

Laboratory 14

Evolution Assignment

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This assignment will allow you to explore some interesting aspects of evolution.

You may do this assignment in class if computers are available, or your instructor may assign it as homework. The questions are to be answered by accessing the internet. Type your answers using a word processor.

1 THE BASICS OF EVOLUTION

Use the hyperlinked references below to answer the following questions. Your answers to the questions in this lab should be one or two well written paragraphs, or one or two pages for each question to discuss the topic adequately.

Do NOT answer these questions with a copy and paste technique on the computer. That is plagiarism. Instead, read each reference thoroughly and put the material into your own words.

1. What is the modern synthesis?
<http://www.talkorigins.org/faqs/modern-synthesis.html>
2. What is macroevolution? <http://www.talkorigins.org/faqs/macroevolution.html>
Explain.
3. Punctuated equilibrium. <http://www.talkorigins.org/faqs/punc-eq.html>
 - a. What is punctuated equilibrium?
 - b. What evidence supports punctuated equilibrium?
 - c. What are some possible explanations for rapid evolutionary changes?
4. What is allopatric speciation? (Look under "Modes of Speciation".)
<http://www.talkorigins.org/faqs/faq-intro-to-biology.html>
5. What are five [lines of evidence](#) in support of the theory of evolution?
<http://www.talkorigins.org/faqs/comdesc/>
<http://facstaff.gpc.edu/~pgore/geology/geo102/evol.htm>
6. Are there examples of observed speciation? List and explain.
<http://www.talkorigins.org/faqs/faq-speciation.html>
See [this reference](#) also <http://www.talkorigins.org/faqs/speciation.html>

7. What are some of the vertebrate transition fossils? List and discuss specific examples. <http://www.talkorigins.org/faqs/faq-transitional.html>
See this reference also:
<http://www.agiweb.org/news/evolution/examplesofevolution.html>
Discuss examples of various genera that are transitional between each of the major groups of vertebrates. You do not need to define the term "vertebrate transition fossils" in your answer.
8. Addressing a common misconception: Did humans evolve from monkeys? Explain why this is false. <http://www.pbs.org/wgbh/evolution/library/faq/cat02.html#Q01>
See this reference also:
<http://www.nap.edu/readingroom/books/evolution98/evol5.html>

The hyperlinks below each explore different aspects of evolution that you need to be familiar with for this course. Please visit all of the web sites listed, keeping in mind the questions you will need to answer for this lab.

Readings:

1. **Evolution and the Fossil Record**, booklet online, published by American Geological Institute and the Paleontological Society
<http://www.agiweb.org/news/evolution/>
2. National Science Teachers Association position statement on the teaching of evolution <http://www.nsta.org/about/positions/evolution.aspx>
3. National Association of Geoscience Teachers position statement on the teaching of evolution <http://nagt.org/files/nagt/evolutiongibson.v2.pdf>
4. PBS Evolution TV series web site <http://www.pbs.org/wgbh/evolution/>
5. **Evolution vs. Creation Science (Ontario Centre for Religious Tolerance)** - <http://www.religioustolerance.org/evolutio.htm> .
6. **University of California, Berkeley**
<http://www.ucmp.berkeley.edu/history/evolution.html>
7. Harvard Dept of Molecular and Cellular Biology Biology Links: Evolution
<http://mcb.harvard.edu/BioLinks/Evolution.html>
8. **Evolution - Talk-Origins Archive** - <http://www.talkorigins.org/origins/faqs-evolution.html>
9. **Frequently asked questions on evolution from Talk-Origins Archive** - <http://www.talkorigins.org/origins/faqs.html>
10. Observed instances of speciation <http://www.talkorigins.org/faqs/faq-speciation.html>
11. Vertebrate Transition Fossils <http://www.talkorigins.org/faqs/faq-transitional.html>
12. **National Academy of Science Publication, "Teaching About Evolution and the Nature of Science"** - <http://www.nap.edu/readingroom/books/evolution98/>
13. **Introduction to Evolutionary Biology** - <http://www.talkorigins.org/faqs/faq-intro-to-biology.html>
14. **God and Evolution** - <http://www.talkorigins.org/faqs/faq-god.html>
15. **Evolution is a Fact and a Theory** - <http://www.talkorigins.org/faqs/evolution-fact.html>
16. **Problems with a global flood** - <http://www.talkorigins.org/faqs/faq-noahs-ark.html>
17. National Center for Science Education <http://www.natcensci.org/>
18. Tree of Life website <http://tolweb.org/tree?group=Life&contgroup=>

You are required to know about the evidence in support of evolution. The diversity of opinions you encounter will be stimulating and exciting. Keep an open mind. Look for well documented evidence (photos? maps?), work done by trained professionals (name, place of employment, dates listed), etc.

