Attachment 2-28 ANSWER KEY

**Evidences of Evolution Summative Assessment**

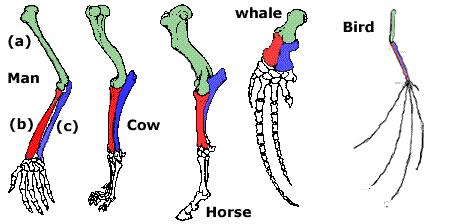
1. Scientists observe data that shows the differences between the same proteins found in two different animals. This type of evidence of evolution would show how closely these two animals are related. If the data shows that there are 2-3 differences between the two animals’s DNA sequence that codes for the protein, what conclusion would the scientists make concerning how closely related the two animals are to each other?

Biochemical evidence is the comparison of either the differences in DNA sequence or the sequence of amino acids within the same gene/protein in different animals. Since a sustained change in the DNA sequence is crucial to natural selection, and since the changes take thousands or millions of years to occur, the time it takes to see several changes can be inferred to be a measure of how related the two species are to each other. If there are 20 DNA base changes between the genes of two organisms, then it took much more time to establish this difference than it would to see 2 or 3 difference. Therefore, the organisms with fewer differences are more closely related than those who show many differences.

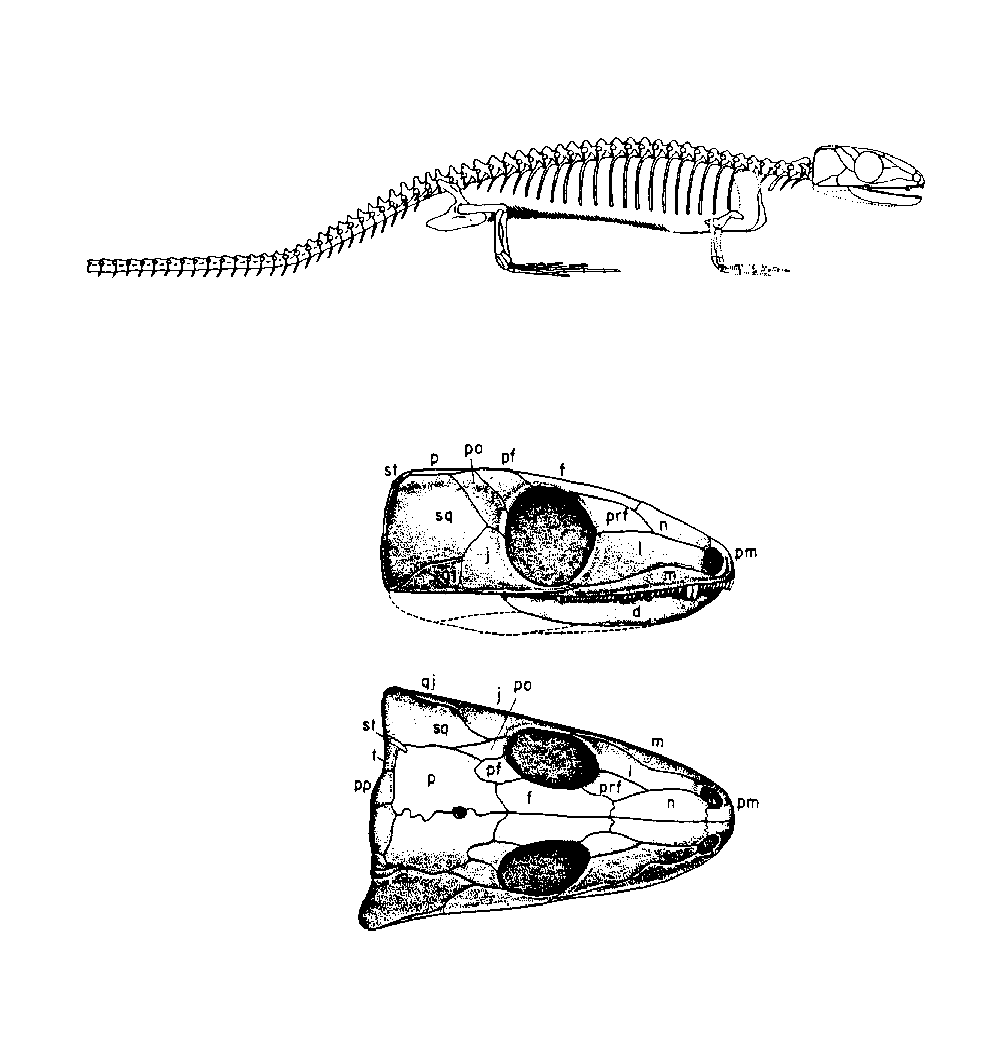
1. The protein mentioned in #1 was compared among several animals. The numbers refer to the differences between the gene sequences of animal X and other animals. What type of animal would you expect X to be? Explain your reasoning.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Differences in DNA sequence cytochrome C | Chicken | Duck | Pigeon | Pig | Tuna |
| X | 2 | 3 | 4 | 24 | 27 |

