## METZGERIALES-FOSSOMBRONIACEAE

FOSSOMBRONIA RWANDAENSIS, A NEW SPECIES FROM TROPICAL AFRICA

#### INTRODUCTION

In a previous paper (Perold 1997), reference was made to some specimens of Fossombronia, notably De Sloover 185.74, (BR, NAM) from Rwanda, which had been referred to F. capensis S.W.Arnell. The two taxa, F. capensis and the fertile Rwanda specimen placed here, have several characters in common: both are dioicous and have large perigonial bracts subtending the antheridia in the male plants and their elaters are similar in that they are poorly formed. The spore ornamentation in F. capensis and the Rwanda specimen is, however, completely different and in some capsules of the Rwanda species (particularly those held at BR) it even exhibits a degree of dimorphism. Since spore ornamentation is regarded as the most important character in distinguishing between species of Fossombronia, it must be assumed that we are here dealing with two different taxa. The records of F. capensis in tropical Africa (Vána et al. 1979; Wigginton & Grolle 1996) should therefore be deleted, as its distribution is seemingly restricted to a smallish area in the southern Cape winter rainfall region (Perold 1997); F. rwandaensis is described as a new species.

# Fossombronia rwandaensis Perold, sp. nov.

Plantae prostratae, crebrae in coloniis. *Folia* imbricata, late patentia, irregulariter rectangularia. *Rhizoidea* purpurea. Dioicae. Plantae masculae communes; antheridiis bracteis magnis tectis, saepe binatim connatis. *Pseudoperianthium* late campanulatum, supra basin crateriforme plicatum vel fimbriatum. Sporae 42.5–52.5  $\mu$ m diametro, superficie distali plerumque cum cristis crassis, rarissime reticulata. *Elateres* 62.5–77.5  $\mu$ m longi, debiliter formati. *Gametophyta* aliquantum similes sunt illis *F. capensis* (ut hae plantae olim agnotae sunt), sed sporarum ornamentis valde differunt.

TYPE.—Rwanda, préfecture de Gisenyi, sous le poste minier de Gikungu, alt. env. 2 000 m. Sur talus très humide, *J.L. De Sloover 18.574* (NAM, holo.!; BR, iso.!).

Plants predominantly male, in dense overlying mats, green; shoots large, simple (Figure 6C) or once furcate (Figure 6A), rarely twice, up to 20 mm long, 1.8-2.0 mm high, 3.2-4.0 mm wide (up to 4.7 mm wide at pseudoperianth in female plants), apical segments moderately divergent, 2-8 mm long. Stems prostrate, sometimes tapering proximally, chlorophyllose, occasionally with a lateral bud, plano-convex in cross section, in male plants apically (Figure 5M) 200-250 µm (10 cell rows) high, 370-450 µm wide, basally (Figure 5N) 200-260 µm high, 280-350 um wide, in female plants apically (Figure 5O), 250-330 µm high, 350-540 µm wide, basally (Figure 5P) 200-300 µm high, 350-450 µm wide. Rhizoids purple, 17.5-25.0 µm wide. Leaves overlapping, widely spreading, succubously inserted, irregularly rectangular longitudinally or transversely, upper margin and sometimes 'leading' edge ± rounded, with low protrusions here and there, 'trailing' edge occasionally sloping obliquely, with up to 6 unevenly spaced marginal slime papillae,  $\pm 17.5 \times 20.0 \ \mu\text{m}$ , sessile or raised on a basal cell; in male (Figure 5A-E) and



FIGURE 5.—Fossombronia rwandaensis, De Sloover 18.574. A-E, male leaves; F-J, female leaves; K, detail of trailing leaf margin; L, median leaf cells with chloroplasts (dotted lines), oil bodies no longer present in material studied; M, cross section of apical part of male stem; N, cross section of basal part of male stem; O, cross section of apical part of female stem; P, cross section of basal part of female stem; Q–U, perigonial bracts; V, opened pseudoperianth; W, pseudoperianth from side; X, cells in capsule wall; Y, Z, elaters. Scale bars: A–J, V, W, 500 µm; K, 100 µm; L, X, 50 µm; M–U, 250 µm; Y, Z, 25 µm. Drawn by G. Condy.

