



# BIOL 1012 PAL Midterm 1 Review

By: Andrew (:



Which of the following  
defines Macroevolution?  
(Hint: There's 2)

a) Evolutionary Change  
Below Species Level

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b) Evolutionary Change  
Above Species Level

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c) Origin of Species or Mass  
Extinction Events

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d) Change in genetic  
composition of a  
population from  
generation to generation

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What branch of biology focuses  
on naming and classifying  
species into groups?

# Which of the following species names is formatted correctly?

a) Canis Lupus

b) *C. lupus*

c) *canis lupus*

d) C. lupus

e) *C. Lupus*

f) *Canis lupus*

True or False: Evolution is goal oriented?



What are the 3 main types of selection? Briefly define each one

(THERE ARE ALSO 3 MODES OF SELECTION BUT THEY WILL BE ASKED ABOUT LATER IN THIS POWERPOINT)

# Match the old white guy to his accomplishments

- Aristotle
- Carolus Linnaeus
- Jean Baptiste de Lamarck
- George Cuvier
- Charles Darwin
- Gregor Mendel
- Discovered genes as the basis for heritability
- Father of evolutionary theory, believed in inheritance of acquired traits and the law of use and disuse
- Father of modern taxonomy, first to group species into categories based on similarity, developed binomial nomenclature
- Figured species had heritable traits, developed the hypothesis of descent with modification, first to propose natural selection as the mechanism for evolution
- Classified organisms on a scale of increasing complexity, believed species were perfect and permanent
- Father of paleontology, looked at strata to find fossils, believed earth was too young for evolution to occur, believed older species were more divergent from current species.



What are the requirements for  
natural selection to occur?





## Match the definition to the term

Homologous Traits

Product of convergent evolution. Similar features in distantly related groups, not caused by common ancestors.

Analogous Traits

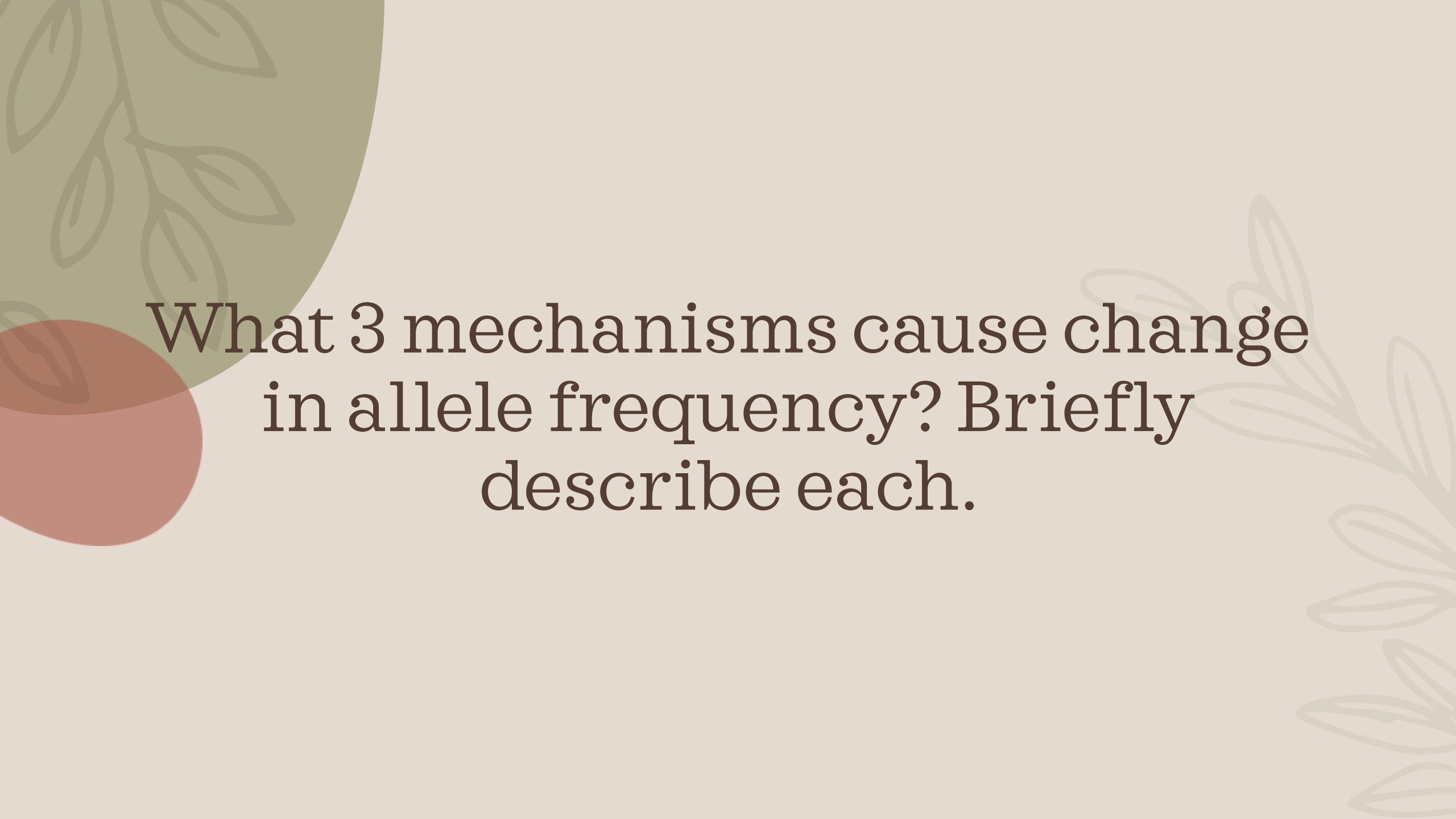
Remnants of features that were important in ancestral species.

