EVIDENCE FOR EVOLUTION

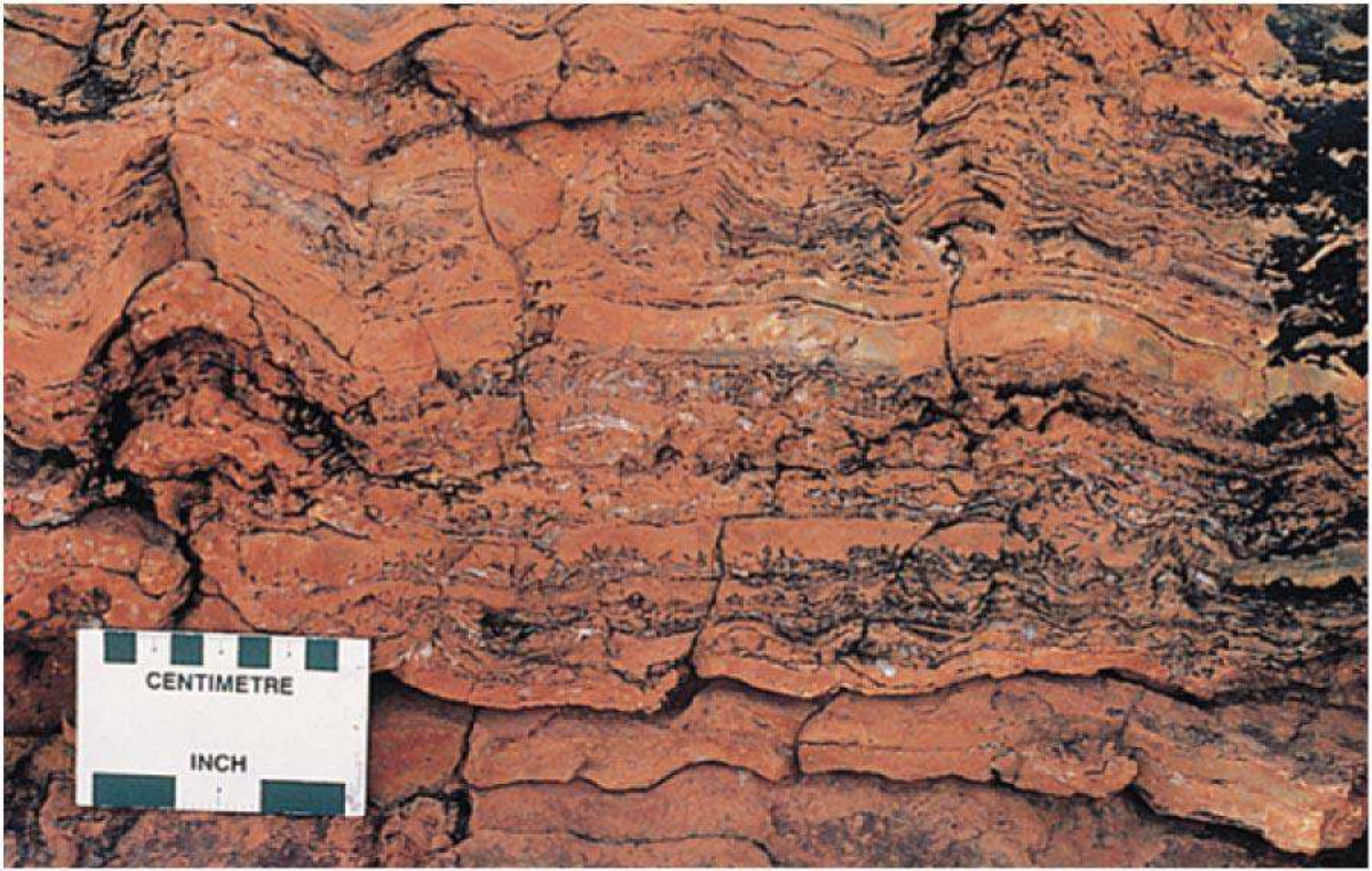
An Overview

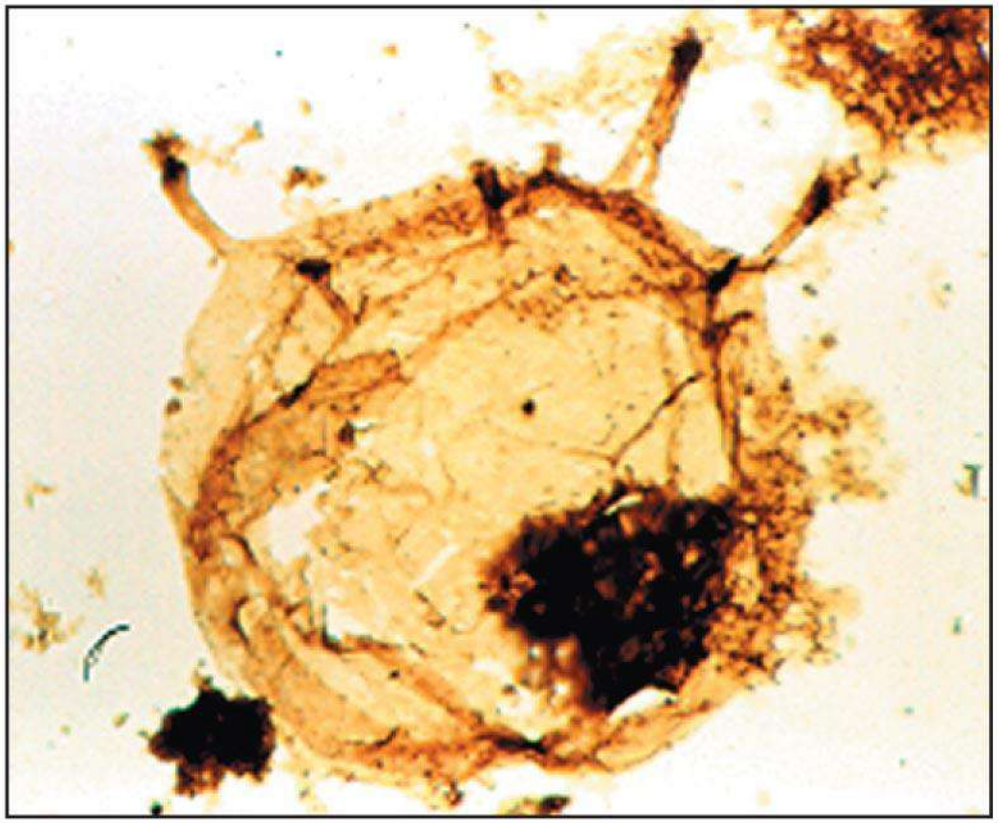
13.4 The study of fossils provides strong evidence for evolution

- The fossil record shows that organisms have evolved in a historical sequence
