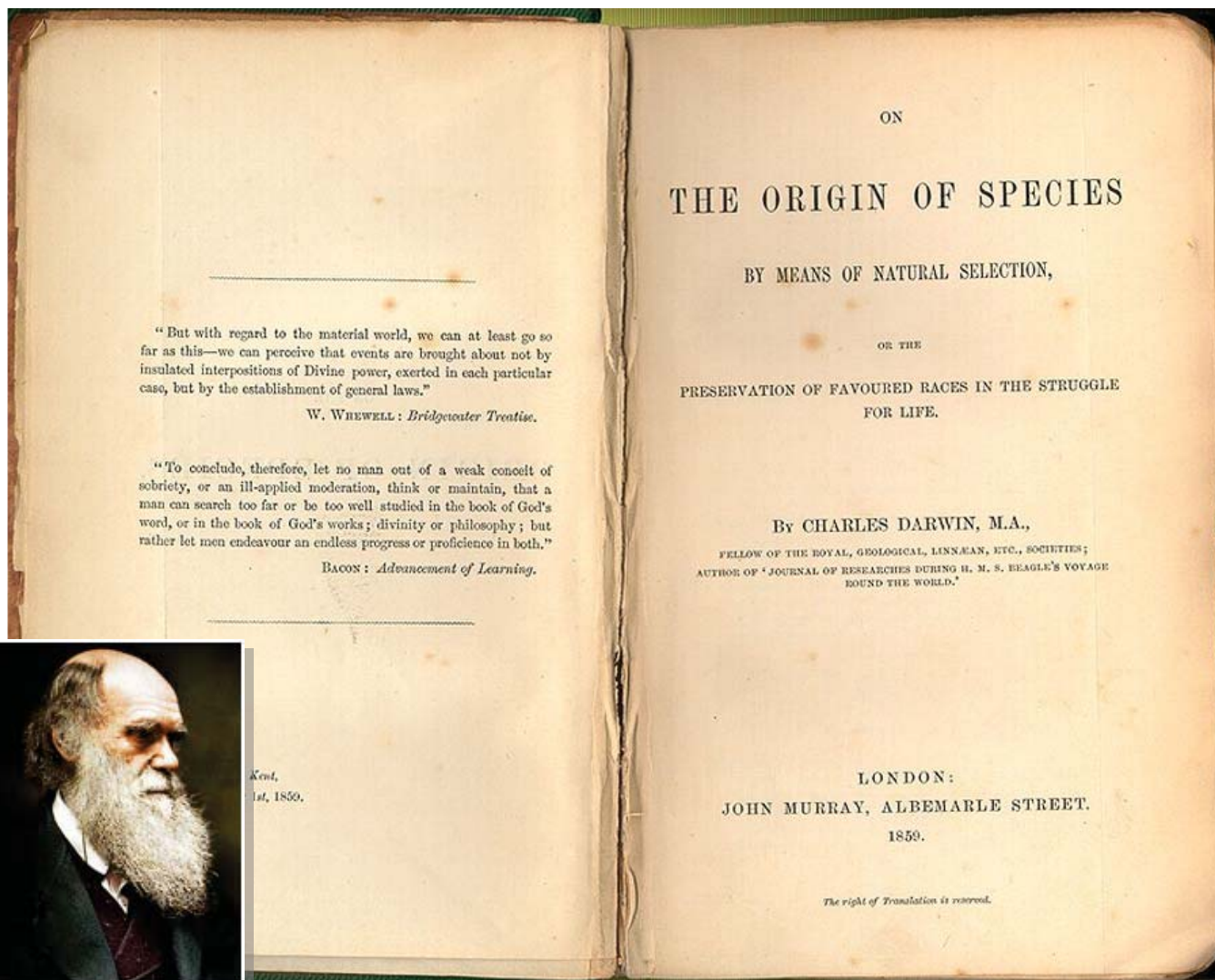
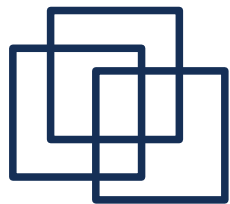


