

Studies in the genus *Riccia* (Marchantiales) from southern Africa. 5. *R. rosea*, a new species

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ABSTRACT

A new species of *Riccia*, *R. rosea* Volk & Perold of the group 'Squamatae', section *Riccia*, subgenus *Riccia*, is described. It is endemic to southern Africa and is characterized by large ventral scales with hyaline margins and reddish pink to deep rose-pink bases, and by the light green dorsal colour of the thallus, fading to white along the margins and older parts. Fertile male plants have prominent hyaline ostioles. The spores are globular or subglobular and apolar, with 9–11 well defined areolae across the diameter.

UITTREKSEL

'n Nuwe endemiese spesie van *Riccia*, *R. rosea*, wat behoort tot die groep 'Squamatae', seksie *Riccia*, subgenus *Riccia*, word beskryf. Die spesie word gekenmerk deur groot pienk ventrale skubbe met kleurlose rande, die liggroen dorsale oppervlak van die thallus, en anterieër met opvallende ostiole. Die spore is bolvormig of amper bolvormig en apolêr, met 9–11 duidelike areole in die deursnee van die spoor.

***Riccia rosea* Volk & Perold, sp. nov.** squamis grandibus, marginis hyalinis, basiliter pluricoloratis, colore dorsali pallide-viridi ceteris speciebus gregis Squamatae differt.

Thallus dioicus, perennis, mediocris ad magnus, pallide-viridis. *Frons* ad 12 mm longa, 1.0 ad 2.5 mm lata, 1.0 mm crassa, simplex ad asymmetricè plurifurcata, segmenta 2.0 ad 4.0 mm longa, marginibus acutis, lateribus rectis ad obliquis, apicem versus acute vel subacute sulcata. *Squamae* prominentes, marginem frondis superantes, in sicco superficie frondis tegentes, marginibus hyalinis irregularibus basaliter pluricoloratae, subpurpureae, lateritiae et roseae, inde nomen. *Ostiola* prominentes. *Sporae* magnae, globosae, apolares, reticulatae. *Chromosomatum numerus* $n = 8$ (Bornefeld 1984).

TYPES. — Transvaal, 2528 (Pretoria): Farm Valschspruit, 19 km N of Bronkhorstspuit, on soil at base of weathered granitic rocks, on hilltop (–DB), 1982.02.20, S.M. Perold 324 (PRE, holo.); 1980.12.01 Volk 81/023 (M, PRE), associated with *Myrothamnus flabellifolia*, *Selaginella dregei*, *R. atropurpurea* Sim and *R. okahandjana* S. Arnell. Soil pH 5.8 and 6.2.

Thallus dioicous, perennial, in crowded gregarious patches or scattered; simple or once to twice symmetrically or asymmetrically furcate, branches diverging 45°–60°, ligulate, narrow proximally, up to 12.0 mm long, 1.0–2.5 mm broad, 1.0–2.5 times broader than thick, segments 2.0–4.0 mm long; apex rounded, shortly emarginate, sulcus narrow and deep, becoming shallow proximally (Figures 1B & C, 2A & B), dorsally light green, white at margins and older parts; margins acute, flanks steep to ascending obliquely near the apex, reddish pink; ven-

tral surface rounded, green, often with narrow violet transverse bands; when dry, dorsal surface white to greenish white, apex and sides inflexed (Figure 1A), covered by prominent scales. *Anatomy of thallus*: cells of dorsal epithelium hyaline, in one to two layers, globular to somewhat flattened above (Figure 2D), about 35 μm high \times 35–55 μm wide, soon collapsing and sunken, forming thick-walled 'ring cells' (Figures 1F & H), air-pores mostly triangular (Figure 1H), margin of thallus with thick-walled ($\pm 5 \mu\text{m}$), irregularly shaped cells (Figure 1J); assimilation tissue (chlorenchyma) about 1/2 the thickness of thallus, cells short-rectangular, 60–70 \times 40–50 μm , in columns of 7 or 8 cells (Figure 1F) enclosing narrow 3- or 4-sided air-canals (Figure 1G); storage tissue nearly 1/2 the thickness of thallus, cells rounded, about 55–60 μm wide, irregularly arranged; ventral epidermal cells rectangular. *Rhizoids* hyaline, smooth and tuberculate, 15–20 μm wide. *Scales* closely imbricate, wavy, semi-circular, large (Figure 2C), 800–900 \times 500–750 μm , projecting about 175 μm above thallus margin, reddish or rose-pink (hence the specific epithet), with hyaline margins 1–4 (–5) cells wide (Figure 1K); apical scales sometimes almost entirely hyaline; cells 4–7-sided, 65–100 \times 40–50 μm , cell walls straight (Figure 1I); marginal cells smaller, about 25 \times 30 μm ; rhizoids sometimes arising ventrally from scale margins. *Antheridia* with large prominent hyaline ostioles about 370 μm tall, in 1 or 2 rows along dorsal groove of male plants, epithelium shrunken away around base of ostioles (Figure 1B). *Archegonia* scattered along median part of female plants, necks purple. *Sporangia*: 3 or 4 dotted along length of lobe (Figure 1C), each containing about 200 spores; dorsal surface bulging, soon disintegrating, seldom developing purple blotches; plants rarely fertile. *Spores* 92.5–105.0 μm in diameter, light brown to brown, semi-transparent, subglobular to globular, apolar, wing and triradiate mark absent (Figure 3A & F), outline crenate or bluntly papillose; ornamentation regularly reticulate on all faces (Figure 3B & D), only distinguishable

