

Studies in the liverwort genus *Fossombronina* (Metzgeriales) from southern Africa. 11. *F. zuurbergensis*, a new species from Eastern Cape and new records for the area

S.M. PEROLD*

Keywords: Eastern Cape, *Fossombronina* Raddi, *F. zuurbergensis*, Hepaticae, Metzgeriales, new records, new species, southern Africa

ABSTRACT

Fossombronina zuurbergensis Perold, sp. nov. from Eastern Cape is described. It is distinguished by having leaves and pseudoperianths with markedly dentate margins; the spore ornamentation on the distal face consists of ridges which can be quite variable, although, at least some of them run parallel to each other in straight or curved, short or long ridges, others occurring at right angles to the former. New records for *F. capensis* var. *capensis* and *F. crispa* are reported for Eastern Cape.

Fossombronina zuurbergensis Perold, sp. nov.

Plantae aggregatae, virides, dioicae; masculae parvae vel mediocres, feminae maiores. *Folia* patentia, marginibus valde dentatis, saepe in plantis masculis minoribus supra subbiloba. *Rhizoidea* purpurea. *Antheridia* serie uno dorsaliter secus caulem disposita, a bracteis perigonialibus protecta, plerumque lateraliter juncta et cum 3–8 processis spinosis. *Pseudoperianthium* campanulatum, folio proxime juxta idem paulo brevius, breviter stipitatum, supra late expansum, margine in ore valde convolutum, dentatoque, cum usque ad 33 processibus spinosis, basin versus cum appendicibus lateralibus versiformibus. *Sporae* 37.5–45.0 µm diametro, superficie distali cum 7–9 cristis transversis brevibus vel longis, ± 5 µm distantibus, 2.5 µm altis, paucis rectis, aliis curvatis, inter se parallelis, gregibus nonnullis ad illas perpendicularibus; superficie proximali cum processibus irregularibus conicis vel spinosis, papillisque minoribus tecta. *Elateres* 75–125 µm longi, 5.0–12.5 µm lati, tenue papilloso, alii 2- vel 3-spirales, alii medio 3-spirales, apicibus bispirales.

TYPE.—Eastern Cape, 3325 (Port Elizabeth): along Zuurberg Pass, (–BC), at altitude 670 m, *John J. Perold 19* (PRE, holo.).

Plants in crowded stands, often growing together with *Riccardia* species, in persistently damp areas, green; shoots prostrate, smallish to medium-sized in male plants, up to 9 mm long, ± 1.5 mm high, ± 3 mm wide; in female plants larger, 10–12 mm long, ± 2 mm high, 3 mm wide, at pseudoperianth up to 5 mm wide, simple or once apically furcate, segments moderately divergent, ± 2 mm long. *Stems* tapering distally, chlorophyllose, plano-convex in cross section, in male plants apically (Figure 1N) up to 170 µm (9 or 10 cell rows) high, 220 µm wide, basally (Figure 1O) ± 180 µm high, 260 µm wide, in female plants apically (Figure 1P) 200–210 µm (9 cell rows) high, 380 µm wide, basally (Figure 1Q) 270 µm high, 350 µm wide. *Rhizoids* purple, 12.5–22.5 µm

wide. *Leaves* spreading, not rucked above, margins markedly dentate, overlapping basally by ± 1/3 their width, sometimes more, obliquely and succubously inserted, often somewhat bilobed above in smaller male plants (Figure 1A–E), 1250–1625 × 1200–1575 µm, in female plants (Figure 1F–J), margins with 10–15 or 16 spinous processes, 2 cells long and 1 cell wide, topped by apical papilla (Figure 1L), sometimes with basally wider, triangular processes, up to 5 cells and a papilla long, leaves irregular in shape, often as in a partly opened fan, 1425–2000 µm long, 1000–2500 µm wide above, 1000–1325 µm wide below, a larger leaf lateral to pseudoperianth (Figure 1K), up to 2375 × 2875 µm wide above, ± 1400 µm wide below, marginally with as many as 24 processes. *Leaf cells* mostly thin-walled, no appreciable differences between those of male and female plants, at upper margin rectangular across or 4- or 5-sided, 25.0–37.5 × 50.0–57.5 µm; upper laminal cells 5- or 6-sided, 57.5–85.0 × 45–55 µm; middle laminal cells 75.0–127.5 × 50.0–62.5 µm; basal cells 90–125 × 60–70 µm. *Oil bodies* (Figure 1M) 9–24 per cell, round or oval, shiny, smooth, 2.5–5.0 µm diam.; chloroplasts numerous, ± 5 µm diam.

