

## ***Campylopus joshii* (Leucobryaceae), a new species from Africa**

Amélie PICHONET\* & Jacques BARDAT

Department of Systematic and Evolution UMR CNRS 7205,  
National Museum of Natural History, 57, rue Cuvier, 75231 Paris Cedex 05, France

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**Abstract** – *Campylopus joshii* Broth. ex Pichonet et Bardat is described as a new species from Uganda and the Democratic Republic of Congo. The type specimen was initially named *Dicranum joshii* Broth. ex Thér. and *Dicranum joshii* var. *latifolium* Thér. et Naveau but these names have never been validly published. The new species resembles the groups of *Campylopus* species with ventral hyalocysts and a ridged costa on the dorsal side but differs by the incomplete band of ventral stereids and single-celled dorsal lamellae.

**Bryophyta / Dicranales / Dicranum / *Campylopus* / Uganda / Democratic Republic of Congo**

**Résumé** – *Dicranum joshii* Broth. ex Thér. et *Dicranum joshii* var. *latifolium* Thér. et Naveau sont des noms invalides car non publiés, cependant, ils représentent bien une nouvelle espèce de *Campylopus* pour l'Afrique (Uganda et République démocratique du Congo). Cette espèce est proche du groupe d'espèces à hyalocystes ventraux ainsi que du groupe à lamelles dorsales cependant il se différencie par une couche partielle de stérides ventrales ainsi que par des lamelles unicellulaires.

**Bryophyta / Dicranales / Dicranum / *Campylopus* / Uganda / République démocratique du Congo**

### **INTRODUCTION**

Five species of the genus *Dicranum* Hedw. are currently recognised from Africa: *D. johnstonii* Mitt., *D. acanthoneurum* Müll. Hal., *D. borbonicum* Renaud et Cardot, *D. obliquatum* Mitt. and *D. petrophyllum* G. Negri (O'Shea, 2006). They are all considered as African endemics but are poorly known taxonomically and the latter three species are known only from the type collections. In addition, a sixth African taxon exists in *Dicranum*, *D. joshii* Broth. ex Thér. var. *latifolium* Thér. et Naveau, which was invalidly published. This paper deals with the latter taxon.

*Dicranum joshii* Broth. ex Thér. var. *latifolium* Thér. et Naveau was based on a species recognised by V. F. Brotherus as "*Campylopus joshii*" but this is only

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\* Correspondence and reprints pichonet@mnhn.fr

a herbarium name which has never been published. Thériot and Naveau (in Naveau, 1927) transferred *Campylopus joshii* to *Dicranum* and described a new variety within it, but failed to provide the description of the species itself. According to the International Code of Botanical Nomenclature (McNeill *et al.*, 2006) both the species and varietal names are invalid.

Examination of the original material of *Campylopus joshii* and *Dicranum joshii* var. *latifolium* showed that this taxon actually represents an undescribed species of the genus *Campylopus*. The new species is currently known from two localities in Uganda and Democratic Republic of Congo (Fig. 1).



Fig. 1. Distribution of *Campylopus joshii* Broth. ex Pichonet *et* Bardat.

## DESCRIPTION

**Campylopus joshii** Broth. ex Pichonet et Bardat, sp. nov.

Figs 2-13

*Dicranum joshii* Broth. ex Thér. in Naveau, *Bull. Soc. Bot. Belgique* 60(1): 21 (1927), *nom. inval. sin. descr. lat.* [Art. 32.1(c)].

*Campylopus joshii* Broth. ex Thér. in Naveau, *Bull. Soc. Bot. Belgique* 60(1): 21 (1927), *nom. inval. in synonym.* [Art. 34.1(c)].

*Dicranum joshii* Broth. ex Thér. var. *latifolium* Thériot et Naveau in Naveau, *Bull. Soc. Bot. Belgique* 60(1): 21, f. 6 (1927), *nom. inval. sin. prior descr. spec.* [Art. 34.1(d)].

