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Romain Lehnebach, Fanny Zeline, Léopold Doumerc, Tancrede Almeras,
Bruno Clair

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Does mechanical state of bark change with ontogeny?

A study on several tropical rainforest species



Romain Lehnebach and co-authors*

Laboratory of Mechanics and Civil Engineering, Montpellier, France

romain.lehnebach@umontpellier.fr



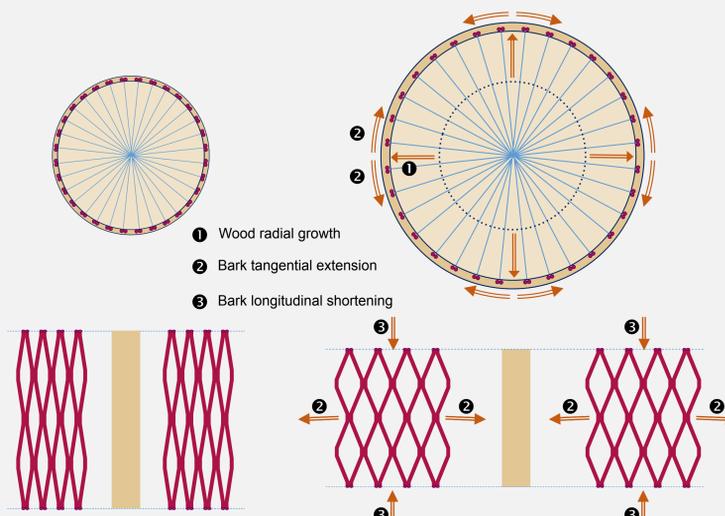
* Fanny Zeline, Léopold Doumerc, Tancrede Alméras, Bruno Clair

BACKGROUND

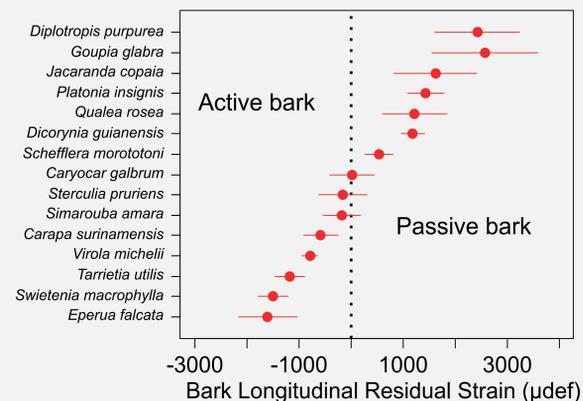
• **Inner bark** is implicated in many tree functions: transport, storage, protection ...

... 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



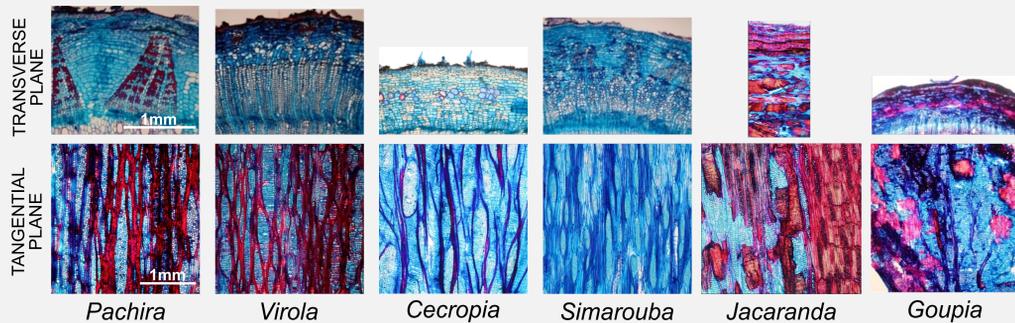
QUESTIONS

• How mechanical state of bark varies with tree size?

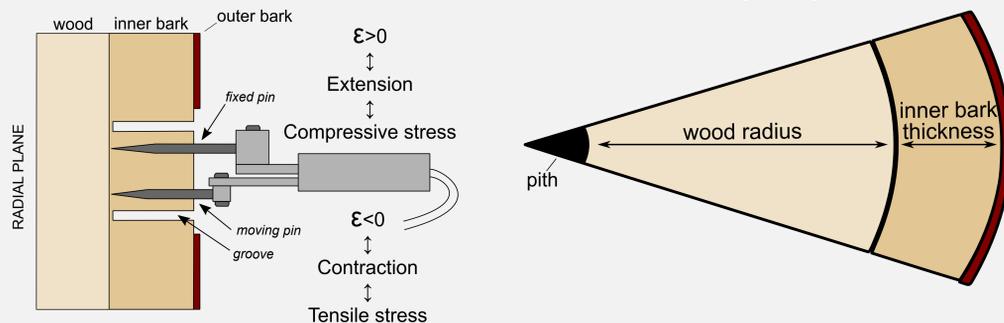
• Does the allometry between bark and wood differ between species with active and passive bark?

