Name _____

Daily Science Big Idea 1 WEEK 3

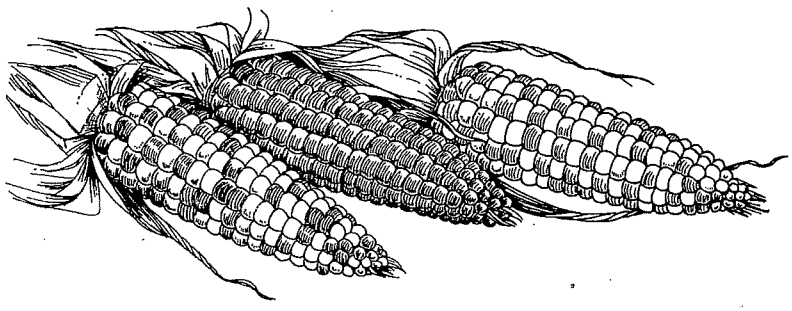
Day 1

Weekly Question

How can corn be yellow, white, or blue?

Corn, like many other plants, passes down its traits through its seeds. When you look at an ear of corn, you are actually looking at a collection of seeds. Each corn kernel is one seed with its own unique set of genes. When you plant a kernel, a new corn plant springs up with a set of traits that are inherited from that seed.

Corn exhibits a huge variety of traits. Corn plants can differ in plant height, ear size, sweetness, and rate of growth. The kernels can also come in a range of colors, including yellow, white, and even blue. Because of this variation, corn is useful as both a food crop and a tool for scientists who study genes and traits.



A. Check the box next to the phrase that completes each analogy.

1. **Kernel** is to **corn** as _____.

   ❒ **flower** is to **petal**
   ❒ **egg** is to **chicken**
   ❒ **color** is to **trait**
   ❒ **DNA** is to **gene**

2. **Ear size** is to **corn plant** as _____.

   ❒ **blue** is to **kernel**
   ❒ **kernel** is to **corn plant**
   ❒ **trait** is to **gene**
   ❒ **sweetness** is to **height**

B. If you plant all the kernels of one ear of corn, do you think the new corn plants will share all the same traits? Why or why not?

_____

_____

Name _____

Daily Science Big Idea 1 WEEK 3

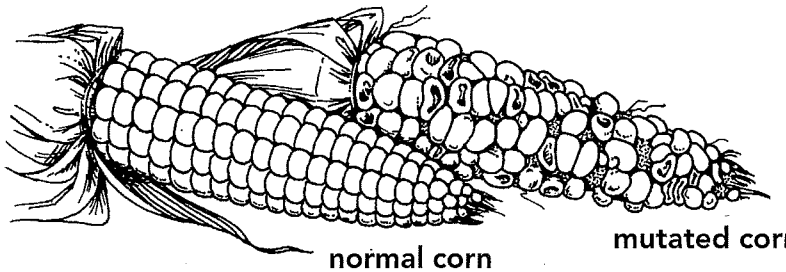
Day 2

Weekly Question

How can corn be yellow, white, or blue?

The wide variety of corn colors is an example of **genetic variation**, or all of the possible differences in inherited traits among members of a species. Variations are due to differences in the genes of individual members.

There are several causes of genetic variation. The genes of an organism can randomly **mutate**, or change, into new genes. Genetic variation also results from genes getting shuffled around to form new combinations of genes. These new combinations give rise to new traits not seen in the organism's parents. A third cause of genetic variation is the introduction of new genes into a population of organisms. For example, in plants, new genes can be introduced through the movement of pollen from one location to another.



normal corn mutated corn

Vocabulary

genetic variation
juh-NET-ik VAIR-ee-AY-shun
differences in inherited traits among the members of a species

mutate
MYOO-tayt
to permanently change in form

A. Name three causes of genetic variation in corn.

1. _____
2. _____
3. _____

B. Write *true* or *false*.

1. Genetic variation causes a plant's genes to mutate. _____
2. Insects can introduce new genes into a corn crop. _____
3. New traits are produced when genes get shuffled around. _____
4. A mutated gene can go back to its original form. _____

