

## DO WE HAVE ANY EVIDENCE THAT ANY PLANTS HAVE GIVEN UP CARNIVORY?

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This might have happened several times during the evolution of the carnivorous groups that we know today. We can even observe partial or total loss of carnivorous traits in some well-known carnivorous plant groups today: *Drosera caduca* for example produces non-carnivorous leaves when adult (consisting only of an elongated petiole, without a carnivorous lamina anymore), and bears carnivorous leaves only in the juvenile stage and shortly after regrowing from dormancy. *Drosera schizandra*, a species of rainforest floors, bears only a very sparse cover of carnivorous glands, and the mucilage is easily washed away, and not continuously replaced as in most other *Drosera* species. This species could be considered on the way to becoming a “post-CP” in adaptation to its habitat.

Some of the rheophytic *Utricularia* species (most notably *U. neottioides* and *U. rigida*) produce traps only occasionally, and many specimens do not have a single trap anymore. Several other aquatic *Utricularia* species are known to reduce their number of traps (up to total loss) when growing in nutrient rich water.

If we consider the carnivorous *Drosophyllum* as the basal branch of the Caryophyllales-clade leading to the carnivorous genus *Nepenthes*, it seems likely that its sisters, Dioncophyllaceae, have almost fully lost carnivorous adaptations (sticky glandular leaves present only in a single genus, *Triphyphyllum*, and only during a short stage of its life; the remaining two genera of this family (i.e. *Dioncophyllum* and *Habropetalum*) are tropical lianas that apparently do not produce any carnivorous leaves anymore). The other sister family, Ancistrocladaceae, consists of entirely non-carnivorous plants, which might have lost their sticky foliage in adaptation to rainforest habitats.

The last example is less likely, but not impossible. If we consider Sarraceniaceae (CP) as the basal sister of the family sister pair Roridulaceae (CP) + Actinidiaceae (non-CP), it might be possible that the whole Chinese gooseberry family are descendants of carnivorous (or subcarnivorous?) ancestors. Of course carnivory is more likely to have evolved two times independently in the carnivorous Ericales (leading to two different trapping strategies, namely the pitfall traps in Sarraceniaceae and the flypaper traps with digestive mutualism in Roridulaceae), but we cannot exclude that the ancestors of this lineage perhaps had pre-carnivorous adaptations.

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