

**Activity A:**  
**Inherited variation**

Get the Gizmo ready:

- Set **Red** to 100, **Green** to 255, and **Blue** to 50.



**Introduction:** An organism's **traits**, or characteristics, are controlled by **genes**. Genes are located on rod-like structures called **chromosomes**. Different versions of genes that code for the same trait are called **alleles**. In this Gizmo, there are 3 genes on each chromosome. For each gene there are eight possible alleles: *W* (white), *R* (red), *G* (green), *B* (blue), *C* (cyan), *M* (magenta), *Y* (yellow), and *K* (black).

**Question:** Where does variation in a population come from?

1. **Observe:** Hold your cursor over one of the insects. The two rod-like structures under **Genotype** on the right side of the Gizmo represent chromosomes. The three letters next to each chromosome represent alleles.

Which alleles does the insect have? *Two sets of W alleles (WWW, WWW)*

The alleles carried on an organism's chromosomes make up the organism's **genotype**.

2. **Observe:** An organism's alleles combine to produce a trait. The physical expression of that trait is a **phenotype**. In the Gizmo, phenotype is expressed in red, green, and blue values.

A. What is the phenotype of the insect? **Red: 255 Green: 255 Blue: 255**

B. What color is the insect? *White*

3. **Run Gizmo:** Move the **Sim. speed** slider all the way to the left. Click **Play** (▶). You will see the insects move to the left in pairs. The pairs mate and produce a set of four offspring. As soon as you see at least one offspring with an oval around it, click **Pause** (⏸). Move your cursor over the circled offspring.

A. What is its genotype and phenotype?

*Answers will vary. Sample answer: WWK, WWW; R = 213, G = 213, B = 213*

B. How does its genotype and phenotype differ from the non-circled offspring?

*Sample answer: There is one different allele in the genotype. The phenotype has a different RGB value.*

4. **Explain:** The change in the circled offspring's genotype was caused by a **mutation**. A mutation is a change in a gene. Mutations happen when a mistake is made when a cell's chromosomes are copied. How might mutations introduce variation into a population?

*Mutations introduce new alleles into the population. The new alleles can affect the organism's phenotype, thus causing differences (or variations) in the population.*

**(Activity A continued on next page)**



# Evolution Mutation And Selection Gizmo Answer Key

**Ines Hellmann**



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### **Table of Contents Evolution Mutation And Selection Gizmo Answer Key**

1. Understanding the eBook Evolution Mutation And Selection Gizmo Answer Key
  - The Rise of Digital Reading Evolution Mutation And Selection Gizmo Answer Key
  - Advantages of eBooks Over Traditional Books
2. Identifying Evolution Mutation And Selection Gizmo Answer Key
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Evolution Mutation And Selection Gizmo Answer Key
  - User-Friendly Interface
4. Exploring eBook Recommendations from Evolution Mutation And Selection Gizmo Answer Key
  - Personalized Recommendations
  - Evolution Mutation And Selection Gizmo Answer Key User Reviews and Ratings
  - Evolution Mutation And Selection Gizmo Answer Key and Bestseller Lists
5. Accessing Evolution Mutation And Selection Gizmo Answer Key Free and Paid eBooks
  - Evolution Mutation And Selection Gizmo Answer Key Public Domain eBooks
  - Evolution Mutation And Selection Gizmo Answer Key eBook Subscription Services

- Evolution Mutation And Selection Gizmo Answer Key Budget-Friendly Options
- 6. Navigating Evolution Mutation And Selection Gizmo Answer Key eBook Formats
  - ePub, PDF, MOBI, and More
  - Evolution Mutation And Selection Gizmo Answer Key Compatibility with Devices
  - Evolution Mutation And Selection Gizmo Answer Key Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Evolution Mutation And Selection Gizmo Answer Key
  - Highlighting and Note-Taking Evolution Mutation And Selection Gizmo Answer Key
  - Interactive Elements Evolution Mutation And Selection Gizmo Answer Key
- 8. Staying Engaged with Evolution Mutation And Selection Gizmo Answer Key
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Evolution Mutation And Selection Gizmo Answer Key
- 9. Balancing eBooks and Physical Books Evolution Mutation And Selection Gizmo Answer Key
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Evolution Mutation And Selection Gizmo Answer Key
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Evolution Mutation And Selection Gizmo Answer Key
  - Setting Reading Goals Evolution Mutation And Selection Gizmo Answer Key
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Evolution Mutation And Selection Gizmo Answer Key
  - Fact-Checking eBook Content of Evolution Mutation And Selection Gizmo Answer Key
  - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
- 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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