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# Does mechanical state of bark change with ontogeny?

A study on several tropical rainforest species



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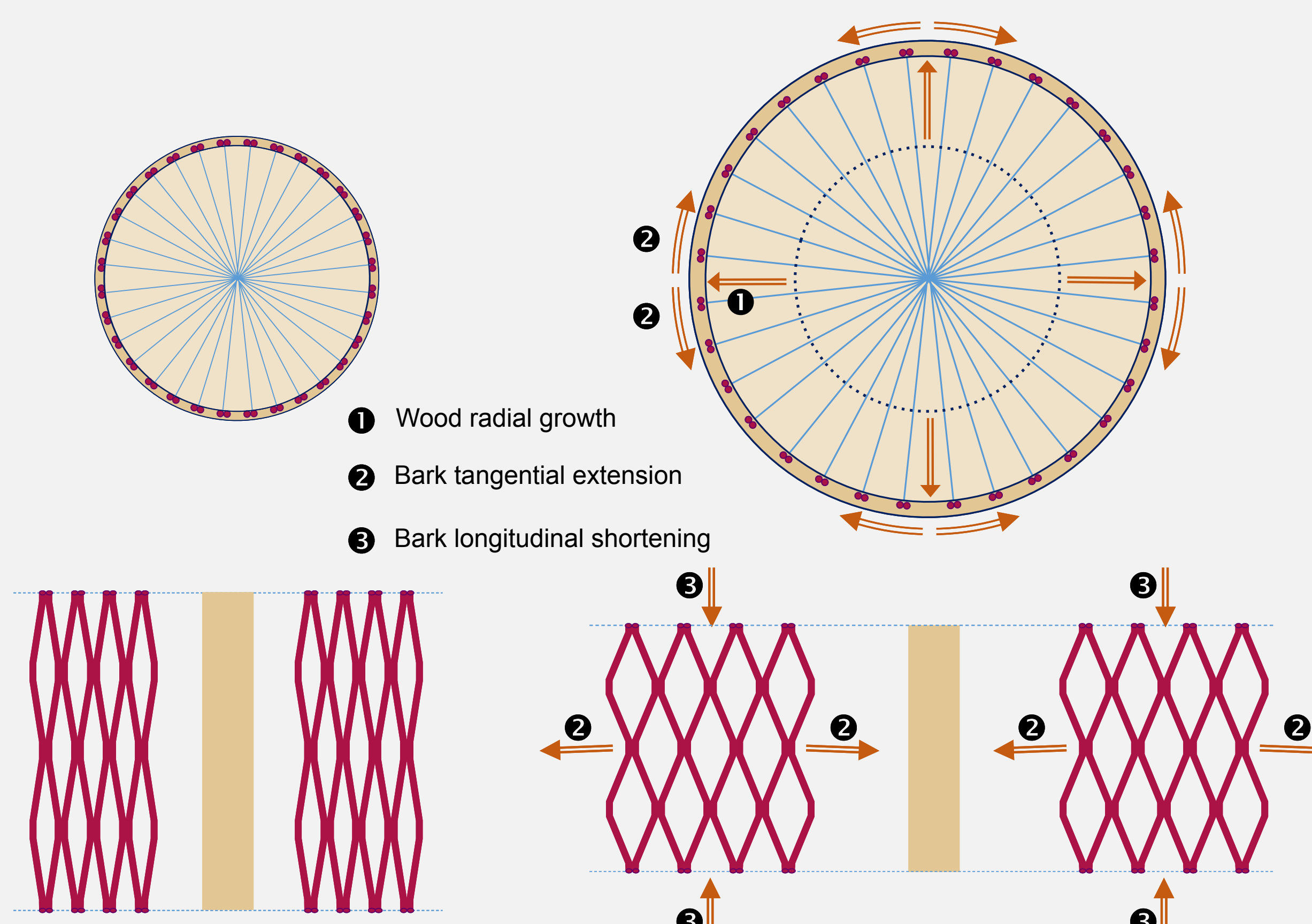
\* Fanny Zeline, Léopold Doumerc, Tancrede Alméras, Bruno Clair

