

NOTES ON THE REPRESENTATIVES OF GENUS *KURZIA* G. MARTENS (LEPIDOZIACEAE, JUNGERMANNIOPSIDA) IN THE COLOMBIAN ANDES

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Abstract: *Kurzia brasiliensis* is new to Colombia compared to the two taxa hitherto known from here (*Kurzia capillaris* and *Kurzia flagellifera*). *Kurzia capillaris* ssp. *paramicola* is described, as new to science. The latter is distinct in having erect leaves adherent to the stem with leaf segments composed mostly of two rows of cells. All four taxa are known from the peaty soil in the páramos in Colombia, at an altitude of 3230–3750 m. A key with illustrations of all Colombian taxa is provided here.

Introduction

In 1978, Professor S. R. Gradstein kindly sent to the author a number of Andean Lepidoziaceae, collected by A. M. Cleef in the high Andes of Colombia, for identification. Most of the *Lepidozia* collections were identified long ago but a group of *Kurzia* specimens, supposed to represent a new taxon, remained unrevised until now. A new subspecies is described and illustrated in detail below and, compared to the related taxa. A key is also given for all Colombian *Kurzia* taxa.

Description of the new subspecies

Kurzia capillaris (Sw.) Grolle ssp. *paramicola* Pócs, subsp. nov. (Figs. 1–15)

Differt a Kurzia capillaris (Sw.) Grolle ssp. *capillaris foliis erectis sicco ad caulem adherentibus segmentibus longis parallelis maxime parte cellulis biseriatis compositis.*

Typus : 'COLOMBIA, Departamento Cundinamarca, Páramo de Palacio, approx. 500 m NW de la mina de Cal, vertiente húmedo con *Swallenochloa*, *Sphagnum*, *Breutelia* y *Riccardia*, alt. 3530 m, 13-V-1972. Coll. A.M. Cleef 3781, (Holotype U, Isotypes COL 379349, EGR only on microslide).

A blackish-brown plant, forming cushions up to 10 mm in height or wefts, growing on the peaty soil in wet páramo vegetation. Shoots 4–10 mm long and up to 190 μm wide, stem remotely, pinnately branched with both *Frullania* and *Microlepidozia* type branches. Main stems are up to 120 μm , stems of primary branches up to 80 μm , secondary ones up to 50 μm thick. The main stems have 12–14 cortical cells with about 16 medullary cells. The cortical cells are thickened and have brownish pigment. The leaves are transversely inserted, deeply 4-segmented, 180–200 x 140–170 μm in size, with fragile, often with broken, segment tips.

