

■ **Text Resources** ■ **Digital Resources** ■ **Classroom Kits** (Available from [CarolinaBiological.com](http://CarolinaBiological.com))

## From Molecules to Organisms: Structures and Processes

- 2)** Gather and synthesize information to explain how prokaryotic and eukaryotic cells differ in structure and function, including the methods of asexual and sexual reproduction.
- 3)** Construct an explanation of the function (e.g., mitochondria releasing energy during cellular respiration) of specific cell structures (i.e., nucleus, cell membrane, cell wall, ribosomes, mitochondria, chloroplasts, and vacuoles) for maintaining a stable environment.

## Ecosystems: Interactions, Energy, and Dynamics

- 9)** Engage in argument to defend the effectiveness of a design solution that maintains biodiversity and ecosystem services (e.g., using scientific, economic, and social considerations regarding purifying water, recycling nutrients, preventing soil erosion).
- 11)** Analyze and interpret data to predict how environmental conditions (e.g., weather, availability of nutrients, location) and genetic factors (e.g., selective breeding of cattle or crops) influence the growth of organisms (e.g., drought decreasing plant growth, adequate supply of nutrients for maintaining normal plant growth, identical plant seeds growing at different rates in different weather conditions, fish growing larger in large ponds than in small ponds).

## Heredity: Inheritance and Variation of Traits

- 12)** Construct and use models (e.g., monohybrid crosses using Punnett squares, diagrams, simulations) to explain that genetic variations between parent and offspring (e.g., different alleles, mutations) occur as a result of genetic differences in randomly inherited genes located on chromosomes and that additional variations may arise from alteration of genetic information.

**Biotech Basics:** DNA Sequencing, RNA and Protein Analyses, Recombinant DNA and Genetic Engineering, Pharmacogenomics, Synthetic Biology  
**Exploring DNA Extraction** available from AMSTI  
**iCell®**



iCell®



**iCell®**



**Shareable Science:**  
Can environmental DNA help protect Earth's biodiversity?



**Gaudy Goldfish™**



**Chromosocks®**  
**Modeling Mendel's Laws®**  
**Disorder Detectives®**



<https://www.hudsonalpha.org/kits/>

**Biotech Basics:**  
Diagnosing Chromosome Disorders



## Heredity: Inheritance and Variation of Traits , cont.

**13)** Construct an explanation from evidence to describe how genetic mutations result in harmful, beneficial, or neutral effects to the structure and function of an organism.

**14)** Gather and synthesize information regarding the impact of technologies (e.g., hand pollination, selective breeding, genetic engineering, genetic modification, gene therapy) on the inheritance and/or appearance of desired traits in organisms.

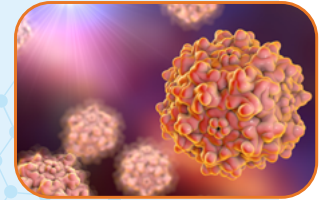
## Unity and Diversity

**18)** Construct an explanation from evidence that natural selection acting over generations may lead to the predominance of certain traits that support successful survival and reproduction of a population and to the suppression of other traits.

■ Text Resources ■ Digital Resources ■ Classroom Kits (Available from CarolinaBiological.com)



**Cat Conundrum™**  
**Genetics and Biotechnology** <https://www.hudsonalpha.org/kits/>  
Seventh Grade Module - Available from AMSTI



**Biotech Basics:** Genome Editing and CRISPR, Studying the Genome to Understand the Sequence, Synthetic Biology

**Shareable Science:** Gene therapy for sickle cell disease shows promise, Gene therapies bring genomic research to patients in life-changing ways, Understanding RNAi: First of its kind Genetic Treatment Approved

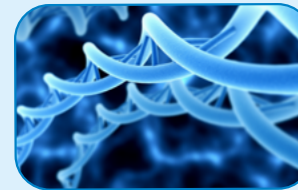


**Gaudy Goldfish™**  
**Cat Conundrum™**  
<https://www.hudsonalpha.org/kits/>



**Biotech Basics:** Gene Therapy and RNAi, Recombinant DNA and Genetic Engineering

**Biotech Basics:**  
Comparative Genomics



### Biotech Basics Articles

A collection of short, student-friendly articles that provide background and foundational content for key concepts in genetics, genomics and biotechnology.