

Studies in the genus *Riccia* (Marchantiales) from southern Africa. 2. A new species of the section *Pilifer*: *R. sarcosa*

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ABSTRACT

Riccia sarcosa Volk & Perold, a new species endemic to southern Africa is described. This species belongs to the section *Pilifer* Volk (1983), which now comprises 8 species characterized by the dorsal epithelium consisting of loose cell pillars. *R. sarcosa* is recognized by the distinct white margins of the thallus, by inconspicuous hyaline scales that do not extend above the thallus margins and by the spore ornamentation consisting of round, deep-set areolae or foveae.

Riccia sarcosa Volk & Perold, sp. nov. sectionis *Pilifer*, *R. duthiae* similis sed thallo marginibus albis sporisque foveolis bene impressis differt.

Thallus dioecius mediocris, lobis ad 10 mm longis, 1,5–3 mm latis, 1–1,5 mm crassis, obovatis, apice sulcatis; superficies dorsalis velutina, virella, leviter concava, marginibus albis. *Frons* in sectione transversali: stratum piliferum (epithelium) pilis liberis gradatim contractis 3–4 cellulis seriatis; chlorenchyma columnis 8–10-cellularibus canalibusque aeriferibus tenuibus. *Squamae* imbricatae, hyalinae, margines thalli aegre superantes. *Sporangia* dorsaliter protuberantia. *Sporae* 90–130 μ m diametro, triangulo-globosae polares, ochraceae, ala angusta, 6–12 foveolis in diametro. Chromosomatum numerus $n = 8$ (Bornefeld 1985).

TYPE.—Cape, 3224 (Graaff-Reinet): Aberdeen, next to road R57, 2 km north-east of junction with R61, at shallow edges of vleis temporarily damp or occasionally inundated (–AC), 1981.04.11, Volk 81–274b (M; PRE), associated with *R. duthiae*, *Marsilia burchellii*, *Crassula* spp., *Ruschia* spp., *Chloris virgata* and thick layers of Cyanophyceae. On clayey soil, pH 6.5–6.9.

Thallus dioecious, perennial, gregarious or in incomplete rosettes up to 20 mm across, medium-sized, lobes up to 10 mm long, 1,5–3 mm broad, 1–1,5 mm thick (Fig. 1.1, 1.2; Table 1), obovate, narrow at base, widening distally, occasionally single, usually 2 to 3 times furcate, some segments branching again close to apex; branches variously divergent: main branches often parallel at initial dichotomy, subsequent branches usually more widely divergent (Fig. 1.1); in dense populations segments mostly elongated and small; dorsal surface when dry whitish green, somewhat felt-like, apex and sides with hyaline scales inflexed; when turgid, bright green, glistening, velvety, older parts and along margins white, sulcate at apex and shortly emarginate, slightly concave to flat, scales only prominent at