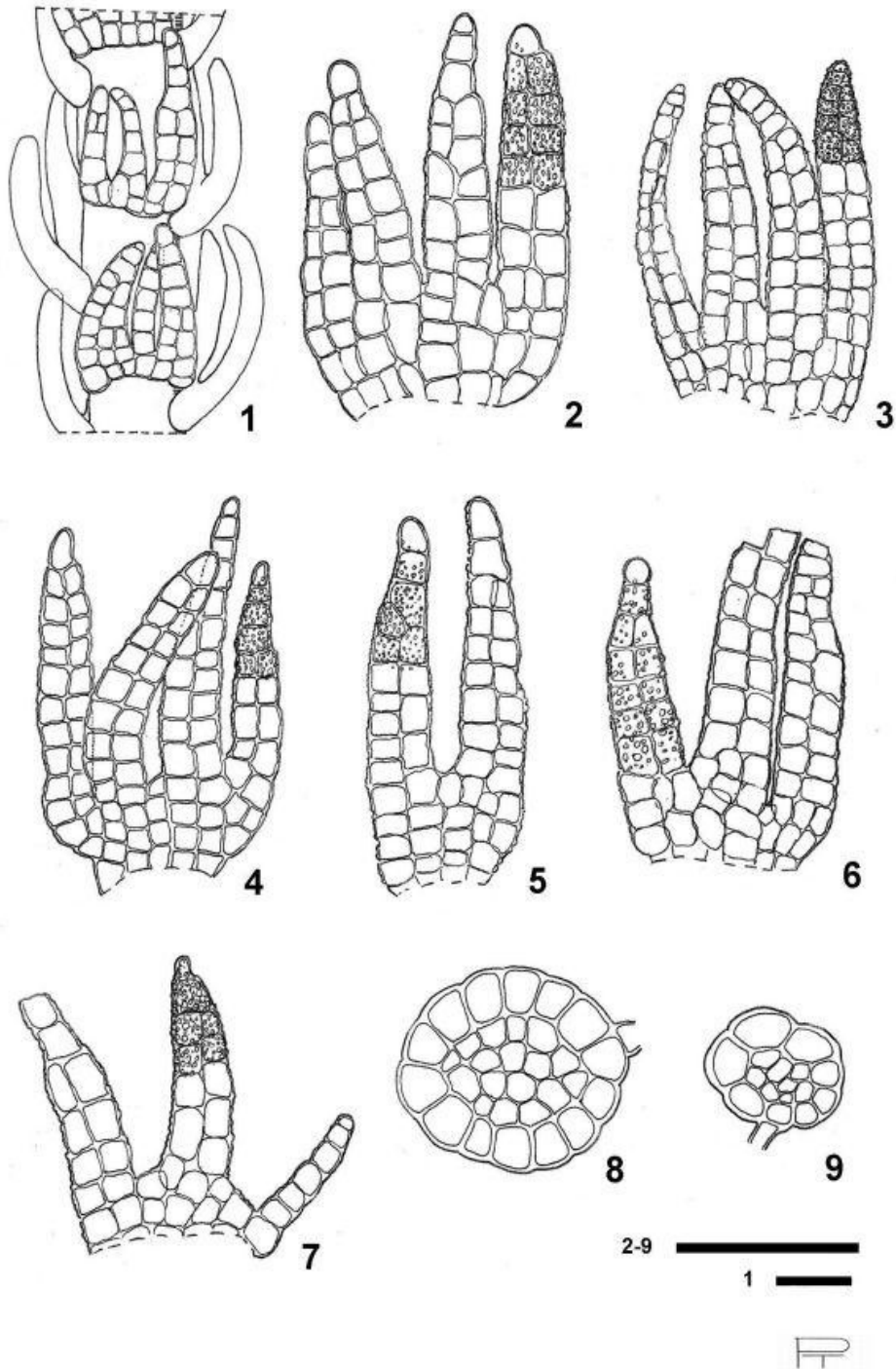


Plate I. *Kurzia capillaris* ssp. *paramicola* Pócs, ssp. nov. Fig. 1: Habit with underleaves. Fig. 2-4: Leaves. Fig. 5-7: Underleaves. Fig. 8 : Stem section. Fig. 9: branch section. Scale bars: 100 μ m. (All drawn from the type).

