Natural and Artificial Selection
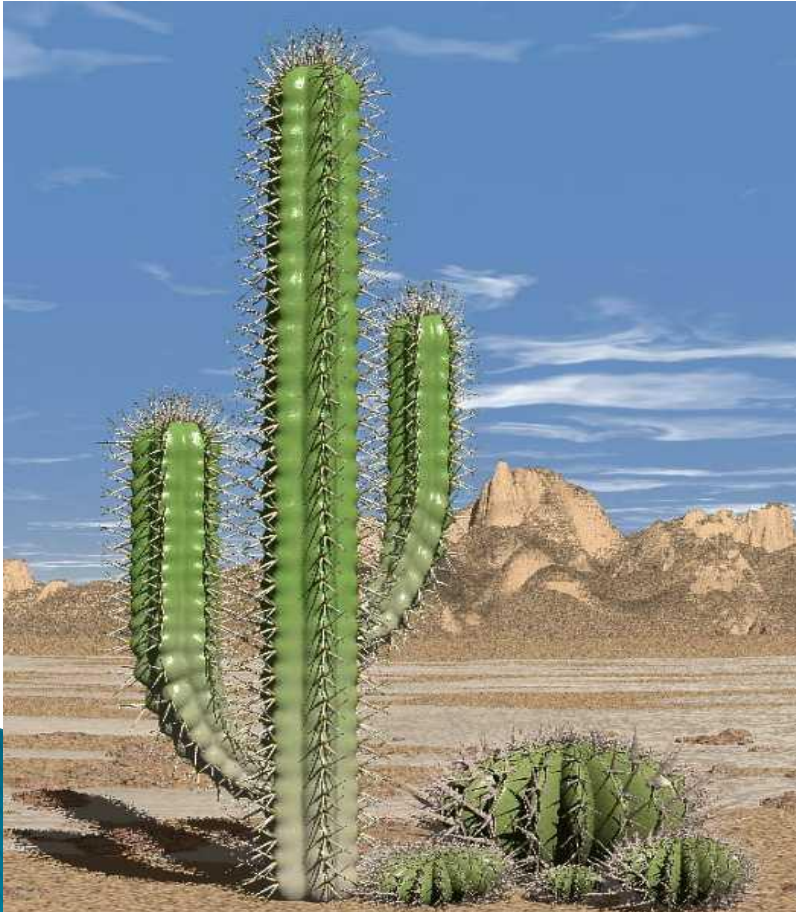
Adaptation

▸ A characteristic or feature of a species that makes it well suited for survival or reproductive success in its environment

