

FOSSOMBRONIACEAE

FOSSOMBRONIA NYIKAENSIS, A NEW SPECIES FROM MALAWI

Fossombronia nyikaensis Perold, sp. nov.

Plantae aggregatae, plerumque smaragdinae, mediocres vel robustulae, dioicae. *Folia* supra subrotundata, saepe plicata, plerumque breviora quam lata. Plantae masculae rarissimae, plerumque quam feminae minores. *Antheridia* a bracteis perigonalibus forma irregulari protecta. *Archegonia* raro etiam bractea versiformi protecta. *Pseudoperianthium* irregulariter 4-lobatum, substipitatum, folios proximos fere aequans. *Sporae* 27.5–37.5 μm diametro, superficie distali cum 16 vel 17 papillis vel cristis papillosis transversis; superficie proximali cum papillis multis grossis irregularibus, inter eas tenuiter granulata, ± 60 papillis brevibus e superficie distali circum margines procurentibus. *Elateres* 107.5–150.0 μm longi, 7.5–10.0 μm lati medio, apices versus angustati, omnino bispirales vel partim bispirales, partimque trispirales.

TYPE.—Malawi, 1033: Nyika National Park, southern circular route at Chelinda Bridge, (–DB), on soil under rock overhang, at altitude 2 227 m, *Koekemoer 1792* (PRE, holo.), with *Calycularia crispula* Mitt. and *Fissidens* sp.

Plants in close stands, clear green, some leaves with yellowed margins, others tinged with red, medium-sized to fairly robust; male plants very rare; shoots smaller, up to 5 mm long, ± 1.5 mm high, 1.8–2.0 mm wide; female plants larger, 9.5–14.0 mm long, 1.6 mm high, 2.8–3.0 mm wide; mostly simple, occasionally apically furcate. *Stems* prostrate, old stems giving rise to new growth

from their apices, chlorophyllose, with globose nodules near base, or with short, ± 1 mm long, fleshy branches with young leaves arising laterally near apices or bases; in cross section plano-convex, in male plants apically (Figure 16M) 260 μm (8 cell rows) high, 400 μm wide, basally 300 μm high, 300 μm wide; in female plants apically (Figure 16N) 240 μm (9 cell rows) high, 350 μm wide, at base (Figure 16O) 270 μm high, 240 μm wide. *Rhizoids* purple, 12.5–17.5 μm wide. *Leaves* suberect to spreading, overlapping, undulating, frequently plicate, somewhat rounded above, succubously inserted on stem, mostly shorter than wide, young apical leaves smaller, margins with 3–8 sessile papillae, $\pm 15 \times 22.5$ μm , sometimes broken, basally brownish, wedged between 2 marginal cells (Figure 16L); in male plants (Figure 16A–D) leaves smaller, 875–1250 \times 1075–1325 μm ; in female plants (Figure 16E–K) leaves larger, 1175–1750 μm long, 1150–2250 μm wide above, narrowing below to 1150–1500 μm . *Leaf cells* thin-walled, in male plants rather smaller than in female plants, where at upper margins rectangular across or 5- or 6-sided, rarely isodiametric, 20–50 \times 35.0–57.5 μm , at lower lateral margins long-rectangular, 105–150 \times 20–25 μm , upper laminal cells 5- or 6-sided, 50.0–67.5 \times 35.0–42.5 μm , middle laminal cells 4–7-sided, 62.5–100.0 \times 37.5–50.0 μm , basal cells 67.5–125.0 \times 30.0–42.5 μm . *Oil bodies* no longer present; chloroplasts numerous, round or oval, ± 3 μm diam.

