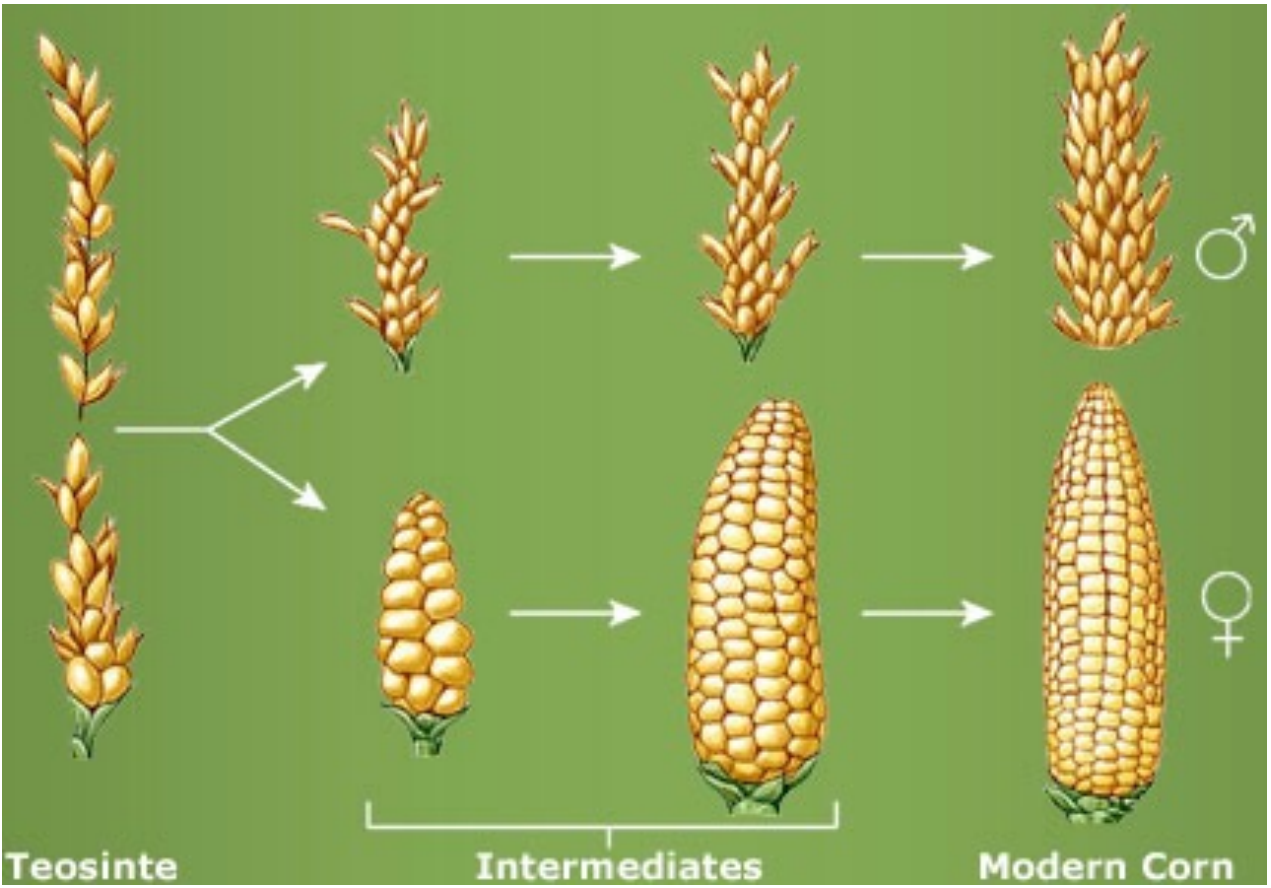
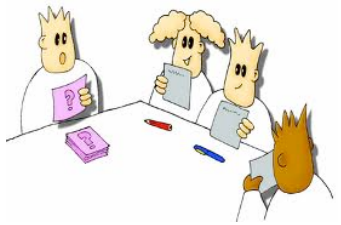
Evolutionary Evidence of Evolution

Evolution - the process in which relative changes in the **genetic** makeup (heritable characteristics) of a species occurs *over time*

eg. Human influence on *Zea mays*





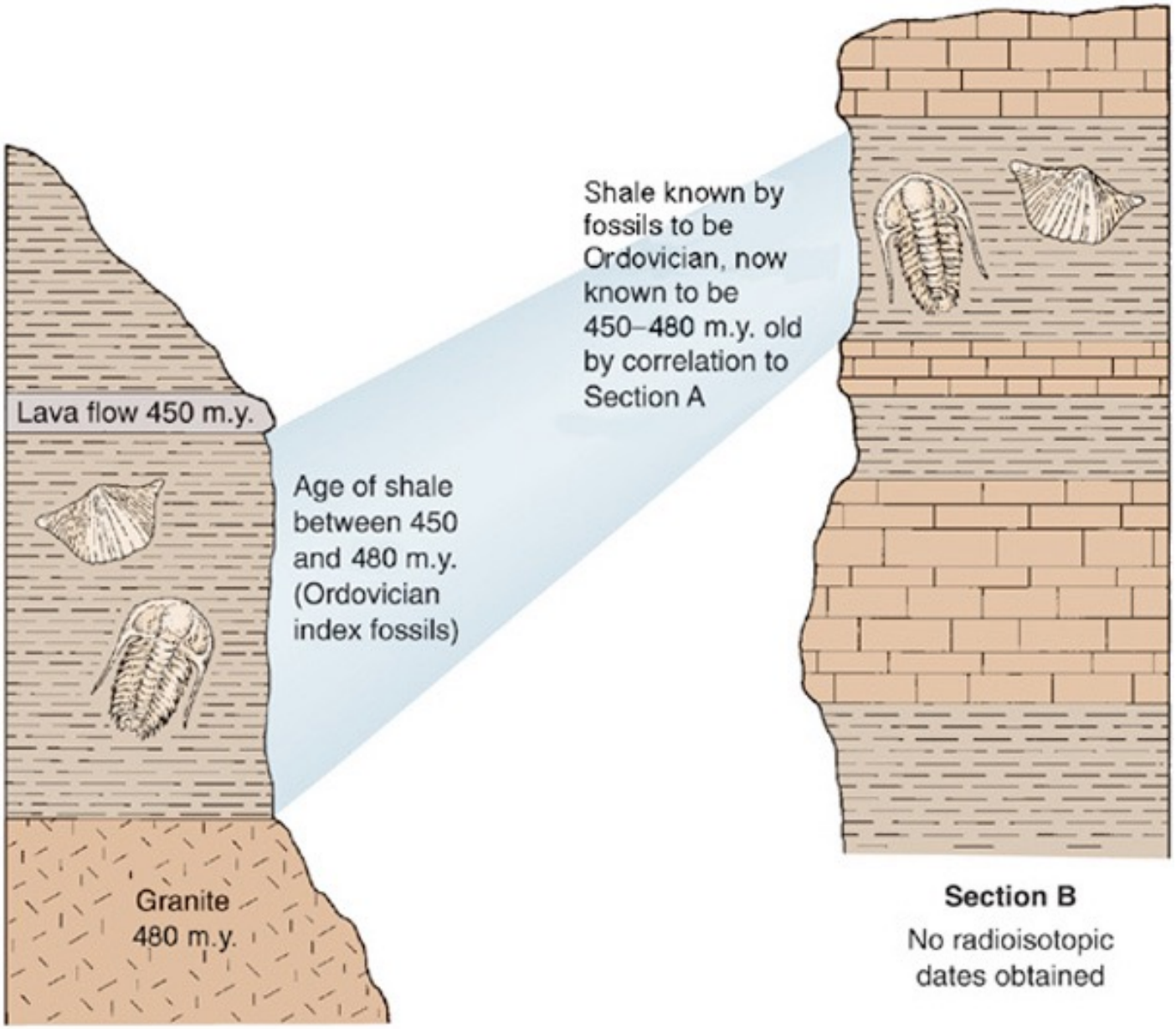
Fossil Find...