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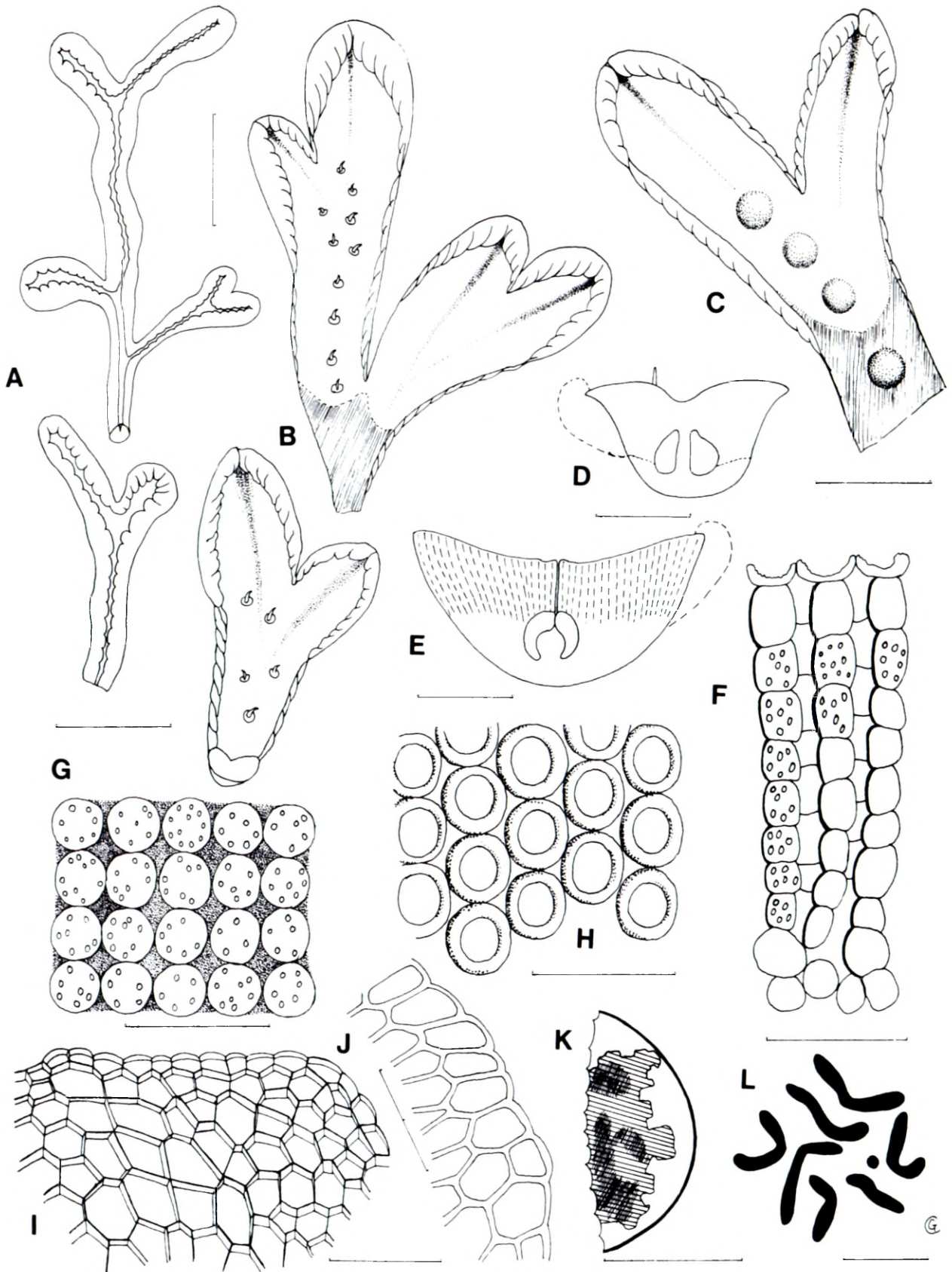


