

Processes Of Evolution



Publication of *On the Origin of Species*

Darwin shelved his manuscript for years and told his wife to publish it in case he died.

In 1858, Alfred Wallace sent an essay to Darwin for review. Wallace's ideas summarized Darwin's work.

In 1859, Darwin published his book, *On the Origin of Species*.

In his book, Darwin:

- proposed a **mechanism for evolution called natural selection.**
- presented evidence that evolution has been taking place for millions of years—and continues in all living things.

Inherited Variation and Artificial Selection

Members of each species vary from one another in important ways. (VARIATION)

Darwin noted that plant and animal breeders would breed only the largest hogs, the fastest horses, or the cows that produced the most milk.

Darwin termed this process **artificial selection**.



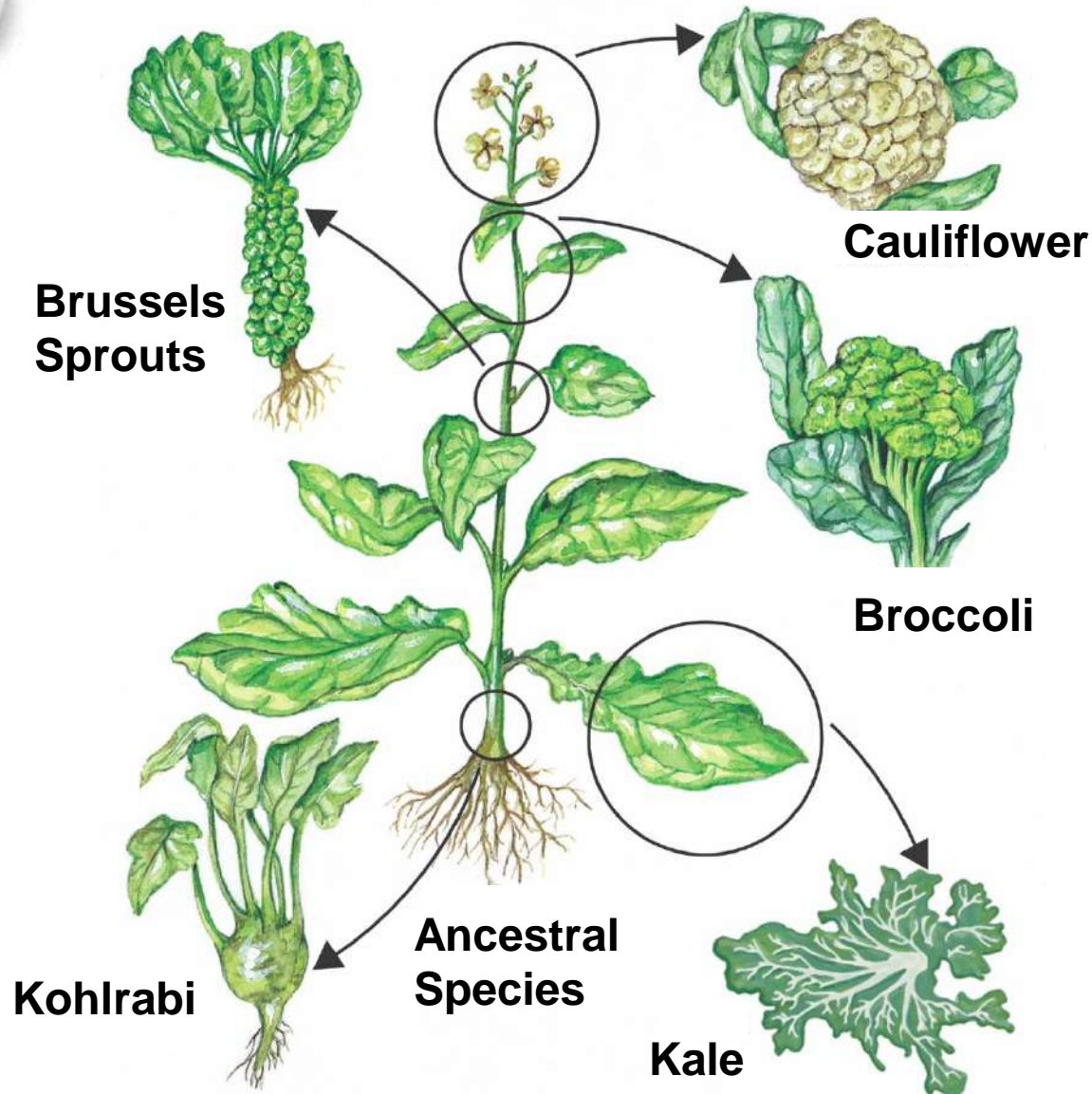
Artificial selection is the selection by humans for breeding of useful traits from the natural variation among different organisms.

Watch this example of artificial selection...

active art

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15-3 Darwin Presents His Case ➡ Inherited Variation and Artificial Selection



Evolution by Natural Selection

Darwin compared processes in nature to artificial selection.

By doing so, he developed a scientific hypothesis to explain how evolution occurs.

The Struggle for Existence

Darwin realized that **high birth rates** (called **overpopulation**) and a shortage of life's basic needs would force organisms to compete for resources (called **competition**).





How is natural selection related to a species' fitness?

Survival of the Fittest

The **ability** of an individual to survive and reproduce in its specific environment is **fitness**.

Darwin proposed that fitness is the result of adaptations.

An **adaptation** is any inherited characteristic that increases an organism's chance of survival.



Because of its similarities to artificial selection, Darwin referred to the survival of the fittest as **natural selection**.

In natural selection, the traits being selected contribute to an organism's fitness in its environment.





Over time, natural selection results in changes in the inherited characteristics of a population. These changes increase a species' fitness in its environment.

Descent With Modification

Natural selection produces organisms that have different structures, establish different niches, or occupy different habitats.

Each living species has descended, with changes, from other species over time.

Darwin referred to this principle as **descent with modification**.

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1 The scientist who motivated Darwin to publish *On the Origin of Species* was

a. Alfred Russel Wallace.

b. Charles Lyell.

c. Jean-Baptiste Lamarck.

d. Thomas Malthus.

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2 Differences among individuals of a single species are referred to as

- a. artificial selection.
- b. genetic variation.**
- c. survival of the fittest.
- d. environmental adaptation.

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- 3 Changes that increase a species' fitness in its environment over time are due to
- a. the principle of common descent.
 - b. the geographic distribution of that species.
 - c. natural selection.
 - d. habitat selection.

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4 An inherited characteristic that increases an organism's chance of survival is called a(an)

a. homologous structure.

b. vestigial organ.

c. adaptation.

d. analogous structure.

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5 Evidence used by Darwin to support the idea of evolution included all the following EXCEPT

- a. fossils that demonstrate change over time.
- b. the genetic mechanism by which useful traits are inherited.
- c. the geographic distribution of living things.
- d. the presence of many homologous structures in plants and animals.