

## Bryophytes from the Republic of Equatorial Guinea (West Central Africa). VI. *Cololejeunea iradieri* sp. nov., *Cololejeunea magna* stat. nov. and their relations to similar species

Marta Infante & Patxi Heras

Museo de Ciencias Naturales de Alava, Siervas de Jesús 24, 01001 Vitoria (Spain). E-mail: bazzania@arrakis.es

**Abstract.** The group of African *Cololejeunea* species with a heart-shaped perianth and elongate marginal leaf cells has been studied. *Cololejeunea iradieri* is described as new from Equatorial Guinea (West Central Africa), while *Cololejeunea harrisii* Pócs var. *magna* Tix. is raised to species level. Their relations to similar species, *C. amaniensis* Pócs, *C. harrisii* Pócs and *C. tenuiparietata* Tix., are discussed.

**Resumen.** Se ha estudiado el grupo de especies africanas del género *Cololejeunea* con periantio en forma de corazón y células foliares marginales elongadas. Se describe *Cololejeunea iradieri* como especie nueva de Guinea Ecuatorial (Africa Centro-Occidental), mientras *C. harrisii* Pócs var. *magna* Tix. es elevada al rango de especie. Se discuten sus relaciones con sus especies afines *C. amaniensis* Pócs, *C. harrisii* Pócs y *C. tenuiparietata* Tix.

### Introduction

In 1975, Pócs described *Cololejeunea harrisii* as an isolated species in its genus due to elongate marginal leaf cells and heart-shaped perianth. Later (Pócs 1985) *C. amaniensis* came to light, again with elongate marginal leaf cells, this time incrassate, and a heart-shaped perianth, less winged, not papillose at mouth and not connate in its upper edges.

Finally, Tixier (1995) described a new variety of *C. harrisii* (*C. harrisii* var. *magna*) and indicated

how Vanden Berghen's specimens from Kivu attributed to *C. harrisii* in 1977 (Vanden Berghen 1977) should be under a newly described species *C. tenuiparietata* Tix., which also exhibits a heart-shaped winged perianth.

The finding among Patxi Heras' collections from Equatorial Guinea (West Africa) of a small *Cololejeunea* with a heart-shaped perianth and correlated with elongate marginal leaf cells, but this time quite far away from the known distributions of any of the above mentioned species, caused us to review the whole group.

## Results

In the studied group, four species have been recognized, all of which share the heart-shaped perianth and elongate marginal leaf cells.

### Key to the group

1- Perianth not connate in its upper part; rhizoids red .....*Cololejeunea amaniensis*

1- Perianth connate in its upper part; rhizoids hyaline.....2

2- Perianth with protruding cells at mouth; first tooth bicellular; hyaline papilla at base of apical tooth cell.....*Cololejeunea harrisii*

2- Perianth lacking protruding cells at mouth; first tooth bicellular or unicellular; hyaline papilla at the apex of apical tooth cell.....3

3- Plant large; first tooth long, bicellular; perianth long (0.7-0.9 mm) and tall winged.....*Cololejeunea magna*

3- Plant small; first tooth short, unicellular (rarely bicellular); perianth short (0.4-0.5 mm) and low winged.....*Cololejeunea iradieri*

#### 1. *Cololejeunea amaniensis* Pócs (Figs. 2a, 3a)

##### Studied material:

Isotype, microscopic slide, East Africa, Tanzania, Tanga region, East Usambara Mts. Amani-Sigi Forest reserve. Sigi headwaters area S of Amani, near Kwamkoro sawmills. Epiphyllous on *Trichomanes rigidum* leaves in submontane rain forest at 1000 m alt. Collected by Pócs No. 6947/BC 19 Feb. 1982.

Tanzania, West Usambara Mts., Shagayu Forest Reserve. In submontane rain forests along the tributary of Uмба river below Kwamshembambu, 6 km NW of Mlalo village, at 1600-1700 m alt. On filmy fern leaves. 21-10-1986. Coll.: T. Pócs, A. Borhidi & E. Farkas N°.: 86203/F EGR.

Diagnostic characters: non-connate short winged perianth (fig. 3a), cells not protruding at the mouth, smaller lobule than *C. harrisii*, but similar first tooth (bicellular and bearing hyaline papilla

at the base of apical cell)(fig. 2a), red rhizoids.

This species is the most isolated in the group due to its red rhizoids and its non-connate perianth.

#### 2. *Cololejeunea harrisii* Pócs (Figs. 2b,3b)

##### Studied material:

Holotype,. East Africa, Tanzania, Morogoro district, Uluguru Mts. Epiphyllous on *Tectaria* leaves in montane mossy forests with many tree ferns on the NW slopes of the Lupanga crest, at 1800-2000 m altitude. 14 Feb 1970. Coll.: Pócs & Harris 6130/S EGR.

