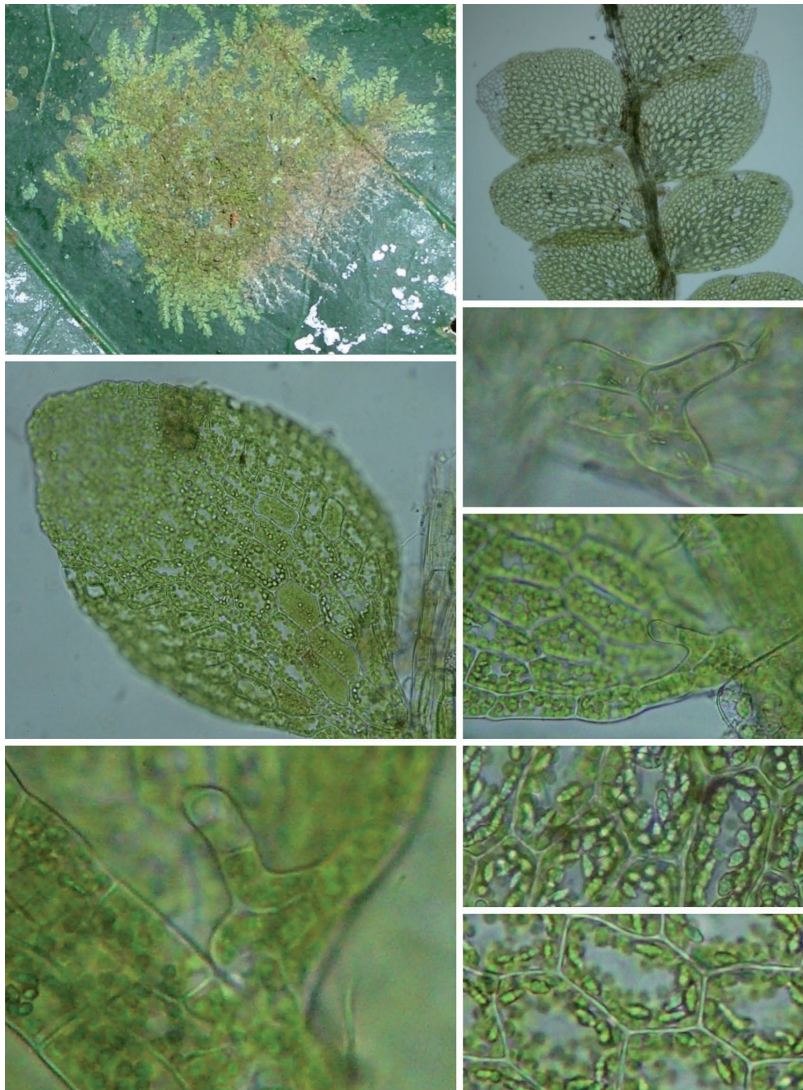
Plants medium-sized, shoots 1.4-1.8 mm wide. Lobe ovate, 0.7-1 x 0.45-0.7 mm, base auriculate, apex usually narrowed, hyaline cells in 2-3 rows, usually a sharply demarcated group at lobe apex, ending abruptly at the distal end of the ventral margin, on the dorsal margin either ending abruptly or extending as a single narrow line. Lobule narrow, lingulate, 8-9 cells wide proximally, 2-6 cells wide distally, often narrowed at a tooth near the narrower distal part, thus appearing sometimes bifid, stylus in the form of a papilla. Autoicous. Perianth pyriform, compressed, 0.6-0.75 mm long, without dorsal keels or with a short median keel on dorsal side, ventrally scarcely keeled. **Habitat:** Montane forest, epiphyllous, 1700 m. **Distribution in Rwanda:** Nyungwe NP: Cyamudongo Forest. **Distribution in Africa:** Sierra Leone, Ivory Coast, Ghana, Togo, Nigeria, Cameroon, DR Congo, Uganda, Tanzania.



