



Thurs, Feb 9, 2017

Pick up: Structures ½ sheet

ISN pg 146 top half

Clicker

Today you will:

- Review-notes on ISN pg 146
- Evidence of Evolution Stations
- Formative Practice Quiz w Clicker

Homework/Planner:

- **Study!**
- **Turn in Stations Answers Friday, Summative Quiz**

# 10.4

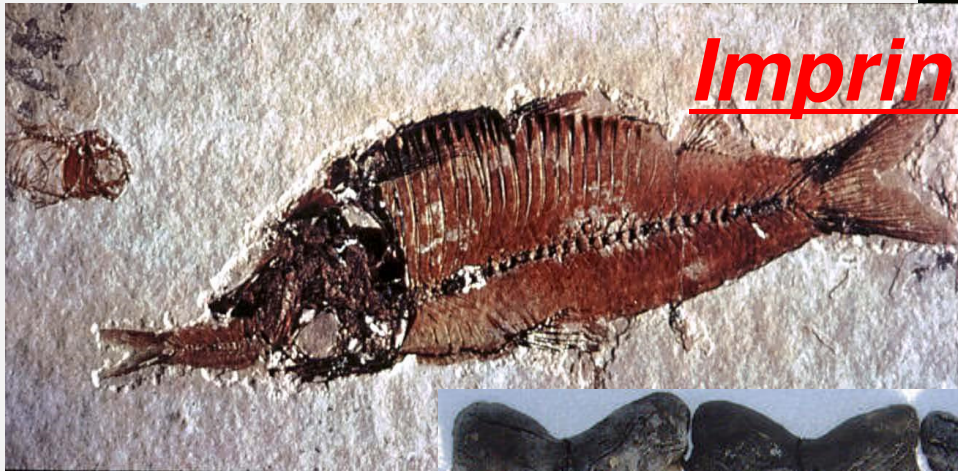
**9 minute video clip reviewing Evidence of Evolution**

[http://www.youtube.com/watch?v=cC8k2Sb1oQ8&safety\\_mode=true&persist\\_safety\\_mode=1&safe=active](http://www.youtube.com/watch?v=cC8k2Sb1oQ8&safety_mode=true&persist_safety_mode=1&safe=active)