Dioicous. *Antheridia* in a row dorsally along stem (Figure 2A), short-stalked, globose, 220–250 µm diam., shielded by perigonal bracts (Figure 1R–V), mostly laterally joined, 400–590 × 320–440 µm, with 3–8 spinous processes, each with an apical papilla, marginal cells 4-sided, 50–70 × 25.0–37.5 µm, internal cells long-rectangular, 50–85 × 30.0–37.5 µm. *Archegonia* in a single row or in pairs, opposite or subopposite, dorsally along stem, 140–200 µm long, one recently fertilized, (Figure 2E). *Pseudoperianth* shortly proximal to apex of stem (Figure 2B) or nearer to base (Figure 2C), rarely 2 per shoot (Figure 2D), campanulate (Figure 1X), slightly shorter than large leaf immediately lateral to it, raised on a short stalk, 700–875 µm wide at base, then widely flaring above (Figure 2F), 2000–2250 µm long, up to 2750 µm wide across mouth, margin highly convolute and dentate, with up to 33 spinous processes (Figure 1W), 87.5–500.0 µm or 3–5 cells and an apical papilla long, generally raised on a gradually widening base, cells comparable in shape and size to those of leaves; toward base with sev-

* National Botanical Institute, Private Bag X101, 0001 Pretoria.
MS. received: 2000-10-02.

