

# Thermal tolerance of dung beetles in different climate zones and forest types

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# Why have we been asking for your poop? :)

Dung beetles provide key ecosystem services such as nutrient cycling, bioturbation, plant growth enhancement, secondary seed dispersal, and parasite suppression (Nichols et al., 2008).

It is important to understand how they will adapt to changes in temperature and humidity caused by climate change



# Preliminary hypotheses

**Key question:** How do dung beetle thermal tolerances respond under different humidity stresses in different spatial scales?

## Preliminary hypotheses:

- Dung beetles in the subtropics have lower CT<sub>max</sub> but larger overall range of thermal tolerance
- Rainforest beetles have larger range of tolerance than rubber plantation beetles in the same climate zone (tropics)
- Different dung beetle species in the same habitat have different thermal tolerance
- Morphological traits (body weight, body length, wing length etc.) are related to thermal tolerance within the same species

# Methodology

## Collecting beetles...



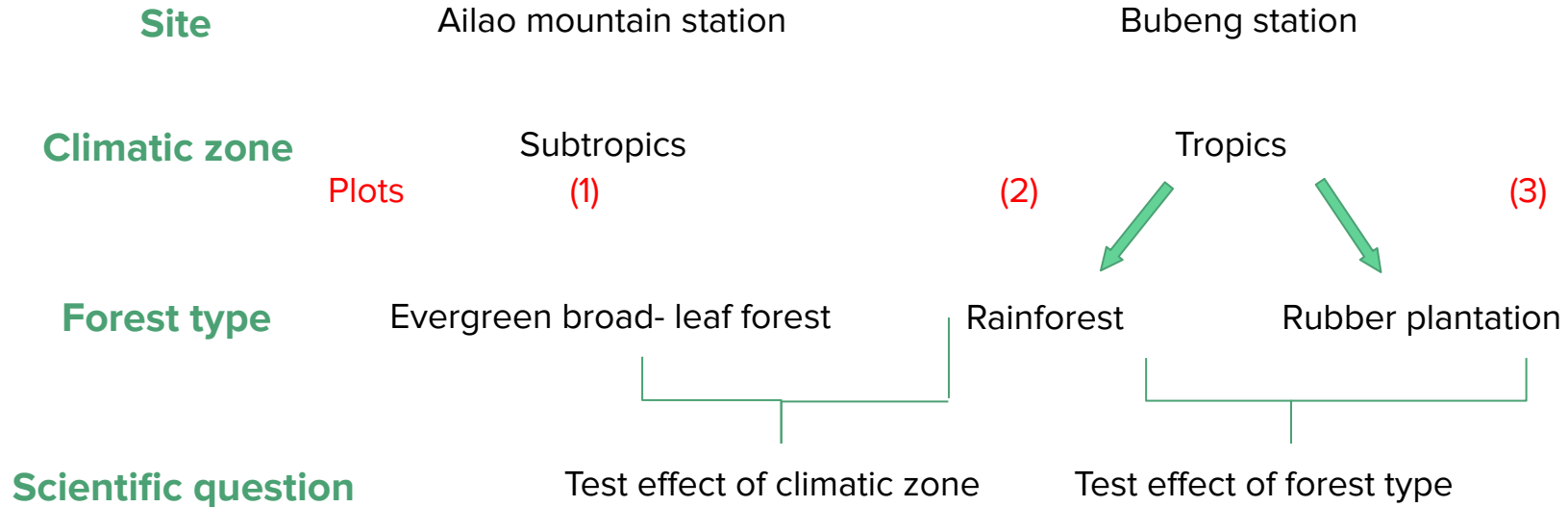
Collecting beetles from subtropical rainforest, tropical rainforest, and rubber plantation

## ...and watching them die!



Measuring CTmax, CTmin, and morphological features

# Experiment design



# Experiment design

## Set dung traps:

- ❖ Subtropical rainforest: 14 traps (finished)
- ❖ Tropical rainforest: 15 traps
- ❖ Rubber plantation: 20 traps

## Collect beetles:

- ❖ Two times per trap
- ❖ The first time after 24 hours, the second time after 48 hours (depending on the actual situation)





# Experiment design

## Thermal tolerance measurement:

For species with enough sample size:

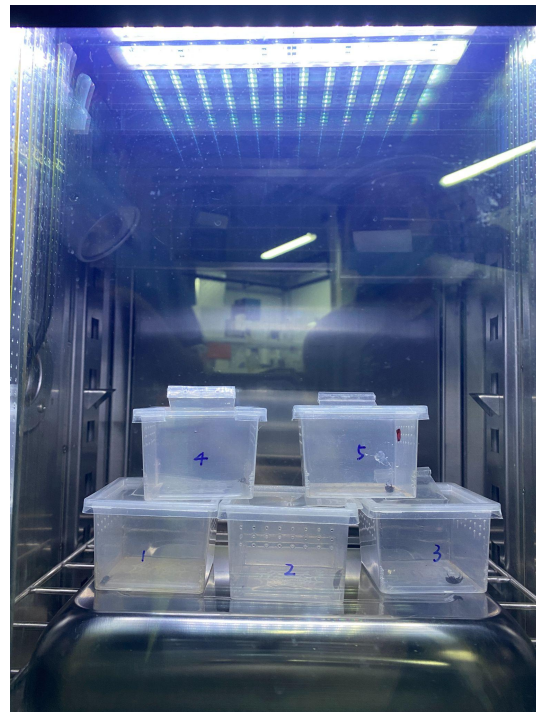
- ❖ Replication: 5 individuals for each treatment
- ❖ Humidity gradients: 30%, 50%, 90%
- ❖ Metrics: CTmax and CTmin
- ❖ In total: 30 individuals

For species with limited sample size:

- ❖ Just measure CTmax and CTmin at 50% humidity
- ❖ In total: 10 individuals

## Morphological traits measurement:

- ❖ Measure traits related to body temperature regulation of each individual respectively
- ❖ For example: body weight, body length, wing length ...



Thank you!

