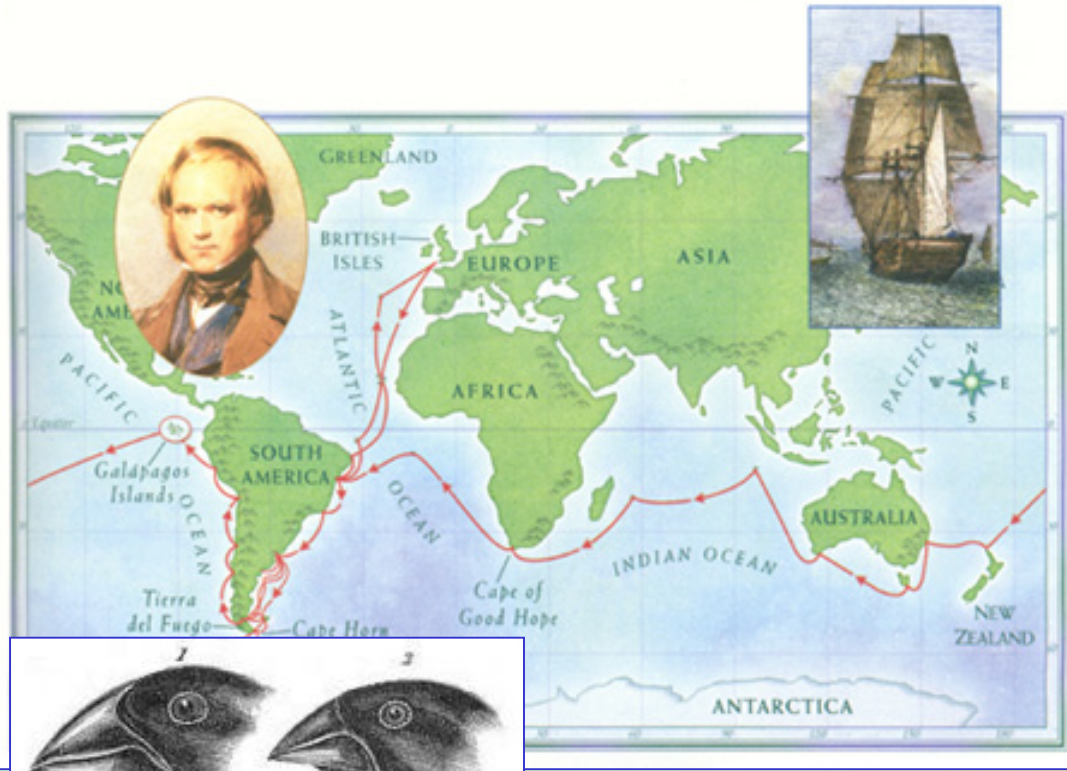


# Evolution

▼ **Figure 14-3** The route of the *Beagle* (top inset) took Darwin around the world during a five-year voyage.