Dioicous. *Antheridia* dorsal on stem, in 1 or 2 row(s), short-stalked, globose, 200–210 μm diam., shielded by irregularly shaped perigonal bracts (Figure 17A, B),

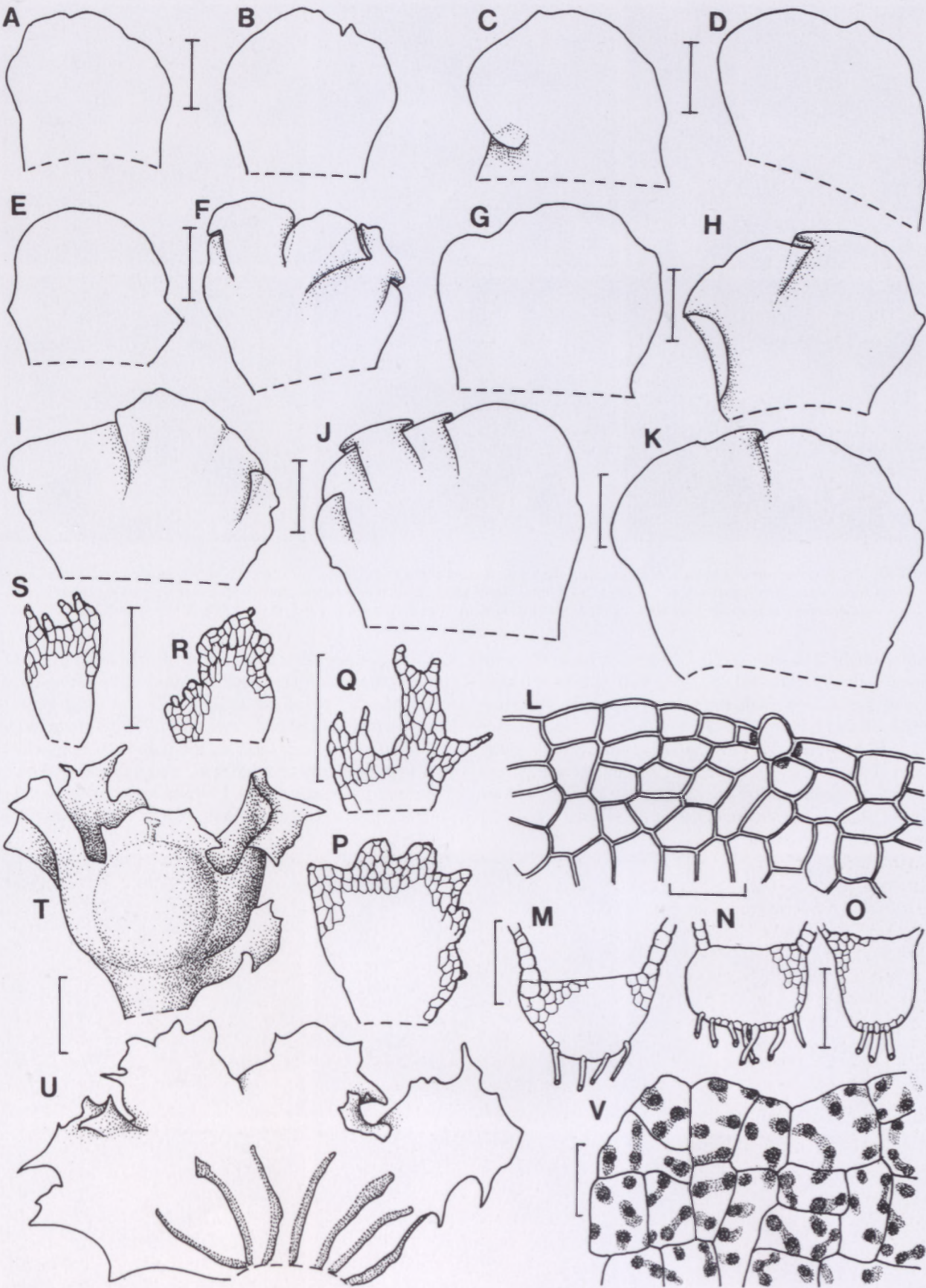


FIGURE 16.—*Fossombronina nyikaensis*. A–D, male leaves; E–K, female leaves; L, detail of leaf margin with papilla; M, c/s male stem apex; N, c/s female stem apex; O, c/s female stem base; P–S, perigonal bracts; T, pseudoperianth from side, showing outline of capsule within; U, opened pseudoperianth; V, cells in inner capsule wall. A–V, *Koekemoer 1792*. Scale bars: A–K, T, U, 500 µm; L, 100 µm; M–O, P–S, 250 µm; V, 50 µm.