Animal X is mostly likely a type of bird. Animal X is most closely related to the chicken, duck and pigeon which are all birds. The biggest differences are between animal X and the pig (a mammal) and the tuna (fish). Since the birds show fewer differences to X, I would expect animal X to be a type of bird.

1. 

How would you describe these structures? Explain how they are used in providing evidence of common ancestry among animals? These are homologous structures. Since all of these limbs have common bone structures as indicated by the colored bones, then all of these organisms must share a common ancestor.

1. 

Describe this type of evidence pictured above. In general, how do scientists use this evidence?

This is fossil evidence. Fossil evidence is used in a variety of ways. It may help date a specific fossil by using relative and absolute dating. In addition, the fossils can be analyzed for bone structure. They can be compared to other bone structures to see similarities. Often, fossils show vestigial structures no longer used by the organisms, but that shows similarities with other animals. It also shows that the organism may have used the structure in a difference environment (vestigial limbs could show that an aquatic animal could have walked on land at some point).

1. *“Fossil Hoax: In November 1999, National Geographic magazine published an article announcing and illustrating the discovery of a new fossil of an ancient bird, Archaeoraptor liaoningensis, discovered in China in July 1997.*

*The discovery was hailed as the finding of a new missing link! Then, 11 months later, it was shown that the*

*“missing link” fossil was a hoax perpetrated by a Chinese farmer trying to please fossil collectors.”*

<http://www.actionbioscience.org/evolution/lessons/lenskilessons.pdf>. This is a true story. What should scientists do to make sure this does not happen again? How should the public view these types of discoveries?

Scientists should continue research and peer reviewing. They should also make sure that data is corroborated by more than one source. The public should inspect the sources of these scientific announcements and note if the journals are peer-reviewed and respected among the field of study.

1. The evidences of evolution suggest which conclusion?
   1. All organisms have changed at one specific time in their existence.
   2. Organisms change through time as a result of environmental changes.
   3. Fossil evidence is the most conclusive of all the evidences of evolution.
   4. One type of evidence is usually sufficient to provide the evolutionary path of an organism.
2. How do scientists explain why they sometimes change a previously held idea or conclusion about a specific evolutionary path?
   1. The original scientists misread the data that was collected.
   2. The general public does not understand scientific explanations of evidence.
   3. New and better technologies allow scientists to readjust their evaluation of evidence.
   4. Changing a foregone conclusion in science is not part of the scientific method.
3. In general, what is the strongest evidence of evolution?
   1. Embryological b. homologous structures c. biochemical d. geographical
4. How do scientists explain the relationship between biochemical evidence and the most recent common ancestor?
   1. The more differences in the biochemical data, the more recent the common ancestor.
   2. The more differences in the biochemical data, the more closely related the organisms are to each other.
   3. The fewer differences in the biochemical data, the more recent the common ancestor.
   4. The fewer differences in the biochemical data, the fewer similarities of the two organisms.
5. Why is it important for scientists to communicate their research through publications and presentations?
   1. Publishing research is expected by most universities throughout the world.
   2. Scientists report their research to disprove other scientist’s conclusions.
   3. Presenting research to colleagues allows others to use it and evaluate it for future use.
   4. Validation is important to all scientists and publishing insures validation.