

# Of water flumes, waxy walls and toilet bowls: Evolution of trapping strategies in *Nepenthes* pitcher plants

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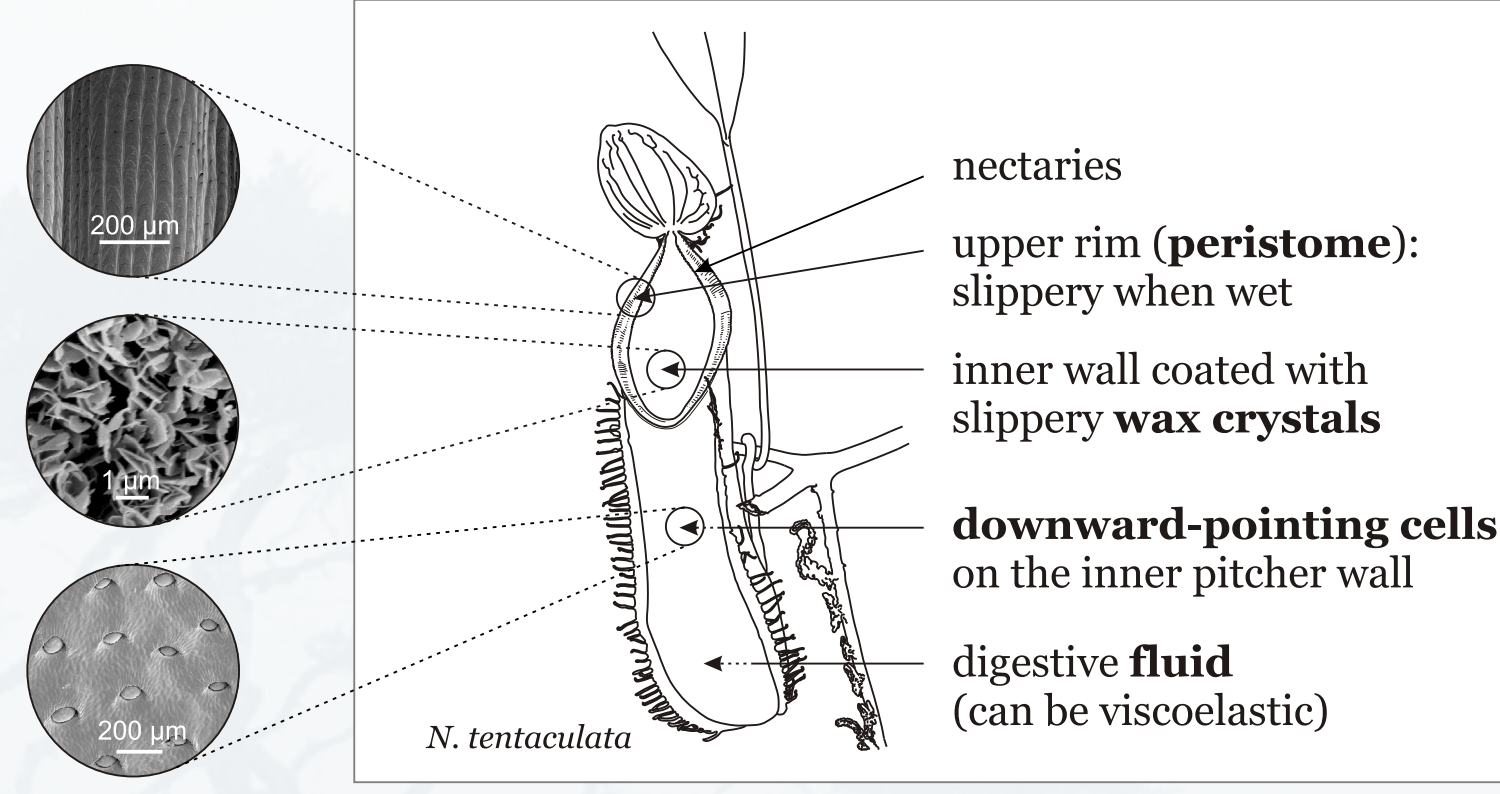
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## *Nepenthes* pitcher plants:



The genus *Nepenthes* comprises >100 species of carnivorous plants that are the product of a recent and still ongoing diversification in tropical Southeast Asia. They use specialised mug-shaped leaves (pitchers) to capture prey, mainly arthropods. This enables them to survive in extremely nutrient-poor habitats.

