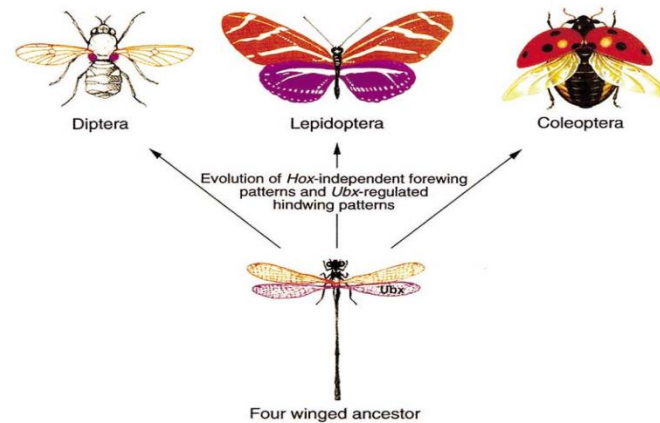


Evolutionary Evidence Using Structure and Organs



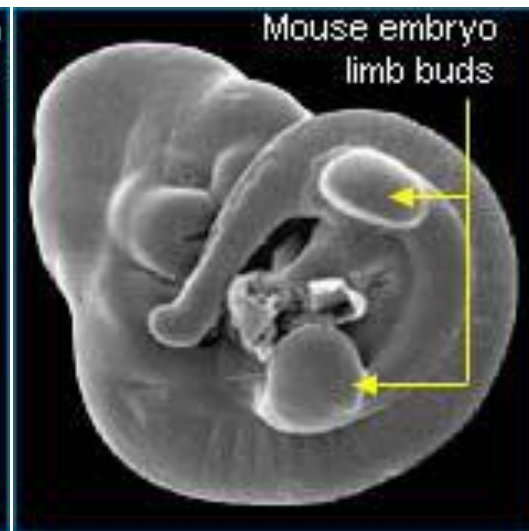
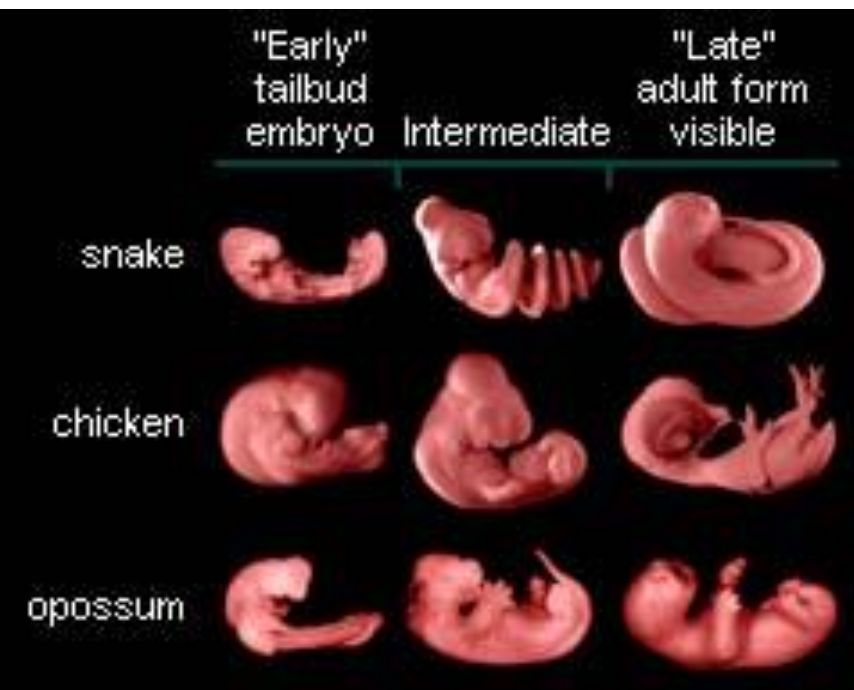


Structures as Evidence

- ❑ If the theory of evolution is correct about the creation of new species via biological change over time, scientists are trying to discover how organisms are related.
- ❑ Proof of relatedness, such as similarity of structures and organs, can be convincing evidence.

