

Category V Notes for Natural Selection Examples

Guiding Student Interpretation and Reasoning

Material H, p. [295st](#)

Second part of question may have helpful characteristic of anticipating common student misconceptions or focusing on contrasts between student misconceptions and scientific alternatives, but suggested response in the teacher notes does not address this part of the question.

suiting to human needs than—and often dramatically different in appearance from—their original parent stock. In **artificial selection, the intervention of humans ensures that only individuals with the more desirable traits produce offspring.**

Darwin became convinced that a process similar to artificial selection must be at work in nature. This process would allow only those organisms best suited to their environment to survive and reproduce. But in nature there is no human intervention; so how, Darwin wondered, could such a process operate?

THE INFLUENCE OF MALTHUS: POPULATION CONTROLS

An important influence on Darwin was the work of the economist Thomas Malthus (1766–1834). Malthus observed that babies were being born at a faster rate than people were dying. If the human population continued to increase in that way, Malthus reasoned, sooner or later there wouldn't be enough living space and food. The only conditions that would prevent the endless growth of human populations, Malthus observed, were famine, disease, and war. In time, these unpleasant observations were called the Malthusian Doctrine.

Darwin realized that the Malthusian Doctrine applied even more to animals and plants than to humans, for most other species produce far more offspring than we do. For example, every summer each mature maple tree produces thousands of seeds. Marine animals, such as the common mussel, produce millions of eggs each time they spawn. If all the offspring of just one of these maple trees or mussels survived, they would overcrowd the area in which they lived. If each offspring then produced as many offspring as its parents, and if all those offspring reproduced, there would soon be so many maple trees or mussels that they would cover the Earth or fill the oceans!

Obviously, the oceans are not filled with mussels and the continents are not covered with maple trees. Most baby mussels die during their first year of life. Most maple seeds never grow into mature trees. Thousands upon thousands of individuals of each species die, and only a few survive. Even fewer successfully raise offspring. That much is clear. But what determines which individuals survive and reproduce?



Figure 14–6 Some animals and plants produce enormous numbers of offspring. Eggs in this praying mantis egg case have begun to hatch (top). If all the young survived to reproduce, you can imagine how the number of mantises in the world would be affected. Each sunflower in this field is capable of producing hundreds of seeds (bottom). If each seed survived and reproduced, there would be uncountable numbers of sunflowers.

HISTORICAL NOTE

LAMARCK AND DARWIN

According to Lamarck's theory, variation is directed. Organisms deliberately change in response to the conditions of the environment and so become better adapted. In Darwin's theory, variation is basically undirected, or random. Organisms are born different from one another. By chance, some variations are beneficial and others are not.

TEACHING SUPPORT

Study Guide

- Section 14–1, p. 135

and thought that a similar process occurred in nature. 4. Opinions will vary. Some students may feel that the work of Lyell and Malthus inspired Darwin, and it is true that their work provided a good foundation for Darwin's thinking. However, Darwin might still have proposed his theory based on his own observations.

Reinforcement/Reteaching

If students are having difficulty answering the Section Review questions, review the appropriate parts of the section.

Closure

Have small groups of students produce concept maps on the development of evolutionary theory. Have one half of the groups map Lamarck's assumptions and the other half map the influences on Darwin's thinking. Pair the groups and have students explain their maps to the opposite group.

14–1 SECTION REVIEW

2. How did Lamarck explain evolution? What are the major problems with his explanation?
3. What is artificial selection? How did this concept influence Darwin's thinking?
4. **Critical Thinking—Identifying Relationships** Would Darwin have developed his theory of evolution if he had not read the works of Lyell and Malthus? Explain.

science. It helps biologists make sense of the natural world.

2. Lamarck was among the first scientists to realize that change occurred in living things over time. He thought that change occurred because organisms

had a desire to change and become more fit to live in a particular environment. He also believed that animals could acquire traits during their lifetime that could be passed on to their offspring.

when farmers and plants breeders select animals and plants to crossbreed. By doing this, a breeder hopes to combine the best traits of the parents so that the offspring will be more fit than their parents. Darwin was aware of artificial selection