Evidence for Evolution

Learning Objectives

Discuss

Discuss how **fossils** provide evidence of evolution

Discuss

Discuss **morphological** evidence of evolution

Explain

Explain how **biochemistry** provides evidence of eolution

Consider

Consider the issues with the evidence of evolution

Defintion

Evolution: A cumulative change over time

- Natural Selection is a possible explanation for evolution.

Derived Traits: Newly derived features that do not appear in fossils
Ancestral Traits: Primitive features, that do appear in ancestral forms

Support for Evolution

Fossil records

- There should be intermediaries between species to show the evolution somewhere in the fossil record
- Archaeopteryx fossils provide evidence of characteristics that classify it as a bird, and also show that the bird retained several distinct dinosaur features.
- Many old extinct species look similar to the ones we have today, with minor modifications or size changes

Comparative anatomy

Type of Structure	Meaning	Evolutionist's Interpretation	Creationist's Interpretation
Homologous Structures	Similar structures across organisms, but serve different functions	many organisms have similar structures, meaning they evolved from a common ancestor	it has a common designer and they are still all unique
Vestigial structures	Structues similar to other organisms that are nonfunctional or without purpose	its because they evolved past the need of them	its because we dont know what they are for yet
Analogous structures	Structures that are for the same purpose but are not inherited from a common ancestor	they share a common ancestor, but developed wings separately	they were created differently

Comparative Embryology

- Vertebrate embryos have homologous structures during certain early phases of development

Evolutionist	Creationist
The similarities in the embryo show how they have common ancestry	The similar looks are only temporary as when the species mature, the similarities disappear

Comparative Biochemistry

- The closer related species are, certain chemicals in their body should be similar

- A certain molecule, Cytochrome-c, is very similar in humans, moneys, and horses
- Cytochrome-c is a sequence of 112 amino acids, 19 are the same across all organisms

Evolutionist	Creationist
This is because they share ancestors and evolved to have differences due to random mutations	19 amino acids still remain unchanged after supposed changes to over 5000 genes, how is this possible

Geographic Distribution

- Species closer to each other tend to have similar features

Evolutionist	Creationist
This is because they evolved and migrated slowly	This can be explained by the flood

Adaptation

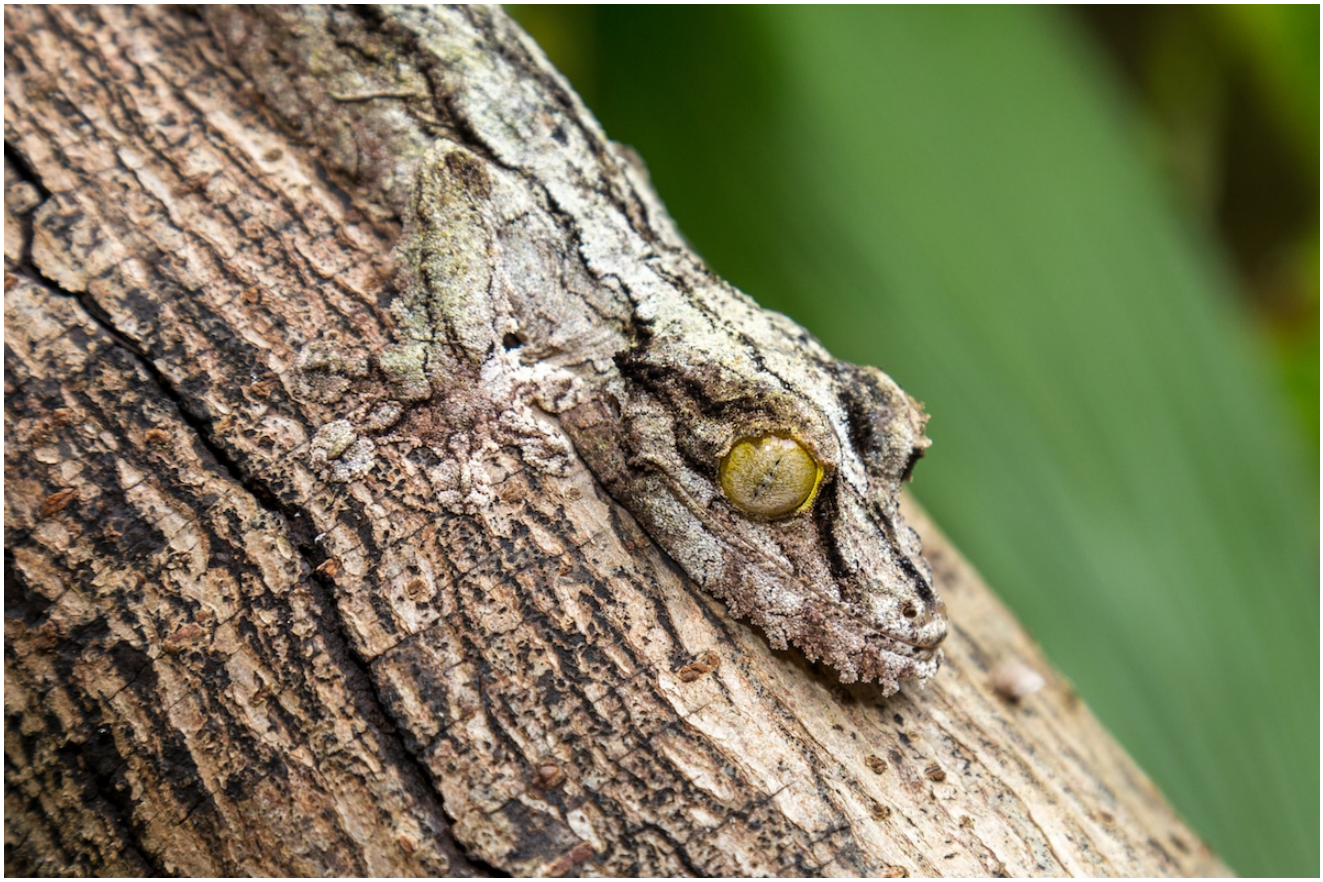
Defintion

Fitness: a measure of the relative contribution an individual trait makes to the next generation (how much the next generation has a trait)

Types of Morphological Adaptations

- Things adapt to their environment
- They then have a higher chance of surviving

Camoflage



- Allows organisms to blend in
- Makes it hard for predators to find them

Mimicry

- A species adapts to look like another species
- Often a harmless species evolves to look like a dangerous species
- Predators will avoid them

Antimicrobial Resistance

- Bacteria that has evolved to be able to survive antibiotics, like penicillin

Consequences of Adaptations

Spandrel Example

- Spandrels are very decorative and prominent, leading people to believe they exist for decoration
    - Spandrels are a necessary side effect of arches, a structural support
- Some features in organisms might be spandrels
    - Even though they stand out, they may not be necessary for reproductive success
    - They may be a necessary side effect of earlier evolution

Human Example

- Humans are born a lot earlier than other primates
- Thought to be so that humans can be smarter to have better reproductive fitness

- Really is just because we have big brains and an upright posture, so we need to be born sooner to fit through the pelvic opening

Evolutionist vs Creationist

Evolutionist	Creationist
Vertical Change	Horizontal Variation
Change inherited from ancestors	Created with differences, and inherits minor changes
New Species come from old ones	New species are just variations of old ones

Vocab

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