1. Day 1 (4 bones): *Type of animal suspected:* _____
2. Day 2 (3 more bones): _____
3. Day 3 (3 more bones): _____
4. Day 4 (collaboration): _____
5. What can you hypothesize about how and where this animal lives?
6. How did collaborating with others hinder or help your work?

EVIDENCE 1 - Fossils

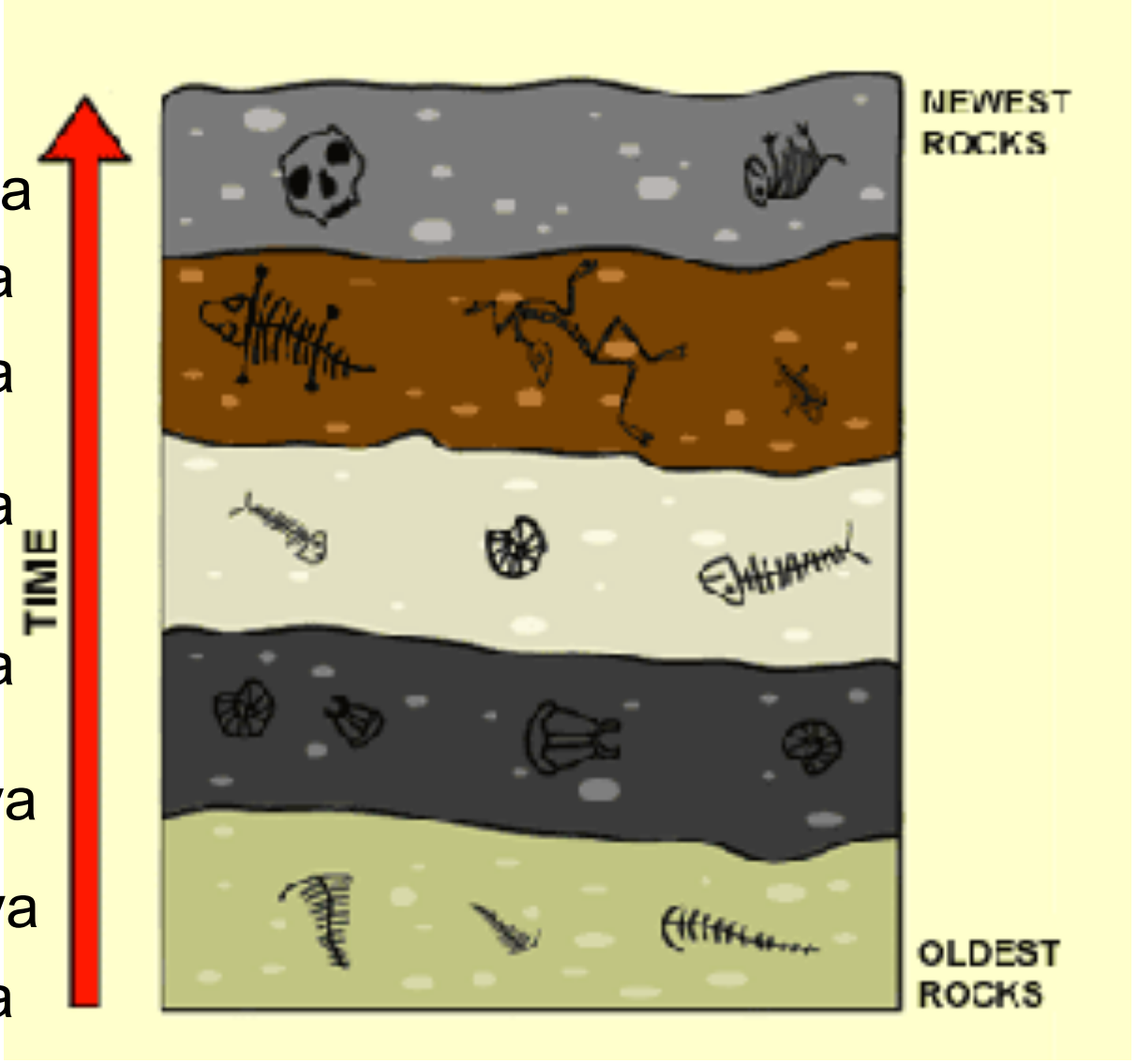
- provide evidence for the history of life
- Radiodating with isotopes determines time of change by the rock strata that the fossils are found in

