

## The theories of evolution

There are several theories explained the idea of evolution include:

1. Spontaneous creation theory نظرية التوالد الذاتي
2. Cosmic theory النظرية الكونية
3. The scientific theory ( Oparin - Holdane theory) (اوبارين) النظرية العلميه (وهولدن)
4. Special creation theory نظرية التكوين الخاص

### 1. Spontaneous creation theory نظرية الخلق الذاتي

---- From ancient times منذ الازمنه القديمه was commonly believed that life could arise by spontaneous generation التوالد الذاتي from dead material, in addition to arising from parental organisms by reproduction (Biogenesis التكوين الحيوي).

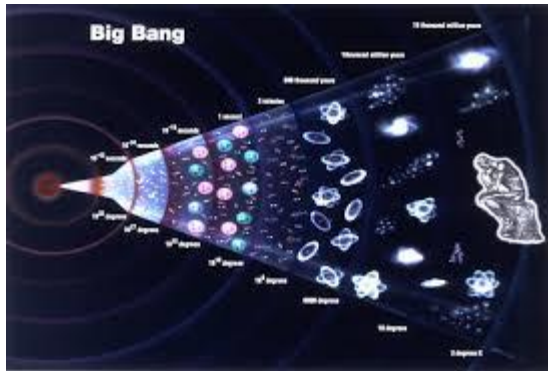
- \*Frogs appeared to arise from damp earth الضفادع تتكون من التربه الرطبه
- \*Mice from putrefied matter الجرذان من المواد المتعفنه .
- \*Insect from dew الحشرات من الندى .
- \*Maggots from decaying الديدان او اليرقات من اللحم المتفسخ .



### 2. Cosmic theory (Extraterrestrial origin)

---Life may not have originated on earth at all but instead may have been carried out it perhaps as an extraterrestrial infection by bacteria or spores originating on a planet of distant star.

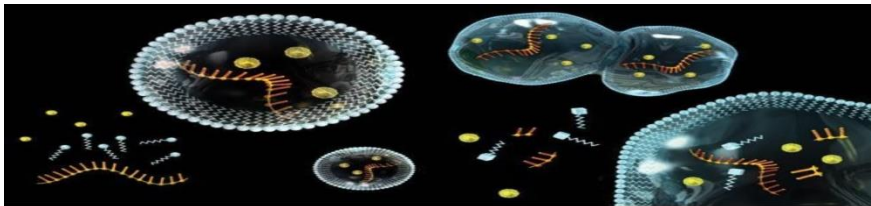
---How life came to exist on that planet is question we can not hope to answer soon.



### 3.The scientific theory ( Oparin-Holdane theory )

---Oparin (Russian biochemist ) and Holdane ( British biologist ) suggested that the simplest living units such as bacteria came into being gradually by the progressive assembly of organic molecules into more complex molecules.

---These molecules would react with each other to form living microorganisms.