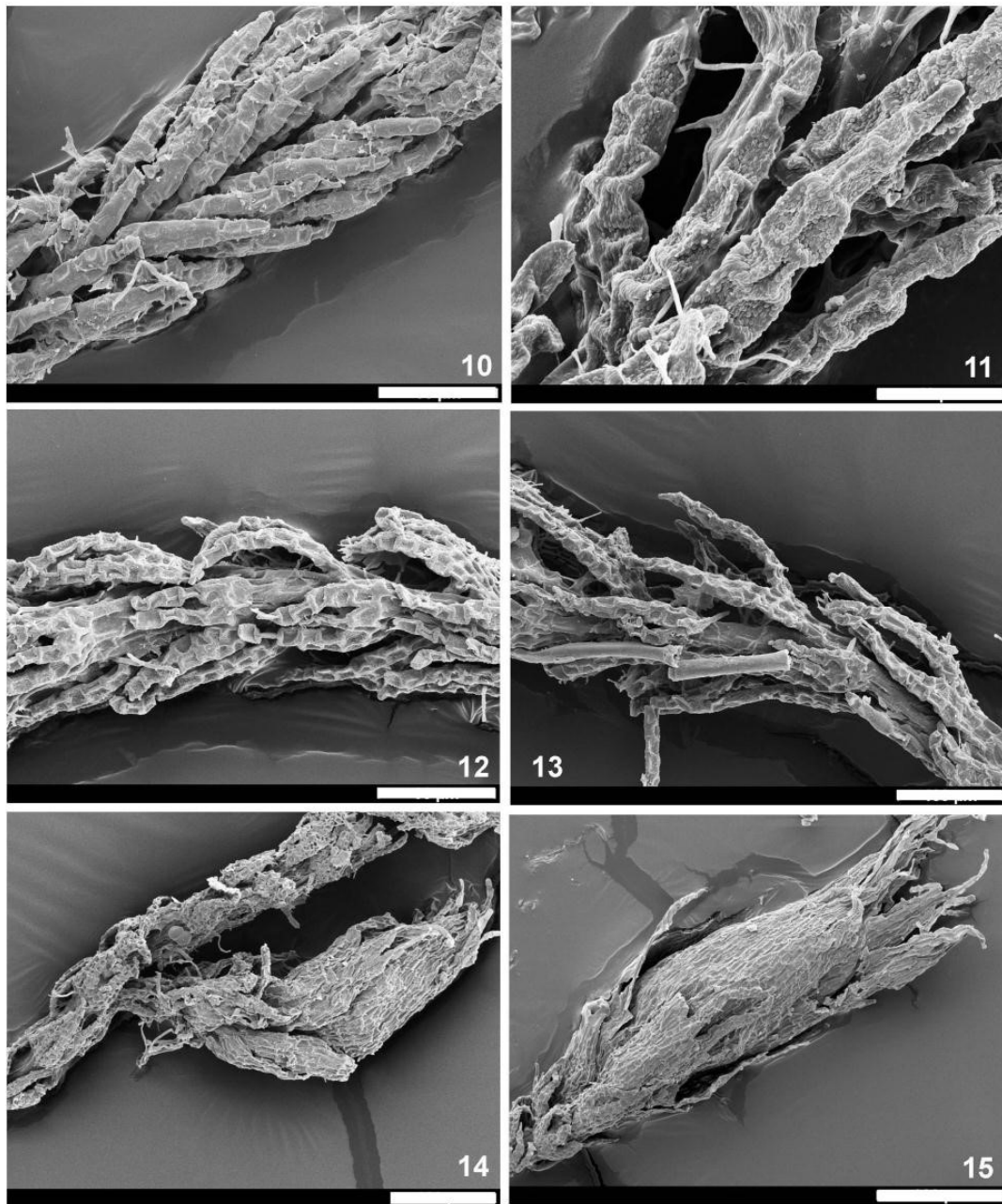


Plate II. Kurzia capillaris ssp. paramicola Pócs, ssp. nov. Fig. 9: Main stem, habit, dorsal view (scale bar 90 μ m). Fig. 10: Leaves on the main stem (scale bar 40 μ m). Fig. 12: Primary branch, ventral view (scale bar 90 μ m). Fig. 13: Secondary branch, ventral view (scale bar 100 μ m). Fig. 14: Female branch with young gynoecium, ventral view (scale bar 200 μ m). Fig. 15: Gynoecium with pericaetial leaves (scale bar 300 μ m). (SEM pictures made from the type of ssp. by A. Sass-Gyarmati).

Discs are 2-4 cells high. Leaf segments are almost parallel-sided, each consisting of two rows of cells up to the 6-9th cells, then ending in a uniseriate apex of 1-3(-5) cells long and tipped by an obtuse rounded cell. Most of the leaf cells are square or near so, 10-15 µm wide, with moderately and evenly thickened walls. Their cuticle is densely verruculose except for the apical cells. The leaves, in a dry state, are adherent to the main stem, but on branches they are more patent. The underleaves are smaller and consist of (1-)2-3 segments, the smaller segments sometimes consisting only of one row of cells. The gynoecea, which growing on short secondary side branches, consists of 3-4 rows of bracts and bracteoles, irregular serrate with long teeth and acute tips, ending in an uniseriate row of 4-8 cells. Perianthium, sporophyte and androecium were not present.

Etymology: It is named after its exclusive habitat, the páramo vegetation.

