

# History of Evolutionary Thinking

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"The Darwinian revolution is both a scientific & a philosophical revolution, & neither revolution could have occurred without the other...."

If I were to give an award for the single best idea anyone has ever had, I'd give it to Darwin, ahead of Newton & Einstein & everyone else. In a single stroke, the idea of evolution by natural selection unifies the realm of life, meaning, purpose, with the realm of space & time, cause & effect, mechanism & physical law."

Daniel Dennett, 1995

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Aboriginal

Native American

2

## Founders of Natural Science: from Ancient Times to the Enlightenment

Anaximander (6<sup>th</sup> C BC): living creatures formed from water; all animals descended from fishes

Empedocles (5<sup>th</sup> C BC): parts joined in random combinations; only certain combinations survived



Plato (~400 BC): fixed essence

Aristotle:  
species have fixed properties

5



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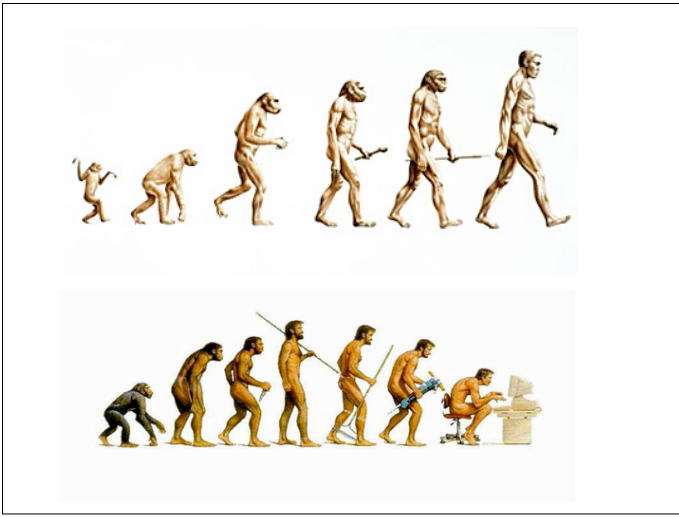
## Christian thought....

- Essence & order

- Creation of the Earth (days 1-6; rest on day 7) October 26, 4004 BC at 9:00 AM GMT (Bishop Ussher, 1654) ...followed by The Noachian Flood

- Scala Naturae

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**Georges-Louis  
Leclerc, Comte de  
Buffon (1707-1788)**

**Erasmus Darwin  
(1731-1802)**



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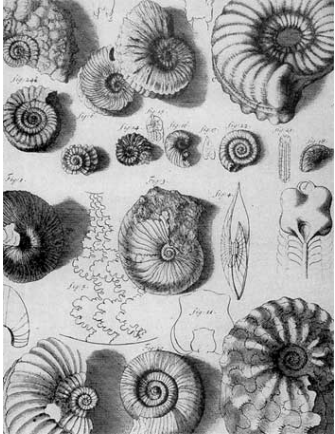
**But some scientists had doubts...**

**1500's:**  
Leonardo da Vinci - fossil shells in Alps > rejected Genesis account of global flood


**1600's:**  
Robert Hooke (1635-1703)

**1700's:**  
cracks in special creation from the exploration of the Americas, Africa, Australia

Ammonoid fossils ("snake stones")  
by R. Hooke




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**William Paley  
(1743-1805)**

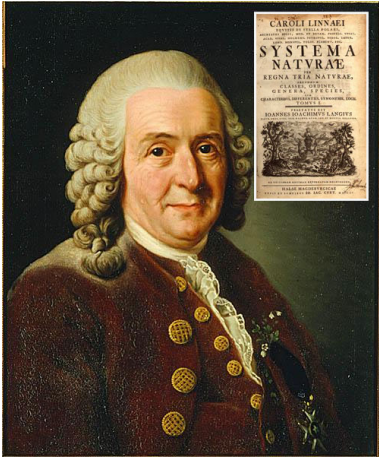
Contributions to political philosophy, ethics and philosophy of religion

- 'Principles of Moral and Political Philosophy'
- 'Natural Theology; or, Evidences of the Existence and Attributes of the Deity' (1802)

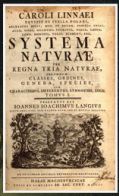


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**Great Naturalists  
of the 18<sup>th</sup>C...**