Vestigial traits

Similar features and structures in species not distantly related that appear due to a common ancestor. Can be genetic, anatomical, or developmental.



What are the 3 main things that the fossil record can tell us?

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What 3 mechanisms cause change  
in allele frequency? Briefly  
describe each.

What is a population?  
What is a gene pool?

What are the criteria of Hardy Weinberg Equilibrium (HWE)?

What are the equations associated with HWE?

(ONE OF THE CRITERIA IS THAT ALLELE AND GENOTYPE FREQUENCIES REMAIN CONSTANT, BUT THERE ARE 5 CRITERIA THAT MAKE THIS POSSIBLE, WHAT ARE THEY?)

True or False: Natural selection  
acts on genotypes

# Match the modes of selection to their description

Directional Selection

Favours phenotypes of both extremes

Disruptive Selection

Favours phenotypes towards one extreme

Stabilizing Selection

Favours phenotypes that are intermediate



Which of the facts about genetic drift are true?

- A) SIGNIFICANT IN LARGER POPULATIONS
- B) CAN CAUSE FREQUENCIES TO CHANGE AT RANDOM
- C) CREATES GENETIC VARIATION
- D) CAN CAUSE FIXATION IN HARMFUL ALLELES
- E) IS NOT AT ALL RELATED TO THE FOUNDER EFFECT AND BOTTLENECK EFFECT
- F) EFFECTS SINGLE POPULATIONS