# Evidence for Evolution

## 1<sup>st</sup> Type of Evidence..

THE FOSSIL RECORD is composed of...  
... actual remains...Or... imprint

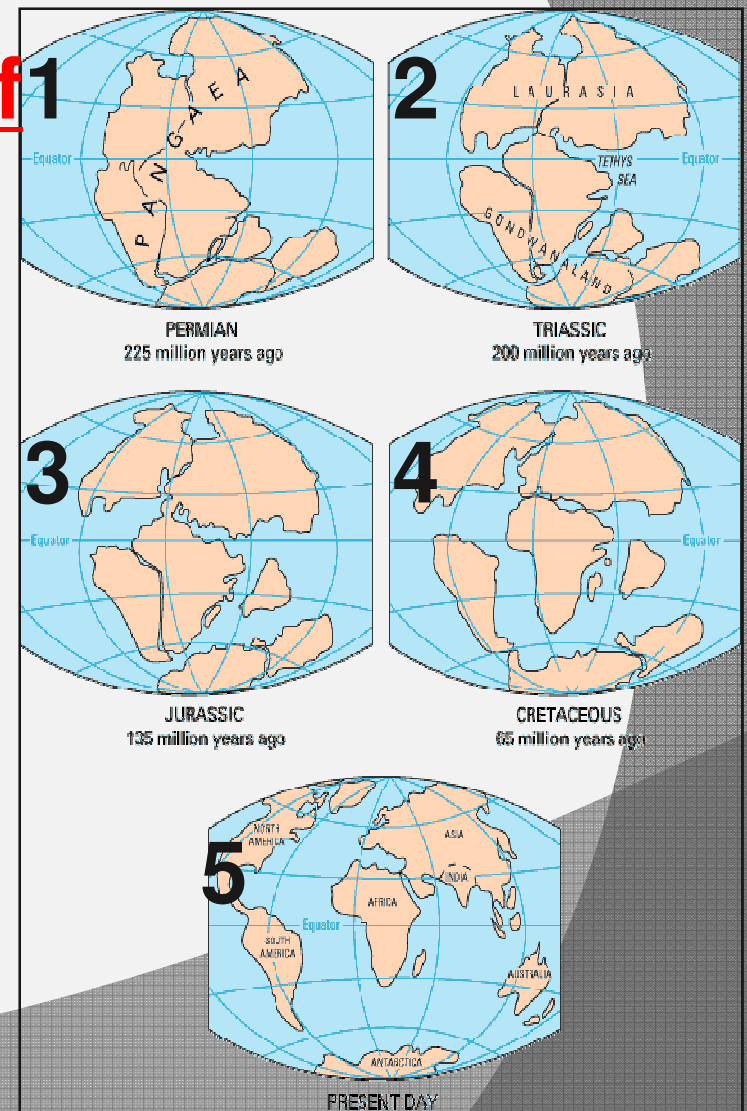


# 2<sup>nd</sup> Type of Evidence..

## BIOGEOGRAPHY/Continental Drift

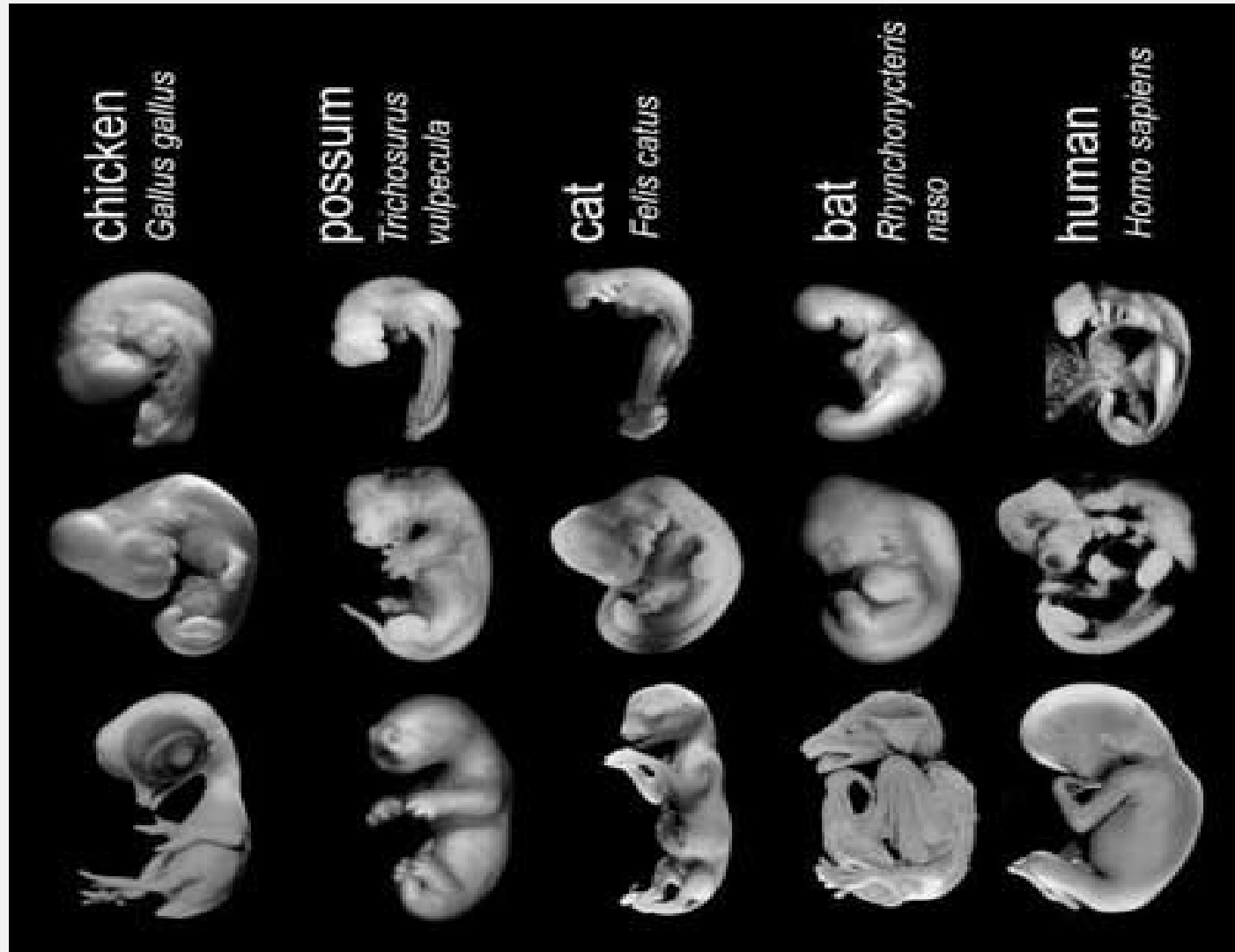
• Study of the distribution of plants & animals around world