Embryology

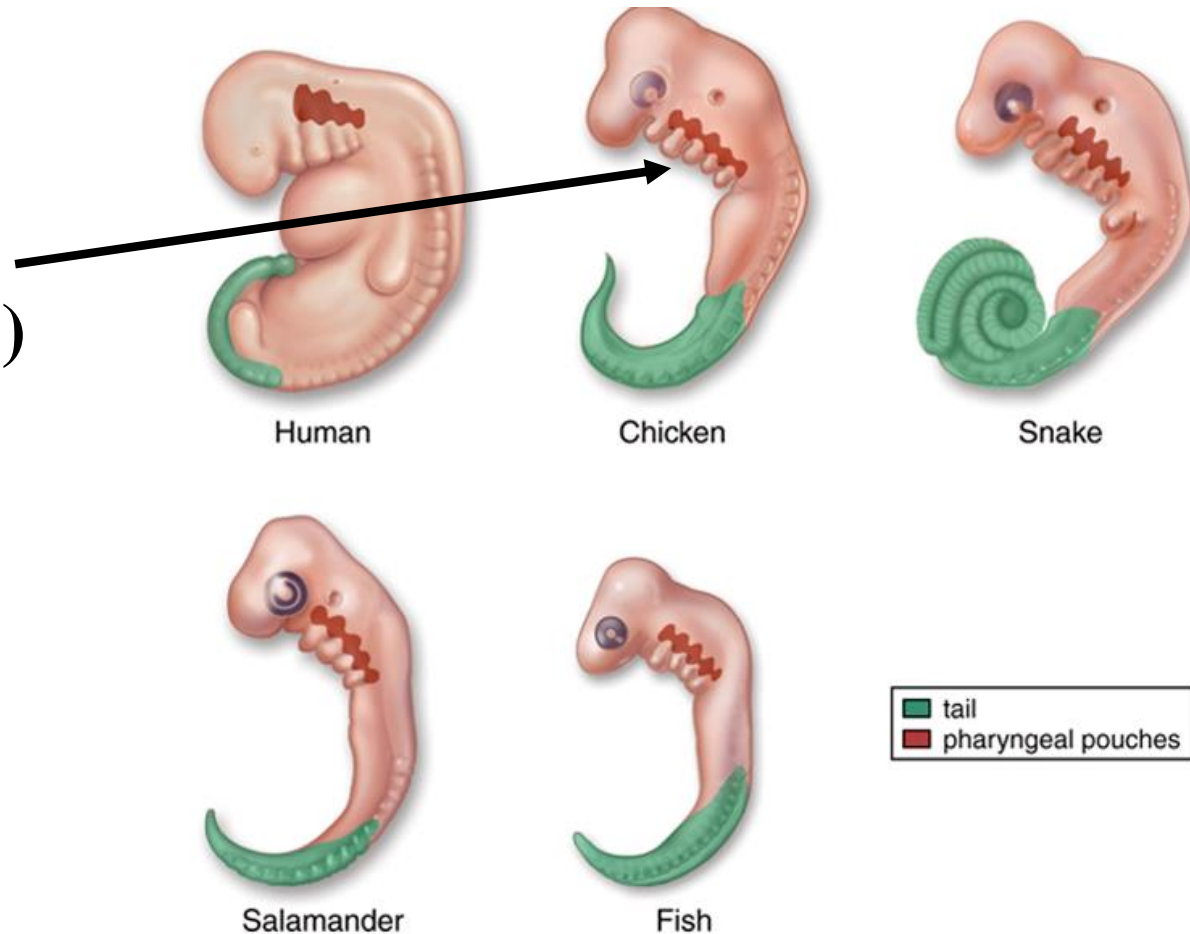
- Some scientists believe that embryos can prove evolutionary relationships in organisms
- There are many similarities, but NOT likely concrete proof of evolutionary decent – just cell development



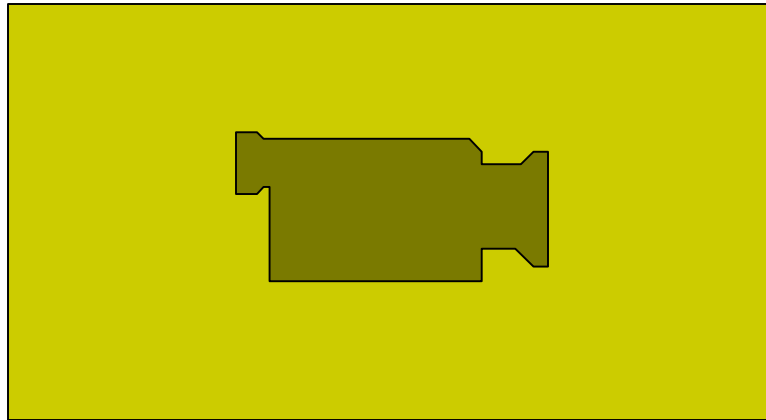
Can demonstrate similarities in:

<http://www.pbs.org/wgbh/nova/evolution/guess-embryo.html>

- Spinal development (notochord)**
- Pharyngeal pouches (ears, bronchi, glands)**
- Eye development**
- Tail development**



