

Evidence of Evolution

Evidence to Support Evolution and Common Ancestors

- DNA Sequence
- Homologous Structures
- Analogous Structures
- Vestigial Structures
- Embryological Development

DNA Sequence

- Organisms with more similar DNA sequences are more closely related.
- Gel Electrophoresis and DNA sequencing are commonly used to compare genetic similarity
- Since DNA provides the code for proteins, we can also compare amino acid sequences for genes

DNA Sequencing:

**A comparison of part of the mouse and fly genes
(identical regions are highlighted)**

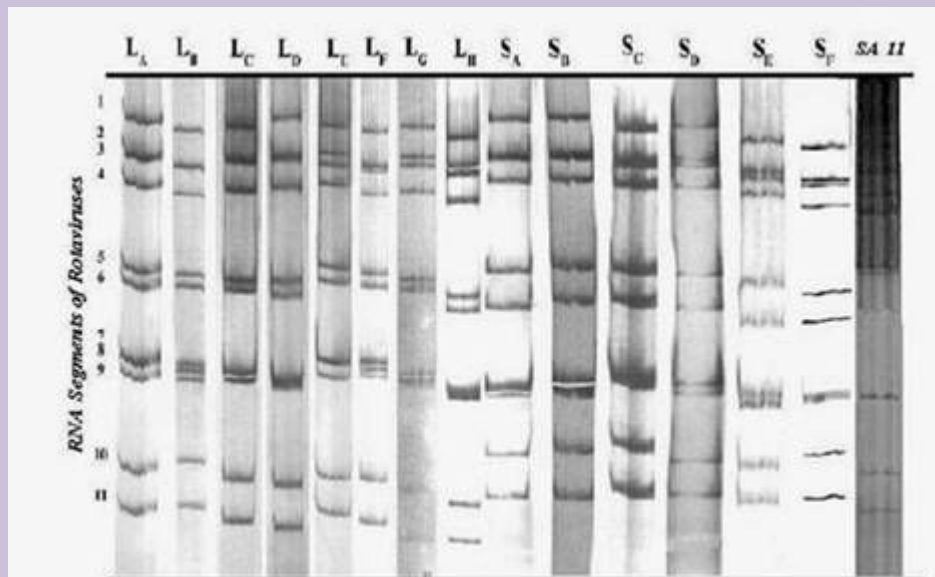
mouse
gene: **GTATCCAACGGTTGTGTGAGTAAAATTCTGGGCAGGTATTACGAGACTGGCTCCATCAGA**

fly
gene: **GTATCAAATGGATGTGTGAGCAAATTCTCGGGAGGTATTATGAAACAGGAAGCATACGA**

These gene sequences are 76.66% similar.

The proteins corresponding to these regions are 100% similar.

Gel Electrophoresis:



Lets see what
you know!!!!

DNA Sequence

- Based on the amino acid data provided, which *two* species are most closely related?