## Functional trap components:



## Morphological diversity:



## Do species/varieties specialise in different trapping strategies ?

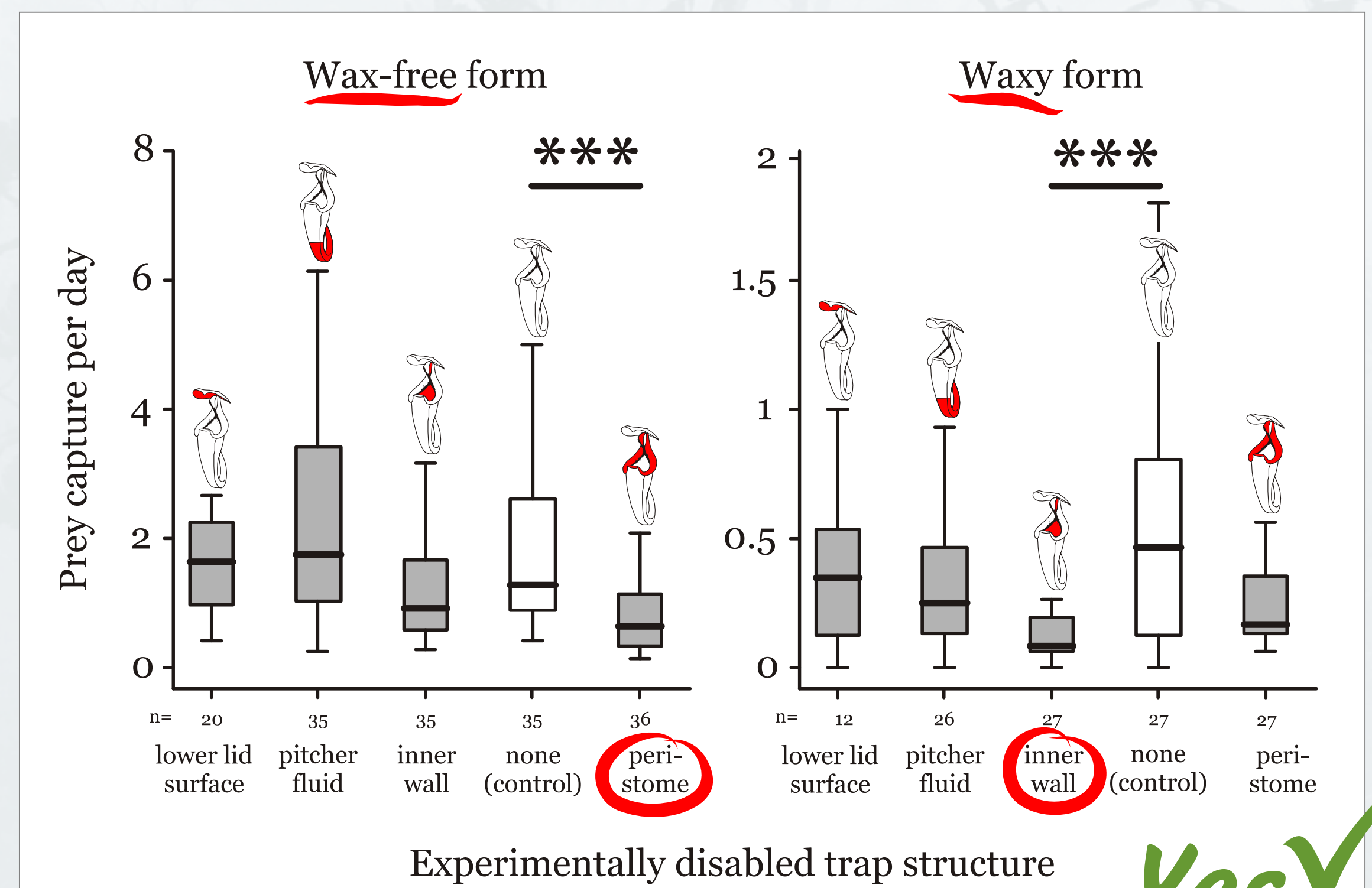
### A Manipulation of individual trap components in 2 varieties of *N. rafflesiana*: implications for prey capture



