

Taxonomic Results of the BRYOTROP Expedition to Zaire and Rwanda

8. *Riccia vulcanicola* E. Fischer (subgenus Ricciella, Sectio Cavernosae), a new species from the Virunga Volcanoes, Rwanda

Eberhard Fischer

Botanisches Institut und Botanischer Garten der Universität, Meckenheimer Allee 170, D 53115 Bonn, Federal Republic of Germany

Abstract. A new *Riccia* species, *R. vulcanicola* is described and illustrated. It is closely related to *R. crystallina*, differing by the incomplete rosettes of the thallus and the larger and fewer areolae of the spores.

Resumé. Une espèce nouvelle du genre *Riccia*, *R. vulcanicola*, est décrite. Elle est relée à *R. crystallina*, mais se distingue par les rosettes incomplètes du thalle et par les aréoles plus grandes et moins nombreuses des spores.

The genus *Riccia* L., fairly well known in Mediterranean North Africa (Jovet-Ast 1986) and South Africa (Arnell 1963, Perold 1989 a & b, 1990, Perold & Volk 1988 a & b, Volk & Bornefeld 1988, Volk & Perold 1985, 1986 a,b,c,d & e; 1990) is greatly in need of a critical study in Tropical Africa. Only a few species have been recorded, most of them from West Africa by Jones (1957) and Jones & Harrington (1983). In Central Africa the genus was mainly studied by Vanden Berghen (1972), who recognized 6 species for South Eastern Zaïre (Shaba). According to Jones (1957) and Vanden Berghen (1972), *Riccia cavernosa*, *R. fluitans*, *R. intermedia*, *R. membranacea*, *R. moenkemeyeri*, *R. runssorensis* and *R. symoensii* are known for Zaïre. Up to

now, no species was known for Rwanda. During the Bryotrop expedition 4 species were collected, which are dealt with by Mrs. S.M. Perold in the same volume. Perold (1990) recognized, that the material of *Riccia fluitans* from Africa belongs to *Riccia stricta* (Lindenb.) Perold. This species is the most frequent in Rwanda and may eventually be conspecific with the American *Riccia stenophylla* Spruce (see Schuster 1992).

During the last years, the author had the opportunity to visit Rwanda several times and to collect bryophytes, among them at least 7 species of *Riccia*. A survey will be presented in a forthcoming paper (Fischer & Perold in prep.). Most of the *Riccia* species were gathered in the Eastern part of Rwanda, the Akagera National Parc and

the presque-île Mpanga, where they grow on granitic outcrops and lateritic surfaces (boval) under climatic conditions of savanna. One species, collected in the cloud forest at the foot of the Virunga Volcanoes proved to be a new species which is described here.

Riccia vulcanicola E. Fischer spec. nov. (Fig. 1, 2)

Differt ab *Riccia crystallina* L. emend. Raddi forma thalli rosulis apertis et sporis cum areolis majoribus et paucis. Ab *Riccia cavernosa* Hoffmann emend. Raddi differt sporis reticulo cristarum ornatis cum areolis polygonalibus .
Typus: Rwanda, Mt. Karisimbi, Pócs 8068, 13.09.1991 (EGR Holotype, BR isotype).

Thallus soft-textured, medium sized, usually grey-green to yellowish green, dorsal surface vesicular-areolate, with distinct pores or gaps in the epidermis, soon lacunose and spongy, rosettes isolated or sometimes overlying, \pm incomplete, usually orbicular, 10-14 mm in diameter. Main segments broadly subquadrate-obovate or orbiculate, rounded obtuse, 1,7-3 mm wide, in cross section usually 4-5 x wider than high. Ventral scales tiny. Air chambers wide, polyhedral, elongated, separated by unistratose lamellae, apically narrow, 125 μ m wide toward base. Rhizoids colorless, dimorphic, smooth rhizoids 15.0 - 27,5 μ m wide, tuberculate rhizoids fewer, 17.5 - 19 μ m in diameter.

Monoecious. Antheridial ostioles up to 240 μ m high, necks colorless. Archegonia in rows along lobes. Capsules frequent, sometimes bursting through the dorsal surface. Spores numerous, usually more than 800 per capsule, triangular globular, yellow brown to light-brown, 52-60 X 56-70 μ m in diameter, wing thin, ca. 10 μ m wide, areolae complete, distal face with large areolae, each ca. 12 - 17 μ m in diameter, areolar walls thin, 5 - 7,5 μ m high, edges crenate, not extended to wing margin.