# The Origin of Species

*150 years since the first edition*

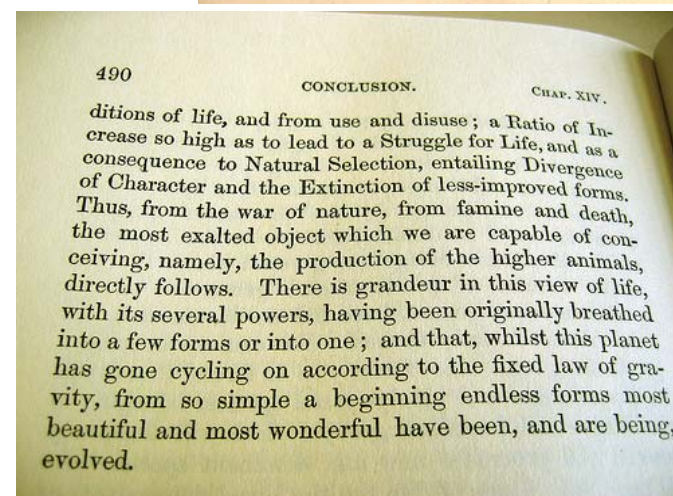
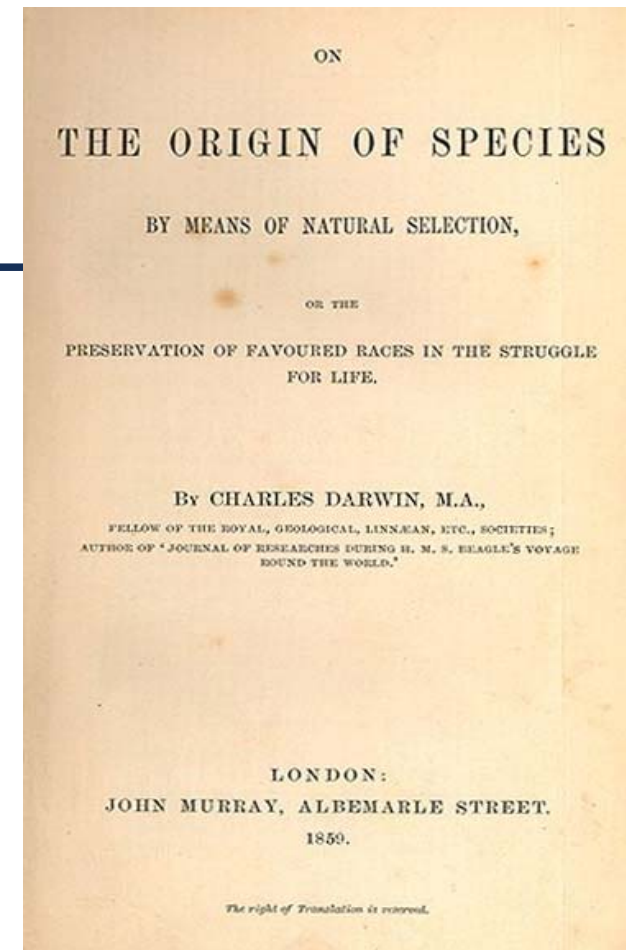


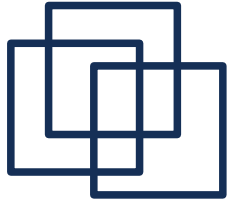


# The Book

- **First edition:** 24<sup>th</sup> of November, 1859
  - Publisher: **John Murray** (now part of Hodder Headline)
  - 1,250 copies printed,  $\approx$  1,170 copies for sale
- **Second edition:** 7<sup>th</sup> of January 1860
  - John Murray, 3000 copies
  - many corrections
  - addition of "by the Creator" to last sentence:

"There is a grandeur in this view of life, with its several powers, having been originally breathed *by the Creator* into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved."





# The Book

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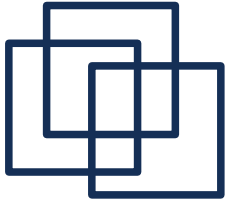
- During his lifetime: **6 editions** (1859, 1860, 1861, 1866, 1869, 1872)
- Many corrections & additions
- Last text: **1872**
- First edition scanned: [http://darwin-online.org.uk/pdf/1859\\_Origin\\_F373.pdf](http://darwin-online.org.uk/pdf/1859_Origin_F373.pdf)

YEAR/Ed	COPIES	Sentences	Sentences	Sentences	TOTAL	% CHANGE
1859 - 1st	1250				3878	
1860 - 2nd	3000	9 eliminated	483 rewritten	30 added	3899	7%
1861 - 3rd	2000	33 eliminated	617 rewritten	266 added	4132	14%
1866 - 4th	1500	36 eliminated	1073 rewritten	435 added	4531	21%
1869 - 5th	2000	178 eliminated	1770 rewritten	227 added	4580	29%
1872 - 6th	3000	63 eliminated	1699 rewritten	571 added	5088	21-29 %

Changes between the 6 editions

<http://www.csuchico.edu/~curbanowicz/DarwinDayCollectionOneChapter.html>

- Translated into 11 languages during his lifetime (Danish, Dutch, French, German, Hungarian, Italian, Polish, Russian, Serbian, Spanish & Swedish)
- and other 18 since