Adaptation

▸ Explains why the cactus can be successful in the desert

Survival of the Fittest

- Herbert Spencer
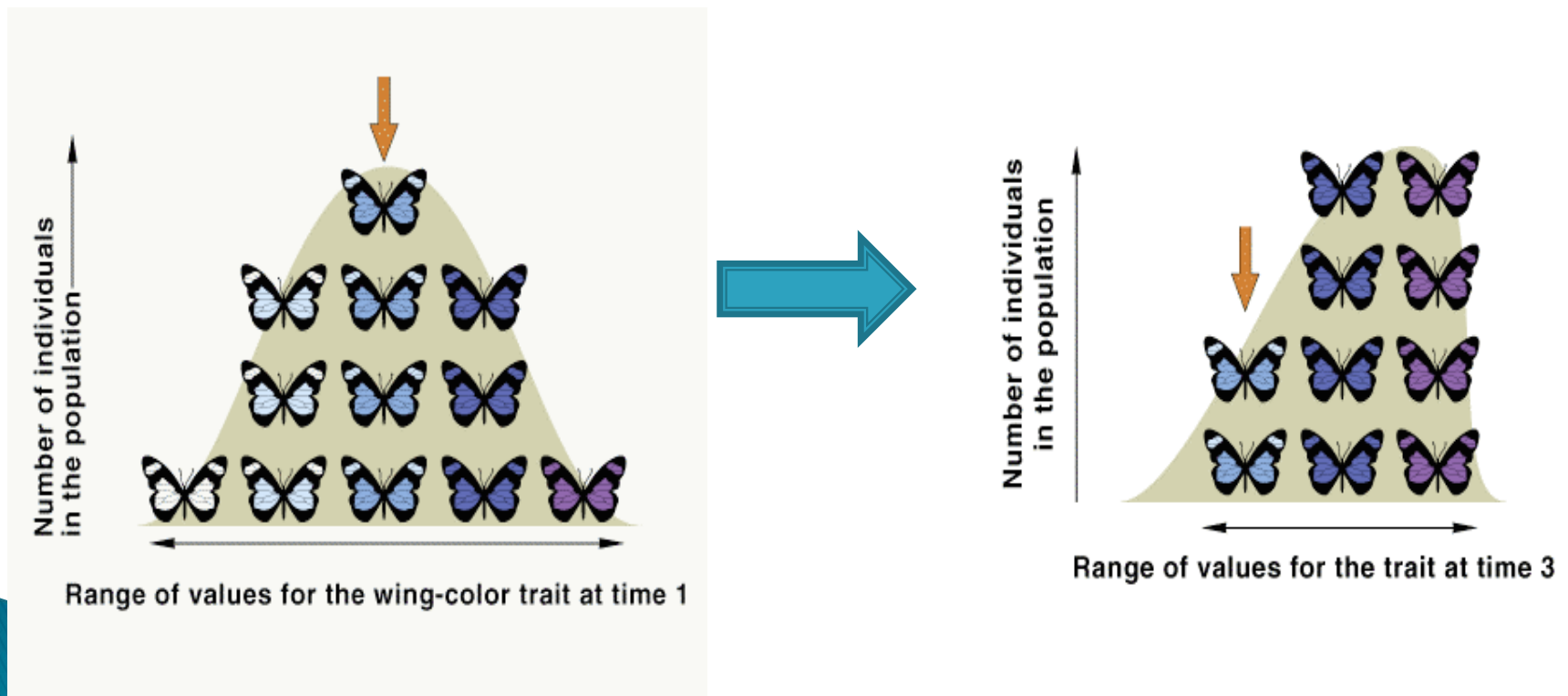- This phrase has been used to describe Darwin's theory
- Is this misleading?