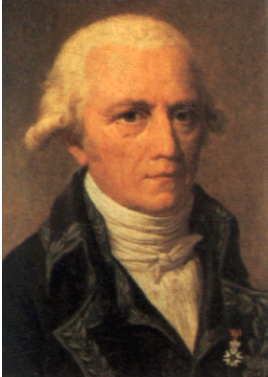


1735: Carl Linnaeus



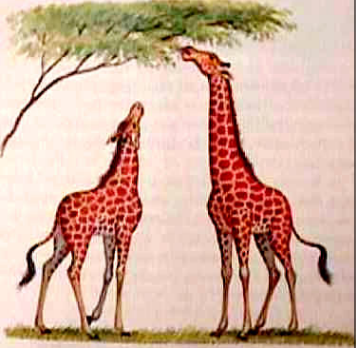
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**Preludes...**



**Jean-Baptiste Antoine de Monet,  
Chevalier de Lamarck  
(1744-1829)**

- first theory of evolution
- inheritance of acquired characteristics



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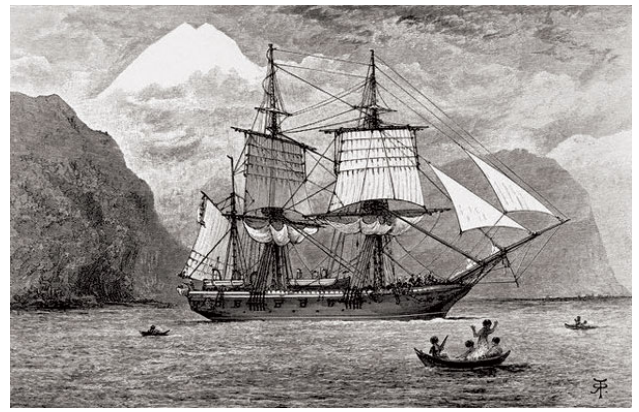
... & Georges Cuvier (1769-1832)



- zoologist, paleontologist, anatomist
- irreducible complexity
- Catastrophism...



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1831: Darwin leaves on a five-year around-the-world journey on the HMS Beagle.

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Charles R. Darwin (1809-1882)

**Natural Selection**

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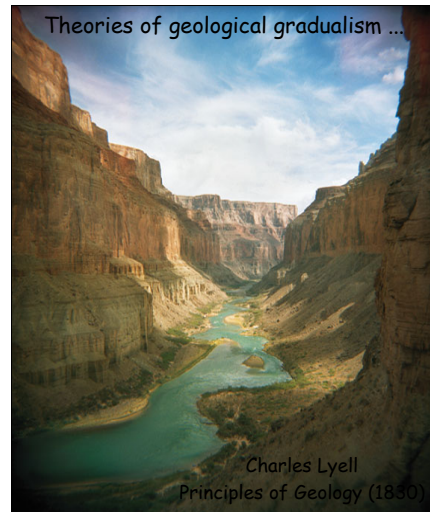
HMS Beagle 1831-1836  
companion to Capt. FitzRoy

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1809: Darwin (shown opposite his younger sister) is born in Shrewsbury, England, into the comfort of a wealthy family.

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Theories of geological gradualism ...

- **Gradualism** (James Hutton) - change results from slow, continuous processes
- **Uniformitarianism** (Charles Lyell) - geological processes not changed throughout Earth's history

Charles Lyell  
Principles of Geology (1830)

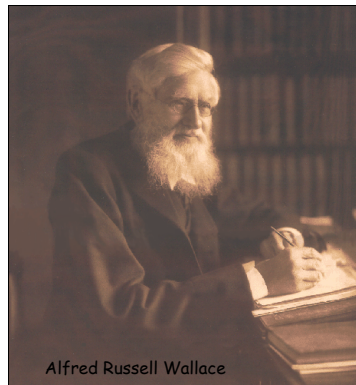
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- 1837 - John Gould examines birds
- origin of Galapagos fauna (900 km w of S.Am)



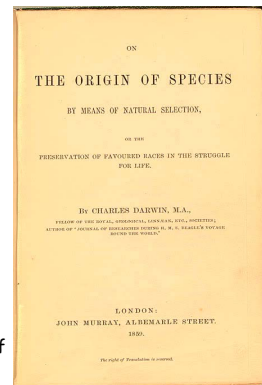
- origin of new species & adaptation to the environment - closely related processes

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Alfred Russel Wallace

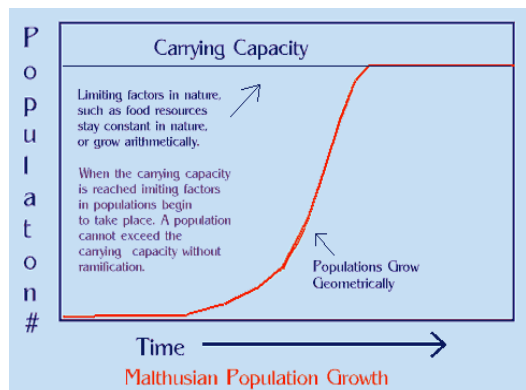
1858: "On the tendency of varieties to depart indefinitely from the original type"



