

Notes on African plants

VARIOUS AUTHORS

METZGERIALES—FOSSOMBRONACEAE

FOSSOMBRONIA OCCIDENTO-AFRICANA. IS IT CONSPECIFIC WITH *F. INDICA*?

INTRODUCTION

Fossombronia occidento-africana S.W. Arnell (1952) was described as a new species from his collections from Mount Aureol [Mont Oriel] at Freetown, Sierra Leone, West Africa. He cited the following collection numbers: 2409, 2413, 2418, 2431, 2448, 2449, 2468, 2476 and 2497, but did not designate a type specimen. Arnell's only illustration of the new species is a simple line drawing of a cross section of the stem, with a single downward-projecting rhizoid.

Because Jones & Harrington (1983) considered Arnell's description to be inaccurate in certain aspects, they presented a more thoroughly investigated description. They also selected the specimen *Arnell 2497* as the lectotype for the following reasons: they considered it to be Arnell's most copious collection with numerous mature sporangia; in addition, Arnell had made a microscope preparation of it. They cited several other Arnell specimens, namely 2409, 2413, 2448, 2517, as well as 2231 and 2249, but according to Arnell's numbers given above, the last two numbers must be incorrect and should read 2431 and 2449 respectively. From Sierra Leone they also cited several Harrington specimens: 504, 555, 599 & 640 and one Richards specimen, *R7086*, as well as *Sellar B35* p.p. From Ghana, three Hall specimens were cited, and from Abuja in northern Nigeria, Jones (1985) cited his own collection, *Jones 885a*. Jones & Harrington (1983) found *F. occidento-africana* to be the most common species of *Fossombronia* in lowland West Africa. Augier (1985) also reported it from Cameroun, after first assigning his specimens to *F. crozalsii* (Augier 1972) and Tixier (1989) cited *Brunel 8838* from Togo. Neither Jones nor Jones & Harrington published an illustration of the species. Scott & Pike (1988), in their wide-ranging study of *Fossombronia* species, published two spore micrographs of *F. occidento-africana* (their figs. 25, 26) and placed it in synonymy under *F. indica* Steph. Evidently unaware of the lectotypification of *F. occidento-africana* by Jones & Harrington, they selected *Arnell 2249* as the lectotype. This number, in all probability, should be 2449. The incorrectly cited numbers by both Jones & Harrington and Scott & Pike are a curious coincidence, and it suggests that the said numbers were incorrectly copied on the herbarium packets held at (S). As the holdings on loan from the Swedish Museum of Natural History (S) had already been returned by me, I could not check these numbers myself. However, Prof. R. Stotler (in litt.) agrees with me that the Arnell 22 xx numbers are 'surely a mistake by Arnell, since all of his other nine *Fossombronia* collections (of *F. occidento-africana*) are 24 xx'.

This paper is presented because *F. occidento-africana* has not been illustrated, except for Arnell's single figure of the stem cross section and the two spore micrographs by Scott & Pike (1988). I also needed to investigate the placement of *F. occidento-africana* in synonymy under *F. indica* implemented by Scott & Pike.

***Fossombronia occidento-africana* S.W. Arnell** in *Botaniska Notiser* 3: 317 (1952); Jones & Harrington: 248 (1983). Type: Sierra Leone, Freetown Peninsula, Mount Aureol ('Oriel'), *Arnell 2497* (S, lecto.!).

