

Taxonomic Results of the BRYOTROP Expedition to Zaire and Rwanda

10. Trichocoleaceae, Geocalycaceae, Acrobolbaceae, Balantiopsidaceae, Lepidoziaceae (*Telaranea*, *Arachniopsis*), Calypogeiaceae, Adelanthaceae, Porellaceae, Jubulaceae, Marchantiaceae (*Dumortiera*), Polytrichaceae

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Abstract. A survey of the families Trichocoleaceae, Geocalycaceae, Acrobolbaceae, Balantiopsidaceae, Lepidoziaceae (*Telaranea*, *Arachniopsis*), Calypogeiaceae, Adelanthaceae, Porellaceae, Jubulaceae, Marchantiaceae (*Dumortiera*) (Hepaticae) and Polytrichaceae (Musci) for Central Africa (Zaire and Rwanda) is presented. *Leptoscyphus infuscatus*, *Tylimanthus ruwenzoriensis*, *Calypogeia fissa*, *Adelanthus lindenbergianus* and *Porella subdentata* are recorded as new to Rwanda. *Telaranea trifida* and *Calypogeia fusca* are new to Zaire. *Leptoscyphus hedbergii* and *Calypogeia afrocaerulea* are new records for Zaire and Rwanda.

Abbreviations::

TRICHOCOLEACEAE

* New record for Rwanda viz. Zaire

KB: Kahuzi-Biega (Zaire)

Ka: Karisimbi (Rwanda)

Ny: Nyungwe Forest (Rwanda)

Ak: Akagera region (Rwanda)

Ki: Kigali region (Rwanda)

100-171, number of collecting site.

For locality data and a description see the contribution by E. Fischer on the vegetation of the study area in this volume (Tropical Bryology 8: 13-37, 1993). The specimens are deposited at the Botanical Museum Berlin as well as in the herbarium of the author (except for unicates).

One genus in Central Africa:

Blepharostoma Dum.

One species in Central Africa:

Blepharostoma trichophyllum (L) Dum.

A widespread species found throughout the Northern Hemisphere. In Africa it is known from the East African Mountains and it has recently been reported from Mt. Bisoke in Rwanda (Bizot & Pócs 1979). It was observed on ground and rotten wood from 2000 to 2500 m.

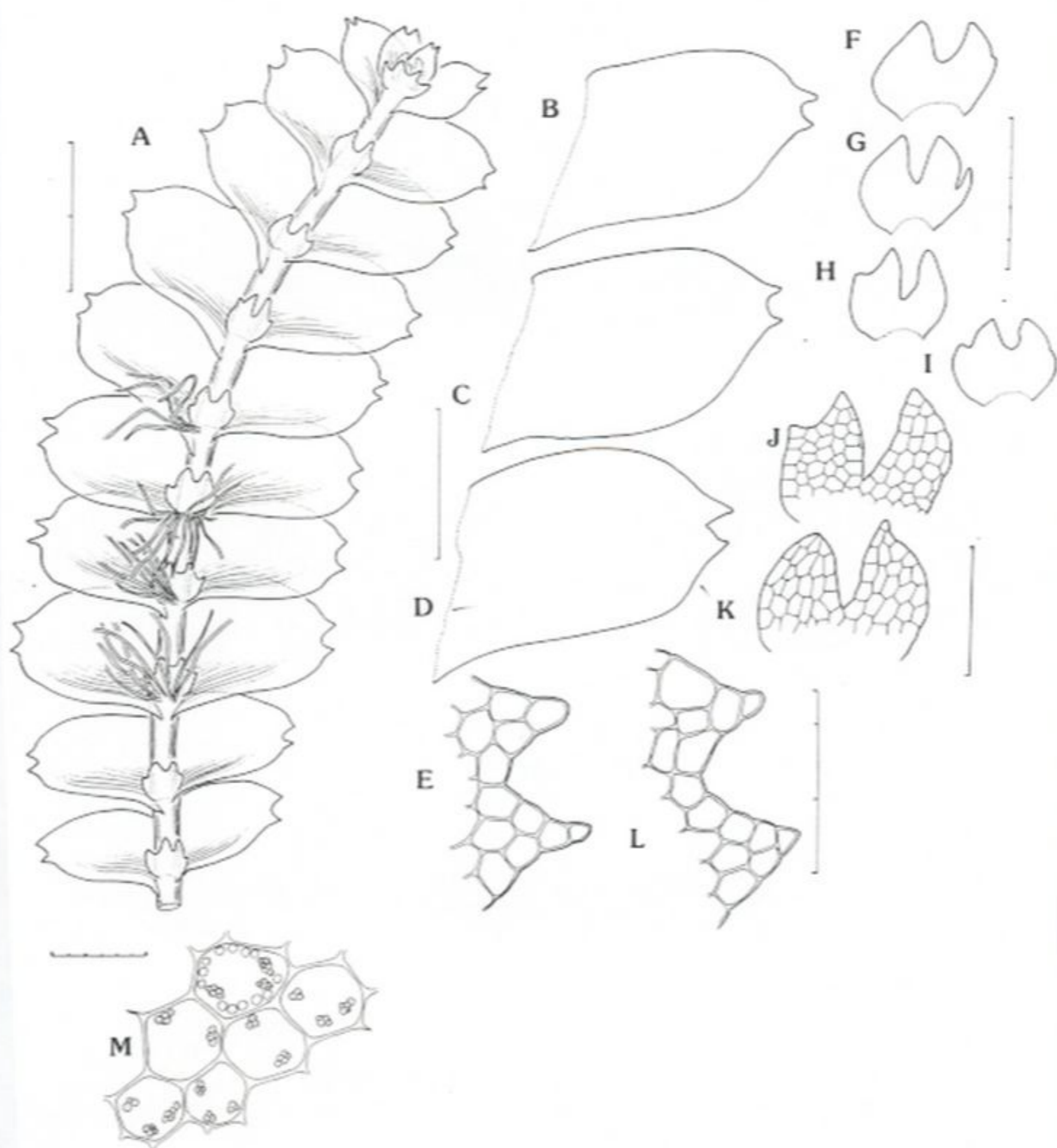


Fig. 1. *Leptoscyphus hedbergi*

A. Sector of shoot, ventral view. B-C Amphigastria. D Margin of Amphigastrium. E Median cells. From Fischer 877. Scale bar on A = 2 mm; B-C = 1 mm; D = 500 μ m; E = 80 μ m.

Ny: 102, *Pócs* 6057, 6058, 6098; 107, *Frahm* 6296; 111, *Pócs* 7627.

