

Témoé GOUX - Elsa LANOE - Maéva GRANGIS

Niche Partitioning and Species Coexistence



WHO ?

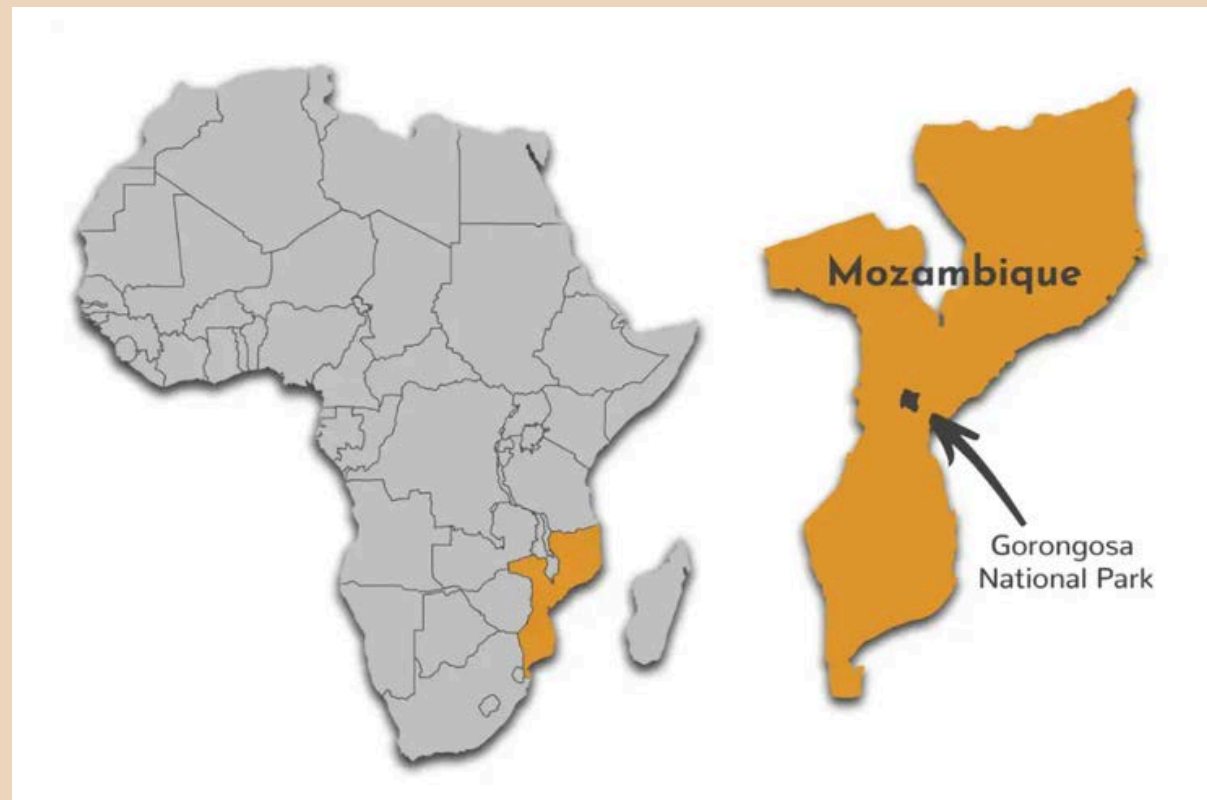
Princeton University biologist Rob Pringle's team, with mammalogist Ryan Long and Tyler Kartzinel, who oversees DNA extraction and sequencing at Princeton.



**PRINCETON
UNIVERSITY**

WHERE ?

Gorongosa National Park, Mozambique



luxurysafaricompany



Source : Gorongosa National Park



Source : Nomade enture



Source : Voyage2Afrique

WHAT is being studied ?

