

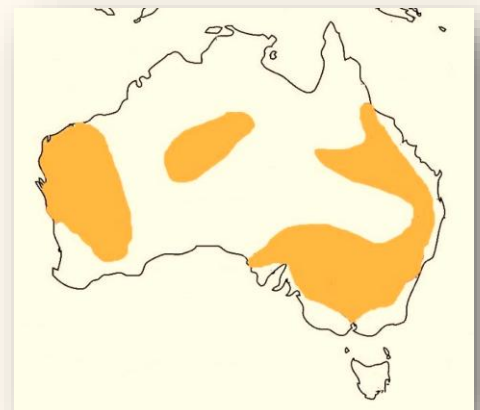
# *Goniomitrium acuminatum*

## A really small moss



Although mosses are *green* plants, they're mostly small and easily overlooked. They are however survivors in the evolutionary game, with origins going back 450 million years and retaining many characteristics of the green algae from which they are descended. Mosses have endured, even though they lack key traits of ferns, conifers, cycads and flowering plants that evolved later and came to dominate our planet's landscapes. For example, mosses don't have an internal transport system to move sap over long distances; they don't develop flowers or seeds, reproducing instead by spores; they have stems and leaves but don't have *true* roots, relying rather on root-like structures called *rhizoids* that anchor them to the often inhospitable substrates.

*Goniomitrium acuminatum* is a *minute* moss, just a few millimetres tall, widespread across much of Australia south of the Tropic of Capricorn, although more common in low-rainfall, semi-arid areas. Probably, because it's so small, it is much more common and abundant than records such as *Atlas of Living Australia* would suggest. The plants are only a few



*Goniomitrium acuminatum* – distribution. Map modified from *Atlas of Living Australia*





*Goniomitrium acuminatum* – capsules, some with characteristically inflated, pleated calyptrae

millimetres high, but they have striking, bright orange capsules that nestle within the leaves. These capsules are a mastery of functional evolution because there are in fact two *caps*. The outer cap is referred to as the *calyptra*, and in *G. acuminatum* this is quite remarkable – very large, inflated, with eight or more pleats down the sides. When the calyptra falls away, it reveals a second *cap*, the operculum. In *G. acuminatum*, this cap is smaller, rounder and less conspicuous. Once the operculum too has fallen away, the bright golden spores are conspicuous within the capsules because they are

three to six times larger than the spores of most mosses. Large spores might not disperse far from a parent plant but have more stored resources leading to better chances of successful establishment, giving them increased tolerance to harsh conditions.

The genus *Goniomitrium* is quite small, with only four species, one from Africa, one from Spain and two endemic species (*G. acuminatum* and *G. enerve*) from Australia although there is *one* record from New Zealand, a specimen collected from Napier on the east coast of the North Island in 1874. Botanists have treated this as a *vagrant*, but it may also have been introduced on goods shipped direct from Australia. The name *Goniomitrium* is rather unfortunate, but when the scientific name is decoded, it's quite logical. The name comes from *gonia*, Greek for angle or corner, and the Latin *mitra*



Biological soil crust – cyanobacteria and mosses



Biological soil crust – cyanobacteria and lichens



Biological soil crust – mosses and liverworts



for a turban or head-dress (think ‘mitre’), referring to the distinctly angled/pleated calyptra which sits over the top of the capsule.

Mosses are remarkably tough and resilient, and although they are often thought of as living in cool, moist, shaded environments, they can be found in just about every habitat on earth, from tropical rainforests, to deserts, to alpine areas, and even occur in Arctic and Antarctic regions. In arid and semi-arid areas, they are usually present as components of *biological soil crusts*, complex and varying combinations of fungi, algae, bacteria, cyanobacteria, lichens, mosses and liverworts. These various organisms form networks sometimes only a few millimetres deep that play an important role in limiting soil erosion by wind or rain by locking otherwise exposed grains of surface soil and sand together. *Goniomitrium acuminatum* commonly occurs as a component of biological soil crusts in Australia.



