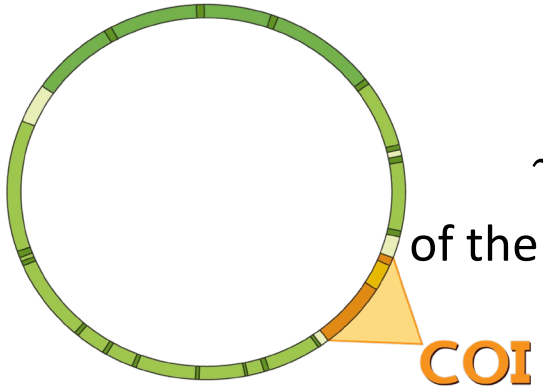
DNA Barcoding of Amazonian Plants and Insects:

Decoding Diversity and Interactions

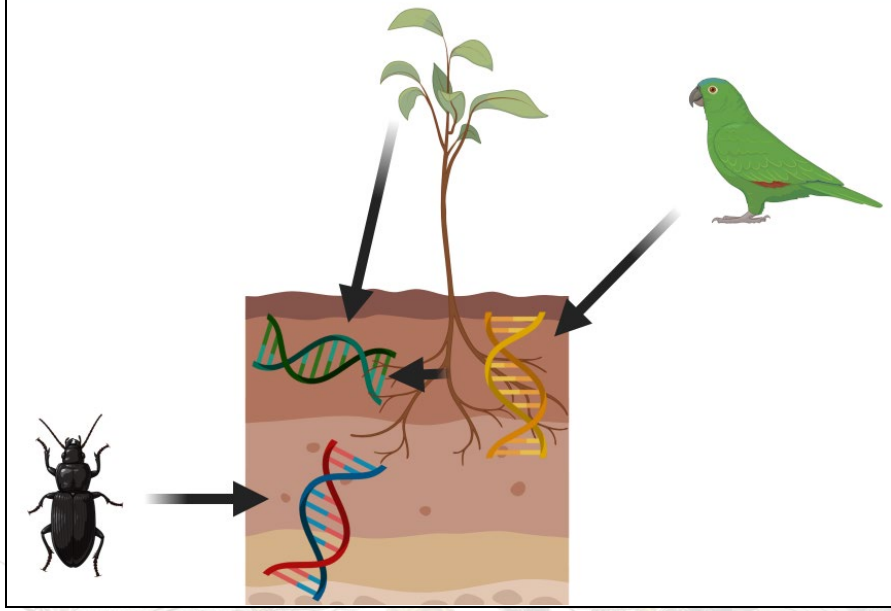
DNA Barcoding: Introduction to Technology and Techniques