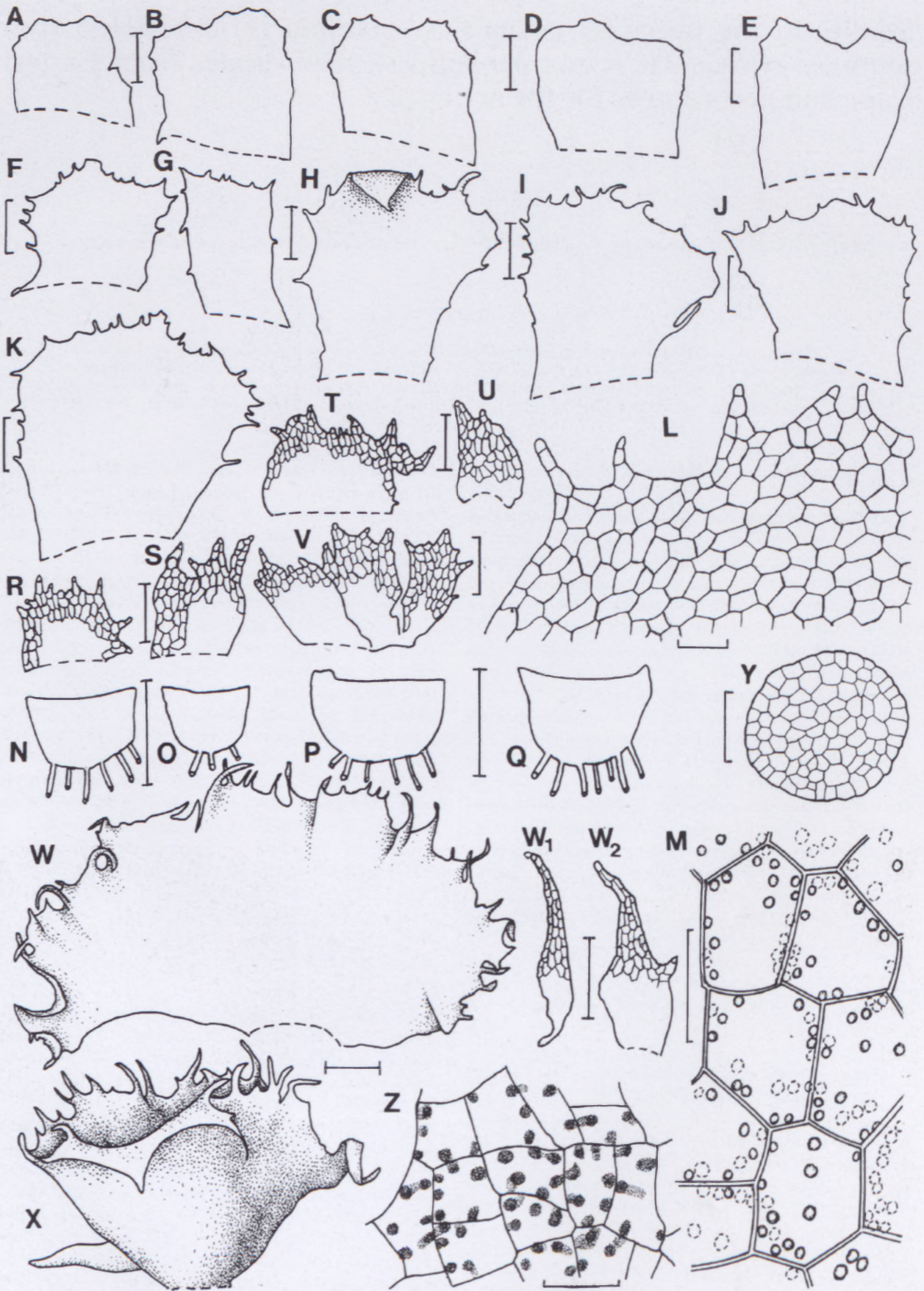


FIGURE 1.—*Fossombronina zuurbergensis*. A–E, male leaves; F–J, female leaves; K, large leaf next to pseudoperianth; L, detail of female leaf margin; M, median leaf cells with oil bodies (solid lines) and chloroplasts (dotted lines); N, c/s male stem apex; O, c/s male stem base; P, c/s female stem apex; Q, c/s female stem base; R–V, perigonal bracts; W, opened pseudoperianth; X, pseudoperianth from side; Y, c/s seta; Z, cells in inner capsule wall. A–E, H, J–M, P, Q, W–Z, *John Perold* 19; F, G, I, N, O, R–V, *John Perold* 24. Scale bars: A–K, W, X, 500 µm; L, Y, 100 µm; M, Z, 50 µm; N–V, 250 µm.

