

# **Birds of a Feather: Adaptation and the Environment Guiding Information**

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**Life Science (Lower Middle)**  
**Unit 5**

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## Birds of a Feather: Adaptations and the Environment Guiding Information

*Adaptations that make a species more successful are not always traits that make the species stronger, bigger, or faster. For example, some adaptations decrease the chances that a species will be eaten by another species. Adaptations of this type include the skin colors of lizards, the spines of porcupines, and the scent glands of skunks.*

### Background Information:

#### Adaptive Coloration

"Cryptic appearance" is an adaptive characteristic found in countless animal species. Coloration, texture, patterning, shape, or a combination of these characteristics can allow an organism to blend in with its surroundings. The phenomenon is not limited to prey species--for example, the stripes and spots of many of the big cats also provide camouflage.

A classic example is that of the peppered moths in the Manchester area of England. The first record of a black individual of this species was made in 1848; by 1895, 98% of the population in that region were dark. In 1937, this dramatic population shift was attributed to the effects of rapid industrialization, which caused the tree trunks upon which the moths rested to darken with soot. In the 1950s, H.B.O. Kettlewell tested this hypothesis through the controlled release and recapture of tagged moths, both dark and light, and both in areas with soot-blackened trees and in areas untouched by the effects of factories. Recapture statistics, along with videotaped footage of birds preying upon individual moths, confirmed the hypothesis. The dark-colored trait, however, was not a direct effect of the environmental change; it existed in the population before industrialization's effects, as the result of random genetic mutations.

### Guided Questions and Expected Responses:

1. In this activity, what effect did the environment have on the process of natural selection?

The color of the environment determined which type of worm was more likely to be eaten by the predator. On a green surface, the beige worms were more likely to be seen, while on a beige surface, the green worms were more likely to be seen. This in turn affected which color of worms survived more often to reproduce. Only the worms that survived to reproduce could pass on their color trait to their offspring.

2. In this activity, what role did the predator (bird) have in the process of natural selection?

The vision of the predator (in this case, scholars pretending to be birds) relied on the contrast between the color of the worm and the color of the background surface. The predator does not "choose" or "decide" which color worm becomes more prevalent in the population, but only preys upon the worms. The fact that one worm color was more visible than the other affected the survival and reproduction of the worms. Over many generations, this caused a change in the color composition of the worm population.

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3. What are the strengths and weaknesses of this activity as a model for natural selection?

Strengths:

- Just like the green worms were harder to see, assuming they were on green grass, the animals that blend in with their surroundings will be more likely to survive.
- Only the worms that survived could reproduce.
- The percentage of worms of each color in the population changed over time, depending on what color of worm survived.

Weaknesses:

- Depending on the area, scholars may say they did not have to search very hard to find the worms.
- Not all surviving worms would reproduce at the steady rate that was used, other factors would affect the population.
- Even though the worms were green, they did not blend in very well with the grass.

4. Why do you think earthworms are beige and not green?

Earthworms, which spend much of their time underground or just at its surface, presumably have camouflage that has evolved relative to the color of the soil (or to foliage that is dried out or is normally beige or brown) rather than to the green color of grass. Other factors besides camouflage may influence the evolution of color in earthworms. It is even possible that green earthworms would avoid predation slightly better, at least in some environments, but that green color is selected against because of the energy required of the body to produce green pigment.