

## Taxonomic Results of the BRYOTROP Expedition to Zaire and Rwanda

### 12. Metzgeriaceae, Plagiochilaceae, Lejeuneaceae (the non-epiphyllous collections)

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#### Abbreviations::

\* 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).

the classification of subgeneric taxa (1978) and synonymized several African taxa with other known species (1986), so the known distribution of several African *Metzgeria* considerably widened.

At present 21 *Metzgeria* species are known from Subsaharan Africa, of which 14 occur in Central and East Africa, as seen from the key below, based mostly on Kuwahara (1978) and Vanden Berghen (1948, 1960), using vegetative characters.

This key should be considered, as tentative, because African *Metzgeria* still badly needs an up to date revision.

#### METZGERIACEAE

The African Metzgeriaceae were reviewed first by Vanden Berghen (1948) who himself described two new species (1951, 1953) and supplied a key for the Central African taxa (Vanden Berghen 1960). Kuwahara described *Metzgeria agnewii* from the Aberdare Mts. in Kenya (1973), established

#### **Metzgeria in Central and in East Africa**

1 Thallus branches of two forms, one strongly tapered with acute ends and the other non tapered with broad lamina and rounded ends. The thallus branches with tapering wing have both laminal gemmae (strongly concave or plane) concentrated along the tapering thallus ends and mucilaginous gemmae produced at thallus apices. All species in our area have only 2 rows of cortical

- cells on both sides of the midrib (increasing up to 4 only near to the thallus apices). (Subgen. *Biformia* Kuw.).....2
- 1\* Thallus uniform consisting of only non tapered branches with broad lamina and rounded, obtuse or emarginate apices.....4
- 2 Dry thallus or at least the thallus apices or gemmae blue. The female involucre develop into ordinary vegetative thallus branches at the base of calyptra.....*M. agnewii* Kuw.
- 2\* Dry thallus yellowish green. No thallus like involucre present.....3
- 3 Lamina 13-40 cells wide at the non tapered part of thallus, median lamina cells 25-55 x 18-37  $\mu\text{m}$ , gemmae strongly concave.....*M. consanguinea* Schiffn.
- 3\* Lamina 11-25 cells wide at the non tapered part of thallus, median lamina cells larger, 40-90 x 30-48  $\mu\text{m}$ , gemmae plane.....*M. attenuata* Steph.
- 4 Gemmae produced on the dorsal thallus surface (Subgen. *Suprigemma* Kuw.).....5
- 4\* Gemmae produced along the thallus margin or no gemmae. (Subgen. *Metzgeria* Kuw.).....6
- 5 Cortical cells of the midrib in 2-4 rows on the dorsal and in 4 (-6) rows on the ventral side. Hairs on thallus margin usually absent or if present, scarce and single. Discoid gemmae with hamati-form (hooked or at least slightly curved) hairs on their ventral side. ....*M. nudifrons* Steph.
- 5\* Cortical cells of the midrib in 2 rows on the dorsal and in 2-4 rows on the ventral side. Thallus margin with 100-180  $\mu\text{m}$  long, isolated or sometimes geminate hairs. Discoid gemmae with growing point on one or two ends and with short, straight marginal hairs. ....*M. propagulifera* Vand.Bergh.
- 6 Dorsal cortical cells of the midrib in 2-6 rows. Midrib 100-180  $\mu\text{m}$  broad.....7
- 6\* Dorsal cortical cells always in 2 rows (except near branching points). Midrib 45-110  $\mu\text{m}$  broad.....10
- 7 Dorsal cortical cells in 2-4, ventral cortical cells in 3-5 rows.....8
- 7\* Dorsal cortical cells in 4-6 (newer in 2), ventral cortical cells in 3-5 rows. Yellowish green or golden yellow plant with 1-1.8 mm wide, convex thallus branches, with 120-320  $\mu\text{m}$  long, paired, often incurved marginal hairs. Thallus ends often with bluish tinge.....*M. muscicola* Steph.
- 8 Thallus bluish, 1-1.5 mm wide. The lamina is glabrous on both sides, with 180-320  $\mu\text{m}$  long, arched, geminate hairs on the margins. Gemmae not known..... *M. hedbergii* Vand.Bergh.
- 8\* Thallus yellowish green, the lamina at least ventrally sparsely hirsute, with 60-180 (-250)  $\mu\text{m}$  long, arched, geminate hairs on its margins.....9
- 9 Thallus 0.9-1.2 mm wide with 90-120  $\mu\text{m}$  thick midrib composed of 16 medullary cells with thickened walls in transversal section. Flat, unnerved, disciform gemmae are produced on the thallus margin with 45-100  $\mu\text{m}$  long, bristle like marginal hairs. ....*M. quadrifaria* Steph.
- 9\* Thallus 1.2-2.2 mm wide with 80-150  $\mu\text{m}$  thick midrib, composed of 10-31 thin walled medullary cells. The cortical cells are larger, often swollen. Gemmae are not produced. ....*M. rufula* Spr.
- 10 Ventral cortical cells in 2-4 rows, midrib 80-180  $\mu\text{m}$  wide.....11
- 10\* Ventral cortical cells always in 2 rows except branching points. Midrib 45-110  $\mu\text{m}$  wide. ....12
- 11 Thallus margin mostly with single hairs and with abundantly developing disciform, hair-

less, unnerved gemmae of 100-140 µm diameter. The ventral lamina surface glabrous or with scattered, isolated hairs..... *M. elliotii* Steph.

11\* Thallus margin mostly with geminate hairs. Gemmae, if rarely develop on the margin, are ribbonlike, thalliform with midrib differentiated. The ventral surface of the lamina, especially near the margins, is more hairy. The ventral side of the midrib with dense, bristlelike hairs.....*M. limbato-setosa* Steph.

12 Thallus margin with abundant, geminate hairs. Midrib 80-110 µm wide.....13

12\* Thallus margin with less abundant, single hairs. Midrib 65-90 µm wide.....14

13 Thallus strongly convex or inrolled, with strongly arched marginal hairs longer than 200 µm.....*M. leptoneura* Spruce

13\* Thallus less convex, margin with shorter, bristle like, straight geminate hairs. ....*M. australis* Steph.

14 Thallus 1-1.4 mm wide, flat or slightly convex, with abundantly developing, flat, thalliform, unnerved marginal gemmae. Both thallus and gemmae margin with sparse, short, single, bristlelike hairs.....  
.....*M. decipiens* (Mass.) Schiffn.

14\* Thallus 0.8-1 mm wide, strongly convex with abundant, cupshaped gemmae at the inrolled margin. The marginal of the strongly convex gemmae with a few short, straight hairs. ....*M. convexa* Vand. Bergh.

### *Metzgeria* Raddi

\* *Metzgeria agnewii* Kuw.

The delimitation of this species is easy, when the whole thallus has a distinct bluish coloration. When the bluish tinge is restricted to the thallus apices or only to the gemmae, sometimes it is difficult to delimit from *M. consanguinea*. In this case the very dense and regular arrangement of

the gemmae at tapering thallus apices and the presence of thalliform involucri at the base of calyptrae proves to be useful to distinguish *M. agnewii* from the related *M. consanguinea*, where the gemmae are irregularly scattered at the thallus apices and thalliform involucri are absent (Kuwahara 1973). Some other characters given by Kuwahara (1986), as the thick walled median line on capsule valves of *M. agnewii* and the papilla like protuberances on the gemmae of *M. consanguinea*, seem not to be stable on the investigated African specimens.

*M. agnewii* was described quite recently from the Aberdare Mts. in Kenya (Kuwahara 1973), then became known from most East African volcanoes along the Rift Valley (Bizot & Pócs 1980, Pócs 1990), and even in the South American Andes (Kuwahara 1986), showing typical Andean - Afroalpine-Afromontane distribution pattern. It occurs in the upper montane, ericaceous and in paramo belts between 2500- 4400 m altitude, on (mostly ericaceous) bark and twigs and on giant Senecios.

The species is hitherto known only from Kenya, Tanzania, Uganda and from the Peruvian Andes (see map in Kuwahara 1986:38).

**Ka:** 158, *Pócs 8051*; 161, *Pócs 8190*; 164, *Pócs 8112*. **Ny:** 102, *Pócs 6104*.

*Metzgeria australis* Steph.

This species was known from tropical Africa under the names of *M. madagassa* Steph. and *M. thomeensis* Steph. until Kuwahara (1986) proved its identity with the Pantropical *M. australis* Steph. It is widespread all over tropical and South Africa, in the montane (seldom up to the paramo) belt; in our area between 1930 and 4190 m, on the bark of very different trees and other woody species, like bamboo and Senecio.