### Origin of life - Part\_3 | Oparin Haldane theory|

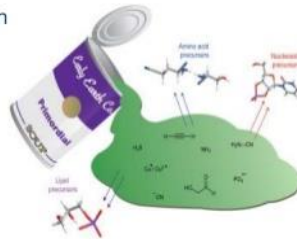
Theory of chemical evolution of life

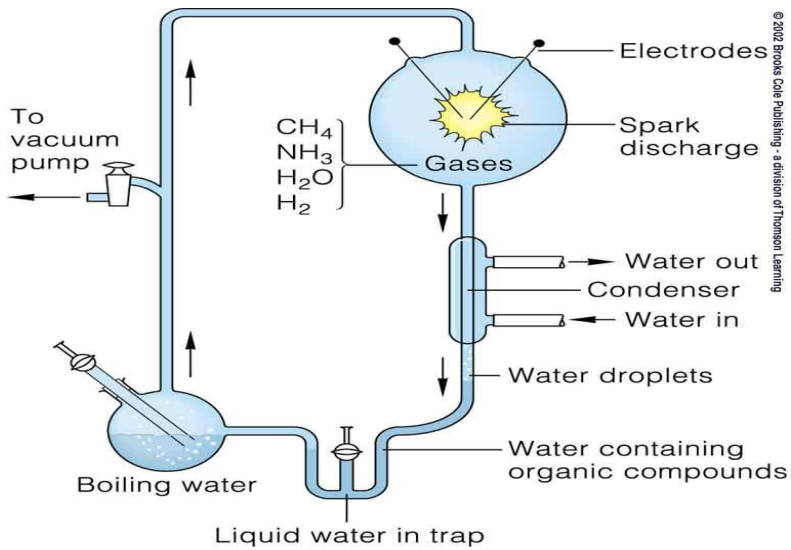
# OPARIN-HALDANE THEORY



## Oparin-Haldane Theory

- + According to their theory, life evolved in the oceans during a period when the atmosphere was reducing: no free  $O_2$  while containing:
  - +  $H_2$
  - +  $H_2O$
  - +  $NH_3$  (Ammonia)
  - +  $CH_4$  (Methane)
  - +  $CO_2$  (Carbon Dioxide)
- + Forces such as lightning and electric discharges such as sun wind, UV light, and meteorites created organic molecules in atmosphere, which rained into the ocean.





#### 4. Special creation theory

---Life may have evolved inanimate matter, with associations among molecules becoming more and more complex.

---In this view, the force leading to life was selection change in molecules that increased their stability caused the molecules to persist longer.

#### The Evidences of Evolution ادلة التطور

##### 1. Fossils record سجل الاحافير

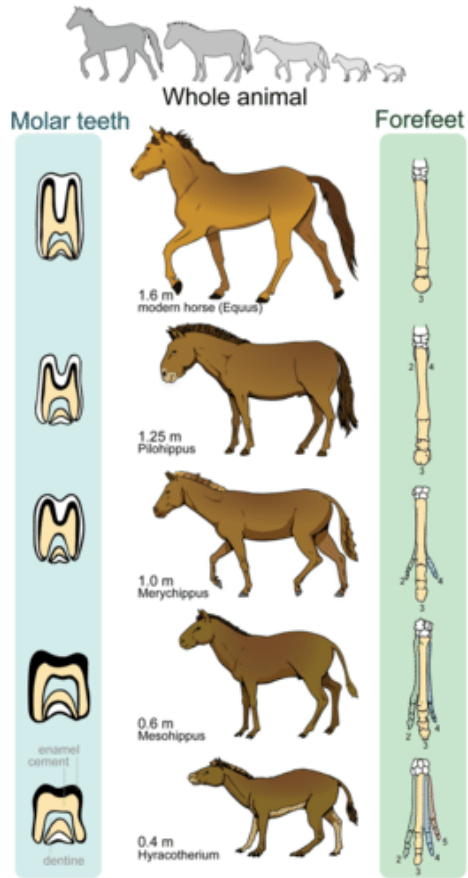
---The most direct evidence of macroevolution is found in fossil record.

---Fossils are the preserved remains بقايا محفوظة, tracks or traces of one living organism.

---Fossils are created when organism become buried in sediments, the calcium in bone or other hard tissue mineralizes and the surrounding sediment eventually harden to form rock.

----Fossils contained in layers of sedimentary rock reveal history of life on the earth.

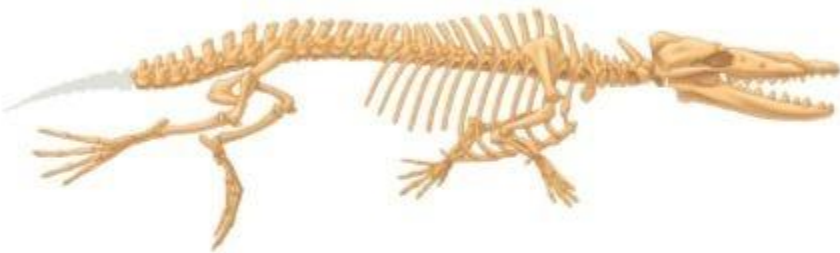
----Today rocks are dated by measuring the degree of decay of certain radioisotopes contained in the rock (absolute dating), the older the rock, the more its isotopes have decayed.