apex. *Thallus* branches in transverse section 1,5 to 2,5 times as broad as thick; dorsal surface with shallow depression in centre, margins acute; flanks steeply ascending, sloping slightly outwards near apex, pale green, sometimes flecked with reddish purple; ventral surface slightly convex, greenish; dorsal covering of epithelial cells (Figs 1.2, 1.3; 2.2–2.4) about $\frac{1-2}{10}$ the thickness of transverse section, consisting of loose cell pillars varying from 130–180–220 μ m in length (Tables 1 & 2), each pillar with 3–4 empty, delicate and inflated, hyaline cells, basal cells up to 80 μ m wide and occasionally giving rise to unicellular globular outgrowths in spaces between pillars, thus reducing sizes of air-spaces above intercellular channels (Fig. 2.2–2.4), pillars tapering to smaller terminal apical cells about 33 μ m wide, their shapes conical, mammillate or globular, giving dorsal surface of thallus a somewhat papillose appearance when viewed from above (Fig. 2.1); assimilation tissue (chlorenchyma) $\frac{4-5}{10}$ the thickness of section, 320–510–640 μ m thick (Fig. 1.2; Table 1), consisting of columns or plates one cell thick, 8–10 cuboidal cells high, and enclosing 4–6–8-sided air-channels (Fig. 1.4); storage tissue $\frac{3-4}{10}$ the thickness of section, 320–400–470 μ m thick (Fig. 1.2; Table 1), with closely packed, rounded or hexagonal cells, average diameter 50 μ m; rhizoids arising from flat epidermal cells of ventral surface or from bases of scales, about 30 μ m wide, mostly smooth. *Scales* closely imbricate, semicircular, 1 000–1 500 μ m long and 600 μ m broad, hyaline or white, basal cells often reddish purple; almost as broad as thickness of thallus, scarcely projecting above thallus margin; cells oblong-hexagonal, 110 μ m long \times 35 μ m wide, smaller at margin, 35 μ m long \times 30–40 μ m wide, cell walls straight (Fig. 1.2, 1.5). *Antheridia* not seen. *Archegonia* near middle of thallus, their necks purple-brown. *Sporangia* bulging dorsally, 0,6–0,8 mm across, containing 250–450 spores. *Spores* 90–130 μ m in diameter, triangular-globular, polar; ochre-coloured to dark brown, semi-transparent becoming opaque with age; wing narrow 2,5 μ m wide, projecting slightly more at marginal angles, incised or with pore in spore wall, margin smooth to finely crenulate; ornamentation on distal face incompletely reticulate: in centre of spore 5–7 smaller areolae about 10 μ m wide, surrounded by larger 25 μ m wide areo-

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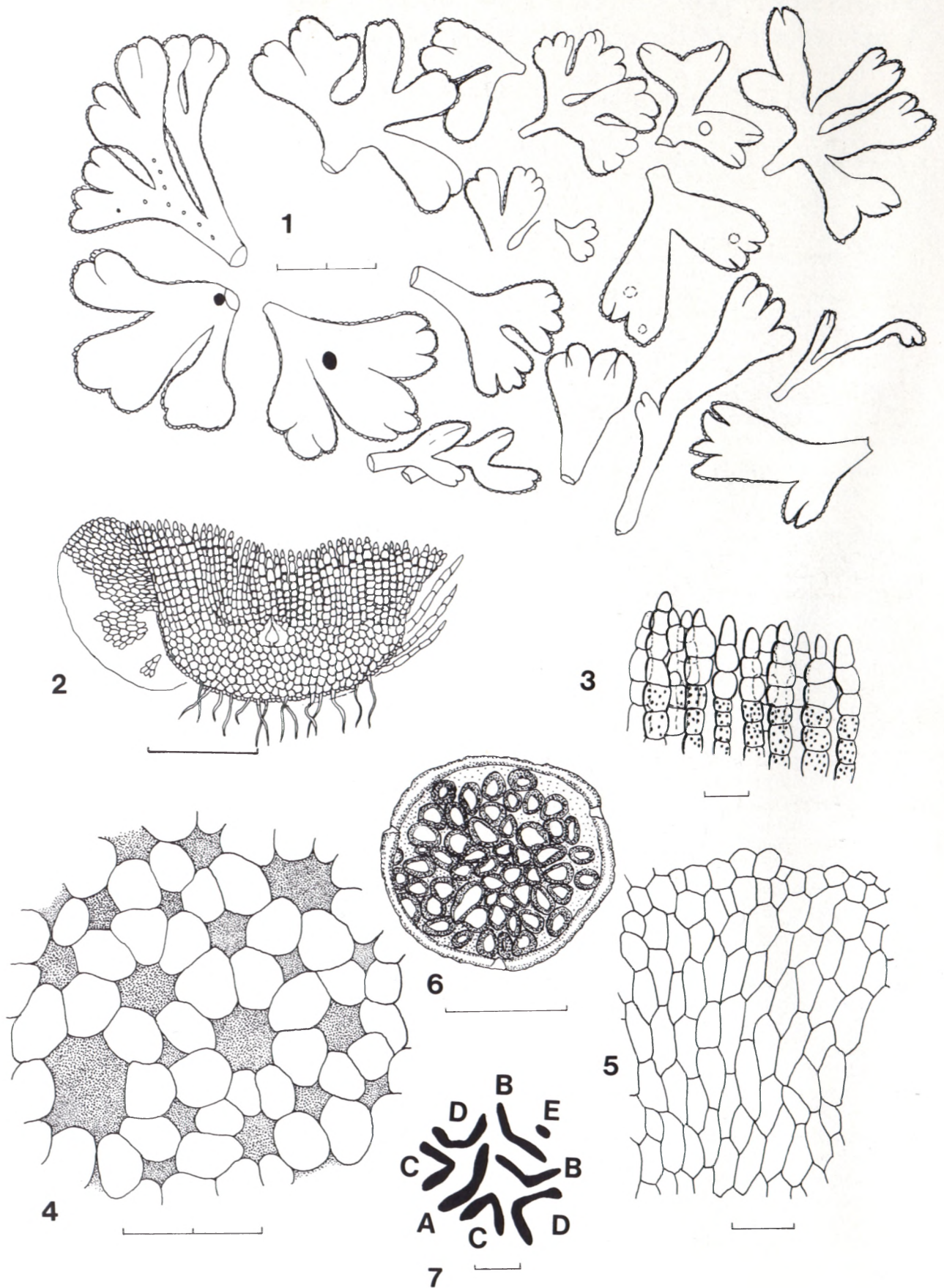


