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EAST AFRICAN BRYOPHYTES XVIII. TWO NEW LEJEUNEACEAE (HEPATICAE) FROM THE ABERDARE MOUNTAINS (KENYA)

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Abstract: *Cololejeunea chuahiana* and *Microlejeunea nyandaruensis* are described and illustrated, as species new to science, collected in the subalpine moorland belt of Aberdare Mountains (Kenya), where both inhabit the tiny twigs of *Erica* species and of *Cliffortia nitidula* R. E. & T. C. E. Fr. Their taxonomic position and affinity to related species is clarified.

Key words: Hepaticae, *Cololejeunea, Microlejeunea,* Aberdare Mts, Kenya, innovation

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This paper discusses two new species of hepatics found by the author during the study trip organized by Dr. Min S. Chuah-Petiot in the Aberdare Mountains from 17–18th of March 2002, for the participants of the Fourth Tropical African Bryology Training Course held at Nairobi University. Dr. Chuah-Petiot is investigating recently the bryoflora of Aberdare Mountains, a very interesting area spreading from the montane forest through the bamboo and ericaceous moorland belt to the Afroalpine páramo and tussock vegetation. She has published already numerous records new to the mountains (Chuah-Petiot 1997).

The knowledge on tropical East African *Cololejeunea* (Spruce) Schiffn. and *Microlejeunea* Steph. species is quite complete, due to the activities of Jones (1953a, 1953b, 1954, 1957, 1968, 1969, 1979), Pócs (1976, 1980, 1985, 1993, 2002), Tixier (1979, 1985) and of Vanden Berghen (1960, 1961, 1971, 1972, 1977, 1978). Therefore it was a surprise to find new species of both genera in the same habitat of subalpine ericaceous woodland. Probably their small size prevented them from earlier discovery in such a well-investigated area. They both inhabit the bark of branches and twigs of *Erica* L. species, while the new *Microlejeunea* grows also abundantly on the twigs of *Cliffortia nitidula* R. E. & T. C. E. Fr. (Rosaceae) shrubs, which yields physically similar substrate and live in the wetter parts of ericaceous bush, especially near watercourses.

Cololejeunea chuahiana Pócs, *sp. nov.*

(Figs 1–2)

Planta minuta, obscure viridis, vix ramosa surculis 5 mm longis et 0.6–1.2 mm latis, caulibus diametro 40–10 μm. *Folia oblongo-ovata, remota, 200–530* μm *longa et 150–350* μm *lata apicibus inflexibus, marginibus integris vel minute crenulatis, sine margine hyalino. Lobulus folii longitudinis plus-minusve 3/4 aequantia, tridentatus papillis hyalinis distaliter ad faciem interiorem dentis primi disposita.*

Plants small, dull green, slightly and irregularly branching, 5 mm long, with 0.6–1.2 mm wide shoots creeping on an *Erica arborea* twig. Stem 40–100 μm thick, built up by 1 row of medullary and 5 rows (6 at rhizoid initials) cortical cells, of which 1 forms the ventral merophyte. The few infra-axillary branches are of *Lejeunea* type (collared). Leaves distant, 200–530 μm long, 150–350 μm broad, oblong-ovate with acute, most cases inflexed apex. Leaf margin entire or slightly crenulate by the protuberant cells, no hyaline margin. Gemmae not seen. Lobule broad ovate, up to 3/4 length and width of lobe, in most cases tridentate (seldom bidentate). Hyaline papilla entally placed