Other specimens seen: COLOMBIA. Boyaca: Páramo de la Rusia, NW of Duitama, "fondo pantanoso del valle 1 km al SE de la Laguna Negra, frailejónal denso de *Espeletia incana* con *Sphagnum* ssp.", 3745 m, 15-XII-1972, A.M. Cleef 7273 (COL, U 379380). "Cundinamarca, Páramo de Palacio, Lagunas de Buitrago y alrededores. Pantano con *Swallenochloa*, *Werneria humilis* var. *angustifolia* y *Sphagnum* ssp.", alt. 3580 m., 25-V-1972, A.M. Cleef 4101a (COL, U 379509, EGR). Cundinamarca: Páramo between Cogua y San Cayetano, Laguna Verde, "vegetación húmeda con *Xyris acutifolia* y *Aragoa abietina* predominantes, asociadas con *Sphagnum* a lo largo de vallecito pantanoso 800 m WNW de la laguna", 3675 m, 13-XI-1972, A.M. Cleef 6329 (COL, U).

Discussion

The American populations recently known, as *Kurzia capillaris* (Sw.) Grolle were distinguished first under the names of *K. capillaris* and *Kurzia verrucosa* (Steph.) Grolle, while the mainland African populations were known, as *Kurzia tabularis* (Steph.) Grolle (Grolle 1964) and the East African islands populations as *Kurzia stephanii* (Renauld) Grolle. Pócs (1984) united them within the frame of *Kurzia capillaris*, giving subspecies rank to *K. stephanii*, which differs because the leaf lobules with a higher ratio of the uniseriate part than in ssp. *capillaris*. However, it occurs also in certain parts of East Africa where it intergrades with rare intermediate forms into ssp. *capillaris*. Specimens with different level of cuticle verrucosity occur everywhere within ssp. *capillaris*, therefore they merit only variety rank (Pócs 1984).

Since long time is used in the classification of different Lepidoziaceae genera the length and width of basal, median and apical part of leaf and underleaf segments, measured by the number of cells. Practically: the number of cells are counted in each of the of uni-, bi- and more-seriate parts in the segment. This

ratio defines the shape of leaf or underleaf segments. Two kinds of diagrams are given to show these cell arrangement patterns. Fig.16 compares how many cells long are the 1-, 2-, 3- and 4-cell wide parts of leaf segments in the four Colombian taxa of *Kurzia* while in fig. 27 *Kurzia capillaris* ssp.*paramicola* is compared with American and African representatives of *Kurzia capillaris* ssp. *capillaris*. For each population the average of 10 random measurements were used. It is clear that ssp.*paramicola* is well separated by its 7-8 cells long biserial and 1.5–2.5 cells long uniseriate part from ssp. *capillaris* which has 2-5 cells long biserial and 2–3 cells long uniseriate part of leaf segments. There is however a Brazilian population in between these two types. The latter is classified to ssp.*capillaris* because its leaf position (see fig.20). There is a difference between the American and African populations too in the ratio of uniseriate and biserial parts (figs. 21–22 versus figs 23–25, as there is a further, similar difference between *Kurzia capillaris* ssp. *capillaris* and ssp. *stephanii*). Therefore it seemed to be wise to distinguish the new taxon known from the Andean páramos only at the subspecies level, while leaving the rest of American and most African populations together within ssp. *capillaris*. Molecular investigations could perhaps better elucidate these taxonomic interrelationships within this group of taxa.

Distribution: *Kurzia capillaris* ssp. *paramicola* is a typical, small, compact cushion forming plantlet growing on the wet, peaty páramo soils at 3500–3800 m altitude and seems to be endemic for the Colombian high Andes.