GEOCALYCACEAE

Key to the genera in Central Africa:

1 Perianth laterally compressed, the ventral face narrow, plants \pm brownish to fuscous pigmented
.....*Leptoscyphus*

1* Perianth \pm symmetrically trigonous, the angles often winged, plants lacking brownish to fuscous pigmentation.....2

2 Leaves moderately to deeply adaxially concave, amphigastria not as large as the stem
.....*Clasmatocolea*
[*Clasmatocolea* has one species in Central Africa, *C. vermicularis* (Lehm.) Grolle, which is known from Shaba (Vanden Berghen 1972) and Burundi (Engel 1980)]

2* Leaves convex, rarely plane, with apices decurved or deflexed, amphigastria larger than stem.....*Chiloscyphus*

Subfamily Leptoscyphoideae

Leptoscyphus Mitten

For a worldwide monograph see Grolle (1962)

Key to the species in Central Africa:

1 Leaves all with two or three spines at the margin, perianth and involucral leaves vesicarious (gibbous) at base.....*L. infuscatus*

1* Leaves mostly or all with entire margin, rarely some leaves with one or two spines, leaves \pm assymmetric, perianth and involucral leaves not vesicarious.....2

2 Amphigastria with 6-8 spines.....*L. hedbergi*

2* Amphigastria with 2-4 (rarely 6) teeth or spines.....*L. expansus* (Lehm.) Grolle (known from Zaïre/Shaba, Vanden Berghen 1972)

* *Leptoscyphus infuscatus* Mitten

For detailed description see Grolle (1962) and Jones (1953). Known from Fernando Po, the Cameroon Mountain, the East African mountains and Reunion. In Central Africa it is known from Ruwenzori and Mt. Niragongo in the Virunga volcanoes. It is reported here as new to Kahuzi and to Rwanda. *L. infuscatus* is a variable species growing as epiphyte, on litter or on ground, ascending up to 3200 m on Mt. Kahuzi. **KB:** 131, *Frey & Kürschner* 6921b, *Pócs* 7131; 132, *Pócs* 7125; 133, *Frey & Kürschner* 6974, *Pócs* 7213; 147, *Pócs* 7760; 148, *Frey & Kürschner* 7473; 149, *Pócs* 7746.

Ny: 103, *Pócs* 6117, 6152.

* *Leptoscyphus hedbergi* (Arnell) Schuster (fig.1)

An afroalpine species known from Kenya (Mt. Kenya) and Uganda (Ruwenzori and Virunga volcanoes). It is reported as new to Zaïre and Rwanda where it grows in the *Senecio*-Paramo and in the Ericaceous belt from 2700 to 3400 m.

KB: 132, *Pócs* 7142; 149, *Pócs* 7596.

Rwanda: Mt. Sabinyo, *Fischer* 877, 22.8. 1984.

Subfamily Lophocoleoideae

For a survey of the African species see Jones (1953) and Grolle (1959).

Chiloscyphus Corda

I follow Engel & Schuster (1984), who unite the genera *Chiloscyphus* and *Lophocolea*. As pointed out by Jones (1953), all species are extremely variable. Beside the species keyed out, *Chiloscyphus muhavurensis* Arnell is known from the Virunga volcanoes in Uganda. This species may be a synonym of the South American *C. trapezoides* (see Gradstein, Pócs & Vana 1983). It is very likely to occur in Rwanda as well, but has yet not been found.

Key to the Central African species:

1 Leaves obtuse or retuse.....*C. concretus* (Mont.) Engel & Schuster (Zaïre, Shaba)

1* Leaves \pm distinctly bilobed.....2

2 Leaves oblong or bilobed with apiculate lobes, opposite to subopposite, apex rounded to truncate or retuse, entire or with several (1-5) teeth, underleaves connate with leaves on both sides

.....3
2* Leaves bilobed with more or less apiculate lobes, alternate, amphigastria completely free from the leaves.....4

3 Leaves robust, bilobed, often 2 - 3 mm long, mid-leaf-cells 25-30 x 35-45 µm...*C. martianus*
3* Leaves smaller, 1 - 1,5 mm long, mid-leaf cells 20-25 x 30 µm.....*C. dubius* Gottsche (Zaire bassin)

4 Minute plants, perianth cylindrical, shortly lobed, exposed surfaces of leaf and perianth usually covered with 1-3 celled hairs
..... *C. muricatus*
4* Plants without hairs on the leaf and perianth surface.....5

5 Small plants, leaves rarely more than 1 mm long, not very asymmetric, bilobed to not more than a sixth of their length, apiculi short
.....*C. difformis*

5* Large plants, leaves often 1,5 mm long or more, strongly asymmetric, with arched front margin and longly decurrent distal margin, the lobes with long fine apiculi.....*C. cuspidatus*

Chiloscyphus cuspidatus (Nees) Engel & Schuster

The most frequent species of *Chiloscyphus* in Central Africa and distributed also in Cameroon, Fernando Po, Uganda, Malawi, South Africa and Madagascar. It was observed on ground, on buttresses of large trees, as epiphyte on bamboo and giant groundsels as well as on rocks, peat and rotten wood from 1300 to 3400 m. Smith (1990) reduces *C. cuspidatus* to a variety of *C. bidentatus*.
KB: 118, *Frey & Kürschner* 6542; 124, *Pócs* 6793; 133, *Pócs* 7214; 135, *Frey & Kürschner* 6985, 6999; 140, *Pócs* 7305.

Ka: 161, *Pócs* 8180.

Ny: 101, *Pócs* 6029 pp.; 101, *Frahm* 6047; 103, *Frahm* 6182; 104, *Pócs* 6188.

Chiloscyphus muricatus (Lehm.) Engel & Schuster (fig. 2)

Known from Cameroon, Zaire (Ruwenzori, as *Lophocolea spiniflora* Steph.) and South Africa. It occurs on rotten wood, as epiphyte on living trees (*Agauria*, *Erica*, *Arundinaria*) as well as on litter or on roadcuts from 2300 to 3700 m. A quite distinct species.

KB: 112, *Frey & Kürschner* 7953; 123, *Frey & Kürschner* 6662; 124, *Frey & Kürschner* 6683; 126, *Frey & Kürschner* 6692, 6698; 128, *Frey & Kürschner* 7372, *Pócs* 7378, 7398; 133, *Pócs* 7214 p.p.; 139, *Pócs* 7282, 7300, 7283, *Frey & Kürschner* 7021; 143 *Frey & Kürschner* 7415; 148, *Frey & Kürschner* 7474; 152, *Frey & Kürschner* 7521.

Ka: 162, *Pócs* 8326.

Chiloscyphus difformis (Nees) Engel & Schuster
C. difformis is known from Cameroon, Sao Thomé, Ethiopia, South Africa, the Mascarenes and Reunion. In the expedition area it was collected between 1930 and 2100 m mainly on rotten wood and occasionally as epiphyte on the bark of *Agauria salicifolia*. This species, formerly known as *Lophocolea moelleri* Stephani, is easily to distinguish from *C. cuspidatus* by the smaller size and the short apicules at leaf apex.

KB: 126, *Frey & Kürschner* 6707; 128, *Pócs* 7399; 139, *Frey & Kürschner* 7026; 143, *Pócs* 7615; 152, *Pócs* 7847.

Ny: 107, *Pócs* 6320; 108, *Pócs* 6384; 110, *Frey & Kürschner* 7915, 7916; 113, *Pócs* 6463.