Embryology and Evolution Video



Embryology and Evolution Video



Homologous structures

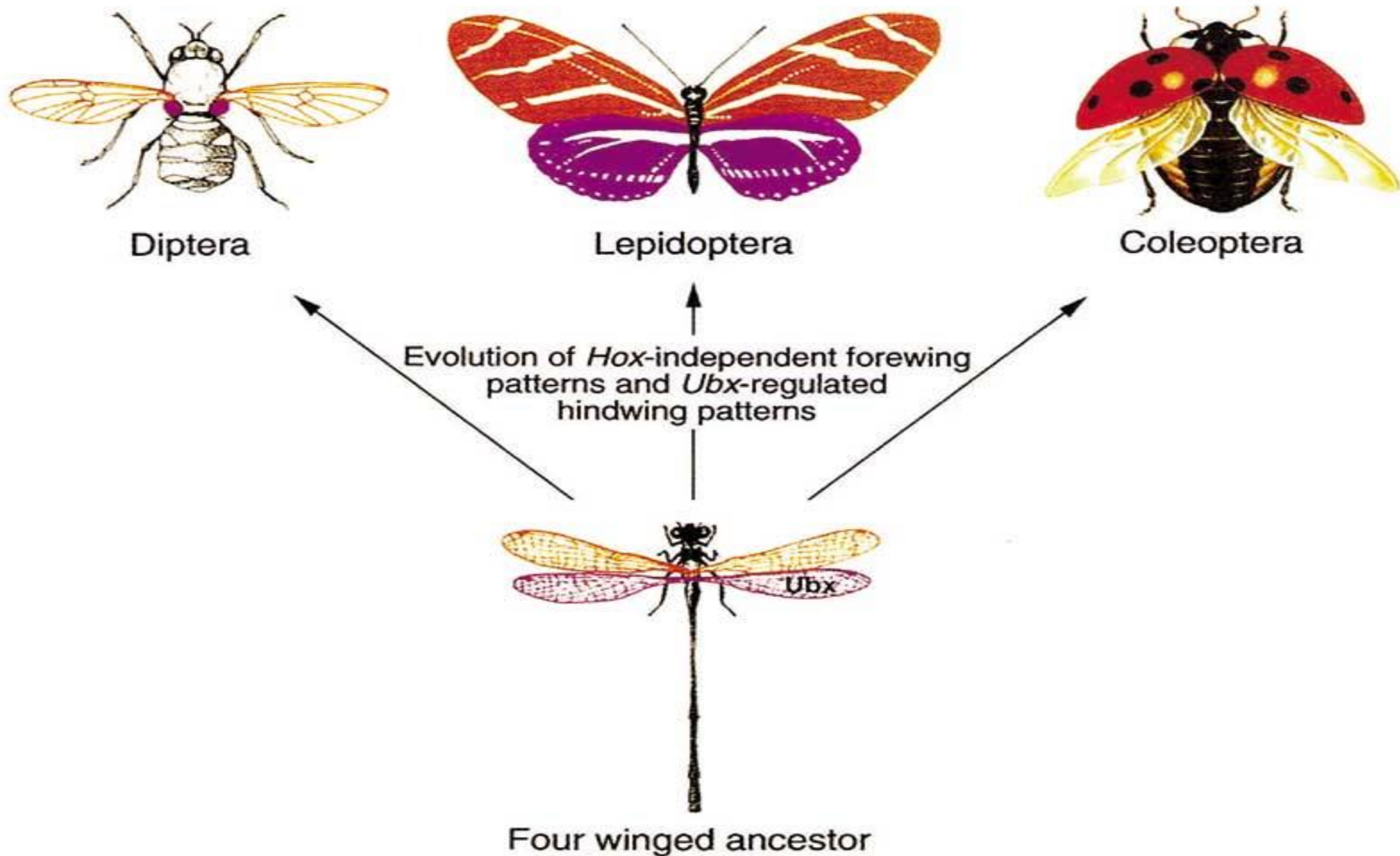
- A **Homologous Structure** is a physiological appendage or organ that is similar between 2 different organisms of different species, showing a possible relationship among the organisms.



Evolution of Homologous Structures

- ❑ The basic idea is that successive generations of organisms may improve upon those structures to become better suited for an environment or niche and thus changes the shape or appearance of the structure, but maintains its basic function.
- ❑ Original ancestor of organism will look different, but have similar functions.