Three closely related antelopes of different sizes



Bushbuck
(*Tragelaphus sylvaticus*)



Nyala
(*Tragelaphus angasii*)

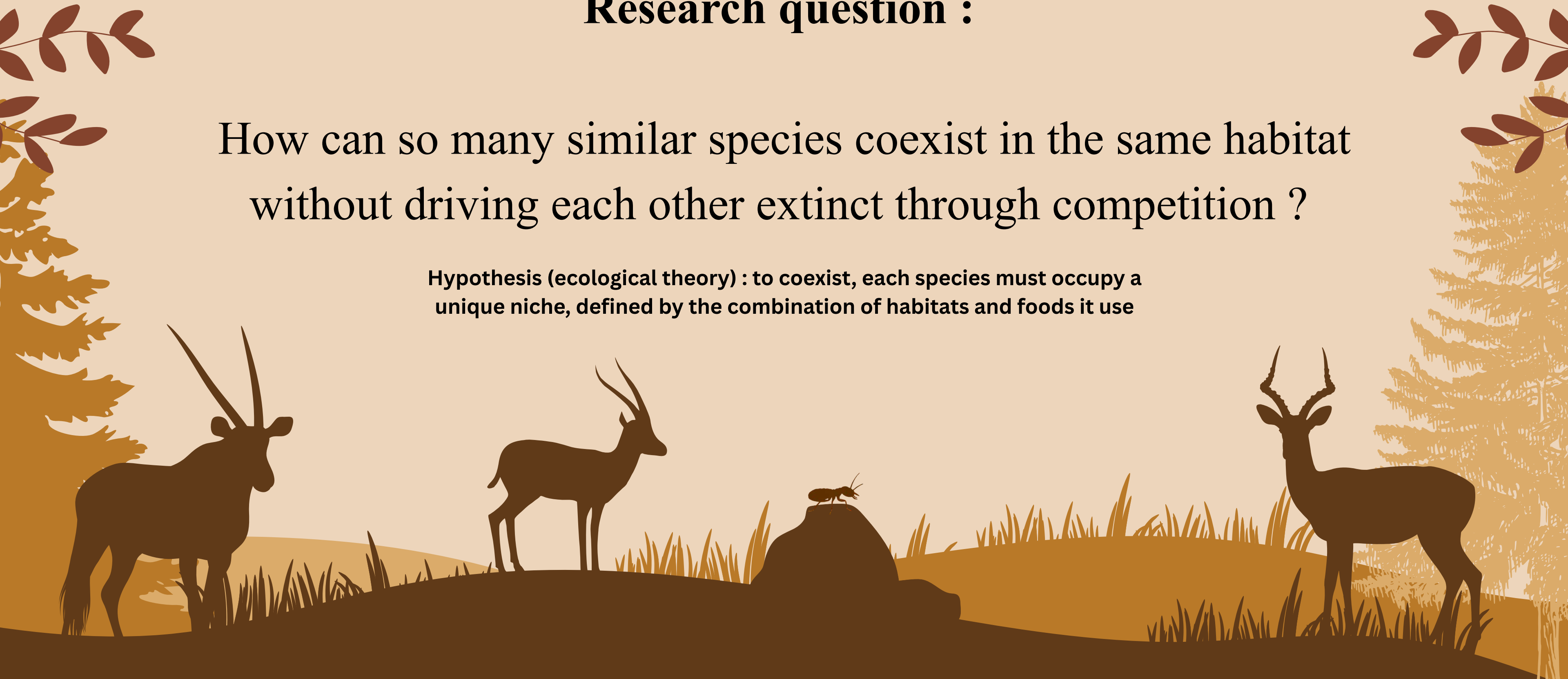


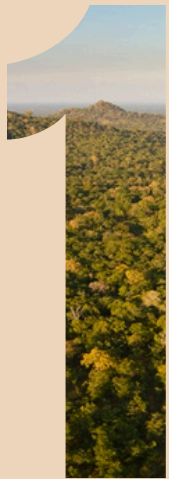
Kudu
(*Tragelaphus strepsiceros*)

Research question :

How can so many similar species coexist in the same habitat without driving each other extinct through competition ?

