

**Tiny plants are treasures of chemicals and beauty!
The case of the thalloid liverwort *Cyathodium* in Panama**

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Panama City, Panama *Cyathodium* is a small thalloid liverwort, the size of plants ranging from 2.5-13 mm long and 0.7 to 8 mm wide (Fig. 1). It is a seasonal plant, that is, it grows during the rainy season and dies in the dry season except in areas that have a constant supply of water. The plants grow in very wet-humid areas in soil or on rocks along rivers and road banks, on trees near rivers or creeks and on cement gutters along the streets and on plant pots. The plants are composed of two layers of cells in most of their length with large pores on the upper surface (Figs. 1-2). They may have a few more layers at mid- thalli. One of the species, *Cyathodium cavernarum* growing on rocks of riverbanks has a metallic greenish yellow luminescence. This is due to reflection and refraction of the light on their almost balloon cells with large chloroplasts. It may be a mechanism enhancing light interception (Duckett & Ligrone 2006). Cells of *Cyathodium* also have oil bodies in specialized cells that do not contain chloroplasts (*C. cavernarum* and *C. bischlerianum*) or with chloroplasts (*C. spruceanum*). Three of the five neotropical species have been recorded for Panama (*C. cavernarum* Kunze, *C. spruceanum* Proskauer and *C. bischlerianum* Salazar Allen). The other two species are: *C. steerei* Hässel (in Argentina) and *C. foetidissimum* Schiffn. (Costa Rica, perhaps Ecuador and Europe). Various compounds were identified in chemical studies of fresh samples of the three species that grow in Panama and in plants axenically grown of *C. foetidissimum* of Costa Rica (Salazar Allen *et al.* 2017). The sesquiterpene germacrene D and bicyclogermacrene in less than 3% were found in *C. spruceanum*, *C. bischlerianum*; additionally, *C. bischlerianum* contained mainly monoterpenes with nerolidol as the main compound. *Cyathodium cavernarum* showed a distinct chemical composition with an octane derivative as its major component. Interesting was the presence of indole compounds in *C. foetidissimum*. These compounds were also found in plant of this species from Tahiti (Ludwiczuk *et al.* 2009). This compound may be considered a potential chemosystematic marker for this species. The indol, skatol, found in these plants is responsible for their fecal odor. There is still a need to pursue further chemical studies of neotropical *Cyathodium* to determine the potential that their compounds may have for biosystematics and perhaps, for pharmaceutical uses.

References cited

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