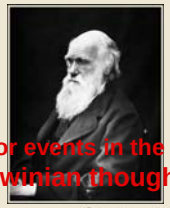

Major events in the history of Biology:
Darwinian thought

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Georges-Louis Leclerc, Comte de Buffon

(1707-1788)

HISTOIRE
NATURELLE.
HISTOIRE DES ANIMAUX.
CHAPITRE PREMIER.
Comparaison des Animaux & des Végétaux.

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Erasmus Darwin

1731-1802

- Translated _____ into English
- Zoonomia (Laws of Organic life)
- The temple of nature

Organic life beneath the shoreless waves
Was born and nurs'd in ocean's pearly caves;
First forms minute, unseen by spheric glass,
Move on the mud, or pierce the watery mass;
These, as successive generations bloom,
New powers acquire and larger limbs assume;
Whence countless groups of vegetation spring,
And breathing realms of fin and feet and wing.

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Georges Cuvier
(1769-1832)

- Comparative biology
- Catastrophic theory
- Extinction

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Darwin's five theories – No constancy of species

Extinction

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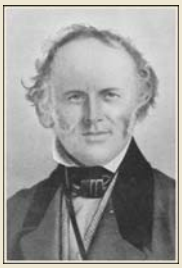
Charles Lyell
(1797- 1875)



- _____ theory of geological change
- Stratigraphy and the geological time scale

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Rock cycle

7
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Plate tectonics

Figure 17.8a

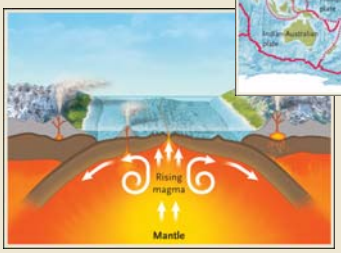

Figure 17.8b

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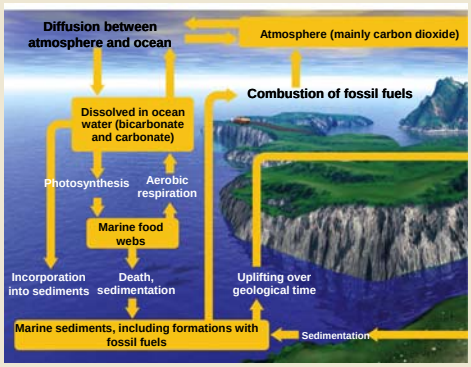
Carbon cycle

Figure. 46.13



Sedimentation of calcium carbonate

$$CO_2 + H_2O \rightleftharpoons \text{Bicarbonate } H_2CO_3 \rightleftharpoons H^+ + H_2CO_3^- + Ca^+ \longrightarrow CaCO_3^-$$

Carbonate

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Carbon cycle

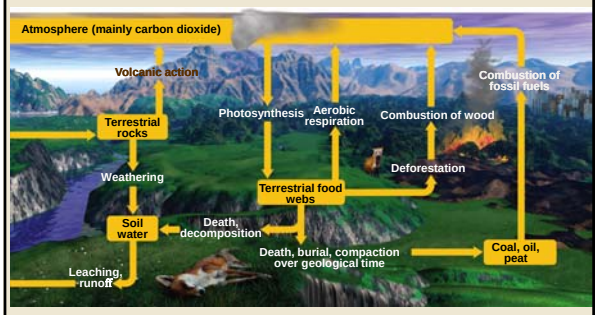

Fig. 46.13c, p. 1189-9

Continental drift Figure 17.9

Continental drift 1
Continental drift 2

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Jean-Baptiste Lamarck
(1744-1829)

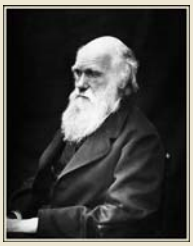
- Transmutation of _____

Essentialist explanation of change

- Transmutation (not Lamarck)
- Transformation
  - Finalism
  - Environmental (this is Lamarck)