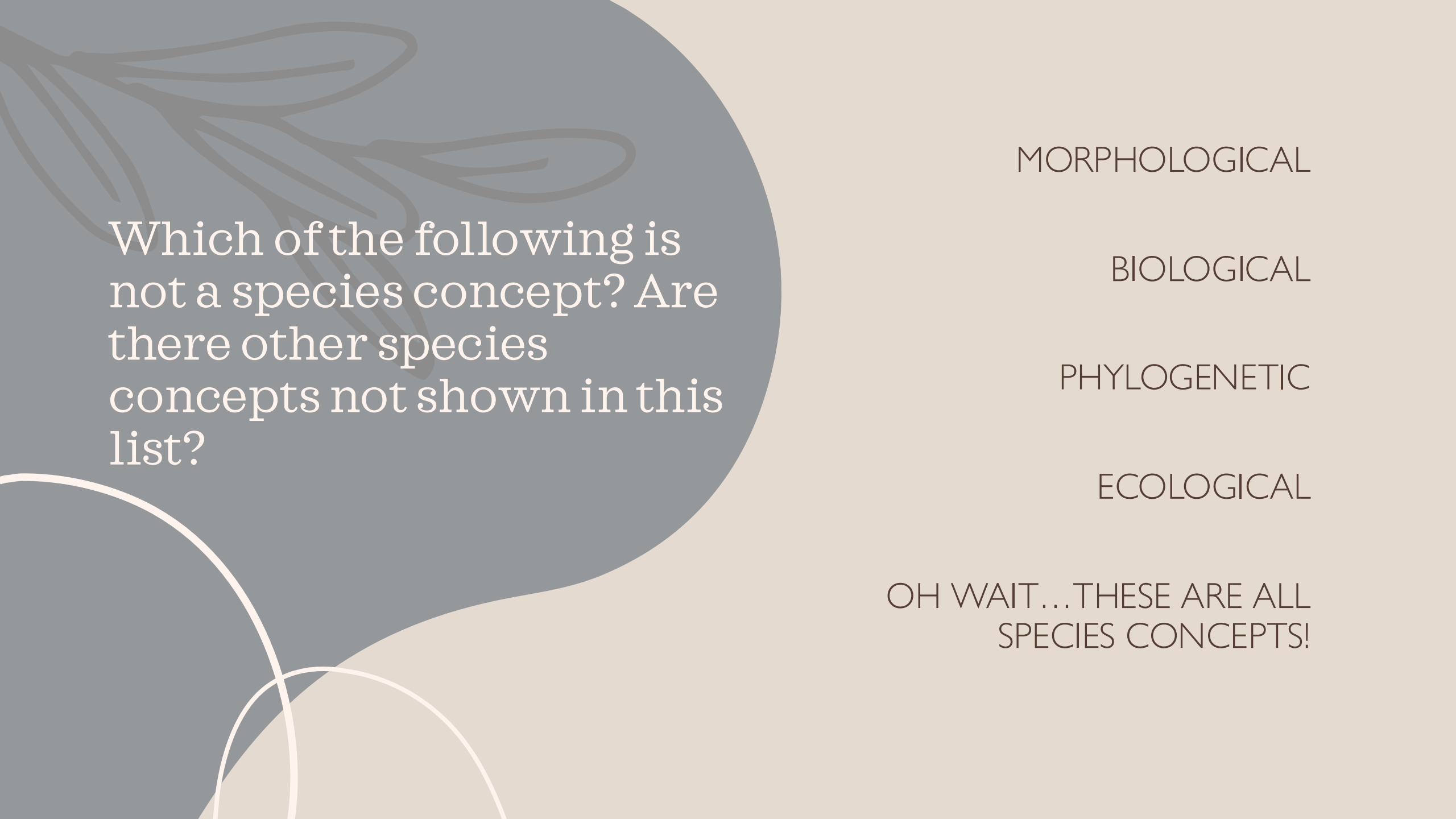
What is the founder effect?  
What is the bottleneck effect?





What is the effect of gene flow?  
How does it work?

Define Speciation. What 2 concepts are bridged by Speciation?



Which of the following is not a species concept? Are there other species concepts not shown in this list?

MORPHOLOGICAL

BIOLOGICAL

PHYLOGENETIC

ECOLOGICAL

OH WAIT...THESE ARE ALL  
SPECIES CONCEPTS!

What are the  
limitations of the  
Morphological  
species concept?

How about  
Biological?

