

Studies in the genus *Riccia* (Marchantiales) from southern Africa. 3. *R. schelpei*, a new species, in the new subgenus *Chartacea*

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Keywords: air-pores, dorsal epidermis, *Riccia*, subgenus *Chartacea*

ABSTRACT

Riccia schelpei Volk & Perold, sp. nov., endemic to the western Cape, is described. It is characterized by the parchment-like epidermis of the thallus, thick-walled hyaline epidermal cells and by dorsal air-pores encircled by a raised ring of smaller thin-walled cells. This species is the type of the new monotypic subgenus *Chartacea* Perold.

Chartacea Perold, subgen. nov. Ricciae L.

Textura thalli chartacea, inde nomen; epidermis indurata cellulis hyalinis parietibus incrassatis; pori aërii (stomata) annulo cellularum superpositarum parietibus tenuibus circumcincti.

TYPE. — *Riccia schelpei* Volk & Perold

Thallus dorsally with papery texture; epidermis parchment-like with thick-walled hyaline cells; air-pores surrounded by a ring of thin-walled superimposed cells.

Riccia schelpei Volk & Perold, sp. nov. *Thallus* monoicus (?), mediocris ad magnus; lobi ad 12 mm longi, 1,5–2 mm crassi, oblongo-ligulati; superficies dorsalis in sicco pallido-flavescens, chartacea, profunde sulcata, apice emarginato, marginibus late alatis. *Frons* in sectione transversali: chlorenchyma cavernulis aëriis latis polyedricis. *Epidermis* unistratosa, cellulis hyalinis parietibus incrassatis, poris aëriis annulo cellularum parvarum superpositarum parietibus tenuibus circumcinctis. *Squamae* inconspicuae, marginem frondis non superantes. *Sporangia* in sulco agglomerata. *Sporae* 95–105 μ diametro, trianguloglobulares, polares, rubello-brunee, alatae, reticulo-foveolatae, 10–12 foveolis in diametro, plerumque granulosa. Chromosomatum numerus $n = 8$ (Bornefeld, 1984).

TYPE. — Cape, 2917 (Springbok): Hester Malan Res. Carolusberg (W), seepage area (–DB), 1977.09.14 *Schelpie* 7775 (BOL; PRE) associated with *Bryum radiculosum* Brid., *B. argenteum* Hedw., *Chamaebryum pottioides* Thér. & Dix., *Riccia parvo-areolata* Volk & Perold, *Crassula* spp. and Cyanophyceae. On decomposed granitic soil, pH 7.

Thallus monoecious (?), perennial, in gregarious patches or single and scattered, medium-sized to large, lobes up to 12 mm long, simple or irregularly furcate, branches widely divergent, oblong-ligulate, winged, 1,5–2 mm thick, 2–3 times broader than thick, when dry 3–4 mm broad, dorsal surface yellow and parchment-like, only apical sides inflexed (Fig. 1.1a & 1b), opposing each other and sometimes clasped together, otherwise wings of thalli expanded

and irregularly undulate; when turgid, up to 6 mm broad, dorsal surface green, somewhat greasy, reticulate with many scattered areolae, formed by faintly visible outlines of air-chambers, each with a single air-pore (Fig. 2.2); apex rounded, emarginate, sulcus deep towards apex, sides convex and sloping steeply; proximally groove shallow and wide (Figs 1.2; 2.1). *Thallus branches in transverse section* with deeply grooved surface on apical sections (Fig. 1.3a), on more proximal sections with wide shallow channel (Figs 1.3b; 2.5); margins of wings acute (Figs 1.3a & 3b; 1.7), attenuate and undulating, flanks sloping steeply up and outwards, occasionally flecked with purple near base; ventrally thickened, slightly rounded, greenish, with numerous smooth and some tuberculate rhizoids, laterally abruptly forming a wing which is without rhizoids (Fig. 1.3a & 3b); assimilation tissue (chlorenchyma) $\frac{3-4}{6}$ the thickness of section, about 600–850 (–1 000) μ m thick, with polyhedral air-chambers up to 150 μ m wide (Figs 1.4; 2.6), in larger plants 25–30 chambers across width of thallus, sloping very obliquely at bases, gradually curving upwards and becoming almost vertical towards surface, where each one opens via a small pore; each air-chamber enclosed by 6–8 chlorophyllose lamellae or plates, 1 cell thick, cells isodiametric, about 55 μ m wide; storage tissue $\frac{2-3}{6}$, the thickness of section 300–500 μ m thick, cells roundish, up to 70 μ m wide, without starch, but rich in oil.

