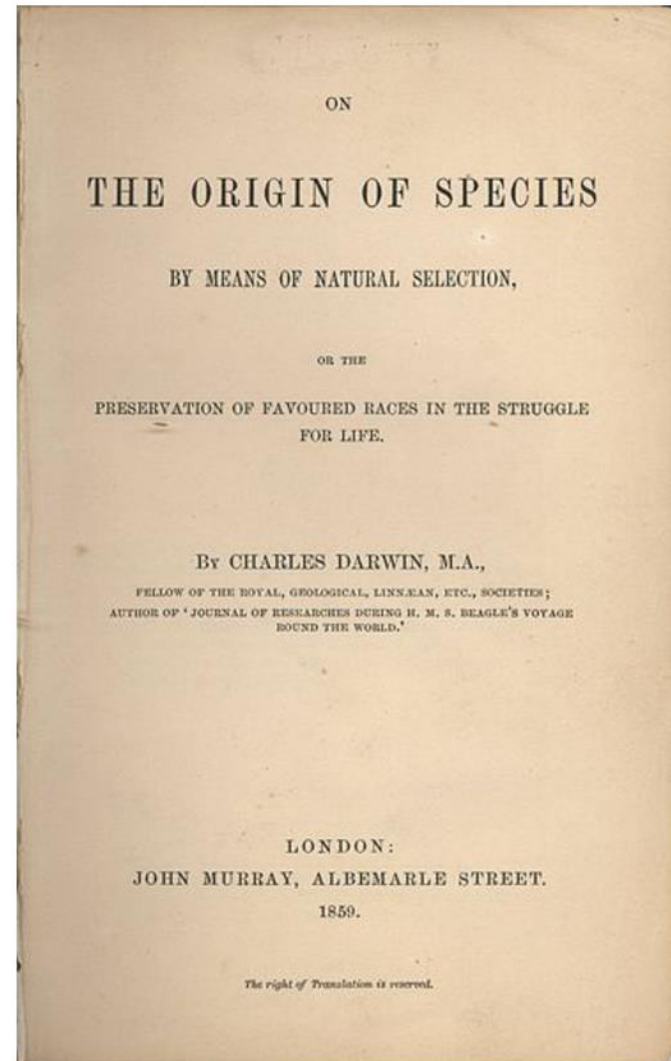


Natural Selection




The Rest of the Title

- ▶ *On the Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life*
- ▶ This is quite a title!
- ▶ But it does suggest that Natural Selection must play an important role in the creation of new species



But What is it?

- ▶ Natural Selection is the way in which nature favours the reproductive success of some individuals within a population over others
 - ▶ In other words, some individuals are more likely to pass their genes along than others
 - ▶ REMEMBER – Natural selection is NOT random
- 

Ways to think about Natural Selection

- ▶ Success can take many forms
 - Better suited to gathering resources in a population
 - Better able to avoid predators
 - Attractiveness to the opposite sex
 - Ability to adapt to a unique environment
- ▶ There is no single recipe for success