Plants in crowded stands, green; shoots smallish, simple (Figure 2A), up to 7 or 8 mm long, 1.3–1.4 mm high, ± 2.6 mm wide, occasionally once furcate, apical segments moderately divergent, up to 3 mm long. *Stems* prostrate, tapering proximally, chlorophyllose, sometimes with a young ventrolateral branch (Figure 2B), planoconvex in cross section, toward apex (Figure 1K) ± 350 μm (11 cell rows) high, ± 420 μm wide, basally (Figure 1L) $\pm 250 \times 300$ μm . *Rhizoids* purple, 12.5–22.5 μm wide. *Leaves* (Figure 1A–H) overlapping, succubously inserted, apically small, soon becoming larger, oblong to broadly obovate or rounded, mostly shorter than wide, but often somewhat narrower below, apex truncate or rounded, sometimes shallowly notched, slightly undulate, (875–)950–1275 \times 1050–1400 μm , margins with 4–7 well-spaced papillae, 30 \times 20 μm , usually sessile, sometimes at base of leaf raised on 1–3 elongated cells, the latter arranged end to end. *Leaf cells* thin-walled, at upper margins (Figure 1I) rectangular across, 25.0–42.5 \times 30.0–52.5 μm , at lateral margins long-rectangular, 50.0–57.5 \times 25.0–30.0 μm ; upper laminal cells 5- or 6-sided, 37.5–50.0 \times 22.5–30.0; middle laminal cells 37.5–62.5 \times 35.0–37.5 μm ; basal cells 57.5–75.0 \times 27.5–37.5 μm . *Oil bodies* disintegrated in the material seen; chloroplasts (Figure 1J) numerous, mostly rounded, ± 2.5 μm diam.

Monoicous. *Antheridia* dorsal on stem, at apex apparently naked, intact, short-stalked, globose (Figure 2C), ± 160 μm diam., further along branch disintegrated, but perigonial bracts (Figure 2A, D) remaining, irregularly shaped (Figure 1M–P), base up to 350 \times 140 μm , with one or occasionally two, tapering, apical appendage(s), 250–500 μm long, a papilla at the tip(s). *Archegonia* in a row dorsally along stem (Figure 2A). *Pseudoperianth* (Figure 1Q, R) near stem apex (Figure 2E), funnel-shaped, up to 1175 μm long, width across flaring mouth (Figure 2F) ± 1500 μm wide, with ± 8 triangular lobes, each topped by a papilla, constricted toward base, ± 500 μm wide, sometimes deeply cleft on one side, free margins overlapping slightly; cells comparable in size and

