

# *Pleurozia* – a carnivorous liverwort?



What on earth is a liverwort? More to the point, what is a *carnivorous* liverwort? Well, to start with, liverworts are green land plants, and comprise one of three divisions of bryophytes, the other two divisions include mosses which are relatively well known, and hornworts, not so well known. All bryophytes are multicellular, eukaryotic, photosynthetic organisms, with chlorophyll A and B, starch, and they have cellulose cell walls. They lack a vascular transport system. Most of us are familiar with *mosses*, but *liverworts*? The name, alone, is enough to put you off.

There are two distinctly different groups of liverworts. Thallose liverworts consist of flattened pads of relatively undifferentiated tissue, and leafy liverworts that have well developed stems and leaves, and are often mistaken for mosses.



Thallose liverwort

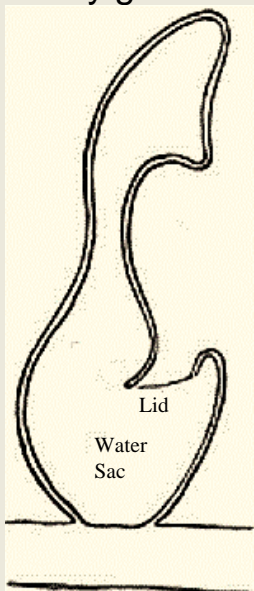


Leafy liverwort

Last year, Dr Liqin Wu sent a photograph taken by Dr Xinyu Wang (Kunming Botanical Garden) of a very unusual epiphytic liverwort. The leaves appeared to be shaped like pouches, urn-shaped, with a conspicuous opening at the top. This unusual plant was identified by Rod Seppelt as *Pleurozia acinosa*, later confirmed by Liqin and Dr Wenzhang Ma who is also from Kunming Botanical Garden. And so, like Rudyard Kipling's *The Elephant's Child*, this unusual liverwort aroused our "satiabile curiosity".



It seems that the genus *Pleurozia* is the only genus in the family Pleuroziaceae in which there are 12 known species,



Trap mechanism of water sac of *Pleurozia purpurea*.  
From Hess et al. 2005.

including the relatively newly described *Pleurozia pocsii* from New Caledonia. New Caledonia, with four species, appears to be a centre of diversity for the genus, and one of these, *Pleurozia articulata*, is also known from the rainforests of Far North Queensland. It seems that many *Pleurozia* species are very distinctive, strongly pigmented, quite large and with deeply concave leaves. Some, including *Pleurozia acinosa*, have a

curious characteristic in which the dorsal lobe of the leaf develops into a complex water-holding sac that looks for all the

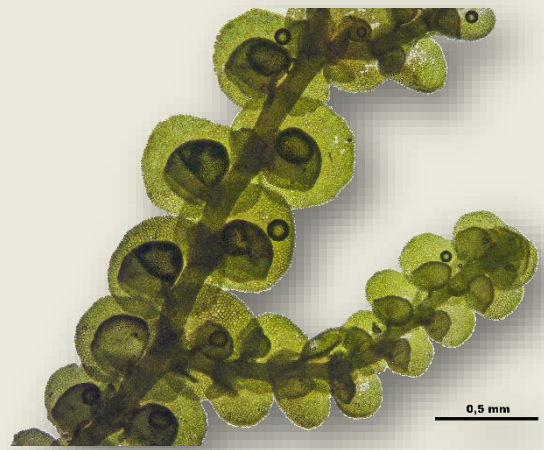
world rather like those of a miniature carnivorous plant such as the pitcher plants *Sarracenia*, *Nepenthes* or the Albany Pitcher Plant, *Cephalotus* from the south-west of Western Australia.

Other liverwort genera, *Frullania* for example, have water sacs that are used for water storage and in which small animals (tardigrades, nematodes, crustaceans and rotifers) are occasionally found, but the water sacs of two liverwort genera, *Colura* (Lejeuneaceae) and *Pleurozia*, are different. They are closed by a moveable lid: when fully turgid, the lid closes



*Cephalotus follicularis* Australian Pitcher Plant  
H. Zell / CC BY-SA  
[https://commons.wikimedia.org/wiki/File:Cephalotus\\_follicularis\\_0001.JPG](https://commons.wikimedia.org/wiki/File:Cephalotus_follicularis_0001.JPG)

and when dry, the lid opens. This information isn't new as the mechanism was described by the German botanist Karl Goebel in a number of studies published between 1888 and 1930. At the time, there was speculation that these sacs with moveable lids could function as traps for microfauna. However, Goebel considered the sacs to provide water storage, although he did consider that the trapped, decomposed bodies could contribute a nutrient source for the liverworts. More recent studies showed that the sacs functioned as traps, trapping protozoa (ciliata).



*Frullania dilatata* with conspicuous water sacs  
Photo: Hermann Schachner,  
[https://commons.wikimedia.org/wiki/File:Frullania\\_dilatata\\_\(k,\\_144700-474800\)\\_3855.JPG](https://commons.wikimedia.org/wiki/File:Frullania_dilatata_(k,_144700-474800)_3855.JPG)



*Utricularia aurea* Photo: Michal Rubeš / CC BY 3.0 CZ  
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The water sacs in *Pleurozia* are pear-shaped, with hollows that end in a small round hole, closed by a circular lid. The lid is larger than the opening, and secured with a small hinge so that it opens inwards but not outwards, a trap-like mechanism, very similar to that of the flowering carnivorous plant *Utricularia*. Although it was possible to demonstrate that traps of *Pleurozia purpurea* could catch animals, no digestive enzymes

could be detected although unicellular ciliate protists *Blepharisma* were attracted to the traps. Who would have believed it, a carnivorous bryophyte! Keep in mind, the term *zoophagous* rather than *carnivorous*, is more commonly used when referring to plants that feed on animals.

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