GENERATIONGENIUS
ALWAYS QUESTION. ALWAYS WONDER.

TEACHER GUIDE

REPRODUCTION OF LIVING THINGS
GRADES 6-8

COMMON MISCONCEPTIONS

- **Sexual reproduction always involves mating.**
  Sexual reproduction is the result of two specialized cells recombining genetic material. The parent organisms do not have to meet for these cells to recombine.

- **Different parts of an organism contain different genetic information.**
  With the exception of sex cells, every cell in an organism contains its complete DNA sequence. Different cells express different genes.

- **Genes are the sole determining factor for traits.**
  Most traits are influenced by both genetic material and environmental factors, such as diet, exercise, or exposure to light.

REPRODUCTIVE STRATEGIES

The two basic reproductive strategies are sexual reproduction and asexual reproduction. In sexual reproduction, two parents each produce haploid cells, containing a set of unpaired chromosomes. Those two cells are combined to create an offspring with a full set of paired chromosomes. In asexual reproduction, a single parent creates an offspring with identical DNA to itself.

STRUCTURES VS. BEHAVIORS

A structural adaptation is a physical feature of an organism, such as the bright feathers of a peacock or the colorful petals of flowers. A behavioral adaptation is an action an organism chooses to perform, such as a mating dance or nest building. Plants rely mainly on structural adaptations, whereas animals can potentially use either.

GENES AND ALLELES

A piece of DNA that controls a trait is called a gene, and different versions of a *gene* are called *alleles*. A dominant allele is a version of a gene that needs only one copy to express the trait it controls. A recessive version of a gene requires two copies of the recessive allele in order to express the trait.

TEACHER TIPS

Students may need some support with analyzing and interpreting the data. Use the initial data set that introduced the phenomenon to model how you would analyze the data and why scientists formed different hypotheses to investigate as a result. Students should question the claims made by other groups because each group has different data. Students should note that the experimental design yielded sound data. (The differences in the number of generations may concern students. Have them focus on the patterns in the data, how confident they are in their claim, and what additional questions and experimentation might be needed.) Students will need to consider the effect of predation and/or mating on color trends in the population.

You will need to help students understand the difference between a scientific *argument* and the common use of the word argument. Tell them that scientists argue in order to improve the quality and soundness of their experimental design, data analysis, and explanation. Argumentation helps scientists construct the most sound explanation given the data.

ABOUT THIS LESSON

This lesson was created by the National Science Teaching Association (NSTA) to pair with the Generation Genius video and support *NGSS*.

They have requested we provide the following background with this lesson:

The Next Generation Science Standards (NGSS) are the national standards on how students learn science, and they are based on contemporary research presented in *A Framework for K–12 Science Education (the Framework).* The shift in science teaching and learning required by the Framework is summarized in this infographic: A New Vision for Science Education.

At the start of each Generation Genius lesson, students are presented with a phenomenon, then they try to explain it. Students will notice they have gaps in their knowledge and ask questions, which motivates them to build ownership of science ideas they need in order to explain how or why the phenomenon occurred. The way students build ownership of science and engineering ideas is through active engagement in the science and engineering practices (SEPs). This process of sensemaking, or doing science to figure out how the world works, is one of the major shifts the *Framework* encourages.

To engage in the SEPs, students should be part of a learning community that allows them to share their ideas, evaluate competing ideas, give and receive critiques, and reach consensus. Students can start by sharing ideas with a partner, then with a small group, and finally, with the whole class. This strategy creates opportunities for all students to be heard, build confidence, and have something to contribute to whole-class discussions. Each Generation Genius lesson provides conversational supports to facilitate such productive student discussions to contribute to sensemaking.

Excited to continue your shift toward the new vision for science education? Check out the Generation Genius Teacher Guide page on the NSTA website for resources and strategies to engage every student in your classroom in **doing** science.