• MAY INDICATE that living things in one area may share a common ancestor with similar living things in other areas



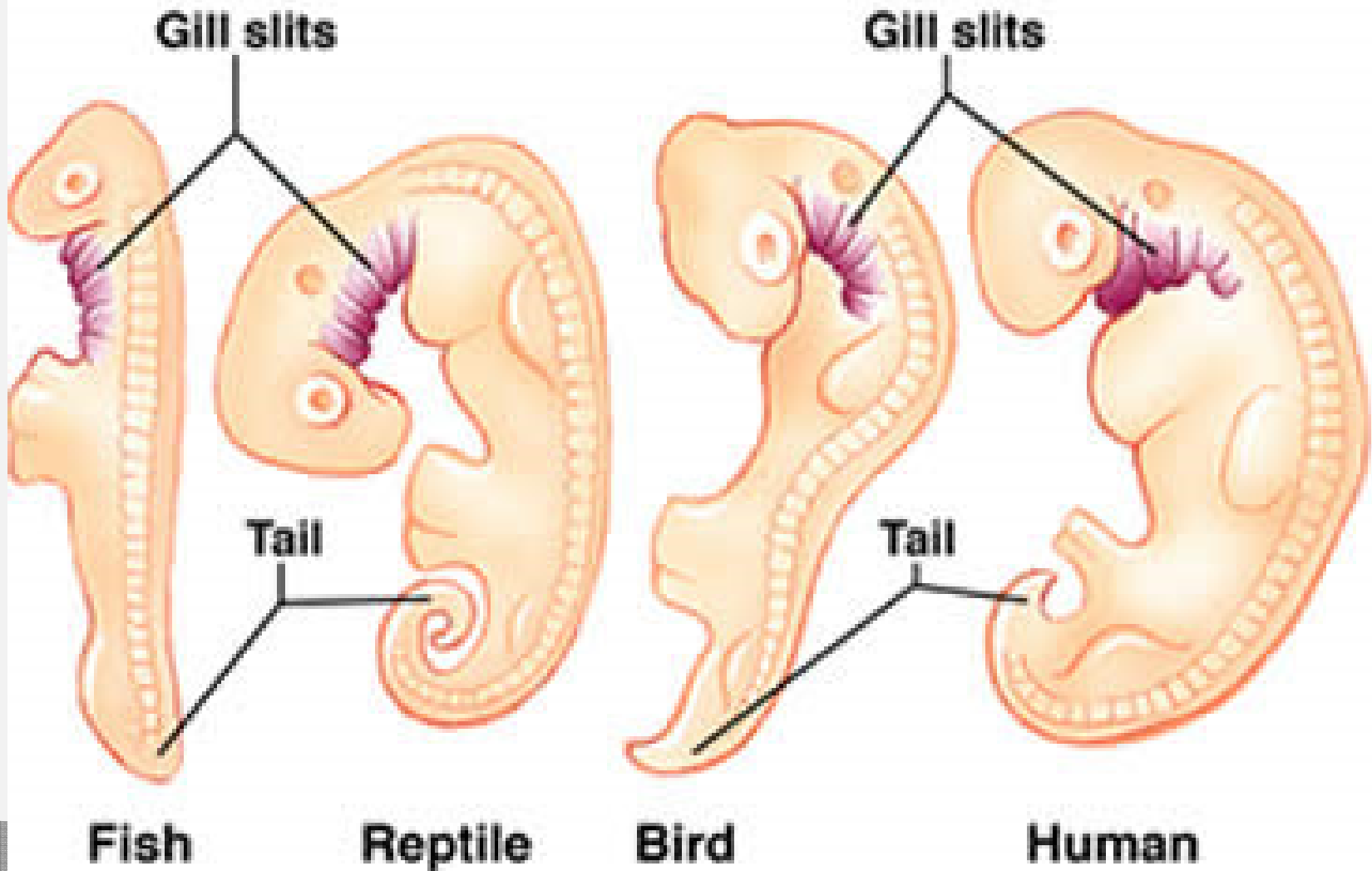
# 3<sup>rd</sup> Type of Evidence..