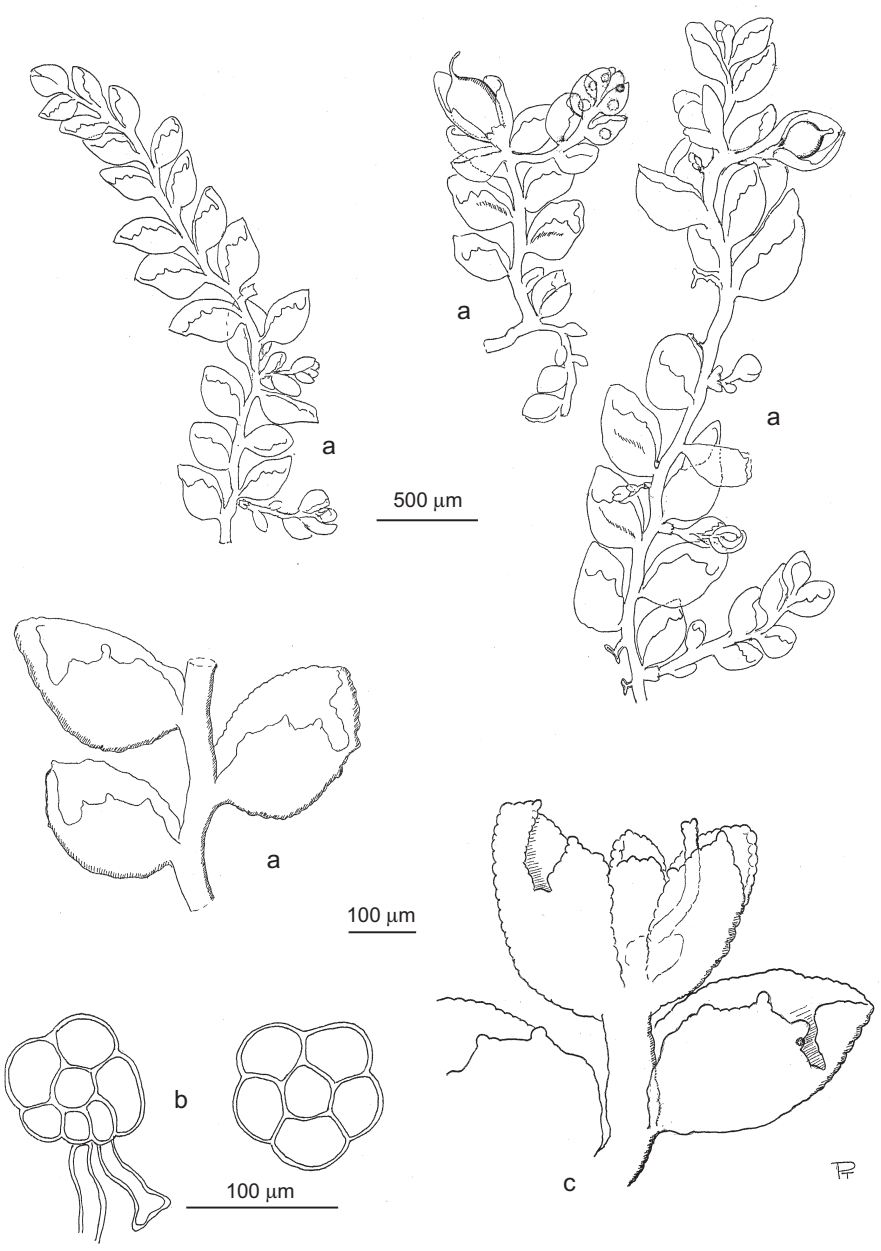

Fig. 1. *Cololejeunea chuahiana* Pócs, *sp. nov.* a – ventral views of sterile, autoicous and female plantlets, b – transversal sections of stem, c – young gynoecium. All drawn from the type.

on the distal base of the first tooth. Lobule teeth triangular, usually composed of three isodiametric cells. The first tooth forms a deep sinus in most cases with an inflexed lobe apex. Cells of lobe and lobule isodiametric, 10–30 (on average 18) µm in size with evenly thin walls, without trigones or in-