Chiloscyphus martianus (Nees) Engel & Schuster

In Africa *C. martianus* is known from the Ivory Coast, Ghana, Nigeria, Cameroon, Principe, Congo, Zaire and Tanzania. In the Kahuzi-area, it has been observed from 1100 to 1500 m, growing on vertical rock and on ground. This species, formerly known under the names *Lophocolea newtoni* Stephani or *L. congoana* Stephani. Both proved to be conspecific with the neotropical *Chiloscyphus martianus* (Gradstein,

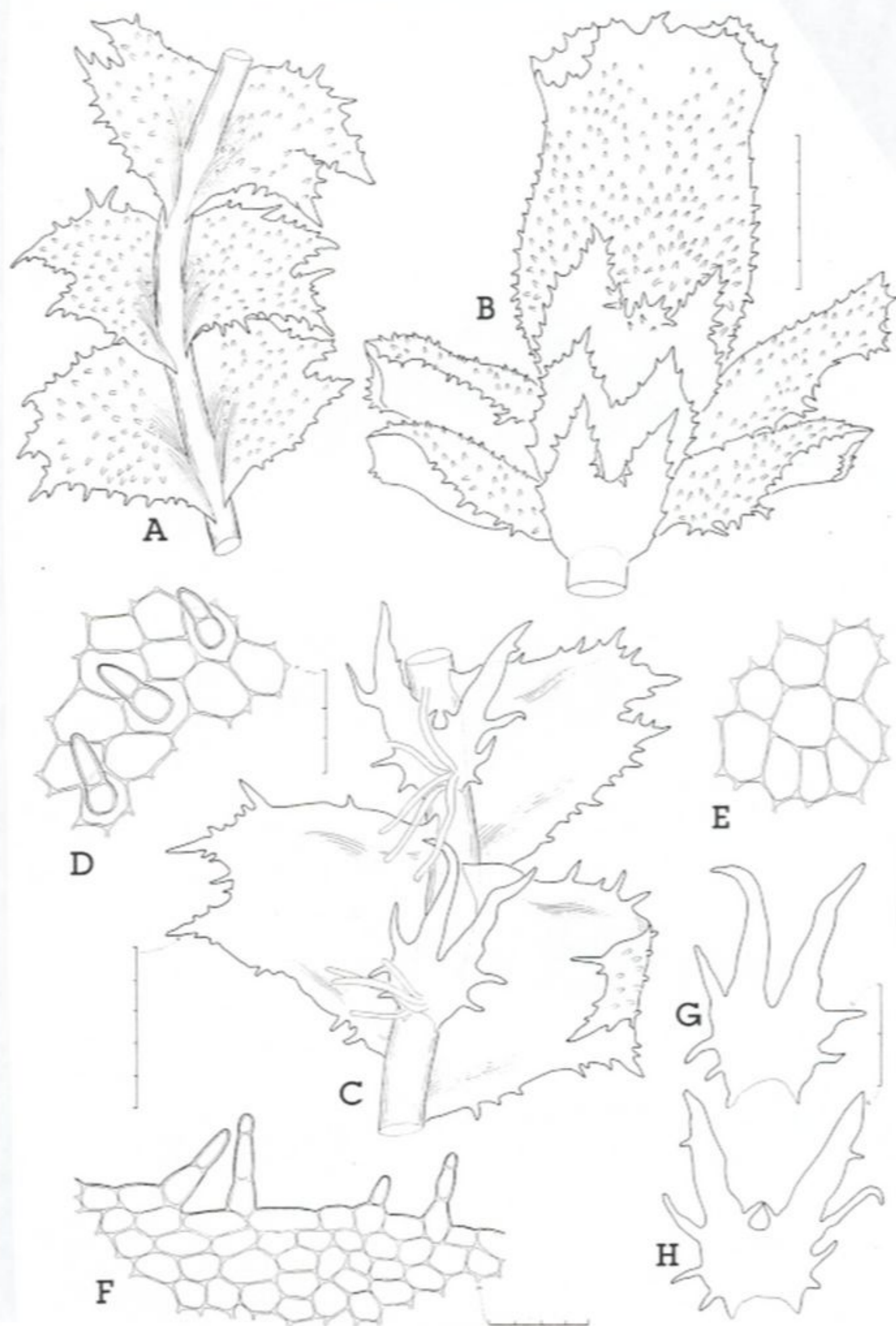


Fig. 2. *Chiloscyphus muricatus*

A Sector of shoot, dorsal view. B Shoot with perianth. C Sector of shoot, ventral view. D Median cells with papillae. E Median cells. F Margin of leaf. G-H Amphigastria. From Pócs 8326. Scale bars on A-B = 500 μm ; C = 500 μm ; D-E = 30 μm ; F = 50 μm ; G-H = 200 μm .

Pócs & Vana 1983).

KB: 123, Pócs 6758; 126, Pócs 6848.

ACROBOLBACEAE

Key to the genera in Central Africa:

1 Leaves entire, with entire margin, plants prostrate, usually yellow-greenish.....*Lethocolea*

1* Leaves ± bilobed, with irregular teeth (up to eight), rarely entire margin, plants ascending to erect, dark green to blackish or brownish in dry state.....*Tylimanthus*

Subfamily Lethocoleoideae

Lethocolea Mitten

In Central Africa one species

Lethocolea congesta (Lehm.) S. Arnell

L. congesta has been collected from 2000 to 2500 m in Nyungwe Forest, at 2300 m in the Kahuzi-Biega area and at 3700 m on Mt. Karisimbi. It is growing mainly on soil with poor vegetation cover, in swamps, on rocks, cliffs or roadcuts.

KB: 144, *Frahm* 7572.

Ka: 159, Pócs 8048; 162, *Frahm* 8248.

Ny: 102, *Fischer* 6052; 106, *Fischer* 6276

Subfamily Acrobolboideae

Tylimanthus Mitten

In Central Africa one species

* *Tylimanthus ruwenzoriensis* S. Arnell

An afroalpine species known from Ethiopia, Uganda (Ruwenzori), Tanzania (Kilimanjaro, Uluguru mountains) and Reunion (Jones 1980). It can be reported here as new to Rwanda and it is likely to occur on Zaïrean side of Ruwenzori and Virunga volcanoes.

Karisimbi: *Lobelia stuhlmannii-Senecio johnstoni*-Paramo at 3700 m s.m., *Fischer* 583, 10. 1985.

BALANTIOPSISACEAE

One genus in Central Africa:

Isotachis Mitt. in J.D. Hooker

For a treatment of the African species see Vana (1982). In Central Africa only one species recognized.

Isotachis aubertii (Schwaegr.) Mitten (fig. 3)

Isotachis aubertii is known from Cameroon, Uganda, Kenya, Tanzania, Zaïre, Rwanda, Burundi, Zimbabwe, South Africa, the East African Islands, Central and South America. The species is growing in *Cyperus* bogs (= "Waldmoor" in Stephani 1914), on ground and on roadcuts ascending from 2000 to the Ericaceous belt at 3200 m s.m. Among the material studied, perianths and sporophytes are frequent. An extremely variable species with wide ecological amplitude. From the expedition area it has been described as *Isotachis aspera* Stephani in Mildbraed (1914), *I. consistipula* Stephani in Mildbraed (1914) and *I. renistipula* Stephani in Mildbraed (1914), all collected in the Nyungwe (=Rugege) Forest. The specimens cited here are gathered partly at the type locality of these species. According to Vana (1982) all these different forms belong to the South American *Isotachis aubertii*.

KB: 128, Pócs 7350; 148, Pócs 7634; 149, Pócs 7770, 7807.

Ny: 101, Pócs 6024; 105, Pócs 6213; 106, Pócs 6254.

LEPIDOZIACEAE

For a survey of the African species see Pócs (1984)

In this paper only the genera *Arachniopsis* and *Telaranea* are dealt with. For an account of the other genera (*Lepidozia*, *Kurzia*, *Sprucella* and *Bazzania*) see the contribution of Pócs in this volume.