## EMBRYOLOGY Development



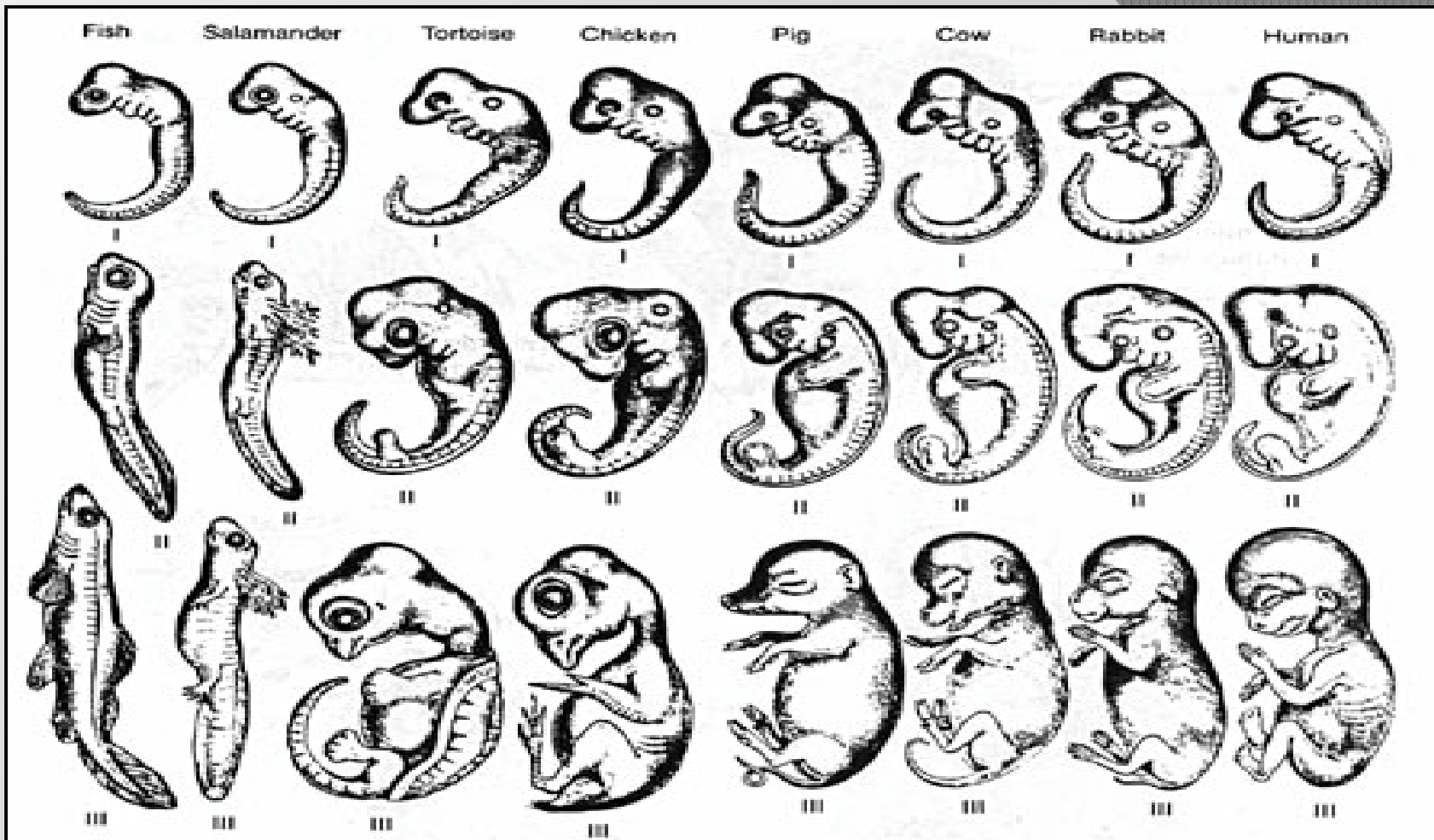
*Do we share a Common Ancestor?*

## Embryos and Evolutionary History





# Comparative Embryology



**Figure 3-10**

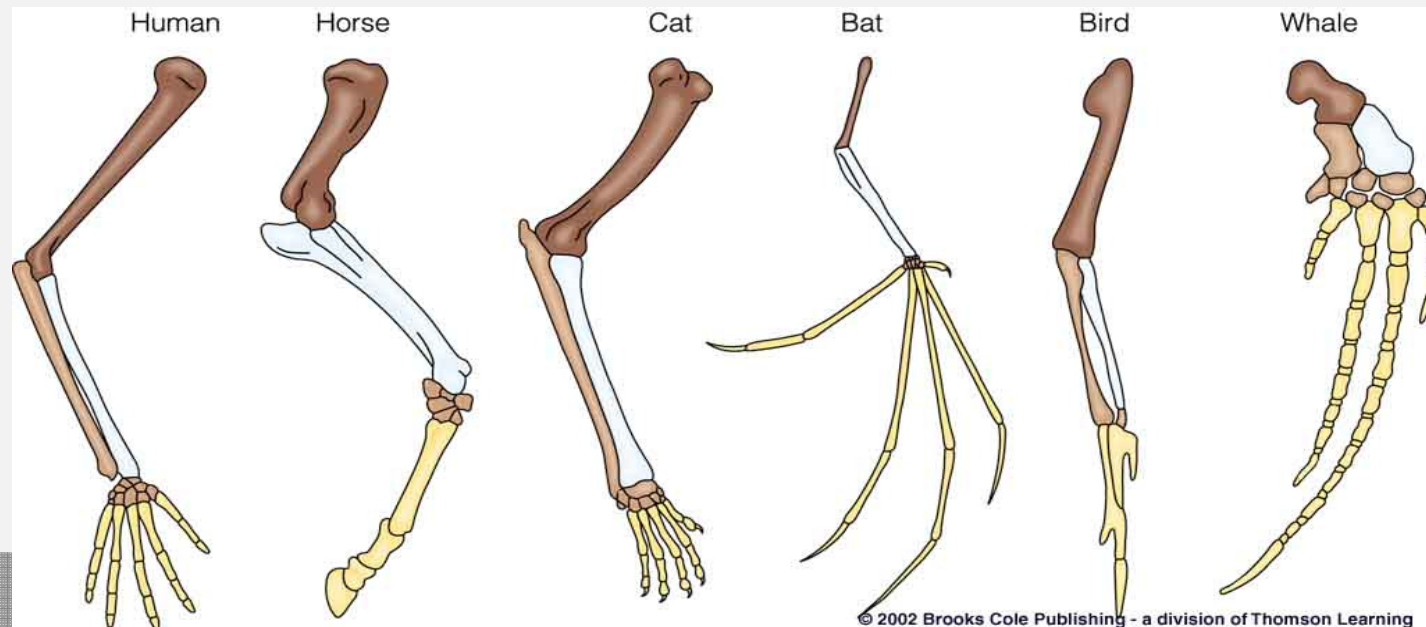
*A series of embryos of different vertebrates at comparable stages of development. The earlier the stage of development, the more strikingly similar are the different groups. Note that each of the embryos begins with a similar number of gill arches (pouches below the head) and a similar vertebral column. In later stages of development, these and other structures are modified to yield the various different forms. (The embryos in the different groups have been scaled to the same approximate size so that comparisons can be made between them.) (From Romanes, adapted from Haeckel.)*