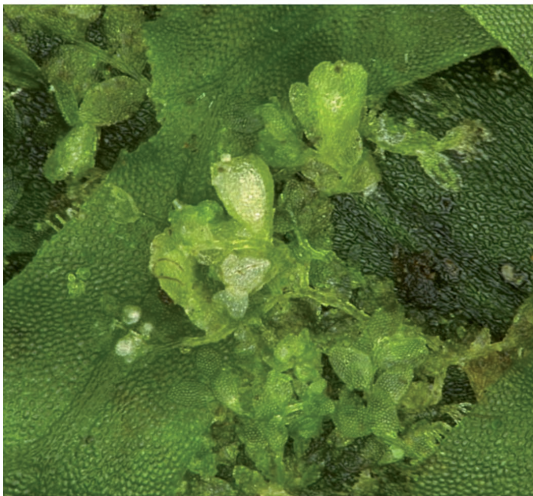
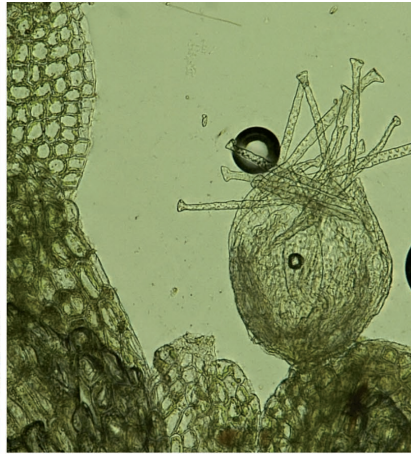
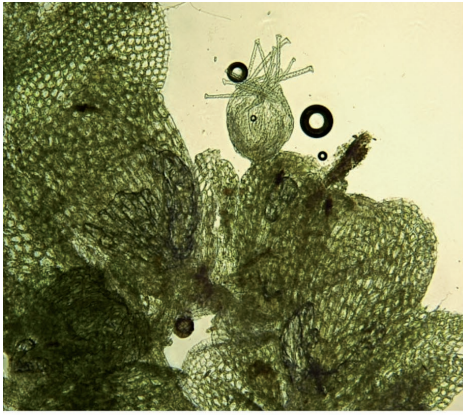


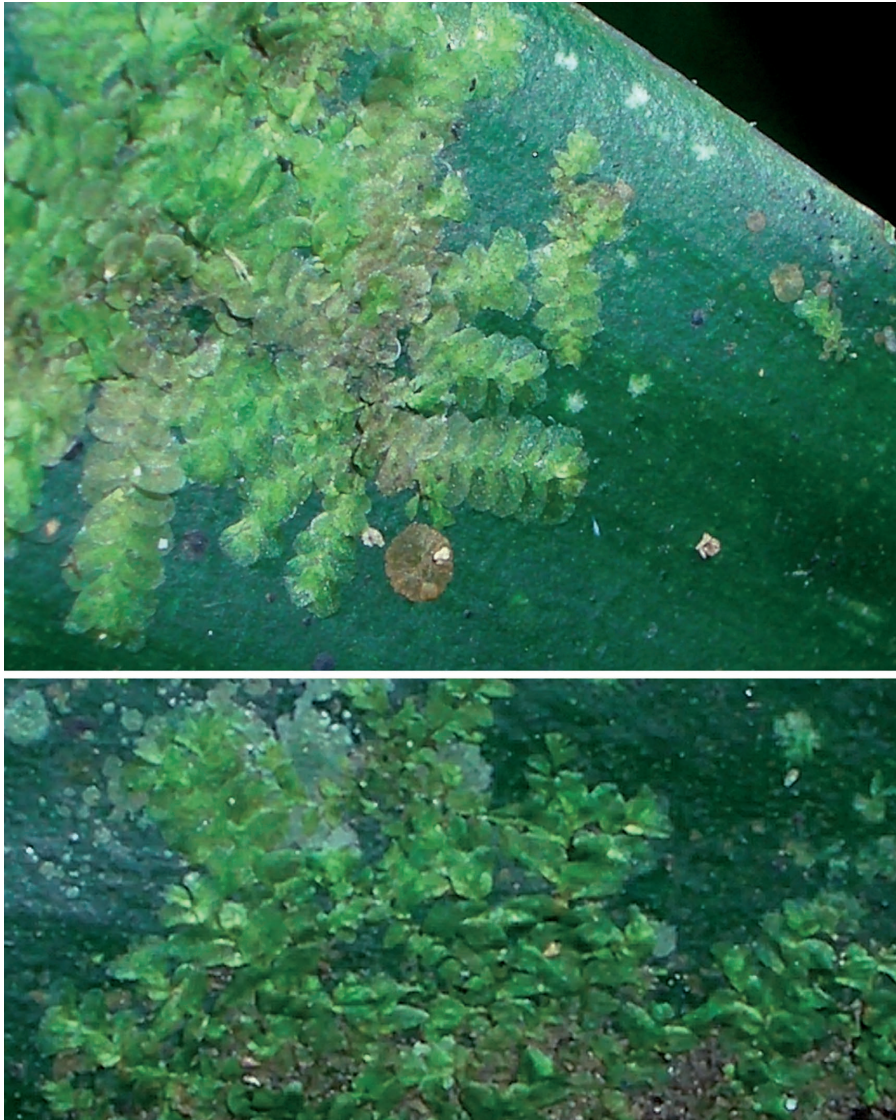
**Fig. 133. *Cololejeunea obliqua* (Nees & Mont.) Schiffn.**