Arachniopsis Spruce

Two species present in Central Africa (Pócs 1984). *A. diplopoda* Pócs is known from Madagascar and Western Zaïre (Matadi), the latter a somewhat doubtful record (confusion of locali-

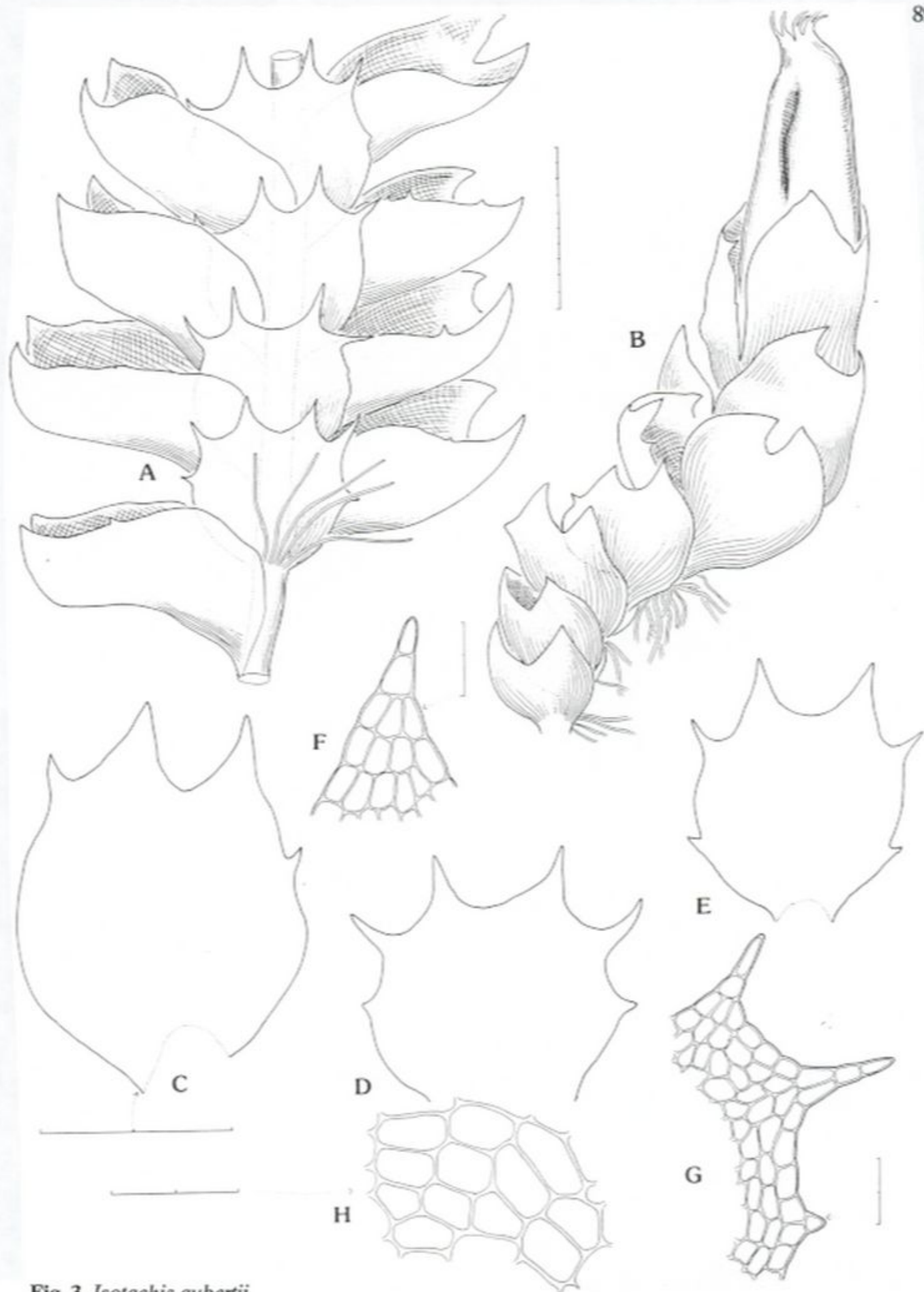


Fig. 3. *Isotachis aubertii*

A Sector of shoot with leaves and amphigastria. B Shoot with perianth. C Leaf. D-E Amphigastria. F Leaf apex. G Margin of Amphigastrium. H Median cells. From Pócs 6024. Scale bars on A-B = 1 mm; C-E = 1 mm; F = 100 μ m; G = 100 μ m; H = 100 μ m.

ties ?, Pócs pers. comm.).

Arachniopsis diacantha (Mont.) Howe (fig.4)
A widespread species known from Central and South America, tropical Africa, South Africa, Madagascar and the Mascarenes.

It was collected on soil, peat, rotten wood and on rocks from 2000 to 3200 m.

KB: 128, *Pócs* 7380; 131, *Pócs* 7099; 139, *Pócs* 7286; 145, *Pócs* 7589; 148, *Pócs* 7861, 7878, 7883.

Ny: 101, *Fischer* 6011; 107, *Pócs* 6314; 108, *Pócs* 6376; 111, *Pócs* 6407; 112, *Pócs* 6438; 113, *Pócs* 6456.

Telaranea Spruce

Key to the Central African species:

1 Leaves usually bilobed, lobes narrow, at base up to two cells large.....*T. nematodes*

1* Leaves usually trilobed, lobes at base up to four cells large.....*T. trifida*

Telaranea nematodes (Mont.) Howe

This species is the most widespread of the genus, known from Europe (Ireland, Bizcaya), North, Central and South America, the Acores and tropical Africa. Stephani (1914) described it from the Nyungwe (=Rugege) forest as *Lepidozia redacta*. It occurs on soil, litter, rotten wood and rocky cliffs between 1300 and 2470 m.

KB: 125, *Fischer* 6741; 128, *Pócs* 7355; 133, *Pócs* 7208, 7215; 134, *Pócs* 7221; 141, *Pócs* 7307; 143, *Pócs* 7789; 152, *Pócs* 7820.

Ny: 106, *Pócs* 6253; 108, *Pócs* 6379; 109, *Pócs* 6349; 111, *Pócs* 6403, 6415, 7609; 113, *Pócs* 6468, 6475.

* *Telaranea trifida* (Stephani) Schuster

This species was only known from the type locality in Nyungwe forest (=Rugege), Rwanda, where it was collected by Mildbraed in a peat bog in 1907 and the Mt. Cameroon. It can be reported here as new to Zaïre. The ecological amplitude seems to be rather narrow as it was collected only in swamps and peat bogs at 2330 to 2350 m.

KB: 129, *Pócs* 7061, 7358.

Ny: 115, *Pócs* 6504.

CALYPOGEIACEAE

Calypogeia Raddi

For a survey of the African species see Bischler (1970) and Jones (1976).

Key to the species in Central Africa:

1 Leaves bilobed with divergent lobes and rounded sinus, amphigastria with subulate lobes and teeth.....*C. arguta* Nees & Mont. (Zaïre, Shaba)

1* Leaves entire or if bilobed the lobes non divergent and sinus narrow, amphigastria entire
o r
bilobed.....2

2 Leaf base longly decurrent, apex of leaf rounded, undivided, amphigastria ± orbicular
.....*C. fusca*

2* Leaf base not or only shortly decurrent, apex of leaf rounded, ± bifid, amphigastria bifid.....3

3 Leaves triangular-ovate, narrowed gradually to apex, antical margin strongly arched proximally, nearly straight distally, oil bodies colourless.....*C. fissa*

3* Leaves oblong-ovate, narrowed more abruptly to a somewhat rounded apex, antical margin nearly straight proximally, arched distally, oil bodies bright blue.....*C. afrocaerulea*

* *Calypogeia fissa* (L.) Raddi

Previously known from Zaïre (Mt. Biega, record cited in Bischler 1970), it is recorded as new to Rwanda. It has been collected between 2500 and 3200 m, where it grows on ground or on roadcuts, rarely as epiphyte. In fresh state easily to distinguish from *Calypogeia afrocaerulea* by the colourless oil bodies.