Epidermis unistratose, thick-walled, except for ventral rhizoid-bearing part; dorsal cells variously shaped, polygonal, with rounded corners (Fig. 1.5), 35–70 μ m long, 30–50 μ m wide and 10–40 μ m high; air-chambers roofed over by 5–8 thick-walled epidermal cells centred around air-pores, each pore encircled by a slightly raised ring of 5–7 fragile, smaller cells 15–20 μ m wide (Figs 1.5; 2.3), overlying and overlapping thick-walled epidermal cells, thus reducing diameters of pores to 5–20 μ m; the pores resemble those of *Oxymitra*; distances between pores 80–140 μ m; some of the epidermis cells bear unicellular club-shaped ‘slime’ papillae (Fig. 2.4), 40 $\times$ 20 μ m, very thin-walled and easily destroyed, especially numerous around archegonia (Fig. 1.11 & 1.12); on transverse section of wing (Fig. 1.7), both dorsal and ventral cells thick-walled, but epidermal cells on dorsal surface of wings with irregularly thickened walls (Fig. 1.6), and on ventral surface of wings cells

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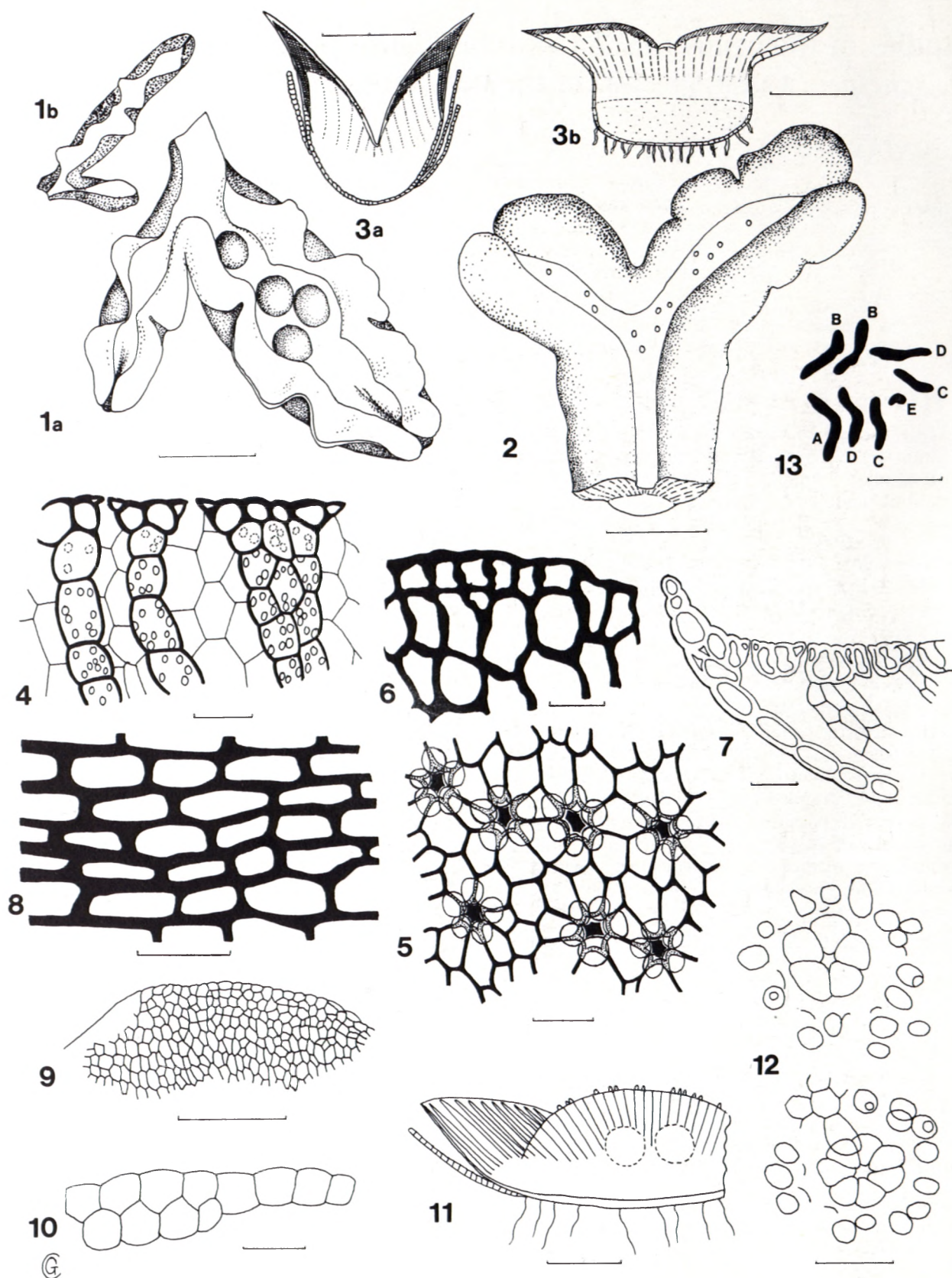