FIG. 1.—*Riccia sarcosa* (Volk 81-274b and Volk 81-292b, M, PRE). Structure of thallus, spores and chromosomes. 1, different habits; 2, transverse section of the thallus; 3, epithelial cells; 4, horizontal section through chlorenchyma; 5, part of ventral scale, 6, ornamentation of distal spore face; 7, chromosomes. (1-6, by O. H. Volk; 7, by T. Bornefeld). Scale bar on 1 = 4 mm; 2 = 500 μ m; 3-5 = 100 μ m; 6 = 50 μ m; 7 = 1 μ m.

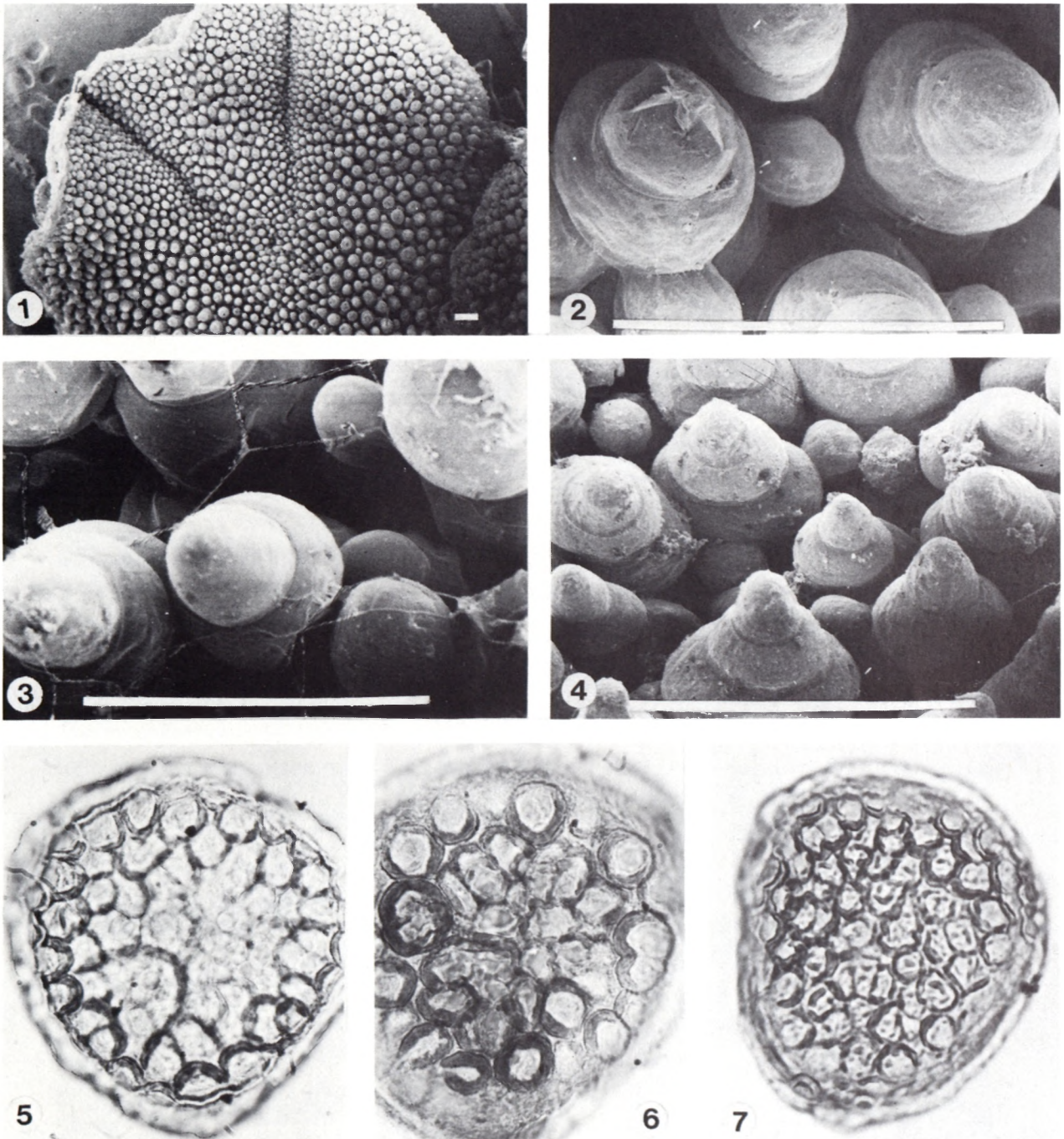


FIG. 2.—*Riccia sarcosa* (Volk 81-274b and Volk 81-292b, M, PRE). Thallus, epithelium and spores. 1, surface view of distal part of thallus; 2 & 3, epithelium viewed from above, showing interspatial outgrowths; 4, oblique view of same; 5-7, distal face of spores. [1-4, SEM micrographs by O. H. Volk; 5, 6, LM (light microscope) photographs by O. H. Volk; 7, LM photograph by S. M. Perold.] Scale bars on 1-4 = 50 μ m; diameter of spores on 5-7 ca 100 μ m.

lae, their borders thick, ring-like, often not reaching to wing (Figs 1.6; 2.5-2.7; 3.5, 3.6), some spores with 6-12 small pits or foveae across diameter; proximal face with triradiate mark distinct, areolae of facets (Fig. 3.1-3.4) about 7,5 μ m