**KB:** 112, *Pócs 6442*; 131, *Frey & Kürschner 6915*, *Pócs 7121*; 142, *Pócs 7629pp.*; 144, *Frey & Kürschner 7535*; 145, *Frey & Kürschner 7503*, *Pócs 7648*; 147, *Pócs 7729*; 148, *Frey & Kürschner 7468*; 152, *Pócs 7816*. **Ka:** 163, *Pócs 8080*. **Ny:** 110, *Frey & Kürschner 7924*; 111, *Frey & Kürschner 7911*; 112, *Frey & Kürschner 7935*.

\**Metzgeria consanguinea* Schiffn.

A Pantropical species, related to *M. agnewii* (differences discussed there).

It occurs mostly on ericaceous twigs and bark and on bamboo nodes in the montane and subalpine belts, between 2100 and 3560 m.

**KB:** 128, *Frey & Kürschner 7326, 7328*; 130, *Pócs 7089*; 143, *Frey & Kürschner 7420*; 140, *Pócs 7583*. **Ka:** 161, *Pócs 8173*; 162, *Pócs 8194, 8254*. **Ny:** 101, *Fischer 6023*.

*Metzgeria nudifrons* Steph.

A Southern African species previously known from Cape, Natal, Zimbabwe, Zaire: Shaba and from Tanzania: Ukaguru Mts., Mandege Forest Station (new record). Very easy to recognize, being the only species in Central Africa with superficial gemmae. In our area corticolous in montane evergreen forest.

**KB:** 142, *Pócs 7359pp., 7629pp.* (associated with *M. australis*)

*Metzgeria leptoneura* Spr.

An oceanic subcosmopolitan species better known under the illegitimate name of *M. hamata* Lindb. It occurs on bark (including giant Senecios), twigs, rotten wood, on roadcut surface and under rock overhang from the montane forest to the Afroalpine paramo belt, at 1930-4150 m altitude.

**KB:** 128, *Pócs 7365*; 130, *Pócs 7096*; 145, *Frahm 7668*; 148, *Pócs 7877*; 149, *Pócs 7725*; 152, *Frey & Kürschner 7518*. **Ka:** 159, *Pócs 8244*; 162, *Pócs 8130*; 163, *Frahm 8046*; 164, *Pócs 8128*. **Ny:** 108, *Pócs 6382*.

*Metzgeria limbato-setosa* Steph. in Mildbr.

Widespread in the Central and East African mountains and in South Africa. Grows on bark and branches throughout the forest belt from the tropical lowland (900m) up to the forest line at 3000 m.

**KB:** 120, *Frey & Kürschner 6595*; 123, *Frey & Kürschner 6671*; 131, *Pócs 7123*; 0133, *Frey & Kürschner 6972*; 145, *Frey & Kürschner 7497*. **Ny:** 103, *Pócs 6137, 6141, 6145, 6184*; 108, *Pócs 6370*; 112, *Frey & Kürschner 7937*.

\* *Metzgeria muscicola* Steph.

This rare Afromontane-Afroalpine species was known from Mt. Cameroon, from the Ruwenzori Mts. and from the Nyiragongo volcano, between

2300 and 4200 m altitude, in the montane forest and in the Afroalpine subparamo and paramo belts. Along its golden yellow color (which can occur also by other species) it is easily recognizable and unique in Africa due to the cortical cells arranged in several rows at both sides of the costa. Vegetative propagation of this species was unknown before: flat, ribbonlike, unnerved thalliform gemmae occur at the thallus margin (specimen No. 6531). There are bristle like, rigid hairs at the gemma margin.

**KB:** 118, *Frey & Kürschner 6531*. **Ka:** 161, *Pócs 8273*; 162, *Frahm 8260*.

## PLAGIOCHILACEAE

*Plagiochila* (Dumort.) Dumort.

The tropical African species were first thoroughly revised by Jones (1962), who also made some additional notes (Jones 1980). A more recent treatment on the Madagascar - Mascarene species was published by Vanden-Berghen (1981). As both authors prepared keys for the species and by the combination of their keys is possible to identify practically all tropical African taxa, I do not supply a key here for the 15 species collected in Central Africa:

\* *Plagiochila barteri* Mitt.

Widespread Afromontane species known from Sierra Leone and Sao Tomé to East Africa, Madagascar and the Mascarenes. New to Rwanda. It occurs in the montane rainforests from 700 to 2100 m altitude in its typical form, with shoot up to 3.5 mm width and leaves up to 3 mm length, with shortly decurrent postical base. Above this altitude, between 2100 and 3200 m larger forms occur with all transitions to *Plagiochila colorans* Steph., as their shoot is 4-7 mm broad, their leaves are 3-4 mm long. Then the "typical" *Plagiochila colorans*, with 7-10 mm broad shoots, 4-5 mm long leaves with far decurrent postical base occurs in the subparamo (Ericaceous) and in the paramo (Afroalpine) belt, usually above 3000 m altitude

(upto 3900m). Taking in account, that the transition between the two taxa is absolutely continuous and *Plagiochila colorans* is restricted to geographically and altitudinally isolated Afroalpine habitats, it deserves the rank of a subspecies under *Plagiochila barteri*. Other characters, like the presence or absence of the teeth on the postical base or on the antical margin, are shared by the two subspecies equally. The character giving giving the name of *P. colorans*, the deep yellow, water soluble pigment is common again by both taxa as by many other African species too (cf. Jones 1962: 280). The giganteism of an Afroalpine subspecies of a more widespread montane taxa is analogous to *Chandonanthus hirtellus* (Web.)Mitt. and its ssp.*giganteus* (Steph.) Vanden Berghen.

ssp.*barteri*

**Ny:** 107, *Pócs 6318*; 155, *Pócs 8026*.

ssp.*colorans* (Steph.)Pócs **comb.nov.**

basionym: *Plagiochila colorans* Steph. in Mildbraed, Wiss. Ergebn. Deutschen Zentral-Afrika Expedition II: 116 (1911). Type: Zaire, Ruwenzori, Butagu valley, on Ericabark, at 3300 m alt., Mildbraed 2602, G.

**KB:** 132, *Frey & Kürschner 6901, Pócs 7112*; 148, *Frey & Kürschner 7463, Frahm 7552*; 149, *Frey & Kürschner 7434, Pócs 7812*. **Ka:** 159, *Pócs 8203a, 8302*; 162, *Pócs 8135*; 167, *Fischer 8078, 8305*.

Transitional forms between ssp. *barteri* and ssp. *colorans*:

**KB:** 143, *Pócs 7752*; 148, *Pócs 7809*; 149, *Frey & Kürschner 7428, 7443, 7446*.

\* *Plagiochila corniculata* (Dum.) Dum.

Very disjunct oceanic subcosmopolitan species (see map by Inoue 1980), known from tropical Africa only in Taita Hills (Kenya), on Mt.Kilimanjaro and on Mt.Meru, mostly from the upper montane forest and from the subalpine ericaceous belt, between 2200 and 3300 m (Arnell 1963, Bizot, Pócs & Sharp 1985). Schuster (1959, 1980) describes and considers the African taxon, as different, under the name of *Plagiochila lophophora* Schust., but Inoue (1980) synonymized the

two taxa.

**KB:** 145, *Frey & Kürschner 7496a & b pp.*; 149, *Frey & Kürschner 7435, 7438, Pócs 9597*.

*Plagiochila divergens* Steph.

Widespread East African montane species known from eastern Zaire to Ethiopia and to Madagascar in the montane forest belt between 1500 and 3000 m. **KB:** 144, *Frey & Kürschner 7532*; 152, *Frey & Kürschner 7522*.

var.*myriocarpa* (Pears.) E.W.Jones

**KB:** 118, *Frey & Kürschner 6525*; 126, *Frey & Kürschner 6697*; 131, *Frey & Kürschner 6917*; 143, *Frey & Kürschner 7413, Pócs 7804*. **Ny:** 110, *Frey & Kürschner 7920*; 111, *Frey & Kürschner 7903*.

*Plagiochila ericicola* Steph.

An endemic species of the Afroalpine ericaceous belt, between 2150 and 3500 m, known from Ruwenzori, Muhavura and Kilimanjaro. **KB:** 145, *Frahm 7896, Frey & Kürschner 7489a, Pócs 7715, 7755*; 148, *Frey & Kürschner 7458, Pócs 7805*.

\* *Plagiochila fusifera* Tayl.