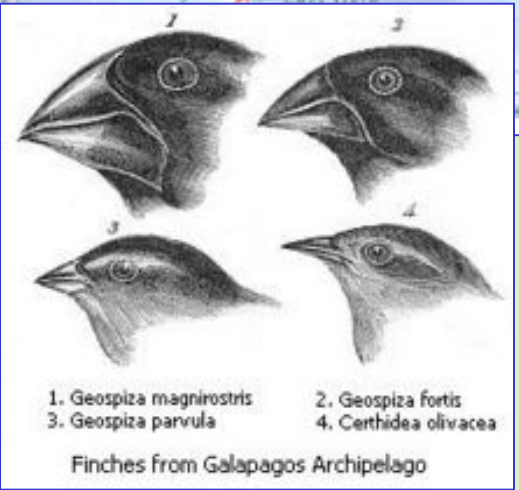


## The Evidence

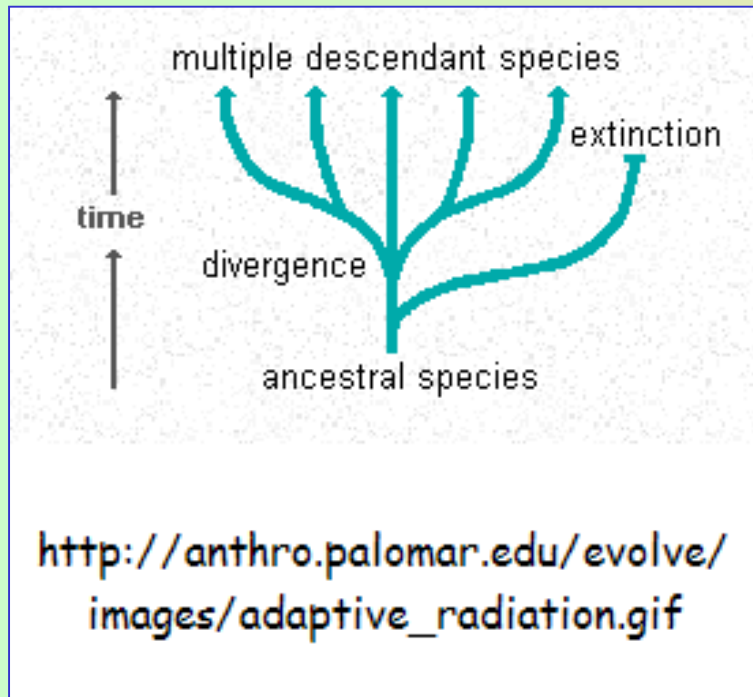
In 1859, Charles Darwin published his controversial theory: **That species evolve by a process of natural selection.**

Today that explanation is overwhelmingly accepted by scientists.

Darwin spent much of his life meticulously collecting evidence to support his idea, and around the world scientists continue to find indications that natural selection is at work.



