Studies in the liverwort genus Fossombronia (Metzgeriales) from southern Africa. 9. A new species from Mbupalanga and KwaZulu-Natal, with notes on other species

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ABSTRACT

A new species of Fossombronia, F. renateae, from Mpumalanga and KwaZulu-Natal in southern Africa is described. It is distinguished by its reflexed, undulating leaves and often stipitate pseudoperianth with a highly convoluted mouth, as well as by completely or incompletely reticulate spores and usually by short, blunt elaters with two spirals which often form rings or coils. Notes are provided on two unnamed species from Mpumalanga which cannot be fully described as yet, since ripe spores are not available for study. Brief references are made to some tropical African species.

Fossombronia renateae Perold, sp. nov.

Plantaee repentes, dense congestae vel cum muscis intercrescentes. Folia late patentia, undulata, oblonga vel breviora quam lata, supra leve lobata. Dioicae. Antheridia in plantis masculis bracteis obiecta. Pseudoperianthium campanulatum; ore perirregulariter lobato et maxime convoluto. Sporae 37.5–47.5 μm diametro, cum 8 vel 9 cristis irregularibus, aliquando anastomosantibus, aliquot areolas formantibus. Elateres plerunque bis spirales, annulares vel spirales, 25–75 x 12.5–17.5 μm.

TYPE.—Mpumalanga, 2530 (Lydenburg): Lone Creek Falls, on soil, at margin of pond below falls, (–BB). Perold & Koekemoer 4073 (PRE, holo.).

Plants smallish to medium-sized to rather large, creeping, in dense, crowded stands or intimately to loosely intergrown with mosses, green; shoots often simple, in male plants 5–13 x 3–4 mm, 1.3–2.5 mm high; in female plants 9–15 x 3.5–4.0 mm, 1.6–2.5 mm high, sometimes fuscate or with short, lateral branches near apex and/or toward base. Stems prostrate, in some populations distally markedly fleshy, tapering proximally, in living material from above, hardly distinct from adjoining leaf bases, sometimes faintly longitudinally striate, in cross section plano-convex, in male plants at apex (Figure 1L) up to 680 μm (15 cell rows) high, ± 1000 μm wide, at base (Figure 1O) ± 420 x 700 μm; in female plants at apex (Figure 1N) up to 600 μm (12-14 cell rows) high, ± 630 μm wide, at base (Figure 1M) ± 570 x 540 μm; in male plants not appreciably different from those of female plants, at upper margins (Figure 1J) rectangular across, occasionally isodiametric, 25.0–37.5 x 27.5–52.5 μm, at lateral margins long-rectangular, 50.0–87.5 x 15.0–22.5 μm; upper laminar cells 3- or 6-sided, 35.0–52.5 x 27.5–37.5 μm; middle laminar cells 47.5–75.0 x 32.5–45.0 μm; basal cells 75.0–107.5 x 42.5–62.5 μm. Oil bodies few (Figure 1K), only 4–6 per cell, 5 μm diam., or a little larger, round, but some slightly irregular and with a central indentation; chloroplasts numerous, mostly rounded, ± 5 μm diam.

Dioicous. Antheridia dorsal on stem, in 1 or 2 crowded rows, short-stalked, globose, distal ones often larger, 220–270 μm diam., white, proximal ones smaller, ± 160 μm diam., yellow, each shielded by a perigonial bract (Figures 1P–S; 2A, B), 460–580 x 200–380 μm, sometimes 2 adjacent ones joined together and then 2–3-lobed, mostly with apical processes topped by a papilla, marginal cells ± rectangular, 40–75 x 27.5–40.0 μm, inner cells usually 5-sided, 65.0–87.5 x 22–35 μm. Archegonia in 1 or 2 rows dorsally along stem (Figure 2C), distally and proximally, naked, sometimes 2 per branch, at intervals or 2 adjacent or even 3 in a cluster, becoming fertilised. Pseudoperianth (Figures 1T, U; 2D–F) campanulate, about as tall as leaves, raised on a short stalk, then widely flaring above, up to 1625 μm long, ± 3500 μm wide across mouth, very irregularly lobed and highly convoluted, lobes 300–400 x 400–450 μm, with papillae at angulations, some sessile, others raised on a basal cell; cells comparable in shape and size to those of leaves, except for basal ones which are larger, 100.0–112.5 x 37.5–45.0 μm. Capsules globose, ± 750 μm diam., walls bistratose, cells in inner layer irregularly shaped (Figure 1V), subquadrate, long-rectangular or triangular, 25–50 x 27.5–40.0 μm, each cell wall with 1 or 2 dark brown, nodular and sometimes semi-annular thickenings. Seta 1.1–2.5 mm long, in cross section (Figure 1W) 200–300 μm diam., 8 cells across. Spores light brown, hemispherical, 37.5–47.5 μm diam., including...
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FIGURE 2.—*Fossombronia renateae*. A, male plant with perigonal bracts; B, close-up of perigonal bracts; C, female plant with archegonia; D, female plant with pseudoperianth (indicated by arrows); E, female plant with pseudoperianth near apex of branch; F, close-up of pseudoperianth. A, B, E, F, Perold & Koekemoer 4071; C, Perold & Koekemoer 4073; D, Liebenau-Nestle SA265. A, x 8.7; B, x 20; C, D, x 8; E, x 8; F, x 25.6.