FIGURE 1. — *Riccia rosea* (S. M. Perold 324, PRE). Structure of thallus, scales and chromosomes. A, dry thalli; B, fresh male thalli with prominent ostioles; C, fresh female thallus with sporangia; D, transverse section of male thallus; E, transverse section of female thallus towards proximal part; F, transverse section through chlorenchyma; G, horizontal section through chlorenchyma showing air-canals; H, collapsed epithelial cells ('ring' cells) and air-pores from above; I, scale; J, marginal cells of thallus; K, multi-coloured scale; L, chromosomes. (A–K by O. H. Volk; L by T. Bornefeld. Drawings by G. Condy.) Scale bars A–E = 2.0 mm; F–I = 200 μ m; J = 100 μ m; K = 500 μ m; L = 1 μ m.

from each other by occasional indentation in centre of distal face (Figure 3C), 9–11 well defined, rounded or angular areolae across diameter, each areola about 10 μm wide, bordered by ridges up to 5,0 μm high, raised at nodes (Figures 3D & E). Chromosome number $n = 8$ (Bornefeld 1984) (Figure 1L).

R. rosea can be recognized by the white dorsal surface of the dry, and the older parts of the wet thallus, which seldom develops any purple colouration; by the prominent antheridial ostioles of male plants and by the large scales which are irregularly wavy and tightly appressed when dry. At the apex of the thallus some scales are entirely hyaline; along the sides of the thallus the scales have pink bases and more proximally, the scale colour darkens to deeper rose-pink or dark bluish red, flecked with groups of more intensely stained cells. The outer 1–5 rows of cells at the scale margins are usually hyaline and appear thick-walled, sometimes with a bluish tint; the deeper coloured cell groups in the body of the scale are not sharply delimited as there is a gradual shading in colour.

A few other species of *Riccia* with red or purple scales also have subglobular spores; however, the papillae at the nodes of the areolae of *R. rosea* spores are intermediate in length between the very prominent truncate projections of *R. runssorensis* Steph. and the low turbercles of *R. atropurpurea* Sim; the colour of the spores is also a distinguishing character: *R. rosea* has light brown spores, whereas

R. runssorensis and *R. atropurpurea* have much darker, red to black spores. *R. rosea* is a more robust plant than *R. atropurpurea*, which has dull, very deep purple or dark brown to almost black scales with hyaline edges that do not extend above the thallus margins; the thallus is glaucous gray dorsally and, when dry, the sides are usually tightly inflexed with 2 white marginal lips running along the midline. More difficult to distinguish from *R. rosea* is *R. runssorensis*, which also has red scales, often with hyaline edges, but they hardly extend beyond the thallus margins; the thallus is bright green dorsally, the lobes usually branching 2 or 3 times, and the dorsal epidermal cells are mammillose, not globose. *R. rosea* is the only one of the above three species that is dioicous.

It grows in full sunlight, but can tolerate partial shade, and often grows mixed with other *Riccia* species e.g. *R. okahandjana*, *R. atropurpurea* and moss species and with small annuals and/or perennials like *Craterostigma wilmsii*, *Lobelia nuda*, *Oropetium* and *Cyperus* spp. *R. rosea* is sometimes found growing on the rotting roots of grasses but it prefers shallow sandy soil overlying granitic, quartzitic or sandstone outcrops. Soil pH values range between 4,4 and 7,0. *R. rosea* is weakly acidophile to neutrophile; of 21 soil samples tested, the pH of 62% were between 5,5 and 6,4; of 24% between 6,5 and 7,0 (Volk). It has a widespread distribution in the summer rainfall areas of southern Africa (annual rainfall 300–600 mm or more), where the habitats become saturated with water for short intervals during the