# Evolution



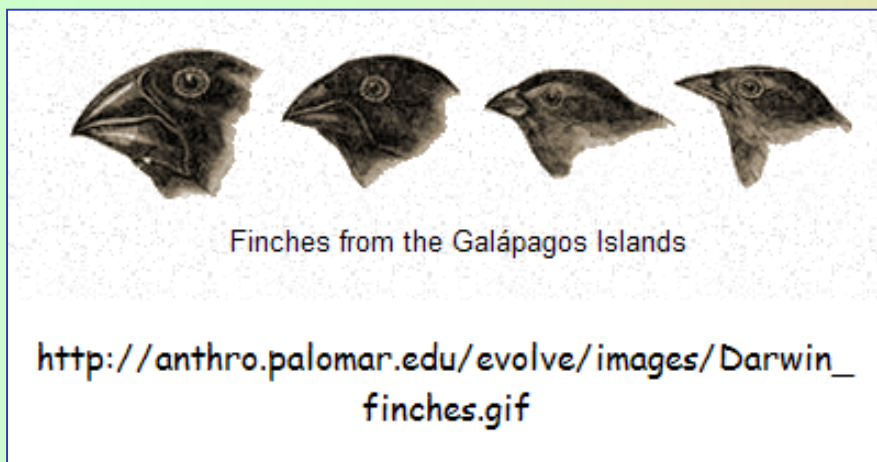
## The concept

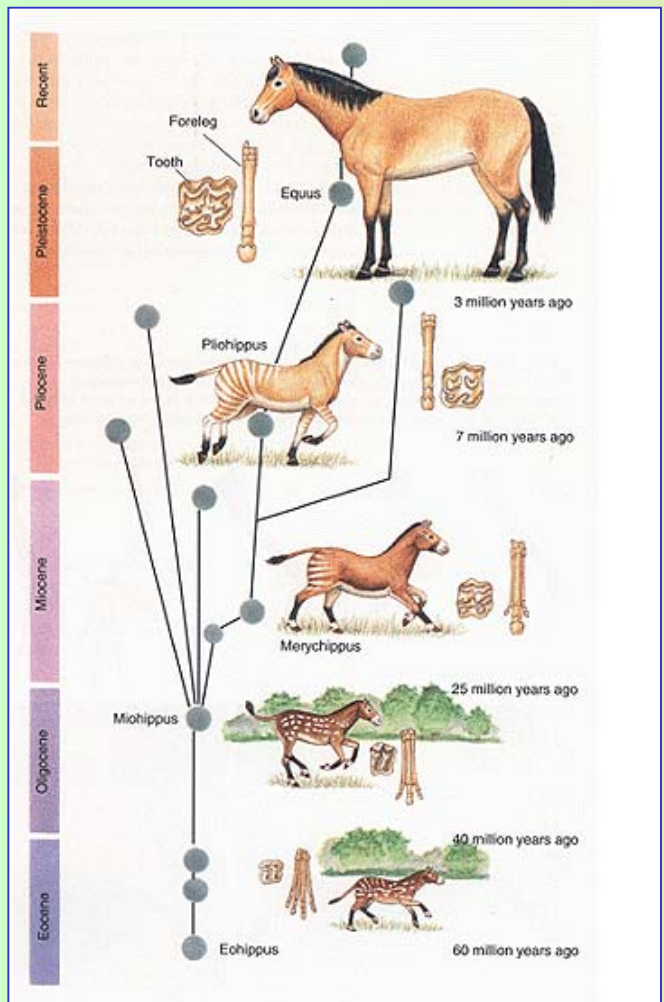
Darwin proposed that **all species are the modified descendents of other, earlier species.**

Small heritable differences make some individuals more likely to succeed in the struggle to survive than others.

These individuals produce more offspring and so those differences become more common in the populations.

**Natural selection works continually to produce a population that is best suited to its changing environment.**





<http://www.bringyou.to/apologetics/HorseEvolution.gif>

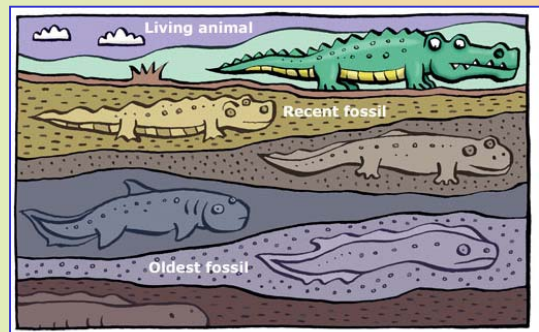
## The evidence: fossil record

Palaeontologists learn about the history and relatedness of species by studying fossils.

Darwin noticed that many animals and plants preserved in this way are no longer found alive.

Furthermore, similar, but slightly modified, species often bunch together in a series of rock layers.

Darwin postulated these species cluster because they are descendent from one another.



[http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh\\_publishing\\_group/documents/image/wtd025982.jpg](http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_publishing_group/documents/image/wtd025982.jpg)

