

Some research notes on Charles Darwin and the development of the theory of Natural Selection.

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It is often assumed that great men work in isolation and that great work came forth in an instant of brilliance. It is not the case in general. What they do is mostly based on the work of others that came before him. Minds are shaped not cast. What we also see is that for every proponent of an idea, we have an opponent that just as fervently fights for the survival of his idea and standpoint. Somehow the idea that is most sound survives. The law remains that the most fit idea will live on unless replaced by a better one. Science is not a doctrine or a religion, although even some scientists, as they grow old and lack new ideas, fall into the trap. We can never say it IS like this or that: We can only say we have a theory that works in practice. Tomorrow it might change. When it comes to evolution, we can never say something developed **because of** this or that function as though evolution has a mind with which to decide. It **developed**. Full stop. The reason why it exists is because it survived, and if it has a better chance of survival because of a change in its trait, then there is change. Not the other way around. Every living thing we see is here because it **survived**.

Darwin, Charles Robert [461] - 12/2/1809 – 19/4/1882

It was Wallace's independent discovery of the principle of natural selection that stimulated Darwin to publish his book, else he might have spent another 20 years collecting facts in support of a convincing work that might have been completely unreadable.

18?? - Geological field trip with Sedgwick to North Wales - Apprenticeship

1831-1837 Voyage of the HMS *Beagle* –

1842 – brief abstract of theory – 35 pages "After five years' work (*collecting further evidence*) I allowed myself to speculate on the subject and drew up some short notes.." [r001p027]

1844 – enlarged to an essay (?) of 230 pages – draft *Origin* – shown only to close friends. These notes "I enlarged in 1844 into a sketch of conclusions, which then seem to be probable" [r001p027]

1859 - *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. One fifth of planned work. "I have been urged to publish this Abstract", due to poor health and "especially" because Wallace has come to the same conclusion in the Malay Archipelago. He complains that his real work will still take many years to complete.

1871 - The Descent of Man, – evidence that man descended from subhuman forms. E.g. Muscles to move ears and remnants of tail bones.

Robert Ardrey – *Nothing propinqs like propinquity*

Darwin, buried in Westminster Abbey, in company of Newton, Faraday, Lyell

Major influences in Darwin's life:

Darwin, Erasmus, - Grandfather.

Humboldt, Friederich Wilhelm – read when young

Sedgwick, Adam – participated in geological field trip

HMS Beagle, 1831 five-year global scientific exploration as naturalist, Galapagos Islands, finch diversity.

Lyell, Sir Charles – introduced to uniformitarianism in geology, antiquity of earth, long time for life to develop. Close friend. Defender & supporter of Darwin.

Malthus, Thomas Robert – provided key to natural selection.

Wallace – like-minded, contemporary, collaborator in some work.

Darwin, Erasmus [260] 12/12/1731-18/4/1802, English physician

Believed that evolutionary changes was brought about by environmental influences.

Zoonomia 1794-1796

Supported the classification system introduced by Linnaeus.

Supported Buffon's [235] feelings about evolution.

Buffon, George Louis Leclerc, 7/9/1707–16/4/1788, French naturalist

Wrote *Natural History*, all 44 volumes, 1752-1788

Superficial ideas about evolution based on of redundant parts of animals

Donkey degenerate horse, ape imperfect man

First to push back age of earth (75Kyear) beyond the 6k limit 'set' by Genesis

Humboldt, Friederich Wilhelm [334] 14/9/1769 - 6/5/1859, German naturalist

Absorbed the false neptunism (sedimentation, water did it) of Abraham Werner

First to see the practicality of the Panama canal.

Wrote *Kosmos*, landmark encyclopaedia of geography, geology & geophysics

Sedgwick, Adam [373] 22/3/1785 – 27/1/1873, English geologist

Assisted with developing theory of modern geology.

Studied fossil bearing Cambrian & Devonian rocks.

Opposed Darwin's theory in later life

Lyell, Sir Charles [418] 14/11/1797-22/2/1875, Scottish geologist

Believed in antiquity of earth, long time for life to develop.

Wrote *The Antiquity of Man*, 1863, pro Darwin.

Prepared to extend Darwin's views to the development of man even when it was still too a sensitive subject for Darwin to do so.

Studied neptunism under Werner

Inclined to vulcanism after trip to Continent.

Developed uniformitarianism which was (unbeknown to him) expounded by Hutton [251] earlier.

Influenced by Cuvier [333], Humboldt [334] and Lamarck [283]

Confirmed Hutton's view that heat and erosion have brought about changes on earth without any catastrophe. Gradual change, evolution.

Set age of oldest fossil-bearing rock at 240my.

Principles of Geology. 1830-1833 amplified Hutton's views.

Carried forth Darwin's views to apply to Man.

Cuvier, George [333] 23/8/1769-13/5/1832.

facinated by Buffon's [235] works.

Founder of comparative anatomy (of different species.)

Extended and perfected the classification system of Linnaeus

Extended system to fossils

Founder of palaeontology – pterodactyl

But had blind spot – literal Genesis – could not 'see' evolution in what was before him. Anti-evolutionist.

Adopted catastrophism, giant floods wiped out old, created the new

Hutton, James [251] 3/6/1726-26/3/1797, Scottish geologist

founded science of geology.

Convinced of slow evolution of earth's surface.