Example of homologous structures



Examples of homologous structures



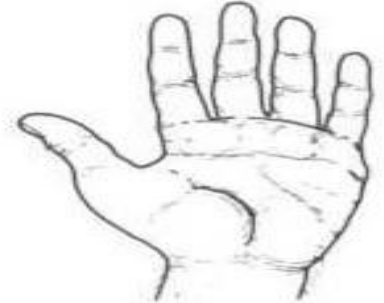
Tarsier



Gibbon



Chimpanzee



Human



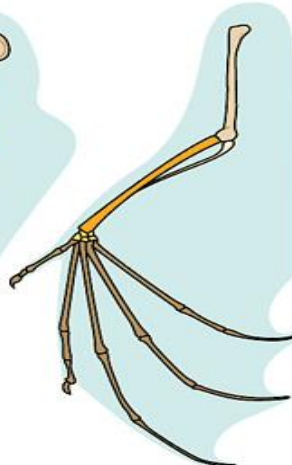
Human



Cat

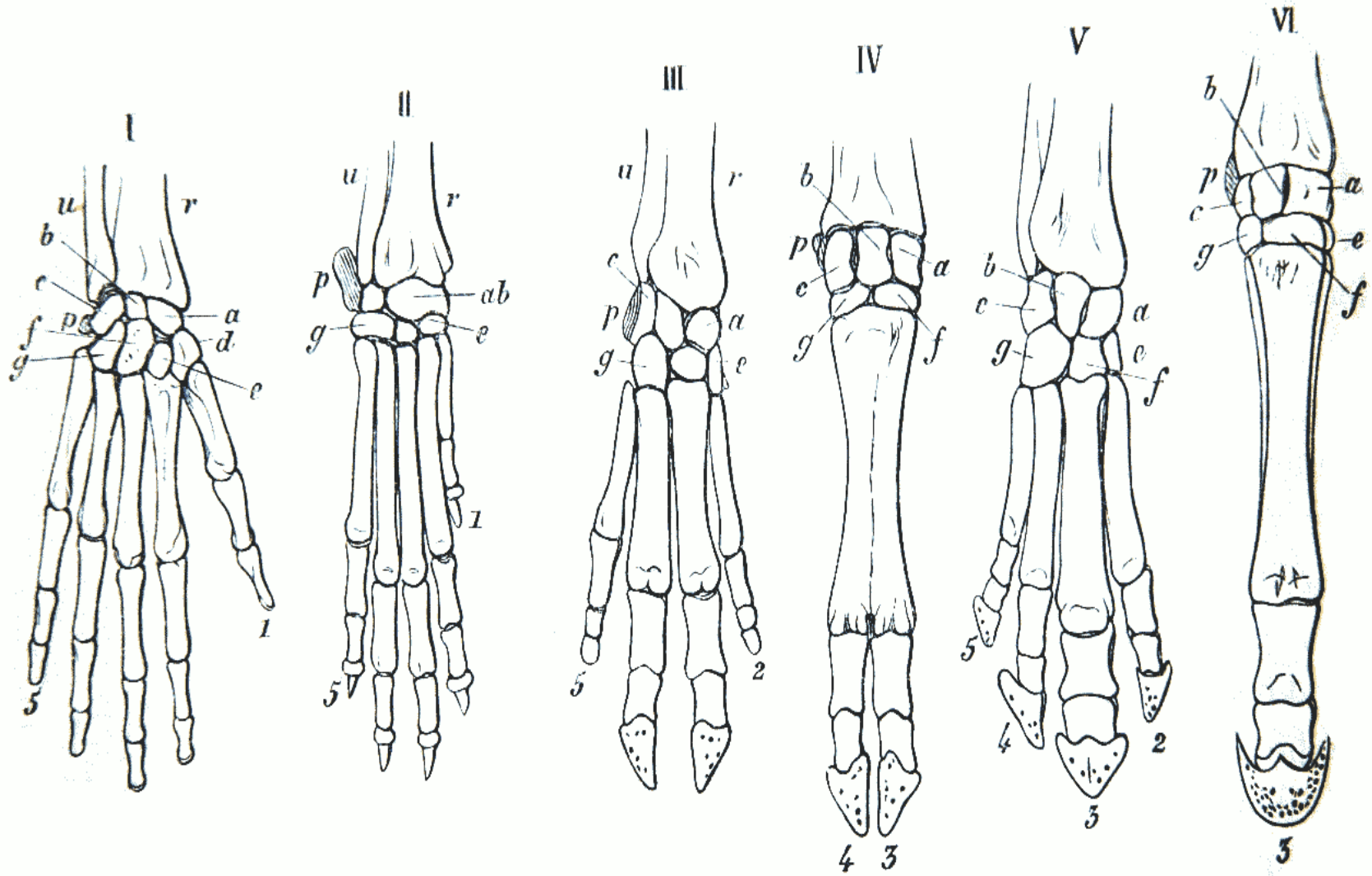


Whale



Bat

Example of homologous structures





Vestigial Organ

- ❑ Some creatures not only have organs or structures that show possible evolutionary relationship by having similar physiological functions, but some have evidence of organs used by previous generations. However, these structures are no longer used by the current organism