FIG. 1. — *Riccia schelpei* (S. M. Perold 535, PRE). Structure of the thallus, scales and chromosomes. 1, dry thalli: a, with several ripe sporangia; b, shrunken, sterile thallus; 2, fresh thallus; 3, branch of thallus in transverse section: a, during transition to resting phase, emptied cells in wing shaded, near apex deeply grooved; b, showing thick-walled epidermis, assimilation and storage tissue, proximally with shallow groove; 4, transverse section enlarged, showing epidermal cells, pores, air-chambers and chlorophyllose lamellae; 5, dorsal epidermis from above: pores (black) encircled by a ring of fragile cells overlying thick-walled epidermis cells; 6, epidermis on margin of wing, from above; 7, transverse section of wing: walls of dorsal and ventral epidermis thick-walled, but different in shape; 8, ventral epidermis at wings, cells thick-walled; 9, scale; 10, transverse section of bistratose base of scale; 11, longitudinal section of thallus through gametangia, 'slime' papillae and wing; 12, mouths of archegonia in deep depressions, from above, surrounded by 'slime' papillae; 13, chromosomes. (1–12, by O. H. Volk; 13, by T. Bornefeld). Scale bar 1, 2, 3 = 2 mm; 4, 5, 8, 10, 12 = 50 μ m; 6, 7 = 100 μ m; 9 = 500 μ m; 11 = 1 mm; 13 = 1 μ m.

uniformly thick-walled, rectangular (Fig. 1.8), up to 60 μm long, without air-pores or rhizoids. Scales imbricate, 300–500 μm broad and up to 1 500 μm long (Fig. 1.9), flush with and not projecting above thallus margin (Fig. 2.1), edge nearly smooth, hyaline, some scattered cells near base purple, cells oblong, 5–6-sided, 110 μm long and 50 μm wide, cell walls straight, at margins cells smaller, about $40 \times 30 \mu\text{m}$; in cross section cells bulging and base bistratose (Fig. 1.10). Gametangia in transient but well-defined groups along dorsal groove (Fig. 1.11); epidermis less complex here, but with large numbers of the fragile, blunt, 'slime' papillae; antheridia with short,

hyaline ostioles; archegonia opening in deep cup-like depressions, surrounded by papillate cells (Fig. 1.12); subsequently, as the spores develop, the necks protrude up to about 200 μm , with bases purple-brown and tips hyaline, thin, almost thread-like. Sporangia crowded together or scattered along groove, bulging dorsally, containing 600–800 spores (over 1 000 in capsules of large plants) enclosed in red-brown sac, which later disintegrates. Spores (90–)95–105(–115) μm in diameter, triangular-globular, polar, reddish or yellowish brown when young, darkening to mahogany brown, opaque; wing 7,5 μm wide, margin crenulate and somewhat eroded, pore