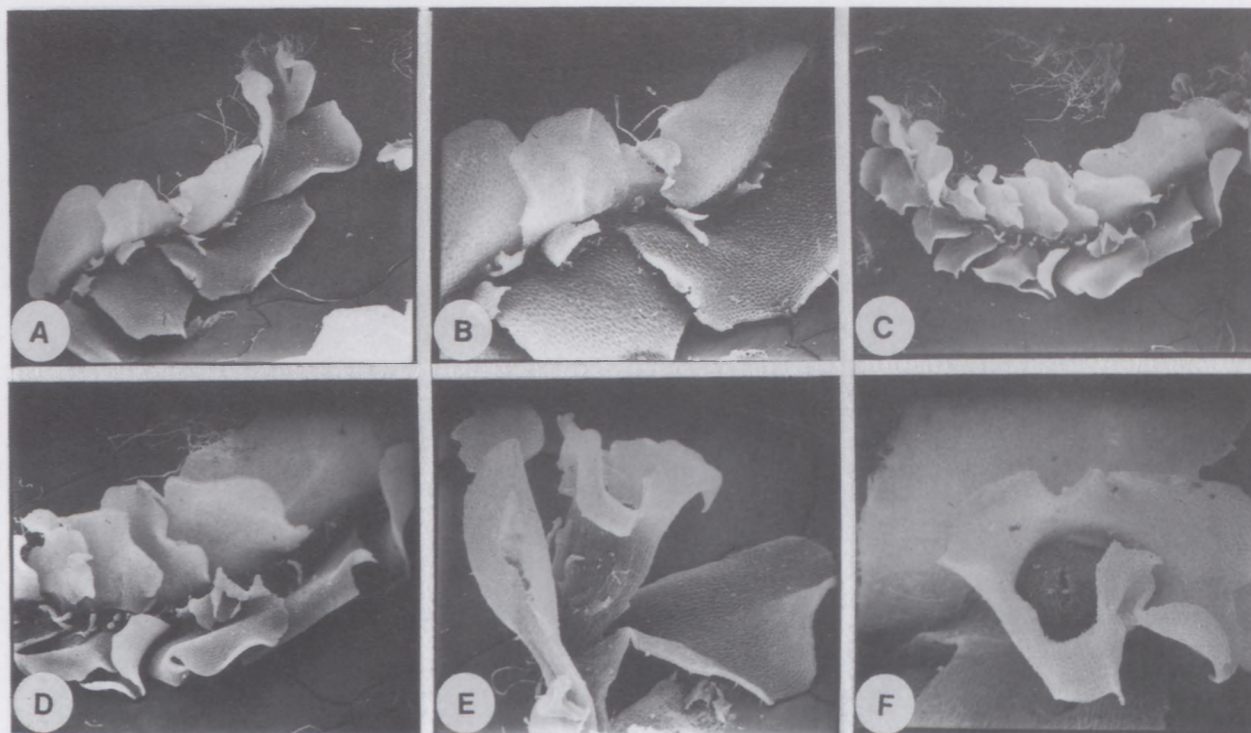


FIGURE 17.—*Fossombronia nyikaensis*. A, simple male shoot with perigonal bracts; B, close-up of bracts; C, simple female shoot with archegonia and young pseudoperianth at \pm midlength; D, close-up of same; E, mature pseudoperianth with lateral outgrowths, from side; F, pseudoperianth and capsule from above. A–F, Koekemoer 1792. A, $\times 11.2$; B, $\times 19$; C, $\times 7.5$; D, $\times 12.5$; E, $\times 15.8$; F, $\times 22.6$.

either single, $250\text{--}400 \times 120\text{--}220\text{ }\mu\text{m}$, or, generally with fused lobes (Figure 16P–S), $490\text{--}520 \times 270\text{--}450\text{ }\mu\text{m}$, apical projections each topped by a papilla, marginal cells $30.0\text{--}52.5 \times 25.0\text{--}37.5\text{ }\mu\text{m}$, cells in interior $52.5\text{--}67.5 \times 30.0\text{--}32.5\text{ }\mu\text{m}$. Archegonia dorsally along stem (Figure 17C, D), in a row, spaced, or sometimes crowded together, $\pm 250\text{ }\mu\text{m}$ long, rarely shielded by variously shaped bract. Pseudoperianth (Figures 16T, U;