glyptodont fossil vs modern day armadillo

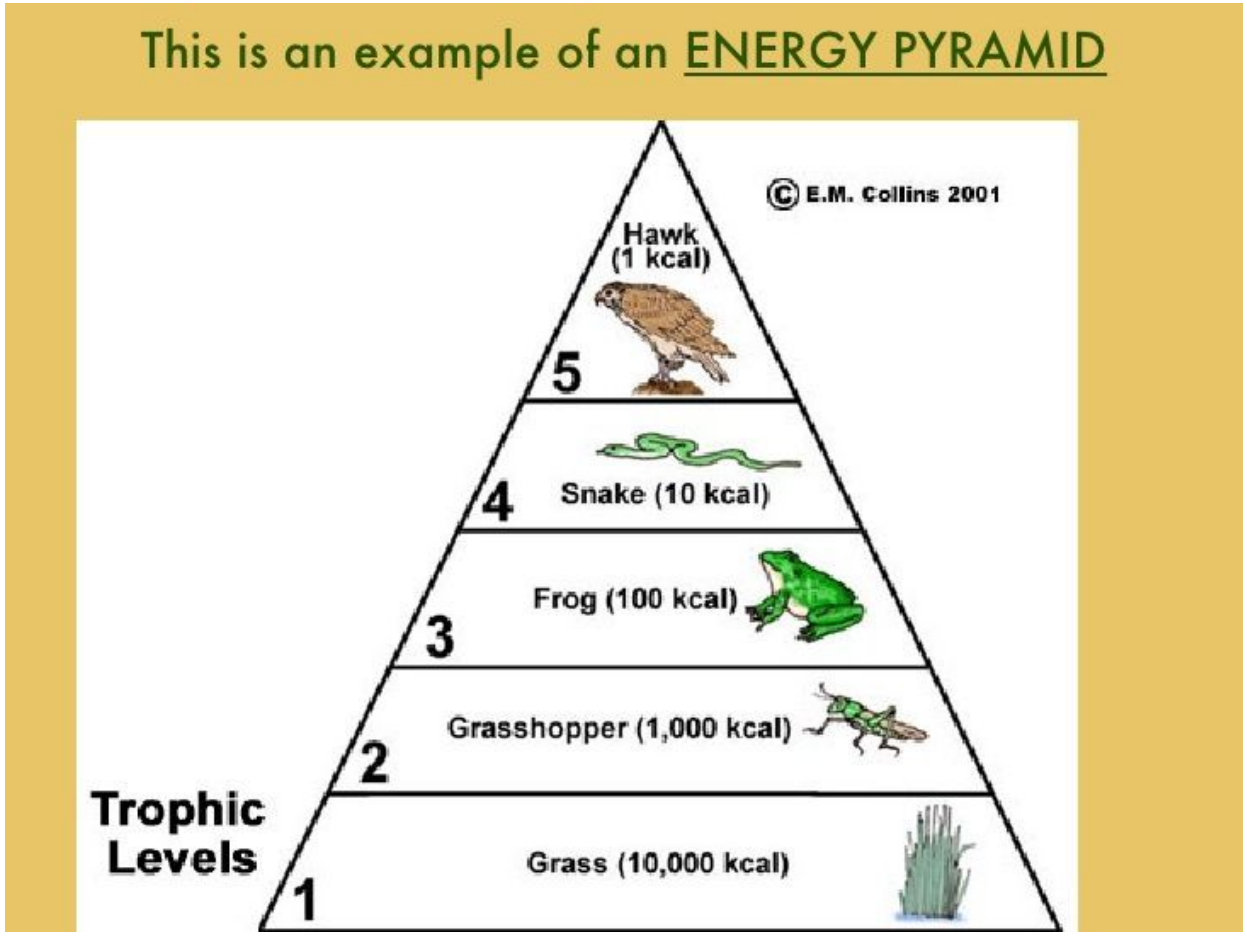

Lava flow 450 m.y.
Granite
480 m.y.
Age of shale between 450 and 480 m.y. (Ordovician index fossils)
Shale known by fossils to be Ordovician, now known to be 450–480 m.y. old by correlation to Section A
Section A
Some radioisotopic dates obtained
Section B
No radioisotopic dates obtained

- Fossils include: hard body parts (shells, teeth, bones), impressions of burrows, footprints, scats, chemical remains

- fossil record matches the sequence in which the world evolve



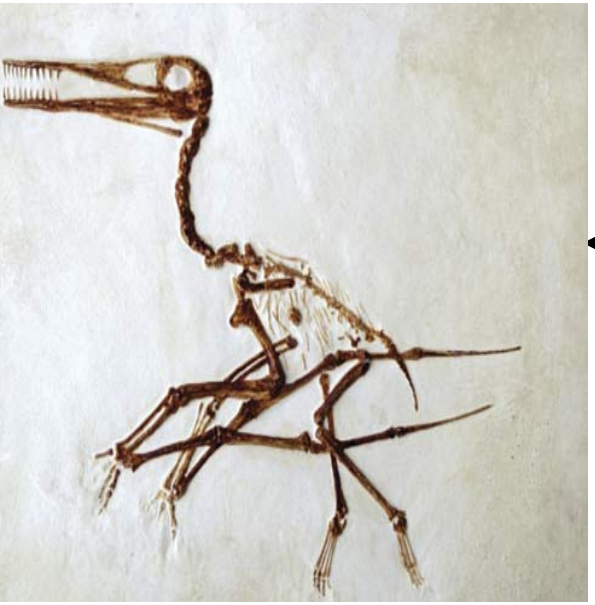
- fossil record matches the evolution of ecology

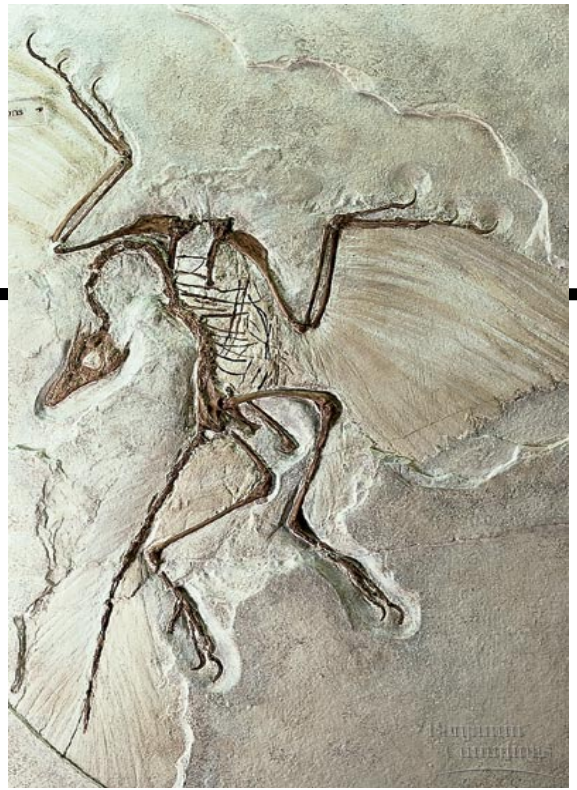


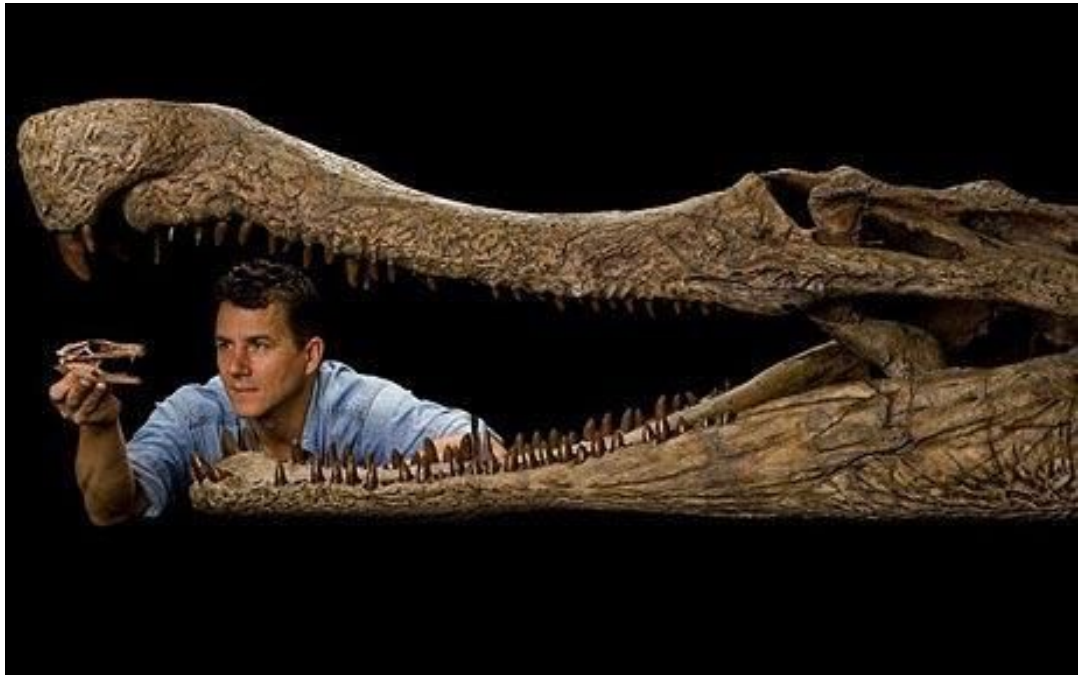
evolved most recent

evolved first

- many fossils are **transitional fossils** or **links**
- shows intermediate step of evolution between groups of organisms,
- share intermediate characteristics to two separate groups
- *eg. Archeopteryx is the link between ancient reptiles and modern birds*