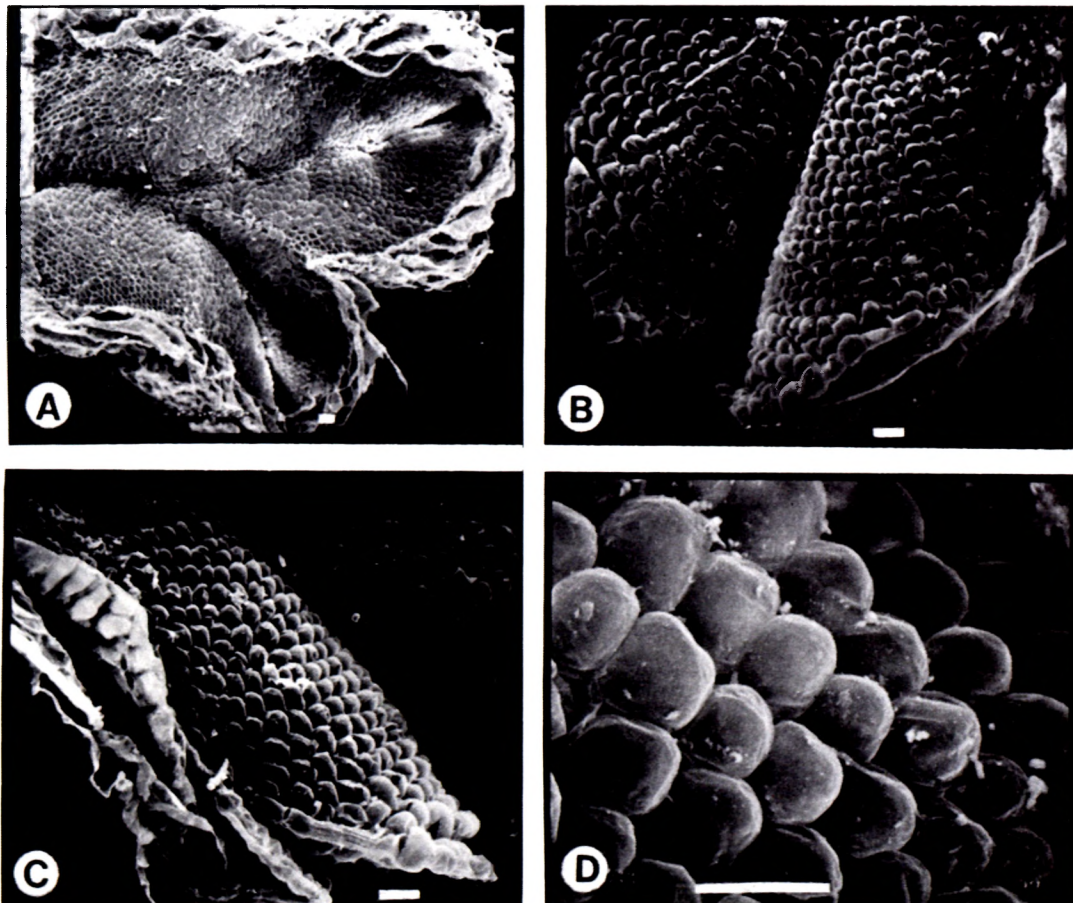


FIGURE 2. — *Riccia rosea* (S. M. Perold 324, PRE). Structure of thallus and cells. A, surface view of thallus; B, apex and groove; C, apical scales; D, dorsal cells. (SEM micrographs by S. M. Perold). Scale bars = 50 μm .