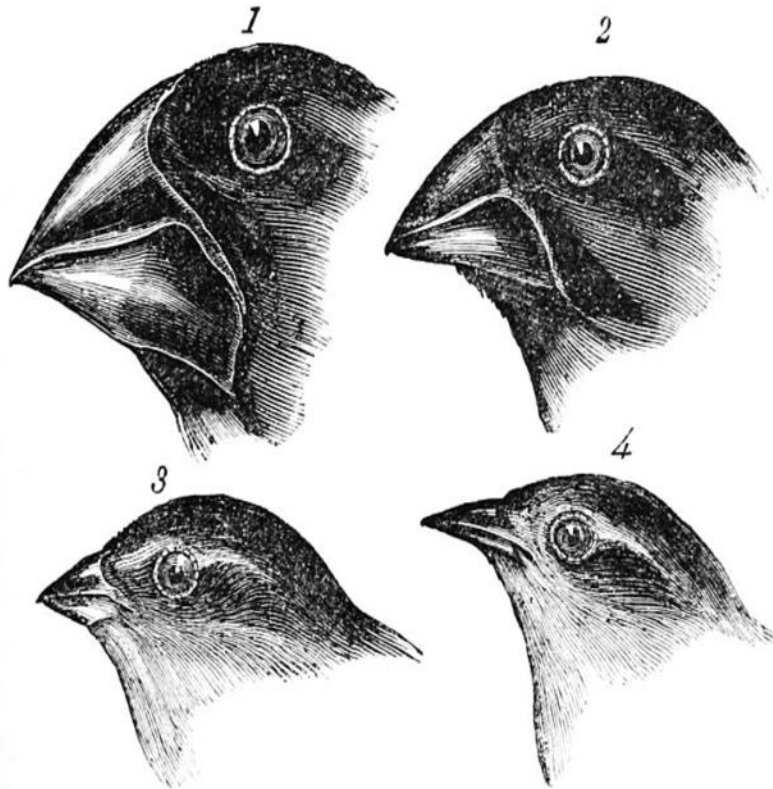


Gathering Resources

- ▶ Cheetahs
- ▶ A faster cheetah is more likely to catch its prey than a slower cheetah
- ▶ Faster cheetahs are more likely to eat regularly and stay alive
- ▶ So on average, faster cheetahs are more likely to reproduce and will have more offspring than slower cheetahs



Gathering Resources



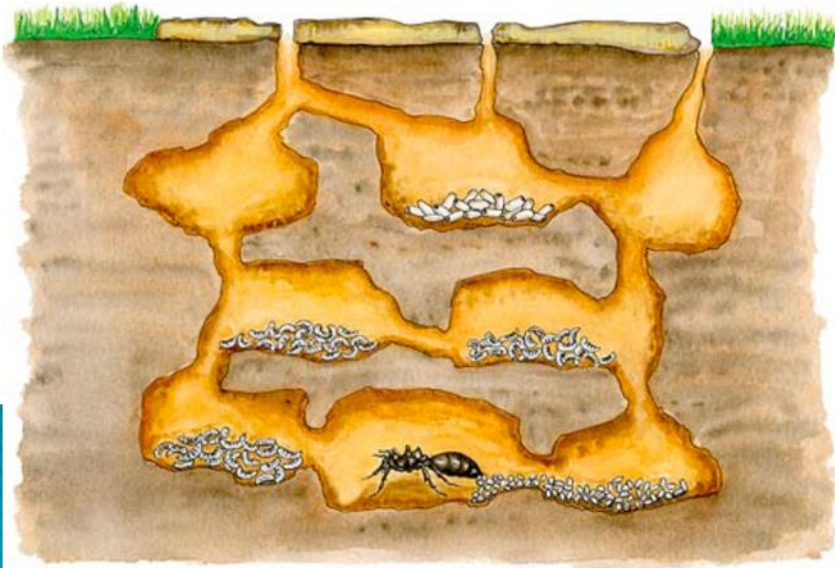
1. *Geospiza magnirostris*.
3. *Geospiza parvula*.

2. *Geospiza fortis*.
4. *Certhidea olivacea*.

- ▶ Darwin's Finches
- ▶ Variation in the size and shape of beaks
- ▶ Each species has evolved to feed on unique things
- ▶ Darwin's Finches have evolved different beaks to fill unique niches in their ecosystem
 - Differences in diet mean that they do not compete with each other for resources

Gathering Resources

- ▶ Anteaters
- ▶ Ant colonies can be large tunnel complexes
- ▶ Ancestors of anteaters with longer noses and tongues found it easier to eat ants directly out of their hive
- ▶ Anteaters with longer noses and tongues did not have to expend much effort hunting food and can be reasonably sure of success
 - They were more likely to pass their genes, including this trait, along