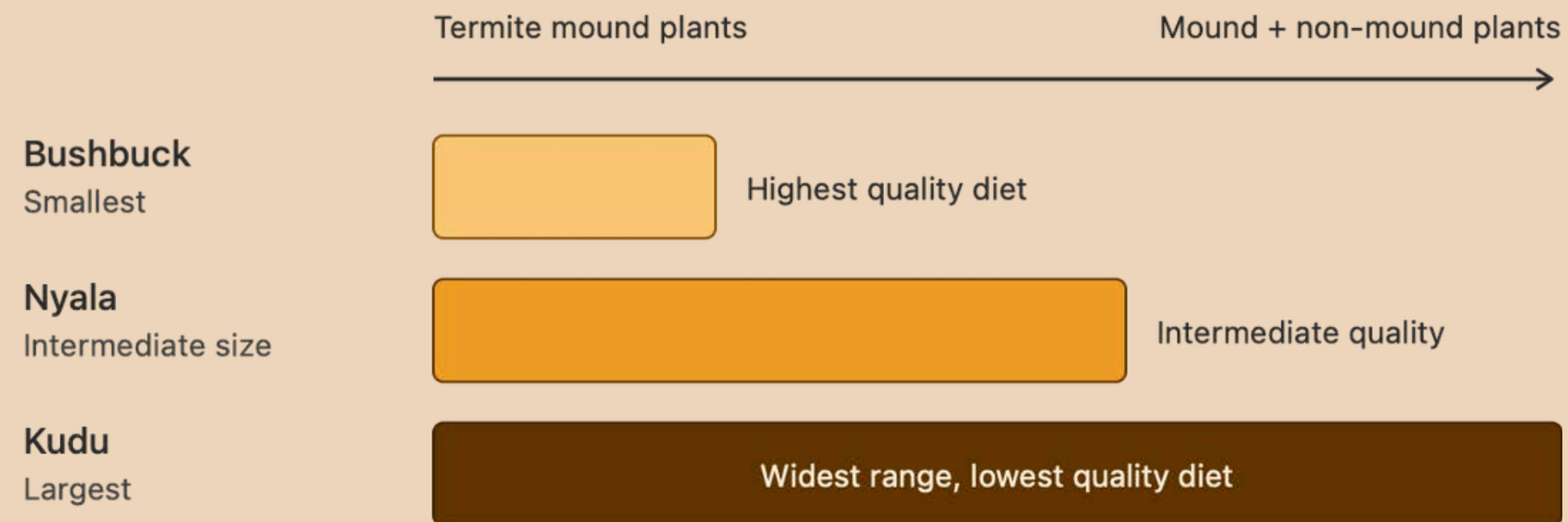
Hypothesis (ecological theory) : to coexist, each species must occupy a unique niche, defined by the combination of habitats and foods it use





Niche partitioning and coexistence

Ecological niche : the set of conditions and resources a species needs to survive and reproduce, and the way it uses them.



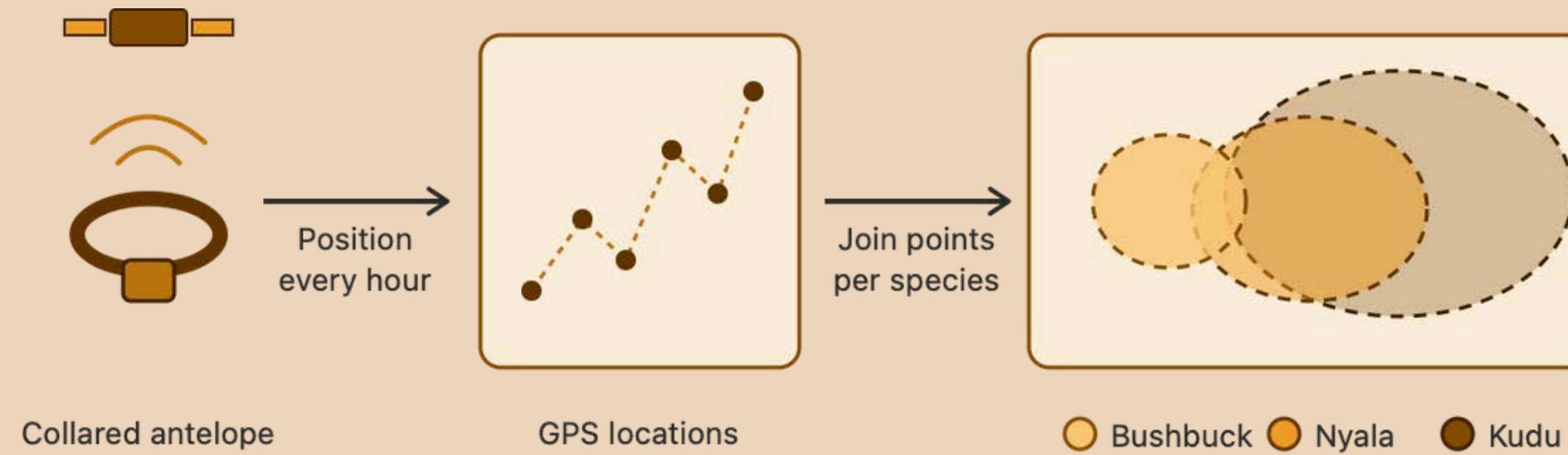
Each species uses the habitat and resources differently, which reduces competition and allows coexistence.