KB: 123, *Frey & Kürschner* 6665; 148, *Pócs* 7869.

Ny: 103, *Pócs* 6150.

* *Calypogeia afrocaerulea* E.W. Jones (fig. 5)
C. afrocaerulea has been collected in Tanzania

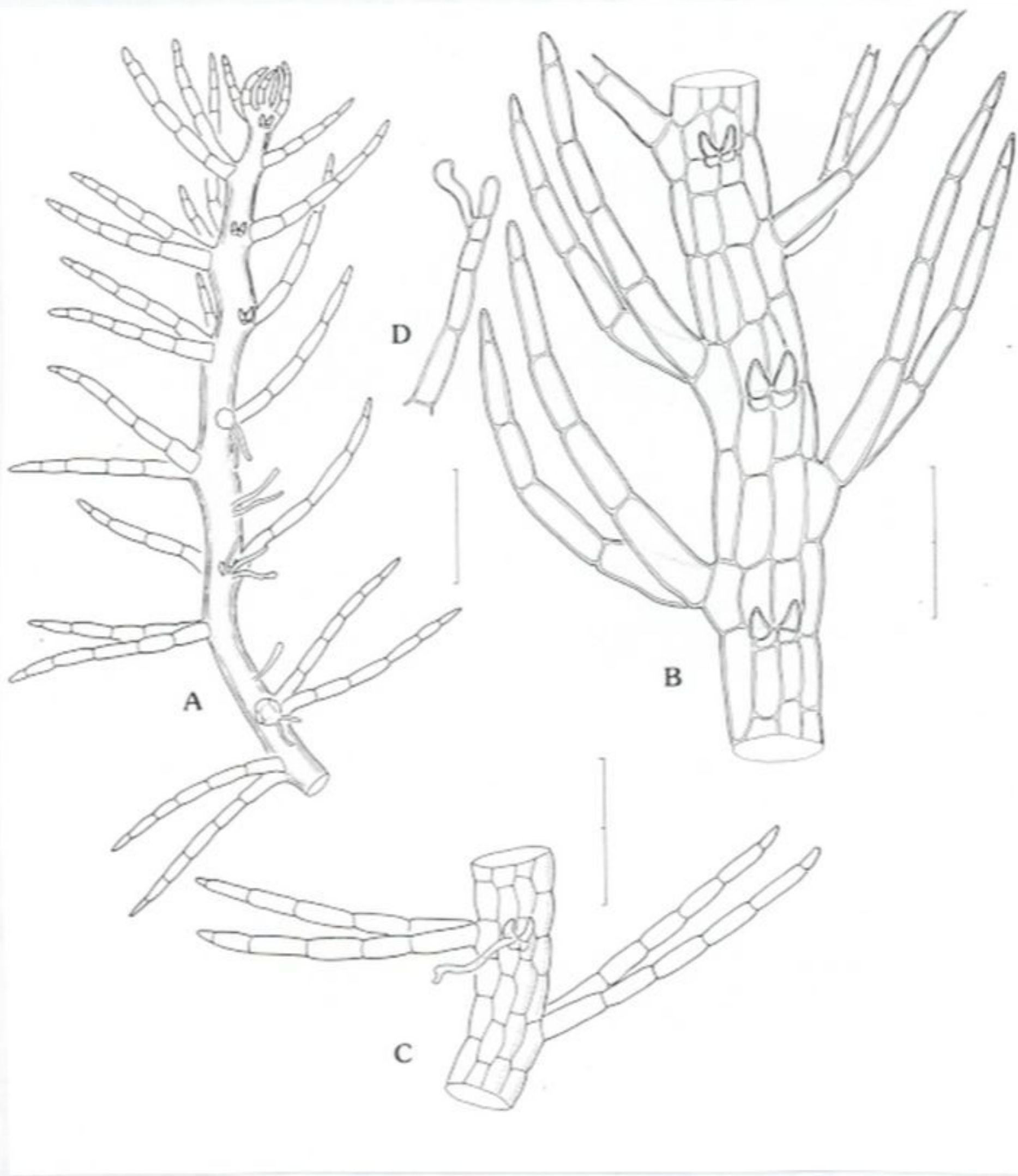


Fig. 4. *Arachniopsis diacantha*

A Shoot, ventral view. B-C Sector of shoot with leaves and amphigastria. D Apex of leaf segment. From *Fischer 6011*. Scale bars on A = 500 μm ; B, D = 100 μm ; C = 200 μm .

Rwanda: Pref. Byumba, gallery forest of the Akagera-Nile near Kagitumba, epiphytic on *Acacia mildbraedii*, Fischer 1250, 20.11. 1985.

JUBULACEAE

For a monograph of the family in Africa see Vanden Berghen (1976). One genus in Central Africa:

Frullania Raddi

Key to the species in Eastern Zaïre and Rwanda:

1 Lobules inflated throughout, the dorsal and ventral faces approximately equal in area, lobule connected to the lobe by a short fold at almost right angles to the stem.....2

1* Lobules inflated in the upper part only, the dorsal faces much larger than the ventral faces, with a large, flat region connected to the lobe by an arched fold, whose outer portions are subparallel to the stem (Subgenus *Chonantheria*)...10

2 Inflated lobules cylindrical, distinctly longer than broad (usually 1,5-3x as long as broad (Subgenus *Frullania*).....3

2* Inflated lobules caplike, very short and broad-cylindrical, often compressed at mouth, about as broad as long (lobules sometimes explanate and lanceolate) (Subgenus *Trachycolea*).....8

3 Leaf lobes acuminate or apiculate.....4

3* Leaf lobes ± rounded-obtuse.....7

4 Gynoecia at end of stem or prolonged branch, 1(-2) innovations, dorsal base of leaf lobe appendiculate, convex or truncate.....5

4* Gynoecia at end of short lateral branches, generally without innovations, dorsal base of leaf lobe convex or appendiculate.....6

5 Dorsal base of leaf lobe distinctly convex, amphigastria 3-5 x as large as the stem, frequently with decurved margins.....

.....*F. schimperi* Nees (Gisenyi)

5* Dorsal base of leaf lobe truncate or slightly convex, amphigastria 2-3 x as large as the stem, with plane margins.....*F. apicalis*

6 Primary branch appendage (hemiphyll) oval, not bilobed, leaf lobe apex generally exposed, lobe and lobule of female bracts ± entire, dioecious species.....*F. angulata*

6* Primary branch appendage bilobed, leaf lobe apex generally involute, lobe and lobule of female bracts densely lacinate or dentate.....*F. serrata*

7 Stylus well developed, with a crescent-shaped lamina and an setaceous appendage, leaf lobule frequently oblique in relation to stem.....*F. grossiclava* Stephani (Ruwenzori)

7* Stylus setaceous, triangular or ligulate, leaf lobule not oblique in relation to stem.....*F. imerinensis* Stephani (Nyungwe)

8 Perianth 3-carinate or 5-carinate, with 1 ventral carina, propagules rare or lacking.....9

8* Perianth with 2-5 ventral carinae, plants with abundant propagules developing from the marginal cells.....*F. obscurifolia*

9 Mid-leaf cells more than 30 µm long, robust plants, not squarrose in wet state, main leaves (1,4) 2-2,5 (2,8) mm wide, leaf lobule with an ± apiculate rostrum, amphigastria with cordate base, perianth smooth.....*F. caffraria* Stephani