17E, F) usually less than 1 mm proximal to apex of shoot, but sometimes near to midlength, irregularly lobed, slightly raised on stalk, $\pm 375\text{ }\mu\text{m}$ long, almost same length as adjoining leaves and $1250\text{--}1600\text{ }\mu\text{m}$ long, $\pm 1750\text{ }\mu\text{m}$ wide across mouth, lobes up to $675\text{ }\mu\text{m}$ wide, with upper $500\text{ }\mu\text{m}$ or more free, marginally with 3 or 4 triangular processes, up to $130\text{ }\mu\text{m}$ long, some acutely pointed, others short and basally wider, slit toward base

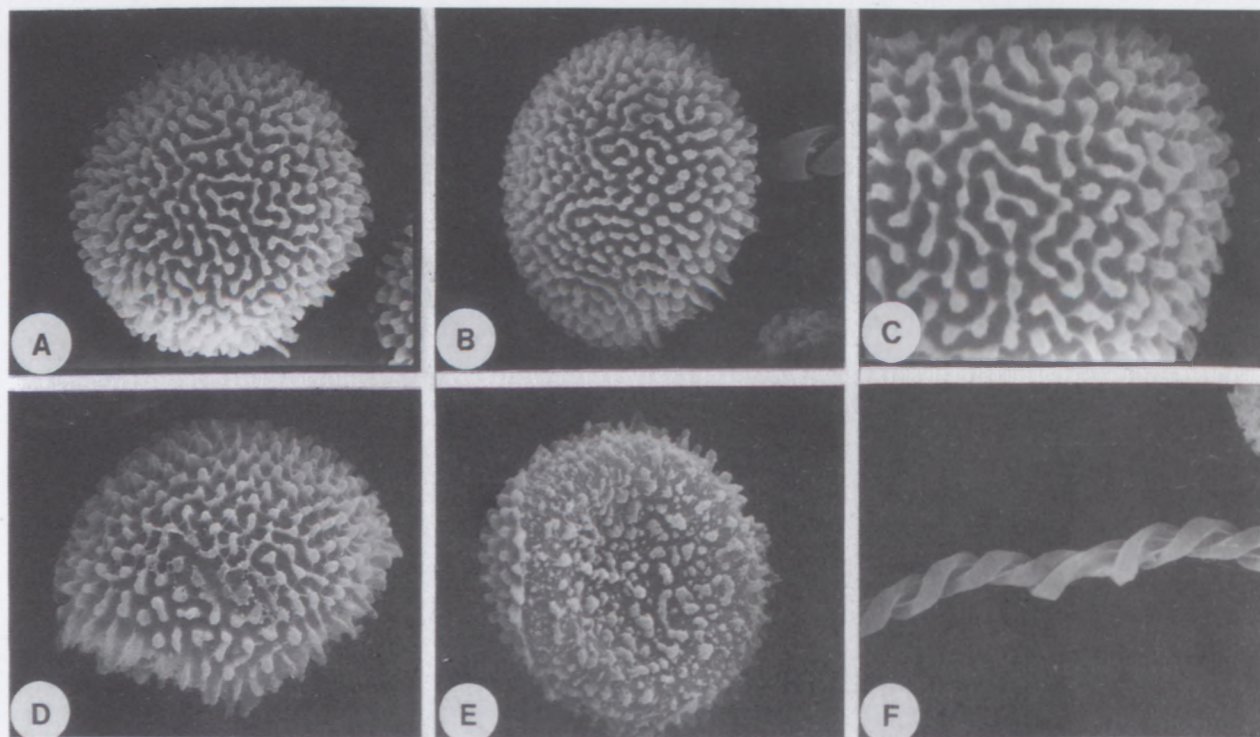


FIGURE 18.—*Fossombronia nyikaensis*. A–E, spores; F, elater. A, distal face; B, distal face partly from side; C, detail of part of distal face; D, side view of distal face; E, proximal face. A–F, Koekemoer 1792. A, $\times 1200$; B, $\times 1105$; C, $\times 2018$; D, $\times 1265$; E, $\times 1234$; F, $\times 917.6$.