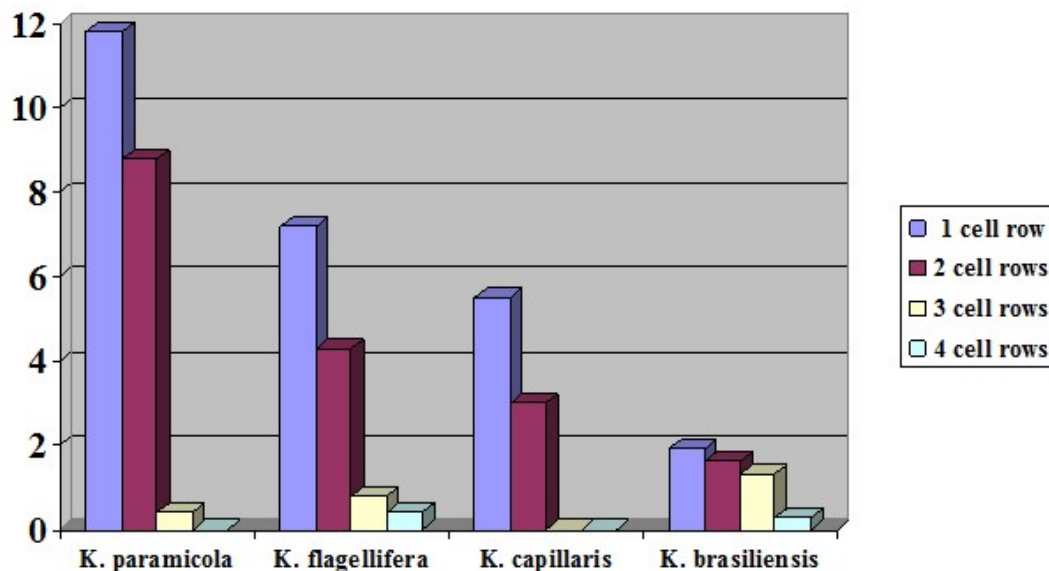


Fig. 16: The cell composition of the leaf segments in the three Colombian Kurzia species.

The columns represent, how many cells long are the parts with different number of cell rows in the leaf segments, in the average of 4-4 leaves of 3-3 different plant specimens of each species.

Selection of other taxa investigated (identified by the author unless otherwise stated)

***Kurzia capillaris* (Sw.) Grolle**

Var. *verrucosa* (Steph.) Pócs. COLOMBIA: Cundinamarca, “Páramo de Cruz Verde, Alto de la Viga, flanco N, vertiente seco con Rastrojo de *Arcytophyllum nitidum* y *Aragoa cupressina*, asociado con *Calamagrostis effusa*. Límite superior del subpáramo. Hepáticas terrestres.” Alt. 3460 m, 12-IV-1972. Coll.: *A.F. Cleef*, 2813 (COL, U. EGR). VENEZUELA:

Mérida, “Parque Nacional Sierra Nevada, teleférico de Mérida, Estación la Montana, Bosque Montano Andino, sobre farallón. Coll.: *S. & T. Pócs*, *R. Rico* 9712/L (MERC, EGR).

Var. *capillaris*: PERU: Amazonas, prov. Chachapoyas, “Straße Chachapoyas-Cajamarca km 418, lianenreicher Sekundärwald mit dünnstämmigen Baumen, teilweise beweidet” Alt. 3000 m, 7.9.1982. Coll.: *J.-P. Frahm et al.*, *Bryotrop* 1194 (EGR). BRAZIL: “São Paulo, Litoral Norte, Ilha São Sebastião, Mata Atlântica am Südbhang. Schlucht des Riberão da Laje, au großem Felsblock”, 150 m. 10-II-1990. Coll. *A. Schäfer-Verwimp* 12476 (Hb. Schäfer-Verwimp, EGR). TANZANIA, Morogoro Reg., Nguru Mts., elfin forest and ericaceous heath on the E side ridge between Chazi and Dikurura Valleys, WNW of Mhonda Mission, 1900 m, thin mat on shady granite cliff below the summit. 5-II-1989. Coll.: *T. Pócs & E. Knox* 89056/R (EGR, Bryophyta Africana Selecta No. 49). SOUTH AFRICA, Western Cape Prov., Silvermine Nature Reserve, above Silvermine river reservoir, on wet ditch side in fynbos, 500 m, 15-X-1996. Coll.: *Th. Arts RSA* 102/25 (Hb. Arts, RSA, EGR). MADAGASCAR: Antsiranana (Diego-Suarez), “Réserve speciale de Manongarivo, Andranomalaza source, sommet, point côté 1869 m, sur tronc de 1 à 3 m diamètre”, 20-III-1999. *L. Gautier & N. Messmer* 19899 (CJB-G, EGR). RÉUNION, Cirque de Cilaos. Dwarf subalpine bush (*Philippia*, *Helichrysum*) near Gîte de Caverne Dufour, on soil, 2478 m, 11-VII-1996. *E. Kónya* 9641/F (EGR). SEYCHELLES, Mahé Island, Morne Seychellois Nat. Park, mossy elfin forest dominated by *Northea* (Sapotaceae) and *Phoenicophorum* (Arecaceae) on the summit ridge of Congo Rouge, 690-730 m, 24-VIII-1993. *T. Pócs* 9345/A (EGR).