Diagnostic characters: broad and tall crenulate wings on the perianth, with very characteristic highly protruding cells at its mouth (Fig. 3b), first tooth of lobule composed of two cells, bearing a proximal hyaline papilla at the base of the apical cell (Fig. 2b).

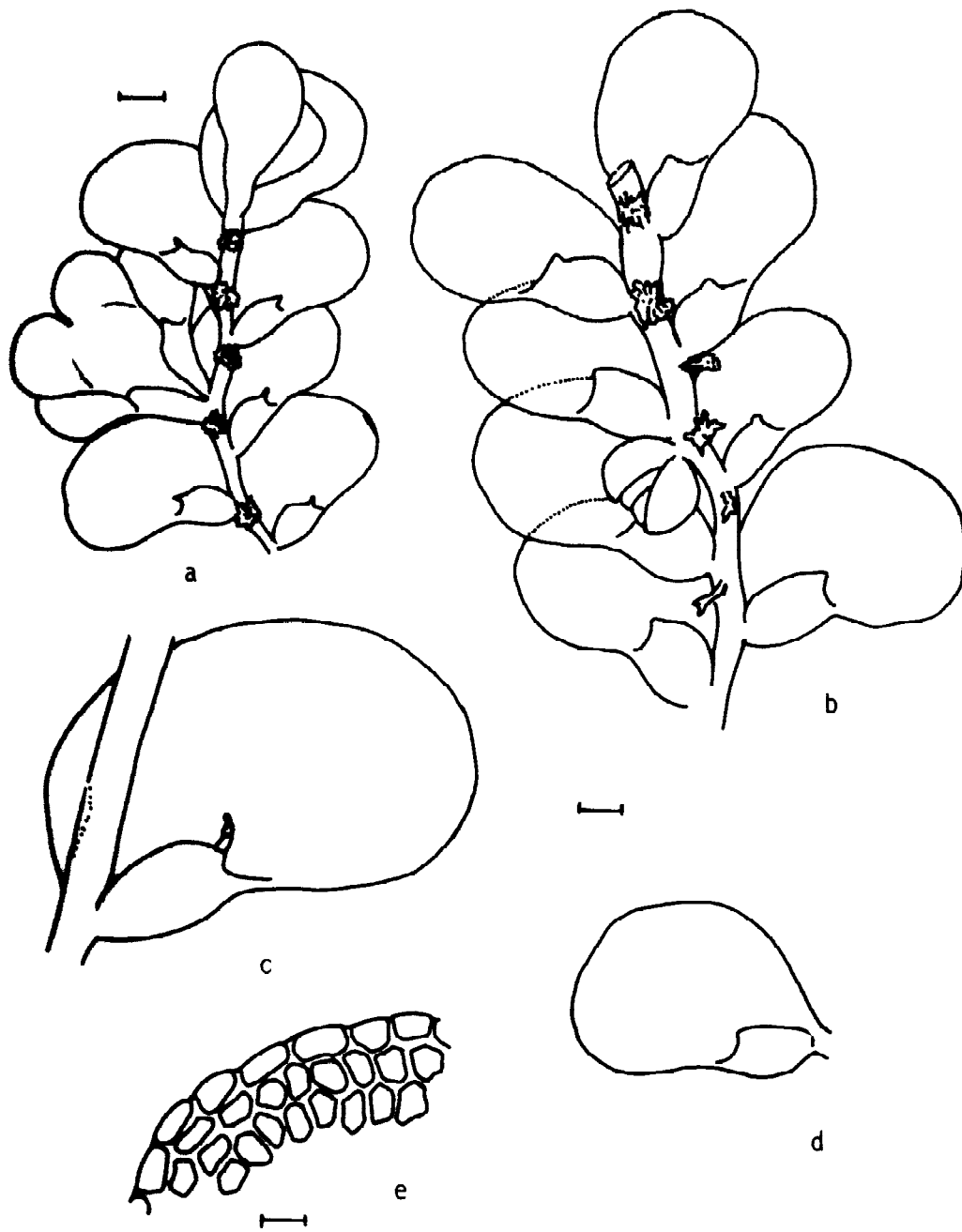
#### 3. *Cololejeunea iradieri* sp. nov. (Figs. 1b,d,e; 2c; 3c)

