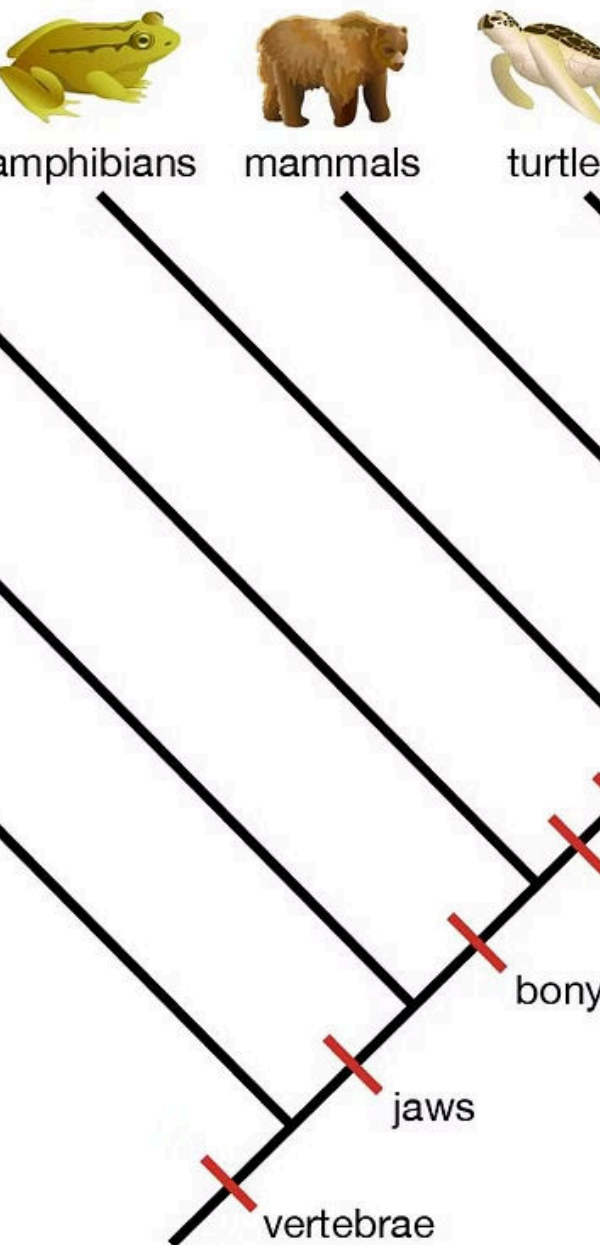


# Residual Phylogenetic Diversity in Tetrapods

Tetrapods, the four-limbed vertebrates, exhibit a remarkable diversity in their evolutionary lineages. This presentation will explore the concept of residual phylogenetic diversity (PD) - the unique evolutionary history captured within tetrapod species and its importance for conservation and evolutionary biology.

HA by Hector Tejero





# Defining Phylogenetic Diversity and Its Importance

- 1 Phylogenetic Diversity**

PD quantifies the evolutionary history and distinctness of species within a given group, capturing the unique genetic and phenotypic characteristics they possess.
- 2 Importance for Conservation**

Preserving PD is crucial for maintaining the evolutionary potential and adaptive capacity of tetrapod lineages in the face of environmental change and threats.
- 3 Evolutionary Insights**

Analyzing patterns of residual PD can reveal the underlying drivers of diversification and adaptation within tetrapod clades.

# Factors Influencing Residual PD in Tetrapods

## Evolutionary History

The unique evolutionary trajectories of different tetrapod lineages, shaped by processes like speciation, extinction, and adaptive radiation.

## Environmental Heterogeneity

The diversity of habitats and ecological niches occupied by tetrapods, which can foster the emergence of unique adaptations.

## Biogeography

The geographical distribution and isolation of tetrapod species, which can influence patterns of diversification and the accumulation of PD.

# Methodological Approaches to Measuring Residual PD

1

## Phylogenetic Trees

Constructing robust phylogenetic trees to represent the evolutionary relationships among tetrapod species.