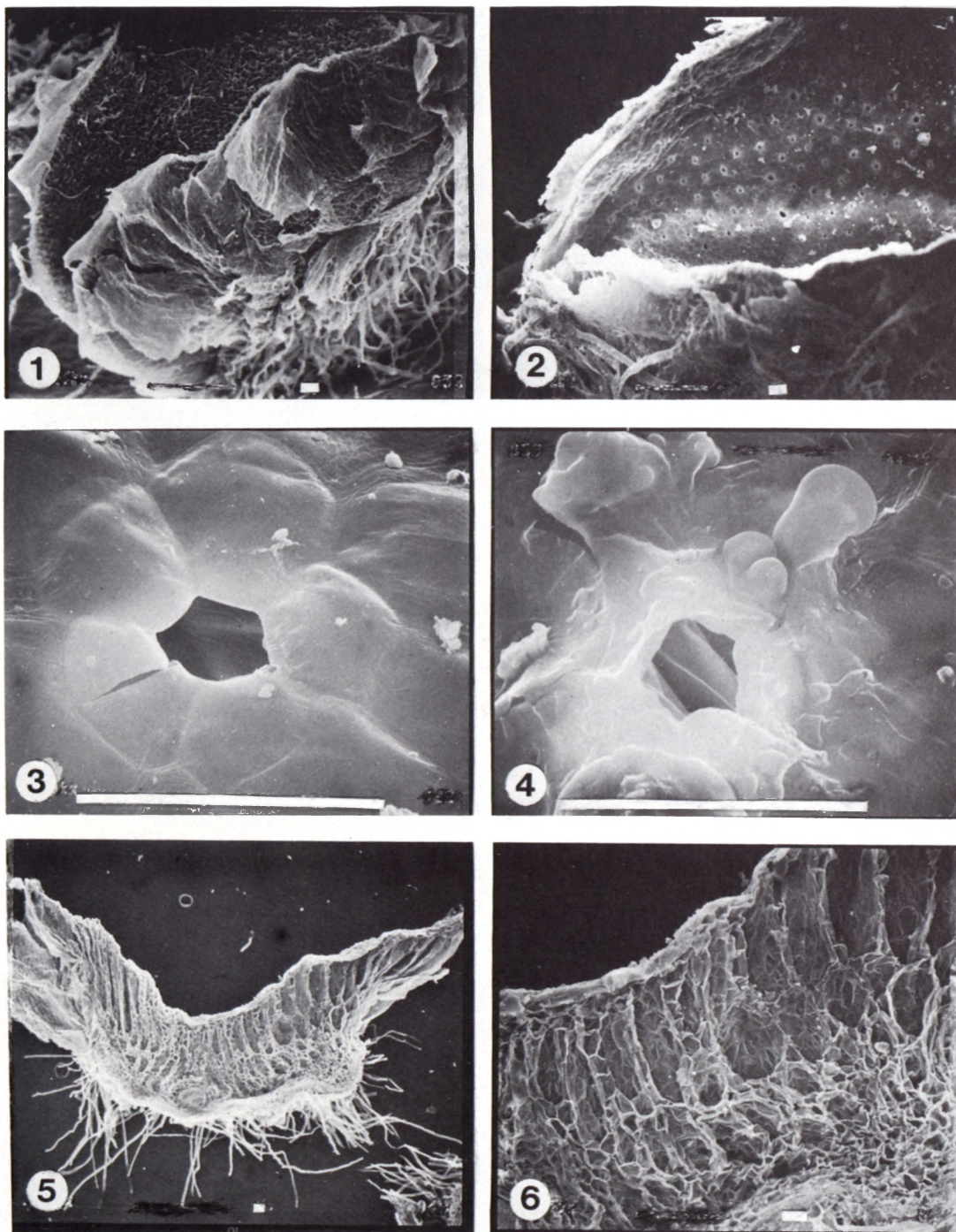


FIG. 2. — *Riccia schelpei* (E. G. H. Oliver 8041, PRE). Thallus, epidermal pores and air-chambers. 1, thallus near apex, showing scales; 2, air-pores on part of dorsal surface with margin and scales in foreground; 3, air-pore with 5 surrounding cells; 4, epidermis, air-pores, 'slime' papillae; 5, transverse section of thallus branch; 6, transverse section of air-chambers. (SEM micrographs by S. M. Perold). Scale bar on 1, 2, 5, 6 = 100 μm ; on 3, 4 = 50 μm .