##### Studied material:

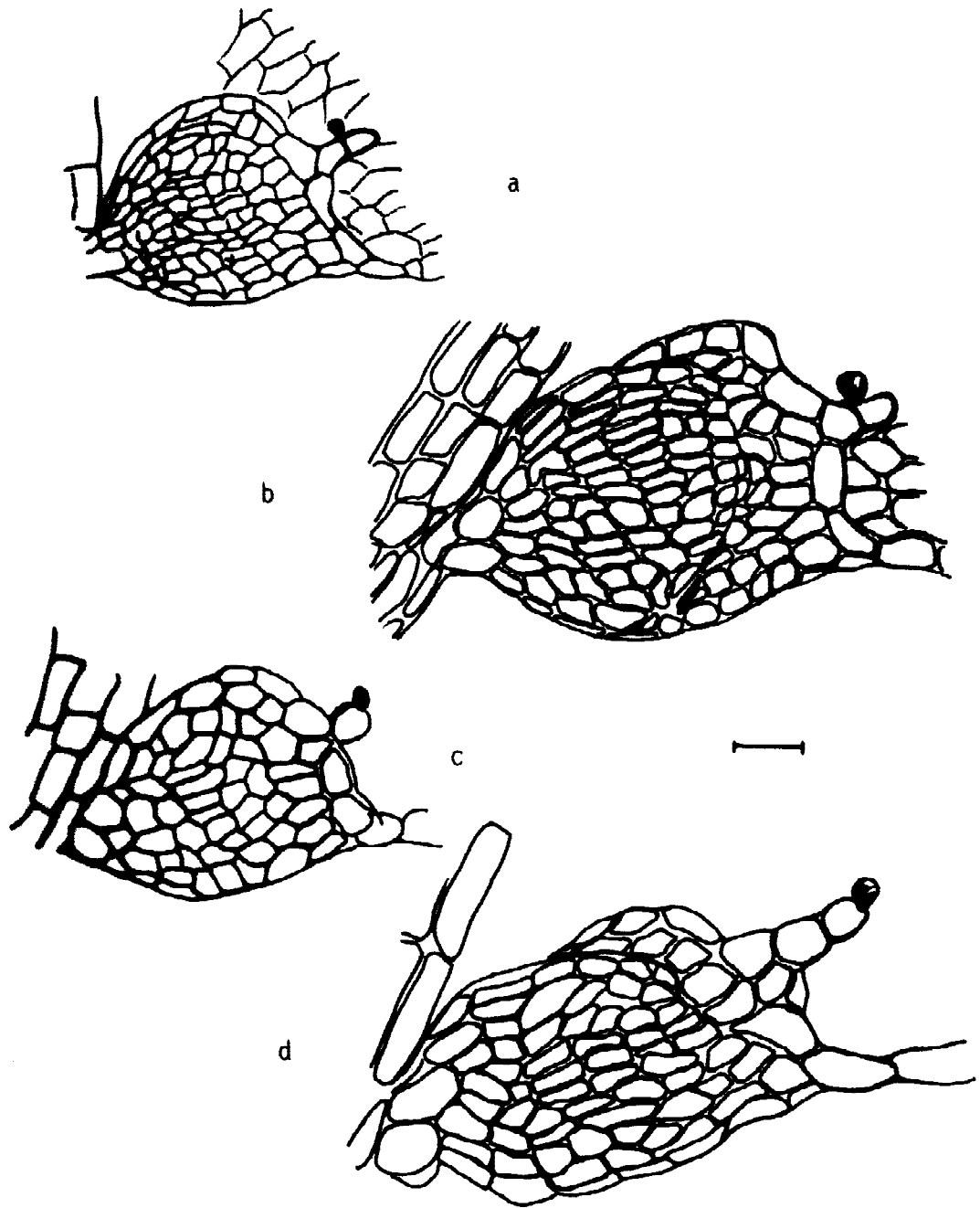
Type: Equatorial Guinea, Muni, Niefang, Mt. Televisión, 800 m. Muscicole on corticolous *Pyrrhobryum spiniforme*. 26-7-1994. Coll. P. Heras. Holotype: VIT 460/94.