Presence of trapping structures :

- ✓ slippery peristome ✓
- ✗ wax crystals ✓
- ✓ downward-pointing cells ✓
- ✓ viscoelastic fluid ✗

Manipulations: ● anti-slip surface coating  
● fluid replaced with water

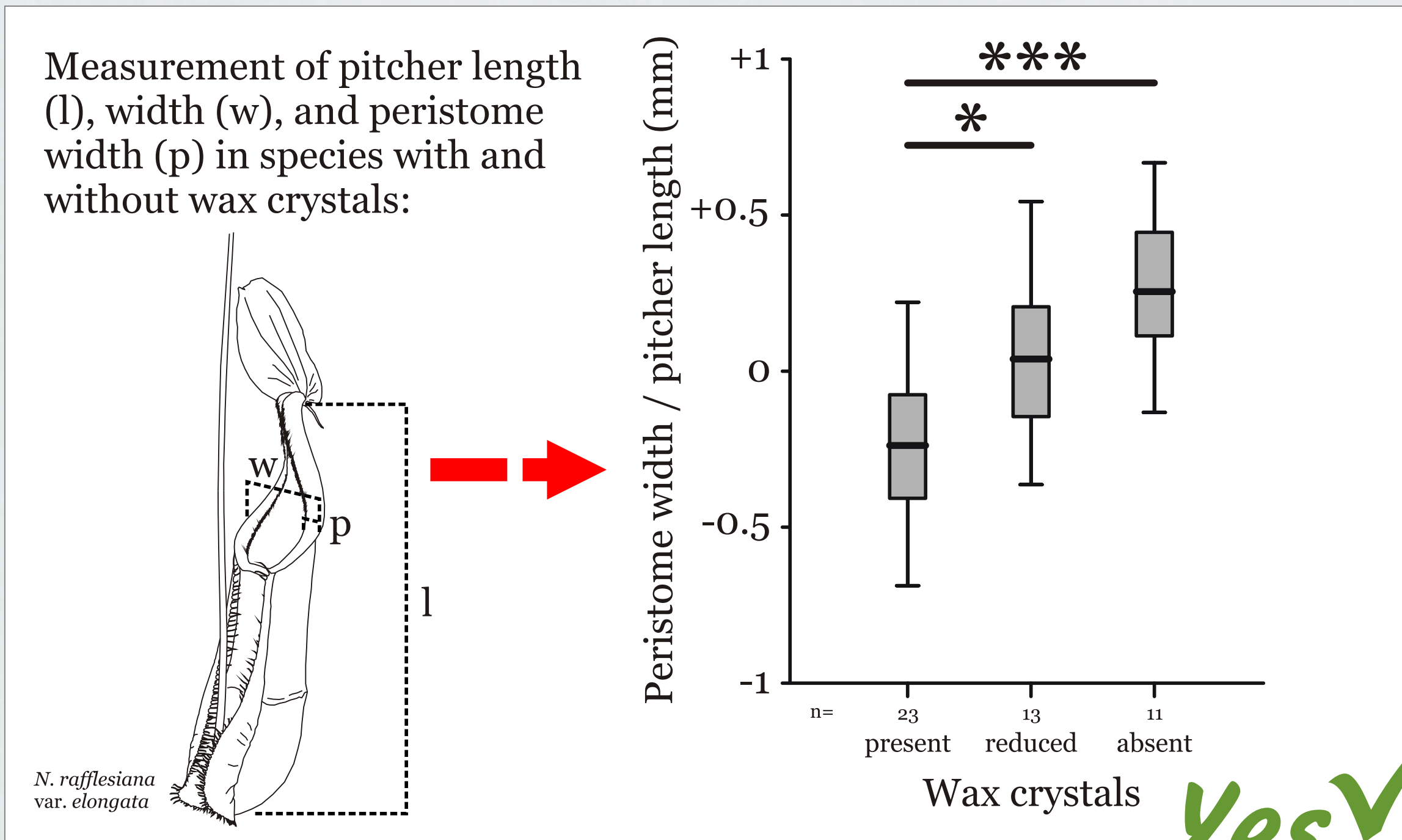


Do they rely on different trapping structures in the field ? →