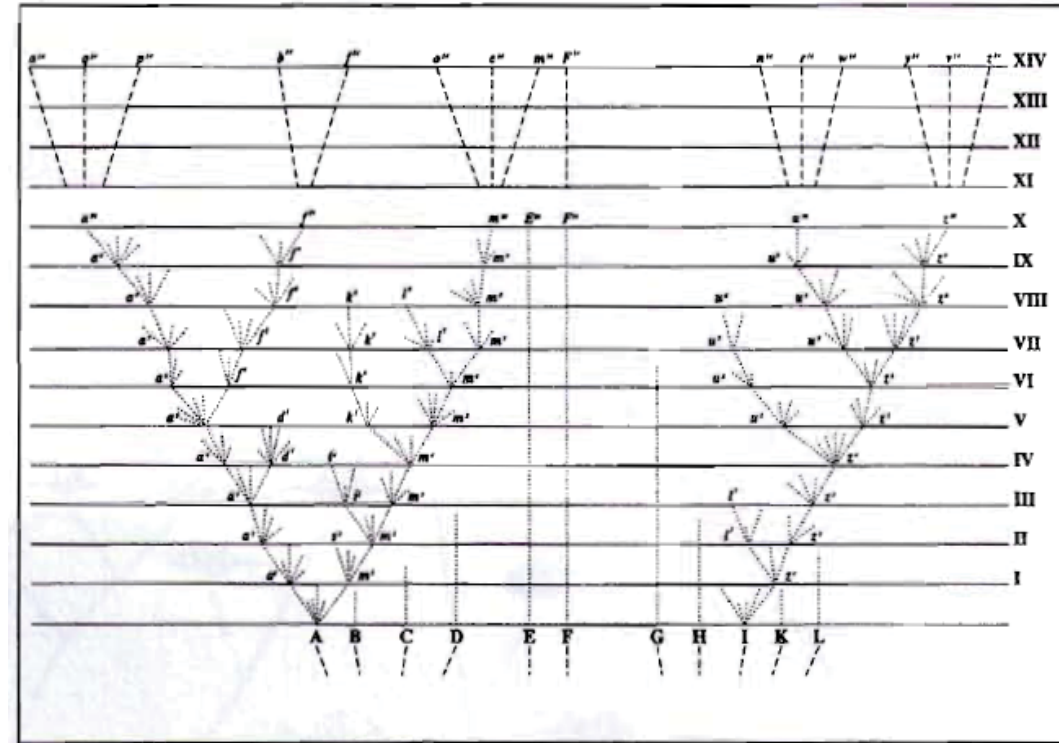


# The Book

- **1859 edition: ≈ 500 pages, 15 chapters:**

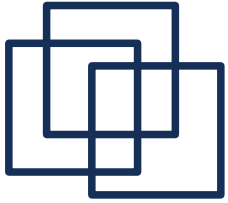
1. Variation under domestication
2. Variation under nature
3. Struggle for existence
4. Natural selection
5. Laws of variation
6. Difficulties on theory
7. Instinct
8. Hybridism
9. On the imperfection of the geological record
10. On the geological succession of organic beings
11. Geographical distribution
12. Geographical distribution—continued
13. Mutual affinities of organic beings: Morphology:  
Embryology: Rudimentary organs
14. Recapitulation and conclusion

- 1 figure



Darwin's "diagram" of a species tree in the 1859 edition  
(ch. 4, between pp. 116-117)

- 14<sup>th</sup> of Nov, 2009 *New Scientist*: very readable & brief summary by Steve Jones (“Almost Like a Whale: The 'Origin of Species' Updated”, 1999)

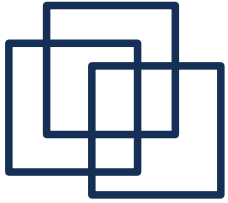


# Publication

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- Arranged by **Sir Charles Lyell**
  - geologist, uniformitarianism, “Principles of Geology” (1830)
- John Murray: agreed to publish the manuscript **unseen** (extremely uncommon) ~ 500 copies
- **Original title:** “An Abstract of an Essay on the Origin of Species and Varieties through Natural Selection”
- **Final title:** “On the Origin of Species by Natural Selection, or the Preservation of Favoured Races in the Struggle for Life”

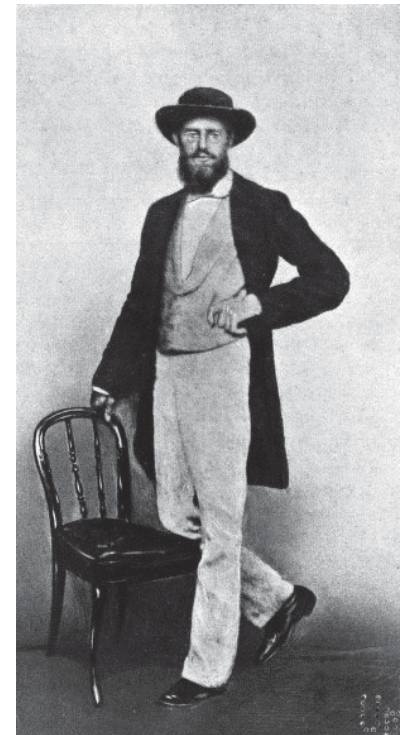
Much too rushed for Darwin...



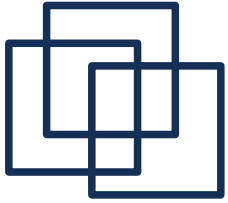
# Publication

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- 1855 paper "On the Law which has regulated the Introduction of New Species" by **Alfred Russel Wallace** (1823 – 1913)
  - similar thinking about **natural selection** (while he was in bed with fever in Halmahera, Moluccas)
  - Darwin did not see it, but Lyell was struck
  - in **spring 1856** Lyell urged Darwin to publish to “establish priority”
- Darwin had to decide between a rushed short version and a long, through, complete account
- **May 1856**: he starts working on a sketch account



Alfred Russel Wallace



# Publication

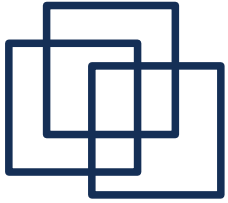
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- **18 June 1858:** letter from Wallace (Borneo),
- 20 pages describing natural selection
- Same day, Darwin writes to Lyell:

“Your words have come true with a vengeance—that I should be forestalled.

[...] if Wallace had my MS. sketch written out in 1842, he could not have made a better short abstract! Even his terms now stand as heads of my chapters.

[...] So all my originality, whatever it may amount to, will be smashed, though my book, if it will ever have any value, will not be deteriorated; as all the labour consists in the application of the theory.”