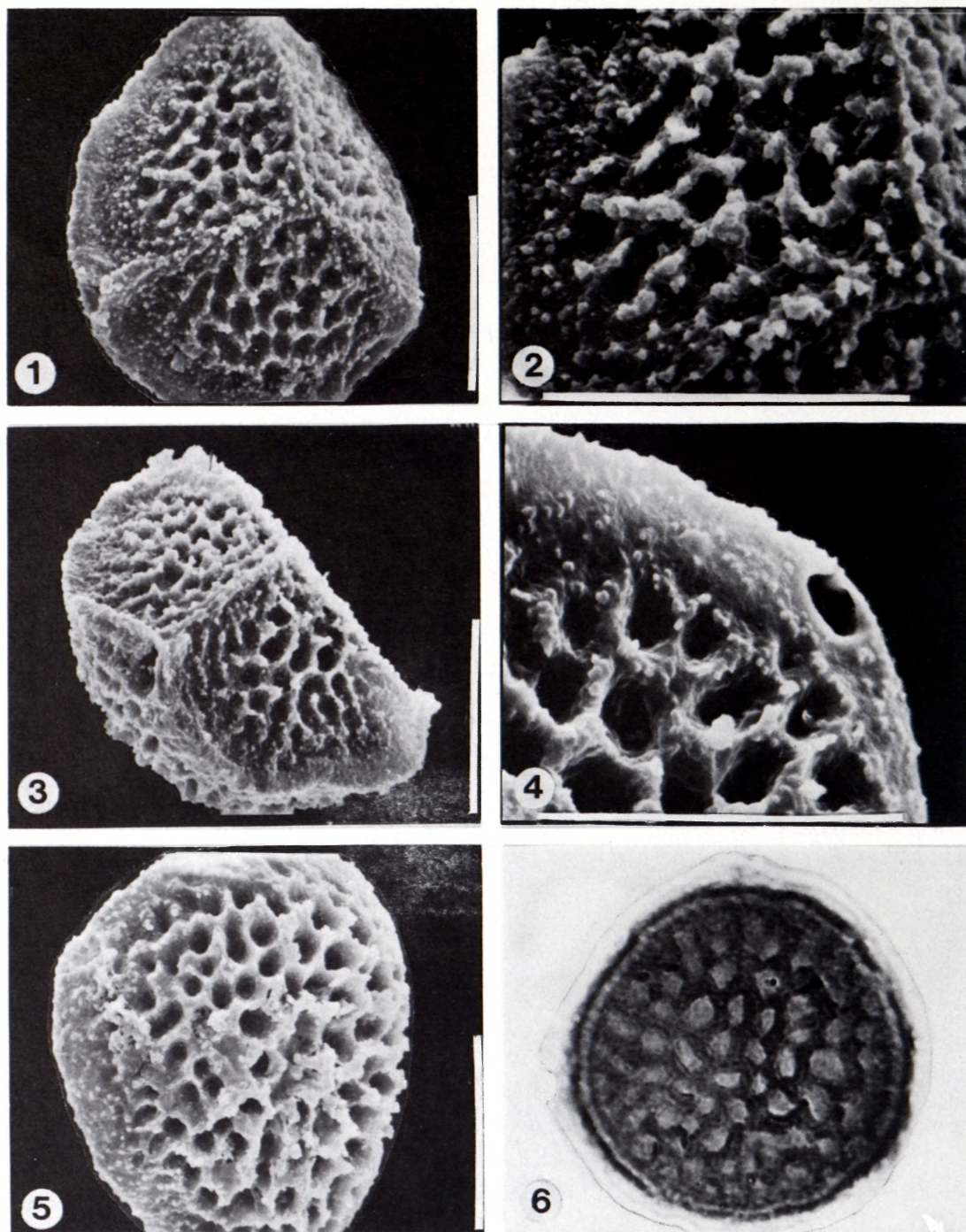


FIG. 3. — *Riccia schelpei* (E. A. Schelpe 7775, BOL). Spores. 1, proximal face; 2, apex; 3, viewed from side; 4, marginal pore and margin; 5, 6, distal face. (1–5, SEM micrographs; and 6, LM (light microscope) photographs, by S. M. Perold). Scale bar on 1–5 = 50 μ m; diameter of spore on 6, ca 100 μ m.

