Roland-Story Biology Class

Chapter 12 Study Guide
The History of Life on Earth

Name _____

Section: How Did Life Begin?

Complete each statement by writing the correct term or phrase in the space provided.

1. Scientists use _____ to calculate the age of an object by measuring the proportions of the radioactive isotopes of certain elements.

2. Unstable isotopes that slowly change and give off energy in the form of charged particles are called _____ .

3. A radioisotope's _____ _____is the time it takes for one-half of a given amount of a radioisotope to change.

Read each question, and write your answer in the space provided.

4. What is the primordial soup model?

5. Explain why the results of the Miller-Urey experiment have recently been reevaluated.

6. What is the bubble model?

Circle the letter of the term or phrase that best completes the statement.

7. RNA molecules can catalyze
    a. primordial soup.
    b. protein synthesis.
    c. ultraviolet radiation.
    d. coacervate development.

8. It is possible that cellular life began with
    a. oil and vinegar.
    b. water and lightning.
    c. large organic molecules.
    d. microspheres made of amino acids.

9. Microspheres could not be considered true cells unless they could
    a. form cellular membranes.
    b. originate spontaneously in water.
    c. incorporate molecules and energy.
    d. pass their characteristics to offspring.

10. Most scientists agree that double-stranded DNA evolved
    a. after RNA.
    b. before RNA.
    c. before microspheres.
    d. after hereditary mechanisms.

11. Most scientists agree that RNA first formed
    a. inside ammonia.
    b. outside the atmosphere.
    c. spontaneously in water.
    d. gradually in microspheres.

12. The simple chemical reactions on the early Earth were energized by
    a. enzymes.
    b. organic molecules.
    c. the sun and volcanoes.
    d. lightning.

Section: The Evolution of Cellular Life

Read each question, and write your answer in the space provided.

1. What are the oldest fossils, and what have they told us about the first organisms?

2. How do eubacteria and archaebacteria differ?

Complete each statement by writing the correct term or phrase in the space provided.

3. The first eukaryotic cells are more likely to have evolved from _____ than from eubacteria.

4. The group _____includes many bacteria that cause disease and decay.

Read each question, and write your answer in the space provided.

5. What is the theory of endosymbiosis?

6. What are chloroplasts?

Circle the letter of the term or phrase that best completes each statement.

7. The kingdom Protista consists of
   a. only unicellular prokaryotes.
   b. only multicellular eukaryotes.
   c. multicellular and unicellular prokaryotes.
   d. multicellular and unicellular eukaryotes.

8. An advantage of multicellularity is that
   a. cells can contain genetic material.
   b. organisms can live in many types of environments.
   c. cells can specialize to carry out specialized functions.
   d. organisms can be less complex than unicellular organisms.

9. Seaweed is classified as a
   a. plant.
   b. fungi.
   c. protist.
   d. prokaryote.

10. The kingdoms Fungi, Plantae, and Animalia each evolved independently from
   a. a single kind of protistan ancestor.
   b. a different kind of protistan ancestor.
   c. a single-celled prokaryote.
   d. a multicellular prokaryote.

11. The oldest known fossils of multicellular organisms were found in rocks
   a. older than the Cambrian period.
   b. formed in the Silurian period.
   c. formed in the early Precambrian era.
   d. younger than the Ordovician period.

Read each question, and write your answer in the space provided.

12. Why have mass extinctions changed the evolution of surviving species?

13. Why do some scientists think that another mass extinction is occurring today?

Section: Life Invaded the Land

Study the following steps in the evolution of life on land. Determine the order in which the steps took place. Write the number of each step in the space provided.

_____ 1. The sun's rays caused some molecules of oxygen, O2, to form molecules of ozone, O3, in the upper atmosphere.

_____ 2. There were no living things on the dry, rocky surface of Earth.

_____ 3. Photosynthesis by cyanobacteria began adding oxygen to Earth's atmosphere.

_____ 4. Enough ozone had accumulated to make Earth's land a safe place to live.

_____ 5. In the upper atmosphere, ozone blocked the ultraviolet radiation of the sun.

Complete each statement by writing the correct term or phrase in the space provided.

6. Plants use the energy from sunlight to make their own _____.

7. Plants cannot obtain _____ from bare rock.

8. Fungi cannot make _____from sunlight.

9. Fungi are able to absorb _____from bare rock.

10. Associations between fungi and the roots of plants are called _____.

11. A relationship in which both organisms benefit is called _____.

Read each question, and write your answer in the space provided.

12. Why was it necessary for plant life on land to evolve before animal life on land?

13. Describe the features of arthropods.

Complete each statement by writing the correct term or phrase in the space provided.

14. Early amphibians had moist breathing sacs called _____ .

15. Frogs, toads, and salamanders are examples of _____ .

16. Snakes, lizards, turtles, dinosaurs, and crocodiles are examples of _____.

17. The movement of Earth's land masses over geologic time is commonly called

_____ _____.

Determine the order in which the following groups of animals evolved. Write the number of each step (1–4) in the space provided.

_____18. amphibians

_____19. mammals and birds

_____20. fishes

_____21. reptiles

Short Answer/Essay Questions:

22. Construct a timeline of events relating to the origin and evolution of life on Earth. Use information presented in your text that represents scientists' current best estimates of when the relevant events occurred. (Your time scale should be in billions of years.) Illustrate your timeline with drawings of cells and organisms that you include. Use descriptions and pictures in your text to help you depict the distinctive features and the environment in which the cells and organisms lived. Include when organic chemicals were first formed, as well as origins for the following: Earth, first cells, first eukaryotic cells, first animals, first vertebrates, first land plants, first fungi, first land animals, first vertebrates.