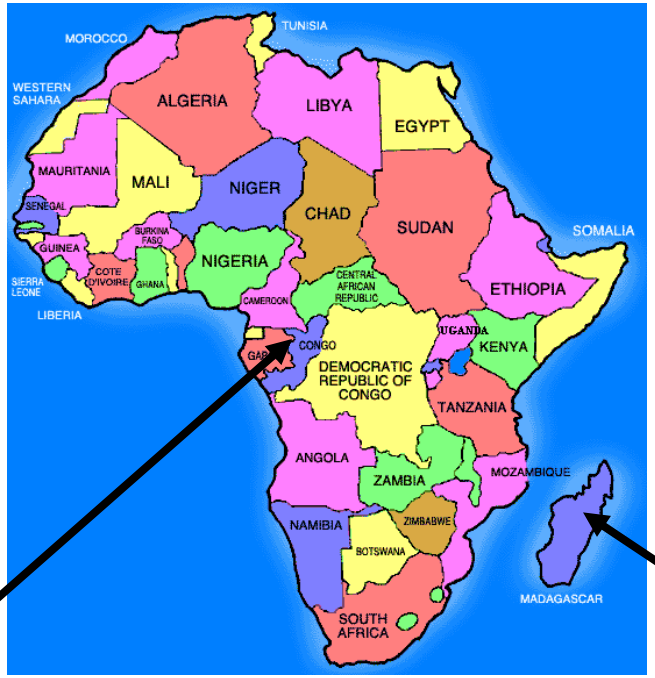




EVIDENCE 2

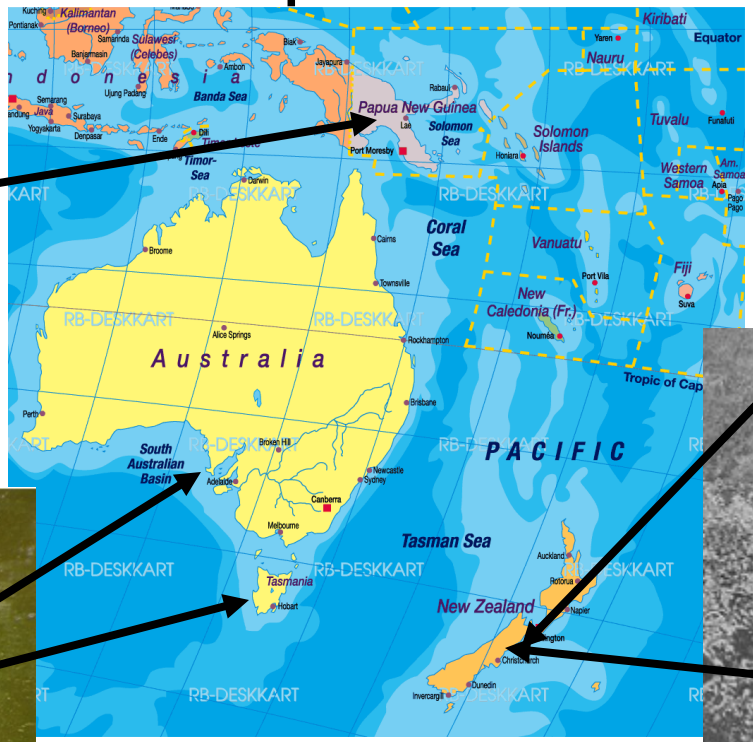
Evidence 2

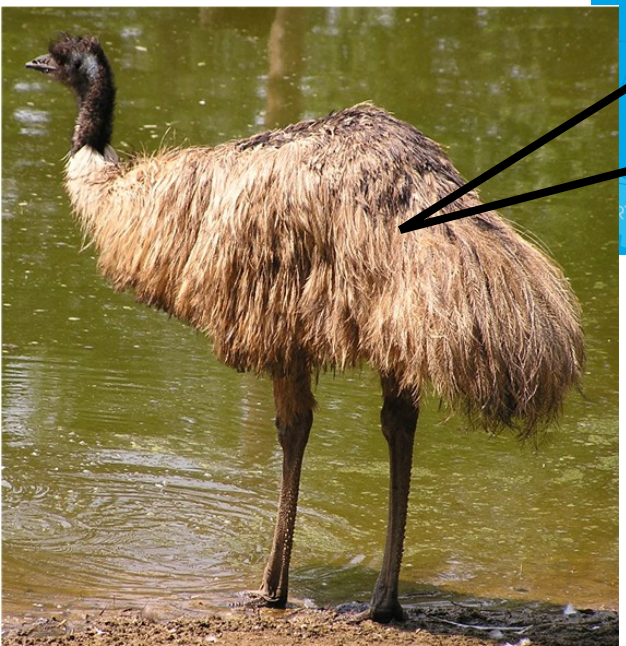
Geographical Distribution Patterns of Species

