

LS4: Biological Unity and Diversity

LS4.A: Evidence of Common Ancestry and Diversity



3rd Grade	7th Grade	8th Grade	Biology
<p>Some kinds of plants and animals that once lived on Earth are no longer found anywhere.</p> <p>Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.</p>	<p>Comparison of the embryological development of different species reveals similarities that show relationships not evident in the fully-formed anatomy</p>	<p>The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth.</p>	<p>Genetic information provides evidence of common ancestry and diversity.</p> <p>DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence.</p>

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LS4.B: Natural Selection



3rd Grade	7th Grade	Biology
<p>Sometimes the differences in characteristics between individuals of the same species provide advantage in surviving, finding mates, and reproducing.</p>	<p>Natural selection leads to the predominance of certain traits in a population, and the suppression of others.</p> <p>In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes which are the passed on to offspring.</p>	<p>Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals.</p> <p>The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population.</p>

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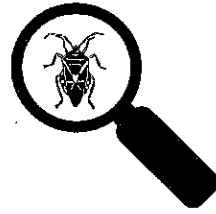
LS4.C: Adaptation



3rd Grade	7th Grade	Biology
<p>For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.</p>	<p>Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions.</p> <p>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</p>	<p>Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not.</p> <p>Adaptation also means that the distribution of traits in a population can change when conditions change.</p> <p>Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment.</p> <p>Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline—and sometimes the extinction—of some species.</p> <p>Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species' adaptation over time is lost</p>

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LS4.D: Biodiversity and Humans



2nd Grade	3rd Grade	6th Grade	Environmental
<p>There are many different kinds of living things in any area, and they exist in different places on land and in water.</p>	<p>Populations live in a variety of habitats, and change in those habitats affects the organisms living there.</p>	<p>(secondary to MSLS2-5) Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling.</p>	<p>(secondary to HS-LS2-7) Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction).</p> <p>Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity.</p> <p>Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth.</p> <p>Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.</p>