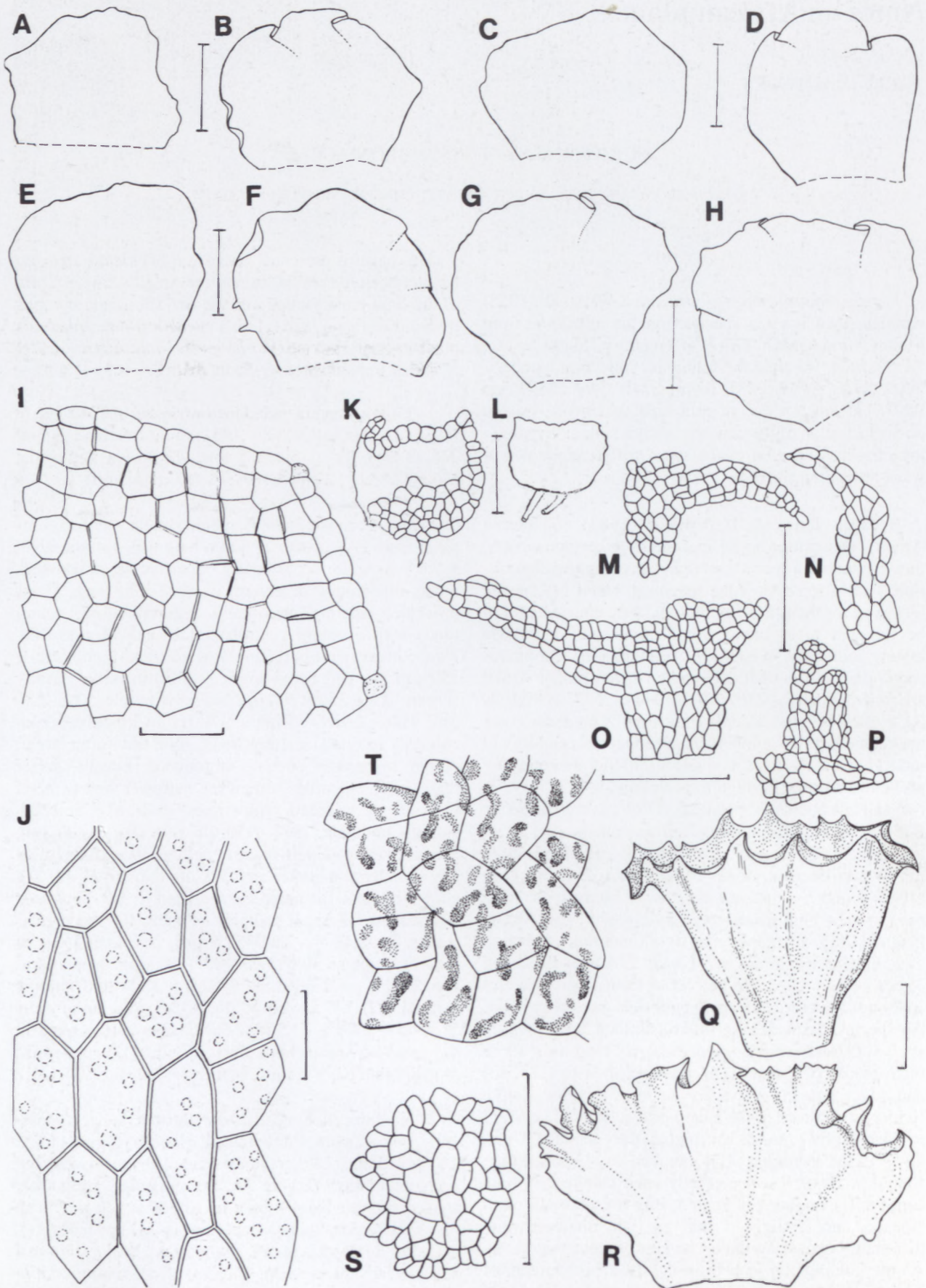


FIGURE 1.—*Fossombronia occidento-africana*. A–H, leaves; I, margin of leaf with 2 papillae; J, middle laminal cells with chloroplasts, oil bodies disintegrated; K, c/s of stem apex; L, c/s of stem base; M–P, perigonal bracts; Q, pseudoperianth from side; R, opened pseudoperianth; S, c/s of seta; T, cells in capsule wall with thickenings. A–T, *S.W. Arnell 2448*. Scale bars: A–H, Q, R, 500 μm ; I, S, 100 μm ; J, T, 50 μm ; K, L, M–P, 250 μm . Artist: M. Steyn.