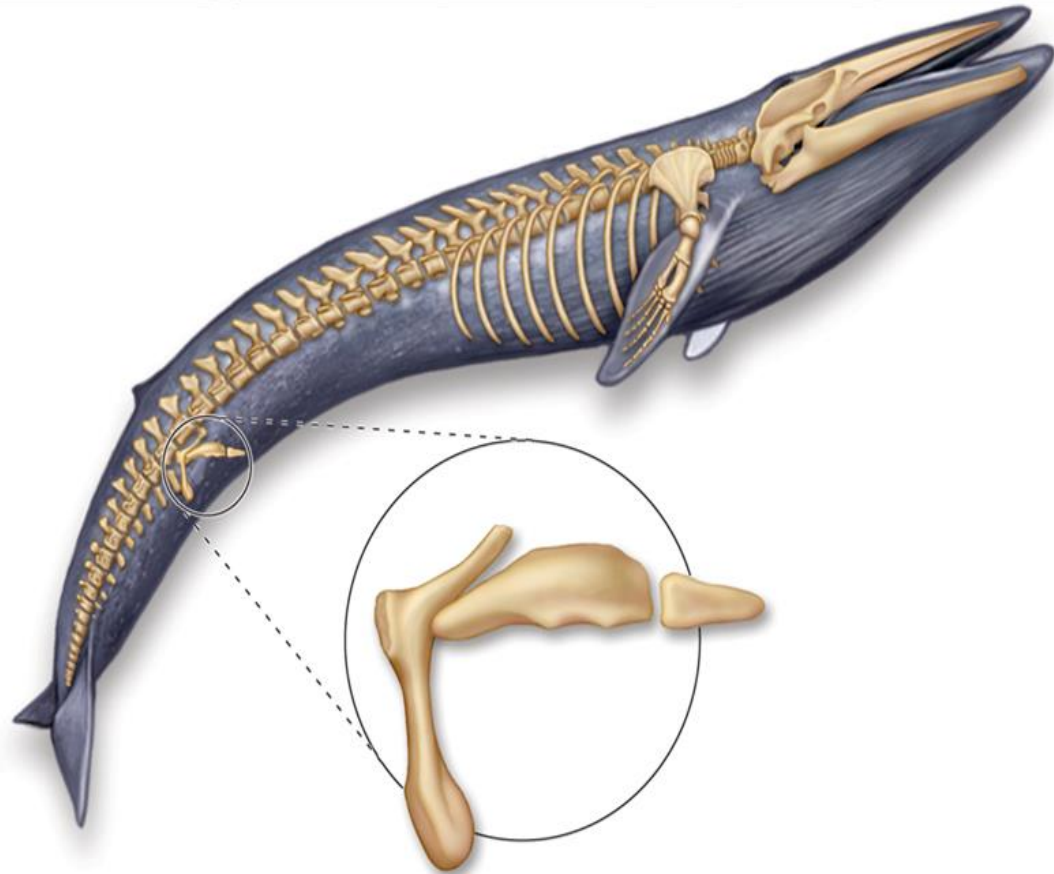


Vestigial Organ

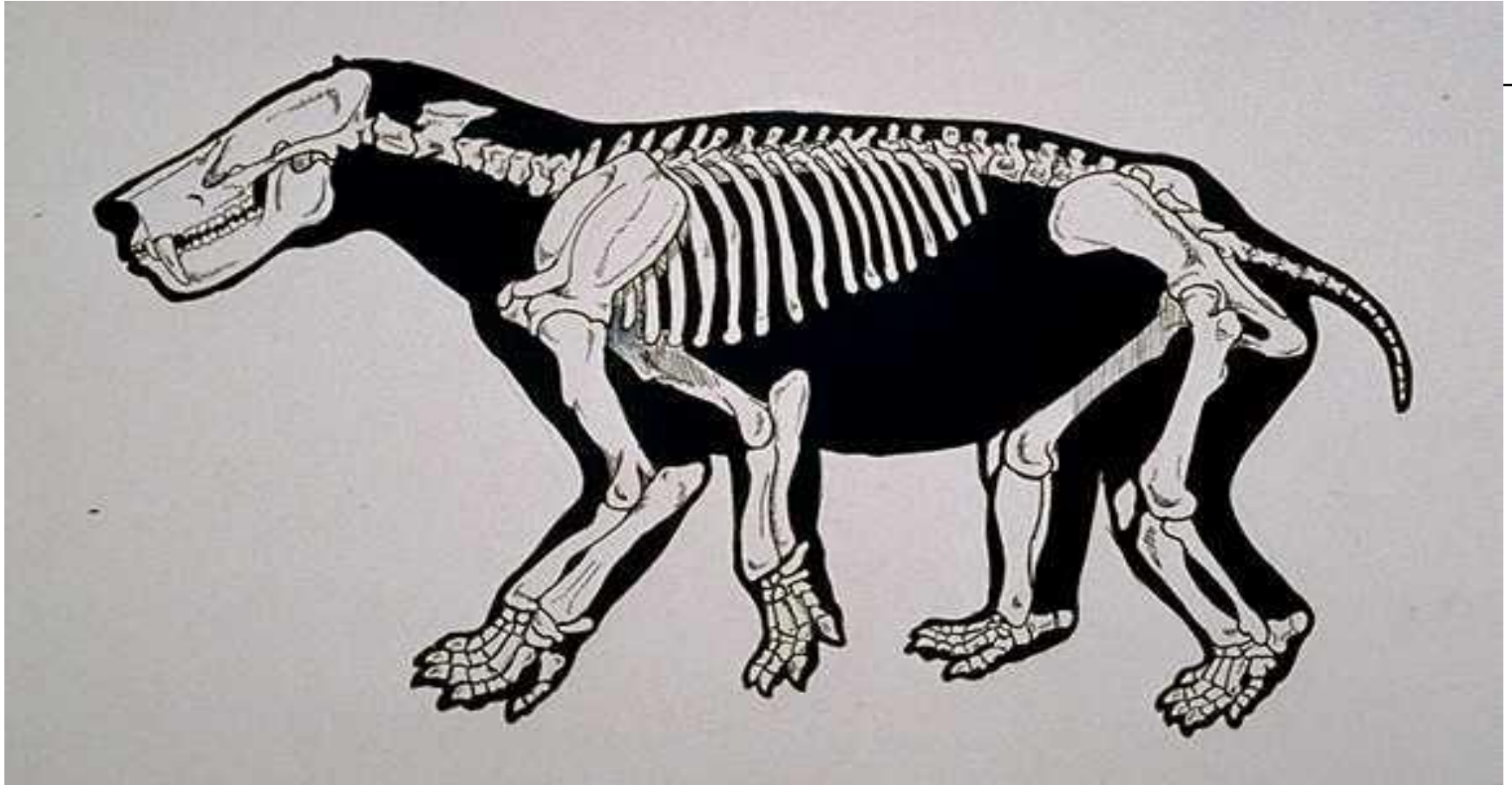
- ❑ A vestigial structure is a organ or structure which has little to no use to an organism, but appears to have been inherited by previous species that DID use it in a different time.