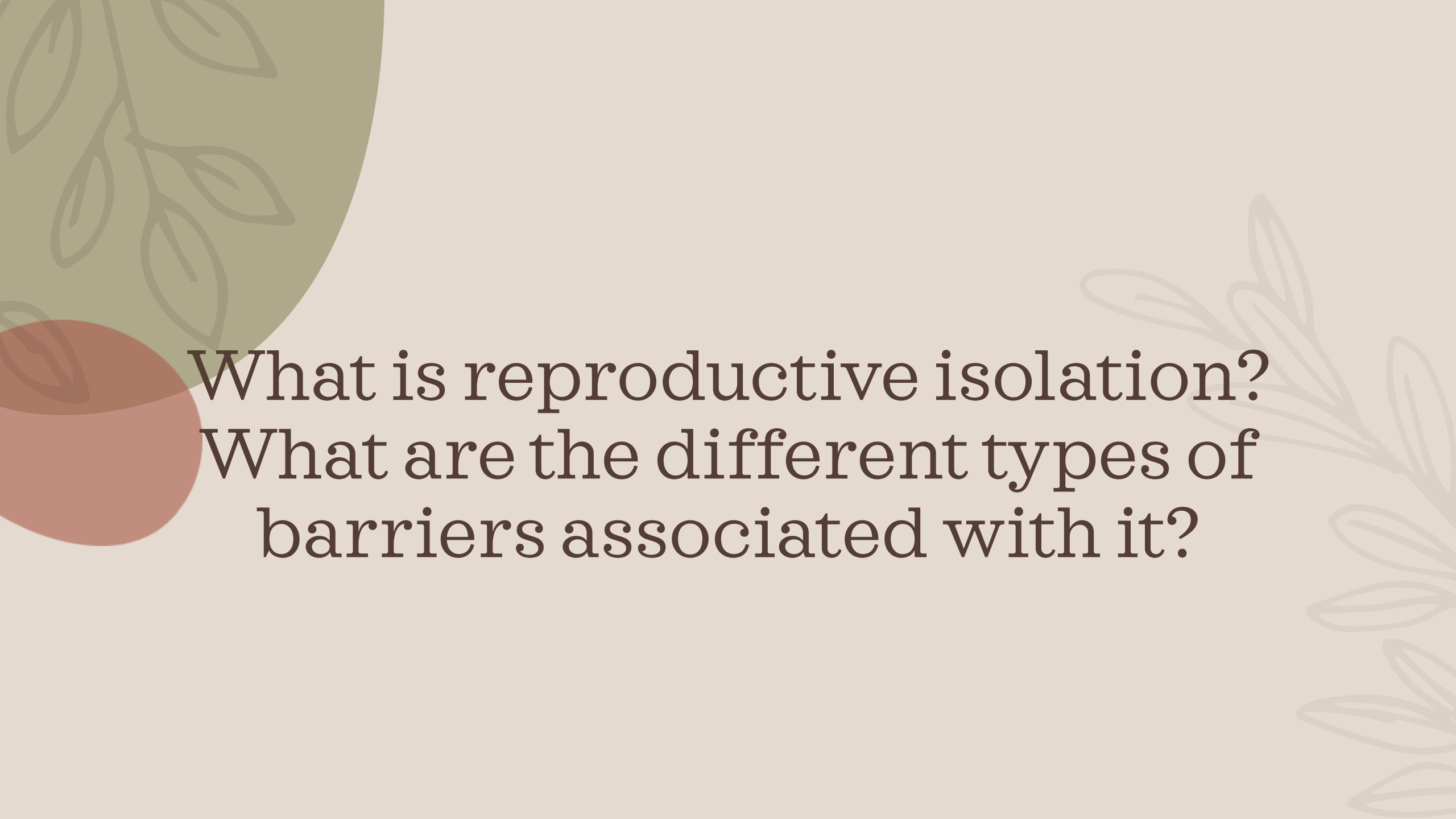
Phylogenetic?