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FIGURE 6.—Fossombronia rwandaensis, De Sloover 18.574. A, moderately divergent terminal segments with rows of perigonial bracts subtending antheridia; B, detail of rows of perigonial bracts; C, apical part of female shoot; D, archegonium near apex (indicated by arrow); E, pseudoperianth from side; F, pseudoperianth from above. A, × 14.4; B, × 24; C, × 12; D, × 33.6; E, × 22.8; F, × 23.4.

female plants (Figure 5F–J) not markedly different, (1075–)1500–2125 × 1850–2250(–2900)  $\mu$ m, sometimes narrower above, up to 1625  $\mu$ m. wide. *Leaf cells* thinwalled, at upper margins subquadrate to rectangular across, 17.5–32.5 × 30.0–45.0  $\mu$ m, at lateral margins (Figure 5K), long-rectangular, 62.5–87.5 × 32.5–42.5  $\mu$ m, upper laminal cells 5- or 6-sided, 45.0–57.5 × 35.0–47.5  $\mu$ m, middle laminal cells 50.0–75.0 × 40.0–50.0  $\mu$ m, basal cells 55.0–95.0 × 50.0–67.5  $\mu$ m. *Oil bodies* lost in the material examined; chloroplasts clumped together at cell margins (Figure 5L), ± 3  $\mu$ m long.

Dioicous. Antheridia dorsal on stem, mostly in 2 crowded rows, short-stalked,  $\pm$  ovoid, 340  $\times$  300  $\mu$ m, shielded by perigonial bracts (Figure 6A, B), which are often in fused pairs (Figure 5R–T),  $600-800 \times 550-600$  $\mu$ m, when single (Figure 5Q, U),  $\pm$  340  $\mu$ m wide, margins with pointed or obtuse projections, up to 300 µm long, marginal cells ± rectangular or subquadrate,  $25.0-42.5 \times 25.0-37.5 \,\mu$ m, cells in interior 4- or 5-sided,  $37.5-67.5 \times 30.0-40.0 \ \mu\text{m}$ . Archegonia in 1(Figure 6D) or 2 scattered rows along stem, naked; sometimes 2 in close proximity becoming fertilised. Pseudoperianth (Figures 5V, W; 6E, F)  $\pm$  1.5 mm proximal to apex, widely flaring and pleated or frilled above bowl-shaped base, about as tall as leaves, up to 2100 µm long and 5500 µm wide across mouth, at margin numerous projections, some rounded, others sharply pointed, with  $\pm$  28 slime papillae, mostly sessile, one-celled,  $20 \times 20 \ \mu m$ , a few raised on 3 tiers of basal cells,  $42.5-50.0 \times 37.5-50.0$ µm, below with winged lateral outgrowths or appendages; cells not appreciably different in shape and size from those in leaves. Capsules globose,  $\pm 1000 \,\mu\text{m}$  diam., wall bistratose, inner layer (Figure 5X) rather pale, cells irregularly shaped, polygonal or roughly triangular to quadrangular,  $37.5-62.5 \times 30.0-42.5 \mu m$ , each cell wall with 2 or 3 brown, nodular thickenings, entirely lacking

semi-annular bands. Seta almost absent, as all capsules examined ± sessile. Spores golden brown, with ridges, loops, blobs and very rarely reticulations deeper brown, hemispherical to occasionally somewhat irregularly shaped, a few still in tetrads (Figure 7H), 42.5-52.5 µm diam., including spines projecting at periphery; distal face (Figure 7A-D) convex, with thick ridges, irregularly branching and curving or unbranched, short or long, straight or bent or looped, sometimes nodular, very rarely in some capsules only, reticulate (Figure 7G, I), with up to 13 small areolae across face; proximal face (Figure 7E, F) with triradiate mark rather indistinct to distinct, occasionally with nodules aligned along its arms, otherwise nodules scattered irregularly, size variable, up to 7.5 µm wide, in between dusted with fine granules, around spore periphery 25-29 conical or truncate spines, ± 3 µm long, unconnected by a perispore. Elaters (Figure 5Y, Z) few, rather delicate and poorly formed, often adhering to a spore, 62.5-77.5 µm long, 10 µm wide throughout or 15 µm wide centrally and tapering to 10 µm wide tips, difficult to distinguish the spirals, but apparently 3-spiral.