Assumption that slow pace of development under influence of forces similar as in the past: uniformitarianism

Chief agent – internal heat of earth.

Lamarck, Jean [283] 1/8/1744-18/12/1829, French naturalist

Resolved classification of invertebrates left in a mess by Linnaeus

Founded modern invertebrate zoology

Natural History of Invertebrates, 1815-1822

Zoological Philosophy, 1809

Found it impossible to classify living species without thinking: evolution

First biologist to devise a scheme to rationalise the evolutionary development of life.

Maintained that species were not fixed but changed & developed.

His scheme "inheritance of acquired characteristics" was wrong unfortunately: but stimulated thought.

[[how can acquired characteristics be inherited?]]

Wallace, Alfred Russel [528] 8/1/1823-7/11/1913, English naturalist

Contemporary of Darwin, independent similar ideas to Darwin

Collaboration. Published in 1858 in *Journal of the Linnaean Society*.

Trips to Amazon basin 1848 and Malay peninsula 1854

Struck by difference between animal species of Asia and Australia

Wallace's Line – Split between the continents

Speculated about evolution by natural selection

Read Malthus [325]. Wrote his theory of natural selection in two days and sent to

Darwin for an opinion not knowing he was busy with the same conclusion.

Malthus, Thomas Robert [325] 14/2/1766-23/12/1834, English academic economist

Attempt a systematic study of human society.

Essay on Population, 1798

Maintained that (human, post industrial revolution English) population would outrun food supply and that numbers would be kept in check by starvation, disease & famine.

Owen, Richard [449], 20/7/1804-18/12/1892, English zoologist, opponent to Darwin

Huxley, Thomas Henry [542] Darwin's bulldog

Haeckel, Ernst [582] German proponent of Darwinism

Virchow, Rudolph [519] German opponent

Gray, Asa [467] USA proponent

The pre-Darwin & "Origin" world: "progress of opinion"

Prior to 1800's view was that species were separately created, but Aristotle already "shadowed forth" the principle of natural selection, although not comprehending it.

Saint-Hilaire, Geoffroy [??], (//), French ?, suspected as early as 1795 that what was called species are various degeneration of the same type, but only published in 1828 his convictions that the same forms (of life) have not perpetuated since the origin of all things. He believed that the "conditions of life" [r001p018] are the vector for change. But did not believe that existing species were undergoing change (cautious?)

Goethe, Johannes Wolfgang von [295], 28/8/1749-22/3/1832, German poet, held view that all plants and animals were derived from separate archetypes that differentiated and specialised through the ages to their present form. A clear expression of the evolutionary view. Studies bones and coined the word "morphology" to represent the systematic study of living things. According to Goethe the question for future naturalists was not why cattle have horns, but how they got them. (!!!)

During same time (1794-1796) Darwin, Erasmus [260], Darwin's grand father published *Zoonomia* furthering the notion that evolutionary changes was brought about by environmental influences.

So around 1794-5 in England, Germany and France these three came to the same conclusions about the "origin of species"

Lamarck [283], 1801,1809, 1815, held progressive view: all species including man are descended from other species. All changes, be it organic or inorganic is the result of Law, not miraculous interposition. Obvious conclusions drawn from classification of species and domestic productions. Law of progressive development.

Wells W C, [x??], before Royal Society, 1813, published 1818, *Two Essays upon Dew and Single Vision*, in which he specifically recognises the principle of natural selection, but only applied it to humans and only regarding certain characteristics eg immunity to disease of certain races in the tropics (Africa) . Accidental varieties of man subjected to the same conditions would react differently. Some would be better fitted for the disease of their country than others. Those would multiply, other would decrease. The same held for the darker skin colour being better suited for the tropics and fair skin in the cooler climates.

According to Darwin, this is the first truly scientific recognition of the principle of natural selection.

Herbert, W [x??] 1882, did experimental work on plants (Amaryllidaceae) that showed "beyond the possibility of refutation that botanical species are only a higher and more permanent class of varieties." [r001p019] and extended the view to animals. He believed that species of each genus were created mainly by intercrossing and variation.

Grant, [x??] in 1826 after work [r0n] on *Spongilla*, declared that species are descended from species and became improved in the course of modification.

In 1844 an anonymous author published *Vestiges of Creation* [r0n] advanced the proportion that animated beings results "first, of an impulse which has been imparted to the forms of life, advancing them, in definite times, by generation, through grades of organisation.....second, on another impulse connected to vital forces, tending....to modify organic structures in accordance with external circumstances" The author believes that organisation progresses in sudden steps, but the effects produced by the conditions of life are gradual. Darwin could not understand the scientific nature of the "impulses"

D'Omakius d'Halloy [x??] (Belgium, French?) geologist in 1846 paper [r0n] thought it was more probable that new species were produced by descent than by separate creation.

Darwin had a bit of a tiff with Owen [449] (*Nature of Limbs*, 1849) because he deceived the scientific community, more specific "other palaeontologists", of his conviction of the immutability of species by using expressions like "continuous operation of creative power". Later, Owen in an address to the British Association (1858), felt inclined to violently attack the principle of natural selection. The ever-polite Darwin, in 1859, felt he made "a preposterous error" in his judgement of Owen.

Saint-Hilaire, in lectures in 1850, (translate the French)

... period 1850-1859 still in progress.