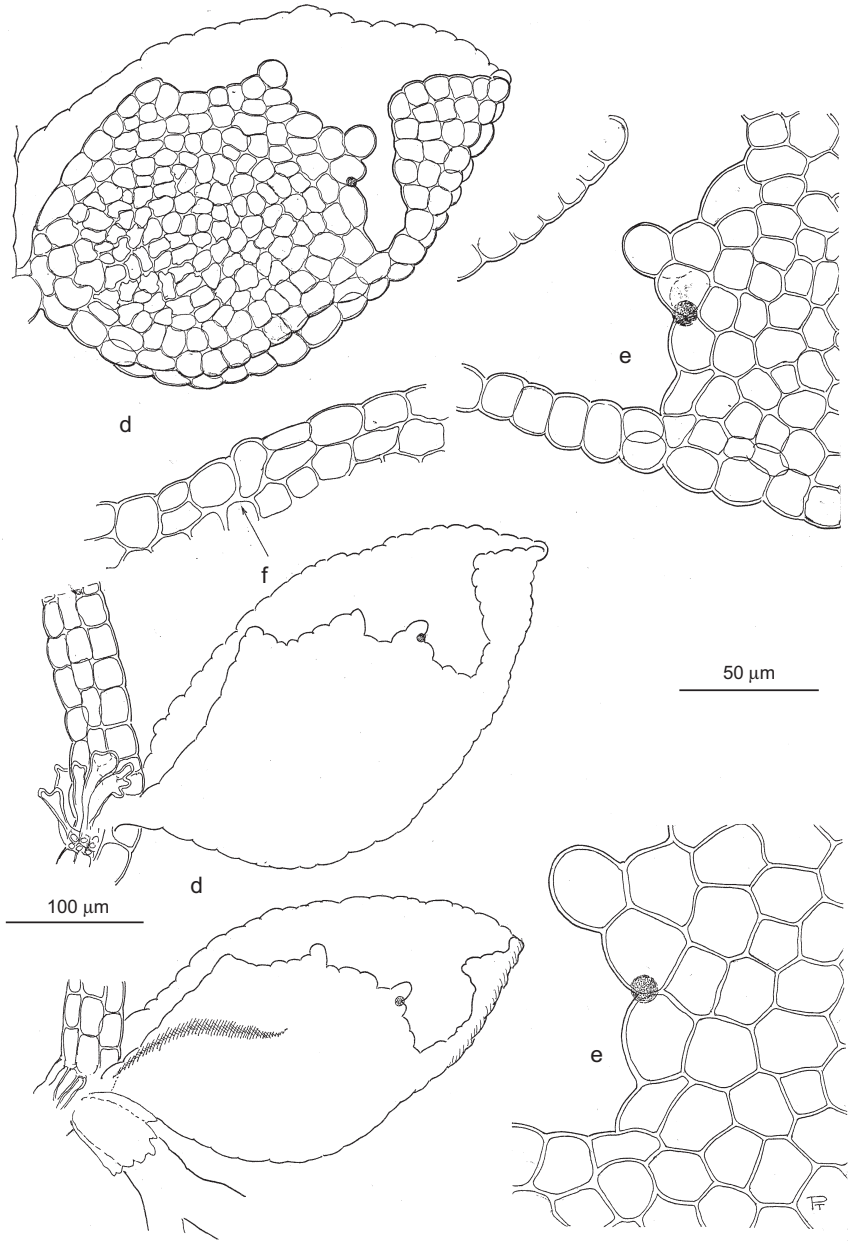

Fig. 2. *Cololejeunea chuahiana* Pócs, *sp. nov.* d – ventral view of leaves with lobule, e – first lobule teeth with hyaline papilla, f – antical lobe margin. All drawn from the type.

termediate thickenings. Rhizoids thick walled, colorless, translucent, originating from 2–6 rhizoid initial cells. Autoicous. Gynoecia terminal or on a short lateral branch Bracts almost equally bilobed, with crenulate margin. Perianth, even around the fertilized archegonium could not be observed. In

some cases one subfloral innovation is present. Androecia on short lateral branches, in the only once observed case just below the gynoecium, in form of a *Radula* type innovation. The oil bodies were not observed.

HOLOTYPE: KENYA, SOUTH NYERI DISTR. Aberdare Mts National Park on the Nyandarua Range. *Erica arborea* giant heath on the E slope of gorge, above Chania Falls, just below the forest line at 3080 m altitude, 00°27.3′N/36°42.4′E. Creeping on *Erica* twig. Only one specimen was found, forming a 5 × 8 mm sized patch on the twig, not far from a locality of *Cololejeunea minutissima*. 17 March 2002, *T. Pócs 02030/AD* (EGR; ISOTYPE on microslide, NAI).

ETYMOLOGY. The new species is dedicated to Dr. Min S. Chuah Petiot, bryologist at Nairobi University, who established a bryological herbarium at the Department of Botany (NAI) and thoroughly and successfully collects and studies the Kenyan bryoflora, especially in the different high mountain areas and national parks.

DISTRIBUTION. The species seems to be endemic to the Aberdare Mountains in Kenya.

The new species belongs to Subgenus and Section *Protocolea* R. M. Schust. and is obviously related to the widespread *Cololejeunea minutissima* (Sm.) Schiffn., to which has some superficial resemblance. But *Cololejeunea chuahiana* is well distinguishable by the much larger overall size, by the special leaf shape and by the tridentate lobuli with entally distad hyaline papilla on the base of the triangular first tooth (first tooth composed of 2 successive cells, so typical for *C. minustissima*, never occurs here). The lack of perianth maybe just a juvenile stage.

Microlejeunea nyandaruensis Pócs, *sp. nov.*
(Figs 3–5)

Planta minuscula pallide vel luteo-viridis, innovationibus paribus oppositis ramificans formans dichasium, 2–5 mm longa, surculis 0.2–0.3 mm lata. Caulis diametro 75–80 μm. Folia remota vel contigua, falcato-ovata, 300–400 μm longa et 250–300 μm lata, cum ocellis (1–)2–6(–8) suprabasalibus mature badiis vel fuscis decorata. Lobulus ovatus dentibus primis falcatis papillis hyalinis distaliter ad faciem interiorem disposita. Amphigastria elongato-ovata lobis 2–5 cellulae latis. Autoica perianthiis obconico-obovatis, 5-carinatis, mature ad 700 μm longis et 250–320 μm latis. Seta 400 μm longa, ab 12 cellulibus corticalibus composita. Sporangium sphaericum, diametro 200 μm, valvis elateribus 4–5. Sporae 40–70 × 25–30 μm, cum rosettis 4–8 et verrucis, clavis et spinis ornata.