9* Mid-leaf cells less than 30 µm long, less robust plants, squarrose in wet state, main leaves less than 2 mm wide, leaf lobule without an apiculate rostrum, perianth verrucose at base.....*F. ericoides*

10 Perianth (5)8-10-carinate, female bracts longly connate, inflated part of lobule shorter than large flat region.....*F. arecae*

10* Perianth 4-carinate, female bracts only shortly connate, inflated part of lobule usually longer or as long as the flat region.....*F. depressa*

The following species occur in other phytogeographic regions of Zaïre and are not keyed out here:

Subgenus *Frullania*

F. letestui Vanden Berghen (Bas Congo, Nsele, Vanden Berghen 1976), *F. eplicata* Stephani (Bas Congo, Haut Katanga, Vanden Berghen

(Kilimanjaro, Usambara), Cameroon and Sao Tomé. It can be recorded here as new to Zaïre and Rwanda. An easily distinguishable species in fresh state by the bright blue coloured oil bodies. It has probably been overlooked or mistaken for *C. fissa*. The specific status of *C. afrocaerulea* is uncertain and the species may well prove to be a synonym of the American *C. peruviana* Nees & Mont. (see Jones 1976, Gradstein, Pócs & Vana 1983). However, until a critical revision, *C. afrocaerulea* is kept here as a separate species. It has been observed on soil, sometimes on roadcuts between 2100 and 3100 m.

KB: 147, *Pócs* 7657, 7885.

Ny: 102, *Pócs* 6059; 103, *Pócs* 6119; 105, *Pócs* 6214.

* *Calypogeia fusca* (Lehmann) Stephani

Widespread species known from the Azores, Cameroon, Ethiopia, Uganda, Tanzania, South Africa and the Seychelles (Bischler 1970). Jones (1976) provides a record for Rwanda. It is here recorded as new to Zaïre. *Calypogeia fusca* grows preferably on soil and rotten wood and is quite frequent on roadcuts too. It was collected between 1500 and 2400 m.

KB: 126, *Pócs* 6838; 128, *Pócs* 7395.

Ny: Uwinka, Newtonia Forest, 2000 m, *Fischer* 622, 10. 1988.

ADELANTHACEAE

One genus in Central Africa

Adelanthus Mitt.

Key to the species in Central Africa:

1 Leaves with 1 to 3 teeth at the margin, sometimes with entire margin.....*A. decipiens*

1* Leaf margin with numerous teeth*A. lindenbergianus*

Adelanthus decipiens (Hooker) Mitten

In Africa, the species is restricted to the East African Mountains, but it occurs in Europe and South America as well. It has been collected as

epiphyte on bark of *Hypericum* and *Erica* and as lithophyte on rocks between 2630 and 3700 m elevation.

KB: 131, *Frey & Kürschner* 6921a; 132, *Pócs* 7111; 132, *Pócs* 7178; 144, *Frey & Kürschner* 7675; 148, *Frey & Kürschner* 7469; 148, *Pócs* 7889.

Ny: 103, *Pócs* 6175.

Ka: 159, *Pócs* 8125; 162, *Pócs* 8207.

* *Adelanthus lindenbergianus* (Lehm.) Mitten
Known from Zaïre it is recorded here as new to Rwanda. Growing usually as epiphyte on bark of *Agauria* and *Erica*, occasionally on ground between 2400 and 3200 m.

KB: 128, *Pócs* 7345; 148, *Frey & Kürschner* 7457; 148, *Pócs* 7754, 7763, 7808, 7891, 7893; 149, *Pócs* 7749.

Ny: Uwinka, on bark of *Agauria salicifolia*, *Fischer* 764, 10. 1985.

PORELLACEAE

One genus in Central Africa:

Porella L

For a survey of *Porella* in tropical Africa see Jones (1963)

Key to the species in Central Africa:

1 Underleaves 2 - 2,5 times the width of the stem, plant yellowish or brownish, leaves, lobules and underleaves entire, very robust.....*P. abyssinica* (Shaba)

1* Underleaves 1 - 1,6 times the width of the stem, plant greenish, lobes, lobules and underleaves ± dentate.....*P. subdentata*

***Porella subdentata* (Mitten) Jones

In Central Africa, it was known from the Zaïre basin (District Forestier Central), from Lake Tanganyika region and Shaba. It is reported as new to Kahuzi-Biega and Rwanda. A variable species growing in rain forests or gallery forests preferably as epiphyte or on rocks.

KB: 119, *Pócs* 6609; 125, *Pócs* 6732; 126, *Frey & Kürschner* 6704.