**Diagnosis:** *Caulis simplex vel parce ramosus, erectus, 8 cm altus, dense tomentosus. Folia erecta, oblongo-lanceolata, sensim et longe acuminata, 9 mm longa. In transversali sectione foliae nervus compositus: una lamella magnarum ventralium rectangularium cellularum, una lamella in centrali parte magnarum globulosarum cellularum praetexta cum ventralibus et dorsalibus stereidis, dorsali superficie cum semi circularibus cristis ornata. Caetera ignota.*

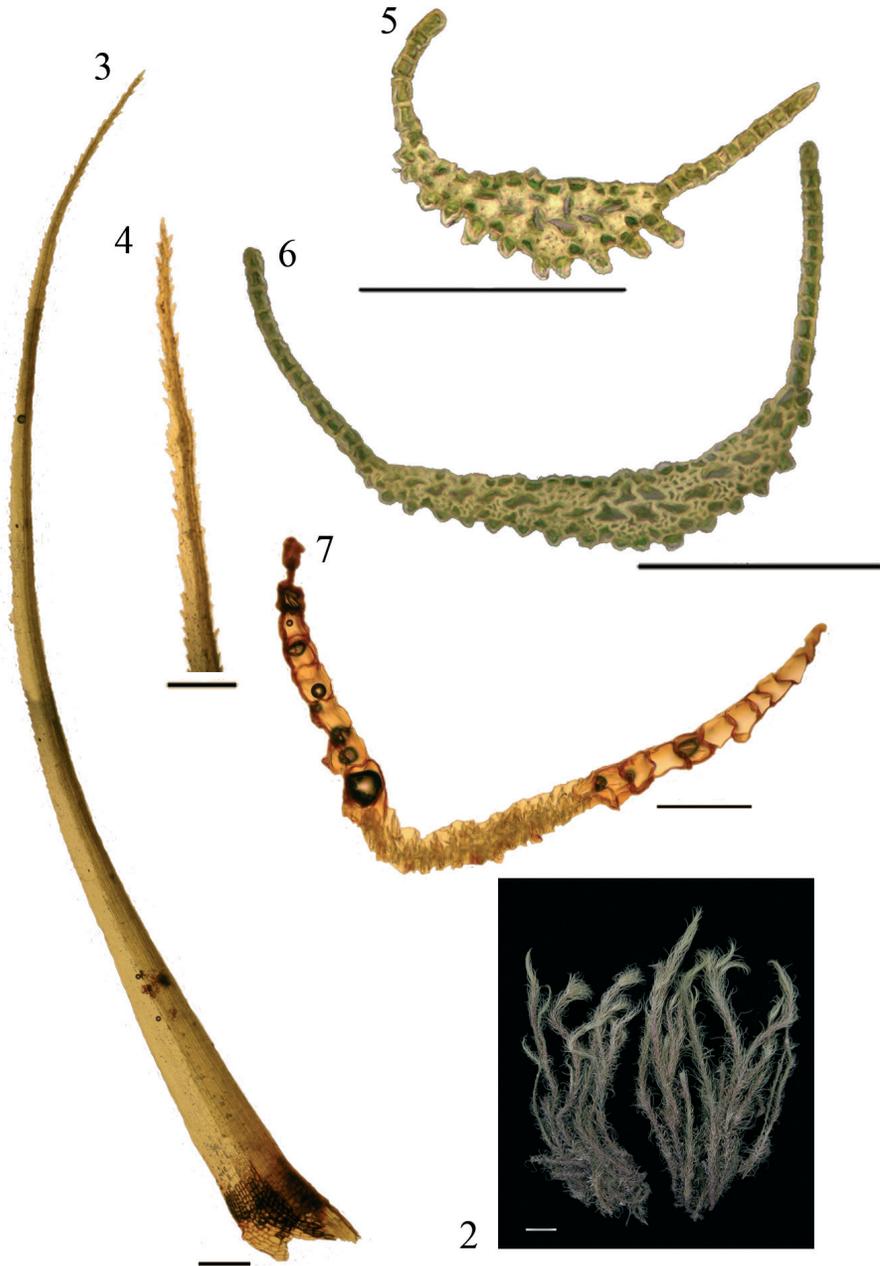
**Type:** AFRICA. UGANDA: Entebbe Jashi, 2900 ft, coll. P. G. Joshi (1905), Hb E. Levier n° 6495 as *Campylopus joshii* Broth. (Holotype: H-Brotherus 0935037; isotype: PC 0128799).