trees grow around termite mounds :



2

Spatial tracking via GPS

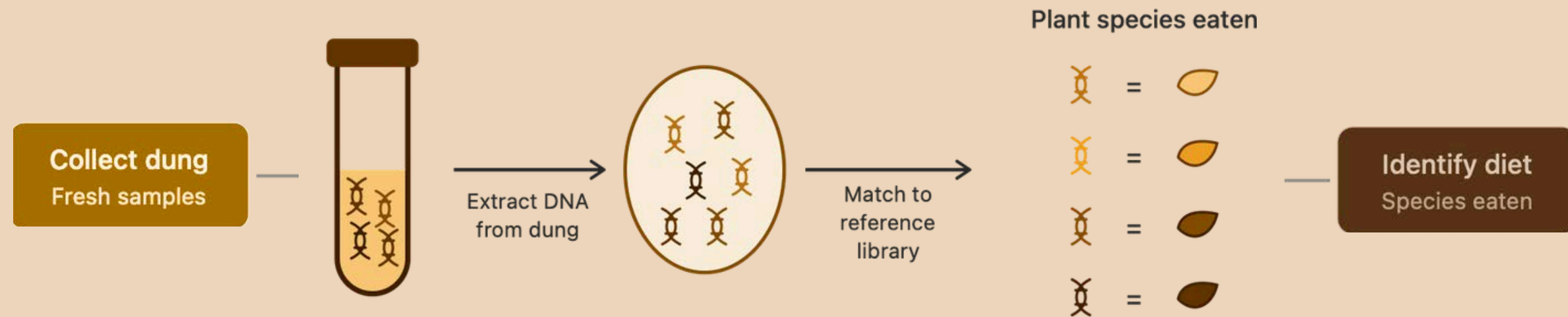


By comparing these home ranges, the team can see whether the three species use the same space, or whether each one concentrates on a different portion of the habitat.

3

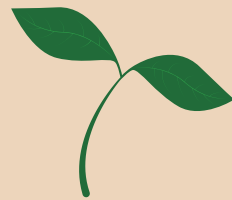
DNA metabarcoding

A method that identifies the plants an animal has eaten by isolating plant DNA from its dung and matching it to a reference library of possible food plants.



Keywords : vocabulary

- **Niche partitioning** : The strategy by which closely related species divide up resources to avoid direct competition with one another.
- **Termite mound** : A large pile of soil built up by termites as their nest.
- **DNA metabarcoding** : A technique that identifies the plant species an animal has eaten by analyzing DNA fragments found in its dungs.
- **Undigested plant cells** : Specifically mentioned as what the team needs to isolate for the DNA technique to work.
- **Palatable** : It means the plant is tasty and nutritious enough that animals actually want to eat it.
- **Dietary profile** : A detailed "portrait" of what an animal eats, which plant species, and in what proportions.
- **Insights** : A piece of knowledge / realization that helps you understand a situation better, often gained through study or research.