# 4<sup>th</sup> Type of Evidence..

## ANATOMY : Homologous Structures

### ◎ **Parts that are similar in structure, but different function**

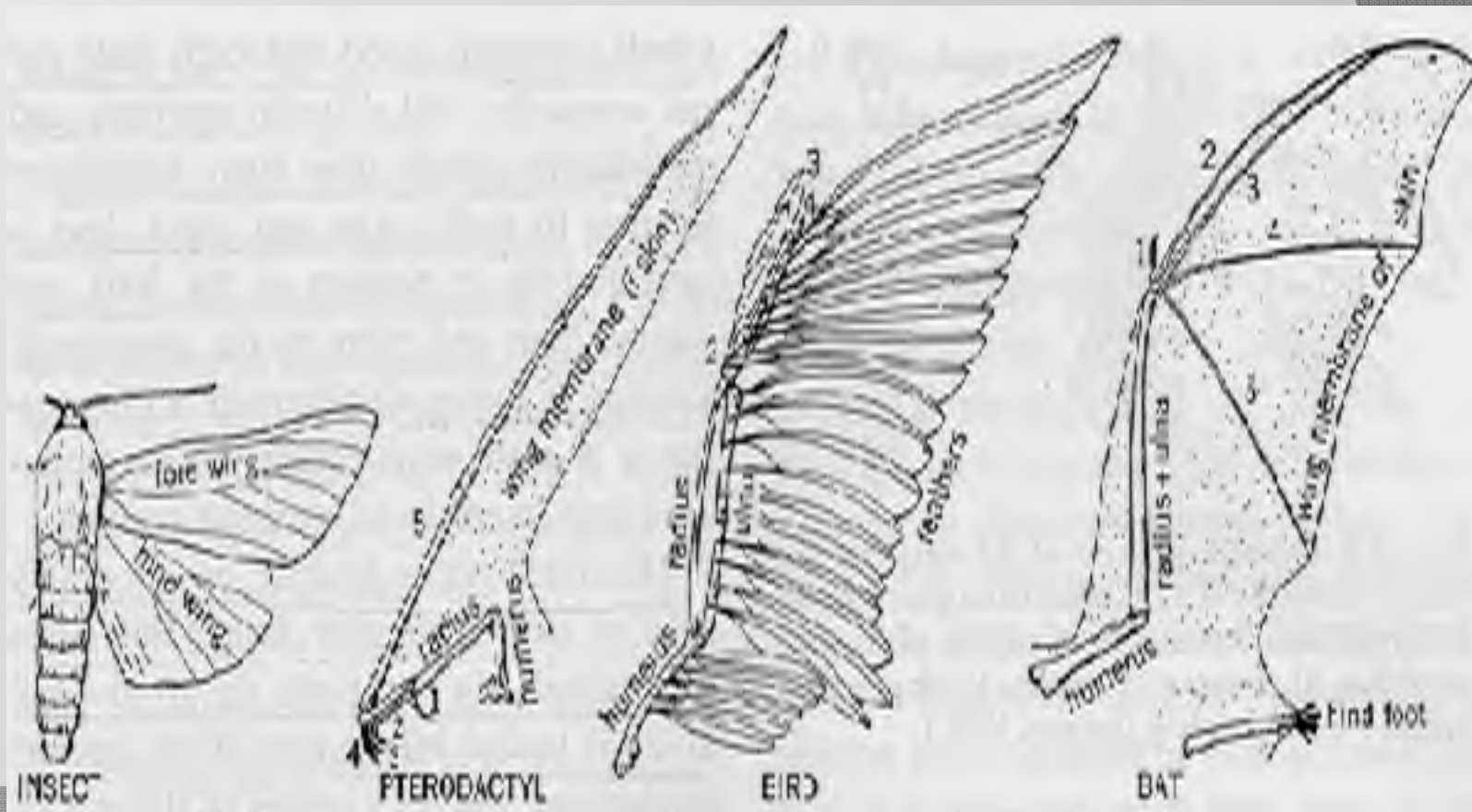
- All tetrapods have limbs w/ 5 digits, at some point
- ***But if the bird wing does not need five digits, why do five initially develop in the growing embryo?***
- *One explanation → while the five digits are not necessary, they may represent a connection to a common ancestor.*