**Paratype:** AFRICA. DEMOCRATIC REPUBLIC OF CONGO: Angi (7 kil. à l'ouest de Rutshuru), 21 September 1914, coll. *Becquaert* n° 5800 (PC 0128798 as *Dicranum joshii* var. *latifolium*).

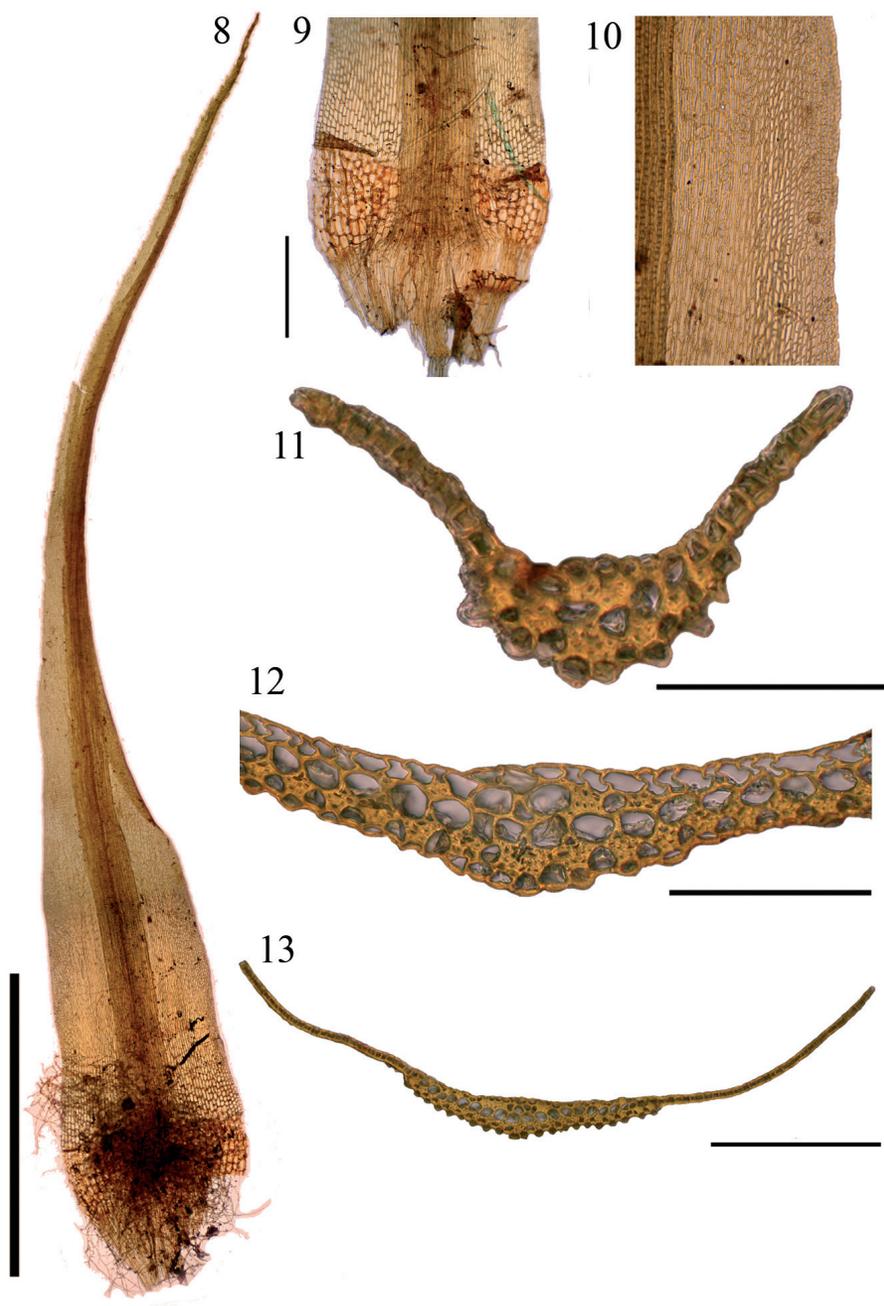
**Description:** Plants robust. Stem erect, to 8 cm tall, densely tomentose. Leaves erect to slightly flexuose when dry, ovate-lanceolate or lanceolate, 9 mm long, 0.85-0.98 mm wide at base; margin serrulate or denticulate from upper third toward apex; costa 300-360 µm wide at base, filling most of subula and excurrent, without hair-point, denticulate dorsally in distal part, ridged at back with single-celled lamellae below, in transverse section with an incomplete ventral stereid band and a complete dorsal stereid band, one row of guide cells, a second row of adaxial guide cells in the middle of costa, one row of adaxial cells as large as guide cells at leaf base, cells thin-walled; alar cells extending to the costa, with reddish walls, forming prominent auricles; laminal cells not pitted, basal juxtacostal cells longly rectangular, 46.2 × 13.0 µm, becoming rhomboidal to quadrate towards the margins, 16.2 × 10.5 µm; upper laminal cells rhomboidal to short-rectangular; rhizoids smooth. Gametoezia and sporophyte not observed.