Important stages in the history of Biology

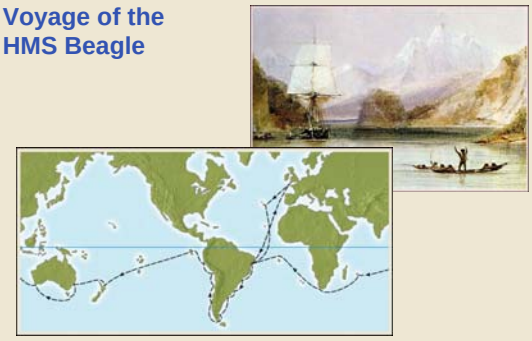
19th century: Modern biology



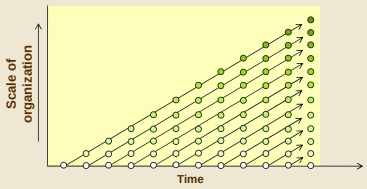
Darwin
(1809-1882)

_____
(1823-1913)

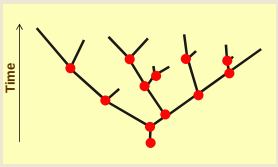
Voyage of the HMS Beagle



Lamarck's theory



Darwin's theory



Darwin's five theories

- No constancy of species
- Common ancestry
- _____
- Multiplication of species
- Natural selection

Darwin's five theories

No constancy of species

- Fossils
- Extinction
- Transitional forms

Darwin's five theories – No constancy of species

Fossils

Petrified wood

Invertebrate

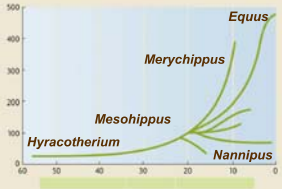
Insects in amber

Mammoth in permafrost

Figure 17.5

Darwin's five theories – No constancy of species
Transitional forms

Evolution of the horse



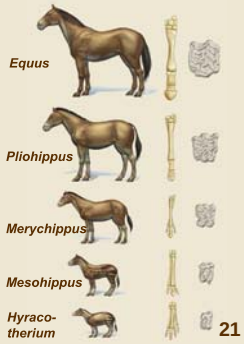


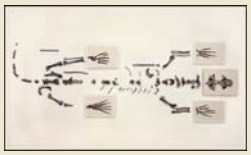
Figure 17.13

Darwin's five theories – No constancy of species
Transitional forms
Archaeopteryx lithographica

Figure 17-21a

Darwin's five theories – No constancy of species
Transitional forms
Puijila darwini

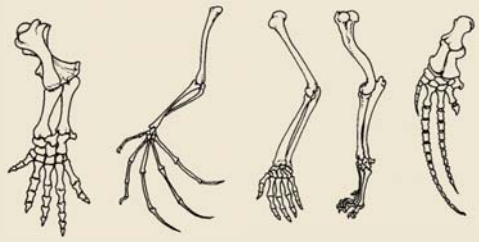
Meet the discoverer



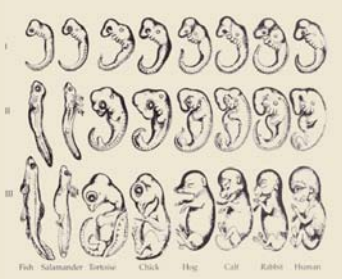
Darwin's five theories
Common ancestry - evidence

- **Comparative anatomy**
- **Comparative embryology**
- **Vestigial structures**
- **Biogeography**
- **Molecules**

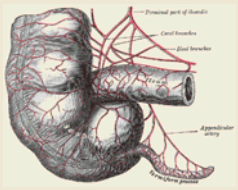
Darwin's five theories - Common ancestry
Comparative anatomy
Homology – Divergent evolution



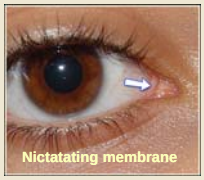
Darwin's five theories - Common ancestry
Comparative embryology