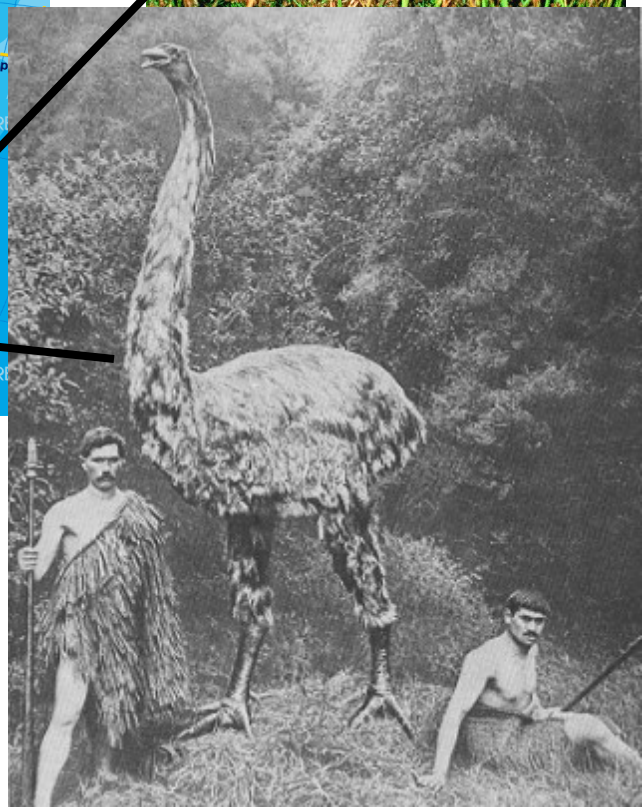


Evidence 2

Geographical Distribution Patterns of Species







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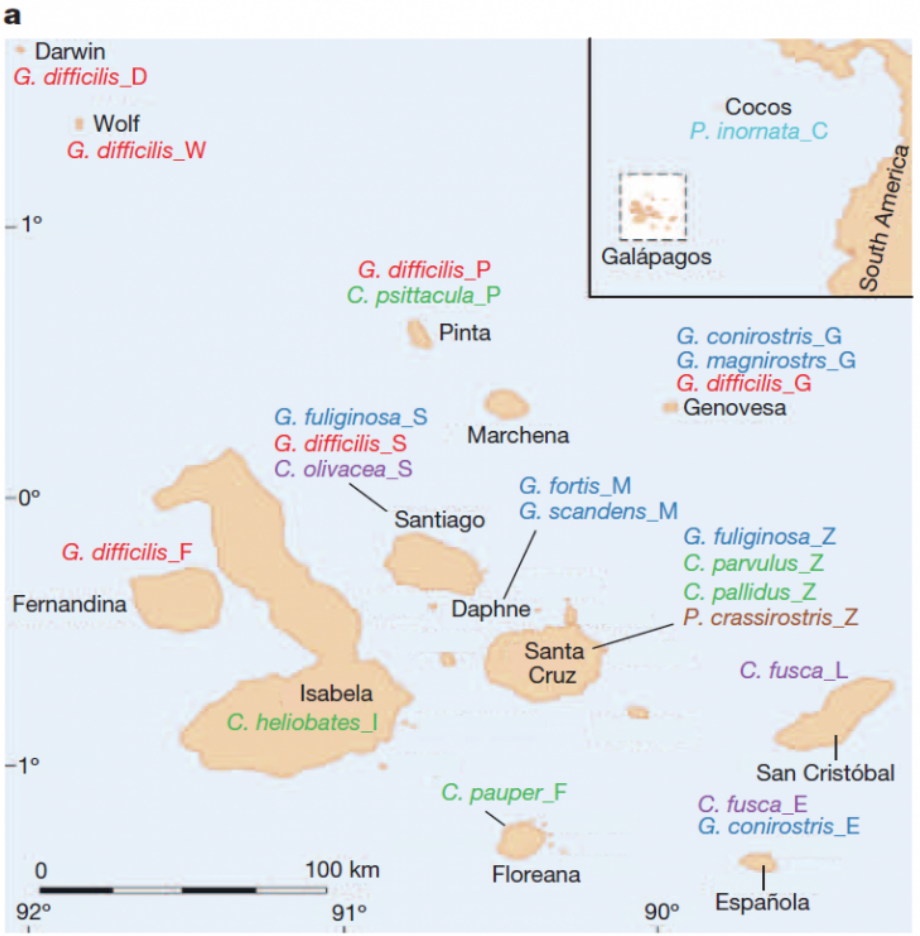


Geographical Distribution Patterns of Species

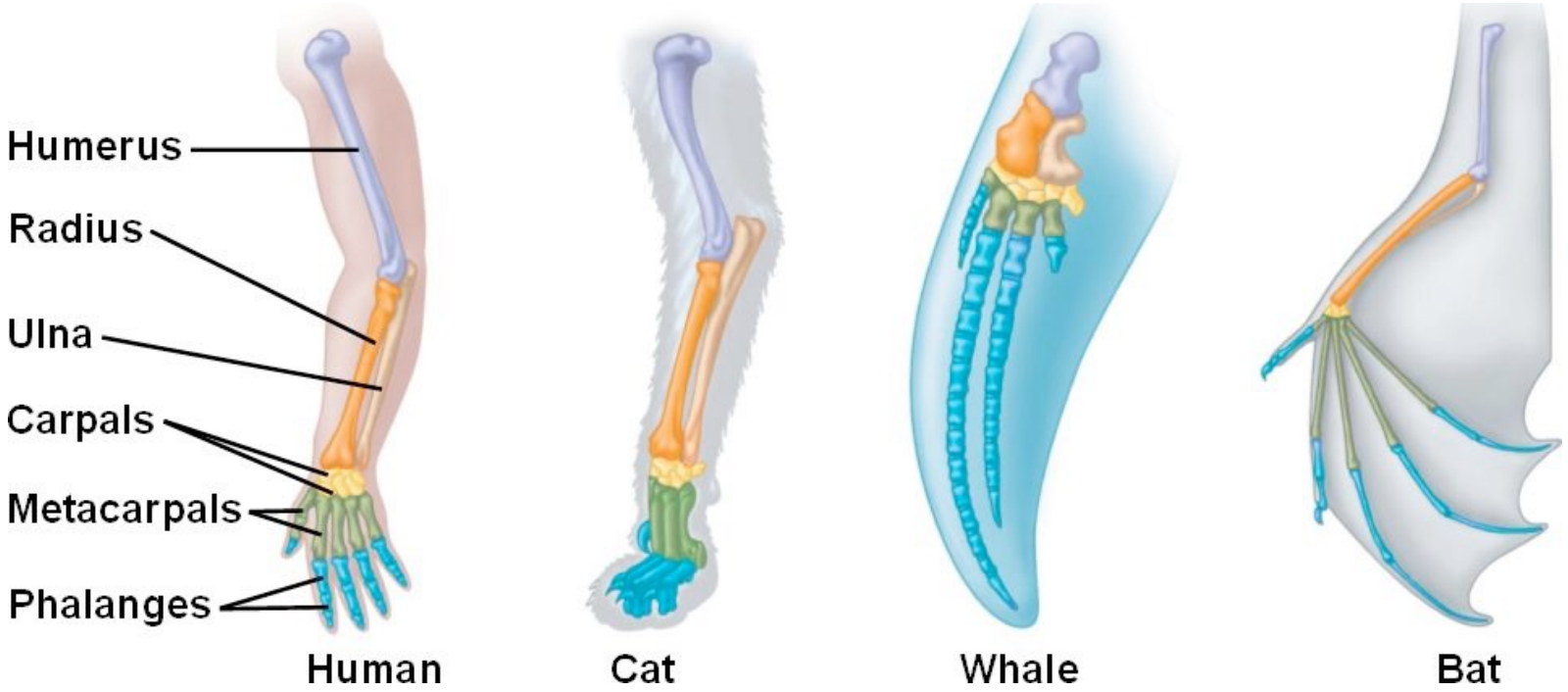
- places that have separated in more recent evolutionary time show a similarity in their species. *eg Darwins finches*

- places that have been isolated for long periods of time show unique species diversity. *eg. Madagascar vs Africa*