## BACKGROUND

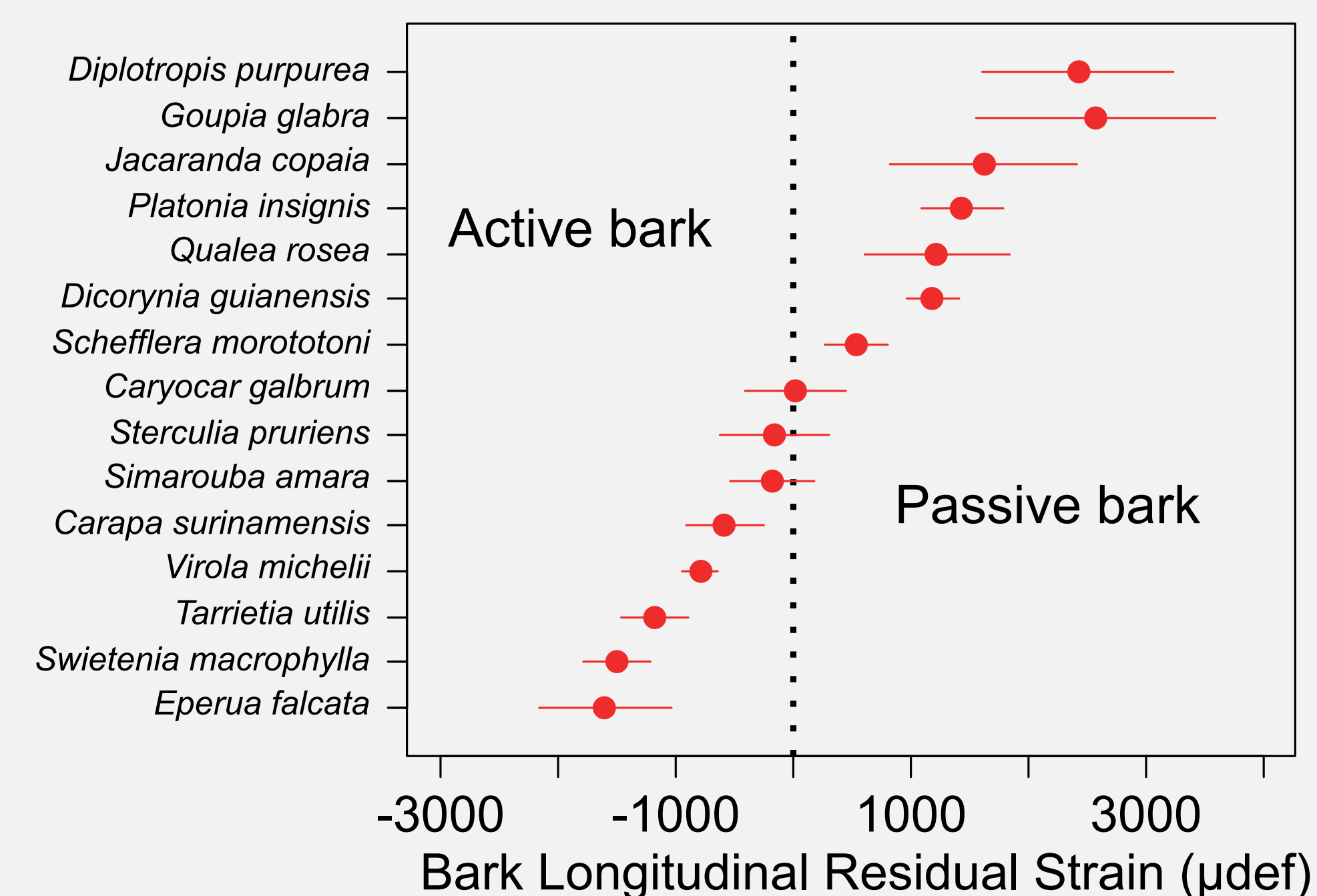
• **Inner bark** is implicated in many tree functions: transport, storage, protection ...

... but it is also able to **generate forces** to offset the effect of gravity:

B. Clair, R 32 "The bark side of the force", August 11, at 15:30



• Variation of bark strain in mature trees of tropical tree species



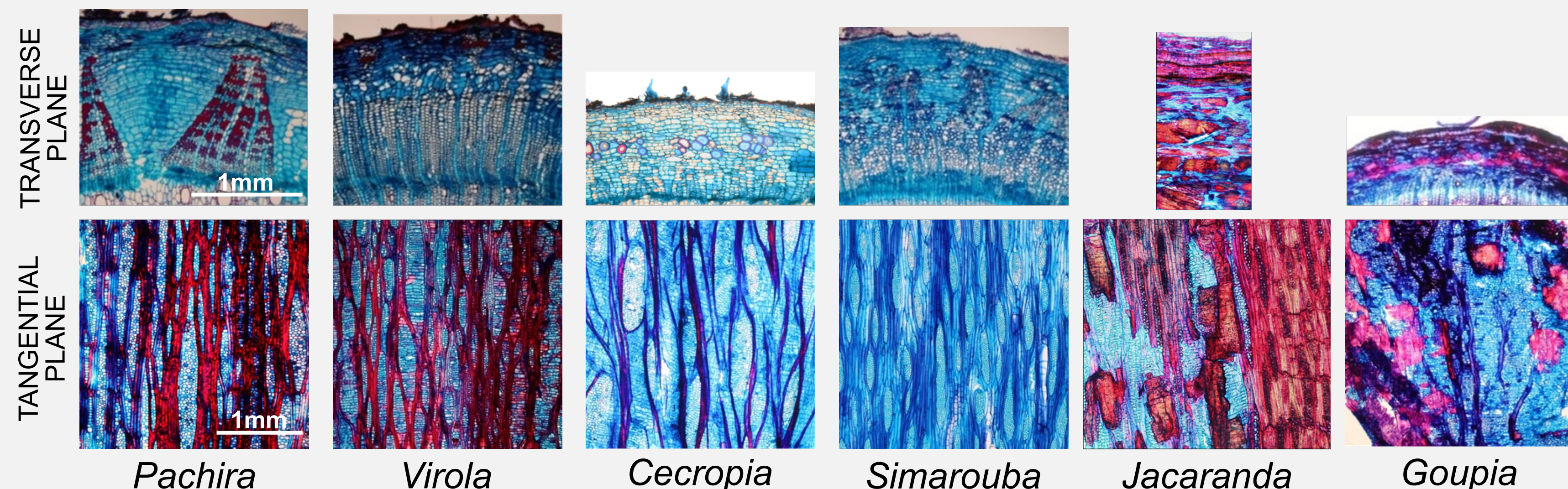
## QUESTIONS

• How mechanical state of bark varies with tree size?

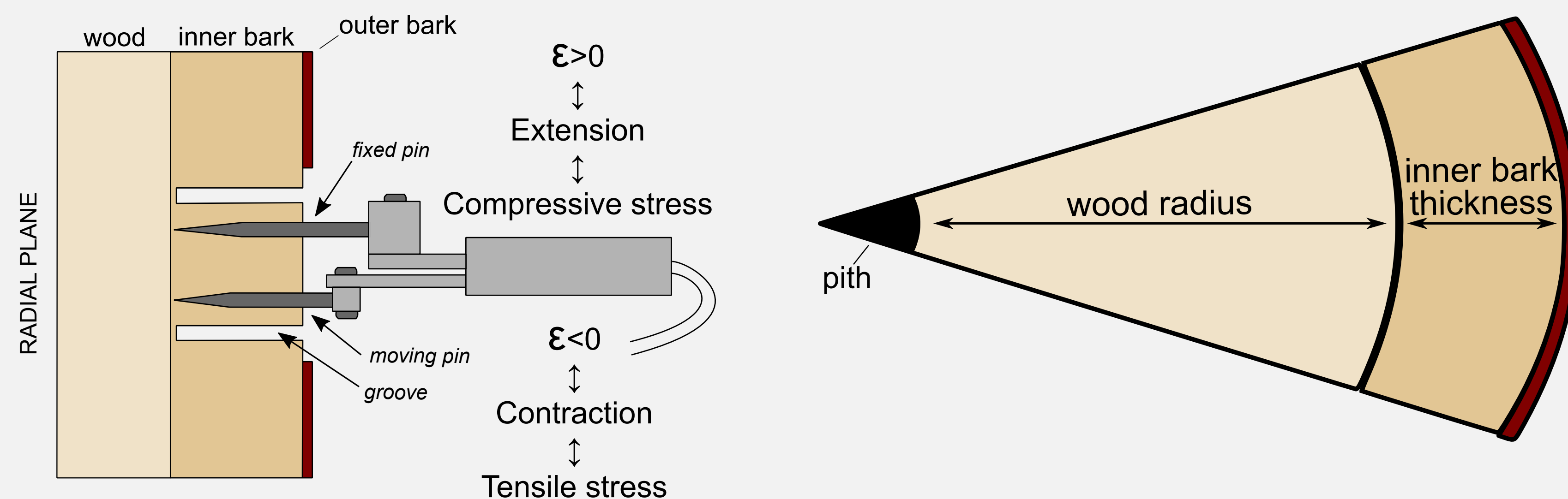
• Does the allometry between bark and wood differ between species with active and passive bark?