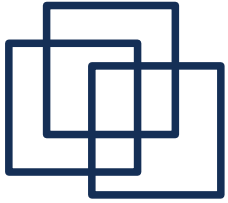


# Publication

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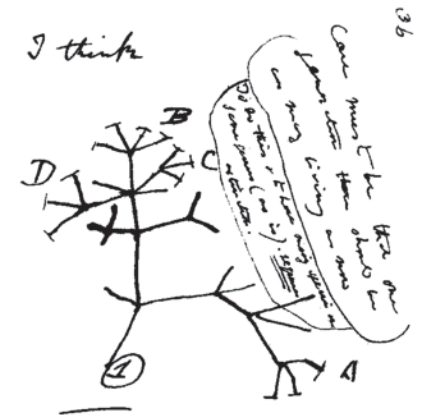
- 28 June 1858: his youngest (and last) son died 18 months old
- Darwin left the matter in the hands of Lyel and Joseph D. Hooker (naturalist, closest friend)
- **1<sup>st</sup> of July, 1858**: joint paper to the **Linnean Society**: “On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection”
- Prof Samuel Haughton: “all that was new in them was false, and what was true was old”
- **20 July 1858**: Darwin starts work on an "**abstract**" of his *Natural Selection* “sketch” written mostly from memory





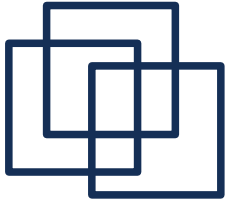
# Inception

- **March-July 1837:** first speculations about “species transmutation”, adaptation & evolutionary trees
- **June 1838:** first bout of illness
- Continued working on the transmutation
- **Oct 1838:** Thomas Maltus' “**An Essay on the Principle of Population**”
- **December 1838:** similarity between breeder's selection and “Malthusian Nature” - *the theory is complete*



then between A & B. various  
size of relation. C & B. The  
first predation, B & D  
rather greater distinction  
then former would be  
formed. - binary relation

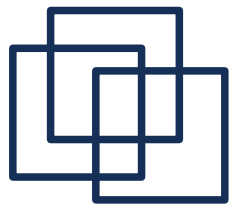
1<sup>st</sup> evolutionary tree  
1837



# Inception

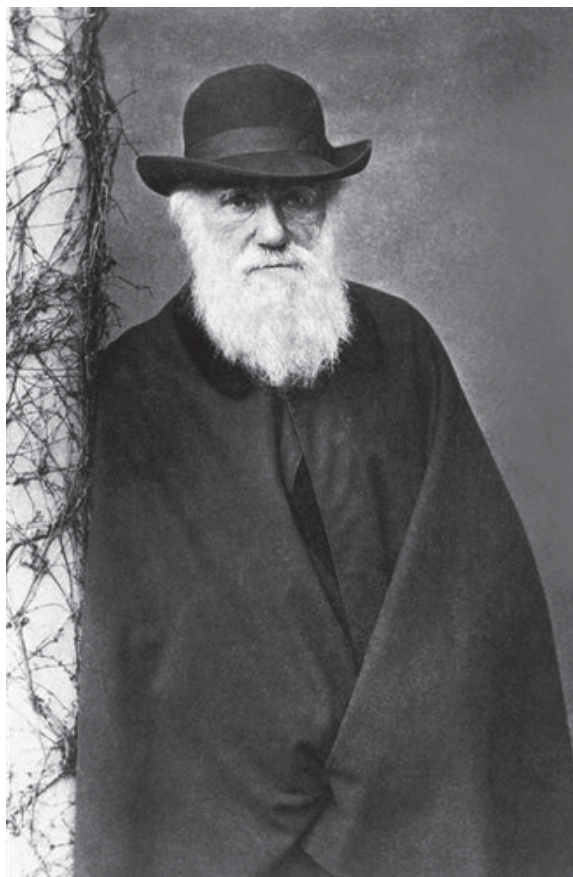
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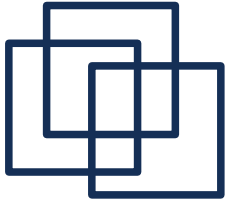
- **Nov 1839:** “Vestiges of the Natural History of Creation” (anonymous/Robert Chambers, 1802 – 1871)
- **1846** – begins his 8 years work on barnacles
- Steady accumulation of facts & experiments
- **1847** – Hooker read the “essay”
- **1853:** the Royal Society’s Royal Medal for his barnacles work