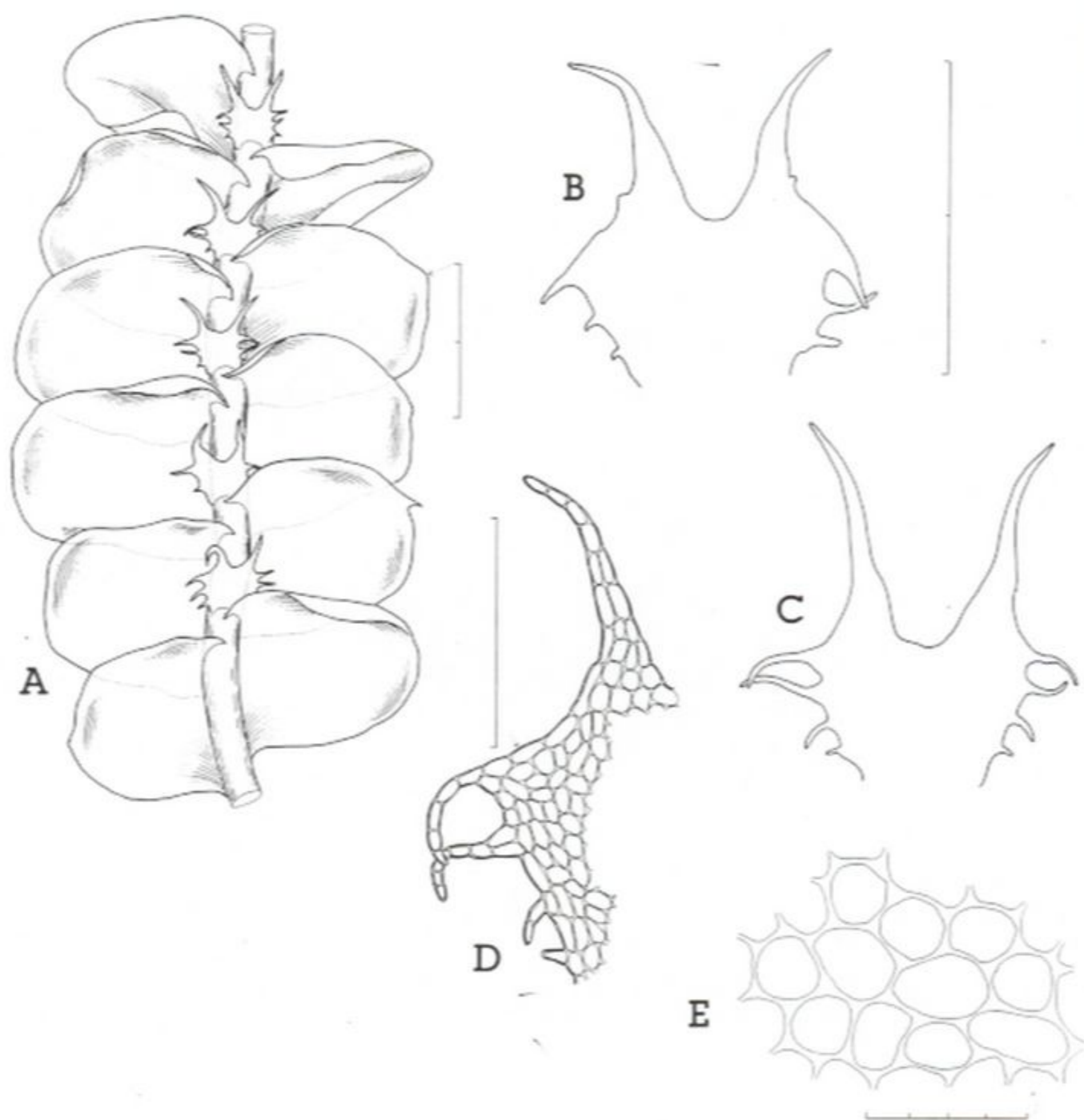


Fig. 5. *Calypogeia afrocoerulea*

A Shoot, ventral aspect. B-D Leaves. E,L Leaf apex. F-K Amphigastria. M Median cells with oil bodies. From *Fischer 2733*. Scale bars on A = 1 mm; B-D = 500 μm ; E,L = 250 μm ; F-I = 500 μm ; J-K = 300 μm ; M = 60 μm .

1976)

Subgenus *Homotropantha*

F. nodulosa (Reinw., Blume & Nees) Nees (Forestier Central, Vanden Berghen 1976)

Subgenus *Chonantheria*

F. africana Stephani (Mayombe, Vanden Berghen 1976)

Subgenus *Trachycolea*

F. socotrana Mitten (Haut Katanga, Vanden Berghen 1976), *F. spongiosa* Stephani (Mayombe, Forestier Central, Vanden Berghen 1976), *F. trinervis* (Lehm. & Lindenb.) Gottsche, Lindenbergh & Nees (Bas Congo, Haut Katanga, Vanden Berghen 1972, 1976)

Frullania variegata Stephani, known from Burundi, may well be a synonym of *F. obscurifolia* Mitten.

Frullania apicalis Mitten

F. apicalis is known in Africa from the mountain areas in West Africa (Mt. Loma, Mt. Nimba, Cameroon Mountain), the islands Fernando Po and Sao Thomé in the Gulf of Guinea and the East African Mountains. It has previously been collected on Mt. Biega and in the Nyungwe forest. The species is growing mainly as epiphyte, rarely on rocks between 2020 and 2650 m.

Ny: 106, *Fischer* 6275; 110, *Pócs* 6499, 6500, 6502; 112, *Frey & Kürschner* 7947, 7949.

KB: 132, *Pócs* 7186; 143, *Frey & Kürschner* 7418; 144, *Frey & Kürschner* 7513 p.p.; 145, *Frey & Kürschner* 7488, *Pócs* 7644

Frullania angulata Mitten

F. angulata is known from Nigeria, Cameroon, the islands of the Gulf of Guinea, Angola, Zaïre, Rwanda, Burundi, Kenya, Tanzania, Malawi, Mozambique and Zimbabwe. It has been collected on Mt. Kahuzi and Biega and in the Nyungwe forest. The species is easily distinguishable in the field by its pendulous growth form. It is growing as epiphyte on small branches and has been observed between 2000 and 2500 m.

Ny: 102, *Pócs* 6077; 112, *Frey & Kürschner* 7946; 155, *Frahm* 7964, 7965, *Pócs* 8023.

KB: 132, *Frey & Kürschner* 6909; 133, *Frey & Kürschner* 6965, 6969b; 139, *Frey & Kürschner* 7025, *Pócs* 7297; 144, *Frey & Kürschner* 7544,

Pócs 7815; 145, *Frey & Kürschner* 7498.

Frullania serrata Gottsche

This species is known from Cameroon, Sao Thomé, Uganda, Zaïre, Rwanda, Tanzania, Zimbabwe and South Africa. It is growing as epiphyte on trunks of trees, on branches and occasionally on rocks between 2000 and 2700. **Ny:** 101, *Fischer* 6012; 102, *Fischer* 6054; 103, *Frahm* 6114, *Pócs* 6138; 104, *Pócs* 6208a; 106, *Frahm* 6289.

KB: 132, *Frahm* 6943, *Pócs* 7178, *Pócs* 7194; 133, *Pócs* 7219; 135, *Frey & Kürschner* 7003; 141, *Frahm* 7051; 142, *Pócs* 7353; 145, *Frey & Kürschner* 7494; 148, *Frey & Kürschner* 7475c.

Frullania obscurifolia Mitten

F. obscurifolia is widely distributed in Africa, known from Sierra Leone, Ghana, Nigeria, Cameroon, Annobon, Angola, Ethiopia, Kenya, Uganda, Zaïre, Rwanda, Burundi, Tanzania, Zambia, Zimbabwe and South Africa. It can be reported here as new for the Kahuzi-Biega area and Nyungwe forest. It has been observed as epiphyte, rarely rupicolous between 1300 and 2500 m.

Ny: 102, *Pócs* 6038, 6056, 6070, 6099.

KB: 118, *Frey & Kürschner* 6547, *Pócs* 6560; 128, *Frey & Kürschner* 7322; 138, *Pócs* 7270; 139, *Frey & Kürschner* 7036b; 139, *Frey & Kürschner* 7043, 7044, *Pócs* 7277; 144, *Pócs* 7779.

Ka: 168, *Pócs* 8065.

Ak: 171, *Pócs*, 8371, *Fischer* 8372, *Pócs* 8381 p.p.

Frullania ericoides (Nees) Montagne

One of the most widespread species, known from West, Central, East and South Africa and some atlantic islands (Canary Islands, Capverdes). It can be recorded here as new to the Kahuzi-Biega area. *Frullania ericoides* is extremely variable and it occurs both on rocks and on bark of trees from 1300 to 2500 m.

KB: 118, *Frey & Kürschner* 6535, *Pócs* 6554, 6563.

Ka: 168, *Pócs* 8311.

Ak: 100, *Pócs* 8000; 171, *Pócs* 8377, 8381, *Fischer* 8378, 8399.

Frullania depressa Mitten

F. depressa is known from the mountain areas of Sierra Leone (Mt. Loma), Nigeria, Cameroon (Cameroon Mountain), Ethiopia, Zaïre (Kivu), Rwanda, Burundi, Kenya (Mt. Kenya, Aberdare, Cherangani hills), Tanzania (Kilimanjaro, Mt. Meru, Usambara Mts.), Zimbabwe (Inyanga, Vumba) and South Africa. It can be reported here as new to the Kahuzi-Biega area. The species is growing as epiphyte, eg. on bark of *Erica* between 2330 and 2500 m.

Ny: 101, *Fischer* 6013, 6014; 102, *Fischer* 6055; 112, *Frey & Kürschner* 7942; 115, *Pócs* 6513.

KB: 128, *Frey & Kürschner* 7330, *Pócs* 7391; 139, *Frey & Kürschner* 7036a; 144, *Frey & Kürschner* 7511, 7513 p.p.

Frullania arecae (Spreng.) Gottsche

A widespread species known from Sierra Leone, Nigeria, Cameroon, Sao Thomé, Ethiopia, Zaïre, Rwanda, Burundi, Uganda, Kenya, Tanzania, Malawi, Mozambique, Zimbabwe and South Africa. *Frullania arecae* is growing as epiphyte, e.g. on *Arundinaria*, *Erica* and *Senecio johnstoni*, occasionally on ground or roadcuts. It has been observed from 2200 m up to the paramo at 3600 m.