A widespread tropical African forest species from Senegambia to Zimbabwe and to Yemen, occurring from the sea level to 2600 m, new to Zaire and Rwanda. **KB:** 118, *Pócs 6556*; 123, *Frey & Kürschner 6657*; 126, *Frey & Kürschner 6689, 6699*; 143, *Frey & Kürschner 7408, Pócs 7786*; 144, *Frey & Kürschner 7547*. **Gishwati F. W of Gakarava:** 168, *Frahm 8292*. **Ny:** 111, *Frey & Kürschner 7898*.

*Plagiochila heterostipa* Steph.

A quite disjunct tropical African forest species known from Zaire to Madagascar, in our area between 1900 and 2500 m altitude.

**KB:** 130, *Pócs 7081*; 152, *Frey & Kürschner 7516*. **Ny:** 113, *Pócs 6478*.

\* *Plagiochila integerrima* Steph.

A widespread tropical African forest species



common near watercourses, in our area between 900 and 2400 m, previously unknown from Rwanda. **KB:** 122, *Pócs* 6810; 152, *Pócs* 7800, 7825, 7851. **Ny:** 105, *Pócs* 6218; 108, *Pócs* 6377; 110, *Frey & Kürschner* 7927.

*Plagiochila lastii* Mitt.

East African montane forest species, known from Zaire to Ethiopia and to Malawi, between 1800 and 3500 m. **KB:** 133, *Pócs* 7195; 138, *Pócs* 7265.

*Plagiochila neckeroidea* Mitt.

West African lowland species, known from Ivory Coast to Zaire in equatorial forest, below 1300 m. It was not known so far to east as **KB:** 124, *Frey & Kürschner* 6675b.

\* *Plagiochila pectinata* (Willd.) Lindenb.

A very disjunct tropical African montane rainforest species known only from Sao Tomé, Sierra Leone, Ghana, Tanzania (Uluguru Mts., Jones & Harrington 1983), Comores, Madagascar and the Mascarenes, new to Central Africa. It grows in our area between 1300 and 3200 m. **KB:** 125, *Pócs* 6631, 6723, 6730; 148, *Pócs* 7863, 7890.

\* *Plagiochila praemorsa* Steph.

A West African species distributed in the equatorial forests from Sierra Leone to Zaire, from sea level to 1500 m altitude. The localities below are its easternmost occurrences: **KB:** 120, *Frey & Kürschner* 6593; 123, *Pócs* 6765.

*Plagiochila salvadorica* Steph.

A West African lowland rainforest species related to *P. neckeroidea*, hitherto known only from Angola, Sierra Leone, Ghana, the Central African Republic and from central Zaire. **KB:** 119, *Pócs* 6868; 120, *Frey & Kürschner* 6575; 123, *Pócs* 6786; 124, *Pócs* 6782.

*Plagiochila squamulosa* Mitt.

A very widespread afro-montane species known from Cameroon to Cape and Réunion and even to the Arab Peninsula. It is one of the commonest epiphytes in the relative dry or mesic montane

forests but seems to avoid the more humid type rainforests. In Central and in East Africa it occurs between 1300 and 3000 m. Its varieties were treated before, as separate species, but, as all transitions exist between them, Vanden Berghen (1981) united the three related taxa, as varieties under *P. squamulosa*. They often occur within the same area in habitats of different moisture regime.

\*var. *crispulo-caudata* (Gott.) Vand. Bergh.  
**Ny:** 102, *Pócs* 6032.

var. *sinuosa* (Mitt.) Vand. Bergh.

**KB:** 118, *Pócs* 6558, 6565; 110, *Pócs* 6398; 128, *Frey & Kürschner* 7313, *Pócs* 7392; 132, *Pócs* 7191; 137, *Pócs* 6958; 139, *Pócs* 7273; 144, *Frey & Kürschner* 7505; 145, *Frey & Kürschner* 7489c. **Gishvati F. W of Giseny:** *Frahm* 8300. **Ny:** 101, *Pócs* 6008; 102, *Pócs* 6042; 103, *Pócs* 6124, 6187.

var. *squamulosa*

City of Butare, 100, *Pócs* 7993. **KB:** 135, *Frey & Kürschner* 6988; 144, *Pócs* 7673. **Ka:** 158, *Pócs* 8341. **Ny:** 103, *Pócs* 6115; 112, *Frey & Kürschner* 7930, 7938, 7952.

\* *Plagiochila subalpina* Steph.

The above name is an illegitimate homonym of *P. subalpina* Mont. et Nees, in Nees, *Naturges. Europ. Leberm.* 3: 520 (1838), but until it is not clarified, which is the oldest valid name among the several binomials at hand, its use still seems to be practical. It is widespread in the upper montane forest and especially in the subalpine ericaceous belt of many African mountains from Cameroon to Ethiopia, to the Cape and even to Madagascar, described under different names. Together with the related species, the *P. subalpina* group badly needs a revision. Its occurrence is new to Rwanda and to the Kahuzi-Biega Nat. Park. **KB:** 132, *Pócs* 2670, 7144, 7193; 135, *Pócs* 7238, 137, *Pócs* 7261; 144, *Frey & Kürschner* 7506, 7682; 145, *Pócs* 7732. **Ka:** 162, *Pócs* 8122, 8263.

*Plagiochila terebrans* Ldbg. in Nees & Mont.

A very widespread afro-montane species from

Cameroon to Mauritius, in wetter types of montane forests and subalpine ericaceous vegetation between (600)1400 and 3500 m. New to **KB**: 118, *Pócs* 6552, 6562, 6573; 125, *Pócs* 6727, *Fischer* 6731; 126, *Pócs* 6841; 130, *Pócs* 7088, 7092; 133, *Frey & Kürschner* 6969a, *Pócs* 7207, 7209; 139, *Frey & Kürschner* 7015, 7019; 143, *Pócs* 7716; 145, *Frey & Kürschner* 7678, *Pócs* 7719; 145, *Frey & Kürschner* 7489b. **Ka**: 152, *Pócs* 7714; 159, *Pócs* 8278; 162, *Pócs* 8225; 167, *Fischer* 8270. **Ny**: 102, *Pócs* 6036; 107, *Pócs* 6312; 108, *Pócs* 6352; 110, *Frey & Kürschner* 7914; 112, *Pócs* 6433; 155, *Pócs* 8035.

### *Syzygiella* Spr.

After the monographic treatment of Inoue (1966) supplemented by Jones (1976), Vána et al. (1979), Vána (1985) revised African *Syzygiella* in details. Both continental African species occur in the research area, but we collected only:

\* *Syzygiella concreta* (Gott.) Spr.

This Afro-American disjunct species became known from continental Africa only recently (Vána et al. 1979, map: Gradstein et al. 1983) and has a very scattered distribution, as in Mexico, Cuba, Venezuela, Brasil, Tristan da Cunha, Mt. Kenya, Nyungwe Forest, Uluguru Mts. in Tanzania, Madagascar. In continental Africa it was known in wet, mossy montane rainforests between 1950 and 2000 m. Its occurrence on Kahuzi summit at 3200 m altitude is far the highest in Africa and new to Zaire. **KB**: 148, *Frahm* 7695b, *Pócs* 7742, 7859. Intermixed in *Adelanthus lindenbergianus* (Lehm.) Mitt. and in *Syzygiella geminifolia* (Mitt.) Steph.

*Syzygiella geminifolia* (Mitt.) Steph.

Afromontane species occurring from Sao Tomé to Ethiopia and from Zaire to Madagascar. New to Kahuzi-Biega area. **KB**: 148, *Pócs* 7892. **Ny**: 106, *Frahm* 6224.

## LEJEUNEACEAE

The non epiphyllous collections.

The family of *Lejeuneaceae* is the most complex among all liverwort families in tropical Africa. Although many genera were revised quite recently (see the references and Pócs & O'Shea 1991), there are still unclarified groups and unsolved problems. To identify the genera, one can use the up to date keys of Jones (1990: 26) or that of Vanden Berghen (1972: 85), for the "*Holostipae*" Gradstein (1985: 14). In Central Africa three subfamilies are represented, *Ptychanthoideae*, *Lejeuneoideae* and *Cololejeuneoideae*.

### Ptychanthoideae

Contributed by S.R. Gradstein, Herbarium, University of Utrecht, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands

About 15 genera and 45 species of the *Lejeuneaceae* subfamily *Ptychanthoideae* have been recorded from Africa (Gradstein 1985). The Bryotrop collections contain only few representatives of this group: eight species in five genera.

#### *Acrolejeunea* (Spruce) Schiffn.

A genus of 15 species, two of which are known from Africa. For a monograph and key to the species see Gradstein (1975).