1859: "On The Origin of Species by Means of Natural Selection, or The Preservation of Favoured Races in the Struggle for Life"

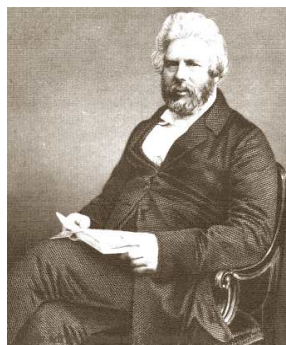
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1838: formulates theory of NS

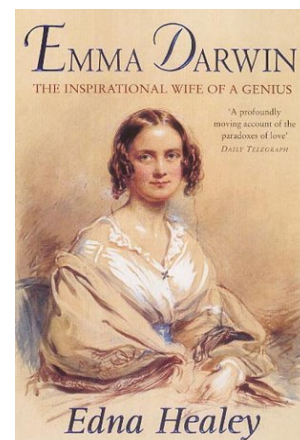


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Why the wait?



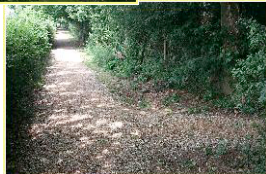
'The Vestiges of the Natural History of Creation' Robert Chambers (1844)



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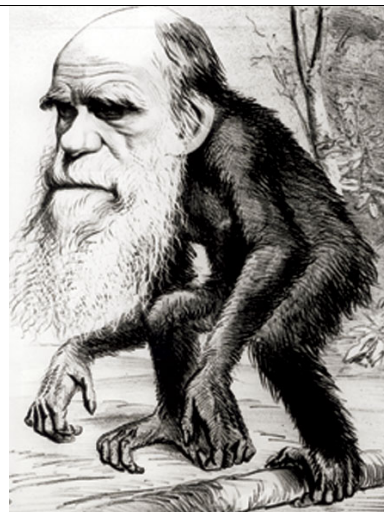
1844: "long essay" to be published in case of his death

1856: Began "big book"...



19 books  
150 ms

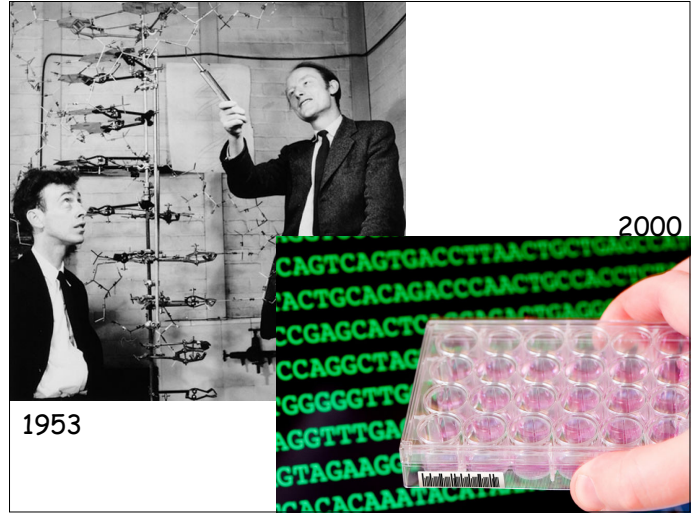
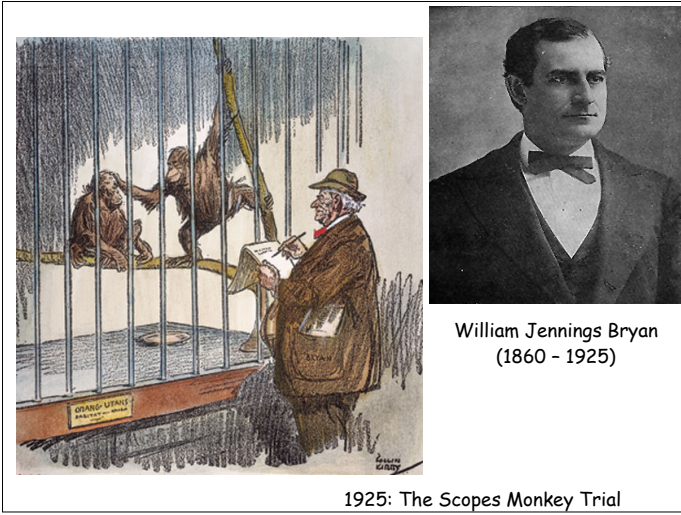
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Public reaction