Vision: A world where we read the biosphere with DNA

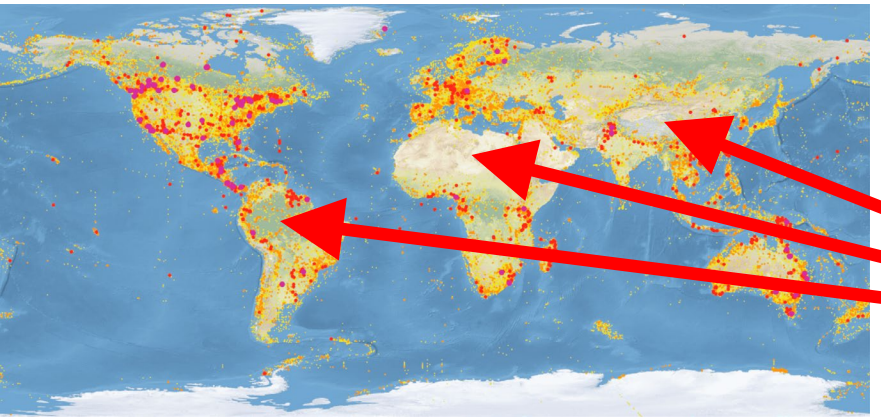


$\sim \frac{1}{1\,000\,000}$ of the whole genome

658 bp of the mitochondrial DNA: COI

sampling strategies:	
	**barcoding**
	**metabarcoding**
	**eDNA**

DNA Barcoding: Introduction to Technology and Techniques



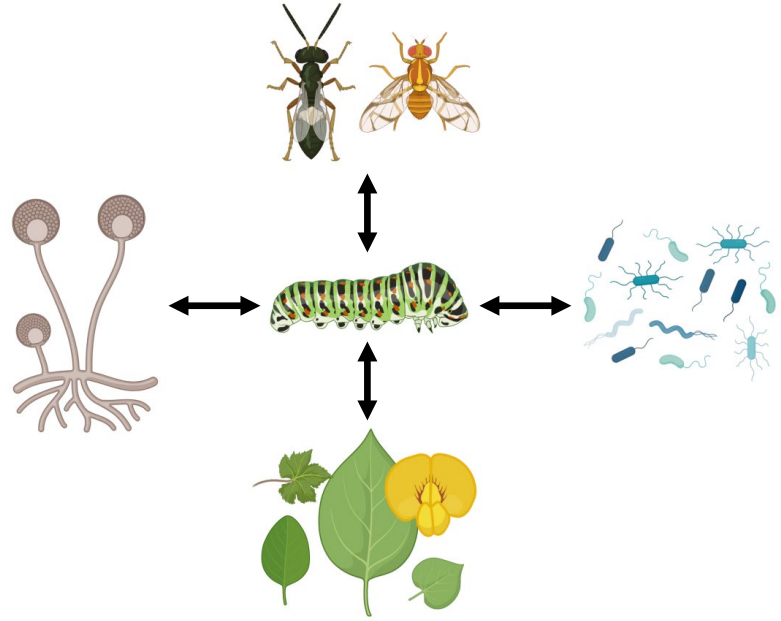
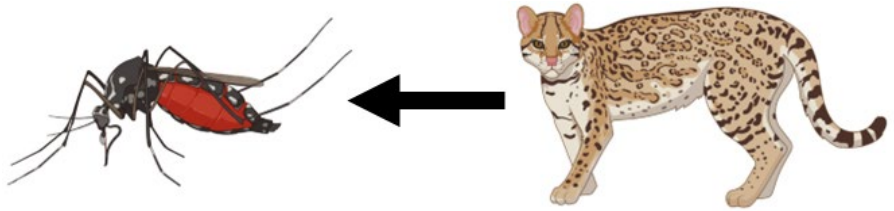
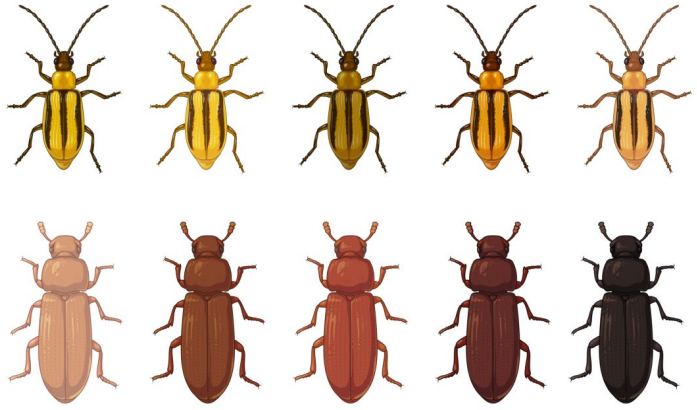
internationally standardized protocols:

- 16M barcodes publicly available
- growth more than 3M barcodes / year
- challenge: specimen acquisition
- challenge: reference database required