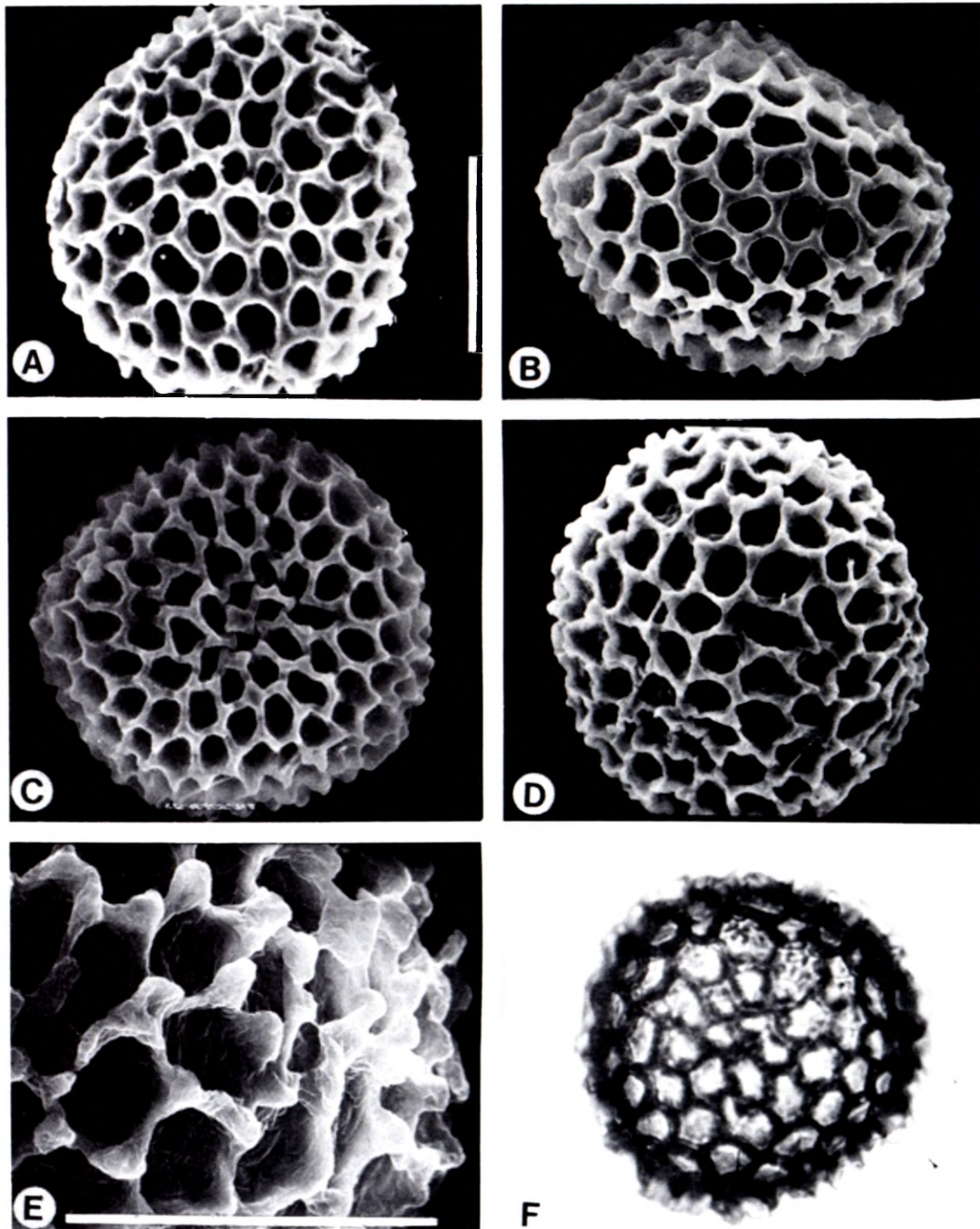


FIGURE 3. — *Riccia rosea* (S. M. Perold 142, 344, PRE). Spores. A, proximal face; B, proximal side; C, distal face; D, side; E, areolae; F, ? proximal face. A–E, SEM micrographs and F, LM (light microscope) by S. M. Perold. Scale bars on A–E = 50 μ m; diameter of spore on F = 100 μ m.

rainy season, followed by long dry periods, which the plants survive in a resting state. When it rains again, even after several years, they revive quickly.

Riccia rosea has been recorded from South West Africa/Namibia, Botswana, Transvaal and northern Orange Free State. Figure 4.

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REFERENCES

- ARNELL, S. 1967. Hepaticae collected in South West Africa by Prof. O. H. Volk. *Mitteilungen aus der Botanischen Staatssammlung, München* 16: 262–272.
- BORNEFELD, T. 1984. Chromosomenanalyse der Gattung *Riccia* von Süd- und SW-Afrika und allgemeine Bemerkungen zur Zytogenetik der Lebermoose. *Nova Hedwigia* 40: 313–328.
- NA-THALANG, O. 1980. A revision of the genus *Riccia* (Hepaticae) in Australia. *Brunonia* 3: 61–140.
- VOLK, O. H. 1983. Vorschlag für eine Neugliederung der Gattung *Riccia* L. *Mitteilungen aus der Botanischen Staatssammlung, München* 19: 453–465.
- VOLK, O. H. 1984. Pflanzenvergesellschaftungen mit *Riccia*-Arten in Südwestafrika (Namibia). *Vegetatio* 55: 57–64.
- VOLK, O. H. & LEIPPERT, H. 1971. Vegetationsverhältnisse im Windhoek Bergland, Südwestafrika. *SWA Wissenschaftliche Gesellschaft — Windhoek* 25: 5–44.