2–4, in optimal case 5 mm long plantlets, with 0.2–0.3 mm wide, pseudo-dichotomously branching shoots. In fact the paired, opposite subfloral innovations repeatedly produce gynoecia with new subfloral innovations and as a result, a dichasial inflorescence pattern is formed (see Fig. 3a, similar to the one depicted by Thiers 1986: 242 on her Fig. 5c). Stem 75–80 μm in diameter and is composed of 3 rows of medullary and 7 rows of cortical cells of which 2 represents the ventral merophyte. The lower part of stem is usually creeping on the bark while its upper part, with 1–2 pairs of repeated innovations, is perpendicular to the substrate surface. Accordingly the leaves are dimorphic, distant to contiguous, 300–400 × 250–300 μm large. On the creeping part their main leaf axis is parallel to the stem (see Fig. 5l) with incubously complicated, bilobed insertion. On the erect part the leaves are more asymmetric, falcate with a shallow sinus between the keel and the postical margin and their main axis inclines at 30–50° to the stem, (Fig. 4e, f). Their insertion is much more approaching the transverse position and the leaf blade often spreads horizontally (Fig. 3a, upper leaves). Along the paired innovations the most important character of the species are the numerous (1–)2–6(–8) suprabasal ocelli forming an irregular group along the midline of the lobe (Figs 3c & 4g). In fresh state the ocelli in the young leaves have 1–1 large, *Leucolejeunea* type oil body (in sense of Kis & Pócs 1997; Fig. 4h). In mature leaves the ocelli becoming shiny brown and the large oil body disintegrates. Interestingly, these very conspicuous ocelli fade out in the herbarium specimens and almost completely disappear by repeated remoistening. Only their slightly larger size distinguishes them from the ordinaly leaf cells.

The lobule is inflated, elongate oval in shape, with a falcate first tooth, which is often hidden