\* *Acrolejeunea emergens* (Mitt.) Steph.

*Acrolejeunea emergens* is common throughout tropical Africa, from sea-level to about 1500 m (map in Gradstein et al. 1983) preferring drier woodland habitats, often on roadside trees. The Bryotrop material came from dry *Acacia* woodland and roadside trees, at altitudes of 1300-1800 m. The 1800 m. record, from near the City of Butare (Rwanda), is the highest occurrence of the species thus far known, on *Cassia* bark.

**Kigali area**: 100, *Fischer* 7997, *Pócs* 8001; 116, *Pócs* 6522; **Ak**: 171, *Pócs* 8401.

#### *Lopholejeunea* (Spruce) Evans

A tropical genus with 20 African species. For a key to the African species see Vanden Berghen (1984).

\* *Lopholejeunea abortiva* (Mitt.) Steph. var. *fragilis* (Steph.) Vanden Berghen

Widespread tropical African species. In our area ramicolous, at 2000 m alt.

**Ny:** 107, *Pócs* 6316.

*Lopholejeunea* sp. ster. (Most species of this genus without perianth and bracts are not identifiable.)

**KB:** 120, *Frey & Kürschner* 6582a, 6583, 6591pp; 122, *Frahm* 6636.

### *Marchesinia* S.F. Gray

A genus of about six species, three of which are known from Africa (Dr. P. Geissler, personal communication). For a key to the two African species recorded here see Jones (1970) and Vanden Berghen (1976).

\* *Marchesinia excavata* (Mitt.) Steph.

Widespread tropical African species. In our area which occurs at rather low elevations throughout West and Central Africa. The present collections are from primary rain forest between 850 and 1500 m on bark and on decaying wood.

**KB:** 119, *Pócs* 6610pp, 6862; 120, *Pócs* 6582b, 6592 (det. Geissler), 6978, *Frey & Kürschner* 6577pp, 6579; 123, *Pócs* 6661 (det. Geissler); 124, *Frey & Kürschner* 6679pp, 6682; 125, *Pócs* 6721; 126, *Pócs* 6849; 127, *Pócs* 6881.

\* *Marchesinia madagassa* Steph. (= *M. moelleriana* Pears.)

East African montane species, from Kenya to Zimbabwe and Madagascar. In our area rare, on bark in montane rain forest at 1500-2000 m.

**KB:** 126, *Frey & Kürschner* 6693; 152, *Pócs* 7529 (det. Geissler)

### *Ptychanthus* Nees

A monotypic genus, containing only *P. striatus*.

*Ptychanthus striatus* (Lehm & Lindenb.) Nees

Widespread Palaeotropical species, common in tropical Africa and Asia. and throughout the Indo-Pacific region, usually at higher elevations. In Africa the species seems to be mainly restricted to East and South Africa. In our area rare, between 1100 and 2000 m.

**KB:** 123, *Pócs* 6762, 6826; 126, *Pócs* 6833, 6852, 6712; 152, *Pócs* 7829.

### *Schiffneriolejeunea* Verd.

A genus of 14 species, eight of which occur in Africa which is the centre of speciation of the genus. For keys to the African species see Vanden Berghen (1976) Vanden Berghen (1976) and Gradstein & Vanden Berghen (1985).

*Schiffneriolejeunea pappeana* (Nees) Gradstein var. *pappeana*

Widespread Afromontane species from Fernando Poo and Annobon to Réunion and Maurice. In our area rupicolous, at 2380 m altitude.

**Ny:** 156, *Pócs* 8041.

*S. altimontana* Vanden Berghen

*Schiffneriolejeunea altimontana* is a rare species which is mostly restricted to the area where the Bryotrop expedition took place: the mountains of Pref. Gyangugu (Rwanda) and the Massif de Kakuzi in eastern Zaire (there is only one collection from East Africa, Tanzania, Uluguru Mts., Bizot & Pócs 1979). Earlier collections of the species, including the type. were gathered in the area by J.L. de Sloover the early 1970's (see Vanden Berghen 1976). The species stands out among the members of *Schiffneriolejeunea* by its pointed leaves. There are 3-5 rounded keels at the perianth tip which are often strongly swollen, resembling small auricles. All collections are from montane rain forest, between 2000 and 2300 m.

**Ny:** 111, *Pócs* 7899, 7900, 7902; 112, *Pócs* 7933, 7951, 7954, 7958; **KB:** 134, *Pócs* 7410; 152, *Pócs* 7795.



*Schiffneriolejeunea* sp. male specimen, unidentifiable.

**Ny:** 110, *Pócs* 6498.

### *Thysananthus* Lindenb.

A pantropical genus of about 10 species, most of which are restricted to Asia. One species is known from Africa. For a review of the genus and key to the species see Gradstein (1992).

*Thysananthus spathulistipus* (Reinw., Bl. & Nees) Lindenb. in Gott.

Palaeotropical species, from Nigeria and Gabon to Madagascar and from India to New Caledonia. African *Thysananthus* is usually considered to represent this species (e.g. Verdoorn 1934, Verdoorn 1934, Vanden Berghen 1950, Vanden Berghen 1950), even though there are some differences with the Asiatic populations. The African plants, for instance, are always monoicous whereas the Asiatic plants are usually dioicous. Furthermore, the leaves in the African materials are rather broad and recurved, approaching those of the Malesian *T. convolutus* (which is dioicous). There also seem to be ecological differences. In Asia, *T. spathulistipus* is a characteristic element of the understory of the rain forest (Kürschner 1990, Kürschner 1990). In West Africa, however, the species grows as a sun epiphyte in the canopy of the rain forest (Dr. A.J. Harrington, personal communication). Its rarity may be due to its occurrence in the canopy of the forest. There are many other species of bryophytes which are rare because they occur only in the canopy of the high forest and are therefore usually not collected. Examples from Africa are *Pycnolejeunea contigua* and *Mastigolejeunea turgida* (Gradstein 1992a, Gradstein 1992a).

The African populations were originally described as *T. monoicus* Steph. Further study is needed to determine the taxonomic status of African *Thysananthus*.

*Thysananthus spathulistipus* is rather rare in Africa and is restricted to primary rain forest at rather low elevations. In our area rare, on bark from 900 to 1300 m alt.

**KB:** 120, *Pócs* 6601, 125, *Pócs* 6735.

## Lejeuneoideae

### *Ceratolejeunea* (Spr.) Schiffn.

Key for African species in Vanden Berghen 1951b.

#### *Ceratolejeunea calabariensis* Steph.

Tropical African species widespread in lowland rainforests from Nigeria to Tanzania. In our area between 850 and 900 m, corticolous.

**KB:** 119, *Pócs* 6610pp; 122, *Pócs* 6807pp, 6813; 127, *Pócs* 6878.

### *Cheilolejeunea* (Spr.) Schiffn.

A key for the subgenera is provided by Schuster (1980), while key for African species in Jones (1954a).

Subg. *Renilejeunea* Schust.

#### \* *Cheilolejeunea montagnei* (Gott.) Steph.

Afromontane species from Sao Tomé to the Mascarenes. In our area at 2000–2700 m, on Erica bark, branches and on rocks.

**Ny:** 106, *Pócs* 6266pp, 6268; 108, *Pócs* 6355; **KB:** 132, *Pócs* 7180.

Subg. *Euosmolejeunea* (Spr.) Schust.

Key for the African species is prepared by Jones (1954a) and by Vanden Berghen (1965).

#### \* *Cheilolejeunea serpentina* (Mitt.) Mizut.

Palaeotropical species (see map in *Pócs* 1992: 39), widespread in lowland rainforests, in our area occurs at 850 m on bark.

**KB:** 119, *Pócs* 6610pp.

#### \* *Cheilolejeunea ruwenzorensis* (S. Arn.) **Pócs comb.nov.**

Basionym: *Euosmolejeunea ruwenzorensis* S. Arn.

Arnell 1956, Arkiv för Bot. 3:529.

Very rare, previously known only from the Ruwenzori Mts. In our area ramicolous, at 2200 m altitude. Its belonging to the subgenus *Euosmolejeunea* needs further proof.

**KB:** 118, *Pócs 6574pp*.

Subg. *Anomalolejeunea* (Spr.ex Pears.) Schust.

Full description of the only species of this monotypic subgenus is made by Vanden Berghen (1948, 1951a, 1953).