Example of Vestigial Organ

- ❑ Whales have hip bones and rear legs



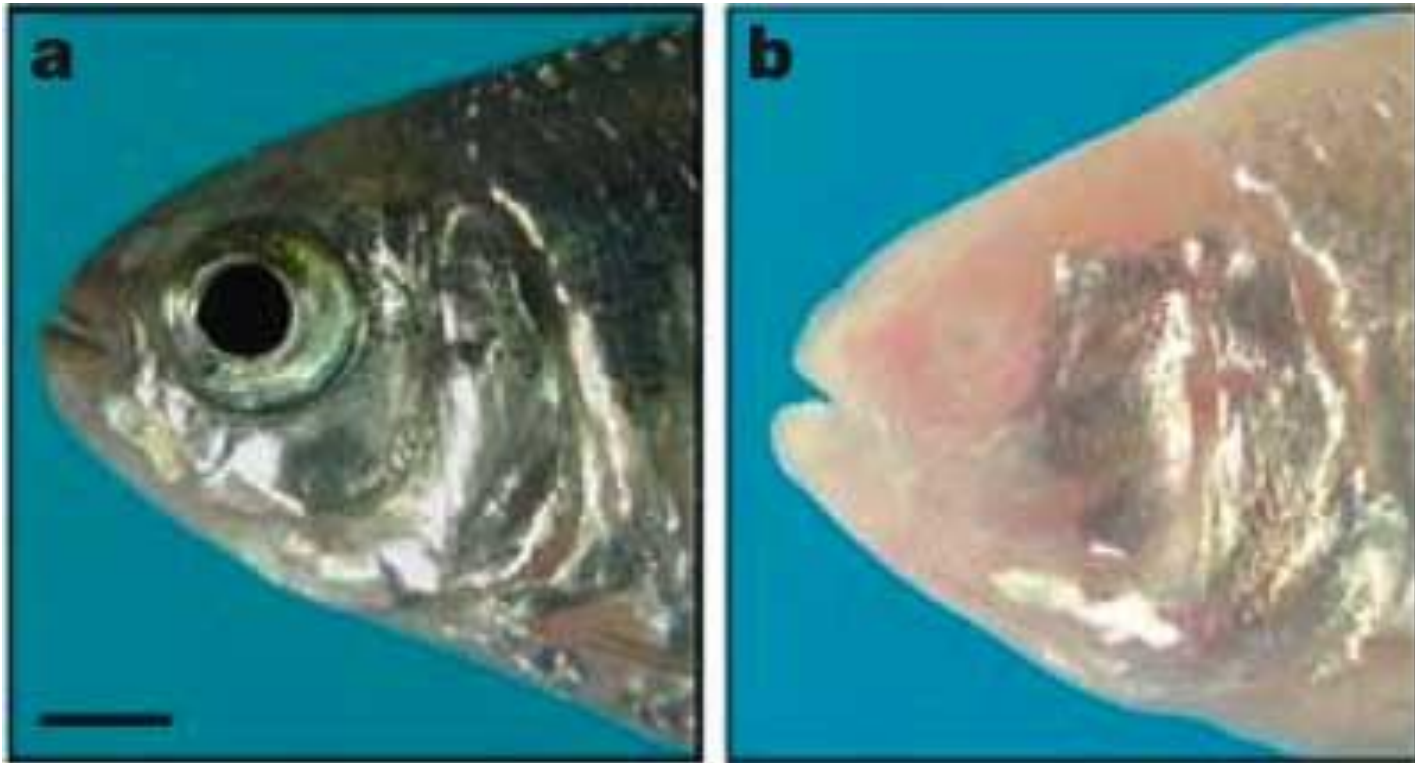
Closest relative of a whale



Hippopotamus

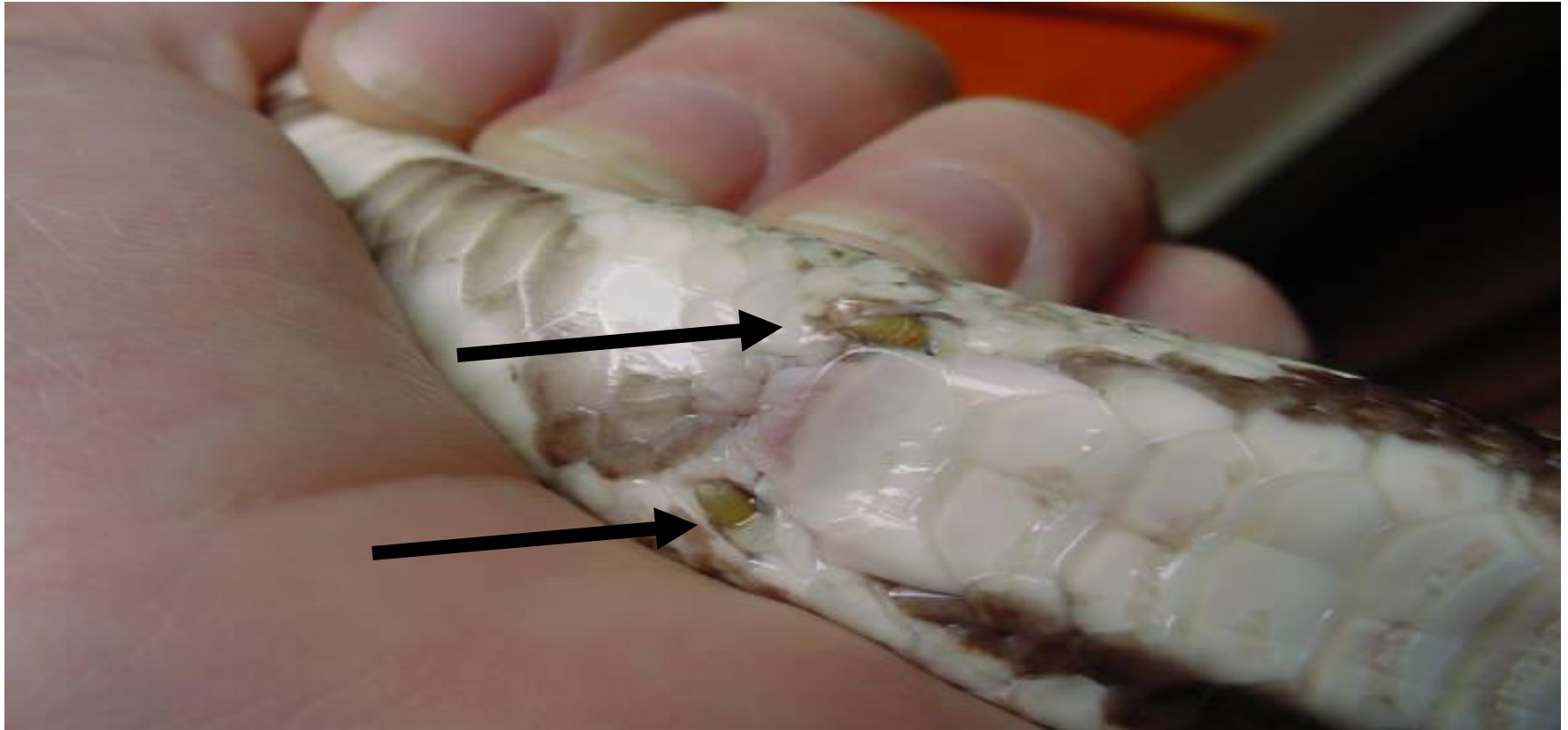
Example of Vestigial Organ

- ❑ Blind cave fish – have eye sockets, but no eyes



Example of Vestigial Organs

- ❑ Pythons and Boas—have portions of leg bones near end of tail – used only in mating