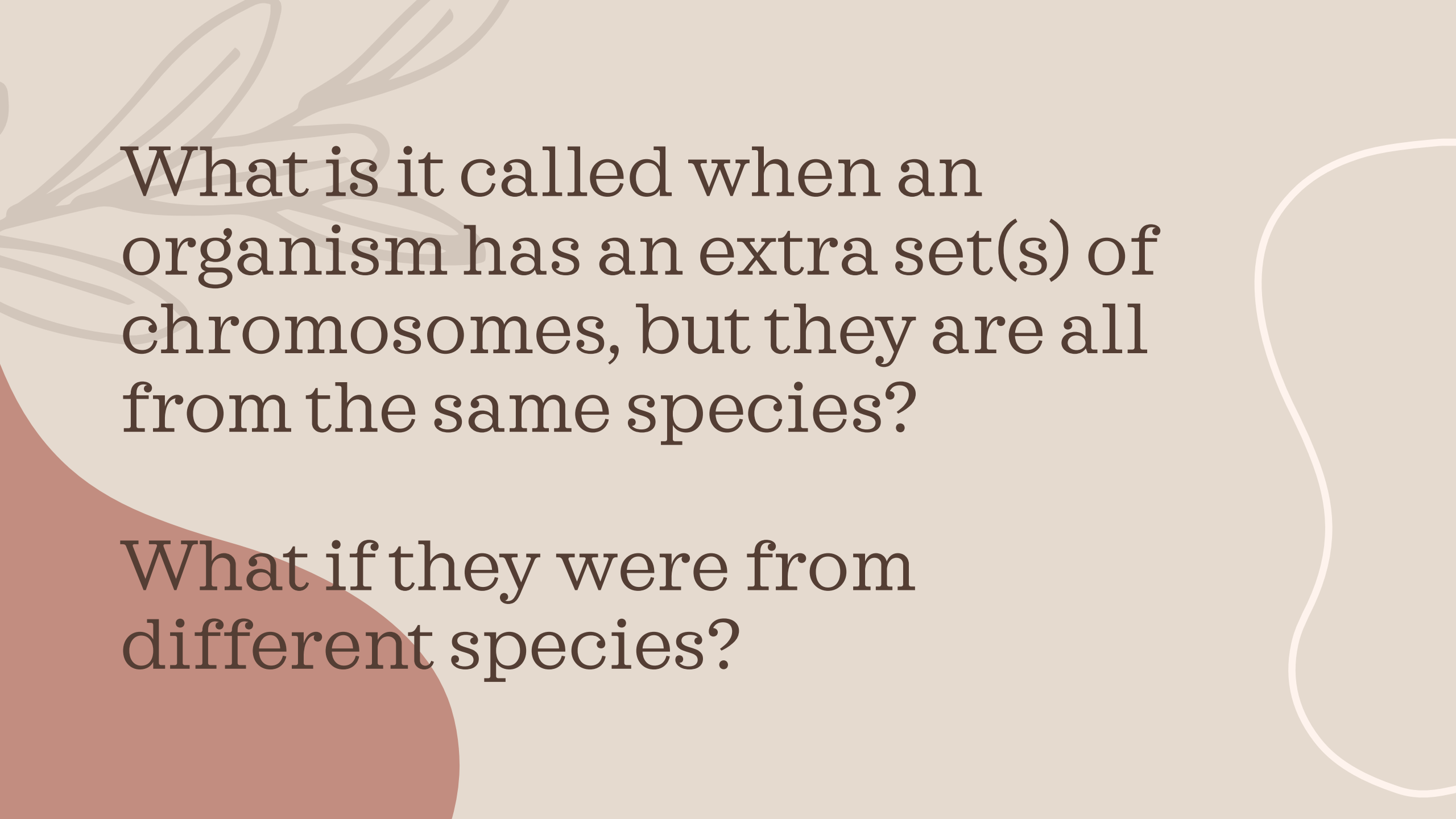
Which of the following types of speciation requires a physical, geological barrier to form within a population?

Allopatric Speciation

Sympatric Speciation



What is reproductive isolation?  
What are the different types of  
barriers associated with it?



What is it called when an organism has an extra set(s) of chromosomes, but they are all from the same species?

What if they were from different species?

# Match the hybrid zone outcome to its meaning

Reinforcement

- Hybrid zone and 2 divergent species persist as is. Species don't diverge more or less, and hybrid zone remains constant. (Usually a temporary outcome)

Fusion

- 2 Divergent species re-converge to one species again and hybrid zone dissipates as a result

Stability

- 2 Divergent species diverge further and further until hybrid zone dissipates as a result



# Phylogenetic trees, different types, their parts, and how to read them



A stylized, dark grey leaf graphic with several pointed lobes, positioned in the upper left corner of the slide.

Which of the definitions  
defines a monophyletic  
group?

