

### Guiding Question

What theory serves as the basis of what we believe about how evolutionary changes occur?



## 7<sup>th</sup> GRADE SCIENCE

## Genetic Changes Lesson 2 – HW

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

Homeroom: \_\_\_\_\_

*Jean-Baptiste Lamarck (1744-1829) and Charles Darwin (1809-1882) both thought and had ideas about how life on earth got to be the way it is now. They had some similar and some very different ideas.*

### **How Lamarck and Darwin Agreed**

Unlike most other people at that time, Darwin and Lamarck both thought that life had changed gradually over time and was still changing, that living things change to be better suited and adapted to their environments, and that all organisms are related. Darwin and Lamarck also agreed that life evolved from fewer, simpler organisms to many, more complex organisms.

### **What Lamarck Believed**

Lamarck is best known for his *Theory of Inheritance of Acquired Characteristics*, first presented in 1801 (Darwin's first book dealing with natural selection was published in 1859): If an organism changes during life in order to adapt to its environment, those changes are passed on to its offspring. He said that change is made by what the organisms want or need. For example, Lamarck believed that elephants all used to have short trunks. When there was no food or water that they could reach with their short trunks, they stretched their trunks to reach the water and branches, and their offspring inherited long trunks.

Lamarck also said that body parts that are not being used, such as the human appendix and little toes are gradually disappearing. He believed that, eventually, people would be born without these parts. This is his theory of "*Use and Disuse*." Lamarck also believed that evolution happens according to a predetermined plan and that the results have already been decided.

### **What Darwin Believed**

Darwin believed that the desires of animals have nothing to do with how they evolve, and that changes in an organism during its life do not affect the evolution of the species. He said that organisms, even of the same species, are all different and that those which happen to have variations that help them to survive in their environments would survive and reproduce and have more offspring. The offspring are born with their parents' helpful traits, and as they reproduce, individuals with that trait make up more of the population. Other individuals, that are not so well adapted, die off. This is his theory of "*Descent with Modification*." For example, most elephants used to have short trunks, but some had longer trunks. When there was no food or water that they could reach with their short trunks, the ones with short trunks died off, and the ones with long trunks survived and reproduced. Eventually, all of the elephants had long trunks. Darwin also believed that evolution does not happen according to any sort of plan.

## **Why We Believe Darwin**

Darwin's theory has been supported by a lot of evidence. Lamarck's *Theory of Inheritance of Acquired Characteristics* has been disproved. This was done in two major ways. The first is by experiment. We have seen through many real examples and observations that changes that occur in an animal during life are not passed on to the animal's offspring. If a dog's ears are cropped short, its puppies are still born with long ears. If someone exercises every day, runs marathons, eats well, and is generally very healthy, the fitness is not passed on and the person's children still have to work just as hard to get that fit and healthy. These and other examples show that Lamarck's theory does not explain how life formed and became the way it is.

The other way that Lamarck's theory has been proven wrong is the study of genetics. Darwin knew that traits are passed on, but he never understood how they are passed on. During the time when Darwin's first book first came out, Gregor Mendel, who discovered genetics, was just starting his experiments. However, now we know a lot more about genetics and DNA, and we know that the only way for traits to be passed on is through genes and DNA, and that genes cannot be affected by the outside world. The only thing that can be affected is which genes there are in a population, and this is determined by which individuals die and which ones live. This is the other way that we have learned that the results of an animal's efforts cannot be inherited by its offspring.

## **Check Your Understanding**

(1) Jean-Baptiste Lamarck and Charles Darwin both thought that living things change to be...

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(2) In what year did Lamarck present his ideas? How many years prior to Darwin presenting his ideas was this?

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(3) Lamarck said that change is made by what the organisms \_\_\_\_\_ or \_\_\_\_\_.

(4) Using elephants as an example, explain Lamarck's theory.

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(5) Darwin believed that organisms which happen to have variations that help them to survive in their environments would...

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(6) Using elephants as an example, explain Darwin's theory.

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(7) Does our current understanding support the work of Lamarck or Darwin?

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(8) Do offspring inherit their parents' acquired traits? Give an example to support your answer.

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(9) How are traits passed on?

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(10) What determines which genes exist within a population?

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## Bonus

Imagine that you are Charles Darwin. The entire world believes that Lamarck's theory of acquired characteristics is correct. You have a new theory to explain how and why there is great diversity of species on Earth. Please write a letter to your local newspaper explaining why your theory should replace Lamarck's.

You should...

- Summarize Lamarck's theory and explain why you believe his theory is incorrect.
- Summarize your (Darwin's) theory and explain why it is correct.

[illegible]