  - The oldest known fossils are prokaryote cells
  - The oldest eukaryotic fossils are a billion years younger
  - Multicellular fossils are even more recent

PLAY

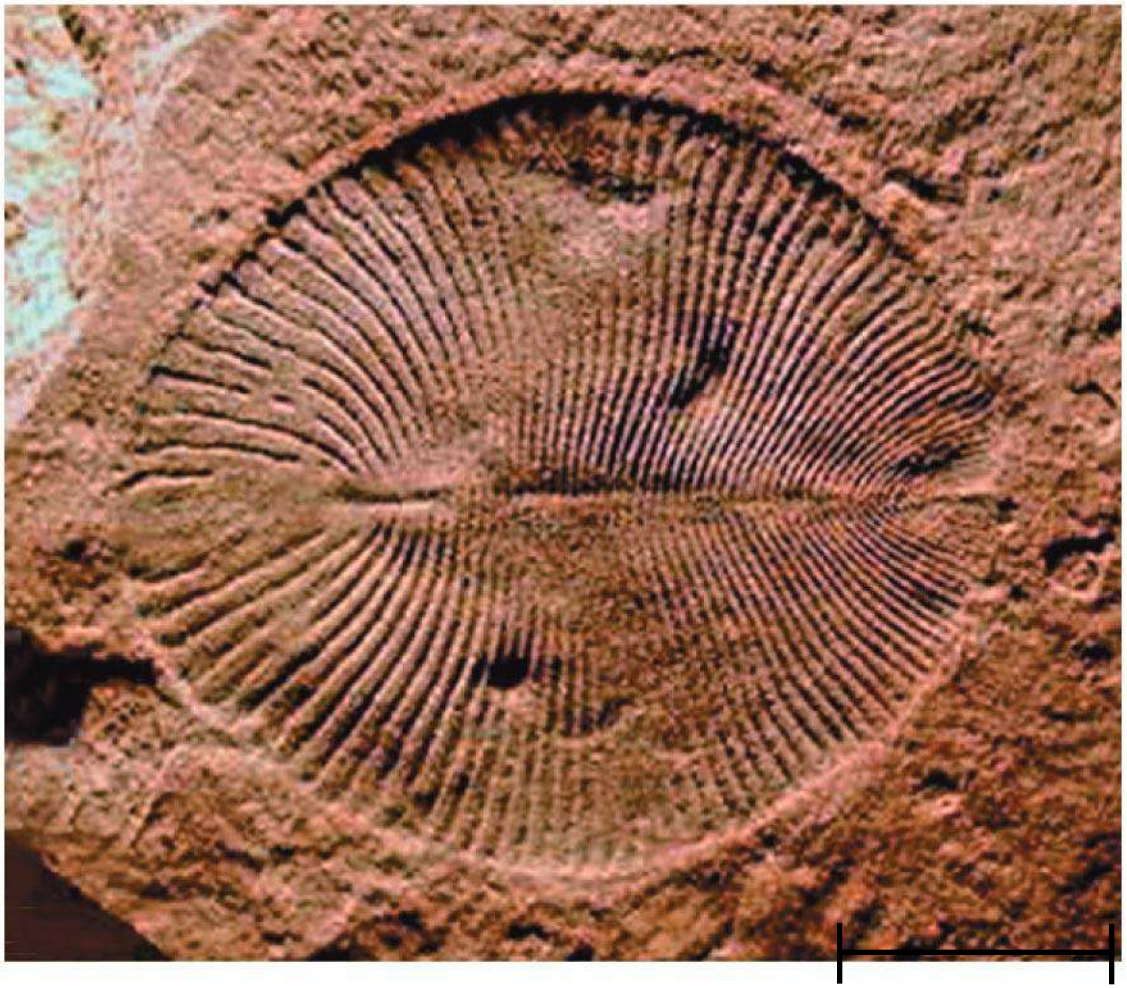
Video: Grand Canyon


CENTIMETRE
INCH



***Tappania,* a unicellular eukaryote**

What type of fossil?