Chromosome number: not known.

Distribution: Only known from the Virunga Volcanoes and the adjacent Gishwati Forest in Rwanda.

Rwanda: Pref. Ruhengeri, between Mt. Karisimbi and Mt. Bisoke, loc. 158: Pócs 8068 (holotype

EGR, isotype BR), Pócs 8073, 09. 1991, Fischer 1544, 11. 1985 ; Mt. Gahinga, Fischer 3711, 09. 1989.

Pref. Gisenyi: Gishwati Forest, Gikungu, at type locality of *Physcomitrella magdalena* De Sloover, Fischer 2978, 08. 1989.

Ecology: A species of moist and compact soil along paths in mountain forest. It grows mainly in the *Hagenia* belt and in *Dombeya-Hagenia* secondary forest between 2700 and 3000 m (see description of locality 158) where it is quite abundant. At Gikungu, *R. vulcanicola* is growing at 2400 m in a *Neoboutonia macrocalyx*-Secondary forest with *Neoboutonia macrocalyx*, *Polyscias fulva*, *Xymalos monospora*, *Arundinaria alpina*, *Macaranga kilimandscharica*, *Bersama abyssinica* in the tree layer, *Mimulopsis arborescens*, *Senecio mannii*, *Vernonia auriculifera*, *Microglossa pyriformis*, *Hypoesstes verticillata*, *Arundinaria alpina*, *Xymalos monospora*, *Lobelia gibberoa*, *Solanum aculeatum*, *Psychotria mahoni*, *Cola pierloti*, *Bersama abyssinica* in the shrub layer, *Coccinea mildbraedii*, *Gynura scandens*, *Rutidea orientalis*, *Mikaniopsis tedlei*, *Stephania abyssinica* as vines and climbers, *Englerina woodfordioides* als parasitic epiphyte, *Asplenium sandersonii*, *Asplenium theciferum*, *Asplenium mannii* as epiphytes and *Plantago palmata*, *Asplenium anisophyllum*, *Phyllanthus odontadenius*, *Achrynanthes aspera*, *Ipomoea involucrata*, *Chlorachne oplismenoides*, *Lactuca attenuata*, *Impatiens warburgiana* in the herbaceous layer. The species probably is perennial, thus also differing from the annual *R. crystallina*.

Riccia vulcanicola belongs to the Subgenus *Ricciella*, which is characterized by its thallus structure, especially by an aerenchyme formed of several superposed series of air chambers. It clearly belongs to the Sectio *Cavernosae* Schuster (see Schuster 1992), which unites mainly monoecious species with thalli in conspicuous rosettes. *Riccia vulcanicola* is closely allied to *R. crystallina* L. emend. Raddi, but can be distinguished by the thalli in \pm incomplete rosettes and the fewer areolae of the spores. The walls of the areolae are relatively thin and high, lacking the