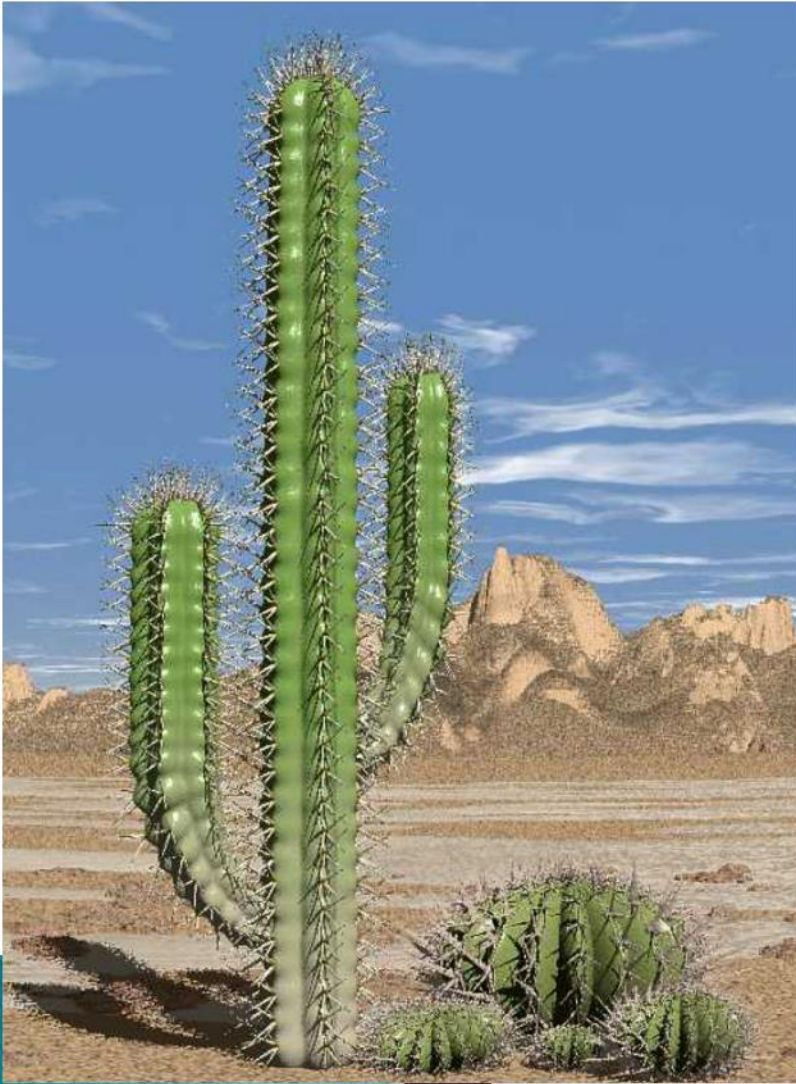


Avoiding Predators

- ▶ Phylliidae
- ▶ Insects are preyed upon by many species
- ▶ The ability to blend in with surroundings provides an advantage over insects that cannot
- ▶ An insect that looks more like a leaf, for example, than another is more likely to be mistaken for a leaf and more likely to be ignored by a predator
- ▶ These traits are more likely to be passed along