Darwin's five theories - Common ancestry
Vestigial structures

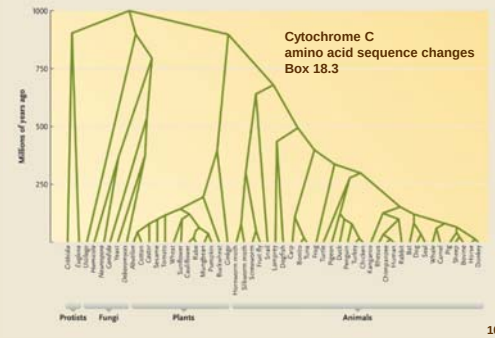


Appendix



Darwin's five theories - Common ancestry

Molecules



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Darwin's five theories

- No constancy of species
- Common ancestry
- gradual changes
- Multiplication of species
- Natural selection

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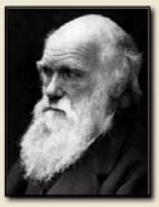
wasn't accepted right away because no one knew what the underlying mechanism was. they needed to figure out how the species were linked to each other

Types of taxonomies

- Folk
- Artificial
- Mechanical
- Natural (Evolutionary)
- Cladistic (Phylogenetic)



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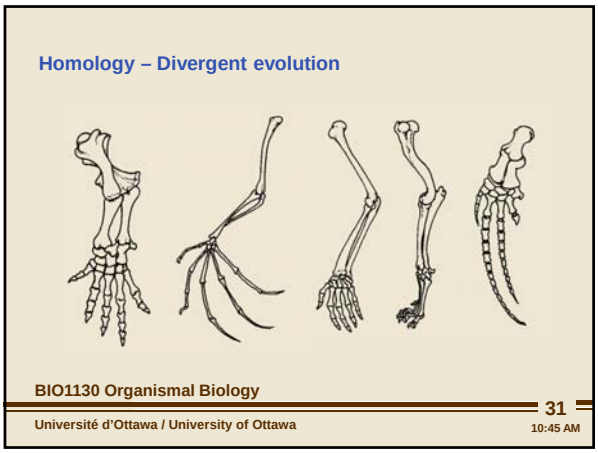
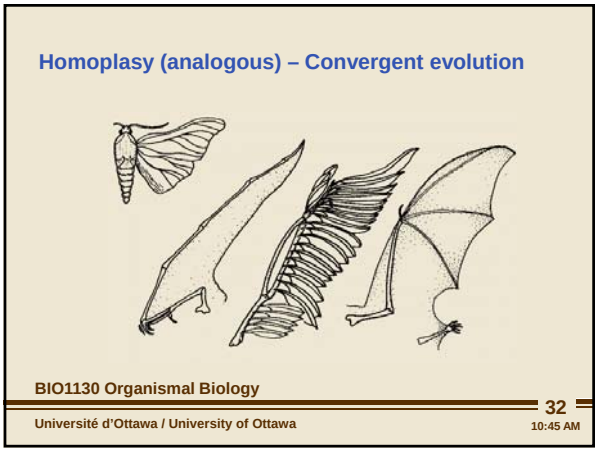
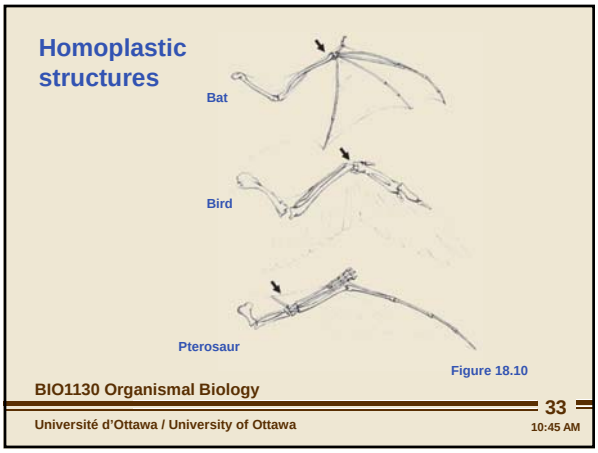


we would figure out how to differentiate between species through morphology, although it is troublesome. when you look at anatomy and bone structure, you will notice similarities between between all of the species: such as in the limb, the bone structure is actually common and related. whats happened over time is that the structure has been used for many different things, therefore the structure has diverged to suit its application.