wide, often with raised papillae at nodes; an area 10 μ m wide between areolae and margin of spore, as well as narrow strips flanking parts of triradiate mark, without ornamentation (Fig. 3.1-3.4). Chromosome number $n = 8$ (Bornefeld 1984); the letters A-E (Fig. 1.7) identify the chromosomes according to Bornefeld (1984).

R. sarcosa is distinguished from the other seven species in the section *Pilifer* by the distinct white

margin of the thallus, by its mostly inconspicuous scales that do not project above the thallus margin, and by the dorsal epithelial cell pillars which often

TABLE 1.—*R. sarcosa*, measurements on transverse section (cultivated plants of Volk 81-274b and Volk 81-292b)

Breadth of thallus :	2,1-2,3-2,7 mm
Thickness of thallus :	1,0-1,3-1,5 mm
Thickness of epithelium :	130-180-220 μ m, ca $\frac{1-2}{10}$ thickness of thallus
Thickness of chlorenchyma :	320-510-640 μ m, ca $\frac{4-5}{10}$ thickness of thallus
Thickness of storage tissue :	320-400-470 μ m, ca $\frac{3-4}{10}$ thickness of thallus

have inflated basal and smaller terminal cells. The ornamentation of the spore wall is also distinctly different with deep-set, ringed areolae or foveae.