2

## Diversity Metrics

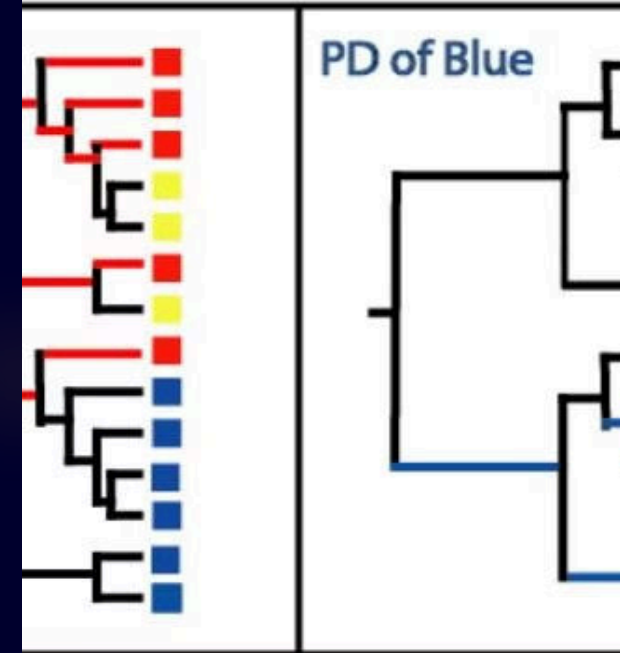
Calculating PD indices that quantify the evolutionary distinctness and uniqueness of species within a given tetrapod assemblage.

3

## Comparative Analyses

Applying statistical methods to identify the factors driving patterns of residual PD across different tetrapod lineages.

Genetic Divers



leading to sequences in a  
spanning the most bran  
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# Patterns of Residual PD Across Tetrapod Lineages

## Amphibians

Amphibians exhibit high levels of residual PD, with many ancient lineages and unique adaptations to diverse aquatic and terrestrial habitats.

## Reptiles

Reptiles show variable patterns of residual PD, with some highly diverse clades like crocodilians and some island-dwelling lineages with low PD.

## Birds and Mammals

These tetrapod classes have experienced extensive diversification, with both hotspots of high residual PD and lineages with reduced PD.



# Drivers of Residual PD Variation in Tetrapods

1

## Diversification Rates

Higher rates of speciation and lower rates of extinction can lead to the accumulation of residual PD within a tetrapod lineage.

2

## Ecological Specialization

Adaptations to unique ecological niches can promote the evolution of distinct tetrapod lineages and increase residual PD.

3

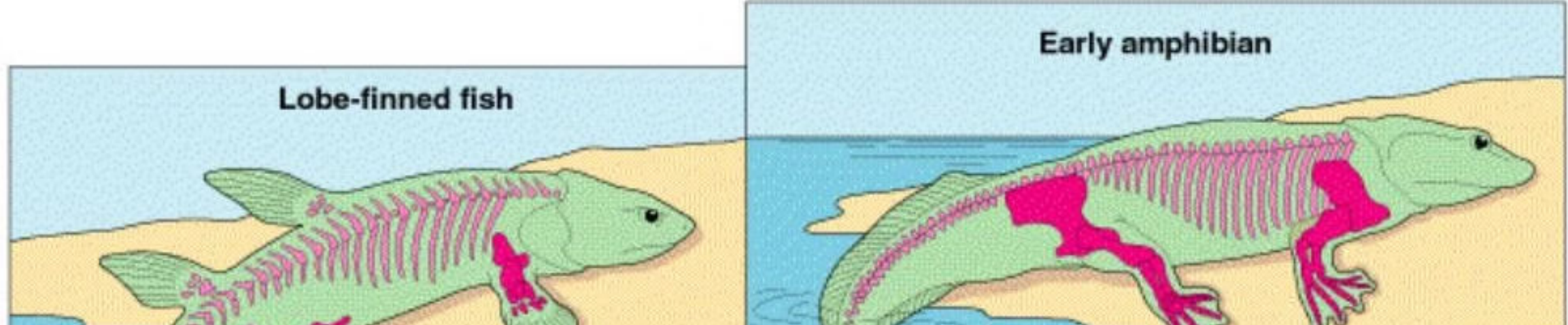
## Geographical Isolation

Isolation of tetrapod populations, such as on islands or in mountain ranges, can foster the emergence of endemic species with high residual PD.

## DEVONIAN EARTH

~400 million years ago





# Implications for Conservation and Evolutionary Biology

## Conservation Prioritization

Identifying tetrapod lineages with high residual PD can inform conservation efforts to preserve the most evolutionarily unique and irreplaceable species.

## Evolutionary Potential

Maintaining high levels of residual PD can enhance the adaptive capacity of tetrapod communities, allowing them to respond to environmental changes.

## Ecological Functions

Preserving tetrapod PD can help maintain the stability and resilience of ecosystems, as different lineages often fulfill unique ecological roles.

# Concluding Remarks and Future Research Directions



## Future Research

Continued exploration of the drivers and patterns of residual PD in tetrapods, integrating new genomic and ecological data.



## Conservation Implications

Leveraging PD metrics to guide conservation strategies and protect the most evolutionarily distinct tetrapod species and lineages.



## Evolutionary Insights

Applying PD analyses to uncover the mechanisms underlying tetrapod diversification and adaptation across spatial and temporal scales.