

## PhD project: opportunity for a student

### Surviving fire: stem traits and evolutionary trade-offs

**Background** In fire-prone environments, possessing traits that facilitate the survival of stems has obvious adaptive value, but evolution of these traits may come at a cost. Surprisingly, the causes of stem death in fire are not well understood, hypotheses including the loss of cambial tissue / meristematic buds from which regrowth could be initiated, and damage to xylem tubes that prevents the flow of water to surviving tissues. Traits that may facilitate stem survival could include the density, moisture content, thickness and thermal conductance of bark, similar traits in the underlying sapwood, and the depth of vulnerable tissues within the wood. Some and perhaps all of these traits will vary as stems grow, and many species acquire stem protection with age.

**Project aim** Working in the fire-prone savannas of northern Australia:

1. to identify the causes of stem death in a range of tree species;
2. to identify traits and trade-offs in protecting stems using a phylogenetically matched-pairs analysis of bark and other traits, and the evolutionary trade-offs (e.g. height growth?) between trees from fire-sheltered monsoon forests and fire-prone savannas
3. to identify size/age paths of development of traits that protect stems in a selection of key savanna species
4. to identify the role of trait development and its relationship with height growth in escaping the seedling/sapling “fire trap”.



Research will be conducted in 140 permanent ‘fire’ plots with known fire histories in three iconic national parks, elsewhere in the Top End of the Northern Territory as required, and may include experimental growth and/or fire treatments.



**Resources** Some funds for travel, and the equipment for measuring bark traits, are available. Successful application is conditional on obtaining an Australian or International postgraduate study award to cover living expenses.

#### Research supervisors

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#### For more information

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