A) AN ANCESTRAL SPECIES  
AND SOME BUT NOT ALL  
DESCENDANTS

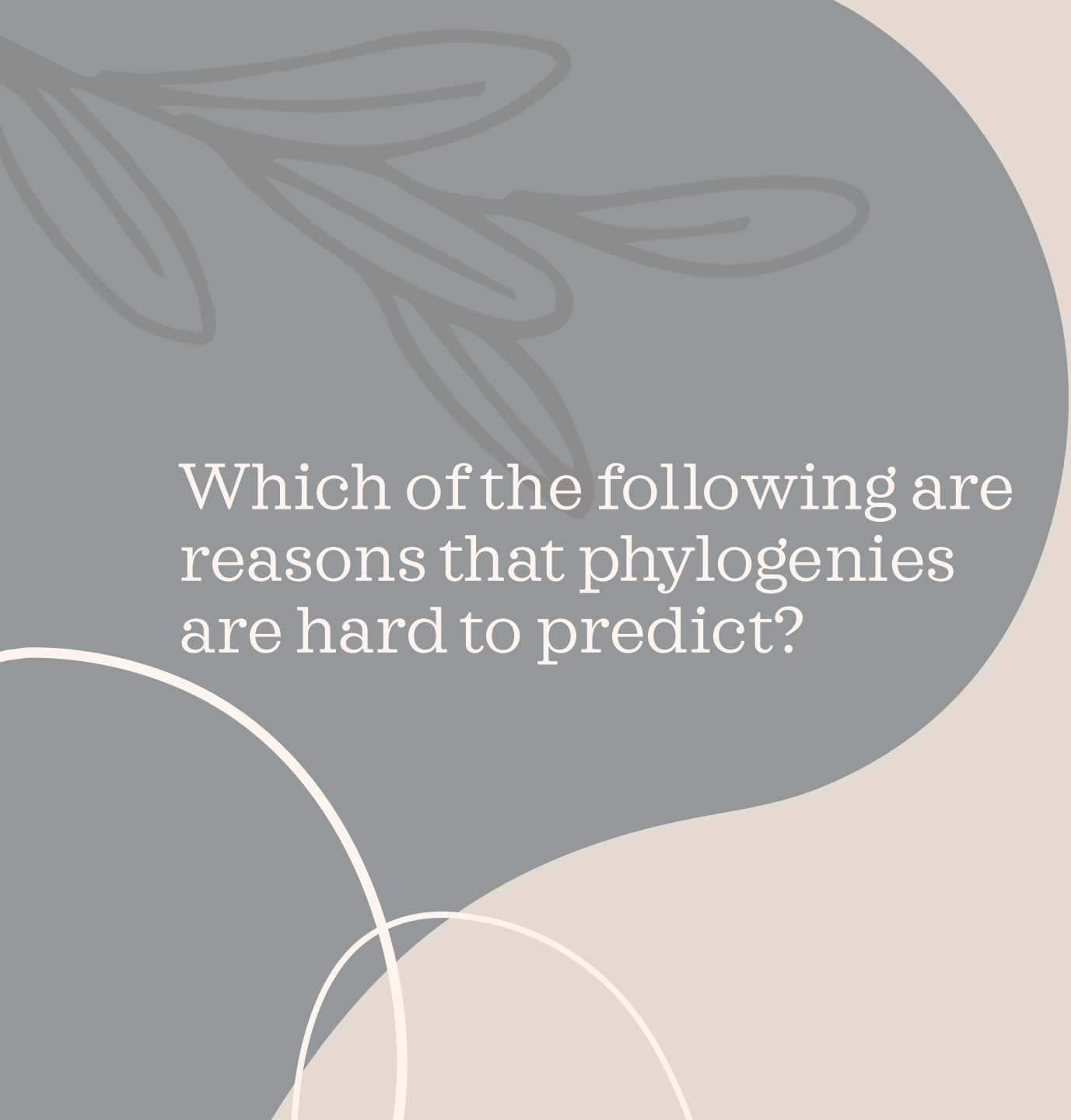
B) AN ANCESTRAL SPECIES  
AND ALL OF ITS  
DESCENDANTS

C) DESCENDANTS FROM  
MULTIPLE DIFFERENT  
ANCESTRAL LINEAGES



Define the rule of parsimony? How  
is it applied?

What is the difference between  
maximum parsimony and  
maximum likelihood?



Which of the following are reasons that phylogenies are hard to predict?

- A) HUGE DIFFERENCES MAKE ORGANISMS HARD TO COMPARE
- B) VERY SMALL SIMPLE ORGANISMS ARE HARD TO DIFFERENTIATE DUE TO FEW FEATURES
- C) LACK OF FOSSIL RECORD
- D) CONVERGENT EVOLUTION
- E) ALL OF THE ABOVE

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What is horizontal gene transfer?  
What can cause it?