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**After Darwin....**

- Neo-Lamarckism
- Orthogenesis
- Mutationism

**Biometricians** (Francis Galton):  
 champions of NS, but focused on continuous variation

**Mendelians** (Thomas Hunt Morgan):  
 discrete variation via mutations the primary engine of evolution, not NS

Nobel Prize 1933

**Present....**

Richard Lewontin

Ernst Mayr

Richard Dawkins

E.O. Wilson

Stephen Jay Gould

**The Modern Synthesis ..... 1936-1947**

Population Geneticists

Ronald Fisher  
J.B.S. Haldane  
Sewall Wright

The Naturalists

Theodosius Dobzhansky  
Ernst Mayr  
George Gaylord Simpson

**Future.....**

Stuart Kauffman

Lynn Margulis

Rosalind Franklin



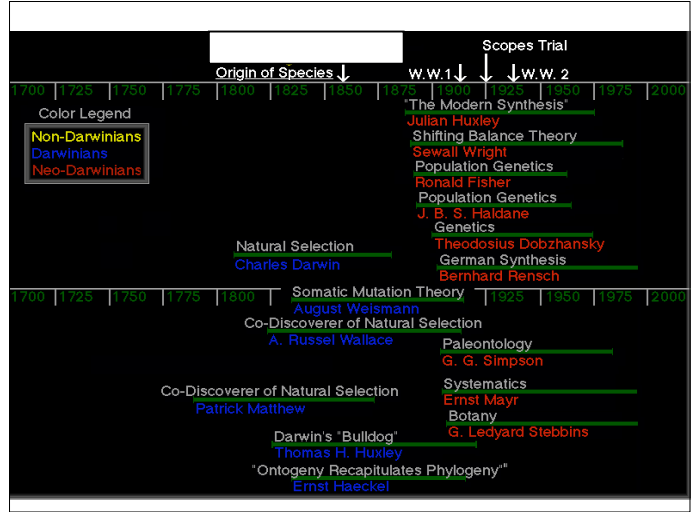
Barbara McClintock  
Nobel Prize 1983



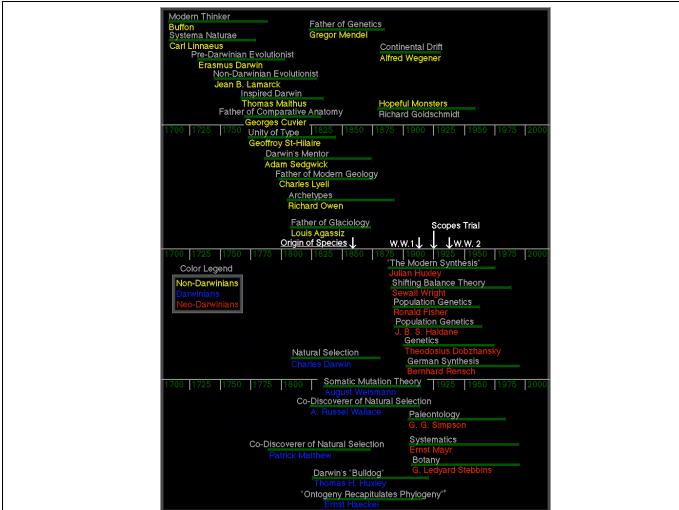
Lynn Margulis



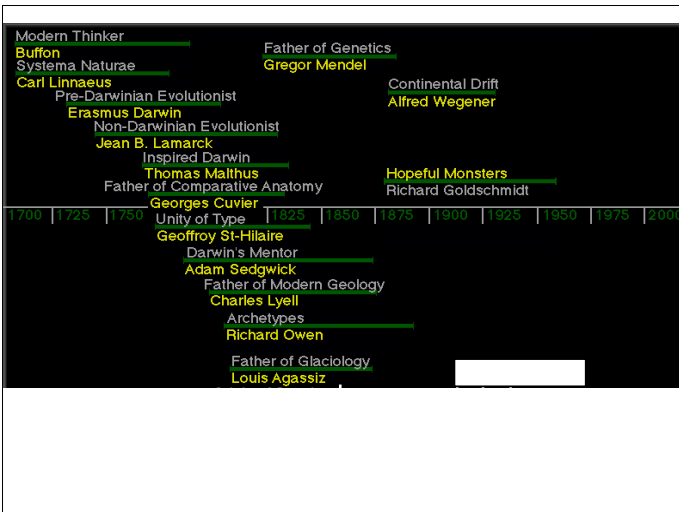
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