Evidence 3

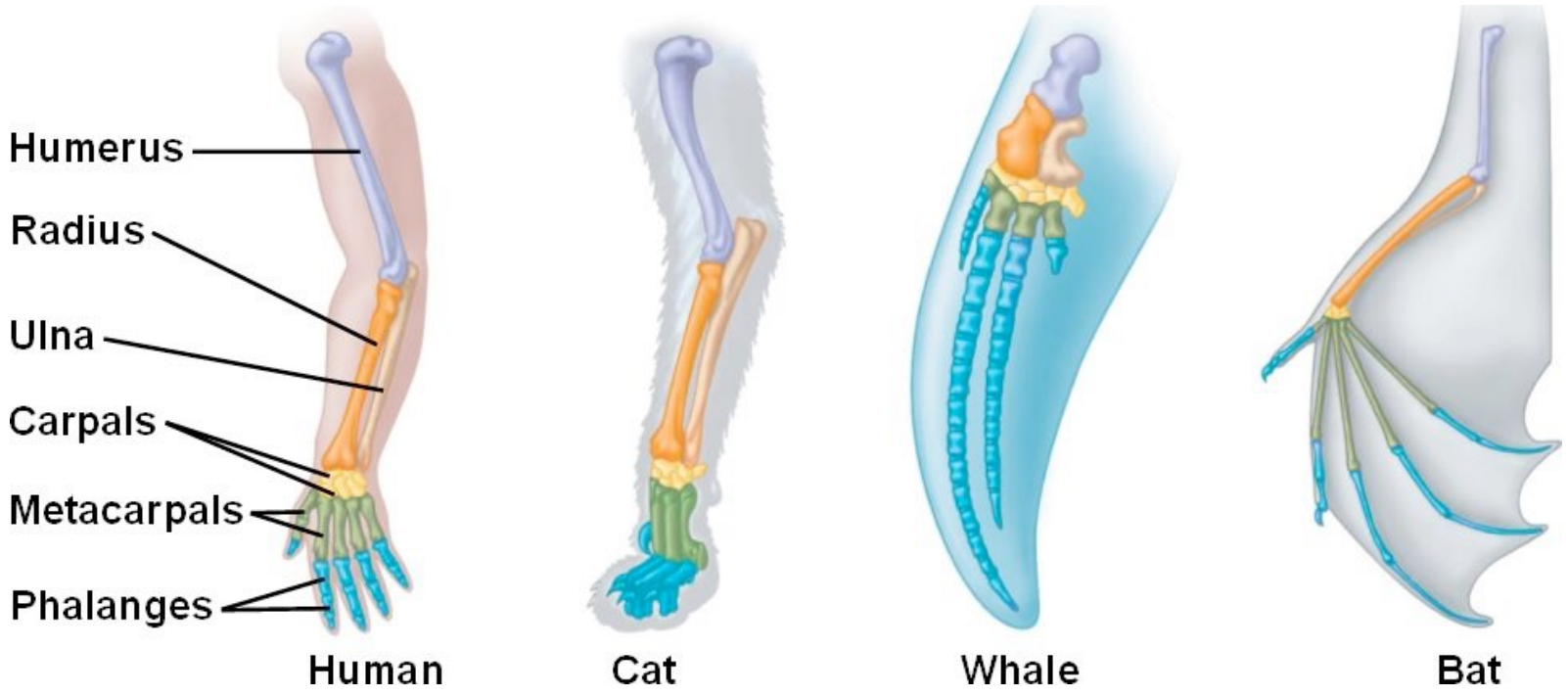
Homologous Structures

- species that have a close relationship show similar structure
- structures of the same origin may be used for different purposes *eg bat wing and human arm* (called **homologous structures**) (SUGGEST A COMMON ANCESTOR that was pentadactyl or five digit limbs)

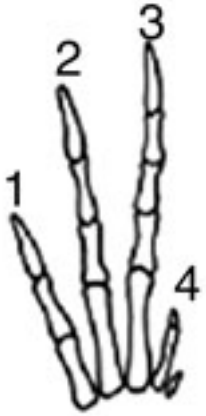


Evidence 3

Homologous Structures

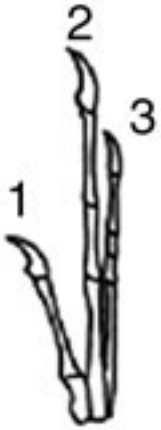


- Having a similar origin but evolving to form, but evolving to perform different function= ***adaptive radiation***