Plate III: *Kurzia capillaris* ssp. *paramicola* Pócs. Fig. 17–18. Main stem, from the type. Fig. 19: primary branch with leaves, from Cleef 7273. *Kurzia capillaris* ssp. *capillaris*, 20–26, all from the main stems. Fig. 19: from Brazil, Schäfer-Verwimp 12476. Fig. 21: From Colombia, Cleef 2813. Fig. 22: from Tanzania, Pócs & Knox 89056. Fig. 23: From Réunion, Kónya 9641/F. Fig. 25: From South Africa, Arts RSA 102.25. Fig. 26: From the Seychelles, Pócs 9345/A. (Scale bars in each case 100 μ m, except for fig. 23, where it is 50 μ m).

Distribution of *Kurzia capillaris*: Mountainous areas of tropical America and Africa, in the southernmost and also in island areas at lower altitudes (see map in Gradstein *et al.* 1984: 142, fig.15).

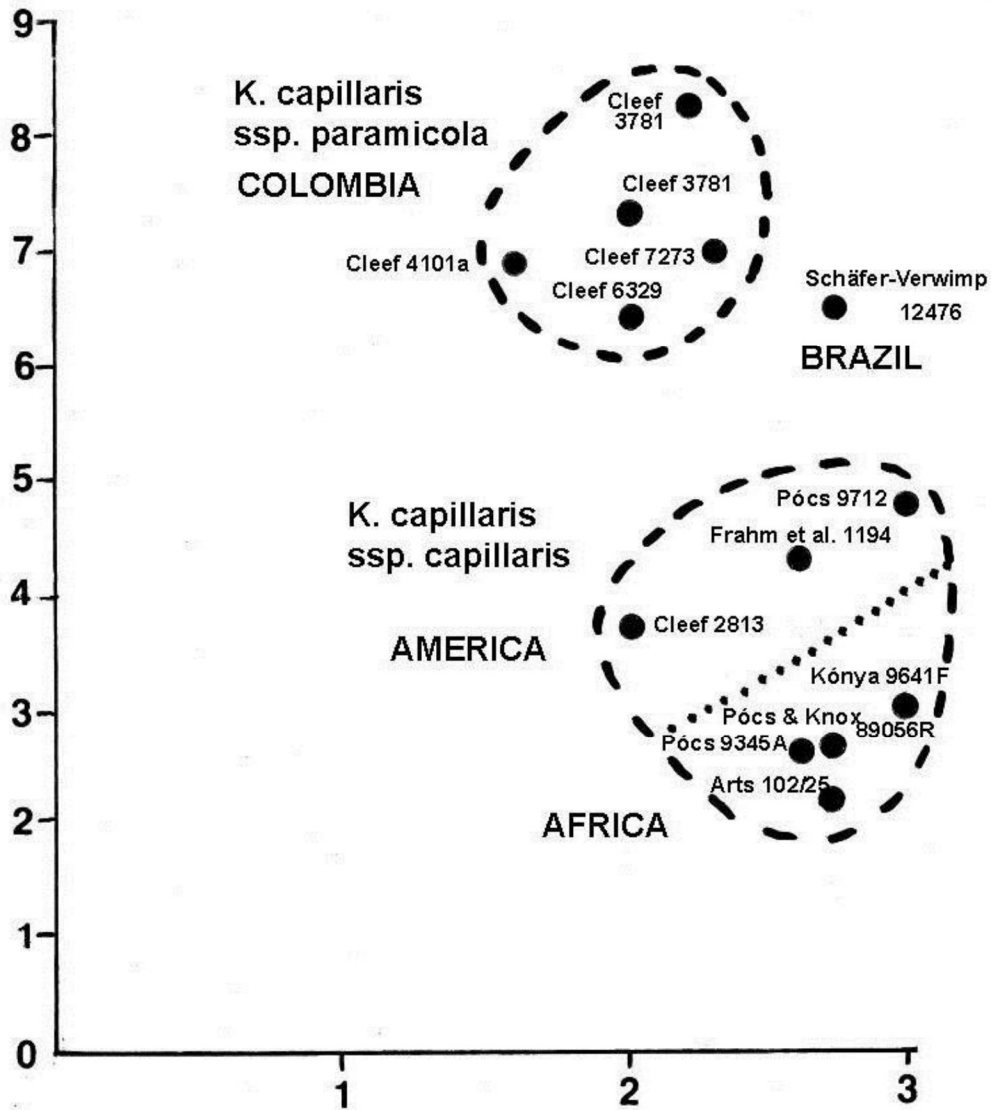


Fig. 27. The ratio of the two and one cell wide parts of leaf segments. The ordinate represents the length of the 2 cells wide part, while the abscissa represents the length of the uniseriate part, counted in terms of cells.