once other organisms are being grouped together, you notice that even though something may fly, it might not be related to everything else that flies. in this case, we realize that the insect is not related to the other flyers. homopalsy is an independent solution, for in this case, flight.



if you look closer at things such as the thumb, we can see that these too are not actually related. the pterosaur was a quadruped that uses=d its thumb to fold back and protect the smooth wing t=while walking. the birds thumb has disappeared and other finger bones have extended with the addition of feathers. the bats still have all of the digits, although they have been extended. The membrane is between the digits causing another different flying surface. Looking at these differences we are able to see that flying is an independent change in each specific species. it does not mean that they are all related.

Homology – Divergent evolution

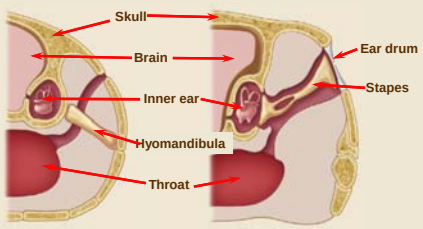


Figure 18.9

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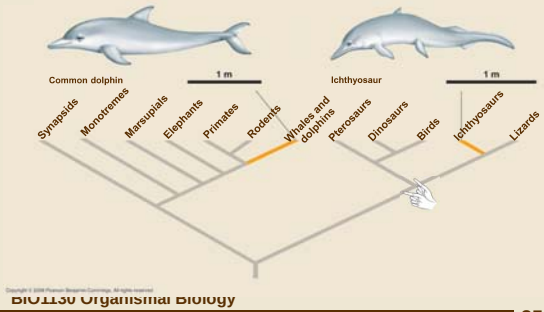
amphibians are able to put their jaw on the ground and hear the ground vibrate in order to hear predators coming. over time that bone moved and changed its orientation to the ear, still serving the same function enabling the amphibian to do the same thing, but on the move.

Homoplasy – convergent evolution



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the body has modified itself over time in order to survive.
in water, which is more dense than air, you need to reduce resistance. the body needs to be streamlined in order to move quickly through the water.
HOMOPLASY: 2 different organisms which look the same, that are diverging in order to solve a common problem based on their environment

Pasteur (1822-1895)

- Life from life not spontaneous generation
- Germ theory

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pasteur is famous for disease, sterilization and the germ theory. he did experiments where he took nutrient broth, boiled it and then let it sit in a flask with a straight neck vs bent neck. he found that the one with the straight neck always went bad. he realized that something must be able to get though the straight path rather than the curve. he decided that life is not spontaneous, life comes from life

Important stages in the history of Biology

19th century: Modern biology

- **Cell theory**
  (Schleiden and Schwann – 1860)
  - **The basic unit of all organisms is the cell**
  - **Individual cells have all the characteristics of life and**
  - **All cell come from the division of other cells**

Schleiden (1804-1881)

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using microscopes, they did a survey of tissues in plants and animals. they noticed is that when you look at tissue through a microscope they always saw this dark thing, the nucleus. they began to realize that all organisms are made of cells and they always have a nucleus. they came together to say that the cell is the fundamental part of life. Life is not spontaneous, it comes from cells.

Mendel (1822-1884)

- **Rediscovered 1900.**
- **Law of segregation of characters**
- **Law of** _____
  _____

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gave us the 2 major laws in biology.
he did a set of observations with pea plants, and crossed fertilized them. Taking different types of plants and crossing them, he was able to watch the product and discover the 3/1 allele ratio in the second generation. he created the punnent square which is able to predict what will come out. mathematic way to explain how the genetic material is passed from generation to generation.