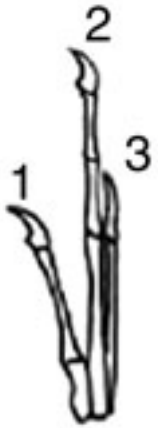


Herrerasaurus

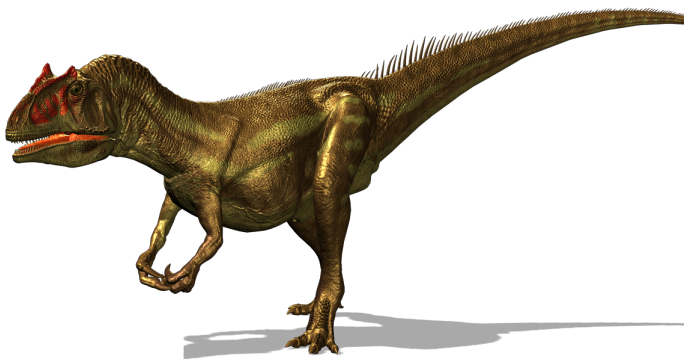
Allosaurus



Archaeopteryx

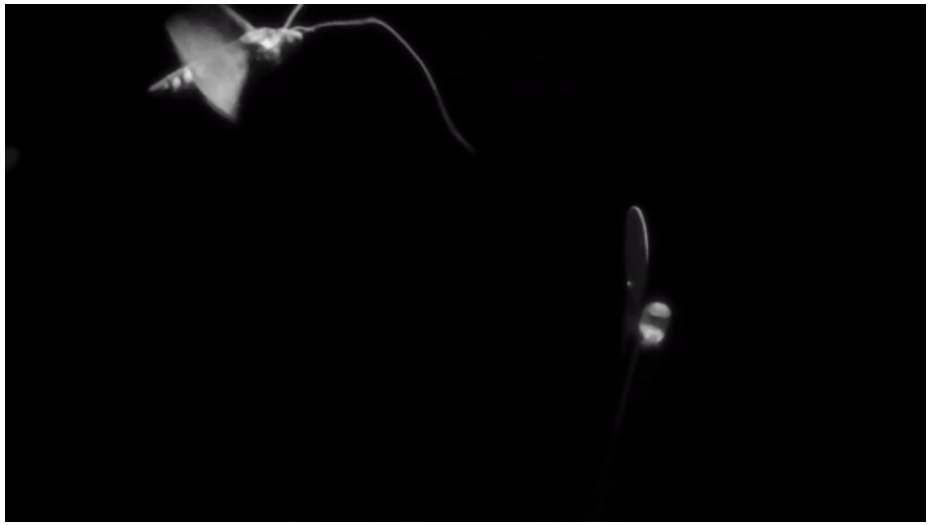


Gallus

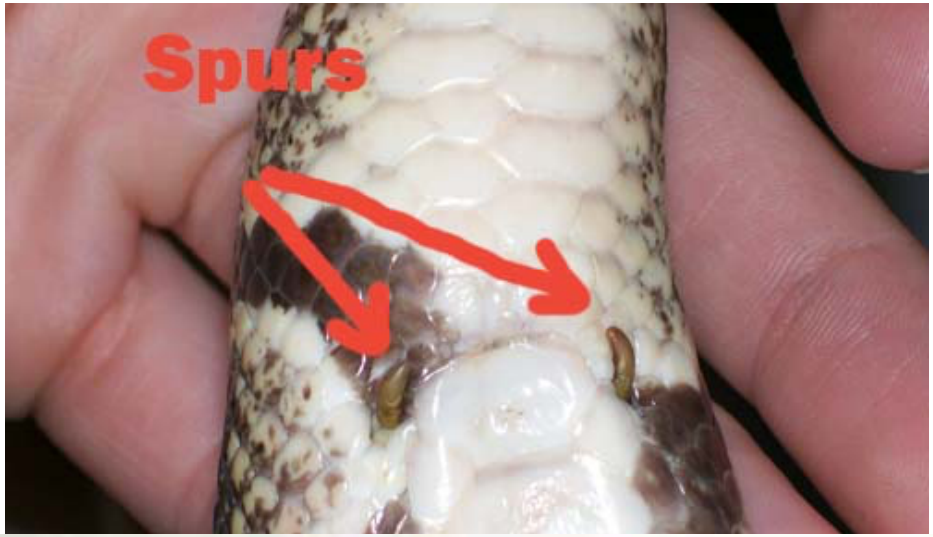


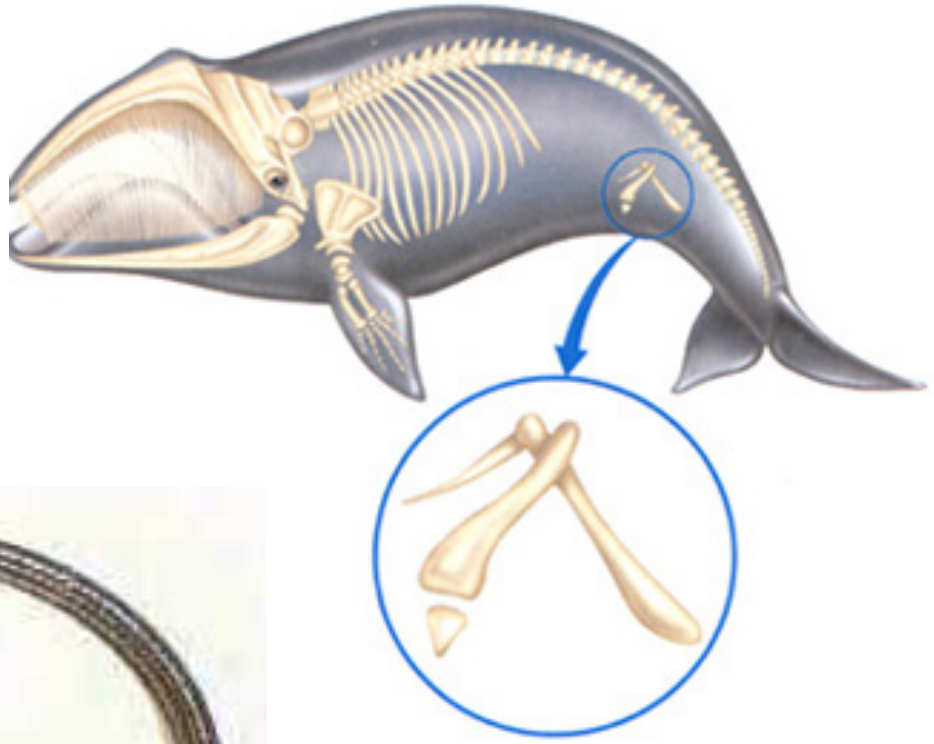
Evidence 3

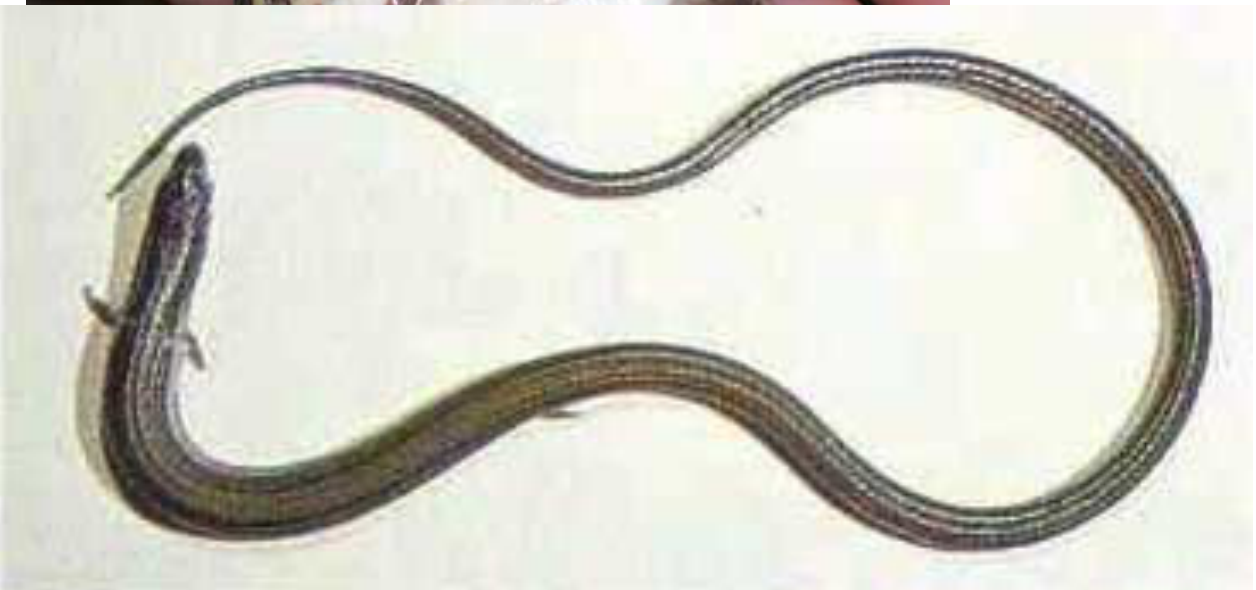
- Some structures may appear similar but have a different evolutionary origin *eg. Moth wing and Bird wing* (called **Analogous Structures**) (DO NOT SUGGEST A COMMON ANCESTOR)



Vestigial Structures - Structures that have lost much of their ancestral function. They suggest the past evolution of a species.