Name _____

Daily Science
Big Idea 1
WEEK 3

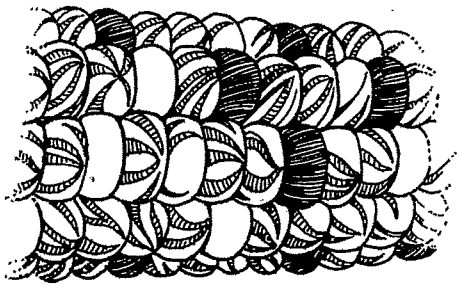
Day 3

Weekly Question

How can corn be yellow, white, or blue?

Much of the genetic variation seen in corn is due to the actions of DNA sequences called transposons (trans-POH-zahnz), or "jumping genes." Nearly 75% of the DNA in corn consists of jumping genes. Jumping genes can move from place to place along a strand of DNA while a new kernel is forming. As the jumping gene moves, it "turns off" the gene it lands next to, preventing that gene from functioning. When a jumping gene moves to another location, the blocked gene is again "turned on" and the trait that the gene controls becomes active.

For example, jumping genes are the reason why a single kernel of corn can be both blue and white. When a jumping gene lands next to a gene that makes a kernel blue, the blue-color gene is turned off. This produces a mottled effect of white streaks or spots. The amount of mottling depends on how long the blue gene is turned off. If the jumping gene stays in the same location long enough, the gene that makes a kernel blue is totally blocked and the kernel will be completely white.



mottled corn kernels

A. Cross out the incorrect word in each statement and write the correct word above it to make the statement true.

1. Jumping genes are a minor source of genetic variation in corn.
2. Corn color is unaffected by jumping genes.
3. Jumping genes turn on the genes they land next to.
4. Jumping genes are sequences of kernels.

B. Fill in the bubble next to the meaning of *mottled*.

Ⓐ moving Ⓑ blue Ⓒ speckled

Name _____

Daily Science
Big Idea 1
WEEK 3

Day 4

Weekly Question

How can corn be yellow, white, or blue?

Genetic variation and jumping genes are only part of the reason that corn can be yellow, white, or blue. Corn was first cultivated in southern Mexico nearly 10,000 years ago. Ancient farmers used the natural variations in corn to create plants with the traits they liked. Through the process of **selective breeding**, they developed many strains of corn, including those that were yellow, white, and blue.

Selective breeding begins when a farmer mates two closely related plants that both have a certain positive trait. From the offspring that are produced, the farmer again breeds the plants that strongly display the desired trait and prevents those without the trait from reproducing. Doing this again and again reinforces the trait in the offspring.

Vocabulary

selective breeding
seh-LECK-tiv BREED-ing
human-directed mating of organisms for desirable traits

A. Explain in your own words how the process of selective breeding can be used to decrease the presence of a trait.

_____

_____

_____

B. *Grafting* is a process that involves putting together part of one plant with part of another plant. One odd example of grafting is merging potatoes and tomatoes to grow on the same plant. Why do you suppose this plant must be grafted instead of selectively bred? Explain your answer.

_____

_____

Talk

What other traits besides color, sweetness, and size might a farmer want to selectively breed in corn? Think about things such as what might affect the growing process, or what corn is used for besides food for humans.

Name _____

Daily Science
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Day 5

Weekly Question

How can corn be yellow, white, or blue?

A. Use the words in the box to complete the paragraph.

selective breeding	genetic variation	mutate

Differences in traits between individuals of the same species are known as _____. This can happen when genes _____, or permanently change. People also use _____ to redirect the variation in an organism to strengthen or eliminate a trait.

B. Today there are many types of dogs, from toy poodles to Great Danes, that have been selectively bred for certain positive traits. What can you say about the traits of early dog ancestors to explain the wide variety of dog breeds today? Explain your answer.

_____

_____

C. The pictures to the right show two sunflowers that were planted at the same time and grown under identical conditions. Which traits in the cultivated flower do you think were the result of selective breeding?

_____

_____

_____

wild cultivated