ridges projecting at margin; distal face (Figure 3A–D) convex, with a tendency to form 8 or 9 well-marked areolae across face, 5.0–7.5 μm wide, occasionally ridges running parallel to each other or else in different directions, interconnected by faint or distinct cross walls or anastomosing and forming incomplete areolae, sometimes with small inclusions, surrounding ridges 2.5–4.0 μm high, crenulate above; proximal face (Figure 3E) lacking triradiate mark, mostly flat, covered with coarse, very irregular spicules or spikes, 20 or 21 ‘spines’ projecting up to 2.5 μm high around spore periphery and completely or somewhat incompletely joined by a ± 5 μm wide, membranous wing or perispore, its margin crenulate. *Elaters* in most populations relatively few, with 2

FIGURE 3.—*Fossombronia renateae*. A–E, spores; F, elater. A, B, distal face; C, side view of distal face; D, detail of part of distal face; E, proximal face. A, Perold & Koekemoer 4073; B–E, Liebenau-Nestle SA265; F, Liebenau-Nestle SA264 p.p. A, x 1046; B, x 908; C, x 881; D, F, x 1744; E, x 752.
spirals (rarely with 3 spirals partly), light brown or greenish, often in rings or coils (Figure 3F), rather short and stout, blunt at both ends, or ± wedge-shaped, 25–75 × 12.5–17.5 μm, sometimes sticking to spores.

*Fossombronia renateae* is so far known from only two localities, both in the Afromontane, summer rainfall region of southern Africa, from Lone Creek Falls, near Sabie in Mpumalanga and Xumeni Forest Reserve, near Donnybrook in KwaZulu-Natal (Figure 4), but it must surely be more widespread. At Lone Creek Falls, the plants grow on soil between rocks and are kept moist by spray from the falls. Unfortunately, there are no details about the substrate and conditions on the label of the Doidge collection from Xumeni Forest Reserve. *Bryum alpinum* Huds. ex With. and *Funaria limbata* (C.Müll.) Broth. are mosses that grow together with the Lone Creek plants.

This newly isolated species has been named *F. renateae* in honour of Dr Renate Liibenau-Nestle of Kempten, Germany, who collected it when on a visit to South Africa in 1992 and kindly lent her specimens to PRE for examination. In 1998, accompanied by Ms M. Koekemoer, curator of PRE herbarium, I visited Lone Creek Falls (and the vicinity) three times. In April we failed to find fertile specimens of this species, but in June we were successful, although the material only had a few dehisced capsules retained from the previous season, and fortunately still with some unshed spores. These spores and elaters are closely similar to those of the Liibenau-Nestle specimens. Samples of the fresh collections with young capsules were cultivated for two months (until August) before ripe spores were obtained. Many of these spores were malformed, but the ornamentation was fairly similar to that of the earlier collections. The elaters, however, were more numerous, usually with 2 (rarely 3) darker and thicker spirals, 45–110 (–132.5) × 10.0–17.5 μm; only a few elaters were identical to the Liibenau-Nestle and Doidge ones.

Scott & Pike (1988) refer to the elaters of *F. caledonica* Steph. as ‘bispiral, with the spirals breaking down into rings’ (translated by them from Latin). They found similar elaters in *F. papillata* (and several other species), where capsules with elaters of this sort and capsules with normal elaters occurred in the same colony. Accordingly, they considered the production of such elaters a mere abnormality not worthy of specific recognition. However, in a genus where there are so few reliable taxonomic characters to discriminate between species, I would hesitate to discard this one entirely.