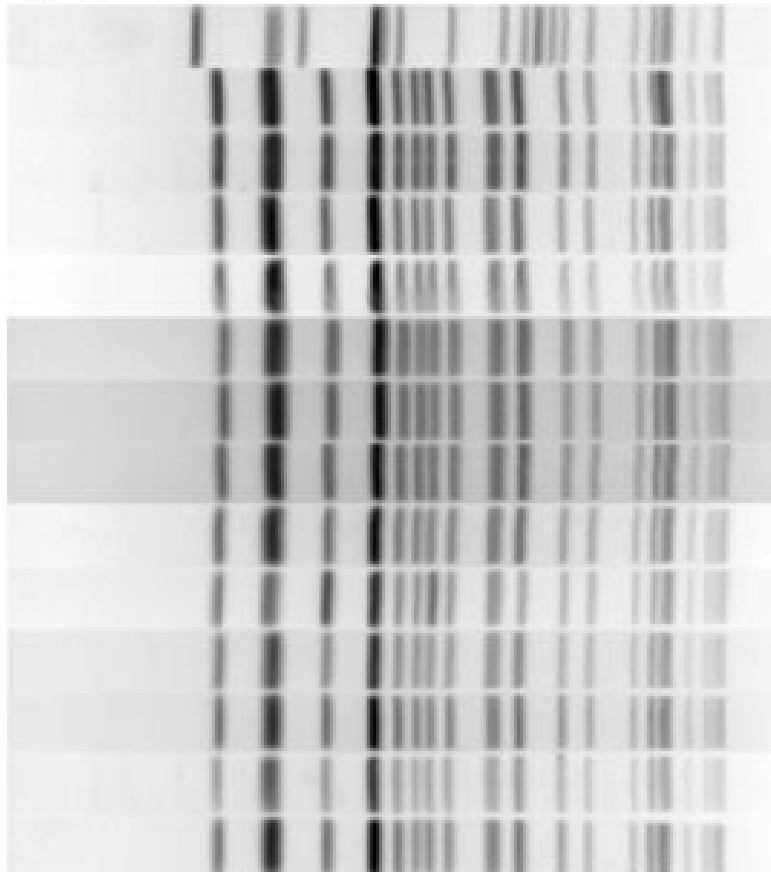
Species	Amino Acid Sequence for Gene X					
Species A	Val	Hist	Leu	Ser	Pro	Arg
Species B	Val	Ser	Pro	Leu	Hist	Glu
Species C	Val	Hist	Leu	Ser	Arg	Glu

The following gel was created from different clinical isolates of *E. coli* O157. What can you tell about the different bacteria found in these different patients, environments, and animals?



Pulsed Field Gel Electrophoresis on
E. coli O157 Isolates, June 3, 2010

PFGE-XbaI



2005 patient (for comparison)

Patient 1

Patient 2

Patient 3

Patient 4

Patient 5

Environmental 1

Environmental 2

Environmental 3

Environmental 4

Environmental 5

Animal 1

Animal 2

Animal 3

Homologous Structures

- **Homologous Structures:**
 - Structures within different organisms that are similar but have different functions.
- Homologous structures are products of **Divergent Evolution**
 - Related organisms start off similar but come to look different because of their environment.

Analogous Structures

- **Analogous Structures:**

- Structures within different organisms that are different but perform the same function.

