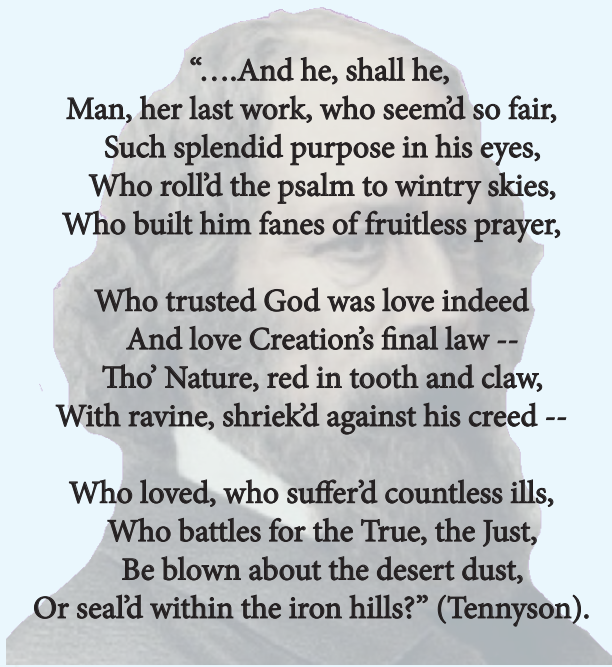


in sudden, violent geological events shaping Earth's landscape. This view was eventually disproven by the gradualistic evolutionary theory of Darwin's world a decade later.



“...And he, shall he,
Man, her last work, who seem'd so fair,
Such splendid purpose in his eyes,
Who roll'd the psalm to wintry skies,
Who built him fanes of fruitless prayer,
Who trusted God was love indeed
And love Creation's final law --
Tho' Nature, red in tooth and claw,
With ravine, shriek'd against his creed --
Who loved, who suffer'd countless ills,
Who battles for the True, the Just,
Be blown about the desert dust,
Or seal'd within the iron hills?” (Tennyson).

The Secret Law

Johann Wolfgang von Goethe, while mostly known for his iconic literary works such as *Faust* and *The Sorrows of Young Werther*, was an astute observer of the evolutionary mind. Although he died two decades before the publication of *On the Origin of Species*, his work entitled *The Metamorphosis of Plants* and his prose demonstrate his understanding of homology, which is the similarity of biological structures between species, and “secret laws” of a barbarously competitive natural world demanding either transformation or continuity in morphology of plants. Darwin would later explain homology as evidence for the existence of a common ancestor sharing a similar body plan, vindicating his overall theory of biological evolution.

“You are perplexed, my love, by this thousand-fold mixed profusion,
Flowering tumultuously everywhere over the garden grounds;
So many names you are hearing, but one suppresses another,
Echoing barbarously the sound makes in the ear.
Each of their shapes is alike, yet none resembles the other,
Thus the whole of the choir points to a secret law,
Points to a holy puzzle. I wish, lovely friend, that I were able to
Happily hand you at once the disentangling word!—
Watch now and be transformed, how bit by bit the plant-form,
Guided stepwise, builds to emerge in blossom and fruit!...” (Goethe).

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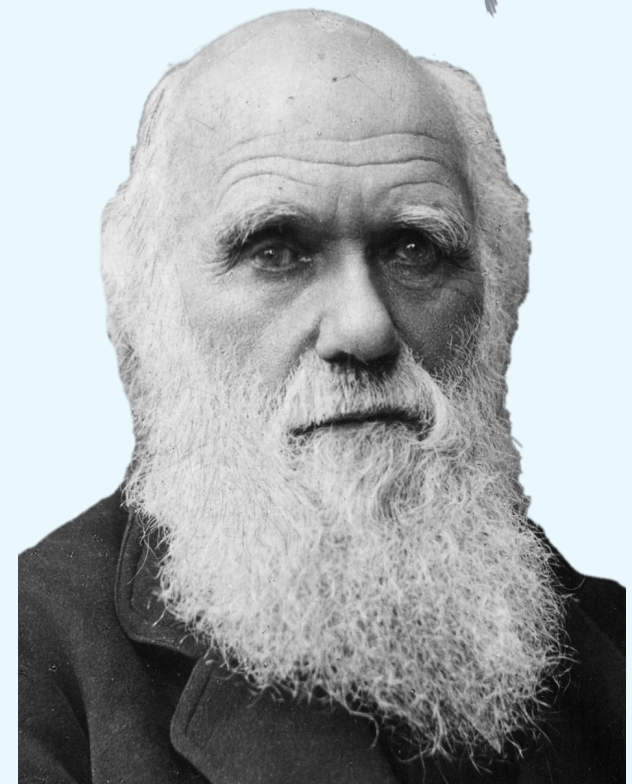
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Progress, Positivism, and Scientific Revolution: The Synthesis of Darwin's Theory of Evolution