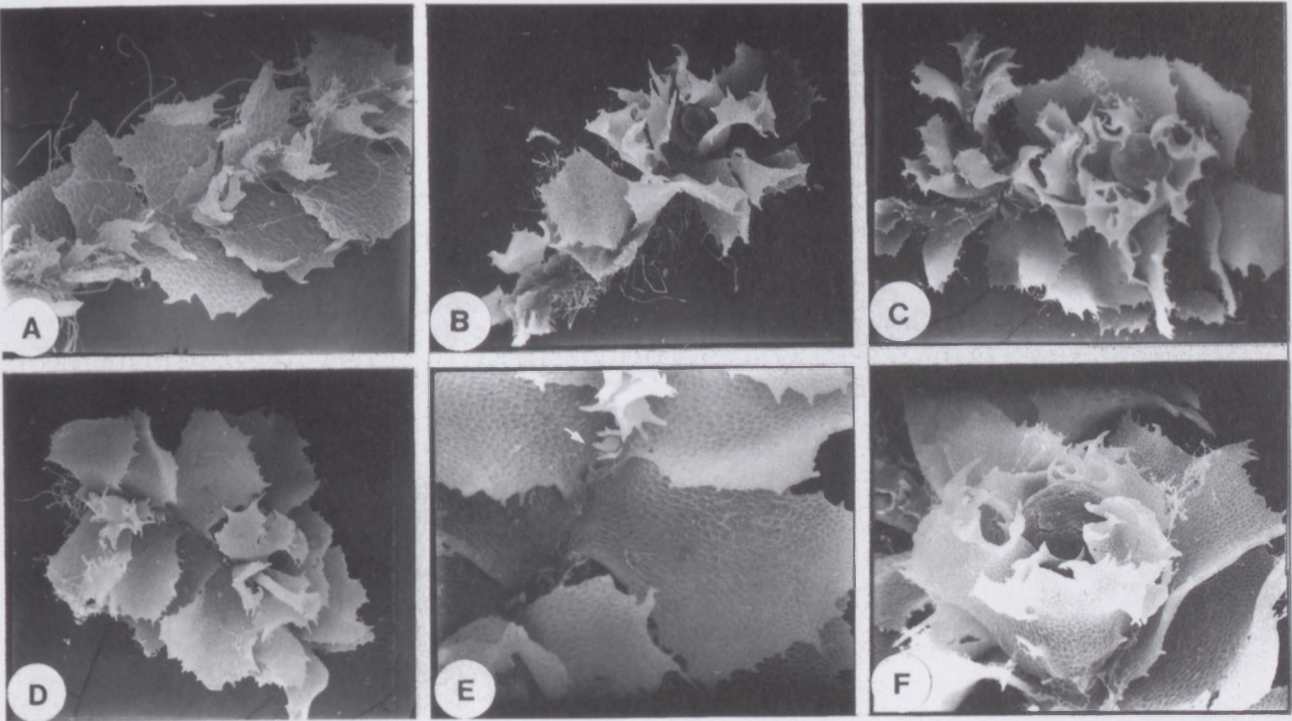


FIGURE 2.—*Fossombronia zuurbergensis*. A, simple male plant with perigonal bracts along stem; B, simple female plant with pseudoperianth near apex of shoot; C, apically furcate female plant with pseudoperianth and capsule more proximally; D, simple female plant with 2 pseudoperianths in acropetal sequence; E, female plant with fertilized archegonium and vestigial pseudoperianth (indicated by arrow); F, pseudoperianth partly from above, appendages near its base. A, *John Perold* 24; B–F, *John Perold* 19. A, $\times 24.3$; B, $\times 13.3$; C, $\times 9$; D, $\times 8.7$; E, $\times 20$; F, $\times 16.5$.

eral, variously shaped, narrow or wider, appendages, 1000–1200 μm long (Figure 1W₁, W₂). *Capsules* globose, 260–300 μm diam., wall bistratose, cells of inner layer triangular, quadrate or rectangular, 37.5–55.0 $\times$ 27.5–50.0 μm , each cell wall with 1–3 dark brown, nodular thickenings, rarely with semi-annular thicken-

ings (Figure 1Z). *Seta* up to 3.25 mm long, $\pm 250 \mu\text{m}$ diam., 9 cells across (Figure 1Y). *Spores* brown, 37.5–45.0 μm diam., including ridges projecting at margin, hemispherical; distal face (Figure 3A–D) convex, with 7–9 short or long ridges across, $\pm 5 \mu\text{m}$ apart and 2.5 μm high, a few straight, others curved, parallel to