Flightless bird wings

□ Ostriches and Emus

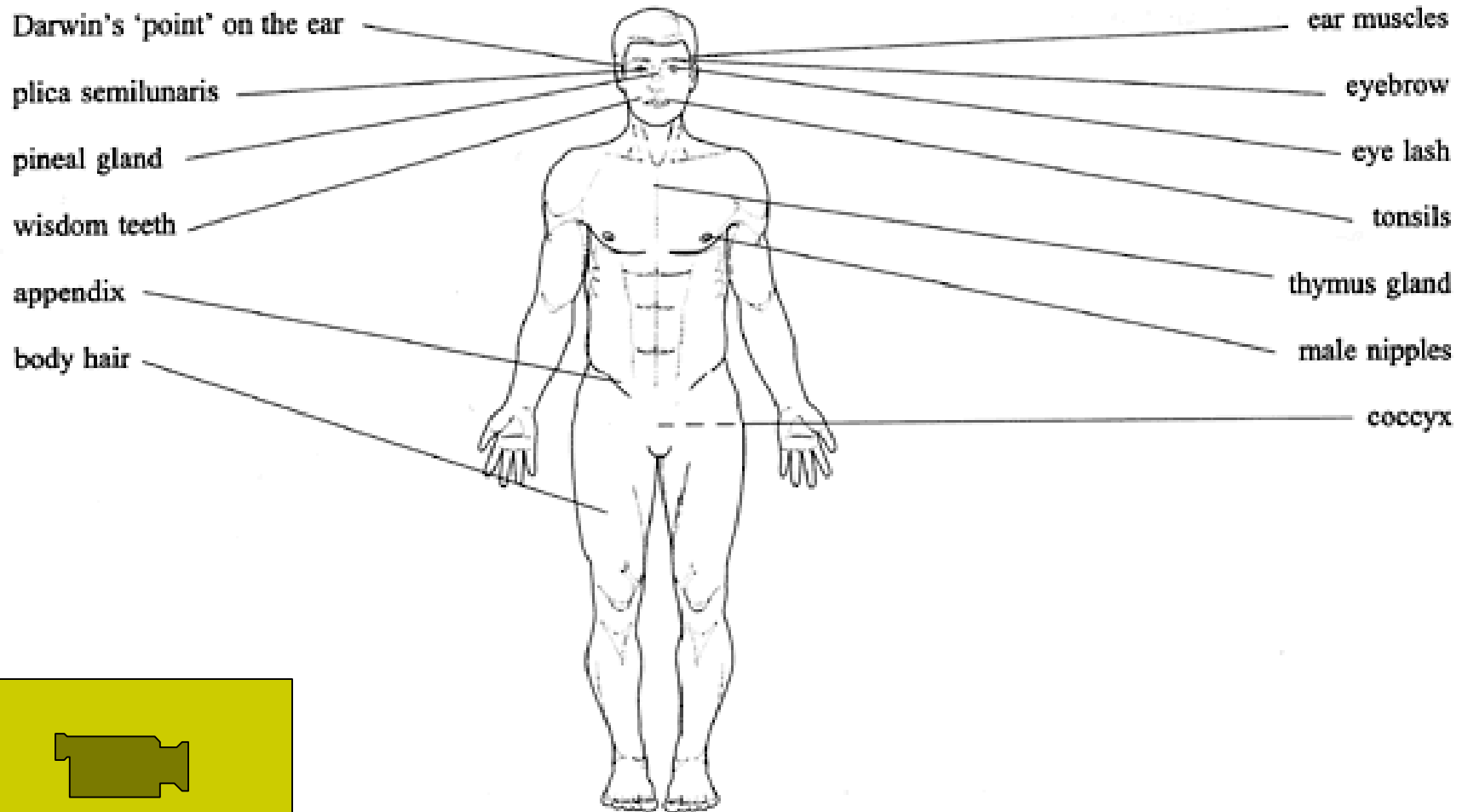


Limbless “Worm Lizards”

- Still have remnants of hip bones

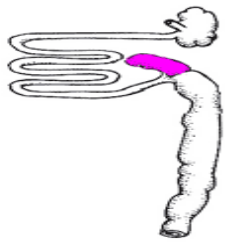


Human Vestigial Organs

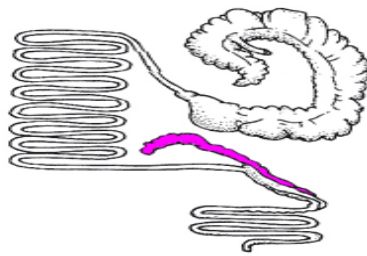


Example of Vestigial Organ

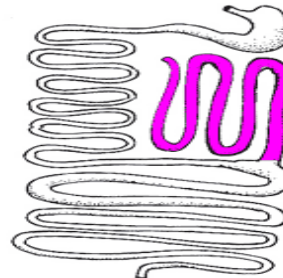
- **Appendix** – Thought to be used by mammals that eat and digest seeds and leaves.