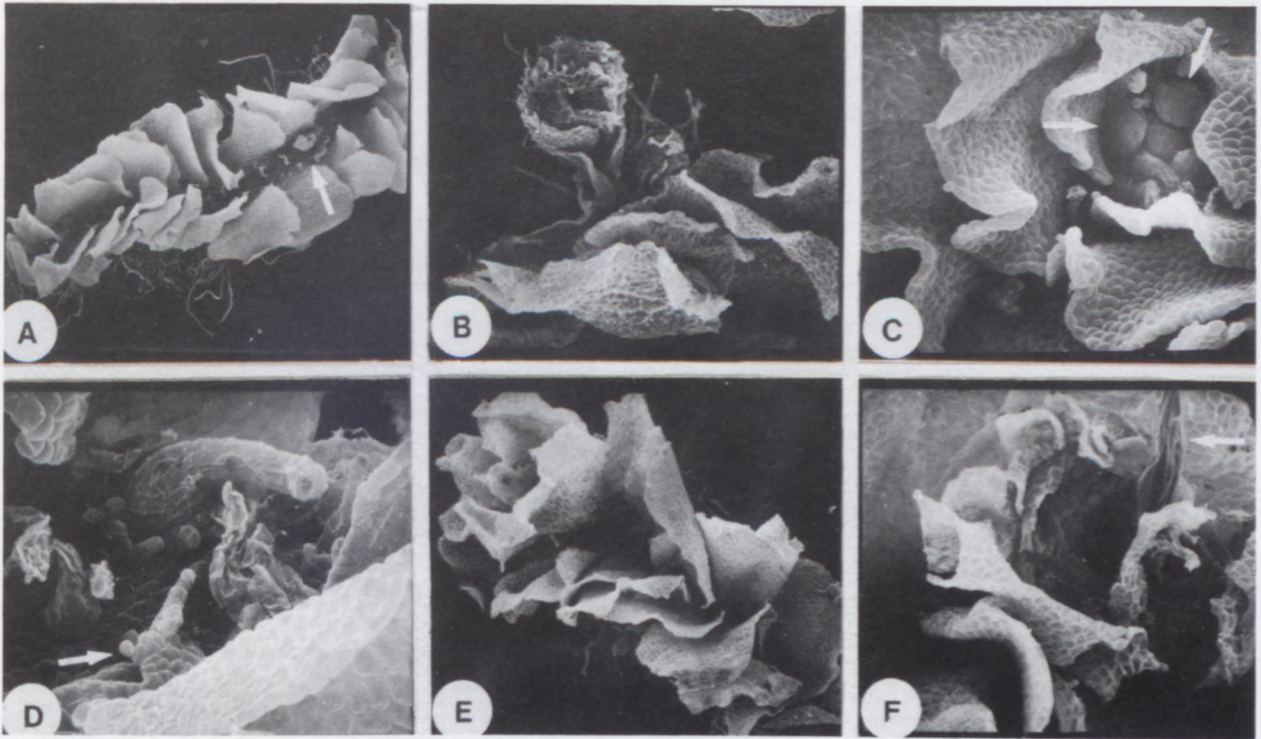


FIGURE 2.—*Fossombronia occidento-africana*. A, simple branch with row of archegonia and single perigonal bract (indicated by arrow); B, branch with young ventrolateral shoot; C, apex of branch with antheridia (indicated by arrows) and archegonia; D, apex of branch with archegonium and papillae around its base; perigonal bract in foreground (indicated by arrow); E, pseudoperianth near apex of branch; F, pseudoperianth from above and part of rather shrivelled seta (indicated by arrow). A–F, S.W. Arnell 2448. A, $\times 12$; B, $\times 32$; C, $\times 50$; D, $\times 57$; E, $\times 19$; F, $\times 46$.

shape to those of leaves. *Capsules* globose, $\pm 675 \mu\text{m}$ diam., wall bistratose, inner cell layer with irregularly rectangular cells, $27.5\text{--}42.5 \times 22.5\text{--}25.0 \mu\text{m}$, on both longitudinal and tangential walls, with 2–4 deep brown, heavy subnodular thickenings, some of which are prolonged to form complete or incomplete semi-annular bands (Figure 1T). *Seta* up to 3 mm long, $\pm 100 \mu\text{m}$ diam. (Figure 1S). *Spores* light brown, \pm hemispherical,

40–50 μm diam.; distal face (Figure 3A–D) convex, with 8 or 9 tall and thin, very irregular, rather wavy lamellae running \pm longitudinally or diagonally across face, spaced $\pm 5 \mu\text{m}$ apart and interconnected by transverse ridges, forming irregular, complete or mostly incomplete areolae, walls smooth above or rather ragged, sometimes raised into processes at the angles; proximal face (Figure 3E) lacking triradiate mark, ornamented with irregular,