METHODS

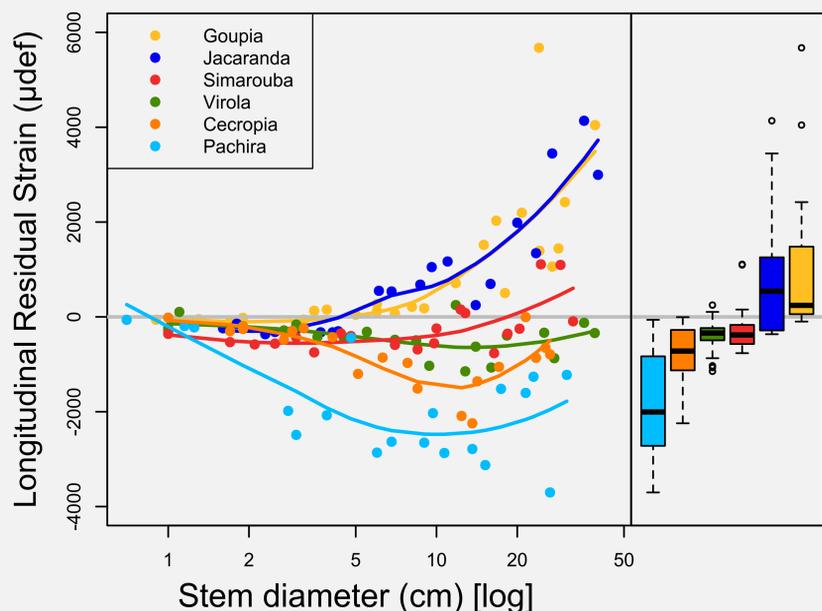
• Selection of 6 species differing by the anatomical structure of their bark



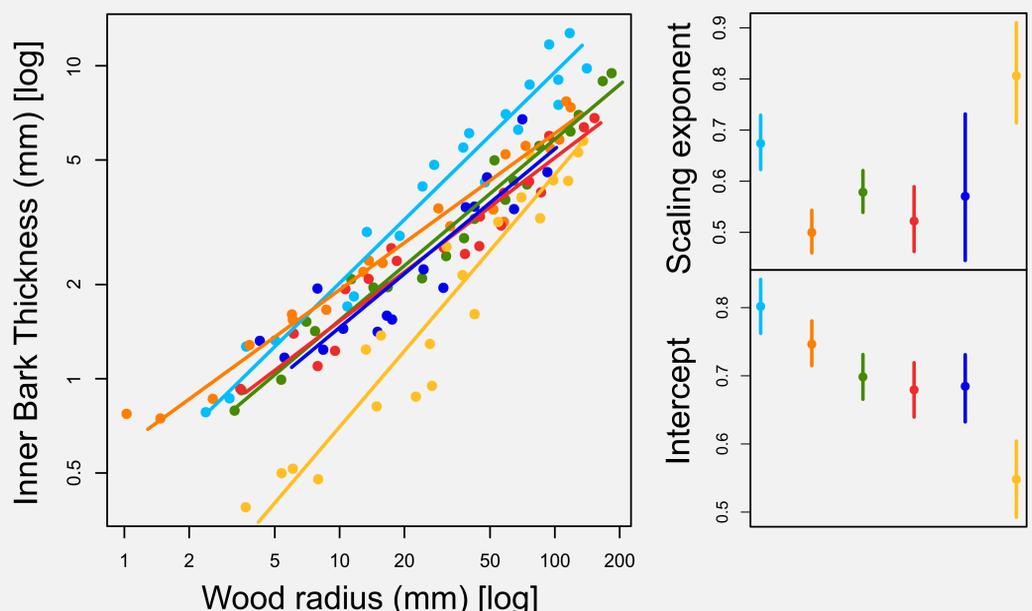
• Measurement of longitudinal residual strain and wood/bark dimensions of 20 trees per species



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