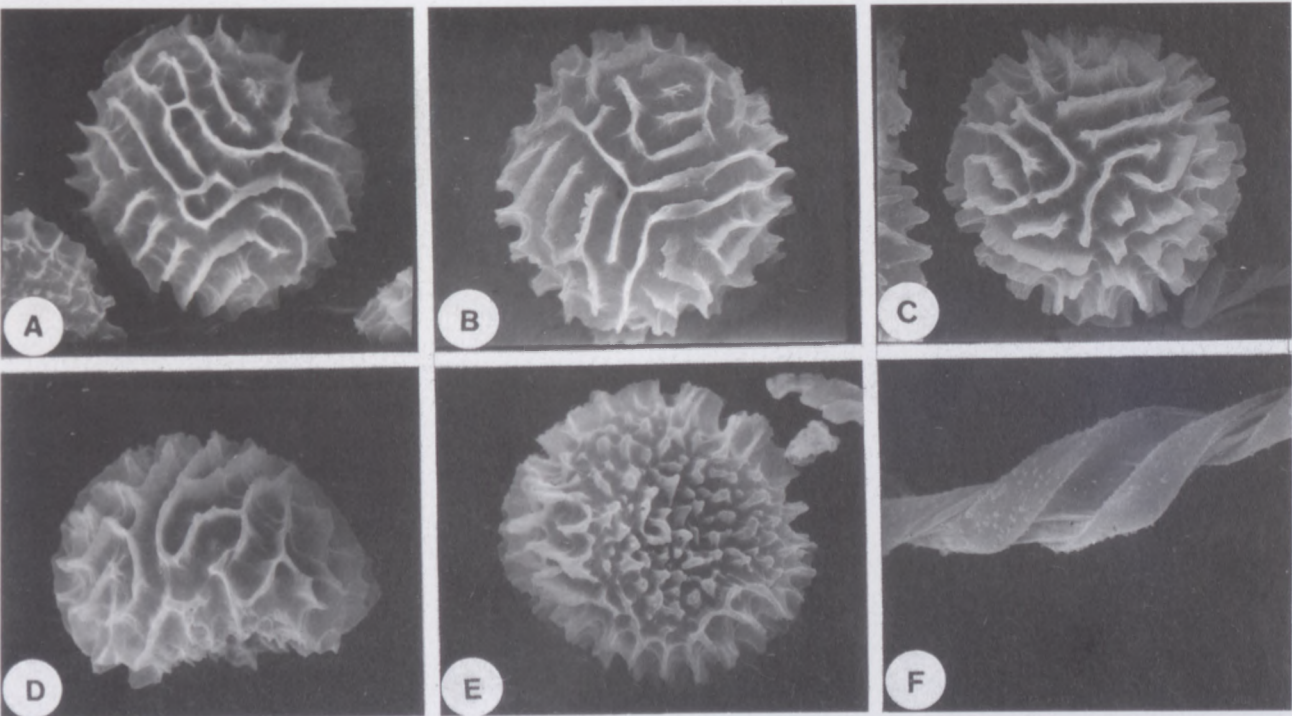


FIGURE 3.—*Fossombronia zuurbergensis*. A–E, spores; F, elater. A–C, distal face; D, side view of distal face; E, proximal face. A, D–F, *John Perold* 19; B, *John Perold* 5; C, *John Perold* 113 (Baviaanskloof). A, $\times 990$; B, $\times 1138$; C, $\times 1064$; D, $\times 1097$; E, $\times 967$; F, $\times 2707$.