Keywords : Pronunciation



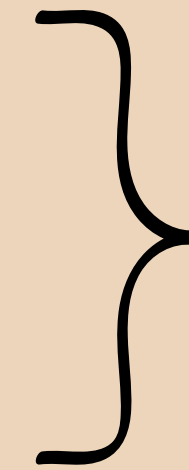
Bushbuck → “boosh-book”



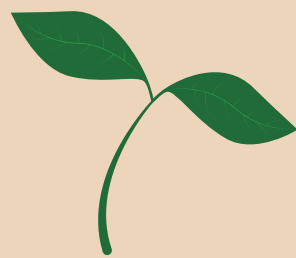
Nyala → “NYAH-luh”



Kudu → “KOO-doo”



Antelopes : Stress on the first syllable
→ “AN-tuh-lohp”



Partitioning : Stress falls on the second syllable → “par-TISH-uh-ning”

Coexistence : Stress falls on “ZIS” → “co-eg-ZIS-tence”

Palatable : Stress is on the first syllable → “PA-la-ta-bol”

Dietary : Stress is on the first syllable → “DYE-uh-teh-ree”



Termite : Stress on the first syllable → “TUR-mite”

The background is a stylized illustration of a savanna landscape. It features three antelopes: a large one on the left, a medium one in the center, and another on the right. In the center, there is a rock with a small insect on top. The landscape includes rolling hills, grass, and several trees, including a large tree on the left and a tall, thin tree on the right. A large, bright sun is visible in the upper left corner. The overall color palette is warm, with shades of brown, orange, and yellow.

Thank You

[Video link](#)

Activities and games

1

INTERACTIVE
QUIZ

Kahoot

2

VOCABULARY
GAME

A
B C D

3

DNA
DETECTIVES



Vocabulary game

Form 2 groups of 9 people

1

Everyone will have 2 cards :
1 "definition" card and 1 "vocabulary word" card, which don't match each other.

2

One person starts by reading their "definition" card.

3

The person who thinks they have the matching "vocabulary word" card raises their hand and says the vocabulary word.

4

The person with the matching card will be the next one to read their "definition" card.

DNA detectives

3 groups of 6 people

Every group will have 6 Dung Samples,
with DNA sequence made up of several 4 letter codons

1

Identify the plants:

Using the reference table, match each codon to a plant species. Careful: not every codon is in the table, like in real DNA metabarcoding studies.

2

Identify the antelope:

Once you've identified the plants in your sample, use the second table, the antelope diet preferences, to figure out which species your dung sample came from: the bushbuck, the nyala, or the kudu.

3

Once every team has an answer, we'll go around and check : which species does each sample belong to, and how did you figure it out?

Reveal:

Now that you've identified all 18 dung samples, what do you notice about the plants eaten by each species? Do their diets overlap completely, partially, or not at all?

DNA detectives



Identify the plants:

Using the reference table, match each codon to a plant species. Careful: not every codon is in the table, like in real DNA metabarcoding studies.

Plant Species	DNA Codons
<i>Mimosa pigra</i>	ATCG
<i>Cleistochlamys kirkii</i>	GGTA
<i>Digitaria swazilandensis</i>	TTAC
<i>Cynodon dactylon</i>	CAGT
<i>Corchorus fascicularis</i>	ACCA
<i>Vachellia tortilis</i>	TGGC
<i>Combretum collinum</i>	CCTA
<i>Grewia hexamita</i>	GTTA
<i>Hyparrhenia rufa</i>	TCAA
<i>Ximenia caffra</i>	GCAC

DNA detectives

2

Identify the antelope:

Once you've identified the plants in your sample, use the second table, the antelope diet preferences, to figure out which species your dung sample came from: the bushbuck, the nyala, or the kudu.

Antelopes/ Plant species	<i>Mimosa pigra</i>	<i>Cleistochlamys kirkii</i>	<i>Digitaria swazilandensis</i>	<i>Cynodon dactylon</i>	<i>Corchorus fascicularis</i>	<i>Vachellia tortilis</i>	<i>Combretum collinum</i>	<i>Grewia hexamita</i>	<i>Hyparrhenia rufa</i>	<i>Ximenia caffra</i>
Bushbuck	X		~		X	X			X	X
Nyala	X		X					X	X	X
Kudu	X	X	~			X	X			X

DNA detectives

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DNA detectives

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