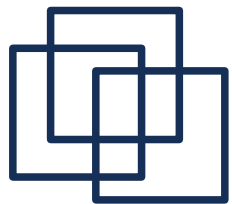


# Impact...

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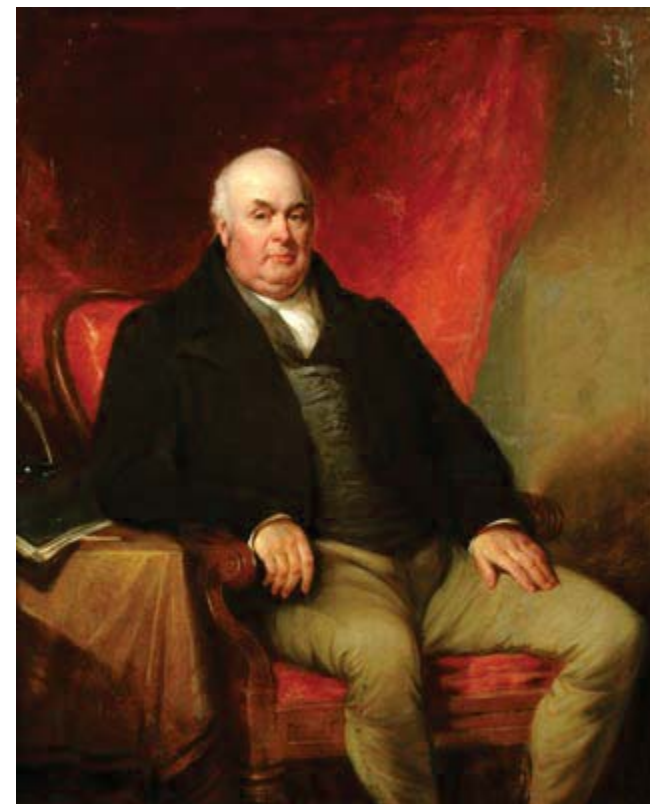




## Birth & family: 1809

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- **The Mount**, Shrewsbury, Shropshire, England
- **Robert Darwin** (physician)
- **Susannah Darwin** (Wedgwood)
- The 5<sup>th</sup> of 6 children
- Erasmus Darwin (grandfather)

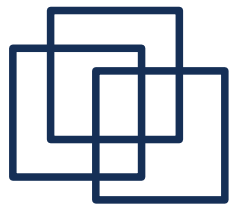


Robert Darwin:  
„the largest man ... I ever saw“



The Mount today

- Unitarians, freethinkers
- Baptised as Anglican



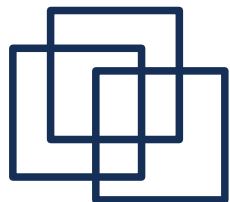
## Childhood: 1809 - 1825

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- Collected animal shells, postal franks, bird's eggs, pebbles and minerals
- **1817**: local Unitarian school
- Telling “monstrous fable[s]”
- **July 1817**: his mother dies
- **1818**: joins Eras (older brother) as boarder at Shrewsbury School
- Chemistry in a garden shed
- “You care for nothing but shooting, dogs, and rat-catching, and you will be a disgrace to yourself and all your family.”  
(Robert to 15 years-old Charles)



7 years old Darwin (1816)



# Edinburgh: 1825 - 1827

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- Study **medicine**, but hated it
- Freed black slave **John Edmonstone** – taxidermy
- Read Erasmus Darwin's “**Zoönomia**”
- **Nov 1826**: joins the “**Plinian Society**”
- **Robert Edmund Grant**
- **Lamarckian ideas**
- Work on **marine invertebrates**



Barnacles

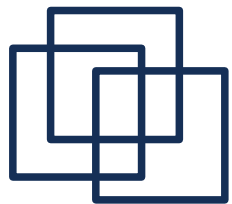


## Cambridge: 1828 - 1831

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- Bachelor of Arts to become **Anglican parson**
- **Beetle collecting**: the then current craze; he became obsessed & very good at it
- The **Radicals** Richard Carlile and Rvd. Robert Taylor (“**the Devil's Chaplain**”), imprisoned for blasphemy)
- **William Paley's** “Evidences of Christianity”
- Botanist **John Stevens Henslow** (“the man who walks with Henslow”)
- **January 1831**: final exam (10<sup>th</sup> out of 178)
- **April 1831**: plans to visit the Canary Islands
- Meets geologist Rvd. **Adam Sedgwick**





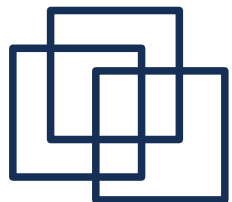
# HMS Beagle: 1831 - 1836

- **Henslow** proposed Darwin as a self-funded companion to Captain Robert FitzRoy
- Planned for **2 years**



HMS Beagle  
Straits of Magellan, 1833

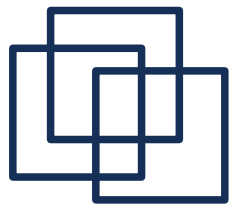




# HMS Beagle: 1831 - 1836

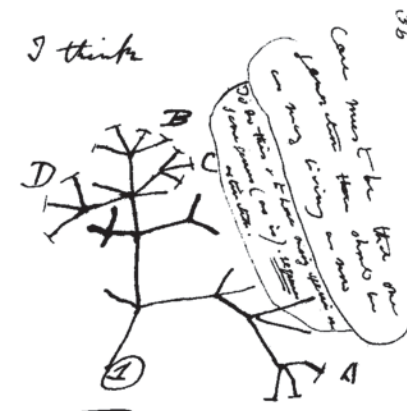
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- FitzRoy gave him the 1<sup>st</sup> volume of Charles Lyell's “**Principles of Geology**” (uniformitarianism)
- **Geology**: ground rising post earthquake (Concepción, Chile), coral reefs, etc;
- **Fossils**: *Megatherium*, *Mastodon*;
- **Biological** observations: Rheas, Galápagos Islands (“centers of creation” as opposed to “transmutation of species”), Australia