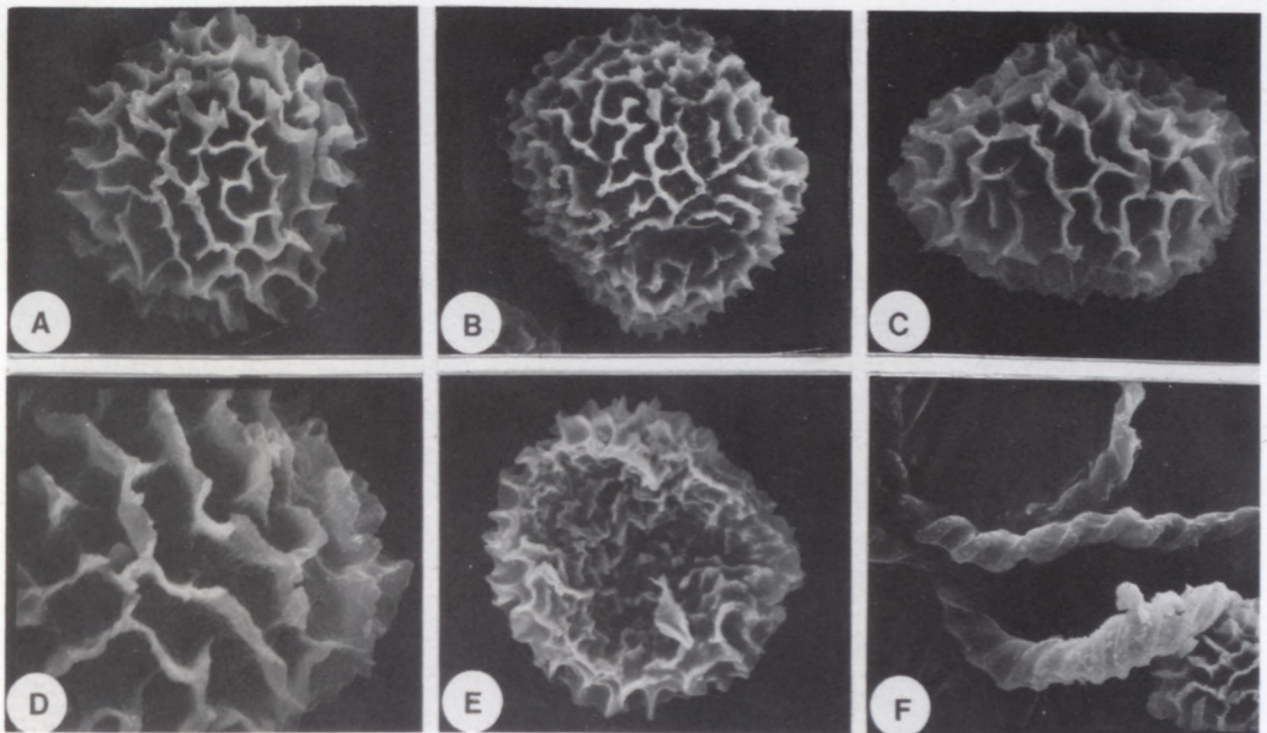


FIGURE 3.—*Fossombronia occidento-africana*. Spores and elaters. A, B, distal face; C, side view of distal face; D, close-up of distal face margin; E, proximal face; F, elaters. A–F, S.W. Arnell 2497. A, $\times 832$; B, $\times 940$; C, $\times 987$; D, $\times 1757$; E, $\times 825$; F, $\times 555$.

faint and low ridges or granules that are interconnected, around spore periphery numerous spines that are not readily individually distinguishable nor joined by a distinct perispore. *Elaters* (Figure 3F) light brown, 102–167 μm long, 10.0–12.5 μm wide in middle, and trispiral, tapering to tips, 5.0–7.5 μm wide, frequently ending in a bispiral loop, occasionally branched.

DISCUSSION

Arnell (1952) was able to study fresh plants of *F. occidento-africana* and described them as dark green; in old herbarium specimens the colour may have faded to a lighter green.

Jones & Harrington (1983) could not confirm the presence on the leaf cuticle of '1–2 long striae per cell' and 'sometimes small trigones' (at the cell corners presumably) that Arnell reported; neither could I. Arnell (1952) described *F. occidento-africana* as dioicous, the male plants 'with antheridia on the dorsal side near the apex, covered by rather long narrow bracts with deeply bidentate apex. Antheridia about 100 μm diam., pale yellow, globose'. Jones & Harrington (1983) on the other hand, described the species as 'monoecious, but probably protandrous', and do not mention antheridia or perigonal bracts at all. As I have now demonstrated, the species is monoicous and perigonal bracts do in fact occur. Jones & Harrington (1983) reported 'massive radial thickened bands' on the cells of the inner sporangium wall, with which I agree. Arnell (1952) found the spore 'pattern' of *F. occidento-africana* to be the same as that of *F. stephani* (sic) from Réunion (lamellis interruptis vermicularibus), but the spores of the former are smaller in size, according to him. Scott & Pike (1988: figs 29, 30) illustrated the spores of *F. stephanii* and remarked that they 'are very similar indeed to those of *F. texana* (= *F. mexicana*); the disjunction from Central America to Réunion Island (off East Africa) seems phyto-geographically improbable, so that we hesitate to equate the two without further investigation'. In the same study, Scott & Pike (1988: figs 33, 34) remark that *F. texana* has sometimes been confused with the *F. foveolata* complex (Scott & Pike 1987). In following this train of thought the spores of *F. occidento-africana* should be similar to those of *F. foveolata* which I don't think to be the case, except that they are both reticulate. Jones & Harrington (1983) admit that *F. occidento-africana* 'may indeed prove to be *F. crozalsii* Corbière, which is, how-

ever, imperfectly known'. Furthermore, they state, 'we prefer to keep the two species (i.e. *F. crozalsii* and *F. occidento-africana*) separate until the range of variation of *F. crozalsii* is adequately known'. British collections of *F. crozalsii* have been referred to *F. pusilla* var. *maritima* by Paton (1973).