along side, with several lateral outgrowths, up to 600 μm long, cells not appreciably different in shape and size from those in leaves. *Capsules* almost sessile, globose, $\pm 675 \mu\text{m}$ diam., wall bistratose, cells of inner layer (Figure 16V) rectangular to polygonal, $35\text{--}40 \times 25.0\text{--}42.5 \mu\text{m}$, each cell wall with 1 or 2 dark brown nodular and occasional semi-annular thickenings. *Spores* light brown, hemispherical, $27.5\text{--}37.5 \mu\text{m}$ diam.; distal face (Figure 18A–D) convex, ornamentation papillose, with 16 or 17 small papillae and ridges across, papillae $\pm 2.5 \mu\text{m}$ long and $\pm 1.3 \mu\text{m}$ wide, some of them remaining discrete, others linked together to form short or sometimes longer, straight or curved, rather uneven, low ridges, less than $1.5 \mu\text{m}$ apart; proximal face (Figure 18E) slightly concave, lacking triradiate mark, with numerous, coarse, irregular papillae and in between dusted with fine granules, ± 60 low papillae from distal face projecting around periphery. *Elaters* (Figure 18F) yellow, $107.5\text{--}150.0 \mu\text{m}$ long, $7.5\text{--}10.0 \mu\text{m}$ wide in centre, tapering to tips and ending in a loop, bispiral throughout or partly bispiral and partly trispiral.

DISCUSSION

Fossombronia nyikaensis has been named for the locality where it was collected (Figure 19), and is known only from the type specimen and another one without spores, but still easily recognizable by the similarity between the thalli of the two samples. These collections were recently made, growing close together on the Nyika Plateau, Malawi, by Ms Marinda Koekemoer, Curator of the National Herbarium (PRE), on a Southern African Botanical Diversity Network (SABONET) Expedition to the region. Specimen *Koekemoer 1792* was divided into two samples: 1, most of the collection was placed in a small paper bag and allowed to air dry; 2, a small living sample with five or six almost ripe sporangia and adherent soil was kept damp in a small plastic dish lined with wet filter paper and covered with a lid. During transportation over many kilometers of extremely rough dirt roads, the soil and plants were rolled into small balls inside the dishes. The capsules of this new *Fossombronia* species had ripened by the time that the expedition had returned to South Africa, and the spores could be studied. Although female plants were fairly numerous in the specimens, those with ripe capsules were few. The capsules appeared to be almost sessile. Male plants were very rare.

The unique ornamentation on the distal face of *F. nyikaensis* spores, immediately distinguished it from other African species with which it had been compared, particularly those that had been collected by members of the British Bryological Society (BBS) on a visit to Mount Mulanje and elsewhere in Malawi, in 1991. The spores from the latter specimens are reticulately ornamented or have lamellae; none are papillate. The ornamentation of *F. nyikaensis* spores is a little like that of *F. cerebriformis* (Scott & Pike 1984) from Victoria, Australia, but in the latter the lamellae are less densely crowded and there are no discrete papillae. The spores of *F. nyikaensis* are also much smaller than those of *F. cerebriformis*, which are $51\text{--}90 \mu\text{m}$ diam. and dark brown, with $30\text{--}50$ peg-like spines around the margin. In *F.*



FIGURE 19.—Locality of *F. nyikaensis* in Malawi.

cerebriformis the leaves are 2–4-lobed and strongly rufed, while the upper margin is crenulate with projecting cells and occasional papillae. The pseudoperianth has a lightly lobed upper margin.

The Nyika Plateau is situated in northern Malawi, southwest of the northernmost tip of Lake Malawi. It is a massive granite and granitic gneiss upfaulted block. The vegetation consists of Afrotropical forest patches, largely confined to valley head sites, that lie in a matrix of grassland dominated by *Themeda triandra* (Meadows & Linder 1993). The climate is influenced by the Tropical Easterly Wind Belt. Rainfall comes with the monsoon, wet conditions occurring from March to May and from mid-October to December; dry conditions prevail from December to March.

Specimens examined

Held at PRE.

Koekemoer 1786 (a), 1792 (holotype).

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species collected in Malawi, which had to be returned for a monographic study of Fossombroniaceae by Stotler, Crandall-Stotler and their students.

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* National Botanical Institute, Private Bag X101, 0001 Pretoria.
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