\* *Cheilolejeunea pluriplicata* (Pears.) Schuster

Afromontane-Afroalpine species from Ruwenzori Mountains to Cape and to Madagascar. Typical member of subalpine elfin forest and heath vegetation and usually occurs on bark of different *Ericaceae*. From our area there are only uncertain records of sterile plants from an altitude of 2700-3200m:

**KB:** 145, *Frey & Kürschner 7495pp*; 148, *Frey & Kürschner 7475b*.

Subg. *Strepsilejeunea* (Spr.) Schust.

Full revision of the African taxa are made by Jones (1988).

*Cheilolejeunea krakammae* (Lindenb.) Schuster

East to South African montane species from the Virunga volcanoes to Cape. New to **KB**, where it occurs at 2200-3300 m, mainly on ericaceous bark. **Ny:** 101, *Pócs 6031pp*; 112, *Frey & Kürschner 7932pp, 7950 & 7953pp*; **KB:** 118, *Frey & Kürschner 6528*; 132, *Pócs 7145pp*; 139, *Frey & Kürschner 7039*; 132, *Pócs 7138pp*; 149, *Pócs 7593pp*; 144, *Frey & Kürschner 7678pp*; **Ka:** *Pócs 8167*.

\* *Cheilolejeunea sp. aff. Ch. usambarana* (Steph.) Grolle

There were three specimens, one from Nyungwe Forest reserve in Rwanda and two from Kahuzi-Biega National Park in Zaire, which are very close to each other and their characters do not fit fully

in the frame of any known species but somewhat to that of *Ch. usambarana*, which is distributed from Mt. Kenya through Tanzania to South Africa and to Madagascar. To establish the identity of this taxon needs further study. It occurs at 2500-3200 m altitude, on *Ericaceae* bark.

**Ny:** 102, *Pócs 6074*; **KB:** 149, *Frey & Kürschner 7425, 7442*.

*Drepanolejeunea* (Spr.) Schiffn.

There is no authentic key for the African species, except for the Subgenus *Kolpolejeunea* Grolle (1976), only species descriptions (Jones 1968b, Jones & Harrington 1983, Vanden Berghen 1960)

\* *Drepanolejeunea cf. clavicornis* Steph.

West African lowland rainforest species previously known only from Sao Tomé, Principe, Cameroon and Guinea betw. 500 and 1250 m altitude. In our area sterile, occurs at 900 m on rotten wood, accompanied by *Prionolejeunea grata*.

**KB:** 120, *Pócs 6626pp*.

*Drepanolejeunea physaefolia* (Gott.) Steph.

Widespread Afromontane species better known under the name of *D. friesii* Vanden Berghen from Sierra Leone and Cameroon to Kenya, Tanzania, Natal, Madagascar and to the Seychelles. In our area it occurs mostly on bark of *Ericaceae* or *Hagenia abyssinica*, between 900 and 3200 m. It is strange, that there is no record from the Virunga volcanoes.

**Ny:** 101, *Pócs 6016pp*; 102, *Pócs 6062*; 106, *Pócs 6241, 6247pp, 6249*; 107, *Pócs 6324*; 112, *Frey & Kürschner 7950 & 7953pp*; 155, *Pócs 8028*; **KB:** 120, *Frey & Kürschner 6587, 6588*; 128, *Frey & Kürschner 7316pp, 7319pp, Pócs 7354*; 132, *Pócs 7120, 7145pp*; 135, *Pócs 7236*; 138, *Pócs 7268*; 144, *Frey & Kürschner 7543pp, Frey & Kürschner 7533pp, 7534pp, 7679, Pócs 7841(?)*; 145, *Frey & Kürschner 7495pp, 7496pp, Pócs 7585pp*; 149, *Frey & Kürschner 7439, 7445pp, 7449pp, 7451, 7505pp, Pócs 7735*.

*Evansiolejeunea* Vanden Berghen

A full description with good illustrations is given of this monotypic Afroalpine genus, endemic in Central Africa (Vanden Berghen, 1948). Schuster (1963), similarly to Stephani (1910) considers it only a segregate of the Latin American genus *Omphalanthus* and regards *Evansiolejeunea* a mere subgenus, creating the new combination *Omphalanthus (Evansiolejeunea) roccatii* (Gola) Schuster. Gradstein (1985) in his review of the Holostipous *Lejeuneaceae* maintains *Evansiolejeunea* as an independent, monotypic genus, similarly to the other, recently distinguished *Omphalanthus* segregate: the high Andean *Aureolejeunea* (Schuster 1978). Possibly these genera evolved during the uplifting of the Andes and of Ruwenzori Mountains respectively, the latter being still the centre of the distribution of *Evansiolejeunea*.

*Evansiolejeunea roccatii* (Gola) Vanden Berghen

Central African endemic distributed only in the ericaceous subparamo belt from Ruwenzori to Kahuzi-Biega and Lugoma massifs in Kivu. A typical epiphyte of *Ericaceae* and of the montane bamboo (*Sinarundinaria alpina*), between 2500-3500 m altitude. We could observe the oil bodies of freshly collected plants, which are large, very coarsely granulate *Calypogeia* type, 2-4/cell.

**KB:** 132, *Frey & Kürschner* 6896, *Pócs* 7105; 148, *Frey & Kürschner* 7471; 149, *Frey & Kürschner* 7431, *Pócs* 7857.

### *Lejeunea* Libert

*Lejeunea* is a very complex genus within the family with many species in tropical Africa. Although we still miss an infrageneric treatment of the genus at worldwide scale, most African species groups are quite well covered by recent treatments. Subg. *Lejeunea*: Sect. *Flavae* was revised by Jones (1968a, 1985 and by Schuster 1980; the small monoecious and dioecious species by Jones (1972 and 1989-key), the species of Sect. *Hygrolejeunea* by Vanden Berghen (1961, 1972, 1977), the species with inflated, eplicate perianths by Vanden Berghen (Sect. *Inflatae*, 1965) and by Jones (Sect. *umbilicatae*, 1967). There is a natural group

characterized by translucent, shiny leaves with many small, homogenous, *Massula* type oil bodies, which when disintegrating, form tiny, "ochraceous bodies" giving dry specimens a "brassy" tinge and finally by the often protruding cells, warts or ciliae on the perianth wings. Jones (1974) discussed this natural unit in details, calling it "*Lejeunea eckloniana* complex" and incorporating in the group *Lejeunea eckloniana* Ldbg., *L. arnelliana* Schuster, *L. cyathearum* E.W. Jones and with some possibility also *Cladolejeunea aberrans* (Steph.) Zwickel, which bears horned perianths and has similar stature to the above species.

Schuster also considers it, as a natural group with a possibility to separate, as Subgenus (1963) or later (1980) as Sect. *Ciliolejeunea*, (within Subg. *Lejeunea*) calling it after the generic name given by Arnell (1953) for *Lejeunea arnelliana* Schust. By the way, this species according to Grolle (1977) is properly called *Lejeunea villaumei* (Steph.) Grolle. Schuster (1980) joins to the group also *Lejeunea japonica* Mitt. *Pócs* (1983) found, that fresh material of the Usambara endemic *Cladolejeunea aberrans* (Steph.) Zwickel (1933) contains the same kind of homogenous, *Massula* type oil bodies, hence confirmed Jones' idea to incorporate this species too in the group, proposing, if this species complex is separated at section level, has to be called Sect. *Cladolejeunea*, which name has priority against *Ciliolejeunea*.

From the Subgenus *Pleurolejeunea* Jones (1969) described a West African species, while we discovered a species hitherto known only from tropical Asia and Oceania.

*Microlejeunea*, *Rectolejeunea* and *Taxilejeunea* are considered in this treatment, as separate genera. As most of the *Lejeunea* species are identifiable safely only possessing perianth, in many cases I could not identify sterile plants or only with some doubt, which is indicated by ? mark.

#### Subg. *Lejeunea* Libert

##### *Lejeunea acuta* Mitt.

Afromontane species, widespread in montane mossy forests from Fernando Poo to Tanzania. In our area ramicolous and on earthy roadcut surface at 2000-2100 m altitude.

**Ny:** 106, *Pócs* 6240; 155, *Pócs* 7390, 8002.

*Lejeunea caespitosa* Ldbg.

Widespread tropical Afro-American species, maybe also in Oceania. According to Schuster (1980) possibly a new immigrant in America as much more widespread and variable in Africa, where it occurs from Guinea to Tanzania and Natal and to Mauritius. In our area corticolous on very different species (even on roadside trees) and on shady rocks, at 1500-2500 m.

**Butare:** 100, *Pócs* 7995, 7998; **Ny:** 111, *Frey & Kürschner* 7910(?); **KB:** 126, *Pócs* 6822(?); 135, *Pócs* 7235, 7243; 139, *Frey & Kürschner* 7019(?), 7022(?), *Pócs* 7279.