- Analogous structures are products of **Convergent Evolution**

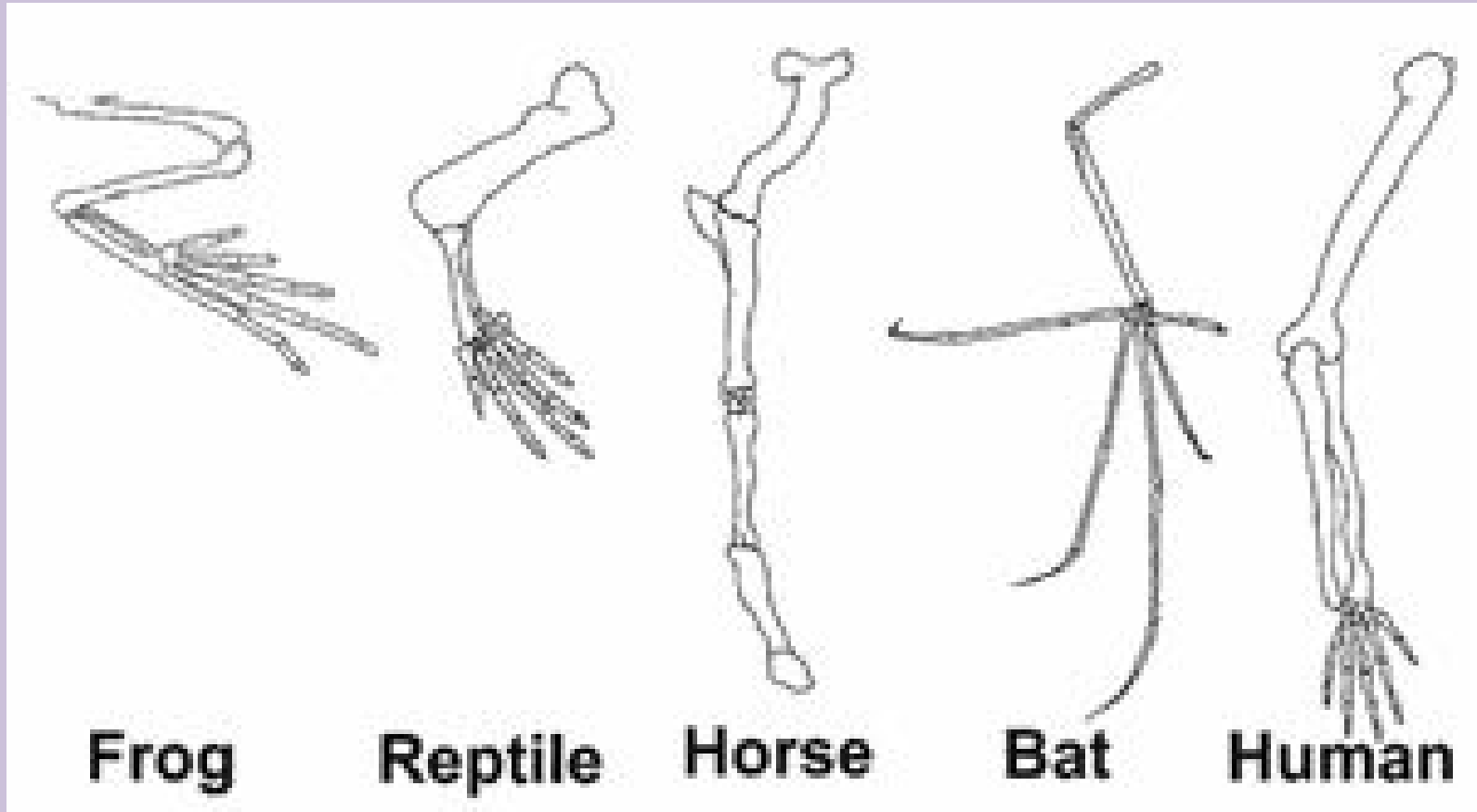
- Unrelated organisms come to resemble one another by independently evolving structures with the same function.

Lets see what
you know!!!!