Types of Selection

- Directional Selection

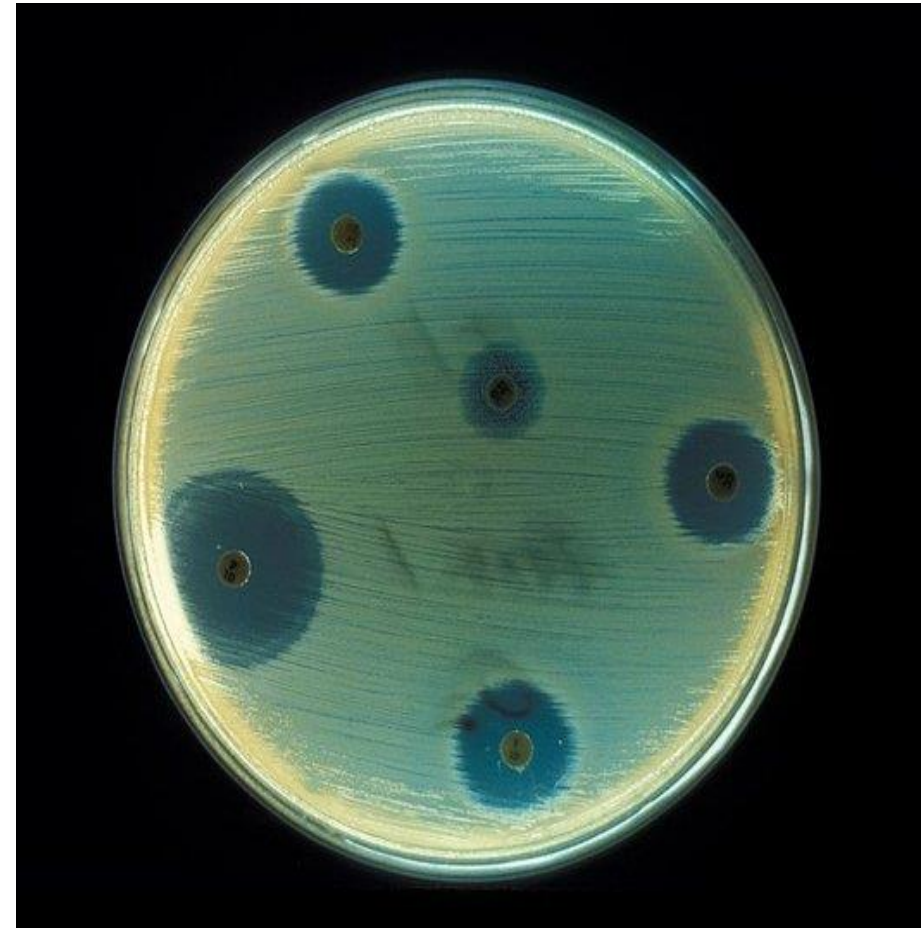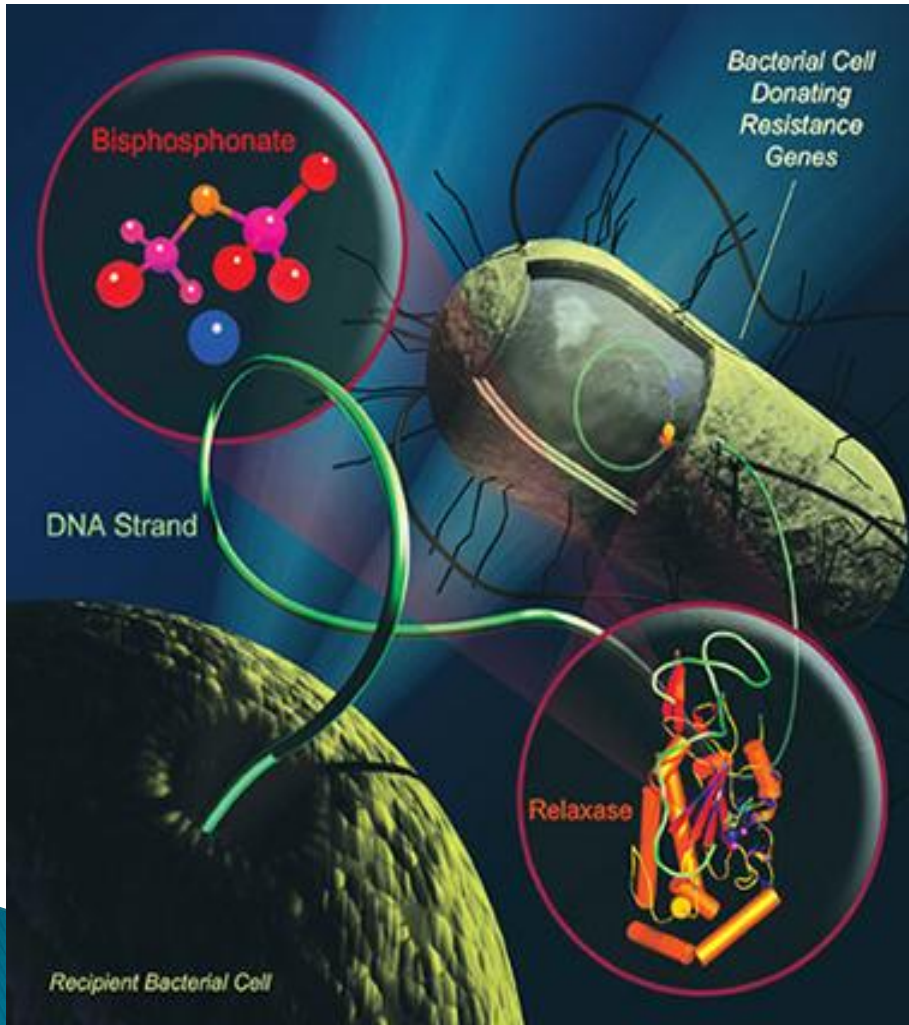- Stabilizing Selection