*Lejeunea capensis* Gott.

East African montane species, known from Cape, Malawi, Madagascar, Tanzania, Kenya and Zaire: Kivu and even from the Yemen Arab Republic according to Jones (1987). In our area rare, corticolous at 2500 m altitude.

**KB:** 135, *Frey & Kürschner* 6986pp.

*Lejeunea confusa* E.W.Jones

Tropical African species from Ghana to Tanzania. In our area corticolous and occurs at 1300-2500 m alt.

**KB:** 124, *Frey & Kürschner* 6679; 142, *Pócs* 7629pp; 144, *Frey & Kürschner* 7507pp.

\* *Lejeunea cyathearum* E.W.Jones

East African montane species hitherto known only from Tanzania. In our area it occurs on bamboo stem and on shady earth bank at 2450-2600 m altitude.

**Ny:** 101, *Pócs* 6004; **KB:** 131, *Frey & Kürschner* 6916.

*Lejeunea eckloniana* Ldbg.

Tropical African species widespread from Cape Verde Islands, Teneriffe, Sierra Leone and Angola to Kenya, Tanzania, Cape and to the Mascarenes.

**Ny:** 101, *Pócs* 6030; **KB:** 135, *Frey & Kürschner* 6986pp, 6994pp (?).

*Lejeunea flava* (Sw.) Nees s.str.

Very widespread, pantropical species northward to oceanic, warm temperate countries. In our area from 850 to 2700 m, corticolous.

**Ny:** 102, *Pócs* 6074pp; 111, *Frey & Kürschner* 7901pp; 112, *Frey & Kürschner* 7941; **KB:** 120, *Frey & Kürschner* 6577pp; 124, *Frey & Kürschner* 6688; 127, *Pócs* 6888; 128, *Frey & Kürschner* 7315; 132, *Pócs* 7145pp; 139, *Frey & Kürschner* 7017; 144, *Frey & Kürschner* 7533pp, 7534pp, 7537, 7546, 7580, 145, *Frey & Kürschner* 7491; 152, *Frey & Kürschner* 7517.

\* *Lejeunea flavovirens* Aongstr.

It was considered to be a very rare species in Mauritius and on the Uganda side of Mt. Muhavura (Jones 1968, 1979). Later Jones reinvestigating the *Lejeunea flava* group (in litt., 1986), established that *L. flavovirens* "seems to be one of the commonest *Lejeuneae* at medium altitudes on some Tanzanian mountains", just it was misinterpreted before. The situation seems to be similar in Rwanda, where it ascends even much higher on the Virunga volcanoes, similarly to the old Muhavura record from 3400 m altitude. In our area the species is inhabiting tree stems and branches, including *Erica*, *Lobelia*, bamboo and giant *Senecio*, from 850 to 3700 m altitude. The population above 3000 m (the three last specimens in the list) has some special common character against the rest. It seems to be worthwhile to study, whether these are merely ecological modifications in the Afroalpine habitat or genotypically fixed variations.

**Ny:** 101, *Pócs* 6017, 6031; 102, *Fischer* 6051; **KB:** 127, *Pócs* 7055; 135, *Frey & Kürschner* 7001; 137, *Pócs* 7256; 145, *Pócs* 7654, 7731; 152, *Pócs* 7850; **Ka:** 152, *Frahm* 7567, 159, *Pócs* 8209, 8329; 162, *Pócs* 8088, 8307; **Ka:** 158, *Pócs* 8066.

\* *Lejeunea helenae* Pears.

Fromontane species previously known only from Angola, Tanzania, Malawi and Natal. In our area corticolous, both on broadleaved trees and on

Ericaceae, at 2100-2700 m altitude.

**Ny:** 101, *Pócs 6020*; 111, *Frey & Kürschner 7901pp, 7906*; **KB:** 118, *Frey & Kürschner 6534b pp*; 141, *Frahm 7049a*; 143, *Frey & Kürschner 7409*; 144, *Frey & Kürschner 7507pp*; 145, *Pócs 7585pp*.

\* *Lejeunea hepaticola* Steph.

East African montane species previously known only from 1900-3100 m altitude in Tanzania (widespread) and from Kenya (Aberdares). In our area corticolous, at 3200 m altitude.

**KB:** 148, *Frey & Kürschner 7467, 7476pp*.

*Lejeunea isophylla* Jones

Afromontane rainforest species, widespread from Cameroon to Madagascar. In our area between 900 and 2700 m altitude, on different substrates.

**Ny:** 103, *Pócs 6113*; **KB:** 122, *Pócs 6807pp*; 123, *Frey & Kürschner 6666 (?)*; 125, *Pócs 6728 (?)*, 6738; 132, *Frey & Kürschner 6904*; 133, *Frey & Kürschner 6967*; 139, *Frey & Kürschner 7032*; 144, *Frey & Kürschner 7543pp*; 152, *Frey & Kürschner 7528*.

\* *Lejeunea ramosissima* Steph.

Afromontane species more frequent in West Africa (Guinea, Sao Tomé, Annobón, Sierra Leone, Cameroon, Rep. of Congo) than in East Africa (Tanzania). New to Central Africa, where it occurs at 850 - 2320 m altitude on bark and on bamboo stems.

**KB:** 119, *Pócs 6876 (?)*; 127, *Pócs 6883*; 138, *Pócs 7263pp*; 144, *Pócs 7853*.

\* *Lejeunea tabularis* (Spreng.) Spreng.

Afromontane - South African species. Although Jones earlier (1968) considered this taxon, as subspecies of *L. flava*, later (1986 in litt.) he recognized the specific integrity of *L. tabularis*, studying much more material and using more characters for the separation of the two taxa. *Lejeunea tabularis*, along its much larger and amphigastria with more cordate base, has erect and irregularly pinnate stems with erecto-patent leaves, while true *Lejeunea flava* has creeping

stem with more widely spreading leaves. In addition, *Lejeunea tabularis* is widespread in East and South Africa, from Uganda to Cape, with sporadic occurrences in West Africa and with a definite montane character in distribution, very seldom occurring below 900 m. Jones also considers, in contrast to his former (1968) opinion *Lejeunea longirostris* (Steph.) E.W.Jones and *Lejeunea grossecristata* (Steph.) E.W.Jones the synonyms of *Lejeunea tabularis*. In our area the species occurs at 900-3200 m altitude on all substrates.

**Ny:** 103, *Pócs 6143, 6154*; 106, *Pócs 6250*; 112, *Frey & Kürschner 7932pp, 7944*; 108, *Pócs 6362 (?)*; 153, *Pócs 8017*; **KB:** 120, *Frey & Kürschner 6582a*; 128, *Frey & Kürschner 7316pp*; 133, *Pócs 7204, 7212*; 138, *Pócs 7263pp*; 141, *Pócs 7349, 7351*; 144, *Pócs 7782*; 144, *Frey & Kürschner 7678pp*; 148, *Frey & Kürschner 7461*; 149, *Frey & Kürschner 7429*.

\* *Lejeunea villaumei* (Steph.) Grolle

This species, better known, as *L. arnelliana* Schust. or as *Ciliolejeunea capensis* S.Arnell, is Lemurian in distribution hitherto published from Madagascar, Réunion, Seychelles, from Cape (Knysna) and from the Precambrian granitic Eastern Arc of Tanzania. Therefore its occurrence in Central Africa is an important extension of its range. In our area it occurs in crystalline mountains at 2000 m altitude, on bark and on decaying wood.

**Ny:** 112, *Pócs 6435pp*; 113, *Pócs 6472*.

Subgenus *Pleurolejeunea* Schuster & Kachroo ex Schuster

Schuster (1963) classified 3 species of *Lejeunea* in the Subgenus *Pleurolejeunea* Schuster & Kachroo, based on the short gynoecial branches on the side of main stem, without innovations: *Lejeunea patagonica* Steph., *L. holtii* Spr. and finally, with some doubt, *L. aloba* Sande Lac. Jones (1969) added to the above *L. okomuensis* E.W.Jones, from West Africa and Inoue (1977) described *Lejeunea syoshii* Inoue also, as the member of the subgenus. Inoue (l.c.) remarks, that *Lejeunea denticuspis* (Steph.) Mizt. from Java (Mizutani 1972), closely allied to the previous



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by us in Central Africa. *L. okomuensis* is distributed in West Africa: Nigeria and in Cameroon (Jones 1969). Maybe Subgenus *Pleurolejeunea* represents a very old group evolved before the dissection of Gondwanaland, that is before the end of lower Cretaceous. It is an interesting fact, that more or less all species are living in rheophytic habitat or at least as epiphyll in very moist rainforest near waterfalls or streams. Their substrates may be different, as they occur on wet or irrigated rocks, on decaying wood or sometimes on living leaves.