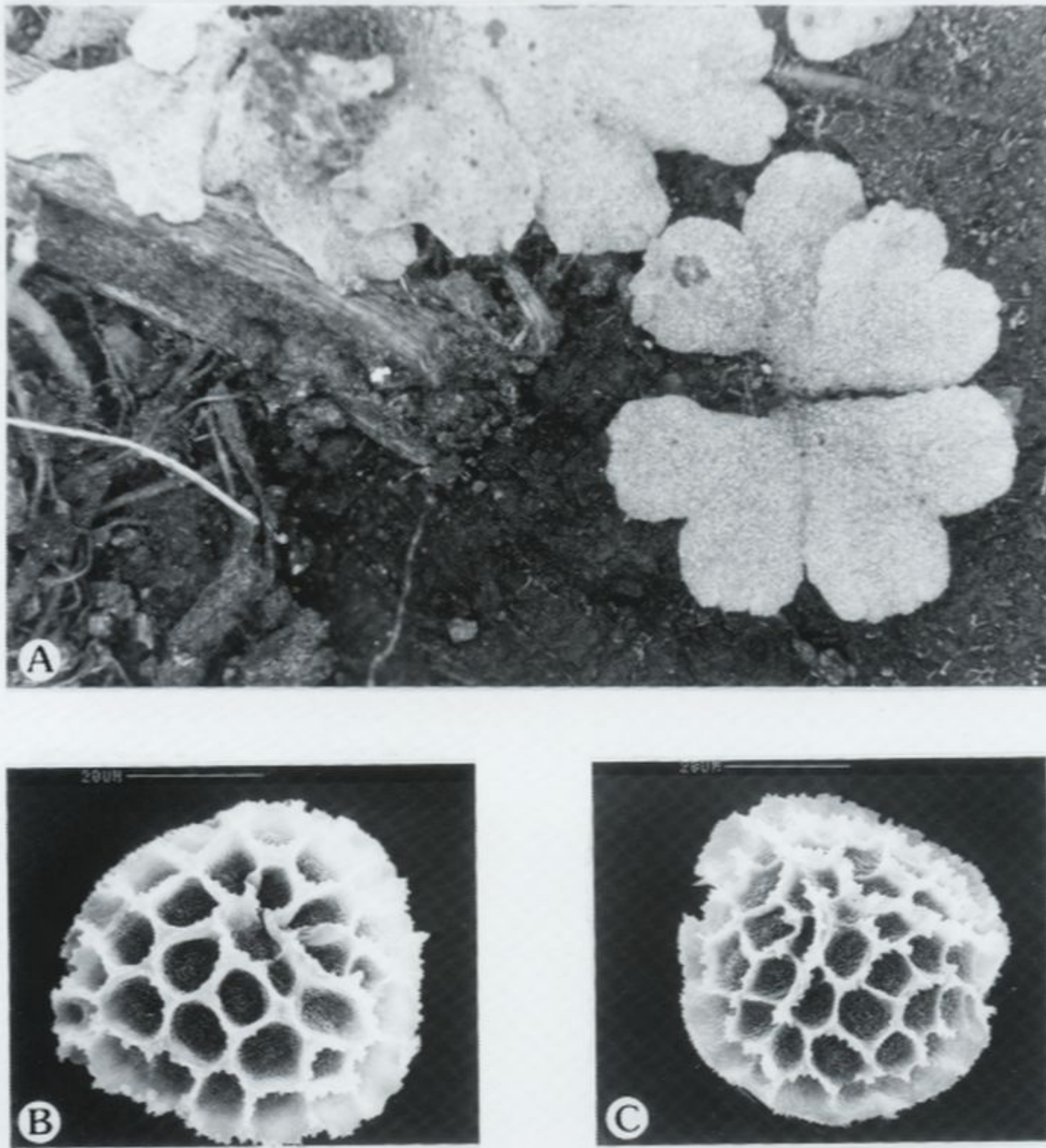


Fig. 1. *Riccia vulcanicola*. A Group of plants at type locality (phot. Frahm). B-C Spores with distal and proximal aspect (phot. C. Neinhuis & E. Fischer). All from *Pocs* 8068. Scale bars on B-C = 20 μ m.