## DISCUSSION

*Campylopus joshii* is known from two specimens. The holotype (H) is composed of about 15 shoots, while the isotype in PC is only one single shoot. The original material of *Dicranum joshii* var. *latifolium* (Figs 8-13), here treated as paratype of *Campylopus joshii*, consists of about ten shoots. The leaves and costa in the isotype of *C. joshii* are narrower than in the holotype (respectively, 624 µm



Figs 2-7. *Campylopus joshii*. **2.** Habit (scale: 1 cm). **3.** Leaf (scale: 500  $\mu$ m). **4.** Leaf apex (scale: 250  $\mu$ m). **5.** Transverse section of upper portion of leaf (scale: 100  $\mu$ m). **6.** Transverse section of lower portion of leaf (scale: 100  $\mu$ m). **7.** Transverse section of alar cells (scale: 100  $\mu$ m). (All from the holotype, H-Brotherus).



Figs 8-13. *Campylopus joshii*. **8.** Leaf (scale: 2.0 mm). **9.** Leaf base (scale: 0.5  $\mu$ m). **10.** Lower cells. **11.** Transverse section of upper portion of leaf (scale: 100  $\mu$ m). **12.** Costa in transverse section in lower portion of leaf (scale: 100  $\mu$ m). **13.** Transverse section of lower portion of leaf (scale: 250  $\mu$ m). (All from *Naveau 5800*, paratype, PC 0128799).

vs 852  $\mu\text{m}$  and 184  $\mu\text{m}$  vs 304  $\mu\text{m}$ ) and if Thériot and Naveau (in Naveau, 1927) studied only the isotype, this may explain why they recognized the paratype as a separate “variety”. Thériot and Naveau also described the sporophyte and the spores of *Dicranum joshii* var. *latifolium* but the original material lacks fertile plants (see Table 1). It is unclear whether there was only a single sporophyte available in the original material or whether there exists another fertile sample which could not be located.

