

## Evolution: Adaptation and Selection Worksheet

### Part A: Terminology Matching (Structural, Behavioral, and Physiological Adaptations)

Match the Key Term on the left with its correct definition on the right.

Term	Definition
1. Adaptation	A. Structural, functional, or physiological differences between individuals.
2. Mimicry	B. A structure, behavior, or physiological process that helps an organism survive and reproduce in a particular environment.
3. Variation	C. A description of a species that has completely disappeared from Earth.
4. Extinct	D. A structural adaptation where a harmless species resembles a harmful species in coloration or structure.
5. Selective Advantage	E. A genetic advantage that improves an organism's chance of survival, usually in a changing environment.
6. Mutation	F. A permanent change in the genetic material (DNA) of an organism; the only source of new genetic variation.

### Part B: Multiple Choice Questions (Natural Selection, Adaptation, and Fitness)

Choose the best answer for each question.

1. What is the primary difference between a beneficial **variation** and an **adaptation**?
  - A. Variations are always harmful, while adaptations are always beneficial.
  - B. Adaptations are the result of gradual, accumulative changes of helpful variations that accumulate over generations.
  - C. Adaptations occur in somatic cells, while variations occur in gamete cells.
  - D. Variations result from sexual reproduction; adaptations result from asexual reproduction.
2. The ability of the *Staphylococcus aureus* bacterium to become resistant to antibiotics is an example of rapid adaptation due to:
  - A. Artificially selecting resistant strains in a lab.
  - B. The bacteria consciously developing resistance during their lifetime.

C. Rapid reproduction rates and a pre-existing mutation providing a selective advantage in a changing environment.

D. Environmental factors always preventing reproduction in non-resistant strains.

3. The concept of **fitness** in natural selection describes:

- A. How large or physically strong an individual is.
- B. The relative contribution an individual makes to the gene pool of the next generation by producing viable offspring.
- C. An organism's lifespan relative to its competitors.
- D. The total number of mutations an organism carries.

4. Which factor acts as the **selective pressure** in the classic example of the English peppered moth (*Biston betularia*) during the Industrial Revolution?

- A. The moth's preference for dark-coloured trees.
- B. The genetic variation for color within the moth population.
- C. The presence of **bird predators** and the pollution that darkened tree trunks.
- D. Clean-air legislation enacted in the 1950s.

5. What is the key difference between **natural selection** and **artificial selection**?

- A. Natural selection creates new species; artificial selection only changes existing ones.
- B. Natural selection requires mutations; artificial selection does not.
- C. In natural selection, the **environment** determines survival and reproduction; in artificial selection, **humans** determine the desired traits.
- D. Artificial selection results in increased genetic variation, while natural selection reduces it.

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#### Part C: Fill-in-the-Blanks (Mechanisms and Consequences)

Complete the following statements using the information from the sources.

1. A permanent change in the genetic material (DNA) of an organism is called a \_\_\_\_\_, and it is the only source of new genetic \_\_\_\_\_.
2. The structural adaptation seen in the viceroy butterfly, where it resembles the bad-tasting monarch butterfly (Figure 7.2), is called \_\_\_\_\_.

3. When a mutation occurs in a \_\_\_\_\_ cell, it disappears when the organism dies. If the mutation alters the DNA in a \_\_\_\_\_ (egg or sperm), the mutation may be passed on to succeeding generations.

4. In a dense forest with low light (Figure 7.7), the low light level acts as a \_\_\_\_\_ on the young trees, favoring those individuals with alleles that allow them to survive in the \_\_\_\_\_.

5. The agricultural practice of planting extensive areas with only one type of crop variety is called \_\_\_\_\_.

6. A major risk of this practice (**monoculture**) is that if a new \_\_\_\_\_ infests the crop population, most of the individual plants will be affected in the same way, potentially leading to massive crop damage.

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#### Part D: Interactive Image and Case Study Analysis

Answer the questions based on the images

Figure Reference	Contextual Question	Answer
	The stick insect's coloring and structure help it blend with vegetation to avoid predators. What type of structural adaptation is this?	



Figure 7.3 illustrates a change from **10% black** moths to **80% black** moths over several generations. This change shows that the population changed in response to the environment, not that individual moths changed color. Explain the key environmental cause of this change.



These various cat breeds (Siamese, Persian, Sphynx) are the result of humans selecting parents with desired traits. What is this process called?

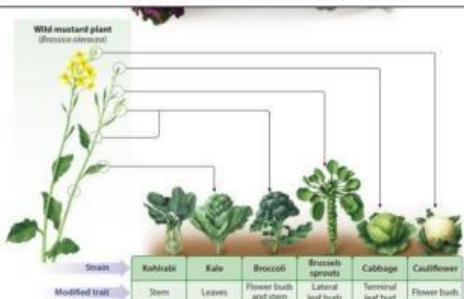
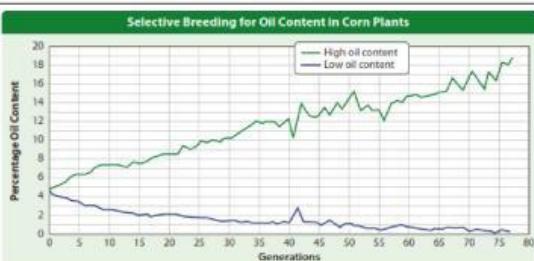


Figure 7.9 shows how a single plant species, *Brassica oleracea*, was modified to create crops like broccoli and cabbage. What general genetic consequence does selective breeding have on the domesticated plant population?



This graph shows corn selected for high oil content increased from about 5% to over 18% in 80 generations. This demonstrates the power of \_\_\_\_\_ pressure exerted by \_\_\_\_\_.