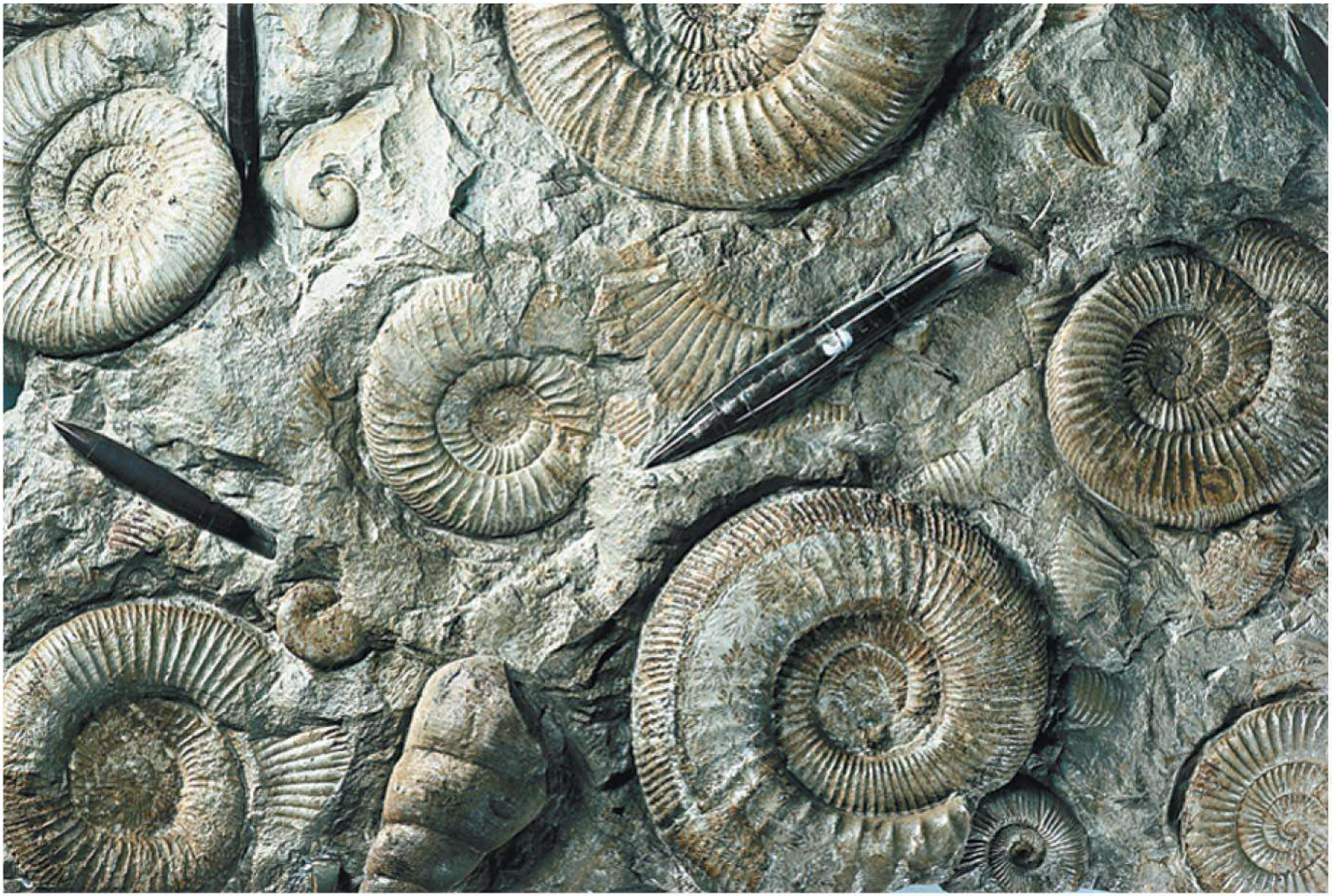


Dickinsonia costata

Mold

A **Skull of *Homo erectus***

What type of fossil?



B Ammonite

Cast

What type of fossil?