The type specimen, *Volk 81-274b*, was part of a mixed collection of *R. duthieae* (*Volk 82-274*) and was only recognized as a new species when plants from this collection were cultivated. A further specimen of *R. sarcosa* was isolated from a gathering of *R. albomarginata*, (*Volk 81-292*) (see Volk 1983)

collected in the Willem Pretorius Wildtuin about 25 km E of the Park office on shallow soil over flat rock plates, temporarily wet and growing together with *Crassula* spp., *Ruschia indurata* (L. Bol.) Schwant., *Anacampseros* spp., *Oropetium* spp., *Riccia volkii* etc. pH of soil 6,2. A third specimen of this rare species was recently collected by J. M. Perold 10 km S of Ladybrand on shallow soil overlying a flat rocky outcrop. Fig. 4.

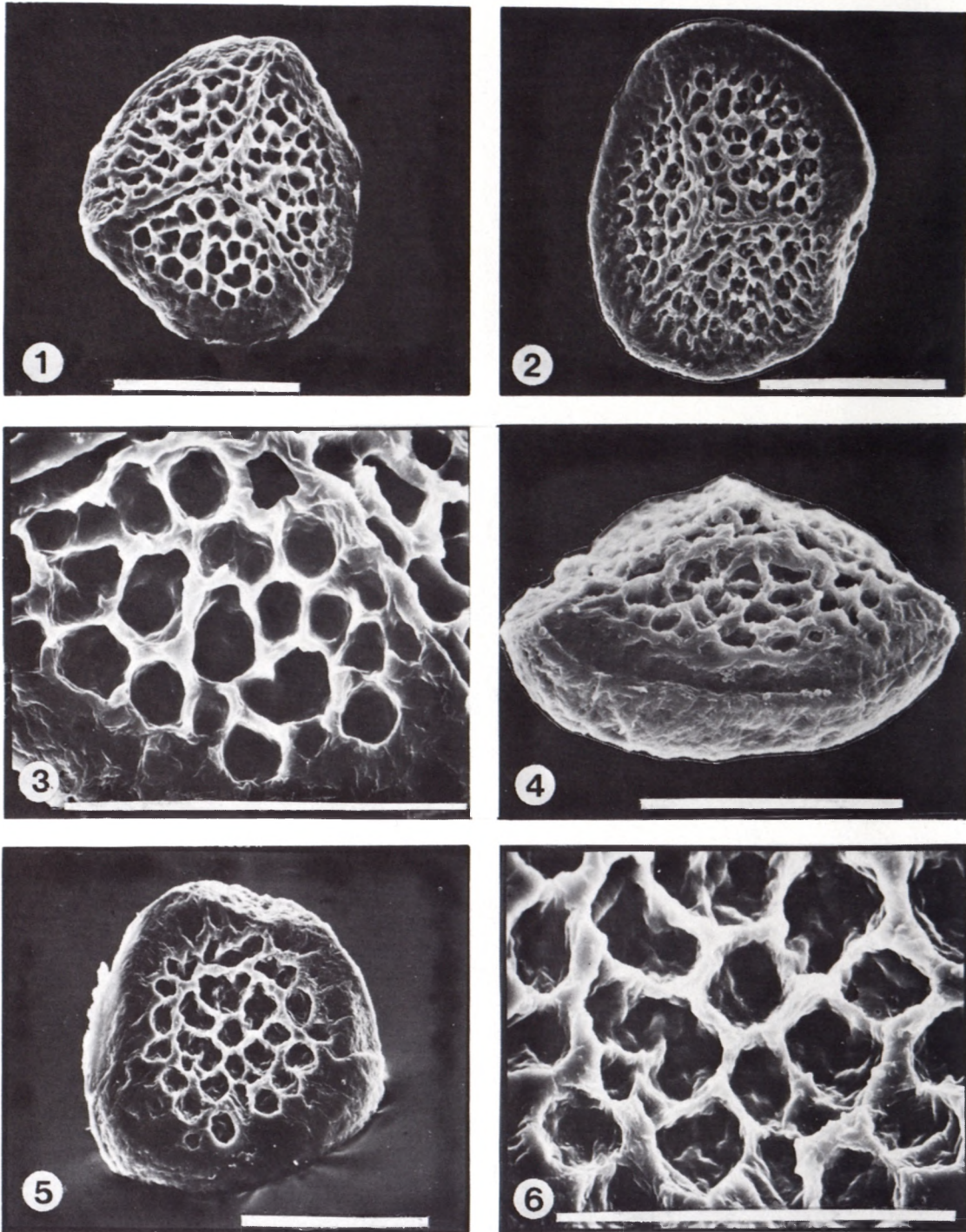
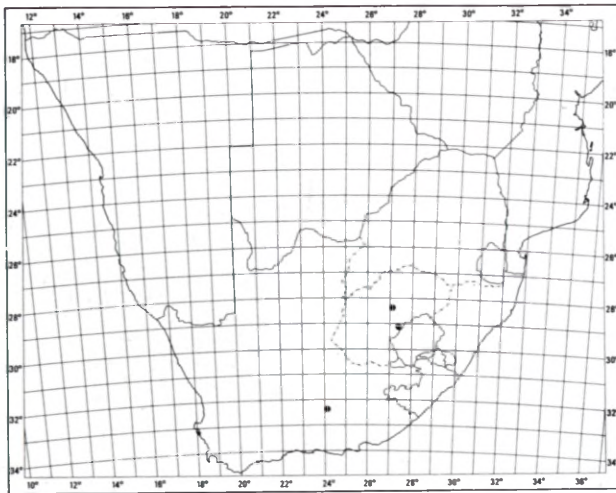