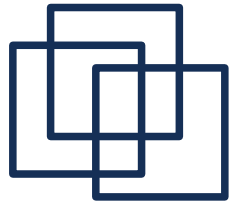
# Becoming famous: 1836 - 1838

- **Already famous** for the specimens & notes he had sent back
- Meets **Charles Lyell** and anatomist **Richard Owen**
- **Jan 1837**: Geological Society of London, paper showing S. American landmass slowly rising
- **17 Feb 1837**: elected to the Council of the Geographical Society
- **March-July 1837**: first speculations about “species transmutation”, adaptation & evolutionary trees



There between A & B. various  
sort of relation. C + B. The  
first predation, B & D  
rather greater distinction  
Then genus would be  
formed. - binary relation

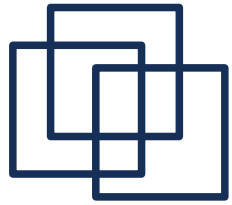
1<sup>st</sup> evolutionary tree  
1837



# Becoming famous: 1836 - 1838

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- **"Zoology of the Voyage of H.M.S. Beagle"**
- **"South American Geology"**
- **March 1838:** Secretary of the Geological Society
  
- **June 1838:** first bout of illness
  
- Continued working on the transmutation
- **Oct 1838:** Thomas Maltus' **"An Essay on the Principle of Population"**



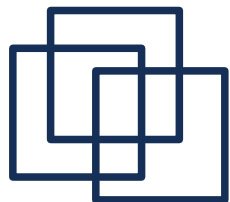
# Transmutation: 1839 - 1858

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- **24 Jan 1839:** elected Fellow of the Royal Society
- **29 Jan:** marries Emma Wedgwood
- **May 1839:** "Journal and Remarks" (Beagle voyage)
- **May 1839:** "The Structure and Distribution of Coral Reefs"
- **Sept 1839:** move to Down House, Downe
- **Nov 1839:** "Vestiges of the Natural History of Creation" (anonymous)
- **April 1852:** Annie dies
- **Barnacles:** 8 years, evolution of sex: the Royal Society's Royal Medal (1853)



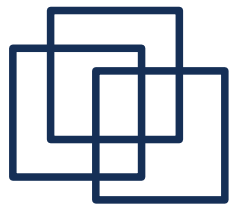
Emma Darwin



# The Origins: 1858 - 1860

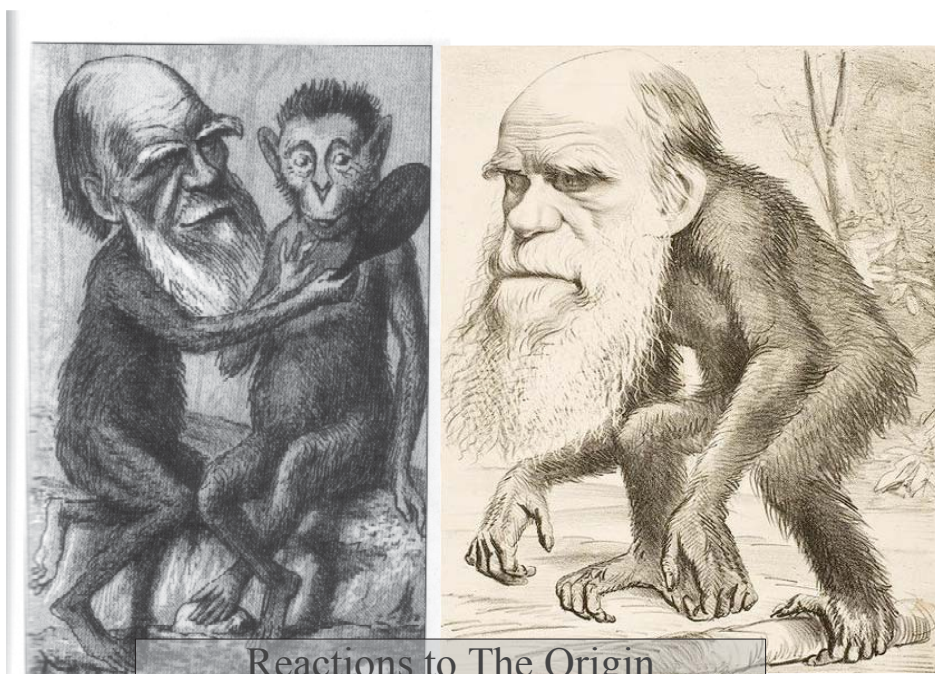
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- Steady accumulation of facts & experiments;
- **18 June 1858: Alfred Russel Wallace's** paper describing natural selection
- **1 July 1858:** joint paper “On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection” to the Linnean Society
- Prof Samuel Houghton: “all that was new in them was false, and what was true was old”
  
- **22 Nov 1859:** “**On the Origin of Species** by Means of Natural Selection, or The Preservation of Favoured Races in the Struggle for Life”



# The Origins: 1858 - 1860

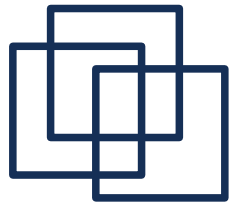
- Church of England
- **1860 Oxford evolution debate** (Bishop Samuel Wilberforce vs Thomas Henry Huxley)
- **Darwinism**