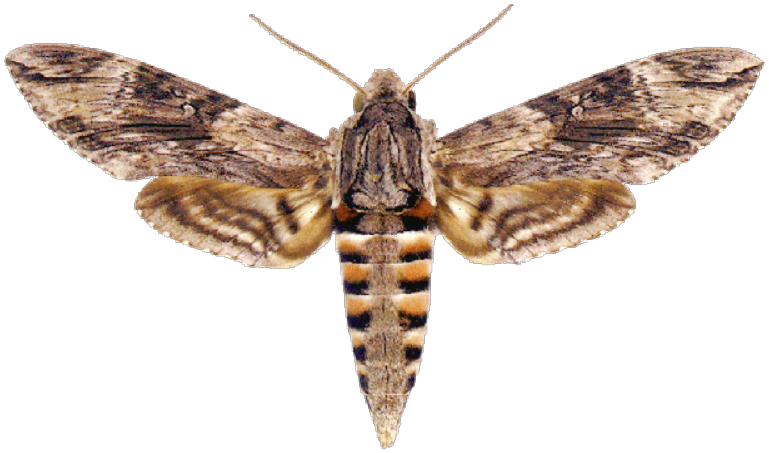




Evidence 3

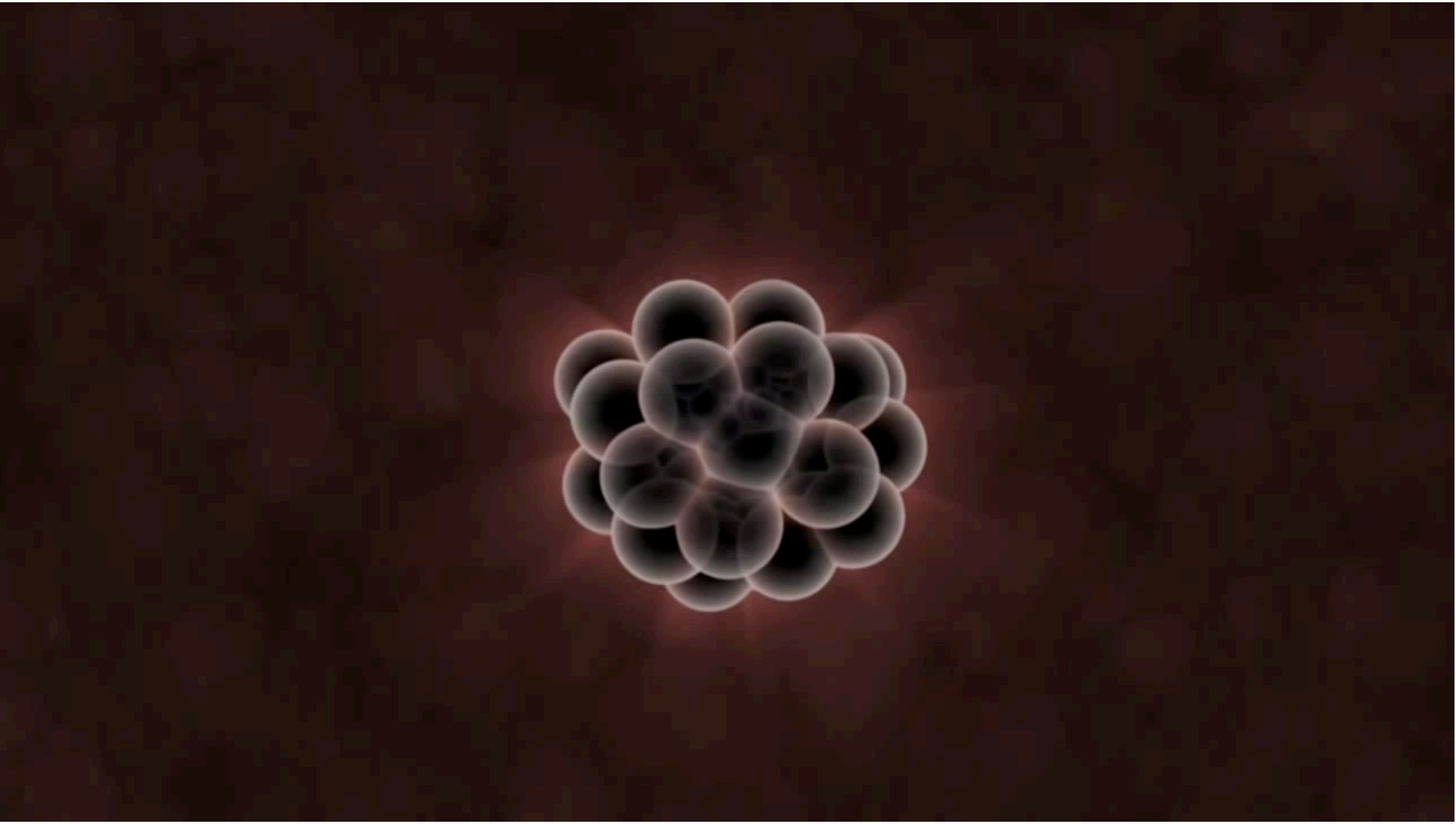
Anatomy

- Some structures may appear similar but have a different evolutionary origin *eg. Moth wing and Bird wing* (called **Analogous Structures**)



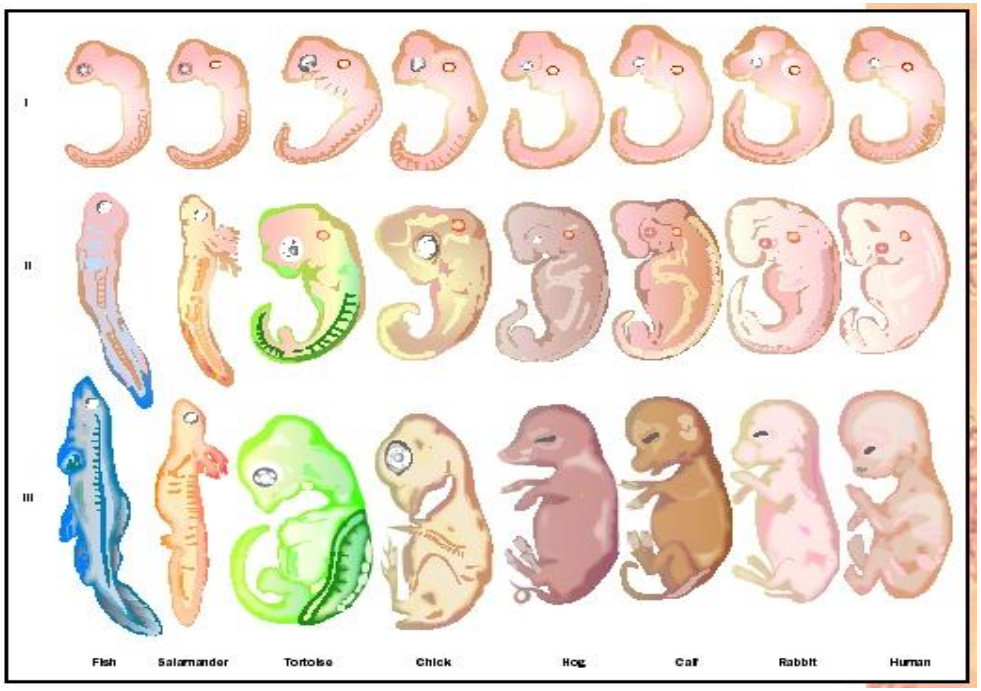
Evidence 4

Embryology



Evidence 4

Embryology



- related organisms have embryos that show similar stages of development (i.e., common ancestor)
- Scientist can determine when specific changes took place in evolution

Evidence 5

DNA

DNA Evidence 5

- Organisms with similar evolutionary backgrounds have similar DNA.
- Closely related species may have similar chromosome structure
- By comparing a percentage relationship, scientist can calculate the closest related species.


Homo sapiens atg gcc ctg tgg atg cgc ctc ctg ccc ctg ctg gcg ctg ctg gcc 45
Pan troglodytes atg gcc ctg tgg atg cgc ctc ctg ccc ctg ctg gtg ctg ctg gcc
Gorilla gorilla atg gcc ctg tgg atg cgc ctc ctg ccc ctg ctg gcg ctg ctg gcc
Pongo pygmaeus atg gcc ctg tgg atg cgc ctc ctg ccc ctg ctg gcg ctg ctg gcc
Canis lupis atg gcc ctc tgg atg cgc ctc ctg ccc ctg ctg gcc ctg ctg gcc
Homo sapiens ctc tgg gga cct gac cca gcc gca gcc ttt gtg aac caa cac ctg 90
Pan troglodytes ctc tgg gga cct gac cca gcc tcg gcc ttt gtg aac caa cac ctg
Gorilla gorilla ctc tgg gga cct gac cca gcc gcg gcc ttt gtg aac caa cac ctg
Pongo pygmaeus ctc tgg gga cct gac ccg gcc cag gcc ttt gtg aac cag cac ctg
Canis lupis ctc tgg gcg ccc gcg ccc acc cga gcc ttc gtt aac cag cac ctg

Ancient Fossil Species	AG**C** TTC GGA TTC T**A**G GGT AT**C** TTC TAG G**A**T CTA ATC GGG **G**AT A**AT**
SPECIES W	AG**C** TTC GGA TTC T**G**G GGT AT**C** TTC TAG G**A**T CTA ATC GGG **A**AT A**TT**
SPECIES X	AG**C** TTC GGA TTC T**G**G GGT AT**T** TTC TAG G**A**T CTA ATC GGG **A**AT A**TT**
SPECIES Z	AG**T** TTC GGA TTC T**G**G GGT AT**T** TTC TAG G**A**T CTA ATC GGG **A**AT A**TG**
SPECIES Y	AG**T** TTC GGA TTC T**G**G GGT AT**T** TTC TAG G**G**T CTA ATC GGG **A**AT A**TG**

Evidence 6

DNA

- Closer Species show similar DNA structure