Analogous Structures



Homologous Structures





Analogous Structures

Homologous Structures



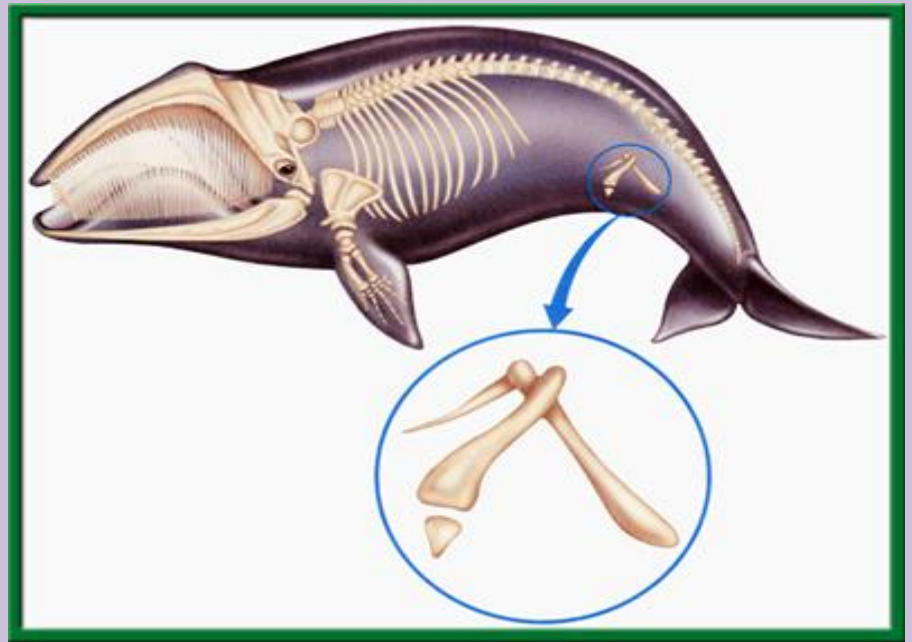
Analogous Structures



Vestigial Structure

Vestigial Structure:

- A structure that is present but no longer being used as it is in most other animals.
- Vestigial structures may be diminished (smaller) than normal