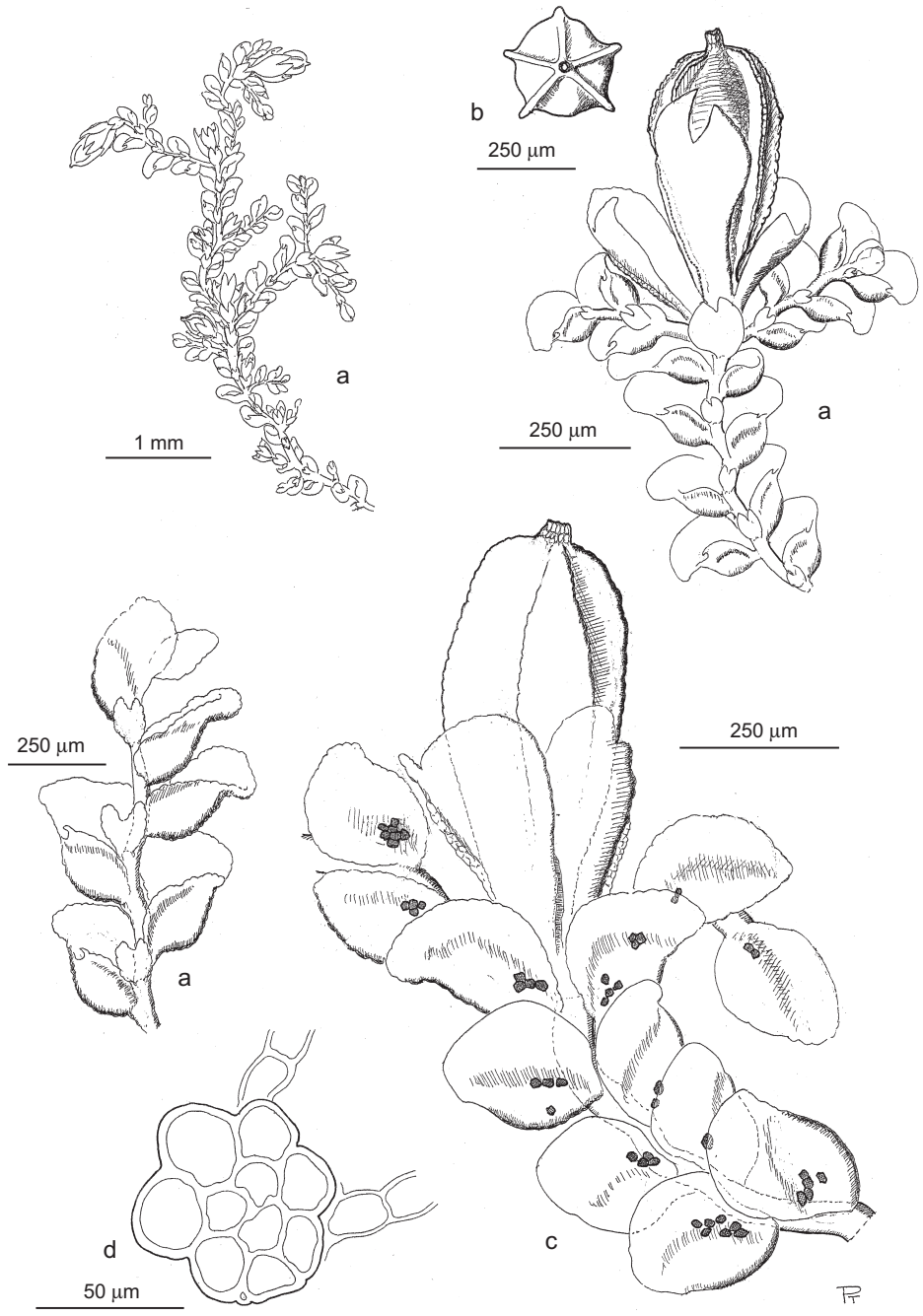

Fig. 3. *Microlejeunea nyandaruensis* Pócs, *sp. nov.* a – ventral view of a fully developed and of a smaller plant with dichasial branching due to the paired (*Lejeunea* type) innovations, detail of a shoot with near transversally inserted upper leaves, b – upper view of a perianth, c – dorsal view of the apical part of fertile shoot, showing the arrangement of the shiny, dark brown ocelli, d – transversal section of stem. All drawn from the type.