at each marginal angle 5–7,5 μ m across (Fig. 3.4), distal face convex, reticulate-foveolate, with 9–10(–12) deep cup-like areolae across diameter of spore (Fig. 3.5, 3.6), each areola 10–12,5 μ m wide, becoming somewhat smaller near margin, high ridges surrounding areolae and raised at nodes usually heavily encrusted with granules and papillae, but occasionally smoother; proximal face with apex blunt and sometimes acute, triradiate mark present, but partly obscured by granules, each facet with 15–20 small shallow areolae, surrounding ridges granulose (Fig. 3.1–3.3). Chromosome number $n = 8$ (Bornefeld 1984); the letters A–E (Fig. 1.13) identify the chromosomes according to Bornefeld (1984).

Under adverse conditions, the thalli become shrunk and transformed to dormant bulbils, as the peripheral cells lose their contents and form a protective covering (Fig. 1.1b). As with other *Riccia* species, the walls of the epidermal cells, of the empty cells and of the rhizoids, are stained a deep blue when treated with dilute Toluidine Blue N, whereas all other cell walls are reddish violet (Volk 1984).

R. schelpei is endemic to the western Cape, which is a winter rainfall region. It grows at seepages or on rocky outcrops, fully exposed to the sun, on acid to neutral (pH 5.0–7.0), well-drained soils, composed

of finely or coarsely decomposed granite, rich in dust. It may be associated with lichens, several small *Crassula* species, other *Riccia* species and with small mosses like *Archidium* and *Bryum*. *R. schelpei* has been named in honour of the late Prof. E. A. Schelpe, former curator of Bolus Herbarium, University of Cape Town, who collected the type specimen. Fig. 4.

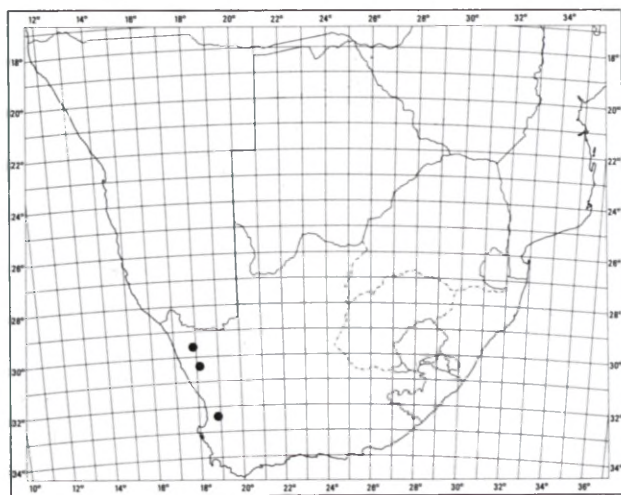


FIG. 4. — Map showing distribution of *R. schelpei*.

The parchment-like, and somewhat greasy epidermis, the air-pores with a ring of fragile cells superimposed over thick-walled, hyaline, epidermal cells, as well as the gametangia in well-defined stands, bear a resemblance to other genera of the *Marchantiales* e.g. *Oxymitracea*. These characters have necessitated placing *R. schelpei* in the new subgenus *Chartacea*, setting it apart from other members of the related subgenus *Spongodes*.

In addition to the type locality, collections were made at the following sites:

CAPE.—3018 (Kamiesberg): Plateau N of Leliefontein towards Draaiklip (—AC), *Oliver 8041* (PRE); 3218 (Clanwilliam): N of Citrusdal, above Olifants River (—BD), *S.M. Perold 535* (PRE).

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UITTREKSEL

Riccia schelpei Volk & Perold, sp. nov., endemies tot die Wes-Kaap, word beskryf. Die spesie word gekenmerk deur die perkamentagtige dorsale oppervlak van die tallus, verdikte selwande van die dorsale epidermisselle, en deur dorsale porieë wat omring is deur 'n opgehewe kring van kleiner, dunwandige selle. Hierdie spesie is die tipe van die nuwe monotipiese subgenus *Chartacea* Perold.

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