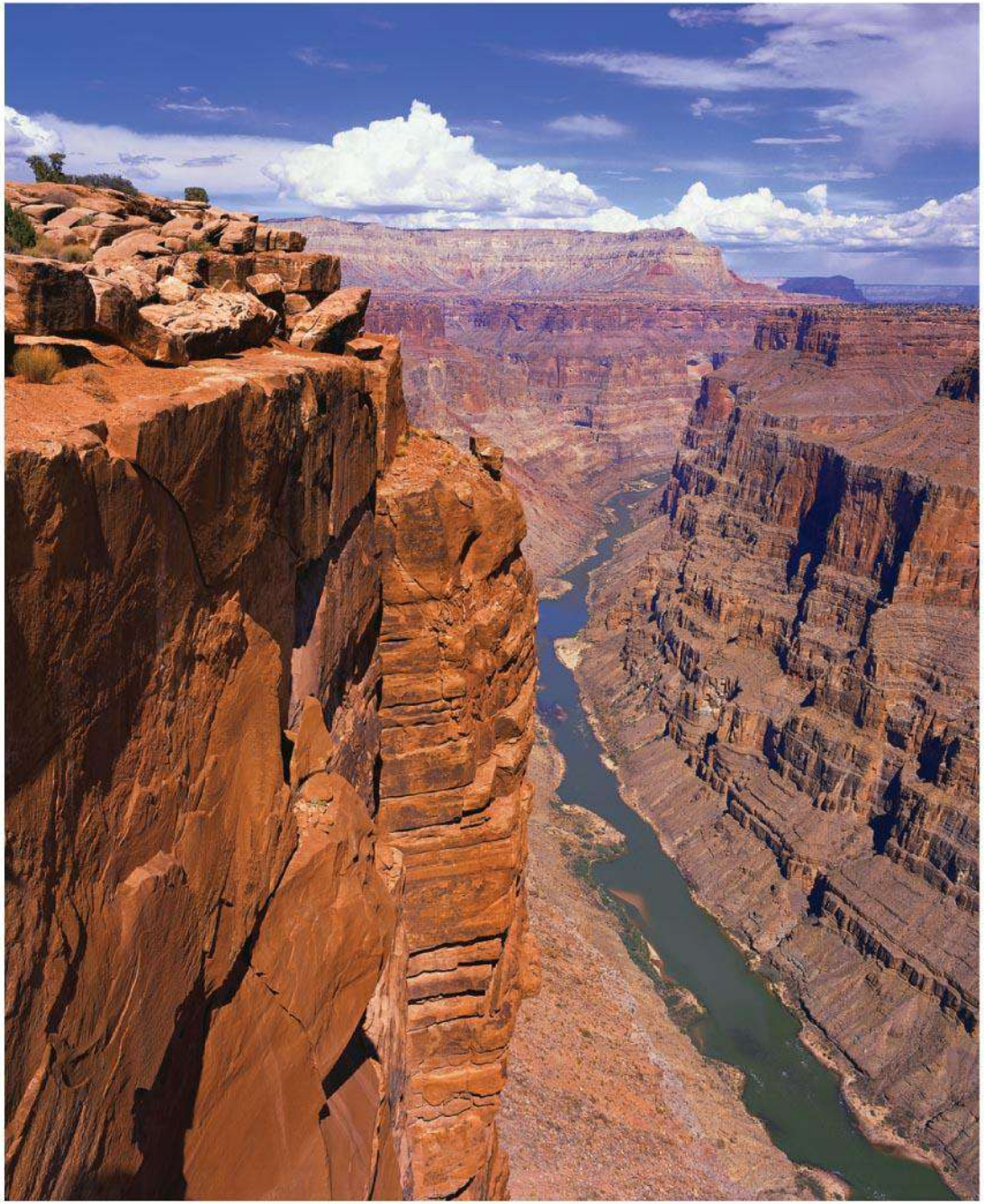
Imprint

D Fossilized organic matter of a leaf

E Insect in amber

F “Ice Man”

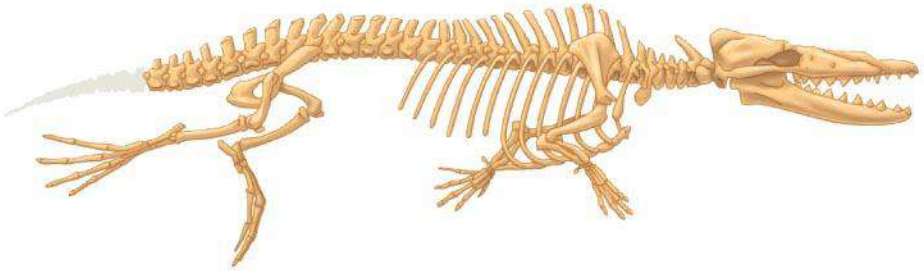
Yucky



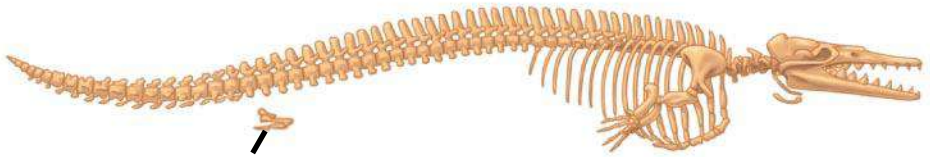
13.4 The study of fossils provides strong evidence for evolution

- Many fossils link early extinct species with species living today
  - A series of fossils documents the evolution of whales from a group of land mammals