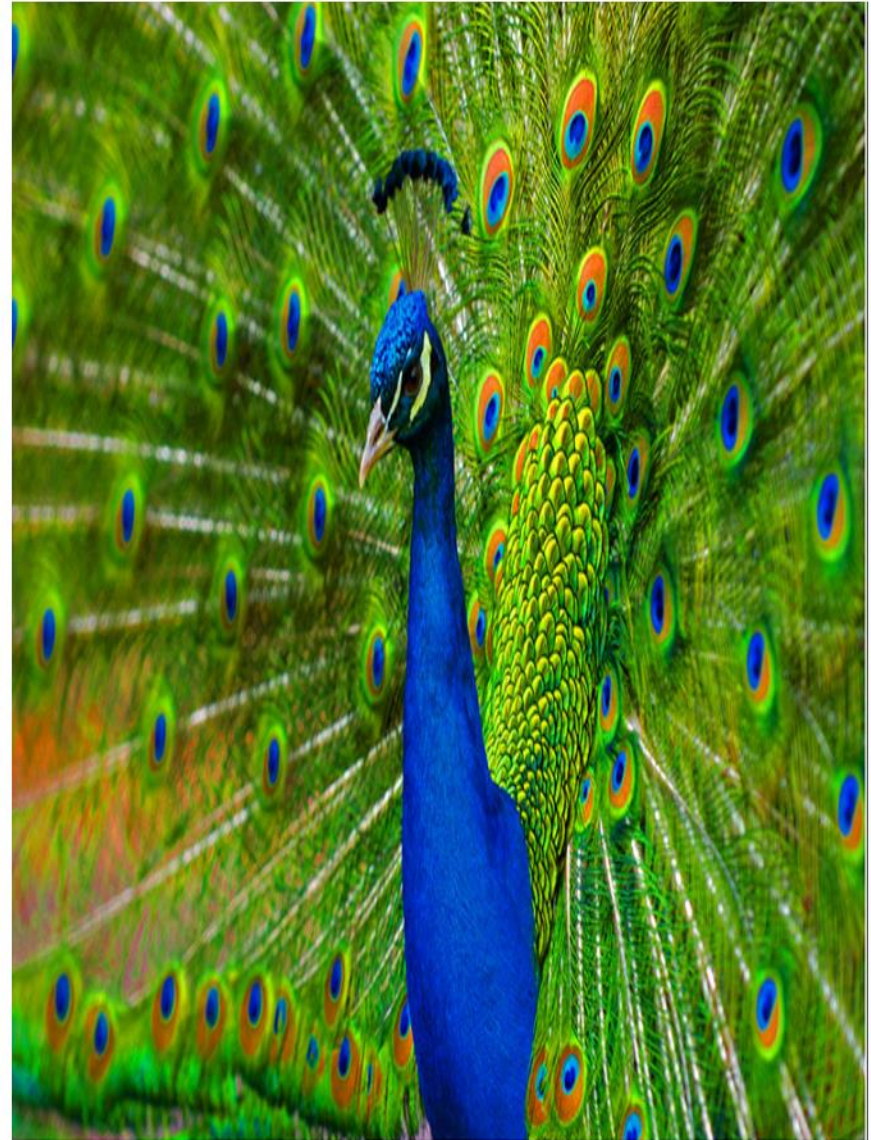
Avoiding Predators



- ▶ Cactus
- ▶ Found mostly in dry, arid places
- ▶ Waxy coating helps keep water from evaporating
- ▶ Animals living in the same areas will eat plants for moisture
- ▶ Cacti that develop spikes as way of deterring predators are more likely to remain alive and reproduce, passing these genes along