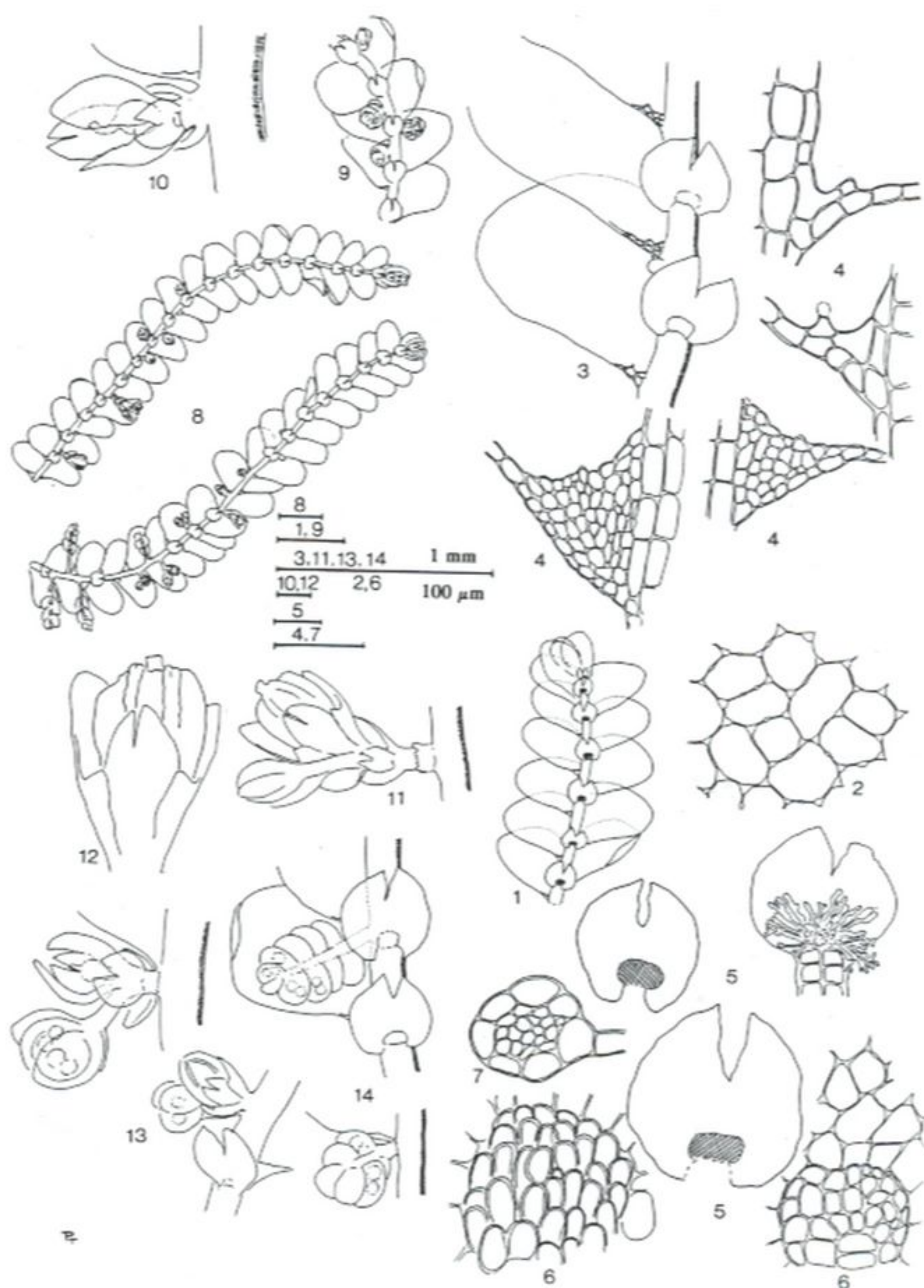
\* *Lejeunea aloba* Sande Lac. (fig. 1)

Syn.: *Rectolejeunea aloba* (Sande Lac.) Steph.  
*Eulejeunea aloba* (Sande Lac.) Schiffn.

When I saw the first specimen from Zaire, thought, that a new species is at hand. The Central African specimens were very different from the only known African representative of the subgenus: *Lejeunea okomuensis* E.W.Jones. Although it was similar to the Asian *Lejeunea aloba*, possessed a few special character (see Plate ..) differing from the description given by Stephani (1914) and by Pandé & Misra (1942). Already Schuster (1963) calls attention to the unadequacy of these diagnoses and refers to the much better drawing given by Pandé & Misra (l.c.). The African plants are monoecious and the mentioned descriptions start with the statement of dioeciousness. But if we examine the Figs. 12 and 13 of Pandé & Misra, it becomes obvious, that a

**Fig.1:** *Lejeunea aloba* Sande Lac. 1: Sterile plant, ventral view. 2: Leaf lamina cells from the middle of leaf. 3: Sterile shoot, the reduced lobules are shown. 4: Lobules with different degree of reduction. 5: Amphigastria. 6: Rhizoid initial disks from young (right) and mature (left) amphigastria. 7: Transversal section of the stem. 8: Shoots with male, female and mixed branches. 9: Part of a shoot with one female and three male branches. 10: Young female branch without innovation. 11: Female branch with innovation. 12: Young perianth with bracts and bracteole. 13: Mixed branches: Female branch with a Male innovation from the base of the perianth. 14: Male branches. All drawn from the Central African BRYOTROP specimens No.122: 6647, 6797 and 6815.





to the Malayan-Oceanian group of Palaeotropic species, distributed from the New Hebrids and Samoa through Java and Southern India to Central Africa. As most of the Palaeotropic species, it probably occurs also in East Africa, but easily overlooked due to its rheophytic habitat.

**KB:** 122, *Frahm* 6647, *Pócs* 6797, 6815, all from the same locality, on the irrigated rocks in rapids under waterfalls, near Irangi Forest Station, at 900 m altitude. It forms blackish or golden green mats on the granitic rocks either submerged or sprayed.

Unidentifiable, sterile *Lejeunea* specimens:

**KB:** 118, *Frey & Kürschner* 6526, 6530, 6534a, *Pócs* 6569; 120, *Frey & Kürschner* 6591; 122, *Pócs* 6812; 123, *Frey & Kürschner* 6673; 124, *Frey & Kürschner* 6685; 126, *Frey & Kürschner* 6694; 131, *Pócs* 7077; 133, *Frey & Kürschner* 6968; 139, *Frey & Kürschner* 7016; 143, *Frey & Kürschner* 7411, 7412, 7419; 152, *Frey & Kürschner* 7525, 7531, *Pócs* 7796.

*Leucolejeunea* Evans

The African species of *Leucolejeunea* were revised by Jones (1973).

*Leucolejeunea xanthocarpa* (Lehm. & Lindenb.) Evans

A Pantropical species common in more open Afrotropical habitats of the ericaceous belt. In our area occurs at 2000-2700 m altitude, mostly on *Ericaceae* bark.

**Ny:** 102, *Fischer* 6101; 155, *Pócs* 8030pp; **KB:** 128, *Frey & Kürschner* 7337, 132, *Frey & Kürschner* 6903pp; 132, *Pócs* 7138pp, 7145pp, 7184; 144, *Frey & Kürschner* 7536b.

*Microlejeunea* (Spruce) Steph.

Without going in the discussion over the generic independence of *Microlejeunea*, I keep the African species under this name combinations, until a thorough study will be done on the African taxa. I just refer to the views of Bischler et al. (1962) and of Jones (1969), who treat *Microlejeunea* as separate genus, while Mizutani (1962) considers it

a mere synonym of *Lejeunea*. Vanden Berghen (1972) and Schuster (1980) regard *Microlejeunea*, as a subgenus within *Lejeunea* and probably this is a wise compromise. Anyway, until it is not clear, whether the commonest species, *M. africana* is identical with the boreal *Lejeunea ulicina* ssp. *ulicina* or with ssp. *bullata* or with ssp. *ocellata* or is an independent species, and whether *Microlejeunea kamerunensis* belongs to Subgenus *Lejeunea* or Subgenus *Microlejeunea* (which decision has again many nomenclatural consequences), I think it is more practical to follow Jones (1969, 1979), who made the treatment for the African species.

*Microlejeunea africana* Steph.