Scott & Pike (1988: figs 25, 26) reduced *F. occidento-africana* to synonymy under *F. indica*, describing the spores of the former as 'very distinct, with a very delicate reticulum of low lamellae over the distal face and a cob-web-like network over the proximal face. In this as well as vegetative features it seems identical to *F. indica* Stephani, an earlier name, to which we here reduce it as a synonym'. I hesitate to accept this reduction for the following reasons: the type (and only known) specimen of *F. indica* (leg. *Pfleiderer s.n.*) is a small and delicate plant, its dimensions agreeing with those given by Srivastava & Udar (1975), i.e. 'stem 3.5–5.0 mm long'. This is rather shorter than the 8 or 10 mm long thallus branches reported by previous authors for *F. occidento-africana* and considerably shorter than Stephani's (1917) length of 13 mm for *F. indica*. The very spinous spore drawing in Stephani's (1985) *Icones* no. 003006 is totally unlike the low, incomplete and irregularly areolate spore markings of the type specimen of *F. indica* (Figure 4A–C). A note on the *Icones* reads 'fehlt Original' but the meaning of this is not clear. Srivastava & Udar wrote that, '*Fossombronia indica* St. (M.S.) Lucknow University Hepatic Herbarium (a part of the materials of the original collection presented to Prof. S.K. Pandé by Rev. P. Pfleiderer) India Orientalis, Mangalore. Legit. Pfleiderer (part of type?) Det.: Stephani 1917. *F. indica* was instituted by Stephani (1917) on the basis of the materials collected by Pfleiderer from Mangalore, South India. It has neither been collected nor investigated again, after Stephani's (1917) original publication'.

The spores of *F. indica* as measured by Stephani are 36 μm , although he had written on the *Icones*, beneath the spore drawing, 45 μm . Srivastava & Udar report them to be '38.4–48.0 μm in diameter', but I found them to be 30.0–37.5 μm and the poorly developed lamellae rather low, irregular and interrupted. The dimensions of the \pm oblong leaves are 750–875 \times 625–875 μm , also rather smaller than those of *F. occidento-africana*.

Until more material of *F. indica* is collected and studied, I think that it is advisable to reject the synonymy of

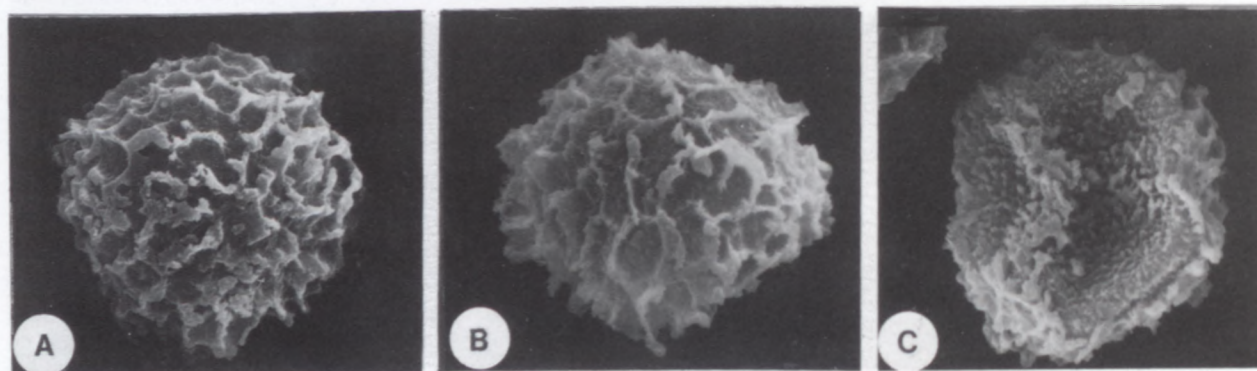


FIGURE 4.—*Fossombronia indica*. Spores. A, distal face; B, side view of distal face; C, proximal face. A–C, *Pfleiderer s.n.* A, $\times 1078$; B, $\times 1189$; C, $\times 1147$.