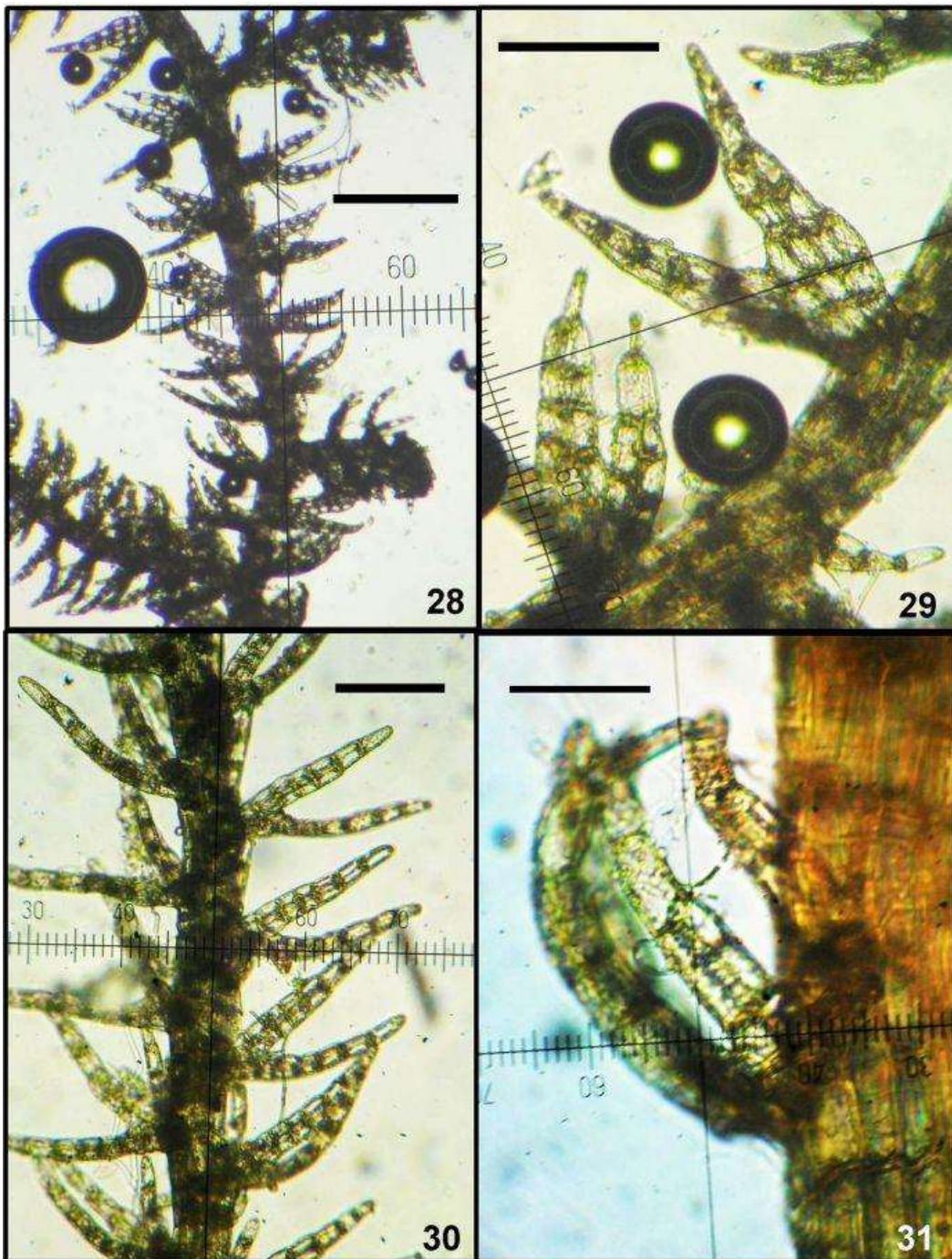


Plate IV: *Kurzia brasiliensis* (Steph.) Grolle. Fig. 28: Habit, ventral view (scale bar 250 µm). Both from Colombia, *Cleef 36848*. Fig. 29: Stem leaves (scale bar 100 µm). *Kurzia flagellifera* (Steph.) Grolle. Fig. 30: Habit, dorsal view (scale bar 100 µm), from Costa-Rica, *Holtz 00-132*. Fig. 31: Stem leaf (scale bar 50 µm), from Colombia, *Cleef 6897a*.

***Kurzia brasiliensis* (Steph.) Grolle**

COLOMBIA, Cundinamarca, “Páramo de Palacio, flanco W, km 8 de la carretera, subpáramo: vertiente pendiente seco con *Calamagrostis effusa*, *Espeletia corymbosa* y *Arcytophyllum nitidum*, asociados con matorral de *Befaria*. Hepáticas terrícolas escionófilas”, 3250 m, 12-V-1972. Coll.: A.M. Cleef 3685b, det. S.R. Gradstein (COL, U). Record new to Colombia (compared to Gradstein & Hekking 1979, Uribe & Gradstein 1998).

Distribution: Hitherto known only from Brazil (Fulford 1966, Gradstein & da Costa 2003).

***Kurzia flagellifera* (Steph.) Grolle**

COLOMBIA, Cundinamarca, “Páramo de Palacio, Lagunas de Buitrago y alrededores, 2 km al SE de la Mina de Cal. Vertiente pantanoso con *Swallenochloa* predominante asociada con *sdpeletia grandiflora* (fma. con tallo 150 cm), *Calamagrostis effusa*, *Breutelia* y *Sphagnum*”, 3750 m, 29-XI-1972. Coll.: A.M. Cleef & L. Uribe 6697a, det. S.R. Gradstein COL, U, EGR). COLOMBIA, Cundinamarca, “Páramo de Cruz Verde, vertiente pantanoso cerca de la orilla NW de la Laguna El Verjón con *Chusquea*, *Senecio flos-fragrans*, *Sphagnum* y *Péeurozium schreberi*. Hepática terrestre”, 3500 m, 27-IV-1972. Coll.: A.M. Cleef 3251 (COL, U, EGR). COSTA RICA, Cartago, Cordillera de Talamanca, small *Blechnum* bog at Panamerican Highway (km 70), Entrada ‘Mirador de Quetzales’, S of road, on rotten log, 2650 m, 19-I-2000. Coll.: I. Holtz CR 00-132, det. J. Váña (GOET, EGR).