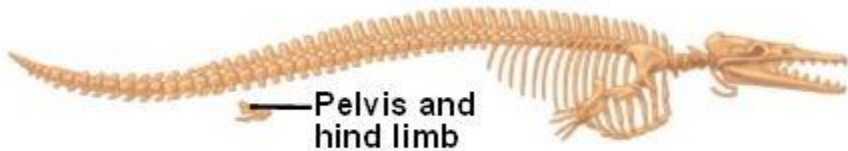
The 57 million years evolution of the horse leg bones and teeth.



(a) *Pakicetus* (terrestrial)



(b) *Rhodocetus* (predominantly aquatic)



(c) *Dorudon* (fully aquatic)



(d) *Balaena*  
(recent whale ancestor)

EVOLUTION OF WHALE (All the above fossil forms occurred in eocen period, 45-55 million years ago)

2.The molecular record السجل الجزيئي

Traces of our evolutionary past are also evident at the molecular level.

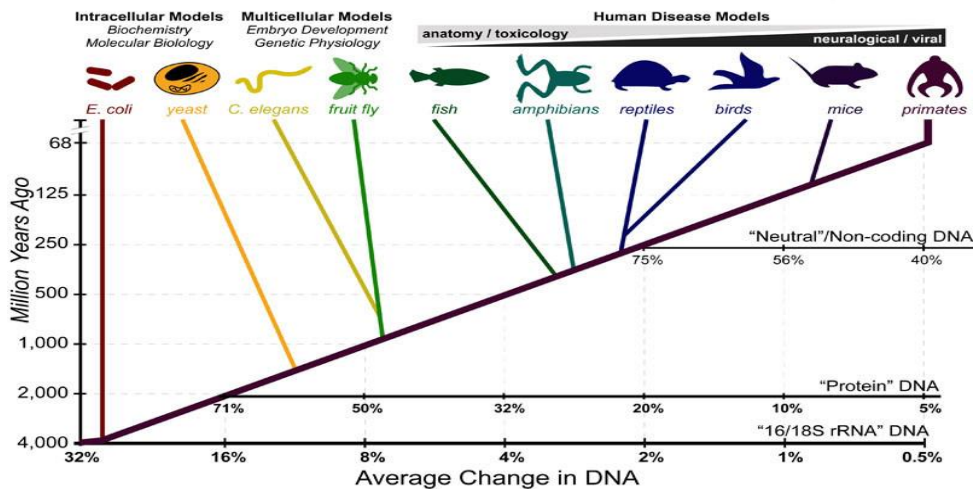
--We possess colour vision gene that have become more complex as vertebrates have evolved, and we employ pattern formation genes during early development that all animals share.

--Primate closely related to human have fewer differences from human in the 146 amino acid hemoglobin b-chain than do more distantly related mammals, like dogs.

--Molecular clock الساعة الجزيئية

\*Same pattern is seen when DNA sequences from various organisms are compared. For example: the longer the time since the organisms diverged the greater the number of differences in the nucleotide sequence of the cytochrome C gene, which codes for a protein that plays a key role in oxidative metabolism.

\*The changes appear to accumulate in cytochrome C at a constant rate, a phenomenon sometimes referred to as molecular clock.