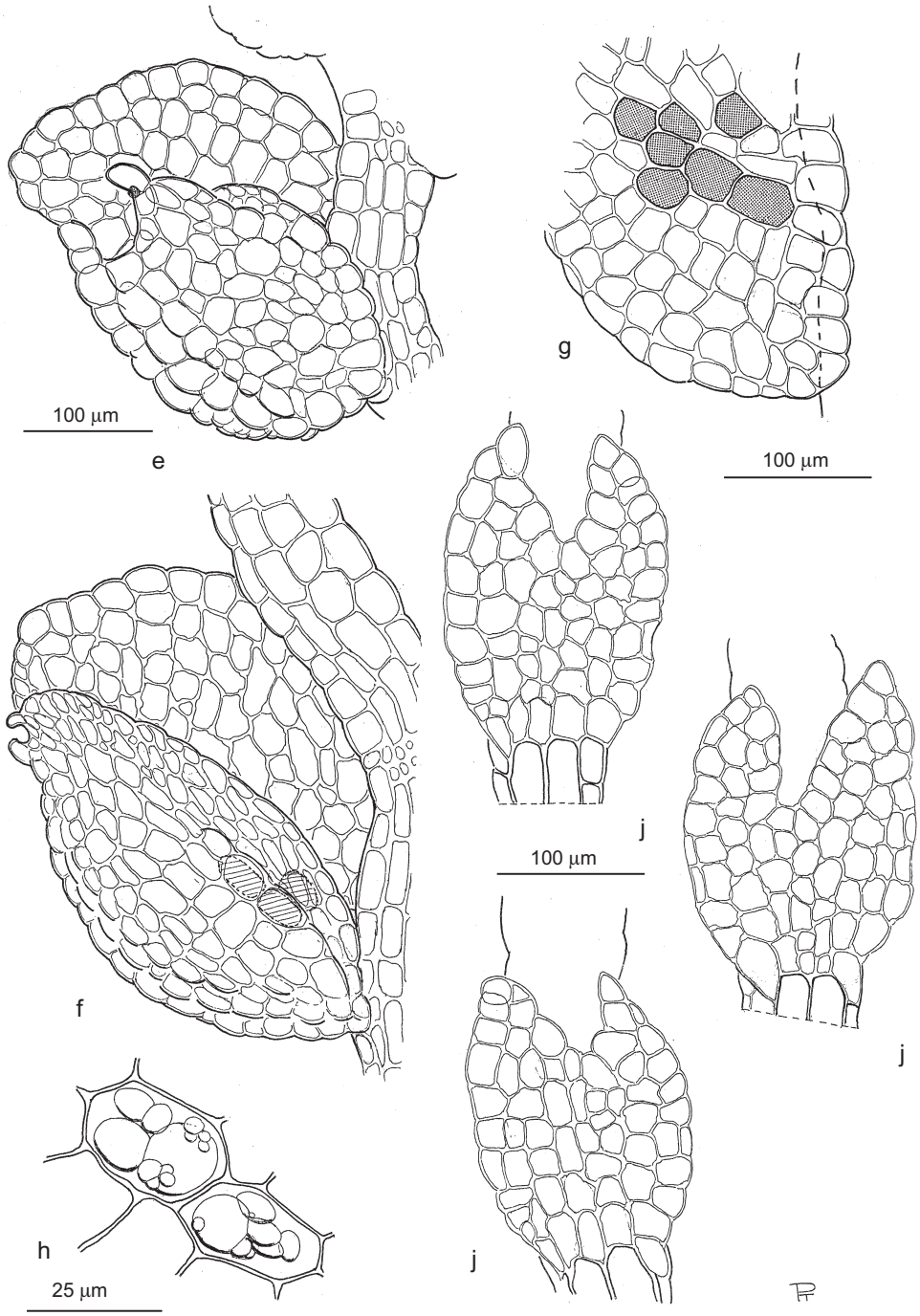

Fig. 4. *Microlejeunea nyandaruensis* Pócs, *sp. nov.* e & f – ventral view of different leaf types with lobuli from the upright part of the shoot, g – close up of the ocelli arrangement at the lobe base, h – *Leucolejeunea* type, living oil bodies in young ocelli, j – underleaves (amphigastria). All drawn from the type.