Distribution: A species occurring in the mountainous areas from Costa Rica through Guatemala, Venezuela and Colombia to Brazil (Dauphin 2005, Fulford 1966, Gradstein & da Costa 2003).

Key to the Colombian species of *Kurzia* G. Martens

1. Leaf segments triangular, 3–4 cells wide at the base, leaf lamina (disc) 3–4 cells high ***K. brasiliensis***
1. Leaf segments lanceolate, with more or less parallel sides, 2 and 1 cell wide for most of their length, lamina (disc) only 1–2 cells high. 2
2. Leaf cells elongate rectangular, 1.5–3 times longer than wide. Remotely branched, branches often elongated, with remote leaves. ***K. flagellifera***
2. Leaf cells quadrate, approximately as long as wide. Quite regularly pinnately branched, leaves also on the branches densely attached. ***K. capillaris***
3. Stem and branch leaves with the shape of a palm with inside curved fingers. The two cell rows wide part of segments are 2–5 cells long. The uniseriate

- end of segments at least half as long as the part composed of two cell rows.
..... 4
3. Stem leaves in dry state adherent to the stem, the two median segments composed mostly of two cell rows for the height of 6–9 cells, the uniseriate part is much shorter than the part of two cell rows. Branch leaves patent
..... ***K. capillaris* ssp. *paramicola***
4. Leaf cells with smooth cuticle. ***K. capillaris* ssp. *capillaris* var. *capillaris***
4. Leaf cells with verruculose cuticle ***K. capillaris* ssp. *capillaris* var. *verrucosa***

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