GRADE 12 BIOLOGY
UNIT C – EVOLUTION
WORKBOOK
CHAPTER 16.3 - DARWIN PRESENTS HIS CASE

Name: _____
Date: _____

16–3 Darwin Presents His Case

OVERVIEW

Darwin was reluctant to publish his ideas because they were so radical. When he realized that another scientist, Alfred Russel Wallace, had the same ideas, Darwin finally published On the Origin of Species in 1859. In the book, Darwin provided evidence that evolution has occurred. He also explained his theory for how evolution comes about.

Darwin's theory was based on artificial selection. In artificial selection, animal breeders select for breeding only animals with the desired traits. For example, they select only the largest hogs or only the cows that produce the most milk. These traits are then passed on to the next generation.

Darwin thought that a process similar to artificial selection occurs in nature. He called this process natural selection. Darwin's theory of evolution by natural selection can be summed up as follows. Individuals differ, and some of the differences can be passed on to their offspring. More offspring are produced than can survive and reproduce. There is competition for limited resources, or a struggle for existence. Individuals best suited to their environment survive and reproduce most successfully. In other words, there is survival of the fittest.

Fitness is the ability to survive and reproduce in a specific environment. It results from adaptations, or inherited characteristics that increase an organism's chance of survival. Only the fittest organisms pass on their traits. Because of this, the species changes over time. Darwin argued that species alive today are descended, with modification, from ancestral species that lived in the past.

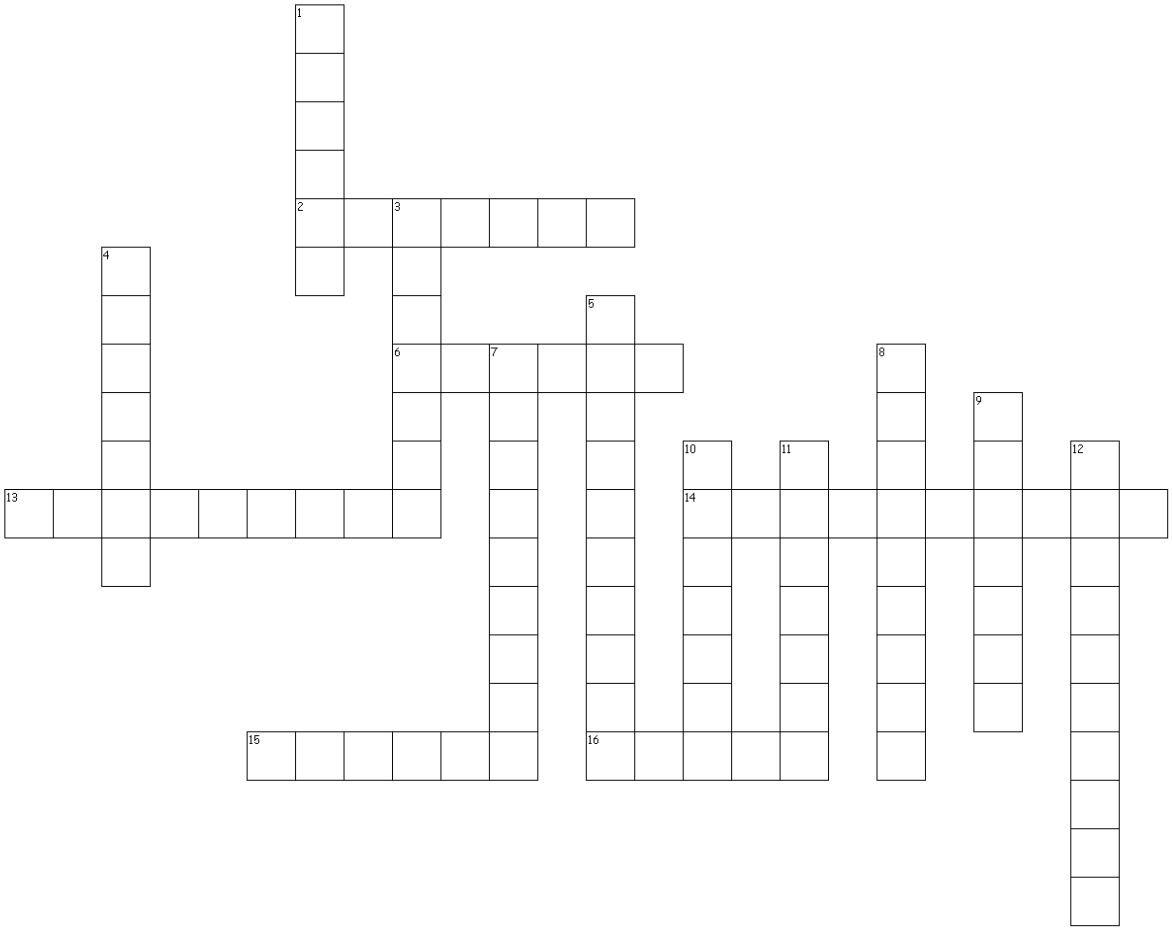
Darwin also introduced the principle of common descent. According to this principle, all species come from common ancestors. The principle of common decent links all organisms on Earth into a single tree of life. Darwin presented four types of evidence in support of evolution: the fossil record, the geographical distribution of living species, homologous structures of living organisms, and similarities in early development, or embryology. Comparing fossils from older and younger rock layers documents the fact that evolution has