FIG. 3.—*Riccia sarcosa* (*Volk 81-292b*, M, PRE). Spores. 1 & 2, proximal face; 3, areolae on one of proximal facets; 4, viewed from side; 5, distal face; 6, areolae on distal face. (SEM micrographs by S. M. Perold). Scale bars = 50 μ m.

TABLE 2.—*R. sarcosa*, size (in μm) of the 3–4 cells of the epithelial pillars and of cells of the chlorenchyma in transverse section (cultivated plants of Volk 81–274b and Volk 81–292b)

	Average size		Length : Breadth	Variations in size	
	Length	Breadth		Length	Breadth
Terminal cell	46	33	1,4:1	28–75	20–40
Middle cell(s)	53	50	1:1	38–70	44–60
Basal cell (if 3 cells in pillar)	63	60	1:1	40–100	48–80
Basal cell (if 4 cells in pillar)	55	56	1:1	40–60	50–70
Total length of pillar	190			160–200	
Chlorenchyma cells					
Volk 81–274b	48	45	1,1:1	40–60	36–56
Volk 81–292b	44	57	0,8:1	40–52	50–60

OFS.—2827 (Senekal): Willem Pretorius Game Reserve (–AC), Volk 81–292b (M; PRE). 2927 (Maseru): Ladybrand, 10 km S (–AB), J. M. Perold 35 (PRE).

FIG. 4.—Map showing distribution of *R. sarcosa*.

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UITTREKSEL

Riccia sarcosa Volk & Perold, 'n nuwe spesie endemies in suidelike Afrika, word beskryf. Hierdie spesie behoort tot die seksie *Pilifer* Volk (1983), wat nou 8 spesies behels en wat gekenmerk word deur 'n dorsale epiteel wat uit los selpilare bestaan. *R. sarcosa* word erken aan die wit rande van die tallus, aan die onopvallende deurskynende skubbe wat nie by die tallusrand verbysteek nie en aan die ornamentasie van die spore wat uit ronde diep ingesonke areole of putjies bestaan.

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