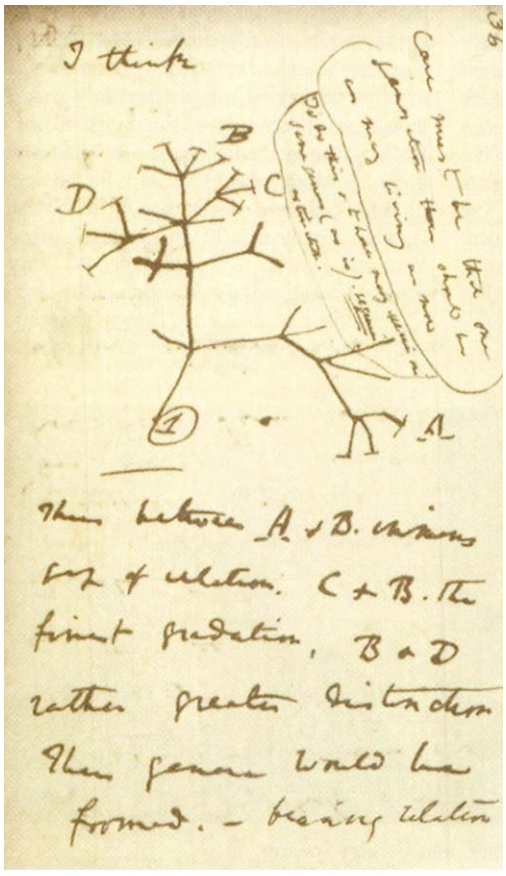
Ex Museo – II

Darwin's Books

In the week celebrating the 200th anniversary of the birth of Charles Darwin, Science Library and Museum present an exhibition of Darwin's books. That Darwin gave global science a tested hypothesis to explain the diversity of life on earth is well known; that he produced eighteen further works either side of that on evolution and many other scientific papers is less well recognised.

The theory was first proposed in a sequence of three short papers delivered at the Linnean Society of London on 1st July 1858 by Charles Lyell and Joseph Hooker. The proposition[1] was delivered jointly under the names of Charles Darwin (at his home in Kent mourning the death of his third child) and Alfred Russel Wallace (on the Island of Ternate in S E Asia) whose letter, outlining a theory of natural selection, to Darwin had prompted delivery of the theory from the reluctant older man. The reticence to publish came from Darwin's acknowledgement of the inevitable controversy that his theory would cause. His ideas were well formed; his five year voyage on *HMS Beagle* had been completed in 1836 and from this journey he had made serious and profound observations that inspired the Theory of Natural Selection. Darwin was already a well established scientist, having been elected a Fellow of the Royal Society aged 30, the year before he departed on the circumnavigation that included the Galapagos. He was awarded the Royal Society's Royal Medal in 1853 for his work on sexes in barnacles. In this research on Cirripedia he had been in correspondence with the deck hand, Syms Covington, who had been his assistant on *HMS Beagle*. Covington, a resident of Australia, sent to Darwin samples from Pambula (NSW) to augment the research.



From Darwin's Transmutation Notebook D 1838. 'I think' is particularly engaging.

Darwin gained public note with the publication of *Naturalist's Voyage* (1854), his account of the voyage of the Beagle. Five year's worth of collecting yielded numerous specimens and samples. He had been given passage on the Beagle through the Captain's (Fitzroy) own efforts and at the strong suggestion of Charles Lyell. He collected and noted widely, principally on Geology and Botany and returned with sufficient material for a number of colleagues to work and present papers upon. The preface to the 1845 edition is notable for Darwin's touching tribute to his undergraduate mentor Professor Henslow. Darwin's

[1] On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection.

reputation as a serious research scientist was now without question. Nonetheless it took the wise counsels of the geologist Lyell and botanist Hooker to drive Darwin to publish that species can show change over generations according to selection pressures.

Breeding fancy pigeons, an important example in *Variations* and a popularVictorian hobby.

Origin went on sale on 22nd November 1859: "*one long argument*" as Darwin put it. Painstakingly meticulous in its development of an idea and use of evidence, it is a masterpiece of the hypothetico-deductive model of philosophy in Science. Darwin wanted to produce a volume so well-argued and rigorous as to be hermetic against its inevitable detractors. It in fact encompassed many criticisms that Darwin anticipated. Natural Selection as a theory is still a vibrant, if not complete, explanation for the species of Life on Earth seen today, modern molecular genetics is additive. Darwinism is employed in social science and in business too: fields well beyond biology.

In the years immediately following the publication of *Origin,* Darwin withdrew somewhat, allowing his 'bulldog', T H Huxley, to take on the clamour. Darwin devoted himself to research and to his family and indeed spent time recuperating from bouts of illness that were to sap him throughout the rest of his life. *Fertilisation in Orchids* was published in time for Darwin to present a copy to Wallace on his return from the East and was a work typical of Darwin's pen: scrupulous in its research and evidence. He showed: how patterns on petals guided specific pollinators to plants, the profound impact of hermaphroditism in some species and how cross fertilisation generates variation in plant species.