# Anatomical Studies : Analogous Structures

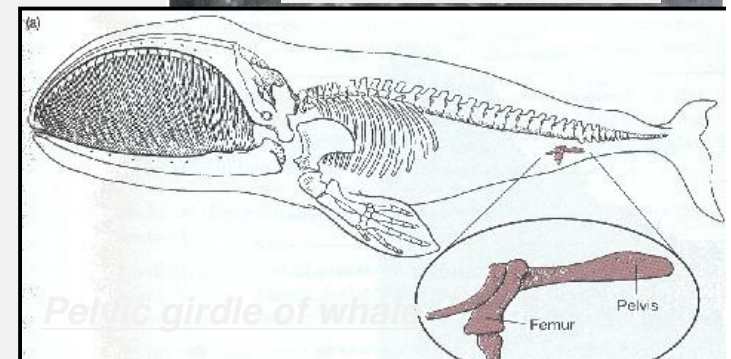
- structures similar in form and/or function, but different in evolutionary origin. Ex. Wings or fins.



# ANATOMY also Includes

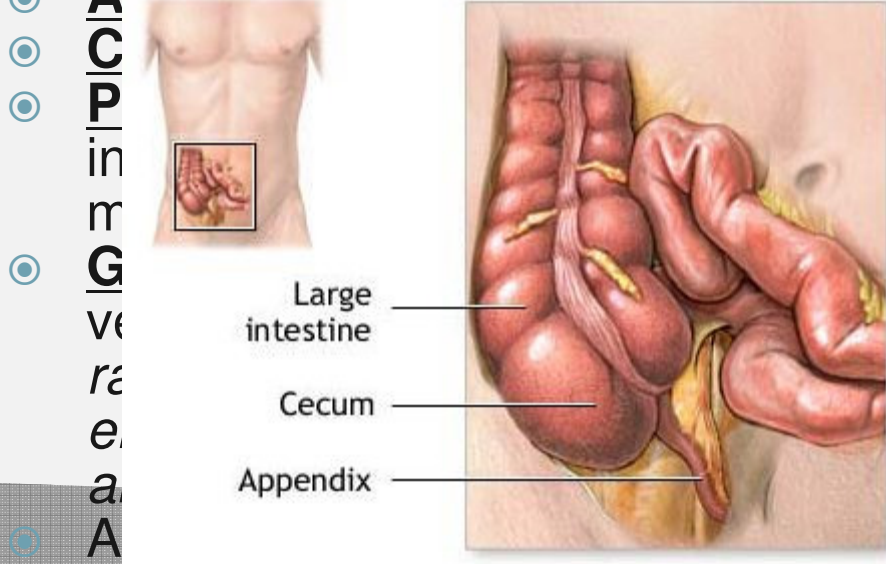
## Vestigial Organs

- Body parts present but no longer useful
- So WHY have them?
- Were they functional in the past?
  - Common ancestor....????

