MS. Natural Selection and Adaptations

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A Performance Expectations MS.LS4.NSE

1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. MS.LS4.1

2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. MS.LS4.2

3 Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. MS.LS4.3

4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. MS.LS4.4

5 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. MS.LS4.6

B Science and Engineering Practices MS.NSE.SEP

1 Analyzing and Interpreting Data MS.NSE.SEP.1

a Analyze and interpret data to determine similarities and differences in findings. (MS-LS4-1) MS.NSE.SEP.1A

2 Using Mathematics and Computational Thinking MS.NSE.SEP.2

a Use mathematical representations to support scientific conclusions and design solutions. (MS-LS4- 6) MS.NSE.SEP.2A

3 Constructing Explanations and Designing Solutions MS.NSE.SEP.3

a Apply scientific ideas to construct an explanation for real-world phenomena, examples, or events. (MSLS4- 2) MS.NSE.SEP.3A

b Construct an explanation that includes qualitative or quantitative relationships between variables that describe phenomena. (MS-LS4-4) MS.NSE.SEP.3B

4 Scientific Knowledge is Based on Empirical Evidence MS.NSE.SEP.4

a Science Knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-LS4-1) MS.NSE.SEP.4A

C Disciplinary Core Ideas MS.NSE.DCI

1 LS4.A: Evidence of Common Ancestry and Diversity MS.NSE.DCI.LS4.A

a The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) 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. (MS-LS4-1) MS.NSE.DCI.LS4.A.1

b Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4- 2) MS.NSE.DCI.LS4.A.2

c Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. (MS-LS4-3) MS.NSE.DCI.LS4.A.3

2 LS4.B: Natural Selection MS.NSE.DCI.LS4.B

a (NYSED) Natural selection can lead to an increase in the frequency of some traits and the decrease in the frequency of other traits. (MS-LS4-4) MS.NSE.DCI.LS4.B.1

3 LS4.C: Adaptation MS.NSE.DCI.LS4.C

a 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. (MS-LS4-6) MS.NSE.DCI.LS4.C.1

D Crosscutting Concepts MS.NSE.CC

1. Patterns MS.NSE.CC.1
   - a. Patterns can be used to identify cause and effect relationships. (MS-LS4-2) MS.NSE.CC.1A
   - b. Graphs, charts, and images can be used to identify patterns in data. (MS-LS4-1) MS.NSE.CC.1B
   - c. Similarities and differences in patterns can be used to sort and classify organisms. (MSLS4-2) MS.NSE.CC.1C
2. Cause and Effect MS.NSE.CC.2
   - a. Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS4- 4), (MS-LS4-6) MS.NSE.CC.2A
3. Scientific Knowledge Assumes an Order and Consistency in Natural Systems MS.NSE.CC.3
   - a. Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS4- 1),(MS-LS4-2) MS.NSE.CC.3A