Pakicetus **(terrestrial)**

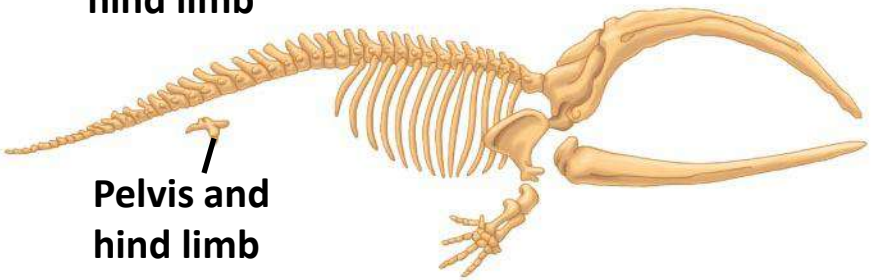


Rhodocetus **(predominantly aquatic)**



Pelvis and hind limb

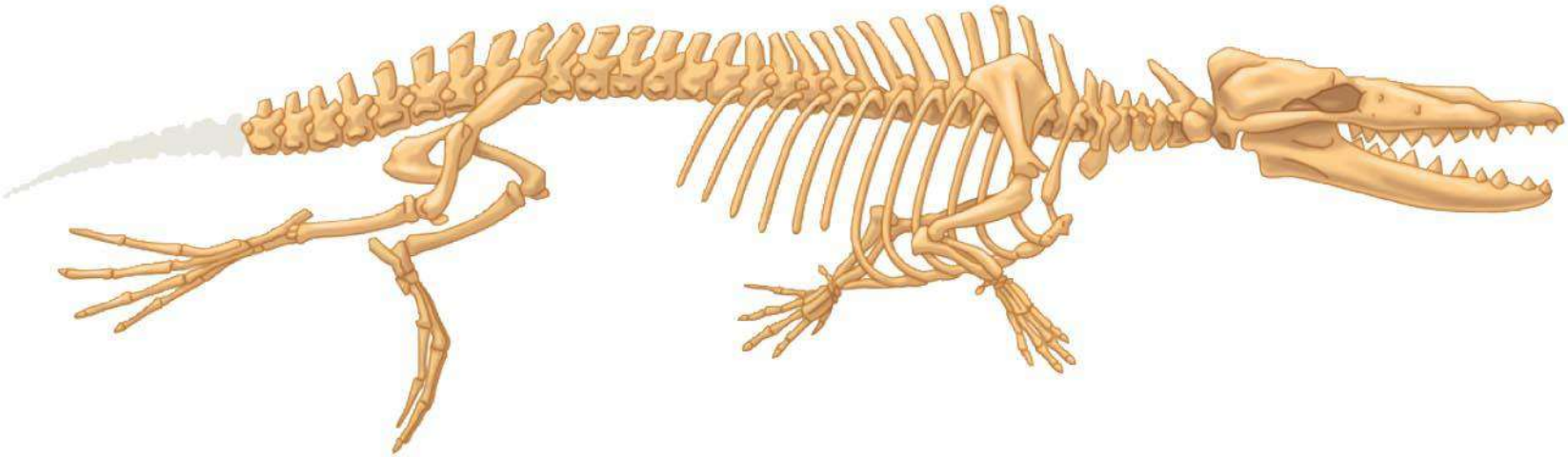
Dorudon **(fully aquatic)**



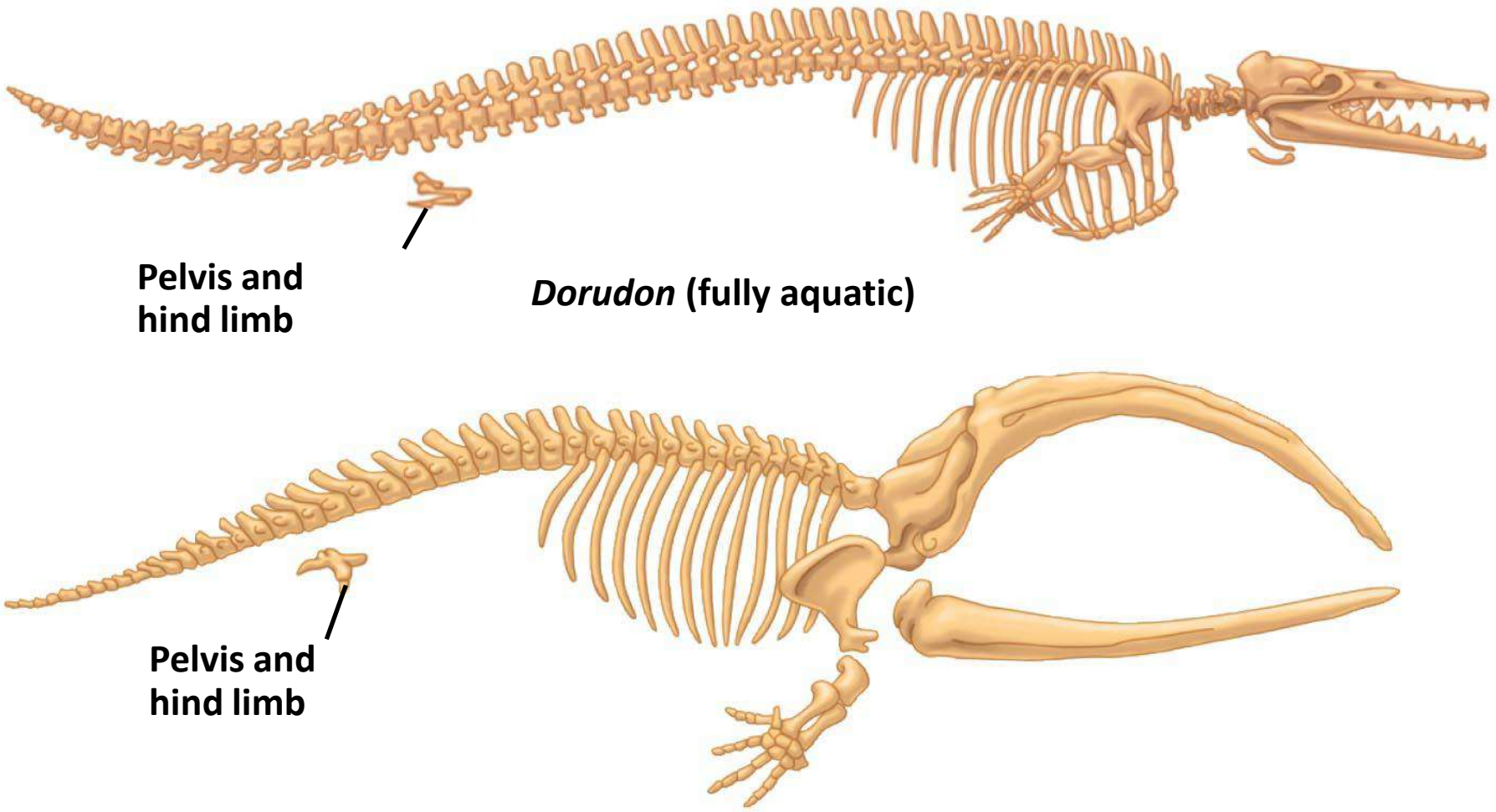
Pelvis and hind limb

Balaena **(recent whale ancestor)**

***Pakicetus* (terrestrial)**



***Rhodocetus* (predominantly aquatic)**

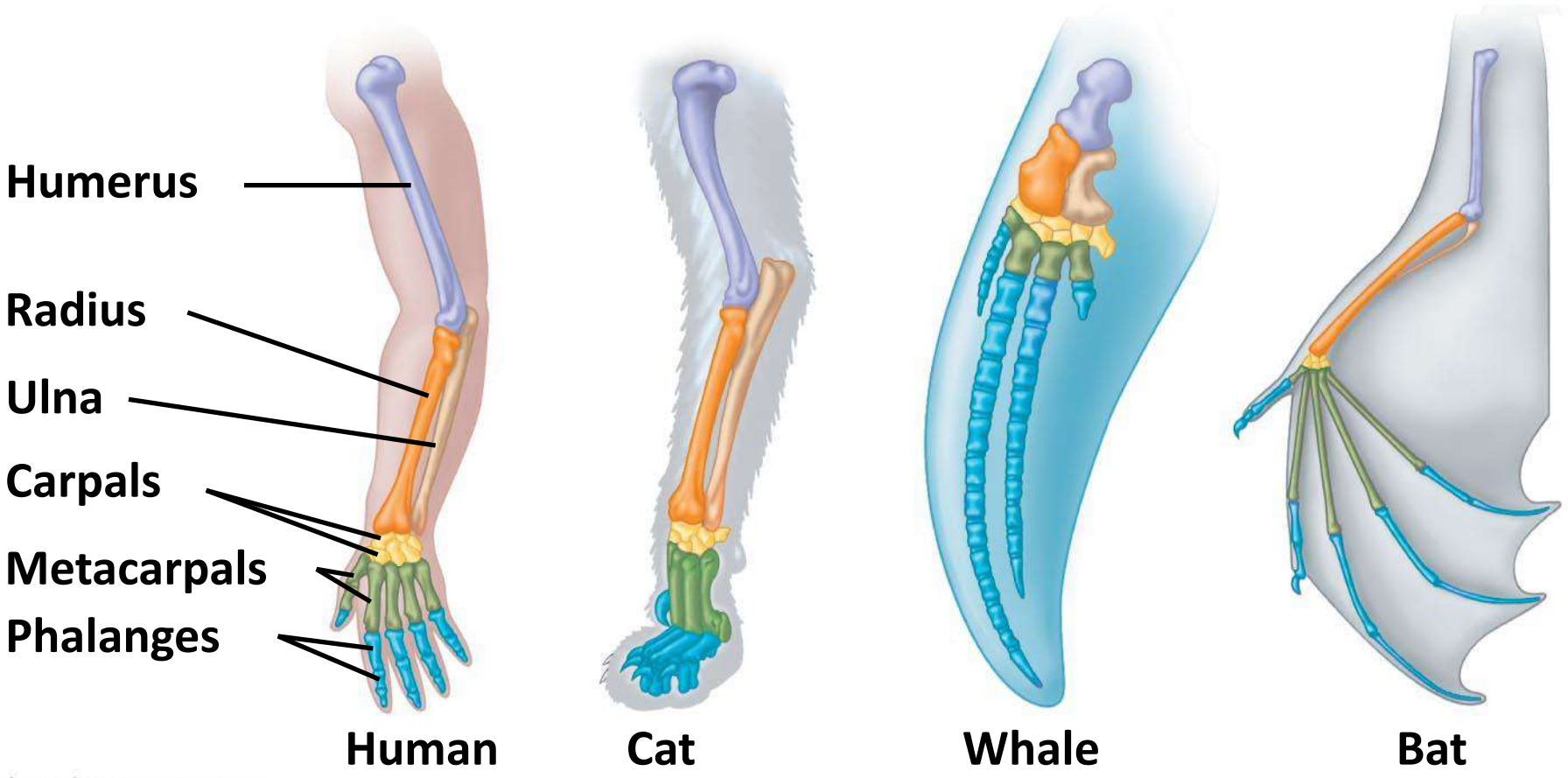


13.5 A mass of other evidence reinforces the evolutionary view of life

- **Biogeography**, the geographic distribution of species, suggested to Darwin that organisms evolve from common ancestors