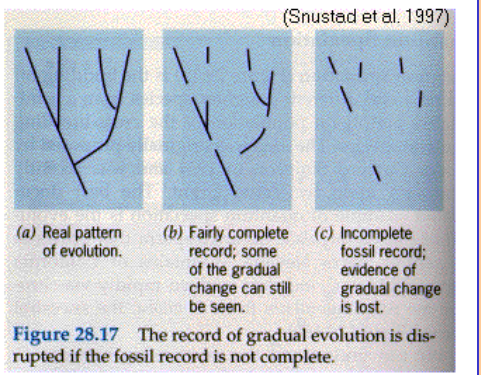
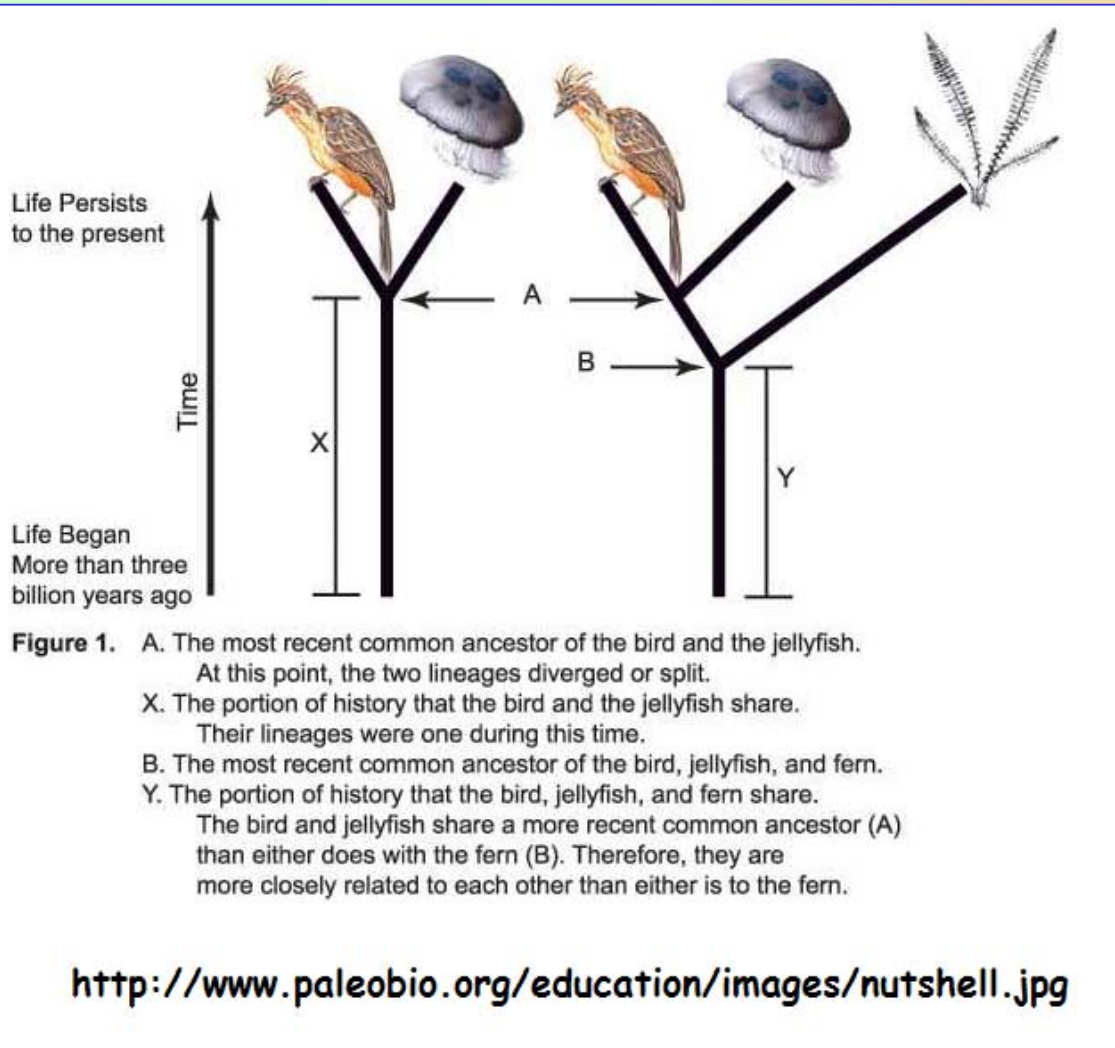


Figure 28.17 The record of gradual evolution is disrupted if the fossil record is not complete.

[http://www.mun.ca/biology/scarr/Fossil\\_record.gif](http://www.mun.ca/biology/scarr/Fossil_record.gif)