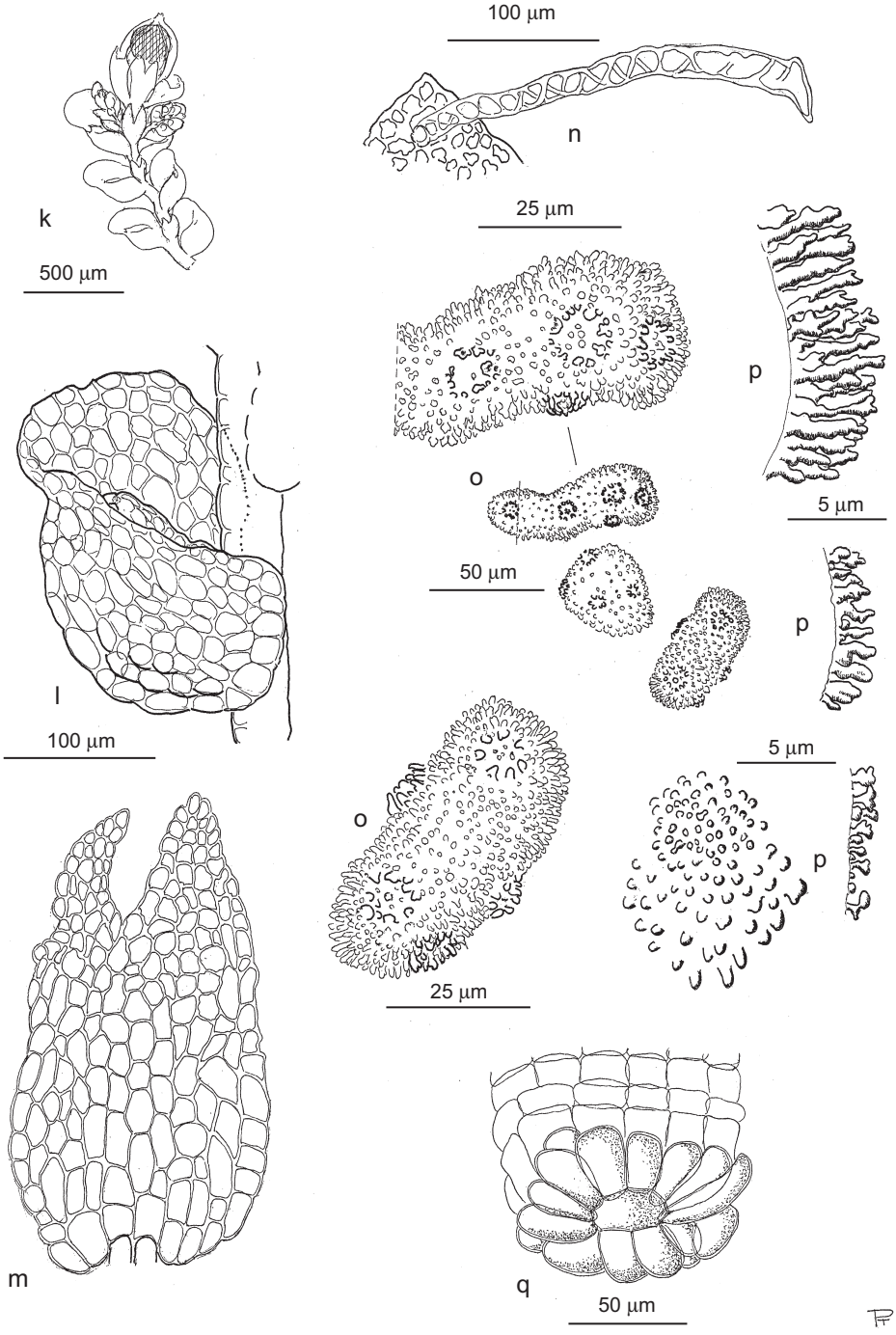

Fig. 5. *Microlejeunea nyandaruensis* Pócs, *sp. nov.* k – ventral view of autoicous plantlet with one innovation-androecium, l – leaf from the horizontally creeping, lower part of stem, m – female bract, n – elater, o – spores with different magnifications, p – different sexine ornamentation seen by oil immersion, q – foot with the lowest part of seta. All drawn from the type.

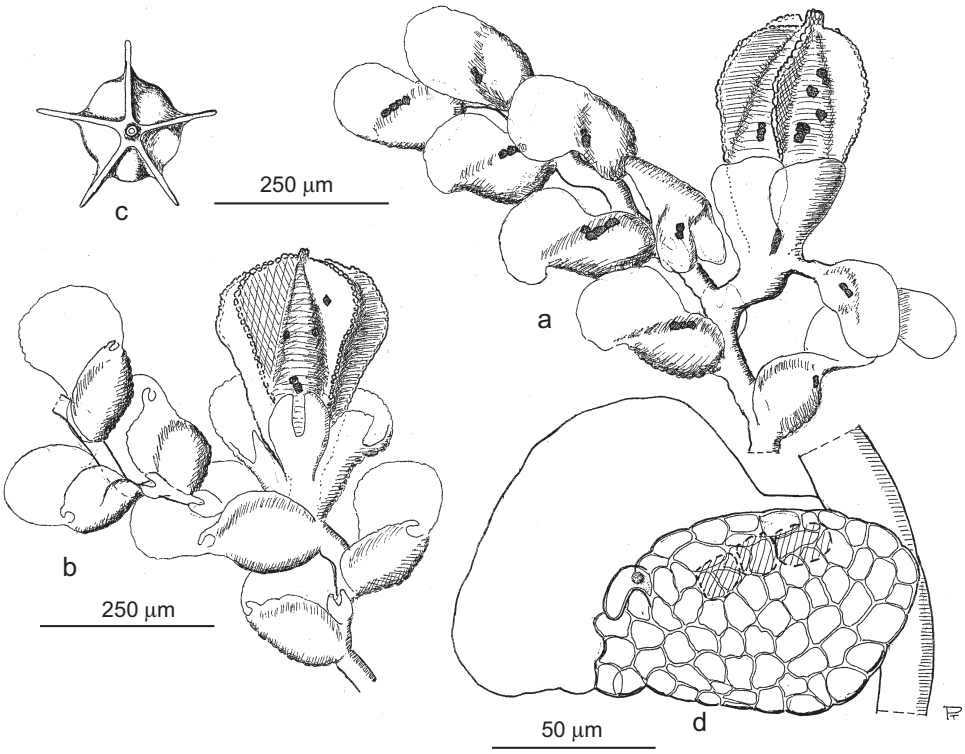

Fig. 6. *Microlejeunea inflata* Steph. a – dorsal view of shoot apex with gynoecium on a short lateral branch, bearing one innovation. The brown ocelli in leaves and perianth are well visible. b – ventral view of a shoot apex with gynoecium and one innovation. c – perianth seen from above. d – ventral view of leaf. The ocelli are visible through the semitransparent lobule. Drawn from *T. Pócs 9274/CG* [Comoro Islands, Ndzouani (Anjouan), Mt. Ntringi 1200-1500 m alt., epiphyllous].

by the enrolled free margin or even reduced. A hyaline papilla is on the inner side of the distal tooth base. The second tooth is obsolete. Average lobe and lobule cells are isodiametric or slightly elongate, quadrate or polygonal with 20 × 20–35 μm size. In some cases the cells of free lobule margin are smaller and more elongated. The oil bodies are of the *Calypogeia* type, 2–5 per cell. The cell walls are slightly incrassate with small trigones but without intermediate thickenings.

Underleaves longer than wide, 1.2–2.0 × of stem width, average size 200 × 150 μm, bilobed to their 1/3–2/5 length. The lobi are 2–4 (–5) cells broad at their base, ending in one triangular cell. Underleaf base inverted U shaped as bordered by two ventral merophyte cells. The uppermost underleaf, which covers the base of innovations (Fig. 5k), is much larger. Autoicous, although 85 out of the investigated 86 plantlets had only gynoecia. Only one of them was bisexual, having a male branch in the form of a subfloral innovation. It was unexpected as almost all plants were very fertile, with developing sporophytes. The only male branch consisted of 3 pairs of bracts, each with 1 antheridium, subtended by two sterile leaves and by 3 reduced bracteoles at its lower part. The gynoecia develop terminally, with bracts of about half length of the mature perianth, with an almost equally long, but much narrower lobule and at least one of them with a two cell rows wide, narrow wing on the keel. Perianth 350–700 μm long, conically obovate or narrow pyriform, with 5 narrow, slightly crenulate wings along its whole length. Beak relatively low, of 2 cell rows.