## 2. The anatomical record **السجل التشريحي**

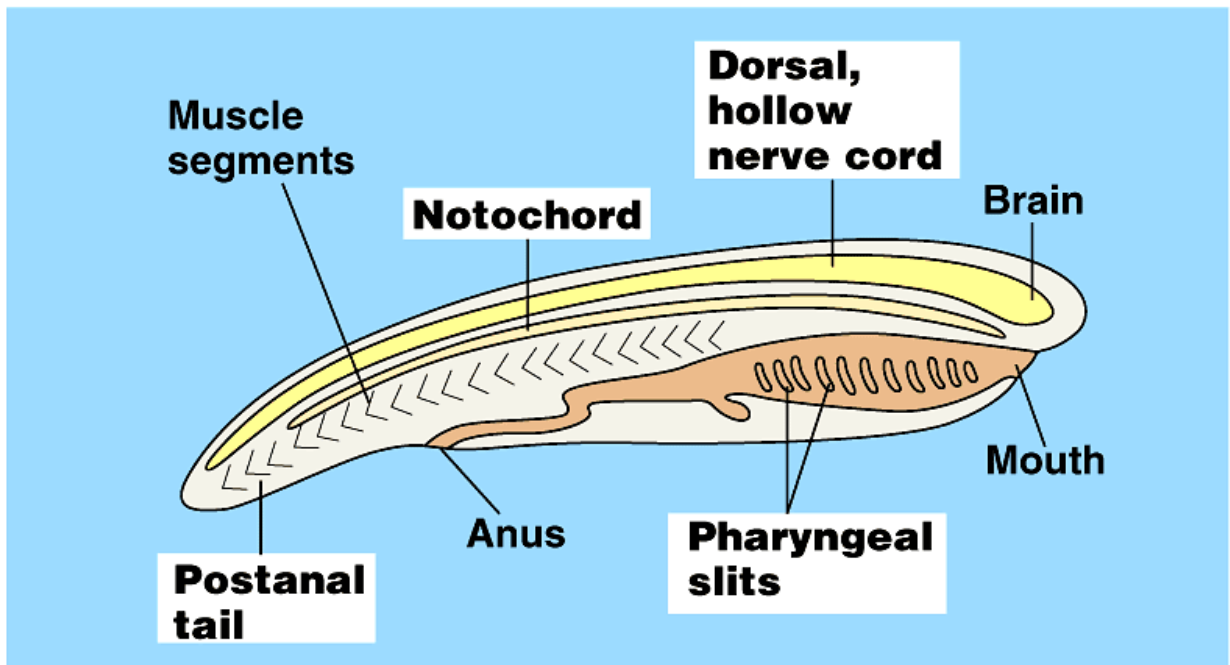
--Much of the evolutionary history of the vertebrates can be seen in the way in which their embryos develop.

--Early development, all vertebrate embryo possess notochord and dorsal neural tube.

--Early in development, all vertebrate embryos developed a gill slits like a fish.

--Every vertebrate embryo has along bony tail.

--The above characters strongly suggest that all vertebrates share a basic set of developmental instructions.



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--The evolutionarists علماء التطور suggested several principles to explain the anatomical evidences for evolution,include:

1. Principle of recapitulation: أساس التلخيص أو التكوين القديم "Descendent ontogenesis tend to recapitulate ancestral ontogenesis"

Recapitulation: An individual repeats its phylogenetic history in its development.

--The earlier stages of all embryos tend to look alike, but as development proceeds, the embryos become more dissimilar.

2. Principle of analogy and homology: أساس المضاهاة والتماثل

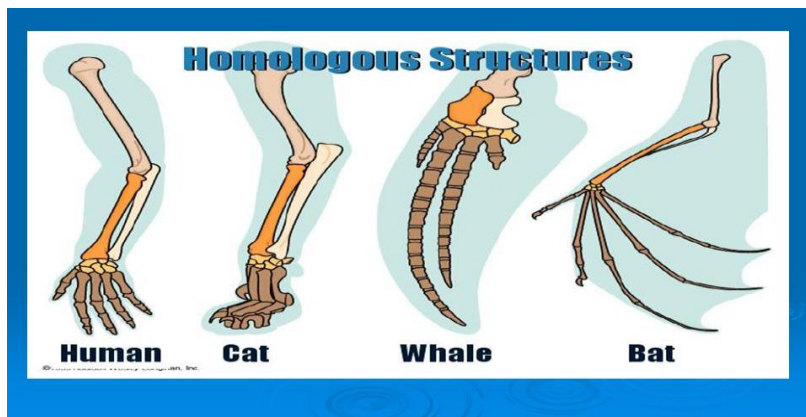
Analogy: مضاهاة: Similarity of function, but not of origin (sometimes have different origin).