  - Darwin noted that animals on islands resemble species on nearby mainland more closely than they resemble animals on similar islands close to other continents

13.5 A mass of other evidence reinforces the evolutionary view of life

- **Comparative anatomy** is the comparison of body structures in different species
- **Homology** is the similarity in characteristics that result from common ancestry
  - Vertebrate forelimbs



13.5 A mass of other evidence reinforces the evolutionary view of life

– Which of the following pairs are homologous structures?

A. Human limb and whale flipper

B. Insect wing and bat wing

C. Human thumb and chimpanzee thumb

13.5 A mass of other evidence reinforces the evolutionary view of life

– Which of the following are homologous structures?

A. Oak leaf and oak root

B. Oak leaf and lichen

C. Oak leaf and maple leaf

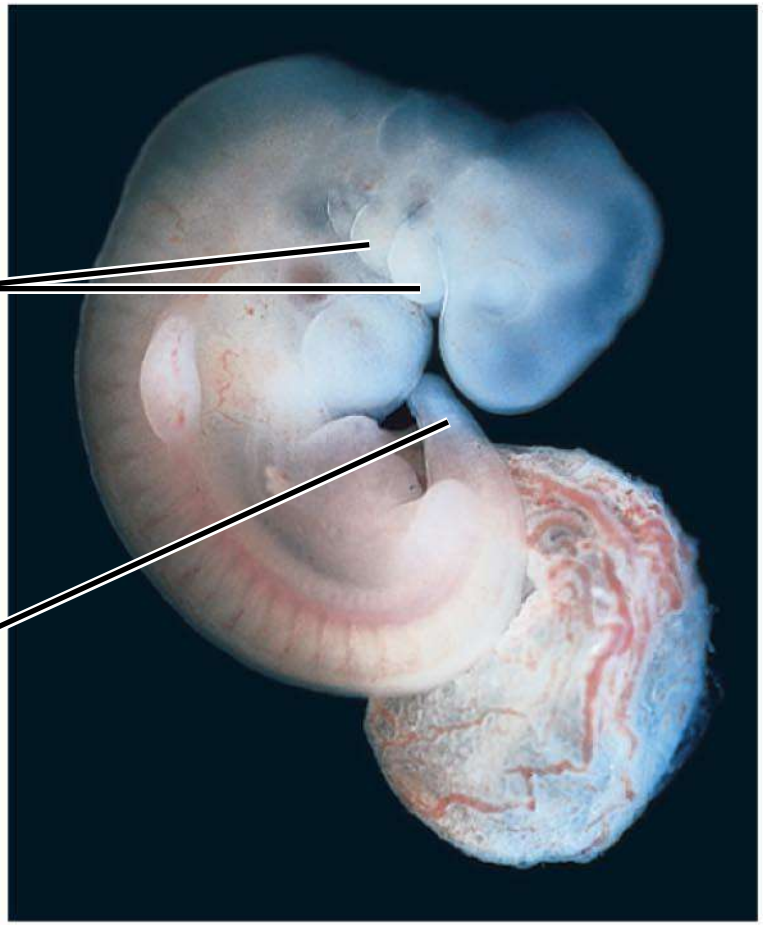
D. There are no homologous plant structures

13.5 A mass of other evidence reinforces the evolutionary view of life

- *Comparative embryology* is the comparison of early stages of development among different organisms
  - Many vertebrates have common embryonic structures, revealing homologies
  - When you were an embryo, you had a tail and pharyngeal pouches (just like an embryonic fish)

