THE STANDARD

Natural Selection & Traits

Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

DCI
DISCIPLINARY CORE IDEA

LS4.C · Adaptation

> *Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.*

Populations change because their environment selects. Traits that help an organism survive and reproduce in that environment become more common in the next generation. Traits that hurt those odds become less common. Individuals don't change. The proportions inside the population do. **Run it across generations and the make-up of the population shifts.**

SEP
SCIENCE & ENGINEERING PRACTICE

Using Mathematics and Computational Thinking

> *Use mathematical representations to support scientific conclusions and design solutions.*

Students aren't deriving equations. They're using math to describe a trend. Percentages of light vs. dark beetles. Fractions of resistant bacteria. Simple probability of which moth a bird sees first. The math is the evidence trail. **It turns "more common over time" into something a student can point at.**

CCC
CROSSCUTTING CONCEPT

Cause and Effect

> *Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.*

Selection is a cause-and-effect relationship students can't predict for any one organism, but can predict in aggregate. Which exact moth gets eaten is probability. Which color is over-represented in the next generation is predictable. **Cause and effect at the population level lives in proportions, not individuals.**