## METHODS

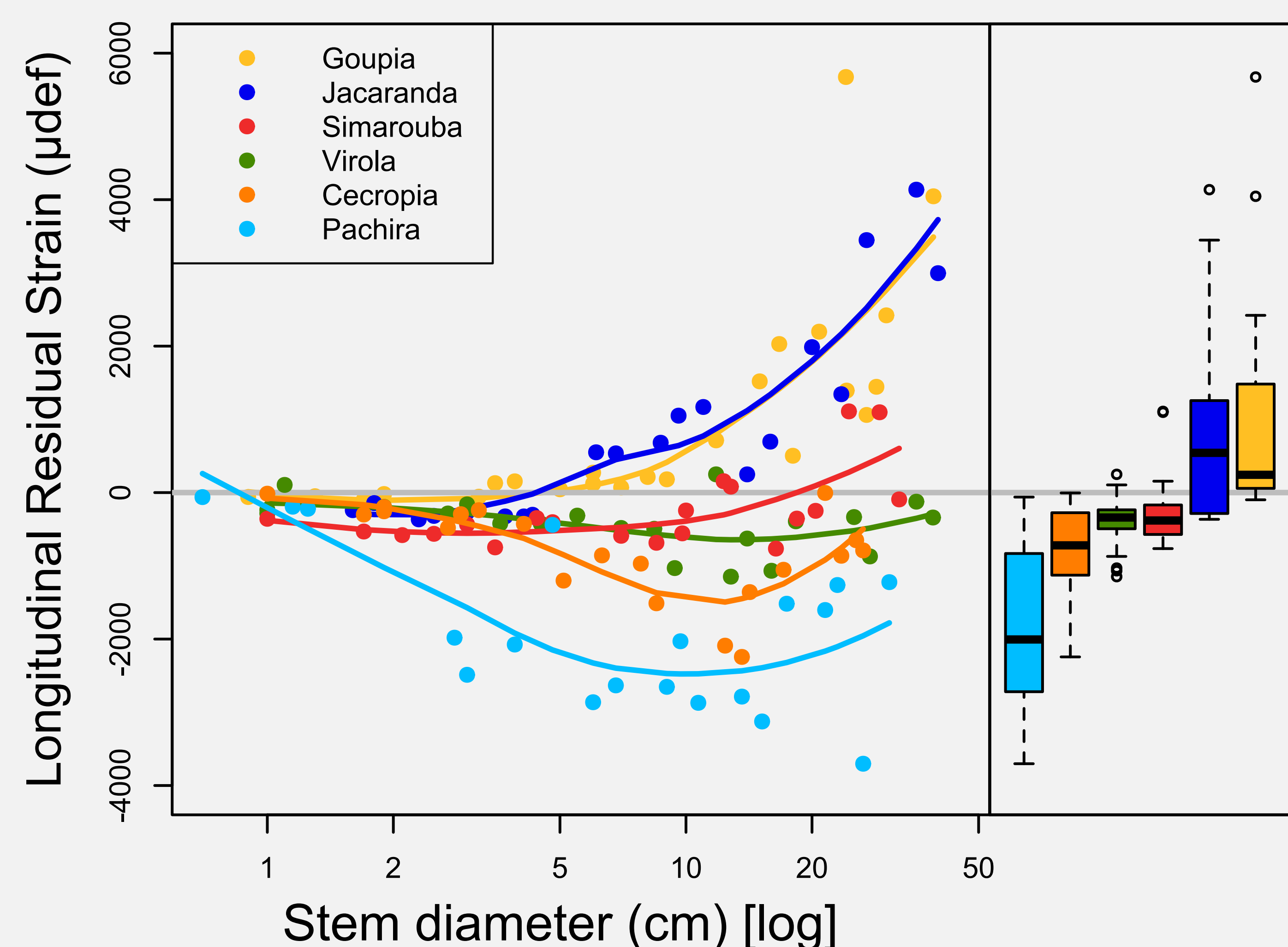
• Selection of 6 species differing by the anatomical structure of their bark



• Measurement of longitudinal residual strain and wood/bark dimensions of 20 trees per species