- Disruptive Selection

- Sexual Selection

Photograph by Chris Mayne

Directional Selection

▸ Selection that favours an increase or decrease in the value of a trait from the current population average

Range of values for the wing-color trait at time 1
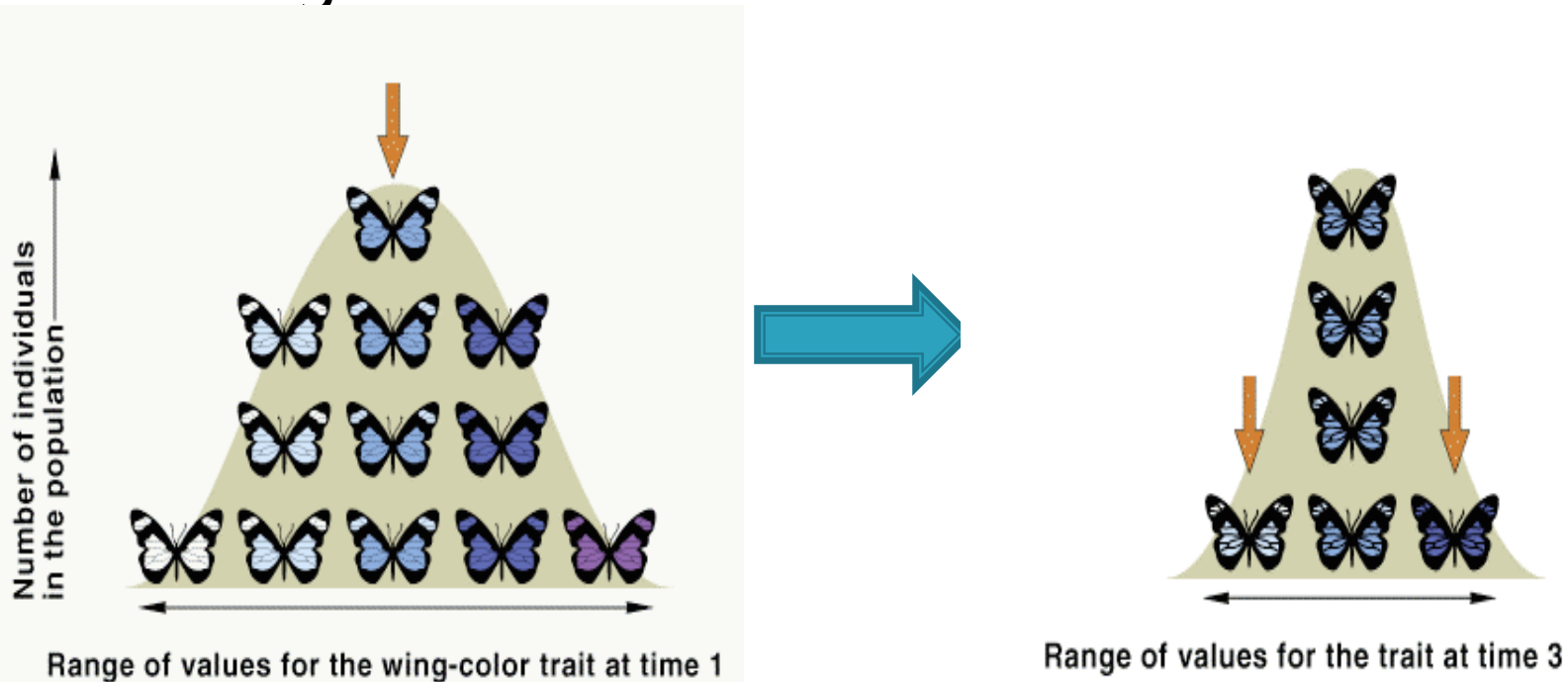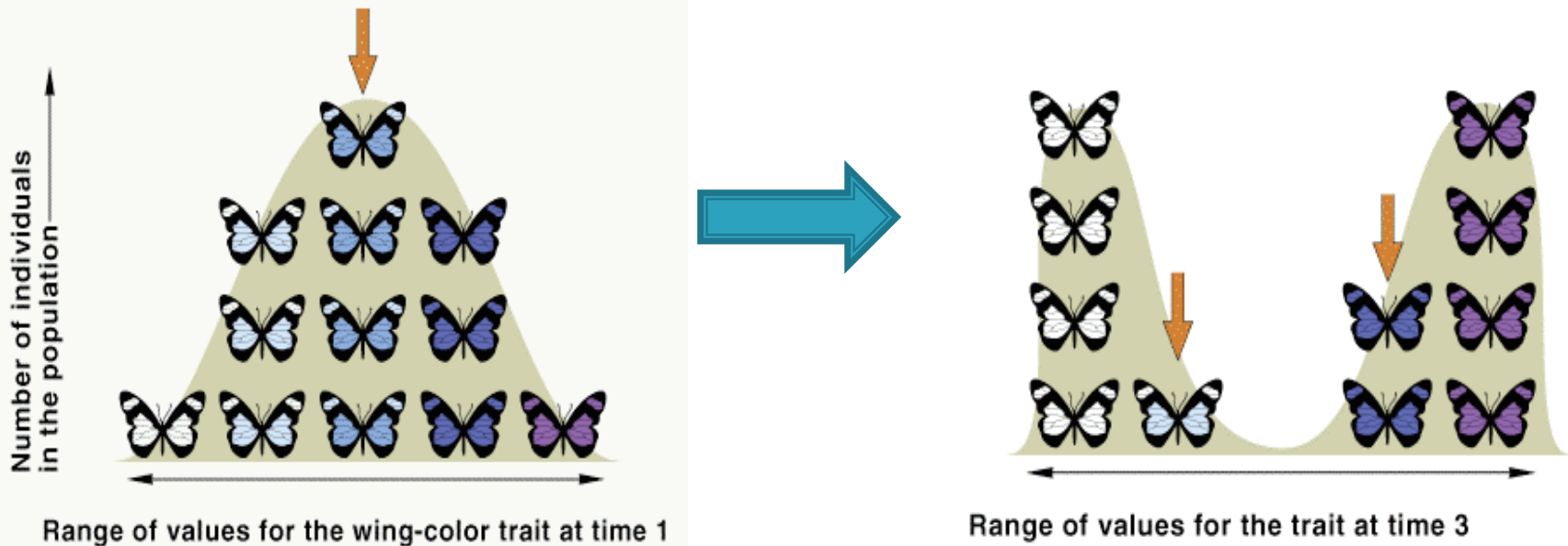
Range of values for the trait at time 3