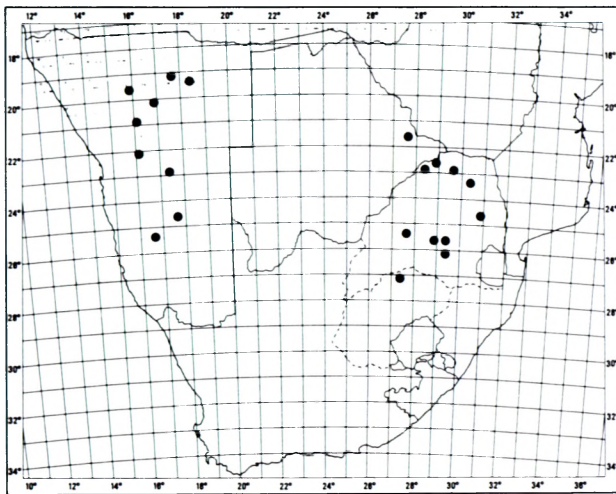


FIGURE 4. — Map showing distribution of *Riccia rosea*.

SPECIMENS EXAMINED

S.W.A./NAMIBIA. — 1915 (Okaukuejo): OU 183 (ETO) Otjowasandu, on granite, 1 250 m, 430 mm rain. (–DB), *Volk 00930* (M, PRE). 1917 (Tsumeb): GR 605, Kamanjab, on sandy soil, 1 300 m, 550 mm rain. (–BA), *Volk 81/153* (M, PRE). 1918 (Grootfontein): GR 729 Gaikos, on quartzite, 1 150 m, ca 550 mm rain. (–AD), *Volk 81/124* p.p., *81/125*, *81/131*, *81/132*, *81/133*,

84/693, *84/700* p.p., *84/701* p.p., *84/702* p.p., (M, PRE). 2016 (Otjiwarongo): GR 83 Luckenwalde, on granite, 1 450 m, 450 mm rain. (–BB), *Volk 84/707* (M); OTJ 87 Lichtenau, at base of granitic batholite, 1 500 m, 400 mm rain. (–CC), *Volk 84/710* p.p. (M, PRE). 2216 (Otjimbingwe): OM 37 Otjua, on granite, 1 400 m, 350 mm rain. (–AA), *Volk 81/106* (M, PRE), *81/111* (M), *81/116*, *84/714*, *84/715*, *84/716* (M, PRE). 2217 (Windhoek): WIN 83 Rietfontein, on granite, 1 775 m, 400 mm rain, *Volk 01165* p.p. (M); WIN 84 Tew, on granite, 1 750 m, 340 mm rain. (–CD), *Volk 81/270* (M). 2417 (Mariental): GIB 18 Haribes, on quartzite, 1 300 m, 200 mm rain. (–DA), *Volk 12403* (M) (det. Arnell 1957, as sub *R. runssorensis*). 2516 (Helmeringhausen): MAL 84 Duwisib, on quartzite, 1 550 m, 170 mm rain (–BC), *Volk 6334* (M).

BOTSWANA. — 2127 (Francistown): NE-District between Shashi River and Francistown (A?), *Long 12438* (E, M).

TRANSVAAL. — 2228 (Maasstrom): Tolwe, 16 km W of (–CD), *S. M. Perold 785* (PRE); Alldays, 27 km NW of (–DB), *S. M. Perold 749*, *750*, *753* (PRE). 2229 (Waterpoort): Farm Driehoek (–DC), *D. Fourie 23c*, *24c* (PRE). 2330 (Tzaneen): Lebowa, Ga-Modadji (–AD), *Glen 1403b* (PRE). 2430 (Pilgrim's Rest): Bourke's Luck Potholes, 27 km N of Graskop (–DB), *S. M. Perold 408* (PRE). 2527 (Rustenburg): Farm Beestekraal (–BC), *S. M. Perold 881* (PRE). 2528 (Pretoria): Bronkhorstspuit, Farm Valschspruit (–DB), *S. M. Perold 139-143*; *322*, *323* (PRE). 2529 (Witbank): Middelburg, 40 km N of (–CB), *Volk 81/020* (M, PRE). 2629 (Bethal): Kriel, 5 km W of, on road to Vandyksdrift (–AB), *S. M. Perold 344*, *346*, *347* (PRE).

O.F.S. — 2727 (Kroonstad): Parys, 9 km S of on N1 road (–AB), *Volk 81/031*, *81/032* (M, PRE); *S. M. Perold 185*, *196* (PRE). 2926 (Bloemfontein): 30 km S of Bloemfontein (–AC), *S. M. Perold 954* (PRE).

