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## MARCHANTIALES

### SPORE GERMINATION, EARLY PROTONEMA DEVELOPMENT AND VEGETATIVE REPRODUCTION IN *RICCIA*, SECTION *PILIFER*

Spore germination in *Riccia* has been investigated by a number of workers, commencing well over a hundred years ago with the work done by Hofmeister (1851), Kny (1867) and Fellner (1875). Not all researchers were, however, in agreement about the site of exit of the germ tube, for example, Campbell (1918) maintained that in *R. trichocarpa* Howe, the exospore ruptures at the triradiate mark. Subsequently, it has been repeatedly reported that the spore wall dehisces on the convex distal face, with the

formation of a germ pore between the areolae and the emergence of a germ tube through this pore.

Duthie & Garside (1936, 1939), studied spore germination in some species occurring in southern Africa, namely *R. cavernosa* Hoffm. emend. Raddi (= *R. rautanenii* Steph.), *R. crystallina* L. emend. Raddi (= *R. plana* Tayl.) and the endemic, *R. cupulifera* A.V. Duthie, as well as in the permanently coherent tetrad spores of *R. compacta*

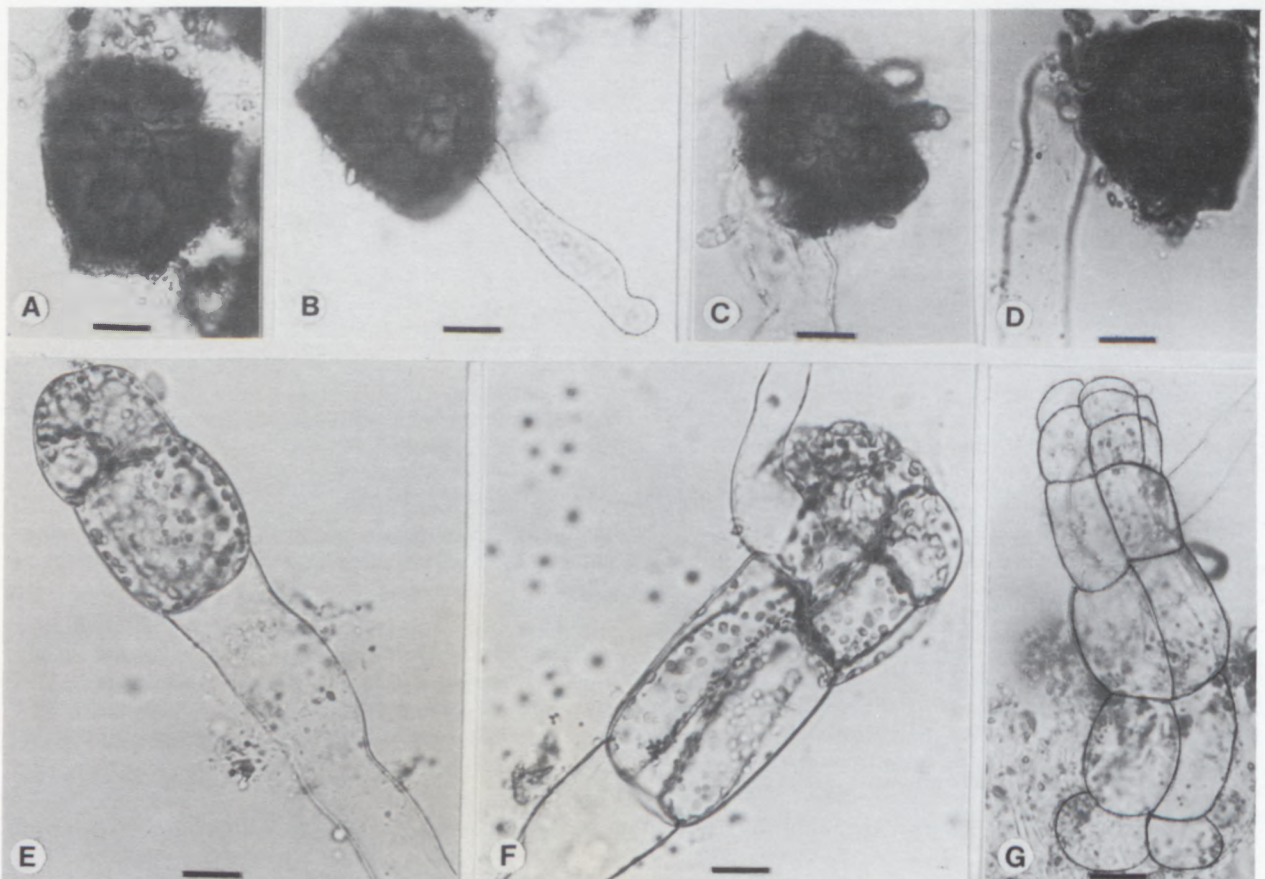


FIGURE 2. — *Riccia albovestita*. Germination of spore and development of protonema: A, dehiscence of spore wall between two areolae; B, spore with germination filament; C, D, spore with germination tube; E, quadrant stage; F, plateau stage; G, formation of plateau into a column. Smook 4036. A–G, LM photographs. Scale bars on A–G = 20  $\mu$ m.



FIGURE 3.—Vegetative reproduction of *R. albovestita*. A, old thallus with three young thalli, indicated by arrows; B, young thallus, enlarged from A, with dorsal cell pillar, J.M. Perold 39. A, B, LM photographs. Scale bars on A = 1 mm; B = 20  $\mu$ m.

Garside and *R. curtisii* (Aust.) T.P. James. The first three species mentioned here belong to the subgenus *Ricciella* (A. Braun) Bischo and the latter two to the subgenus *Thallocarpus* (Aust.) Jovet-Ast.

Jovet-Ast (1975) also investigated spore germination as well as the protonemal phase in several members of these two subgenera, in addition to a few species in the subgenus *Riccia*, namely *R. crozalsii* Lev., *R. albolimbata* S. Arnell, and the European species *R. sommierii* Lev. and *R. beyrichiana* Hampe ex Lehm. & Lindenb.

The present communication is, however, the first report of spore germination in a species of the endemic southern

African section *Pilifer* Volk, subgenus *Riccia*. It is evident that its germination is no different from those in the rest of the genus and that this phenomenon is constant throughout. Spores from a specimen of *R. albovestita* Volk, leg. Smook 4036, collected at the edge of a small dam between Ulster and Mooi River in the eastern Cape, germinated six years after collection, when several thalli with sporangia were kept moist on filter paper in a covered dish. Various stages can be seen in Figure 2A–G: the spore wall dehisces between the areolae on the distal face (Figure 2A) and soon a germinative pore appears, from which a germinative filament emerges (Figure 2B); the filament enlarges into a germinative tube (Figure 2C, D), and at its tip, it produces a quadrant (Figure 2E), which has 4 cells in 2 tiers; more cells are formed at the top of the quadrant (Figure 2F) producing a plateau, which elongates into a column (Figure 2G). At this stage the protonema measures 180  $\times$  60  $\mu$ m. Its subsequent growth was not monitored.

#### Vegetative reproduction of young thalli from an old thallus

Figure 3A, B illustrates the vegetative reproduction of new young thalli (indicated by arrows) from cells of the gametophyte of *R. albovestita*. In Figure 3B, one young thallus already has a dorsal cell pillar, here projecting laterally.

The above developmental stages also agree with those observed in other species of *Riccia*.

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