23. Most cells found in organisms on Earth today are aerobic; that is, they need oxygen. Explain why the first cells could not have been aerobic 1.1.bacteria.

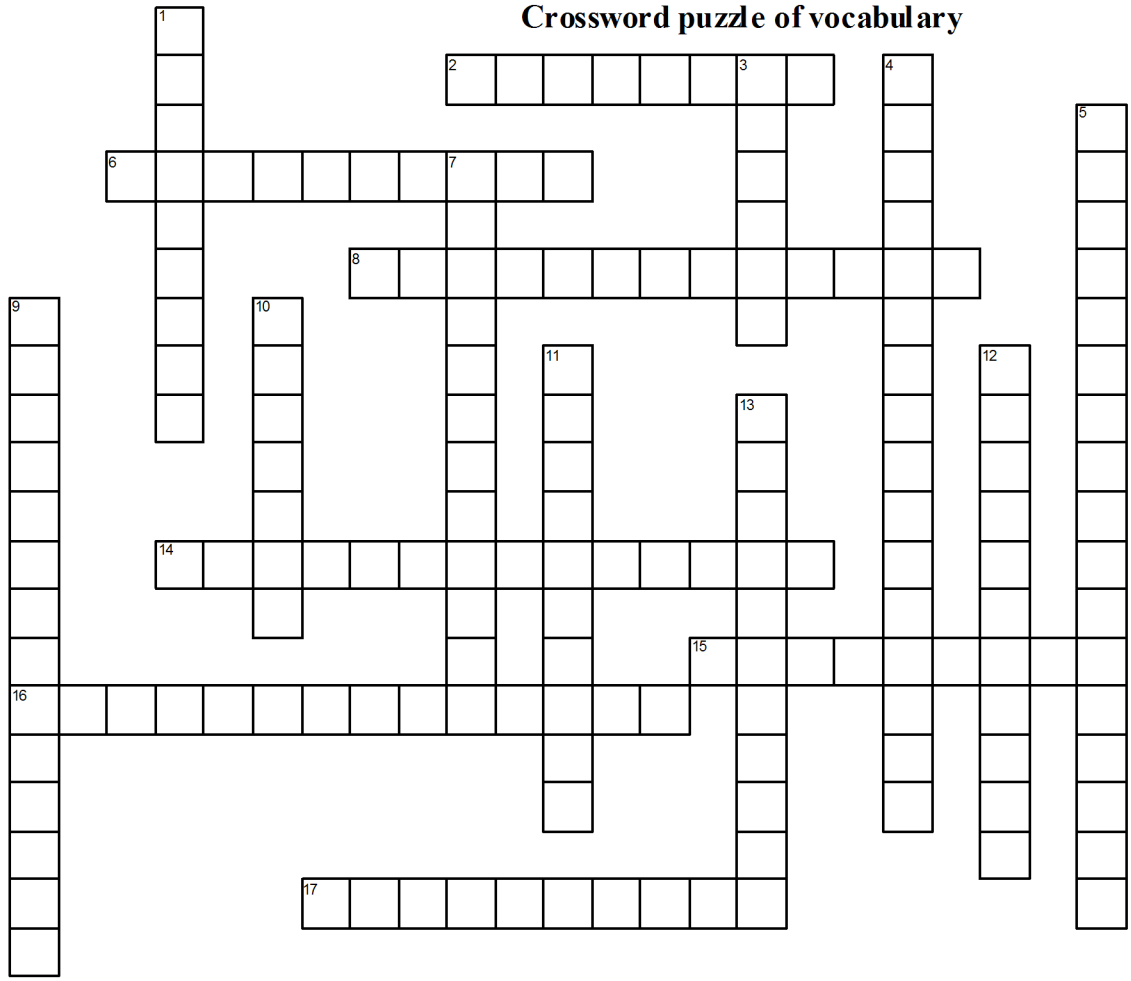
24. Many scientists think the thinning of Earth's ozone layer is caused by the activities of people in industrialized countries. Why do you think many biologists are urging industrialized nations to take steps that may prevent further destruction of the ozone layer?

25. Why would insects have an ecological advantage over flightless animals?

26. What characteristic did the first terrestrial animals have that allowed them to survive on land?

27. Describe the structural innovations that helped amphibians adapt to life on land.

Crossword puzzle of vocabulary



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ACROSS

2 the time needed for half of a sample of a radioactive substance to break down naturally
6 a classification kingdom that includes all prokaryotes except archaebacteria
8 a relationship in which one living thing lives within a different living thing and in which both living things benefit
14 an event during which every member of large numbers of species dies
15 a member of the phylum Arthropoda, which includes invertebrate animals
16 a type of bacterium that can carry out photosynthesis
17 an animal that has a backbone

DOWN

1 a relationship between two species in which both species benefit
3 the preserved remains of an organism that lived long ago
4 the hypothesis that says that the continents once formed a single landmass, broke up, and drifted to their present locations
5 a way to estimate the age of an object by comparing the amounts of a radioactive isotope and a stable sotope
7 an isotope that is not stable
9 a classification kingdom made up of bacteria that live in extreme environments
10 a living thing that belongs to the kingdom Protista
11 the death of every member of a species
12 short chains of amino acids that come together into tiny droplets when placed in water
13 a relationship in which fungi and plant roots live in close association