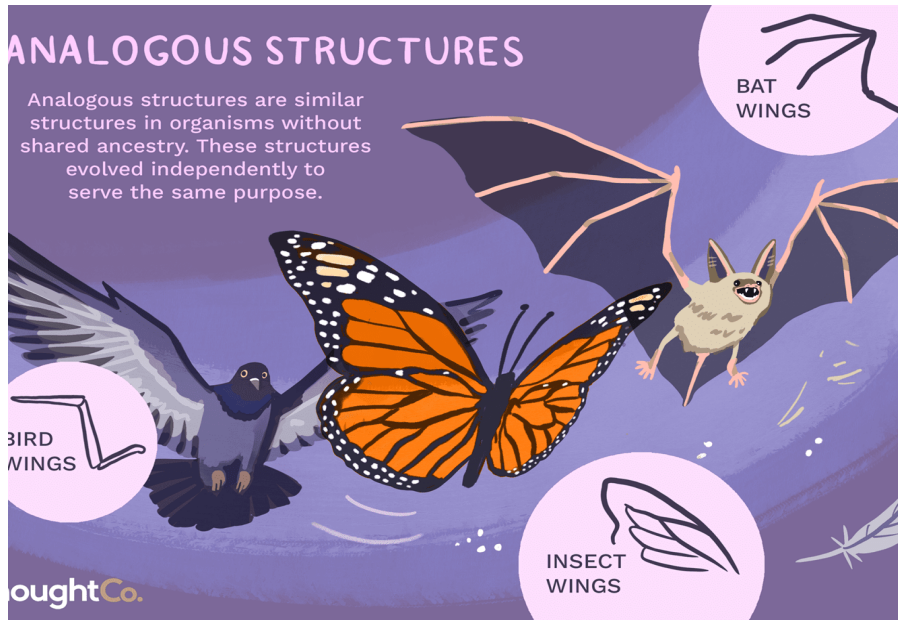
Homology: تماثل: Similarity of parts or organs of different organisms caused by similar embryonic origin and evolutionary development from a corresponding part in some ancestor.

Examples:

\*The forelimbs of vertebrates are all homologous structures, they are derived from the same body part present in a common ancestor.

\*The wings of birds, pterosaurs, bats are analogous structures, modified through the natural selection to serve the same functions





3. Principle of parsimony اساس القله . example: number of teeth in dogfish and humans.
4. Principle of resemblance اساس التشابه . example: the resemblance between ,dog, cat, and crocodile.
5. Principle of adaptation اساس التكيف . example: the presence of lungs in terrestrial animals represented an adaptation for the respiration on the land.
6. Principle modification اساس التحور . example: feathers in birds originate from the modification of epidermal scales of the reptiles.
7. Principle of intermediate stages اساس المراحل المتوسطة . example: the presence of spiral valve الصمام الحلزوني in dogfish and short intestine (stage 1), while in the amia, which is represented early developed bony fish, the intestine elongated and kept the spiral valve (stage 2),and in teleost fish (modern bony fish الاسماك العظمية الحديثه) the spiral valve disappeared and the intestine long and coiled (stage 3). The amia represented the intermediate stage as it has spiral valve and long intestine (it has the primary and secondary characters).
8. Principle of irreversibility of evolution اساس لارجوعية التطور .example: the whales are mammals with a modified fore limbs to flippers مجاذيف like fish fins .

9. Next lecture: Darwin's theory ( Darwinism)

THANKS