occurred. The presence of similar but unrelated organisms in similar environments suggests the operation of natural selection. Homologous structures have different mature forms but develop from the same embryonic tissues. They provide strong evidence that organisms have descended, with modifications, from common ancestors.

Some homologous structures no longer serve important functions in descendants. If the structures are greatly reduced in size, they are called vestigial organs. The early stages, or embryos, of many animals are very similar. These similarities also provide evidence that the animals share common ancestors.

Scientific advances have supported most of Darwin's hypotheses. Today, evolutionary theory is called the "grand unifying theory of the life sciences." It gives insights to all biological and biomedical sciences.

Vocabulary Review - Crossword Puzzle. Complete the puzzle by entering the term that matches each numbered description.



Across

2. scientist whose ideas about evolution influenced Darwin
6. explanation of natural events that is supported by evidence and can be tested with new evidence
13. islands where Darwin observed variation in tortoises
14. inherited characteristic that increases an organism's chance of survival
15. another geologist who influenced Darwin
16. geologist who influenced Darwin

Down

1. ship on which Darwin traveled
3. economist whose ideas about human population influenced Darwin
4. remains of ancient life
5. type of selection in which humans select the variations
7. change over time
8. homologous structure that is greatly reduced in size
9. ability of an individual to survive and reproduce in its specific environment
10. scientist whose ideas about evolution were the same as Darwin's
11. type of selection Darwin referred to as survival of the fittest
12. structures that have different mature forms but develop from the same embryonic tissues

Publication of On the Origin of Species

1. Is the following sentence true or false? When Darwin returned to England, he rushed to publish his thoughts about evolution. **T / F**

2. The naturalist whose essay gave Darwin an incentive to publish his own work was: _____

3. Circle the letter of *each* sentence that is true about Darwin's book, On the Origin of Species.

a. It was published in 1869.
b. It was ignored when it was first published.
c. It contained evidence for evolution.
d. It described natural selection.

Inherited Variation and Artificial Selection

4. Differences among individuals of a species are referred to as:
_____

5. Is the following sentence true or false? Genetic variation is found only in wild organisms in nature. **T / F**

6. Circle the letter of each sentence that is true about artificial selection:

a. It is also called selective breeding.
b. It occurs when humans select natural variations they find useful.
c. It produces organisms that look very different from their ancestors.
d. It is no longer used today.

Evolution by Natural Selection

7. What was Darwin's greatest contribution? _____
_____

Match each term with its definition.

Terms	Definitions
____ 8. fitness	a. Any inherited characteristic that increases an organism's chance of survival
_____9. adaptation	
_____10. natural selection	b. Survival of the fittest
	c. The ability of an individual to survive and reproduce in its specific environment

11. What does the phrase struggle for existence mean? _____

_____

12. Is the following sentence true or false? Adaptations can be physical characteristics but not more complex features such as behavior. **T / F**

13. Explain what Darwin meant by the phrase survival of the fittest. ____

_____ _____

14. Circle the letter of each sentence that is true about natural selection.
    a. It selects traits that increase fitness.
    b. It takes place without human control.
    c. It can be observed directly in nature.
    d. It leads to an increase in a species' fitness.