Biological soil crust – cyanobacteria and mosses – *G. acuminatum* (coloured plants) and *Gigaspermum repens* (silver white plants). Flinders Ranges, South Australia

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Atlas of Living Australia: <https://bie.ala.org.au/search?q=Goniomitrium+acuminatum>

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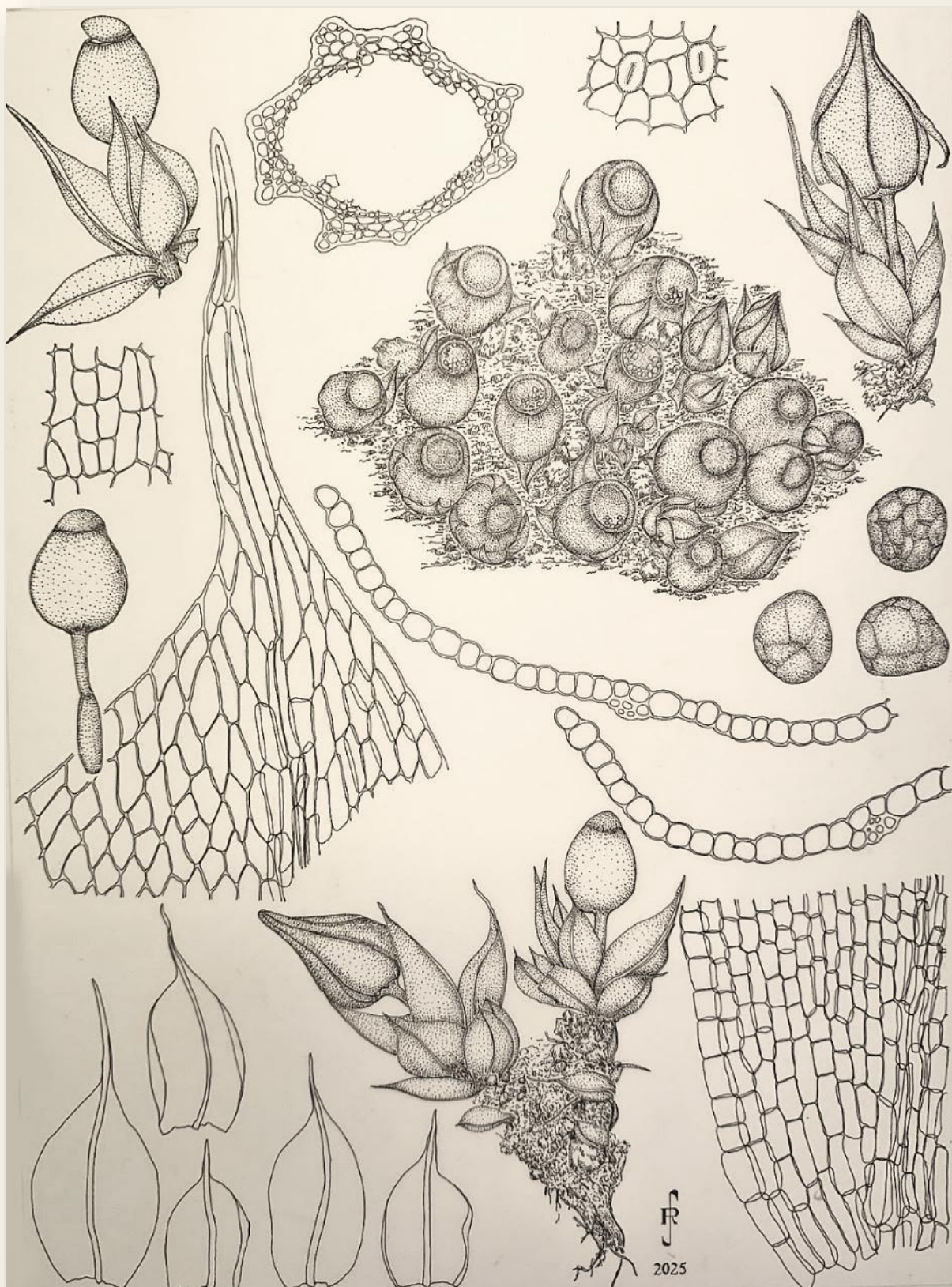
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***Goniomitrium acuminatum* Hook. & Wilson**

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