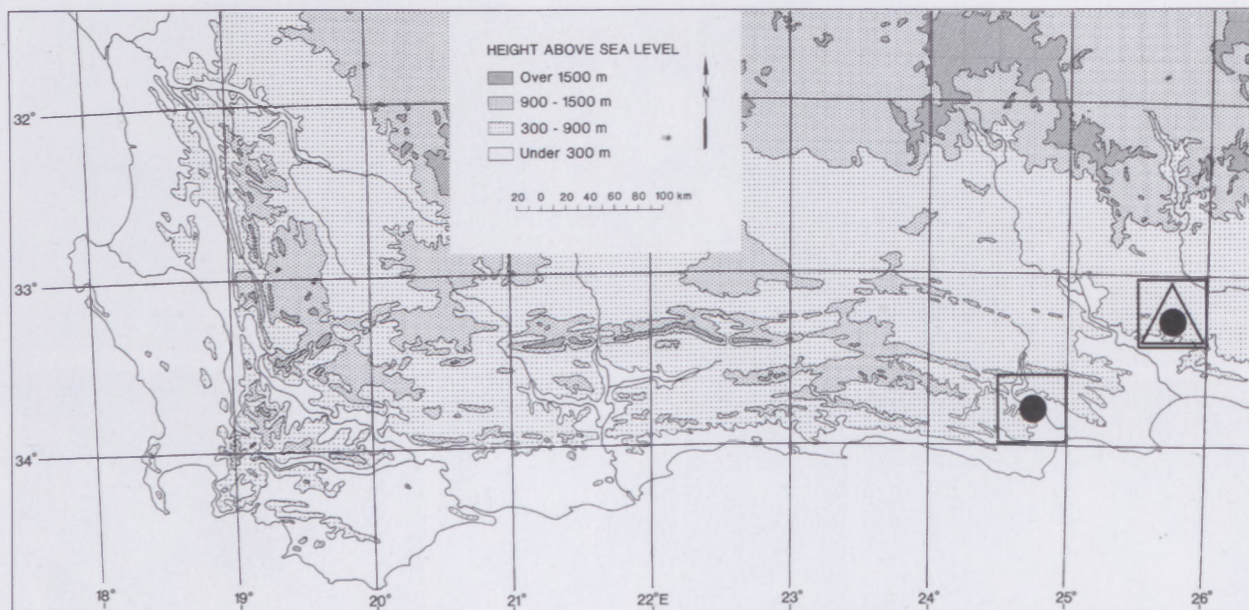


FIGURE 4.—Distribution of *Fossombronia zuurbergensis*, ●, New localities of *F. capensis* var. *capensis*, □; and *F. crispa*, △, in Eastern Cape.

each other, but some groups running at right angles to the former, occasionally interlinked to form complete or incomplete alveoli, truncate or spinous processes sometimes interspersed in between; proximal face (Figure 3E) lacking triradiate mark, flat to slightly concave, covered with irregular conical or spinous processes and smaller papillae, around spore periphery 21–25 projecting 'spines', i.e. the ends of ridges which extend over the sides of the distal face, some joined by an incomplete membranous wing. *Elaters* yellow, 75–125 × 5.0–12.5 µm, tapering to tips and ending in loop, or not, finely papillose (Figure 3F), bispiral or trispiral, others trispiral in centre, tips bispiral, very rarely once furcate.

Fossombronia zuurbergensis has been named for the Zuurberg in the Eastern Cape (Figure 4), where it was collected at several localities along the Pass, some only in small stands, others in larger clumps. A few collections had to be kept in cultivation to allow the spores to ripen. The vegetation type of vascular plants in this area is Mountain Fynbos (Low & Rebelo 1996). The soil is derived from quartzitic sandstone shale of the Witpoort/Weltevrede formation of the Witteberg group of the Cape Supergroup (Visser 1984). It was recently also collected further to the west at Baviaanskloof (3324DA) along the banks of the Wit River, at altitude ± 900 m. These areas have fairly sparse rain, both in winter and in summer.

On account of the markedly dentate margins of the leaves and pseudoperianths, it was originally thought that these plants, although noticeably larger, belonged to *F. spinifolia* Steph., which had only been collected twice by Breutel in 1853 at Genadendal in the Western Cape (Perold 1997a). However, on comparing the ornamentation on the distal face of *F. zuurbergensis* spores with those of *F. spinifolia*, the former has 7–9, longer and sometimes parallel, as well as smoother ridges running across it. In *F. spinifolia* spores the 6 or 7 ridges on the distal face, besides being shorter, are also much less regular and not smooth; occasionally with a few large papillae interspersed between them. *F. densilamellata*

S.W. Arnell (1952) also has spores with parallel ridges on the distal spore face, but they are closer together and more numerous, i.e. 12–16 and are sometimes connected with slender threads between them (Perold 1997b).