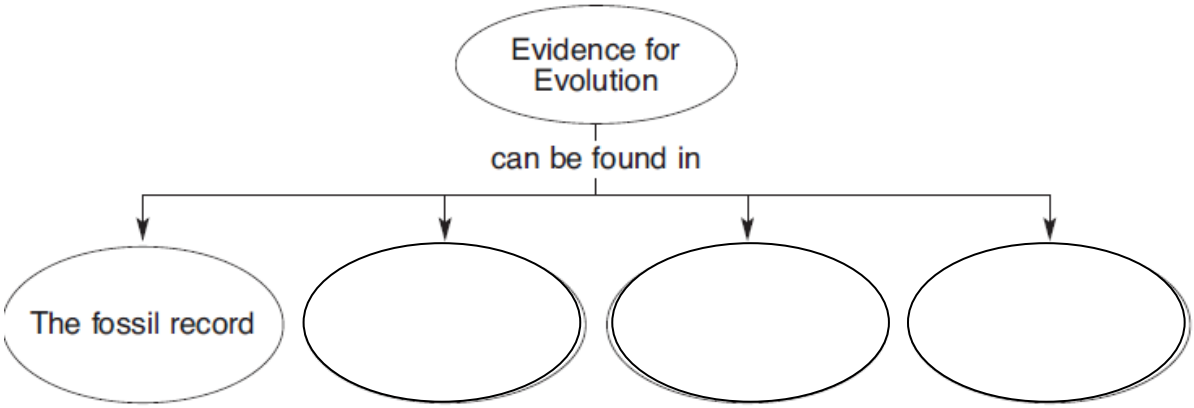
15. The principle that living species descend, with changes, from other species over time is referred to as: _____

16. The principle that all species were derived from common ancestors is known as: _____

Evidence of Evolution

17. Is the following sentence true or false? Darwin argued that living things have been evolving on Earth for thousands of years. **T / F**

18. Complete the concept map.



19. How do fossils that formed in different rock layers provide evidence of evolution? _____
_____

20. Circle the letter of the way Darwin explained the distribution of finch species on the Galápagos Islands.

a. They had descended with modification from a common mainland ancestor.
b. They had descended with modification from several different mainland ancestors.
c. They had remained unchanged since arriving on the Galápagos from the mainland.
d. They had become more similar to one another after arriving on the Galápagos.

21. How did Darwin explain the existence of similar but unrelated species? Darwin thought that such species evolved features in common because they were exposed to similar pressures of natural selection.

_____
_____

22. Structures that have different mature forms but develop from the same embryonic tissues are called : _____

23. Is the following sentence true or false? Homologous structures provide strong evidence that all four-limbed vertebrates have descended, with modifications, from common ancestors. **T / F**

24. Organs that are so reduced in size that they are just vestiges, or traces, of homologous organs in other species are called: _____

Summary of Darwin's Theory

25. Circle the letter of each idea that is part of Darwin's theory of evolution.
    a. There is variation in nature.
    b. Fewer organisms are produced than can survive.
    c. There is a struggle for existence.
    d. Species change over time.

26. According to Darwin's theory, what happens to individuals whose characteristics are not well suited to their environment?
_____

27. Darwin believed that all organisms on Earth are united into a single tree of life by: _____

Evolutionary Theory Since Darwin

28. What is the status of Darwin's hypotheses today?
_____

CROSSWORD FOR ENTIRE CHAPTER 16

Clues across:

1. The type of selection that humans control

3. The ability to survive and reproduce in a specific environment

5. Change over time

9. The kind of structures that have different mature forms but develop from the same embryonic tissues

10. Any inherited characteristic that increases an organism's chance of survival

Clues down:

2. The preserved remains of ancient organisms

4. A well-supported explanation of phenomena that have occurred in the natural world

6. The type of selection that increases an organism's fitness in its environment

7. The kind of organs that are so reduced in size they are just traces of homologous organs in other species

8. The type of descent that explains why all species are linked in a single tree of life