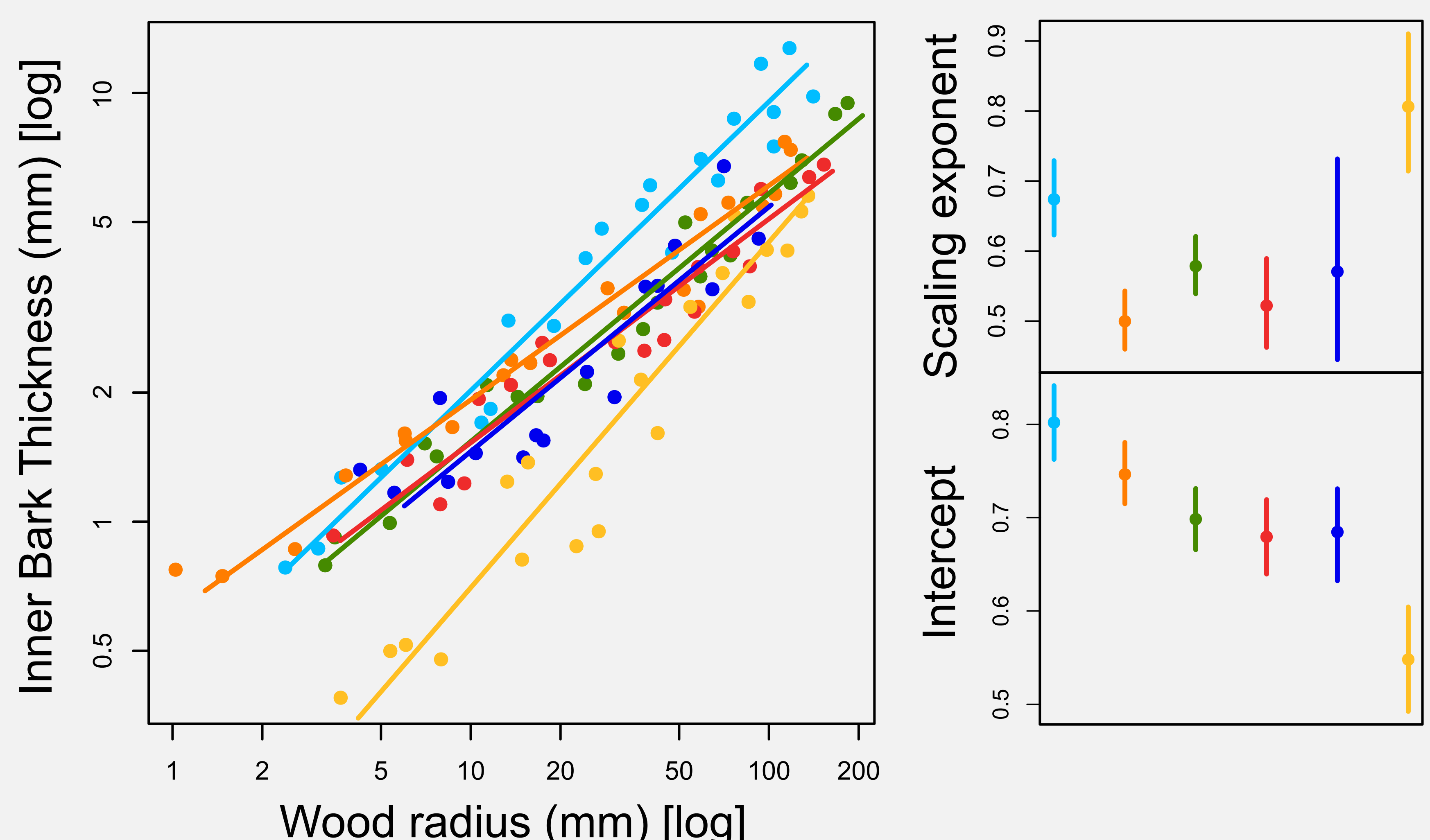


## RESULTS



• **Bark Residual strain varies with tree size:**

- Compressive strain increases in *Jacaranda* and *Goupia*
- Tensile strain increases in *Pachira*, *Cecropia*, *Virola* and *Simarouba* but decreases when stem diameter > 10 cm



• **The relationship between bark thickness and wood radius is allometric:**

- Scaling exponent does not differentiate active and passive bark species
- Species with higher tensile strain have higher intercept value

## CONCLUSION

- Species with active bark produce more bark per unit of wood than species with passive bark
- For species with active bark: the magnitude of tensile strain increases during young stages and decreases in older stages
  - Study of secondary changes in bark and numerical simulations are in progress to understand how the shift of bark mechanical state occurs during ontogeny