# Evolution



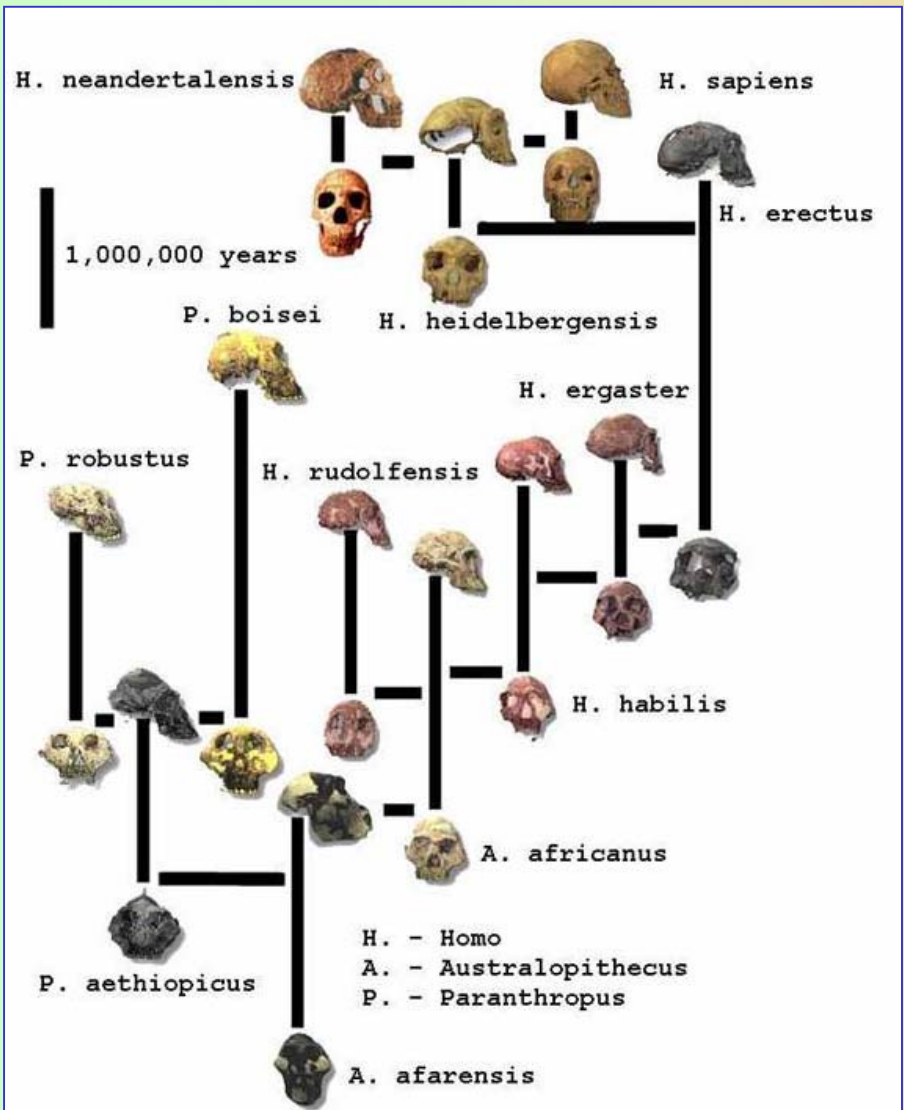
## The evidence: geographical distribution

Darwin noticed that similar species tend to cluster in space as well as time.

For example, the 13 finch species he encountered in the Galapagos are found nowhere else and virtually all marsupials are found in Australia.

The reason for this, suggested Darwin, is simply that these species are descendent from a **common ancestor** that lived in the same region.

# Evolution



[http://www.globalchange.umich.edu/gctext/Inquiries/Inquiries\\_by\\_Unit/Unit\\_5\\_files/image017.jpg](http://www.globalchange.umich.edu/gctext/Inquiries/Inquiries_by_Unit/Unit_5_files/image017.jpg)