*Planta parva, aurata, fulgens, ad Pyrrhobryum spiniforme reptans, frons 0.7-0.9 mm lata et 2-2.5 mm longa. Caule 60 µm crassis. Rhizoidis hyalinis. Folia contigua, 0.4-0.53 mm longa, 0.28-0.38 mm lata, ovalis-suborbicularis. Cellulae marginales elongatae. Cellulae mediales 27-28 x 22.5 µm. Lobulus 1/3 longus lobi, planus. Dens primus unicellularis. Papilla hyalina apicalis. Dens secundus subnullus, saepe absens. Perianthia auriculata, ad ostium cellulis non mamillatis, 0.44-0.53 mm longa. Bracteae partem 2/3 ad 3/4 longitudinis attingentibus. Androecia lateralia, bracteis in 2-3 jugis.*

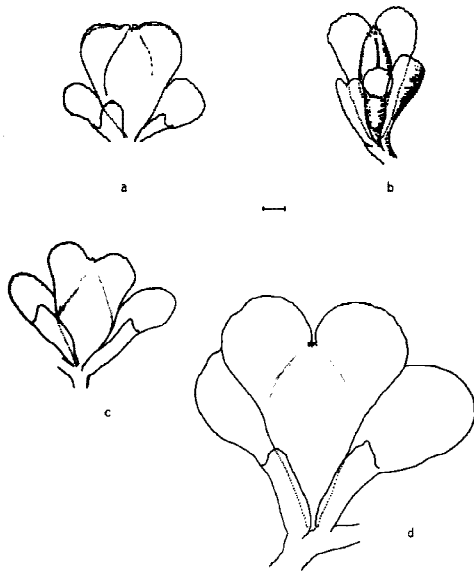
Small, golden shiny plant, creeping over *Pyrrhobryum spiniforme*, shoots 0.7-0.9 mm wide



**Fig. 1:** a) Plant of *Cololejeunea magna*, scale bar 250  $\mu\text{m}$ ; b) Plant of *C. iradieri*, bearing androecia, scale bar 100  $\mu\text{m}$ ; c) Leaf of *C. magna* and d) leaf of *C. iradieri*, scale bar 100  $\mu\text{m}$ ; e) Marginal leaf cells of *C. iradieri*, scale bar 25  $\mu\text{m}$ .



**Fig. 2:** Lobule, a) *Cololejeunea amaniensis*, redrawn from Pócs 1985; b) *C. harrisii*, redrawn from Pócs 1975; c) *C. iradieri*, drawn from type; d) *C. magna*, drawn from type. Scale bar 50  $\mu\text{m}$ .



**Fig. 3:** Perianth, a) *Cololejeunea amaniensis*, rescaled and redrawn from Pócs 1985; b) *C. harrisii*, rescaled and redrawn from Pócs 1975; c) *C. iradieri*, drawn from type; d) *C. magna*, drawn from type. Scale bar 100  $\mu$ m.

and 2-2.5 mm long. Stem diameter 60  $\mu$ m. Rhizoids hyaline. Leaves slightly imbricate, 0.4-0.53 x 0.28-0.38 mm, oval to rounded. The marginal leaf cells elongate, forming a weak border. Median leaf cells 27-28 x 22.5  $\mu$ m, with evenly thickened cell walls. Lobule 1/3 the leaf length, not or hardly inflated. First tooth unicellular (rarely bicellular), bearing a hyaline papilla at apex of apical tooth cell, the second tooth blunt or lacking. Perianths heart-shaped, connate in upper part, low winged, lacking protruding cells at its mouth, 0.44-0.53 mm long. Female bracts reaching 2/3 – 3/4 of perianth length. Male spikelets lateral, formed of 2-3 pairs of bracts.

This species is named after Manuel Iradier, XIXth century explorer of Equatorial Guinea and Gabon, born in Vitoria (Spain); and after Asociación Africanista Manuel Iradier, an NGO supporting health, cultural and scientific projects in the area.

Diagnostic characters: small golden shiny plant,

winged perianth lacking protruding cells at its mouth (Fig. 3c), lobule with unicellular first tooth bearing hyaline papilla at the apex of this only cell (Fig. 2c), evenly but thick cell walls.

4. *Cololejeunea magna* comb. et stat. nov. (Figs. 1a,c; 2d; 3d)  
*C. harrisii* Pócs var. *magna* Tixier, Trop. Bryol. 11: 56. 1995.

Studied material:

Holotype: Rwanda, Cyangugu, Nyungwe Karamba forest Loc 107. Montane rainforest with *Dicranoloma billardieri* mossballs in canopy, epiphyllous. 2000 m. 13.8.91. Coll. E. Fischer No. 8506 – 17. Bryotrop Expedition 1991. (G 448166).

Rwanda, Cyangugu, Rugege forest, km 106 de la route Butare-Cyangugu. Epiphyllous dans la forêt de montagne, 1000 m. 15.8.1974. Coll. De Sloover. 18934 (EGR).

Tixier 1995 described this species as a variety of *C. harrisii* (*C. harrisii* var. *magna*) based in its larger dimensions and also a larger first lobule tooth (Fig. 1a, 1c). In his drawing of the lobule it can be seen how the hyaline papilla is placed at the very apex of the apical cells (Fig. 2d), same as the drawings of *C. harrisii* that can be found at Vanden Berghen 1977.