The plants collected by Perold & Koekemoer are decidedly more robust and the stems flesher than in the earlier collections. The species can be distinguished by *F. caledonica*. Its leaves are sub-rounded, slightly concave and rather stilt, imbricate rounded, slightly concave and rather stilt, imbricate and only very slightly decurrent at the 'trailing' edge, undulating. The perigonial bracts shielding the antheridia, of which the mouth is highly convoluted, by compound leaves, 1250–1750 × 1500–2000 μm. They overlap by ± 1/3 of their width and are not decurrently inserted on the stem. The shoots are up to 19 mm long, including the apical branches which are 5–7 mm long. The pseudoperianth is cupulate, also rather stiff and the margin is undulating. The perigonal bracts shielding the antheridia in the male plants, are conspicuous.

Another species of *Fossombronia* collected at Lone Creek Falls, *Perold & Koekemoer 4059, 4060*, is very large, with up to 50 mm long shoots. It is an erect-growing, bottle-green, aquatic plant. Its leaves are sub-quadrate to rectangular, 2800–3375 × 2725–3200 μm, and only very slightly decurrent at the 'trailing' edge, rather stiff, 4-stratose at the base and bistrate at up to ± midlength. Unfortunately, only specimens with archegonia were found, and the plants kept in cultivation deteriorated rapidly. It cannot, therefore, be described at this stage, but it is still worth mentioning, in case fruiting material turns up later.

Several more, large, aquatic specimens, without spores have been collected elsewhere in southern Africa. It would appear that fertilisation of these plants in quite rapidly flowing streams, seldom takes place.

**NOTES ON SOME TROPICAL AFRICAN SPECIES**

It is unlikely that the above-mentioned plants belong to *F. pulvinata*, a sterile species described by Stephani...
The leaves of *F. pulvinata*, in contrast to the abovementioned South African plants, are strongly decurrent, much wider than long (7 mm lata, medio 4 mm longa) and rather lax. Scott & Pike (1988) think that this species may be *F. australis*.

Jones (1990) reports *Notocladia porphyrorhiza* (Nees) Steph. with purple rhizoids, as once recorded from Kilimanjaro. The pseudoperianth is said to be laterally compressed and bilabiate, but spores are not mentioned. This species had previously been transferred to *Fossombronia porphyrorhiza* (Nees) Prosk. by Proskauer (1955). I have not seen this specimen and am unable to comment on it. I have, however, examined a sterile specimen from Lydenburg, Wilms 02467/1(G), which had been referred to *Fossombronia (= Androcypha) porphyrorhiza* Nees. This plant has surely been misidentified, as the type species is from South America, which Scott & Pike (1988) think may also be *F. australis*.

Another *Fossombronia* species described from tropical Africa on Mt Kilimanjaro in Kenya, is *F. grandis* Steph., leg. Volkens 1226 (G18524) holotype (G!). It is a large plant, as the specific epithet is intended to convey. The shoots are 20 mm long and simple, the leaves large and broadly rounded, the margins with some short, longitudinal folds. Stephani (1900) reported the spores of this dioicus species to be 34 μm diam.; my measurements are 32.5-37.5 μm diam. The distal face is coarsely reticulate, with rather thin, 2.5-5.0 μm high ridges delimiting 4 or 5(-6) angular areolae, 7.5-10.0 μm wide, across the diameter and with ± 12 spinous projections connected by a perspersore, at the periphery; the proximal face is generally concave in the centre, with fine, irregular, sinuating ridges, sometimes forming small areolae, partly or completely surrounded and often a little obscured by several large, angular areolae, seemingly 'folded' inward from the outer row on the distal face. The elaters are 242-280 x 7.5 μm and often 2-spiral. I have also examined a specimen, Adam & Jager 9211/X from Mt Elgon National Park, which was kindly lent by Dr Chuah-Petiot (holotype), Doidge CH3564 Lubenau-Nestle SA264 (Herbarium of Meise, curator at PRE. is kindly thanked for her helping suggestions. I also sincerely thank Dr Theo Arts, St.-Job in’t Klimpen, Germany, for the loan of specimens. Ms M. Koekemoer, curator at PRE, is kindly thanked for her unstinting help with fieldwork, likewise my thanks to Ms G. Condy for the drawings, Mrs A. Romanowski for developing and printing the photographs and to Ms D. Maree for typing the manuscript.

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