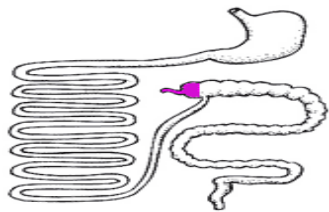
Opossum



Kangaroo



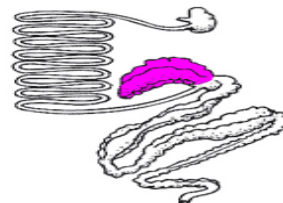
Koala



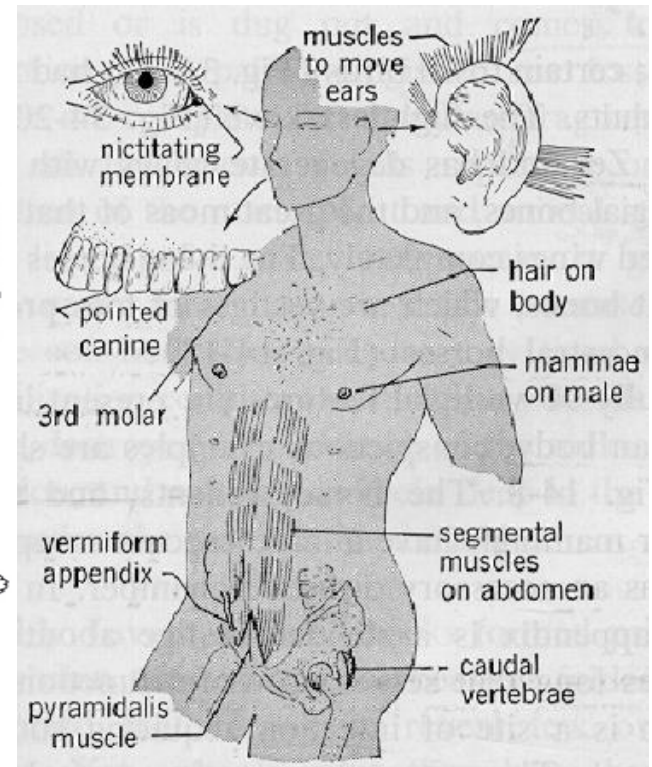
Human



Rabbit

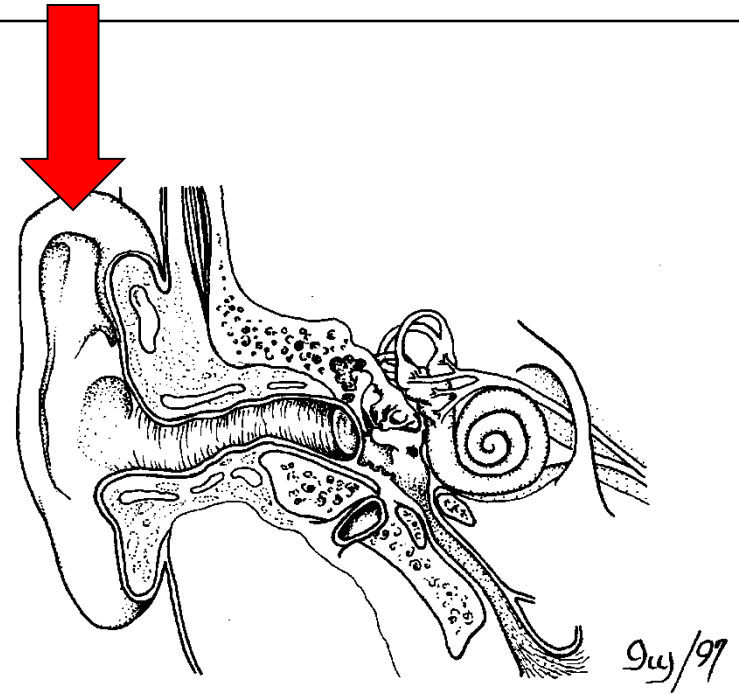


Zebra



External Ear Muscles

- ❑ Humans have 3 small muscles on the outside of the ear.
- ❑ Most people cannot control these muscles, but some of us can still wiggle our ears
- ❑ Primates use these muscles to orient their ears toward a sound. From www.txtwriter.com/backgrounders/Evolution/EVpage12.html



Ivy Livingstone © BIODIDAC

Image courtesy of BIODODAC website <http://biodidac.bio.uottowa.ca>

Goose bumps

- ❑ Goose bumps are a vestigial reflex.
- ❑ In furry mammals, goose bumps allowed the fur to stand on end, making the animal appear larger to enemies.
- ❑ Goosebumps still serve a function in warming humans, as many thousands of tiny muscles contract creating heat.



Proof of Evolution?

- Although homologous structures and vestigial organs don't prove that evolution is true, they supply compelling evidence that organisms have the ability to gain and lose the function of body parts, but continue to pass them on to successive generations.
- New species may have little to no use of them, or have similar appearance and function.

Resources

□ Pics

- www.google/images/

□ Information

- outreach.mcb.harvard.edu/teachers/Summer06/DonnaBrowne/Human**Vestigial.ppt**
- outreach.mcb.harvard.edu/teachers/Summer06/BethMick/TheoryEvolution.**ppt**
- Power% 20Point% 20Slides% 20from% 20Textbook/chapt21_lecture.**ppt**