Ny: 102, *Fischer* 6053; 103, *Pócs* 6147; 115, *Pócs* 6511.

KB: 118, *Frey & Kürschner* 6541, *Pócs* 6551; 128, *Frey & Kürschner* 7321, 7338; 132, *Frey & Kürschner* 6912; 133, *Frey & Kürschner* 6973; 135, *Frey & Kürschner* 6983; 136, *Pócs* 7251; 139, *Frey & Kürschner* 7028; 144, *Pócs* 7854, 7855; 145, *Frey & Kürschner* 7490, *Frahm* 7674.

Ka: 159, *Pócs* 8188; 162, *Pócs* 8101, 8321.

MARCHANTIACEAE

In the present paper only *Dumortiera* is dealt with. For *Marchantia* and *Asterella* see the treat-

ment of Bischler & Long in this volume.

Dumortiera Nees

Only one species in Central Africa:

Dumortiera hirsuta (Swartz) Nees

A widespread species known from Europe, North, Central and South America, Cameroon, East Africa and Tropical Asia. In the Expedition area, it has been collected from 850 to 2000 m on soil and roadcuts, mainly near rivers and stream under humid air conditions.

KB: 118, *Fischer* 2432, 2.10. 1988.

Ny: 109, *Frahm* 6391; 113, *Pócs* 6470, 6471, *Frahm* 6491.

POLYTRICHACEAE

For a survey of the African species see De Sloover (1979, 1986)

Key to the genera in Central Africa:

- 1 Lamellae sinuose.....*Oligotrichum*
 1* Lamellae straight.....2
 2 Capsule usually at least obscurely angled, apophysis present.....*Polytrichum*
 2* Capsule not angled, apophysis absent.....
*Pogonatum*

Oligotrichum Lam. & Cand.

One species in Central Africa

Oligotrichum cavallii (Negri) G.L. Smith

For full synonymy, description and illustration see De Sloover (1979).

An afroalpine species growing generally on soil. In Central Africa, it is known from the Ruwenzori Mountains and the Virunga Volcanoes. In Rwanda, it has been previously collected on Sabinyo.

Ka: 162, *Pócs* 8287.

Polytrichum Hedw.

Key to the Central African species:

1 Leaf margin \pm revolute, leaves ending in a toothed hyaline hair.....*P. piliferum*
 1* Leaf margin not revolute, leaves not ending in h y a l i n e hair.....2

2 Marginal cells of the lamellae nearly bifid in transverse section, lamellae with papillose or crenulate margin, leaf margin sometimes papillose and presenting small teeth between the main teeth.....*P. subpilosum*
 2* Marginal cells of the lamellae semi-circular in transverse section, lamellae with rectilinear margin, leaf margin generally straight between the teeth.....*P. commune*

Polytrichum piliferum Schreb. ex Hedw.

In Africa, *P. piliferum* is restricted to mountain areas above 2400 m. It prefers open, rocky places in the paramo and the Ericaceous belt.

KB: 137, *Frahm* 6948

Ka: 165, *Pócs* 8123, *Frahm* 8298

Polytrichum subpilosum P. Beauv.

Widely distributed in localities with scarce vegetation cover in mountain forests, bamboo, the Ericaceous belt up to the paramo.

Ny: 106, *Frahm* 6231.

Polytrichum commune L. ex Hedw.

In mountain forest area mainly in swamps with *Cyperus* or *Sphagnum* and in Ericaceous shrub vegetation. The most frequent species of *Polytrichum* in Rwanda and eastern Zaïre.

KB: 132, *Pócs* 7188; 134, *Pócs* 7226; 137, *Frahm* 6955; 145, *Pócs* 7590; 148, *Pócs* 7894.

Ny: 102, *Frahm* 6109, 6110.

Pogonatum P. Beauv.

Key to the Central African species:

1 Marginal cells of the lamellae distinctly differentiated, walls thicker than those of the lower cells, with quadrangular-rounded or triangular rounded shape in transverse section.....2
 1* Marginal cells of the lamellae not differentia-

ted or only a bit larger than the lower cells, walls not thicker than those of lower cells, with rounded or oval lumen in transverse section.....3

2 Marginal cells of the lamellae with triangular rounded lumen in transverse section, with papillose or generally very papillose wall.....*P. urnigerum*

2* Marginal cells of the lamellae with quadrangular rounded lumen in transverse section, walls smooth.....*P. simense* (C. Muell.) Jaeg. (in mountain forest and the Ericaceous belt, known from Karisimbi and Muhavura in Rwanda and Bugarama in Burundi)

3 Marginal cells of leaf forming a dark band, sometimes indistinctly marked, mid-leaf-cells often longer than large.....4

3* Marginal cells never forming a dark band, mid-leaf-cells isodiametric or sometimes larger than long

4 Shoot not reaching 1,5 cm of height, leaves appressed in dry state, free part of leaf (not covered by lamellae) 10 cells large at maximum

4* Shoot generally higher than 1,5 cm, leaves not appressed to shoot in dry state, free part of leaf (not covered by lamellae) at least 10 cells large.....*P. semilamellatum* Leroy (known from rainforest at lower altitudes, in Zaïre: Mayombe, Forestier Central, Lacs Edouard et Kivu)

5 Plants rigid, often brown or reddish, 1,5 - 5 (8) cm high, leaves generally 4 mm long, incurved or sometimes slightly crisped in dry state.....6

5* Plants smooth, intensively green coloured, 2 - 10 cm high, leaves more than 5 mm long, straight and \pm crisped in dry state.....7

6 Leaf-lamellae with eroded or crenulate margin, marginal cells often irregularly divided and with more slender walls than those of the cells below.....*P. mollerii* (C. Muell.) Paris (known from Ruwenzori, Mt Biega and Mt Sabinyio)

6* Leaf-lamellae with straight, rectilinear mar-

gin, marginal cells not divided and their walls as thick as those of the cells below.....*P. belangeri*

7 Leaf with 12 - 25 lamellae, occupying at maximum 3 times the latitude of the nerve, lamellae 1-2 (3) cells high.....

.....*P. ugandae* P. Varde (known from Nyungwe Forest in Rwanda and the type locality in Uganda)

7* Leaf with 30 - 60 lamellae, occupying more than 3 times the latitude of the nerve, lamellae (2) 3-4 cells high.....*P. rubenti-viride*

Pogonatum urnigerum (Hedw.) P. Beauv.

A mountain species, growing from 2500 to 4200 m in mountain forest, the *Hagenia* and Ericaceous belt up to the Paramo, frequently on volcanic rock.

Ka: 159, *Pócs* 8201

Pogonatum belangeri (C. Muell.) Jaeg.

Mainly a pioneer species on open places, roadcuts and on rocks in mountain forests from 1500 to 2400 m. Easily to distinguish from *P. mollerii* in transverse section of leaf by the non-ramified lamellae.

Ny: 112, *Frahm* 6459; 154, *Pócs* 8019

Pogonatum rubenti-viride (C. Muell.) Paris

A pioneer species on roadcuts, in tea plantations and on rocks in mountain forest areas. Easily to distinguish from *P. ugandae* by the number of lamellae and the number of cells per lamellae.

KB: 128, *Pócs* 7393.

Ny: 108, *Pócs* 6378; 153, *Pócs* 8025.

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