Yes ✓

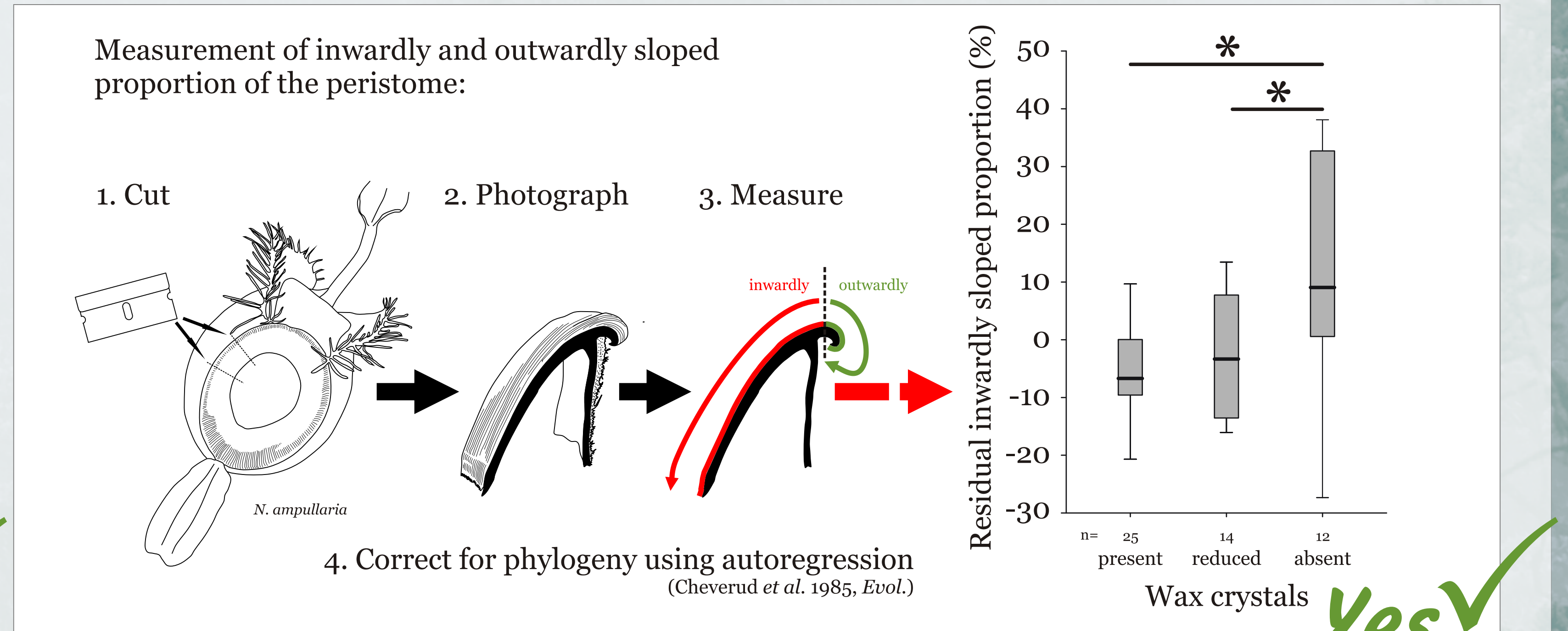
### B Comparative analysis of functional pitcher morphology in 51 *Nepenthes* species

Do species without wax have **larger** peristomes ?



Yes ✓

Do species without wax have peristomes with **longer inward slope** ?