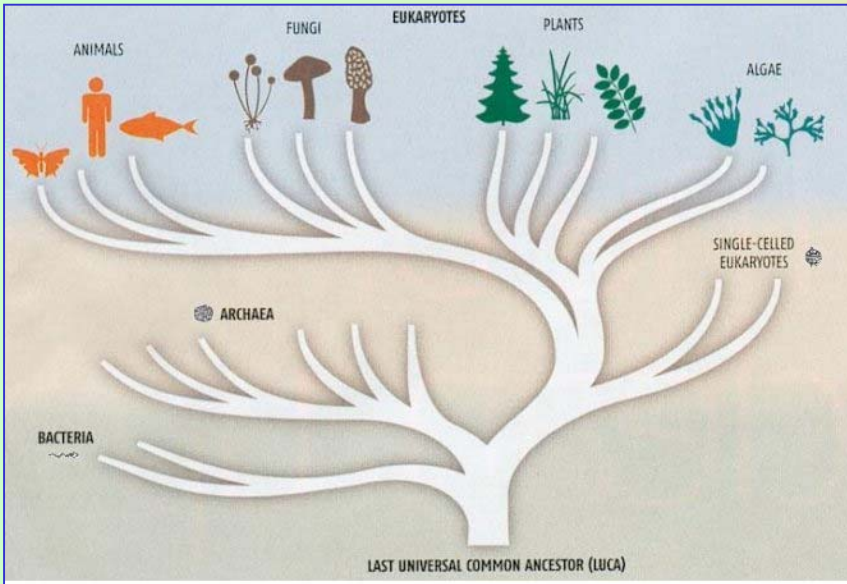
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# Evolution

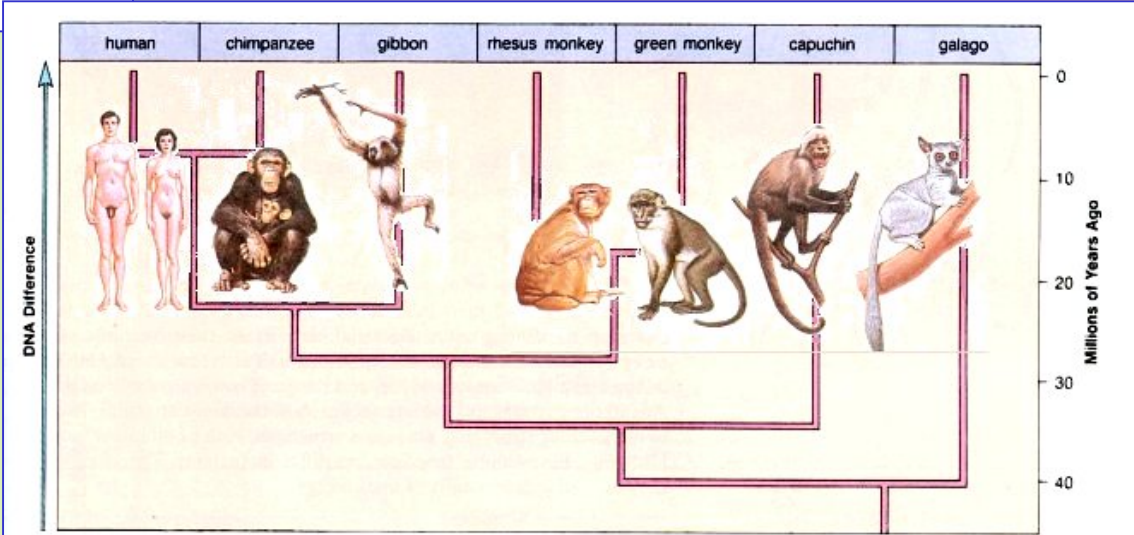


<http://universe-review.ca/I10-02-TreeOfLife1.jpg>

## The evidence: anatomical similarities

Darwin argued that the anatomical similarities amongst living species are further evidence for common descent from common ancestors.

Furthermore the similarities can be used to group all animals into a hierarchical "tree of life".



<http://universe-review.ca/I10-02-TreeOfLife4.jpg>

# Evolution



## The evidence: genetic similarities

Despite the enormous diversity of life, the genetic blueprint encoding it shows striking uniformity.

From nanometre-scale viruses to blue whales, **life is encoded in just two substances: RNA and DNA.**

The degree of **similarity in DNA sequences between closely related species** can be striking: we share 98.5 % of our DNA with chimpanzees.

DNA and proteins are less similar in distantly related species, suggesting that **genetic differences have accumulated as species diverged from common ancestors.**