Reactions to The Origin



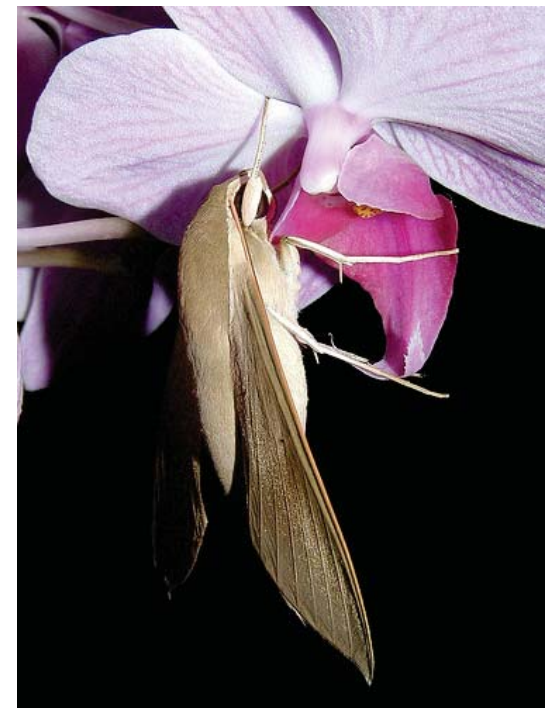
Darwin, 1859



# Natural Selection: 1860 - 1871

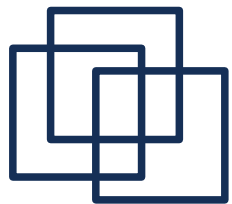
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- **1862:** “Fertilisation of Orchids” – co-evolution, complex relationships
- Studies of movement in climbing plants (“The Power of Movement in Plants”, 1880)
- **1864:** **The X Club** (pure science)
- **1868:** “The Variations of Animals and Plants under Domestication”
- **1869:** *Nature* is founded by The X Club



Moth on orchid



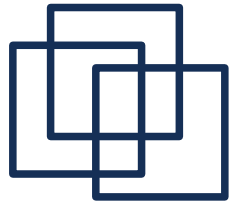


# Sexual Selection, Human Evolution & Emotions: 1871 - 1872

- **1871:** "The Descent of Man, and Selection in Relation to Sex":
  - **Human evolution**
  - Humans are one species
  - **Sexual selection**
- **1872:** "The Expression of the Emotions in Man and Animals"



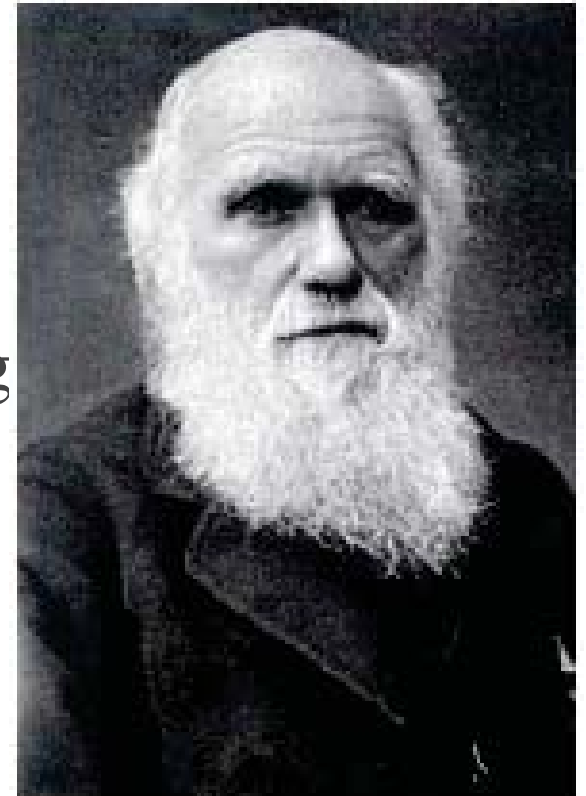
The Expression of the Emotions in Man and Animals, 1872



## Last years: 1872 - 1882

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- **1880:** “The Power of Movement in Plants”
- **1881:** “The Formation of Vegetable Mould through the Action of Worms, with Observations on their Habits”
- **19 April 1882:** dies in Downe after a long & painful agony
- **Buried in Westminster Abbey**

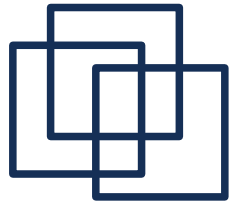


Darwin, 1877



# Darwin and Science

- ~~Darwin's ideas are at the core of modern biology~~
- The “**Modern Synthesis**” ('30s-'40s): genetics + evolution
- In every corner of biology
- "Nothing in biology makes sense except in the light of evolution" (Theodosius Dobzhansky, 1973)
- “**Generalized darwinism**”
- Evolutionary approaches to culture
- .....



# Darwin and Religion

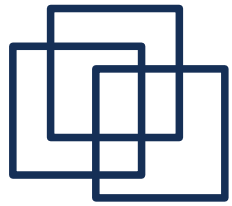
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- During the Beagle he started to doubt
- Tried to share his doubts with Emma
- After Annie's death (1851) he stopped believing (and attending church)
- He described himself as an **Agnostic** (not an Atheist)
  
- The Lady Hope story (1915)