Pharyngeal pouches

Post-anal tail



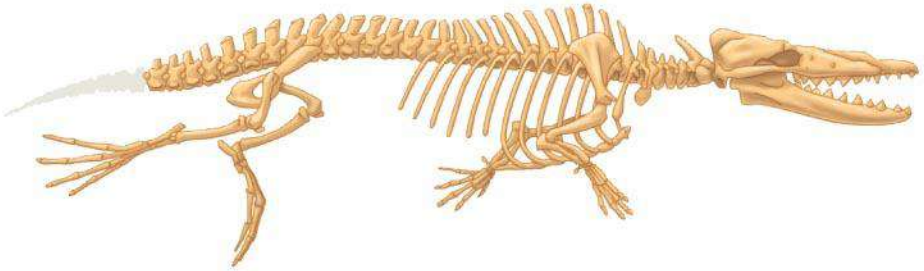
Chick embryo

Human embryo

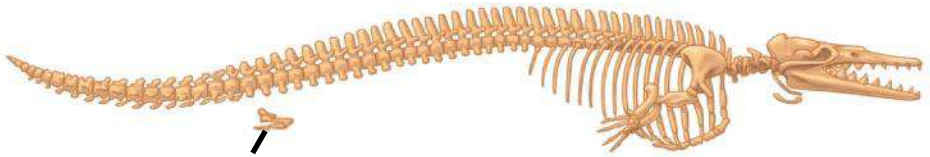
13.5 A mass of other evidence reinforces the evolutionary view of life

- Some homologous structures are vestigial organs
  - For example, the pelvic and hind-leg bones of some modern whales

Pakicetus **(terrestrial)**



Rhodocetus **(predominantly aquatic)**



Pelvis and hind limb

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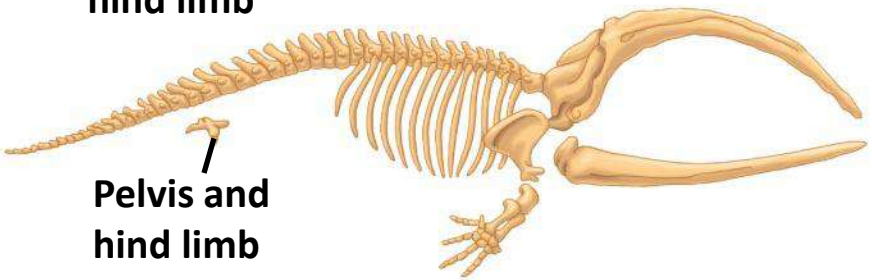
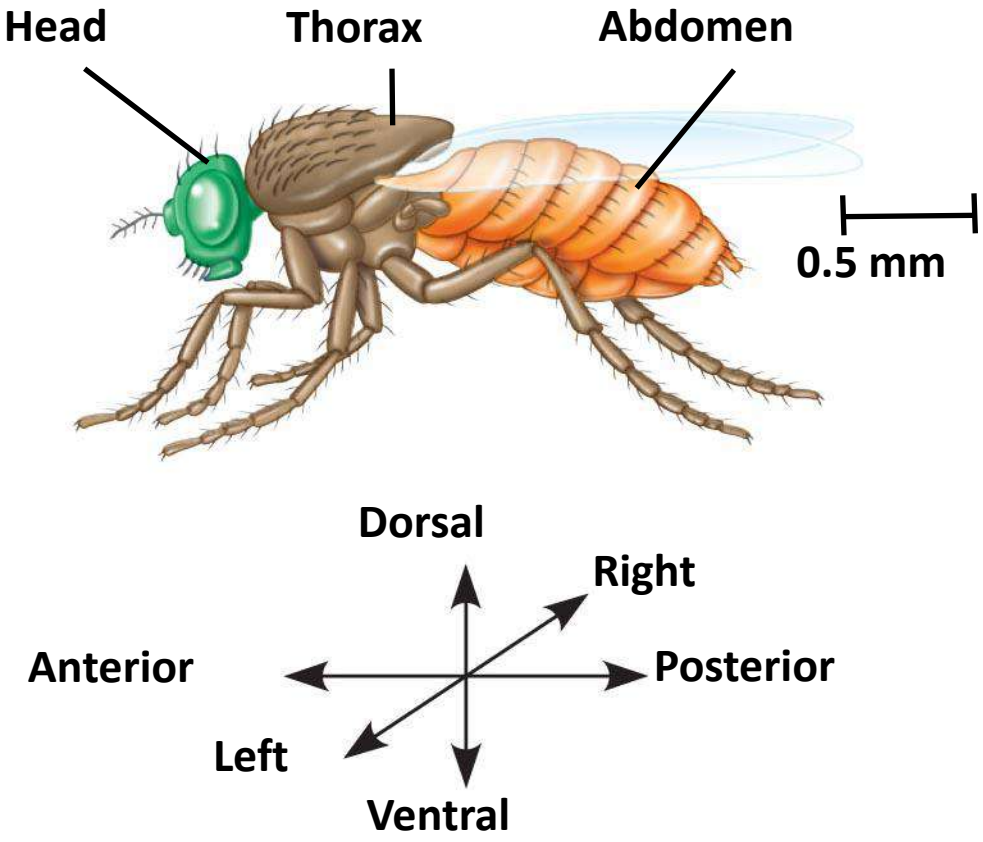


Pelvis and hind limb

Balaena **(recent whale ancestor)**

13.5 A mass of other evidence reinforces the evolutionary view of life

- **Molecular biology**: Comparisons of DNA and amino acid sequences between different organisms reveal evolutionary relationships
  - All living things share a common DNA code for the proteins found in living cells
  - We share genes with bacteria, yeast, and fruit flies



BODY AXES

(a) Adult