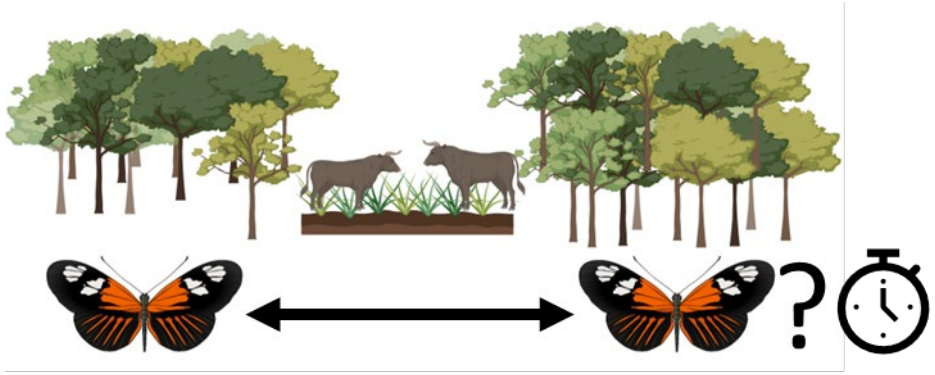
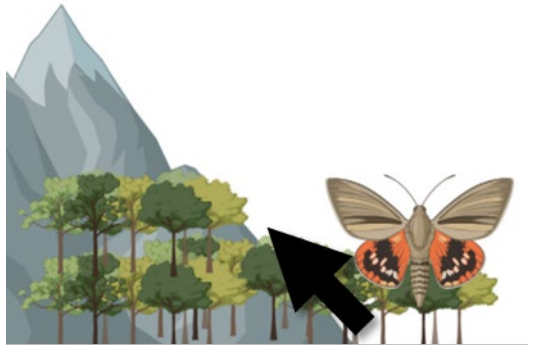
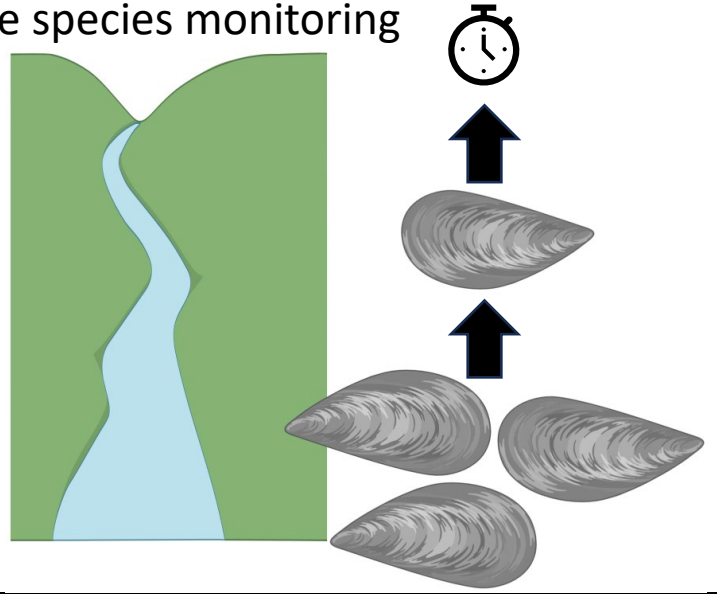
fast-paced technological advancements:

- portable DNA sequencer
- costs of sequencing / specimen < 0.1$
- challenge: technical complexity

DNA Barcoding: Potential Applications for Biodiversity Monitoring

Biodiversity Baselines:	
species inventories to identify priority areas 	species interactions (e.g. parasitism) 
elusive species: indirect/non-invasive detection (e.g. mosquito blood) 	ecosystem resilience: taxonomic diversity 

DNA Barcoding: Potential Applications for Biodiversity Monitoring

Temporal Variation:	
connectivity: population loss by habitat fragmentation 	elevation shift due to climate change 
impact of extreme weather events 	invasive species monitoring 

DNA Barcoding: Case Studies and Practical Examples

Biodiversity Inventory:

Malaise traps from 220m to 2900m

> 300 000 insects sorted, imaged & sequenced

~60% of BINs (species hypothesis) new to BOLD

>50% of BINs represented by single specimen

>80% of BINs by 3 or fewer specimens

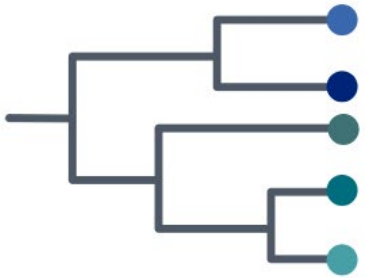
<5% overlap: Manu Station and Wayquecha

<1% overlap: Wayquecha and Los Amigos

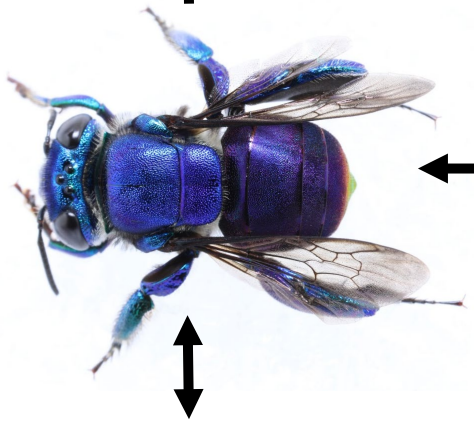
DNA Barcoding: Case Studies and Practical Examples

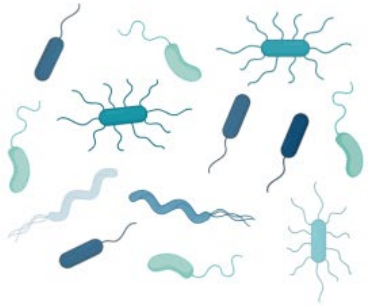
Euglossini (orchid bees):

