

Carnivorous plants use pitchers of 'slimy saliva' to catch their prey

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Carnivorous plants supplement the meager diet available from the nutrient-poor soils in which they grow by trapping and digesting insects and other small arthropods. Pitcher plants of the genus *Nepenthes* were thought to capture their prey with a simple passive trap but in a paper in this week's PLoS ONE, Laurence Gaume and Yoel Forterre, a biologist and a physicist from the CNRS, working respectively in the University of Montpellier and the University of Marseille, France show that they employ slimy secretions to doom their victims.

They show that the fluid contained inside the plants' pitchers has the perfect viscoelastic properties to prevent the escape of any small creatures that come into contact with it even when diluted by the heavy rainfall of the forest of Borneo in which they live.

Since Charles Darwin's time, the mechanism of insect-trapping by *Nepenthes* pitcher plants from the Asian tropics has intrigued scientists but is still incompletely understood. The slippery inner surfaces of their pitchers have – until now – been considered the key trapping devices, while it was assumed that the fluid secretions were only concerned with digestion. Gaume and Forterre were able to combine their separate expertise in biology and physics to show that the digestive fluid of *Nepenthes rafflesiana* actually plays a crucial role in prey capture.

The pair took high-speed videos of flies and ants attempting to move through plants' fluid. Flies quickly became completely coated in the fluid and unable to move even when diluted more than 90% with water.

Physical measurements on the fluid showed that this was because this complex fluid generates viscoelastic filaments with high retentive forces that give no chance of escape to any insect that has fallen into it and that is struggling in it. That the viscoelastic properties of the fluid remain strong even when highly diluted is of great adaptive significance for these tropical plants which are often subjected to heavy rainfalls.

For insects, this fluid acts like quicksand: the quicker they move, the more trapped they become. Its constituency is closely akin to mucus or saliva, which, in some reptiles and amphibians, serves a very similar purpose. The exact makeup of this fluid, apparently unique in the plant kingdom, remains to be determined; however, it may point the way to novel, environmentally friendly approaches to pest control.

Citation: Gaume L, Forterre Y (2007) A Viscoelastic Deadly Fluid in Carnivorous Pitcher Plants. PLoS ONE 2(11): e1185.
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