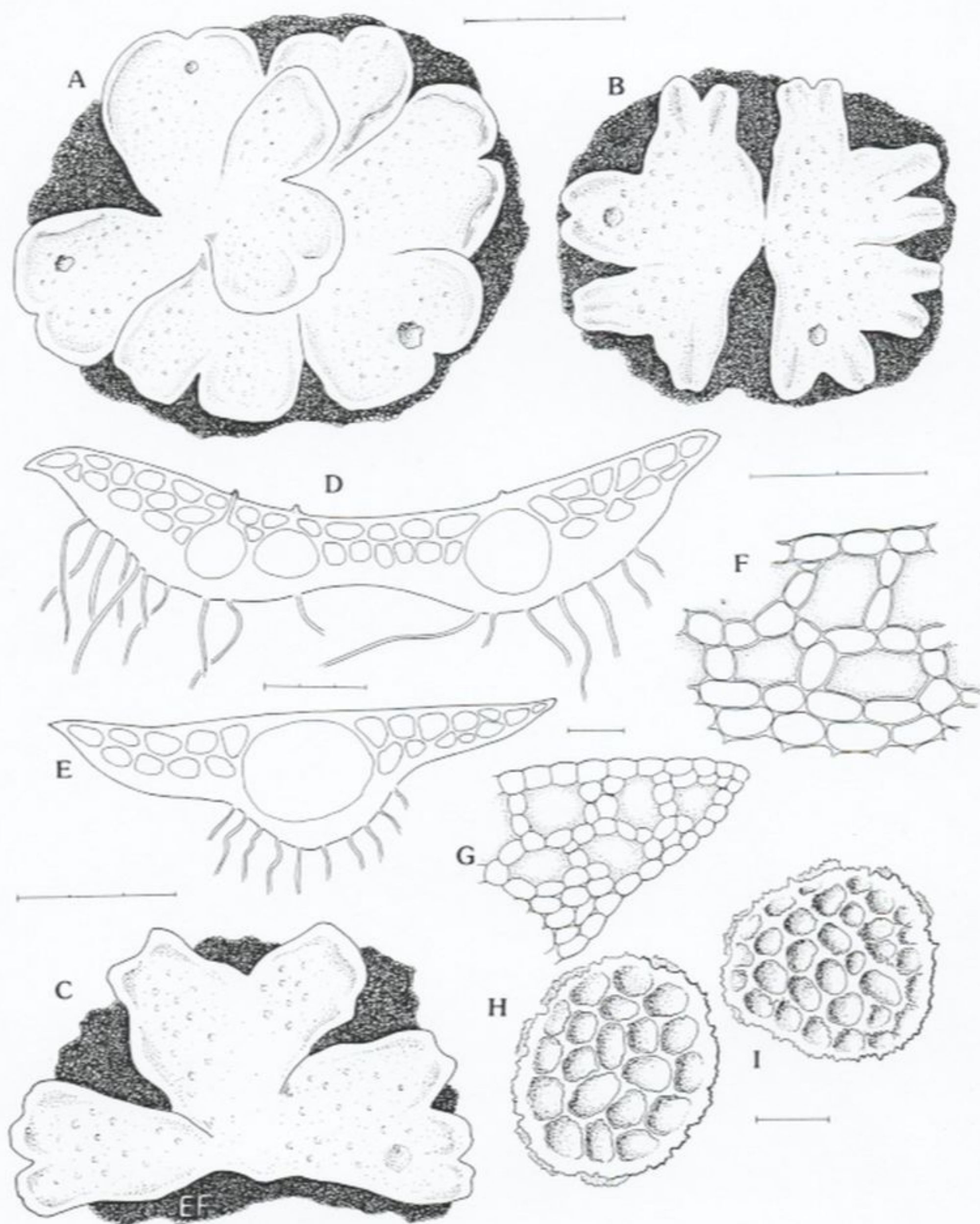


Fig. 2. *Riccia vulcanicola*. A-C Thallus in situ, D-E Cross sections of thallus branches. F Thallus cross section, detail with air chambers. G Cross section of Thallus margin. H-I Spores. A, D from Fischer 1544, B-C, E-I from Pocs 8068. Scale bars on A-C = 3 mm; D-E = 300 μ m; F = 200 μ m; G = 100 μ m; H-I = 20 μ m.

<i>R. vulcanicola</i>	<i>R. crystallina</i> (after Schuster 1992)	<i>R. cavernosa</i> (after Schuster 1992)
Thalli 2-4 X dichotomous, mostly with segments 2-3 mm wide, rosette incomplete, segments eventually overlapping.	Thalli (2) 3-4 X dichotomous, soon breaking into two hemirosettes, segments 1,5 - 2,5 mm wide.	Thalli closely (2) 3-6 X dichotomous, with segments 1-2 (2,7) mm wide, mostly oblong, the segments eventually overlapping
Air chambers in 2-3 superposed strata, 125 μm wide at base, polygonal.	Air chambers rather narrow canals, in one stratum (locally 2).	Air chambers in 2-4 (5) strata, wide and polyhedral.
Epidermis soon collapsed and prominently lacunose, pores enlarging, thallus spongy. Ventral scales tiny.	Epidermis \pm persistent, pores not or tardily enlarging, air chambers not or tardily exposed. Small, ephemeral narrowly lineate ventral scales distinct.	Epidermis soon prominently lacunose, pores rapidly enlarging, thallus spongy. Ventral scales lacking.
Ventral tissue present in median part of thallus only, flanks formed by large air chambers.	Ventral tissue extended almost to lateral margins of segments, flanks without large air chambers.	Ventral tissue present in median 0,5 - 0,65 of thallus only, flanks formed by large air chambers.
Spores \pm perfectly areolate, with large areolae, (10) 12 - 15 (17) μm wide, their edges not extending to the wing.	Spores \pm perfectly areolate, with small areolae, \pm 12 μm in diameter, the areolation extended clearly to the wing.	Spores on distal face with areolation imperfect, the center of the spore, at least, with irregularly ramified crests or lamellae, sculpture ceasing well before the wing margin, a \pm smooth gutter separating wing and areolae.