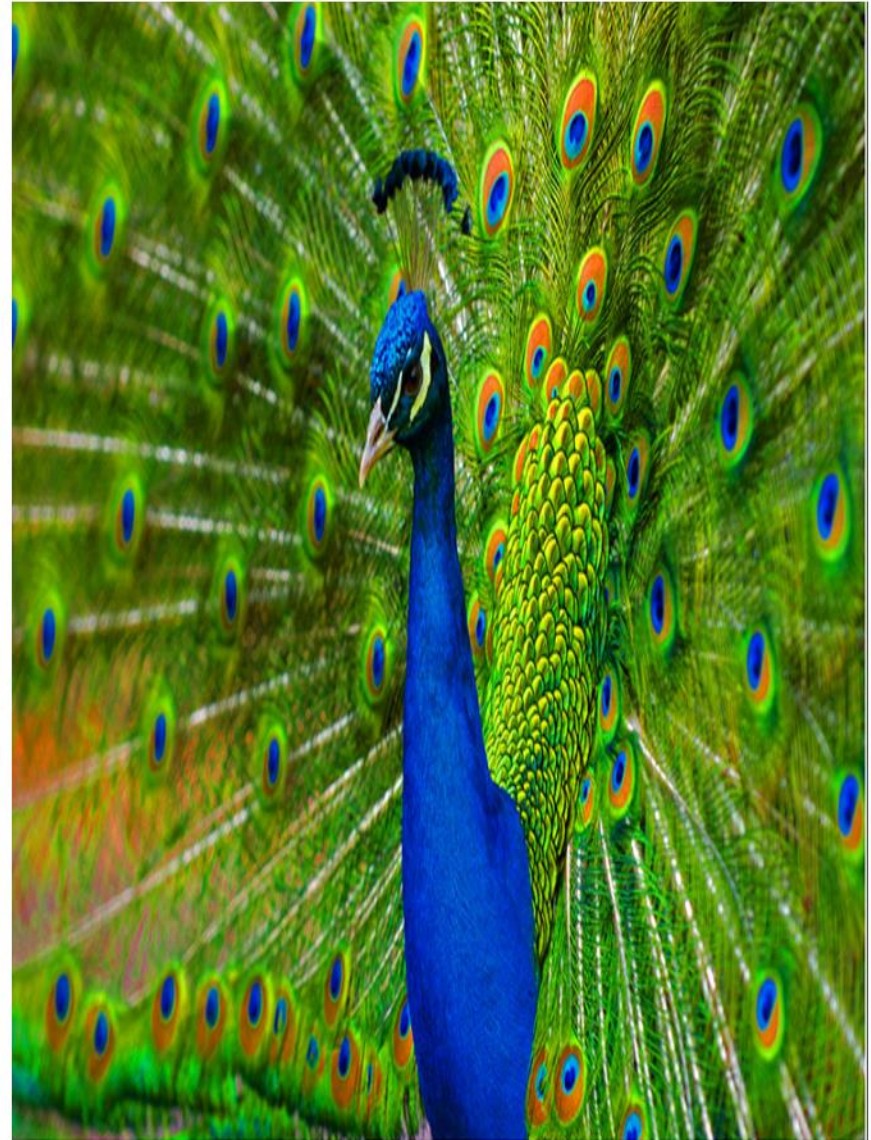
Attraction

- ▶ Birds use their bright, colorful plumage to attract members of the opposite species
- ▶ Usually the male is more brilliantly colored
- ▶ The Peacock is a dramatic example
- ▶ Larger, brighter plumage is more likely to attract a female peahen – why?



Attraction

- ▶ Larger, brighter plumage is more likely to attract a female peahen – why?
 - Suggests healthiness: the ability to produce larger, brighter feathers may indicate to a female the ability to produce more offspring