The theory of evolution has provided important insights into our own biology and that of every living thing on earth. It follows that inherited traits of a population of organisms change over the course of generations. The accumulation of such traits is the result of natural selection, where traits beneficial to the survival of an individual are maintained in the offspring. This gives rise to the dynamism of nature's competition and struggle for existence, which would upend religious notions of creationism based on divine right, and propel our scientific understanding forward to the realm of mechanism and minutiae of cellular functions and the movement of atoms. Charles Darwin takes on ubiquitous authorship for the theory of evolution. Although Darwin's proposal outlined in *On the Origin of Species* provides an essential summation of the tangible evidence for biological evolution, providing *a posteriori* proof for the skeptics, along with the novel invention of the term "natural selection", our oversimplified view of history negates the importance of Darwin's predecessors, fellow scientists, and the overall milieu whose combination should be credited with the synthesis of the theory of evolution.

To understand the origins of one of the most essential theories created by humankind, it is best to adopt a pluralistic attitude towards history. A less mechanistic and less causative view of historical events is vital in achieving a greater understanding of the origins of biological evolution. It is the nature of humans to create a fictional narrative of history, wherein the course of events is reduced and simplified into a logical progression leading to the present, and where the action of the theater of history is monopolized by a select few players. The shadowy masses of the other actors in history are forgotten and cast aside. The idea that Darwin single-handedly synthesized the idea of biological evolution is one such reductionist oversimplification of history. We should not view Darwin as a catalytic revolutionary who, against all odds, lifted up humanity from its pagan creationist depths but instead as a product of his progressive milieu.

In Darwin's time, 'evolution' was in the air. His scientific predecessors, his own grandfather Erasmus Darwin among them, set the stage for scientific revolution.

The elder **Erasmus Darwin** along with **Buffon**, a French naturalist, were early teleological evolutionists who theorized the slow modification of ancestral forms. As teleologists, they identified the cause of modification as the needs of the organisms themselves, towards divine perfection, which was eventually disproven by Darwin and his contemporaries by the idea of non-directional evolution.

Saint-Hilaire and **Goethe** would find the derivation of current morphology through modification of pre-existent organisms.

Lamarck breached the surface further with his theory of universal descendants from primordial forms, and his perpetuation of the idea of biological evolution in accordance with natural laws.

All of the biological theories of this time were informed by geology and astronomy, with Emmanuel Kant's **nebular hypothesis** and Charles Lyell's **uniformitarian principle**, both derivative of a concept of slow, natural development instead of immediate, miraculous creation through a higher Deity.

Thomas Henry Huxley, known as "**Darwin's Bulldog**" debated on behalf of Darwin against the religious dogmatists. His triumphant public debate against Samuel Wilberforce resulted in the wider public acceptance of biological evolution.

Darwin attributes **Malthusian** social theory of survival, selection and competition for finite resources as the source of his novel theory of natural selection. In a letter to the German evolutionist Ernst Haeckel, Darwin writes, 'I fortunately happened to read Malthus's "Essay on Population" and the idea of natural selection through the struggle for existence at once occurred to me. Of all the subordinate points in the theory, the last which I understood was the cause of the tendency in the descendants from a common progenitor to diverge in character.'

During the year of Darwin's publication of *On the Origin of Species*, Paul du Chaillu, explorer and hunter of central Africa, brought to Europe the first specimens of **gorilla** ever seen by continental inhabitants. Very little intuition would have been needed to see the unnerving continuity of features between man and its closest primate relative.

In that same year of 1859, Karl Marx, the very embodiment of positivism in this evolutionary milieu, used **biological analogies** in his revolutionary writing to reveal the material origins of social and economic ills.

Darwin was the outcome of a convergence of factors: scientific positivism, the necessary rejection of teleological evolutionary thought, his own heredity, and the arbitrary temporal succession of thinkers. The scientific, literary masses surrounding Darwin make up an army of Darwinian evolutionists who remain unnamed and unselected by our historical narrative. The importance of this pluralistic view of the synthesis of a revolutionary scientific theory is to prevent the discouragement of these shadowy scientific masses whose individual intellects converge to form the scientific revolutions of the future. Science cannot be seen as reserved for the insurmountable intellect of a few isolated geniuses. It is a massive collective advancement towards a better world where the construction of the edifice of human knowledge endlessly extends.

Nature, Red in Tooth and Claw

Alfred, Lord Tennyson, the famed Poet Laureate, wrote *In Memoriam* in 1849 following the death of a close friend, Arthur Henry Hallam. Tennyson laments of a senseless and untimely death, ultimately leading him to doubt his Christian faith, citing his proto-evolutionist contemporaries as proof of the antiteleological nature of the world. The turbulent forces of nature "red in tooth and claw" are at odds with God's creations, who wither and petrify in "iron hills". Tennyson was likely a catastrophist, who were proto-evolutionists believing