F. zuurbergensis can be distinguished by the many spinose processes at the margins of the leaves and pseudoperianths, by being dioicous with smaller male plants, by mostly composite perigonal bracts and by the spore ornamentation with some smooth, parallel ridges on the distal face.

NEW RECORDS OF *F. CAPENSIS* VAR. *CAPENSIS* FROM EASTERN CAPE

F. capensis var. *capensis* (Perold 1999) was collected for the first time in Eastern Cape at several localities along the Zuurberg Pass and at Baviaanskloof. Sporulating specimens are easy to recognize because of the poorly formed elaters.

NEW RECORDS OF *F. CRISPA* FROM EASTERN CAPE

F. crispa is widespread in southern Africa (Perold 1997c), but has not previously been reported from Eastern Cape. I collected the specimens in October 1999, at Nerina Bush Camp along the stream bank, on soil in the Zuurberg National Park. The spores have the usual incompletely reticulate ornamentation on the distal face. The plants, however, are clearly dioicous. In Perold (1997c), I, stated that *F. crispa* is 'monoicous, sometimes seemingly dioicous'.

SPECIMENS EXAMINED

Held at PRE. Bracketed numbers after collectors' name and number refer to the species in the text, namely: *F. zuurbergensis* (1), *F. capensis* var. *capensis* (2) and *F. crispa* (3).

John Perold 1, 2, 6, 8–10 (2); 11 (1); 13, 16 (2); 19 (1) (holotype); 28, 35, 37 (2); 38 (1); 39–41 (2); 42 (1); 46, 75 (2); 79 (1); 80 (2); 102, 113, 145 (1) (the last two collections are from Baviaanskloof (3324DA), the others from the Zuurberg).

S.M. Perold 4147, 4148 (3).

ACKNOWLEDGEMENTS

I sincerely thank my nephew, John Perold, and his wife, Audrey, for their hospitality during my visit to them at Addo, in October 1999 and for John's help, interest and enthusiasm in collecting liverworts in Eastern Cape and for delivering them to me. For his helpful suggestions Dr H. Stieperaere is thanked and also Dr H.F. Glen for translating the diagnosis into Latin. Furthermore, I extend my gratitude to Ms G. Condry for the drawings, to Mrs A. Romanowski for developing and printing the photographs and to Ms D. Maree for typing the manuscript.

REFERENCES

- ARNELL, S.W. 1952. Hepaticae collected in South and West Africa (1951). New and little known species. *Botaniska Notiser* 1952: 307–329.
- LOW, A.B. & REBELO, A.G. (eds). 1996. *Vegetation of South Africa, Lesotho and Swaziland*. Department of Environmental Affairs & Tourism, Pretoria.
- PEROLD, S.M. 1997a. Studies in the liverwort genus *Fossombronia* (Metzgeriales) from southern Africa. 3. An amendment to *F. spinifolia*. *Bothalia* 27: 39–42.
- PEROLD, S.M. 1997b. 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.
- PEROLD, S.M. 1997c. Studies in the liverwort genus *Fossombronia* (Metzgeriales) from southern Africa. 4. A re-examination of *F. crispa*, *F. leucoxantha* and *F. tumida*. *Bothalia* 27: 105–115.
- PEROLD, S.M. 1999. Studies in the liverwort genus *Fossombronia* (Metzgeriales) from southern Africa. 7. *F. capensis* var. *spiralis*, a new variety from Western Cape. *Bothalia* 29: 1–4.
- VISSER, D.J.L. Compiler. 1984. *Geological map of the Republics of South Africa, Transkei, Bophuthatswana, Venda and Ciskei and the Kingdoms of Lesotho and Swaziland*. Government Printer.