

Sample Assignments: Pre-Test given in BIOL 280, Evolution

See "Teaching Philosophy" for information regarding how this pre-test was used to structure the course.

PRE-TEST (ungraded)

This ungraded individual assessment will test your understanding about basic evolutionary biology concepts obtained prior to taking BIOL 280. Please answer the following questions to the best of your ability as your responses will shape the content covered in this course.

PART I: Knowledge Assessment

1. Indicate whether the following statements are true (T) or false (F). If false, please provide a brief (one sentence) explanation.
 - A. _____ Evolution is the result of individuals adapting to their environment.

 - B. _____ Evolution provides species with adaptations they need.

 - C. _____ Evolution always goes from simple to complex.

2. Which of the following statements correctly defines **gene flow**?
 - A. Flow of DNA from parent to offspring
 - B. Transfer of alleles from one population to another
 - C. Spread of mutations from one cell to another
 - D. Insertion of viral DNA into a eukaryotic cell

3. Which of the following statements correctly defines **genetic drift**?
 - A. Change in allele frequency due to chance
 - B. Sharing of genetic information between parent and offspring
 - C. Shift in allele frequencies caused by genetically linked loci
 - D. Random event that causes a genetic change within an individual

4. How old is the earth?
 - A. Under 1 million years
 - B. 4.5 million years
 - C. 4.5 billion years
 - D. 4.5 trillion years

5. Circle and label an example of the following features on the phylogeny to the right:

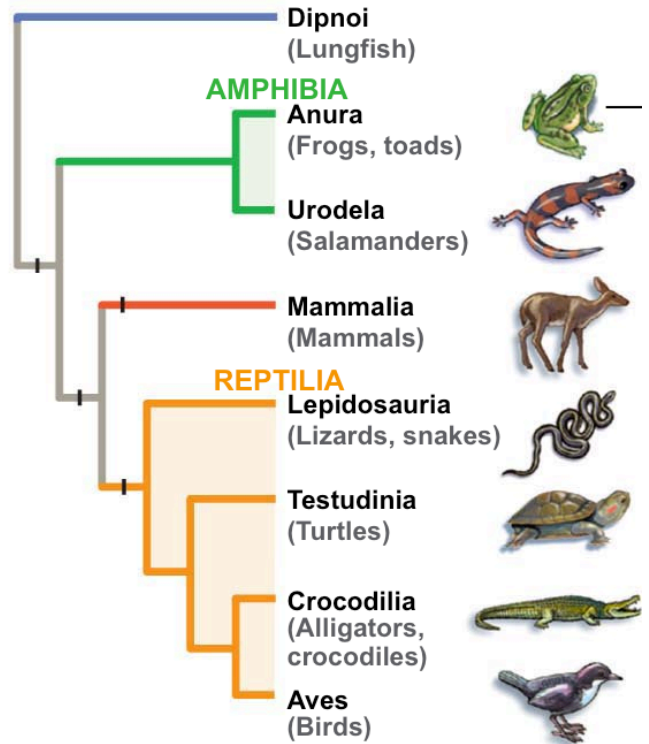
- A. Taxon
- B. Clade
- C. Synapomorphy

6. Which of the following groups are **NOT** monophyletic?

- A. Amphibia
- B. Reptilia
- C. Reptilia & Mammalia
- D. Amphibia & Mammalia

7. Which of the following are lizards most closely related to?

- A. Mammals
- B. Birds
- C. Salamanders
- D. Lungfish



8. One population of *Rhagoletis pomonella* flies lays its eggs exclusively on hawthorn fruit, while another population lays eggs only on apples. Apple trees were introduced 400 years ago in the eastern United States in the same region where hawthorn trees are present. Scientists believe that these fly populations will eventually become two distinct species. This is an example of:

- A. Geographic isolation
- B. Allopatric speciation
- C. Sympatric speciation
- D. Temporal isolation

9. Fossil remains of *Cynognathus*, a Triassic land reptile have been found in southeast Africa and central South America. The two continents are separated by nearly 2,000 miles of ocean. Explain how it is possible that *Cynognathus* existed on both continents if it could not fly or swim? (1-2 sentences)

10. Giraffes have long necks, which they use to reach leaves and other vegetation high off the ground. Explain how natural selection could have caused the evolution of long necks in giraffes; assuming their ancestors had shorter necks. (HINT: what are the requirements of natural selection?) (2-5 sentences)

PART II: Learning Assessment

1. Why are you taking BIOL 280?

2. Please rank your Top 3 questions of interest (i.e. questions you would like to learn the answers to during this course). Also, indicate all other questions of interest using a check mark.

- _____ What will my children inherit?
- _____ Why do some species have giant genomes, while others have small ones?
- _____ Why aren't antibiotics and vaccines 100% effective?
- _____ Why hasn't sickle cell anemia disappeared if its so detrimental?
- _____ Why do males and females of some species look so different?
- _____ Why do some organisms produce hundreds of offspring while others produce only a few?
- _____ Why do women stop having children? Why menopause?
- _____ What is the origin of snake venom?
- _____ Can acquired characteristics actually be inherited!?
- _____ Can a behavior evolve?
- _____ How do you even read a phylogenetic tree?
- _____ Where do new species come from?
- _____ Why is the living world so diverse?
- _____ How can two species become one?
- _____ What was the first living thing and where did it come from?
- _____ How can we estimate when a species diverged?
- _____ How is it that whales are more closely related to us than to fish?
- _____ What is the evolutionary history of humans?

Do you have any other questions related to evolution that you would like answered during this course if time permits?

3. Please describe if and how you have studied for biology exams in the past. In your answer indicate whether or not your strategies were successful, and if they were unsuccessful what you could have done differently.

4. What academic or non-academic accomplishment are you most proud of?