Table 1. Distinctions between *Riccia vulcanicola*, *R. crystallina* and *R. cavernosa*.

typical bifid processes at the nodes.

The main differences between *R. vulcanicola*, *R. crystallina* and *R. cavernosa* are summarized in table 1.

Literature cited

Arnell, S. 1963: Hepaticae of South Africa, pp. 441. Swedish National Science Council, Stockholm.

Jones, E.W. 1957: African Hepatics XIII: The Ricciaceae in Tropical Africa. Transactions of the British Bryological Society 3: 208 - 227.

Jones, E.W. & Harrington, A.J. 1983: The hepatics of Sierra Leone and Ghana. Bulletin of the British Museum (Natural History), (Botany) 11: 283 - 431.

Jovet-Ast, S. 1986: La *Riccia* de la Région Méditerranéenne. Cryptogamie, Bryologique et Lichénologique 7: 283 - 431.

Perold, S.M. 1989a: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 11. *Riccia montana* and *R. albospora*, a further two new white-scaled species of the group "Squamatae". Bothalia 19, 1: 9 - 16.

Perold, S.M. 1989b: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. *Riccia albolimbata* and the status of *R. albosquamata*, white scaled species originally described by Arnell. Bothalia 19, 1: 17 - 25.

Perold, S.M. 1990: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 21. *Riccia stricta* stat. nov. and *R. purpurascens*, subgenus *Ricciella*. Bothalia 20: 197 - 206.

Perold, S.M. & Volk, O.H. 1988a: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 8. *R. campbelliana* (Subgenus *Riccia*) newly recorded for the region. Bothalia 18: 37 - 42.

Perold, S.M. & Volk, O.H. 1988b: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 9. *R. nigrella* and the status of *R. capensis*. Bothalia 18: 43 - 49.

Schuster, R.M. 1992: The Hepaticae and Anthocerotae of North America. Volume VI. pp. 937. Chicago.

Vanden Berghen, C. 1972: Hépatiques et Anthocérotes. Exploration hydrobiologique du Bassin du Lac Bangweolo et du Luapula 8, 1: 1 - 202.

Volk, O.H. & Bornefeld, T. 1988: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 10. Two new white scaled species of the group "Squamatae": *R. argenteo-limbata* and *R. albornata*. Bothalia 18: 155 - 164.

Volk, O.H. & Perold, S.M. 1985: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 1. Two new species of the section Pilifer: *R. duthieae* and *R. alatospora*. Bothalia 15: 531 - 539.

Volk, O.H. & Perold, S.M. 1986a: Studies in the genus *Riccia*

(Marchantiales) from Southern Africa. 2. A new species of the section Pilifer: *R. sarcosa*. Bothalia 16: 23 - 27.

Volk, O.H. & Perold, S.M. 1986b: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 3. *R. schelpi*, a new species, in the subgenus Chartacea. Bothalia 16: 29 - 33.

Volk, O.H. & Perold, S.M. 1986c: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 4. Three endemic species, *R. natalensis*, *R. microciliata* sp. n. and *R. mammifera* sp. n. Bothalia 16: 169 - 180.

Volk, O.H. & Perold, S.M. 1986d: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 5. *R. rosea*, a new species. Bothalia 16: 181 - 185.

Volk, O.H. & Perold, S.M. 1986e: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 6. *R. hirsuta*, a new species. Bothalia 16: 187 - 191.

Volk, O.H. & Perold, S.M. 1990: Studies in the genus *Riccia* (Marchantiales) from Southern Africa. 15. *R. hirsuta* and *R. tomentosa* sp. n., two distinct species previously treated as one. Bothalia 20: 23 - 29.