A very common species all over tropical Africa, or if we unite it with *Lejeunea ulicina*, then is distributed throughout Atlantic Europe, North America, tropical America and Africa (see map 45 in Gradstein et al. 1983) in the form of the not too distinct different subspecies. In our area it occurs throughout the montane forest belt from 1500 to 3200 m altitude on all kinds of substrates. It even penetrates in the Senecio paramo at 3700 m altitude where it occurs on giant *Lobelia* stem.

**Ny:** 102, *Pócs* 6045pp, 6066pp, 6073; 103, *Frahm* 6130; **KB:** 118, *Frey & Kürschner* 6534b pp, *Pócs* 6570; 126, *Frey & Kürschner* 6703; 128, *Frey & Kürschner* 7317pp, 7319pp, 7335pp; 134, *Pócs* 7196; 142, *Pócs* 7359pp; 144, *Frey & Kürschner* 7533pp; 145, *Pócs* 7638pp, 7655; **Ka:** 162, *Pócs* 8133.

*Microlejeunea kamerunensis* Steph.

Afrotropical species distributed from Sierra Leone to Kenya and to Zimbabwe. In our area rare, occurs from 2400 to 3700 m alt. on bark of different trees incl. giant *Lobelia* stem.

**KB:** 128, *Frey & Kürschner* 7336; 148, *Frey & Kürschner* 7466pp, *Pócs* 7723; **Ka:** 162, *Pócs* 8133pp.

*Prionolejeunea* (Spruce) Schiffner

The two African species were revised by Vanden

Berghen (1952, 1960) and by Grolle (1978).

*Prionolejeunea grata* (Gott.) Schiffn.

Tropical African lowland - submontane rainforest species better known under the name of *P. serrula* (Mitt.) Steph. Widespread from Ghana to the Seychelles and to Madagascar. In our area occurs at 900-2000 m altitude on very different substrates. **Ny:** 108, *Pócs* 6317; **KB:** 120, *Frey & Kürschner* 6597pp, *Pócs* 6617, 6626pp; 123, *Frey & Kürschner* 6656pp; 124, *Pócs* 6790; 125, *Pócs* 6742.

***Rectolejeunea*** Evans

The African species of the genus were revised by Jones (1974), then a general account was given on the genus, including African species, by Schuster (1980).

\* *Rectolejeunea brittoniae* Evans

The species is better known from Africa, as *R. arnellii* E.W. Jones. It is Afro-American in distribution, known from the Caribbean region and from East to South Africa (see map 9 in Gradstein et al. 1983). In our area is uncommon, we have only one record at 2200 m altitude from bark:

**KB:** 118, *Pócs* 6568.

*Rectolejeunea rhodesiae* (Sim) S. Arnell

Tropical African species distributed from Central African Republic and from Angola to Tanzania and to South Africa, better known under the name of *Lejeunea letabaensis* S. Arnell. In our area it occurs from 1100 to 2200 m altitude, on bark of different, even of roadside trees.

**Butare:** 100, *Pócs* 6000; **KB:** 123, *Frey & Kürschner* 6664; 144, *Frey & Kürschner* 7512; **Kigali area:** 171, *Fischer* 8400.

***Taxilejeunea*** (Spr.) Schiffn. em. Schust.

The delimitation of *Taxilejeunea*, similarly to *Microlejeunea*, is difficult from *Lejeunea* proper and is possible only by using a combination of

characters. The problem is fully exposed by Schuster (1980). For the same reason, as in the case of *Microlejeunea*, I retain in this treatment the concept of Jones (1967), who revised the continental African taxa.

*Taxilejeunea conformis* (Mont.) Steph.

Very widespread Afrotropical species from Cameroon to the Mascarenes. In our area occurs at 1100-2200 m altitude on bark.

**KB:** 118, *Pócs* 6574; 123, *Pócs* 6752.

\* *Taxilejeunea pulchriflora* Pearson

Afrotropical species known in medium altitude wet forests from Guinea to Tanzania (see map in Aké-Assi & Pócs 1983). Jones (1976) established its synonymy with *Crossotolejeunea kilimanjara* S. Arnell and supplied good illustrations and description of this rare species, new to Central Africa, where it occurs on wet cliffs at 1300 m altitude.

**KB:** 125, *Fischer* 6733.

**Cololejeuneoideae**

***Aphanolejeunea*** Evans

A detailed account on the genus in tropical Africa is given by Pócs (1984).

*Aphanolejeunea exigua* Evans

var. *exigua*

The variety has Afro-American montane distribution (see map 13 in Gradstein et al. 1983), in our area at 3200 m on Erica bark.

**KB:** 148, *Frey & Kürschner* 7466pp, 7476pp.

\*var. *africana* Pócs

Central and East African montane variety (see map 2 in Pócs 1984), in our area at 2100-3200 m alt., corticolous and epiphyllous.

**Ny:** 102, *Pócs* 6043; 112, *Frey & Kürschner* 7941pp; 135, *Frey & Kürschner* 6994pp, 145, *Pócs* 7638pp;



148, *Frey & Kürschner 74745a pp.*

*Aphanolejeunea sp.*

Very scanty, growing on *Plagiochila divergens* Steph. It needs further study to identify.

***Cololejeunea*** (Spr.) Schiffn.

The majority of tropical *Cololejeunea* are epiphyllous. Anyway, there are species, which occur also on bark or decaying wood. For the identification of the African species one can use Jones 1953, 1954c, Pócs 1975, 1980, Vanden Berghen 1972, 1977 and Tixier 1977a, 1985.

*Cololejeunea hillebrandii* (Aust.) Steph.

Palaeotropical species distributed from West Africa to Oceania (Tixier 1985). Previously known under the name of *C. filicaulis* in Africa. In our area at 2000 m alt., on filmy fern leaves.

**Ny:** 108, *Pócs 6356pp.*

*Cololejeunea runssorensis* (Steph.) Pócs

Central African endemic distributed on Ruwenzori, Rwanda and Burundi. In our area grows together with the previous species.

**Ny:** 108, *Pócs 6356pp.*

*Cololejeunea zenkeri* (Steph.) E.W.Jones

Tropical African species known from Guinea to Tanzania. In our area at 2300 m, on bark. At other places usually epiphyllous.

**Ny:** 111, *Frey & Kürschner 7988.*

***Diplasiolejeunea*** (Spruce) Schiffn.

Key to identify continental African *Diplasiolejeunea* is supplied by Vanden Berghen (1977), many additional data by Jones (1973), additional species for Madagascar by Tixier (1977b, 1979, 1984).

\* *Diplasiolejeunea cornuta* Steph.

East African - Lemurian species previously known

from Rwanda, Tanzania, Zimbabwe, Madagascar and Réunion. In our area occurs almost exclusively on Ericaceae bark at 2330-320 m altitude.

**Ny:** 101, *Pócs 6016pp, 6022, 6026*; 102, *Fischer 6056pp*; 115, *Pócs 6514*; **KB:** 128, *Frey & Kürschner 7317pp*; 129, *Pócs 7058*; 134, *Pócs 7196pp*; 149, *Pócs 7593pp.*

*Diplasiolejeunea kraussiana* (Lindenb.) Spr.

Southeast African in distribution, known in montane forests from Shaba and Burundi through Tanzania and Zimbabwe to Cape. In our area corticolous, at 2400 m altitude.

**KB:** 128, *Frey & Kürschner 7335pp*; *Pócs 7621.*

*Diplasiolejeunea runssorensis* Steph.

Central African endemic known from Ruwenzori, Zaire: Kivu, Rwanda and Burundi, mostly in the ericaceous belt. Data from Tanzania distinguished under the name var. *australis* E.W.Jones (1973) refer to the related Lemurian species: *Diplasiolejeunea villaumei* Steph. (Tixier 1983). *D.runssorensis* occurs in our area at 2000-3240 m altitude. Corticolous, in most cases on *Ericaceae*, sometimes on bamboo (*Sinarundinaria*) stem.

**Ny:** 101, *Pócs 6016pp, 6019*; 102, *Pócs 6078*; 155, *Pócs 8030pp*, **KB:** 128, *Pócs 7608*; 132, *Frey & Kürschner 6903pp*; 142, *Pócs 7361*; 144, *Frey & Kürschner 7536a*; 145, *Pócs 7653*; 148, *Frey & Kürschner 7475a pp*; 149, *Frey & Kürschner 7450, Pócs 7643.*

*Diplasiolejeunea symoensii* Vanden Berghen

East African - Lemurian species known from Kivu through Rwanda, Burundi, Kenya and Tanzania to Madagascar. In our area epiphyllous, at 2000 m alt.

**Ny:** 108 (type locality!), *Pócs 6373.*

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