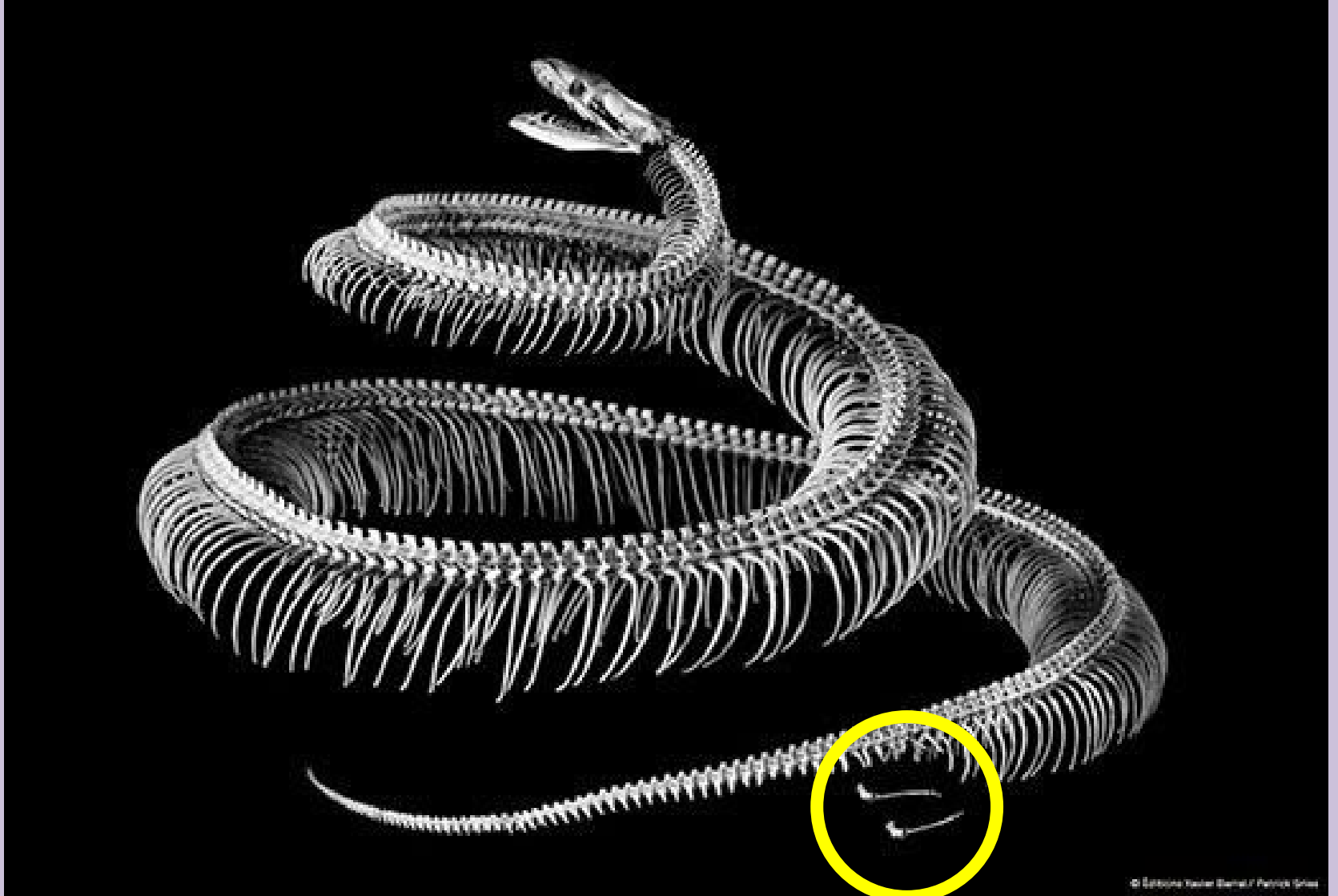


Lets see what
you know!!!!

What vestigial structure do you see?

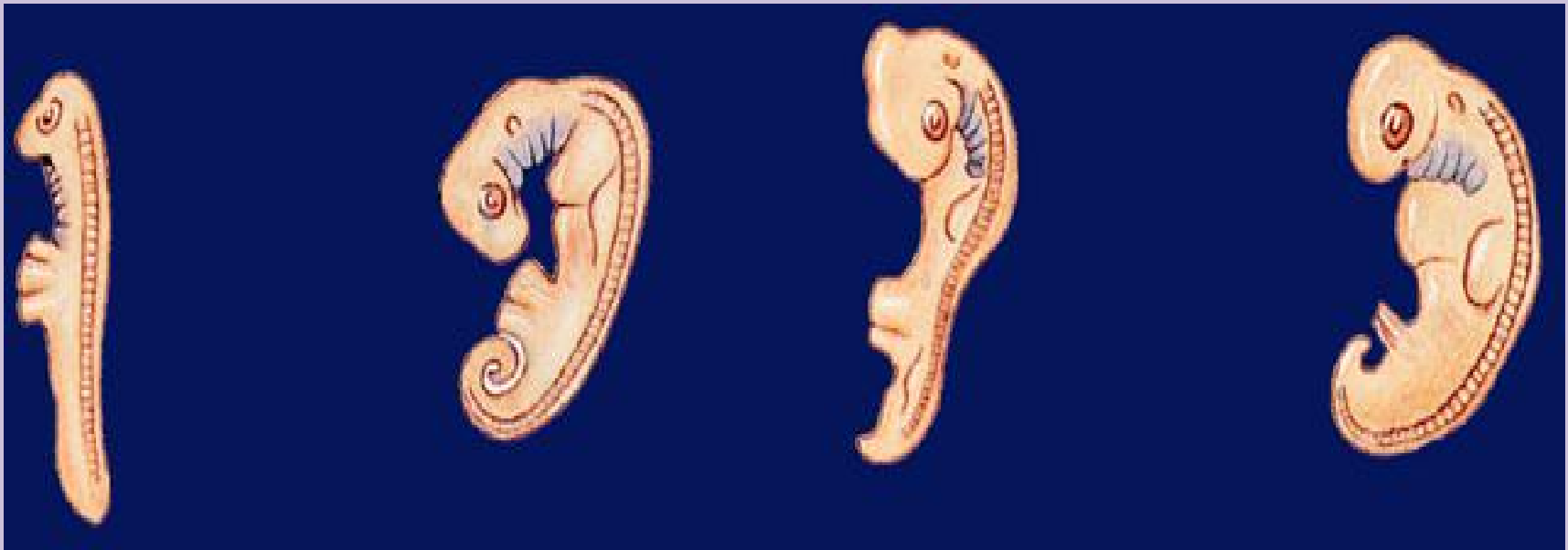


What vestigial structure do you see?



Embryologic Development

- The phases of prenatal development involved in the establishment of the characteristics of an organism.
- All embryos start off identical to one another and begin to grow into different organisms. The more stages of development in common the more closely related the organisms are.



Lets see what
you know!!!!

Which two organisms are most similar?



Which organism is *least* similar to the others?