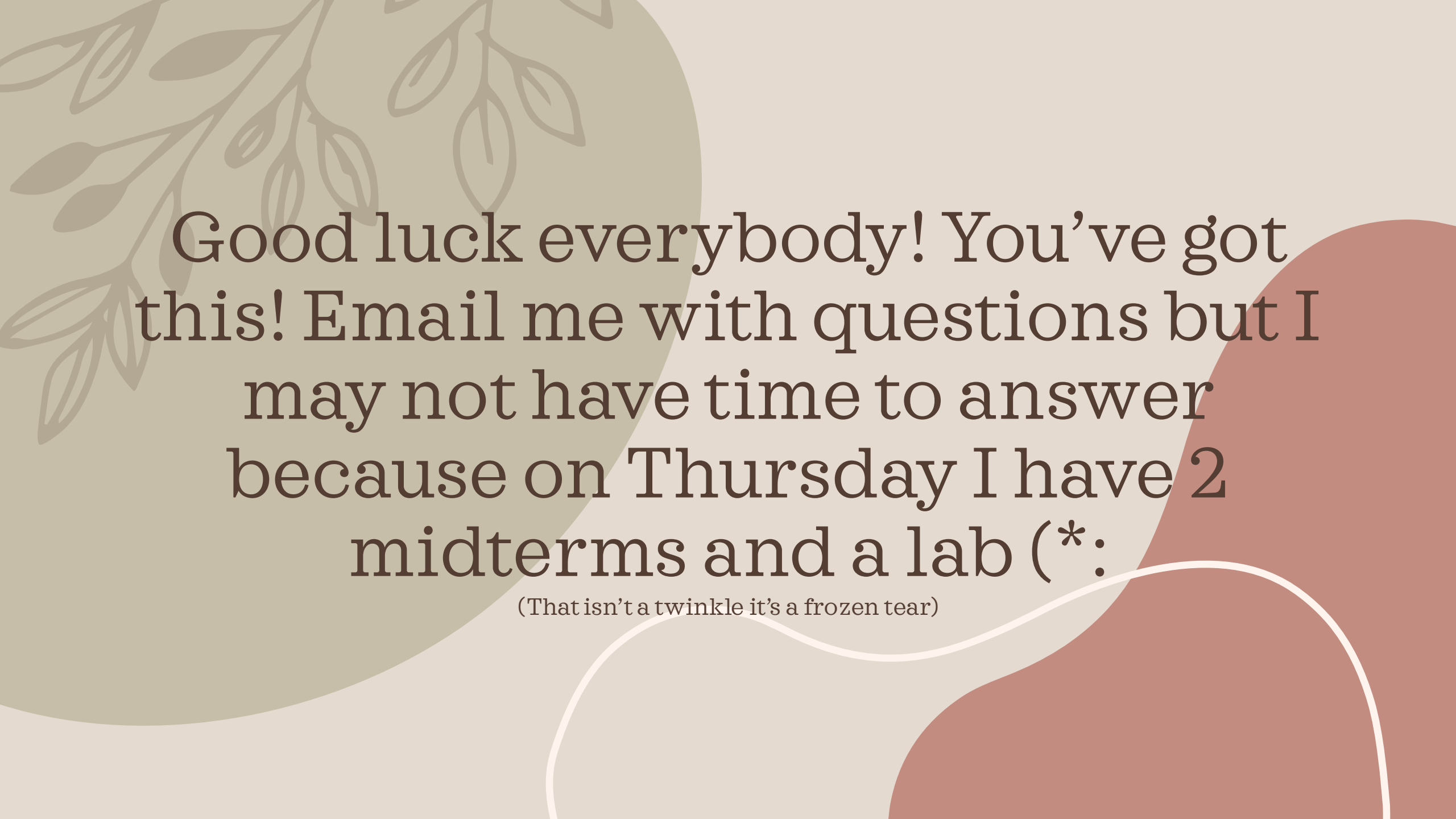
# History of life in a nutshell

Earth formed 4.6 billion years ago

Seas formed like  $\frac{1}{2}$  or  $\frac{3}{4}$  billion years later

Not much oxygen present in the atmosphere

- Abiotic synthesis of small organic molecules (chemical reactions make small molecules like nitrogen bases and stuff)
- Molecules join making macromolecules (remember last term...sugars and fatty acids making fats and polysaccharides...)
- Packaging of molecules into protocells (basically a drop of water or some other liquid that had its own special chemistry happening within that differed from that of the environment it was found in)
- Origin of self replicating molecules and systems (DNA replications, transcription, mitosis, etc.)
- Stromatolites (oldest fossils currently found, from 3.5 billion years)
- Only prokaryotes seen until about  $1 \frac{1}{2}$  billion years after



Good luck everybody! You've got  
this! Email me with questions but I  
may not have time to answer  
because on Thursday I have 2  
midterms and a lab (\*:

(That isn't a twinkle it's a frozen tear)