Directional Selection

Stabilizing Selection

▸ Selection against individuals exhibiting traits that deviate from the current population average

Number of individuals in the population

Range of values for the wing-color trait at time 1

Range of values for the trait at time 3

Disruptive Selection

▸ Favours two or more variations of a trait that differ from the current population average

Range of values for the wing-color trait at time 1

Range of values for the trait at time 3

Disruptive Selection

A Human Example

- Some populations have adapted to living at extreme heights
- Able to survive despite low oxygen levels

Sexual Selection

‣ The favoring of any trait that specifically enhances the mating success of an individual

Artificial Selection

- A controlled, captive breeding process
- Occurs in captivity rather than in the wild
- Humans choose which individuals to breed that demonstrate a favorable trait

teosinte

corn

The Process of Artificial Selection

- 1) Choose a species that can be bred in captivity
- 2) Breed a large number of individuals
- 3) Choose a trait that you wish to favour
- 4) Identify individuals that exhibit this trait most strongly
- 5) Breed only these individuals to produce the next generation
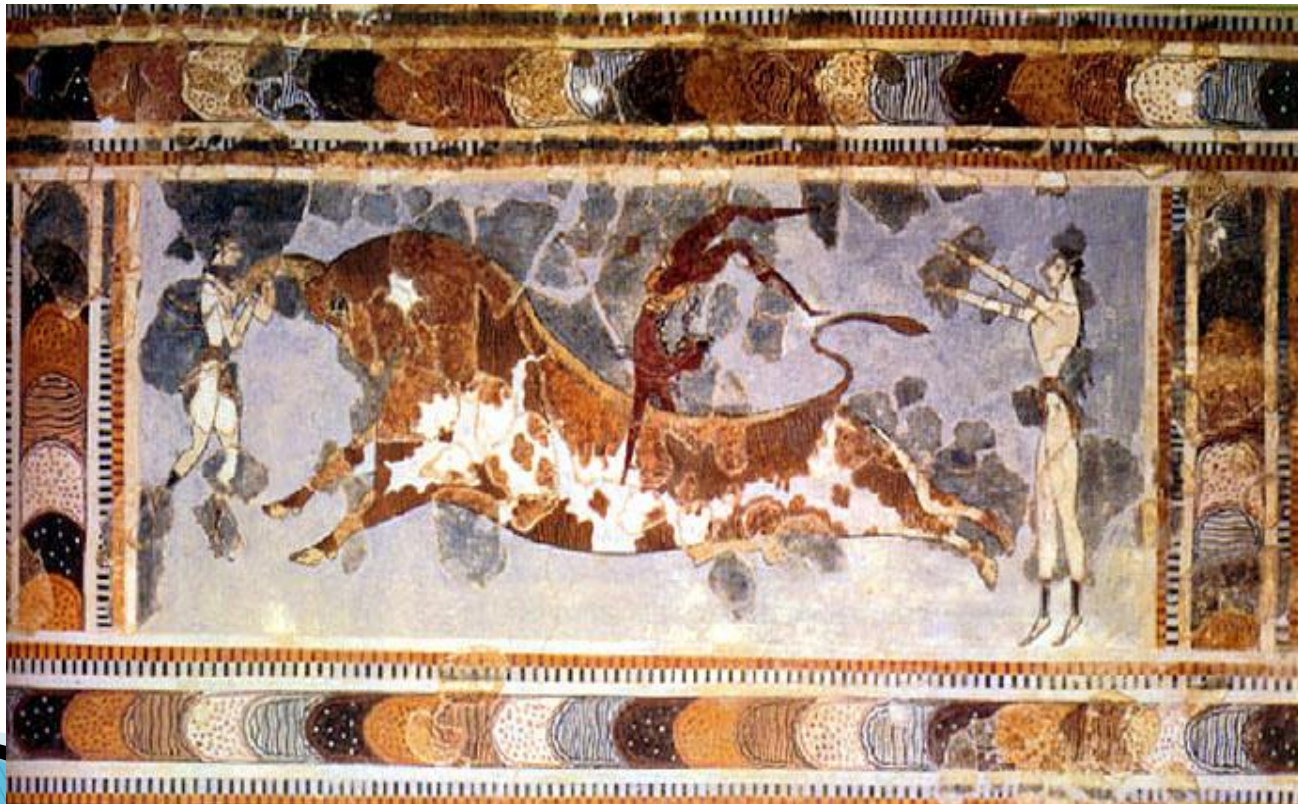- 6) Repeat steps 4 and 5 over many generations

Artificial Selection in Plants

- Domestic crops are bigger and heartier than wild
  - Why might this be important?
- Selection process takes place over thousands of years – beginnings in the Fertile Crescent

Artificial Selection in Animals

- In animals, there are a number of features we many consider

Artificial Selection in Animals

‣ In animals, there are a number of features we many consider
  ◦ Size
  ◦ Muscle Mass
  ◦ Fattiness
  ◦ Temper