Gregor Mendel

Darwin received the Royal Society's highest accolade, the Copley Medal, in 1864, recognition that, in scientific circles at least, his theories had gained credence in full. The publication of *Variation* extended the argument against divinely-guided variation by demonstrating that in a number of species under domestication, including the pigeon, the hereditary forms of a given breed could be directed by humans. Further, that mankind was itself a domesticated species and subject to the same processes.

For all its empirical impregnability, *Origin* lacked a mechanism to demonstrate the 'strong principle of

heredity' and thus account for the transmission of traits favoured by natural selection, from one generation to the next. In 1865 Gregor Mendel published a paper showing in astonishing depth just such a scheme, using *Pisum sativum* as a plant model. Mendelian genetics remains just as resonant today as Darwinian natural selection. Despite both publications being made concurrently, it was not until the neo-Darwinian synthesis[2] that genetics and evolution were brought together.

Darwin had only in one line in the first edition of *Origin* alluded to the significance of the theory to the position of the human species. Between its publication and that of *Descent of Man* he had become bolder and more explicit. Not only this but this later volume set straight the role of sexual selection in elements such as a peacock's tail as systems for improved fitness as opposed to divine ornament. As to man's place and origins Darwin synthesised elegantly and indeed extensively from elements of embryology and brain structure to demonstrate our descent from 'lower forms'. The existential chasm between the human and the divine had been made plain by Darwin, though this caused relatively little new controversy with the intellectual battle having been won over *Origin*. Nonetheless the book was an immediate sell out and netted Darwin £1,500.

If money had ever been a consideration, it was in Darwin's next work, *Expression of Emotion,* that the publishers for all his works, John Murray, had reservations: the inclusion of photographs made it an especially expensive project. He sought again to rebuff the divine influence in nature and thus demonstrate natural selection as responsible for producing facial muscles and their coordination. Darwin drew on comparative anatomy and ethology to demonstrate his principle.

In this latter stage of his career and life Darwin was an increasingly reserved character, remaining utterly devoted to his family and slave to his illnesses. His next work, *Insectivorous Plants* was typical of the Darwin style, deeply erudite and drawing support from a number of long-held professional acquaintances; including Asa Gray at Harvard (a letter to whom had formed part of the original proposition of the theory of Natural Selection at the Linnean Society). Many well known genera: Sundews and Venus fly traps, were surveyed comprehensively and mechanisms for their insect trapping and assimilation are elucidated on its pages.

In *Cross and Self Pollination*, an astonishingly comprehensive work on botany, Darwin showed the results of a significant number of experiments to attempt to explain the inheritance of characters in plants.

Darwin's last work of a biological nature, *Vegetable Mould and Worms*, showed care and delight, and was completed amongst his work for his parish and as a magistrate. It was, as all previous works had been, a collaborative piece and given great assurance by his prodigious use of data: he became nearly sentimental over

[2] J. Huxley, *Evolution: A Modern Synthesis* (1942)

the observation that worms drew leaves into their burrows by the narrow end, he produces copious insights into the rate of production of worm casts.

Darwin died in great pain on 19th April 1882. Arrangements were made for a state funeral in Westminster Abbey, the pall bearers were: Duke of Argyll, Duke of Devonshire, Earl of Derby, Sir Joseph Hooker, American Ambassador, President of the Royal Society, Professor Huxley, Alfred Russel Wallace, Canon Farrar and Sir John Lubbock. He is buried between Newton and Herschel.

Books on display

(Darwin, published by John Murray of Albemarle St., unless otherwise stated):

A Naturalist's Voyage: Journal of Researches into Natural History and Geology of the Countries visited during the Voyage of HMS Beagle *round the World*, 2nd edn 1888, (1st publ. 1854)

The Origin of Species by means of Natural Selection, 6th edn 1872, (1st publ. 1859) This is the definitive edition, it uses the word evolution for the first time and was published just after Descent of Man.

The Various Contrivances by which Orchids are Fertilised by Insects, 2nd edn 1877, (1st publ. 1862)

The Variation of Animals and Plants under Domestication Vol. I, 2nd edn 1875, (1st publ. 1868)

The Descent of Man and Selection in Relation to Sex, 2nd edn 1882, (1st publ. 1871)

The Expression of Emotions in Man and Animals, 1872

Insectivorous Plants, 1875

The effects of Cross and Self Pollination in the Vegetable Kingdom, 1878 (1st publ. 1876)

The formation of Vegetable Mould through the action of Worms, 1881

W. Bateson, *Mendel's Principles of Heredity* (Cambridge University Press, 1913)

Bibliography:

G. de Beer (ed.), *Unpublished Letters of Charles Darwin*, (Royal Society, 1959)

A. Desmond & J. Moore, *Darwin* (Michael Joseph, 1991)

P. Raby, *Alfred Russel Wallace* (Chatto and Windus, 2001)

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