2 WHALE ORIGINS

In the early Cenozoic, mammals diverged rapidly from rodent-like ancestors to forms as diverse as whales (swimming mammals) and bats (flying mammals). This is called an adaptive radiation.

This assignment asks you to research and learn about the origin of whales as revealed by the fossil record.

Answer the following questions.

1. What is the significance of *Basilosaurus*? Describe the significant feature of its skeletal structure.
2. Where have *Basilosaurus* fossils been found?
3. In what epoch did *Basilosaurus* live?
4. The oldest group of fossil whales, the archaeocetes, (such as *Pakicetus*) have whale-like features as well as features of land dwelling mammals. What are these features?
5. In what epoch did *Pakicetus* live?
6. What are mesonychians?
7. Whales may be related to what modern mammal?
8. The transition from the land to the sea affected the hearing system in addition to the locomotor system. Describe the hearing system in whales, as compared with that of land-dwelling mammals.
9. What is osmoregulation, and how does it relate to whales making the transition to the sea?

Readings:

- <http://www.ucmp.berkeley.edu/mammal/cetacea/cetacean.html>
- <http://www.talkorigins.org/features/whales/>
- <http://darla.neoucom.edu/DEPTS/ANAT/TheWissen/>
- <http://darla.neoucom.edu/DEPTS/ANAT/whaleorigins.htm>
- <http://darla.neoucom.edu/DEPTS/ANAT/Hearing.htm>
- <http://darla.neoucom.edu/DEPTS/ANAT/Locomotion.htm>
- <http://darla.neoucom.edu/DEPTS/ANAT/Osmo.html>
- <http://www.enchantedlearning.com/subjects/whales/classification/Whalefossils.shtml>

UNUSUAL EVOLUTIONARY IDEAS

3

Aquatic Ape Theory (Hypothesis, really) - Science or Pseudoscience?

You will find the Aquatic Ape Theory (more correctly called a hypothesis) interesting. Can you tell why it is not considered to be a valid theory?

The Aquatic Ape Theory makes the argument that humans have many features in common with marine mammals. While there is a very compelling list of similarities, there is LITTLE OR NO HARD EVIDENCE to support the theory. Read about it and see what you think. This theory is not generally regarded seriously, but you will be amazed at the list of features we have in common with marine mammals. What does it all mean? (And is it all true?)

Aquatic Ape Information

<http://www.primitivism.com/aquatic-ape.htm>

http://survive2012.com/aquatic_ape_theory.php

<http://www.freewebs.com/aquatic-ape-theory/>

http://www.dmoz.org/Science/Biology/Evolution/Human/Aquatic_Ape_Theory/

Critiques of the Aquatic Ape hypothesis

"There are very good reasons why this theory is dismissed by almost all biologists. It's a classic example of why a little knowledge about evolution can be a very dangerous thing. "

1. [Wikipedia](http://www.wikipedia.org/wiki/Aquatic_ape_hypothesis) - http://www.wikipedia.org/wiki/Aquatic_ape_hypothesis
2. [Did humans descend from "aquatic apes"?](http://www.straightdope.com/mailbag/maquaticape.html) - - <http://www.straightdope.com/mailbag/maquaticape.html>
3. [Aquatic Ape Theory - Sink or Swim. A scientific critique by Jim Moore](http://www.aquaticape.org/) - <http://www.aquaticape.org/>

Your assignment is to write an essay on why the aquatic ape hypothesis is dismissed as pseudoscience.

If you liked this, see the Pliocene Pussy Cat Theory.

<http://improbable.com/airchives/paperair/volume7/v7i15/pliocene-pussy.html>

4

SEARCHING FOR INFORMATION ON THE WEB

1. Take this opportunity to use a search-engine to research evolution.

Type in "evolution" or "science biology evolution" or "science geology evolution" or "evolution fossils geology" or some other combinations. There are a lot of references on evolution. Try to see a diversity of viewpoints.

Write a 3-paged typed double spaced paper, with a font size of 10 or 12 and a 1-inch margin all the way around. Write about what you learned. You may add a brief opinion at the end, but the main purpose of the paper is to document the NEW ideas you encounter and the evidence for them. use web resources, and cite them correctly

Include URLs (web page reference locations) so that you or your instructor can go back to the sources.