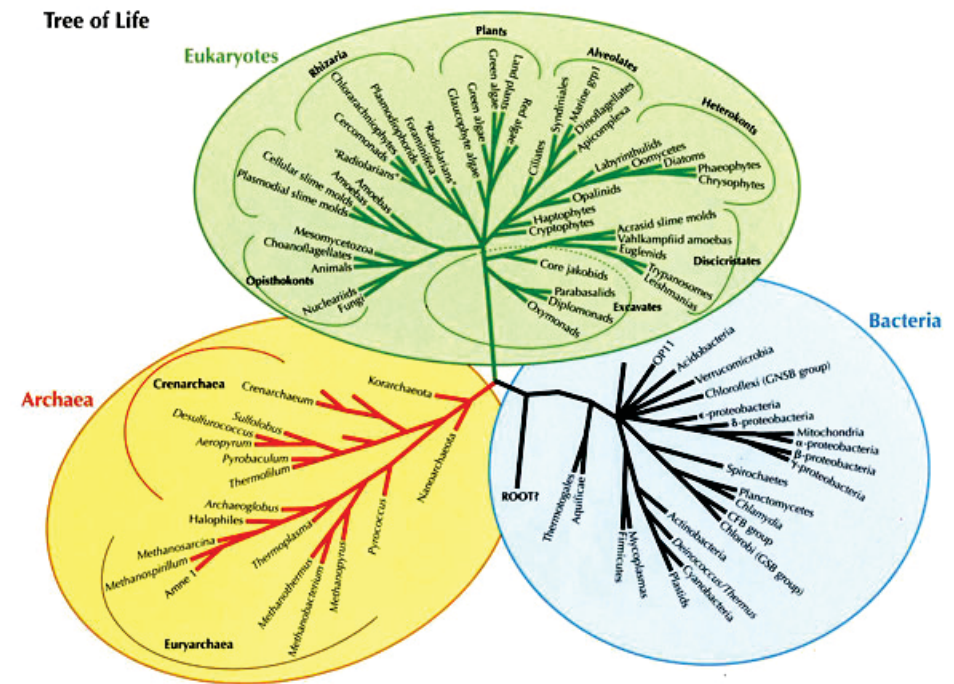
Annie Darwin, 1851

“I can indeed hardly see how anyone ought to wish Christianity to be true; for if so the plain language of the text seems to show that the men who do not believe, and this would include my Father, Brother and almost all my best friends, will be everlastingly punished. And this is a damnable doctrine” (The Autobiography of Charles Darwin 1809–1882, 87)



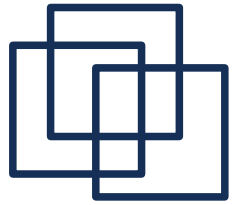
# Darwin and Our Place in Nature

- Man is not specially created, nor the top of an „evolutionary ladder“ but just a branch of the tree of life
- Continuity with the other forms of life
- Man is not above the Laws of Nature



The Universal Tree of Life.  
Humans are a branch of *Animals*, which are just of branch of one of the three Domains, *Eukarya*

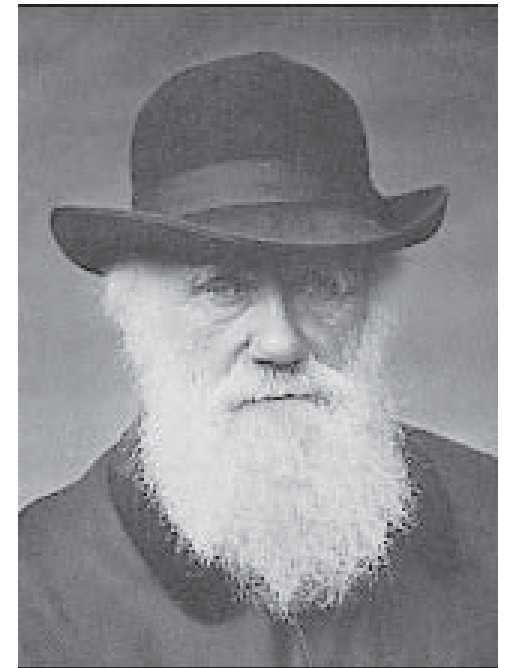
- Reactions: man is somehow special
- Creationism/ID „vs“ Evolution



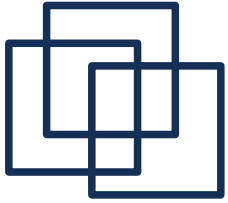
# Darwin as Scientist and Humanist

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- Despite his debilitating illness, he painstakingly **collected data, experimented** and thoroughly **weighted hypotheses**
- Not one but **many exceptional contributions**
- **Extremely humane** and averse to **conflict & suffering**
- **Very socially sensitive**



Darwin, 1880



# The End

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## Selected sources:

- Desmond, A. & Moore, J. (1991), *Darwin*, Penguin
- *Charles Darwin in his own words*  
[http://www.thesecondevolution.com/darwin\\_intro.html](http://www.thesecondevolution.com/darwin_intro.html)
- *Wikipedia*  
[http://en.wikipedia.org/wiki/Charles\\_Darwin](http://en.wikipedia.org/wiki/Charles_Darwin)
- *Darwin Exhibition*, American Museum of Natural History  
<http://www.amnh.org/exhibitions/darwin/>
- *The Complete Works of Charles Darwin Online*  
<http://darwin-online.org.uk/contents.html>
- *The Darwin Correspondence Project*  
<http://www.darwinproject.ac.uk/index.php>
- *Darwin 200*, Natural History Museum  
<http://www.darwin200.org/>
- *Good religion needs good science*  
<http://www.cofe.anglican.org/darwin/malcolmbrown.html>

**24 November 2009:** 150 years since the publication of the  
*The Origins!*