HOLOTYPE: KENYA, SOUTH NYERI DISTR. Aberdare Mts National Park on the Nyandarua Range. *Erica arborea* giant heath on the E slope of gorge, above Chania Falls, just below the forest line at 3080 m altitude, 00°27.3′N/36°42.4′E. On *Erica* twig. 17 March 2002, *T. Pócs 02030/AC* (EGR; ISOTYPE – NAI).

PARATYPES: KENYA, SOUTH NYERI DISTR. Aberdare Mts National Park on the Nyandarua Range. Ericaceous heath below the Fishing Camp on the slopes of Magura River Valley, 2980–3040 m, 00°29′S/36°43.9′E. Abundant on ericaceous and on *Cliffortia nitidula* (Rosaceae) twigs, sometimes intermixed with *Microlejeunea africana* Steph. 18 March 2002, *T. Pócs 02031/RB* (EGR, NAI); RWANDA, BRYOTROP Expedition, locality 162, PREF. DE RUHENGERI, Parc Nat. des Volcans, Mt. Karisimbi. *Sencio refractisquamatus* páramo on the E slope along the trail to summit, at 3700 m altitude. On *Lobelia stuhlmannii* stem. 14 Sept. 1991, *T. Pócs 8133*, (EGR, Herb. Frahm, previously indentified as *M. kamerunensis* Steph.).

ETYMOLOGY. *Microlejeunea nyandaruensis* is named after the local (Kikuyu) name of the Aberdare Mountains – 'Nyandarua'.

DISTRIBUTION. This species seems to have Afroalpine range, distributed from Rwanda to Kenya. It will be found among similar conditions probably on the other high volcanoes too.

The monograph of Weis (2001) called my attention to several important sporophyte characters hitherto neglected by most authors. Seta 400 μm long, 120 μm thick, composed of 12 cortical cell rows, each of them being 12–14 cells high (types 4/16 and 3/2 of Weis 2001). Its foot is made up of ca 20 radially arranged, flat cells around a central cell, each with finely dotted outer walls (Fig. 5q). Capsule globose, 200 μm in diameter, becoming ripe within the enlarged perianth. Valves 290 × 170 μm, each with 4–7 parallel strips of median cells with nodular thickenings in their longitudinal walls (Type 15/5 of Weis 2001). 4 or 5 marginal elaters occur on the alternate valves, each 250 μm long and 20 μm thick, with colorless or pale yellow, irregular, fading spiral thickenings (Fig. 5n). Number of spores approximately 96 in the fully ripe, just unopened capsule. Spore size 40–70 × 25–30 μm, each with 4–8 rosettes (type 33/5 of Weis 2001. But she does not know such a big

Table 1. The distinguishing characters of species related to *Microlejeunea nyandaruensis* Pócs, *sp. nov.*

Character \ Species	*M. nyandaruensis* Pócs	*M. ankasica* E.W. Jones	*M. inflata* Steph.	*M. kamerunensis* Steph.
Sex relations	autoicous	autoicous	autoicous	dioicous
Innovation	paired	none	simple	simple
Inflorescence pattern	dichasium	diffuse	monochasium	monochasium
Position of hyaline papilla to 1st tooth	entally distal	entally proximal	entally central	entally proximal
Ocelli in leaves	(1)2–6(8), in irregular groups, dark brown	not observed	2–4 in line, brown	1–2(4) in a line
Ocelli in perianth	none	none	2–10, scattered, dark brown	none
Perianth wings	evenly narrow	slightly broadened upwards	much broadened upwards	evenly narrow

spore within the genus). Other exine ornamentation consists of dense verrucae and baculae of 0.5–1.0 μm size, at both ends of 1–6 μm long clavae and spinae (Figs 5o, p).

The new species is quite distinct from *Microlejeunea africana* Steph. in a number characters. It has among the African species closer affinity to *Microlejeunea kamerunensis* Steph., *M. ankasica* E.W. Jones and especially to the Madagascar–Comoro–Mascarene *M. inflata* Steph. (Fig. 6). The falcate leaf shape of the last three is nearly identical, forming a natural group not known outside Africa among other members of the genus. Their specific differences are shown in Table 1.

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