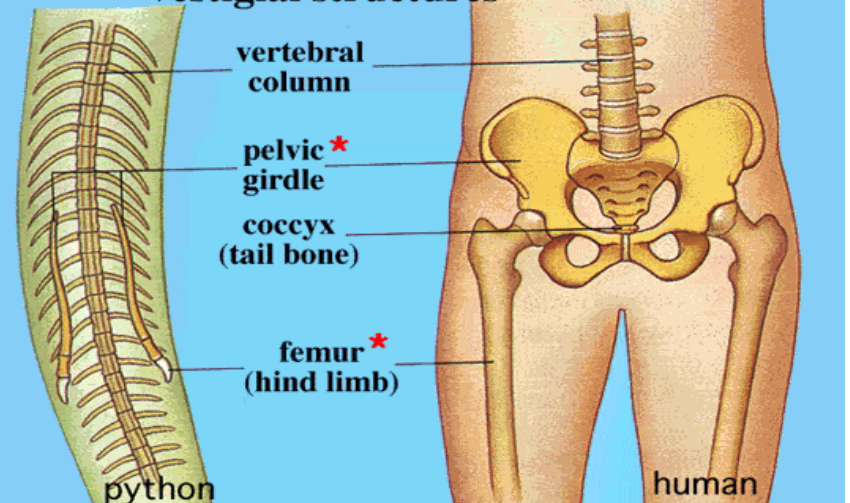


### Wisdom teeth

### Appendix



How do you explain the presence of these bones vestigial structures\* in a python?



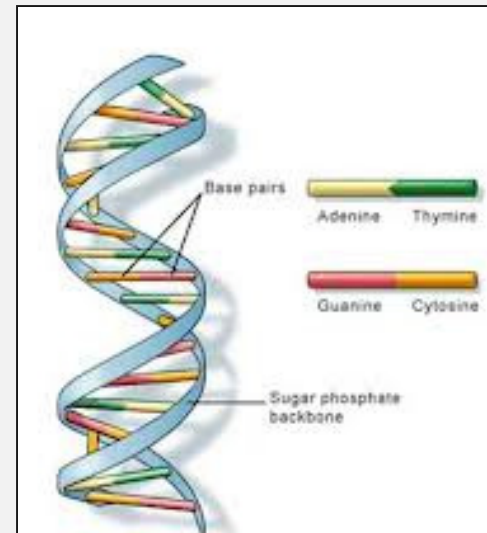
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# \*\*\*5th Type of Evidence\*\*\* BIOLOGICAL MOLECULES...







• Means... DNA & Proteins... which are nearly universal in Pro&Eukaryotes!

- Humans & chimps → 96-98% similar DNA!!!
- Proteins/enzymes common to many organisms
  - 1. trypsin - protein splitting enzyme - many animals from **protozoans to mammals**
  - 2. amylase - starch-splitting enzyme found in everything from **sponges to humans**



## Amino acids reveal evolution

### Cytochrome c Evolution

Organism	Number of amino acid differences from humans
 Chimpanzee	0
 Rhesus monkey	1
 Rabbit	9
 Cow	10
 Pigeon	12
 Bullfrog	20
 Fruit fly	24
 Wheat germ	37
 Yeast	42

A

# ISN pg 146

- Color Code similar structures-use Stations to help
- Underneath structures ½ sheet

Copy:

H**O**mologous: Same structure, different  
function, Similar **O**origin

**A**nalogous: Different Structures, Same  
function, (**A**dapted for function)