350m – 1450m, 2 years
~ 2200 specimens



- phylogeny
- cryptic species
- potential as indicator species





- microbiome distinct from honey bees
- bacterial strain discovery

- transport mode of phytopathogenic fungi
- flower yeasts
- diversity discovery: 190 families in 80 orders

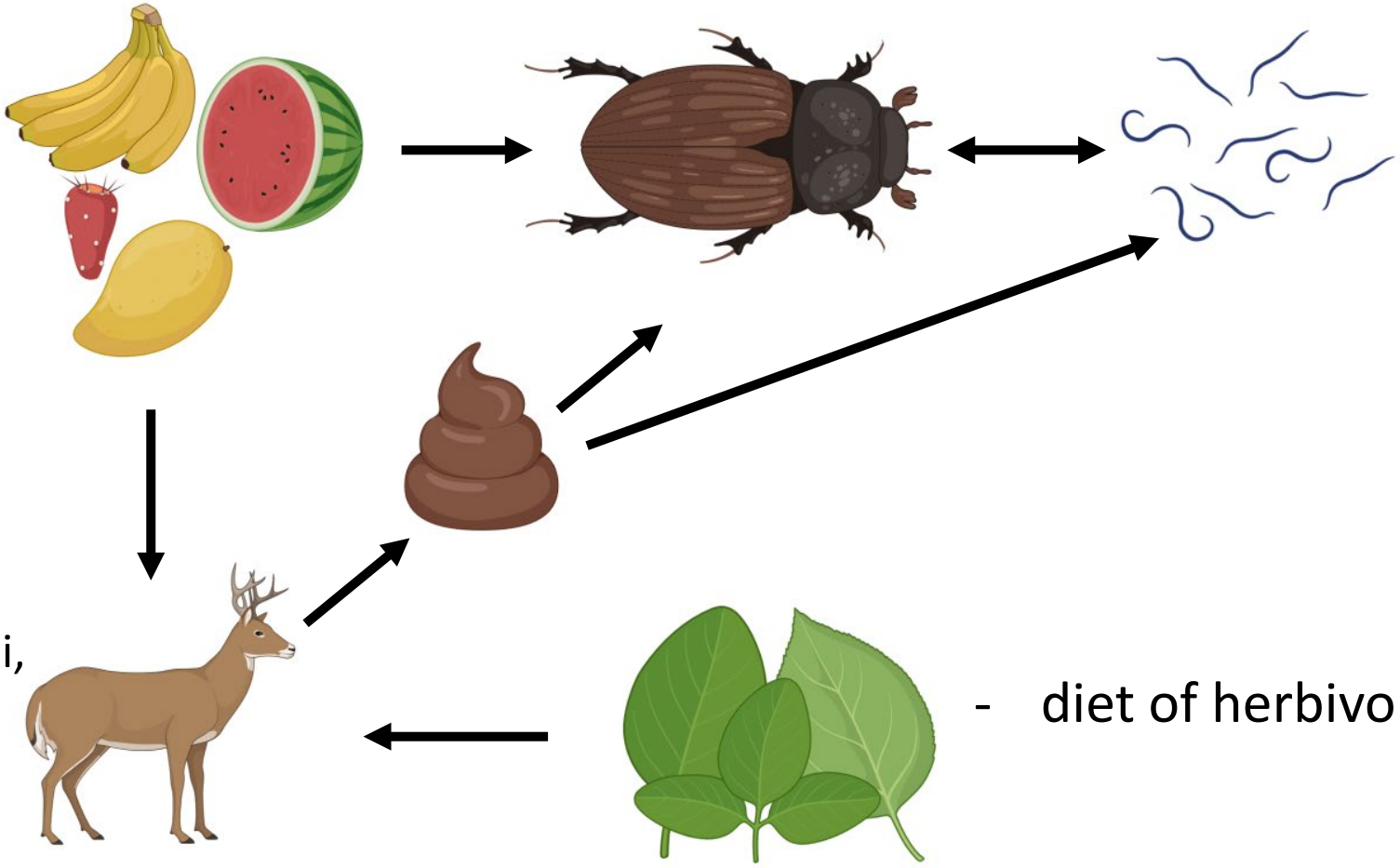
- approx. 300 plant genera, 90 families
- pollination networks
- plant distribution

DNA Barcoding: Case Studies and Practical Examples

Scarabaeinae (dung beetles):

~ 1200 specimens

- fruits eaten by dung beetle and/or herbivore



- nematode species discovery
- lifecycle or DNA traces?

- mammal/bird detection: Jagarundi, Jaguar, Deer, Tapir, Paccari, Paca, Monkeys, Tinamous

- diet of herbivores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