Plants medium-sized, shoots up to 0.9-1.5(-2) mm wide. Leaves spreading at (45-)60-90° to the stem. Lobes ovate to oblong-ovate, 0.6-1.2 x 0.4-0.7 mm, base rounded or truncate, margin crenulated with papillate cells. Lobule 0.25-0.3 the length of the lobe, apical tooth of 2 short cells, with spherical hyaline papilla at the base or the middle of its proximal side, proximal tooth on free margin of lobule 1-celled, variable. Gemmae on both sides of the leaf. Autoicous. Perianths c. 0.7 x 0.5 mm, obcordate, compressed, ventrally inflated. **Habitat:** Montane forest, epiphyllous, 1700 m. **Distribution in Rwanda:** Nyungwe NP: Cyamudongo Forest. **Distribution in Africa:** Guinea, Sierra Leone, Ivory Coast, Ghana, Togo, Nigeria, São Tomé, Bioko, Rio Muni, Cameroon, DR Congo, Burundi, Uganda, Tanzania, Zambia. Also Comoros, Madagascar, Réunion, Mauritius, Seychelles.



**Figs 134 and 135 (next page). *Cololejeunea obtusifolia* (E.W.Jones) Tixier**  
 Synonym: *Cololejeunea pusilla* var. *obtusifolia* E.W.Jones. Plants small, shoots 0.5-0.8(-1) mm wide. Leaves approximate, spreading at 50-80° to the stem. Lobe up to 0.4-0.6 mm long, ovate, with broad rounded apex. Lobule reduced to a few (4-8) cells, 36-55 x 22-40 µm. Gemmae on non-marginal lobe cells. Autoicous. Perianth pyriform and terete, 0.4-0.6 x 0.3-0.4 mm, with 5 keels. **Habitat:** Epiphyllous in submontane and montane forest, 1600-2000 m. **Distribution in Rwanda: Nyungwe NP:** Cyamudongo Forest, Kamiranzovu, Uwinka, Gisakura. **Distribution in Africa:** Guinea-Bissau, Guinea, Sierra Leone, Ivory Coast, Ghana, Nigeria, Bioko, Cameroon, Rio Muni, DR Congo, Burundi, Ethiopia, Kenya, Tanzania. Also Madagascar.





**Figs 136 and 137 (next page). *Cololejeunea occidentalis*** (E.W.Jones) Vanden Berghen  
 Plants medium-sized to large, shoots (1.5-)1.8-2 mm wide. Lobe ovate-reniform, c. 0.9-1.2 x 0.65-0.85 mm, apex broadly rounded, hyaline margin fimbriate, forming a border 1 row wide around most of the lobe, abruptly ending on ventral margin. Lobule ovate, 0.4-0.55 x 0.25-0.3, distal margin with 2 teeth, the apical tooth with a globose or clubshaped hyaline papilla at the side or base of the apical cell. Chlorophyllose cells with smooth cuticle. **Habitat:** Montane forest, epiphyllous, 1700 m. **Distribution in Rwanda:** Nyungwe **NP:** Cyamudongo Forest. **Distribution in Africa:** Nigeria, Kenya, Tanzania, Zimbabwe, Malawi, South Africa.