

Mechanics of Venus' flytrap Closure

Yoel Forterre⁽¹⁾, Jan Skotheim⁽²⁾, Jacques Dumais⁽³⁾, L. Mahadevan⁽²⁾

(1) *IUSTI CNRS, Marseille, France*

(2) *DEAS Harvard University, Cambridge, USA*

(3) *OEB Harvard University, Cambridge, USA*

We investigate the snapping closure of the carnivorous plant Venus flytrap (*Dionaea muscipula*), which exhibits one of the fastest motion in the vegetable kingdom (typically 100 ms). The three-dimensional dynamics of the leaves during the snap is recorded using a high-speed camera and the strain field before and after closure is precisely measured using microscopy techniques. From the experimental measurements, we propose that the very fast closure of the trap results from a mechanical instability similar to the elastic buckling of a shell, the instability being damped by the diffusion of water inside the leaves. In order to test this mechanism, a simple mechanical model for the snapping of a poroelastic shell is written, which allows to explain the main experimental observations.

ABIOMED guest

[View the extended summary](#)