Table 1. Morphological characters of the genera *Dicranum*, *Campylopus* and *Dicranodontium*, compiled from Frahm (1997), Allen & Ireland (2002), Allen (1989) and Limpricht (1890) – and of *Campylopus joshii* Broth. ex Pichonet et Bardat. Sporophyte characters of *C. joshii* after Thériot et Naveau (in Naveau, 1927).

	<i>Campylopus joshii</i>	<i>Dicranum</i> Hedw.	<i>Campylopus</i> Brid.	<i>Dicranodontium</i> Bruch et Schimp.
Costa	1/3 of the leaf base, ribbed and serrulate at the back, well developed dorsal stereid band, incomplete band of ventral steroids, ventral layer of hyalocysts present	< 1/3 of the leaf base, often ridged and serrate at back, with two stereid bands, ventral layer of hyalocysts lacking	1/3 to 7/8 of the leaf base, more or less ribbed and serrulate at the back, well developed dorsal stereid band, ventral layer of hyalocysts present	1/3 to 1/2 of the leaf base, more or less rough at the back above, with two stereid bands, ventral layer of hyalocysts lacking
Alar cells	inflated, reddish	often inflated, usually yellow-brown near the margin and hyaline toward the costa	usually clearly inflated, hyaline to brown to reddish	more or less inflated, hyaline or brownish
Seta	“flexuose” when moist	erect when moist	cygneous when moist, sometimes erect-flexuose	strongly curved to geniculate or cygneous when moist, erect-sinuose when dry
Capsule	horizontal, obloid, smooth when dry	erect, inclined or horizontal, elongate to cylindrical, more or less furrowed when dry	erect or curved, ovoid to ellipsoid, smooth to deeply furrowed when dry	erect, obloid-cylindrical, smooth to weakly furrowed when dry
Operculum	unknown	longly rostrate	rostrate	very longly rostrate (as long or almost as long as the capsule)
Stomata	unknown	present	absent	absent
Peristome teeth	bifid to 1/3-1/2	bifid to 1/3-1/2	bifid to 1/2	bifid to near the base
Calyptra	unknown	surface smooth, base entire	surface smooth base usually fringed by single-celled hairs	surface entire or rarely ciliate, base entire
Rhizoids	unknown	always arising from the stem or at the base of branches, never from the costa	frequently arising from the dorsal surface of the costa	on both surface of the costa, along stems and branch bases

The placement of a species in the genus *Dicranum* or one of its close relatives is sometimes difficult, especially when the specimens are sterile. For example, *Dicranum subporodictyon* (Broth.) C. Gao et T. Cao is included in *Dicranodontium* Bruch et Schimp., *Campylopus* Brid. or *Dicranum* by different authors. However, by its morphology the new species as described by Thériot and Naveau (in Naveau, 1927) and observed by the authors clearly belongs in the genus *Campylopus*, and not in *Dicranum* or *Dicranodontium* (Table 1). The costa is broad and occupies one third the width of the leaf base, with ventral hyalocysts, a partial band of ventral stereids and a well-developed band of dorsal stereids, and is serrulate at the back. The capsule is curved and oblong and the peristome teeth are divided to about 1/3-1/2 of their length. However, by its double row of guide cells in the middle of the costa in the lower part of the leaf the new species does not fit any of the *Campylopus* species known from Africa and Central America (Allen, 1989; Frahm, 1985, 1990, 1994; Frahm & Stech, 2006).

*Campylopus joshii* is closely related to the group of species which have a ridged costa on the dorsal side from the base to the upper part of the leaf, including *C. introflexus* (Hedw.) Brid., *C. pilifer* Brid., *C. aureonitens* (Müll. Hal.) A. Jaeger, but differs in having single-celled dorsal lamellae. The new species also resemble the group of species with a row of large hyaline adaxial cells (*C. pseudo-bicolor* Müll. Hal. ex Renaud et Cardot and *C. robillardae* Besch.) but differs from these by the presence of a dorsal and a partial ventral stereid band in the costa.

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