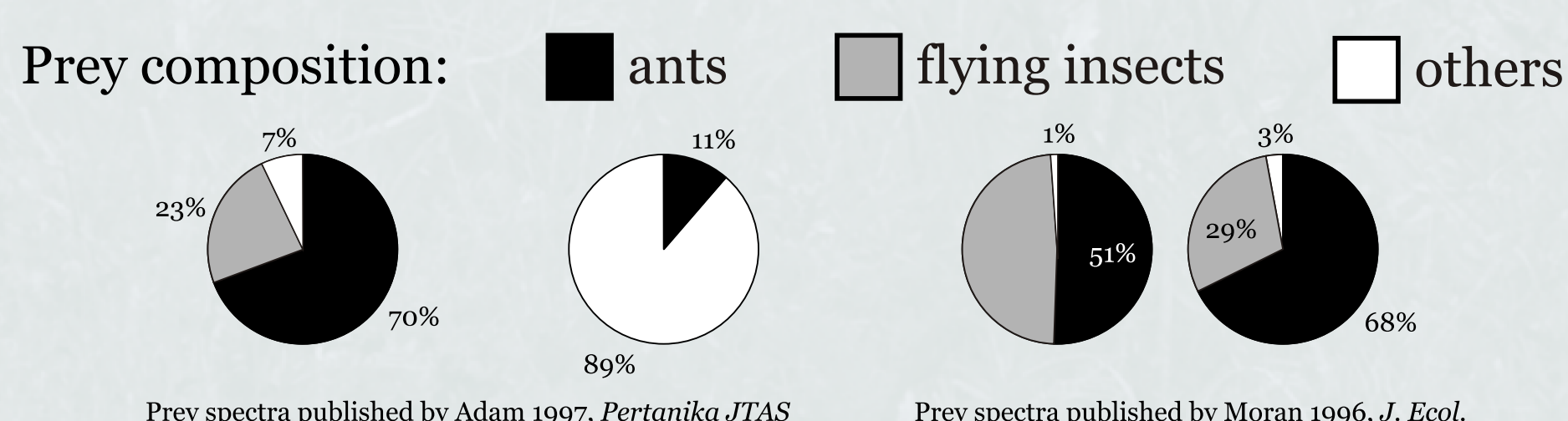


Yes ✓

## Divergent evolution might be driven by competition for prey.

### Evidence from the literature:

These sympatric species differ in trap morphology and target different prey spectra.

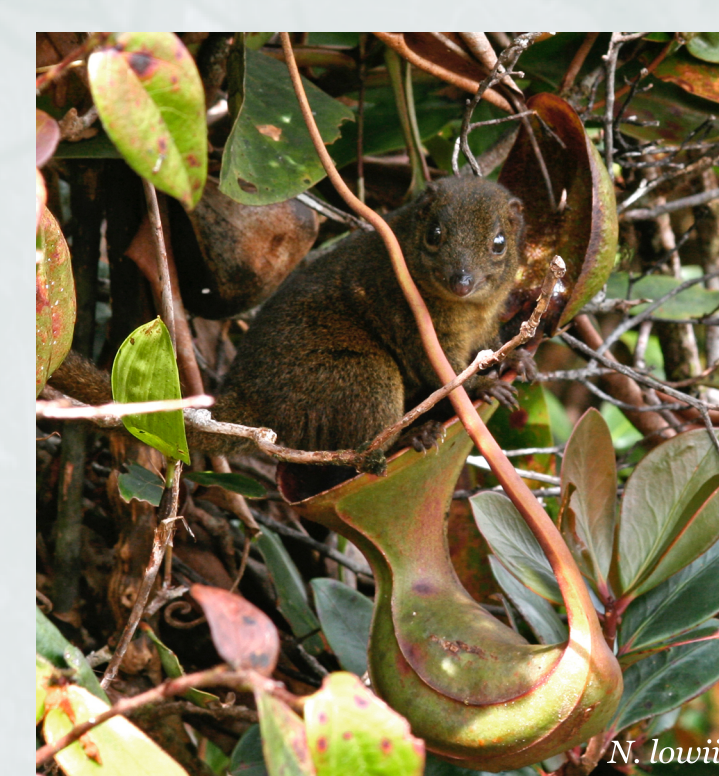


### Evidence from the field:

A montane species with an extreme strategy for nutrient acquisition.

**The problem:**  
Arthropod diversity and abundance decreases with increasing altitude → more competition for prey

**The solution:**  
Utilisation of alternative nutrient sources: mammalian faeces!



- Upper pitchers of *N. lowii* attract tree shrews (*Tupaia montana*) that feed on a white exudate under the pitcher lid.
- Upper pitchers have lost the ability to trap insects.
- Mature *N. lowii* plants derive 57-100% of their foliar N from tree shrew faeces.

Published in: Clarke et al. 2009, *Biol. Lett.*