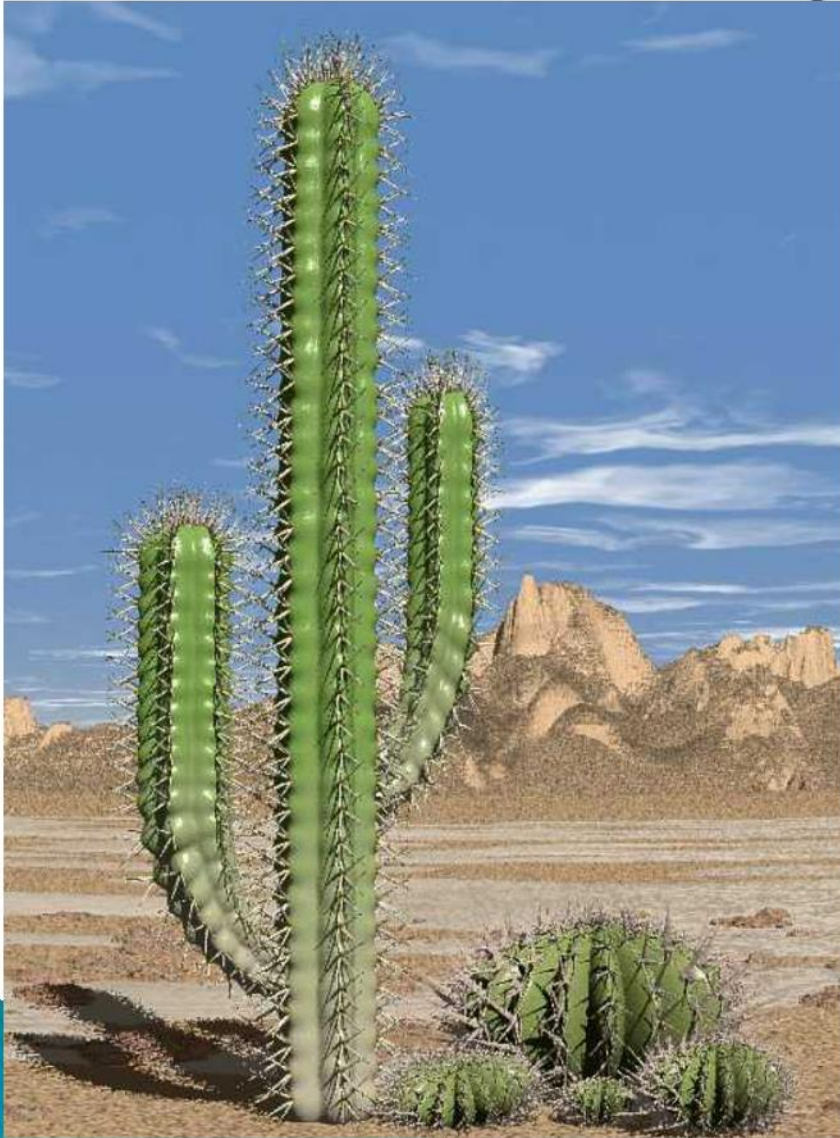


Attraction

- ▶ Lions live in prides: several females and one male that mates with them all
- ▶ A larger, more powerful male is more likely to defend and protect his pride
- ▶ Female lions are more likely to mate with a stronger male for this reason



Adaptation



- ▶ A characteristic or feature of a species that makes it well suited for survival or reproductive success in its environment
- ▶ Remember the cactus, with its waxy coating?
- ▶ This coating prevents water evaporation in a hot, arid environment
- ▶ The cactus retains more of the water it consumes

Adaptation

- ▶ The polar bear
- ▶ Among the largest bears
- ▶ Has both a heavy double layer of fur and a layer of fat 4–5 inches thick, to survive extreme cold
- ▶ They are very strong swimmers
 - Why might this be important?



Adaptation

- ▶ They are very strong swimmers
 - Why might this be important?
 - They live in oceanic areas and often live on areas of the sea frozen only during the winter months
- ▶ They blend well into their surroundings, making it harder for prey to spot them



Predictions

- ▶ The Theory of Natural Selection allowed Darwin to make predictions he could not prove
- ▶ He predicted that, based on the location of great apes today, we would find fossil evidence of human ancestry in Africa

Predictions

- ▶ Darwin's orchid: flower with a very long spur
 - He predicted an insect must exist with a very long proboscis, in order to pollinate it
 - Madagascan Hawk Moth discovered in 1903



Darwin's 5 Observations

Observations

In each generation, populations produce more offspring than there are adults.

Populations do not continue to grow in size.

Food and many other resources are limited.

Individuals within all populations vary.

Many variations are heritable.

Inferences

Individuals within a population compete for resources.

Some individuals will inherit characteristics that give them a better chance of surviving and reproducing.

Theory of Natural Selection

Over time the population changes as advantageous heritable characteristics become more common generation after generation.

Figure 2 Darwin's theory of evolution by natural selection was powerful because it was based on five key observations that were well established and undeniable. Darwin realized that together, they gave rise to two logical inferences and provided a mechanism for evolution.