*Fossombronia rwandaensis* has been named for the country where the type and only specimen with spores, *De Sloover 18.574*, was collected at high altitude in very humid conditions. Some maps that were consulted, give the spelling of the 'préfecture' as Kisenyi, not Gisenyi. The other *De Sloover* collections that were determined as *F. capensis* by Vána, *De Sloover 13.345*, *19.118*, *19.169* (the latter from neighbouring Burundi) lack spores and can, therefore, not be identified with certainty, even though *13.345* has large perigonial bracts in the male plants. *F. rwandaensis* can be distinguished by its dioicity, by large bracts subtending the antheridia, usually in 2 crowded rows dorsally along the stems of the male plants, by the cells in the inner wall of the capsules lacking semi-annular bands, by the coarsely ridged spores and by poor-



FIGURE 7.—Fossombronia rwandaensis, De Sloover 18.574. Spores. A–C, distal face; D, detail of ridges near margin of spore; E, side view; F, proximal face; G, several spores in one field, some ridged, others reticulate; H, reticulate spores in partially broken tetrad; I, reticulate spore. A, × 1200; B, × 995; C, × 1212; D, × 2160; E, × 1260; F, × 1030; G, × 190; H, × 545; I, × 1055 (reticulate spores in G indicated by arrows).

ly formed elaters. As mentioned above, some capsules also contained a few spores that had reticulate ornamentation, either still in tetrads or already separated. Out of a total of 758 spores examined (from various samplings), only 24 or 3% had reticulate ornamentation, whereas all the rest, i.e. 97%, were ridged. The reticulate spores may be aberrant or still somewhat immature. As far as could be ascertained, they appeared to be absent from capsules that had been intact in the holotype specimen held at NAM. I think, however, that contamination of the capsules with occasionally reticulate spores, can be ruled out as a possible explanation for their presence. Paton (1973) observes that, 'Aberrant spores occur occasionally in this [i.e. Fossombronia] and other genera. Sometimes it appears that after the spore has attained full size, the development of the sculpturing has been arrested prior to final cutinisation. In such cases lamellae may be poorly developed or fragmentary'. Whether this would apply to the reticulate spores occasionally encountered in F. rwandaensis remains a matter of conjecture.

*Eossombronia rwandaensis* shares several characters with *F. capensis*, namely dioicity, large perigonial bracts and poorly formed elaters. The distribution of the latter is, however, confined to a smallish area in the southern Cape winter rainfall region (Perold 1997). The lamellate spore ornamentation in *F. capensis* is also quite different. The records of *F. capensis* in tropical Africa (Vána *et al.* 1979; Wigginton & Grolle 1996) should, therefore, be deleted.

### SPECIMENS EXAMINED

De Sloover 13.345 (BR, NAM), Rwanda, forêt de Gishwati, le long de la route Gisenyi-Kibuye. De Sloover 18.574 (NAM, holotype; BR, isotype), Rwanda, préfecture de Gisenyi, sous le poste minier de Gikungu, le long de la Bikoneko. De Sloover 19.118 (BR, NAM), Rwanda, préfecture de Cyangugu, Forêt de Rugege, entre Gisakura et Karamba. De Sloover 19.169 (BR), Burundi, au km 30 de la route Bujumbura-Ijenda, Matara.

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#### REFERENCES

PATON, J.A. 1973. Taxonomic studies in the genus *Fossombronia* Raddi. *Journal of Bryology* 7: 243–252.
PEROLD, S.M. 1997. Studies in the liverwort genus *Fossombronia* (Metzgeriales) from southern Africa. 2. An amendment to three species from Western Cape, described by S.W. Arnell. *Bothalia* 27: 29–38.
VÁNA, J., PÓCS, T. & DE SLOOVER, J.L. 1979. Hépatiques

d'Afrique Tropicale. Lejeunia 98: 1-23.

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WIGGINTON, M.J. & GROLLE, R., supplemented by A. Gyarmati. 1996. Bryophytorum Bibliotheca 50: 1–267.