F. occidento-africana under *F. indica* and to reinstate the much better known *F. occidento-africana* S.W. Arnell.

SPECIMENS EXAMINED

Arnell 2409, 2431 S, 2448 PRE, 2497 (lectotype) S.
Jones 854 PRE.
Pfleiderer s.n. G(16585).

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NEW RECORDS FROM KWAZULU-NATAL, SOUTH AFRICA

INTRODUCTION

Eastern coastal links between the flora of southern Africa and tropical East Africa are well established but authors have concentrated on arborescent taxa (White 1965, 1971; Moll & White 1978). The southern extension of tropical species on the eastern coast of Africa is largely the result of the ameliorating effects of the Mozambique Current. Moll & White (1978) briefly outlined the vegetation of the Indian Ocean Coastal belt and drew attention to the strong links which exist between Tongaland-Pondoland and Zanzibar-Inhambane woody floras. Recently *Microcoelia obovata* Summerh. (Orchidaceae) and *Pseuderanthemum hildebrandtii* Lindau (Acanthaceae) were collected in northern KwaZulu-Natal. These records further reflect the vegetation links between the northern areas of KwaZulu-Natal and tropical East Africa. The new records also highlight the importance of amateur botanists, such as Mr E. Harrison, in the further discovery of our flora.

ACANTHACEAE

1. ***Pseuderanthemum hildebrandtii*** Lindau in *Botanischer Jahrbücher* 20: 39 (1895a); Lindau: 330 (1895b); C.B. Clarke: 172 (1899); Milne-Redh.: 260 (1936). Type: Tanzania, Zanzibar, at Kidoti. *Hildebrandt* 981 (syn., designated by Milne-Redhead l.c. as 'type').

The genus *Pseuderanthemum* Radlk. includes about 120 species and has a pantropical distribution (Dyer 1975). The genus was created to include species of the tribe Justiceae which had formerly been placed in *Eranthemum* (Ruellieae), *Eranthemum sensu stricto* does not occur in Africa (Milne-Redhead 1936). *Pseuderan-*

themum is most closely related to *Ruspolia*, the latter being distinguished by its monothealous anthers (Figure 5). In general the African species of *Pseuderanthemum* occur in closed forests and produce long, narrow corollas which are usually white or insipidly coloured. Formerly only one species was recorded from South Africa, namely *P. subviscosum* (C.B. Clarke) Stapf which occurs as a herb of subtropical forest and is characterised by its long, narrowly tubular white flowers. *P. hildebrandtii* (Figure 5) diverges from this typical pattern in producing brick-red flowers very similar to those of *Ruspolia hypocrateriformis* (Vahl) Milne-Redh. from which it is distinguished by its bithealous anthers, slender habit and smaller leaves. The floral similarity to *R. hypocrateriformis* transcends colour to the extent that Clarke (1899) omitted a detailed description of floral dimensions in his description of *Eranthemum hildebrandtii* C.B. Clarke (= *Pseuderanthemum hildebrandtii*) substituting 'otherwise as *E. hypocrateriforme* Roem. & Schultes'. This uncanny floral convergence correlates with a similarity in habitat for the two species and probably indicates shared pollinators. *P. hildebrandtii* occurs in woodland and along forest margins (not on forest floors like *P. subviscosum*); this difference in habitat is likely to be associated with different pollinators and different floral pigments.

The sculpturing of the seeds of *P. hildebrandtii* is also atypical for *Pseuderanthemum* in that the inner and outer seed surfaces have different patterns (Figure 6), a trend common in *Ruspolia*.

Although the distributions of other African species of *Pseuderanthemum* are patchy, no major disjunctions occur. By contrast, the collection of *P. hildebrandtii* in South Africa, produces a disjunction which mirrors that of