Revising Tixier's type of *C. harrisii* var. *magna* and one of Vanden Berghen's specimens we observed that the lobules are effectively the same, and that their tall winged perianths lack protruding cells at their mouths (fig. 3d).

Diagnostic characters: big perianth, tall winged but lacking protruding cells at the mouth (Fig. 3d), big lobule, with bicellular first tooth bearing papilla at the apex of the apical cell (Fig. 2d).

#### Notes on *Cololejeunea tenuiparietata* Tix.

Studied material:

Holotype, Zaire 8515 – 4. Kivu, Mt. Kahuzi area. Submontane rainforest in the NNE valley of Kahuzi N of the park border close to the road Bukavu-Irangi, dominated by *Newtonia* and

**Comparative table**

|  | <i>C. amaniensis</i>                | <i>C. harrisii</i> | <i>C. iradieri</i>              | <i>C. magna</i> |
|--|-------------------------------------|--------------------|---------------------------------|-----------------|
| Shoot width                                  | 0.6-0.8 mm                          | 1.2-1.5 mm         | 0.7-0.9 mm                      | 1.4 mm          |
| Stem width                                   | 50 µm                               | 70 µm              | 60 µm                           | 70 µm           |
| Leaves                                       | 0.4-0.6 x 0.25-0.4 mm               |                    | 0.6-1 x 0.4-0.6 mm              | 0.4-0.53 x      |
| 0.28-0.38 mm                                 | 0.6-0.7 x 0.35-0.4 mm               |                    |                                 |                 |
| First tooth                                  | Bicellular (rarely unicellular)     |                    | Bicellular (rarely unicellular) |                 |
| Unicellular (rarely bicellular)              | Bicellular (rarely unicellular)     |                    | Bicellular (rarely unicellular) |                 |
| Hyaline papilla                              | At base of apical tooth cell        |                    | At base of apical tooth cell    |                 |
| At apex of apical tooth cell                 | At apex of apical tooth cell        |                    | At apex of apical tooth cell    |                 |
| Perianth length                              | 0.45-0.5 (0.6) mm                   | 0.5-0.6 mm         | 0.44-0.53 mm                    | 0.7-0.9 mm      |
| Female bracts length in relation to perianth |                                     |                    | 1/2                             | 1/2- 2/3        |
| 2/3 – 3/4                                    | 1/2 - 2/3                           |                    |                                 |                 |
| Rhizoids                                     | Red                                 | Hyaline            | Hyaline                         | Hyaline         |
| Leaf cell walls                              | Marginal leaf cell walls incrassate |                    | Not incrassate                  | Incrassate      |
| Not incrassate                               |                                     |                    |                                 |                 |

*Parinaria excelsa* 1930 – 2060 m alt. Epiphyllous. 5.9.1991. Coll. E. Fischer 8515-4. (G 448168). Bryotrop Expedition 1991.

Although Tixier indicated in 1995 that this is the species described by Vanden Berghen 1977 as *C. harrisii*, *C. tenuiparietata* possesses a heart-winged perianth but its wings are much smaller than in Vanden Berghen's specimen, the pattern of elongate marginal leaf cells is not clear, the shape of leaf is slightly different, being oval, sometimes slightly apiculate. In conclusion, in our opinion *C. tenuiparietata* cannot be assigned to any of the species mentioned above. Vanden Berghen's specimen is different from it and attributable to *C. magna*.

**Acknowledgements**

We are very grateful to Saci and Dr. Tamás Pócs who provided invaluable advice, specimens and his kind permission to use some of his drawings. Thanks are given to Dr. Patricia Geissler for the loan of specimens and to Asociación Africanista Manuel Iradier, for logistical support during collection trip.

**References**

- Pócs, T. 1975.** New or little known epiphyllous liverworts I. *Cololejeunea* from tropical Africa. Acta Botanica Hungarica 21(3-4): 353-375.
- Pócs, T. 1985.** East African Bryophytes, VII. The Hepaticae of the Usambara Rain Forest Project Expedition, 1982. Acta Botanica Hungarica, 31 (1-4): 113-133.
- Tixier, P. 1995.** Résultats taxonomiques de l'expédition BRYOTROP au Zaïre et Rwanda. 30. Bryophytes épiphyllées (récoltes de E. Fischer). Tropical Bryology, 11: 11-76
- Vanden Berghen, C. 1977.** Hépatiques épiphyllées récoltées par J.L. De Sloover au Kivu (Zaïre), au Rwanda et au Burundi. Bulletin du Jardin Botanique National de Belgique, 47 (1-2): 199- 246.